



Controls Start-Up, Operation, Service, and Troubleshooting

SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location (roof, elevated structures, mechanical rooms, etc.). Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

When working on this equipment, observe precautions in the literature, and on tags, stickers, and labels attached to the equipment, and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves. Use care in handling, rigging, and setting this equipment, and in handling all electrical components.

⚠ 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

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

⚠ WARNING

To prevent potential damage to heat exchanger tubes always run fluid through heat exchangers when adding or removing refrigerant charge. Use appropriate brine solutions in cooler and condenser fluid loops to prevent the freezing of heat exchangers when the equipment is exposed to temperatures below 32 F (0° C). Proof of flow switch is required to protect coolers from freezing.

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

⚠ WARNING

DO NOT attempt to unbrazed factory joints when servicing this equipment. Compressor oil is flammable and there is no way to detect how much oil may be in any of the refrigerant lines. Cut lines with a tubing cutter as required when performing service. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to system. DO NOT re-use compressor oil.

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GENERAL

This publication contains Start-Up, Service, Controls, Operation, and Troubleshooting information for the 30HK,HWB, and HWC,S water-cooled chillers and the 30HL,HWA and 30GTN air-cooled chillers. See Table 1. These liquid chillers are equipped with *ComfortLink* controls and conventional thermostatic expansion valves (TXVs). The 30GTN and 30HL are also equipped with liquid line solenoid valves (LLSVs).

⚠ WARNING

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

Table 1 — Unit Sizes (30G,H)

UNIT MODEL	NOMINAL TONS
30HK040	40
30HK050	50
30HK060	60
30HL050	50
30HL060	60
30HW018	15
30HW025	20
30HW028	25
30HW035	30
30HW040	35
30GTN015	15
30GTN020	20
30GTN025	25
30GTN030	30
30GTN035*	35

*60 Hz only.

MAJOR SYSTEM COMPONENTS

General — The 30HK,HL,HW, 30GTN air-cooled reciprocating chillers contain the *ComfortLink™* electronic control system that controls and monitors all operations of the chiller.

The control system is composed of several components as listed in the sections below. See Fig. 1 for typical control box drawing. See Fig. 2-4 for control schematics.

Main Base Board (MBB) — See Fig. 5. The MBB is the heart of the *ComfortLink* control system. It contains the major portion of operating software and controls the operation of the machine. The MBB continuously monitors input/output channel information received from its inputs and from all other modules. The MBB receives inputs from thermistors T1, T2, T9, and T10. The 30GTN models also include thermistor T3. See Table 2. The MBB also receives the feedback inputs from compressors A1 (all) and B1 (30HK,HL only) and other status switches. See Table 3. The MBB also controls several outputs. Relay outputs controlled by the MBB are shown in Table 4. Information is transmitted between modules via a 3-wire communication bus or LEN (Local Equipment Network). The CCN (Carrier Comfort Network) bus is also supported. Connections to both LEN and CCN buses are made at TB3. See Fig. 5.

QuickSet Set Point Adjustment — This standard device is used for setting the desired leaving fluid temperature set point. This device is the factory-installed standard.

Alarm/Alert Indicator Light — This light comes factory installed with the QuickSet Set Point Adjustment. It is illuminated when any alarm or alert conditions are present.

Scrolling Marquee Display — This optional device is the keypad interface used for accessing chiller information, reading sensor values, and testing the chiller. The marquee display is a 4-key, 4-character, 16-segment LED (light-emitting diode) display. Eleven mode LEDs are located on the display as well as an Alarm Status LED. See Marquee Display Usage section on page 15 for further details.

Energy Management Module (EMM) — The EMM module is available as a factory-installed option or as a field-installed accessory. The EMM module receives 4 to 20 mA inputs for the temperature reset, cooling set point reset and demand limit functions. The EMM module also receives the switch inputs for the field-installed 2-stage demand limit and ice done functions. The EMM module communicates the status of all inputs with the MBB, and the MBB adjusts the control point, capacity limit, and other functions according to the inputs received.

Enable/Off/Remote Contact Switch — The Enable/Off/Remote Contact switch is a 3-position switch used to control the chiller. When switched to the Enable position the chiller is under its own control. Move the switch to the Off position to shut the chiller down. Move the switch to the Remote Contact position and a field-installed dry contact can be used to start the chiller. The contacts must be rated for dry circuit application capable of handling a 5-vdc, 1- to 20-mA load. In the Enable and Remote Contact (dry contacts closed) positions, the chiller is allowed to operate and respond to the scheduling configuration, CCN configuration and set point data. See Fig. 6.

Emergency On/Off Switch — The Emergency On/Off switch should only be used when it is required to shut the chiller off immediately. Power to the MBB, EMM, and marquee display is interrupted when this switch is off and all outputs from these modules will be turned off.

Board Addresses — The Main Base Board (MBB) has a 3-position Instance jumper that must be set to '1.' All other

boards have 4-position DIP switches. All switches are set to 'On' for all boards.

Control Module Communication

RED LED — Proper operation of the control boards can be visually checked by looking at the red status LEDs (light-emitting diodes). When operating correctly, the red status LEDs should be blinking 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. Be sure that the Main Base Board (MBB) is supplied with the current software. If necessary, reload current software. If the problem still persists, replace the MBB. A board 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 — The MBB has one green LED. The Local Equipment Network (LEN) LED should always be blinking whenever power is on. All other boards have a LEN LED which should be blinking whenever power is on. Check LEN connections for potential communication errors at the board J3 and/or J4 connectors. Communication between modules is accomplished by a 3-wire sensor bus. These 3 wires run in parallel from module to module. The J4 connector on the MBB provides both power and communication directly to the marquee display only.

YELLOW LED — The MBB has one yellow LED. The Carrier Comfort Network (CCN) LED will blink during times of network communication.

Carrier Comfort Network (CCN) Interface —

The 30HK,HL,HW and 30GTN chiller units can be connected to the CCN if desired. The communication bus wiring is a shielded, 3-conductor cable with drain wire and is supplied and installed in the field. See Table 5. 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. This is also required for the negative and signal ground pins of each system element. Wiring connections for CCN should be made at TB3. Consult the CCN Contractor's Manual for further information.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gage) minimum 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 -20 C to 60 C is required. Wire manufactured by Alpha (2413 or 5463), American (A22503), Belden (8772), or Columbia (02525) meets the above mentioned requirements.

It is important when connecting to a CCN communication bus 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.)

- Connect the red wire to (+) terminal on TB3 of the plug, the white wire to COM terminal, and the black wire to the (–) terminal.
- The RJ14 CCN connector on TB3 can also be used, but is only intended for temporary connection (for example, a laptop computer running 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, unplug the connector. 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.

Table 2 — Thermistor Designations

THERMISTOR NO.	PIN CONNECTION POINT	THERMISTOR INPUT
T1	J8-13,14 (MBB)	Cooler Leaving Fluid
T2	J8-11,12 (MBB)	Cooler Entering Fluid
T3	J8-21,22 (MBB)	Saturated Condensing Temperature, Circuit A (30GTN Only)
T9	J8-7,8 (MBB)	Outdoor-Air Temperature Sensor or Dual LWT Sensors (Accessory)
T10	J8-5,6 (MBB)	Remote Space Temperature Sensor (Accessory)

LEGEND

LWT — Leaving Water Temperature
MBB — Main Base Board

Table 3 — Status Switches

STATUS SWITCH	PIN CONNECTION POINT	30HK,HL 040-060	30HW 018-040	30GTN 015-035
Oil Pressure, Ckt B*	J7-1,2	OPSB	Not Used	Not Used
Oil Pressure, Ckt A*	J7-3,4	OPSA	OPSA	OPSA
Remote On/Off	TB5-9,10	Field-Installed Relay Closure		
Compressor Fault Signal, B1	J9-8,12	CR-B1	Not Used	Not Used
Compressor Fault Signal, A1	J9-11,12	CR-A1	CR-A1	CR-A1

*Standard on 30HL, 30HWA, and brine 30GTN units.

LEGEND FOR FIG. 2-4

ALM — Alarm
C — Compressor Contactor
CB — Circuit Breaker
COTP — Compressor Overtemperature Protection
CWFS — Chilled Water Flow Switch
CWPI — Chilled Water Pump Interlock
CR — Control Relay
EMM — Energy Management Module
FB — Fuse Block
FIOP — Factory-Installed Option Package
FM — Fan Motor
GCS — Ground Current Sensing
HGBP — Hot Gas Bypass
HPS — High-Pressure Switch
LPS — Low-Pressure Switch
OAT — Outdoor-Air Temperature
OPS — Oil Pressure Switch
PL — Plug
POT — Potentiometer
R — Relay
SPT — Space Temperature
SW — Switch
TB — Terminal Block
TRAN — Transformer
UL — Unloader

Table 4 — Output Relays

RELAY NO.	DESCRIPTION
K1	Energize Compressor A1 (30HK,HL,HW) Energize Compressor A1 and Condenser Fan Motor OFM1 (30GTN)
K2	Energize Compressor B1 (30HK,HL)
K3	Energize Unloader A1
K4	Energize Unloader B1 (30HK,HL) Energize Unloader A2 (30HW, 30GTN)*
K5	Energize Liquid Line Solenoid Valve for Circuit A (30HL, 30GTN)
K6	Energize Liquid Line Solenoid Valve for Circuit B (30HL)
K7	Alarm
K8	Cooler Pump
K9	Energize Condenser Fan Relay for Circuit A (30HL, 30HWA) Energize Condenser Pump Relay (30HK, 30HWB,C,S) Energize Condenser Fan Motor OFM2 (30GTN015-035)
K10	Energize Condenser Fan Relay for Circuit B (30HL) Energize Condenser Fan Motor OFM3 (30GTN035)
K11	Hot Gas Bypass

*Hot Gas Bypass is energized for 30GTN models 015 (50 Hz), 020 (60 Hz) and 30HW025.

Table 5 — CCN Communication Bus Wiring

MANUFACTURER	PART NO.	
	Regular Wiring	Plenum Wiring
Alpha	1895	—
American	A21451	A48301
Belden	8205	884421
Columbia	D6451	—
Manhattan	M13402	M64430
Quabik	6130	—

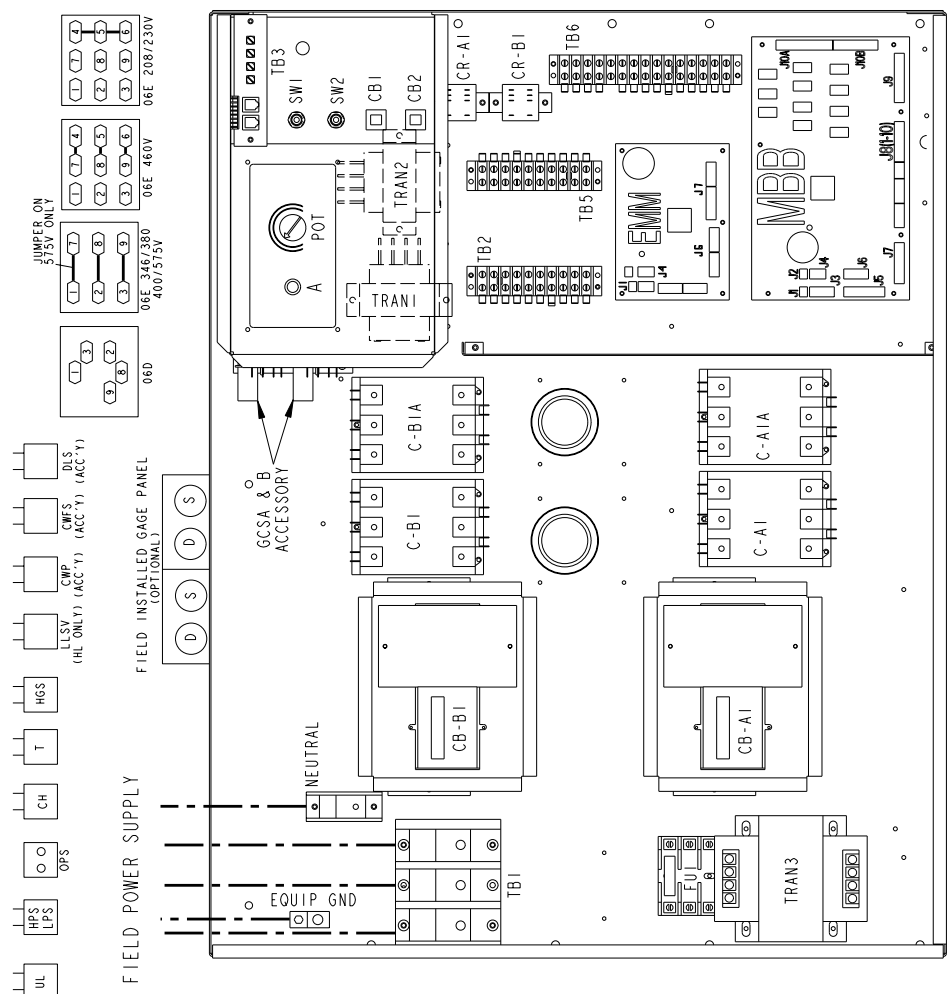
OPERATING DATA

Sensors — The electronic control uses 2 to 6 thermistors to sense temperatures for controlling chiller operation. See Table 2. These sensors are outlined below. Thermistors T1, T2, T3, T9 and condenser entering and leaving thermistors (30HWB,C,S HL) are 5 kΩ at 77 F (25 C) and are identical in temperature versus resistance and voltage drop performance. Thermistor T10 is 10 kΩ at 77 F (25 C) and has a different temperature vs resistance and voltage drop performance. See Thermistors section on page 58 for temperature-resistance-voltage drop characteristics.

T1 — COOLER LEAVING FLUID SENSOR — This thermistor is located in the leaving-fluid nozzle for 30HK,HL and 30GTN models. The sensor is installed in a friction-fit well which is located directly in the fluid path. For 30HW models, the sensor itself is installed directly in the fluid path using a compression fitting. Pressure must be relieved from the cooler and fluid drained before the sensor is removed.

T2 — COOLER ENTERING FLUID SENSOR — This thermistor is located in the entering fluid nozzle. The thermistor probe is inserted into a friction-fit well. The sensor is located directly in the fluid path. This sensor is factory-supplied and field-installed on 30HW units only. Sensor and probe are secured to the back of the 30HW control box. Sensor is factory-installed for all other models.

T3 — SATURATED CONDENSING TEMPERATURE SENSOR — This thermistor is factory installed on 30GTN models only. The sensor is clamped to the outside of a return bend on the condenser coil. Sensor location is shown in Fig. 7.



NOTES:

1. Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
2. Use 75 C min wire for field power supply.
3. All circuit breakers 'Must Trip Amps' are equal to or less than 156% FLA (Full Load Amps).
4. Oil pressure safety switches are standard on 30HL units only.
5. All field interlock contacts must have a minimum rating of 2 amps at 24 vac sealed. See field interlock wiring.
6. Compressors thermally protected — three phase motors protected against primary single phase conditions.
7. Terminals 9 and 10 of TB5 are for field connection of remote On-Off. The contacts must be rated for dry circuit application capable of handling a 5 vdc 1 mA to 20 mA load.

Fig. 1 — Typical Control Box — 30HK,HL Units Shown

LEGEND

A	Alarm
C	Contactor, Compressor
CB	Circuit Breaker
CH	Crankcase Heater
CR	Control Relay
CWFS	Chilled Water Flow Switch
CWP	Chilled Water Pump Interlock
DLS	Demand Limit Switch
EMM	Energy Management
FU	Control Transformer Fuse
GCS	Ground Current Sensing
GND	Ground
HGS	Hot Gas Solenoid
HPS	High-Pressure Switch
LPS	Low-Pressure Switch
MBB	Main Base Board
OPS	Oil Pressure Switch
PL	Plug
POT	Potentiometer
SW	Switch
T	Thermistor
TB	Terminal Block
TRAN	Transformer
UL	Unloader
x	Terminal Block
—	Factory Wiring
---	Field Wiring
---	Accessory or Option Wiring

MAIN BASE BOARD

J10B

13

RED

3.2 AMPS

CB2

FROM 115V SCHEMATIC

TRAN2

SECONDARY 24V

GRN TEL

BRN

PL2-4

A-L2

BRN

UL-B1

PL2-4

TRAN2

PL1-4

BRN

UL-A1

PL1-4

PL2-4

BRN

PL4-1

RED

HPS-B

PL4-2

ORN

C1

CR-B1

C2

BRN

CR-A1

C2

BRN

TRAN2

GCS-B ACCESSORY

A

LOGIC

B

COM

NC

CUT AND CAP JUMPER FOR GCS ACCESSORY

TB2

ORN

TB2

ORN

PL3-1

RED

HPS-A

PL3-2

GRA

C1

CR-A1

C2

BRN

A-L2

BRN

C2

BRN

TRAN2

GCS-A ACCESSORY

A

LOGIC

B

COM

NC

CUT AND CAP JUMPER FOR GCS ACCESSORY

TB2

GRA

TB2

GRA

K3

14

PL2-3

PNK

PNK

K2

12

PL1-3

PNK

PNK

K1

10

ORN

RED

9

K0

8

GRA

7

RED

6

RED

5

RED

4

RED

3

RED

2

RED

1

RED

K6

11

RED

MAX LOAD-15VA SEALED 30VA INRUSH

ALM R

(SETPOINT POT ONLY)

BRN

C2

CR-A1

BRN

TRAN2

L1

A

L2



[illegible]

LOW VOLTAGE CONTROL SCHEMATIC

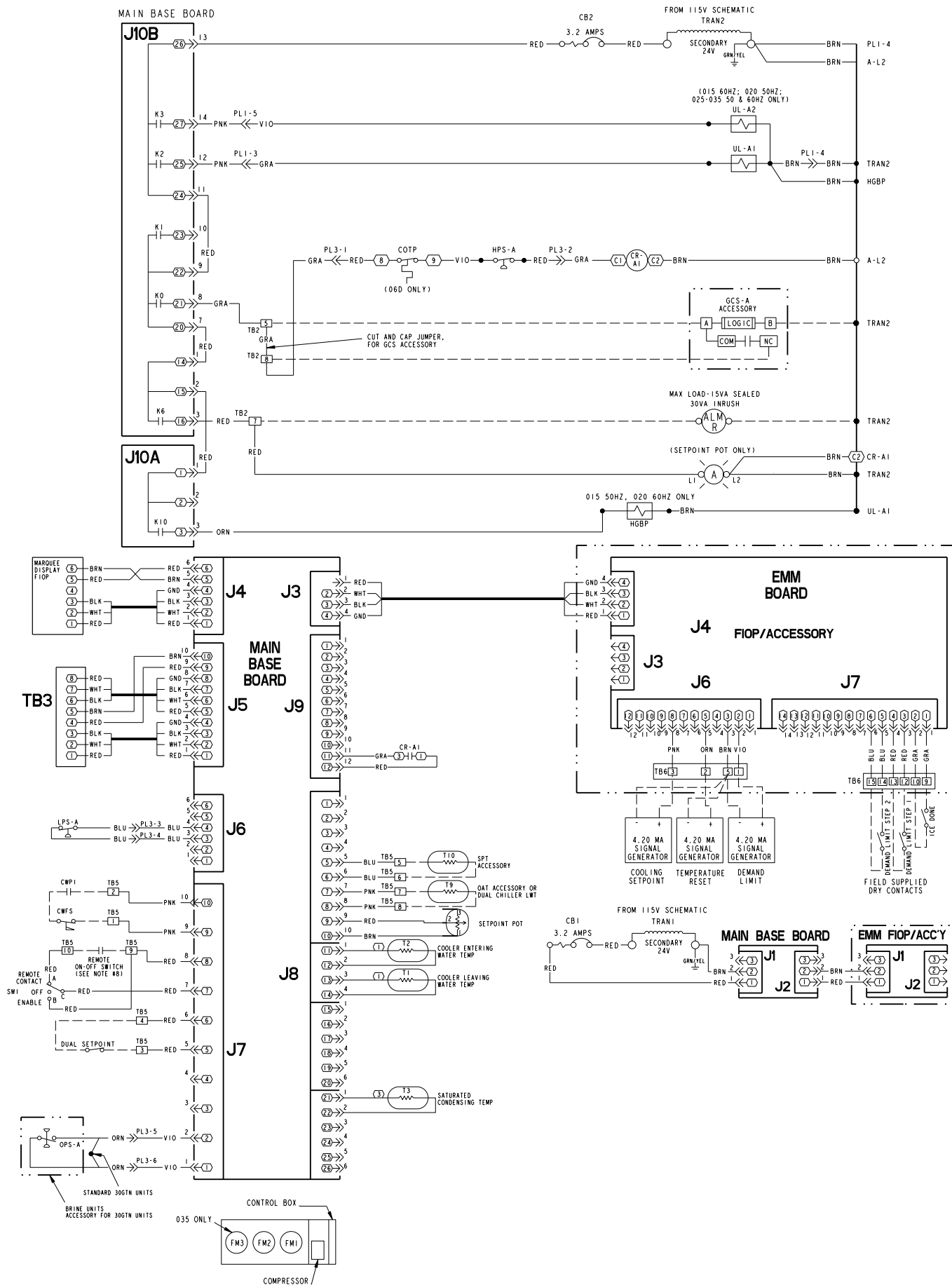


Fig. 4 — Low-Voltage (24-V) Control Schematic; 30GTN Units

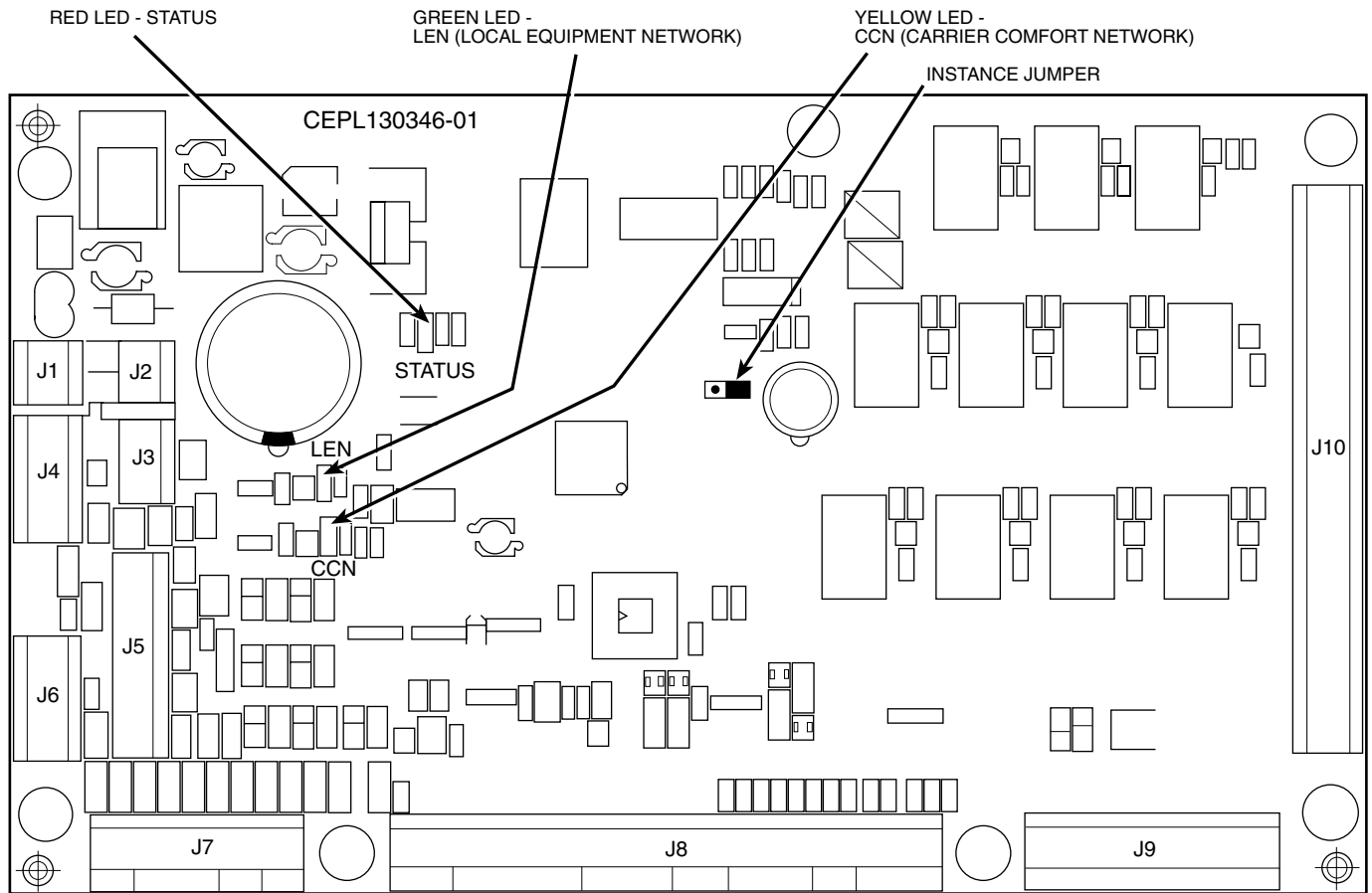


Fig. 5 — Main Base Board

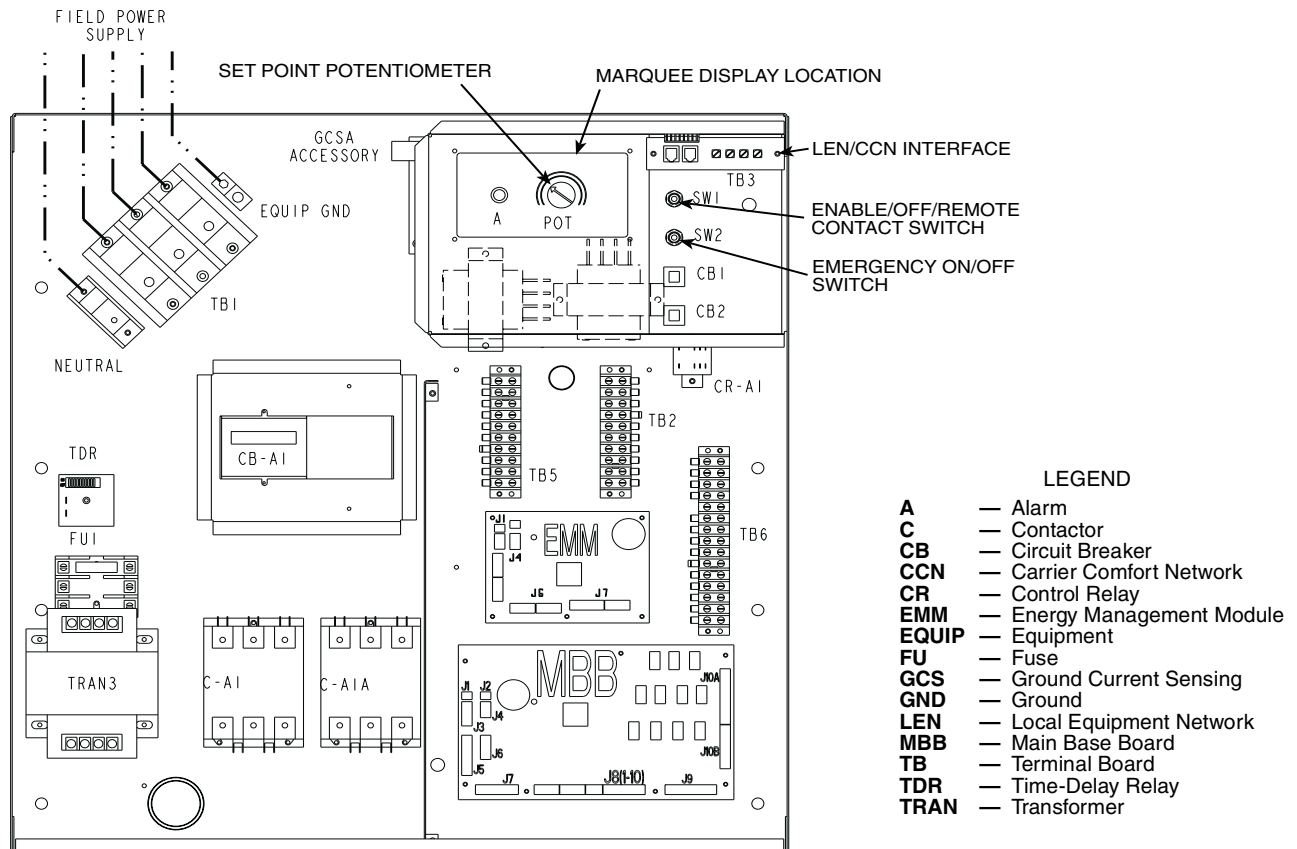


Fig. 6 — LEN/CCN Interface, Enable/Off/Remote Contact Switch, and Emergency On/Off Switch Locations

T9 — OUTDOOR-AIR TEMPERATURE SENSOR —
Sensor T9 is an accessory sensor that is remotely mounted and used for outdoor-air temperature reset.

T10 — REMOTE SPACE TEMPERATURE SENSOR —
Sensor T10 (part no. HH51BX006) is an accessory sensor that is remotely mounted in the controlled space and used for space temperature reset. The sensor should be installed as a wall-mounted thermostat would be (in the conditioned space where it will not be subjected to either a cooling or heating source or direct exposure to sunlight, and 4 to 5 ft above the floor). The push button override button is not supported by the *ComfortLink™* Controls.

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

To connect the space temperature sensor (Fig. 8):

1. Using a 20 AWG twisted pair conductor cable rated for the application, connect 1 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 5 and 6 on TB5 located in the unit control box.

Units on the CCN can be monitored from the space at the sensor through the RJ11 connector, if desired. To wire the RJ11 connector into the CCN (Fig. 9):

IMPORTANT: The cable selected for the RJ11 connector wiring **MUST** be identical to the CCN communication bus wire used for the entire network. Refer to Table 5 for acceptable wiring.

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.

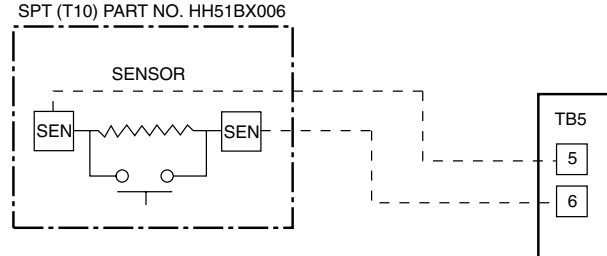


Fig. 8 — Typical Space Temperature Sensor Wiring

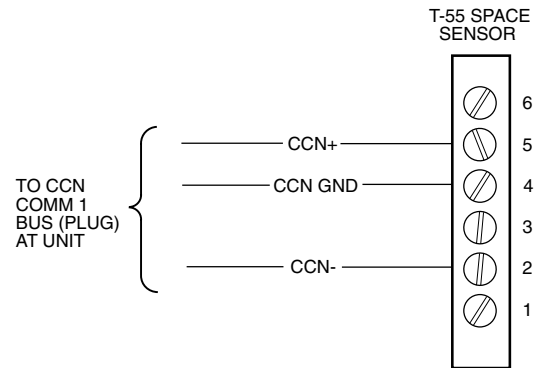


Fig. 9 — CCN Communications Bus Wiring to Optional Space Sensor RJ11 Connector

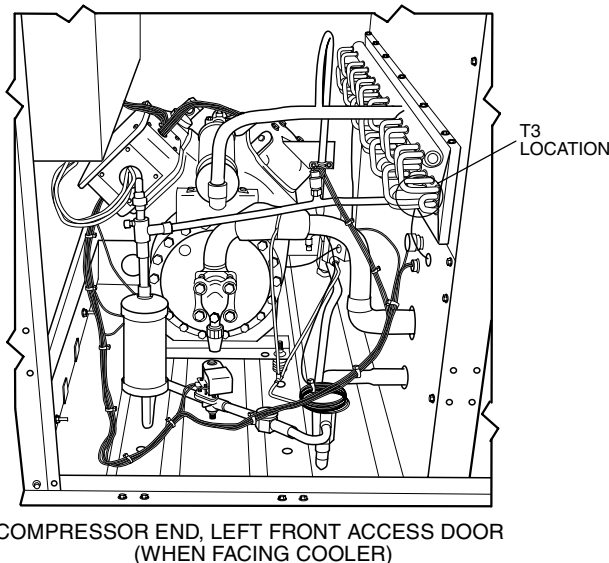
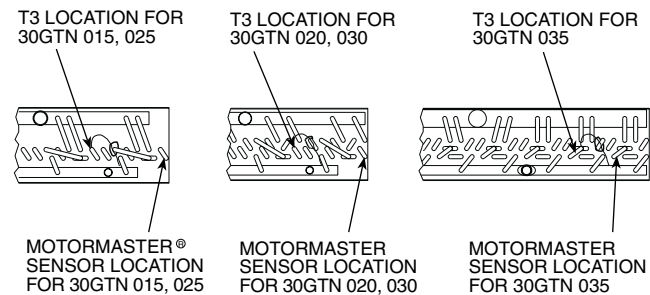


Fig. 7 — Thermistor T3 Location, 30GTN Units



Energy Management Module (Fig. 10) — This factory-installed option or field-installed accessory is used for the following types of temperature reset, demand limit, and/or ice features:

- 4 to 20 mA leaving fluid temperature reset (requires field-supplied 4 to 20 mA generator)
- 4 to 20 mA cooling set point reset (requires field-supplied 4 to 20 mA generator)
- Discrete inputs for 2-step demand limit (requires field-supplied dry contacts capable of handling a 5 vdc, 1 to 20 mA load)
- 4 to 20 mA demand limit (requires field-supplied 4 to 20 mA generator)
- Discrete input for Ice Done switch (requires field-supplied dry contacts capable of handling a 5 vdc, 1 to 20 mA load)

See Demand Limit and Temperature Reset sections on pages 39 and 37 for further details.

Loss-of-Cooler Flow Protection — A proof-of-cooler flow device (accessory flow switch) **MUST** be used with all chillers. The device should be set to shut the unit off if cooler gpm drops below the minimum flow rate for the machine. Refer to Pre-Start-Up, System Check section on page 63. The flow switch contacts are connected to TB5-1,2.

Compressor Ground Fault Sensor — The ground fault sensor accessory (Part Number 30HW900004) monitors all phases of the 3-phase power supply to the compressor. If a short to ground is sensed by the sensor, the compressor automatically shuts down. This action prevents contamination of the refrigeration system from acid formation. The compressor shuts down when a 2.5 ± 2 amp ground current is sensed by a toroid installed around the compressor power leads. The MBB will lock the compressor off until the compressor failure alert is reset. For installation details, see the instructions included with the accessory package.

NOTE: Two accessory packages are required for 30HK,HL units.

Thermostatic Expansion Valves (TXV) — All units are equipped from the factory with conventional TXVs. The 30HL and 30GTN models also have factory-installed liquid line solenoids. The liquid line solenoid valves are not intended to be a mechanical shut-off. When service is required, use the liquid line service valve to pump down the system.

The TXV is set at the factory to maintain approximately 8 to 12° F (4.4 to 6.7° C) suction superheat leaving the cooler by monitoring the proper amount of refrigerant into the cooler. All TXVs are adjustable, *but should not be adjusted unless absolutely necessary.*

The TXV is designed to limit the cooler saturated suction temperature to 55 F (12.8 C). This makes it possible for unit to start at high cooler fluid temperatures without overloading the compressor.

Compressor Control Relay (CR) — Each compressor has its own control relay. The CR is used to control and protect the compressors and crankcase heaters. The CR provides the following functions:

- compressor contactor and crankcase heater control
- status communication to the processor board

A high-pressure switch is wired in series between the MBB and CR. If the high-pressure switch opens during operation of a compressor, the compressor will be stopped, the failure will be

detected through the signal contacts and the compressor will be locked off.

Capacity Control — The control system cycles compressors, unloaders, and hot gas bypass solenoids to maintain the user-configured leaving chilled fluid temperature set point. Entering fluid temperature is used by the Main Base Board (MBB) to determine the temperature drop across the cooler and is used in determining the optimum time to add or subtract capacity stages. The chilled fluid temperature set point can be automatically reset by the return temperature reset space, or outdoor-air temperature reset features. It can also be reset from an external 4- to 20-mA signal (requires Energy Management Module FIOP or accessory).

With the automatic lead-lag feature in the unit, the control determines by compressor wear factor (combination of starts and run hours) which circuit will start first (30HK,HL only). At the first call for cooling, the compressor crankcase heater will be deenergized, a condenser fan (30GTN) or condenser fan relay (30HL, 30HWA) will start and the compressor will start unloaded.

