



48/50HG014-028

Single Package Large Rooftop Units with *ComfortLink™* Controls

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

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment. Untrained personnel can perform the basic maintenance functions of replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may

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

GENERAL

This publication contains Start-Up, Controls, Operation, and Troubleshooting information for the 48/50HG rooftop units. See Table 1. These units are equipped with *ComfortLink*™ controls.

Table 1 — Unit Sizes (48/50HG)

UNIT	NOMINAL TONS
48/50HG014	12 ¹ / ₂
48/50HG016	15
48/50HG020	18
48/50HG024	20
48/50HG028	25

Currently, 48/50HG units are being produced in two separate factories. Depending on where the unit is made, small differences are present in the units. This guide covers units made in both factories. The units are differentiated by the design revision number in the model number nomenclature (position 13). There are design revision 0 and design revision 1 HG units currently being produced. Design revision 0 units will be referred to as DR0 and design revision 1 units will be referred to as DR1 in this literature. Table 2 lists the major differences between DR0 and DR1 units.

Table 2 — Design Revision Differences

ITEM	DR0 UNIT	DR1 UNIT
Number of Terminal Strips	4 or 5	1 or 2
SAT Location	Underneath gas section	Blower side plate
OAT Location	Economizer section	Condenser support bracket (inboard condenser, return bend side)
SAT and OAT Sensors	5K Type	10K Type
Fan Power Relay	YES	NO
Economizer Power Relay	Only with no reheat	NO
575 V Unit	Step-down transformers	All components 575 V
Power Exhaust	Separate fuses	No additional fuses
Fan Status Wires	Accessory	Standard
Smoke Detectors	System Sensor Type	Tel Aire Type
Condensing Thermistor	Located on hairpins	Located on return bends
Outdoor Fan Wiring	Located far side of unit	Located near side of unit

MAJOR SYSTEM COMPONENTS

General — The 48/50HG single package rooftop units with electric cooling and gas heating (48HG units) or electric cooling and electric heating (50HG units) contain the *ComfortLink* electronic control system that monitors all operations of the rooftop. The control system is composed of several components as listed in sections below. See Fig. 1A-3B for the control and power schematics. Figures 4A and 4B shows the layout of the control box, unit, and thermistor and transducer locations.

Main Base Board (MBB) — See Fig. 5 and Table 3. The MBB is the center of the *ComfortLink* control system. It contains the major portion of the operating software and controls the operation of the unit. The MBB continuously monitors input/output channel information received from its inputs and from the Economizer Control Board (ECB). The MBB receives inputs from thermistors and transducers. The MBB also receives the Current Sensor inputs for compressors A1, B1 and C1 and other discrete or digital inputs. The MBB reads space temperature (SPT) from either a T-55, T-56 or T-58 device and space temperature offset (SPTO) from a T-56 device. See Field-Installed Accessories section on page 17. The MBB controls 11 relays.

Economizer Control Board (ECB) — The ECB (part no. 50TG500596) controls the economizer actuator. See Fig. 6 and Table 4. The control signal from the ECB uses either the Belimo communication protocol or a 4 to 20 mA output signal as defined by the configuration ECTL. The analog signal is only available on unit software 3.1 or later. The ECB has inputs for Indoor Air Quality (IAQ), Outdoor Air Quality (OAQ), and enthalpy. It also controls two power exhaust motors (PE1 and PE2).

By digitally communicating with the ECB, the economizer actuator is able to provide the damper position and diagnostic information to the *ComfortLink* controller. The damper position is displayed as EC.AP under Outputs/Econ on the Scrolling Marquee. Diagnostic information is displayed via Alert T414. More information about these alarms is contained in the Alarms and Alerts section.

On the ECB, RLY 6 can either provide power to the economizer actuator or reheat valve for Circuit B. For DR0 units, the configuration Economizer Power Relay Installed (EPR), located under Unit on the Scrolling Marquee, must be set to YES. For DR1 units this configuration must be set to NO. For DR0 units, RLY 6 will control economizer actuator power unless reheat is installed. For DR1 units, RLY 6 will only control reheat as needed.

Integrated Gas Control (IGC) Board — The IGC is provided on gas heat units. See Table 5. The IGC controls the direct spark ignition system and monitors the rollout switch, limit switch, and induced-draft motor Hall Effect switch. The IGC is equipped with an LED (light-emitting diode) for diagnostics. See the Troubleshooting section for more information.

Low Voltage Terminal Strip — This circuit board provides a connection point between the major control boards and a majority of the field-installed accessories. See Fig. 7 and Tables 6A and 6B. The circuit breakers for the low voltage control transformers, interface connection for the Carrier Comfort Network (CCN) communication, and interface connection for the Local Equipment Network (LEN) communications are also located on the low voltage terminal strip.

Scrolling Marquee Display — This device is the keypad interface used to access rooftop information, read sensor values, and test the unit. See Fig. 8. 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 Scrolling Marquee Display Operation section on page 20 for further details.

Board Addresses — The Main Base Board (MBB) has a 3-position instance jumper that is set at the factory to “1.” Do not change this setting. The ECB has a 4-position DIP switch. Each DIP switch is set to “0” at the factory. Do not change this setting.

Control Module Communication

RED LED — Proper operation of the control boards can be visually checked by looking at the red status LEDs. When operating correctly, the red status LEDs should blink in unison at a rate of once every 2 seconds. If the red LEDs are not blinking in unison, verify that correct power is being supplied to all modules. Also, be sure that the Main Base Board 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 that will blink whenever power is on. If LEN LED is not blinking, check LEN connections for potential communication errors (J3 and 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.

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

Carrier Comfort Network Interface — The 48/50HG units can be connected to the CCN if desired. The communication bus wiring is a shielded, 3-conductor cable with drain wire and is field supplied and installed. See Table 7 for wiring information. 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 TB2. See Fig. 1A-2B. 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. See Table 7.

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. The shield screw on TB2 can be used to tie the cables together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground at one point only. The shield screw on TB2 is not acceptable for grounding. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only). To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (-) conductors. (Substitute appropriate colors for different colored cables.)
3. Connect the red wire to (+) terminal on TB2 of the plug, the white wire to COM terminal, and the black wire to the (-) terminal.
4. The RJ14 CCN connector on TB2 can also be used, but is only intended for temporary connection (for example, a laptop computer running Service Tool).
5. Restore power to unit.

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.

- NOTES:
1. Use TB5-5 and TB5-6 for remote occupancy switch. Remember to configure software; see Controls and Troubleshooting Guide.
 2. See legend on page 10.

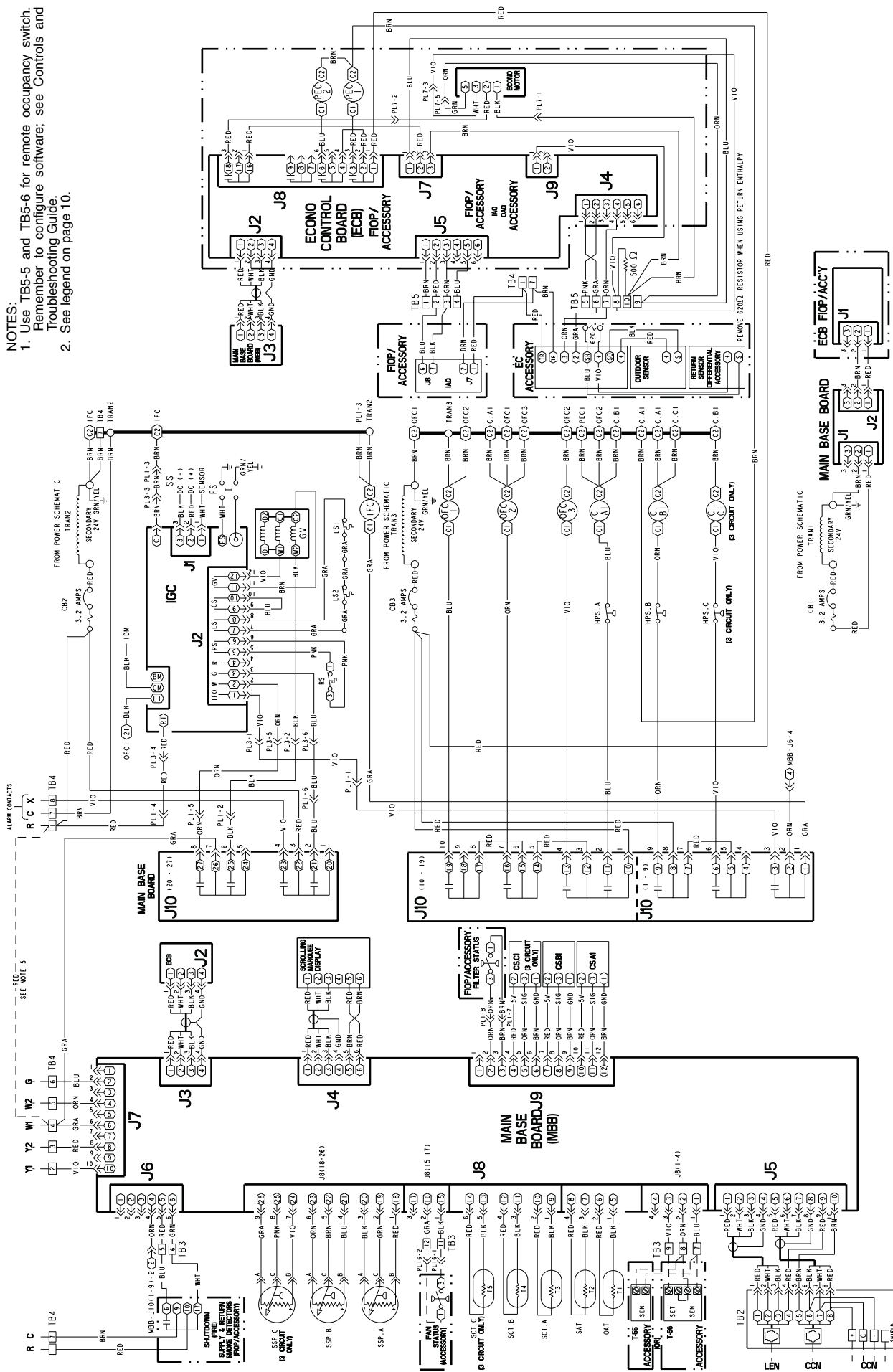


Fig. 1A — Low Voltage Control Schematic — 48HG Units (DR0)

LOW VOLTAGE CONTROL SCHEMATIC 48HG

NOTES:

1. Use TB5-5 and TB5-6 for remote occupancy switch. Remember to configure software; see Controls and Troubleshooting Guide.
2. See legend on page 10.

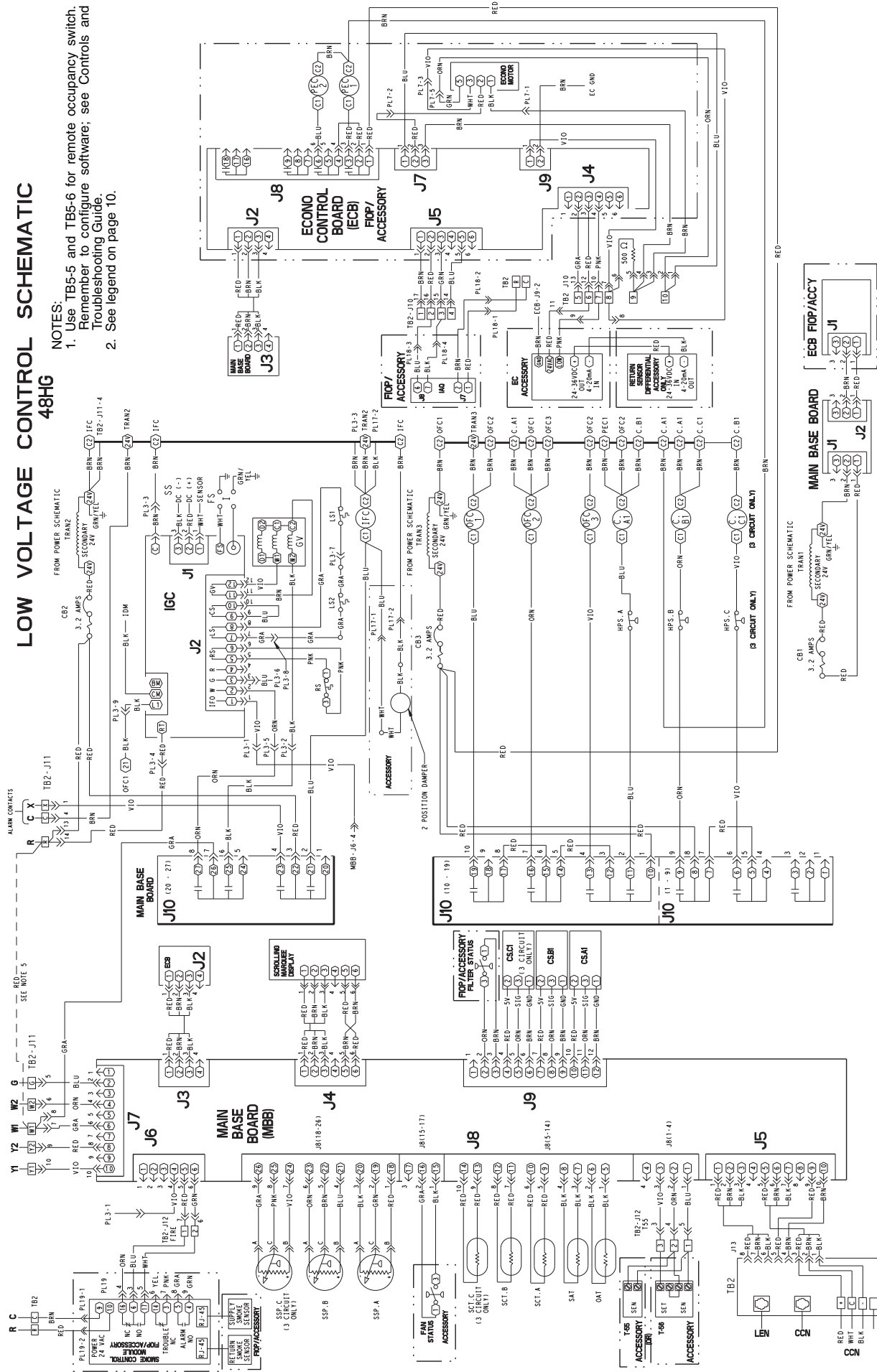


Fig. 1B — Low Voltage Control Schematic — 48HG Units (DR1)

- NOTES:
1. Use TB5-5 and TB5-6 for remote occupancy switch. Remember to configure software; see Controls and Troubleshooting Guide.
 2. See legend on page 10.

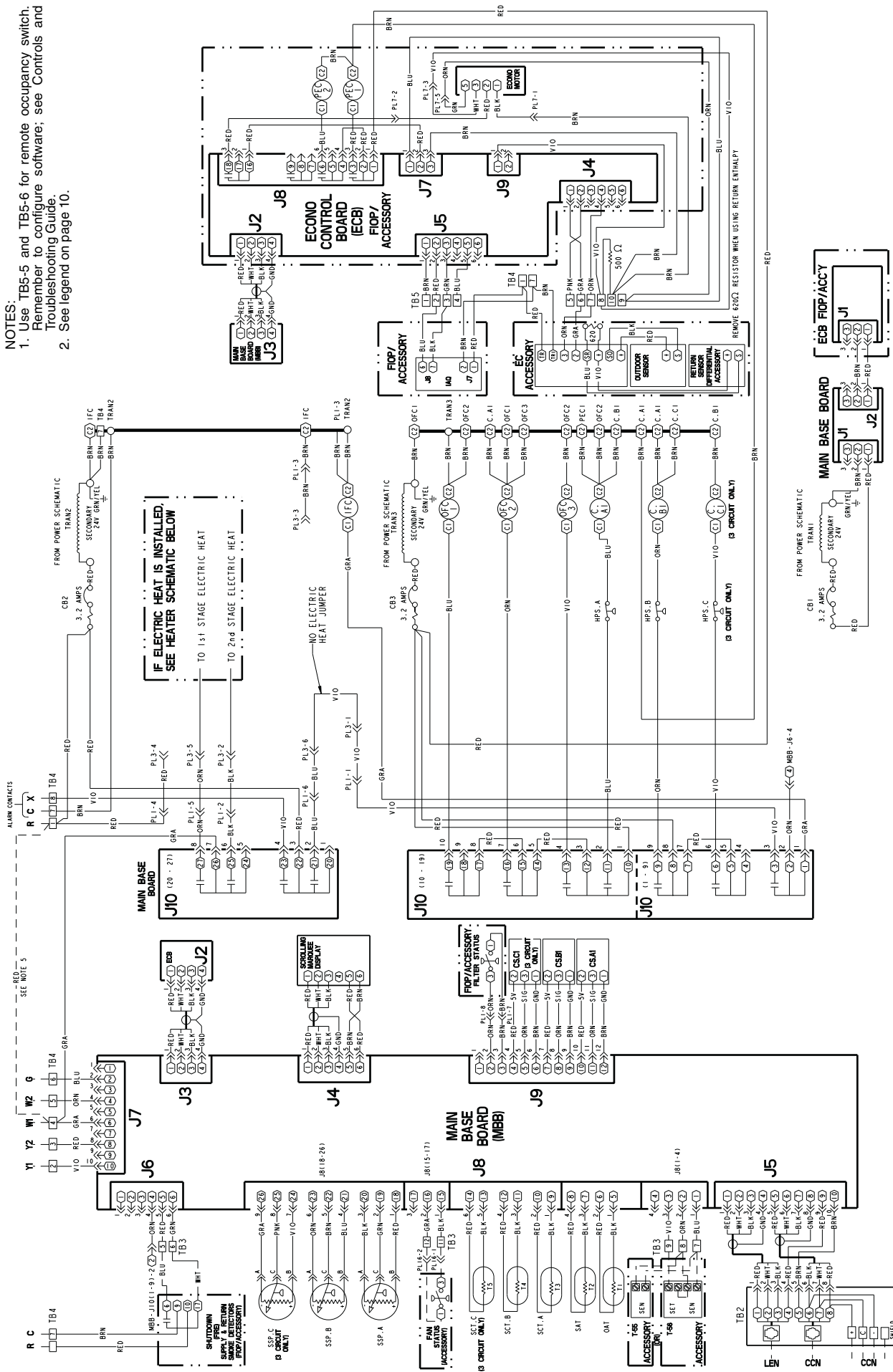


Fig. 2A — Low Voltage Control Schematic — 50HG Units (DR0)

LOW VOLTAGE CONTROL SCHEMATIC 50HG

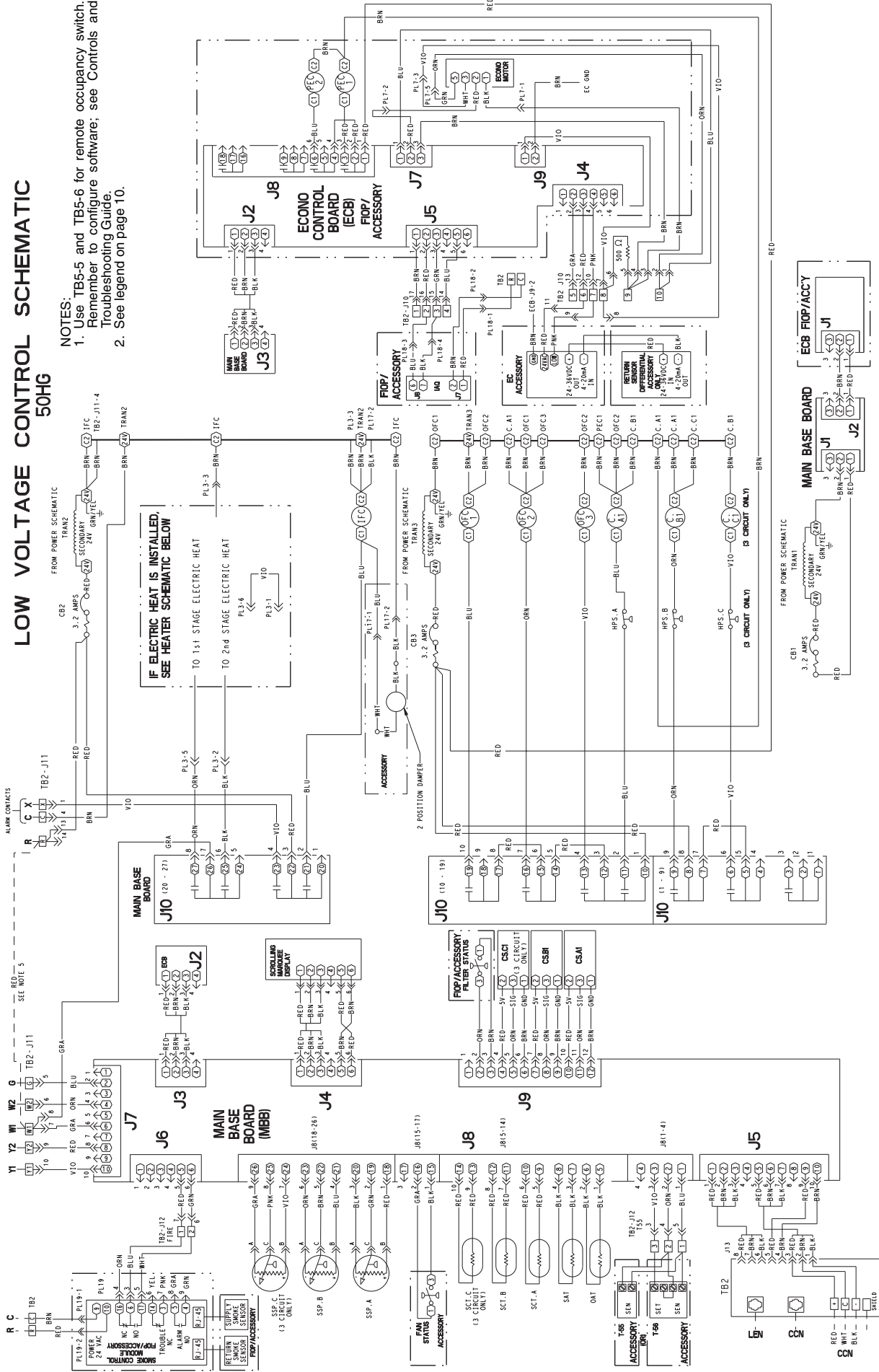
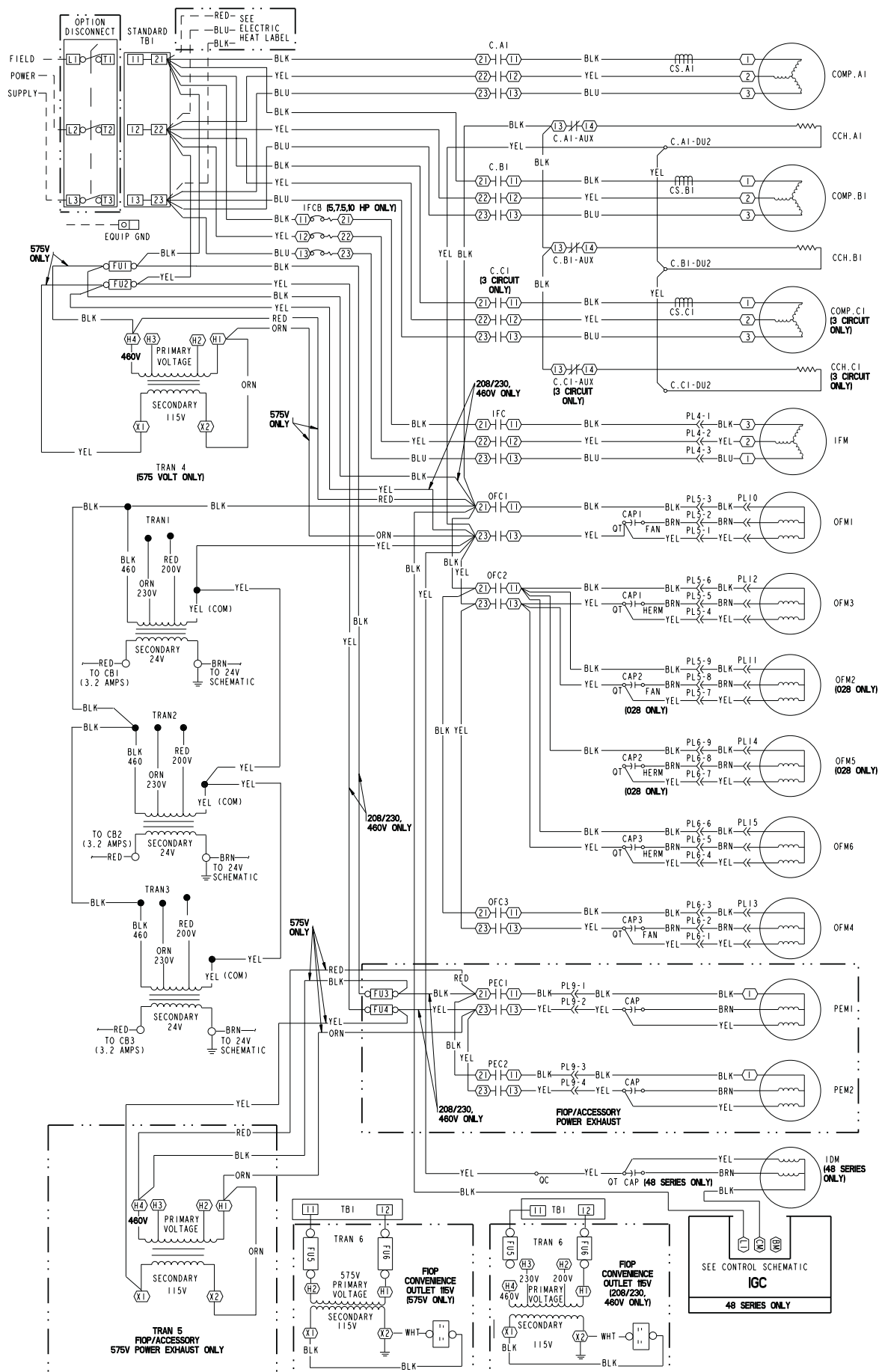


Fig. 2B — Low Voltage Control Schematic — 50HG Units (DR1)



NOTE: See legend on page 10.

Fig. 3A — Typical Power Schematic (DR0)

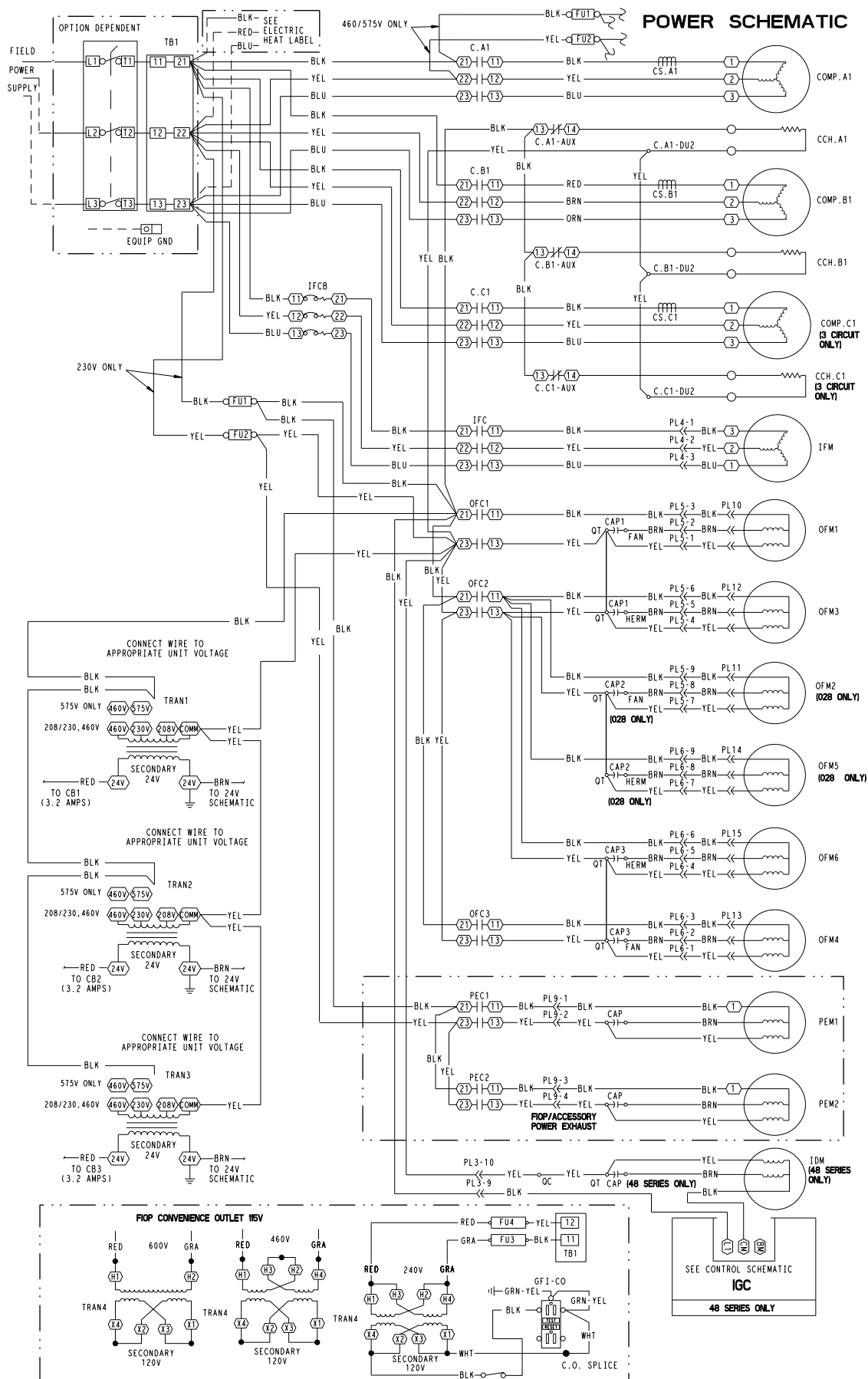
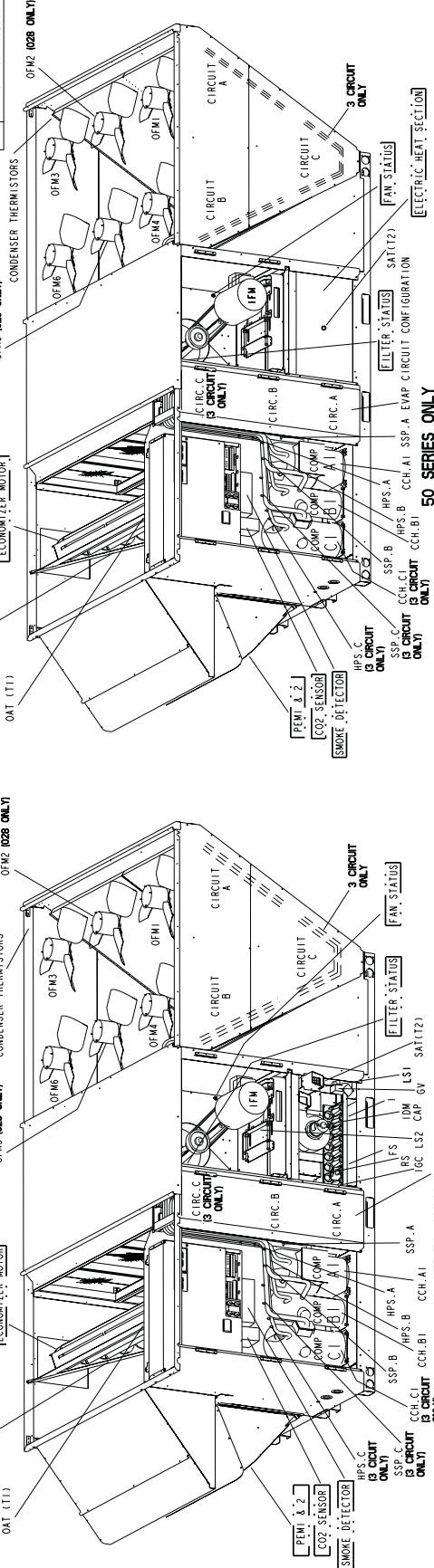
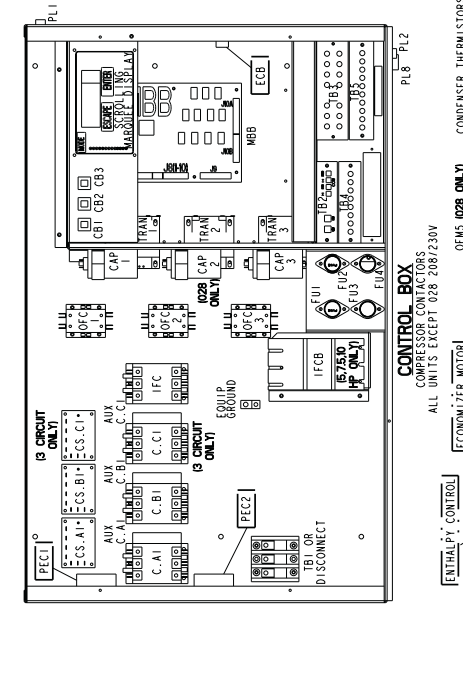
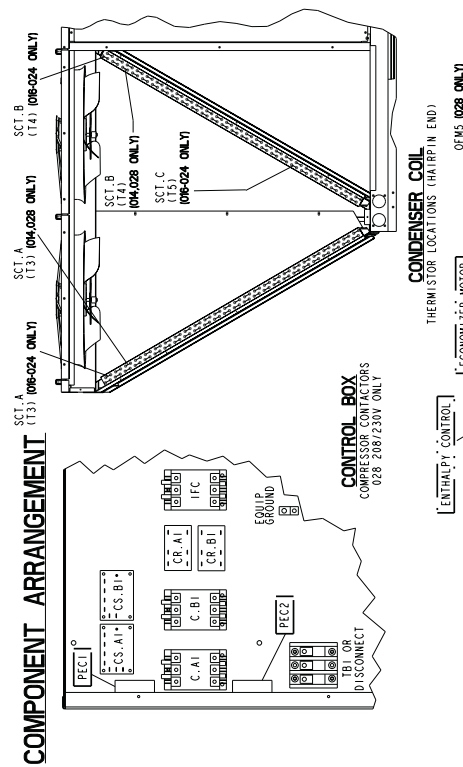


Fig. 3B — Typical Power Schematic (DR1)

PLUG LOCATION REFERENCE	PLUG LOCATION REFERENCE
PL1 CONTROL BOX-TOP RIGHT (HEAT CONTROLS)	PL16 FAN SECTION (FAN STATUS ACCESSORY)
PL2 CONTROL BOX-BOTTOM (HPS, A, B, C)	
PL3 HEAT SECTION PARTITION (HEAT CONTROLS)	
PL4 FAN SECTION (T44)	
PL5 CONDENSER SECTION (OFH1, 2, 3)	
PL6 CONDENSER SECTION (OFH4, 5, 6)	
PL7 ECONOMIZER SECTION (ECONOMIZER MOTOR)	
PL8 TRANSFORMER SECTION (TRANSFORMER, SP, A, B, C)	
PL9 POWER EXHAUST SECTION (POWER EXHAUST MOTORS)	
PL10 CONDENSER SECTION (OFH1)	
PL11 CONDENSER SECTION (OFH2)	
PL12 CONDENSER SECTION (OFH3)	
PL13 CONDENSER SECTION (OFH4)	
PL14 CONDENSER SECTION (OFH5)	
PL15 CONDENSER SECTION (OFH6)	



- NOTES:**
- Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
 - Use 75°C min wire for field power supply. Use copper wires for all units.
 - All circuit breakers Must Trip Amps are equal to or less than 156% FLA.
 - Compressor and fan motors are thermally protected. Three-phase motors protected against primary single-phase conditions.
 - Red jumper wire must be added between R and W1 for Space Temperature mode and temporarily during Service Test mode when the heaters need to operate.

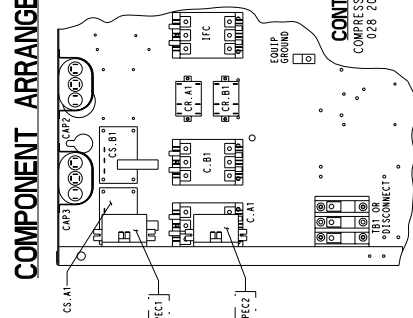
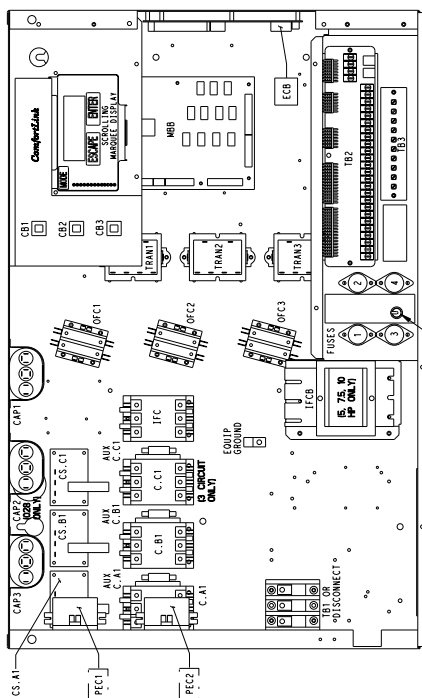
- THERMOSTAT/IGC MARKINGS**
- BM** — Blower Motor
C — Common
CM — Inducer Motor
CS — Centrifugal Switch
G — Fan
I/O — Indoor Fan On
L1 — Line 1
RT — Thermostat Power
SS — Power Supply
W — Speed Sensor
W1 — Thermostat Heat
W2 — 1st Stage of Heating
X — Alarm Output
Y1 — 1st Stage of Cooling
Y2 — 2nd Stage of Cooling

- TB** — Terminal Block
TRAN — Transformer
T-55 — Room Temp Device
T-56 — Room Temp Device with Set Point Adjustment
- LEGEND FOR FIG. 1A TO 4B**
- 48 SERIES ONLY**
- 50 SERIES ONLY**

- LEGEND FOR FIG. 1A TO 4B**
- 48 SERIES ONLY**
- 50 SERIES ONLY**

Fig. 4A — Typical Component Arrangement (DR0)

COMPONENT ARRANGEMENT



PLUG LOCATION	REFERENCE
PL3	HEAT SECTION PARTITION (HEAT CONTROLS)
PL4	FAN SECTION (INDOOR FAN MOTOR)
PL5	ECONOMIZER SECTION (ECONOMIZER MOTOR)
PL6	DAMPEN SECTION (FAN DAMPER)
PL7	ECONOMIZER SECTION (ECONOMIZER MOTOR)
PL9	POWER EXHAUST SECTION (POWER EXHAUST MOTORS)
PL10	DAMPEN SECTION (FAN DAMPER)
PL11	DAMPEN SECTION (FAN DAMPER)
PL12	DAMPEN SECTION (FAN DAMPER)
PL13	DAMPEN SECTION (FAN DAMPER)
PL14	DAMPEN SECTION (FAN DAMPER)
PL15	DAMPEN SECTION (FAN DAMPER)
PL16	FAN SECTION (FAN STATUS ACCESSORY)
PL17	ECONOMIZER SECTION (ECONOMIZER DAMPER)
PL18	COMPRESSOR SECTION (CO2 SENSOR)
PL19	COMPRESSOR SECTION (SMOKE DETECTOR CONTROL MODULE)

CONDENSER COIL

THERMISTOR LOCATIONS (RETURN BEND END)

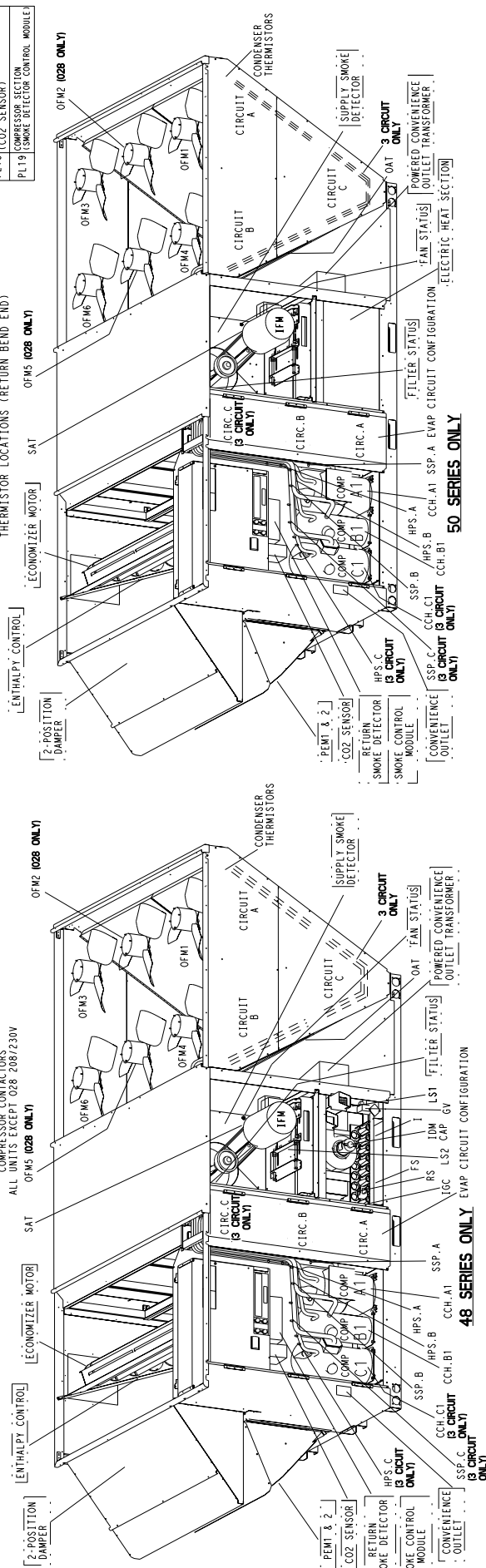


Fig. 4B — Typical Component Arrangement (DR1)

NOTE: See legend on page 10.