If the circuit has been off for 15 minutes, the liquid line solenoid (if installed) will remain closed for 10 seconds while the cooler and suction lines are purged of any liquid refrigerant.

After the purge period, the liquid line solenoid (if installed) will open allowing the TXV to meter the refrigerant to the cooler. If the off-time is less than 15 minutes, the liquid line solenoid will be opened as soon as the compressor starts.

The TXVs will open gradually to provide a controlled start-up. During start-up, the low pressure and oil pressure (if installed) switches will be bypassed for 2 minutes to allow for the transient changes during start-up. As additional stages of compression are required, the processor control will add them. See Table 5.

If a circuit is to be stopped, the following occurs:

For 30HK, 30HW units, the compressor will be shut off.

For 30HL, 30GTN units, the control will first close the liquid line solenoid valve. The compressor will operate until the low pressure switch opens and will then be shut off. If the low pressure switch does not open within 3 minutes, the alarm/alert indicator light will be illuminated and alert 135 (Circuit A) or 136 (Circuit B, 30HL only) will be generated (with Scrolling Marquee option only).

During shutdown all diagnostic conditions will be honored. If a safety trips or alarm condition is detected before pumpout is complete, the circuit will be shut down.

The capacity control algorithm runs every 30 seconds. The algorithm attempts to maintain the Control Point at the desired set point. Each time it runs, the control reads the entering and leaving fluid temperatures. The control determines the rate at which conditions are changing and calculates 2 variables based on these conditions. Next, a capacity ratio is calculated using the 2 variables to determine whether or not to make any changes to the current stages of capacity. This ratio value ranges from -100 to +100%. If the next stage of capacity is a compressor, the control starts (stops) a compressor when the ratio reaches +100% (-100%). If the next stage of capacity is an unloader, the control deenergizes (energizes) an unloader when the ratio reaches +60% (-60%). Unloaders are allowed to cycle faster than compressors, to minimize the number of starts and stops on each compressor. A delay of 90 seconds occurs after each capacity step change. Refer to Table 6.

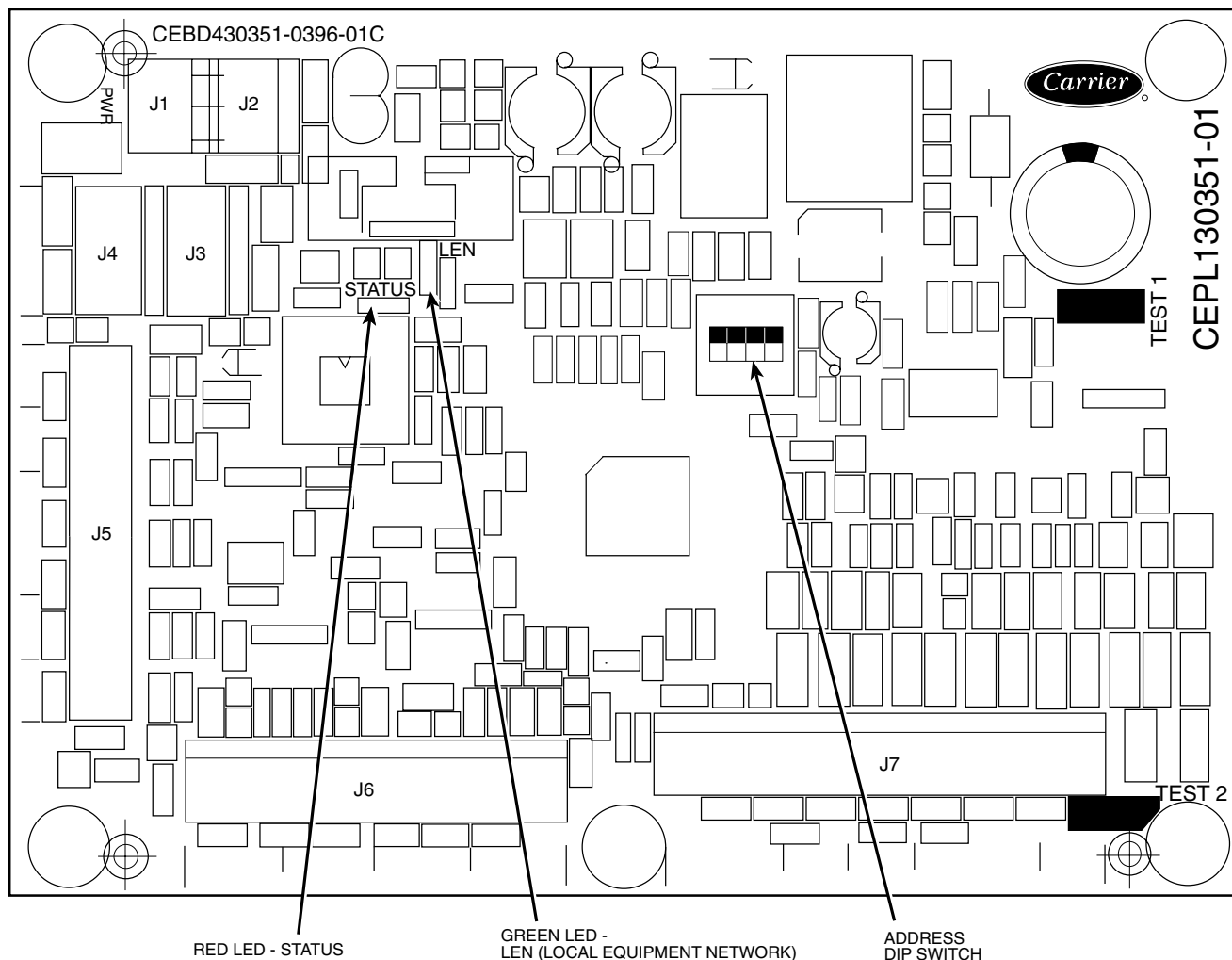


Fig. 10 — Energy Management Module

Table 6 — Part Load Data Percent Displacement, Standard Units

UNIT TYPE	CONTROL STEPS	LOADING SEQ A		LOADING SEQ B	
		% Displacement	Compressor	% Displacement	Compressor
30HK,HL 040 (60 Hz)	1	25	A1*	25	B1*
	2	50	A1	50	B1
	3	75	A1*,B1	75	A1,B1*
	4	100	A1,B1	100	A1,B1
30HK,HL 040 (50 Hz) 050 (60 Hz)	1	40	A1*	16	B1*
	2	60	A1	40	B1
	3	—	—	60	A1*,B1*
	4	80	A1*,B1	80	A1,B1*
	5	100	A1,B1	100	A1,B1
30HK,HL 050 (50 Hz) 060 (All)	1	33	A1*	33	B1*
	2	50	A1	50	B1
	3	67	A1*,B1*	67	A1*,B1*
	4	83	A1*,B1	83	A1,B1*
	5	100	A1,B1	100	A1,B1
30HW (All) 018,028-040	1	33	A1†	—	—
	2	67	A1*	—	—
	3	100	A1	—	—
30HW (All) 025	1	50	A1**	—	—
	2	100	A1	—	—
30GTN 015 (60 Hz) 020 (50 Hz) 025-035 (All)	1	33	A1†	—	—
	2	67	A1*	—	—
	3	100	A1	—	—
30GTN 015 (50 Hz) 020 (60 Hz)	1	50	A1**	—	—
	2	100	A1	—	—

*Unloaded compressor, one unloader energized.
†Unloaded compressor, two unloaders energized.
**Hot gas bypass energized as first stage.

MINUTES LEFT FOR START — This value is displayed only in the network display tables (using Service Tool or ComfortWORKS® software) and represents the amount of time to elapse before the unit will start its initialization routine. This value can be zero without the machine running in many situations. This can include being unoccupied, ENABLE/OFF/REMOTE CONTACT switch in the OFF position, CCN not allowing unit to start, Demand Limit in effect, no call for cooling due to no load, and alarm or alert conditions present. If the machine should be running and none of the above are true, a minimum off time (DELY, see below) may be in effect. The machine should start normally once the time limit has expired.

MINUTES OFF TIME (DELY, Configuration Mode under OPT2) — This user-configurable time period is used by the control to determine how long unit operation is delayed after power is applied/restored to the unit. It is also used to delay compressor restarts after the unit has shut off its lowest stage of capacity. 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.

LOADING SEQUENCE (30HK,HL) — The compressor efficiency is greatest at partial load. Therefore, the following sequence list applies to capacity control.

The next compressor will be started with unloaders energized on the lead compressor.

All valid capacity combinations using unloaders will be used as long as the total capacity is increasing.

LEAD/LAG DETERMINATION — This is a configurable choice and is factory set to be automatic for 30HK,HL units. It is set for Circuit A leading for 30HW and 30GTN units. The value can be changed (30HK,HL only) to Circuit A or Circuit B leading as desired. Set at automatic, 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. 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.

CAPACITY SEQUENCE DETERMINATION — This control choice does NOT have any impact on these machines.

CAPACITY CONTROL OVERRIDES — The following overrides will modify the normal operation of the routine.

Deadband Multiplier — The user configurable Deadband Multiplier (Z.GN, Configuration Mode under SLCT) has a default value of 1.0. The range is from 1.0 to 4.0. When set to

other than 1.0, this factor is applied to the capacity Load/Unload Factor. The larger this value is set, the longer the control will delay between adding or removing stages of capacity. Figure 11 shows how compressor starts can be reduced over time if the leaving water temperature is allowed to drift a larger amount above and below the set point. This value should be set in the range of 3.0 to 4.0 for systems with small loop volumes.

First Stage Override — If the current capacity stage is zero, the control will modify the routine with a 1.2 factor on adding the first stage to reduce cycling. This factor is also applied when the control is attempting to remove the last stage of capacity.

Slow Change Override — The control prevents the capacity stages from being changed when the leaving fluid temperature is close to the set point (within an adjustable deadband) and moving towards the set point.

Ramp Loading (CRMP, Configuration Mode under SLCT) — Limits the rate of change of leaving fluid temperature. 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 leaving fluid 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 (CRMP), the control does not allow any changes to the current stage of capacity.

Low Entering Fluid Temperature Unloading — When the entering fluid temperature is below the control point, the control will attempt to remove 25% of the current stages being used. If exactly 25% cannot be removed, the control removes an amount greater than 25% but no more than necessary. The lowest stage will not be removed.

HOT GAS BYPASS — If equipped, the hot gas bypass valve is energized only when all unloaders are energized. The valve is closed when unloaders are deenergized to increase capacity. The valve is energized on 30HK,HL units only when one circuit is operating unloaded.

Cooler Freeze Protection — The control will try to prevent shutting the chiller down on a Cooler Freeze Protection alarm by removing stages of capacity. If the cooler fluid selected is Water, the freeze point is 34 F (1.1 C). If the cooler fluid selected is Brine, the freeze point is 8° F (4.4° C) below the cooling set point (or lower of two cooling set points in dual set point configurations). If the cooler leaving fluid temperature is less than the freeze point plus 2.0° F (1.1° C), the control will immediately remove one stage of capacity. This can be repeated once every 30 seconds.

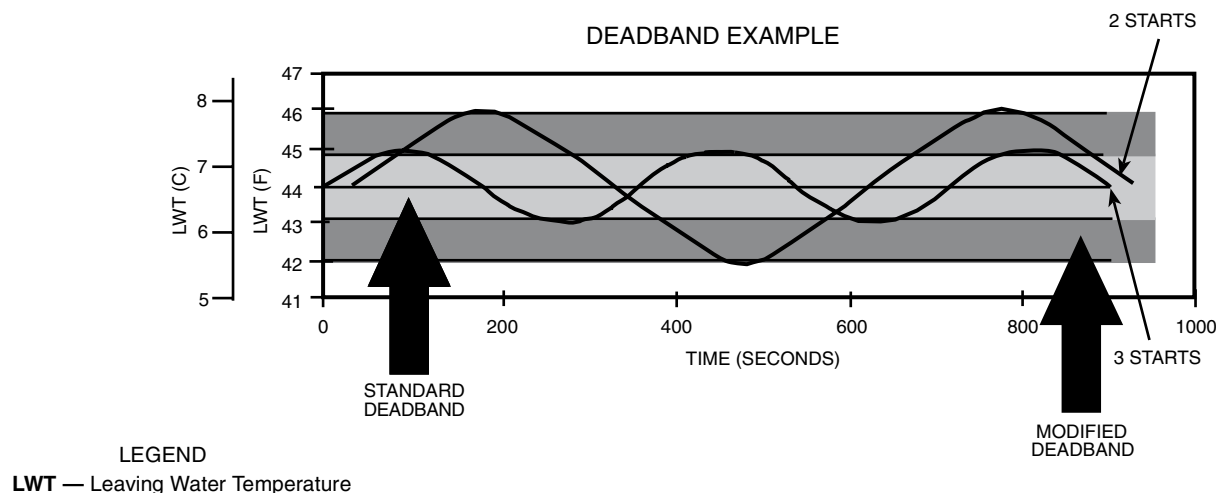


Fig. 11 — Deadband Multiplier

Head Pressure Control

COMFORTLINK™ UNITS (30GTN Only) — The Main Base Board (MBB) controls the condenser fans to maintain the lowest condensing temperature possible, and thus the highest unit efficiency. The fans are controlled by the saturated condensing temperature set from the factory. Fan control is determined by the Head Pressure Control Method (HPCM) setting in the Configuration Mode under the OPT1 sub-mode. This setting (HPCM=2) indicates set point control. During the first 10 minutes after circuit start-up, MBB-controlled fans are not turned on until T3 is greater than the head pressure set point plus 10° F (5.6° C). If T3 is greater than 95 F (35 C) just prior to circuit start-up, all MBB-controlled fan stages are turned on to prevent excessive discharge pressure during pull-down. At each change of the fan stage, the system will wait one minute to allow the head pressure to stabilize unless T3 is greater than 125 F (51.6 C), in which case all MBB-controlled fans will start immediately. This method allows the unit to run at very low condensing temperatures at part load. The control will turn off a fan stage when T3 is below the head pressure set point by 35 F (19.4 C). Fan sequences are shown in Fig. 12.

Motormaster® Option — For low-ambient operation, the lead fan on 30GTN units can be equipped with the Motormaster head pressure controller option or accessory. The fan controlled is that which is energized with compressor A1. Refer to Fig. 12 for condenser fan staging information.

Operation of Machine Based on Control Method and Cooling Set Point Selection Settings — Machine On/Off control is determined by the configuration of the control method (CTRL, Configuration mode under sub-mode OPT2) and cooling set point select (CLSP, Configuration mode under sub-mode SLCT) variables. For models using the Quickset Set Point Adjustment, these variables are factory configured for control method of 0 (Enable/Off/Remote Contact) and a cooling set point select of 5 (External Quickset POT). Models with the optional Scrolling Marquee have the same control method, but have cooling set point select set to 1 (single set point, CSP1). With the control method set to 0, simply switching the Enable/Off/Remote Contact switch to the Enable or Remote Contact position (external contacts closed) will put the chiller in an occupied state. The control mode (MODE) will be 1 when the switch is Off and will be 5 when in the Enable position or Remote Contact position with external contacts closed.

Three other control methods are available for Machine On/Off control:

7-DAY SCHEDULE (CTRL=1) — The Main Base Board will use the schedule defined under the Time Clock mode. This schedule is accessible ONLY from the Scrolling Marquee or accessory Navigator display. Refer to example tables in the Marquee Display Usage section, page 15. The Enable/Off/Remote Contact must be in the Enable or Remote Contact position. Note that this is NOT the same schedule that is seen when using Building Supervisor, Service Tool, ComfortWORKS®, etc. The control mode (MODE) will be 1 when the switch is Off. The control mode will be 3 when the Enable/Off/Remote Contact switch input is On and the time of day is during an unoccupied period. Similarly, the control mode will be 7 when the time of day is during an occupied period.

OCCUPANCY SCHEDULE (CTRL=2) — The Main Base Board will use the operating schedules that can only be accessed and configured using a CCN tool such as Building Supervisor, Service Tool or ComfortWORKS software. The Enable/Off/Remote Contact must be in the Enable or Remote Contact position. The control mode (MODE) will be 1 when the switch is Off. The control mode will be 3 when the Enable/Off/Remote Contact switch input is On and the time of day is during an unoccupied period. Similarly, the control mode will be 7 when the time of day is during an occupied period.

CCN SCHEDULE (CTRL=3) — An external CCN device such as Flotronic™ System Manager controls the On/Off state of the machine. This CCN device forces the variable 'CHIL_S_S' between Start/Stop to control the chiller. The control mode (MODE) will be 1 when the switch is Off. The control mode will be 2 when the Enable/Off/Remote Contact switch input is On and the CHIL_S_S variable is 'Stop.' Similarly, the control mode will be 6 when the CHIL_S_S variable is 'Start.'

Table 7 illustrates how the control method and cooling set point select variables direct the operation of the chiller and the set point to which it controls. The illustration also shows the ON/OFF state of the machine for the given combinations.

Pumpout (30HL, 30GTN Units) — Pumpout is a time-based feature. On a command for start-up, the compressor starts with the liquid line solenoid closed (provided 15 minutes has elapsed since previous start). After 10 seconds, the liquid line solenoid opens. At shutdown, the liquid line solenoid is closed and the compressor is turned off 10 seconds later.

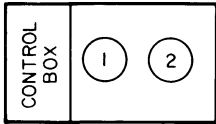
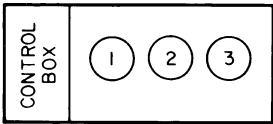
FAN ARRANGEMENT	FAN NO.	FAN RELAY	NORMAL CONTROL
30GTN015-030 	1	—	Compressor A1
	2	1	First Stage Condenser Fan
30GTN035 	1	—	Compressor A1
	2	1	First Stage Condenser Fan
	3	2	Second Stage Condenser Fan

Fig. 12 — 30GTN Condenser Fan Sequence

Table 7 — Control Methods and Cooling Set Points

CONTROL TYPE (CTRL)	OCCUPANCY STATE	COOLING SET POINT SELECT (CLSP)					
		0 (single)	1 (dual, switch)	2 (dual, 7 day)	3 (dual, occ)	4 (4 to 20 mA)	5 (QuickSet)
0 (switch)	Occupied	ON,CSP1	ON*	ON,CSP1	ON,CSP1	ON†	ON**
	Unoccupied	ON,CSP1	ON*	ON,CSP2	ON,CSP2	ON	ON**
1 (7 day)	Occupied	ON,CSP1	ON*	Illegal	Illegal	ON†	ON**
	Unoccupied	OFF	OFF	Illegal	Illegal	OFF	OFF
2 (Occupancy)	Occupied	ON,CSP1	ON*	Illegal	Illegal	ON†	ON**
	Unoccupied	OFF	OFF	Illegal	Illegal	OFF	OFF
3 (CCN)	Occupied	ON,CSP1	ON*	ON,CSP1	ON,CSP1	ON†	ON**
	Unoccupied	ON,CSP1	ON*	ON,CSP2	ON,CSP2	ON†	ON**

*Dual set point switch input used. CSP1 used when switch input is closed. CSP2 used when switch input is open.

†Cooling set point determined from 4 to 20 mA input to Energy Management Module (EMM) to terminals TB6-3,5.

**Cooling set point determined from QuickSet Set Point Adjustment input to the Main Base Board (MBB), J8 pins 9,10.

Marquee Display Usage (See Fig. 13 and Tables 8-27) — The Optional Marquee display module provides the user interface to the *ComfortLink™* control system. The display has up and down arrow keys, an **ESCAPE** key, and an **ENTER** key. These keys are used to navigate through the different levels of the display structure. See Table 8. Press the **ESCAPE** key until the display is blank to move through the top 11 mode levels indicated by LEDs on the left side of the display.

Pressing the **ESCAPE** and **ENTER** keys simultaneously will scroll a clear language text description across the display indicating the full meaning of each display acronym. Pressing the **ESCAPE** and **ENTER** keys when the display is blank (Mode LED level) will return the Marquee display to its default menu of rotating display items. In addition, the password will be disabled requiring that it be entered again before changes can be made to password protected items.

Clear language descriptions in English, Spanish, French, or Portuguese can be displayed when properly configuring the LANG variable in the Configuration Mode, under DISP sub-mode. See Tables 17A and 17B.

NOTE: When the LANG variable is changed to 1, 2, or 3, all appropriate display expansions will immediately change to the new language. No power-off or control reset is required when reconfiguring languages.

When a specific item is located, the display will flash showing the operator, the item, followed by the item value and then followed by the item units (if any). Press the **ENTER** key to stop the display at the item value. Items in the Configuration and Service Test modes are password protected. The display will flash PASS and WORD when required. Use the **ENTER** and arrow keys to enter the 4 digits of the password. The

default password is 1111. The password can only be changed through CCN devices such as ComfortWORKS® and Service Tool.

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. Press **ENTER** to stop the display at the item value. Press the **ENTER** key again so that the item value flashes. Use the arrow keys to change the value or state of an item and press the **ENTER** key to accept it. Press the **ESCAPE** key and the item, value, or units display will resume. Repeat the process as required for other items.

See Tables 8-27 for further details.

Service Test (See Tables 10A and 10B) — Both main power and control circuit power must be on.

The Service Test function should be used to verify proper operation of compressors, unloaders, liquid line solenoids, hot gas bypass (if installed), cooler pump and remote alarm relays, condenser pump, and condenser fans/relays. To use the Service Test mode, the Enable/Off/Remote Contact switch must be in the OFF position. Use the display keys and Tables 10A and 10B to enter the mode and display TEST. Press **ENTER** twice so that OFF flashes. Enter the password if required. Use either arrow key to change the TEST value to the On position and press **ENTER**. Press **ESCAPE** and the  button to enter the OUTS or COMP sub-mode.

Test the condenser fans, liquid line solenoids, cooler pump, condenser pump, and alarm relays by changing the item values from OFF to ON. These discrete outputs are then turned off if there is no keypad activity for 10 minutes. All compressor outputs can be turned on, but the control will limit the rate by staging one compressor per minute. Compressor unloaders and hot gas bypass relays/solenoids (if installed) can be tested with compressors on or off. The relays under the COMP sub-mode will stay on for 10 minutes if there is no keypad activity. Compressors will stay on until they are turned off by the operator. The Service Test mode will remain enabled for as long as there is one or more compressors running. All safeties are monitored during this test and will turn a compressor, circuit or the machine off if required. Any other mode or sub-mode can be accessed, viewed, or changed during the TEST mode. The STAT item (Run/status mode under sub-mode VIEW) will display “0” as long as the Service mode is enabled. The TEST sub-mode value must be changed back to OFF before the chiller can be switched to Enable or Remote contact for normal operation.

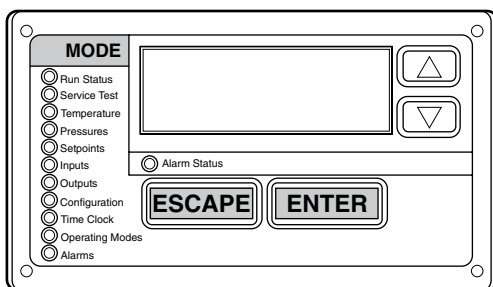


Fig. 13 — Scrolling Marquee Display

QuickSet Set Point Adjustment Usage — Standard units are shipped with the QuickSet Potentiometer. This device is used to set the desired leaving fluid temperature set point. The potentiometer is factory calibrated and the pointer on the dial should be aligned to the desired leaving fluid temperature. The chiller is factory configured for fluid type of water (FLUD=1) and the set point can be adjusted from 38 F to 70 F (3.3 C to 21.1 C). Settings between the -20 F to 38 F (-28.9 C to 3.3 C) temperature range are for brine applications only and require that the unit be equipped with the Scrolling Marquee display.

NOTE: Medium temperature brine units are factory-shipped with set point adjustable from 15 F to 70 F (-9.4 C to 21.1 C). Ensure that cooler fluid is adequately protected from freezing before setting desired temperatures below 38 F (3.3 C).

QUICKSET CALIBRATION — The potentiometer **MUST** be calibrated if it or the Main Base Board (MBB) is replaced. To calibrate the potentiometer, follow the steps shown below:

1. Turn the knob fully counterclockwise (CCW) so that the pointer is pointing to the asterisk on the label. The alarm/alert indicator light will illuminate.
2. Turn the knob clockwise (CW) so that the pointer is positioned at -20 F (-28.9 C) (outer temperature ring). The alarm/alert indicator light will turn OFF and then back ON.
3. Turn the knob clockwise (CW) so that the pointer is positioned at 70 F (21.1 C). The alarm/alert indicator light will turn OFF which indicates that the calibration is complete.
4. Turn the knob so that the pointer is positioned at the desired leaving fluid temperature.

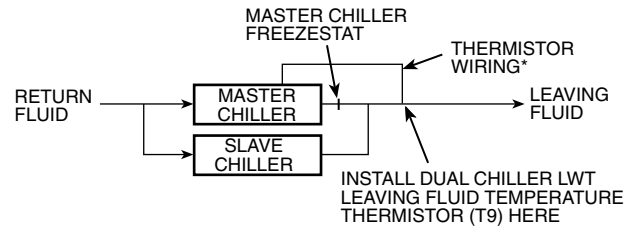
NOTE: If the alarm/alert indicator is illuminated, calibration is still allowed. The light turns OFF and then turns back to ON when positioned at asterisk as described in Step 1. There is no change during Steps 2-4. The light turns back ON after calibration if condition is still present.

Configuring and Operating Dual Chiller Control (See Table 20) — The dual chiller routine is available for the control of two units supplying chilled fluid on a common loop. This control is designed for a parallel fluid flow arrangement only. One chiller must be configured as the master chiller, the other as the slave chiller. An additional leaving fluid temperature thermistor (Dual Chiller LWT) must be installed as shown in Fig. 14 and connected to the master chiller. Refer to Thermistors section, page 58, for sensor wiring.

To configure the two chillers for operation, follow the example shown in Table 20. The master chiller will be configured with a slave chiller at address 6. Also in this example, the master chiller will be configured to use Lead/Lag Balance to even out the chiller runtimes weekly. The Lag Start Delay feature will be set to 10 minutes. The master and slave chillers cannot have the same CCN address (CCNA, Configuration mode under OPT2). Both chillers must have the control method variable (CTRL, Configuration mode under OPT2) set to '3.' In addition, the chillers must both be connected together on the same CCN bus. Connections can be made to the CCN screw terminals on TB3 in both chillers. The master chiller will determine which chiller will be Lead and which will be Lag. The master chiller controls the slave chiller by forcing the slave chiller's CHIL_S_S (CCN) variable, control point (CTPT) and demand limit.

The master chiller is now configured for dual chiller operation. To configure the slave chiller, only the LLEN and MSSL variables need to be set. Enable the Lead/Lag chiller enable variable (LLEN) as shown Table 20. Similarly, set the Master/Slave Select variable (MSSL) to SLVE. The variables LLBL, LLBD, an LLDY are not used by the slave chiller.

Installation of a master chiller freezestat (part no. HH22CC050) and well (part no. HL79ZZ002) is also required.



- *Depending on piping sizes, use either:
- HH79NZ014 sensor / 10HB50106802 well (3-in. sensor/well)
 - HH79NZ029 sensor / 10HB50106801 well (4-in. sensor/well)

Fig. 14 — Dual Chiller Thermistor Location

Table 8 — Marquee Display Menu Structure

RUN STATUS	SERVICE TEST	TEMPERATURES	PRESSURES	SET POINTS	INPUTS	OUTPUTS	CONFIGURATION	TIME CLOCK	OPERATING MODES	ALARMS
Auto Display (VIEW)	Manual Mode On/Off (TEST)	Unit Temperatures (UNIT)	Ckt A Pressures (PRC.A)	Cooling (COOL)	Unit Discrete (GEN.I)	Unit Discrete (GEN.O)	Display (DISP)	Unit Time (TIME)	Modes (MODE)	Current (CRNT)
Machine Hours/Starts (RUN)	Ckt A/B Outputs (OUTS)	Ckt A Temperatures (CIR.A)	Ckt B Pressures (PRC.B)*	Heating (HEAT)	Ckt A/B (CRCT)	Ckt A (CIR.A)	Machine (UNIT)	Unit Date (DATE)		Reset Alarms (RCRN)
Compressor Run Hours (HOUR)*	Compressor Tests (COMP)	Ckt B Temperatures (CIR.B)*		Head Pressure (HEAD)	Unit Analog (4-20)	Ckt B (CIR.B)*	Options 1 (OPT1)	Schedule (SCHD)		Alarm History (HIST)
Compressor Starts (STRT)*							Options 2 (OPT2)			Reset History (RHIS)
Software Version (VERS)							Temperature Reset (RSET)			
							Set Point Select (SLCT)			

LEGEND

Ckt — Circuit
 *30HK,HL only.

Table 9 — Run Status Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
VIEW		EWT	XXX.X °F	ENTERING FLUID TEMP	
		LWT	XXX.X °F	LEAVING FLUID TEMP	
		SETP	XXX.X °F	ACTIVE SETPOINT	
		CTPT	XXX.X °F	CONTROL POINT	
		STAT	X	CONTROL MODE	0 = SERVICE TEST 1 = OFF — LOCAL 2 = OFF — CCN 3 = OFF — TIME 4 = OFF — EMRGCY 5 = ON — LOCAL 6 = ON — CCN 7 = ON TIME
		OCC	YES/NO	OCCUPIED	
		MODE	YES/NO	OVERRIDE MODES IN EFFECT	
		CAP	XXX %	PERCENT TOTAL CAPACITY	
		STGE	XX	REQUESTED STAGE	
		ALRM	XX	CURRENT ALARMS & ALERTS	
		TIME	XX.XX	TIME OF DAY	00.0 — 23.59
		MNTH	XX	MONTH OF YEAR	1=JAN,2=FEB, etc.
		DATE	XX	DAY OF MONTH	01 — 31
		YEAR	XXXX	YEAR OF CENTURY	
RUN		HRS.U	XXXX	MACHINE OPERATING HOURS	
		STR.U	XXXX	MACHINE STARTS	
HOUR*		HRS.A	XXXX	CIRCUIT A RUN HOURS	
		HRS.B	XXXX	CIRCUIT B RUN HOURS	
		HR.A1	XXXX	COMPRESSOR A1 RUN HOURS	
		HR.A2	XXXX	COMPRESSOR A2 RUN HOURS	N/A
		HR.A3	XXXX	COMPRESSOR A3 RUN HOURS	N/A
		HR.A4	XXXX	COMPRESSOR A4 RUN HOURS	N/A
		HR.B1	XXXX	COMPRESSOR B1 RUN HOURS	(30HK,HL Only)
		HR.B2	XXXX	COMPRESSOR B2 RUN HOURS	N/A
		HR.B3	XXXX	COMPRESSOR B3 RUN HOURS	N/A
		HR.B4	XXXX	COMPRESSOR B4 RUN HOURS	N/A
STRT*		ST.A1	XXXX	COMPRESSOR A1 STARTS	
		ST.A2	XXXX	COMPRESSOR A2 STARTS	N/A
		ST.A3	XXXX	COMPRESSOR A3 STARTS	N/A
		ST.A4	XXXX	COMPRESSOR A4 STARTS	N/A
		ST.B1	XXXX	COMPRESSOR B1 STARTS	(30HK,HL Only)
		ST.B2	XXXX	COMPRESSOR B2 STARTS	N/A
		ST.B3	XXXX	COMPRESSOR B3 STARTS	N/A
		ST.B4	XXXX	COMPRESSOR B4 STARTS	N/A

*The following sub-modes do not appear on 30HW and 30GTN machines: HOUR, STRT.

Table 9 — Run Status Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
VERS		MBB		CESR-131170-XX-XX CESR-131213-XX-XX	(30HK,HL Only) (30HW,GTN Only)
		EXV			N/A
		CXB			N/A
		EMM		CESR-131174-XX-XX	
		MARQ		CESR-131171-XX-XX	
		NAV		CESR-130227-XX-XX	

*The following sub-modes do not appear on 30HW and 30GTN machines: HOUR, STRT.

Table 10A — Service Test Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TEST			ON/OFF	SERVICE TEST MODE	Use to Enable/Disable Manual Mode
OUTS		LLS.A	OPEN/CLSE	LIQ. LINE SOLENOID VALVE	30HL Only
		EXV.A	0-100%	EXV % OPEN	N/A
		LLS.B	OPEN/CLSE	LIQ. LINE SOLENOID VALVE	30HL Only
		ESV.B	0-100%	EXV % OPEN	N/A
		FAN1	ON/OFF	FAN1 RELAY	N/A CRF-A (30HL Only)
		FAN2	ON/OFF	FAN2 RELAY	N/A CFR-B (30HL Only)
		FAN3	ON/OFF	FAN3 RELAY	N/A
		FAN4	ON/OFF	FAN4 RELAY	N/A
		CLR.P	ON/OFF	COOLER PUMP RELAY	
		CND.P	ON/OFF	CONDENSER PUMP RELAY	
		RMT.A	ON/OFF	REMOTE ALARM RELAY	
COMP		CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
		CC.A2	ON/OFF	COMPRESSOR A2 RELAY	N/A
		CC.A3	ON/OFF	COMPRESSOR A3 RELAY	N/A
		CC.A4	ON/OFF	COMPRESSOR A4 RELAY	N/A
		UL.A1	ON/OFF	UNLOADER A1 RELAY	
		UL.A2	ON/OFF	UNLOADER A2 RELAY	
		HGBP	ON/OFF	HOT GAS BYPASS RELAY	
		CC.B1	ON/OFF	COMPRESSOR B1 RELAY	
		CC.B2	ON/OFF	COMPRESSOR B2 RELAY	N/A
		CC.B3	ON/OFF	COMPRESSOR B3 RELAY	N/A
		CC.B4	ON/OFF	COMPRESSOR B4 RELAY	N/A
		UL.B1	ON/OFF	UNLOADER B1 RELAY	
		UL.B2	ON/OFF	UNLOADER B2 RELAY	

LEGEND

EXV — Electronic Expansion Valve

Table 10B — Service Test Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TEST			ON/OFF	SERVICE TEST MODE	Use to Enable/Disable Manual Mode
OUTS		LLS.A	OPEN/CLSE	LIQ. LINE SOLENOID VALVE	30GTN Only
		EXV.A	0-100%	EXV % OPEN	N/A
		LLS.B	OPEN/CLSE	LIQ. LINE SOLENOID VALVE	N/A
		EXV.B	0-100%	EXV % OPEN	N/A
		FAN1	ON/OFF	FAN1 RELAY	OFM2 (30GTN015-035) CFR-A (30HWA Only)
		FAN2	ON/OFF	FAN2 RELAY	OFM3 (30GTN015-035)
		FAN3	ON/OFF	FAN3 RELAY	N/A
		FAN4	ON/OFF	FAN4 RELAY	N/A
		CLR.P	ON/OFF	COOLER PUMP RELAY	
		CND.P	ON/OFF	CONDENSER PUMP RELAY	
		RMT.A	ON/OFF	REMOTE ALARM RELAY	
COMP		CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
		UL.A1	ON/OFF	UNLOADER A1 RELAY	
		UL.A2	ON/OFF	UNLOADER A2 RELAY	
		HGBP	ON/OFF	HOT GAS BYPASS RELAY	

LEGEND

EXV — Electronic Expansion Valve

Table 11A — Temperature Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT		CEWT	XXX.X °F	COOLER ENTERING FLUID	
		CLWT	XXX.X °F	COOLER LEAVING FLUID	
		OAT	XXX.X °F	OUTSIDE AIR TEMPERATURE	
		SPT	XXX.X °F	SPACE TEMPERATURE	
		CNDE	XXX.X °F	CONDENSER ENTERING FLUID	
		CNDL	XXX.X °F	CONDENSER LEAVING FLUID	
		DLWT	XXX.X °F	LEAD/LAG LEAVING FLUID	
CIR.A		SCT.A	XXX.X °F	SATURATED CONDENSING TMP	N/A
		SST.A	XXX.X °F	SATURATED SUCTION TEMP	N/A
		SGT.A	XXX.X °F	COMPRESSOR SUCTION TEMP	N/A
		SUP.A	XXX.X °F	SUCTION SUPERHEAT TEMP	N/A
CIR.B		SCT.B	XXX.X °F	SATURATED CONDENSING TMP	N/A
		SST.B	XXX.X °F	SATURATED SUCTION TEMP	N/A
		SGT.B	XXX.X °F	COMPRESSOR SUCTION TEMP	N/A
		SUP.B	XXX.X °F	SUCTION SUPERHEAT TEMP	N/A

Table 11B — Temperature Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT		CEWT	XXX.X °F	COOLER ENTERING FLUID	
		CLWT	XXX.X °F	COOLER LEAVING FLUID	
		OAT	XXX.X °F	OUTSIDE AIR TEMPERATURE	
		SPT	XXX.X °F	SPACE TEMPERATURE	
		CNDE	XXX.X °F	CONDENSER ENTERING FLUID	
		CNDL	XXX.X °F	CONDENSER LEAVING FLUID	
		DLWT	XXX.X °F	LEAD/LAG LEAVING FLUID	
CIR.A		SCT.A	XXX.X °F	SATURATED CONDENSING TMP	
		SST.A	XXX.X °F	SATURATED SUCTION TEMP	
		SGT.A	XXX.X °F	COMPRESSOR SUCTION TEMP	N/A
		SUP.A	XXX.X °F	SUCTION SUPERHEAT TEMP	N/A
CIR.B		SCT.B	XXX.X °F	SATURATED CONDENSING TMP	N/A
		SST.B	XXX.X °F	SATURATED SUCTION TEMP	N/A
		SGT.B	XXX.X °F	COMPRESSOR SUCTION TEMP	N/A
		SUP.B	XXX.X °F	SUCTION SUPERHEAT TEMP	N/A

Table 12A — Pressure Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
PRC.A		DP.A	XXX.X PSIG	DISCHARGE PRESSURE	Pressure is calculated. (N/A)
		SP.A	XXX.X PSIG	SUCTION PRESSURE	Pressure is calculated. (N/A)
PRC.B		DP.B	XXX.X PSIG	DISCHARGE PRESSURE	Pressure is calculated. (N/A)
		SP.B	XXX.X PSIG	SUCTION PRESSURE	Pressure is calculated. (N/A)

Table 12B — Pressure Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
PRC.A		DP.A	XXX.X PSIG	DISCHARGE PRESSURE	Pressure is calculated. (N/A)
		SP.A	XXX.X PSIG	SUCTION PRESSURE	Pressure is calculated. (N/A)
		OILP	XXX.X PSIG	OIL PRESSURE	Pressure is calculated. (N/A)

Table 13 — Set Point Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL		CSP.1	XXX.X °F	COOLING SETPOINT 1	Default: 44 F
		CSP.2	XXX.X °F	COOLING SETPOINT 2	Default: 44 F
		CSP.3	XXX.X °F	ICE SETPOINT	Default: 32 F
HEAT		HSP.1	XXX.X °F	HEATING SETPOINT 1	Default: 100 F
		HSP.2	XXX.X °F	HEATING SETPOINT 2	Default: 100 F
HEAD		HD.P.A	XXX °F	HEAD PRESSURE SETPOINT A	Default: 113 F
		HD.P.B	XXX °F	HEAD PRESSURE SETPOINT B	Default: 113 F (30HK,HL Only)

Table 14 — Reading and Changing Chilled Fluid Set Point

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL		CSP.1	44.0 °F	COOLING SETPOINT 1	Default: 44° F
			44.0 °F		Scrolling stops
			44.0 °F		Value flashes
					Select 46.0
			46.0 °F		Change accepted
		CSP.1	46.0 °F	COOLING SETPOINT 1	Item/Value/Units scrolls again

Table 15A — Inputs Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.I		STST	STRT/STOP	START/STOP SWITCH	Enable/Off/Remote Contact Switch Input
		FLOW	ON/OFF	COOLER FLOW SWITCH	
		CND.F	ON/OFF	CONDENSER FLOW SWITCH	
		DLS1	ON/OFF	DEMAND LIMIT SWITCH 1	
		DLS2	ON/OFF	DEMAND LIMIT SWITCH 2	
		ICED	ON/OFF	ICE DONE	
		DUAL	ON/OFF	DUAL SETPOINT SWITCH	N/A
CRCT		FKA1	ON/OFF	COMPRESSOR A1 FEEDBACK	
		FKA2	ON/OFF	COMPRESSOR A2 FEEDBACK	N/A
		FKA3	ON/OFF	COMPRESSOR A3 FEEDBACK	N/A
		FKA4	ON/OFF	COMPRESSOR A4 FEEDBACK	N/A
		OIL.A	OPEN/CLSE	OIL PRESSURE SWITCH A	
		LPS.A	OPEN/CLSE	LOW PRESSURE SWITCH	
		FKB1	ON/OFF	COMPRESSOR B1 FEEDBACK	
		FKB2	ON/OFF	COMPRESSOR B2 FEEDBACK	N/A
		FKB3	ON/OFF	COMPRESSOR B3 FEEDBACK	N/A
		FKB4	ON/OFF	COMPRESSOR B4 FEEDBACK	N/A
		OIL.B	OPEN/CLSE	OIL PRESSURE SWITCH B	
		LPS.B	OPEN/CLSE	LOW PRESSURE SWITCH	
4-20		DMND	XX.X MA	4-20 MA DEMAND SIGNAL	
		RSET	XX.X MA	4-20 MA RESET SIGNAL	
		CSP	XX.X MA	4-20 MA COOLING SETPOINT	
		HSP	XX.X MA	4-20 MA HEATING SETPOINT	

Table 15B — Inputs Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.I		STST	STRT/STOP	START/STOP SWITCH	Enable/Off/Remote Contact Switch Input
		FLOW	ON/OFF	COOLER FLOW SWITCH	
		CND.F	ON/OFF	CONDENSER FLOW SWITCH	
		DLS1	ON/OFF	DEMAND LIMIT SWITCH 1	
		DLS2	ON/OFF	DEMAND LIMIT SWITCH 2	
		ICED	ON/OFF	ICE DONE	
		DUAL	ON/OFF	DUAL SETPOINT SWITCH	
CRCT		FKA1	ON/OFF	COMPRESSOR A1 FEEDBACK	
		OIL.A	OPEN/CLSE	OIL PRESSURE SWITCH A	
		LPS.A	OPEN/CLSE	LOW PRESSURE SWITCH	
4-20		DMND	XX.X MA	4-20 MA DEMAND SIGNAL	
		RSET	XX.X MA	4-20 MA RESET SIGNAL	
		CSP	XX.X MA	4-20 MA COOLING SETPOINT	
		HSP	XX.X MA	4-20 MA HEATING SETPOINT	

Table 16A — Outputs Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.O		FAN1	ON/OFF	FAN 1 RELAY	
		FAN2	ON/OFF	FAN 2 RELAY	
		FAN3	ON/OFF	FAN 3 RELAY	
		FAN4	ON/OFF	FAN 4 RELAY	
		C.PMP	ON/OFF	COOLER PUMP RELAY	
		H.GAS	ON/OFF	HOT GAS BYPASS RELAY	
		CNDP	ON/OFF	CONDENSER PUMP RELAY	
CIR.A		CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
		CC.A2	ON/OFF	COMPRESSOR A2 RELAY	
		CC.A3	ON/OFF	COMPRESSOR A3 RELAY	
		CC.A4	ON/OFF	COMPRESSOR A4 RELAY	
		UL.A1	ON/OFF	UNLOADER A1 RELAY	
		UL.A2	ON/OFF	UNLOADER A2 RELAY	
		LLS.A	OPEN/CLSE	LIQUID LINE SOLENOID VLV	
		EXV.A	XXX.X %	EXV % OPEN	N/A
CIR.B		CC.B1	ON/OFF	COMPRESSOR B1 RELAY	
		CC.B2	ON/OFF	COMPRESSOR B2 RELAY	
		CC.B3	ON/OFF	COMPRESSOR B3 RELAY	
		CC.B4	ON/OFF	COMPRESSOR B4 RELAY	
		UL.B1	ON/OFF	UNLOADER B1 RELAY	
		UL.B2	ON/OFF	UNLOADER B2 RELAY	N/A
		LLS.B	OPEN/CLSE	LIQUID LINE SOLENOID VLV	
		EXV.B	XXX.X %	EXV % OPEN	N/A

LEGEND

EXV — Electronic Expansion Valve

Table 16B — Outputs Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.O		FAN1	ON/OFF	FAN 1 RELAY	
		FAN2	ON/OFF	FAN 2 RELAY	
		C.PMP	ON/OFF	COOLER PUMP RELAY	
		H.GAS	ON/OFF	HOT GAS BYPASS RELAY	
		CNDP	ON/OFF	CONDENSER PUMP RELAY	
CIR.A		CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
		UL.A1	ON/OFF	UNLOADER A1 RELAY	
		UL.A2	ON/OFF	UNLOADER A2 RELAY	
		LLS.A	OPEN/CLSE	LIQUID LINE SOLENOID VLV	

LEGEND

EXV — Electronic Expansion Valve

Table 17A — Configuration Mode and Sub-Mode Directory (30HK,HL Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT		
DISP		TEST	ON/OFF	TEST DISPLAY LEDS			
		METR	ON/OFF	METRIC DISPLAY	Off = English On = Metric		
		LANG	X	LANGUAGE SELECTION	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese		
UNIT		TYPE	X	UNIT TYPE	2 = Water Cooled (30HK) 3 = Split System (30HL)		
		TONS	XXX	UNIT SIZE			
		CAP.A	XXX	CIRCUIT A % CAPACITY	Unit Size	60 Hz	50 Hz
					30HK040	50	60
					30HK,HL050	60	50
					30HK,HL060	50	50
		CMP.A	X	NUMBER CIRC A COMPRESSOR	1		
		CYL.A	X	COMPRESSOR A1 CYLINDERS	4 = HK040 6 = All other HK,HL Models		
		CMP.B	X	NUMBER CIRC B COMPRESSOR	1 (30HK,HL)		
		CYL.B	X	COMPRESSOR B1 CYLINDERS	4 = HK040, HK,HL050 (60 Hz) 6 = All other HK,HL Models		
		EXV	YES/NO	EXV MODULE INSTALLED	N/A		
		SH.SP	Δ F	EXV SUPERHEAT SETPOINT	N/A		
		SH.OF	Δ F	EXV SUPERHEAT OFFSET	N/A		
OPT1		REFG	X	REFRIGERANT	1 = R-22		
		FAN.S	X	FAN STAGING	Default: 1 1 = 1 Stage Independent		
		FLUD	X	COOLER FLUID	Default: 1 1 = Water 2 = Medium Temperature Brine 3 = Low Temperature Brine (Not Supported)		
		HGB.S	YES/NO	HOT GAS BYPASS SELECT			
		HPCM	X	HEAD PRESS. CONT. METHOD	Default: 2 2 = Set Point Control		
		HPCT	X	HEAD PRESS. CONTROL TYPE	Default: 1 0 = No Control 1 = Air Cooled 2 = Water Cooled		
		MMR.S	YES/NO	MOTORMASTER SELECT			
		PRTS	YES/NO	PRESSURE TRANSDUCERS	CURRENTLY NOT SUPPORTED		
		PMP.I	ON/OFF	COOLER PUMP INTERLOCK	Default: On (Off not allowed)		
		CPC	ON/OFF	COOLER PUMP CONTROL	Default: Off		
		CNP.I	ON/OFF	CONDENSER PUMP INTERLOCK	Default: Off		
		CNP.C	ON/OFF	CONDENSER PUMP CONTROL	Default: 0 0 = No control 1 = On when occupied 2 = On with compressor(s)		
		CWT.S	YES/NO	CONDENSER FLUID SENSORS	Default: No		
		CA.UN	X	NO. CIRCUIT A UNLOADERS			
		CB.UN	X	NO. CIRCUIT B UNLOADERS			
		EMM	YES/NO	EMM MODULE INSTALLED			

Table 17A — Configuration Mode and Sub-Mode Directory (30HK,HL Units) (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
OPT2		CTRL	X	CONTROL METHOD	Default: 0 0 = Enable/Off/Remote Switch 1 = 7 Day Schedule 2 = Occupancy 3 = CCN Control
		CCNA	XXX	CCN ADDRESS	Default: 1 Range: 1 to 239
		CCNB	XXX	CCN BUS NUMBER	Default: 0 Range: 0 to 239
		BAUD	X	CCN BAUD RATE	Default: 3 1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400
		LOAD	X	LOADING SEQUENCE SELECT	Default: 1 1 = Equal 2 = Staged
		LLCS	X	LEAD/LAG CIRCUIT SELECT	Default: 1 (for HK,HL) 1 = Automatic 2 = Circuit A Leads 3 = Circuit B Leads
		LCWT	XX.X ΔF	HIGH LCW ALERT LIMIT	Default: 60 Range: 2 to 60 F
		DELY	XX	MIN MINUTES OFF TIME	Default: 0 Minutes Range: 0 to 15 Minutes
		ICE.M	ENBL/DSBL	ICE MODE ENABLE	Default: Disable
RSET		CRST	X	COOLING RESET TYPE	0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temperature 3 = Return Fluid 4 = Space Temperature
		CRT1	XXX.X °F	NO COOL RESET TEMP	Default: 125 F Range: 0 to 125 F
		CRT2	XXX.X °F	FULL COOL RESET TEMP	Default: 0° F Range: 0 to 125 F
		DGRC	XX.X ΔF	DEGREES COOL RESET	Default: 0° F Range: -30 to 30 F
		HRST	X	HEATING RESET TYPE	Default: 0 0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temp 3 = Return Fluid 4 = Space Temperature
		HRT1	XXX.X °F	NO HEAT RESET TEMP	Default: 0° F Range: 0 to 125 F
		HRT2	XXX.X °F	FULL HEAT RESET TEMP	Default: 125 F Range: 0 to 125 F
		DGRH	XX.X ΔF	DEGREES HEAT RESET	Default: 0° F Range: -30 to 30 F
		DMDC	X	DEMAND LIMIT SELECT	Default: 0 0 = None 1 = Switch 2 = 4 to 20 mA Input 3 = CCN Loadshed
		DM20	XXX %	DEMAND LIMIT AT 20 MA	Default: 100% Range: 0 to 100%
		SHNM	XXX	LOADSHED GROUP NUMBER	Default: 0 Range: 0 to 99
		SHDL	XXX %	LOADSHED DEMAND DELTA	Default: 0% Range: 0 to 60%
		SHTM	XXX MIN	MAXIMUM LOADSHED TIME	Default: 60 minutes Range: 0 to 120 minutes
		DLS1	XXX %	DEMAND LIMIT SWITCH 1	Default: 80% Range: 0 to 100%

LEGEND

CCN — Carrier Comfort Network
EMM — Energy Management Module
EXV — Electronic Expansion Valve
LCW — Leaving Chilled Water

Table 17A — Configuration Mode and Sub-Mode Directory (30HK,HL Units) (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET (cont)		DLS2	XXX %	DEMAND LIMIT SWITCH 2	Default: 50% Range: 0 to 100%
		LLEN	ENBL/DSBL	LEAD/LAG CHILLER ENABLE	Default: Disable
		MSSL	SLVE/MAST	MASTER/SLAVE SELECT	Default: Master
		SLVA	XXX	SLAVE ADDRESS	Default: 0 Range: 0 to 239
		LLBL	ENBL/DSBL	LEAD/LAG BALANCE SELECT	Default: Disable
		LLBD	XXX HRS	LEAD/LAG BALANCE DELTA	Default: 168 hours Range: 40 to 400 Hours
		LLDY	XX	MIN LAG START DELAY	Default: 5 minutes Range: 0 to 30 minutes
SLCT		CLSP	X	COOLING SETPOINT SELECT	0 = Single 1 = Dual Switch 2 = Dual 7 day 3 = Dual CCN Occupied 4 = 4 to 20 mA Input 5 = External POT
		HTSP	X	HEATING SETPOINT SELECT	0 = Single 1 = Dual Switch 2 = Dual 7 day 3 = Dual CCN Occupied 4 = 4 to 20 mA Input
		RL.S	ENBL/DSBL	RAMP LOAD SELECT	Default: Enable
		CRMP	X.X	COOLING RAMP LOADING	Default: 1.0 Range: 0.2 to 2.0
		HRMP	X.X	HEATING RAMP LOADING	Default: 1.0 Range: 0.2 to 2.0
		HCSW	COOL/HEAT	HEAT COOL SELECT	Default: Cool
		Z.GN	X.X	DEADBAND MULTIPLIER	Default: 1.0 Range: 1.0 to 4.0

LEGEND

CCN — Carrier Comfort Network
EMM — Energy Management Module
EXV — Electronic Expansion Valve
LCW — Leaving Chilled Water

Table 17B — Configuration Mode and Sub-Mode Directory (30GTN and 30HW Units)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
DISP		TEST	ON/OFF	TEST DISPLAY LEDS	
		METR	ON/OFF	METRIC DISPLAY	Off = English On = Metric
		LANG	X	LANGUAGE SELECTION	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese
UNIT		TYPE	X	UNIT TYPE	1 = Air Cooled (30GTN) 2 = Water Cooled (30HWC,S) 3 = Split System (30HWA)
		TONS	XXX	UNIT SIZE	
		CYL.A	X	COMPRESSOR A1 CYLINDERS	4 = 30HW025, 30GTN015 (50 Hz), 30GTN020 (60 Hz) 6 = All other models
		REFG	X	REFRIGERANT	1 = R-22
		FAN.S	X	FAN STAGING SELECT	1 = 30HWA, 30GTN015-030 (Single Stage) 2 = 30GTN035 (Two Stage)

Table 17B — Configuration Mode and Sub-Mode Directory (30GTN and 30HW Units) (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
OPT1		FLUD	X	COOLER FLUID	1 = Water 2 = Medium Temperature Brine 3 = Low Temperature Brine (Not Supported)
		HGB.S	YES/NO	HOT GAS BYPASS SELECT	
		PRTS	YES/NO	PRESSURE TRANSDUCERS	Default: No
		PMP.I	ON/OFF	COOLER PUMP INTERLOCK	Default: On (Off not allowed)
		CPC	ON/OFF	COOLER PUMP CONTROL	Default: Off
		CNP.I	ON/OFF	CONDENSER PUMP INTERLOCK	Default: Off
		CNP.C	ON/OFF	CONDENSER PUMP CONTROL	Default: 0 0 = No control 1 = On when occupied 2 = On with compressor(s)
		CWT.S	YES/NO	CONDENSER FLUID SENSORS	Default: No
		CA.UN	X	NO. CIRCUIT A UNLOADERS	1 = 30GTN015 (50 Hz), 020 (60 Hz), 30HW (025) 2 = All other models
		EMM	YES/NO	EMM MODULE INSTALLED	
OPT2		CTRL	X	CONTROL METHOD	Default: 0 0 = Enable/Off/Remote Switch 1 = 7 Day Schedule 2 = Occupancy 3 = CCN Control
		CCNA	XXX	CCN ADDRESS	Default: 1 Range: 1 to 239
		CCNB	XXX	CCN BUS NUMBER	Default: 0 Range: 0 to 239
		BAUD	X	CCN BAUD RATE	Default: 3 1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400
		LCWT	XXX.X ΔF	HIGH LCW ALERT LIMIT	Default: 60 Range: 2 to 60 F
		DELY	XX	MIN MINUTES OFF TIME	Default: 0 Minutes Range: 0 to 15 Minutes
		ICE.M	ENBL/DSBL	ICE MODE ENABLE	Default: Disable
RSET		CRST	X	COOLING RESET TYPE	0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temperature 3 = Return Fluid 4 = Space Temperature
		CRT1	XXX.X °F	NO COOL RESET TEMP	Default: 125 F Range: 0 to 125 F
		CRT2	XXX.X °F	FULL COOL RESET TEMP	Default: 0° F Range: 0 to 125 F
		DGRC	XX.X ΔF	DEGREES COOL RESET	Default: 0° F Range: -30 to 30 F
		HRST	X	HEATING RESET TYPE	Default: 0 0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temp 3 = Return Fluid 4 = Space Temperature

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CCN — Carrier Comfort Network
EMM — Energy Management Module
EXV — Electronic Expansion Valve
LCW — Leaving Chilled Water

Table 17B — Configuration Mode and Sub-Mode Directory (30GTN and 30HW Units) (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET (cont)		HRT1	XXX.X °F	NO HEAT RESET TEMP	Default: 0° F Range: 0 to 125 F
		HRT2	XXX.X °F	FULL HEAT RESET TEMP	Default: 125 F Range: 0 to 125 F
		DGRH	XX.X ΔF	DEGREES HEAT RESET	Default: 0° F Range: -30 to 30 F
		DMDC	X	DEMAND LIMIT SELECT	Default: 0 0 = None 1 = Switch 2 = 4 to 20 mA Input 3 = CCN Loadshed
		DM20	XXX %	DEMAND LIMIT AT 20 MA	Default: 100% Range: 0 to 100%
		SHNM	XXX	LOADSHED GROUP NUMBER	Default: 0 Range: 0 to 99
		SHDL	XXX %	LOADSHED DEMAND DELTA	Default: 0% Range: 0 to 60%
		SHTM	XXX MIN	MAXIMUM LOADSHED TIME	Default: 60 minutes Range: 0 to 120 minutes
		DLS1	XXX %	DEMAND LIMIT SWITCH 1	Default: 80% Range: 0 to 100%
		DLS2	XXX %	DEMAND LIMIT SWITCH 2	Default: 50% Range: 0 to 100%
		LLEN	ENBL/DSBL	LEAD/LAG CHILLER ENABLE	Default: Disable
		MSSL	SLVE/MAST	MASTER/SLAVE SELECT	Default: Master
		SLVA	XXX	SLAVE ADDRESS	Default: 0 Range: 0 to 239
		LLBL	ENBL/DSBL	LEAD/LAG BALANCE SELECT	Default: Disable
		LLBD	XXX HRS	LEAD/LAG BALANCE DELTA	Default: 168 hours Range: 40 to 400 Hours
		LLDY	XX	MIN LAG START DELAY	Default: 5 minutes Range: 0 to 30 minutes
SLCT		CLSP	X	COOLING SETPOINT SELECT	0 = Single 1 = Dual Switch 2 = Dual 7 day 3 = Dual CCN Occupied 4 = 4 to 20 mA Input 5 = External POT
		HTSP	X	HEATING SETPOINT SELECT	0 = Single 1 = Dual Switch 2 = Dual 7 day 3 = Dual CCN Occupied 4 = 4 to 20 mA Input
		RL.S	ENBL/DSBL	RAMP LOAD SELECT	Default: Enable
		CRMP	X.X	COOLING RAMP LOADING	Default: 1.0 Range: 0.2 to 2.0
		HRMP	X.X	HEATING RAMP LOADING	Default: 1.0 Range: 0.2 to 2.0
		HCSW	COOL/HEAT	HEAT COOL SELECT	Default: Cool
		Z.GN	X.X	DEADBAND MULTIPLIER	Default: 1.0 Range: 1.0 to 4.0

LEGEND

CCN — Carrier Comfort Network
EMM — Energy Management Module
EXV — Electronic Expansion Valve
LCW — Leaving Chilled Water

Table 18 — Example of Temperature Reset (Outdoor Air) Configuration

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET	ENTER	CRST	0	COOLING RESET TYPE	0 = No reset 1 = 4 to 20 mA input 2 = Outdoor Air Temp 3 = Return Fluid 4 = Space Temperature
	ENTER		0		Scrolling stops
	ENTER		0		Value flashes
	▲		2		Select 2
	ENTER		2		Change accepted
	ENTER	CRST	2		Item/Value/Units scrolls again
	▼	CRT1	125	NO COOL RESET TEMP	Range: 0 to 125 F
	ENTER		125		Scrolling stops
	ENTER		125		Value flashes
	▼		75		Select 75
	ENTER		75		Change accepted
	ESCAPE	CRT1	75		Item/Value/Units scrolls again
	▼	CRT2	0	FULL COOL RESET TEMP	Range: 0 to 125 F
	ENTER		0		Scrolling stops
	ENTER		0		Value flashes
	▲		50		Select 50
	ENTER		50		Change accepted
	ESCAPE	CRT2	50		Item/Value/Units scrolls again
	▼	DGRC	0	DEGREES COOL RESET	Range: -30 to 30 F
	ENTER		0		Scrolling stops
	ENTER		0		Value flashes
	▲		10		Select 10
	ENTER		10		Change accepted
	ESCAPE	DGRC	10		Item/Value/Units scrolls again

NOTE: The example above shows how to configure the chiller for temperature reset by an accessory outdoor-air temperature sensor. The chiller will be configured for a full reset of 10 degrees at 50 F and no reset at 75 F.

Table 19 — Example of Temperature Reset (Return Fluid) Configuration

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET		CRST	0	COOLING RESET TYPE	0 = No reset 1 = 4 to 20 mA input 2 = Outdoor Air Temp 3 = Return Fluid 4 = Space Temperature
			0		Scrolling stops
			0		Value flashes
			3		Select 3
			3		Change accepted
		CRST	3		Item/Value/Units scrolls again
		CRT1	125	NO COOL RESET TEMP	Range: 0 to 125 F
			125		Scrolling stops
			125		Value flashes
			10		Select 10
			10		Change accepted
		CRT1	10		Item/Value/Units scrolls again
		CRT2	0	FULL COOL RESET TEMP	Range: 0 to 125 F
			0		Scrolling stops
			0		Value flashes
			2		Select 2
			2		Change accepted
		CRT2	2		Item/Value/Units scrolls again
		DGRC	0	DEGREES COOL RESET	Range: -30 to 30 F
			0		Scrolling stops
			0		Value flashes
			8		Select 8
			8		Change accepted
		DGRC	8		Item/Value/Units scrolls again

NOTE: The example above shows how to configure the chiller for temperature reset based on chiller return fluid. The chiller will be configured for no reset at a cooler delta (EWT-LWT) of 10 F (5.6 C) and a full reset of 8 F (4.4 C) at a cooler delta of 2 F (1.1 C).

Table 20 — Example of Configuring Dual Chiller Control

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET		CRST	0	COOLING RESET TYPE	
		LLDY	5	LAG START DELAY	
			5		Scrolling stops
			5		Value flashes
			10		Select 10
			10		Change accepted
		LLDY	10		
		LLBD	168	LEAD/LAG BALANCE DELTA	No change needed. Default set for weekly changeover
		LLBL	DSBL	LEAD/LAG BALANCE SELECT	
			DSBL		Scrolling stops
			DSBL		Value flashes
			ENBL		Select Enable
			ENBL		Change accepted
		LLBL	ENBL		
		SLVA	0	SLAVE ADDRESS	
			0		Scrolling stops
			0		Value flashes
			6		Select 6
			6		Change accepted
		SLVA	6		
		MSSL	MAST	MASTER/SLAVE SELECT	No change needed. Default set for Master
		LLEN	DSBL	LEAD/LAG CHILLER ENABLE	
			DSBL		Scrolling stops
			DSBL		Value flashes
			MAST		Select Master
		LLEN	MAST		Change accepted
		LLEN	MAST	LEAD/LAG CHILLER ENABLE	Item/Value/Units scrolls again

Table 21 — Example of Compressor Lead/Lag Configuration

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
OPT2		CTRL	0	CONTROL METHOD	
		CCNA	1		
		CCNB	0		
		BAUD	3		
		LOAD	1		
		LLCS	1	LEAD/LAG CIRCUIT SELECT	DEFAULT: 1 (30HK,HL) 1 = Automatic* 2 (30HW,GTN) 2 = Circuit A Leads 3 = Circuit B Leads*
			1		Scrolling stops
			1		Value flashes
			3		Select 3*
			3		Change accepted
		LLCS	3	LEAD/LAG CIRCUIT SELECT	Item/Value/Units scrolls again

*Options 1 and 3 are valid for 30HK,HL units only.

Table 22 — Time Clock Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TIME		HH.MM	XX.XX	HOUR AND MINUTE	Military (00.00-23.59)
DATE		MNTH	XX	MONTH	1=Jan, 2=Feb, etc.
		DOM	XX	DATE OF MONTH	Range 1-31
		DAY	X	DAY OF WEEK	1=Mon, 2=Tue, etc.
		YEAR	XXXX	YEAR OF CENTURY	
SCHD		MON.O	XX.XX	MONDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		MON.U	XX.XX	MONDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		TUE.O	XX.XX	TUESDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		TUE.U	XX.XX	TUESDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		WED.O	XX.XX	WEDNESDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		WED.U	XX.XX	WEDNESDAY UNOCC TIME	Range: 00.00 to 23.59 Default: 00.00
		THU.O	XX.XX	THURSDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		THU.U	XX.XX	THURSDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		FRI.O	XX.XX	FRIDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		FRI.U	XX.XX	FRIDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		SAT.O	XX.XX	SATURDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		SAT.U	XX.XX	SATURDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		SUN.O	XX.XX	SUNDAY OCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00
		SUN.U	XX.XX	SUNDAY UNOCCUPIED TIME	Range: 00.00 to 23.59 Default: 00.00

Table 23 — Setting an Occupied Time Schedule

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCHD		MON.O	00.00	MONDAY OCCUPIED TIME	TIME IN MILITARY FORMAT (HH.MM)
			00.00		Scrolling stops
			00.00		Hours flash
			07.00		Select 7 AM
			07.00		Change accepted, minutes flash
			07.30		Select 30
			07.30		Change accepted
		MON.O	07.30	MONDAY OCCUPIED TIME	Item/Value/Units scrolls again

Table 24 — Operating Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
MODE		MD01	ON/OFF	FSM CONTROLLING CHILLER	
		MD02	ON/OFF	WSM CONTROLLING CHILLER	
		MD03	ON/OFF	MASTER/SLAVE CONTROL	
		MD04	ON/OFF	LOW SOURCE PROTECTION	Not Supported
		MD05	ON/OFF	RAMP LOAD LIMITED	
		MD06	ON/OFF	TIMED OVERRIDE IN EFFECT	
		MD07	ON/OFF	LOW COOLER SUCTION TEMP A	N/A
		MD08	ON/OFF	LOW COOLER SUCTION TEMP B	(30HK,HL Only)
		MD09	ON/OFF	SLOW CHANGE OVERRIDE	
		MD10	ON/OFF	MINIMUM OFF TIME ACTIVE	
		MD11	ON/OFF	LOW SUCTION SUPERHEAT A	N/A
		MD12	ON/OFF	LOW SUCTION SUPERHEAT B	(30HK,HL Only)
		MD13	ON/OFF	DUAL SETPOINT	
		MD14	ON/OFF	TEMPERATURE RESET	
		MD15	ON/OFF	DEMAND LIMIT IN EFFECT	
		MD16	ON/OFF	COOLER FREEZE PROTECTION	
		MD17	ON/OFF	LO TMP COOL/HI TMP HEAT	
		MD18	ON/OFF	HI TMP COOL/LO TMP HEAT	
		MD19	ON/OFF	MAKING ICE	
		MD20	ON/OFF	STORING ICE	
		MD21	ON/OFF	HIGH SCT CIRCUIT A	(30GTN Only)
		MD22	ON/OFF	HIGH SCT CIRCUIT B	(30HK,HL Only)

LEGEND

FSM — Flotronic™ System Manager
SCT — Saturated Condensing Temperature
WSM — Water System Manager

Table 25 — Operating Modes

MODE NO.	ITEM EXPANSION	DESCRIPTION
01	FSM CONTROLLING CHILLER	Flotronic™ System Manager (FSM) is controlling the chiller.
02	WSM CONTROLLING CHILLER	Water System Manager (WSM) is controlling the chiller.
03	MASTER/SLAVE CONTROL	Lead/Lag Chiller control is enabled.
04	LOW SOURCE PROTECTION	Not currently supported.
05	RAMP LOAD LIMITED	Ramp load (pulldown) limiting in effect. In this mode, the rate at which leaving fluid temperature is dropped is limited to a predetermined value to prevent compressor overloading. See CRMP set point in the Set Point Select (SLCT) section of the Configuration mode. The pulldown limit can be modified, if desired, to any rate from 0.2° F to 2° F (0.1 to 1 C)/minute.
06	TIMED OVERRIDE IN EFFECT	Timed override is in effect. This is a 1 to 4 hour temporary override of the programmed schedule, forcing unit to Occupied mode. Override can be implemented with unit under Local (Enable) or CCN control. Override expires after each use.
07	LOW COOLER SUCTION TEMP A	Circuit A capacity may be limited due to operation of this mode. Control will attempt to correct this situation for up to 10 minutes before shutting the circuit down. The control may decrease capacity when attempting to correct this problem. See Alarms and Alerts section for more information.
08	LOW COOLER SUCTION TEMP B	Circuit B capacity may be limited due to operation of this mode. Control will attempt to correct this situation for up to 10 minutes before shutting the circuit down. The control may decrease capacity when attempting to correct this problem. See Alarms and Alerts section for more information.
09	SLOW CHANGE OVERRIDE	Slow change override is in effect. The leaving fluid temperature is close to and moving towards the control point.
10	MINIMUM OFF TIME ACTIVE	Chiller is being held off by Minutes Off Time (DELY) found under Options 2 (OPT2) section of Configuration mode.
11	LOW SUCTION SUPERHEAT A	Circuit A capacity may be limited due to operation of this mode. Control will attempt to correct this situation for up to 5 minutes before shutting the circuit down. See Alarms and Alerts section for more information.
12	LOW SUCTION SUPERHEAT B	Circuit B capacity may be limited due to operation of this mode. Control will attempt to correct this situation for up to 5 minutes before shutting the circuit down. See Alarms and Alerts section for more information.
13	DUAL SETPOINT	Dual set point mode is in effect. Chiller controls to CSP.1 during occupied periods and CSP.2 during unoccupied periods. Both CSP.1 and CSP.2 are located under COOL in the Set Point mode.
14	TEMPERATURE RESET	Temperature reset is in effect. In this mode, chiller is using temperature reset to adjust leaving fluid set point upward and is currently controlling to the modified set point. The set point can be modified based on return fluid, outdoor-air-temperature, space temperature, or 4 to 20 mA signal.
15	DEMAND LIMIT IN EFFECT	Demand limit is in effect. This indicates that the capacity of the chiller is being limited by demand limit control option. Because of this limitation, the chiller may not be able to produce the desired leaving fluid temperature. Demand limit can be controlled by switch inputs or a 4 to 20 mA signal.
16	COOLER FREEZE PROTECTION	Cooler fluid temperatures are approaching the Freeze point (see Alarms and Alerts section for definition). The chiller will be shut down when either fluid temperature falls below the Freeze point.
17	LO TMP COOL/HI TMP HEAT	Chiller is in Cooling mode and the rate of change of the leaving fluid is negative and decreasing faster than -0.5° F per minute. Error between leaving fluid and control point exceeds fixed amount. Control will automatically unload the chiller if necessary.
18	HI TMP COOL/LO TMP HEAT	Chiller is in Cooling mode and the rate of change of the leaving fluid is positive and increasing. Error between leaving fluid and control point exceeds fixed amount. Control will automatically load the chiller if necessary to better match the increasing load.
19	MAKING ICE	Chiller is in an unoccupied mode and is using Cooling Setpoint 3 (CSP.3) to make ice. The ice done input to the Energy Management Module (EMM) is open.
20	STORING ICE	Chiller is in an unoccupied mode and is controlling to Cooling Setpoint 2 (CSP.2). The ice done input to the Energy Management Module (EMM) is closed.
21	HIGH SCT CIRCUIT A	Chiller is in a cooling mode (30GTN only) and the Saturated Condensing temperature (SCT) read by sensor T3 is greater than 140 F (60 C). No additional stages of capacity will be added. Chiller may be unloaded if SCT continues to rise to avoid high-pressure switch trips by reducing condensing temperature.
22	HIGH SCT CIRCUIT B	N/A

Table 26 — Alarms Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CRNT		AXXX or TXXX	CURRENTLY ACTIVE ALARMS	Alarms are shown as AXXX. Alerts are shown as TXXX.
RCRN		YES/NO	RESET ALL CURRENT ALARMS	
HIST		AXXX or TXXX	ALARM HISTORY	Alarms are shown as AXXX. Alerts are shown as TXXX.
RHIS		YES/NO	RESET ALARM HISTORY	

Table 27 — Example of Reading and Clearing Alarms

SUB-MODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CRNT		AXXX or TXXX	CURRENTLY ACTIVE ALARMS	ACTIVE ALARMS (AXXX) OR ALERTS (TXXX) DISPLAYED.
CRNT				
RCRN		NO		Use to clear active alarms/alerts
		NO		NO Flashes
		YES		Select YES
		NO		Alarms/alerts clear, YES changes to NO

Temperature Reset — The control system is capable of handling leaving-fluid temperature reset based on return cooler fluid temperature. Because the change in temperature through the cooler is a measure of the building load, the return temperature reset is in effect an average building load reset method. The control system is also capable of temperature reset based on outdoor-air temperature (OAT), space temperature (SPT), or from an externally powered 4 to 20 mA signal. Accessory sensors must be used for OAT and SPT reset (HH79NZ073 for OAT and HH51BX006 for SPT). The Energy Management Module (EMM) must be used for temperature reset using a 4 to 20 mA signal.