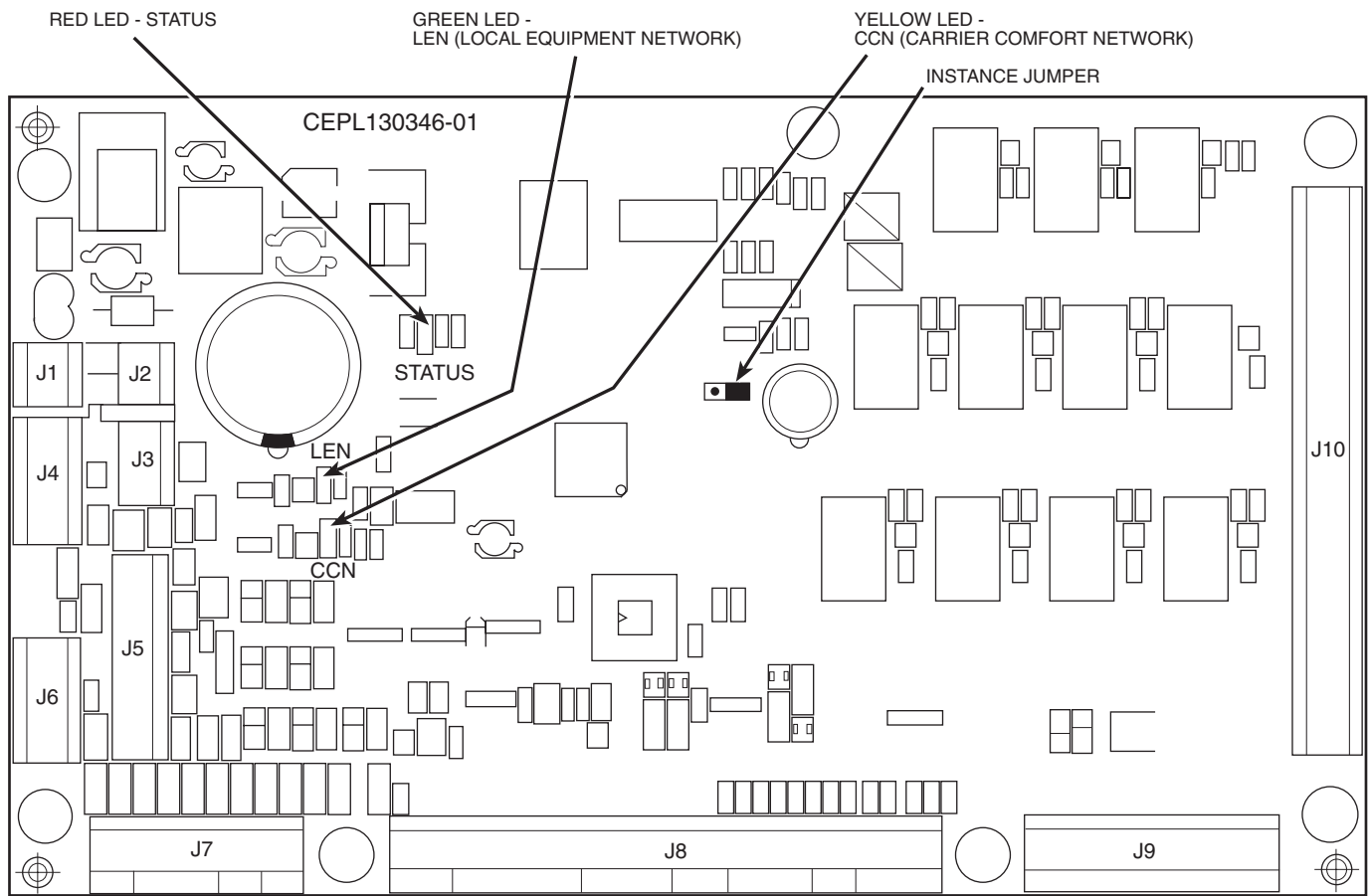


Fig. 5 — Main Base Board

Table 3 — MBB Connections

DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
	Input power from TRAN1	control box	24 VAC	J1, 1-3
	Indoor fan output feedback (IGC)	gas section	switch input	J6, 4
FDWN	Fire shutdown switch	supply/return/space	switch input	J6, 5-6
G	Thermostat G (Fan)	space	switch input	J7, 2
W2	Thermostat W2 (2nd Stage Heat)	space	switch input	J7, 4
W1	Thermostat W1 (1st Stage Heat)	space	switch input	J7, 6
Y2	Thermostat Y2 (2nd Stage Cool)	space	switch input	J7, 8
Y1	Thermostat Y1 (1st Stage Cool)	space	switch input	J7, 10
SPT	Space temperature (T55/56)	space	10k thermistor	J8, 1-2
SPTO or RAT	Space temperature offset (T56) or Return air temperature	space or return	10k thermistor	J8, 2-3
OAT	Outdoor air temperature	economizer section (DR0) outdoor coil support (DR1)	5k thermistor (DR0) 10k thermistor (DR1)	J8, 5-6
SAT	Supply air temperature	heat section (DR0) indoor fan housing, or supply duct (DR1)	5k thermistor (DR0) 10k thermistor (DR1)	J8, 7-8
SCT.A	Saturated condenser temperature, circuit A	A condenser hairpin (DR0) A condenser return bend (DR1)	5k thermistor	J8, 9-10
SCT.B	Saturated condenser temperature, circuit B	B condenser hairpin (DR0) B condenser return bend (DR1)	5k thermistor	J8, 11-12
SCT.C	Saturated condenser temperature, circuit C	C condenser hairpin (DR0) C condenser return bend (DR1)	5k thermistor	J8, 13-14
FAN.S	Fan status switch	indoor fan section	switch input	J8, 15-16
SSP.A	Suction pressure, circuit A	compressor A suction	analog input	J8, 18-20
SSP.B	Suction pressure, circuit B	compressor B suction	analog input	J8, 21-23
SSP.C	Suction pressure, circuit C	compressor C suction	analog input	J8, 24-26
FIL.S	Filter status switch	indoor fan section	switch input	J9, 2-3
CS.A1	Compressor A1 Feedback	control box	digital input	J9, 4-6
CS.B1	Compressor B1 Feedback	control box	digital input	J9, 7-9
CS.C1	Compressor C1 Feedback	control box	digital input	J9, 10-12
OUTPUTS				
	Output power to ECB		24 VAC	J2, 1-2
	Output power to Marquee Display		24 VAC	J4, 5-6
IDFP	Indoor Fan Power (DR0 only)		relay	J10, 3
C1	Compressor C1		relay	J10, 6
B1	Compressor B1		relay	J10, 9
A1	Compressor A1		relay	J10, 11
OFC.3	Outdoor fan 3		relay	J10, 13
OFC.1	Outdoor fan 1		relay	J10, 16
OFC.2	Outdoor fan 2		relay	J10, 19
IDF	Indoor fan		relay	J10, 21
ALRM	Alarm		relay	J10, 23
HTR.1	Heat stage 1		relay	J10, 25
HTR.2	Heat stage 2		relay	J10, 27
COMMUNICATION				
	Local Equipment Network (LEN)		communication	J5, 1-3
	Carrier Comfort Network (CCN)		communication	J5, 5-7
	Network device power		24 VAC	J5, 9-10

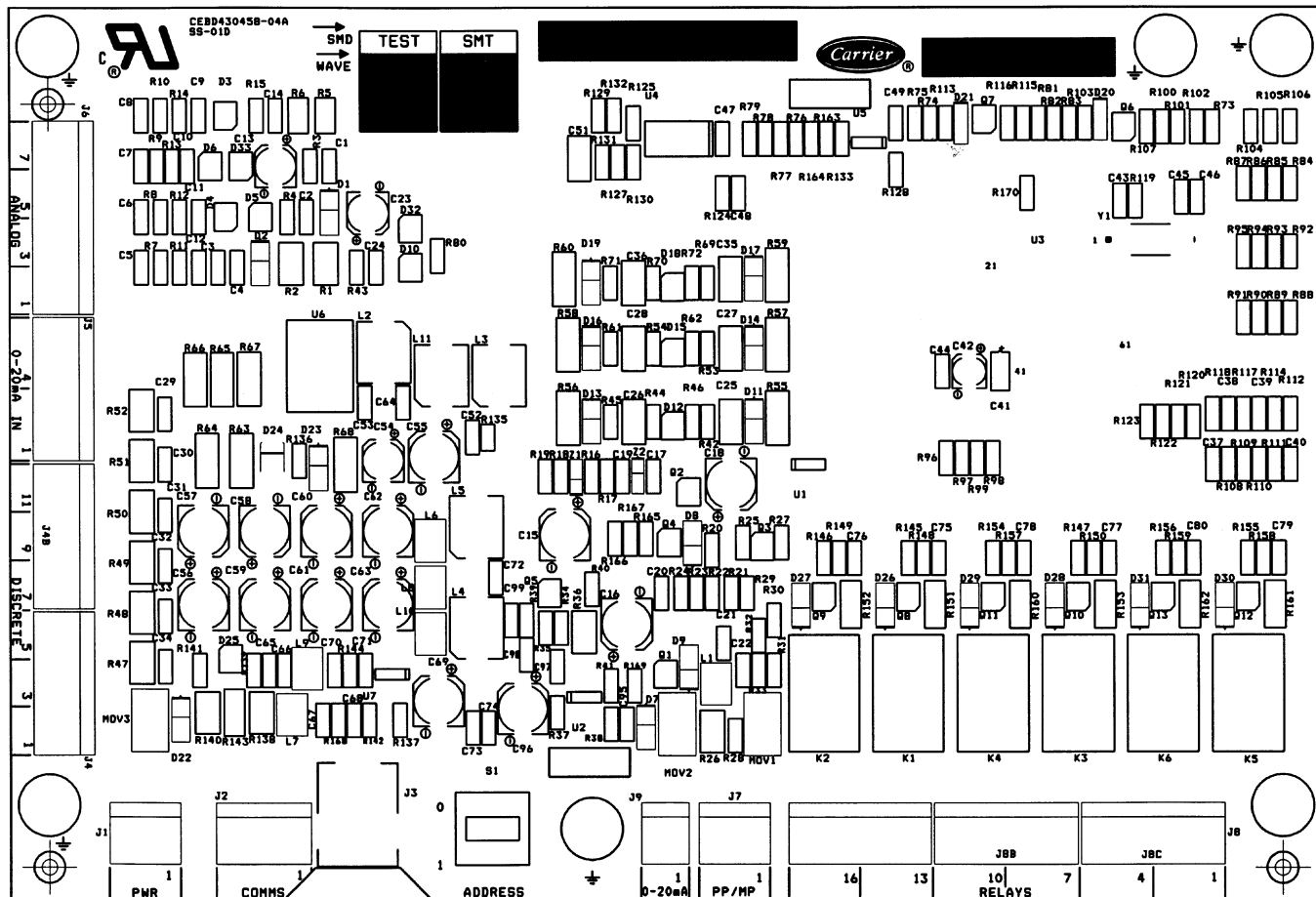


Fig. 6 — Economizer Control Board

Table 4 — ECB Connections

DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
RM.OC	Input power from MBB Remote occupancy switch	control box field installed	24 VAC switch input	J1, 1-2 J4, 2
ENTH or IAQ.S	Outdoor enthalpy switch, or Indoor air quality switch	economizer, or return/space	switch input	J4, 4
IAQ	Indoor air quality sensor	return/space	4-20 mA	J5, 2-3
OAQ or RHS	Outdoor air quality sensor, or Relative humidity sensor	field installed	4-20 mA	J5, 3-4
OUTPUTS				
—	Output power to enthalpy switch		24 VAC	J4, 3
—	Output power to economizer motor		24 VAC	J7, 2
PE.1	Power exhaust relay 1		relay	J8, 3
PE.2	Power exhaust relay 2		relay	J8, 6
RHT.A	Reheat circuit A Output		relay	J8, 9
RHT.B	Reheat circuit B Output (Reheat units or DR1)		relay	J8, 18
ECPR	Economizer Power (DR0 without reheat)		4-20 mA	J9, 1
EC.CP or EC.AP	Economizer actuator (analog, digital)		4-20 mA	J9, 1
COMMUNICATION				
—	Local Equipment Network (LEN)		communication	J2, 1-3
EC.CP and EC.AP	Economizer actuator (digital control)		communication	J7, 1 & 3

Table 5 — IGC Connections

TERMINAL LABEL	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
RT, C	Input power from TRAN 2	control box	24 VAC	
SS	Speed sensor	gas section	analog input	J1, 1-3
FS, T1	Flame sensor	gas section	switch input	
W	Heat stage 1	MBB	24 VAC	J2, 2
RS	Rollout switch	gas section	switch input	J2, 5-6
LS	Limit switch	gas section	switch input	J2, 7-8
CS	Centrifugal switch (not used)		switch input	J2, 9-10
L1	Line power for induced draft combustion motor	-	line power	L1
OUTPUTS				
CM	Induced draft combustion motor	gas section	relay	CM
IFO	Indoor fan	MBB	relay	J2, 1
GV	Gas valve (heat stage 1)	gas section	relay	J2, 11-12

Table 6A — Field Connections for Low-Voltage Terminal Strip (TB2 to TB5 for DR0 Units)

TERMINAL LABEL	DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O
LEN (TB2)		Local Equipment Network (LEN)		communication
CCN (TB2)		Carrier Comfort Network (CCN)		communication
5-6 (TB3)	FDWN	Fire shutdown switch	supply/return/space	switch input
7-8 (TB3)	SPT	Space temperature (T55/56)	space	10k thermistor
8- 9 (TB3)	SPTO or RAT	Space temperature offset (T56) or Return air temperature	space or return	10k thermistor
11-12 (TB3)	FAN.S	Fan Status	blower section	24 VAC input
R (TB4)		24 VAC power		24 VAC output
Y1 (TB4)	Y1	Thermostat Y1 (1st stage cool)	space	24 VAC input
Y2 (TB4)	Y2	Thermostat Y2 (2nd stage cool)	space	24 VAC input
W1 (TB4)	W1	Thermostat W1 (1st stage heat)	space	24 VAC input
W2 (TB4)	W2	Thermostat W2 (2nd stage heat)	space	24 VAC input
G (TB4)	G	Thermostat G (Fan)	space	24 VAC input
C (TB4)		24 VAC common		24 VAC output
X (TB4)	ALRM	Alarm output (normally open)		24 VAC output
2 (TB5)	IAQ	Indoor air quality sensor	return/space	4-20 mA input
3 (TB5)		Indoor & outdoor air quality common		4-20 mA input
4 (TB5)	OAQ or RHS	Outdoor air quality sensor, or Relative humidity sensor	field installed	4-20 mA input
5 (TB5)	RM.OC or HUM	Remote occupancy switch, or Humidistat Input	field installed	24 VAC input
6 (TB5)		24V output for enthalpy switch	economizer	24 VAC input
7 (TB5)	ENTH or IAQ.S	Outdoor enthalpy switch, or Indoor air quality switch	economizer, or return/space	24 VAC input
8 (TB5)	EC.CP or EC.AP EC.CP	Economizer actuator (digital control) Economizer actuator (analog control)	economizer	2-10 VDC output
9 (TB5)	EC.CP -	Economizer actuator (digital control) Economizer actuator (analog control)	economizer	communication 2-10 VDC output
10 (TB5)		Economizer signal common	economizer	VDC

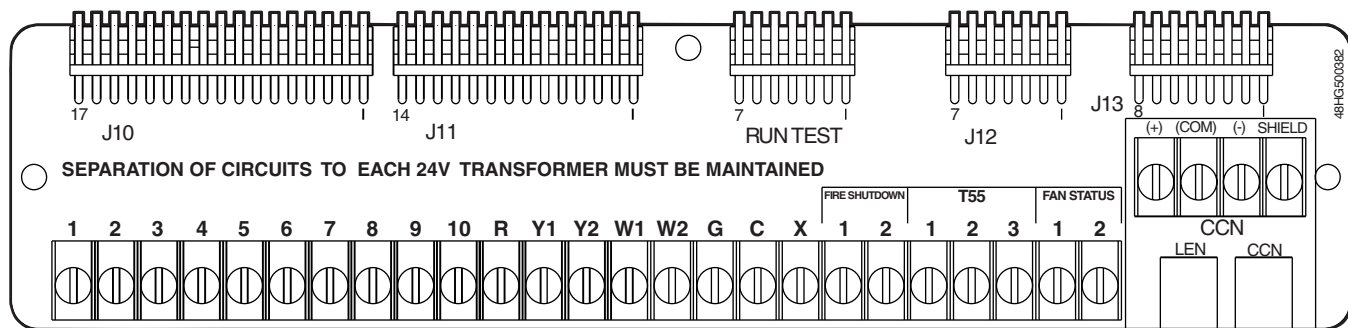


Fig. 7 — Low-Voltage Terminal Strip

Table 6B — Field Connections for Low-Voltage Terminal Strip (TB2 for DR1 Units)

TERMINAL LABEL	DISPLAY NAME	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
1	IAQ	(not used)	return/space	24 VAC output	J10, 17
2		Indoor air quality sensor		4-20 mA input	J10, 16
3		Indoor & outdoor air quality common		4-20 mA input	J10, 15
4	OAQ or RHS	Outdoor air quality sensor, or Relative humidity sensor	field installed	4-20 mA input	J10, 14
5	RM.OC or HUM	Remote occupancy switch, or Humidistat Input	field installed	24 VAC input	J10, 13
6		Outdoor enthalpy switch power	economizer	24 VAC input	J10, 11-12
7	ENTH or IAQ.S	Outdoor enthalpy switch, or Indoor air quality switch	economizer, or return/space	24 VAC input	J10, 9-10
8	EC.CP or EC.AP EC.CP	Economizer actuator (digital control) Economizer actuator (analog control)	economizer	2-10 VDC output	J10, 6-8
9		Economizer signal common	economizer	VDC	J10, 3-5
10	EC.CP -	Economizer actuator (digital control) Economizer actuator (analog control)	economizer	communication 2-10 VDC output	J10, 1-2
R		24 VAC power		24 VAC output	J11, 11-14
Y1	Y1	Thermostat Y1 (1st stage cool)	space	24 VAC input	J11, 10
Y2	Y2	Thermostat Y2 (2nd stage cool)	space	24 VAC input	J11, 9
W1	W1	Thermostat W1 (1st stage heat)	space	24 VAC input	J11, 7-8
W2	W2	Thermostat W2 (2nd stage heat)	space	24 VAC input	J11, 6
G	G	Thermostat G (Fan)	space	24 VAC input	J11, 5
C		24 VAC common		24 VAC output	J11, 2-4
X	ALRM	Alarm output (normally open)		24 VAC output	J11, 1
FIRE SHUTDOWN 1-2	FDWN	Fire shutdown switch	supply/return/space	switch input	J12, 6-7
T55 1-2	SPT	Space temperature (T55/56)	space	10k thermistor	J12, 4-5
T55 2-3	SPTO or RAT	Space temperature offset (T56) or Return air temperature	space or return	10k thermistor	J12, 3-4
FAN STATUS 1-2	-	(not used)	-	-	J12, 1-2
LEN		Local Equipment Network (LEN)		communication	J13, 6-8, 4-5
CCN		Carrier Comfort Network (CCN)		communication	J13, 1-3, 4-5

Table 7 — CCN Communication Bus Wiring

MANUFACTURER	PART NO.
Alpha	2413 or 5463
Belden	8772
Carol	C2528
West Penn	302

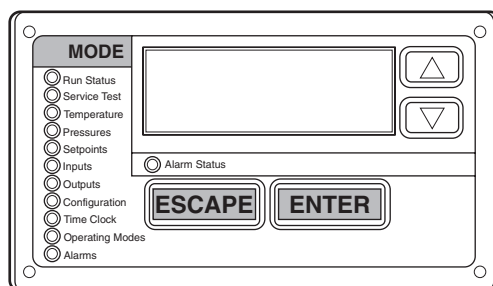


Fig. 8 — Scrolling ComfortLink™ Display

Field-Installed Accessories

SPACE TEMPERATURE SENSOR (T-55) — The T-55 Space Temperature Sensor (part no. 33ZCT55SPT) is a field-installed accessory. The sensor is installed on a building interior or wall to measure room air temperature. The T-55 sensor also includes an override button on the front cover to permit occupants to override the Unoccupied Schedule (if programmed). The jumper wire in the installer's packet or on the control box cover must be connected between R and W1 when using a T-55 device. See Fig. 9-11.

SPACE TEMPERATURE SENSOR (T-56) — The T-56 Space Temperature Sensor (part no. 33ZCT56SPT) is a field-installed accessory. This sensor includes a sliding scale on the front cover that permits an occupant to adjust the space temperature set point remotely. The T-56 sensor also includes an override button on the front cover to allow occupants to override the unoccupied schedule (if programmed). The jumper wire in the installer's packet must be connected between R and W1 when using a T-56 device. See Fig. 9, 10, and 12.

SPACE TEMPERATURE SENSOR (T-58) — The T-58 Space Temperature Sensor (part no. 33ZCT58SPT) is a field-installed accessory. The T-58 sensor communicates with the *ComfortLink™* controller, providing space temperature, heating and cooling set points, and mode operation information. The jumper wire in the installer's packet or on the control box cover must be connected between R and W1 when using a T-58 device. See Fig. 13.

Refer to the T-58 installation instructions for information on installing and configuring the T-58 sensor.

Each T-58 sensor must have a unique address on the CCN. Each T-58 sensor must also be configured with the address of the unit control it is communicating to.

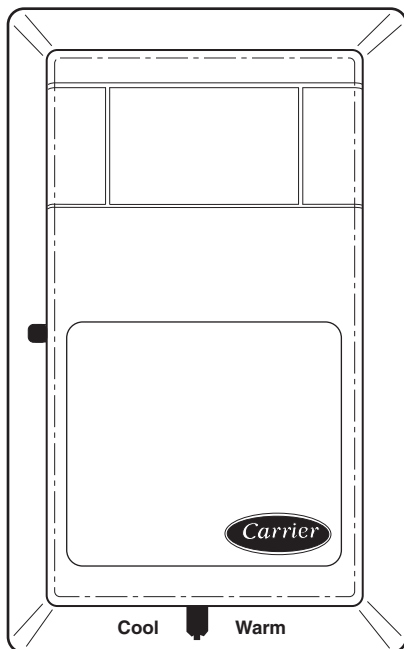
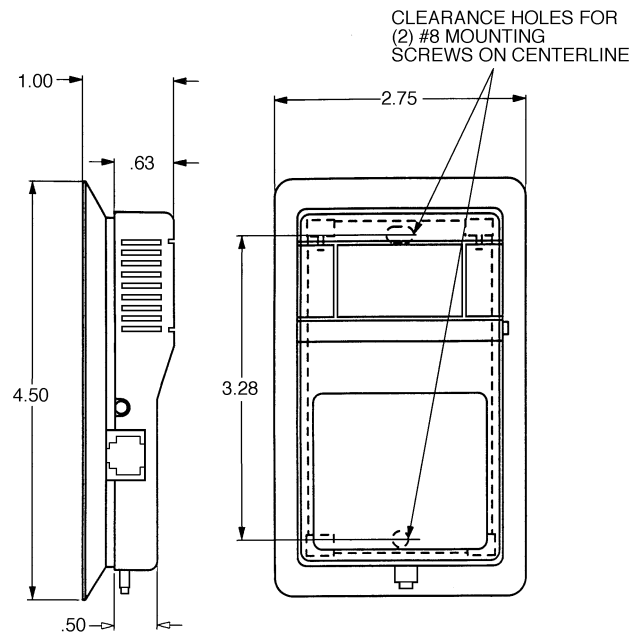


Fig. 9 — Space Temperature Sensor (P/N 33ZCT56SPT Shown)



NOTE: Dimensions are in inches.

Fig. 10 — Space Temperature Sensor Mounting

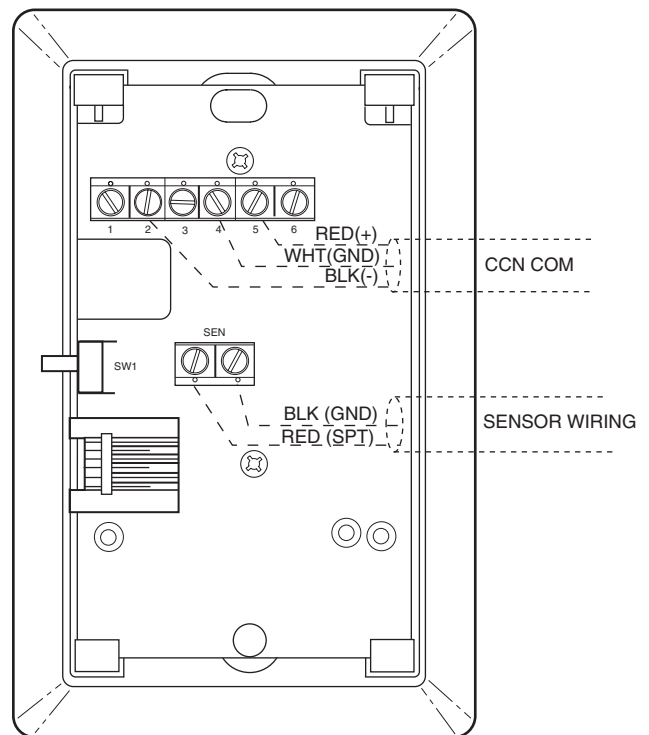


Fig. 11 — T-55 Space Temperature Sensor Wiring (P/N 33ZCT55SPT)

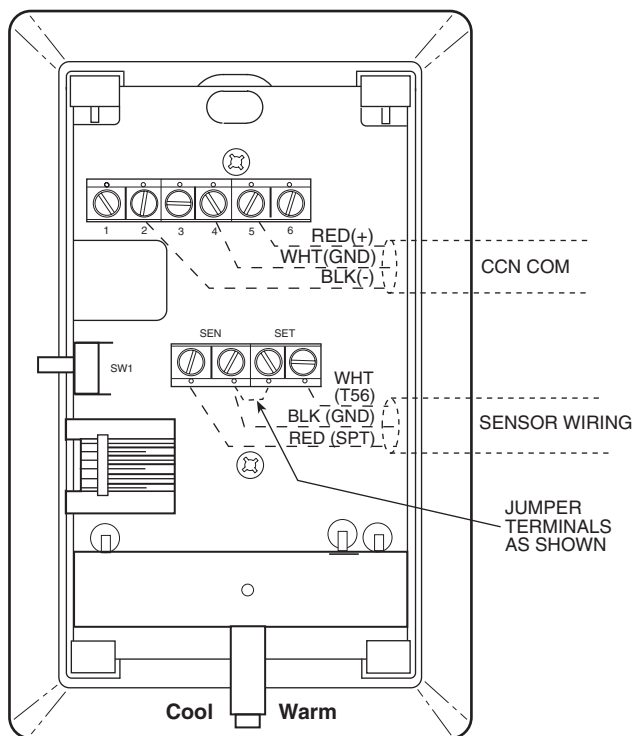


Fig. 12 — T-56 Space Temperature Sensor Wiring (P/N 33ZCT56SPT)

SPACE TEMPERATURE SENSOR AVERAGING — See Fig. 14 for space temperature averaging with T-55 sensors only. If the use of one T-56 sensor is required, refer to Fig. 15.

SPACE TEMPERATURE SENSOR CALIBRATION — The temperature reading of the space temperature sensors can be calibrated. Refer to the Space Temperature Sensor Calibration and Trim section on page 76 for more information.

ECONOMIZER — The economizer accessories (part no. CRECOMZR009E01) for size 014-024 units and part no. CRECOMZR011E01 for size 028 units) are field-installed accessories. When installing this accessory, the unit must be configured for economizer installation by setting EC.EQ to YES. The default settings for the other economizer configurations should be satisfactory. If they need to be changed, additional information about these configuration settings can be found in the Economizer section.

POWER EXHAUST — The power exhaust accessories (part no. CRPWREXH018B00, CRPWREXH019B00, CRPWREXH020B00) are field-installed accessories for power exhaust for different voltages. When installing this accessory, the unit must be configured for power exhaust installation by setting PE.EN to ENBL. The default settings for the other power exhaust configurations should be satisfactory. If they need to be changed, additional information about these configurations can be found in the Power Exhaust section.

INDOOR AIR QUALITY — The indoor air quality (IAQ) accessory (part no. CRCBDIOX001B00) is a field-installed accessory. This sensor measures CO₂ concentrations in the unit return. The defaults for IAQ configurations should be satisfactory; however, if they are not, additional information about these configurations can be found in the Indoor Air Quality Analog Sensor and Switch Input section.

SMOKE DETECTORS — The smoke detectors are field-installed accessories. These detectors can detect smoke in either the return duct (part no. CRSMKDET001D00) or supply

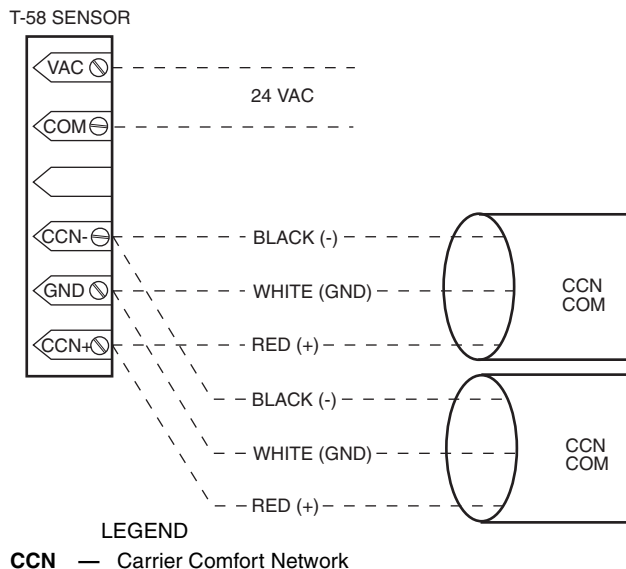


Fig. 13 — T-58 Communicating Space Temperature Sensor Wiring

duct (part no. CRSMKSUP001B00). When installing either detector, the switch configuration (Configurations/Unit/FS.SW) must be configured. When only one detector is installed, the user can select between normally open (1) or normally closed (2). If both smoke detectors are installed, the user must configured FS.SW to normally open (1).

FILTER STATUS — The filter status accessory (part no. CRSTATUS002B00) is a field-installed accessory. This accessory detects plugged filters. When installing this accessory, set the switch configuration to normally open or normally closed as wired (FL.SW). Normally open (1) is the preferred configuration.

FAN STATUS — The fan status accessory (part no. CRSTATUS003B00) is a field-installed accessory. This accessory detects when the indoor fan is blowing air. When installing this accessory, set the switch configuration to normally open or normally closed as wired (FN.SW). Normally open (1) is the preferred configuration.

ENTHALPY SENSORS — The enthalpy accessories (part no. CRENTSNG001A00 or CRDENTDIF001A00 for DR0 and CRENTSNG002A00 or CRDENTDIF002A00 for DR1) are field-installed accessories. The first accessory (outdoor air only) determines when the enthalpy is low relative to a fixed reference. The second accessory (outdoor and return enthalpy are measured) compares the enthalpy between the outdoor and return airstreams. In each case, the enthalpy 4 to 20 mA signals are converted to a switch output which is read by the ECB. When installing this accessory, set the switch configuration to normally open or normally closed as wired (EN.SW). Normally open (1) is the preferred configuration.

RETURN/SUPPLY AIR TEMPERATURE SENSOR — The temperature sensor (part no. 33ZCSENSAT) is a field-installed accessory which may be installed on the common return air duct and/or the common supply air duct near the unit. The duct return air temperature (RAT) may be selected for display only if the space temperature offset (SPTO) is not used. When installing the sensor, the unit must be configured by setting RAT.S to YES. The duct supply air temperature (SAT) may be used to replace the SAT sensor that is internal to the unit. A supply duct SAT measurement is valid for heating mode display while the factory-standard internal SAT is not valid for heating due to its location upstream of the heating section (DR1 only). When installing the supply duct SAT, the unit must be configured by setting SAT.H to 1.

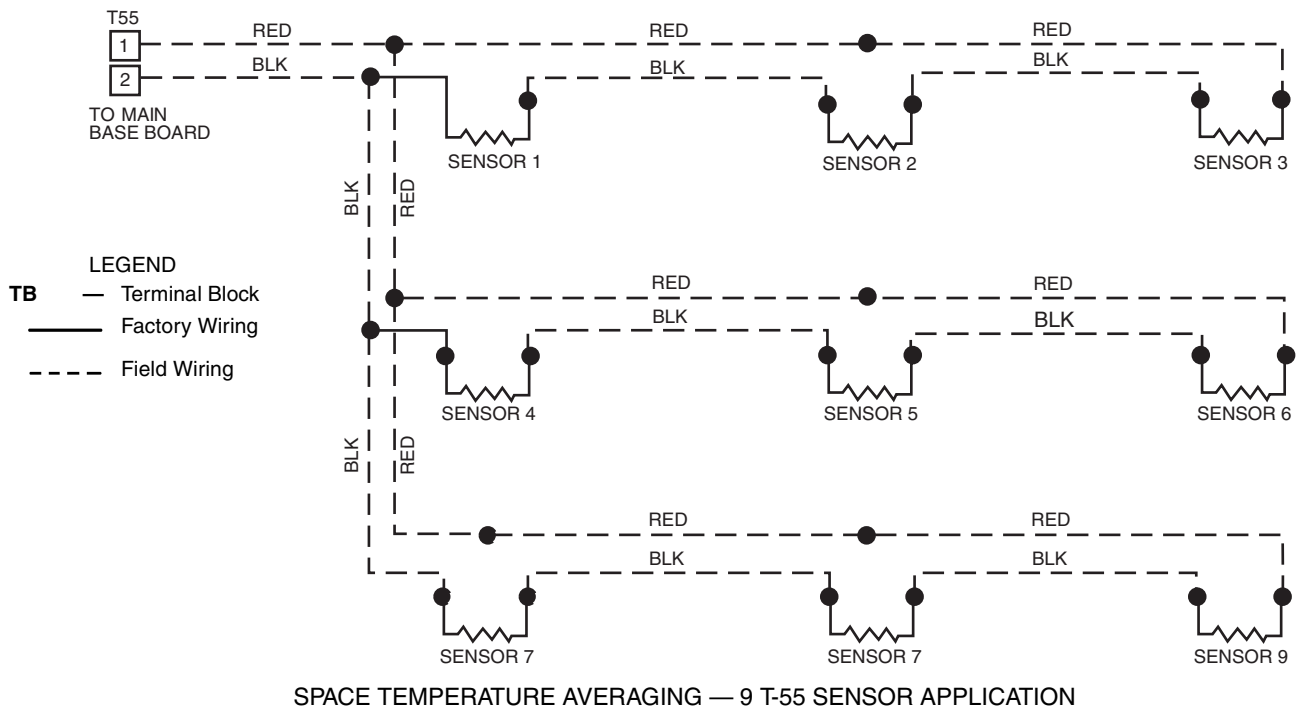
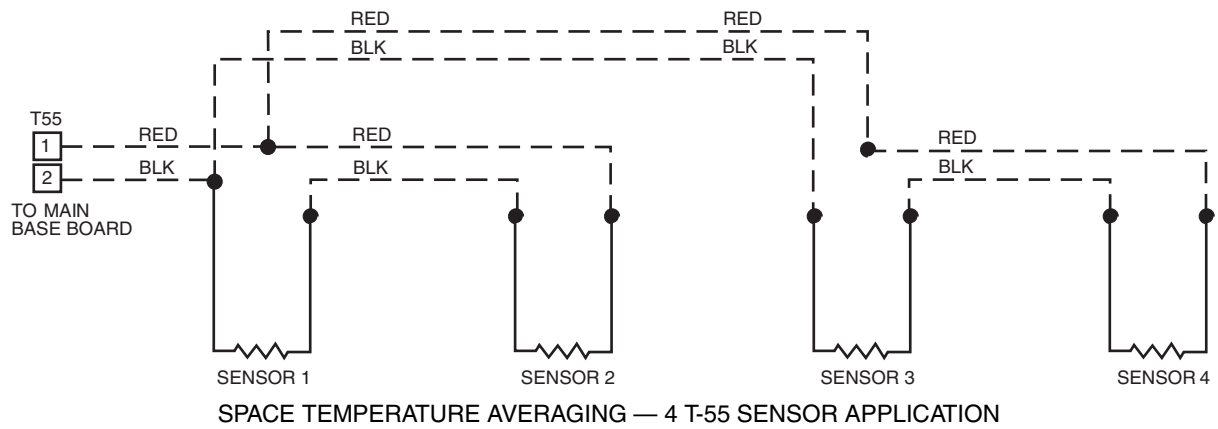
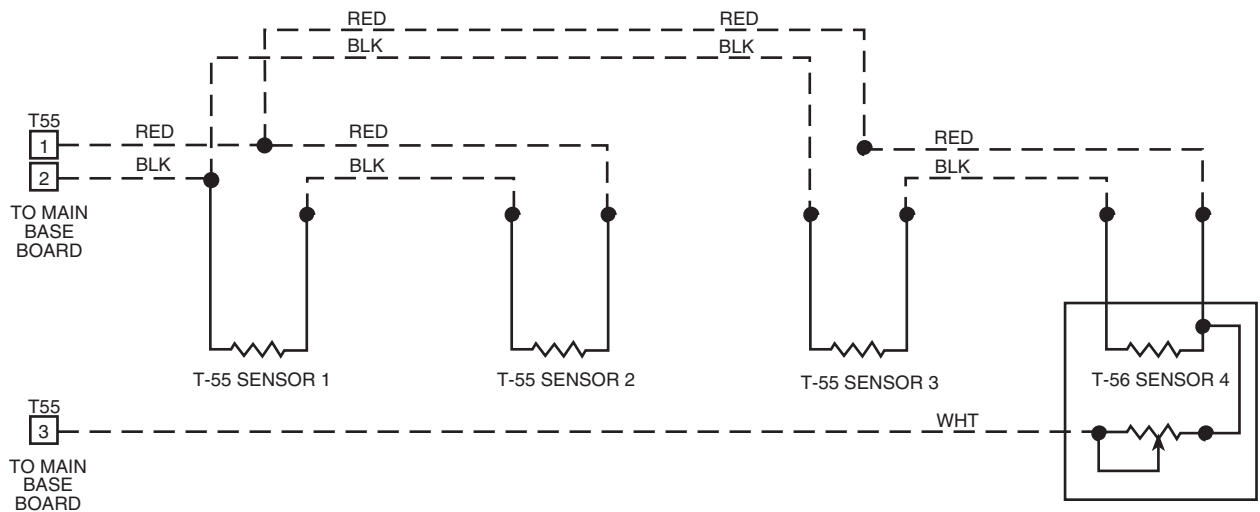


Fig. 14 — Space Temperature Sensor Averaging



SPACE HUMIDITY SENSOR — The space relative humidity sensor is a field-installed accessory. The space relative humidity (RHS) may be selected for display only if the outdoor air quality sensor (OAQ) is not used. When installing the relative humidity sensor, the unit must be configured by setting RHS to YES.

ELECTRIC HEAT — The electric heat accessory depends on model size, voltage, and heater kW size. When field installing this accessory, the unit must be configured for electric heat by setting HT.TY to a value of 2. The number of electric heat stages must be configured by setting N.HTR per the installed heater.

NOTE: Heaters have either 1 or 2 stages. Refer to electric heater accessory installation instructions for more information.

CONTROLS AND FUNCTIONS

Overview — The *ComfortLink*™ controls and software have a large number of features that will meet the requirements of broad range of applications. The controls are pre-configured from the factory for the various factory-installed options, but there will be field configurations required to setup the unit for particular applications and field-installed accessories.

NOTE: Procedures for viewing and configuring of the 48/50HG *ComfortLink* control inputs, outputs, and other parameters are generally described in the following sections based on display table structure and parameter names.

Scrolling Marquee Display Operation — The key to the setup, operation, and diagnostics for the 48/50HG series *ComfortLink* Control System is the Scrolling Marquee display. All units are shipped from the factory with the Scrolling Marquee display, which is located in the main control box. See Fig. 4A and 4B.

In addition, the *ComfortLink* control also supports the use of the hand held Navigator™ display which can be plugged into the LEN jack on the main terminal board of the field connection terminal strip. The Navigator display can also be plugged into the LEN jack located on the ECB board located in the control box.

Both displays provide the user with an interface to the *ComfortLink* control system. The displays have ▲ and ▼ arrow keys, an **ESCAPE** key and an **ENTER** key. These keys are used to navigate through the different levels of the display structure. The Navigator display and the Scrolling Marquee operate in the same manner, except that the Navigator display has multiple lines of display and the Scrolling Marquee has a single line. All further discussions and examples in this document will be based on the Scrolling Marquee display.

The 4 keys are used to navigate through the display structure, which is organized in a tiered mode structure as shown in Tables 8-23. If the buttons have not been used for a period, the display will default to the AUTOVIEW display category as shown under the RUN STATUS category. To show the top-level display, press the **ESCAPE** key until a blank display is shown. Then use the ▲ and ▼ arrow keys to scroll through the top-level categories. These are listed at the top of Table 8 and will be indicated on the Scrolling Marquee by the LED next to each mode listed on the face of the display.

When a specific mode or sub-mode is located, push the **ENTER** key to enter the mode. Depending on the mode, there may be additional tiers of categories. Continue to use the ▲ and ▼ keys and the **ENTER** keys until the desired display

item is found. At any time, the user can move back a mode level by pressing the **ESCAPE** key. Once an item has been selected the display will flash showing the item, followed by the item value and then followed by the item units (if any).

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.

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 display to its default menu of rotating AUTO VIEW display items. In addition the password will be disabled requiring that it be entered again before changes can be made to password-protected items.

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. Press the **ENTER** key 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 of 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 8-23.

Depending on the unit model, factory-installed options and field-installed accessories, some of the items in the various Mode categories may not apply.

CCN Tables and Display — In addition to the unit-mounted Scrolling Marquee display, the user can also access the same information through the CCN tables by using Carrier software or other CCN programs. Details on the CCN tables are summarized in Appendix A. The variable names used for the CCN tables and the Scrolling Marquee tables may be different and more items are displayed in the CCN tables.

Clearing Unit Alarms — The unit alarms can be cleared through the *ComfortLink* display. To check the current alarms, enter the Alarms menu. The first submenu is the CURR submenu. The CURR function displays the list of current alarms (maximum of 25). The second submenu item is the R.CUR (Reset Current Alarms) function. Press **ENTER** to reset the current alarms. The next submenu item, HIST, displays the list of the last 20 alarms. The HIST function can be cleared with the R.HIS function. See Tables 22 and 23.

ECONOMIZER CALIBRATION — Because of a mechanical problem with the economizer, the actuator might acquire a new degree of rotation which is less than 90 degrees. If this occurs, a “T414 Economizer Damper Actuator Out of Calibration” alert will be generated. This alarm can only occur if the economizer is using digital communications (configurations/ECON/E.CTL = 1 or 2). The economizer calibration procedure (E.CAL under the INDP submenu) will reconfigure the actuator to the new fully closed and fully open positions. To implement the calibration procedure, change E.CAL from OFF to ON. E.CAL will remain ON as long as the calibration procedure is being implemented (as long as 5 minutes). During the calibration procedure the actuator will close fully and then open fully. After the calibration is complete, the degree of rotation should be greater than 90 degrees, causing the T414 alarm to clear. If the T414 alert does not clear, check the economizer damper for other mechanical problems.