To use the return reset, four variables must be configured. In the Configuration mode under the sub-mode RSET, items CRST, CRT1, CRT2, and DGRC must be set properly. See Table 28 on page 38 for correct configuration. See Fig. 2-4 for wiring details.

Under normal operation, the chiller will maintain a constant leaving fluid temperature approximately equal to the chilled fluid set point. As the cooler load varies, the entering cooler fluid will change in proportion to the load as shown in Fig. 15. Usually the chiller size and leaving-fluid temperature set point are selected based on a full-load condition. At part load, the fluid temperature set point may be colder than required. If the leaving fluid temperature was allowed to increase at part load, the efficiency of the machine would increase.

Return temperature reset allows for the leaving temperature set point to be reset upward as a function of the return fluid temperature or, in effect, the building load.

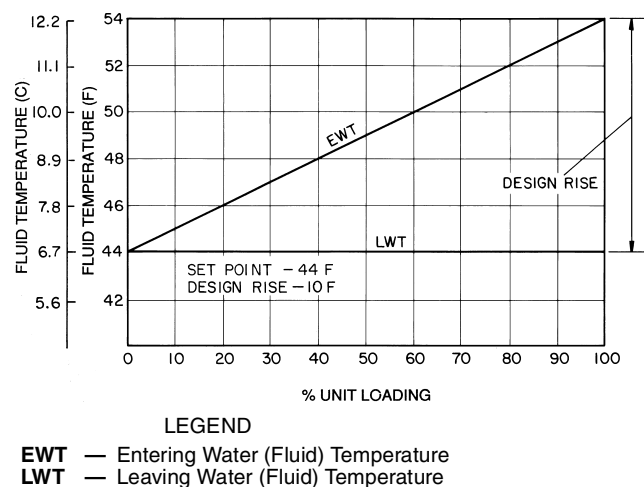
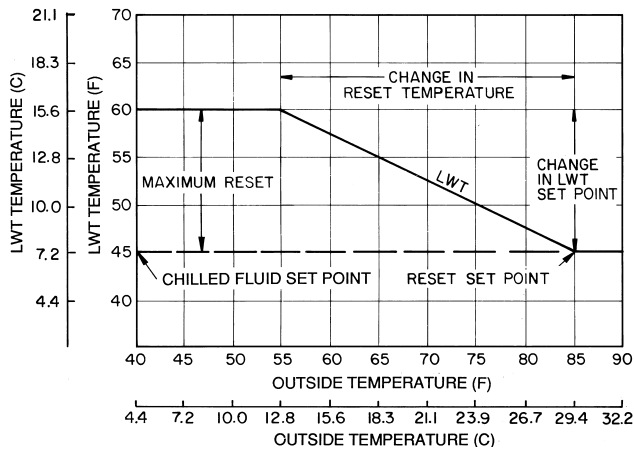


Fig. 15 — Standard Chilled Fluid Temperature Control — No Reset

Table 28 — Configuring Temperature Reset

MODE (GREEN LED)	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CONFIGURATION	ENTER	DISP	ENTER	TEST	ON/OFF	TEST DISPLAY LEDs	
	▼	UNIT	ENTER	TYPE	X	UNIT TYPE	
	▼	OPT1	ENTER	FLUD	X	COOLER FLUID	
	▼	OPT2	ENTER	CTRL	X	CONTROL METHOD	
	▼	RSET	ENTER	CRST	X	COOLING RESET TYPE	0 = No Reset 1 = 4 to 20 mA Input (EMM required) (Connect to EMM J6-2,5) 2 = Outdoor-Air Temperature (Connect to TB5-7,8) 3 = Return Fluid (Connect to TB5-5,6) 4 = Space Temperature
			▼	CRT1	XXX.X F	NO COOL RESET TEMP	Default: 125 F (51.7 C) Range: 0 to 125 F Set to 4.0 for CRST= 1
			▼	CRT2	XXX.X F	FULL COOL RESET TEMP	Default: 0° F (–17.8 C) Range: 0 to 125 F Set to 20.0 for CRST=1
			▼	DGRC	XX.X ΔF	DEGREES COOL RESET	Default: 0° F (0° C) Range: –30 to 30°F (–16.7 to 16.7 C)

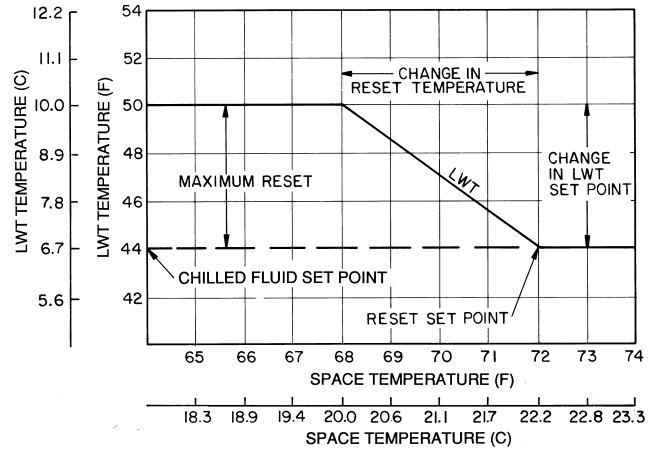
Figures 16 and 17 are examples of outdoor air and space temperature resets:



LEGEND

LWT — Leaving Water (Fluid) Temperature

Fig. 16 — Outdoor-Air Temperature Reset



LEGEND

LWT — Leaving Water (Fluid) Temperature

Fig. 17 — Space Temperature Reset

Demand Limit — Demand Limit is a feature that allows the unit capacity to be limited during periods of peak energy usage. There are 3 types of demand limiting that 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 uses the CCN Loadshed module and has the ability to limit the current operating capacity to maximum and further reduce the capacity if required.

NOTE: The 2-stage switch control and 4- to 20-mA input signal types of demand limiting require the Energy Management Module (EMM).

To use Demand Limit, select the type of demand limiting to use. Then configure the Demand Limit set points based on the type selected.

DEMAND LIMIT (2-Stage Switch Controlled) — To configure Demand Limit for 2-stage switch control set the Demand Limit Select (DMDC) to 1. Then configure the 2 Demand Limit Switch points (DLS1 and DLS2) to the desired capacity limit. See Table 29. Capacity steps are controlled by 2 relay switch inputs field wired to TB6 as shown in Fig. 2-4.

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.

To disable demand limit configure the DMDC to 0. See Table 29.

EXTERNALLY POWERED DEMAND LIMIT (4 to 20 mA Controlled) — To configure Demand Limit for 4 to 20 mA control set the Demand Limit Select (DMDC) to 2. Then configure the Demand Limit at 20 mA (DM20) to the maximum loadshed value desired. The control will reduce allowable capacity to this level for the 20 mA signal. See Table 29 and Fig. 18.

DEMAND LIMIT (CCN Loadshed Controlled) — To configure Demand Limit for CCN Loadshed control set the Demand Limit Select (DMDC) to 3. Then configure the Loadshed Group Number (SHNM), Loadshed Demand Delta (SHDL), and Maximum Loadshed Time (SHTM). See Table 29.

The Loadshed Group number is established by the CCN system designer. The PIC (product integrated control) will respond to a Redline command from the Loadshed control. When the Redline command is received, the current stage of capacity is set to the maximum stages available. Should the loadshed control send a Loadshed command, the PIC will reduce the current stages by the value entered for Loadshed Demand delta. The Maximum Loadshed Time is the defines the maximum length of time that a loadshed condition is allowed to exist. The control will disable the Redline/Loadshed command if no Cancel command has been received within the configured maximum loadshed time limit.

Table 29 — Configuring Demand Limit

MODE	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CONFIGURATION		DISP		TEST	ON/OFF	Test Display LEDs	
		UNIT		TYPE	X	Unit Type	
		OPT1		FLUD	X	Cooler Fluid	
		OPT2		CTRL	X	Control Method	
		RSET		CRST	X	Cooling Reset Type	
				CRT1	XXX.X °F	No Cool Reset Temperature	
				CRT2	XXX.X °F	Full Cool Reset Temperature	
				DGRC	XX.X ΔF	Degrees Cool Reset	NOTE: Heating Reset values skipped in this example.
				DMDC	X	Demand Limit Select	Default: 0 0 = None 1 = Switch 2 = 4 to 20 mA Input 3 = CCN Loadshed
				DM20	XXX %	Demand Limit at 20 mA	Default: 100% Range: 0 to 100
				SHNM	XXX	Loadshed Group Number	Default: 0 Range: 0 to 99
				SHDL	XXX%	Loadshed Demand Delta	Default: 0% Range: 0 to 60%
				SHTM	XXX MIN	Maximum Loadshed Time	Default: 60 min. Range: 0 to 120 min.
				DLS1	XXX %	Demand Limit Switch 1	Default: 80% Range: 0 to 100%
				DLS2	XXX %	Demand Limit Switch 2	Default: 50% Range: 0 to 100%

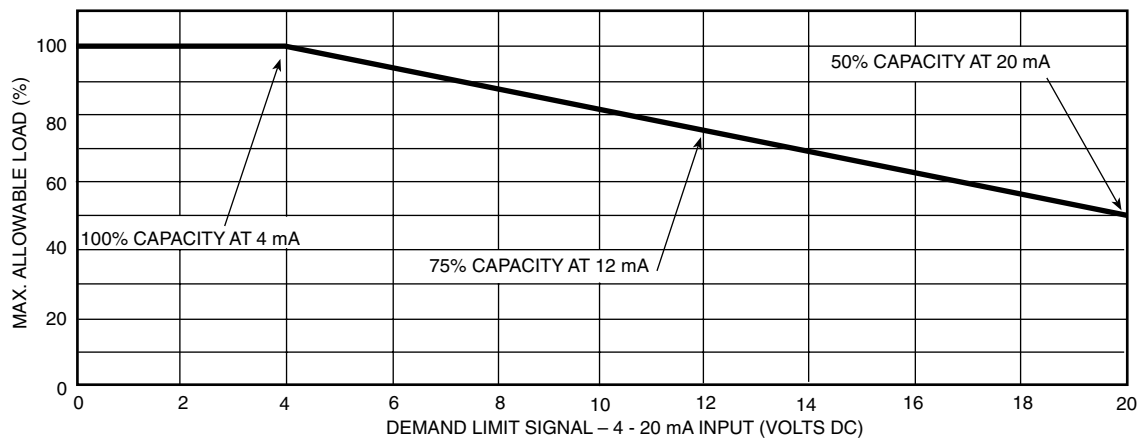


Fig. 18 — 4- to 20-mA Demand Limiting

TROUBLESHOOTING

Complete Unit Stoppage and Restart — Possible causes for unit stoppage and reset methods are shown below. (See Table 30 also.)

GENERAL POWER FAILURE — After power is restored, restart is automatic through normal MBB start-up.

UNIT ENABLE-OFF-REMOTE CONTACT SWITCH IS OFF — When the switch is OFF, the unit will go through pumpout (30HL, 30GTN) and then stop immediately. Place the switch in the ENABLE position for local switch control or in the REMOTE CONTACT position for control through remote contact closure.

CHILLED FLUID PROOF-OF-FLOW SWITCH(ES) OPEN — After the problem causing the loss of flow has been corrected, reset is manual by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

OPEN LOW-PRESSURE SWITCH — If a low-pressure switch remains open for more than 2 minutes during unit operation, the compressor(s) shuts down and is locked off. The unit service light is illuminated. Determine and correct the cause of the failure. The switch automatically resets, but the unit must be reset manually by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27. One switch opening per day is allowed and will be reset automatically. The second (or more) trip in one day will be a manual reset condition. If this is the case, determine the cause of the loss of charge, correct the problem, and recharge the unit before restarting.

OPEN HIGH-PRESSURE SWITCH(ES) — The unit service light is illuminated. Determine and correct the cause of the failure. The switch resets automatically, but the unit must be reset manually by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

OPEN COMPRESSOR INTERNAL THERMAL PROTECTION (30HW and 30GTN Units) — This switch provides compressor overtemperature protection on 30HW018 and 30GTN015 units. The unit alarm/alert indicator light is illuminated. Determine and correct the cause of the problem. The switch resets automatically, but the unit must be reset

manually by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

OPEN OIL PRESSURE SWITCH — If oil pressure switch(es) opens for more than 2 minutes during unit operation, the unit shuts down and is locked off. The unit service light is illuminated. Determine and correct the cause of the failure. Unit must be reset by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

OPEN CONTACTS ON COMPRESSOR GROUND-CURRENT SENSOR(S) (Accessory) — The light-emitting diode (LED) on the ground current accessory board (located in field control wiring section of control box) is illuminated. See Fig. 19-23. Unit service light is also illuminated. **Check the compressor motor windings for a short to ground.** Determine and correct the cause of the failure. Unit must be reset by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

OPEN 24-V CONTROL CIRCUIT BREAKER(S) — Determine the cause of the failure and correct. Reset circuit breaker(s). Restart is automatic after MBB start-up cycle is complete.

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

THERMISTOR FAILURE — If a thermistor fails in either an open or shorted condition, the unit will be shut down. Replace T1, T2, or T3 as required. Unit restarts automatically when the condition has been corrected by switching the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF then to ENABLE within 5 seconds (QuickSet units) or resetting the alarm with the Scrolling Marquee as shown in Table 27.

⚠ CAUTION

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

Table 30 — Troubleshooting

SYMPTOMS	CAUSE	REMEDY
Compressor does not run	Power line open	Reset circuit breaker.
	Control fuse or circuit breaker opens	Check control circuit for ground or short. Reset breaker and replace fuse.
	Compressor overtemperature sensor open (06D)	Find cause of high temperature and reset controls.
	Tripped power breaker	Check the controls. Find the cause of trip and reset breaker.
	Condenser or cooler circulating pump not running	Power off — restart.
		Pump binding — free pump.
		Incorrect wiring —rewire.
		Pump motor burned out — replace.
	Loose terminal connection	Check connections.
	Improperly wired controls	Check wiring and rewire if necessary.
Compressor cycles off on loss of charge	Low line voltage	Check line voltage —determine location of voltage drop and remedy deficiency.
	Compressor motor defective	Check motor winding for open or short. Replace compressor if necessary.
	Seized compressor	Replace compressor.
	Loss of charge control erratic in action	Repair leak and recharge.
		Replace control.
	Low refrigerant charge	Add refrigerant.
Compressor cycles off on out of range condition	Low suction temperature	Raise cooler leaving fluid temperature set point.
	Compressor suction valve leaking	Replace valve plate.
	Plugged compressor suction strainer	Clean or replace strainer.
	Compressor suction shutoff valve partially closed	Open valve.
	Thermistor failure	Replace thermistor.
Compressor cycles control steps rapidly	System load was reduced faster than controller could remove stages	Unit will restart after fluid temperature rises back into the control band. Avoid rapidly removing system load.
	Temperature controller deadband setting is too low	Raise deadband setting.
Compressor shuts down on high-pressure control	High-pressure control acting erratically	Replace control.
	Compressor discharge valve partially closed	Open valve or replace (if defective).
	Noncondensables in system	Purge system.
	Condenser scaled/dirty	Clean condenser.
	Receiver not properly vented — refrigerant backs up into evaporator condenser	Repipe as required to provide adequate venting.
	Condenser water pump or fans not operating	Start pump — repair or replace if defective.
	System overcharged with refrigerant	Reduce charge.
Unit operates too long or continuously	Low refrigerant charge	Add refrigerant.
	Control contacts fused	Replace control.
	Air in system	Purge system.
	Partially plugged or plugged expansion valve or filter drier	Clean or replace as needed.
	Defective insulation	Replace or repair as needed.
	Service load	Keep doors and windows closed.
	Inefficient compressor	Check valves, and replace if necessary.
Unusual or loud system noises	Piping vibration	Support piping as required.
		Check for loose pipe connections
	Expansion valve hissing	Add refrigerant.
		Check for plugged liquid line filter drier.
	Compressor noisy	Check valve plates for valve noise.
		Replace compressor (worn bearings). Check for loose compressor holddown bolts.

Table 30 — Troubleshooting (cont)

SYMPTOMS	CAUSE	REMEDY
Compressor loses oil	Leak in system	Repair leak.
	Mechanical damage (blown piston or broken discharge valve)	Repair damage or replace compressor as needed.
	Oil trapped in line	Check piping for oil traps.
	Crankcase heater not energized during shutdown	Check wiring and crankcase heater contacts on the temperature controller, and replace heater if necessary.
Hot liquid line	Shortage of refrigerant due to leak	Repair leak and recharge.
Frosted liquid line	Shutoff valve partially closed or restricted	Open valve or remove restriction.
	Restricted filter drier	Replace filter drier.
Frosted suction line	Expansion valve admitting excess refrigerant	Adjust expansion valve. Replace valve if defective.
Compressor will not unload	Burned-out coil	Replace coil.
	Defective capacity control valve	Replace valve.
	Miswired solenoid	Rewire correctly.
	Weak, broken, or wrong valve body spring	Replace spring.
Compressor will not load	Miswired solenoid	Rewire correctly.
	Defective capacity control valve	Replace valve.
	Plugged strainer (high side)	Clean or replace strainer.
	Stuck or damaged unloader piston or piston ring(s)	Clean or replace the necessary parts.
Freeze-up	Improper charging	Make sure a full quantity of fluid is flowing through the cooler while charging, and suction pressure in cooler is equal to or greater than pressure corresponding to 32 F (0° C) (58 psig [400 kPa] for Refrigerant 22).
	Improperly set safety thermostat	Check safety thermostat for proper setting at beginning of each season.
	Operating with safety thermostat bypassed	If thermostat was bypassed for checking, be sure it is back in circuit before starting unit.
	Improper circulation of condenser water	Use adequately sized cleanable strainer in the condenser water circuit. Make sure strainer is clean. It may sometimes be necessary to chemically treat the water to prevent formation of deposits.
	System not drained for winter shutdown	Remove drain plugs at end of cooling season. Blow out any residual water. Instead of draining, a suitable anti-freeze may be added to the water. <i>Damage to chiller due to freezing is considered abuse and is not covered by warranty.</i>
	Loose Thermistor	Verify thermistors are fully inserted in wells.

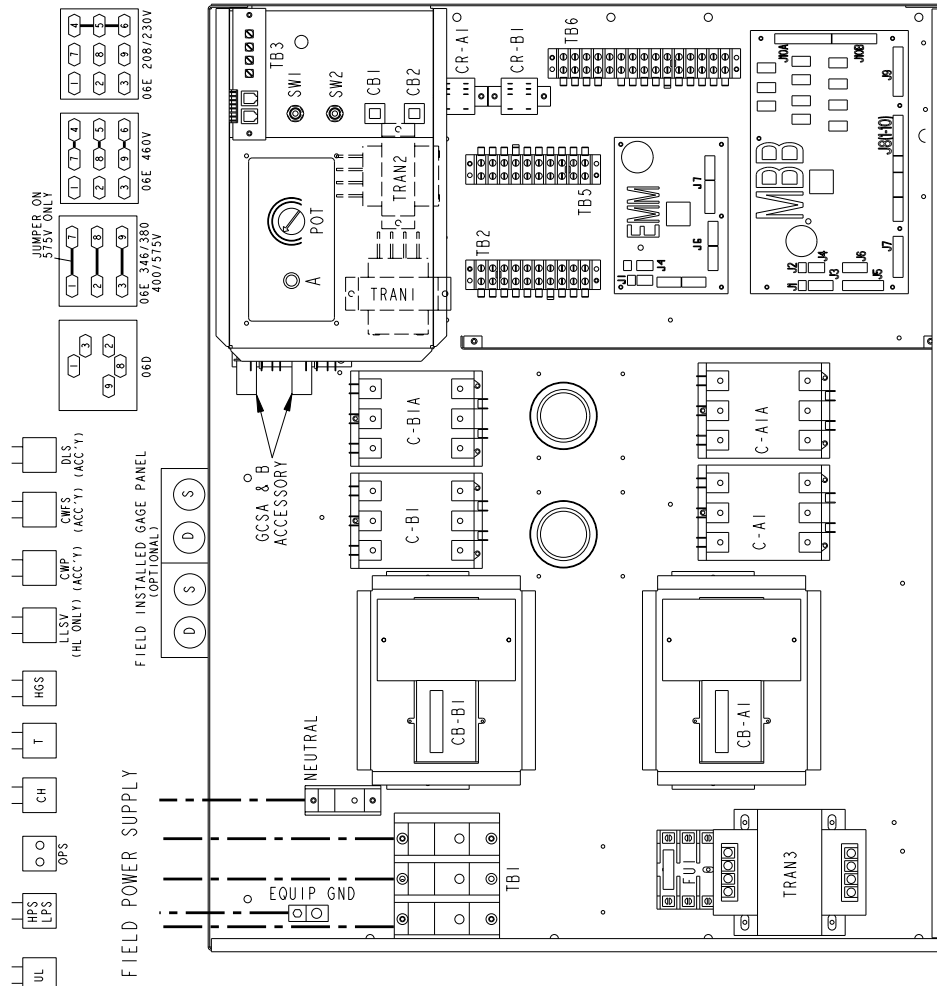
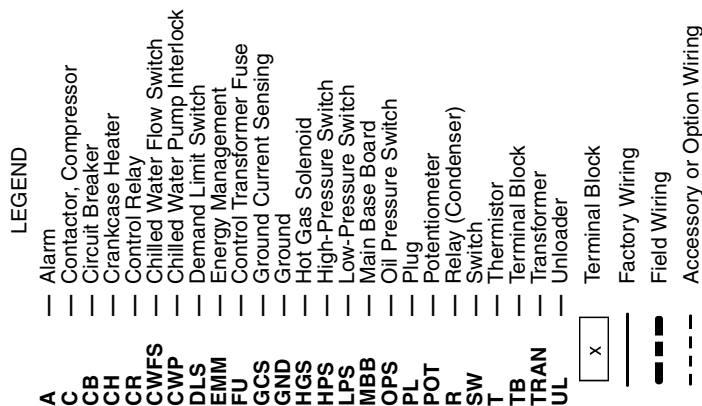
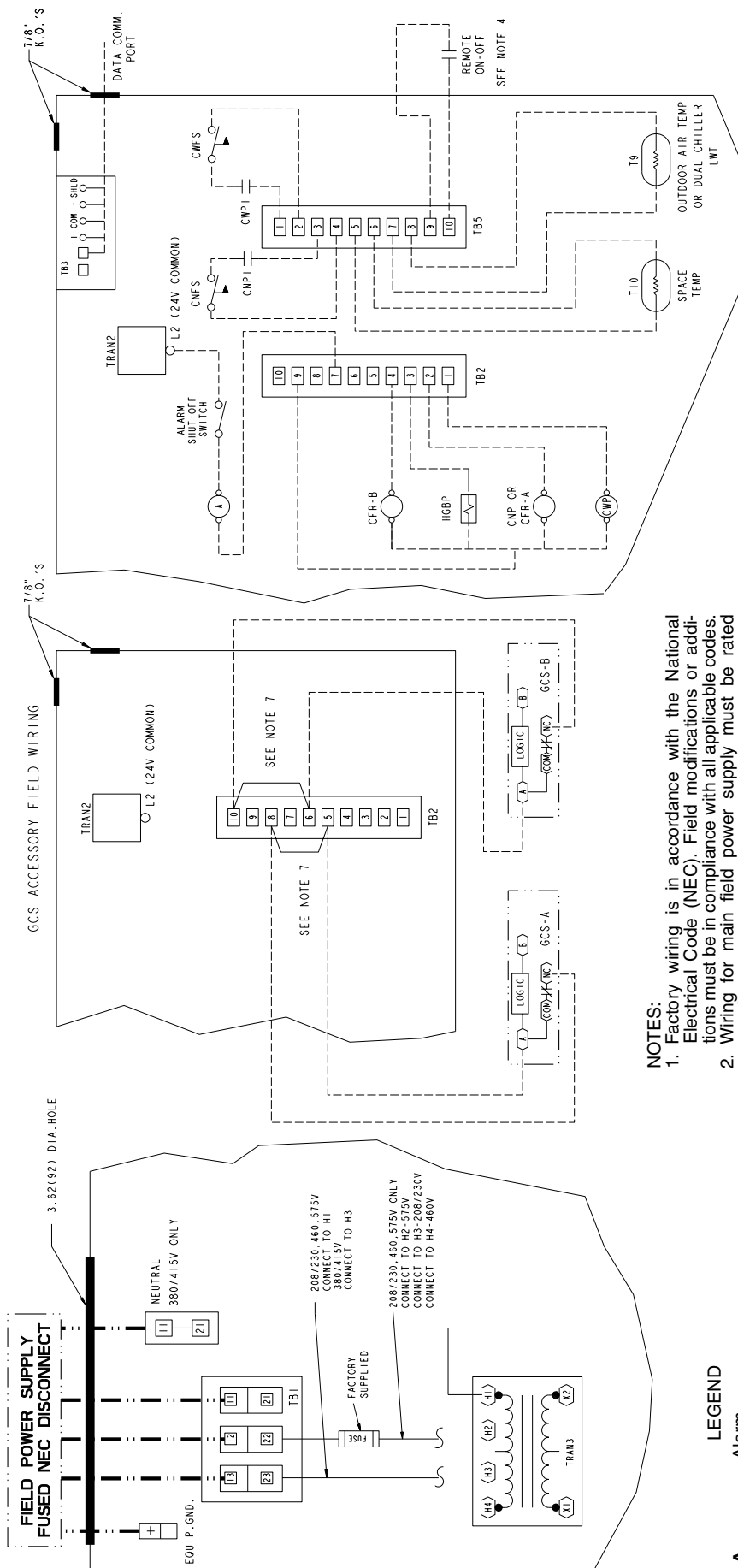


Fig. 19 — Component Arrangement; 30HK, HL040-060



- NOTES:**
1. Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
 2. Use 75 C min wire for field power supply.
 3. All circuit breakers 'Must Trip Amps' are equal to or less than 156% RLA (Rated Load Amps).
 4. Oil pressure safety switches are standard on 30HL units only.
 5. All field interlock contacts must have a minimum rating of 2 amps at 24 vac sealed. See field interlock wiring.
 6. Compressors thermally protected — three phase motors protected against primary single phase conditions.
 7. Terminals 9 and 10 of TB5 are for field connection of remote On-Off. The contacts must be rated for dry circuit application capable of handling a 5 vdc 1 mA to 20 mA load.



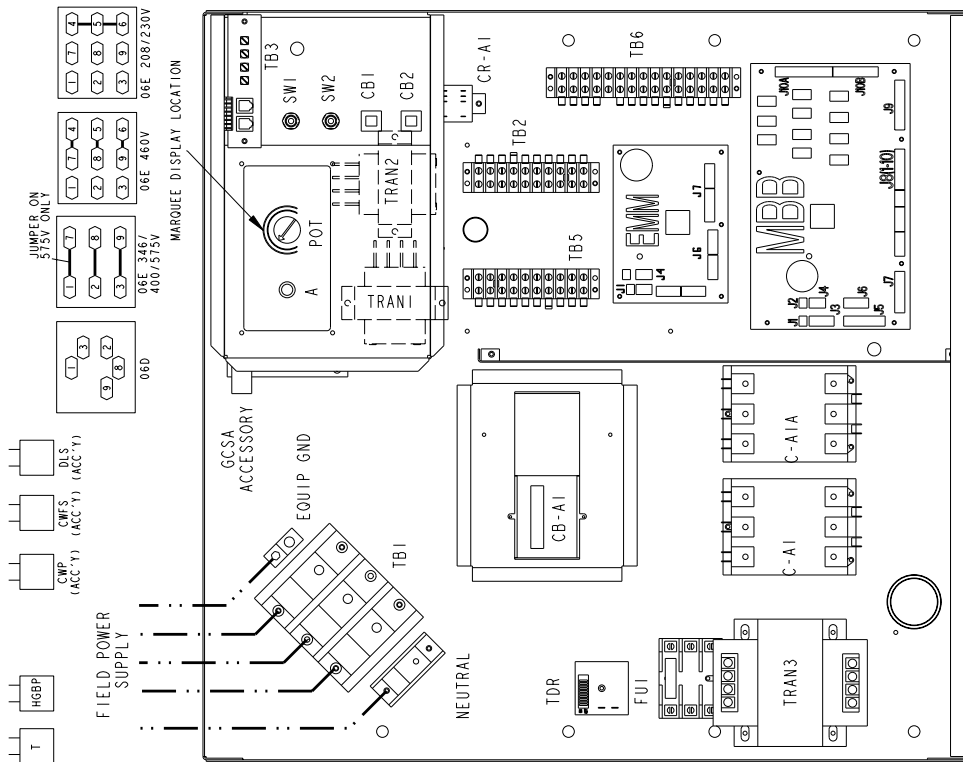
NOTES:

1. Factory wiring is in accordance with the National Electrical Code (NEC). Field modifications or additions must be in compliance with all applicable codes.
2. Wiring for main field power supply must be rated 75° C minimum. Use copper, copper clad aluminum or aluminum conductors for all units.
3. Control power is factory supplied. TRAN3 primary voltage is 230 v for 208/230-3-60 and 380/415-3-50 units. TRAN3 primary voltage is 460 v for 460-3-60 and 575 v for 575-3-60. TRAN3 secondary voltage is 115 v for all units.
4. Terminals 9 and 10 of TB5 are for field connection for remote on-off control. The contacts must be rated for dry circuit application capable of reliably switching a 5 vdc, .5 mA load.
5. The maximum load allowed for the remote alarm relay circuit is 15 va sealed, 30 va inrush at 24 volt.
6. The maximum load allowed for the condenser fan, condenser pump or cooler pump relays is 15 va sealed, 30 va inrush each at 115 volt.
7. For GCS accessory, remove jumper wire from TB2, terminals 5/8 for compressor A1 and from terminals 6/10 for compressor B1.

LEGEND

A	Alarm
CFR	Condenser Fan Relay
CNFS	Condenser Flow Switch
CNP	Condenser Pump
CNPI	Condenser Pump Interlock
CWFS	Chilled Water Flow Switch
CWP	Chilled Water Pump
CWPI	Chilled Water Pump Interlock
GCS	Ground Current Sensing
HGBP	Hot Gas Bypass
LWT	Leaving Water Temperature
TB	Terminal Block
TRAN	Transformer
---	Field Power Wiring
---	Field Control Wiring
---	Factory-Installed Wiring
---	Field-Installed Device

Fig. 20 — Field Wiring Diagram; 30HK, HL040-060



- NOTES:**
1. Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
 2. Use 75° C min wire for field power supply.
 3. All circuit breakers 'Must Trip Amps' are equal to or less than 156% RLA (Rated Load Amps).
 4. Oil pressure safety switches are standard on 30HWA units only.
 5. All field interlock contacts must have a minimum rating of 2 amps at 24 vac sealed. See field interlock wiring.
 6. Compressors thermally protected — three phase motors protected against primary single phase conditions. Terminals 9 and 10 of TB5 are for field connection of remote On-Off. The contacts must be rated for dry circuit application capable of handling a 5 vdc 1 mA to 20 mA load.

Fig. 21 — Component Arrangement; 30HWA, B, C, S018-040

LEGEND

—	Alarm
—	Contactor, Compressor
—	Circuit Breaker
—	Crankcase Heater
—	Control Relay
—	Chilled Water Flow Switch
—	Cooler Water Pump
—	Demand Limit Switch
—	Energy Management
—	Fuse
—	Ground Current Sensing
—	Ground
—	Hot Gas Bypass
—	High-Pressure Switch
—	Low-Pressure Switch
—	Main Base Board
—	Oil Pressure Switch
—	Plug
—	Potentiometer
—	Switch
—	Thermistor
—	Terminal Block
—	Time Delay Relay
—	Transformer
—	Unloader
—	Terminal Block
—	Factory Wiring
—	Field Wiring
—	Accessory or Option Wiring

A Alarm
C Contactor, Compressor
CB Circuit Breaker
CH Crankcase Heater
CR Control Relay
CWFS Chilled Water Flow Switch
CWP Cooler Water Pump
DLS Demand Limit Switch
EMM Energy Management
FU Fuse
GCS Ground Current Sensing
GND Ground
HGBBP Hot Gas Bypass
HPS High-Pressure Switch
LPS Low-Pressure Switch
MBB Main Base Board
PL Oil Pressure Switch
POT Potentiometer
SW Switch
T Thermistor
TB Terminal Block
TDR Time Delay Relay
TRAN Transformer
UL Unloader

— x — Terminal Block
 — — — — — Factory Wiring
 - - - - - Field Wiring
 - - - - - Accessory or Option Wiring

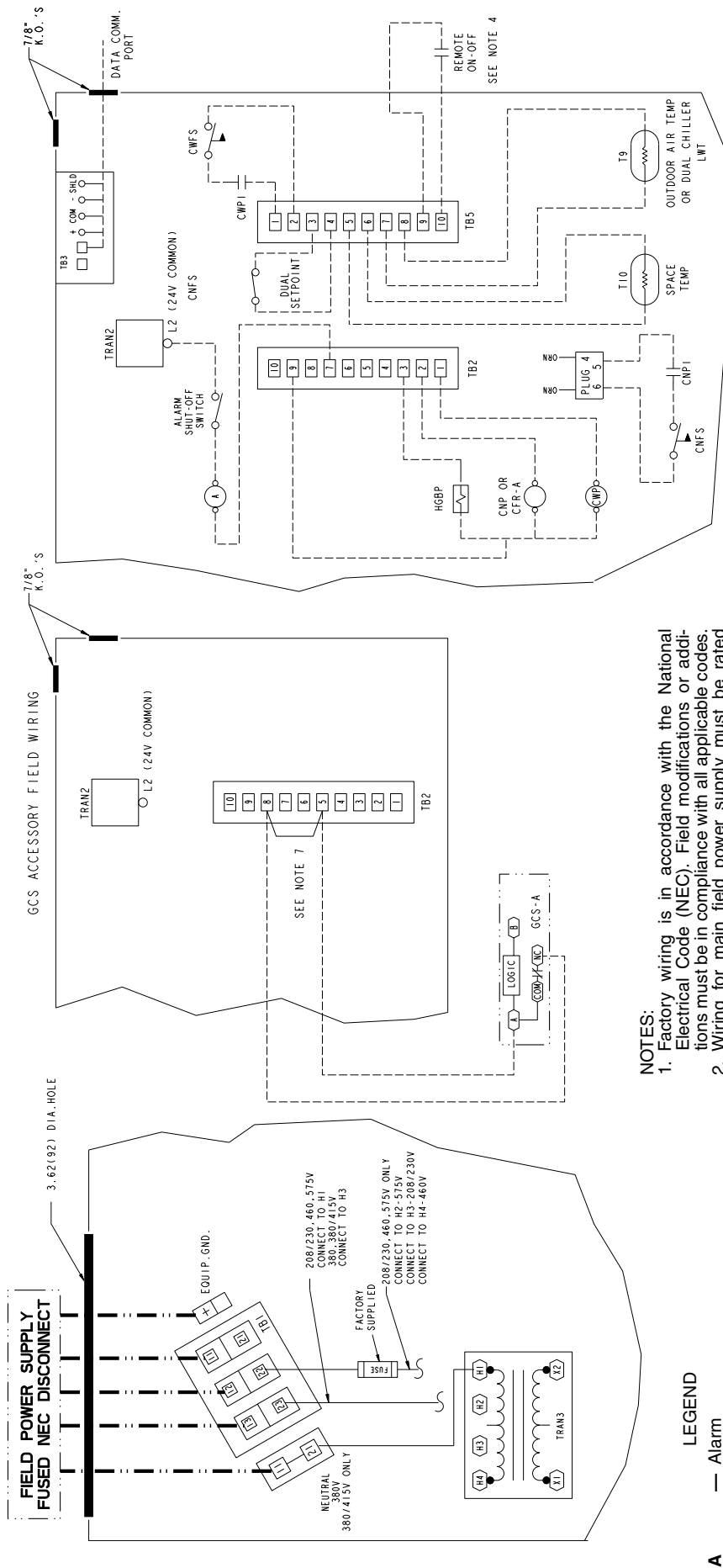
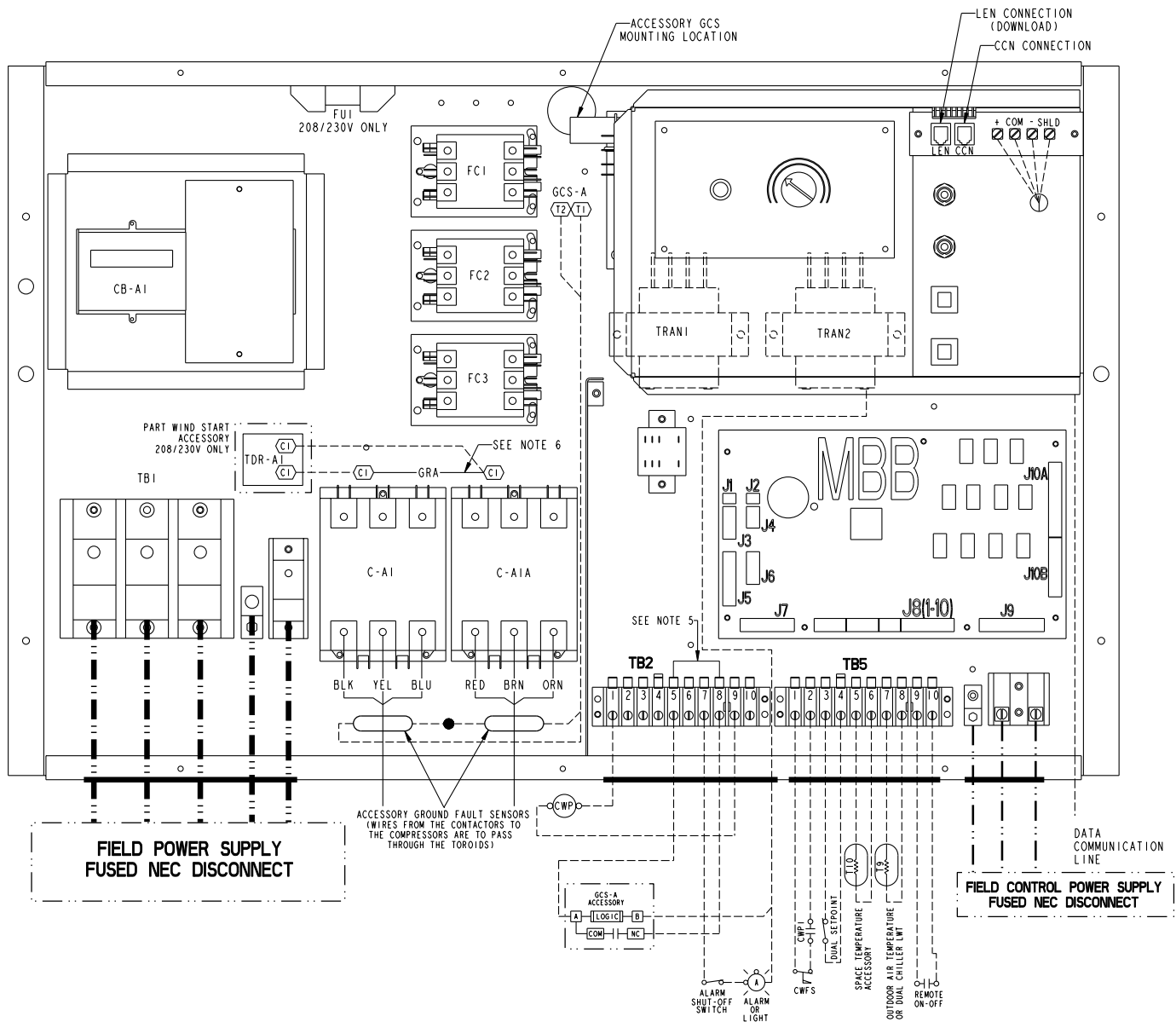


Fig. 22 — Field Wiring Diagram; 30HWA,B,C,S018-040



LEGEND	
C	Compressor Contactor
CB	Circuit Breaker
CCN	Carrier Comfort Network
CWFS	Chilled Water Flow Switch
CWP	Chilled Water Pump
CWPI	Chilled Water Pump Interlock
FC	Fan Contactor
FU	Fuse
GCS	Ground Current Sensor
LEN	Local Equipment Network
MBB	Main Base Board
NEC	National Electrical Code
TB	Terminal Block
TDR	Time-Delay Relay
TRAN	Transformer
■ ■ ■ ■	Field Power Wiring
— · — ·	Field Control Power Wiring
— — — —	Factory-Installed Wiring
- - - -	Field Wiring

NOTES:

1. Factory wiring is in accordance with the National Electrical Code. Any field modifications or additions must be in compliance with all applicable codes.
2. Connect separate source of control power from field-supplied fused disconnect to terminal 1 of TB4. Neutral side must be connected to terminal 2. This provides power for the unit control circuit, cooler heater and compressor crankcase heater.
3. All field interlock contacts must have a minimum rating of 360 va pilot duty plus capacity required for field-installed equipment.
4. For internal unit wiring, reference wiring book or unit wiring label diagram.
5. For GCS accessory, remove jumper wire between terminals 5 and 8 on terminal block TB2.
6. For part wind start accessory, remove gray jumper wire between C-A1-C1 and C-A1A-C1. Time-delay relay shown is suggested mounting position.
7. Voltage requirements:

MAIN POWER	CONTROL POWER
208/230-3-60	115-1-60
460-3-60	115-1-60
575-3-60	115-1-60
380-3-60	220-1-60
380/415-3-50	230-1-50

Fig. 23 — Component Arrangement and Field Wiring Diagram, 30GTN015-035

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 described in Table 31.

The alarm/alert indicator light is illuminated when any alarm or alert condition is present. To reset the unit, switch the ENABLE-OFF-REMOTE CONTACT switch from ENABLE to OFF and back to ENABLE within 5 seconds. Indicator light will be turned off when switched correctly. Do not reset the chiller at random without first investigating and correcting the cause(s) of the failure.

Automatic alarms will reset without operator intervention if the condition corrects itself. The following method must be used to reset manual alarms:

Before resetting any alarm, first determine the cause of the alarm and correct it. Enter the Alarms mode indicated by the LED on the side of the Scrolling Marquee Display. Press **ENTER** and **▼** until the sub-menu item RCRN “RESET ALL CURRENT ALARMS” is displayed. Press **ENTER**. The control will prompt the user for a password, by displaying PASS and WORD. Press **ENTER** to display the default password, 1111. Press **ENTER** for each character. If the password has been changed, use the arrow keys to change each individual character. Toggle the display to “YES” and press **ENTER**. The alarms will be reset.

Table 31 — Alarm and Alert Codes

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T051	Alert	Circuit A, Compressor 1 Failure	Compressor feedback signal does not match relay state	Circuit A shut down.	Manual	High-pressure switch open, faulty control relay, ground current sensor accessory tripped, loss of condenser flow/air, liquid valve closed, filter drier plugged, operation beyond capability.
T055	Alert	Circuit B, Compressor 1 Failure	Compressor feedback signal does not match relay state	Circuit B shut down.	Manual	High-pressure switch open, faulty control relay, ground current sensor accessory tripped, loss of condenser flow/air, liquid valve closed, filter drier plugged, operation beyond capability.
A060	Alarm	Cooler Leaving Fluid Thermistor Failure (T1)	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Chiller shutdown immediately (30HK, 30HW) or after pumpdown is complete (30HL).	Automatic	Thermistor failure, damaged cable/wire or wiring error.
A061	Alarm	Cooler Entering Fluid Thermistor Failure (T2)	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Chiller shutdown immediately (30HK, 30HW) or after pumpdown is complete (30HL).	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T062	Alert	Condenser Leaving Fluid Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Alert only. No action taken.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T063	Alert	Condenser Entering Fluid Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Alert only. No action taken.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T064	Alert	Circuit A Saturated Condensing Thermistor Failure (T3)	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Circuit A shutdown after pumpdown complete. (30GTN only)	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T073	Alert	Outside Air Thermistor Failure (T9)	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Temperature reset disabled. Chiller runs under normal control/set points.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T074	Alert	Space Temperature Thermistor Failure (T10)	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Temperature reset disabled. Chiller runs under normal control/set points.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T079	Alert	Lead/Lag Thermistor Failure	Lead/lag runs using Master LWT sensor. Master is lead chiller	Circuit A shutdown after pumpdown complete.	Automatic	Dual LWT thermistor failure, damaged cable/wire or wiring error.
T118	Alert	Circuit A Low Oil Pressure	Oil pressure switch open after 1 minute of continuous operation	Circuit shutdown without going through pumpdown.	Manual	Oil pump failure, low oil level, switch failure or compressor circuit breaker tripped.
T119	Alert	Circuit B Low Oil Pressure	Oil pressure switch open after 1 minute of continuous operation	Circuit shutdown without going through pumpdown.	Manual	Oil pump failure, low oil level, switch failure or compressor circuit breaker tripped.
T133	Alert	Circuit A Low Refrigerant Pressure	Low pressure switch open during operation	Circuit shutdown.	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty or plugged TXV, low refrigerant charge, TXV out of adjustment, liquid line solenoid valve faulty.
T134	Alert	Circuit B Low Refrigerant Pressure	Low-pressure switch open during operation	Circuit shutdown.	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty or plugged TXV, low refrigerant charge, TXV out of adjustment, liquid line solenoid valve faulty.
T135	Alert	Circuit A Failure to pump down	Low-pressure switch did not open within 3 minutes	Circuit shutdown.	Manual	Faulty liquid line solenoid valve, faulty low-pressure switch.
T136	Alert	Circuit B Failure to pump down	Low-pressure switch did not open within 3 minutes	Circuit shutdown	Manual	Faulty liquid line solenoid valve, faulty low-pressure switch.

Table 31 — Alarm and Alert Codes (cont)

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
A150	Alarm	Emergency Stop	CCN emergency stop command received	Chiller shutdown without going through pumpdown.	Automatic once CCN command for EMSTOP returns to normal	CCN Network command.
A151	Alarm	Illegal Configuration [XX]	One or more of the illegal configurations shown in the Note on page 50 exists.	Chiller is not allowed to start.	Manual once configuration errors are corrected	Configuration error. See Note on page 50.
A152	Alarm	Unit Down Due to Failure	Both circuits are down due to alarms/alerts.	Chiller is unable to run.	Automatic once alarms/alerts are cleared that prevent the chiller from starting.	Alarm notifies user that chiller is 100% down.
T153	Alert	Real Time Clock Hardware Failure	Internal clock on MBB fails	Occupancy schedule will not be used. Chiller defaults to Local On mode.	Automatic when correct clock control restarts.	Time/Date/Month/Day/Year not properly set.
A154	Alarm	Serial EEPROM Hardware Failure	Hardware failure with MBB	Chiller is unable to run.	Manual	Main Base Board failure.
T155	Alert	Serial EEPROM Storage Failure	Configuration/storage failure with MBB	No Action	Manual	Potential failure of MBB. Download current operating software. Replace MBB if error occurs again.
A156	Alarm	Critical Serial EEPROM Storage Failure	Configuration/storage failure with MBB	Chiller is not allowed to run.	Manual	Main Base Board failure.
A157	Alarm	A/D Hardware Failure	Hardware failure with peripheral device	Chiller is not allowed to run.	Manual	Main Base Board failure.
T158	Alert	Cooler LWT Setpoint Pot (QuickSet) Failure	Potentiometer input exceeds 14 kohms.	Control uses Cooling Setpoint 1 (CSP1)	Automatic	Faulty potentiometer, wiring error.
T173	Alert	Loss of Communication with EMM	MBB loses communication with EMM	4 to 20 mA temperature reset disabled. Demand Limit set to 100%. 4 to 20 mA set point disabled.	Automatic	Wiring error, faulty wiring or failed Energy Management Module (EMM).
T174	Alert	4 to 20 mA Cooling Set Point Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Set point function disabled. Chiller controls to CSP1.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
T175	Alert	4 to 20 mA Heating Set Point Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Set point function disabled. Chiller controls to HSP1.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
T176	Alert	4 to 20 mA Temperature Reset Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Reset function disabled. Chiller returns to normal set point control.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
T177	Alert	4 to 20 mA Demand Limit Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Demand limit function disabled. Chiller returns to 100% demand limit control.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
A200	Alarm	Cooler Pump Interlock Failure to Close at Start-Up	If configured for cooler pump interlock and the flow switch input fails to close within 5 minutes after start-up. Also valid when configured for cooler pump control.	Cooler pump shut off. Chiller shutdown without going through pumpdown.	Automatic 3 times/day; manual thereafter.	Failure of cooler pump, flow switch, or interlock.
A201	Alarm	Cooler Pump Interlock Opened During Normal Operation	If configured for cooler pump interlock and the flow switch opens during normal operation (or when the cooler pump relay is on when cooler pump control is configured).	Cooler pump shut off. Chiller shutdown without going through pumpdown.	Manual	Failure of cooler pump, flow switch, or interlock.
A202	Alarm	Cooler Pump Interlock Closed When Pump is Off	If configured for cooler pump control and interlock closes while cooler pump relay is off (after 5-minute delay).	Chiller is not allowed to start.	Manual	Failure of cooler pump relay or interlock, welded contacts.

Table 31 — Alarm and Alert Codes (cont)

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RES METHOD	PROBABLE CAUSE
T203	Alert	Loss of Communication with slave chiller	Master chiller MBB loses communication with slave chiller MBB	Dual chiller control disabled. Chiller runs as a stand-alone machine.	Automatic	Wiring error, faulty wiring, failed Slave chiller MBB module, power loss at slave chiller, wrong slave address.
T204	Alert	Loss of Communication with master chiller	Slave chiller MBB loses communication with master chiller MBB	Dual chiller control disabled. Chiller runs as a stand-alone machine	Automatic	Wiring error, faulty wiring, failed master chiller MBB module, power loss at Master chiller.
T205	Alert	Master and slave chiller with same address	Master and slave chiller have the same CCN address (CCN.A)	Dual chiller routine disabled. Master/slave run as stand-alone chillers.	Automatic	CCN Address for both chillers is the same. Must be different. Check CCN.A under the OPT2 sub-mode in Configuration at both chillers.
T206	Alert	High Leaving Chilled Water Temperature	LWT read is greater than LCW Alert Limit, Total capacity is 100% and LWT is greater than LWT reading one minute ago	Alert only. No action taken.	Automatic	Building load greater than unit capacity, low water/ brine flow or compressor fault. Check for other alarms/alerts.
A207	Alarm	Cooler Freeze Protection	Cooler EWT or LWT is less than freeze*	Chiller shutdown without going through pumpdown. Cooler pump continues to run (if control enabled).	Automatic for first occurrence of day. Manual reset thereafter.	Faulty thermostat (T1/T2), low water flow.
A208	Alarm	Low Cooler Fluid Flow	Cooler EWT is less than LWT by 3° F (1.7° C) for 1 minute after a circuit is started	Chiller shutdown without going through pumpdown. Cooler pump shut off (if control enabled).	Manual	Faulty cooler pump, low water flow, plugged fluid strainer.
A220	Alarm	Condenser Pump Interlock Failure to Close at Start-Up	If configured for condenser pump interlock and the flow switch input fails to close within 5 minutes after start-up. Also valid when configured for condenser pump control.	Condenser and cooler pumps shut off. Chiller shutdown without going through pumpdown.	Manual	Failure of condenser pump or controls. Wiring error.
A221	Alarm	Condenser Pump Interlock Opened During Normal Operation	If configured for condenser pump interlock and the flow switch opens for 15 seconds during normal operation (or when the condenser pump relay is on when condenser pump control is configured.)	Condenser and cooler pumps shut off. Chiller shutdown without going through pumpdown.	Manual	Failure of condenser pump or controls. Wiring error.
A222	Alarm	Condenser Pump Interlock Closed When Pump is Off	If configured for condenser pump interlock condenser pump control, and the flow switch is closed when pump relay is off.	Chiller is not allowed to start.	Manual	Failure of condenser pump relays or interlocks, welded contacts.

LEGEND

CCN — Carrier Comfort Network
EMM — Energy Management Module
EWT — Entering Fluid Temperature
LCW — Leaving Chilled Water
LWT — Leaving Fluid Temperature
MBB — Main Base Board
TXV — Thermostatic Expansion Valve
WSM — Water System Manager

*Freeze is defined as 34 F (1.1 C) for water. For brine fluids, freeze is CSP.1 – 8 F (4.4 C) for single set point and lower of CSP.1 or CSP.2 – 8 F (4.4 C) for dual set point configuration.

When ice mode is enabled, freeze is the lower of CSP.1 or CSP.3 – 8 F (4.4 C) during occupied periods. The lower of CSP.2 or CSP.3 – 8 F (4.4 C) is used during unoccupied periods.

NOTE: The following table shows illegal configurations:

CODE	DESCRIPTION
01	Unit type (TYPE) = 0
08	Low-temperature brine (FLUD) = 3 and unit type (TYPE) = 1.
11	Lead/lag (LLEN) enabled, master selected (MSSL) and cooling set point select (CLSP) = 5.
13	Condenser pump interlock (CNP.1) = ON and unit type (TYPE) = 1.
14	Low-pressure set point out of range.
15	Conflicting occupancy schedules.
16	Cooler fluid type (FLUD) = 1 and ice mode (ICE.M) = Enable

SERVICE



ELECTRIC SHOCK HAZARD.

Turn off all power to unit before servicing. The ENABLE/OFF/REMOTE CONTACT switch on control panel does *not* shut off control power; use *field disconnect*.

Electronic Components

CONTROL COMPONENTS — Unit uses an advanced electronic control system that normally does not require service. For details on controls refer to Operating Data section.

The compressor compartment has 2 side access panels and one hinged and latched front door for easy opening on 30GTN models. The front door provides access to the compressor, all components of the refrigeration system, electrical controls and the control box. After opening the front door, an inner panel must be removed to access the components in the control box. The control box door on 30HK,HL,HW models is also hinged and is secured in place by two screws.

Compressor Replacement (30HK,HL,HW) — If a replacement 6-cylinder compressor has a center-bank cylinder head with discharge valve pad facing the pump end, remove head and install reverse flange head from original compressor (discharge valve pad toward the motor end). Center-bank cylinder head cannot be rotated 180 degrees.

Be sure all the hardware from the old compressor is removed and installed on the new compressor, including the high-pressure switch snubber, the discharge gas thermostat (30HW025-040), the oil pressure safety switch (if equipped), and the low-pressure switch.

The compressor can be removed from either the front or the sides of the unit, depending on where clearance space was allowed during unit installation. The compressor and mounting hardware are mounted on a plate which is screwed down to the unit basepan. Remove the 4 screws holding the plate to the basepan and the plate should easily slide out of the unit. Mount the replacement compressor to the plate, slide the plate back into the unit and secure with the 4 screws.

Compressor Replacement (30GTN) — Access to the compressor for replacement is from the control box end (door) and the left side access panel when facing the control box end. See Fig. 24.

IMPORTANT: All compressor mounting hardware and support brackets removed during servicing must be reinstalled prior to start-up.

Following the installation of the new compressor:

Tighten discharge valves to —

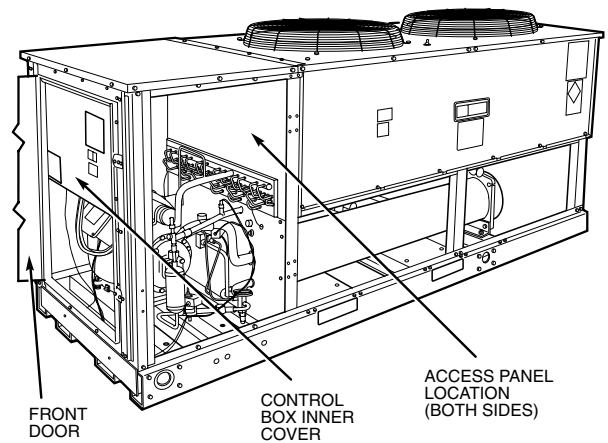
	Compressor(s)
20 to 25 ft-lb (27 to 34 N-m)	06D537, 06E250
80 to 90 ft-lb (109 to 122 N-m)	06E265,275,299

Tighten suction valves to —

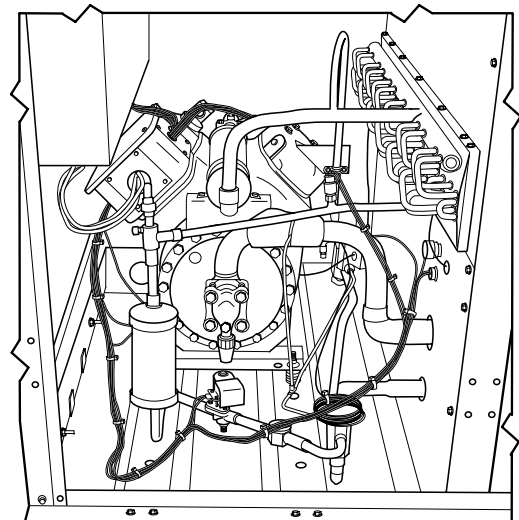
80 to 90 ft-lb (109 to 122 N-m)	06D537, 06E250
90 to 120 ft-lb (122 to 163 N-m)	06E265,275,299

Tighten the following fittings to —

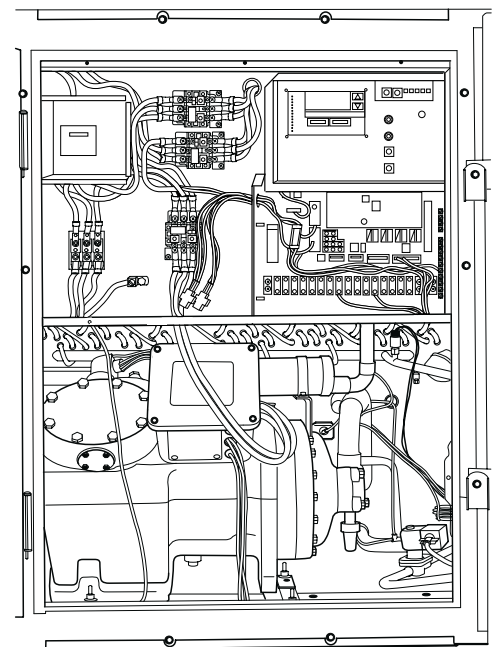
10 ft-lb (13.5 N-m)	High-Pressure Switch
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LEFT FRONT VIEW, COMPRESSOR END



COMPRESSOR END, LEFT FRONT ACCESS DOOR (WHEN FACING COOLER)



COMPRESSOR END, CONTROL BOX PANEL REMOVED

Fig. 24 — 30GTN Unit With Access Panels Removed (30GTN020 Shown)

30HK,HL,HW Condenser and 30HW Cooler

BRAZED-PLATE COOLER AND CONDENSER HEAT EXCHANGER REPLACEMENT — Brazed-plate heat exchangers cannot be repaired if they develop a leak. If a leak (refrigerant or water) develops, the heat exchanger **must** be replaced. To replace a brazed plate heat exchanger:

1. Disconnect the liquid-in and liquid-out connections at the heat exchanger.
2. Check that the replacement heat exchanger is the same as the original heat exchanger. For the condensers, compare part numbers on the heat exchangers. For the coolers, insulation covers the manufacturer's part number. Make sure the depths of the replacement and original cooler heat exchangers are the same.
3. Reclaim the refrigerant from the system, and unsolder the refrigerant-in and refrigerant-out connections.
4. Remove the four 1/2-in. nuts holding the heat exchanger to the brackets. Save the nuts.
5. Install the replacement heat exchanger in the unit and attach to the bracket using the four 1/2-in. nuts removed in Step 4.
6. *Carefully* braze the refrigerant lines to the connections on the heat exchanger. Lines should be soldered using silver as the soldering material with a minimum of 45% silver. Keep the temperature below 1472 F (800 C) under normal soldering conditions (no vacuum) to prevent the copper solder of the brazed plate heat exchanger from changing its structure. Failure to do so can result in internal or external leakage at the connections which cannot be repaired.
7. Reconnect the water/brine lines.
8. Dehydrate and recharge the unit. Check for leaks.

BRAZED-PLATE COOLER AND CONDENSER HEAT EXCHANGER CLEANING — Brazed-plate heat exchangers must be cleaned chemically. A professional cleaning service skilled in chemical cleaning should be used. Use a weak acid (5% phosphoric acid, or if the heat exchanger is cleaned frequently, 5% oxalic acid). Pump the cleaning solution through the exchanger, preferably in a backflush mode. After cleaning, rinse with large amounts of fresh water to dispose of all the acid. Cleaning materials must be disposed of properly.

The mesh screens in front of the water/brine inlets of the heat exchangers should be cleaned periodically, depending on condition of the chiller water/brine.

SHELL-AND-TUBE CONDENSER CLEANING — The shell-and-tube condenser tubes can be cleaned either mechanically or chemically. To clean them chemically, follow the procedure described in Brazed-Plate Cooler and Condenser Heat Exchanger Cleaning section above.

To clean the condenser tubes manually:

1. Order tubing brushes (Carrier part no. KC21AH105).
2. Close the valves on the condenser and relieve condenser water pressure. **BE SURE TO PROVIDE DRAINAGE TO PREVENT WATER DAMAGE.**
3. Remove the condenser heads and brush the tubes clean, removing scale and other deposits.
4. Inspect the head gaskets and replace if necessary.
5. Clean all gasket surfaces prior to reassembly.
6. Replace the water heads and torque the head bolts to 90 ft-lb (122 N-m). Allow the gaskets to set overnight and re-torque the bolts to ensure proper sealing.

30HK,HL Cooler

NOTE: The cooler on 30HW units is not serviceable.

When cooler heads and partition plates are removed, tube sheets are exposed showing tube ends as shown in Fig. 25.

⚠ CAUTION

Four tubes in the bundle are secured inside cooler at baffles and *cannot be removed*. These are identified on the tube sheets by a drill mark horizontally adjacent to each of the 4 tubes. See Fig. 25. *If leakage occurs in any of these tubes, plug as described in Tube Plugging section below.*

TUBE PLUGGING — Leaky tube(s) can be plugged until retubing can be done. The number of plugged tubes determines how soon the cooler *must* be retubed. If several tubes require plugging, check with your local Carrier representative to find out how number and location will affect unit capacity.

Figure 26 shows an Elliott tube plug and a cross-sectional view of a plug in place. Table 32 lists the components for plugging.

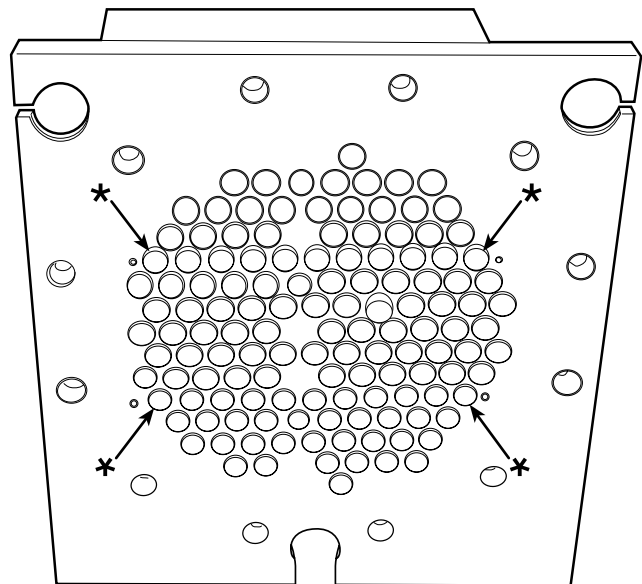
⚠ CAUTION

Use extreme care when installing plugs to prevent damaging the tube sheet sections between holes.

Clean parts with Locquic "N" solution (or equivalent) and apply a few drops of Loctite No. 675 sealant (or equivalent) to obtain a tight seal without using too much force to set the pin.

Usually plugs can be removed by heating the projecting end of pin to approximately 1000 F (538 C) and chilling quickly with water. Apply heating flame to side of the pin to prevent overheating tube sheet.

RETUBING (See Table 32) — When retubing is to be done, obtain the service of qualified personnel experienced in boiler maintenance and repair. Most standard procedures can be followed when retubing the 10HA coolers. A 6% crush is recommended when rolling replacement tubes into the tube sheet. A 6% crush can be achieved by setting the torque on the gun at 48 to 50 in.-lb (780 to 815 N-m).



*Four fixed tubes (cannot be removed) identified by adjacent drill points.

Fig. 25 — Typical Tube Sheet

The following Elliott Co. tube rolling tools are required:

B3400 Expander Assembly
B3401 Cage
B3405 Mandrel
B3408 Rolls

Place one drop of Loctite No. 675 sealant (or equivalent) on top of the tube prior to rolling.

Tube information:

	in.	mm
• Tube sheet hole diameter.	0.631	16.03
• Tube OD	0.625	15.87
• Tube ID after rolling.	0.581	14.76
(includes expansion due to clearance)	0.588	14.94

IMPORTANT: Tubes next to gasket webs must be flush with tube sheet (both ends).

TIGHTENING COOLER HEAD BOLTS

Gasket Preparation — When reassembling, use new gaskets. Compressed non-asbestos/neoprene gaskets (Carrier Material Specification ZA00-32) are to be *momentarily* dipped in compressor break-in oil prior to assembly. Do not soak gaskets in oil, as gasket deterioration results. Use dipped gaskets within 30 minutes to prevent deterioration.

Bolt Torques — Apply the following torques during bolt tightening sequence described below:

$\frac{5}{8}$ -in. (16-mm) diameter flange bolts 150 to 170 ft-lb (203 to 230 N-m)

$\frac{1}{2}$ -in. (13-mm) diameter center-stud nuts 70 to 90 ft-lb (95 to 122 N-m)

Bolt Tightening Sequence (Fig. 27) — The recommended bolt tightening sequence is:

Step 1 — Tighten all $\frac{5}{8}$ -in. (16-mm) flange bolts and $\frac{1}{2}$ -in. (13-mm) center nuts finger tight.

Step 2 — Following sequence shown in Fig. 27, tighten the bolts and nuts to approximately 50% of specified torque.

Step 3 — Starting at top (12 o'clock) tighten flange bolts to specified torque (see Bolt Torques section on this page) consecutively in a clockwise direction.

Step 4 — Tighten center nuts to specified torque.

Step 5 — No less than one hour later, retighten center nuts.

Step 6 — After refrigerant is restored to cooler, check center studs and exposed gasket edges for refrigerant leaks with soap solution or a Halide device.

Table 32 — Plugs and Tubes

COMPONENTS FOR PLUGGING	PART NUMBER
For Tubes	
Brass Pin	853103-500*
Brass Ring	853002-570*
For Holes without Tubes	
Brass Pin	853103-1*
Brass Ring	853002-631*
Loctite	No. 675†
Locquic	"N"†

*Order directly from Elliott Tube Co., Dayton, Ohio.

†Can be obtained locally.

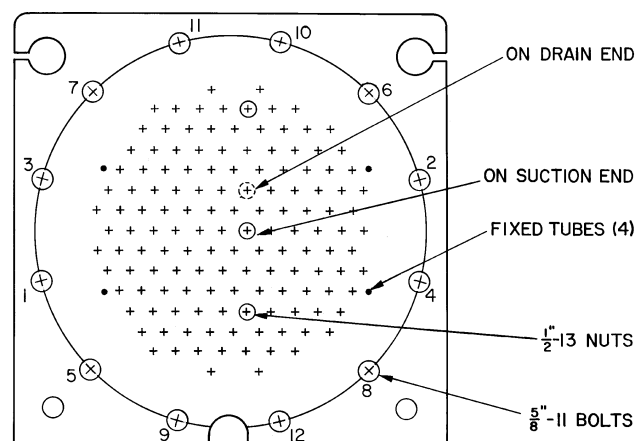
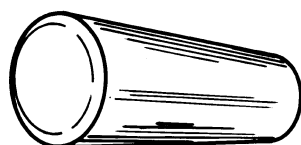
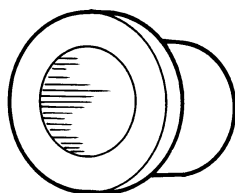


Fig. 27 — Head Bolt Tightening Sequence (30GTN,HK,HL)



PIN



RING

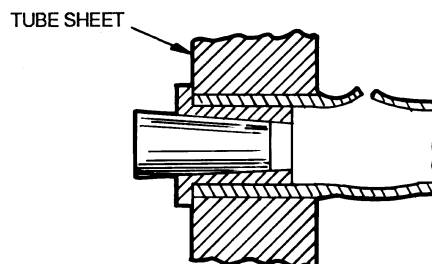


Fig. 26 — Elliott Tube Plug

30GTN Cooler — When the cooler heads and partition plates are removed, the tube sheets are exposed showing the ends of the tubes as seen in Fig. 25. Four tubes in the bundle are secured inside the cooler at the baffles and *cannot be removed*. These are identified on the tube sheets by a drill mark horizontally adjacent to each of the 4 tubes. See Fig. 25. *If leaks occur in any of these 4 tubes, plug the tube(s) as described in Table Plugging section below.*

TUBE PLUGGING — A leaky tube(s) can be plugged until retubing can be done. The number of plugged tubes determines how soon the cooler must be retubed. If several tubes require plugging, check with your local Carrier representative to find out how the number and location will affect unit capacity.

Figure 26 shows an Elliott tube plug and a cross sectional view of a plug in place. Table 33 lists the components for plugging.

⚠ CAUTION

Use extreme care when installing plugs to prevent damaging the tube sheet sections between the holes.

Table 33 — 30GTN Plugs and Tubes

UNIT 30GTN	015,020	025,030	035
TUBE DATA	SPECIFICATIONS		
Part No. 10HA501—	033	053	063
Length in. (mm)	62.5 (1588)	85.5 (2172)	109.5 (2781)
OD in. (mm)		0.625 (15.9)	
Wall Thickness in. (mm)			
Plain End		0.038 (0.97)	
Finned Section		0.025 (0.64*)	
COMPONENTS FOR PLUGGING	PART NO.		
For Tubes			
Brass Pin		853103-500†	
Brass Ring		853002-559†	
For Holes without Tubes			
Brass Pin		853103†	
Brass Ring		853002-631†	
Loctite		No. 675**	
Locquic		"N"***	

*Check with thickness gage (23 ga).

†Order directly from Elliott Tube Company, Dayton, Ohio.

**Can be obtained locally.

Clean parts with Locquic "N" and apply a few drops of Loctite No. 675 to obtain a tight seal without using too much force to set the pin.

Usually plugs can be removed by heating the projecting end of the pin to approximately 1000 F (540 C) and chilling quickly with water. Apply the heating flame to the side of the pin to prevent overheating the tube sheet.

RETUBING (See Table 33) — When retubing is to be done, obtain the service of qualified personnel experienced in boiler maintenance and repair. Most standard procedures can be followed, except that for the tubes in the 30GTN coolers, a 5% crush is recommended in setting torque (5/8-in. [15.87 mm] diameter tubes are used in the 30GTN cooler).

Example:

- Tube sheet hole diameter 0.630 in. (16.00 mm)
- Tube OD 0.625 in. (125.87 mm)
- Clearance (a minus b) 0.005 in. (0.13 mm)
- Tube ID before rolling
(use Elliott tube gage) 0.549 in. (13.9 mm)
- 5% of twice the wall thickness
(5% of b minus d) 0.004 in. (0.10 mm)
- Tube ID after rolling
(c + d + e) 0.558 in. (14.2 mm)

NOTE: The tubes next to the gasket webs must be flush with the tube sheet (both ends).

TIGHTENING COOLER HEAD BOLTS

NOTE: When reassembling cooler heads, use new gaskets.

Gasket Preparation — To protect against leakage, apply light coating of compressor oil to both surfaces in contact with gasket. Gaskets are not to be soaked in oil as gasket deterioration results. *Dipped gaskets are to be used within 30 minutes to prevent deterioration.*

Bolt Torque — The following torque is to be applied during the bolt tightening sequence described below:

1/2-in. diameter flange bolts 70 to 90 ft-lb
(95 to 122 N-m)

Bolt Tightening Sequence (Fig. 27) — The recommended bolt tightening sequence is as follows:

Step 1 — Tighten moderately (without torquing) all the flange bolts in the sequence shown.

Step 2 — Repeat Step 1, tightening the bolts to the specified torque.

Check Oil Charge

30GTN — Compressors are factory charged with oil as shown in Table 34.

Table 34 — Oil Charge (30GTN)

COMPRESSOR	AMOUNT pints (liters)
06DG537	9.5 (4.5)
06E2250	17 (8.0)
06E7265	21 (9.9)
06E7275	21 (9.9)
06E7299	19 (9.0)

If oil is visible in the compressor sight glass, check unit for operating readiness as described in Pre-Start-Up, System Check section (page 63), then start the unit. Observe oil level and add oil if required, to bring oil level in compressor crankcase up to between 1/4 and 1/3 of sight glass during steady operation.

30HK,HL,HW — Compressors are factory-charged with oil. If oil is visible in the compressor sight glasses, check the unit for operating readiness as described in Pre-Start-Up, System Check section (page 63), then start the unit. Observe oil level and add oil, if required, to bring the oil level in the compressor crankcase(s) to between 1/8 and 3/8 of the sight glass(es) during steady operation.