Service Test — The Service Test function can be used to verify proper operation of compressors, heating stages, indoor fan, outdoor fans, power exhaust fans, economizer, and alarm relay. Use of service test is recommended at initial system start up and during troubleshooting. See Table 10.

Service Test mode has the following changes from normal operation:

- Normal compressor timeguards and other staging delays are reduced to 30 seconds or less.
- Circuit alerts are limited to 1 strike (versus 3) before changing to alarm shut down state.
- The status of ALM.N is ignored so all alerts and alarms are broadcast on CCN. The words “SERVICE TEST” are inserted into every alarm message.

Service test can only be turned ON/OFF at the unit display. Once turned ON, other entries may be made with the display or through CCN.

NOTE: Service Test mode may be password protected. Refer to Scrolling Marquee Display Operation section for more information.

To turn service test on, change the value of TEST to ON. To turn service test off, change the value of TEST to OFF.

The independent (INDP) submenu is used to change output status for the economizer, power exhaust stages, and alarm relay. These independent outputs can operate simultaneously with other Service Test modes. All outputs return to normal operation when Service Test is turned off. When the economizer is using the factory default Digital Control Type (E.CTL is 1 or 2) then the Economizer Calibration feature may be used to

automatically check and reset the economizer actuator range of motion.

The fans (FANS) submenu is used to change output status for the indoor fan and outdoor fan stages.

The cooling (COOL) submenu is used to change output status for the individual compressors. Compressor starts are staggered by 15 seconds. The fans (FANS) and heating (HEAT) service test outputs are reset to OFF for the cooling service test. Indoor fans and outdoor fans are controlled normally to maintain proper unit operation. All normal cooling alarms and alerts are functional.

The REHT submode is used to test the reheat valves. Turning on RH.A or RH.B will only turn on the valve, not the compressor and fans.

The heating (HEAT) submenu is used to change output status for the individual heat stages, gas or electric. The fans (FANS) and cooling (COOL) service test outputs are reset to OFF for the heating service test. Indoor and outdoor fans are controlled normally to maintain proper unit operation. All normal heating alarms and alerts are functional.

NOTE: Field terminal strip terminal R must be connected to W1 for the heat to operate in service test. Alert number T410 will occur as a reminder if not done. If the normal unit control mode is thermostat mode, then remove the R-W1 jumper after completing service test.

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)		Cooling (COOL)	Thermostat Inputs (STAT)	Fans (FANS)	Unit Configuration (UNIT)	Time (TIME)	System (SYS)	Current Alarms (CURR)
Software Version (VERS)	Test Independent Outputs (INDP)	Circuit Temperatures (CIRC)		Heating (HEAT)	Switch Inputs (SW.IN)	Compressor (CMPR)	Cooling Configuration (COOL)	Date (DATE)	HVAC (HVAC)	Reset Current Alarms (R.CUR)
Run Hours (HRS)	Test Fans (FANS)	Calibrate Temperatures (CALB)		Supply Air (SAT)	IAQ Inputs (AQ.IN)	Reheat Outputs (REHT)	Reheat Configuration (REHT)	Daylight Savings Config (DST)		Alarm History (HIST)
Component Cycles (CYCS)	Test Cooling (COOL)			Heat-Cool Set Point Gap (HC.SG)	Compressor Current Sensor (CS.IN)	Heat (HEAT)	Heating Configuration (HEAT)	Occupancy Schedule Number (SCH.N)		Reset Alarm History (R.HIS)
Comp/Heater Timeguard (TMGD)	Test Reheat (REHT)			SPT Offset Range (STO.R)		Economizer (ECON)	Economizer Configuration (ECON)	SPT Override Enabled? (OVR.E)		
	Test Heating (HEAT)			Space RH Setpoint (RH.SP)			IAQ Configuration (IAQ)	Override Time Limit (OTL)		
				Space RH Setpoint Deadband (RH.DB)			CCN Configuration (CCN)	Local Occupancy Schedule (SCH.L)		
							Display Configuration (DISP)	Accept Global Holidays (HOL.G)		
							Alarm Output Control (ALRM)	Local Holiday Schedule (HOL.L)		

Table 9 — “Run Status” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
VIEW				Auto View of Run Status	
		SAT	XXX.X	Supply Air Temperature	
		OCC	YES/NO	Currently Occupied	
		ALRM	XX	Current Alarms & Alerts	
		TIME	XX.XX	Time of Day	00.00 to 23.59
VERS				Software Version Numbers	
		MBB		CESR131248-XX-XX	
		ECB		CESR131249-XX-XX	
		MARQ		CESR131171-XX-XX	
HRS				Component Run Hours	
		A1	XXXX	Comp A1 Run Hours	
		B1	XXXX	Comp B1 Run Hours	
		C1	XXXX	Comp C1 Run Hours	
		RH.A	XXXX	Reheat A Run Hours	
		RH.B	XXXX	Reheat B Run Hours	
		IDF	XXXX	Indoor Fan Run Hours	
		OFC.1	XXXX	OD Fan Cont. 1 Run Hours	
		OFC.2	XXXX	OD Fan Cont. 2 Run Hours	
		OFC.3	XXXX	OD Fan Cont. 3 Run Hours	
		HTR.1	XXXX	Heat Stage 1 Run Hours	
		HTR.2	XXXX	Heat Stage 2 Run Hours	
		PE.1	XXXX	Power Exhaust1 Run Hours	
		PE.2	XXXX	Power Exhaust2 Run Hours	
		E.PWR	XXXX	Economizer Pwr Run Hours	
		ALM	XXXX	Alarm Output Run Hours	
CYCS				Component Cycles	
		A1	XXXX	Compressor A1 Cycles	
		B1	XXXX	Compressor B1 Cycles	
		C1	XXXX	Compressor C1 Cycles	
		RH.A	XXXX	Reheat Circuit A Cycles	
		RH.B	XXXX	Reheat Circuit B Cycles	
		IDF	XXXX	Indoor Fan Cycles	
		OFC.1	XXXX	OD Fan Contact. 1 Cycles	
		OFC.2	XXXX	OD Fan Contact. 2 Cycles	
		OFC.3	XXXX	OD Fan Contact. 3 Cycles	
		HTR.1	XXXX	Heat Stage 1 Cycles	
		HTR.2	XXXX	Heat Stage 2 Cycles	
		PE.1	XXXX	Power Exhaust 1 Cycles	
		PE.2	XXXX	Power Exhaust 2 Cycles	
		E.PWR	XXXX	Economizer Power Cycles	
		ALM	XXXX	Alarm Output Cycles	
TMGD				Comp/Heater Timeguards	
		TG.A1	XXX	A1 Timeguard (secs)	
		TG.B1	XXX	B1 Timeguard (secs)	
		TG.C1	XXX	C1 Timeguard (secs)	
		TG.RA	XX	Reheat A Timeguard (secs)	
		TG.RB	XX	Reheat B Timeguard (secs)	
		TG.H1	XXX	Heat 1 Timeguard (secs)	
		TG.H2	XXX	Heat 2 Timeguard (secs)	

Table 10 — “Service Test” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TEST			ON/OFF	Field Service Test Mode	Use to Enable/Disable Manual Mode
INDP				Test Independent Outputs	
		ECON	XXX	Economizer Position Test	%
		E.PWR	ON/OFF	Economizer Power Test	DR0 units without reheat only
		E.CAL	ON/OFF	Calibrate Economizer	
		PE.1	ON/OFF	Power Exhaust 1 Test	
		PE.2	ON/OFF	Power Exhaust 2 Test	
		ALM	ON/OFF	Alarm Relay Test	
FANS				Test Fans	
		IDF	ON/OFF	Indoor Fan Test	
		IDFP	ON/OFF	Indoor Fan Power Test	DR0 units only
		OFC.1	ON/OFF	Outdoor Fan Cntr 1 Test	
		OFC.2	ON/OFF	Outdoor Fan Cntr 2 Test	
		OFC.3	ON/OFF	Outdoor Fan Cntr 3 Test	
COOL				Test Cooling	
		A1	ON/OFF	Compressor A1 Test	
		RH.A	ON/OFF	Reheat Circuit A Test	
		B1	ON/OFF	Compressor B1 Test	
		RH.B	ON/OFF	Reheat Circuit B Test	
		C1	ON/OFF	Compressor C1 Test	
REHT				Test Reheat Valves	
		RH.A	ON/OFF	Reheat Valve A Test	
		RH.B	ON/OFF	Reheat Valve B Test	
HEAT				Test Heating	
		HTR.1	ON/OFF	Heat Stage 1 Test	
		HTR.2	ON/OFF	Heat Stage 2 Test	

Table 11 — “Temperatures” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT				Unit Temperatures	
		SAT	XXX.X	Supply Air Temperature	
		OAT	XXX.X	Outdoor Air Temperature	
		SPT	XXX.X	Space Temperature	
		SPTO	X.X	Space Temperature Offset	
CIRC				Circuit Temperatures	
		SST.A	XXX.X	Saturated Suct Temp A	Temperature is calculated
		SCT.A	XXX.X	Saturated Cond Temp A	
		SST.B	XXX.X	Saturated Suct Temp B	Temperature is calculated
		SCT.B	XXX.X	Saturated Cond Temp B	
		SST.C	XXX.X	Saturated Suct Temp C	Temperature is calculated
		SCT.C	XXX.X	Saturated Cond Temp C	
CALB				Calibrate Temperatures	
		SPT.C	XXX.X	Space Sensor Calibration	Enter either temperature or trim but not both
		SPT.T	XXX.X	Space Temperature Trim	Enter either temperature or trim but not both

Table 12 — “Pressures” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
		SSP.A	XXX.X	Saturated Suct Press A	
		SCP.A	XXX.X	Saturated Cond Press A	Pressure is calculated
		SSP.B	XXX.X	Saturated Suct Press B	
		SCP.B	XXX.X	Saturated Cond Press B	Pressure is calculated
		SSP.C	XXX.X	Saturated Suct Press C	
		SCP.C	XXX.X	Saturated Cond Press C	Pressure is calculated

Table 13 — “Set Points” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL				Cooling Set points	
		OCSP	XX	Occupied Cool Set point	Default: 78
		UCSP	XX	Unoccupied Cool Set point	Default: 85
HEAT				Heating Set points	
		OHSP	XX	Occupied Heat Set point	Default: 68
		UHSP	XX	Unoccupied Heat Set point	Default: 60
SAT				Supply Air Set points	
		LCSP	XX	Low Cool SAT Set point	Default: 65
		HCSP	XX	High Cool SAT Set point	Default: 55
		MIN.L	XX.X	Minimum SAT Lower Level	Default: 48.0
		MIN.H	XX.X	Minimum SAT Upper Level	Default: 58.0
HC.SG		HC.SG	XX	Heat-Cool Set Point Gap	Default: 5
STO.R		STO.R	X	SPT Offset Range (+/-)	Default: 5
RH.SP		RH.SP	XX	Space RH Setpoint	Default: 50
RH.DB		RH.DB	XX	Space RH Setpnt Deadband	Default: 5

Table 14 — Reading and Changing Cooling Occupied Set Point

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL		OCSP	78	Occupied Cool Set point	Default: 78
			78		Scrolling Stops
			78		Value flashes
					Select 75
			75		Change accepted
		OCSP	75	Occupied Cool Set point	Item/Value/Units scroll again

Table 15 — “Inputs” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION
STAT				Thermostat Inputs
		Y1	ON/OFF	Thermostat Y1 Input
		Y2	ON/OFF	Thermostat Y2 Input
		W1	ON/OFF	Thermostat W1 Input
		W2	ON/OFF	Thermostat W2 Input
		G	ON/OFF	Thermostat G Input
SW.IN				Switch Inputs
		FIL.S	DRT/CLN	Filter Status
		FAN.S	ON/OFF	Fan Status
		FDWN	ON/OFF	Unit Shutdown Input
		ENTH	HIGH/LOW	Enthalpy Switch Input
		IAQ.S	HIGH/LOW	IAQ Level (Switch Input)
		RM.OC	ON/OFF	Remote Occupancy Input
		HUM	ON/OFF	Humidistat Input
AQ.IN				IAQ Inputs
		IAQ	XXXX	Indoor Air Quality
		IAQ.S	HIGH/LOW	IAQ Level (Switch Input)
		OAQ	XXXX	Outdoor Air Quality
		SPRH	XXX	Space Relative Humidity
CS.IN				Current Sensor Inputs
		CS.A1	ON/OFF	A1 Current Sensor
		CS.B1	ON/OFF	B1 Current Sensor
		CS.C1	ON/OFF	C1 Current Sensor

Table 16 — “Outputs” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION
FANS				Fan Outputs
		IDF	ON/OFF	Indoor Fan
		IDFP	ON/OFF	Indoor Fan Power (DR0 Only)
		OFC.1	ON/OFF	Outdoor Fan Contactor 1
		OFC.2	ON/OFF	Outdoor Fan Contactor 2
		OFC.3	ON/OFF	Outdoor Fan Contactor 3
CMPR				Compressor Outputs
		A1	ON/OFF	Compressor A1
		B1	ON/OFF	Compressor B1
		C1	ON/OFF	Compressor C1
REHT				Enter Reheat Outputs
		RHT.A	ON/OFF	Reheat Cir. A Output
		RHT.B	ON/OFF	Reheat Cir. B Output
HEAT				Heat Outputs
		HTR.1	ON/OFF	Heat Stage 1
		HTR.2	ON/OFF	Heat Stage 2
ECON				Economizer Outputs
		EC.AP	XXX	Economizer Position
		EC.CP	XXX	Economizer Commanded Pos
		E.PWR	ON/OFF	Economizer Power (DR0 units without reheat only)
		PE.1	ON/OFF	Power Exhaust Relay 1
		PE.2	ON/OFF	Power Exhaust Relay 2

Table 17 — “Configuration” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT				Unit Configuration	
		U.CTL	X	Unit Control Type	Default: 1 1 = Auto Select 2 = Thermostat 3 = Space Sensor
		T.CTL	X	Thermostat Control Type	Default: 0 0 = Adaptive 1 = 1 Stage Y1 2 = 2 Stage Y1
		OC.FN	YES/NO	Fan On When Occupied	Default: YES
		S.DLY	XXX	Start Up Delay	Default: 30 sec
		IDF.F	YES/NO	Shut Down On IDF Failure	Default: YES
		FN.SW	X	Fan Status Input	Default: 0 0 = No Switch 1 = Normally Open 2 = Normally Closed
		FL.SW	X	Filter Status Input	Default: 0 0 = No Switch 1 = Normally Open 2 = Normally Closed
		FS.SW	X	Fire Shutdown Input	Default: 0 0 = No Switch 1 = Normally Open 2 = Normally Closed
		RM.SW	X	Remote Occupancy Switch	Default: 0 0 = No Switch 1 = Normally Open 2 = Normally Closed
		SAT.T	XXX	SAT Settling Time (Secs)	Default: 240 sec
		SAT.H	X	SAT Sensor Heat Config	Default: 0 For Horizontal Discharge DR0 units and all DR1 units 2 For Vertical Discharge DR0 units 0 = Invalid 1 = Accurate 2 = Approximate
		RAT.S	YES/NO	RAT Sensor On SPTO Input	Default: NO
		RH.S	YES/NO	RH Sensor on OAQ Input	Default: NO
		THER	X	Air Temp Thermistor Type	Default: 1: DR0 Units 2: DR1 Units 1 = 5K 2 = 10K
		FPR	YES/NO	Fan Pwr Relay Installed	Default: YES: DR0 Units NO: DR1 Units
		EPR	YES/NO	Econ Pwr Relay Installed	Default: YES: DR0 Units NO: DR1 Units
COOL				Cooling Configuration	
		N.CMP	X	Number of Compressors	Default: 3 (016-024), 2 (014,028)
		MC.LO	XX	Compressor Lockout Temp	Default: 0° F
		MRT.C	XXX	Compressor Min On Time	Default: 180 sec
		MOT.C	XXX	Compressor Min Off Time	Default: 300 sec
		CL.PD	X.X	SPT Cool Demand (+) Level	Default: 1.0 ΔF
		CL.ND	X.X	SPT Cool Demand (–) Level	Default: –1.0 ΔF
		C.LAG	X.X	Cool Thermal Lag Factor	Default: 1.0 min
		SA.PD	X.X	SAT Cool Demand (+) Level	Default: 1.0 ΔF
		SA.ND	X.X	SAT Cool Demand (–) Level	Default: –1.0 ΔF
		C.INC	XXX	Cool Stage Increase Secs	Default: 450 sec
		C.DEC	XXX	Cool Stage Decrease Secs	Default: 300 sec
		A.NOW	YES/NO	Alert Each Strike	Default: YES

Table 17 — “Configuration” Mode and Submode Directory (cont)

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL (cont)		INV.E	YES/NO	Invert Evaporators	Default: YES
		A1.CS	YES/NO	A1 Current Sensing	Default: YES
		B1.CS	YES/NO	B1 Current Sensing	Default: YES
		C1.CS	YES/NO	C1 Current Sensing	Default: YES
REHT				Reheat Configuration	
		RHT.E	YES/NO	Reheat Equipped Unit	Default: NO
		N.RHT	X	Number of Reheat Cirs.	Default 2
		RH.HB	X.X	Reheat Heat SP Deadband	Default: 2 ΔF
		MOT.R	XXX	Reheat Minimum Off Time	Default 30 secs
		H.CTL	X	Humidistat Control Type	Default 4 1: 1-Stage Y1 2: 2-Stage Y1 3: Digital 4: Exclusive
		HM.SW	X	Humidistat Input	Default: 0 0: No Switch 1: Normal Open 2: Normal Closed
		RHF.E	YES/NO	Flush Reheat Circuits	Default: NO
		RHT.T	XXXX	Runtime Between RH Flush	Default: 10 hr
		RHT.D	XXX	RH Flush Duration (Secs)	Default: 120
		L2.UP	XXX	Lev 2 ON Reheat Offset	Default: 10 psig
		L2.DN	XXX	Lev 2 OFF Reheat Delta	Default: 50 psig
		L2.TM	XXXX	Lev 2 Reheat Eval Time	Default: 60 sec
HEAT				Heating Configuration	
		HT.TY	X	Type of Heat Installed	Default: 0 0: No Heat 1: Gas 2: Electric
		N.HTR	X	Number of Heat Stages	Default: 2
		HT.LO	XX	Heating Lockout Temp	Default: 75 F
		MRT.H	XXX	Heat Minimum On Time	Default: 120 sec
		MOT.H	XXX	Heat Minimum Off Time	Default: 120 sec
		HT.PD	X.X	SPT Heat Demand (+) Level	Default: 1.0 ΔF
		HT.ND	X.X	SPT Heat Demand (–) Level	Default: –1.0 ΔF
		H.LAG	X.X	Heat Thermal Lag Factor	Default: 1.0 min
		H.INC	XXX	Heat Stage Increase Secs	Default: 450 sec
		H.DEC	XXX	Heat Stage Decrease Secs	Default: 300 sec
ECON				Economizer Configuration	
		EC.EQ	YES/NO	Economizer Equipped Unit	Default: NO
		E.CTL	X	Economizer Control Type	Default: 3 1 = Digital/Position 2 = Digital/Command 3 = Analog Control
		MIN.P	XXX	Economizer Min Position	Default: 30 %
		ECL.H	XX	Econ High Temp Lockout	Default: 65 F
		ECL.L	XX	Econ Low Temp Lockout	Default: 0° F
		UEFC	X	Unoccupied Free Cooling	Default: 2 0 = Disabled 1 = Unoccupied 2 = Preoccupancy
		FC.TM	XXX	Free Cooling Preoccupancy Time	Default: 120 sec
		FC.LL	XX	Free Cooling Low Temperature Limit	Default: 50 F
		EN.SW	X	Enthalpy Switch Input	Default: 0 0: No Switch 1: Normal Open 2: Normal Close

Table 17 — “Configuration” Mode and Submode Directory (cont)

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
ECON (cont)		PE.EN	ENBL/DSBL	Power Exhaust Control	Default: DSBL (ENBL if equipped with power exhaust)
		PE1.P	XXX	PE Stage1 Econo Position	Default: 40 %
		PE2.P	XXX	PE Stage2 Econo Position	Default: 75 %
IAQ				IAQ Configuration	
		IA.CF	X	IAQ Input Configuration	Default: 0 if no IAQ sensor installed 1 if IAQ sensor installed 0 = No IAQ 1 = Demand Control Ventilation (DCV) 2 = Override IAQ 3 = Control Minimum Position
		IA.FN	X	Fan Enable for IAQ Input	Default: 0 0 = Never 1 = Occupied 2 = Always
		II.CF	X	IAQ Level (Switch Input)	Default: 0 0 = Not Switch 1 = DCV NO 2 = DCV NC 3 = Override NO 4 = Override NC
		II.FN	X	IAQ Switch Input Fan CFG	Default: 0 0 = Never 1 = Only When Occupied 2 = Always
		AQ.MP	XXX	Minimum IAQ Position	Default: 10 %
		MIN.P	XXX	Economizer Min Position	Default: 30 %
		OVR.P	XXX	Econo Override Position	Default: 100%
		OA.CF	X	OAQ Sensor Operation	Default: 0 0 = No OAQ 1 = DCV OAQ 2 = Lockout OAQ
		OAQ.L	XXXX	OAQ Lockout Valve	Default: 600 ppm
		AQD.L	XXX	AQ Differential Low	Default: 100 ppm
		AQD.H	XXXX	AQ Differential High	Default: 700 ppm
		DF.ON	XXX	Fan On AQ Differential	Default: 600 ppm
		DF.OF	XXX	Fan Off AQ Differential	Default: 200 ppm
		I.4M	XXXX	IAQ Sensor Value at 4MA	Default: 0 ppm
		I.20M	XXXX	IAQ Sensor Value at 20MA	Default: 2000 ppm
		O.4M	XXXX	OAQ Sensor Value at 4MA	Default: 0 ppm
		O.20M	XXXX	OAQ Sensor Value at 20MA	Default: 2000 ppm
		H.4M	XXX	RH Sensor Value at 4 mA	Default: 0% Range: 0-100%
		H.20M	XXX	RH Sensor Value at 20 mA	Default: 100% Range: 0-100%
		RH.SP	XX	Space RH Setpoint	Default: 50% Range: 30-95%
		RH.DB	XX	Space RH SetPnt Deadband	Default: 5% Range: 2-20%
CCN				CCN Configuration	
		CCN.A	XXX	CCN Address	Default: 1 Range: 1 to 239
		CCN.B	XXX	CCN Bus Number	Default: 0 Range: 1 to 239
		BAUD	X	CCN Baud Rate	Default: 3 1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400
		B.TIM	ON/OFF	CCN Time/Date Broadcast	Default: OFF
		B.OAT	ON/OFF	CCN OAT Broadcast	Default: OFF
		B.GS	ON/OFF	Global Schedule Broadcast	Default: OFF
		B.ACK	ON/OFF	CCN Broadcast Ack'R	Default: OFF

Table 17 — “Configuration” Mode and Submode Directory (cont)

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
DISP				Display Configuration	
		METR	YES/NO	Metric Display	Default: NO YES = Metric NO = English
		LANG	X	Language Selection	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese
		PROT	ENBL/DSBL	Password Protection	Default: Disabled
		PSWD	XXXX	User Password	Default: 1111
		TEST	ON/OFF	Test Display LEDs	
ALRM				Alarm Output Control	
		A.SPC	YES/NO	SPT/SPRH Sensor Failure	Default: YES
		A.SRT	YES/NO	SAT/RAT Thermistor Failure	Default: YES
		A.OAT	YES/NO	OAT Thermistor Failure	Default: YES
		A.CS	YES/NO	Current Sensor Failure	Default: YES
		A.CMP	YES/NO	Compressor Failure	Default: YES
		A.CKT	YES/NO	Refrig Circuit Failure	Default: YES
		A.SSP	YES/NO	SSP Transducer Failure	Default: YES
		A.SCT	YES/NO	SCT Thermistor Failure	Default: YES
		A.FAN	YES/NO	Indoor Fan Failure	Default: YES
		A.FIL	YES/NO	Plugged Filter	Default: YES
		A.TST	YES/NO	Thermostat Failure	Default: YES
		A.ECO	YES/NO	Economizer Failure	Default: YES

LEGEND

AQ — Air Quality	PE — Power Exhaust
CCN — Carrier Comfort Network	RAT — Return Air Temperature
DCV — Demand Control Ventilation	RH — Relative Humidity
IAQ — Indoor-Air Quality	SAT — Supply Air Temperature
IDF — Indoor Fan	SCT — Saturated Condensing Temperature
OAQ — Outdoor-Air Quality	SPT — Space Temperature
OAT — Outdoor-Air Temperature	SSP — Saturated Suction Pressure

Table 18 — Example of Changing the CCN Configuration

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CCN		CCN.A	1	CCN Address	Default: 1
			1		Scrolling Stops
					Value flashes
					Select 2
					Change accepted
		CCN.A			Item/Value/Units scroll again
		CCN.B		CCN Bus Number	No change
		BAUD		CCN Baud Rate	Default: 3 = 9600
			3		Scrolling Stops
			3		Value flashes
					Select 5 = 38,400
			5		Change accepted
		BAUD	5	CCN Baud Rate	Item/Value/Units scroll again

Table 19 — “Time Clock” Mode and Submode Directory

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TIME			TIME	XX.XX	Hour and Minute	Military (00.00 to 23.59)
DATE					Current Date	
			MNTH	XX	Month of Year	1=Jan, 2=Feb, etc.
			DOM	XX	Day of Month	Range: 1 to 31
			YEAR	XXXX	Year	
			DAY	XX	Day of Week	1=Mon, 2=Tue, etc.
DST					Daylight Savings Config.	
			STR.M	XX	DST Start Month	Default: 4
			STR.W	X	DST Start Week	Default: 1
			STR.D	X	DST Start Day	Default: 7
			M.ADD	XX	DST Minutes to Add	Default: 60
			STP.M	XX	DST Stop Month	Default: 10
			STP.W	X	DST Stop Week	Default: 5
			STP.D	X	DST Stop Day	Default: 7
			M.SUB	XX	DST Minutes to Subtract	Default: 60
SCH.N			SCH.N	XX	Occupancy Schedule Num.	0 = Always Occupied 1 to 64 = Local Schedule 65 to 99 = Global Schedule
OVR.E			OVR.E	YES/NO	SPT Override Enabled	Default: YES
OTL			OTL	X	Override Time Limit	Default: 4
SCH.L	PER.1				Local Occupancy Schedule	
					Occupancy Period 1	
			OCC.1	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.1	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.1	YES/NO	Monday In Period	Default = No
			TUE.1	YES/NO	Tuesday In Period	Default = No
			WED.1	YES/NO	Wednesday In Period	Default = No
			THU.1	YES/NO	Thursday In Period	Default = No
			FRI.1	YES/NO	Friday In Period	Default = No
			SAT.1	YES/NO	Saturday In Period	Default = No
			SUN.1	YES/NO	Sunday In Period	Default = No
			HOL.1	YES/NO	Holiday In Period	Default = No
	PER.2				Occupancy Period 2	
			OCC.2	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.2	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00

Table 19 — “Time Clock” Mode and Submode Directory (cont)

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L (cont)	PER.2 (cont)		MON.2	YES/NO	Monday In Period	Default: No
			TUE.2	YES/NO	Tuesday In Period	Default: No
			WED.2	YES/NO	Wednesday In Period	Default: No
			THU.2	YES/NO	Thursday In Period	Default: No
			FRI.2	YES/NO	Friday In Period	Default: No
			SAT.2	YES/NO	Saturday In Period	Default: No
			SUN.2	YES/NO	Sunday In Period	Default: No
			HOL.2	YES/NO	Holiday In Period	Default: No
	PER.3				Occupancy Period 3	
			OCC.3	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.3	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.3	YES/NO	Monday In Period	Default: No
			TUE.3	YES/NO	Tuesday In Period	Default: No
			WED.3	YES/NO	Wednesday In Period	Default: No
			THU.3	YES/NO	Thursday In Period	Default: No
			FRI.3	YES/NO	Friday In Period	Default: No
			SAT.3	YES/NO	Saturday In Period	Default: No
			SUN.3	YES/NO	Sunday In Period	Default: No
			HOL.3	YES/NO	Holiday In Period	Default: No
	PER.4				Occupancy Period 4	
			OCC.4	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.4	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.4	YES/NO	Monday In Period	Default: No
			TUE.4	YES/NO	Tuesday In Period	Default: No
			WED.4	YES/NO	Wednesday In Period	Default: No
			THU.4	YES/NO	Thursday In Period	Default: No
			FRI.4	YES/NO	Friday In Period	Default: No
			SAT.4	YES/NO	Saturday In Period	Default: No
			SUN.4	YES/NO	Sunday In Period	Default: No
			HOL.4	YES/NO	Holiday In Period	Default: No
	PER.5				Occupancy Period 5	
			OCC.5	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.5	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.5	YES/NO	Monday In Period	Default: No
			TUE.5	YES/NO	Tuesday In Period	Default: No
			WED.5	YES/NO	Wednesday In Period	Default: No
			THU.5	YES/NO	Thursday In Period	Default: No
			FRI.5	YES/NO	Friday In Period	Default: No
			SAT.5	YES/NO	Saturday In Period	Default: No
			SUN.5	YES/NO	Sunday In Period	Default: No
			HOL.5	YES/NO	Holiday In Period	Default: No

Table 19 — “Time Clock” Mode and Submode Directory (cont)

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L (cont)	PER.6				Occupancy Period 6	
			OCC.6	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.6	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.6	YES/NO	Monday In Period	Default: No
			TUE.6	YES/NO	Tuesday In Period	Default: No
			WED.6	YES/NO	Wednesday In Period	Default: No
			THU.6	YES/NO	Thursday In Period	Default: No
			FRI.6	YES/NO	Friday In Period	Default: No
			SAT.6	YES/NO	Saturday In Period	Default: No
			SUN.6	YES/NO	Sunday In Period	Default: No
			HOL.6	YES/NO	Holiday In Period	Default: No
	PER.7				Occupancy Period 7	
			OCC.7	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.7	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.7	YES/NO	Monday In Period	Default: No
			TUE.7	YES/NO	Tuesday In Period	Default: No
			WED.7	YES/NO	Wednesday In Period	Default: No
			THU.7	YES/NO	Thursday In Period	Default: No
			FRI.7	YES/NO	Friday In Period	Default: No
			SAT.7	YES/NO	Saturday In Period	Default: No
			SUN.7	YES/NO	Sunday In Period	Default: No
			HOL.7	YES/NO	Holiday In Period	Default: No
	PER.8				Occupancy Period 8	
			OCC.8	XX.XX	Period Occupied Time	Range: 00.00 to 23.59; Default: 00.00
			UNC.8	XX.XX	Period Unoccupied Time	Range: 00.00 to 23.59; Default: 00.00
			MON.8	YES/NO	Monday In Period	Default: No
			TUE.8	YES/NO	Tuesday In Period	Default: No
			WED.8	YES/NO	Wednesday In Period	Default: No
			THU.8	YES/NO	Thursday In Period	Default: No
			FRI.8	YES/NO	Friday In Period	Default: No
			SAT.8	YES/NO	Saturday In Period	Default: No
			SUN.8	YES/NO	Sunday In Period	Default: No
			HOL.8	YES/NO	Holiday In Period	Default: No

Table 19 — “Time Clock” Mode and Submode Directory (cont)

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
HOL.G			HOL.G	YES/NO	Accept Global Holidays	Default: YES
HOL.L					Local Holiday Schedule	
	HOL.1				Holiday 1	
			MTH.1	XX	Holiday Start Month	Default: 0
			DAY.1	X	Holiday Start Day	Default: 0
			LEN.1	XX	Holiday Duration (Days)	Default: 0
	HOL.2				Holiday 2	
			MTH.2	XX	Holiday Start Month	Default: 0
			DAY.2	X	Holiday Start Day	Default: 0
			LEN.2	XX	Holiday Duration (Days)	Default: 0
	HOL.3				Holiday 3	
			MTH.3	XX	Holiday Start Month	Default: 0
			DAY.3	X	Holiday Start Day	Default: 0
			LEN.3	XX	Holiday Duration (Days)	Default: 0
	HOL.4				Holiday 4	
			MTH.4	XX	Holiday Start Month	Default: 0
			DAY.4	X	Holiday Start Day	Default: 0
			LEN.4	XX	Holiday Duration (Days)	Default: 0
	HOL.5				Holiday 5	
			MTH.5	XX	Holiday Start Month	Default: 0
			DAY.5	X	Holiday Start Day	Default: 0
			LEN.5	XX	Holiday Duration (Days)	Default: 0
	HOL.6				Holiday 6	
			MTH.6	XX	Holiday Start Month	Default: 0
			DAY.6	X	Holiday Start Day	Default: 0
			LEN.6	XX	Holiday Duration (Days)	Default: 0
	HOL.7				Holiday 7	
			MTH.7	XX	Holiday Start Month	Default: 0
			DAY.7	X	Holiday Start Day	Default: 0
			LEN.7	XX	Holiday Duration (Days)	Default: 0
	HOL.8				Holiday 8	
			MTH.8	XX	Holiday Start Month	Default: 0
			DAY.8	X	Holiday Start Day	Default: 0
			LEN.8	XX	Holiday Duration (Days)	Default: 0
	HOL.9				Holiday 9	
			MTH.9	XX	Holiday Start Month	Default: 0
			DAY.9	X	Holiday Start Day	Default: 0
			LEN.9	XX	Holiday Duration (Days)	Default: 0

Table 20 — Setting an Occupied Time Schedule – Weekdays Only for 7:30 to 22:30

SUBMODE	SUB-SUB MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
SCH.L					Local Occupancy Schedule	
	PER.1		OCC.1		Period Occupied Time	
				00.00		Scrolling stops
				00.00		Hours Flash
				07.00		Select 7
				07.00		Change accepted, minutes flash
				07.30		Select 30
				07.30		Change accepted
			OCC.1	07.30	Period Occupied Time	Item/Value/Units scrolls again
			UNC.1	00.00	Period Unoccupied Time	
				00.00		Scrolling stops
				00.00		Hours Flash
				22.00		Select 22
				22.00		Change accepted, minutes flash
				22.30		Select 30
				22.30		Change accepted
			UNC.1	22.30	Period Unoccupied Time	Item/Value/Units scrolls again
			MON.1	NO	Monday In Period	
				NO		Scrolling stops
				YES		Select YES
				YES		Changed accepted
			MON.1	YES	Monday In Period	Item/Value/Units scrolls again
			TUE.1	NO	Tuesday In Period	
				NO		Scrolling stops
				YES		Select YES
				YES		Changed accepted
			TUE.1	YES	Tuesday In Period	Item/Value/Units scrolls again
			WED.1	NO	Wednesday In Period	
				NO		Scrolling stops
				YES		Select YES
				YES		Changed accepted
			WED.1	YES	Wednesday In Period	Item/Value/Units scrolls again
			THU.1	NO	Thursday In Period	
				NO		Scrolling stops
				YES		Select YES
				YES		Changed accepted
			THU.1	YES	Thursday In Period	Item/Value/Units scrolls again
			FRI.1	NO	Friday In Period	
				NO		Scrolling stops
				YES		Select YES
				YES		Changed accepted
			FRI.1	YES	Friday In Period	Item/Value/Units scrolls again

Table 21 — “Operating Modes” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	DISPLAY	COMMENT
SYS				Item expansion changes as a function of system status
HVAC				Item expansion changes as a function of the HVAC status.

Table 22 — “Alarms” Mode and Submode Directory

SUBMODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CURR		AXXX or TXXX	Currently Active Alarms	Alarms are shown as AXXX Alerts are shown as TXXX
R.CUR		YES/NO	Reset All Current Alarms	
HIST		AXXX or TXXX	Alarm History	Alarms are shown as AXXX Alerts are shown as TXXX
R.HIS		YES/NO	Reset Alarm History	

Table 23 — Example of Reading and Clearing Alarms

SUBMODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CURR		AXXX or TXXX		Active Alarms (AXXX) or Alerts (TXXX) displayed
CURR				
R.CUR		NO		Use to clear active alarms/alerts
		NO		NO Flashes
		YES		Select YES
		NO		Alarms/alerts clear, YES changes to NO

START-UP

Use the following information and Start-Up Checklist on page CL-4 to check out unit PRIOR to start-up.

Unit Preparation — Check that unit has been installed in accordance with installation instructions and all applicable codes.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor hold-down bolts.

Refrigerant Service Ports — Each refrigerant system has a total of 3 Schrader-type service gage ports per circuit. One port is located on the suction line, one on the compressor discharge line, and one on the liquid line. Be sure that caps on the ports are tight.

Crankcase Heater(s) — Crankcase heaters are energized as long as there is power to the unit and the compressor is not operating.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

Compressor Rotation

CAUTION

Improper wiring will cause compressor stoppage and alarm. Correct wiring by switching leads as indicated below.

It is important to be certain the compressors are rotating in the proper direction. To determine whether or not compressors are rotating in the proper direction perform the following procedure:

1. Use the Service Test feature to energize a compressor (see Service Test section for details).
2. If the compressor is rotating in the wrong direction, the control will stop the compressor and an alarm will be displayed.
NOTE: The evaporator fan is probably also rotating in the wrong direction.
3. Turn off power to the unit and lock out the power.
4. Reverse any two of the incoming power leads.
5. Turn on power to the unit.
6. Repeat the procedure to energize each compressor and check the evaporator fan rotation.

Internal Wiring — Check all electrical connections in unit control boxes; tighten as required.

Evaporator Fan — Fan belt and variable pulleys are factory-installed. Remove tape from the fan pulley. See Tables 24-54 for Fan Performance Data. Be sure that fans rotate in the proper direction. See Table 55 for air quantity limits. See Table 56 for Evaporator Fan Motor Specifications. See Tables 57 and 58 for Accessory (FIOP) Static Pressure. See Table 59 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 78.

Condenser-Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section (page 78) as required.

Return-Air Filters — Check that correct filters are installed in filter tracks. Do not operate unit without return-air filters.

NOTE: For units with 4-in. filter option, units are shipped with standard 2-in. filters. To install 4-in. filters, the filter spacers must be removed and discarded.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

Gas Heat (48HG Only) — Verify gas pressures before turning on heat as follows:

1. Turn off field-supplied manual gas stop, located external to unit.
2. Connect pressure gage to supply gas tap, located on field-supplied manual shutoff valve.
3. Connect pressure gage to manifold pressure tap on unit gas valve.

4. Turn on field-supplied manual gas stop. Enter Service Test Mode by setting TEST to “YES” using the *ComfortLink™* Scrolling Marquee (see Control and Troubleshooting manual). Temporarily install the jumper wire, found in the installer’s packet, between “R” and “W1” on TB4. Use the Service Test feature to energize HTR.1 (first stage of heat) using the Scrolling Marquee.

5. After the unit has run for several minutes, verify the supply gas pressure is between 5.5 in. wg to 13.0 in. wg, and the manifold pressure is 2.95 in. wg on horizontal discharge applications or 3.0 in. wg on vertical discharge applications. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section.

NOTE: Supply gas pressure must not exceed 13.0 in. wg.

6. Turn off HTR.1 using *ComfortLink* Scrolling Marquee.
7. Remove jumper wire if the unit will be operating under thermostat mode. The jumper must remain if a space temperature sensor (T55 or T56) will control the unit.
8. Exit Service Test mode by setting TEST to “NO” using the *ComfortLink* Scrolling Marquee.