To Add Oil

- Close the suction shutoff valve and pump the compressor crankcase down to between zero and 2 psig (zero to 13.8 kPa) (the low-pressure switch must be jumpered). Wait a few minutes and repeat as needed until the pressure remains between zero and 2 psig (zero to 13.8 kPa).
- Close the discharge shutoff valve.
- Remove the oil-fill plug above the compressor sight glass, add oil through the plug hole, and replace the plug.
- After opening the suction and discharge service valves, remove low-pressure switch jumper, run the compressor for about 20 minutes, and check the oil level.

Use only Carrier-approved compressor oil:

Petroleum Specialties, Inc. Cryol 150*
Texaco, Inc. Capella WF-32
Witco Chemical Co. Suniso 3GS

*Factory charge.

Do not reuse drained oil, and do not use any oil that has been exposed to the atmosphere.

To Remove Oil

⚠ CAUTION

The crankcase will be under slight pressure. Be careful not to lose the entire oil charge. Gloves and eye protection must be worn.

Pump down the compressor to between zero and 2 psig (zero to 13.8 kPa). Loosen the oil drain valve located in the compressor base to allow the oil to seep out past plug threads. Be careful not to remove plug; the entire oil charge may be lost. Small amount of oil can be removed through oil pump discharge connection.

Condenser Section and Coils (30GTN Only)

COIL CLEANING — For standard aluminum, copper and pre-coated aluminum fin coils, clean the coils with a vacuum cleaner, fresh water, compressed air, or a bristle brush (not wire). Units installed in corrosive environments should have coil cleaning as part of a planned maintenance schedule. In this type of application, all accumulations of dirt should be cleaned off the coil.

⚠ CAUTION

Do not use high-pressure water or air to clean coils — fin damage may result.

CLEANING E-COATED COILS — Follow the outlined procedure below for proper care, cleaning and maintenance of E-coated aluminum or copper fin coils:

Coil Maintenance and Cleaning Recommendations — 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.

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 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 bent over) 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 Coil Surfaces — Monthly cleaning with *Enviro-Shield*™ Coil Cleaner is essential to extend the life of coils. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or E-coated coil are cleaned with the *Enviro-Shield* 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.

Enviro-Shield Coil Cleaner is non-flammable, hypo-allergenic, non-bacterial, USDA accepted biodegradable and 100% ecologically safe 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.

Enviro-Shield Coil Cleaner Application Equipment

- 2½ Gallon Garden Sprayer
- Water Rinse with Low-Velocity Spray Nozzle

Enviro-Shield Coil Cleaner Application Instructions

- Although *Enviro-Shield* Coil Cleaner is harmless to humans, animals, and marine life, proper eye protection

such as safety glasses is recommended during mixing and application.

- Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
- Thoroughly wet finned surfaces with clean water and a low-velocity garden hose being careful not to bend fins.
- Mix *Enviro-Shield* Coil Cleaner is a 2½ gallon garden sprayer according to the instructions included with the Enzyme Cleaner. The optimum solution temperature is 100 F.

NOTE: DO NOT USE water in excess of 130 F as the enzymatic activity will be destroyed.

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

⚠ CAUTION

HARSH CHEMICAL AND ACID CLEANERS — Harsh chemical, household bleach or acid cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the *Enviro-Shield* Coil Cleaner as described above.

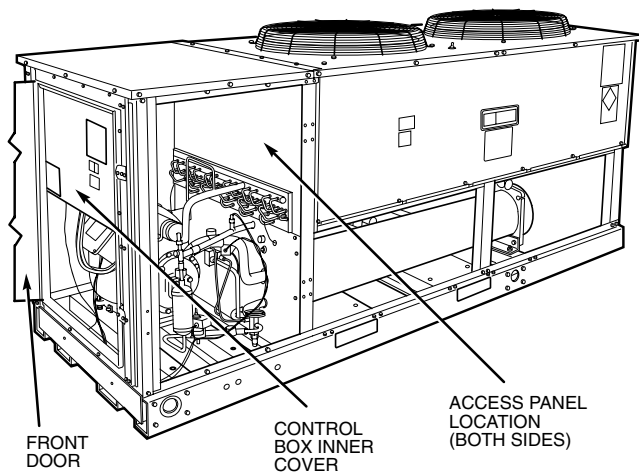
HIGH-VELOCITY WATER OR COMPRESSED AIR — High-velocity water from a pressure washer, garden hose or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdown may occur.

CONDENSER SECTION — Condenser fan motors and fans can be serviced by removal of outlet grilles or side panels. See Fig. 28. If a fan motor is serviced, be sure the wire fan guard is in place over each fan before starting unit. See Fig. 29 for proper fan adjustment. Tighten fan hub securely on motor shaft with setscrew which bears against the key. Be sure to replace Permagum and rubber cap over end of motor shaft to protect against moisture causing fan to rust on shaft.

Check Refrigerant Feed Components

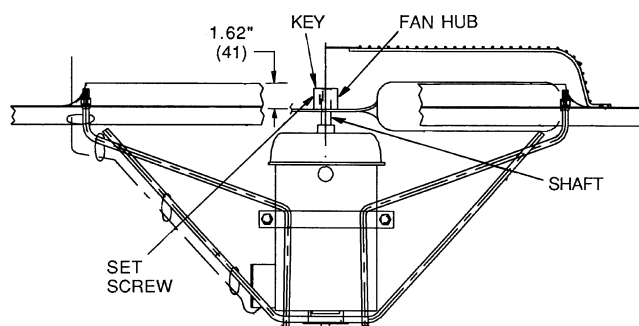
THERMOSTATIC EXPANSION VALVE (TXV) — The TXV controls the flow of liquid refrigerant to the cooler by maintaining constant superheat of vapor leaving the cooler. There is one valve per refrigerant circuit. The valve(s) is activated by a temperature-sensing bulb(s) strapped to the suction line(s).

The valve(s) is factory-set to maintain between 8° and 10° F (4.4° and 5.6° C) of superheat leaving the cooler. Check the superheat during operation after conditions have stabilized. If necessary, adjust the superheat to prevent refrigerant floodback to the compressor.



LEFT FRONT VIEW, COMPRESSOR END

Fig. 28 — 30GTN Access Panels



NOTE: Dimension in () is in millimeters.

Fig. 29 — Condenser-Fan Adjustment

FILTER DRIER — The function of the filter drier is to maintain a clean, dry system. The moisture indicator (described below) indicates any need to change the filter drier. The filter drier is a sealed-type drier. When the drier needs to be changed, the entire filter drier must be replaced.

NOTE: The 30HK, HL units have 2 filter driers; one per circuit.

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

- Green (safe) — Moisture is below 45 ppm
- Yellow-Green (caution) — 45 to 130 ppm
- Yellow (wet) — above 130 ppm

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

NOTE: The 30HK, HL units have 2 indicators; one per circuit.

LIQUID LINE SERVICE VALVE — This valve provides a refrigerant charging port and, in combination with the

compressor discharge service valve(s), allows the refrigerant to be pumped into the high side of the system.

DISCHARGE LINE CHECK VALVE — On all 30HL, HWA units, a factory-supplied check valve is shipped with the unit (two valves are provided for 30HL units). The check valve(s) should be installed in the discharge line(s) downstream from, but close to, the compressor muffler. Install the valve in any position except bonnet down.

The check valve(s) prevents backwards-migration of refrigerant from the condenser(s) to the compressor(s) and cooler during the compressor off cycle

HOT GAS BYPASS VALVE — On units equipped with the factory-installed capacity reduction option (30HW and 30GTN only), a hot gas bypass valve is located between the discharge line and the cooler entering-refrigerant line. A solenoid valve is installed in the equalizer line of the hot gas valve to allow the MBB to cycle the hot gas bypass function.

The amount of capacity reduction achieved by the hot gas bypass valve may be altered by adjusting the spring tension of the hot gas bypass valve. The total unit capacity should not be reduced below 10% of the nominal rating.

LIQUID LINE SOLENOID VALVE (30HL and 30GTN Only) — The solenoid valve closes when its circuit is inoperative, either from capacity control or from any safety trip.

PRESSURE RELIEF DEVICES — All units are equipped with a compressor pressure relief valve located on the crank-case of the 06E compressor units (except for the 30HW018 and 30GTN015 (60 Hz) units which have a compressor displacement less than 50 cfm). The pressure relief valve opens at 450 psig (3103 kPa).

The 30HK, HWC, and HWS units are also equipped with a high-side refrigerant pressure relief valve on the shell and tube condenser. The valve is set to open at the working pressure of the condenser, as shown in Table 35.

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

For 30HL and HWA condenserless units, pressure relief devices designed to relieve at 450 psig (3103 kPa), must be field-supplied and installed in the discharge line piping after the muffler in accordance with ANSI/ASHRAE 15 safety code requirements. Additional pressure relief valves, properly selected, must be field-supplied and installed to protect high side equipment and may be required by applicable codes.

Most codes require that a relief valve be vented directly to the outdoors. *The vent line must not be smaller than the relief valve outlet. The condenser relief valves have a 5/8-in. SAE (Society of Automotive Engineers, U.S.A.) flare connection. The compressor relief valves have a 3/8-in. SAE Flare connection. Consult ANSI/ASHRAE 15 for detailed information concerning layout and sizing of relief vent lines.*

All units have a factory-installed fusible plug in the suction line which relieves on a temperature rise at 170 F (77 C) and one in the liquid line which relieves at 210 F (99 C).

Table 35 — Pressure Relief Valve Settings

UNIT	PRESSURE RELIEF VALVE SETTINGS	
	Psig	kPa
30HK	385	2655
30HWC	365	2517
30HWS	335	2310

Compressor and Unit Protective Devices

CIRCUIT BREAKER — There is a single circuit breaker per compressor in each unit. The circuit breaker(s) protects the compressor(s) against overloading, locked rotor conditions, and primary single phasing. If the circuit breaker(s) trips, determine the cause and correct it before resetting the breaker(s). Circuit breakers are calibrated trip manual reset, ambient compensated, magnetic breakers.

COMPRESSOR INTERNAL THERMAL PROTECTION — On the units with 06D compressors, there is a sensor imbedded in the compressor windings to detect an overtemperature condition.

The thermostat opens and shuts off the compressor if the discharge gas temperature exceeds 295 ± 5 F (146 ± 2.8 C). The thermostat will reset when the temperature drops to approximately 250 F (121 C). However, the control module will keep the unit locked off until the alert condition is reset.

NOTE: Compressor overtemperature protection for 30HK, HL units is accomplished by high and low pressure switches and circuit breakers which are external to the compressors.

CRANKCASE HEATER

⚠ CAUTION

Never open or disconnect any switch that energizes the crankcase heater, unless the unit is being serviced or will be shut down for an extended period. After service or shut-down, energize the crankcase heater for 24 hours before starting the compressor.

IMPORTANT: The crankcase heater is located in the bottom corner of the compressor and held in place by a clip. The heater must be tight to prevent it from backing out of the heater well. The heater eventually burns out if exposed to the air for an extended period.

The heater in each compressor prevents absorption of liquid refrigerant by the compressor oil when the compressor is not operating. The heater is wired into the normally closed contacts of the compressor control relay so that it energizes only when the compressor is not operating. The heater is 125 w, 115 v on all 30HK,HL,HW and 30GTN (60 Hz) units. The heater is 230 v on 30GTN (50 Hz) units.

OIL PRESSURE SAFETY SWITCH (OPS) — One OPS per compressor is standard on all 30HL and HWA units, and on all units equipped with the medium temperature brine option. One is located in each compressor terminal box with capillaries to the crankcase and oil pump. The switch is also offered as an accessory (part number 30HW900006) for standard 30HK, HWB, HWC, HWS, and 30GTN units. When used, the OPS is monitored by the Main Base Board (MBB). If at any time after the compressor is started, the OPS is open for more than 2 minutes, the compressor shuts down and is locked off until the alert condition is reset. The OPS cuts out at 5 ± 1 psig (34.5 ± 6.9 kPa), and has a maximum cut-in of 9.5 psig (65.5 kPa).

Check Unit Safeties

HIGH-PRESSURE SWITCH — A high-pressure switch is provided to protect each compressor and refrigeration system from unsafe high pressure conditions. See Table 36 for high-pressure switch settings.

The high-pressure switch is mounted in the discharge side of each compressor. A snubber is provided between the compressor discharge manifold and the high-pressure switch to prevent pressure pulsations from damaging the switch.

If an unsafe, high-pressure condition should exist, the switch opens and shuts off the affected compressor. The

compressor feedback signal to J9 of the MBB then opens causing an alert condition. The MBB prevents the compressor from restarting until the alert condition is reset. To check operation of the switch, slowly close the compressor discharge shutoff valve until the compressor shuts down. The switch should open at the pressure corresponding to the appropriate switch setting as shown in Table 36.

Table 36 — Factory Settings, High-Pressure Switch (Fixed)

UNIT 30	CUTOUT		CUT-IN	
	Psig	kPa	Psig	kPa
HK, HWS	280 ± 10	1931 ± 69	180 ± 20	1241 ± 138
HL, HWB, HWC	375 ± 10	2585 ± 69	275 ± 20	1896 ± 138
HWA	395 ± 10	2723 ± 69	298 ± 20	2054 ± 138
GTN	426 ± 7	2937 ± 48	324 ± 20	2206 ± 138

Reopen the compressor discharge shutoff valve and clear the alarm condition using the ENABLE-OFF-REMOTE Contact switch or Marquee display (if equipped) as described on page 48. The unit should restart after the compressor anti-short-cycle delay, built into the unit control module, expires.

LOW-PRESSURE SWITCH — A low-pressure switch is provided to protect each compressor and system from a loss of refrigerant. The low-pressure switches also provide freeze protection for the cooler. The low-pressure switches are non-adjustable. See Table 37 for low-pressure switch settings. One switch is used for all 30GTN units and 30H brine units. Standard 30H units use a different switch, as shown in Table 37.

Table 37 — Factory Settings, Low-Pressure Switch (Fixed)

UNIT TYPE	CUTOUT		CUT-IN	
	Psig	kPa	Psig	kPa
STANDARD 30H UNITS	42 ± 3	290 ± 21	57 ± 5	393 ± 34
30H BRINE UNITS AND ALL 30GTN UNITS	27 ± 3	186 ± 21	44 ± 5	303 ± 34

To check operation of the low-pressure switch, slowly close the suction service valve and allow the affected compressor to pump down. The compressor should cut out when the suction pressure falls below the low-pressure switch cutout setting. Open the suction service valve. The compressor should restart after the low-pressure switch closes. Note that the control will only allow one automatic reset of a low-pressure switch failure per day.

COOLER FREEZE-UP PROTECTION

⚠ WARNING

On medium temperature brine units, the brine must be properly mixed to prevent freezing at a temperature of at least 15 F (8.3 C) below the leaving-fluid temperature set point. Failure to provide the proper brine mixture is considered abuse and may void the Carrier warranty.

The Main Base Board (MBB) monitors leaving fluid temperature at all times. The MBB will rapidly remove stages of capacity as necessary to prevent freezing conditions due to the rapid loss of load or low cooler fluid flow.

When the cooler is exposed to lower ambient temperatures (34 F [1° C] or below), freeze-up protection is recommended using inhibited ethylene glycol.

The low-pressure switch provides a back-up cooler freeze-up protection system. The low-pressure switch shuts down the unit when the suction temperature drops to a point where the cooler will freeze up.

HEATER CABLE (30GTN Only) — A heater cable is helically wound around the entire length of the cooler. A thermostat energizes the cable whenever the ambient temperature is 35 F (1.7 C) or lower. The cable is between the cooler and the insulation blanket around the cooler. The heater cable and the insulation protect the cooler down to -20 F (-29 C) ambient temperature.

Since the auxiliary power source (control power) for the heater cable is separate from main power source, power to heater is assured even though the main unit power may be off.

⚠ CAUTION

Do not disconnect heater cable power when servicing compressor if ambient temperature is below 40 F (4.4 C). If power to the heater cable is cut off, or if unit is to be down for a prolonged period, drain the cooler.

WINTER SHUTDOWN (30GTN Only) — At the end of the cooling season:

1. Drain the water from the cooler.
2. Replace the drain plug and put 2 gallons (8 L) of ethylene glycol or other suitable uninhibited antifreeze solution in the cooler to prevent any residual water in the cooler from freezing.
3. At the beginning of the next cooling season, refill the cooler and add the recommended inhibitor.

Thermistors — Electronic control uses up to five 5 kΩ thermistors to sense temperatures used to control operation of the chiller. Thermistors T1, T2 and T9 are identical in their temperature vs. resistance and voltage drop performance. Thermistor T3 (30GTN only) has a different voltage drop characteristic, but is identical in temperature vs. resistance. Thermistor T10 is a 10 kΩ input channel and has a different set of temperature vs. resistance and voltage drop performance. Resistance at various temperatures are listed in Tables 38A-39B.

Thermistor pin connection points are shown in Table 2. Thermistor T1 is located in a well in the leaving fluid path. Thermistor T2 is located in a well in the entering fluid path for 30HK, 30HL, and 30GTN models. This thermistor is factory supplied for 30HW models, but must be field installed. On 30GTN models, thermistor T3 is clamped to a return bend on the right side of the condenser coil viewing from the control box end.

REPLACING THERMISTORS T1 and T2 — Add a small amount of thermal conductive grease to the thermistor well and end of probe. Thermistors are friction-fit thermistors, which must be slipped into receivers located in the cooler leaving fluid nozzle (T1) and entering fluid nozzle (T2). See Fig. 30.

NOTE: Thermistor T1 on 30HW unit is installed in a well on the back side (closest to control box back) of the heat exchanger.

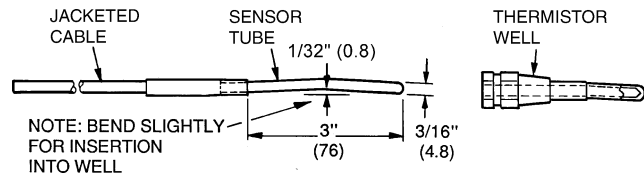
REPLACING THERMISTOR T3 (30GTN Only) — This thermistor is located on the header end of the condenser coil. Remove the old thermistor and clamp the new thermistor on the same return bend using the original hardware.

THERMISTOR/TEMPERATURE SENSOR CHECK — A high quality digital volt-ohmmeter is required to perform this check.

1. Connect the digital voltmeter across the appropriate thermistor terminals at the J8 terminal strip on the Main Base Board (see Fig. 31). Using the voltage reading obtained, read the sensor temperature from Tables 38A-39B. 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, $\pm 5^\circ\text{F}$ (3°C) if care was taken in applying thermocouple and taking readings.

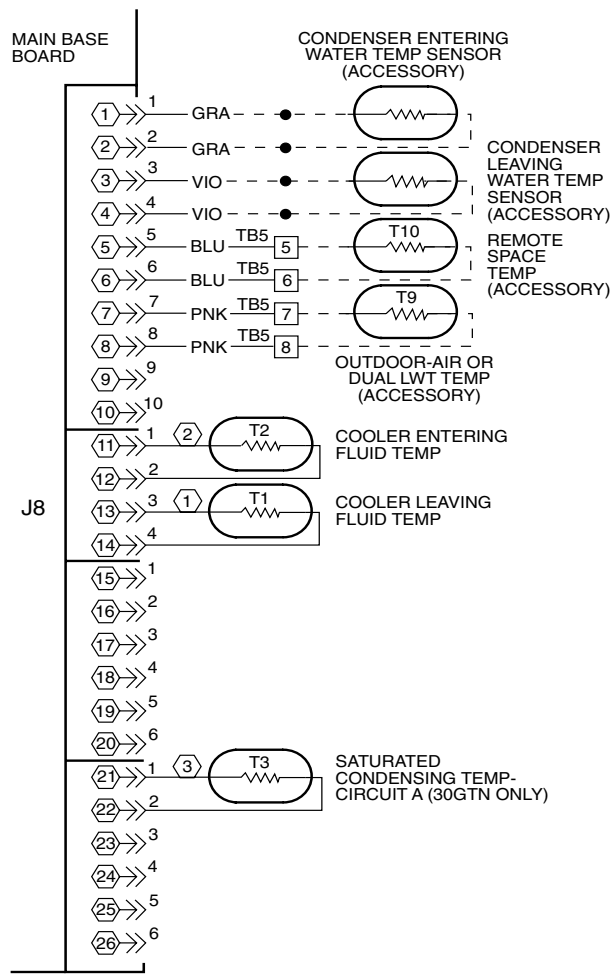
2. If a more accurate check is required, unit must be shut down and thermistor removed and checked at a known temperature (freezing point or boiling point of water) using either voltage drop measured across thermistor at the J8 terminal, by determining the resistance with chiller shut down and thermistor disconnected from J8. Compare the values determined with the value read by the control in the Temperatures mode using the Marquee display (if equipped).



FLUID-SIDE TEMPERATURE SENSORS (T1 AND T2)

NOTE: Dimensions in () are in millimeters.

Fig. 30 — Fluid-Side Temperature Sensors (T1 and T2)



T1-T3, T9, T10 THERMISTORS

Fig. 31 — Thermistor Connections to Main Base Board, J8 Connector

**Table 38A — 5K Thermistor Temperatures (°F) vs Resistance/Voltage Drop
(Voltage Drop A for Entering and Leaving Condenser Water Thermistors T1, T2, T9)
(Voltage Drop B for Thermistor T3)**

TEMP (F)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)	TEMP (F)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)	TEMP (F)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)
-25	3.699	4.538	61	1.930	2.137	147	0.477	0.489
-24	3.689	4.523	62	1.905	2.105	148	0.469	0.480
-23	3.679	4.508	63	1.879	2.074	149	0.461	0.471
-22	3.668	4.493	64	1.854	2.043	150	0.453	0.463
-21	3.658	4.476	65	1.829	2.013	151	0.445	0.455
-20	3.647	4.460	66	1.804	1.982	152	0.438	0.447
-19	3.636	4.444	67	1.779	1.952	153	0.430	0.440
-18	3.624	4.427	68	1.754	1.923	154	0.423	0.432
-17	3.613	4.409	69	1.729	1.893	155	0.416	0.424
-16	3.601	4.391	70	1.705	1.864	156	0.408	0.417
-15	3.588	4.373	71	1.681	1.835	157	0.402	0.410
-14	3.576	4.354	72	1.656	1.808	158	0.395	0.403
-13	3.563	4.335	73	1.632	1.778	159	0.388	0.396
-12	3.550	4.316	74	1.609	1.749	160	0.381	0.389
-11	3.536	4.296	75	1.585	1.722	161	0.375	0.382
-10	3.523	4.276	76	1.562	1.694	162	0.369	0.376
-9	3.509	4.255	77	1.538	1.667	163	0.362	0.369
-8	3.494	4.234	78	1.516	1.640	164	0.356	0.363
-7	3.480	4.213	79	1.493	1.613	165	0.350	0.357
-6	3.465	4.191	80	1.470	1.587	166	0.344	0.351
-5	3.450	4.169	81	1.448	1.561	167	0.339	0.345
-4	3.434	4.146	82	1.426	1.535	168	0.333	0.339
-3	3.418	4.123	83	1.404	1.510	169	0.327	0.333
-2	3.402	4.100	84	1.382	1.485	170	0.322	0.327
-1	3.386	4.076	85	1.361	1.460	171	0.317	0.322
0	3.369	4.052	86	1.340	1.436	172	0.311	0.316
1	3.352	4.027	87	1.319	1.412	173	0.306	0.311
2	3.335	4.002	88	1.298	1.388	174	0.301	0.306
3	3.317	3.976	89	1.278	1.365	175	0.296	0.301
4	3.299	3.951	90	1.257	1.342	176	0.291	0.295
5	3.281	3.924	91	1.237	1.319	177	0.286	0.291
6	3.262	3.898	92	1.217	1.296	178	0.282	0.286
7	3.243	3.871	93	1.198	1.274	179	0.277	0.281
8	3.224	3.844	94	1.179	1.253	180	0.272	0.276
9	3.205	3.816	95	1.160	1.231	181	0.268	0.272
10	3.185	3.788	96	1.141	1.210	182	0.264	0.267
11	3.165	3.760	97	1.122	1.189	183	0.259	0.263
12	3.145	3.731	98	1.104	1.169	184	0.255	0.258
13	3.124	3.702	99	1.086	1.148	185	0.251	0.254
14	3.103	3.673	100	1.068	1.128	186	0.247	0.250
15	3.082	3.643	101	1.051	1.109	187	0.243	0.246
16	3.060	3.613	102	1.033	1.089	188	0.239	0.242
17	3.038	3.583	103	1.016	1.070	189	0.235	0.238
18	3.016	3.552	104	0.999	1.051	190	0.231	0.234
19	2.994	3.522	105	0.983	1.033	191	0.228	0.230
20	2.972	3.490	106	0.966	1.015	192	0.224	0.226
21	2.949	3.459	107	0.950	0.997	193	0.220	0.223
22	2.926	3.428	108	0.934	0.980	194	0.217	0.219
23	2.903	3.396	109	0.918	0.963	195	0.213	0.216
24	2.879	3.364	110	0.903	0.948	196	0.210	0.212
25	2.856	3.331	111	0.888	0.929	197	0.206	0.209
26	2.832	3.299	112	0.873	0.913	198	0.203	0.205
27	2.808	3.266	113	0.858	0.896	199	0.200	0.202
28	2.784	3.234	114	0.843	0.881	200	0.197	0.199
29	2.759	3.201	115	0.829	0.865	201	0.194	0.196
30	2.735	3.168	116	0.815	0.850	202	0.181	0.192
31	2.710	3.134	117	0.801	0.835	203	0.188	0.189
32	2.685	3.101	118	0.787	0.820	204	0.185	0.186
33	2.660	3.068	119	0.774	0.805	205	0.182	0.183
34	2.634	3.034	120	0.761	0.791	206	0.179	0.181
35	2.609	3.000	121	0.748	0.777	207	0.176	0.178
36	2.583	2.966	122	0.735	0.763	208	0.173	0.175
37	2.558	2.933	123	0.723	0.750	209	0.171	0.172
38	2.532	2.899	124	0.710	0.736	210	0.168	0.169
39	2.506	2.865	125	0.698	0.723	211	0.165	0.167
40	2.480	2.831	126	0.686	0.710	212	0.163	0.164
41	2.454	2.797	127	0.674	0.698	213	0.160	0.162
42	2.428	2.764	128	0.663	0.685	214	0.158	0.159
43	2.402	2.730	129	0.651	0.673	215	0.155	0.157
44	2.376	2.696	130	0.640	0.661	216	0.153	0.154
45	2.349	2.662	131	0.629	0.650	217	0.151	0.152
46	2.323	2.628	132	0.618	0.638	218	0.148	0.150
47	2.296	2.594	133	0.608	0.627	219	0.146	0.147
48	2.270	2.561	134	0.597	0.616	220	0.144	0.145
49	2.244	2.527	135	0.587	0.605	221	0.142	0.143
50	2.217	2.494	136	0.577	0.594	222	0.140	0.141
51	2.191	2.461	137	0.567	0.584	223	0.138	0.138
52	2.165	2.427	138	0.557	0.573	224	0.135	0.136
53	2.138	2.395	139	0.548	0.563	225	0.133	0.134
54	2.122	2.362	140	0.538	0.553			
55	2.086	2.329	141	0.529	0.543			
56	2.060	2.296	142	0.520	0.534			
57	2.034	2.264	143	0.511	0.525			
58	2.008	2.232	144	0.502	0.515			
59	1.982	2.200	145	0.494	0.506			
60	1.956	2.168	146	0.485	0.497			

**Table 38B — 5K Thermistor Temperatures (°C) vs Resistance/Voltage Drop
(Voltage Drop A for Entering and Leaving Condenser Water Thermistors T1, T2, T9)
(Voltage Drop B for Thermistor T3)**

TEMP (C)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)	TEMP (C)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)	TEMP (C)	VOLTAGE DROP A (V)	VOLTAGE DROP B (V)
-32	3.705	4.547	15	1.982	2.200	62	0.506	0.519
-31	3.687	4.520	16	1.935	2.143	63	0.490	0.502
-30	3.668	4.493	17	1.889	2.087	64	0.475	0.487
-29	3.649	4.464	18	1.844	2.031	65	0.461	0.471
-28	3.629	4.433	19	1.799	1.976	66	0.447	0.457
-27	3.608	4.402	20	1.754	1.923	67	0.433	0.443
-26	3.586	4.369	21	1.710	1.870	68	0.420	0.429
-25	3.563	4.335	22	1.666	1.817	69	0.407	0.415
-24	3.539	4.300	23	1.623	1.766	70	0.395	0.403
-23	3.514	4.264	24	1.580	1.716	71	0.383	0.390
-22	3.489	4.226	25	1.538	1.667	72	0.371	0.378
-21	3.462	4.187	26	1.497	1.619	73	0.360	0.367
-20	3.434	4.146	27	1.457	1.571	74	0.349	0.355
-19	3.406	4.104	28	1.417	1.525	75	0.339	0.345
-18	3.376	4.061	29	1.378	1.480	76	0.329	0.334
-17	3.345	4.017	30	1.340	1.436	77	0.319	0.324
-16	3.313	3.971	31	1.302	1.393	78	0.309	0.314
-15	3.281	3.924	32	1.265	1.351	79	0.300	0.305
-14	3.247	3.876	33	1.229	1.310	80	0.291	0.295
-13	3.212	3.827	34	1.194	1.270	81	0.283	0.287
-12	3.177	3.777	35	1.160	1.231	82	0.274	0.278
-11	3.140	3.725	36	1.126	1.193	83	0.266	0.270
-10	3.103	3.673	37	1.093	1.156	84	0.258	0.262
-9	3.065	3.619	38	1.061	1.120	85	0.251	0.254
-8	3.025	3.564	39	1.030	1.085	86	0.244	0.247
-7	2.995	3.509	40	0.999	1.051	87	0.237	0.239
-6	2.945	3.453	41	0.969	1.019	88	0.230	0.232
-5	2.903	3.396	42	0.940	0.987	89	0.223	0.226
-4	2.860	3.338	43	0.912	0.956	90	0.217	0.219
-3	2.817	3.279	44	0.885	0.926	91	0.211	0.213
-2	2.774	3.221	45	0.858	0.896	92	0.204	0.207
-1	2.730	3.161	46	0.832	0.868	93	0.199	0.201
0	2.685	3.101	47	0.807	0.841	94	0.193	0.195
1	2.639	3.041	48	0.782	0.814	95	0.188	0.189
2	2.593	2.980	49	0.758	0.788	96	0.182	0.184
3	2.547	2.919	50	0.735	0.763	97	0.177	0.179
4	2.500	2.858	51	0.713	0.739	98	0.172	0.174
5	2.454	2.797	52	0.691	0.716	99	0.168	0.169
6	2.407	2.737	53	0.669	0.693	100	0.163	0.164
7	2.360	2.675	54	0.649	0.671	101	0.158	0.160
8	2.312	2.615	55	0.629	0.650	102	0.154	0.155
9	2.265	2.554	56	0.610	0.629	103	0.150	0.151
10	2.217	2.494	57	0.591	0.609	104	0.146	0.147
11	2.170	2.434	58	0.573	0.590	105	0.142	0.143
12	2.123	2.375	59	0.555	0.571	106	0.138	0.139
13	2.076	2.318	60	0.538	0.553	107	0.134	0.135
14	2.029	2.258	61	0.522	0.536			

**Table 39A — 10K Thermistor Temperature (°F) vs Resistance/Voltage Drop
(For Thermistor T10)**

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
-25	4.758	196,453	61	2.994	14,925	147	0.890	2,166
-24	4.750	189,692	62	2.963	14,549	148	0.876	2,124
-23	4.741	183,300	63	2.932	14,180	149	0.862	2,083
-22	4.733	177,000	64	2.901	13,824	150	0.848	2,043
-21	4.724	171,079	65	2.870	13,478	151	0.835	2,003
-20	4.715	165,238	66	2.839	13,139	152	0.821	1,966
-19	4.705	159,717	67	2.808	12,814	153	0.808	1,928
-18	4.696	154,344	68	2.777	12,493	154	0.795	1,891
-17	4.686	149,194	69	2.746	12,187	155	0.782	1,855
-16	4.676	144,250	70	2.715	11,884	156	0.770	1,820
-15	4.665	139,443	71	2.684	11,593	157	0.758	1,786
-14	4.655	134,891	72	2.653	11,308	158	0.745	1,752
-13	4.644	130,402	73	2.622	11,031	159	0.733	1,719
-12	4.633	126,183	74	2.592	10,764	160	0.722	1,687
-11	4.621	122,018	75	2.561	10,501	161	0.710	1,656
-10	4.609	118,076	76	2.530	10,249	162	0.699	1,625
-9	4.597	114,236	77	2.500	10,000	163	0.687	1,594
-8	4.585	110,549	78	2.470	9,762	164	0.676	1,565
-7	4.572	107,006	79	2.439	9,526	165	0.666	1,536
-6	4.560	103,558	80	2.409	9,300	166	0.655	1,508
-5	4.546	100,287	81	2.379	9,078	167	0.645	1,480
-4	4.533	97,060	82	2.349	8,862	168	0.634	1,453
-3	4.519	94,020	83	2.319	8,653	169	0.624	1,426
-2	4.505	91,019	84	2.290	8,448	170	0.614	1,400
-1	4.490	88,171	85	2.260	8,251	171	0.604	1,375
0	4.476	85,396	86	2.231	8,056	172	0.595	1,350
1	4.461	82,729	87	2.202	7,869	173	0.585	1,326
2	4.445	80,162	88	2.173	7,685	174	0.576	1,302
3	4.429	77,662	89	2.144	7,507	175	0.567	1,278
4	4.413	75,286	90	2.115	7,333	176	0.558	1,255
5	4.397	72,940	91	2.087	7,165	177	0.549	1,233
6	4.380	70,727	92	2.059	6,999	178	0.540	1,211
7	4.363	68,542	93	2.030	6,838	179	0.532	1,190
8	4.346	66,465	94	2.003	6,683	180	0.523	1,169
9	4.328	64,439	95	1.975	6,530	181	0.515	1,148
10	4.310	62,491	96	1.948	6,383	182	0.507	1,128
11	4.292	60,612	97	1.921	6,238	183	0.499	1,108
12	4.273	58,781	98	1.894	6,098	184	0.491	1,089
13	4.254	57,039	99	1.867	5,961	185	0.483	1,070
14	4.235	55,319	100	1.841	5,827	186	0.476	1,052
15	4.215	53,693	101	1.815	5,698	187	0.468	1,033
16	4.195	52,086	102	1.789	5,571	188	0.461	1,016
17	4.174	50,557	103	1.763	5,449	189	0.454	998
18	4.153	49,065	104	1.738	5,327	190	0.447	981
19	4.132	47,627	105	1.713	5,210	191	0.440	964
20	4.111	46,240	106	1.688	5,095	192	0.433	947
21	4.089	44,888	107	1.663	4,984	193	0.426	931
22	4.067	43,598	108	1.639	4,876	194	0.419	915
23	4.044	42,324	109	1.615	4,769	195	0.413	900
24	4.021	41,118	110	1.591	4,666	196	0.407	885
25	3.998	39,926	111	1.567	4,564	197	0.400	870
26	3.975	38,790	112	1.544	4,467	198	0.394	855
27	3.951	37,681	113	1.521	4,370	199	0.388	841
28	3.927	36,610	114	1.498	4,277	200	0.382	827
29	3.903	35,577	115	1.475	4,185	201	0.376	814
30	3.878	34,569	116	1.453	4,096	202	0.370	800
31	3.853	33,606	117	1.431	4,008	203	0.365	787
32	3.828	32,654	118	1.409	3,923	204	0.359	774
33	3.802	31,752	119	1.387	3,840	205	0.354	762
34	3.776	30,860	120	1.366	3,759	206	0.349	749
35	3.750	30,009	121	1.345	3,681	207	0.343	737
36	3.723	29,177	122	1.324	3,603	208	0.338	725
37	3.697	28,373	123	1.304	3,529	209	0.333	714
38	3.670	27,597	124	1.284	3,455	210	0.328	702
39	3.654	26,838	125	1.264	3,383	211	0.323	691
40	3.615	26,113	126	1.244	3,313	212	0.318	680
41	3.587	25,396	127	1.225	3,244	213	0.314	670
42	3.559	24,715	128	1.206	3,178	214	0.309	659
43	3.531	24,042	129	1.187	3,112	215	0.305	649
44	3.503	23,399	130	1.168	3,049	216	0.300	639
45	3.474	22,770	131	1.150	2,986	217	0.296	629
46	3.445	22,161	132	1.132	2,926	218	0.292	620
47	3.416	21,573	133	1.114	2,866	219	0.288	610
48	3.387	20,998	134	1.096	2,809	220	0.284	601
49	3.357	20,447	135	1.079	2,752	221	0.279	592
50	3.328	19,903	136	1.062	2,697	222	0.275	583
51	3.298	19,386	137	1.045	2,643	223	0.272	574
52	3.268	18,874	138	1.028	2,590	224	0.268	566
53	3.238	18,384	139	1.012	2,539	225	0.264	557
54	3.208	17,904	140	0.996	2,488			
55	3.178	17,441	141	0.980	2,439			
56	3.147	16,991	142	0.965	2,391			
57	3.117	16,552	143	0.949	2,343			
58	3.086	16,131	144	0.934	2,297			
59	3.056	15,714	145	0.919	2,253			
60	3.025	15,317	146	0.905	2,209			

**Table 39B — 10K Thermistor Temperature (°C) vs Resistance/Voltage Drop
(For Thermistor T10)**

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			

PRE-START-UP

IMPORTANT: Before beginning Pre-Start-Up or Start-Up, complete Start-Up Checklist for *ComfortLink™* Chiller Systems at end of this publication (page CL-1). The Checklist assures proper start-up of a unit, and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

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

System Check

1. Check all auxiliary components, such as cooling tower (if used), chilled liquid and condenser water pumps, air-handling equipment, or other equipment to which the chiller supplies liquid. Consult manufacturer's instructions. Verify that chiller pump flow switch interlocks are properly installed. If the unit has field-installed accessories, be sure all are properly installed and wired correctly. Refer to unit wiring diagrams.
2. Set the QuickSet Setpoint Adjustment to the desired leaving fluid temperature or set Cooling Setpoint through Scrolling Marquee display (if equipped).
3. Backseat (open) compressor suction and discharge shutoff valves. Close valves one turn to allow refrigerant pressure to reach the test gages.
4. Open liquid line service valves.
5. Fill chilled fluid circuit with clean water (with recommended inhibitor added) or other non-corrosive fluid to be cooled. Bleed all air out of the high points of the system. Set flow rate according to job requirements. See Table 40 for 30H models. See Table 41 for 30GTN models. If chilled water is to be maintained at a temperature below 40 F (4.4 C) or outdoor temperatures are expected to be below 32 F (0° C) (30GTN models), a brine of sufficient concentration must be used to prevent freeze-up at anticipated suction temperatures.
6. Check tightness of all electrical connections.
7. Open valve to capillaries from fluid regulating valve (when used).
8. Open supply valve (or fill cooling tower, if used) for condenser water.
9. Oil should be visible in the compressor sight glass. See Fig. 32. An acceptable oil level in the compressor is from $\frac{1}{8}$ to $\frac{3}{8}$ 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 Check Oil Charge section on page 54 for Carrier-approved oils.
10. Electrical power source must agree with unit nameplate.
11. *Crankcase heaters must be firmly locked into compressors, and must be on for 24 hours prior to start-up.*
12. 30GTN condenser fan motors are 3 phase. Check for proper fan rotation. To reverse fan rotation, interchange any 2 of the power leads.
13. Be sure system is fully charged with refrigerant (see Check Refrigerant Charge sections on pages 64 and 65).

14. Be sure compressor(s) floats freely on the mounting springs.
15. If unit is a brine unit, check to ensure proper brine concentration is used to prevent freezing.

Table 40 — 30H Minimum Cooler and Condenser Flow Rates and Minimum Loop Volume

UNIT SIZE	COOLER MINIMUM FLOW		CONDENSER MINIMUM FLOW*		MINIMUM COOLER LOOP VOLUME	
	Gpm	L/s	Gpm	L	Gal.	L
30HK040	56.0	3.5	67	4.23	120	454.2
30HK,HL050	68.0	4.3	76	4.79	148	560.2
30HK,HL060	68.0	4.3	83	5.24	174	658.6
30HW018	22.5	1.4	22.5	1.4	44	167
30HW025	30.0	1.9	30.0	1.9	59	223
30HW028	37.5	2.4	37.5	2.4	76	288
30HW035	45.0	2.8	45.0	2.8	85	322
30HW040	57.0	3.6	57.0	3.6	113	428

LEGEND

ARI — Air Conditioning and Refrigeration Institute
 Gpm — Gallons per Minute
 N — Liters per kW
 V — Gallons per ton

*30HK, HWB, HWC and HWS only.

†Minimum system fluid volumes.

NOTES:

Gallons = V x ARI capacity in tons.

Liters = N x ARI capacity in kW.

APPLICATION	V	N
Normal Air Conditioning	3	3.25
Process Type Cooling	6 to 10	6.5 to 10.8
Low Ambient Operation	6 to 10	6.5 to 10.8

Table 41 — 30GTN Minimum/Maximum Cooler Flow Rates and Minimum Loop Volume

UNIT 30GTN	MINIMUM FLOW		MAXIMUM FLOW		MINIMUM LOOP VOLUME	
	Gpm	L/s	Gpm	L	Gal.	L
015	25	2	294	19	45	171
020	25	2	294	19	60	228
025	30	2	356	22	75	285
030	30	2	356	22	90	342
035	34	2	406	26	105	399

LEGEND

ARI — Air Conditioning and Refrigeration Institute
 Gpm — Gallons per Minute
 N — Liters per kW
 V — Gallons per ton

NOTES:

1. Minimum flow based on 1.5 fps (0.46 m/s) velocity in cooler without special cooler baffling.

2. Minimum Loop Volumes

Gallons = V x ARI Cap. (tons)

Liters = N x ARI Cap. (kW)

APPLICATION	V	N
Normal Air Conditioning	3	3.25
Process Type Cooling	6	6.5
Low Ambient Operation	6	6.5

Check Refrigerant Charge — 30HK,HL,HW

⚠ CAUTION

When adding or removing refrigerant charge, circulate water through condenser and cooler at all times to prevent freezing. Freezing damage is considered abuse and is not covered by Carrier warranty.

The 30HK, HWB, HWC, and HWS units are shipped with a full refrigerant charge (see 30H Installation Instructions). However, if it is necessary to add refrigerant, operate the unit for some time at full capacity and then add charge until the sight glass is clear of bubbles. For maximum liquid subcooling, liquid level should be up to condenser end (30HK, HWC, HWS units only). This usually requires additional refrigerant charge beyond the amount to clear sight glass.

The 30HL and HWA units (condenserless) are shipped with a refrigerant holding charge only. After chiller assembly is completed in the field, system must be fully charged. While the unit is running at full capacity, add refrigerant until the sight glass is clear. R-22 is the normal refrigerant.

Do not open the liquid valve or the compressor discharge valve until there is a charge in remainder of system. *A positive pressure indicates a charge in system.* With the unit operating at **full load**, check liquid line sight glass to be sure the unit is fully charged (bubbles in the sight glass indicate the unit is **not** fully charged).

If there is no refrigerant vapor pressure in the system, the entire system must be leak tested. After repairing leaks, evacuate the system before recharging. Follow approved evacuation procedures when removing refrigeration. Release remaining pressure to an approved evacuated cylinder.

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

⚠ CAUTION

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

LIQUID CHARGING METHOD — Add charge to the unit through the liquid line service valve. **Never charge liquid into the low-pressure side of the system.**

1. Frontseat (close) condenser liquid line shutoff valve.
2. Connect a refrigerant cylinder loosely to the charging valve connection of the liquid line shutoff valve. Purge the charging hose and tighten the connections.
3. Open the charging valve.
4. If the system has been dehydrated and is under vacuum, break the vacuum with refrigerant gas. For R-22, build up system pressure to 58 psig and 32 F (400 kPa and 0° C). Invert the refrigerant cylinder so that the liquid refrigerant will be charged.
5.
 - a. For complete charge of 30HK, HWB, HWC, and HWS units, follow charging by weight procedure. When charge is nearly full, complete the process by observing the sight glass for clear liquid flow. *The use of sight glass charging is valid only when unit is operating at full capacity (no unloaders energized).*
 - b. For complete charge of 30HL and HWA units or where refrigerant cylinder cannot be weighed, follow charging by sight glass procedure. *The use of sight glass charging is valid only when unit*

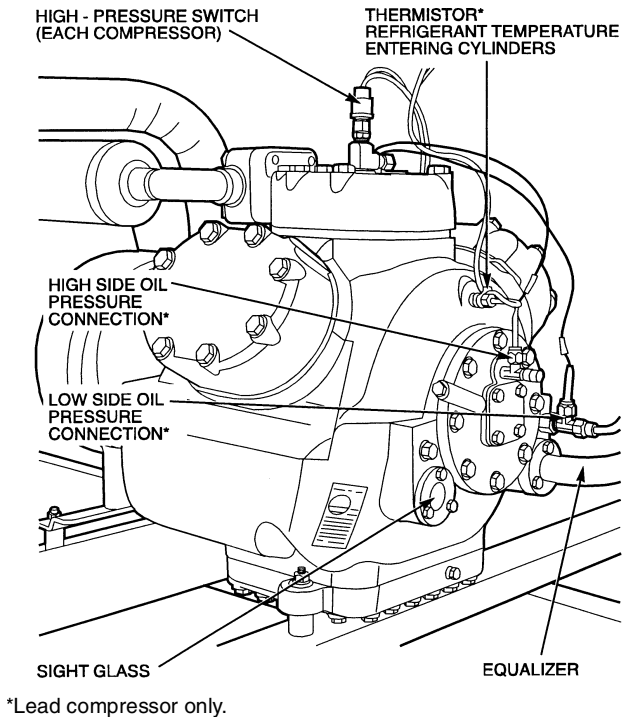


Fig. 32 — Compressor Connections (Lead Compressor Shown)

START-UP AND OPERATION

NOTE: Refer to Start-Up Checklist on pages CL-1 to CL-12.

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

1. Be sure all service valves are open. Units are shipped from factory with suction, discharge, and liquid line service valves closed.
2. Using the Marquee display, if equipped, set leaving-fluid set point (CSP.1 is Set Point mode under sub-mode COOL), or QuickSet Pot. No cooling range adjustment is necessary.
3. Start chilled fluid pump (if not configured for cooler pump control).
4. Turn ENABLE/OFF/REMOTE CONTACT switch to ENABLE position.
5. Allow unit to operate and confirm that everything is functioning properly. Check to see that leaving fluid temperature agrees with leaving set point (CSP.1 or CSP.2), or if reset is used, with the control point (CTPT) in the Run Status mode under the sub-mode VIEW (if equipped with Scrolling Marquee display).
6. Adjust the water regulating valve (where used) to obtain the most economical head pressure (based on the relative cost of water and electricity). Head pressure is normally 200 to 230 psig (1379 to 1586 kPa) for 30HK,HL units, and 195 to 226 psig (1344 to 1558 kPa) for 30HW units when using R-22 refrigerant.
7. Check the cooler leaving chilled water temperature to see that it remains well above 32 F (0° C), or the brine freezing point if the unit is a medium temperature brine unit.
8. Recheck compressor oil level (see Check Oil Charge section).

is operating at full capacity (no unloaders energized).

6. a. The 30HL and HWA condenserless units are shipped with a holding charge only. After installation with the field-supplied system high side, the complete system should be charged until the sight glass is clear (with the unit running at full capacity). To achieve maximum system capacity, add additional charge equal to the difference between the condenser optimal charge and the condenser minimum charge, which can be obtained from the charge data provided in the condenser installation instructions.
- b. To ensure maximum performance of 30HWC units, raise the compressor saturated discharge temperature (SDT) to approximately 105° F (40.6° C) by throttling the condenser water intake. Add charge until there is approximately 15 to 17° F (8.3 to 9.4° C) of system subcooling (SDT minus actual temperature entering the thermostatic expansion valve).
- c. To ensure maximum performance of 30HK, HWC, and HWS units, raise the compressor saturated discharge temperature (SDT) to approximately 103° F (39.4° C) by throttling the condenser water intake. Add charge until there is approximately 8 to 10° F (4.4 to 5.6° C) for 30HK units or 12 to 14° F (6.7 to 7.8° C) for 30HWC, HWS units of system subcooling (SDT minus actual temperature entering the thermostatic expansion valve).

Check Refrigerant Charge — 30GTN — All 30GTN units are shipped with complete operating charge of R-22 and should be under sufficient pressure to conduct leak test after installation. If there is no system pressure, admit nitrogen until a pressure is observed and then proceed to test for leaks. After leaks are repaired, the system must be dehydrated.

When additional or complete field charging is required, refer to 30GTN Installation Instructions and use approved liquid charging method.

Immediately ahead of the filter drier is a factory-installed liquid shutoff charging valve. A 1/4-in. flare connection is provided for field charging.

Do not open condenser liquid line valve or compressor discharge valve until the charge (positive pressure) is found in remainder of system. With the unit operating at **full load**, check liquid line sight glass to be sure unit is fully charged (bubbles in the sight glass indicate the unit is **not** fully charged).

⚠ CAUTION

Never charge liquid into low-pressure side of system. Do not overcharge. Overcharging results in higher discharge pressure, possible compressor damage, and higher power consumption. During charging or removal of refrigerant, be sure water is continuously circulating through the cooler to prevent freezing. Damage caused by freezing is considered abuse and may void the Carrier warranty.

Operating Limitations

TEMPERATURES — 30HK,HL,HW

⚠ WARNING

Do not operate with cooler leaving chiller water (fluid) temperature (LCWT) below 38° F (3.3° C) for the standard units, or below 15° F (–9.4° C) for units factory built for medium temperature brine.

High Cooler Leaving Chilled Water (Fluid) Temperatures (LCWT) — During start-up with cooler LCWT above approximately 60° F (16° C), the unit expansion valve will limit suction pressure to approximately 90 psig (620 kPa) to avoid overloading the compressor.

Low Cooler LCWT — For standard units, the LCWT must be no lower than 38° F (3.3° C). If the unit is the factory-installed optional medium temperature brine unit, the cooler LCWT can go down to 15° F (–9.4° C).

TEMPERATURES — 30GTN (Table 42) — If unit is to be used in an area with high solar radiation, mounted position should be such that control box is not exposed to direct solar radiation. Exposure to direct solar radiation could affect the temperature switch controlling cooler heaters.

Table 42 — Temperature Limits for Standard 30GTN Units

TEMPERATURE	F	C
Maximum Ambient Temperature	125	52
Minimum Ambient Temperature	0	–18
Maximum Cooler EWT*	95	35
Maximum Cooler LWT	70	21
Minimum Cooler LWT†	38	3.3

LEGEND

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

*For sustained operation, EWT should not exceed 85° F (29.4° C).

†Unit requires modification below this temperature.

Low-Ambient Operation — If operating temperatures below 0° F (–18° C) are expected, refer to separate installation instructions for low-ambient operation using accessory Motor-master® I control. Contact your Carrier representative for details.

⚠ CAUTION

Brine duty application (below 38° F [3.3° C] LCWT) for chiller normally requires factory modification. Contact your Carrier representative for applicable LCWT range for standard water-cooled chiller in a specific application.

VOLTAGE — ALL UNITS

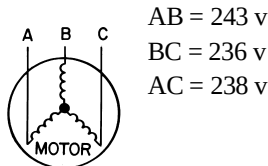
Main Power Supply — Minimum and maximum acceptable supply voltages are listed in the Installation Instructions.

Unbalanced 3-Phase Supply Voltage — *Never operate a motor where a phase imbalance between phases is greater than 2%.* To determine percent voltage imbalance:

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

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

Example: Supply voltage is 240-3-60.



1. Determine average voltage:

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

2. Determine maximum deviation from average voltage:

$$(\text{AB}) 243 - 239 = 4 \text{ v}$$

$$(\text{BC}) 239 - 236 = 3 \text{ v}$$

$$(\text{AC}) 239 - 238 = 1 \text{ v}$$

Maximum deviation is 4 v.

3. Determine percent voltage imbalance:

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{239} \\ &= 1.7\% \end{aligned}$$

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

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

Control Circuit Power — Power for the control circuit is supplied by a factory-installed control power transformer (TRAN3) for all 30H models. Control circuit power is field supplied to TB4 for 30GTN models. It must be from a field-supplied fused disconnect rated at 7 amps. Field wiring connections are made to either terminal block TB2 or TB5.

OPERATION SEQUENCE

During unit off cycle, crankcase heaters are energized. If ambient temperature is below 36 F (2 C), cooler heaters (30GTN models) are energized.

The unit is started by putting the ENABLE/OFF/REMOTE CONTACT switch in the ENABLE or REMOTE CONTACT position. When the unit receives a call for cooling (either from the internal control or CCN network command or remote contact closure), the unit stages up in capacity to maintain the leaving fluid set point. The first compressor starts 1½ to 3 minutes after the call for cooling.

The lead circuit can be specifically designated on 30HK,HL models or selected based on compressor run hours and starts depending on field configuration. When the compressor starts, a pumpout occurs (30HL, GTN models only) with the liquid line solenoid valve closed (if equipped and more than 15 minutes since the last start). On 30GTN models, the MBB controls up to 2 fan stages to maintain the head pressure set point. A pumpout sequence is also performed during shutdown (when equipped with a liquid line solenoid). If the unit does not have a liquid line solenoid, the compressor is turned off immediately when commanded.

For all units, if temperature reset is being used, the unit controls to a higher leaving-fluid temperature as the building load reduces. If demand limit is used, the unit may temporarily be unable to maintain the desired leaving-fluid temperature because of imposed power limitations. Loading sequence for compressors is shown in Table 6.

APPENDIX A — CCN TABLES

UNIT (Configuration Settings, 30HK,HL Units)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Unit Type	1 = Air Cooled 2 = Water Cooled 3 = Split System 4 = Heat Machine 5 = Air Cooled Heat Reclaim	2 HK 3 HL		UNIT_TYP
2	Unit Size	40 to 60	40	TONS	SIZE
3	Circuit A1% Capacity	0 to 100	50	%	CAP_A
4	Number Circ A Compressor	1 to 4	1		NUMCA
5	Compressor A1 Cylinders	4 or 6	6		NUM_CYLA
6	Number Circ B Compressor	1 to 4	1		NUMCB
7	Compressor B1 Cylinders	4 or 6	6		NUM_CYLB
8	EXV Module Installed	No/Yes	No		EXV_BRD
9	EXV Superheat Setpoint	10 to 40	29.0	^F	SH_SP
10	EXV MOP	40 to 80	50.0	°F	MOP_SP
11	EXV Superheat Offset	-20 to 20	0.0	^F	SH_OFFST
12	EXV Circ. A Min Position	0 to 100	8.0	%	EXVAMINP
13	EXV Circ. B Min Position	0 to 100	8.0	%	EXVBMINP
14	Refrigerant	1 = R22 2 = R134A	1		REFRIG_T
15	Low Pressure Setpoint	3 to 60	10.0	PSI	LOW_PRES
16	Fan Staging Select	1 = 2 Stage indpt. 2 = 3 Stage indpt. 3 = 2 Stage common 4 = 3 Stage common	1		FAN_TYPE

OPTIONS1 (Options Configuration, 30HK,HL Units)

	DESCRIPTION	STATUS	DEFAULT	POINT
1	Cooler Fluid	1 = Water 2 = Med. Brine 3 = Low Brine	1	FLUIDTYP
2	Hot Gas Bypass Select	No/Yes	No	HGBV_FLG
3	Head Press. Cont. Method	1 = EXV controlled 2 = Setpoint control 3 = Setpoint-A, EXV-B 4 = EXV-A, Setpoint-B	2	HEAD_MET
4	Head Press. Control Type	0 = None 1 = Air Cooled 2 = Water Cooled	0	HEAD_TYP
5	Motormaster Select	No/Yes	No	MTR_TYPE
6	Pressure Transducers	Off/On	On	PRESS_TY
7	Cooler Pump Interlock	Off/On	On	LOCK_FLG
8	Cooler Pump Control	Off/On	Off	CPC
9	Condenser Pump Interlock	Off/On	Off	CND_LOCK
10	Condenser Pump Control	0 = No Control 1 = On with Mode 2 = On with Compressors	0	CNPC
11	Condenser Fluid Sensors	No/Yes	No	CD_TEMP
12	No. Circuit A Unloaders	0-2	1	NUNLA
13	No. Circuit B Unloaders	0-2	1	NUNLB
14	EMM Module Installed	No/Yes	No	EMM_BRD

APPENDIX A — CCN TABLES (cont)

CONFIGURATION SCREEN (TYPE 10)

OPTIONS2 (Options Configuration, 30HK,HL Units)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Control Method	0 = Switch 1 = 7 day sched. 2 = Occupancy 3 = CCN	0		CONTROL
2	Loading Sequence Select	1 = Equal loading 2 = Staged loading	1		SEQ_TYPE
3	Lead/Lag Circuit Select	1 = Automatic 2 = Circuit A leads 3 = Circuit B leads	1		LEAD_TYP
4	Cooling Setpoint Select	0 = Single 1 = Dual, remote switch controlled 2 = Dual, 7-day occupancy 3 = Dual, CCN occupancy 4 = 4-20 mA input 5 = External POT	0 (Marquee Display) 5 (QuickSet)		CLSP_TYP
5	Heating Setpoint Select	0 = Single 1 = Dual, remote switch controlled 2 = Dual, 7-day occupancy 3 = Dual, CCN occupancy 4 = 4-20 mA input	0		HTSP_TYP
6	Ramp Load Select	Enable/Disable	Disable		RAMP_EBL
7	Heat Cool Select	Cool/Heat	Cool		HEATCOOL
8	High LCW Alert Limit	2 to 60	60.0	°F	LCW_LMT
9	Minutes off time	0 to 15	0	min	DELAY
10	Deadband Multiplier	1.0 to 4.0	1.0		Z_GAIN
11	Ice Mode Enable	Enable/Disable	Disable		ICE_CNFG

DISPLAY (STDU SETUP)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Service Password	nnnn	1111		PASSWORD
2	Password Enable	Enable/Disable	Enable		PASS_EBL
3	Metric Display	Off/On	Off		DISPUNIT
4	Language Selection	0 = ENGLISH 1 = FRANCAIS 2 = ESPANOL 3 = PORTUGUES	0		LANGUAGE

SCHEDOVR (TIMED OVERRIDE SETUP)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Schedule Number	0-99	0		SCHEDNUM
2	Override Time Limit	0-4	0	hours	OTL
3	Timed Override Hours	0-4	0	hours	OTL_EXT
4	Timed Override	Yes/No	No		TIMEOVER

ALARMDEF (Alarm Definition Table)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Alarm Routing Control	00000000	00000000		ALRM_CNT
2	Equipment Priority	0 to 7	4		EQP_TYPE
3	Comm Failure Retry Time	1 to 240	10	min	RETRY_TM
4	Re-alarm Time	1 to 255	30	min	RE-ALARM
5	Alarm System Name	XXXXXXXX	CHILLER		ALRM_NAM

APPENDIX A — CCN TABLES (cont)

RESETCON (Temperature Reset and Demand Limit)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	COOLING RESET				
2	Cooling Reset Type	0 = No Reset 1 = 4-20 ma input 2 = External temp-OAT 3 = Return fluid 4 = External temp-SPT	0		CRST_TYP
3	No Cool Reset Temp	0 to 125	0.0	°F	CT_NO
4	Full Cool Reset Temp	0 to 125	125.0	°F	CT_FULL
5	Degrees Cool Reset	-30 to 30	0.0	^F	CT_DEG
6					
7	HEATING RESET				
8	Heating Reset Type	0 = No Reset 1 = 4-20 mA input 2 = External temp – OAT 3 = Return fluid 4 = External temp – SPT	0		HRST_TYP
9	No Heat Reset Temp	0 to 125	0.0	%	HT_NO
10	Full Heat Reset Temp	0 to 125	125.0	%	HT_FULL
11	Degrees Heat Reset	-30 to 30	0.0	min	HT_DEG
12					
13	DEMAND LIMIT				
14	Demand Limit Select	0 = None 1 = External switch input 2 = 4-20 mA input 3 = Loadshed	0		DMD_CTRL
15	Demand Limit at 20 mA	0 to 100	100	%	DMT20MA
16	Loadshed Group Number	0 to 99	0		SHED_NUM
17	Loadshed Demand Delta	0 to 60	0	%	SHED_DEL
18	Maximum Loadshed Time	0 to 120	60	min	SHED_TIM
19	Demand Limit Switch 1	0 to 100	80	%	DLSWSP1
20	Demand Limit Switch 2	0 to 100	50	%	DLSWSP2
21					
22	LEAD/LAG				
23	Lead/Lag Chiller Enable	Enable/disable	Disable		LL_ENA
24	Master/Slave Select	Slave/Master	Master		MS-SEL
25	Slave Address	0 to 239	0		SLV_ADDR
26	Lead/Lag Balance Select	Enable/Disable	Disable		LL_BAL
27	Lead/Lag Balance Delta	40 to 400	168	hours	LL_BAL_D
28	Lag Start Delay	0 to 30	5	mins	LL_DELAY

BRODEFS (Broadcast POC Definition Table)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	CCN Time/Date Broadcast	Yes/No	No		CCNBC
2	CCN OAT Broadcast	Yes/No	No		OATBC
3	Global Schedule Broadcast	Yes/No	No		GSBC
4	CCN Broadcast Acker	Yes/No	No		CCNBCACK
5	Daylight Savings Start				
6	Month	1 to 12	1		STARTM
7	Week	1 to 5	1		STARTW
8	Day	1 to 7	0		STARTD
9	Minutes to add	0 to 99	0	min	MINADD
10	Daylight Savings Stop				
11	Month	1 to 12	1		STOPM
12	Week	1 to 5	1		STOPW
13	Day	1 to 7	0		STOPD
14	Minutes to subtract	0 to 99	0	min	MINSUB

APPENDIX A — CCN TABLES (cont)

A_UNIT (General Unit Parameters)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	Control Mode	0 = Service 1 = OFF - local 2 = OFF-CCN 3 = OFF-time 4 = Emergency 5 = ON-local 6 = ON-CCN 7 = ON-time		STAT	N
2	Occupied	Yes/No		OCC	N
3	CCN Chiller	Start/Stop		CHIL_S_S	Y
4	Alarm State	Normal		ALM	N
5	Active Demand Limit	0-100	%	DEM_LIM	Y
6	Override Motor in Effect	Yes/No		MODE	N
7	Percent Total Capacity	0-100	%	CAP_T	N
8	Requested Stage	nn		STAGE	N
9	Active Setpoint	snnn.n	°F	SP	N
10	Control Point	snnn.n	°F	CTRL_PNT	Y
11	Entering Fluid Temp	snnn.n	°F	EWT	N
12	Leaving Fluid Temp	snnn.n	°F	LWT	N
13	Emergency Stop	Enable/Emstop		EMSTOP	Y
14	Minutes Left for Start	nn	min	MIN_LEFT	N
15	Heat Cool Select	Heat/Cool		HEATCOOL	Y

CIRCA_AN (Circuit A Analog Parameters, 30HK,HL Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	Circuit A Analog Values				
2	Percent Total Capacity	0-100	%	CAPA_T	N
3	Percent Available Cap	0-100	%	CAPA_A	N
4	Discharge Pressure	nnn.n	PSI	DP_A	N
5	Suction Pressure	nnn.n	PSI	SP_A	N
6	Saturated Condensing Tmp	snnn.n	°F	TMP_SCTA	N
7	Saturated Suction Temp	snnn.n	°F	TMP_SSTA	N
8	Compressor Suction Temp	snnn.n	°F	CTA_TMP	N
9	Suction Superheat Temp	snnn.n	°F	SH_A	N
10	EXV % Open	0-100.0	%	EXV_A	N

CIRCADIO (Circuit A Discrete Parameters, 30HK,HL Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	CIRC. A DISCRETE OUTPUTS				
2	Compressor A1 Relay	ON/OFF		K_A1_RLY	N
3	Compressor A2 Relay	ON/OFF		K_A2_RLY	N
4	Compressor A3 Relay	ON/OFF		K_A3_RLY	N
5	Compressor A4 Relay	ON/OFF		K_A4_RLY	N
6	Unloader A1 Relay	ON/OFF		UNL_A1	N
7	Unloader A2 Relay	ON/OFF		UNL_A2	N
8	Liq. Line Solenoid Valve	OPEN/CLOSE		LLSV_A	N
9	Hot Gas Bypass Relay	ON/OFF		HGB	N
10					
11	CIRC. A DISCRETE INPUTS				
12	Compressor A1 Feedback	ON/OFF		K_A1_FBK	N
13	Compressor A2 Feedback	ON/OFF		K_A2_FBK	N
14	Compressor A3 Feedback	ON/OFF		K_A3_FBK	N
15	Compressor A4 Feedback	ON/OFF		K_A4_FBK	N
16	Oil Pressure Switch A	OPEN/CLOSE		OILSW_A	N
17	Low Pressure Switch A	OPEN/CLOSE		LPS_A	N

APPENDIX A — CCN TABLES (cont)

CIRCB_AN (Circuit B Analog Parameters, 30HK,HL Only)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	Circuit B Analog Values				
2	Percent Total Capacity	0-100	%	CAPB_T	N
3	Percent Available Cap	0-100	%	CAPB_A	N
4	Discharge Pressure	nnn.n	PSI	DP_B	N
5	Suction Pressure	nnn.n	PSI	SP_B	N
6	Saturated Condensing Tmp	snnn.n	°F	TMP_SCTB	N
7	Saturated Suction Temp	snnn.n	°F	TMP_SSTB	N
8	Compressor Suction Temp	snnn.n	°F	CTB_TMP	N
9	Suction Superheat Temp	snnn.n	^F	SH_B	N
10	EXV % Open	0-100.0	%	EXV_B	N

CIRCBDIO (Circuit B Discrete Parameters, 30HK,HL Only)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	CIRC. B DISCRETE OUTPUTS				
2	Compressor B1 Relay	ON/OFF		K_B1_RLY	N
3	Compressor B2 Relay	ON/OFF		K_B2_RLY	N
4	Compressor B3 Relay	ON/OFF		K_B3_RLY	N
5	Compressor B4 Relay	ON/OFF		K_B4_RLY	N
6	Unloader B1 Relay	ON/OFF		UNL_B1	N
7	Unloader B2 Relay	ON/OFF		UNL_B2	N
8	Liq. Line Solenoid Valve	ON/OFF		LLSV_BA	N
9	Hot Gas Bypass Relay	ON/OFF		HGB	N
10					
11	CIRC. B DISCRETE INPUTS				
12	Compressor B1 Feedback	ON/OFF		K_B1_FBK	N
13	Compressor B2 Feedback	ON/OFF		K_B2_FBK	N
14	Compressor B3 Feedback	ON/OFF		K_B3_FBK	N
15	Compressor B4 Feedback	ON/OFF		K_B4_FBK	N
16	Oil Pressure Switch B	OPEN/CLOSE		OILSW_B	N
17	Low Pressure Switch B	OPEN/CLOSE		LPS_B	N

APPENDIX A — CCN TABLES (cont)

OPTIONS (Unit Parameters, 30HK,HL Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	FANS				
2	Fan 1 Relay	ON/OFF		FAN_1	N
3	Fan 2 Relay	ON/OFF		FAN_2	N
4	Fan 3 Relay	ON/OFF		FAN_3	N
5	Fan 4 Relay	ON/OFF		FAN_4	N
6					
7	UNIT ANALOG VALUES				
8	Cooler Entering Fluid	snnn.n	°F	COOL_EWT	N
9	Cooler Leaving Fluid	snnn.n	°F	COOL_LWT	N
10	Condenser Entering Fluid	snnn.n	°F	COND_EWT	N
11	Condenser Leaving Fluid	snnn.n	°F	COND_LWT	N
12	Lead/Lag Leaving Fluid	snnn.n	°F	DUAL_LWT	N
13					
14	TEMPERATURE RESET				
15	4-20 mA Reset Signal	nn.n	mA	RST_MA	N
16	Outside-Air Temperature	snnn.n	°F	OAT	Y
17	Space Temperature	snnn.n	°F	SPT	Y
18					
19	DEMAND LIMIT				
20	4-20 mA Demand Signal	n.nn		LMT_MA	N
21	Demand Limit Switch 1	ON/OFF		DMD_SW1	N
22	Demand Limit Switch 2	ON/OFF		DMD_SW2	N
23	CCN Loadshed Signal	0 = Normal 1 = Redline 2 = Shed		OL_STAT	N
24					
25	PUMPS				
26	Cooler Pump Relay	ON/OFF		COOL_PMP	
27	Condenser Pump Relay	ON/OFF		COND_PMP	N
28					
29	MISCELLANEOUS				
30	Dual Setpoint Switch	ON/OFF		DUAL_IN	N
31	Cooler LWT Setpot	snn.n	°F	LWR_SP	N
32	Cooler Flow Switch	ON/OFF		COOLFLOW	N
33	Condenser Flow Switch	ON/OFF		CONDFLOW	N
34	Ice Done	ON/OFF		ICE	N

APPENDIX A — CCN TABLES (cont)

STRTHOUR (30HK,HL Units)

	DESCRIPTION	STATUS	UNITS	POINT
1	Machine Operating Hours	nnnnnn	hours	HR_MACH
2	Machine Starts	nnnnnn		CY_MACH
3				
4	Circuit A Run Hours	nnnnnn	hours	HR_CIRA
5	Compressor A1 Hours	nnnnnn	hours	HR_A1
6	Compressor A2 Hours	nnnnnn	hours	HR_A2
7	Compressor A3 Hours	nnnnnn	hours	HR_A3
8	Compressor A4 Hours	nnnnnn	hours	HR_A4
9	Circuit B Run Hours	nnnnnn	hours	HR_CIRB
10	Compressor B1 Hours	nnnnnn	hours	HR_B1
11	Compressor B2 Hours	nnnnnn	hours	HR_B2
12	Compressor B3 Hours	nnnnnn	hours	HR_B3
13	Compressor B4 Hours	nnnnnn	hours	HR_B4
14				
15	Circuit A Starts	nnnnnn		CY_CIRA
16	Compressor A1 Starts	nnnnnn		CY_A1
17	Compressor A2 Starts	nnnnnn		CY_A2
18	Compressor A3 Starts	nnnnnn		CY_A3
19	Compressor A4 Starts	nnnnnn		CY_A4
20	Circuit B Starts	nnnnnn		CY_CIRB
21	Compressor B1 Starts	nnnnnn		CY_B1
22	Compressor B2 Starts	nnnnnn		CY_B2
23	Compressor B3 Starts	nnnnnn		CY_B3
24	Compressor B4 Starts	nnnnnn		CY_B4

ALARMS

	DESCRIPTION	STATUS	UNITS	POINT
1	Active Alarm #1	Axxx or Txxx		ALARM01C
2	Active Alarm #2	Axxx or Txxx		ALARM02C
3	Active Alarm #3	Axxx or Txxx		ALARM03C
4	Active Alarm #4	Axxx or Txxx		ALARM04C
5	Active Alarm #5	Axxx or Txxx		ALARM05C
6	Active Alarm #6	Axxx or Txxx		ALARM06C
7	Active Alarm #7	Axxx or Txxx		ALARM07C
8	Active Alarm #8	Axxx or Txxx		ALARM08C
9	Active Alarm #9	Axxx or Txxx		ALARM09C
10	Active Alarm #10	Axxx or Txxx		ALARM10C
11	Active Alarm #11	Axxx or Txxx		ALARM11C
12	Active Alarm #12	Axxx or Txxx		ALARM12C
13	Active Alarm #13	Axxx or Txxx		ALARM13C
14	Active Alarm #14	Axxx or Txxx		ALARM14C
15	Active Alarm #15	Axxx or Txxx		ALARM15C
16	Active Alarm #16	Axxx or Txxx		ALARM16C
17	Active Alarm #17	Axxx or Txxx		ALARM17C
18	Active Alarm #18	Axxx or Txxx		ALARM18C
19	Active Alarm #19	Axxx or Txxx		ALARM19C
20	Active Alarm #20	Axxx or Txxx		ALARM20C
21	Active Alarm #21	Axxx or Txxx		ALARM21C
22	Active Alarm #22	Axxx or Txxx		ALARM22C
23	Active Alarm #23	Axxx or Txxx		ALARM23C
24	Active Alarm #24	Axxx or Txxx		ALARM24C
25	Active Alarm #25	Axxx or Txxx		ALARM25C

NOTE: Alerts will displayed as Txxx.