Table 24 — Fan Performance — 48HGD/K014 (Low Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	460	591	0.68	548	774	0.89	623	951	1.09	692	1126	1.29	755	1301	1.50
4000	499	774	0.89	581	976	1.12	653	1170	1.35	717	1361	1.56	777	1551	1.78
4500	538	990	1.14	617	1212	1.39	685	1423	1.64	746	1630	1.88	803	1835	2.11
5000	579	1243	1.43	654	1485	1.71	719	1715	1.97	778	1938	2.23	832	2158	2.48
5500	621	1536	1.77	693	1798	2.07	755	2045	2.35	811	2285	2.63	864	2520	2.90
6000	664	1871	2.15	732	2152	2.48	792	2417	2.78	846	2673	3.07	897	2925	3.36
6500	707	2250	2.59	772	2550	2.93	830	2834	3.26	883	3106	3.57	932	3373	3.88
7000	751	2676	3.08	813	2994	3.44	869	3295	3.79	920	3585	4.12	967	3868	4.45
7500	795	3150	3.62	855	3487	4.01	909	3805	4.38	958	4112	4.73	1004	4411	5.07
8000	839	3676	4.23	897	4029	4.63	949	4366	5.02	997	4689	5.39	1042	5004	5.75
8500	884	4253	4.89	940	4625	5.32	990	4978	5.73	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	814	1476	1.70	871	1650	1.90	924	1825	2.10	975	1999	2.30	1023	2173	2.50
4000	834	1740	2.00	888	1930	2.22	939	2119	2.44	988	2308	2.65	1035	2497	2.87
4500	857	2039	2.35	909	2243	2.58	958	2446	2.81	1005	2650	3.05	1051	2853	3.28
5000	884	2376	2.73	933	2594	2.98	980	2811	3.23	1026	3028	3.48	1070	3244	3.73
5500	913	2753	3.17	960	2984	3.43	1006	3215	3.70	1049	3445	3.96	1092	3674	4.23
6000	945	3172	3.65	990	3417	3.93	1034	3662	4.21	1076	3905	4.49	1117	4147	4.77
6500	978	3636	4.18	1022	3895	4.48	1064	4153	4.78	1104	4409	5.07	1144	4665	5.37
7000	1012	4145	4.77	1055	4419	5.08	1095	4691	5.39	1135	4960	5.70	—	—	—
7500	1047	4703	5.41	1089	4992	5.74	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous

watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 25 — Fan Performance — 48HGF/M014 (High Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	470	611	0.70	556	791	0.91	630	967	1.11	697	1141	1.31	760	1314	1.51
4000	511	802	0.92	591	1001	1.15	661	1194	1.37	725	1383	1.59	784	1572	1.81
4500	553	1029	1.18	629	1248	1.44	695	1458	1.68	756	1663	1.91	812	1866	2.15
5000	597	1297	1.49	669	1534	1.76	732	1761	2.03	789	1982	2.28	843	2201	2.53
5500	641	1606	1.85	709	1862	2.14	770	2106	2.42	825	2343	2.70	876	2577	2.96
6000	686	1961	2.26	751	2234	2.57	809	2495	2.87	862	2749	3.16	911	2997	3.45
6500	732	2363	2.72	794	2653	3.05	849	2931	3.37	900	3201	3.68	948	3465	3.99
7000	779	2815	3.24	837	3122	3.59	891	3416	3.93	940	3702	4.26	986	3981	4.58
7500	826	3320	3.82	882	3642	4.19	933	3953	4.55	980	4254	4.89	1025	4549	5.23
8000	873	3879	4.46	926	4217	4.85	975	4542	5.22	1021	4860	5.59	—	—	—
8500	921	4495	5.17	972	4847	5.57	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	818	1488	1.71	874	1661	1.91	927	1835	2.11	978	2008	2.31	1026	2182	2.51
4000	840	1760	2.02	893	1948	2.24	943	2136	2.46	992	2324	2.67	1039	2512	2.89
4500	865	2068	2.38	915	2270	2.61	964	2472	2.84	1011	2673	3.07	1056	2876	3.31
5000	893	2417	2.78	942	2632	3.03	988	2848	3.28	1033	3063	3.52	1076	3278	3.77
5500	925	2808	3.23	971	3037	3.49	1016	3266	3.76	1059	3494	4.02	1100	3721	4.28
6000	958	3243	3.73	1003	3486	4.01	1045	3728	4.29	1087	3970	4.57	1127	4210	4.84
6500	993	3725	4.28	1036	3982	4.58	1077	4238	4.87	1117	4492	5.17	1156	4745	5.46
7000	1029	4256	4.90	1071	4528	5.21	1111	4797	5.52	—	—	—	—	—	—
7500	1067	4838	5.56	—	—	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous

watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 26 — Fan Performance — 48HGD/K016 (Low Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	460	591	0.68	548	774	0.89	623	951	1.09	692	1126	1.29	755	1301	1.50
4000	499	774	0.89	581	976	1.12	653	1170	1.35	717	1361	1.56	777	1551	1.78
4500	538	990	1.14	617	1212	1.39	685	1423	1.64	746	1630	1.88	803	1835	2.11
5000	579	1243	1.43	654	1485	1.71	719	1715	1.97	778	1938	2.23	832	2158	2.48
5500	621	1536	1.77	693	1798	2.07	755	2045	2.35	811	2285	2.63	864	2520	2.90
6000	664	1871	2.15	732	2152	2.48	792	2417	2.78	846	2673	3.07	897	2925	3.36
6500	707	2250	2.59	772	2550	2.93	830	2834	3.26	883	3106	3.57	932	3373	3.88
7000	751	2676	3.08	813	2994	3.44	869	3295	3.79	920	3585	4.12	967	3868	4.45
7500	795	3150	3.62	855	3487	4.01	909	3805	4.38	958	4112	4.73	1004	4411	5.07
8000	839	3676	4.23	897	4029	4.63	949	4366	5.02	997	4689	5.39	1042	5004	5.75
8500	884	4253	4.89	940	4625	5.32	990	4978	5.73	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	814	1476	1.70	871	1650	1.90	924	1825	2.10	975	1999	2.30	1023	2173	2.50
4000	834	1740	2.00	888	1930	2.22	939	2119	2.44	988	2308	2.65	1035	2497	2.87
4500	857	2039	2.35	909	2243	2.58	958	2446	2.81	1005	2650	3.05	1051	2853	3.28
5000	884	2376	2.73	933	2594	2.98	980	2811	3.23	1026	3028	3.48	1070	3244	3.73
5500	913	2753	3.17	960	2984	3.43	1006	3215	3.70	1049	3445	3.96	1092	3674	4.23
6000	945	3172	3.65	990	3417	3.93	1034	3662	4.21	1076	3905	4.49	1117	4147	4.77
6500	978	3636	4.18	1022	3895	4.48	1064	4153	4.78	1104	4409	5.07	1144	4665	5.37
7000	1012	4145	4.77	1055	4419	5.08	1095	4691	5.39	1135	4960	5.70	—	—	—
7500	1047	4703	5.41	1089	4992	5.74	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous

watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 27 — Fan Performance — 48HGE/F/L/M016 (Medium and High Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	470	611	0.70	556	791	0.91	630	967	1.11	697	1141	1.31	760	1314	1.51
4000	511	802	0.92	591	1001	1.15	661	1194	1.37	725	1383	1.59	784	1572	1.81
4500	553	1029	1.18	629	1248	1.44	695	1458	1.68	756	1663	1.91	812	1866	2.15
5000	597	1297	1.49	669	1534	1.76	732	1761	2.03	789	1982	2.28	843	2201	2.53
5500	641	1606	1.85	709	1862	2.14	770	2106	2.42	825	2343	2.70	876	2577	2.96
6000	686	1961	2.26	751	2234	2.57	809	2495	2.87	862	2749	3.16	911	2997	3.45
6500	732	2363	2.72	794	2653	3.05	849	2931	3.37	900	3201	3.68	948	3465	3.99
7000	779	2815	3.24	837	3122	3.59	891	3416	3.93	940	3702	4.26	986	3981	4.58
7500	826	3320	3.82	882	3642	4.19	933	3953	4.55	980	4254	4.89	1025	4549	5.23
8000	873	3879	4.46	926	4217	4.85	975	4542	5.22	1021	4860	5.59	—	—	—
8500	921	4495	5.17	972	4847	5.57	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	818	1488	1.71	874	1661	1.91	927	1835	2.11	978	2008	2.31	1026	2182	2.51
4000	840	1760	2.02	893	1948	2.24	943	2136	2.46	992	2324	2.67	1039	2512	2.89
4500	865	2068	2.38	915	2270	2.61	964	2472	2.84	1011	2673	3.07	1056	2876	3.31
5000	893	2417	2.78	942	2632	3.03	988	2848	3.28	1033	3063	3.52	1076	3278	3.77
5500	925	2808	3.23	971	3037	3.49	1016	3266	3.76	1059	3494	4.02	1100	3721	4.28
6000	958	3243	3.73	1003	3486	4.01	1045	3728	4.29	1087	3970	4.57	1127	4210	4.84
6500	993	3725	4.28	1036	3982	4.58	1077	4238	4.87	1117	4492	5.17	1156	4745	5.46
7000	1029	4256	4.90	1071	4528	5.21	1111	4797	5.52	—	—	—	—	—	—
7500	1067	4838	5.56	—	—	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous

watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 28 — Fan Performance — 48HGD/K020 (Low Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	460	591	0.68	548	774	0.89	623	951	1.09	692	1126	1.29	755	1301	1.50
4000	499	774	0.89	581	976	1.12	653	1170	1.35	717	1361	1.56	777	1551	1.78
4500	538	990	1.14	617	1212	1.39	685	1423	1.64	746	1630	1.88	803	1835	2.11
5000	579	1243	1.43	654	1485	1.71	719	1715	1.97	778	1938	2.23	832	2158	2.48
5500	621	1536	1.77	693	1798	2.07	755	2045	2.35	811	2285	2.63	864	2520	2.90
6000	664	1871	2.15	732	2152	2.48	792	2417	2.78	846	2673	3.07	897	2925	3.36
6500	707	2250	2.59	772	2550	2.93	830	2834	3.26	883	3106	3.57	932	3373	3.88
7000	751	2676	3.08	813	2994	3.44	869	3295	3.79	920	3585	4.12	967	3868	4.45
7500	795	3150	3.62	855	3487	4.01	909	3805	4.38	958	4112	4.73	1004	4411	5.07
8000	839	3676	4.23	897	4029	4.63	949	4366	5.02	997	4689	5.39	1042	5004	5.75
8500	884	4253	4.89	940	4625	5.32	990	4978	5.73	1037	5318	6.12	1080	5649	6.50

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	814	1476	1.70	871	1650	1.90	924	1825	2.10	975	1999	2.30	1023	2173	2.50
4000	834	1740	2.00	888	1930	2.22	939	2119	2.44	988	2308	2.65	1035	2497	2.87
4500	857	2039	2.35	909	2243	2.58	958	2446	2.81	1005	2650	3.05	1051	2853	3.28
5000	884	2376	2.73	933	2594	2.98	980	2811	3.23	1026	3028	3.48	1070	3244	3.73
5500	913	2753	3.17	960	2984	3.43	1006	3215	3.70	1049	3445	3.96	1092	3674	4.23
6000	945	3172	3.65	990	3417	3.93	1034	3662	4.21	1076	3905	4.49	1117	4147	4.77
6500	978	3636	4.18	1022	3895	4.48	1064	4153	4.78	1104	4409	5.07	1144	4665	5.37
7000	1012	4145	4.77	1055	4419	5.08	1095	4691	5.39	1135	4960	5.70	1173	5229	6.01
7500	1047	4703	5.41	1089	4992	5.74	1128	5277	6.07	1167	5561	6.40	1204	5842	6.72
8000	1084	5311	6.11	1124	5615	6.46	1163	5915	6.80	1200	6211	7.14	1236	6506	7.48
8500	1121	5972	6.87	1160	6290	7.23	1198	6604	7.60	1234	6914	7.95	1269	7223	8.31

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 29 — Fan Performance — 48HGE/F/L/M020 (Medium and High Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	470	611	0.70	556	791	0.91	630	967	1.11	697	1141	1.31	760	1314	1.51
4000	511	802	0.92	591	1001	1.15	661	1194	1.37	725	1383	1.59	784	1572	1.81
4500	553	1029	1.18	629	1248	1.44	695	1458	1.68	756	1663	1.91	812	1866	2.15
5000	597	1297	1.49	669	1534	1.76	732	1761	2.03	789	1982	2.28	843	2201	2.53
5500	641	1606	1.85	709	1862	2.14	770	2106	2.42	825	2343	2.70	876	2577	2.96
6000	686	1961	2.26	751	2234	2.57	809	2495	2.87	862	2749	3.16	911	2997	3.45
6500	732	2363	2.72	794	2653	3.05	849	2931	3.37	900	3201	3.68	948	3465	3.99
7000	779	2815	3.24	837	3122	3.59	891	3416	3.93	940	3702	4.26	986	3981	4.58
7500	826	3320	3.82	882	3642	4.19	933	3953	4.55	980	4254	4.89	1025	4549	5.23
8000	873	3879	4.46	926	4217	4.85	975	4542	5.22	1021	4860	5.59	1065	5169	5.95
8500	921	4495	5.17	972	4847	5.57	1019	5189	5.97	1063	5521	6.35	1105	5846	6.72

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	818	1488	1.71	874	1661	1.91	927	1835	2.11	978	2008	2.31	1026	2182	2.51
4000	840	1760	2.02	893	1948	2.24	943	2136	2.46	992	2324	2.67	1039	2512	2.89
4500	865	2068	2.38	915	2270	2.61	964	2472	2.84	1011	2673	3.07	1056	2876	3.31
5000	893	2417	2.78	942	2632	3.03	988	2848	3.28	1033	3063	3.52	1076	3278	3.77
5500	925	2808	3.23	971	3037	3.49	1016	3266	3.76	1059	3494	4.02	1100	3721	4.28
6000	958	3243	3.73	1003	3486	4.01	1045	3728	4.29	1087	3970	4.57	1127	4210	4.84
6500	993	3725	4.28	1036	3982	4.58	1077	4238	4.87	1117	4492	5.17	1156	4745	5.46
7000	1029	4256	4.90	1071	4528	5.21	1111	4797	5.52	1150	5064	5.82	1187	5330	6.13
7500	1067	4838	5.56	1107	5124	5.89	1146	5407	6.22	1184	5688	6.54	1220	5967	6.86
8000	1106	5474	6.30	1145	5774	6.64	1182	6071	6.98	1219	6365	7.32	1254	6657	7.66
8500	1145	6165	7.09	1183	6479	7.45	1220	6790	7.81	1255	7098	8.16	1290	7403	8.51

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 30 — Fan Performance — 48HGD/K024 (Low Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	590	1276	1.47	663	1516	1.74	727	1745	2.01	786	1968	2.26	840	2189	2.52
5,500	633	1579	1.82	703	1838	2.11	764	2084	2.40	820	2324	2.67	872	2560	2.94
6,000	677	1925	2.21	744	2203	2.53	803	2467	2.84	857	2723	3.13	907	2974	3.42
6,500	722	2317	2.67	786	2614	3.01	842	2896	3.33	894	3167	3.64	942	3434	3.95
7,000	767	2758	3.17	828	3073	3.53	883	3371	3.88	933	3660	4.21	979	3942	4.53
7,500	813	3250	3.74	871	3582	4.12	924	3897	4.48	972	4202	4.83	1017	4500	5.18
8,000	859	3795	4.36	915	4143	4.77	966	4475	5.15	1012	4797	5.52	1056	5110	5.88
8,500	906	4394	5.05	959	4759	5.47	1008	5107	5.87	1053	5445	6.26	1096	5774	6.64
9,000	952	5051	5.81	1004	5432	6.25	1051	5797	6.67	1095	6150	7.07	1136	6494	7.47
9,500	999	5767	6.63	1049	6163	7.09	1094	6544	7.53	1137	6913	7.95	1177	7272	8.36
10,000	1047	6544	7.53	1094	6956	8.00	1138	7352	8.46	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	891	2408	2.77	940	2625	3.02	987	2843	3.27	1032	3060	3.52	1076	3277	3.77
5,500	921	2792	3.21	968	3024	3.48	1014	3255	3.74	1057	3485	4.01	1099	3716	4.27
6,000	954	3221	3.70	999	3467	3.99	1042	3711	4.27	1084	3955	4.55	1125	4198	4.83
6,500	988	3696	4.25	1032	3956	4.55	1073	4214	4.85	1114	4470	5.14	1153	4726	5.44
7,000	1024	4219	4.85	1066	4493	5.17	1106	4764	5.48	1145	5034	5.79	1183	5303	6.10
7,500	1060	4792	5.51	1101	5080	5.84	1140	5365	6.17	1178	5649	6.50	1215	5930	6.82
8,000	1098	5417	6.23	1138	5719	6.58	1176	6018	6.92	1213	6315	7.26	1249	6610	7.60
8,500	1137	6096	7.01	1175	6413	7.38	1212	6726	7.74	1248	7036	8.09	1283	7344	8.45
9,000	1176	6831	7.86	1214	7163	8.24	1250	7490	8.61	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 31 — Fan Performance — 48HGE/F/L/M024 (Medium and High Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	607	1329	1.53	677	1565	1.80	740	1791	2.06	797	2013	2.31	850	2231	2.57
5,500	652	1648	1.90	719	1902	2.19	779	2145	2.47	833	2382	2.74	884	2616	3.01
6,000	699	2013	2.32	763	2285	2.63	819	2545	2.93	872	2798	3.22	921	3046	3.50
6,500	746	2428	2.79	807	2716	3.12	861	2993	3.44	911	3262	3.75	958	3525	4.05
7,000	794	2895	3.33	851	3198	3.68	904	3491	4.02	952	3776	4.34	998	4055	4.66
7,500	842	3415	3.93	897	3735	4.30	947	4043	4.65	994	4343	5.00	1038	4637	5.33
8,000	891	3992	4.59	943	4327	4.98	991	4650	5.35	1036	4966	5.71	1079	5274	6.07
8,500	940	4628	5.32	990	4977	5.72	1036	5316	6.11	1080	5646	6.49	1121	5970	6.87
9,000	990	5325	6.12	1037	5688	6.54	1082	6042	6.95	1124	6386	7.35	1163	6724	7.73
9,500	1039	6085	7.00	1085	6462	7.43	1128	6829	7.85	1168	7188	8.27	—	—	—
10,000	1089	6911	7.95	1133	7301	8.40	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	900	2448	2.82	949	2664	3.06	995	2879	3.31	1040	3095	3.56	1083	3310	3.81
5,500	933	2847	3.27	979	3077	3.54	1023	3305	3.80	1066	3534	4.06	1108	3762	4.33
6,000	967	3292	3.79	1011	3535	4.07	1054	3778	4.35	1095	4019	4.62	1135	4260	4.90
6,500	1003	3785	4.35	1046	4043	4.65	1087	4298	4.94	1127	4553	5.24	1165	4806	5.53
7,000	1041	4330	4.98	1082	4601	5.29	1122	4870	5.60	1160	5138	5.91	1197	5404	6.22
7,500	1079	4926	5.67	1119	5212	5.99	1158	5495	6.32	1195	5776	6.64	1231	6055	6.96
8,000	1119	5578	6.42	1158	5878	6.76	1195	6174	7.10	1231	6468	7.44	1267	6761	7.78
8,500	1160	6288	7.23	1198	6601	7.59	1234	6912	7.95	1269	7219	8.30	—	—	—
9,000	1202	7056	8.12	1238	7384	8.49	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 32 — Fan Performance — 48HGD/K028 (Low Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	750	2468	2.84	806	2767	3.18	854	3031	3.49	898	3298	3.79	943	3584	4.12
7,000	797	2942	3.38	853	3276	3.77	899	3557	4.09	941	3832	4.41	982	4118	4.74
7,500	845	3468	3.99	900	3840	4.42	945	4142	4.76	985	4430	5.09	1024	4721	5.43
8,000	892	4045	4.65	948	4462	5.13	991	4789	5.51	1030	5092	5.86	1067	5391	6.20
8,500	939	4677	5.38	995	5141	5.91	1038	5497	6.32	1076	5818	6.69	1112	6129	7.05
9,000	986	5364	6.17	1042	5882	6.76	1085	6269	7.21	1122	6611	7.60	1157	6936	7.98
9,500	1033	6108	7.03	1090	6684	7.69	1132	7105	8.17	1169	7470	8.59	1203	7813	8.99
10,000	1079	6911	7.95	1137	7550	8.68	1180	8007	9.21	1216	8399	9.66	1249	8761	10.08
10,500	1126	7773	8.94	1184	8480	9.75	1227	8978	10.33	1263	9399	10.81	1296	9782	11.25
11,000	1172	8696	10.00	1232	9475	10.90	—	—	—	—	—	—	—	—	—
11,500	1219	9681	11.13	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	988	3900	4.49	1035	4250	4.89	1082	4634	5.33	1130	5053	5.81	1177	5499	6.32
7,000	1024	4426	5.09	1066	4760	5.48	1109	5126	5.90	1153	5524	6.35	1197	5953	6.85
7,500	1063	5026	5.78	1101	5351	6.15	1141	5702	6.56	1181	6081	6.99	1222	6490	7.46
8,000	1104	5698	6.55	1140	6020	6.92	1176	6361	7.32	1213	6727	7.74	1251	7118	8.19
8,500	1146	6443	7.41	1180	6765	7.78	1214	7103	8.17	1249	7459	8.58	1283	7837	9.01
9,000	1190	7259	8.35	1222	7586	8.73	1255	7925	9.11	1287	8276	9.52	1319	8645	9.94
9,500	1235	8148	9.37	1266	8483	9.76	1296	8824	10.15	1327	9176	10.55	1357	9541	10.97
10,000	1280	9111	10.48	1310	9456	10.88	1340	9804	11.28	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 33 — Fan Performance — 48HGE/F/L/M028 (Medium and High Heat Units) — Vertical Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	775	2600	2.99	825	2872	3.30	871	3130	3.60	915	3400	3.91	959	3692	4.25
7,000	826	3115	3.58	875	3408	3.92	918	3679	4.23	959	3954	4.55	1000	4245	4.88
7,500	878	3690	4.24	925	4006	4.61	966	4292	4.94	1005	4575	5.26	1043	4868	5.60
8,000	929	4326	4.98	975	4667	5.37	1015	4970	5.72	1052	5265	6.06	1088	5564	6.40
8,500	981	5029	5.78	1026	5395	6.20	1064	5717	6.58	1100	6025	6.93	1134	6332	7.28
9,000	1033	5799	6.67	1076	6191	7.12	1114	6533	7.51	1148	6856	7.89	1181	7173	8.25
9,500	1085	6640	7.64	1128	7058	8.12	1164	7421	8.54	1198	7761	8.93	1229	8091	9.31
10,000	1137	7553	8.69	1179	8000	9.20	1214	8385	9.64	1247	8741	10.05	1278	9086	10.45
10,500	1190	8542	9.82	1230	9016	10.37	1265	9424	10.84	1297	9799	11.27	—	—	—
11,000	1242	9609	11.05	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	1004	4016	4.62	1050	4374	5.03	1098	4,769	5.48	1145	5,195	5.97	1192	5646	6.49
7,000	1041	4559	5.24	1083	4902	5.64	1126	5,277	6.07	1170	5,685	6.54	1214	6122	7.04
7,500	1081	5179	5.96	1120	5512	6.34	1159	5,872	6.75	1199	6,261	7.20	1240	6680	7.68
8,000	1124	5875	6.76	1160	6203	7.13	1196	6,553	7.54	1233	6,928	7.97	1270	7329	8.43
8,500	1168	6647	7.64	1202	6974	8.02	1235	7,318	8.42	1269	7,684	8.84	1304	8071	9.28
9,000	1214	7495	8.62	1245	7825	9.00	1277	8,168	9.39	1309	8,527	9.81	1341	8905	10.24
9,500	1260	8421	9.69	1290	8756	10.07	1320	9,100	10.47	1351	9,457	10.88	1381	9830	11.31
10,000	1308	9425	10.84	1337	9768	11.23	1365	10,116	11.63	1394	10,474	12.05	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 34 — Fan Performance — 48HGD/K014 (Low Heat Units) — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	635	1064	1.22	709	1278	1.47	776	1492	1.72	838	1708	1.96	896	1924	2.21
4,000	707	1402	1.61	773	1627	1.87	835	1853	2.13	892	2080	2.39	947	2307	2.65
4,500	780	1802	2.07	840	2037	2.34	897	2273	2.61	950	2510	2.89	1001	2465	2.84
5,000	853	2264	2.60	909	2510	2.89	961	2756	3.17	1011	2710	3.12	1059	3015	3.47
5,500	928	2794	3.21	979	3049	3.51	1028	3012	3.46	1075	3333	3.83	1120	3661	4.21
6,000	1003	3047	3.50	1051	3376	3.88	1096	3714	4.27	1140	4059	4.67	1182	4411	5.07
6,500	1079	3812	4.38	1123	4166	4.79	1166	4529	5.21	1207	4898	5.63	—	—	—
7,000	1155	4697	5.40	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	951	2143	2.46	1003	2120	2.44	1052	2387	2.75	1100	2662	3.06	1146	2944	3.39
4,000	998	2535	2.92	1048	2548	2.93	1095	2835	3.26	1141	3129	3.60	1184	3432	3.95
4,500	1050	2756	3.17	1097	3055	3.51	1142	3363	3.87	1185	3678	4.23	1227	4001	4.60
5,000	1105	3329	3.83	1150	3651	4.20	1192	3979	4.58	1234	4315	4.96	1274	4658	5.36
5,500	1163	3997	4.60	1205	4342	4.99	1246	4692	5.40	—	—	—	—	—	—
6,000	1224	4771	5.49	—	—	—	—	—	—	—	—	—	—	—	—
6,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with optional drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v

units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 35 — Fan Performance — 48HGF/M014 (High Heat Units) — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	635	1064	1.22	709	1278	1.47	776	1492	1.72	838	1708	1.96	896	1924	2.21
4000	707	1402	1.61	773	1627	1.87	835	1853	2.13	892	2080	2.39	947	2307	2.65
4500	780	1802	2.07	840	2037	2.34	897	2273	2.61	950	2510	2.89	1001	2465	2.84
5000	853	2264	2.60	909	2510	2.89	961	2756	3.17	1011	2710	3.12	1059	3015	3.47
5500	928	2794	3.21	979	3049	3.51	1028	3012	3.46	1075	3333	3.83	1120	3661	4.21
6000	1003	3047	3.50	1051	3376	3.88	1096	3714	4.27	1140	4059	4.67	1182	4411	5.07
6500	1079	3812	4.38	1123	4166	4.79	1166	4529	5.21	1207	4898	5.63	—	—	—
7000	1155	4697	5.40	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	951	2143	2.46	1003	2120	2.44	1052	2387	2.75	1100	2662	3.06	1146	2944	3.39
4000	998	2535	2.92	1048	2548	2.93	1095	2835	3.26	1141	3129	3.60	1184	3432	3.95
4500	1050	2756	3.17	1097	3055	3.51	1142	3363	3.87	1185	3678	4.23	1227	4001	4.60
5000	1105	3329	3.83	1150	3651	4.20	1192	3979	4.58	1234	4315	4.96	1274	4658	5.36
5500	1163	3997	4.60	1205	4342	4.99	1246	4692	5.40	—	—	—	—	—	—
6000	1224	4771	5.49	—	—	—	—	—	—	—	—	—	—	—	—
6500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with optional drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and

460-v units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 36 — Fan Performance — 48HGD/K016 (Low Heat Units) — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	635	1064	1.22	709	1278	1.47	776	1492	1.72	838	1708	1.96	896	1924	2.21
4,000	707	1402	1.61	773	1627	1.87	835	1853	2.13	892	2080	2.39	947	2307	2.65
4,500	780	1802	2.07	840	2037	2.34	897	2273	2.61	950	2510	2.89	1001	2465	2.84
5,000	853	2264	2.60	909	2510	2.89	961	2756	3.17	1011	2710	3.12	1059	3015	3.47
5,500	928	2794	3.21	979	3049	3.51	1028	3012	3.46	1075	3333	3.83	1120	3661	4.21
6,000	1003	3047	3.50	1051	3376	3.88	1096	3714	4.27	1140	4059	4.67	1182	4411	5.07
6,500	1079	3812	4.38	1123	4166	4.79	1166	4529	5.21	1207	4898	5.63	—	—	—
7,000	1155	4697	5.40	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	951	2143	2.46	1003	2120	2.44	1052	2387	2.75	1100	2662	3.06	1146	2944	3.39
4,000	998	2535	2.92	1048	2548	2.93	1095	2835	3.26	1141	3129	3.60	1184	3432	3.95
4,500	1050	2756	3.17	1097	3055	3.51	1142	3363	3.87	1185	3678	4.23	1227	4001	4.60
5,000	1105	3329	3.83	1150	3651	4.20	1192	3979	4.58	1234	4315	4.96	1274	4658	5.36
5,500	1163	3997	4.60	1205	4342	4.99	1246	4692	5.40	—	—	—	—	—	—
6,000	1224	4771	5.49	—	—	—	—	—	—	—	—	—	—	—	—
6,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with optional drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and

460-v units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

**Table 37 — Fan Performance — 48HGE/F/L/M016 (Medium and High Heat Units) —
Horizontal Discharge Units***

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	645	1105	1.27	720	1329	1.53	788	1549	1.78	851	1767	2.03	910	1982	2.28
4,000	718	1454	1.67	785	1692	1.95	848	1926	2.22	906	2158	2.48	962	2388	2.75
4,500	792	1866	2.15	853	2117	2.43	911	2364	2.72	965	2609	3.00	1017	2583	2.97
5,000	867	2343	2.69	923	2605	3.00	977	2865	3.30	1027	2845	3.27	1076	3163	3.64
5,500	943	2889	3.32	995	3162	3.64	1044	3158	3.63	1092	3497	4.02	1138	3843	4.42
6,000	1019	3177	3.65	1067	3532	4.06	1113	3892	4.48	1158	4259	4.90	1201	4631	5.33
6,500	1096	3973	4.57	1141	4354	5.01	1184	4742	5.45	—	—	—	—	—	—
7,000	1173	4894	5.63	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	965	2195	2.53	1018	2181	2.51	1068	2442	2.81	1116	2708	3.11	1162	2979	3.43
4,000	1014	2364	2.72	1064	2644	3.04	1112	2930	3.37	1158	3221	3.70	1202	3517	4.05
4,500	1067	2882	3.31	1114	3187	3.67	1160	3498	4.02	1204	3814	4.39	1246	4135	4.76
5,000	1123	3489	4.01	1168	3820	4.39	1211	4156	4.78	1253	4497	5.17	1294	4844	5.57
5,500	1182	4194	4.82	1224	4551	5.23	1266	4913	5.65	—	—	—	—	—	—
6,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with optional drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and

460-v units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 38 — Fan Performance — 48HGD/K020 (Low Heat Units) — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	635	1064	1.22	709	1278	1.47	776	1492	1.72	838	1708	1.96	896	1924	2.21
4,000	707	1402	1.61	773	1627	1.87	835	1853	2.13	892	2080	2.39	947	2307	2.65
4,500	780	1802	2.07	840	2037	2.34	897	2273	2.61	950	2510	2.89	1001	2465	2.84
5,000	853	2264	2.60	909	2510	2.89	961	2756	3.17	1011	2710	3.12	1059	3015	3.47
5,500	928	2794	3.21	979	3049	3.51	1028	3012	3.46	1075	3333	3.83	1120	3661	4.21
6,000	1003	3047	3.50	1051	3376	3.88	1096	3714	4.27	1140	4059	4.67	1182	4411	5.07
6,500	1079	3812	4.38	1123	4166	4.79	1166	4529	5.21	1207	4898	5.63	1247	5274	6.07
7,000	1155	4697	5.40	1196	5078	5.84	1236	5465	6.29	1275	5859	6.74	1313	6260	7.20
7,500	1231	5714	6.57	1270	6120	7.04	1308	6533	7.51	1345	6952	8.00	1381	7378	8.49
8,000	1308	6871	7.90	1344	7303	8.40	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	951	2143	2.46	1003	2120	2.44	1052	2387	2.75	1100	2662	3.06	1146	2944	3.39
4,000	998	2535	2.92	1048	2548	2.93	1095	2835	3.26	1141	3129	3.60	1184	3432	3.95
4,500	1050	2756	3.17	1097	3055	3.51	1142	3363	3.87	1185	3678	4.23	1227	4001	4.60
5,000	1105	3329	3.83	1150	3651	4.20	1192	3979	4.58	1234	4315	4.96	1274	4658	5.36
5,500	1163	3997	4.60	1205	4342	4.99	1246	4692	5.40	1286	5051	5.81	1324	5415	6.23
6,000	1224	4771	5.49	1263	5138	5.91	1302	5511	6.34	1340	5892	6.78	1377	6278	7.22
6,500	1286	5658	6.51	1324	6048	6.96	1361	6445	7.41	1397	6847	7.87	—	—	—
7,000	1350	6668	7.67	1386	7081	8.14	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with optional drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

- not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

**Table 39 — Fan Performance — 48HGE/F/L/M020 (Medium and High Heat Units) —
Horizontal Discharge Units***

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	645	1105	1.27	720	1329	1.53	788	1549	1.78	851	1767	2.03	910	1982	2.28
4,000	718	1454	1.67	785	1692	1.95	848	1926	2.22	906	2158	2.48	962	2388	2.75
4,500	792	1866	2.15	853	2117	2.43	911	2364	2.72	965	2609	3.00	1017	2583	2.97
5,000	867	2343	2.69	923	2605	3.00	977	2865	3.30	1027	2845	3.27	1076	3163	3.64
5,500	943	2889	3.32	995	3162	3.64	1044	3158	3.63	1092	3497	4.02	1138	3843	4.42
6,000	1019	3177	3.65	1067	3532	4.06	1113	3892	4.48	1158	4259	4.90	1201	4631	5.33
6,500	1096	3973	4.57	1141	4354	5.01	1184	4742	5.45	1226	5136	5.91	1267	5535	6.37
7,000	1173	4894	5.63	1215	5304	6.10	1256	5719	6.58	1295	6140	7.06	1334	6567	7.55
7,500	1250	5952	6.85	1290	6389	7.35	1328	6832	7.86	1366	7281	8.37	—	—	—
8,000	1328	7153	8.23	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	965	2195	2.53	1018	2181	2.51	1068	2442	2.81	1116	2708	3.11	1162	2979	3.43
4,000	1014	2364	2.72	1064	2644	3.04	1112	2930	3.37	1158	3221	3.70	1202	3517	4.05
4,500	1067	2882	3.31	1114	3187	3.67	1160	3498	4.02	1204	3814	4.39	1246	4135	4.76
5,000	1123	3489	4.01	1168	3820	4.39	1211	4156	4.78	1253	4497	5.17	1294	4844	5.57
5,500	1182	4194	4.82	1224	4551	5.23	1266	4913	5.65	1306	5280	6.07	1345	5652	6.50
6,000	1243	5008	5.76	1283	5391	6.20	1323	5779	6.65	1361	6172	7.10	1398	6569	7.56
6,500	1306	5939	6.83	1345	6349	7.30	1382	6763	7.78	—	—	—	—	—	—
7,000	1371	6997	8.05	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with optional drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 40 — Fan Performance — 48HGD/K024 (Low Heat Units) — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	642	1082	1.24	714	1296	1.49	781	1510	1.74	843	1726	1.98	901	1943	2.23
4,000	714	1426	1.64	780	1651	1.90	841	1877	2.16	898	2103	2.42	952	2330	2.68
4,500	787	1831	2.11	847	2067	2.38	904	2303	2.65	957	2540	2.92	1008	2501	2.88
5,000	862	2301	2.65	917	2547	2.93	969	2793	3.21	1019	2755	3.17	1066	3062	3.52
5,500	937	2838	3.26	988	3094	3.56	1036	3067	3.53	1083	3390	3.90	1127	3719	4.28
6,000	1013	3113	3.58	1060	3445	3.96	1105	3783	4.35	1149	4130	4.75	1191	4484	5.16
6,500	1089	3893	4.48	1133	4250	4.89	1175	4615	5.31	1216	4986	5.73	1256	5364	6.17
7,000	1166	4798	5.52	1207	5181	5.96	1247	5570	6.41	1285	5965	6.86	1323	6369	7.32
7,500	1243	5837	6.71	1282	6244	7.18	1319	6658	7.66	1355	7080	8.14	1391	7507	8.63
8,000	1320	7017	8.07	1356	7450	8.57	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	955	2160	2.48	1007	2142	2.46	1056	2409	2.77	1104	2684	3.09	1149	2968	3.41
4,000	1004	2299	2.64	1053	2578	2.96	1100	2865	3.29	1145	3160	3.63	1189	3463	3.98
4,500	1056	2793	3.21	1103	3093	3.56	1147	3402	3.91	1191	3718	4.28	1233	4041	4.65
5,000	1112	3376	3.88	1156	3699	4.25	1199	4029	4.63	1240	4366	5.02	1280	4710	5.42
5,500	1171	4057	4.67	1212	4402	5.06	1253	4754	5.47	1292	5114	5.88	1331	5480	6.30
6,000	1232	4845	5.57	1271	5213	6.00	1310	5588	6.43	1348	5970	6.87	1384	6358	7.31
6,500	1295	5749	6.61	1333	6141	7.06	1369	6538	7.52	—	—	—	—	—	—
7,000	1360	6778	7.80	1396	7193	8.27	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with optional drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

**Table 41 — Fan Performance — 48HGE/F/L/M024 (Medium and High Heat Units) —
Horizontal Discharge Units***

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	652	1123	1.29	726	1347	1.55	793	1567	1.80	856	1784	2.05	914	2000	2.30
4,000	725	1479	1.70	792	1716	1.97	854	1950	2.24	912	2182	2.51	967	2412	2.77
4,500	800	1897	2.18	861	2148	2.47	918	2395	2.75	972	2639	3.04	1024	2620	3.01
5,000	875	2383	2.74	931	2645	3.04	984	2904	3.34	1035	2892	3.33	1083	3212	3.69
5,500	952	2937	3.38	1003	2883	3.32	1053	3217	3.70	1100	3558	4.09	1145	3905	4.49
6,000	1029	3249	3.74	1077	3605	4.15	1123	3966	4.56	1167	4334	4.98	1210	4707	5.41
6,500	1106	4061	4.67	1151	4445	5.11	1194	4834	5.56	1236	5229	6.01	1276	5629	6.47
7,000	1184	5003	5.75	1226	5414	6.23	1266	5831	6.71	1306	6253	7.19	1344	6681	7.68
7,500	1262	6083	7.00	1302	6522	7.50	1340	6967	8.01	1377	7417	8.53	—	—	—
8,000	1341	7312	8.41	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3,500	970	2213	2.55	1022	2203	2.53	1072	2464	2.83	1120	2730	3.14	1166	3002	3.45
4,000	1019	2393	2.75	1069	2673	3.07	1117	2959	3.40	1163	3251	3.74	1207	3548	4.08
4,500	1073	2920	3.36	1120	3226	3.71	1165	3537	4.07	1209	3854	4.43	1252	4176	4.80
5,000	1130	3537	4.07	1174	3870	4.45	1218	4207	4.84	1259	4549	5.23	1300	4896	5.63
5,500	1189	4257	4.90	1232	4614	5.31	1273	4977	5.72	1313	5345	6.15	1352	5719	6.58
6,000	1251	5086	5.85	1292	5469	6.29	1331	5859	6.74	1369	6253	7.19	—	—	—
6,500	1315	6035	6.94	1354	6446	7.41	1391	6861	7.89	—	—	—	—	—	—
7,000	1381	7114	8.18	—	—	—	—	—	—	—	—	—	—	—	—
7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with optional drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on baffles, filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 42 — Fan Performance — 48HGD/K028 (Low Heat Units) — Horizontal Discharge Units*

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	786	2658	3.06	819	2835	3.26	857	3052	3.51	899	3304	3.80	943	3586	4.12
7,000	842	3208	3.69	871	3386	3.89	905	3599	4.14	943	3847	4.42	983	4123	4.74
7,500	898	3827	4.40	925	4006	4.61	955	4217	4.85	989	4460	5.13	1026	4733	5.44
8,000	955	4518	5.20	979	4699	5.40	1007	4908	5.65	1037	5148	5.92	1070	5416	6.23
8,500	1012	5284	6.08	1034	5466	6.29	1059	5675	6.53	1087	5912	6.80	1117	6176	7.10
9,000	1069	6127	7.05	1090	6312	7.26	1113	6521	7.50	1138	6757	7.77	1165	7017	8.07
9,500	1127	7050	8.11	1146	7238	8.32	1167	7448	8.57	1190	7682	8.84	1215	7940	9.13
10,000	1184	8057	9.27	1202	8247	9.49	1221	8460	9.73	1243	8693	10.00	1266	8948	10.29
10,500	1242	9149	10.52	1258	9344	10.75	1276	9557	10.99	1296	9791	11.26	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	988	3900	4.49	1035	4248	4.89	1082	4632	5.33	1129	5050	5.81	1177	5499	6.32
7,000	1024	4428	5.09	1066	4760	5.48	1109	5124	5.89	1153	5521	6.35	1197	5950	6.84
7,500	1063	5031	5.79	1102	5354	6.16	1141	5703	6.56	1181	6081	6.99	1221	6487	7.46
8,000	1105	5709	6.57	1140	6025	6.93	1176	6364	7.32	1213	6729	7.74	1250	7116	8.18
8,500	1149	6465	7.44	1181	6777	7.79	1215	7109	8.18	1249	7463	8.58	1283	7838	9.02
9,000	1194	7302	8.40	1225	7608	8.75	1256	7935	9.13	1287	8282	9.53	1319	8649	9.95
9,500	1242	8222	9.46	1270	8524	9.80	1298	8847	10.17	1328	9189	10.57	1358	9548	10.98
10,000	1290	9227	10.61	1316	9525	10.96	1343	9845	11.32	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

**Table 43 — Fan Performance — 48HGE/F/L/M028 (Medium and High Heat Units) —
Horizontal Discharge Units***

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	799	2730	3.14	833	2914	3.35	872	3135	3.61	914	3392	3.90	958	3687	4.24
7,000	856	3294	3.79	887	3481	4.00	921	3699	4.25	958	3950	4.54	999	4235	4.87
7,500	913	3929	4.52	941	4118	4.74	972	4335	4.99	1006	4582	5.27	1042	4860	5.59
8,000	971	4637	5.33	996	4829	5.55	1024	5046	5.80	1055	5290	6.08	1088	5562	6.40
8,500	1029	5421	6.24	1052	5617	6.46	1078	5835	6.71	1106	6077	6.99	1136	6345	7.30
9,000	1087	6285	7.23	1108	6484	7.46	1132	6703	7.71	1158	6946	7.99	1185	7211	8.29
9,500	1145	7231	8.32	1165	7433	8.55	1187	7655	8.80	1211	7898	9.08	1236	8161	9.39
10,000	1203	8262	9.50	1222	8468	9.74	1243	8693	10.00	1265	8936	10.28	1288	9199	10.58
10,500	1261	9381	10.79	1279	9592	11.03	1299	9820	11.29	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	1005	4020	4.62	1052	4390	5.05	1100	4791	5.51	1148	5221	6.00	1195	5673	6.52
7,000	1041	4555	5.24	1084	4908	5.64	1128	5294	6.09	1172	5710	6.57	1217	6153	7.08
7,500	1080	5168	5.94	1119	5508	6.33	1160	5878	6.76	1201	6279	7.22	1242	6708	7.71
8,000	1122	5862	6.74	1158	6190	7.12	1195	6548	7.53	1233	6934	7.97	1272	7347	8.45
8,500	1167	6638	7.63	1200	6959	8.00	1234	7305	8.40	1269	7677	8.83	1304	8076	9.29
9,000	1214	7499	8.63	1244	7813	8.99	1275	8149	9.37	1308	8511	9.79	1340	8896	10.23
9,500	1262	8447	9.72	1290	8754	10.07	1319	9084	10.45	1349	9437	10.85	1379	9812	11.28
10,000	1312	9482	10.91	1338	9785	11.25	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 44 — Fan Performance — 50HG014 — Vertical Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	423	522	0.60	521	715	0.82	605	906	1.04	679	1093	1.26	747	1278	1.47
4000	454	675	0.78	545	884	1.02	625	1093	1.26	697	1299	1.49	762	1502	1.73
4500	487	859	0.99	572	1082	1.24	648	1307	1.50	717	1529	1.76	780	1750	2.01
5000	522	1077	1.24	601	1311	1.51	673	1550	1.78	739	1789	2.06	800	2026	2.33
5500	559	1330	1.53	632	1573	1.81	700	1826	2.10	763	2080	2.39	822	2332	2.68
6000	598	1621	1.86	664	1873	2.15	729	2137	2.46	789	2405	2.77	846	2671	3.07
6500	637	1953	2.25	698	2212	2.54	759	2486	2.86	817	2766	3.18	871	3046	3.50
7000	677	2327	2.68	734	2593	2.98	791	2876	3.31	846	3167	3.64	898	3459	3.98
7500	718	2745	3.16	770	3018	3.47	824	3309	3.81	876	3609	4.15	926	3913	4.50
8000	759	3209	3.69	808	3489	4.01	858	3787	4.36	907	4095	4.71	956	4410	5.07
8500	801	3722	4.28	846	4007	4.61	893	4311	4.96	940	4628	5.32	986	4952	5.69

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	810	1461	1.68	868	1642	1.89	923	1821	2.09	975	1999	2.30	1024	2176	2.50
4000	823	1703	1.96	880	1902	2.19	934	2100	2.42	985	2296	2.64	1034	2490	2.86
4500	839	1969	2.26	894	2185	2.51	947	2400	2.76	997	2613	3.01	1045	2826	3.25
5000	857	2261	2.60	911	2494	2.87	962	2726	3.14	1011	2956	3.40	1058	3185	3.66
5500	877	2583	2.97	930	2832	3.26	979	3080	3.54	1027	3326	3.83	1073	3570	4.11
6000	899	2937	3.38	950	3202	3.68	999	3465	3.98	1045	3726	4.29	1090	3986	4.58
6500	923	3327	3.83	972	3606	4.15	1020	3883	4.47	1065	4159	4.78	1108	4434	5.10
7000	948	3753	4.32	996	4045	4.65	1042	4337	4.99	1086	4627	5.32	1128	4917	5.65
7500	975	4219	4.85	1021	4525	5.20	1066	4829	5.55	—	—	—	—	—	—
8000	1002	4727	5.44	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous watts

for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 45 — Fan Performance — 50HG016 — Vertical Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	423	522	0.60	521	715	0.82	605	906	1.04	679	1093	1.26	747	1278	1.47
4000	454	675	0.78	545	884	1.02	625	1093	1.26	697	1299	1.49	762	1502	1.73
4500	487	859	0.99	572	1082	1.24	648	1307	1.50	717	1529	1.76	780	1750	2.01
5000	522	1077	1.24	601	1311	1.51	673	1550	1.78	739	1789	2.06	800	2026	2.33
5500	559	1330	1.53	632	1573	1.81	700	1826	2.10	763	2080	2.39	822	2332	2.68
6000	598	1621	1.86	664	1873	2.15	729	2137	2.46	789	2405	2.77	846	2671	3.07
6500	637	1953	2.25	698	2212	2.54	759	2486	2.86	817	2766	3.18	871	3046	3.50
7000	677	2327	2.68	734	2593	2.98	791	2876	3.31	846	3167	3.64	898	3459	3.98
7500	718	2745	3.16	770	3018	3.47	824	3309	3.81	876	3609	4.15	926	3913	4.50
8000	759	3209	3.69	808	3489	4.01	858	3787	4.36	907	4095	4.71	956	4410	5.07
8500	801	3722	4.28	846	4007	4.61	893	4311	4.96	940	4628	5.32	986	4952	5.69

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	810	1461	1.68	868	1642	1.89	923	1821	2.09	975	1999	2.30	1024	2176	2.50
4000	823	1703	1.96	880	1902	2.19	934	2100	2.42	985	2296	2.64	1034	2490	2.86
4500	839	1969	2.26	894	2185	2.51	947	2400	2.76	997	2613	3.01	1045	2826	3.25
5000	857	2261	2.60	911	2494	2.87	962	2726	3.14	1011	2956	3.40	1058	3185	3.66
5500	877	2583	2.97	930	2832	3.26	979	3080	3.54	1027	3326	3.83	1073	3570	4.11
6000	899	2937	3.38	950	3202	3.68	999	3465	3.98	1045	3726	4.29	1090	3986	4.58
6500	923	3327	3.83	972	3606	4.15	1020	3883	4.47	1065	4159	4.78	1108	4434	5.10
7000	948	3753	4.32	996	4045	4.65	1042	4337	4.99	1086	4627	5.32	1128	4917	5.65
7500	975	4219	4.85	1021	4525	5.20	1066	4829	5.55	—	—	—	—	—	—
8000	1002	4727	5.44	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and 460-v units) or 2574 (for 575-v units). The maximum continuous

watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 46 — Fan Performance — 50HG020 — Vertical Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	423	522	0.60	521	715	0.82	605	906	1.04	679	1093	1.26	747	1278	1.47
4000	454	675	0.78	545	884	1.02	625	1093	1.26	697	1299	1.49	762	1502	1.73
4500	487	859	0.99	572	1082	1.24	648	1307	1.50	717	1529	1.76	780	1750	2.01
5000	522	1077	1.24	601	1311	1.51	673	1550	1.78	739	1789	2.06	800	2026	2.33
5500	559	1330	1.53	632	1573	1.81	700	1826	2.10	763	2080	2.39	822	2332	2.68
6000	598	1621	1.86	664	1873	2.15	729	2137	2.46	789	2405	2.77	846	2671	3.07
6500	637	1953	2.25	698	2212	2.54	759	2486	2.86	817	2766	3.18	871	3046	3.50
7000	677	2327	2.68	734	2593	2.98	791	2876	3.31	846	3167	3.64	898	3459	3.98
7500	718	2745	3.16	770	3018	3.47	824	3309	3.81	876	3609	4.15	926	3913	4.50
8000	759	3209	3.69	808	3489	4.01	858	3787	4.36	907	4095	4.71	956	4410	5.07
8500	801	3722	4.28	846	4007	4.61	893	4311	4.96	940	4628	5.32	986	4952	5.69

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	810	1461	1.68	868	1642	1.89	923	1821	2.09	975	1999	2.30	1024	2176	2.50
4000	823	1703	1.96	880	1902	2.19	934	2100	2.42	985	2296	2.64	1034	2490	2.86
4500	839	1969	2.26	894	2185	2.51	947	2400	2.76	997	2613	3.01	1045	2826	3.25
5000	857	2261	2.60	911	2494	2.87	962	2726	3.14	1011	2956	3.40	1058	3185	3.66
5500	877	2583	2.97	930	2832	3.26	979	3080	3.54	1027	3326	3.83	1073	3570	4.11
6000	899	2937	3.38	950	3202	3.68	999	3465	3.98	1045	3726	4.29	1090	3986	4.58
6500	923	3327	3.83	972	3606	4.15	1020	3883	4.47	1065	4159	4.78	1108	4434	5.10
7000	948	3753	4.32	996	4045	4.65	1042	4337	4.99	1086	4627	5.32	1128	4917	5.65
7500	975	4219	4.85	1021	4525	5.20	1066	4829	5.55	1109	5134	5.90	1150	5436	6.25
8000	1002	4727	5.44	1047	5045	5.80	1091	5362	6.17	1133	5680	6.53	1173	5995	6.90
8500	1031	5280	6.07	1075	5609	6.45	1117	5938	6.83	1158	6268	7.21	1197	6596	7.59

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 47 — Fan Performance — 50HG024 — Vertical Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	533	1106	1.27	611	1342	1.54	682	1582	1.82	748	1822	2.10	808	2059	2.37
5,500	571	1366	1.57	643	1613	1.86	711	1867	2.15	773	2121	2.44	832	2374	2.73
6,000	610	1666	1.92	676	1922	2.21	740	2188	2.52	800	2456	2.82	857	2724	3.13
6,500	650	2007	2.31	712	2271	2.61	772	2548	2.93	829	2829	3.25	883	3110	3.58
7,000	691	2391	2.75	748	2663	3.06	805	2949	3.39	859	3242	3.73	911	3536	4.07
7,500	732	2820	3.24	786	3100	3.57	839	3395	3.91	891	3698	4.25	941	4004	4.61
8,000	775	3297	3.79	824	3585	4.12	874	3887	4.47	924	4200	4.83	972	4516	5.19
8,500	817	3823	4.40	863	4118	4.74	911	4428	5.09	958	4749	5.46	1003	5075	5.84
9,000	860	4400	5.06	904	4702	5.41	948	5019	5.77	993	5347	6.15	1036	5683	6.54
9,500	903	5031	5.79	944	5339	6.14	986	5663	6.51	1028	5998	6.90	1070	6343	7.29
10,000	947	5715	6.57	985	6030	6.93	1025	6360	7.32	1065	6703	7.71	1105	7055	8.11

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	865	2294	2.64	918	2527	2.91	969	2760	3.17	1018	2990	3.44	1065	3219	3.70
5,500	886	2625	3.02	938	2875	3.31	988	3123	3.59	1035	3369	3.87	1081	3614	4.16
6,000	910	2990	3.44	960	3254	3.74	1008	3518	4.05	1054	3779	4.35	1099	4040	4.65
6,500	935	3391	3.90	984	3670	4.22	1030	3948	4.54	1075	4224	4.86	1118	4499	5.18
7,000	961	3830	4.40	1008	4123	4.74	1054	4415	5.08	1098	4706	5.41	1140	4996	5.75
7,500	989	4311	4.96	1035	4617	5.31	1079	4922	5.66	1122	5227	6.01	1163	5530	6.36
8,000	1018	4835	5.56	1062	5153	5.93	1105	5472	6.29	1147	5790	6.66	1187	6106	7.02
8,500	1048	5405	6.22	1091	5735	6.60	1133	6065	6.98	1173	6396	7.36	1212	6725	7.73
9,000	1079	6022	6.93	1121	6364	7.32	1161	6706	7.71	1201	7048	8.11	1239	7390	8.50
9,500	1112	6691	7.70	1152	7042	8.10	1191	7395	8.51	—	—	—	—	—	—
10,000	1145	7412	8.52	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 48 — Fan Performance — 50HG028 — Vertical Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	734	2,384	2.74	752	2,482	2.85	803	2,752	3.16	848	2,998	3.45	891	3,250	3.74
7,000	728	2,506	2.88	792	2,911	3.35	844	3,220	3.70	887	3,484	4.01	928	3,742	4.30
7,500	746	2,738	3.15	831	3,375	3.88	884	3,734	4.29	927	4,023	4.63	966	4,293	4.94
8,000	786	3,148	3.62	869	3,868	4.45	925	4,292	4.94	968	4,612	5.30	1006	4,901	5.64
8,500	827	3,611	4.15	905	4,384	5.04	964	4,891	5.63	1008	5,251	6.04	1046	5,564	6.40
9,000	870	4,125	4.74	940	4,921	5.66	1003	5,529	6.36	1049	5,939	6.83	1086	6,281	7.22
9,500	913	4,691	5.40	975	5,480	6.30	1042	6,202	7.13	1089	6,674	7.68	1127	7,053	8.11
10,000	957	5,312	6.11	1010	6,073	6.98	1079	6,906	7.94	1128	7,453	8.57	1167	7,876	9.06
10,500	1002	5,988	6.89	1047	6,715	7.72	1115	7,635	8.78	1167	8,275	9.52	1207	8,751	10.06
11,000	1047	6,719	7.73	1086	7,416	8.53	1150	8,388	9.65	1205	9,133	10.50	1247	9,674	11.13
11,500	1092	7,507	8.63	1126	8,180	9.41	1185	9,163	10.54	—	—	—	—	—	—
12,000	1137	8,356	9.61	1168	9,009	10.36	1220	9,975	11.47	—	—	—	—	—	—
12,500	1182	9,264	10.65	1210	9,903	11.39	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	934	3,521	4.05	978	3,822	4.40	1023	4,160	4.78	1071	4,540	5.22	1119	4,961	5.71
7,000	967	4,010	4.61	1007	4,297	4.94	1048	4,612	5.30	1090	4,960	5.70	1134	5,344	6.15
7,500	1003	4,565	5.25	1040	4,847	5.57	1078	5,148	5.92	1116	5,474	6.30	1155	5,830	6.71
8,000	1041	5,181	5.96	1076	5,465	6.29	1111	5,762	6.63	1146	6,076	6.99	1181	6,412	7.37
8,500	1081	5,859	6.74	1114	6,150	7.07	1147	6,448	7.42	1179	6,756	7.77	1212	7,081	8.14
9,000	1121	6,595	7.59	1153	6,899	7.93	1184	7,202	8.28	1215	7,512	8.64	1246	7,832	9.01
9,500	1161	7,390	8.50	1193	7,710	8.87	1223	8,025	9.23	1253	8,340	9.59	1282	8,660	9.96
10,000	1202	8,244	9.48	1233	8,584	9.87	1263	8,913	10.25	1291	9,237	10.62	1319	9,563	11.00
10,500	1242	9,154	10.53	1273	9,519	10.95	1303	9,866	11.35	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 49 — Fan Performance — 50HG014 — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	445	546	0.63	526	712	0.82	603	892	1.03	681	1102	1.27	761	1346	1.55
4000	484	718	0.83	559	896	1.03	627	1079	1.24	694	1280	1.47	763	1505	1.73
4500	524	923	1.06	596	1116	1.28	658	1308	1.50	717	1508	1.73	777	1724	1.98
5000	566	1166	1.34	634	1373	1.58	692	1576	1.81	747	1781	2.05	800	1996	2.30
5500	608	1450	1.67	672	1667	1.92	729	1884	2.17	780	2099	2.41	829	2318	2.67
6000	651	1777	2.04	712	2002	2.30	766	2232	2.57	815	2459	2.83	862	2686	3.09
6500	695	2152	2.47	753	2381	2.74	805	2623	3.02	852	2863	3.29	897	3100	3.57
7000	740	2576	2.96	794	2807	3.23	844	3059	3.52	890	3312	3.81	933	3561	4.10
7500	785	3051	3.51	836	3282	3.77	885	3544	4.08	929	3807	4.38	971	4069	4.68
8000	831	3581	4.12	878	3810	4.38	925	4077	4.69	969	4352	5.01	1009	4625	5.32
8500	878	4167	4.79	922	4394	5.05	966	4664	5.36	1008	4948	5.69	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
4000	833	1759	2.02	†	†	†	†	†	†	†	†	†	†	†	†
4500	838	1961	2.26	900	2223	2.56	962	2507	2.88	†	†	†	†	†	†
5000	854	2226	2.56	909	2473	2.84	964	2740	3.15	1020	3029	3.48	†	†	†
5500	878	2546	2.93	927	2787	3.21	976	3042	3.50	1026	3315	3.81	1077	3606	4.15
6000	907	2918	3.36	952	3158	3.63	996	3408	3.92	1041	3672	4.22	1087	3950	4.54
6500	939	3339	3.84	981	3583	4.12	1022	3834	4.41	1063	4094	4.71	1105	4364	5.02
7000	974	3809	4.38	1013	4059	4.67	1052	4314	4.96	1090	4575	5.26	1128	4843	5.57
7500	1010	4328	4.98	1047	4587	5.28	1084	4848	5.58	—	—	—	—	—	—
8000	1047	4896	5.63	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For standard motor with alternate drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

†Contact Carrier Applications Engineering for operation in this region.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and

460-v units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 50 — Fan Performance — 50HG016 — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	445	546	0.63	526	712	0.82	603	892	1.03	681	1102	1.27	761	1346	1.55
4000	484	718	0.83	559	896	1.03	627	1079	1.24	694	1280	1.47	763	1505	1.73
4500	524	923	1.06	596	1116	1.28	658	1308	1.50	717	1508	1.73	777	1724	1.98
5000	566	1166	1.34	634	1373	1.58	692	1576	1.81	747	1781	2.05	800	1996	2.30
5500	608	1450	1.67	672	1667	1.92	729	1884	2.17	780	2099	2.41	829	2318	2.67
6000	651	1777	2.04	712	2002	2.30	766	2232	2.57	815	2459	2.83	862	2686	3.09
6500	695	2152	2.47	753	2381	2.74	805	2623	3.02	852	2863	3.29	897	3100	3.57
7000	740	2576	2.96	794	2807	3.23	844	3059	3.52	890	3312	3.81	933	3561	4.10
7500	785	3051	3.51	836	3282	3.77	885	3544	4.08	929	3807	4.38	971	4069	4.68
8000	831	3581	4.12	878	3810	4.38	925	4077	4.69	969	4352	5.01	1009	4625	5.32
8500	878	4167	4.79	922	4394	5.05	966	4664	5.36	1008	4948	5.69	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
4000	833	1759	2.02	†	†	†	†	†	†	†	†	†	†	†	†
4500	838	1961	2.26	900	2223	2.56	962	2507	2.88	†	†	†	†	†	†
5000	854	2226	2.56	909	2473	2.84	964	2740	3.15	1020	3029	3.48	†	†	†
5500	878	2546	2.93	927	2787	3.21	976	3042	3.50	1026	3315	3.81	1077	3606	4.15
6000	907	2918	3.36	952	3158	3.63	996	3408	3.92	1041	3672	4.22	1087	3950	4.54
6500	939	3339	3.84	981	3583	4.12	1022	3834	4.41	1063	4094	4.71	1105	4364	5.02
7000	974	3809	4.38	1013	4059	4.67	1052	4314	4.96	1090	4575	5.26	1128	4843	5.57
7500	1010	4328	4.98	1047	4587	5.28	1084	4848	5.58	—	—	—	—	—	—
8000	1047	4896	5.63	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 618 to 789 rpm (208/230 and 460-v units) or 609 to 778 (575-v units). For standard motor with alternate drive, the drive range is 485 to 613 rpm (208/230 and 460-v units) or 472 to 619 (575-v units). For alternate motor with standard drive, the drive range is 778 to 1021 rpm. For alternate motor with alternate drive, the drive range is 1000 to 1227 rpm. All other rpms require a field-supplied drive.

†Contact Carrier Applications Engineering for operation in this region.

NOTES:

1. Maximum continuous Bhp for the standard motor is 4.25 (for 208/230 and 460-v units) or 3.45 (for 575-v units). Maximum continuous Bhp for the alternate motor is 5.75. The maximum continuous watts for the standard motor is 3171 (for 208/230 and

460-v units) or 2574 (for 575-v units). The maximum continuous watts for the alternate motor is 4290. Do not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 51 — Fan Performance — 50HG020 — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	445	546	0.63	526	712	0.82	603	892	1.03	681	1102	1.27	761	1346	1.55
4000	484	718	0.83	559	896	1.03	627	1079	1.24	694	1280	1.47	763	1505	1.73
4500	524	923	1.06	596	1116	1.28	658	1308	1.50	717	1508	1.73	777	1724	1.98
5000	566	1166	1.34	634	1373	1.58	692	1576	1.81	747	1781	2.05	800	1996	2.30
5500	608	1450	1.67	672	1667	1.92	729	1884	2.17	780	2099	2.41	829	2318	2.67
6000	651	1777	2.04	712	2002	2.30	766	2232	2.57	815	2459	2.83	862	2686	3.09
6500	695	2152	2.47	753	2381	2.74	805	2623	3.02	852	2863	3.29	897	3100	3.57
7000	740	2576	2.96	794	2807	3.23	844	3059	3.52	890	3312	3.81	933	3561	4.10
7500	785	3051	3.51	836	3282	3.77	885	3544	4.08	929	3807	4.38	971	4069	4.68
8000	831	3581	4.12	878	3810	4.38	925	4077	4.69	969	4352	5.01	1009	4625	5.32
8500	878	4167	4.79	922	4394	5.05	966	4664	5.36	1008	4948	5.69	1048	5233	6.02

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3500	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
4000	833	1759	2.02	†	†	†	†	†	†	†	†	†	†	†	†
4500	838	1961	2.26	900	2223	2.56	962	2507	2.88	†	†	†	†	†	†
5000	854	2226	2.56	909	2473	2.84	964	2740	3.15	1020	3029	3.48	†	†	†
5500	878	2546	2.93	927	2787	3.21	976	3042	3.50	1026	3315	3.81	1077	3606	4.15
6000	907	2918	3.36	952	3158	3.63	996	3408	3.92	1041	3672	4.22	1087	3950	4.54
6500	939	3339	3.84	981	3583	4.12	1022	3834	4.41	1063	4094	4.71	1105	4364	5.02
7000	974	3809	4.38	1013	4059	4.67	1052	4314	4.96	1090	4575	5.26	1128	4843	5.57
7500	1010	4328	4.98	1047	4587	5.28	1084	4848	5.58	1120	5112	5.88	1156	5382	6.19
8000	1047	4896	5.63	1083	5165	5.94	1118	5435	6.25	1153	5706	6.56	1187	5980	6.88
8500	1085	5515	6.34	1120	5795	6.66	1154	6074	6.99	1187	6353	7.31	1220	6634	7.63

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

†Contact Carrier Applications Engineering for operation in this region.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 52 — Fan Performance — 50HG024 — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	575	1193	1.37	642	1400	1.61	700	1603	1.84	754	1810	2.08	808	2028	2.33
5,500	619	1483	1.71	682	1702	1.96	737	1918	2.21	788	2134	2.45	837	2355	2.71
6,000	663	1817	2.09	723	2046	2.35	776	2276	2.62	825	2503	2.88	871	2731	3.14
6,500	708	2198	2.53	765	2435	2.80	816	2677	3.08	863	2916	3.35	906	3155	3.63
7,000	753	2629	3.02	807	2871	3.30	857	3125	3.59	902	3377	3.88	944	3626	4.17
7,500	800	3112	3.58	850	3357	3.86	898	3621	4.16	942	3885	4.47	982	4146	4.77
8,000	847	3650	4.20	894	3897	4.48	940	4169	4.80	982	4445	5.11	1022	4717	5.43
8,500	894	4244	4.88	939	4491	5.17	982	4770	5.49	1024	5056	5.82	1062	5340	6.14
9,000	941	4896	5.63	983	5145	5.92	1025	5428	6.24	1065	5723	6.58	1103	6018	6.92
9,500	989	5610	6.45	1029	5858	6.74	1069	6145	7.07	1108	6447	7.41	1144	6753	7.77
10,000	1037	6386	7.34	1075	6634	7.63	1113	6923	7.96	1150	7231	8.32	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
5,000	862	2260	2.60	917	2510	2.89	972	2781	3.20	1028	3073	3.53	1084	3384	3.89
5,500	886	2586	2.97	935	2829	3.25	985	3089	3.55	1035	3365	3.87	1086	3660	4.21
6,000	916	2965	3.41	960	3207	3.69	1005	3461	3.98	1050	3728	4.29	1096	4009	4.61
6,500	949	3395	3.90	990	3641	4.19	1032	3894	4.48	1073	4157	4.78	1114	4430	5.10
7,000	984	3875	4.46	1023	4127	4.75	1062	4383	5.04	1100	4647	5.34	1139	4918	5.66
7,500	1021	4406	5.07	1059	4666	5.37	1095	4928	5.67	1131	5195	5.98	1167	5468	6.29
8,000	1059	4988	5.74	1095	5258	6.05	1130	5528	6.36	1165	5800	6.67	1199	6077	6.99
8,500	1099	5623	6.47	1133	5903	6.79	1167	6182	7.11	1200	6463	7.43	1232	6745	7.76
9,000	1138	6312	7.26	1172	6603	7.59	1205	6893	7.93	1237	7182	8.26	1268	7472	8.59
9,500	1179	7057	8.12	1212	7359	8.46	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 658 to 808 rpm. For standard motor with alternate drive, the drive range is 794 to 974 rpm. For alternate motor with standard drive, the drive range is 949 to 1145 rpm. For alternate motor with alternate drive, the drive range is 1126 to 1328 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 5.75. Maximum continuous Bhp for the alternate motor is 8.63. The maximum continuous watts for the standard motor is 4290. The maximum continuous watts for the alternate motor is 6438. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 53 — Fan Performance — 50HG028 — Horizontal Discharge Units*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	759	2517	2.89	804	2753	3.17	844	2975	3.42	883	3202	3.68	922	3445	3.96
7,000	810	3020	3.47	853	3274	3.77	891	3509	4.04	928	3743	4.30	964	3986	4.58
7,500	862	3581	4.12	903	3856	4.43	939	4105	4.72	974	4348	5.00	1008	4596	5.29
8,000	913	4206	4.84	953	4500	5.18	988	4765	5.48	1021	5019	5.77	1053	5274	6.07
8,500	965	4894	5.63	1003	5209	5.99	1037	5491	6.32	1069	5758	6.62	1100	6022	6.93
9,000	1017	5651	6.50	1054	5988	6.89	1087	6285	7.23	1118	6567	7.55	1147	6841	7.87
9,500	1069	6477	7.45	1105	6834	7.86	1137	7150	8.22	1167	7446	8.56	1195	7733	8.89
10,000	1121	7376	8.48	1156	7755	8.92	1187	8089	9.30	1216	8400	9.66	1243	8699	10.01
10,500	1173	8350	9.60	1207	8751	10.06	1238	9103	10.47	1266	9430	10.85	1292	9744	11.21
11,000	1226	9401	10.81	1259	9823	11.30	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,500	962	3710	4.27	1003	4005	4.61	1045	4334	4.98	1090	4701	5.41	1135	5103	5.87
7,000	1000	4245	4.88	1037	4527	5.21	1075	4836	5.56	1115	5174	5.95	1155	5547	6.38
7,500	1041	4854	5.58	1075	5129	5.90	1110	5424	6.24	1145	5744	6.61	1182	6091	7.01
8,000	1085	5535	6.37	1116	5808	6.68	1148	6096	7.01	1180	6403	7.36	1214	6733	7.74
8,500	1129	6289	7.23	1159	6563	7.55	1189	6849	7.88	1219	7149	8.22	1249	7467	8.59
9,000	1175	7115	8.18	1204	7394	8.50	1232	7681	8.83	1260	7978	9.18	1288	8289	9.53
9,500	1222	8016	9.22	1249	8301	9.55	1276	8591	9.88	1302	8890	10.22	1329	9198	10.58
10,000	1270	8993	10.34	1296	9286	10.68	1321	9582	11.02	1346	9884	11.37	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*For standard motor with standard drive, the drive range is 799 to 965 rpm. For standard motor with alternate drive, the drive range is 939 to 1152 rpm. For alternate motor with standard drive, the drive range is 945 to 1187 rpm. For alternate motor with alternate drive, the drive range is 1152 to 1366 rpm. All other rpms require a field-supplied drive.

NOTES:

1. Maximum continuous Bhp for the standard motor is 8.63. Maximum continuous Bhp for the alternate motor is 11.50. The maximum continuous watts for the standard motor is 6438. The maximum continuous watts for the alternate motor is 8579. Do

not adjust motor rpm such that motor maximum Bhp and/or watts is exceeded at the maximum operating cfm.

2. Static pressure losses must be added to external static pressure before entering fan performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on filters, unit casing, and wet coil losses.
5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Tables 57 and 58 on page 67 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.

Table 54 — Power Exhaust Fan Performance

AIRFLOW (Cfm)	LOW SPEED						MEDIUM SPEED						HIGH SPEED					
	208 V			230,460,575 V			208 V			230,460,575 V			208 V			230,460,575 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
3250	0.32	1.41	1580	0.70	1.49	1670	—	—	—	—	—	—	—	—	—	—	—	—
3350	0.23	1.44	1610	0.63	1.52	1700	0.60	1.51	1690	0.82	1.62	1810	—	—	—	—	—	—
3450	0.17	1.46	1635	0.59	1.55	1730	0.55	1.54	1720	0.78	1.64	1840	—	—	—	—	—	—
3550	0.13	1.47	1645	0.56	1.56	1745	0.49	1.56	1750	0.73	1.67	1870	—	—	—	—	—	—
3650	0.09	1.49	1665	0.53	1.58	1765	0.43	1.59	1780	0.68	1.70	1900	—	—	—	—	—	—
3750	—	—	—	0.51	1.60	1790	0.39	1.62	1815	0.64	1.72	1930	—	—	—	—	—	—
3850	—	—	—	0.48	1.62	1810	0.33	1.64	1835	0.59	1.74	1950	0.60	1.85	2070	0.73	1.99	2230
3950	—	—	—	0.45	1.64	1835	0.27	1.66	1860	0.54	1.76	1975	0.56	1.87	2095	0.69	2.01	2255
4050	—	—	—	0.40	1.67	1865	0.22	1.68	1885	0.49	1.79	2000	0.51	1.89	2120	0.65	2.04	2280
4250	—	—	—	—	—	—	0.17	1.74	1945	0.40	1.84	2060	0.41	1.92	2145	0.56	2.06	2310
4450	—	—	—	—	—	—	0.00	1.79	2005	0.30	1.89	2115	0.31	1.97	2205	0.47	2.12	2370
4650	—	—	—	—	—	—	—	—	—	0.22	1.94	2170	0.20	2.04	2280	0.37	2.19	2450
4850	—	—	—	—	—	—	—	—	—	0.16	1.98	2215	0.11	2.09	2335	0.30	2.24	2505
5050	—	—	—	—	—	—	—	—	—	0.12	2.02	2260	0.04	2.13	2385	0.23	2.28	2555
5250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	2.33	2610
5450	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	2.38	2665
5650	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	2.40	2690
5850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	2.42	2710

ESP — External Static Pressure

Table 55 — Operation Air Quantity Limits

48/50HG	COOLING		GAS HEAT	HEATING (Nat. Gas, Vertical) MINIMUM CFM	HEATING (Natural Gas, Horizontal) MINIMUM CFM	HEATING (Propane, Vertical) MINIMUM CFM	HEATING (Propane, Horizontal) MINIMUM CFM	ELECTRIC HEAT	ELECTRIC HEAT (Vertical) MINIMUM CFM	ELECTRIC HEAT (Horizontal) MINIMUM CFM
	Minimum CFM	Maximum CFM								
014	3,750	6,250	High Heat (6 Cell)	4,218	4,218	3,964	3,678	High Heat (50 kW)	3,750	4,800
			Medium Heat (N/A)	N/A	N/A	N/A	N/A	Medium Heat (25 kW)	3,750	3,750
			Low Heat (5 Cell)	4,086	4,086	4,218	3,796	Low Heat (15 kW)	3,750	3,750
016	4,500	7,500	High Heat (8 Cell)	5,522	5,522	5,522	4,920	High Heat (75 kW)	4,500	5,400
			Medium Heat (8 Cell)	4,977	4,977	4,480	4,480	Medium Heat (50 kW)	3,750	4,800
			Low Heat (5 Cell)	4,218	4,218	4,218	3,796	Low Heat (25 kW)	3,750	3,750
020	5,400	9,000	High Heat (8 Cell)	5,522	5,522	5,522	4,920	High Heat (75 kW)	4,500	5,400
			Medium Heat (8 Cell)	4,977	4,777	4,480	4,480	Medium Heat (50 kW)	3,750	4,800
			Low Heat (5 Cell)	4,218	4,218	4,218	3,796	Low Heat (25 kW)	3,750	3,750
024	5,500	10,000	High Heat (8 Cell)	5,522	5,522	5,522	4,920	High Heat (75 kW)	4,500	5,400
			Medium Heat (8 Cell)	4,977	4,977	4,480	4,480	Medium Heat (50 kW)	3,750	4,800
			Low Heat (5 Cell)	4,218	4,218	4,218	3,796	Low Heat (25 kW)	3,750	3,750
028	6,000	11,500	High Heat (8 Cell)	5,522	5,470*	5,522	4,920*	High Heat (75 kW)	4,500	5,400
			Medium Heat (8 Cell)	4,977	4,977	4,480	4,480*	Medium Heat (50 kW)	3,750	4,800
			Low Heat (5 Cell)	4,218	4,218	4,218	3,796	Low Heat (25 kW)	3,750	3,750

*7,000 cfm recommended for operation above 1.0 in. wg external static pressure.

Table 56 — Evaporator Fan Motor Specifications

UNIT 48/50HG	OPTION	MOTOR P/N	NOMINAL HP	VOLTAGE	MAX WATTS	EFFICIENCY %	MAX BHP	MAX BkW	MAX AMPS	FACTORY SPEED SETTING	
										Std Drive	Alt Drive
014	STD MOTOR	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6	549	704
		HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6	549	704
		HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8	549	704
		HD58DL575	3.0	575	3149	81.7	3.45	2.57	3.9	546	694
	ALT MOTOR	HD60L650	5.0	208	4900	87.5	5.75	4.29	16.7	900	1114
		HD60L650	5.0	230	4900	87.5	5.75	4.29	15.2	900	1114
		HD60L650	5.0	460	4900	87.5	5.75	4.29	7.6	900	1114
		HD60L575	5.0	575	4900	87.5	5.75	4.29	6.1	900	1114
016	STD MOTOR	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6	704	549
		HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6	704	549
		HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8	704	549
		HD58DL575	3.0	575	3149	81.7	3.45	2.57	3.9	694	546
	ALT MOTOR	HD60L650	5.0	208	4900	87.5	5.75	4.29	16.7	900	1114
		HD60L650	5.0	230	4900	87.5	5.75	4.29	15.2	900	1114
		HD60L650	5.0	460	4900	87.5	5.75	4.29	7.6	900	1114
		HD60L575	5.0	575	4900	87.5	5.75	4.29	6.1	900	1114
020	STD MOTOR	HD60L650	5.0	208	4900	87.5	5.75	4.29	16.7	733	884
		HD60L650	5.0	230	4900	87.5	5.75	4.29	15.2	733	884
		HD60L650	5.0	460	4900	87.5	5.75	4.29	7.6	733	884
		HD60L575	5.0	575	4900	87.5	5.75	4.29	6.1	733	884
	ALT MOTOR	HD62L650	7.5	208	7267	88.5	8.63	6.43	24.2	1047	1227
		HD62L650	7.5	230	7267	88.5	8.63	6.43	22.0	1047	1227
		HD62L650	7.5	460	7267	88.5	8.63	6.43	11.0	1047	1227
		HD62L575	7.5	575	7267	88.5	8.63	6.43	9.0	1047	1227
024	STD MOTOR	HD60L650	5.0	208	4900	87.5	5.75	4.29	16.7	733	884
		HD60L650	5.0	230	4900	87.5	5.75	4.29	15.2	733	884
		HD60L650	5.0	460	4900	87.5	5.75	4.29	7.6	733	884
		HD60L575	5.0	575	4900	87.5	5.75	4.29	6.1	733	884
	ALT MOTOR	HD62L650	7.5	208	7267	88.5	8.63	6.43	24.2	1047	1227
		HD62L650	7.5	230	7267	88.5	8.63	6.43	22.0	1047	1227
		HD62L650	7.5	460	7267	88.5	8.63	6.43	11.0	1047	1227
		HD62L575	7.5	575	7267	88.5	8.63	6.43	9.0	1047	1227
028	STD MOTOR	HD62L650	7.5	208	7267	88.5	8.63	6.43	24.2	882	1046
		HD62L650	7.5	230	7267	88.5	8.63	6.43	22.0	882	1046
		HD62L650	7.5	460	7267	88.5	8.63	6.43	11.0	882	1046
		HD62L575	7.5	575	7267	88.5	8.63	6.43	9.0	882	1046
	ALT MOTOR	HD64L650	10.0	208	9582	89.5	11.50	8.58	30.8	1066	1259
		HD64L650	10.0	230	9582	89.5	11.50	8.58	28.0	1066	1259
		HD64L650	10.0	460	9582	89.5	11.50	8.58	14.0	1066	1259
		HD64L575	10.0	575	9582	89.5	11.50	8.58	11.0	1066	1259

LEGEND

BkW — Brake kilowatts

Table 57 — Accessory/FIOP Electrical Heater Static Pressure (in. wg) — 50HG014-028 Units

UNIT 50HG	ELECTRIC HEATERS							
	Unit Voltages	Cfm	Nominal Heater Size (kW)	Pressure Drop (in. wg)	Nominal Heater Size (kW)	Pressure Drop (in. wg)	Nominal Heater Size (kW)	Pressure Drop (in. wg)
014	208/240-3-60	4,000	15	0.01	25	0.01	50	0.01
		5,000		0.01		0.01		0.02
		6,000		0.02		0.02		0.04
		6,250		0.02		0.02		0.04
	480-3-60	4,000		0.01		0.01		0.01
		5,000		0.02		0.01		0.02
		6,000		0.02		0.02		0.04
		6,250		0.02		0.02		0.04
	575-3-60	4,000		0.01		0.01		0.01
		5,000		0.01		0.01		0.02
		6,000		0.02		0.02		0.04
		6,250		0.02		0.02		0.04
016,020, 024,028	208/240-3-60	4,800	25	0.01	50	0.02	75	0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27
	480-3-60	4,800		0.01		0.02		0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27
	575-3-60	4,800		0.01		0.02		0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27

**Table 58 — Accessory/FIOP Static Pressure
(in. wg)* — 48/50HG014-028**

COMPONENT	CFM								
	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000
Economizer	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
4-in. Filters†	0.00	0.02	0.03	0.05	0.06	0.08	0.09	0.11	0.12

COMPONENT	CFM							
	8,500	9,000	9,500	10,000	10,500	11,000	11,500	12,000
Economizer	0.11	0.12	0.13	0.15	0.16	0.17	0.19	0.20
4-in. Filters†	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24

LEGEND

FIOP — Factory-Installed Option

*The static pressure must be added to the external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm and watts.

†Four-inch filters are field-supplied.

Table 59 — Fan Rpm at Motor Pulley Settings*

48/50HG	MOTOR AND DRIVE	TURNS OPEN												
		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
014 (except 575 v)	Std. Motor/Std. Drive	613	602	592	581	570	560	549	538	528	517	506	496	485
	Std. Motor/Alt. Drive	789	775	761	746	732	718	704	689	675	661	647	632	618
	Alt. Motor/Std. Drive	1021	1001	981	960	940	920	900	879	859	839	819	798	778
	Alt. Motor/Alt. Drive	1227	1208	1189	1170	1151	1132	1114	1095	1076	1057	1038	1019	1000
014 (575 v)	Std. Motor/Std. Drive	619	607	595	582	570	558	546	533	521	509	497	484	472
	Std. Motor/Alt. Drive	778	764	750	736	722	708	694	679	665	651	637	623	609
	Alt. Motor/Std. Drive	1021	1001	981	960	940	920	900	879	859	839	819	798	778
	Alt. Motor/Alt. Drive	1227	1208	1189	1170	1151	1132	1114	1095	1076	1057	1038	1019	1000
016 (except 575 v)	Std. Motor/Std. Drive	789	775	761	746	732	718	704	689	675	661	647	632	618
	Std. Motor/Alt. Drive	613	602	592	581	570	560	549	538	528	517	506	496	485
	Alt. Motor/Std. Drive	1021	1001	981	960	940	920	900	879	859	839	819	798	778
	Alt. Motor/Alt. Drive	1227	1208	1189	1170	1151	1132	1114	1095	1076	1057	1038	1019	1000
016 (575 v)	Std. Motor/Std. Drive	778	764	750	736	722	708	694	679	665	651	637	623	609
	Std. Motor/Alt. Drive	619	607	595	582	570	558	546	533	521	509	497	484	472
	Alt. Motor/Std. Drive	1021	1001	981	960	940	920	900	879	859	839	819	798	778
	Alt. Motor/Alt. Drive	1227	1208	1189	1170	1151	1132	1114	1095	1076	1057	1038	1019	1000
020, 024	Std. Motor/Std. Drive	808	796	783	771	758	746	733	721	708	696	683	671	658
	Std. Motor/Alt. Drive	974	959	944	929	914	899	884	869	854	839	824	809	794
	Alt. Motor/Std. Drive	1145	1129	1112	1096	1080	1063	1047	1031	1014	998	982	965	949
	Alt. Motor/Alt. Drive	1328	1311	1294	1278	1261	1244	1227	1210	1193	1177	1160	1143	1126
028	Std. Motor/Std. Drive	965	951	937	924	910	896	882	868	854	841	827	813	799
	Std. Motor/Alt. Drive	1152	1134	1117	1099	1081	1063	1046	1028	1010	992	975	957	939
	Alt. Motor/Std. Drive	1187	1167	1147	1127	1106	1086	1066	1046	1026	1006	985	965	945
	Alt. Motor/Alt. Drive	1366	1348	1330	1313	1295	1277	1259	1241	1223	1206	1188	1170	1152

*Approximate rpm shown.

QUICK START

The following information will provide a quick guide to setting up and configuring the 48/50HG series units with ComfortLink™ controls. Unit controls are pre-configured at the factory for factory-installed options. Field-installed accessories will require configuration at start-up. Additionally, specific job requirements may require changes to default configuration values. See the CCN and Display parameter tables and other sections of these instructions for more details.

Thermostat Control — Wire accessory thermostat to the corresponding R, Y1, Y2, W1, W2, and G terminals on the field connection terminal board located at the unit control box.

The Unit Control Type configuration, U.CTL, default value is for Thermostat (2) so there is no need to configure this item.

Space Temperature Sensor Control — Direct Wired (T-55 or T-56) — Wire accessory space temperature sensor(s) to the T-55 terminals on the field connection terminal board located at the unit control box. Refer to Field-Installed Accessories section.

The Unit Control Type configuration, U.CTL, must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

Space Temperature Sensor Control — CCN (T-58) — Install the T-58 communicating thermostat. Connect the CCN communication bus from the T-58 to the CCN terminals on the field connection terminal board located at the unit control box. Configure the 48/50HG unit CCN communication element number (see below). Configure the T-58 thermostat CCN communication element number and also configure the T-58 with the 48/50HG unit element number.

The Unit Control Type configuration, U.CTL, must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

Space Temperature Control — CCN Linkage — The CCN communication must be properly configured for the 48/50HG unit and all devices. Linkage configuration is automatically done by the supervisory CCN Linkage device.

The Unit Control Type configuration, U.CTL, must be set to Space Sensor (3). The jumper wire in the installer's packet must be connected between R and W1 for heating mode to operate.

CCN Communication — Configure CCN.A to desired element number. (Default is 1.) Configure CCN.B to desired bus number. (Default is 0.) Configure BAUD to desired code number for baud rate. (Default is 3 = 9600 baud.)

Accessories — See the Field-Installed Accessories section, control connection tables, and CCN or Display parameter tables for required connections and configurations.

Service Test — The Service Test function can be used to verify proper operation of compressors, heating stages, indoor fan, outdoor fans, power exhaust fans, economizer, and alarm relay. Use of Service Test is recommended at initial system start-up and during troubleshooting.

Control Configuration Checklist — Refer to Control Set Up checklist for recording site specific unit control configurations.

OPERATION

Unit Control Type (U.CTL) — The control method is determined by Unit Control Type, which can be found in UNIT, a submode of Configuration. There are three available options that can be set from the Scrolling Marquee.

1. Auto (U.CTL = 1) — This mode selects the active mode by evaluating the devices connected to the unit. If a valid space temperature probe is connected to the unit, the unit will operate in Space Sensor mode. If not, the unit will operate in Thermostat mode.
2. Thermostat (U.CTL = 2) — The unit determines cooling and heating demand by the state of G, Y1, Y2, W1 and W2.
3. Space Sensor (U.CTL = 3) — The unit determines cooling or heating demand based on the space temperature and the appropriate set point.

The available set points are Occupied Cool Set Point (OCSP), Unoccupied Cool Set Point (UCSP), Occupied Heat Set Point (OHSP), and Unoccupied Heat Set Point (UHSP). The occupied or unoccupied heating set point should always be a minimum of 5° F below the corresponding cooling set point. This ensures that the unit does not switch from cooling to heating unnecessarily. The cooling and heating set point deadband can be changed (HC.SG).

Occupancy Determination — Many factors determine whether the unit considers the building occupied or unoccupied. If the unit is operating with a space temperature probe (T-55, T-56 or T-58), occupancy affects the unit set points and the operation of the economizer. If the unit is operating under thermostat control, occupancy only affects the operation of the economizer. The factors affecting occupancy are listed below from highest to lowest priority.

1. The CCN point OCCUPIED is forced via an external device such as a ComfortID™ controller: When OCCUPIED is forced to YES, the unit is considered occupied. When OCCUPIED is forced to NO, the unit is considered unoccupied. If OCCUPIED is not being forced, proceed to the level 2 priority.
2. Remote Occupancy Switch is configured as Normally Open or Normally Closed — This switch should be configured to either Normally Open or Normally Closed when the user would like to control the occupancy with an external switch. This switch is field-supplied (24-V, SPST). There are three possible configurations for the remote occupancy switch: No Switch (0), Normally Open (1) or Normally Closed (2). This configuration is accessible on the display at Configuration/Unit/RM.SW. If the switch is configured to No Switch (0), the switch input value will be ignored and software will proceed to the level 3 priority. For each type of switch, the appropriate configuration and states are listed in the table below.

NOTE: To perform remote occupancy, an Economizer Control Board must be installed in the unit.

TYPE OF SWITCH	SWITCH CONFIGURATION	STATE OF SWITCH AND STATE OF OCCUPANCY
Occupied when closed or Unoccupied when open	Normal Open (1)	Open and Unoccupied
		Closed and Occupied
Occupied when open or Unoccupied when closed	Normal Close (2)	Open and Occupied
		Closed and Unoccupied

3. The following occupancy options are determined by the state of Occupancy Schedule Number (SCH.N) and the Global Schedule Broadcast (B.GS). The Schedule Number is a submode of Time Clock on the Scrolling Marquee and Global Schedule Broadcast can be found on the Scrolling Marquee under Configuration/CCN.
 - a. SCH.N = 0: The unit is always considered occupied and the programmed schedule is ignored. This is the factory default.
 - b. SCH.N = 1-64: Follow the local programmed schedule. Schedules 1 to 64 are local within the controller. The 48/50HG unit can only store one local schedule and therefore changing this number only changes the title of the schedule table.
 - c. SCH.N = 65-99: Follow the global programmed schedule. If the 48/50HG unit is configured as a Global Schedule broadcaster (B.GS = YES), the unit will follow the unit's programmed schedule and broadcast the schedule so that other devices programmed to follow this schedule number can receive the schedule. If the 48/50HG unit is not programmed as a Global Schedule broadcaster (B.GS = NO), the unit will receive its information from the unit programmed to broadcast this schedule number.

While using a programmed schedule, occupancy can be temporarily switch from unoccupied to occupied by pressing the override button for approximately 3 seconds on a T-55, T-56, or T-58 device. Override will only occur if OVR.E is set to YES. The length of the override period is determined by the setting of

OTL. Both configurations are under the Time Clock mode on the Scrolling Marquee.

Indoor Fan (DR0 Units)

48HG UNITS — The indoor fan is controlled by three independent relays on a 48HG unit. The MBB fan relay is located on the MBB and signals the IGC to turn on the indoor fan. The IGC fan relay is located on the IGC and can operate independently of the MBB relay. When the IGC receives a request from the MBB relay, the IGC will turn on its relay. The IGC will also turn on its relay when it determines that the indoor fan should be on for gas heating. The IGC fan relay supplies 24 volts to the final relay known as indoor fan power relay (IDFP), located on the MBB. This final relay supplies 24V to the indoor fan contactor and to the indoor fan feedback input. Unless there is a problem, this relay will be closed. When the unit needs to shut down immediately because of a smoke problem, this relay will open. This allows the Centurion unit to turn off the indoor fan immediately even when the IGC is controlling the indoor fan. The fan feedback input allows the MBB to determine when the IGC has turned on the indoor fan. For indoor fan operation, see Indoor-Fan Control section below.

50HG UNITS — Because a 50HG unit does not have an IGC, the indoor fan is controlled by the indoor fan relay (IDF) and the indoor fan power (IDFP) relay on the MBB. The IGC fan relay is replaced by a jumper wire on the 50HG unit. The indoor fan will operate whenever the IDF and the IDFP relay are closed. For indoor fan operation, see the Indoor-Fan Control section below. Unless there is a problem, the IDFP relay will be closed. When the unit needs to shut down immediately because of a smoke problem, this relay will open.

INDOOR-FAN CONTROL (48HG AND 50HG UNITS) — In Space Temperature mode, the IDF relay will be on in the following situations. If the unit is in Occupied mode and the indoor fan is configured to always run while occupied (OC.FN = YES), the indoor fan will be ON. If OC.FN equals NO or the unit is unoccupied, the indoor fan will operate only when heating or cooling is necessary.

In Thermostat mode, the IDF relay will be on in the following situations. If G is On, then the IDF will be On. If the unit is in the Cool mode, the IDF will be on. If the unit is in the Heat mode for a 50HG unit, the IDF will be On. The unit will not turn on the IDF on a 48HG unit while in Heat mode (unless G is On) because the IGC is capable of controlling the indoor fan in this situation.

Indoor Fan (DR1 Units) — The indoor fan is controlled by the indoor fan relay output (IDF) on the MBB control, which then operates the indoor fan contactor. The indoor fan may operate during cooling with compressors mode, free cooling with outdoor air mode, heating mode, or for ventilation with outdoor air mode.

The indoor fan operation can be affected by configurations for thermostat control type (T.CTL), the occupancy fan configuration (OC.FN), the indoor air quality sensor fan configuration (IA.FN), the indoor air quality switch fan configuration (II.FN), and the fan status switch configuration (FN.SW). For 48HG gas heating units, the IGC control fan output is also monitored by the MBB control. This can result in additional modification of fan delays or other operation due to safety functions of the IGC control. See the Indoor Air Quality Analog Input and Switch Input sections if using IAQ accessory sensors.

THERMOSTAT MODE — In thermostat mode, the IDF relay will be on in the following situations:

- If fan request G in ON, the IDF will be ON.
- If cooling request Y1 or Y2 is ON, the IDF will be ON.
- If heating request W1 or W2 is ON, the IDF will be ON.

SPACE TEMPERATURE MODE — In Space Temperature mode, the IDF relay will be on in the following situations. If the unit is in Occupied mode and the indoor fan is configured to always run while occupied (OC.FN = YES), the indoor fan will be ON. If OC.FN equals NO or the unit is unoccupied, the indoor fan will operate only when heating or cooling is necessary.

Outdoor Fans — The operation of the outdoor fans depends on the on/off status and discharge pressure, measured by the condensing temperature thermistors, of each circuit. Depending upon these values, the “fan level” for each circuit will be either 0, 1, or 2 as defined by Table 60. Fan level will increment when the discharge pressure is greater than the “On” level and decrement when the discharge pressure is less than the “Off” level. For example, if the discharge pressure starts at 90 psig for Circuit A, the fan level for Circuit A will be 0. When the pressure rises above 150 psig, the fan level will change from 0 to 1. Later, if the pressure drops below 0 psig, the fan level will return to 0. However, since the pressure cannot drop below 0 once the circuit is level 1, it will remain at least level 1 until the corresponding compressor is turned off.

If a circuit is operating as a reheat circuit, the effective LEV2ON value will be increased by the configuration “Lev 2 ON Reheat Offset” (L2.UP) which is accessible via the Scrolling Marquee at Configurations/REHT/L2.UP. In addition, if a circuit is operating as a reheat circuit, the effective LEV2OFF value will be recalculated once per reheat/compressor cycle. The new effective LEV2OFF value equals the effective LEV2ON value minus the configuration “Lev 2 OFF Reheat Delta” (Configurations/REHT/L2.DN). Therefore, the effective LEV2OFF value is equal to LEV2ON + L2.UP – L2.DN. This adjustment will only take place after the reheat valve has been open “Lev 2 Reheat Eval Time” seconds (Configurations/REHT/L2.TM).

Depending upon the fan level of each circuit, the unit will control the three outdoor-fan contactors as specified in Table 61. If any circuit requires an outdoor-fan contactor to be ON, then it will be ON even if another circuit does not require it to be ON. As shown in Fig. 3A or 3B, OFC1 controls OFM1; OFC2 controls OFM2 (028 only), OFM3, OFM5 (028 only) and OFM6; and OFC3 controls OFM4. For example, if the fan levels for Circuits A and B are 0 and the fan level for Circuit C is 1, OFC1 and OFC3 will be energized.

Economizer — If an economizer is installed, then Economizer Equipped configuration should be set to YES (EC.EQ). If the indoor fan is off or the building is unoccupied, the economizer position is zero. If in Occupied mode and the unit is heating or cooling and the economizer cannot provide free cooling, the economizer position is the Economizer Min Position (MIN.P) or the position specified by the IAQ algorithm. If in Unoccupied mode, the position is 0% open.

In cooling, the economizer will be allowed to help with cooling if the outdoor air temperature (OAT) is less than the economizer high temperature lockout (ECL.H). If an enthalpy sensor is installed, the outdoor temperature must be below the economizer high temperature lockout temperature and enthalpy must be low. If the outdoor temperature is less than economizer low temperature lockout (ECL.L), the economizer will not provide free cooling. In addition, the economizer cannot provide cooling if the unit has a reheat demand.

If the unit is in cooling, operating under thermostat control, Y1 = ON, and the economizer is available for cooling, the economizer will control the supply-air temperature to the low cool set point (LCSP). When Y2 = ON, the economizer will control the supply air temperature to high cool set point (HCSP).

If the unit is in cooling, operating under space temperature control, the economizer is available for cooling, and no compressors are operating, the economizer will control the SAT to

either LCSP or HCSP (see Table 62). If a compressor is ON, the economizer will try to position itself at 100%.

If at any time there is a low suction pressure problem while the economizer is cooling, the maximum allowable economizer position will be reduced. The maximum values are 50, 25 and 0% for circuits A, B and C respectively. The maximum value will remain in effect until the compressor “in trouble” turns off. The effective maximum economizer position must always be higher than the current minimum position.

Table 60 — Outdoor Fan Level Transitions

FAN LEVEL	CIRCUIT (PRESSURE) (psig)		
	A	B	C
Lev1Off	0	0	0
Lev1On	150	150	150
Lev2Off	100	100	100
Lev2On	200	200	200

Table 61 — Fan Level Control of Outdoor-Fan Contactors (1,2,3)

FAN LEVEL	CIRCUIT		
	A	B	C
0	—	—	—
1	1	3	1, 3
2	1, 2	2, 3	1, 2, 3

Table 62 — LCSP and HCSP Transitions for Space Temperature Mode

CURRENT SAT SET POINT	COOL DEMAND (ΔF)	NEXT SAT SET POINT
LCSP	>0.5	HCSP
HCSP	<0	LCSP
LCSP	<−0.5	Exit Cooling

LEGEND

SAT — Supply-Air Temperature

Economizer Actuator Communications — The user can select either digital or analog communications for the economizer actuator via a configuration that can be changed using the Scrolling Marquee. If digital communications is selected, the ECB 4 to 20 mA output along with a 500-Ω resistor provides a 2 to 10-v signal that represents either the economizer actuator’s actual or commanded position. When the analog communications is selected, the actuator provides a 2 to 10-v signal representing economizer position. In all cases, these 2 to 10-v signals are accessible from terminal strip TB5.

The configuration Economizer Control Type determines the communication method, either digital or analog, used to communicate between the ECB and the economizer actuator. Economizer Control Type is accessible via the Scrolling Marquee at Configurations/ECON/E.CTL. The power to the unit must be cycled after E.CTL is changed.

E.CTL = 1 (Digital/Position) — When E.CTL is set to 1, the ECB will communicate with the economizer actuator using the digital protocol. The ECB 4 to 20 mA output will represent the actuator’s actual position. Because the new wiring has a built-in 500-ohm resistor, the 4 to 20 mA signal is converted to a 2 to 10-v signal that is accessible via TB5-8 and TB5-10 for DR0 units and TB2-8 and TB2-9 for DR1 units. However, before this signal can be read, the violet wire that connects the actuator to TB5-8 must be removed for DR0 units and TB2-J10-7 for DR1 units.

E.CTL = 2 (Digital/Command) — When E.CTL is set to 2, the ECB will communicate with the economizer actuator using the digital protocol. The ECB 4 to 20 mA output will represent the actuator’s commanded position. Because the new wiring has a built-in 500-ohm resistor, the 4 to 20 mA

signal is converted to a 2 to 10-v signal that is accessible via TB5-8 and TB5-10 for DR0 units and TB2-8 and TB2-9 for DR1 units. However, before this signal can be read, the violet wire that connects the actuator to TB5-8 must be removed for DR0 units and TB2-J10-7 for DR1 units.

E.CTL = 3 (Analog Control) — When E.CTL is set to 3, the ECB will communicate with the economizer actuator using the 4 to 20 mA analog signal along with the 500-ohm resistor producing a 2 to 10-v signal for the actuator. While in this mode, the actuator's built-in 2 to 10-v feedback signal is accessible via TB5-9 and TB5-10 for DR0 units and TB2-9 and TB2-10 for DR1 units.

Indoor Air Quality (IAQ) — Analog Sensor —

Indoor air quality (IAQ) is measured using a CO₂ sensor whose measurements are displayed in parts per million (ppm). The IAQ sensor can be field or factory installed in the return duct. If IAQ must be measured directly in the space instead of the unit return duct, a wall-mounted accessory can be field installed. Four different IAQ algorithms are available as configured by IA.CF (IAQ Input Configuration). All IAQ configurations are accessible via the Scrolling Marquee at Configurations/IAQ.

IAQ ANALOG SENSOR INPUT CONFIGURATION

IA.CF = 0 (No IAQ) — IA.CF = 0 signifies that there is no IAQ sensor installed. The damper will operate at the MIN.P position when the space is occupied and the indoor fan is on.

IA.CF = 1 (DCV) — When IA.CF = 1, the IAQ algorithm is set for Demand Control Ventilation (DCV). During DCV, the damper modulates between two user configurations depending upon the relationship between the IAQ and the Outdoor Air Quality (OAQ). The lower of these two positions is referred to as the Minimum IAQ Damper Position (AQ.MP) while the higher is referred to as Economizer Minimum Position (MIN.P). The AQ.MP should be set to an economizer position that brings in enough fresh air to remove contaminants and CO₂ generated by sources other than people. The MIN.P

should be set to an economizer position that brings in enough fresh air to remove contaminants and CO₂ generated by all sources including people. The MIN.P value is the design value for maximum occupancy.

The *ComfortLink*™ control will begin to open the damper from the AQ.MP position when the IAQ level begins to exceed the Outdoor Air Quality (OAQ) level by a configurable amount. This amount is referred to as AQ Differential Low (AQD.L). When the differential between IAQ and OAQ reaches AQ Differential High (AQD.H), the economizer position will be MIN.P. When the IAQ/OAQ differential is between AQD.L and AQD.H, the control will modulate the damper between AQ.MP and MIN.P in a linear manner as shown in Fig. 16. The damper position will never exceed the bounds specified by AQ.MP and MIN.P during IAQ control.

IA.CF = 2 (Override IAQ) — When IA.CF = 2, the IAQ algorithm maintains the damper at MIN.P until the override condition triggers. The override triggers when the IAQ/OAQ differential is greater than AQD.H. The override position is OVR.P (Economizer Override Position). The economizer position will return to MIN.P when the IAQ/OAQ differential is less than AQD.L.

The Override algorithm will operate whenever the building is occupied and the indoor fan is operating or whenever the IAQ algorithm has caused the indoor fan to operate. The configuration IA.FN determines whether or not the IAQ algorithm can turn on the indoor fan.

If the indoor fan is not operating, the economizer position will be zero. If the override is not active and the building is unoccupied, the economizer position will be zero. The damper position may exceed MIN.P or OVR.P to provide economizer cooling.

IA.CF = 3 (Control Minimum Position) — When IA.CF = 3, an external 4 to 20 mA source is used to set the minimum position. The 4 mA signal corresponds to 0% and the 20 mA signal corresponds to 100%. In this mode, configurations such as MIN.P and AQ.MP are not used.

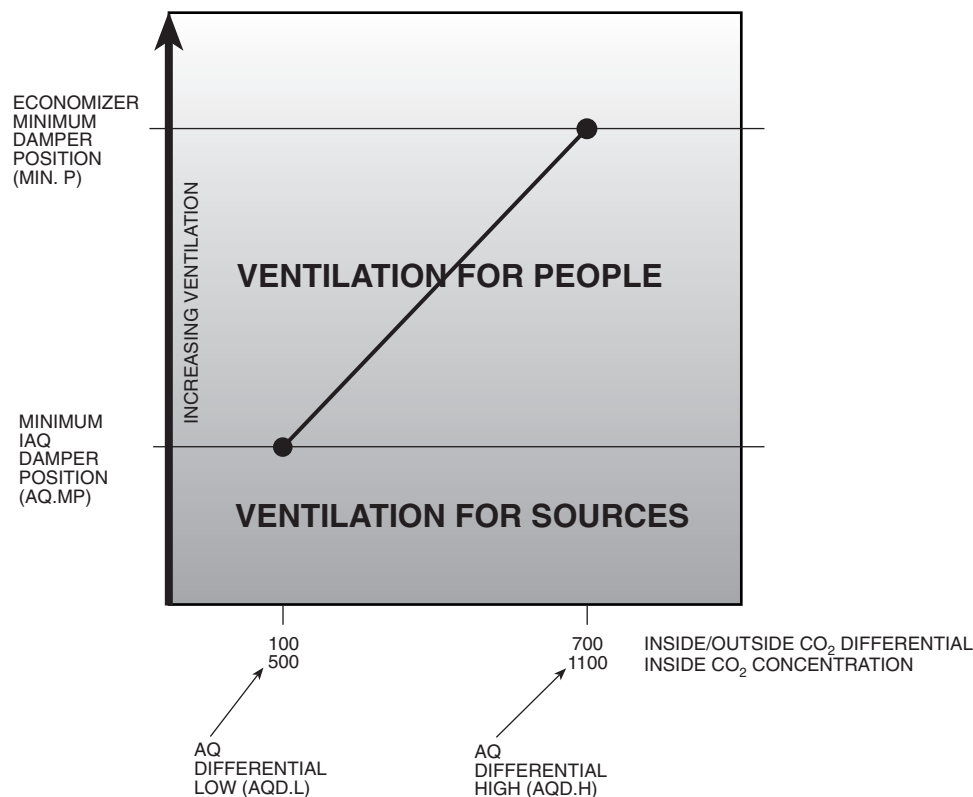


Fig. 16 — IAQ Control

If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed the economizer minimum position to provide economizer cooling.

OAQ LEVEL — The OAQ level is determined by the configuration OA.CF. When OA.CF equals 0, there is no OAQ sensor and therefore the default value for the OAQ level is 400 ppm. When OA.CF = 1, the OAQ level is determined by the OAQ sensor value. When OA.CF = 2, there is an OAQ sensor reading; however, it is only used to lock out the outdoor air and therefore the OAQ Level is set to 400 ppm.

OAQ LOCKOUT — If OAQ exceeds the OAQ Lockout Value (OAQ.L), the economizer will position will be set to 0. Economizer cooling will also be disabled.

FAN ENABLE (Analog Sensor) — The DCV algorithm will operate whenever the building is occupied and the indoor fan is operating or whenever the IAQ algorithm has caused the indoor fan to operate. The configuration IA.FN (Fan Enable for IAQ), determines whether or not the IAQ algorithm can turn on the indoor fan. If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed MIN.P to provide economizer cooling.

IA.FN = 0 (Never) — When IA.FN = 0, the IAQ algorithm can never turn on the fan.

IA.FN = 1 (Occupied) — When IA.FN = 1, the IAQ algorithm will turn on the indoor fan whenever the building is occupied and IAQ/OAQ differential is greater than the configuration DF.ON (Fan On AQ Differential). The indoor fan will turn off when the IAQ/OAQ differential is less than the configuration DF.OF (Fan Off AQ Differential).

IA.FN = 2 (Always) — The indoor fan performance for IA.FN = 2 is the same as the performance when IA.FN = 1 except the algorithm is not limited to occupied periods only. The fan can be triggered on when the space is occupied or unoccupied.

IAQ SENSOR — The *ComfortLink™* control is configured for air quality sensors which provide 4 mA at 0 ppm and 20 mA at 2000 ppm. If a sensor has a different range, these bounds must be reconfigured. The values for I.4M, I.20M, O.4M and O.20M on the display represent the ppm corresponding to 4 mA and 20 mA for IAQ and OAQ, respectively.

Indoor Air Quality (IAQ) — Switch Input — Indoor air quality can also be measured using a switch input. For the purpose of specifying the type of switch input, low CO₂ levels are considered “normal”. The IAQ switch input is defined by the configuration by II.CF (IAQ Level Switch Input) which is accessible via the Scrolling Marquee at Configurations/IAQ. Enthalpy and IAQ are controlled by the same switch input and therefore they cannot be used simultaneously.

IAQ SWITCH INPUT CONFIGURATION

II.CF = 0 (No IAQ) — The configuration II.CF = 0 signifies that there is no IAQ switch input. The damper will operate at the MIN.P position when the space is occupied and the indoor fan is on.

II.CF = 1 (DCV NO) or II.CF = 2 (DCV NC) — Demand Control Ventilation (DCV) allows the economizer minimum position to be decreased when there is no IAQ problem. If IAQ is low, the economizer minimum position is Minimum IAQ Damper Position (AQ.MP). If IAQIN is high, the economizer minimum position is the Economizer Minimum Position (MIN.P). See the Indoor Air Quality (IAQ) — Analog Sensor section for more details. Enthalpy is always LOW for this configuration.

II.CF = 3 (Override NO) or II.CF = 4 (Override NC) — The damper override function permits absolute positioning of the economizer damper for ventilation purposes. The override is active when IAQ is high and inactive when IAQ is low. The override position is configurable by the configuration by

OVR.P (Economizer Override Position). Enthalpy is always LOW for this configuration.

FAN ENABLE — IAQ SWITCH INPUT — The DCV algorithm will operate whenever the building is occupied and the indoor fan is operating or the whenever the IAQ algorithm has caused the indoor fan to operate. The configuration II.FN (IAQ Switch Input Fan CFG) determines whether or not the IAQ algorithm can turn on the indoor fan. If the indoor fan is not operating, the economizer position will be zero. The damper position may exceed MIN.P to provide economizer cooling.

II.FN = 0 (Never) — When II.FN = 0, the IAQ algorithm cannot turn on the fan.

II.FN = 1 (Occupied) — When II.FN = 1, the IAQ algorithm will turn on the indoor fan whenever the building is occupied and IAQ is high. The indoor fan will turn off if IAQ returns to normal.

II.FN = 2 (Always) — The indoor fan performance for II.FN = 2 is the same as the performance when II.FN = 1 except the algorithm is not limited to occupied periods only. The fan can be triggered on when the space is occupied or unoccupied.

Unoccupied Free Cooling — The unoccupied free cooling algorithm attempts to maintain the building space at the occupied cooling set point during unoccupied periods if the conditions in the building and the outdoors are suitable. Three different configurations define this algorithm: Unoccupied Free Cooling (UEFC), Free Cooling Preoccupancy Time (FC.TM) and Free Cool Low Temp Limit (FC.LL). All three configurations are accessible via Configurations/Econ on the Scrolling Marquee.

UNOCCUPIED FREE COOLING CONFIGURATION

UEFC = 0 (Disabled) — When UEFC = 0, unoccupied free cooling is disabled.

UEFC = 1 (Unoccupied) — When UEFC = 1, unoccupied free cooling can occur whenever the building is unoccupied.

UEFC = 2 (Preoccupancy) — When UEFC = 2, unoccupied free cooling can only occur when the time to the next occupied period is less than FC.TM minutes.

FREE COOLING PREOCCUPANCY TIME

FC.TM — FC.TM is the configuration that determines how many minutes before occupancy that free cooling can occur.

FREE COOL LOW TEMPERATURE LIMIT

FC.LL — Unoccupied free cooling cannot occur if the Outdoor Air Temperature (OAT) is less than FC.LL.

Power Exhaust — To enable power exhaust, PE.EN must be set to ENBL. If power exhaust is enabled, Power Exhaust 1 will turn on when the economizer position is greater than PE1.P. If power exhaust is enabled, Power Exhaust 2 will turn on when the economizer position is greater than PE2.P. There are small time delays to ensure that rapid cycling does not occur.

Compressor Staging — The electronic controls determine the number of cooling stages needed at any given time as specified in the Cooling section. However, which specific cooling stage operates at any given time depends on compressor staging order and compressor status.

COMPRESSOR STAGING ORDER — The 48/50HG016-024 units have three stages of cooling (Circuits A, B and C). The 48/50HG014 and 028 units have two stages of cooling (Circuits A and B). The position of the evaporators for Circuits A, B and C are bottom, middle and top (see Fig. 4A and 4B) for a 3-circuit unit. The position of the evaporators is bottom and top for Circuits A and B on a 2-circuit unit. Depending on conditions listed below, circuits will either stage from the bottom evaporator to the top evaporator (BtoT) or from the top evaporator to the bottom evaporator (TtoB). When the unit is staging TtoB, the unit is stated to be inverted. Inverting is never allowed if the unit has reheat (RHT.E=YES).

If inverting is not allowed as determined by the configuration (INV.E = NO), the unit will always stage BtoT. However, if INV.E = YES, then the unit will invert if the outdoor temperature as measured by OAT is greater than 80 F for 15 minutes continuously. Inverting will continue until either INV.E is set to NO or the OAT drops below 75 F for 1 minute.

COMPRESSOR STATUS — Having determined whether staging will occur as either BtoT or TtoB, the unit controls will determine the final order of compressor staging. If all circuits are functioning properly, the compressor staging will always follow either BtoT or TtoB. Therefore if the staging method is BtoT, then Circuit A must turn On before Circuit B and Circuit B before Circuit C. Likewise when removing stages, the stages must be removed in the opposite order. In all cases, the minimum on-time of 3 minutes (MRT.C) and the minimum off-time of 5 minutes (MOT.C) must be honored. Therefore, if the staging order is BtoT and Circuit A was shut down two minutes previously, no circuits will turn on until the minimum off-time for Circuit A has expired; no matter how many circuits are requested.

The rules are different if a circuit has shut down because of an alarm such as low refrigerant pressure. When a circuit is unavailable because it is not functioning properly, it will be replaced immediately by another circuit. Therefore, if Circuit A and B are operating because two circuits have been requested, the staging is BtoT, and then Circuit A shuts down because of low refrigerant pressure, the control will turn off Circuit A and replace it with Circuit C. Later if Circuit A is allowed to restart (see Alarm Handling on page 76) and BtoT is still active with two requested stages, Circuit A will attempt to restart. If Circuit A has run for 1 minute without sensing any problems, it will be deemed acceptable, causing Circuit C to shut down. Circuit C will shut down because only two circuits are needed and Circuit A and B are functioning properly.

Heating (48HG Units)

NOTE: The 48HG units have 2 stages of heat.

For 48HG units, the heat type will automatically be set to 1 for gas units (HT.TY). Heat will not operate if the outdoor temperature is greater than the heat lockout temperature (HT.LO).

THERMOSTAT CONTROL — When the thermostat calls for heating, the MBB senses that W1 is On and closes the HTR.1 relay. When the relay is closed, it sends power to W on the IGC (integrated gas unit controller) board. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed. The induced-draft motor is then energized. When speed is proven with the Hall Effect sensor on the motor, the ignition activation period begins.

The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5-second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not ignited, heating is locked out. The control will reset when the request for heat is temporarily removed.

When ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, limit switches, Hall Effect sensor, and the flame sensor. If the unit is controlled through a room thermostat set for fan auto, 45 seconds after ignition occurs the indoor-fan motor will be energized (and the outdoor-air dampers will open to their minimum position). If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control.

When additional heat is required and the MBB senses that W2 is On, the MBB closes the HTR.2 relay and sends power to the second stage of the main gas valve. If the thermostat removes the call for W2, the unit will turn off HTR.2 (minimum on-time 2 minutes [MRT.H], minimum off-time 2 minutes [MOT.H]). If W1 is satisfied, the main base board will open HTR.1 (minimum on-time 2 minutes and minimum off-time 2 minutes), interrupting the flow of gas to the main burners. The IGC also has a minimum on-time of 1 minute. Therefore, in modes such as Service Test where the long minimum on-time and off-times are not enforced, the one minute minimum on-time for the IGC will still be followed. If the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will continue to operate for an additional 45 seconds then stop. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control.

An LED indicator is provided on the IGC to monitor operation. The IGC is located by removing the heat section side panel. See Fig. 4A and 4B. During normal operation, the LED is continuously on. See Table 63 for error codes.

If the user has selected Adaptive (see Cooling section) for its thermostat mode, the algorithm will follow the configurable delays for adding and removing stages. When adding additional heat stages, the delay is measured from when the last stage was added (H.INC). When removing stages, the delay is measured from when the last stage was removed (H.DEC). Therefore, if W1 and W2 turn on simultaneously, the second stage will turn on after a H.INC delay.

NOTE: If the mode is not Adaptive, then there are no delays for adding and removing stages.

SPACE SENSOR CONTROL — During Space Sensor control, the electronic control uses information from the space sensor to determine the number of heat stages. Once the number of stages needed for heating is determined, this information is passed to the IGC by turning on either HTR.1 or HTR.2. See Thermostat Control section for description of IGC operation.

NOTE: The jumper wire in the installer's packet must be connected between R and W1 when using a T-55, T-56, or T-58 device. See Fig. 1A-2B.

During Space Sensor control, two methods are used to add stages of heat and two methods are used to subtract stages of heat. The first method of adding and subtracting stages causes the unit to operate around its configured steady state number of stages. For example, if the correct number of stages is between 0 and 1, this method will cause the first stage to cycle. If the correct number of stages is between 1 and 2, this method will cause the second stage to cycle.

The second method of adding and subtracting stages causes the unit to find the steady state number of stages. The first method will not add or remove a stage of heating unless the current Heat Demand (set point – SPT), corrected by the rate of change in the Heat Demand, is greater than Heat Demand Positive Level (HT.PD) or less than Heat Demand Negative Level (HT.ND). The correction term is the Heat Thermal Lag (H.LAG) multiplied by the change in the Heat Demand. Therefore, if the corrected current demand is in between –1.0 and 1.0, the number of stages will not change no matter how long there has been a positive error. Because the corrected heat demand incorporates the rate of change in heat demand, it will have a tendency to add or remove stages earlier when the temperature in the space is moving very rapidly, thereby reducing overshoot.

Because the first method of adding or removing a stage of heat is used to operate around the steady number of stages, this method can not be used to add an additional stage until a stage has been subtracted. Likewise, if this method has subtracted a stage, it can not be used again to subtract another stage until a stage has been added.

The second method will add additional stages of heat whenever Heat Demand is greater than $HT.PD + 0.5$ and the heat demand is increasing at rate greater than 0.3 F per min. Additional stages of heat will be removed whenever the Heat Demand is less than $HT.ND - 0.5$ and the heat demand is decreasing at rate less than 0.3 F per min.

Table 63 — IGC LED Indications

ERROR CODE	LED INDICATION
Normal Operation	On
Hardware Failure	Off
Fan On/Off Delay Modified	1 Flash
Limit Switch Fault	2 Flashes
Flame Sense Fault	3 Flashes
Five Consecutive Limit Switch Faults	4 Flashes
Ignition Lockout Fault	5 Flashes
Inducer Switch Fault	6 Flashes
Rollout Switch Fault	7 Flashes
Internal Control Fault	8 Flashes
Software Lockout	9 Flashes

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

NOTES:

1. There is a 3-second pause between error code displays.
2. If more than one error code exists, all applicable error codes will be displayed in numerical sequence.
3. Error codes on the IGC will be lost if power to the unit is interrupted.

Supply-Air Temperature (SAT) Sensor — The SAT Sensor Heat Configuration affects the SAT value displayed on the Scrolling Marquee and the generation of SAT sensor alarms. SAT Sensor Heat (SAT.H) Configuration is accessible via the Scrolling Marquee at Configurations/Unit/SAT.H.

SAT.H = 0 (Invalid) — For all horizontal discharge DR0 units and all DR1 units, SAT.H should be set to 0. This eliminates any false SAT sensor alarms that might occur because of very high temperatures. When SAT.H = 0, a SAT sensor alarm will not be generated when either heater is on or for five minutes after a heater has been on. During this time period, the SAT value on the Scrolling Marquee will be set to zero. This ensures that a user cannot be misled by the high SAT readings that are sometimes recorded during heating operation for horizontal units. During all other times, the SAT will read correctly and is displayed correctly on the Scrolling Marquee. SAT sensor alarms can be generated. The SAT value that is accessible via Service Tool or the CCN network will always read the temperature being sensed by the SAT sensor.

SAT.H = 1 (Accurate) OR SAT.H = 2 (Approximate) — For all vertical discharge DR0 units, SAT.H should be set to 2. When SAT.H = 2, the software will allow SAT sensor alarms to be generated at all times and the SAT value displayed on the display will also be the current value read by the sensor. Unit behavior when SAT.H = 1 is identical to the unit behavior when SAT.H = 2.

Heating (50HG Units)

NOTE: The 50HG units have 2 stages of heat.

For 50HG units, the heat type will automatically be set to 2 for electric heat units if the electric heat was installed in the factory (HT.TY). If electric heat is being installed in the field, the

user must change HT.TY from 0 to 2. If a 15-kW heater is installed, N.HTR must be changed from 2 to 1.

Heat will not operate if the outdoor temperature is greater than the heat lockout temperature (HT.LO).

THERMOSTAT CONTROL — The first stage of electric heat (HTR.1) will follow the W1 input and the second stage (HTR.2) of heat will follow the W2 input. During auto fan, the indoor fan will follow the HTR.1 output. During continuous fan, the indoor fan will follow the G input.

If the user has selected Adaptive (see Cooling section) for thermostat mode, the algorithm will follow the configurable delays for adding and removing stages. When adding additional heat stages, the delay is measured from when the last stage was added (H.INC). When removing stages, the delay is measured from when the last stage was removed (H.DEC). Therefore, if W1 and W2 turn on simultaneously, the second stage will turn on after a H.INC delay.

NOTE: If the mode is not Adaptive, then there are no delays for adding and removing stages.

SPACE SENSOR CONTROL — During Space Sensor control, the electronic control uses information from the space sensor to determine the number of heat stages. Once, the number of stages needed for heating is determined, either HTR.1 or W1 and W2 outputs will be turned on. See Space Sensor Control section for 48HG units.

NOTE: The jumper wire in the installer's packer must be connected between R and W1 when using a T-55, T-56, or T-58 device. See Fig. 1A-2B.

Cooling — If the outdoor temperature is less than the Compressor Lockout Temperature (MC.LO), then compressors will not operate.

THERMOSTAT CONTROL — There are four types of thermostat control as defined by thermostat control type (T.CTL): 0 is referred to as Adaptive control, 1 is referred to as 1-stage Y1, 2 as 2-stage Y1 and 3 as Digital. The preferred method of control is Adaptive.

For 1-stage Y1, 2-stage Y1 and Digital control methods, the adaptive control method is used whenever the economizer can provide cooling, regardless of the selected control method. This will ensure proper time delays and SAT control when the economizer is cooling. If the economizer cannot provide cooling, then the 1-stage Y1, 2-stage Y1, and Digital control methods follow the thermostat inputs directly.

On two-compressor units (size 014 and 028 units), the 1-stage Y1 and 2-stage Y1 control methods are identical and the compressor outputs follow the thermostat inputs directly, obeying the compressor minimum on-time (MRT.C) and minimum off-time (MOT.C) (equal to 3 and 5 minutes, respectively).

For 3-compressor units (size 016 to 024 units), Y1 will turn on one stage when configured for 1-stage Y1, and two stages when configured for 2-stage Y1. When Y2 is On, all three stages will operate. The compressor must follow the minimum on-time and off-time requirements. If multiple compressor are requested on or off simultaneously, the compressor will be staged at a 5-second interval.

The Digital control method is identical for all number of compressors. Y1 turns on the first compressor, Y2 by itself turns on the second compressor and Y1 and Y2 turn on the third compressor.

In Adaptive mode, thermostat cooling begins when the Y1 input is energized. If the economizer is available for cooling, the economizer will try to provide cooling as discussed in the Economizer section. If the economizer is not available for cooling or the economizer has been at 100% for 5 minutes, compressor staging will begin when Y1 is energized.

For size 014 and 028 units, the compressor stages will follow the Y1 and Y2 inputs directly with a configurable delay when adding stages (C.INC) and when removing stages (C.DEC). Therefore, if Y1 and Y2 turn on simultaneously, the second stage will turn on after a C.INC delay. In Adaptive mode, a stage of compression cannot be turned on if the Supply-Air Temperature (SAT) is less than Minimum Supply Air Temperature Upper Level (MIN.H). In addition, a stage of compression will be removed if SAT is less than the Minimum Supply Air Temperature Lower Level (MIN.L). If MIN.H and MIN.L are configured so that they are close together, the last stage of compressor might cycle rapidly, slowed only by its minimum on-time and off-time requirements.

For size 016 to 024 units, the algorithm must decide how to map a two-stage thermostat to three stages of compression. The staging algorithm uses information from Y1, Y2, and the supply-air temperature to determine the number of stages. If Y1 = OFF, then no compressors will operate unless they are being forced to run in order to status their minimum on-time. If Y1 = ON, then either 1 or 2 stages will operate. Finally, if Y2 = ON, then after the C.INC delay times, the maximum number of stages will operate. When only Y1 is ON, the unit will decide to operate 1 or 2 stages of compression using the following logic. When Y1 turns ON, the first stage of compressor will turn on immediately. The algorithms begin to count the number of seconds since the last change in the number of compressors (in this case, from 0 to 1). After the compressor settling time (SAT.T) is reached, a reference value for SAT is stored. If, while operating with only one compressor on, the return temperature begins to rise, and therefore the SAT temperature rises also, the second compressor will be added when SAT is greater the SAT reference plus SAT positive demand (SA.PD). After the second compressor has been added, another SAT reference value will be taken. The second stage will be turned off when SAT is less than SAT reference plus SAT negative demand (SA.ND). If at any time Y2 is turned ON, then the algorithm would immediately try to reach 3 stages following the C.INC requirement. If Y1 turns OFF, then all the compressors will turn off after their minimum on-time has been met.

SPACE SENSOR CONTROL — To operate the unit in Space Sensor mode, Unit Control Type must be set to Space Sensor (3) and a wire must be added between R and W1 on TB4. See Fig. 1A-2B.

While in space sensor control mode, the unit tries to maintain the Space Temperature (SPT) at one of 4 different set points: the Occupied Cool Set Point (OCSP), the Unoccupied Cool Set Point (UCSP), the Occupied Heat Set Point (OHSP), or the Unoccupied Heat Set Point (UHSP). The building's occupancy is affected by a number of different factors. See Occupancy Determination section on page 69. When the building is occupied, the occupied set points are active. When the building is unoccupied, the unoccupied set points are active.

Because Space Sensor mode is an "Auto" mode, the control will switch between cooling and heating to maintain temperature. However, to minimize unnecessary cool to heat and heat to cool changes, there is a 10-minute delay after the last stage turns off before the control will switch modes.

To maintain temperature while cooling, the unit will turn on compressors as needed when the economizer is either unavailable or not providing enough cooling. Information from the space sensor and the supply temperature sensor is used to determine the number of necessary stages. The minimum on-time for each compressor is 3 minutes (MRT.C). The minimum off-time is 5 minutes (MOT.C).

Because the unit contains 3 compressors, each with its own circuit, there are 3 stages of cooling (the economizer is not considered a stage of cooling even though it can provide cooling in certain situations). In general, the minimum time between increasing stages is a configurable delay (C.INC). The

minimum time between decreasing stages is a configurable delay (C.DEC).

The unit will request a stage of cooling whenever the Cool Demand (SPT – set point) is greater than the SPT Cool Demand Positive Level (CL.PD) plus the change in Cool Demand times the Cool Thermal Lag (C.LAG).

Consider the following values: Cool Demand = 0.9, change in Cool Demand = 0.2, Cool Thermal Lag = 1.0, and Cool Demand Positive Level = 1.0. Because $0.9 + 0.2 \times 1.0$ is greater than 1.0, a stage of cooling would be added. This method of adding a stage can only be used after the compressor settling time has expired (SAT.T) and trend in SAT is increasing or slowly decreasing. This method of adding a stage of cooling can not be used again until a stage of cooling has been removed. Additional stages of cooling can be added whenever Cool Demand is greater than CL.PD + 0.5 and the SAT is decreasing at rate greater than -0.3°F/min .

The unit will remove a stage of cooling whenever the Cool Demand (SPT – set point) is less than the SPT Cool Demand Negative Level (CL.ND) plus the change in Cool Demand times the Cool Thermal Lag (C.LAG). Consider the following values: Cool Demand = -0.9 , change in Cool Demand = -0.2 , Cool Thermal Lag = 1.0, and Cool Demand Negative Level = -1.0 . Because $-0.9 + -0.2 \times 1.0$ is less than -1.0 , a stage of cooling would be removed. This method of removing a stage can only be used after the compressor settling time has expired (SAT.T) and the trend in SAT is decreasing or slowly increasing. This method of removing a stage of cooling cannot be used again until a stage of cooling has been added. Additional stages of cooling can be removed whenever the Cool Demand is less than CL.ND – 0.5 and the SAT is increasing at rate less than 0.2°F/min .

Reheat — Reheat is a factory-installed option. For two-circuit units with reheat, the A circuit has a reheat coil and a reheat valve. For three-circuit units with reheat, both the A and B circuits have a reheat coil and a reheat valve. The humidistat input, which is part of the ECB, is used to trigger reheat.

The majority of reheat units will not have a check valve in the refrigerant circuit. However, some units have a check valve. If the unit is equipped with a check valve, the reheat circuit must be flushed periodically. This will occur automatically if the following configurations are set (all of these configurations can be found at Configurations/REHT on the Scrolling Marquee). The configuration Flush Reheat Circuits (RHT.E) must be set to YES to enable the flushing of the reheat circuits. The configuration Runtime Between RH Flush (RHT.T) determines after how many compressor run hours, a flush must be initiated. The flush will last for RH Flush Duration (Secs) (RHT.D).

REHEAT — HUMIDISTAT CONTROL — Four different control methods are available for reheat as defined by the configuration Humidistat Control Type (Configurations/REHT/H.CTL on the Scrolling Marquee). Option 1 is referred to as 1-stage Y1, option 2 as 2-stage Y1, option 3 as Digital and option 4 as Exclusive. Tables 64-67 define the number of desired cooling and reheat stages for each control type. A refrigerant circuit will only operate in reheat mode if the HUMSTAT is ON. Tables 64-67 assume that HUMSTAT is ON. In all modes except Digital, Y2 = ON and Y1 = OFF cause an alarm. The Humidistat Input (HW.SW) allows the user to define the humidistat input as normally open or normally closed. Normal refers to no reheat. Control methods 1-Stage Y1, 2-Stage Y1 and Digital can be used with a smart thermostat that is programmed when to signal for cooling and when to signal for reheat. The Exclusive control method is used when the thermostat and the humidistat do not interact. Table 67 shows that if either Y1 or Y2 is ON when using the Exclusive control method, the unit will operate in cooling as specified by thermostat control type (T.CTL). If a circuit is

malfunctioning and the desired number of cooling and reheat stages cannot be met, the algorithm will turn off reheat requests to satisfy the cooling request.

Reheat will terminate if W1 or W2 call for heating while operating in thermostat mode or if the space temperature comes within the Reheat Heat SP Deadband (RH.HB) while operating in space temperature mode.

REHEAT — RELATIVE HUMIDITY CONTROL — A relative humidity sensor can be used to control reheat. Reheat works with a thermostat or a space temperature sensor. The UNIT configuration RH.S must be set to YES. This signifies that a relative humidity sensor has been wired to the input that is typically used as the Outdoor Air Quality (OAQ) sensor input. The unit will initiate reheat when the relative humidity is greater than the Space RH Setpoint (RH.SP) and the space temperature is greater than the heat setpoint by Reheat Heat SP Deadband (RH.HB). Reheat will continue until the space relative humidity reaches the set point minus the Reheat Deadband (RH.DB) or until the space temperature comes within the deadband Reheat Heat SP Deadband (RH.HB). This configuration can be set to a negative value which would allow reheat to dehumidify below the heat set point. This feature ensures that the unit will not overcool the space. When reheating, the unit will run all available reheat stages.

**Table 64 — Reheat Thermostat Table
(H.CTL = 1-STAGE Y1)**

Y2	Y1	NUM_COMP = 2		NUM_COMP = 3	
		COOL	REHT	COOL	REHT
0	0	0	0	0	0
0	1	0	1	0	1
1	0	1	1	1	2
1	1	1	1	1	2

**Table 65 — Reheat Thermostat Table
(H.CTL = 2-STAGE Y1)**

Y2	Y1	NUM_COMP = 2		NUM_COMP = 3	
		COOL	REHT	COOL	REHT
0	0	0	0	0	0
0	1	0	1	0	2
1	0	1	1	1	2
1	1	1	1	1	2

**Table 66 — Reheat Thermostat Table
(H.CTL = DIGITAL)**

Y2	Y1	NUM_COMP = 2		NUM_COMP = 3	
		COOL	REHT	COOL	REHT
0	0	0	1	0	1
0	1	1	1	1	1
1	0	1	1	0	2
1	1	1	1	1	2

**Table 67 — Reheat Thermostat Table
(H.CTL = EXCLUSIVE)**

Y2	Y1	NUM_COMP = 2		NUM_COMP = 3	
		COOL	REHT	COOL	REHT
0	0	0	1	0	2
0	1	T.CTL	0	T.CTL	0
1	0	T.CTL	0	T.CTL	0
1	1	T.CTL	0	T.CTL	0

T-58 Communicating Sensor Configuration — Refer to the T-58 installation instructions for information on installing and configuring the T-58 sensor.

Each T-58 sensor must have a unique address on the CCN. Each T-58 sensor must be configured with the address it is communicating to (unit controller) and the unit must be configured with the address of the sensor.

Space Temperature Sensor Calibration and Trim

The space temperature sensor (SPT) can be calibrated. The sensor can be calibrated by entering data using either the *ComfortLink™* display or by using Service Tool. The SPT calibration information is found under CALB submenu of Temperatures when using the Scrolling Marquee, or under the maintenance table SENS_CAL when using Service Tool. When using either method, the user can calibrate the sensor by entering the correct space temperature at SPT.C (display) or SPT_CAL (Service Tool). The software will automatically calculate the trim value SPT.T (display) or SPT_OFF (Service Tool). The space temperature should be measured with an accurate temperature measuring device. The user can also calibrate the sensor by entering the trim value directly. The trim value should be positive when the SPT sensor is reading low and it should be negative when the SPT is reading high.

If SPT is forced (T-58 sensors) or failed, the sensor cannot be calibrated. In general, the SPT should be calibrated only when the space is near its expected operating temperature. If the calibration value is refused by either the Scrolling Marquee or its CCN table, calibration is currently not being allowed by the software. The SPT Trim can be set at any time.

Alarm Handling — There are a variety of different alerts and alarms in the system. Alerts are indicated by TXXX (where XXX is the alert number) on the display and generally signify that the improperly functioning circuit can restart without human interaction. If an alarm occurs, indicated by AXXX (where XXX is the alarm number), the damaged circuit will generally not restart without an alarm reset via the Scrolling Marquee display or CCN.

The response of the control system to various alerts and alarms depends on the seriousness of the particular alert or alarm. In the mildest case, an alert does not affect the operation of the unit in any manner. An alert can also cause a “strike.” A “striking” alert will cause the circuit to shut down for 15 minutes. This feature reduces the likelihood of false alarms causing a properly working system to be shutdown incorrectly. If three strikes occur before the circuit has an opportunity to show that it can function properly, the circuit will strike out, causing the shutdown alarm for that particular circuit. Once activated, the shutdown alarm can only be cleared via an alarm reset.

However, circuits with strikes will be given an opportunity to reset their strike counter to zero. As discussed above, a strike typically causes the circuit to shut down. Fifteen minutes later, that circuit will once again be allowed to run. If the circuit is able to run for 1 minute, its replacement circuit will be allowed to shut down (if not required to run to satisfy requested stages). However, the “troubled” circuit must run continuously for 5 minutes with no detectable problems before the strike counter will be reset to zero.

Operators with CCN networks might not want to be notified of “striking” alerts until a circuit has been shut down because of three alerts. If the operator sets A.NOW (Alarm Now) to NO, alerts will not be announced until a circuit is permanently shut down. This implies that alarm will not be broadcast on the CCN network or listed on the display until a permanent shutdown alarm occurs.

The status of A.NOW is ignored during Service Test mode because it is presumed that the service technician will want to be notified of any alerts or alarms immediately. So as not to confuse a monitor center, the words “SERVICE TEST” are inserted into every alarm message while the unit is operating in Service Test mode. The alarm output relay can be configured using the Scrolling Marquee under ALRM in the configuration menu or by using the ALARMOUT table via Service Tool. This configuration allows the user to decide whether or not the alarm output will activate when a particular set of alarms occurs. (See Appendix A, ALARMOUT table.)

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

Cleaning — Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

EVAPORATOR COIL — Clean as required with commercial coil cleaner.

REHEAT COIL — Clean as required with commercial coil cleaner.

CONDENSER COIL — Clean condenser coil annually and as required by location and outdoor-air conditions. Inspect coil monthly; clean as required.

CONDENSATE DRAIN — Check and clean each year at the start of the cooling season. In winter, keep drains and traps dry. An access panel is located above the condensate connection to allow easy clean out of the condensate pan. The first time the panel is removed, the insulation behind the access panel will need to be cut away. Carefully cut the insulation with a knife or blade on three sides so the insulation can be folded out of the way during cleaning. Be careful not to damage components behind the insulation while cutting. Once cleaning is completed, fold the insulation back into place and secure the access panel in the original position.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to unit installation instructions for type and size.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens. See unit installation instructions for quantity and size.

MAIN BURNER (48HG Only) — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames. Refer to Main Burners section on page 81.

FLUE GAS PASSAGEWAYS (48HG Only) — The flue collector box and heat exchanger cells may be inspected by removing heat section access panel (Fig. 4A and 4B), flue box cover, and main burner assembly (Fig. 17). Refer to Main Burners section on page 81 for burner removal sequence. If cleaning is required, clean tubes with a wire brush.

Use caution with ceramic heat exchanger baffles. When installing retaining clip, be sure the center leg of the clip extends inward toward baffle. See Fig. 18.

COMBUSTION-AIR BLOWER (48HG Only) — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, remove heat section panel. Using an inspection mirror and flashlight, look into the flue exhaust duct to inspect the wheel. If cleaning is required, remove motor and wheel assembly by removing the screws holding the flue box cover to the flue box. See Fig. 17. Remove the screws holding the inducer housing to the inlet plate. The wheel can then be removed from the motor shaft and cleaned with a detergent or solvent. Replace the wheel onto the motor shaft in the correct position and reassemble the flue cover onto the flue box.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. Conventional white oil

(Zerol 150T or Sontex SA32) is used. White oil is compatible with 3GS oil, and 3GS oil may be used if the addition of oil is required. See compressor nameplate for original oil charge. Oil recharge amount is shown in unit installation instructions. When a compressor is exchanged in the field it is possible that a major portion of the oil from the replaced compressor may still be in the system. While this will not affect the reliability of the replacement compressor, the extra oil will add rotor drag and increase power usage. To remove this excess oil, an access valve may be added to the lower portion of the suction line at the inlet of the compressor. The compressor should then be run for 10 minutes, shut down and the access valve opened until no oil flows. This should be repeated twice to make sure the proper oil level has been achieved.

FAN SHAFT BEARINGS — Lubricate bearings at least every 6 months with suitable bearing grease. Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

CONDENSER AND EVAPORATOR-FAN MOTOR BEARINGS — The condenser-fan and evaporator-fan motors have permanently-sealed bearings, so no field lubrication is necessary.

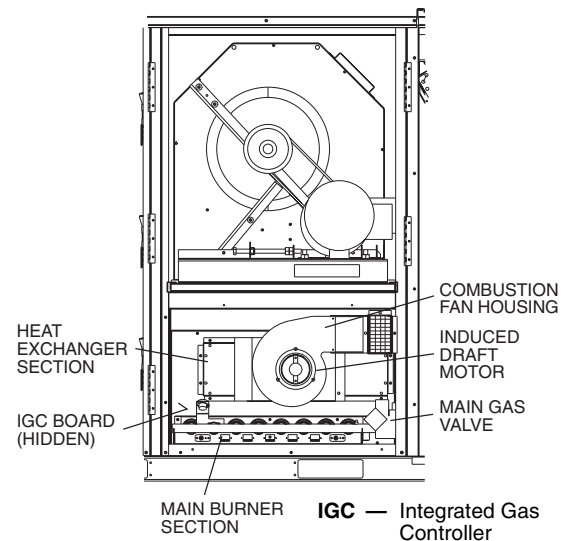
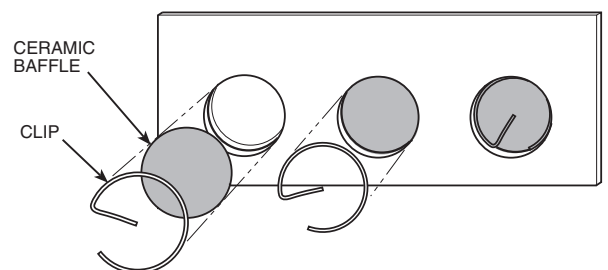


Fig. 17 — Typical Gas Heating Section



NOTE: One baffle and clip will be in each upper tube of the heat exchanger.

Fig. 18 — Removing Heat Exchanger Ceramic Baffles and Clips

Evaporator Fan Service and Replacement — The 48/50HG units feature a slide-out fan deck for easy servicing of the indoor-fan motor, pulleys, belt, and bearings. To service components in this section, perform the following procedure:

1. Turn off unit power.
2. Open the fan section access panel.
3. Remove three no. 10 screws at front of slide-out fan deck. Save screws. See Fig. 19.
4. Disconnect the electrical plugs and wires connected to the slide-out fan deck (evaporator fan plug, supply air thermostat, and fan status switch if installed). Wires may be damaged if not disconnected.
5. Fan deck can now be slid out to access serviceable components.

⚠ CAUTION

DO NOT SLIDE FAN DECK OUT PAST THE STOP BRACKET. If further access is required, the fan deck must be supported. Make sure plugs and wiring are not pinched between fan housing and unit center post. Damage to unit may result.

6. To replace fan deck to operating position, slide fan deck back into the unit. Secure with the three no. 10 screws removed in Step 3.
7. Re-attach electrical plugs and wires.
8. Close fan section access door.
9. Restore power to unit.

Evaporator Fan Performance Adjustment (Fig. 19 and 20) — Fan motor pulleys are factory set for speed shown in Table 56.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen nuts on the 4 carriage bolts in the mounting base. Using adjusting bolts and plate, slide motor and remove belt.
3. Loosen movable-pulley flange setscrew (see Fig. 20).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in unit Installation Instructions.
- See Table 55 for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 59 for speed change for each full turn of pulley flange.)
6. Replace and tighten belts (see Belt Tension Adjustment section below).
7. Restore power to unit.

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

Belt Tension Adjustment — To adjust belt tension:

1. Turn off unit power.
2. Slide out fan deck to service position as shown in Evaporator Fan Service and Replacement section above.
3. Loosen fan motor bolts.
4. Move motor mounting plate to adjust to proper belt tension. See Table 68. Motor adjuster bolts may be used to tighten belts. See Fig. 19.
5. Check for proper belt alignment. Adjust if necessary.

6. Tighten motor mounting plate bolts to lock motor in proper position.
7. Return fan deck back into operating position.
8. Restore power to unit.

Condenser-Fan Adjustment (Fig. 21)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 21.
4. Tighten setscrews and replace condenser-fan assembly.
5. Turn on power to unit.

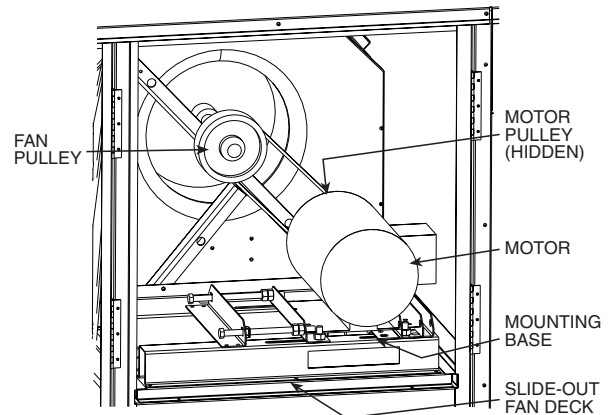


Fig. 19 — Evaporator-Fan Motor Adjustment

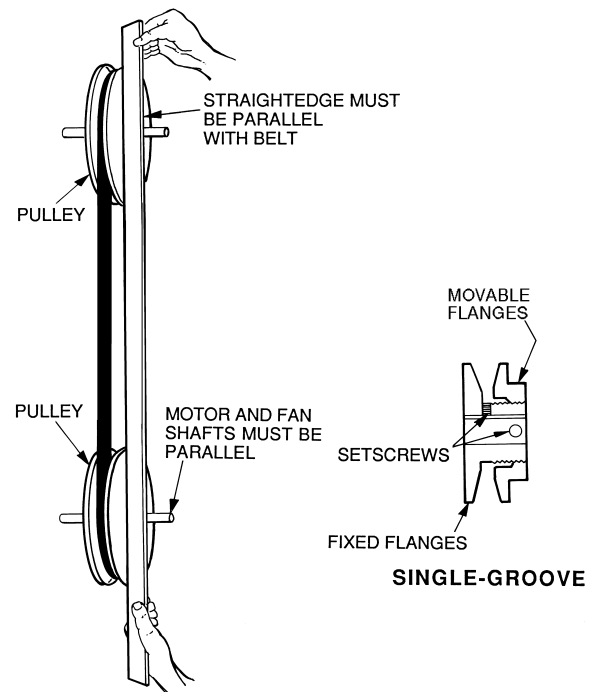


Fig. 20 — Evaporator-Fan Alignment and Adjustment

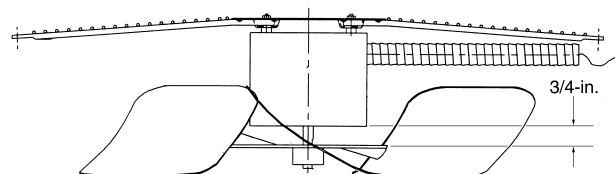


Fig. 21 — Condenser-Fan Adjustment

Table 68 — Belt Tension Adjustment

UNIT SIZE 48/50HG	VOLTAGE	BELT TENSION — lb			
		Unit Model Number Position 10			
		—	A	B	C
014	230	4.6	3.8	5.6	4.5
	460	4.6	3.8	5.6	4.5
	575	4.2	3.3	5.6	4.5
016	230	3.8	4.6	5.6	4.5
	460	3.8	4.6	5.6	4.5
	575	3.3	4.2	5.6	4.5
020	230	5.1	4.9	5.5	5.7
	460	5.1	4.9	5.5	5.7
	575	5.1	4.9	5.5	5.7
024	230	5.1	4.9	5.5	5.7
	460	5.1	4.9	5.5	5.7
	575	5.1	4.9	5.5	5.7
028	230	4.2	5.8	4.6	3.7
	460	4.2	5.8	4.6	3.7
	575	4.2	5.8	4.6	3.7

Economizer Checkout Procedure — For units equipped with economizers, the unit software provides a test to determine if the economizer is working properly. The following steps specify how to test the economizer using the *ComfortLink™* display. Refer to Scrolling Marquee Display Operation section on page 20 for more information.

1. Enter the Service Test main menu on the display.
2. Enter the TEST submenu and turn ON test mode. If the password has not already been entered, the password must be entered in order to turn on Service Test. The default password is 1111.
3. Return to the main level of Service Test.
4. Enter the FANS submenu and turn on the IDF (indoor fan).
5. Exit the FANS menu and enter the INDP submenu and enter an initial value for ECON. This will drive the economizer damper to the specified position. Continue to adjust the ECON value to make sure the economizer opens and closes.
6. For DR0 units without Reheat, the economizer spring return can be checked by setting E.PWR in the INDP menu to NO. Be sure to change the E.PWR value back to YES before exiting in order to restore power to the economizer.
7. Return to the TEST submenu and turn OFF test mode. This will cause the economizer to close and the indoor fan to turn off. Verify that the economizer damper moves as directed.

Verify Sensor Performance — Verify that the OAT and SAT sensors are reading correctly. The OAT and SAT values can be accessed through the *ComfortLink* display in the Temperatures menu and UNIT submenu.

Power Failure — Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures. Unit panels must be in place when unit is operating during charging procedure.

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

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant.

LOW CHARGE COOLING — Using cooling charging chart (see Fig. 22-26), add or remove refrigerant until conditions of the chart are met. An accurate pressure gage and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

TO USE THE COOLING CHARGING CHART — Use the above temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully recover some of the charge. Re-check suction pressure as charge is adjusted.

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

The TXV (thermostatic expansion valve) is set to maintain between 10 and 15 degrees of superheat at the compressors. The valves are factory set and should not require re-adjustment.

Gas Valve Adjustment (48HG Only)

NATURAL GAS — The gas valve opens and closes in response to the thermostat or limit control.

When power is supplied to valve terminals W2 (High Fire) and C1, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body. The setting is 3.00 in. wg for vertical supply/discharge units. The setting is 2.95 in. wg for horizontal supply/discharge units.

To adjust regulator:

1. Set unit at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove 1/8-in. pipe plug from manifold or gas valve pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw (See Fig. 27).
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
8. Once desired pressure is established, set unit setting for no call for heat, turn off main gas valve, remove pressure-measuring device, and replace 1/8-in. pipe plug and screw cap.

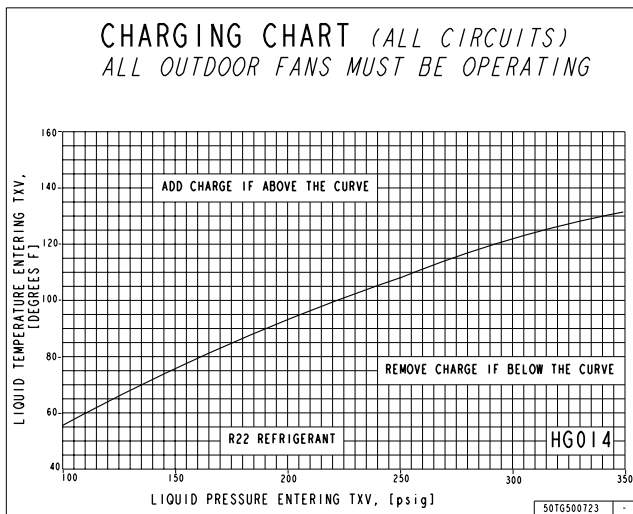


**Fig. 22 — Cooling Charging Chart —
48/50HG014 Units**

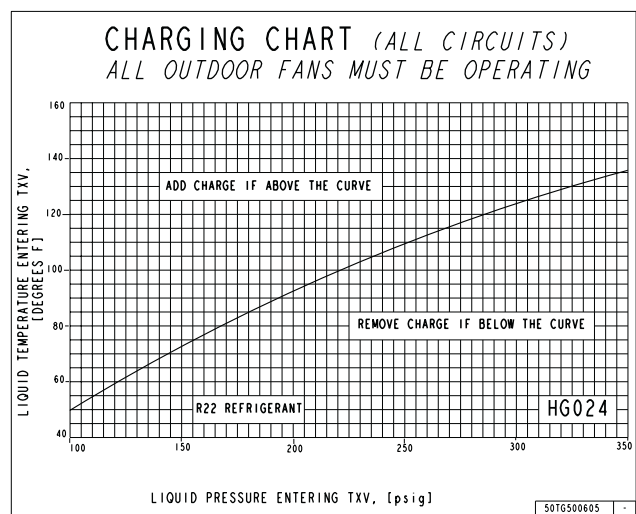


**Fig. 25 — Cooling Charging Chart —
48/50HG024 Units**

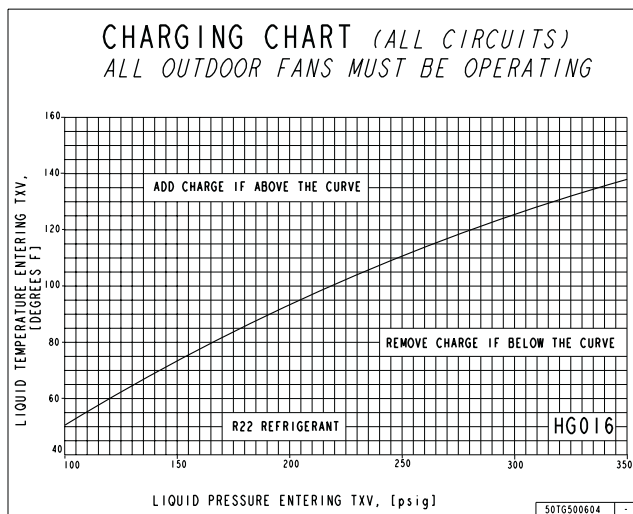


**Fig. 23 — Cooling Charging Chart —
48/50HG016 Units**

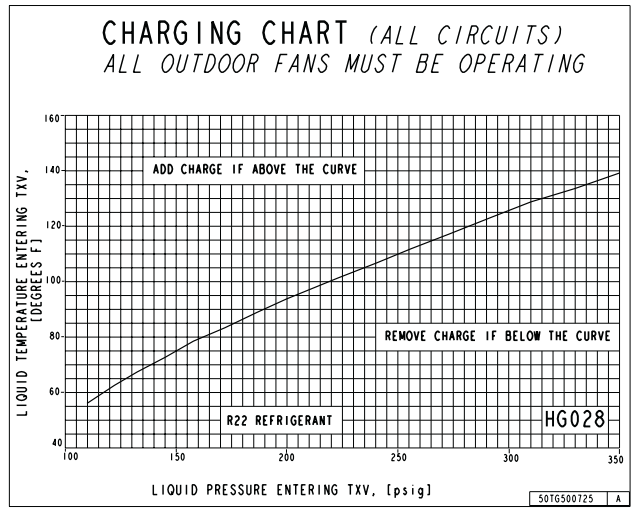


**Fig. 26 — Cooling Charging Chart —
48/50HG028 Units**

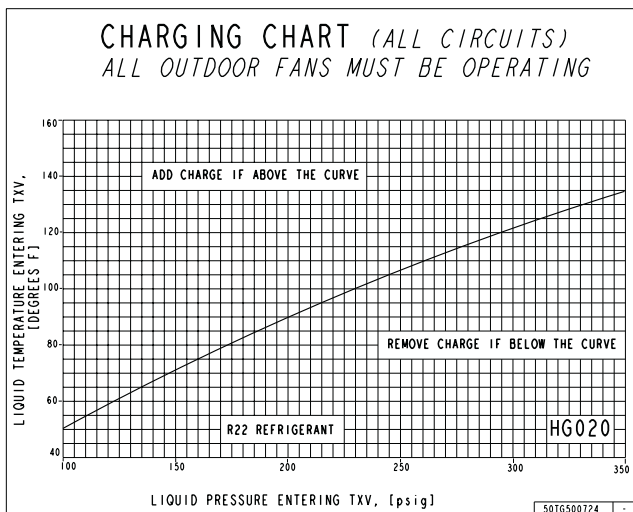


**Fig. 24 — Cooling Charging Chart —
48/50HG020 Units**

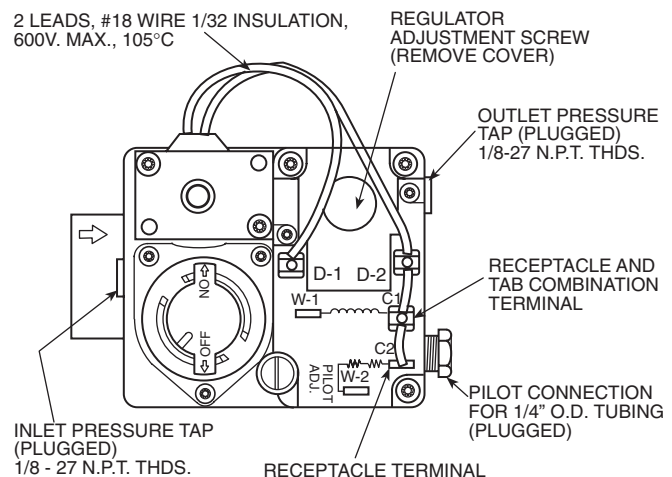


Fig. 27 — Gas Valve (48HG Only)

Main Burners (48HG Only) — For all applications, main burners are factory set and should require no adjustment.

MAIN BURNER REMOVAL

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Remove gas section access panel.
4. Disconnect gas piping from gas valve inlet.
5. Remove wires from gas valve.
6. Remove wires from rollout switch.
7. Remove sensor wire and ignitor cable from IGC board.
8. Remove 2 screws securing manifold bracket to basepan.
9. Remove 2 screws that hold the burner assembly to vestibule plate.
10. Lift burner/manifold assembly out of unit.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Main Burner Removal section above.
2. Inspect burners, and if dirty, remove burners from rack.
3. Using a soft brush, clean burners and crossover port as required.
4. Adjust spark gap. See Fig. 28.
5. Reinstall burners on rack.
6. To reinstall burner rack, reverse steps of Main Burner Removal section above.

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has internal line break motor protection.

Overtemperature — Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

High-Pressure Switch — If the high-pressure switch trips, the compressor will shut down and the current sensor will not detect current. See the Current Sensor section below for more information.

Current Sensor (CS) — The purpose of the CS is to detect losses in compressor power. After detecting a loss in compressor power, unit control locks out the compressor for 15 minutes. After 15 minutes, the alarm will automatically reset. If this alarm occurs 3 times consecutively, the compressor will remain locked out until an alarm reset is initiated via CCN or manually via the *ComfortLink* display (see Alarms and Alerts section on page 82 for more details).

EVAPORATOR FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature.

Fuses are also located in the control box and feed power to the condenser fan motors. Always replace blown fuses with the correct size fuse as indicated on the unit fuse label.

SATURATED SUCTION PRESSURE (SSP) — If the SSP for a particular circuit is reading below the alarm set point for an extended period of time, that circuit will be shut down. After 15 minutes, the alarm will automatically reset. If this alarm occurs 3 times consecutively, the circuit will remain locked out until an alarm reset is initiated via CCN or manually via the *ComfortLink*™ display (see Alarms and Alerts section on page 82 for more details).

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

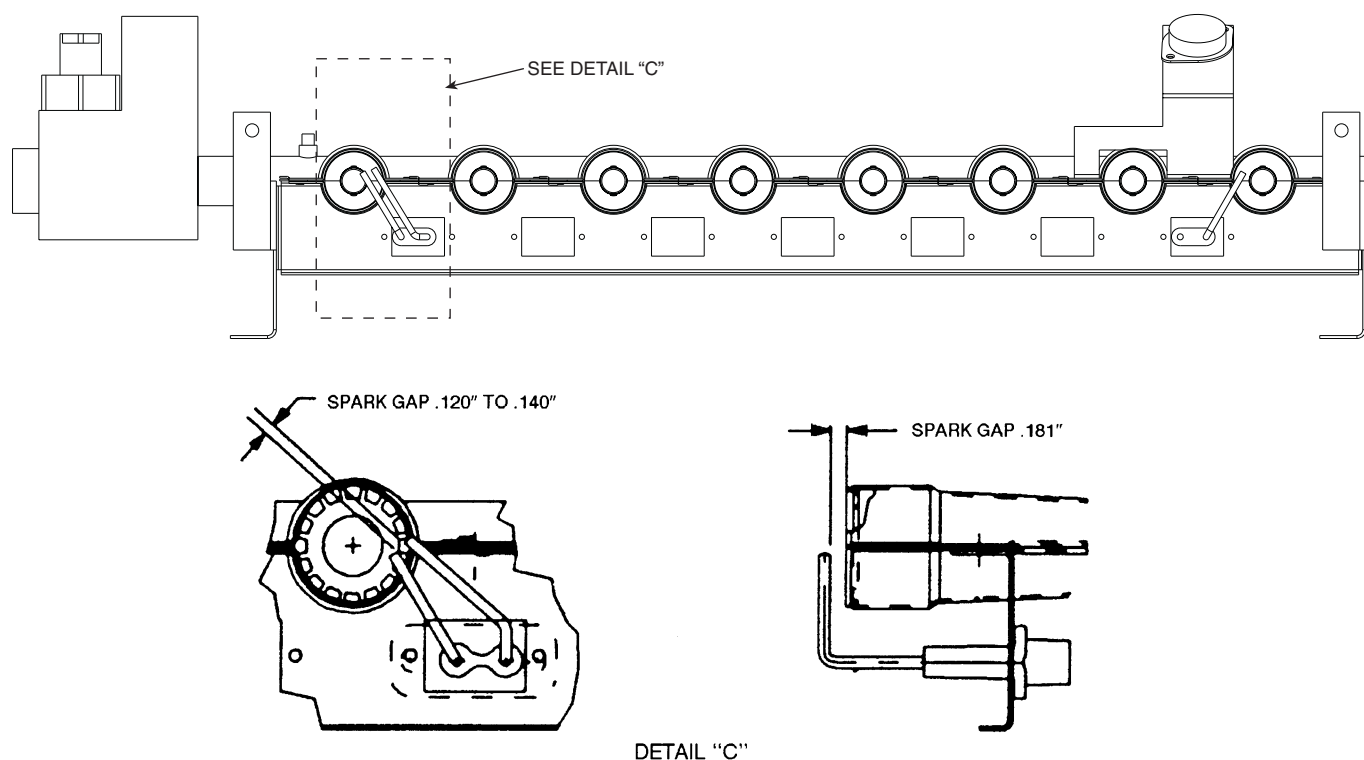


Fig. 28 — Spark Gap Adjustment (48HG Only)

TROUBLESHOOTING

The Scrolling Marquee display shows the actual operating conditions of the unit while it is running. If there are alarms or there have been alarms, they will be displayed in either the current alarm list or the history alarm list. See Tables 22 and 69. The Service Test mode allows proper operation of the compressors, fans, and other components to be checked while the unit is not operating. See Service Test on page 21.

Complete Unit Stoppage — There are several conditions that can cause the unit not to provide heating or cooling:

- If an alarm is active which causes the unit to shut down, diagnose the problem using the information provided in Alarms and Alerts section below.
- Cooling and heating loads are satisfied.
- Programmed schedule.
- General power failure.
- Tripped CB1, CB2 or CB3 (24-volt transformer circuit breakers).
- Blown fuse (1 or 2).
- Unit is turned off through the CCN network.
- If unit cannot cool, supply-air temperature may be less than variable MIN.L (Default = 48 F).

Single Circuit Stoppage — If a single circuit stops incorrectly, there are several possible causes. The problem should be investigated using information from the alarm list. See Table 69.

Service Analysis — Detailed service analysis can be found in Tables 70, 71, and 72 and in Fig. 29.

Restart Procedure — Before attempting to restart the machine, check the alarm list to determine the cause of the shutdown. If the shutdown alarm for a particular circuit has occurred, determine and correct the cause before allowing the unit to run under its own control again. When there is problem, the unit should be diagnosed in Service Test mode. The alarms must be reset before the circuit can operate in either Normal mode or Service Test mode.

Alarms and Alerts — Alarms and alerts are warnings of abnormal or fault conditions, and may cause either one circuit or the entire unit to shut down. They are assigned code numbers and descriptions as described below. The description for an alarm can be viewed from the Scrolling Marquee display by pressing **[ESCAPE]** and **[ENTER]** keys simultaneously while displaying the alarm code number. Be sure to expand the description for each alert and alarm, because in some cases, there are different possible descriptions for each number. Table 69 contains a detailed description of each alarm and alert code error and possible cause. Possible actions taken by the electronic controls are:

- nothing
- adding a “strike” to the strike counter for a particular circuit
- shutting down a circuit
- shutting down the unit.

When a “strike” is added, the circuit is shut down for 15 minutes. After 3 strikes, the circuit will be permanently shut down until the alarms are reset via the Scrolling Marquee display. More information concerning alarm handling can be found in Alarm Handling on page 76.

DIAGNOSTIC ALARM CODES AND POSSIBLE CAUSES

Alert Codes 51, 55 and 59 (Compressor Safety) — Alert codes 51, 55, and 59 are for compressors A1, B1, and C1, respectively. These alerts occur when the Current Sensor (CS) does not detect compressor current during compressor

operation. When this occurs, the control turns off the compressor and logs a strike for the respective circuit. These alerts reset automatically.

The possible causes are:

1. High-pressure switch (HPS) open. The HPS is wired in series with compressor relays on the MBB. If the high-pressure switch opens during compressor operation, the compressor stops, and the CS no longer detects current, causing the control to activate this alert.
2. Compressor internal protection is open.
3. Wiring error. A wiring error might not allow the compressor to start.

To check out alerts 51, 55 and 59:

1. Turn on the compressor in question using Service Test mode. If the compressor does not start, then most likely the problem is one of the following: HPS open, open internal protection, incorrect safety wiring, or incorrect compressor wiring.
2. If the compressor starts, verify that the indoor and outdoor fans are operating properly.
3. If the CS is always detecting current, then verify that the compressor is on. If the compressor is on, check the contactor and the relay on the MBB. If the compressor is off and there is no current, verify CS wiring and replace if necessary.
4. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized after compressor starts.

Alert Codes 51, 55 and 59 (Current Detected After Turnoff)

— Alert codes 51, 55, and 59 are for compressors A1, B1, and C1, respectively. These alerts occur when the Current Sensor (CS) detects current when the compressor should be off. When this occurs, the control turns off all of the compressors. Use the Scrolling Marquee to reset the alert.

The possible causes are

1. Welded contactor.
2. Frozen compressor relay on MBB.

To check out alerts 51, 55 and 59:

1. Place the unit in Service Test Mode. All compressors should be Off.
2. Verify that there is not 24 v at the contactor coil. If there is 24 v at the contactor, check relay on MBB and wiring.
3. Check for welded contactor.
4. Verify CS wiring.
5. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized after compressor starts.

Alert Codes 64, 65 and 80 (Condensing Temp. Failure)

— Alert codes 64, 65, and 80 are for circuits A, B and C, respectively. These alerts occur when the temperature is outside the range -40 to 240 F (-40 to 116 C). When this occurs, the control uses the outdoor temperature to control the outdoor fans. If the outdoor temperature is greater than 40 F, the circuit will run at Fan Level 2. If the outdoor temperature is less than 35 F, the circuits will run at Fan Level 1. If the outdoor-air sensor is also faulty, the circuit will be locked out, otherwise this alert resets automatically.

The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 73 (Outside Air Temp. Failure) — This alert occurs when the temperature is outside the range -40 to 240 F (-40 to 116 C). This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 74 (Space Temp. Failure) — This alert occurs when the temperature is outside the range -40 to 240 F (-40 to 116 C). This alert will only occur if the unit is in Space Sensor mode. The unit will shut down if this alert occurs while in Space Sensor mode. This alert resets automatically. The cause of the alert is usually a faulty thermistor in the T-55, T-56, or T-58 device, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 75 (Supply Air Temp. Failure) — This alert occurs when the temperature is outside the range -40 to 240 F (-40 to 116 C). This alert resets automatically. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection.

Alert Code 76 (Return Air Temperature Failure) — This alert occurs when the temperature is outside the range -40 to 240 F (-40 to 116 C) and the sensor is configured as installed (RAT.S = YES). This alert resets automatically. RAT.S must be set to YES for this alert to occur. The cause of the alert is usually a faulty thermistor, a shorted or open thermistor caused by a wire error or a loose connection.

Alert Code 77 (Space Relative Humidity Sensor Failure) — This alert occurs when the SPRH input is less than 3.5 mA and the sensor is configured as installed. Check sensor and wiring. This alert clears automatically.

Alert Code 80 (Condensing Temp. Failure) — See Alert 64.

Alert Codes 92, 93, 101 (Suction Pres. Trans. Failure) — Alert codes 92, 93, and 101 are for circuits A, B and C, respectively. These alerts occur when the pressure is outside the range 0.5 to 134.5 psig. A circuit cannot run when this alert is active. Use the Scrolling Marquee to reset the alarm. The cause of the alert is usually a faulty transducer, faulty 5-v power supply, or a loose connection.

Alert Codes 102, 103, 104 (Current Sensor Failure) — Alert codes 102, 103, and 104 are for compressors A1, B1, and C1, respectively. These alerts occur when the output of the current sensor (CS) is a constant high value. These alerts reset automatically. The cause of the alert is a wiring error or a loose connection. If the problem cannot be resolved and the CS board must be replaced, the CS board can be temporarily disabled while securing a replaced board. A CS board is disabled by setting the corresponding configuration to DISABLE (CS.A1, CS.B1 or CS.C1).

Alert Codes 110, 111, 140 (Loss of Charge) — Alert codes 110, 111, and 140 are for circuits A, B and C, respectively. These alerts occur when the compressor is OFF and the suction pressure < 5 psig and OAT > -5 F for 1 continuous minute. Use the Scrolling Marquee to reset the alert. The cause of the alert is usually low refrigerant pressure or a faulty suction pressure. These alerts only occur when the compressor is OFF because the low refrigerant pressure alarms (alerts 133, 134 and 141) handle this situation when the compressor is operating.

Alert Codes 126, 127, 142 (High Refrigerant Pressure) — Alert codes 126, 127, and 142 are for circuits A, B, and C, respectively. These alerts occur when alerts 51, 55, or 59 are active while the appropriate condensing temperature is greater than 150 F. These alerts reset automatically. The cause of the alert is usually an overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch. See Alerts 51, 55 and 59 for diagnostic procedure.

Alert Codes 133, 134, 141 (Low Refrigerant Pressure) — Alert codes 133, 134, and 141 are for circuits A, B and C, respectively. These alerts occur when the compressor is operating and the evaporating temperature (converted from the suction pressure) is less than 20 F for 5 minutes, 15 F for 3 minutes, or 10 F for 1.5 minutes. When the outdoor temperature is less than 40 F, the above values are reduced by an offset that scales between 0 and 10 as the outdoor temperature goes from 40 to 0° F. These alerts cause a strike for the respective circuit. These alerts will activate

when the coil becomes frosted. However, during the 15-minute reset period, the coils will thaw and strike should clear at restart if there is nothing else wrong with the circuit. The alert resets automatically. The cause of the alert is usually low refrigerant charge, dirty filters, evaporator fan operating backwards, loose or broken belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.

Alert Code 140 (Loss of Charge) — See Alert 110.

Alert Code 141 (Low Refrigerant Pressure) — See Alert 133.

Alert Code 142 (High Refrigerant Pressure) — See Alert 126.

Alert Codes 143, 144, 145 (Failure to Pressurize) — Alert codes 143, 144, and 145 are for circuits A, B, and C, respectively. These alerts occur when the compressor turns on and the suction pressure does not drop 5 psig during the first 15 seconds and the condensing temperature does not rise 5 F during the first minute. These alerts cause a strike for the respective circuit. The alert resets automatically. The cause of the alert is usually compressor wiring causing reverse rotation or a faulty compressor.

Alert Code 153 (Real Time Clock Hardware Failure) — This alert occurs when the real time clock is malfunctioning. The real time clock enables the unit to track time. If the problem does not reset after setting the time and the data via the Scrolling Marquee, replace the MBB.

Alarm Codes 163, 164, 165 (Circuit Failure) — Alarm codes 163, 164, and 165 are for circuits A, B, and C, respectively. These alarms occur when a circuit has 3 strikes. Use the Scrolling Marquee display to reset the alarm. Investigate the alarm that caused the strikes to occur.

Alert Code 179 (Com. Failure with ECB) — This alert occurs when the MBB cannot communicate with the ECB. This is usually caused by a wiring problem. Investigate using the Low Voltage Schematic.

Alert Codes 180 (Com. Failure with Economizer Actuator) — This alert occurs when the MBB cannot communicate with the Belimo Actuator. This is usually caused by a wiring problem. Investigate using the Low Voltage Schematic.

Alarm Code 404 (Fire Shutdown) — This alarm occurs when the shutdown input is either open or closed depending upon its configuration. This alarm is usually caused by an auxiliary device that is trying to shut down the unit, e.g., smoke detector. The configuration for this switch input can be found at variable FS.SW. Verify that the configuration is set correct, verify the wiring and auxiliary device. This alarm resets automatically.

Alert Code 408 (Dirty Air Filter) — This alert occurs when the Filter Status switch senses a plugged filter for 120 continuous seconds after the indoor fan has been running for 10 seconds. Because the Dirty Air Filter switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at variable FL.SW. Verify that the configuration is set correct, verify the wiring and filter status switch. The hose should be connected to the low side of the switch. This alert resets automatically.

Alert Code 409 (Fan Status Switch On, Fan Contactor Off) — This alarm occurs when the fan status switch has sensed that the indoor fan has been on for 10 seconds and the indoor fan feedback has determined that the indoor fan should be off. Because the Fan Status switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at Scrolling Marquee: Configuration mode, UNIT submode, FN.SW. Verify that the configuration is set correctly. Verify the wiring and fan status switch. The hose should be connected to the high side of the switch. If the IDF is configured to shut down the unit when this alarm occurs (Scrolling Marquee: Configuration mode, UNIT submode, IDF.F = YES), then this alarm can only be reset manually and the unit is shut down. If the IDF is not

configured to shut the unit down when this alarm occurs (Scrolling Marquee: Configuration mode, UNIT submode, IDFF = NO), then this alarm resets automatically and no specific control action is taken.

Alert Code 409 (Fan Status Switch Off, Fan Contactor On) — This alert occurs when the fan status switch has sensed that the indoor fan has been off for 10 seconds and the indoor fan feedback has determined that the indoor fan should be on. Because the Fan Status switch can be configured normally opened or closed, the switch might be open or closed. The configuration for this switch input can be found at Scrolling Marquee: Configuration mode, UNIT submode, FN.SW. Verify that the configuration is set correctly. Verify the wiring and fan status switch. The hose should be connected to the high side of the switch. If the IDF is configured to shut down the unit down when this alert occurs (Scrolling Marquee: Configuration mode, UNIT submode, IDFF = YES), then this alarm can only be reset manually and the unit is shut down. If the IDF is not configured to shut the unit down when this alert occurs (Scrolling Marquee: Configuration mode, UNIT submode, IDFF = NO), then this alert resets automatically and no specific control action is taken.

Alert Code 409 (Fan Feedback On When Not Expected) — This alert occurs when the Fan Feedback signal has been On for more than 5 seconds yet the Fan Power relay is Off. Verify wiring. This alert occurs on DR0 units only.

Alert Code 409 (Fan Feedback Off When Not Expected) — This alert occurs when the IDF has been on for more than 15 seconds yet the Fan Feedback is Off. Verify wiring. Compressors will not be allowed to run until this alert clears. Check for errors on the IGC which might have caused the IDF to turn off. This alert occurs on DR0 units only.

Alert Code 410 (R-W1 Jumper Not Installed in Spare Temp Mode) — This alert occurs when the control mode is Space Temperature Mode via Auto Select or Space Temp Select yet there is no power to W1. Verify that space temperature mode is the desired mode or add jumper between R and W1. This alert resets automatically.

Alert Code 410 (R-W1 Jumper Must be Installed to Run Heat in Service Test) — This alert occurs when a request for a heat output has occurred yet the W1 input is not high. A jumper must be installed between R and W1 when trying to test heat in Service Test. The alert will clear when Service Test is exited or if another Service Test mode is selected. Remove jumper when done using Service Test if the unit is operating with a Thermostat. The jumper should only be left in place if the unit is operating with a Space Temperature Probe.

Alert Code 411 (Y2 without Y1) — This alert occurs in Thermostat Mode when Y2 is energized and Y1 is not and the thermostat type is not Digital, or Reheat is NO and Humidistat Type is not Digital. Verify thermostat and thermostat wiring. When Y2 turns On, the software will behave as if Y1 and Y2 are both On. When Y2 turns Off, the software will behave as if Y1 and Y2 are both Off. This alert resets automatically when Y1 is turned On or when the configuration changes so that an alert would not have occurred.

Alert Code 412 (W2 without W1) — This alert occurs in Thermostat Mode when W2 is energized and W1 is not and the thermostat type is not Digital, or Reheat is NO and Humidistat Type is not Digital. Verify thermostat and thermostat wiring. When W2 turns On, the software will behave as if W1 and W2 are both On. When W2 turns Off, the software will behave as if W1 and W2 are both Off. This alert resets automatically when W1 is turned On.

Alert Code 413 (Y and W Simultaneously) — This alert occurs in Thermostat Mode when Y1 or Y2 is energized simultaneously with W1 or W2. Verify thermostat and thermostat wiring. The software will enter either the cooling or heating mode depending upon which input turned on first. This alert resets automatically when Y1 and Y2 are not on simultaneously with W1 and W2.

Alert Code 414 (Economizer Damper Actuator Out of Calibration) — This alert occurs when the economizer range of motion is less than 90 degrees. Initiate economizer calibration (E.CAL) using the Service Test menu. The economizer calibration procedure will try to find new maximum open and closed positions. If the alert does not clear automatically after the calibration procedure is complete, investigate what is limiting economizer rotation. This alert resets automatically.

Alert Code 414 (Economizer Damper Actuator Torque Above Load Limit) — This alert occurs when the actuator load is too high. Investigate to determine what is increasing damper load. This alert resets automatically.

Alert Code 414 (Economizer Damper Actuator Hunting Excessively) — This alert occurs when the commanded damper position is changing too rapidly. This alert resets automatically.

Alert Code 414 (Economizer Damper Stuck or Jammed) — This alarm occurs when the actuator senses it can no longer move. Investigate what is stopping the rotation of the actuator and fix. This alert resets automatically.

Alert Code 414 (Economizer Damper Actuator Mechanical Failure) — This alert occurs when the actuator senses a catastrophic failure. Investigate actuator and replace if necessary. This alert resets automatically.

Alert Code 414 (Economizer Damper Actuator Direction Switch Wrong) — This alert occurs when the economizer damper direction switch is in the wrong position. The direction switch should be in the clockwise position and the actuator should be mounted so that the CW face of the actuator is accessible. Correct if necessary. This alert clears automatically.

Alert Code 415 (IAQ Input Out of Range) — This alert occurs when the IAQ input is less than 3.5 mA and the sensor is configured as installed. Check sensor and wiring. This alert clears automatically.

Alert Code 416 (OAQ Input Out of Range) — This alert occurs when the OAQ input is less than 3.5 mA and the sensor is configured as installed. Check sensor and wiring. This alert clears automatically.

Table 69 — Alarm Codes

ALARM OR ALERT NUMBER	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T051	Compressor A1 Safety Trip	Add Strike for Circuit A	Automatic	High-pressure switch open. Check for T126 Compressor internal protection open. Wiring error
	Compressor A1 Current Detected After Turnoff	Turn off all compressors	Automatic	Welded contactor
T055	Compressor B1 Safety Trip	Add Strike for Circuit B	Automatic	High-pressure switch open. Check for T127 Compressor internal protection open. Wiring error
	Compressor B1 Current Detected After Turnoff	Turn off all compressors	Automatic	Welded contactor
T059	Compressor C1 Safety Trip	Add Strike for Circuit C	Automatic	High-pressure switch open. Check for T142 Compressor internal protection open. Wiring error
	Compressor C1 Current Detected After Turnoff	Turn off all compressors	Automatic	Welded contactor
T064	Circuit A Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T065	Circuit B Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T073	Outdoor Air Temperature Thermistor Failure	—	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T074	Space Temperature Thermistor Failure	Unit shutdown	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T075	Supply Air Temperature Thermistor Failure	—	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T076	Return Air Temperature Failure	—	Automatic	Faulty, shorted or open thermistor caused by wire error or loose connection. Sensor configured incorrectly.
T077	Space Relative Humidity Sensor Failure	—	Automatic	Faulty sensor, bad wiring, or sensor configured incorrectly.
T080	Circuit C Saturated Condensing Temp Thermistor Failure	Use OAT to control Outdoor fans	Automatic	Faulty, shorted, or open thermistor caused by wiring error or loose connection.
T092	Circuit A Suction Pressure Transducer Failure	Shutdown Circuit A	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T093	Circuit B Suction Pressure Transducer Failure	Shutdown Circuit B	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T101	Circuit C Suction Pressure Transducer Failure	Shutdown Circuit C	Manual	Faulty transducer, faulty 5-V power supply, or loose connection
T102	Compressor A1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T103	Compressor B1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T104	Compressor C1 Current Sensor Failure	—	Automatic	Faulty current sensor caused by wiring error or loose connection
T110	Circuit A Loss of Charge	Shutdown Circuit A	Manual	Low refrigerant or faulty suction pressure transducer
T111	Circuit B Loss of Charge	Shutdown Circuit B	Manual	Low refrigerant or faulty suction pressure transducer
T126	Circuit A High Refrigerant Pressure	Shutdown Circuit A	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T127	Circuit B High Refrigerant Pressure	Shutdown Circuit B	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T133	Circuit A Low Refrigerant Pressure	Add Strike for Circuit A	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T134	Circuit B Low Refrigerant Pressure	Add Strike for Circuit B	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T140	Circuit C Loss of Charge	Shutdown Circuit C	Manual	Low refrigerant or faulty suction pressure transducer
T141	Circuit C Low Refrigerant Pressure	Add Strike for Circuit C	Automatic	Low refrigerant charge, dirty filters, evaporator fan turning backwards, loose or broken fan belt, plugged filter drier, faulty transducer, excessively cold return air, or stuck open economizer when the ambient temperature is low.
T142	Circuit C High Refrigerant Pressure	Shutdown Circuit C	Automatic	An overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.
T143	Circuit A Failure To Pressurize	Add Strike for Circuit A	Automatic	Wiring causing reverse rotation or faulty compressor
T144	Circuit B Failure To Pressurize	Add Strike for Circuit B	Automatic	Wiring causing reverse rotation or faulty compressor
T145	Circuit C Failure To Pressurize	Add Strike for Circuit C	Automatic	Wiring causing reverse rotation or faulty compressor
T153	Real Time Clock Hardware Failure	—	Automatic	Faulty MBB. Set time and date to check.
A163	Circuit A Down Due to Failure	Shutdown Circuit A	Manual	Circuit has 3 strikes or has been locked out by another alarm
A164	Circuit B Down Due to Failure	Shutdown Circuit B	Manual	Circuit has 3 strikes or has been locked out by another alarm
A165	Circuit C Down Due to Failure	Shutdown Circuit C	Manual	Circuit has 3 strikes or has been locked out by another alarm
T179	Loss of communication with the Economizer Control Board	—	Automatic	Communication wiring problem with ECB or faulty MBB or ECB
T180	Loss of communication with the Economizer Actuator	—	Automatic	Communication wiring problem with actuator.
A404	Fire Shutdown	Unit Shutdown	Automatic	Smoke detected by smoke detector
T408	Dirty Filter	—	Automatic	Dirty Filter
T409	Fan Status Switch ON, Contactor OFF	If IDFF = Yes, then Unit Shutdown	If IDFF = YES, then Automatic, otherwise manual	Faulty Fan Status Switch. Configuration incorrect.
	Fan Status Switch OFF, Contactor ON	If IDFF = Yes, then Unit Shutdown	If IDFF = YES, then Automatic, otherwise manual	Tripped Circuit Breaker. Broken belt. Faulty indoor fan motor. Configuration incorrect. Faulty fan status switch.
	Fan Feedback ON when not Expected	—	Automatic	Faulty relay.
	Fan Feedback OFF when not Expected	Compressors will not operate	Automatic	Faulty IGC, wiring problem, or bad MBB relays.
T410	R-W1 Jumper Not Installed in Space Temp Mode	Unable to run heat	Automatic	Missing jumper wire
	R-W1 Jumper Must Be Installed to Run Heat In Service Test	Unable to Test Heat Outputs	Automatic	Missing jumper wire.
T411	Thermostat Y2 Input Activated without Y1 Activated	Run unit as if Y2 and Y1 are On	Automatic	Faulty thermostat or thermostat wiring
T412	Thermostat W2 Input Activated without W1 Activated	Run unit as if W2 and W1 are On	Automatic	Faulty thermostat or thermostat wiring
T413	Thermostat Y and W Inputs Activated Simultaneously	Run unit in mode activated first	Automatic	Faulty thermostat or thermostat wiring
T414	Economizer Damper Actuator Out of Calibration	Alert Generated	Automatic	Calibrate economizer (E.CAL). If problem still exist then determine what is limiting economizer rotation.
	Economizer Damper Actuator Torque Above Load Limit	Alert Generated	Automatic	Actuator load too high. Check damper load.
	Economizer Damper Actuator Hunting Excessively	Alert Generated	Automatic	Damper position changing too quickly.
	Economizer Damper Stuck or Jammed	Alert Generated	Automatic	No economizer motion. Check actuator.
	Economizer Damper Actuator Mechanical Failure	Alert Generated	Automatic	Check actuator and replace if necessary.
T415	Economizer Damper Actuator Direction Switch Wrong	Alert Generated	Automatic	Switch wired incorrect direction.
	IAQ Input Out of Range	Alert Generated	Automatic	Faulty sensor, faulty wiring, or sensor configured incorrectly.
T416	OAQ Input Out of Range	Alert Generated	Automatic	Faulty sensor, faulty wiring, or sensor configured incorrectly.

LEGEND

ECB — Economizer Control Board MBB — Main Base Board
IGC — Integrated Gas Controller OAT — Outdoor-Air Thermistor

Table 70 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and Fan Will Not Start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped. Check CB1, CB2, and CB3.	Replace fuse or reset circuit breaker.
	Disconnect off.	Power disconnect.
	Compressor time guard to prevent short cycling.	Check using <i>ComfortLink™</i> Scrolling Marquee.
	Thermostat or occupancy schedule set point not calling for Cooling.	Check using <i>ComfortLink</i> Scrolling Marquee.
	Outdoor temperature too low.	Check Compressor Lockout Temperature (MC.LO) using <i>ComfortLink</i> Scrolling Marquee.
	Active alarm.	Check active alarms using <i>ComfortLink</i> Scrolling Marquee.
Compressor Cycles (Other than Normally Satisfying Thermostat).	Insufficient line voltage.	Determine cause and correct.
	Active alarm.	Check active alarms using <i>ComfortLink</i> Scrolling Marquee.
Compressors Operates Continuously.	Unit undersized for load.	Decrease load or increase of size of unit.
	Thermostat or occupancy schedule set point too low.	Reset thermostat or schedule set point.
	Dirty air filters.	Replace filters.
	Low refrigerant charge.	Check pressure, locate leak, repair evacuate, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive Head Pressures.	Loose condenser thermistors.	Tighten thermistors.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharge.	Recover excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Condenser air restricted or air short cycling.	Determine cause and correct.
	Restriction in liquid tube.	Remove restriction.
Condenser Fans Not Operating.	No Power to contactors.	Fuse blown or plug at motor loose.
Excessive Suction Pressure.	High heat load.	Check for sources and eliminate
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction Pressure Too Low.	Dirty air filters.	Replace air filters.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV (and filter drier) if stuck open or closed.
	Insufficient evaporator airflow.	Check belt tension. Check for other restrictions.
	Temperature too low in conditioned area (low return-air temperature).	Reset thermostat or occupancy schedule.

LEGEND

CB — Circuit Breaker
TXV — Thermostatic Expansion Valve

Table 71 — Gas Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners Will Not Ignite.	Active alarm.	Check active alarms using <i>ComfortLink™</i> Scrolling Marquee.
	No power to unit.	Check power supply, fuses, wiring, and circuit breakers.
	No power to IGC (Integrated Gas Control).	Check fuses and plugs.
	Heaters off due to time guard to prevent short cycling.	Check using <i>ComfortLink</i> Scrolling Marquee.
	Thermostat or occupancy schedule set point not calling for Cooling.	Check using <i>ComfortLink</i> Scrolling Marquee.
	No gas at main burners.	Check gas line for air and purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to re-light unit.
	Water in gas line.	Drain water and install drip.
Inadequate Heating.	Dirty air filters.	Replace air filters.
	Gas input too low.	Check gas pressure at manifold. Refer to gas valve adjustment in Installation, Start-up, and Service Manual.
	Thermostat or occupancy schedule set point only calling for W1.	Allow time for W2 to energize.
	Unit undersized for load.	Decrease load or increase of size of unit.
	Restricted airflow.	Remove restriction.
	Too much outdoor air.	Check economizer position and configuration. Adjust minimum position using <i>ComfortLink</i> Scrolling Marquee.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
Poor Flame Characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger, replace.
		Unit is over-fired, reduce input. Adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners Will Not Turn Off.	Unit is in minimum on-time.	Check using <i>ComfortLink</i> Scrolling Marquee.
	Unit running in Service Test Mode.	Check using <i>ComfortLink</i> Scrolling Marquee.

Table 72 — Electric Heating Service Analysis

PROBLEM	CAUSE	REMEDY
No Heat.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped. Check CB1, CB2, and CB3.	Replace fuse or reset circuit breaker.
	Thermostat occupancy schedule set point not calling for Heating.	Check using <i>ComfortLink</i> Scrolling Marquee.
	No 24 vac at primary contactor.	Check transformer and circuit breaker.
	No power (high voltage) to L2 of primary contactor.	Check safety switches “one-shot” backup and auto limit.
	Bad electrical elements.	Power off unit and remove high voltage wires. Check resistance of heater, replace if open.

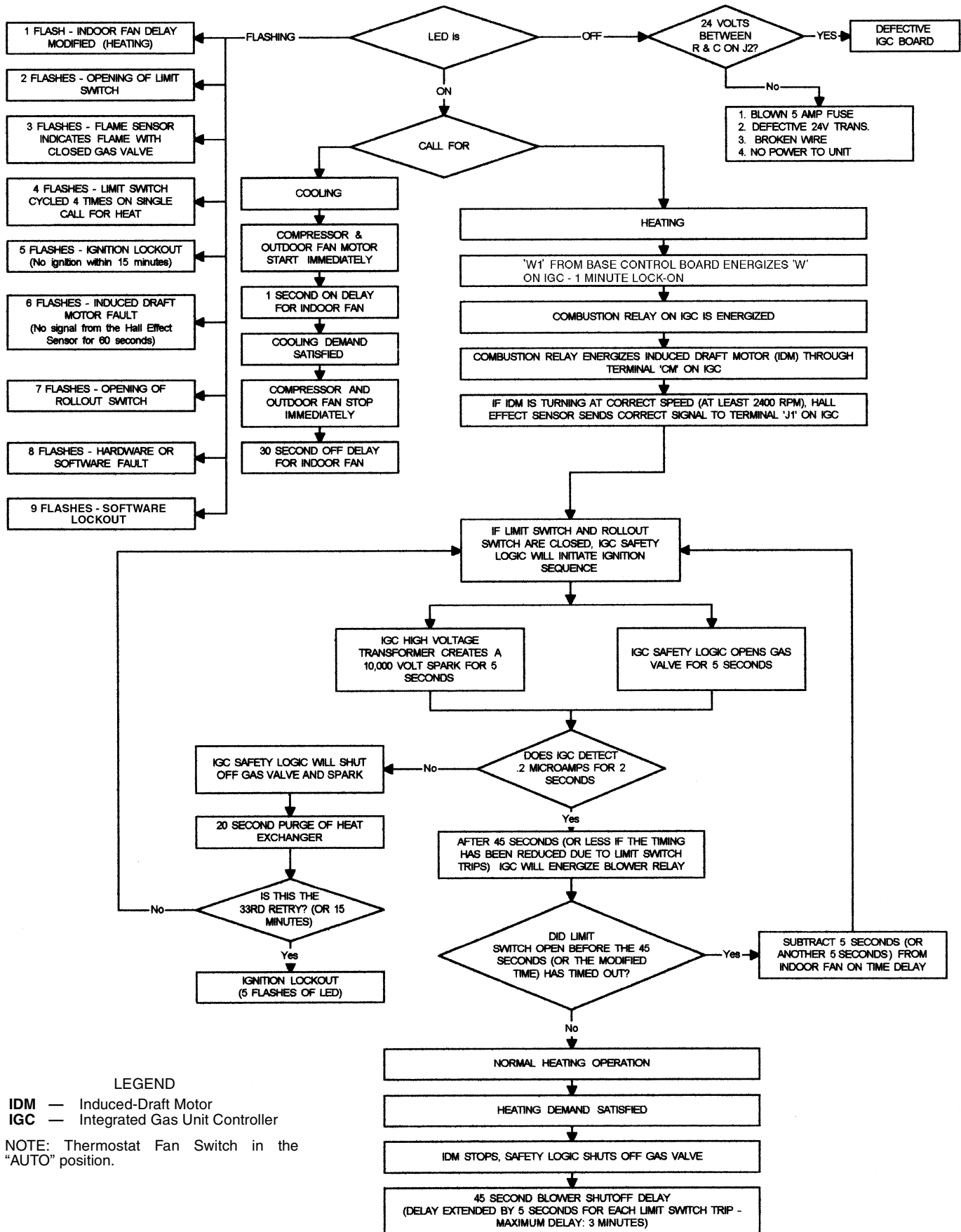


Fig. 29 — IGC Control (Heating and Cooling)

Thermistor Troubleshooting — The electronic control uses 5K and 10K thermistors to sense temperatures used to control operation of the unit. See Fig. 1A-2B and Table 73. Resistances at various temperatures are listed in Tables 74-77. Thermistor pin connection points are shown in Tables 3 and 6B. The locations of the thermistors are shown on Fig. 4A and 4B.

The T-55, T-56, and T-58 space temperature sensors use 10K thermistors. Resistances at various temperatures are listed in Tables 76 and 77.

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. 1A-2B).
2. Using the voltage reading obtained, read the sensor temperature from Tables 74-77.
3. To check thermistor accuracy, measure temperature at probe location with an accurate thermocouple-type temperature-measuring instrument. Insulate thermocouple to avoid ambient temperatures from influencing reading. Temperature measured by thermocouple and temperature determined from thermistor voltage reading should be within 5° F (3° C) if care was taken in applying thermocouple and taking readings.

Table 73 — Thermistor Type

FUNCTION	DR0 UNITS	DR1 UNITS
SAT	5K	10K
OAT	5K	10K
SCT.A	5K	5K
SCT.B	5K	5K
SCT.C	5K	5K

LEGEND

- OAT** — Outdoor-Air Thermistor
SAT — Supply-Air Thermistor
SCT — Saturated Condensing Temperature Thermistor

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, or by determining the resistance with unit shut down and thermistor disconnected from J8. Compare the values determined with the value read by the control in the Temperatures mode using the Scrolling Marquee display.

Transducer Troubleshooting — The electronic control uses 3 suction pressure transducers to measure the suction pressure of circuits A, B, and C. The pressure/voltage characteristics of these transducers are in shown in Table 78. The accuracy of these transducers can be verified by connecting an accurate pressure gage to the second refrigerant port in the suction line.

**Table 74 — Thermistor Temperature (F) vs Resistance/Voltage Drop Values for
5K Thermistors (5K at 25 C Resistors)**

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
-25	3.699	98,010	59	1.982	7,866	143	0.511	1,190
-24	3.689	94,707	60	1.956	7,665	144	0.502	1,165
-23	3.679	91,522	61	1.930	7,468	145	0.494	1,141
-22	3.668	88,449	62	1.905	7,277	146	0.485	1,118
-21	3.658	85,486	63	1.879	7,091	147	0.477	1,095
-20	3.647	82,627	64	1.854	6,911	148	0.469	1,072
-19	3.636	79,871	65	1.829	6,735	149	0.461	1,050
-18	3.624	77,212	66	1.804	6,564	150	0.453	1,029
-17	3.613	74,648	67	1.779	6,399	151	0.445	1,007
-16	3.601	72,175	68	1.754	6,238	152	0.438	986
-15	3.588	69,790	69	1.729	6,081	153	0.430	965
-14	3.576	67,490	70	1.705	5,929	154	0.423	945
-13	3.563	65,272	71	1.681	5,781	155	0.416	925
-12	3.550	63,133	72	1.656	5,637	156	0.408	906
-11	3.536	61,070	73	1.632	5,497	157	0.402	887
-10	3.523	59,081	74	1.609	5,361	158	0.395	868
-9	3.509	57,162	75	1.585	5,229	159	0.388	850
-8	3.494	55,311	76	1.562	5,101	160	0.381	832
-7	3.480	53,526	77	1.538	4,976	161	0.375	815
-6	3.465	51,804	78	1.516	4,855	162	0.369	798
-5	3.450	50,143	79	1.493	4,737	163	0.362	782
-4	3.434	48,541	80	1.470	4,622	164	0.356	765
-3	3.418	46,996	81	1.448	4,511	165	0.350	750
-2	3.402	45,505	82	1.426	4,403	166	0.344	734
-1	3.386	44,066	83	1.404	4,298	167	0.339	719
0	3.369	42,679	84	1.382	4,196	168	0.333	705
1	3.352	41,339	85	1.361	4,096	169	0.327	690
2	3.335	40,047	86	1.340	4,000	170	0.322	677
3	3.317	38,800	87	1.319	3,906	171	0.317	663
4	3.299	37,596	88	1.298	3,814	172	0.311	650
5	3.281	36,435	89	1.278	3,726	173	0.306	638
6	3.262	35,313	90	1.257	3,640	174	0.301	626
7	3.243	34,231	91	1.237	3,556	175	0.296	614
8	3.224	33,185	92	1.217	3,474	176	0.291	602
9	3.205	32,176	93	1.198	3,395	177	0.286	591
10	3.185	31,202	94	1.179	3,318	178	0.282	581
11	3.165	30,260	95	1.160	3,243	179	0.277	570
12	3.145	29,351	96	1.141	3,170	180	0.272	561
13	3.124	28,473	97	1.122	3,099	181	0.268	551
14	3.103	27,624	98	1.104	3,031	182	0.264	542
15	3.082	26,804	99	1.086	2,964	183	0.259	533
16	3.060	26,011	100	1.068	2,898	184	0.255	524
17	3.038	25,245	101	1.051	2,835	185	0.251	516
18	3.016	24,505	102	1.033	2,773	186	0.247	508
19	2.994	23,789	103	1.016	2,713	187	0.243	501
20	2.972	23,096	104	0.999	2,655	188	0.239	494
21	2.949	22,427	105	0.983	2,597	189	0.235	487
22	2.926	21,779	106	0.966	2,542	190	0.231	480
23	2.903	21,153	107	0.950	2,488	191	0.228	473
24	2.879	20,547	108	0.934	2,436	192	0.224	467
25	2.856	19,960	109	0.918	2,385	193	0.220	461
26	2.832	19,393	110	0.903	2,335	194	0.217	456
27	2.808	18,843	111	0.888	2,286	195	0.213	450
28	2.784	18,311	112	0.873	2,239	196	0.210	445
29	2.759	17,796	113	0.858	2,192	197	0.206	439
30	2.735	17,297	114	0.843	2,147	198	0.203	434
31	2.710	16,814	115	0.829	2,103	199	0.200	429
32	2.685	16,346	116	0.815	2,060	200	0.197	424
33	2.660	15,892	117	0.801	2,018	201	0.194	419
34	2.634	15,453	118	0.787	1,977	202	0.191	415
35	2.609	15,027	119	0.774	1,937	203	0.188	410
36	2.583	14,614	120	0.761	1,898	204	0.185	405
37	2.558	14,214	121	0.748	1,860	205	0.182	401
38	2.532	13,826	122	0.735	1,822	206	0.179	396
39	2.506	13,449	123	0.723	1,786	207	0.176	391
40	2.480	13,084	124	0.710	1,750	208	0.173	386
41	2.454	12,730	125	0.698	1,715	209	0.171	382
42	2.428	12,387	126	0.686	1,680	210	0.168	377
43	2.402	12,053	127	0.674	1,647	211	0.165	372
44	2.376	11,730	128	0.663	1,614	212	0.163	367
45	2.349	11,416	129	0.651	1,582	213	0.160	361
46	2.323	11,112	130	0.640	1,550	214	0.158	356
47	2.296	10,816	131	0.629	1,519	215	0.155	350
48	2.270	10,529	132	0.618	1,489	216	0.153	344
49	2.244	10,250	133	0.608	1,459	217	0.151	338
50	2.217	9,979	134	0.597	1,430	218	0.148	332
51	2.191	9,717	135	0.587	1,401	219	0.146	325
52	2.165	9,461	136	0.577	1,373	220	0.144	318
53	2.138	9,213	137	0.567	1,345	221	0.142	311
54	2.112	8,973	138	0.557	1,318	222	0.140	304
55	2.086	8,739	139	0.548	1,291	223	0.138	297
56	2.060	8,511	140	0.538	1,265	224	0.135	289
57	2.034	8,291	141	0.529	1,240	225	0.133	282
58	2.008	8,076	142	0.520	1,214			

**Table 75 — Thermistor Temperature (C) vs Resistance/Voltage Drop Values for
5K Thermistors (5K at 25 C Resistors)**

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
-32	3.705	100,260	15	1.982	7,855	62	0.506	1,158
-31	3.687	94,165	16	1.935	7,499	63	0.490	1,118
-30	3.668	88,480	17	1.889	7,161	64	0.475	1,079
-29	3.649	83,170	18	1.844	6,840	65	0.461	1,041
-28	3.629	78,125	19	1.799	6,536	66	0.447	1,006
-27	3.608	73,580	20	1.754	6,246	67	0.433	971
-26	3.586	69,250	21	1.710	5,971	68	0.420	938
-25	3.563	65,205	22	1.666	5,710	69	0.407	906
-24	3.539	61,420	23	1.623	5,461	70	0.395	876
-23	3.514	57,875	24	1.580	5,225	71	0.383	836
-22	3.489	54,555	25	1.538	5,000	72	0.371	805
-21	3.462	51,450	26	1.497	4,786	73	0.360	775
-20	3.434	48,536	27	1.457	4,583	74	0.349	747
-19	3.406	45,807	28	1.417	4,389	75	0.339	719
-18	3.376	43,247	29	1.378	4,204	76	0.329	693
-17	3.345	40,845	30	1.340	4,028	77	0.319	669
-16	3.313	38,592	31	1.302	3,861	78	0.309	645
-15	3.281	38,476	32	1.265	3,701	79	0.300	623
-14	3.247	34,489	33	1.229	3,549	80	0.291	602
-13	3.212	32,621	34	1.194	3,404	81	0.283	583
-12	3.177	30,866	35	1.160	3,266	82	0.274	564
-11	3.140	29,216	36	1.126	3,134	83	0.266	547
-10	3.103	27,633	37	1.093	3,008	84	0.258	531
-9	3.065	26,202	38	1.061	2,888	85	0.251	516
-8	3.025	24,827	39	1.030	2,773	86	0.244	502
-7	2.985	23,532	40	0.999	2,663	87	0.237	489
-6	2.945	22,313	41	0.969	2,559	88	0.230	477
-5	2.903	21,163	42	0.940	2,459	89	0.223	466
-4	2.860	20,079	43	0.912	2,363	90	0.217	456
-3	2.817	19,058	44	0.885	2,272	91	0.211	446
-2	2.774	18,094	45	0.858	2,184	92	0.204	436
-1	2.730	17,184	46	0.832	2,101	93	0.199	427
0	2.685	16,325	47	0.807	2,021	94	0.193	419
1	2.639	15,515	48	0.782	1,944	95	0.188	410
2	2.593	14,749	49	0.758	1,871	96	0.182	402
3	2.547	14,026	50	0.735	1,801	97	0.177	393
4	2.500	13,342	51	0.713	1,734	98	0.172	385
5	2.454	12,696	52	0.691	1,670	99	0.168	376
6	2.407	12,085	53	0.669	1,609	100	0.163	367
7	2.360	11,506	54	0.649	1,550	101	0.158	357
8	2.312	10,959	55	0.629	1,493	102	0.154	346
9	2.265	10,441	56	0.610	1,439	103	0.150	335
10	2.217	9,949	57	0.591	1,387	104	0.146	324
11	2.170	9,485	58	0.573	1,337	105	0.142	312
12	2.123	9,044	59	0.555	1,290	106	0.138	299
13	2.076	8,627	60	0.538	1,244	107	0.134	285
14	2.029	8,231	61	0.522	1,200			

Table 76 — Thermistor Temperature (°F) vs Resistance/Voltage Drop Values for 10K Thermistors and Sensors (10K at 25 C Resistors)

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 77 — Thermistor Temperatures (°C) vs Resistance/Voltage Drop Values for 10K Thermistors and Sensors (10K at 25 C Resistors)

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	16,474	61	0.968	2,400			

Table 78 — Suction Pressure Transducer Pressure (PSIG) vs Voltage Drop Values for SSP-A, SSP-B, and SSP-C

PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)	PRESSURE (PSIG)	VOLTAGE DROP (V)
0	0.290	34	1.436	68	2.582	102	3.728
1	0.324	35	1.470	69	2.615	103	3.761
2	0.357	36	1.503	70	2.649	104	3.795
3	0.391	37	1.537	71	2.683	105	3.829
4	0.425	38	1.571	72	2.717	106	3.862
5	0.458	39	1.604	73	2.750	107	3.896
6	0.492	40	1.638	74	2.784	108	3.930
7	0.526	41	1.672	75	2.818	109	3.964
8	0.560	42	1.705	76	2.851	110	3.997
9	0.593	43	1.739	77	2.885	111	4.031
10	0.627	44	1.773	78	2.919	112	4.065
11	0.661	45	1.807	79	2.952	113	4.098
12	0.694	46	1.840	80	2.986	114	4.132
13	0.728	47	1.874	81	3.020	115	4.166
14	0.762	48	1.908	82	3.054	116	4.200
15	0.795	49	1.941	83	3.087	117	4.233
16	0.829	50	1.975	84	3.121	118	4.267
17	0.863	51	2.009	85	3.155	119	4.301
18	0.897	52	2.042	86	3.188	120	4.334
19	0.930	53	2.076	87	3.222	121	4.368
20	0.964	54	2.110	88	3.256	122	4.402
21	0.998	55	2.144	89	3.290	123	4.435
22	1.031	56	2.177	90	3.323	124	4.469
23	1.065	57	2.211	91	3.357	125	4.503
24	1.099	58	2.245	92	3.391	126	4.537
25	1.132	59	2.278	93	3.424	127	4.570
26	1.166	60	2.312	94	3.458	128	4.604
27	1.200	61	2.346	95	3.492	129	4.638
28	1.234	62	2.380	96	3.525	130	4.671
29	1.267	63	2.413	97	3.559	131	4.705
30	1.301	64	2.447	98	3.593	132	4.739
31	1.335	65	2.481	99	3.627	133	4.772
32	1.368	66	2.514	100	3.660	134	4.806
33	1.402	67	2.548	101	3.694	135	4.840

APPENDIX A — CCN TABLES
UNIT (General Unit Configurations) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Number of Compressors	1 – 3	2: 12.5, 25 ton 3: 15, 18, 20 ton		NUM_COMP
Compressor Min On Time	120 – 999	180	sec	MIN_ON
Compressor Min Off Time	300 – 999	300	sec	MIN_OFF
Runtime to Reset Strikes	120 – 999	300	sec	MIN_ON_S
Cool Stage Decrease Rate	120 – 999	300	sec	STAGEDEC
Cool Stage Increase Rate	120 – 999	450	sec	STAGEINC
Fan-off Delay, Mech Cool	0 – 600	60	sec	COOL_FOD
Invert Evaporators	Yes/No	Yes		INVERT_E
Alert Each Strike	Yes/No	Yes		ALM_NOW
Suction OK Temperature	10 – 50	18	dF	SSTOK
Low Suction — Level 1	10 – 50	20	dF	SSTLEV1
Low Suction — Level 2	5 – 50	15	dF	SSTLEV2
Low Suction — Level 3	0 – 50	10	dF	SSTLEV3
Type of Heat Installed	0 = No Heat 1 = Gas 2 = Electric	1: 48 Series 2: 50 Series with electric heat 0: 50 Series with no electric heat		HEATTYPE
Number of Heat Stages	1 – 2	2 (All units except 50HG014 with low heat) 1 (50HG014 with low heat)		NUM_HEAT
Heat Minimum On Time	60 – 999	120	sec	HMIN_ON
Heat Minimum Off Time	60 – 999	120	sec	HMIN_OFF
Heat Stage Decrease Rate	120 – 999	300	sec	HSTAGDEC
Heat Stage Increase Rate	120 – 999	450	sec	HSTAGINC
Fan-off Delay, Elec Heat	10 – 600	30	sec	ELEC_FOD
Fan-off Delay, Gas Heat	45 – 600	45	sec	GAS_FOD
SAT Sensor Heat Config	0 = Invalid for Heat 1 = Accurate for Heat 2 = Approximate for Heat	0: Horizontal Discharge 2: Vertical Discharge		SAT_HEAT
SAT Cool Demand (+) Level	0.5 – 10.0	1.0	^F	SAT_POS
SAT Cool Demand (–) Level	-10.0 – -0.5	-1.0	^F	SAT_NEG
SAT Settling Time	10 – 900	240	sec	SAT_SET
Minimum SAT Upper Level	35.0 – 65.0	58.0	dF	SATMIN_H
Minimum SAT Lower Level	35.0 – 65.0	48.0	dF	SATMIN_L
A1 Current Sensing	Enable/Disable	Enable		A1_SENSE
Circuit A Level 1 Fans	1 – 7	1		CIR_A_1
A Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	ALEV1ON
A Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	ALEV1OFF
Circuit A Level 2 Fans	1 – 7	3		CIR_A_2
A Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	ALEV2ON
A Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	ALEV2OFF
B1 Current Sensing	Enable/Disable	Enable		B1_SENSE
Circuit B Level 1 Fans	1 – 7	4		CIR_B_1
B Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	BLEV1ON
B Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	BLEV1OFF
Circuit B Level 2 Fans	1 – 7	6		CIR_B_2
B Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	BLEV2ON
B Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	BLEV2OFF
C1 Current Sensing	Enable/Disable	Enable		C1_SENSE
Circuit C Level 1 Fans	1 – 7	5		CIR_C_1
C Fan Lev1 ON Pressure	0 – 500.0	150.0	PSIG	CLEV1ON
C Fan Lev1 OFF Pressure	0 – 500.0	0.0	PSIG	CLEV1OFF
Circuit C Level 2 Fans	1 – 7	7		CIR_C_2
C Fan Lev2 ON Pressure	0 – 500.0	200.0	PSIG	CLEV2ON
C Fan Lev2 OFF Pressure	0 – 500.0	100.0	PSIG	CLEV2OFF

APPENDIX A — CCN TABLES (cont)

OPTIONS1 (Option Configurations) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Startup Delay (seconds)	0 – 600	30	sec	STARTDLY
Unit Control Type	1 = AutoSelect 2 = Thermostat 3 = Space Sensor	2		CTL_TYPE
Thermostat Control Type	0 = Adaptive 1 = 1 Stage Y1 2 = 2 Stage Y1	0		STATTYPE
Fan On When Occupied	Yes/No	Yes		OCC_FAN
Shut Down on IDF Failure	Yes/No	Yes		FATALFAN
Economizer Equipped Unit	Yes/No	Yes		ECONO
Fan Status Switch	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		FANSTCFG
Filter Status Switch	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0: No FIOP 1: FIOP		FILSTCFG
Fire Shutdown Switch	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0: No FIOP 2: FIOP		SHTDNCFG
Remote Occupancy Switch	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		REMOCCFG
RAT Sensor on SPTO Input	Yes/No	No		RAT_SPTO
RH Sensor on OAQ Input	Yes/No	No		RH_OAQ

IAQ (Indoor Air Quality Configurations) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
IAQ Analog Input Configuration	0 = Not Used 1 = Demand Ventilation 2 = Econ Position Override 3 = Econ Min Position Ctrl	0: No CO ₂ sensor 1: CO ₂ sensor		IAQANCFG
IAQ Analog Input Fan Cfg	0 = Never 1 = Only While Occupied 2 = Always	0		IAQANFAN
IAQ Switch Input Config	0 = Not Switch 1 = DCV NO 2 = DCV NC 3 = Override NO 4 = Override NC	0		IAQINCFG
IAQ Switch Input Fan CFG	0 = Never 1 = Only When Occupied 2 = Always	0		IAQINFAN
Minimum IAQ Position	0 – 100	10	%	IAQMINP
Economizer Min Position	0 – 100	30	%	ECONOMIN
Econo Override Position	0 – 100	100	%	IAQOVPOS
OAQ Sensor Operation	0 = Not used 1 = Demand Ventilation 2 = Outdoor Air Lockout	0		OAQANCFG
OAQ Lockout		600		OAQLOCK
AQ Differential Low	0 – 5000	100		DAQ_LOW
AQ Differential High	0 – 5000	700		DAQ_HIGH
Fan On AQ Differential	0 – 5000	600		DAQFNON
Fan Off AQ Differential	0 – 5000	200		DAQFNOFF
IAQ Sensor Value at 4mA	0 – 5000	0		IAQ_4MA
IAQ Sensor Value at 20mA	0 – 5000	2000		IAQ_20MA
OAQ Sensor Value at 4mA	0 – 5000	0		QAQ_4MA
OAQ Sensor Value at 20mA	0 – 5000	2000		OAQ_20MA
RH Sensor Value at 4mA	0 – 100	0	%	RH_4MA
RH Sensor Value at 20mA	0 – 100	100	%	RH_20MA
Space RH Setpoint	30 – 95	50	%	SPRH_SP
Space RH SetPnt Deadband	2 – 20	5	%	SPRH_DB

APPENDIX A — CCN TABLES (cont)

SEN_CAL (Space Temperature Sensor Calibration) — MAINTENANCE

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Space Temperature Calibration	–30 – 130		F	SPT_CAL
Space Temperature Trim	–30 – 30	0	^F	SPT_OFF

ECONOCFG (Economizer Configurations) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Economizer Control Type	1 = Digital/Position Feedback 2 = Digital/Command Feedback 3 = Analog Control	1		ECON_CTL
Economizer Min Position	0 – 100	30	%	ECONOMIN
Econ High Temp Lockout	55 – 75	65	dF	OATLECLH
Econ Low Temp Lockout	0 – 50	0	dF	OATLECLL
Unocc Econ Free Cooling	0 = Disabled 1 = Entire Unoccupied Per. 2 = PreOccupancy (Timed)	2		UEFC_CFG
Free Cooling PreOcc Time	1 – 9999	120	Minutes	UEFCTIME
Free Cool Low Temp Limit	0 – 70	50	dF	OATLUEFC
Power Exhaust Control	Enable/Disable	Disable : NO FIOP Enable: FIOP		PE_ENABL
PE Stage1 Econo Position	0 – 100	40	%	PE1_POS
PE Stage2 Econo Position	0 – 100	75	%	PE2_POS
Enthalpy Switch	0 = Not Installed 1 = Normally Open 2 = Normally Closed	0		ENTHLCFG
Economizer Travel Time	5 – 300	150	sec	ECONOTRV
Bottom Stage Max Econmzr	0 – 100	50	%	ECONMAXB
Middle Stage Max Econmzr	0 – 100	25	%	ECONMAXM
Top Stage Max Econmzr	0 – 100	0	%	ECONMAXT
Economizer PID Deadband	0 – 25	3	%	ECONBAND
Economizer PID – kP	0.0 – 99.9	2.5		ECONO_P
Economizer PID – kI	0.0 – 99.9	0.1		ECONO