APPENDIX A — CCN TABLES (cont)

CURRMODS

	DESCRIPTION	STATUS	UNITS	POINT
1	FSM controlling chiller	ON/OFF		MODE_1
2	WSM controlling chiller	ON/OFF		MODE_2
3	Master/Slave control	ON/OFF		MODE_3
4	Low source protection	ON/OFF		MODE_4
5	Ramp Load Limited	ON/OFF		MODE_5
6	Timed Override in effect	ON/OFF		MODE_6
7	Low Cooler Suction TempA	ON/OFF		MODE_7
8*	Low Cooler Suction TempB	ON/OFF		MODE_8
9	Slow Change Override	ON/OFF		MODE_9
10	Minimum OFF Time	ON/OFF		MODE_10
11	Low Suction Superheat A	ON/OFF		MODE_11
12*	Low Suction Superheat B	ON/OFF		MODE_12
13	Dual Setpoint	ON/OFF		MODE_13
14	Temperature Reset	ON/OFF		MODE_14
15	Demand Limit in effect	ON/OFF		MODE_15
16	Cooler Freeze Prevention	ON/OFF		MODE_16
17	Lo Tmp Cool/Hi Tmp Heat	ON/OFF		MODE_17
18	Hi Tmp Cool/Lo Tmp Heat	ON/OFF		MODE_18
19	Making Ice	ON/OFF		MODE_19
20	Storing Ice	ON/OFF		MODE_20
21†	High SCT Circuit A	ON/OFF		MODE_21
22*	High SCT Circuit B	ON/OFF		MODE_22

*These modes apply to 30HK,HL units only.

†30GTN only.

SETPOINT

	DESCRIPTION	STATUS	UNITS	POINT	DEFAULTS
1	COOLING				
2	Cool Setpoint 1	-20 to 70	°F	CSP1	44
3	Cool Setpoint 2	-20 to 70	°F	CSP2	44
4	Ice Setpoint	-20 to 32	°F	CSP3	32
5					
6	HEATING				
7	Heat Setpoint 1	80 to 140	°F	HSP1	100
8	Heat Setpoint 2	80 to 140	°F	HSP2	100
9					
10	RAMP LOADING				
11	Cooling Ramp Loading	0.2 to 2.0	°F/min	CRAMP	1.0
12	Heating Ramp Loading	0.2 to 2.0	°F/min	HRAMP	1.0
13					
14	HEAD PRESSURE				
15	Head Pressure Setpoint A	80 to 140	°F	HSP_A	113
16*	Head Pressure Setpoint B	80 to 140	°F	HSP_B	113

*Applies to 30HK,HL units only.

APPENDIX A — CCN TABLES (cont)

LOADFACT

	DESCRIPTION	STATUS	UNITS	POINT
1	CAPACITY CONTROL			
2	Load/Unload Factor	snnn.n	%	SMZ
3	Control Point	snnn.n	°F	CTRL_PNT
4	Leaving Water Temp	snnn.n	°F	LWT

VERSIONS

	DESCRIPTION	STATUS	STATUS
1	MBB	CESR-131170- (30HK,HL Only) CESR-131213- (30HW,GTN Only)	nn-nn
2	EXV	N/A	nn-nn
3	CXB	N/A	nn-nn
4	EMM	CESR131174-	nn-nn
5	MARQ	CESR131171-	nn-nn
6	NAV	CESR130227-	nn-nn

LID DEFAULT SCREEN DEFINITION

TABLE TYPE 19 HEX

	DESCRIPTION	STATUS	UNITS	POINT	DISPLAY
1	(SYSTEM PRIMARY MESSAGE)				
2	(SYSTEM SECONDARY MESSAGE)				
3	Machine Operating Hours	nnnnnn	hours	HR_MACH	HR_MACH
4	Entering Chilled Water	snnn.n	°F	EWT	EWT
5	Leaving Chilled Water	snnn.n	°F	LWT	LWT
6	Control Point	snnn.n	°F	CTRL_PNT	CTRL_PNT
7	Percent Total Capacity	0-100	%	CAP_T	CAP_T
8	Active Demand Limit	0-100	%	DEM_LIM	DEM_LIM
9	Operating Setpoint	snnn.n	°F	SP	SP
10*	Circuit A Total Cap	0-100	%	CAPA_T	CAPA_T
11*	Circuit B Total Cap	0-100	%	CAPB_T	CAPB_T
12	Machine Starts	nnnnnn		CY_MACH	CY_MACH

*Applies to 30HK,HL units only.

APPENDIX A — CCN TABLES (cont)

CSM/FSM EQUIPMENT TABLE (Type 621H, Block 2)

LINE	DESCRIPTION	POINT
1	Chiller Status 0 = Chiller is off 1 = Valid run state in CCN mode 2 = Recycle active 3 = Chiller is in Local Mode 4 = Power Fail Restart in Progress 5 = Shutdown due to fault 6 = Communication Failure	CHILSTAT
2	Lag Status	LAGSTAT
3	Percent Total Capacity Running	CAP_T
4	Service Runtime	HR_MACH
5	unused	
6	unused	
7	unused	
8	Power Fail Auto Restart	ASTART
9	Percent Available Capacity On	CAP_A

WSM EQUIPMENT PART COOL SOURCE MAINTENANCE TABLE SUPERVISOR MAINTENANCE TABLE

DESCRIPTION	STATUS	POINT
WSM Active?	Yes	WSMSTAT
Chilled water temp	snn.n °F	CHWTEMP
Equipment status	On	CHLRST
Commanded state	Enable/Disable/None	CHLRENA
CHW setpoint reset value	nn.n ^F	CHWRVAL
Current CHW setpoint	snn.n °F	CHWSTPT

OCCUPANCY MAINTENANCE TABLE OCCUPANCY SUPERVISORY

DESCRIPTION	STATUS	POINT
Current Mode (1=Occup.)	0,1	MODE
Current Occup. Period #	0-8	PER-NO
Timed-Override in Effect	Yes/No	OVERLAST
Time-Override Duration	0-4 hours	OVR_HRS
Current Occupied Time	hh:mm	STRTTIME
Current Unoccupied Time	hh:mm	ENDTIME
Next Occupied Day		NXTOCDAY
Next Occupied Time	hh:mm	NXTOCTIM
Next Unoccupied Day		NXTUNDAY
Next Unoccupied Time	hh:mm	NXTUNTIM
Previous Unoccupied Day		NXTUNDAY
Previous Unoccupied Time	hh:mm	PRVUNTIM

APPENDIX A — CCN TABLES (cont)

UNIT (Configuration Settings, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Unit Type	1 = Air Cooled 2 = Water Cooled 3 = Split System 4 = Heat Machine	1		UNIT_TYP
2	Unit Size	15 to 40	15	TONS	SIZE
3	Compressor A1 Cylinders	4 or 6	6		NUM_CYLA
4	Refrigerant	1 = R22 2 = R134a	1		REGRIG_T
5	Low Pressure Setpoint	3 to 60	10.0		LOW_PRES
6	Fan Staging Select	1 = 1 stage 2 = 2 stage	1		FAN_TYPE

OPTIONS1 (Options Configuration, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Cooler Fluid	1 = Water 2 = Med. Brine 3 = Low Brine	1		FLUIDTYP
2	Hot Gas Bypass Select	No/Yes	No		HGBV_FLG
3	Pressure Transducers	No/Yes	No		PRESS_TY
4	Cooler Pump Interlock	Off/On	On		LOCK_FLG
5	Cooler Pump Control	Off/On	Off		CPC
6	Condenser Pump Interlock	Off/On	Off		CND_LOCK
7	Condenser Pump Control	Off/On	Off		CNPC
8	Condenser Fluid Sensors	No/Yes	No		CD_TEMP
9	No. Circuit A Unloaders	0-2	1		NUNLA
10	EMM Module Installed	No/Yes	No		EMM_BRD

APPENDIX A — CCN TABLES (cont)

OPTIONS2 (Options Configuration, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
1	Control Method	0 = Switch 1 = 7 day sched. 2 = Occupancy 3 = CCN	0		CONTROL
2	Cooling Setpoint Select	0 = Single 1 = Dual, remote switch controlled 2 = Dual, 7 day occupancy 3 = Dual CCN occupancy 4 = 4-20 mA input 5 = External POT	0		CLSP_TYP
3	Heating Setpoint Select	0 = Single 1 = Dual, remote switch controlled 2 = Dual, 7 day occupancy 3 = Dual CCN occupancy 4 = 4-20 mA input	0 (Marquee Display) 5 (QuickSet)		HTSP_TYP
4	Ramp Load Select	Enable/Disable	Disable		RAMP_EBL
5	Heat Cool Select	Cool/Heat	Cool		HEATCOOL
6	High LCW Alert Limit	2 to 60	60.0	^F	LCW_LMT
7	Minutes off time	0 to 15	0	min	DELAY
8	Deadband Multiplier	1.0 to 4.0	1.0		Z_GAIN
9	Ice Mode Enable	Enable/Disable	Disable		ICE_CNFG

CIRCA_AN (Options Configuration, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	CIRCUIT A ANALOG VALUES				
2	Percent Total Capacity	0-100	%	CAPA_T	N
3	Percent Available Capacity	0-100	%	CAPA_A	N
4	Discharge Pressure	nnn.n	PSI	DP_A	N
5	Suction Pressure	nnn.n	PSI	SP_A	N
6	Saturated Condensing Temp	snnn.n	°F	TMP_SCTA	N
7	Saturated Suction Temp	snnn.n	°F	TMP_SSTA	N
8	Oil Pressure	nnn.n	PSI	OILP_A	N

CIRCADIO (Options Configuration, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	OUTPUTS				
2	Compressor A1 Relay	ON/OFF		K_A1_RLY	N
3	Unloader A1 Relay	ON/OFF		UNL_A1	N
4	Unloader A2 Relay	ON/OFF		UNL_A2	N
5	Liq. Line Solenoid Valve	OPEN/CLOSE		LLSV_A	N
6	Hot Gas Bypass Relay	ON/OFF		HGB	N
7					
8	INPUTS				
9	Compressor A1 Feedback	ON/OFF		K_A1_FBK	N
10	Oil Pressure Switch A	OPEN/CLOSE		OILSW_A	N
11	Low Pressure Switch A	OPEN/CLOSE		LPS_A	N

APPENDIX A — CCN TABLES (cont)

OPTIONS (UNIT Parameters, 30GTN and 30HW Units)

	DESCRIPTION	STATUS	UNITS	POINT	FORCEABLE
1	FANS				
2	Fan 1 Relay	ON/OFF		FAN_1	N
3	Fan 2 Relay	ON/OFF		FAN_2	N
4					
5	UNIT ANALOG VALUES				
6	Cooler Entering Fluid	snnn.n	°F	COOL_EWT	N
7	Cooler Leaving Fluid	snnn.n	°F	COOL_LWT	N
8	Condenser Entering Fluid	snnn.n	°F	COND_EWT	N
9	Condenser Leaving Fluid	snnn.n	°F	COND_LWT	N
10	Lead/Lag Leaving Fluid	snnn.n	°F	DUAL_LWT	N
11					
12	TEMPERATURE RESET				
13	4-20 mA Reset Signal	nn.n	mA	RST_MA	N
14	Outside Air Temperature	snnn.n	°F	OAT	Y
15	Space Temperature	snnn.n	°F	SPT	Y
16					
17	DEMAND LIMIT				
18	4-20 mA Demand Signal	n.nn		LMT_MA	N
19	Demand Limit Switch 1	ON/OFF		DMD_SW1	N
20	Demand Limit Switch 2	ON/OFF		DMD_SW2	N
21	CCN Loadshed Signal	0 = Normal 1 = Redline 2 = Shed		DL_STAT	N
22					
23	PUMPS				
24	Cooler Pump Relay	ON/OFF		COOL_PMP	
25	Condenser Pump Relay	ON/OFF		COND_PMP	N
26					
27	MISCELLANEOUS				
28	Dual Setpoint Switch	ON/OFF		DUAL_IN	N
29	Cooler LWT Setpot	snn.n	°F	LWT_SP	N
30	Cooler Flow Switch	ON/OFF		COOLFLOW	N
31	Condenser Flow Switch	ON/OFF		CONDFLOW	N
32	Ice Done	ON/OFF		ICE	N

STRTHOUR (30GTN and 30HW Units)

	DESCRIPTION	STATUS	UNITS	POINT
1	Machine Operating Hours	nnnnnn	hours	HR_MACH
2	Machine Starts	nnnnnn	%	CY_MACH

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs are available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

Classroom Service Training which includes “hands-on” experience with the products in our labs can mean increased confidence that really pays dividends in faster troubleshooting and fewer callbacks. Course descriptions and schedules are in our catalog.

CALL FOR FREE CATALOG 1-800-962-9212

☐ Packaged Service Training ☐ Classroom Service Training

START-UP CHECKLIST FOR COMFORTLINK™ CHILLER SYSTEMS

(Remove and use for job file.)

A. Preliminary Information

JOB NAME _____

LOCATION _____

INSTALLING CONTRACTOR _____

DISTRIBUTOR _____

START-UP PERFORMED BY _____

EQUIPMENT: Chiller: MODEL NO. _____ SERIAL NO. _____

COMPRESSORS:

CIRCUIT A	CIRCUIT B (30HK,HL Only)
MODEL NO. _____	MODEL NO. _____
SERIAL NO. _____	SERIAL NO. _____
MTR NO. _____	MTR NO. _____

COOLER:

MODEL NO. _____ MANUFACTURED BY _____

SERIAL NO. _____ DATE _____

CONDENSER (30HK,HWB,HWC,HWS ONLY):

MODEL NO. _____

SERIAL NO. _____

AIR-HANDLING EQUIPMENT:

MANUFACTURER _____

MODEL NO. _____ SERIAL NO. _____

ADDITIONAL AIR-HANDLING UNITS AND ACCESSORIES _____

B. Preliminary Equipment Check (Yes or No)

IS THERE ANY SHIPPING DAMAGE? _____ IF SO, WHERE _____

WILL THIS DAMAGE PREVENT UNIT START-UP? _____

CHECK POWER SUPPLY. DOES IT AGREE WITH UNIT? _____

HAS THE CIRCUIT PROTECTION BEEN SIZED AND INSTALLED PROPERLY? (refer to Installation Instructions) _____

ARE THE POWER WIRES TO THE UNIT SIZED AND INSTALLED PROPERLY? (refer to Installation Instructions) _____

HAS THE GROUND WIRE BEEN CONNECTED? _____

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

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

B. Preliminary Equipment Check (Yes or No) (cont)

ARE ALL TERMINALS TIGHT? _____

ON 30HW UNITS, HAS THE ENTERING-FLUID THERMISTOR (T2) BEEN PROPERLY INSTALLED IN THE RETURN FLUID STREAM? _____

ON ALL UNITS, HAS THE COOLER FLUID FLOW SWITCH BEEN INSTALLED AND CORRECTLY WIRED TO TB5, TERMINALS 1 AND 2? _____

ON BRINE UNITS, HAS THE COOLER FLUID BEEN PROPERLY PROTECTED FROM FREEZING TO AT LEAST 15° F (8.3° C) BELOW THE LOWEST ANTICIPATED LEAVING FLUID TEMPERATURE SET POINT? _____

ON 30H MODELS, IS THE YELLOW WIRE GOING TO TRANSFORMER 3 (POWER TRANSFORMER) ON THE CORRECT TERMINAL (TERMINAL H2 FOR 208 V AND 575 V; TERMINAL H3 FOR 230 V, 380 V, AND 400 V; TERMINAL H4 for 460 V)? _____

HAVE THE MAIN BASE BOARD, ENERGY MANAGEMENT MODULE (OPTION) AND CONTROL RELAY CONNECTIONS BEEN CHECK FOR TIGHTNESS? _____

C. Unit Start-Up (insert check mark as each item is completed)

- ☐ CHILLER HAS BEEN PROPERLY INTERLOCKED WITH THE AUXILIARY CONTACTS OF THE CHILLED FLUID PUMP STARTER.
- ☐ CHILLER HAS BEEN PROPERLY INTERLOCKED WITH THE AUXILIARY CONTACTS OF THE CONDENSER WATER PUMP STARTER.
- ☐ UNIT IS SUPPLIED WITH CORRECT CONTROL VOLTAGE POWER
(30H MODELS, 115 V FOR ALL VOLTAGES)
(30GTN MODELS, 115 V FOR 208/230, 460 AND 575-VOLT UNITS; 230 V FOR 380 AND 380/415-V UNITS)
- ☐ CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR A MINIMUM OF **24 HOURS** PRIOR TO START-UP.
- ☐ COMPRESSOR OIL LEVEL IS CORRECT.
- ☐ BOTH LIQUID LINE SERVICE VALVES ARE BACKSEATED.
- ☐ **ALL** COMPRESSOR DISCHARGE SERVICE VALVES ARE BACKSEATED.
- ☐ **ALL** COMPRESSOR SUCTION SERVICE VALVES ARE BACKSEATED.
- ☐ LOOSEN COMPRESSOR SHIPPING HOLDDOWN BOLTS.
- ☐ OPEN GAGE PANEL SERVICE VALVES.
- ☐ SET POINT SHOULD BE ADJUSTED TO THE DESIRED COOLER LEAVING FLUID TEMPERATURE.
(refer to installation instructions).
- ☐ LEAK CHECK **THOROUGHLY**: CHECK ALL COMPRESSORS, CONDENSER MANIFOLDS AND HEADERS, EXVs, TXVs, SOLENOID VALVES, FILTER DRIERS, FUSIBLE PLUGS, THERMISTORS, AND COOLER HEADS USING ELECTRONIC LEAK DETECTOR.
- ☐ LOCATE, REPAIR, AND REPORT ANY REFRIGERANT LEAKS.
- ☐ CHECK VOLTAGE IMBALANCE: AB _____ AC _____ BC _____
AB + AC + BC (divided by 3) = AVERAGE VOLTAGE = _____ V
MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____
VOLTAGE IMBALANCE = $\frac{(\text{MAX. DEVIATION})}{\text{AVERAGE VOLTAGE}} \times 100 = \text{_____ \% VOLTAGE IMBALANCE}$
IF OVER 2% VOLTAGE IMBALANCE, DO NOT ATTEMPT TO START CHILLER!
CALL LOCAL POWER COMPANY FOR ASSISTANCE.
- ☐ INCOMING POWER VOLTAGE TO CHILLER MODULES IS WITHIN RATED UNIT VOLTAGE RANGE.

C. Unit Start-Up (cont)**SYSTEM FLUID VOLUME IN LOOP: TYPE SYSTEM:**

AIR CONDITIONING — MINIMUM 3 GAL PER NOMINAL TON (3.25 L PER kW) = _____ GAL (L)

PROCESS COOLING — MINIMUM 6 GAL PER NOMINAL TON (6.50 L PER kW) = _____ GAL (L)

CHECK PRESSURE DROP ACROSS COOLER.

FLUID ENTERING COOLER: _____ PSIG (kPa)

FLUID LEAVING COOLER: _____ PSIG (kPa)

(PSIG DIFFERENCE) x 2.31 = FT OF FLUID PRESSURE DROP = _____

PLOT COOLER PRESSURE DROP ON PERFORMANCE DATA CHART (LOCATED IN PRODUCT DATA LITERATURE) TO DETERMINE TOTAL GPM (L/s).

TOTAL GPM (L/s) = _____ UNIT'S RATED MIN GPM (L/s) = _____

GPM (L/s) PER TON = _____ UNIT'S RATED MIN PRESSURE DROP = _____
(Refer to product data literature.)

JOB'S SPECIFIED GPM (L/s) (if available): _____

NOTE: IF UNIT HAS LOW FLUID FLOW, FIND SOURCE OF PROBLEM: CHECK FLUID PIPING, IN-LINE FLUID STRAINER, SHUT-OFF VALVES, CWP ROTATION, ETC.

COOLER LOOP FREEZE PROTECTION IF REQUIRED:

GALLONS (LITERS) ADDED: _____

PIPING INCLUDES ELECTRIC TAPE HEATERS (Y/N): _____

CONDENSER PROTECTION:

IN-LINE MINIMUM 20-MESH STRAINER INSTALLED ADJACENT TO THE CONDENSER WATER INLET.

YES _____ NO _____

VISUALLY CHECK MAIN BASE BOARD FOR THE FOLLOWING:

- ☐ INSPECT ALL THERMISTORS FOR POSSIBLE CROSSED WIRES.
- ☐ CHECK TO BE SURE ALL WELL-TYPE THERMISTORS ARE FULLY INSERTED INTO THEIR RESPECTIVE WELLS.

TO START THE CHILLER:

TURN THE EMERGENCY ON/OFF SWITCH (SW2) TO ON POSITION.

IF EQUIPPED WITH QUICKSET SETPOINT ADJUSTMENT, SET THE DESIRED LEAVING FLUID TEMPERATURE SETPOINT AND TURN THE ENABLE/OFF/REMOTE CONTACT SWITCH (SW1) TO THE ENABLE POSITION.

IF EQUIPPED WITH THE OPTIONAL SCROLLING MARQUEE, LEAVE THE ENABLE/OFF/REMOTE CONTACT SWITCH (SW1) IN THE OFF POSITION.

NOTE: USE ESCAPE KEY TO GO UP ONE LEVEL IN THE STRUCTURE.

USE ARROW/ESCAPE KEYS TO ILLUMINATE CONFIGURATION LED. PRESS ENTER KEY AND 'DISP' WILL BE DISPLAYED. PRESS DOWN ARROW KEY TO DISPLAY 'UNIT'. PRESS ENTER KEY. RECORD CONFIGURATION INFORMATION ON THE FOLLOWING PAGE.

C. Unit Start-Up (cont)

UNIT (Configuration Settings, 30HK,HL Units)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
TYPE	Unit Type	1 = Air Cooled 2 = Water Cooled 3 = Split System 4 = Heat Machine 5 = Air Cooled Heat Reclaim		
TONS	Unit Size	15 to 40	TONS	
CAP.A	Circuit A1% Capacity	0 to 100	%	
CMP.A	Number Circ A Compressor	1 to 4		
CYL.A	Compressor A1 Cylinders	4 or 6		
CMP.B	Number Circ B Compressor	1 to 4		
CYL.B	Compressor B1 Cylinders	4 or 6		
EXV	EXV Module Installed	No/Yes		
SH.SP	EXV Superheat Setpoint	10 to 40	^F	
SH.OF	EXV Superheat Offset	-20 to 20	^F	
REFG	Refrigerant	1 = R22, 2 = R134A		
FAN.S	Fan Staging Select	1 = 2 Stage indpt. 2 = 3 Stage indpt. 3 = 2 Stage common 4 = 3 Stage common		

PRESS ESCAPE KEY TO DISPLAY 'UNIT'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT1'.
PRESS ENTER KEY. RECORD CONFIGURATION INFORMATION BELOW:

OPTIONS1 (Options Configuration, 30HK,HL Units)

ITEM	DESCRIPTION	STATUS	VALUE
FLUD	Cooler Fluid	1 = Water 2 = Med. Brine 3 = Low Brine	
HGB.3	Hot Gas Bypass Select	No/Yes	
HPCM	Head Press. Cont. Method	1 = EXV controlled 2 = Setpoint controlled 3 = Setpoint-A, EXV-B 4 = EXV-A, Setpoint-B	
HPCT	Head Press. Control Type	0 = None 1 = Air Cooled 2 = Water Cooled	
MMR.S	Motormaster Select	No/Yes	
PRTS	Pressure Transducers	No/Yes	
PMP.I	Cooler Pump Interlock	Off/On	
CPC	Cooler Pump Control	Off/On	
CNP.I	Condenser Pump Interlock	Off/On	
CNPC	Condenser Pump Control	0 = No Control 1 = On with Mode 2 = On with Compressor(s)	
CWT.S	Condenser Fluid Sensors		
CA.UN	No. Circuit A Unloaders	0-2	
CB.UN	No. Circuit B Unloaders	0-2	
EMM	EMM Module Installed	No/Yes	

C. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'OPT1'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT2'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

OPTIONS2 (Options Configuration, 30HK,HL Units)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
CTRL	Control Method	0 = Switch 1 = 7 day sched. 2 = Occupancy 3 = CCN		
CCNA	CCN Address	1 to 239		
CCNB	CCN Bus Number	0 to 239		
BAUD	CCN Baud Rate	1 = 240 2 = 480 3 = 9600 4 = 19,200 5 = 38,400		
LOAD	Loading Sequence Select	1 = Equal loading 2 = Staged loading		
LLCS	Lead/Lag Circuit Select	1 = Automatic 2 = Circuit A leads 3 = Circuit B leads		
LCWT	High LCW Alert Limit	2 to 60	^F	
DELY	Minutes off time	0 to 15	min.	
ICE.M	Ice Mode Enable	Enable/Disable		

FOR 30HK,HL UNITS, CONTINUE WITH RESETCON ON PAGE CL-7.

UNIT (Configuration Settings, 30GTN and 30HW Units)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
TYPE	Unit Type	1 = Air Cooled 2 = Water Cooled 3 = Split System 4 = Heat Machine		
TONS	Unit Size	15-40	TONS	
CYL.A	Compressor A1 Cylinders	4 or 6		
REFG	Refrigerant Type	1 = R22 2 = R134a		
FAN.S	Fan Staging Select	2 = 2 Stage		

C. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'UNIT'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT1'.
PRESS ENTER KEY. RECORD CONFIGURATION INFORMATION BELOW:

OPTIONS1 (Options Configuration, 30GTN and 30HW Units)

ITEM	DESCRIPTION	STATUS	VALUE
FLUD	Cooler Fluid	1 = Water 2 = Med. Brine 3 = Low Brine	
HGB.S	Hot Gas Bypass Select	No/Yes	
PRTS	Pressure Transducers	No/Yes	
PMP.I	Cooler Pump Interlock	Off/On	
CPC	Cooler Pump Control	Off/On	
CNP.I	Condenser Pump Interlock	Off/On	
CNPC	Condenser Pump Control	0 = No Control 1 = On with Mode 2 = On with Compressor(s)	
CWT.S	Condenser Fluid Sensors	No/Yes	
CA.UN	No. Circuit A Unloaders	0-2	
EMM	EMM Module Installed	No/Yes	

PRESS ESCAPE KEY TO DISPLAY 'OPT1'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT2'.
PRESS ENTER KEY. RECORD CONFIGURATION INFORMATION BELOW:

OPTIONS2 (Options Configuration, 30GTN and 30HW Units)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
CTRL	Control Method	0 = Switch 1 = 7 day sched. 2 = Occupancy 3 = CCN		
CCNA	CCN Address	1 to 239		
CCNB	CCN Bus Number	0 to 239		
BAUD	CCN Baud Rate	1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400		
LCWT	High LCW Alert Limit	2 to 60	^F	
DELY	Minutes off time	0 to 15	min.	
ICE.M	Ice Mode Enable	Enable/Disable		

C. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'OPT2'. PRESS DOWN ARROW KEY TO DISPLAY 'RSET'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

RESETCON (Temperature Reset and Demand Limit)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
COOLING RESET				
CRST	Cooling Reset Type	0 = No Reset 1 = 4-20 mA input 2 = External temp-OAT 3 = Return fluid 4 = External temp-SPT		
CRT1	No Cool Reset Temp	0 to 125	°F	
CRT2	Full Cool Reset Temp	0 to 125	°F	
DGRC	Degrees Cool Reset	-30 to 30	^F	
HRST	Heating Reset Type	0 = No Reset 1 = 4-20 mA input 2 = External temp-OAT 3 = Return fluid 4 = External temp-SPT		
HRT1	No Heat Reset Temp	80 to 140	°F	
HRT2	Full Heat Reset Temp	80 to 140	°F	
DGRH	Degrees Heat Reset	-30 to 30	^F	
DEMAND LIMIT				
DMDC	Demand Limit Select	0 = None 1 = External switch input 2 = 4-20 ma input 3 = Loadshed	0	
DM20	Demand Limit at 20mA	0 to 100	%	
SHNM	Loadshed Group Number	0 to 99		
SHDL	Loadshed Demand Delta	0 to 60	%	
SHTM	Maximum Loadshed Time	0 to 120	min	
DLS1	Demand Limit Switch 1	0 to 100	%	
DLS2	Demand Limit Switch 2	0 to 100	%	
LEAD/LAG				
LLEN	Lead/Lag Chiller Enable	Enable/Disable		
MSSL	Master/Slave Select	Slave/Master		
SLVA	Slave Address	0 to 239		
LLBL	Lead/Lag Balance Select	Enable/Disable		
LLBD	Lead/Lag Balance Delta	40 to 400	hours	
LLDY	Lag Start Delay	0 to 30	min	

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CUT ALONG DOTTED LINE

C. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'RSET'. PRESS DOWN ARROW KEY TO DISPLAY 'SLCT'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW:

SLCT (Heating Cooling Setpoint Select, 30HK,HL Units)

ITEM	DESCRIPTION	STATUS	UNITS	VALUE
CLSP	Cooling Setpoint Select	0 = Single 1 = Dual Switch 2 = Dual Clock 3 = 4 to 20 mA Input 4 = 4-20 mA Input 5 = External POT		
HTSP	Heating Setpoint Select	0 = Single 1 = Dual Switch 2 = Dual 7 day schedule 3 = Dual CCN occupancy 4 = 4-20 mA Input		
RLS	Ramp Load Select	Enable/Disable		
CRMP	Cooling Ramp Loading	0.2 to 2.0		
HRMP	Heating Ramp Loading	0.2 to 2.0		
HCSW	Heat Cool Select	Cool/Heat		
Z.GN	Deadband Multiplier	1.0 to 4.0		

PRESS ESCAPE KEY SEVERAL TIMES TO GET TO THE MODE LEVEL (BLANK DISPLAY). USE THE
ARROW KEYS TO SCROLL TO THE SET POINT LED. PRESS ENTER TO DISPLAY SETPOINTS.
RECORD CONFIGURATION INFORMATION BELOW:

SETPOINT

SUB-MODE	ITEM	DESCRIPTION	STATUS	UNITS	VALUE
COOL	CSP.1	Cooling Setpoint 1	-20 to 70	°F	
	CSP.2	Cooling Setpoint 2	-20 to 70	°F	
	CSP.3	Cooling Setpoint 3	-20 to 32	°F	
HEAT	HSP.1	Heating Setpoint 1	80 to 140	°F	
	HSP.2	Heating Setpoint 2	80 to 140	°F	
HEAD	HD.P.A	Head Pressure Setpoint A	80 to 140	°F	
	HD.P.B	Head Pressure Setpoint B	80 to 140	°F	

USE ARROW/ESCAPE KEYS TO ILLUMINATE THE TEMPERATURES LED. PRESS ENTER TO DISPLAY
'UNIT'. PRESS ENTER AND USE THE ARROW KEYS TO RECORD TEMPERATURES FOR T1 AND
T2 BELOW. RECORD T9 AND T10 IF INSTALLED. RECORD CONDENSER ENTERING AND LEAVING
FLUID TEMPERATURES IF INSTALLED. PRESS ESCAPE TO DISPLAY 'UNIT' AGAIN AND PRESS THE
DOWN ARROW KEY TO DISPLAY 'CIR.A'. PRESS ENTER AND USE THE ARROW KEYS TO RECORD
TEMPERATURE FOR T3 (30GTN ONLY). USING A DC VOLTMETER, MEASURE AND RECORD THE
VOLTAGE FOR EACH THERMISTOR AT THE LOCATION SHOWN. FOR MODELS WITH QUICKSET,
RECORD THE TEMPERATURES ACCORDING TO THE DC VOLTAGES USING TABLES 38A-39B.

	TEMPERATURE	VDC	BOARD LOCATION
T1 (CLWT)	_____	_____	MBB, J8 PINS 13,14
T2 (CEWT)	_____	_____	MBB, J8 PINS 11,12
T3 (SCT.A)	_____	_____	MBB, J8 PINS 21,22
T9 (OAT)	_____	_____	MBB, J8 PINS 7,8
T10 (SPT)	_____	_____	MBB, J8 PINS 5,6
(CNDE)	_____	_____	MBB, J8 PINS 1,2
(CNDL)	_____	_____	MBB, J8 PINS 3,4

C. Unit Start-Up (cont)

USE ESCAPE/ARROW KEYS TO ILLUMINATE CONFIGURATION LED. PRESS ENTER TO DISPLAY 'DISP'. PRESS ENTER AGAIN TO DISPLAY 'TEST' FOLLOWED BY 'OFF'. PRESS ENTER TO STOP DISPLAY AT 'OFF' AND ENTER AGAIN SO 'OFF' DISPLAY FLASHES. 'PASS' AND 'WORD' WILL FLASH IF PASSWORD NEEDS TO BE ENTERED. PRESS ENTER TO DISPLAY PASSWORD FIELD AND USE THE ENTER KEY FOR EACH OF THE FOUR PASSWORD DIGITS. USE ARROW KEYS IF PASSWORD IS OTHER THAN STANDARD. AT FLASHING 'OFF' DISPLAY, PRESS THE UP ARROW KEY TO DISPLAY 'ON' AND PRESS ENTER. ALL LED SEGMENTS AND MODE LEDS WILL LIGHT UP. PRESS ESCAPE TO STOP THE TEST. PRESS ESCAPE TO RETURN TO THE 'DISP' DISPLAY. PRESS THE ESCAPE KEY AGAIN AND USE THE ARROW KEYS TO ILLUMINATE THE SERVICE TEST LED. PRESS ENTER TO DISPLAY 'TEST'. PRESS ENTER TO STOP DISPLAY AT 'OFF' AND ENTER AGAIN SO 'OFF' FLASHES. PRESS THE UP ARROW KEY AND ENTER TO ENABLE THE MANUAL MODE. PRESS ESCAPE AND DISPLAY NOW SAYS 'TEST' 'ON'.

PRESS THE DOWN ARROW TO DISPLAY 'OUTS'. PRESS THE ENTER KEY TO DISPLAY 'LLS.A'. PRESS THE ENTER KEY TO STOP DISPLAY AT 'OFF' AND ENTER AGAIN SO 'OFF' FLASHES. PRESS THE UP ARROW KEY AND ENTER TO TURN THE OUTPUT ON. PRESS ENTER SO THE 'ON' DISPLAY FLASHES, PRESS THE DOWN ARROW KEY AND THEN ENTER TO TURN THE OUTPUT OFF. OUTPUTS WILL ALSO BE TURNED OFF OR SENT TO 0% WHEN ANOTHER OUTPUT IS TURNED ON. CHECK OFF THE FOLLOWING THAT APPLY AFTER BEING TESTED:

LLS.A	_____	(30HL,GTN ONLY)	EXV.A	_____	N/A
LLS.B	_____	(30HL ONLY)	EXV.B	_____	N/A
FAN1	_____	(CHECK ROTATION, 30GTN ONLY)			
FAN2	_____	(CHECK ROTATION, 30GTN ONLY)			
CLR.P	_____	(TB2-1,9)	CND.P	_____	(TB2-2,9)
RMT.A	_____	(TB2-7, TRAN2-L2)			

USE ESCAPE KEY TO RETURN TO 'OUTS' DISPLAY. PRESS DOWN ARROW TO DISPLAY 'COMP'. PRESS ENTER KEY TO DISPLAY 'CC.A1'. NOTE THAT UNLOADERS AND HOT GAS BYPASS SOLENOIDS CAN BE TESTED BOTH WITH AND WITHOUT COMPRESSOR(S) RUNNING. MAKE SURE ALL SERVICE VALVES ARE OPEN AND COOLER/CONDENSER PUMPS HAVE BEEN TURNED ON BEFORE STARTING COMPRESSORS. CHECK OFF EACH ITEM AFTER SUCCESSFUL TEST. THE CONTROL WILL ONLY START ONE COMPRESSOR PER MINUTE. WHEN AT THE DESIRED ITEM, PRESS THE ENTER KEY TWICE TO MAKE THE 'OFF' FLASH. PRESS THE UP ARROW KEY AND ENTER TO TURN THE OUTPUT ON.

CC.A1	_____		CC.A2	_____	N/A
CC.A3	_____	N/A	CC.A4	_____	N/A
UL.A1	_____		UL.A2	_____	
HGBP	_____	(IF INSTALLED)			
CC.B1	_____	(30HK,HL ONLY)	CC.B2	_____	N/A
CC.B3	_____	N/A	CC.B4	_____	N/A
UL.B1	_____		UL.B2	_____	N/A

CHECK AND ADJUST SUPERHEAT AS REQUIRED.

C. Unit Start-Up (cont)

ALL UNITS:

MEASURE THE FOLLOWING (MEASURE WHILE MACHINE IS IN A STABLE OPERATING CONDITION):

	CIRCUIT A	CIRCUIT B
DISCHARGE PRESSURE	_____	_____
SUCTION PRESSURE	_____	_____
OIL PRESSURE	_____	_____
DISCHARGE LINE TEMP	_____	_____
SUCTION LINE TEMP	_____	_____
SATURATED COND TEMP (T3) (30GTN ONLY)	_____	_____
COOLER ENTERING FLUID (T2)	_____	
COOLER LEAVING FLUID (T1)	_____	
CONDENSER ENTERING FLUID	_____	
CONDENSER LEAVING FLUID	_____	

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE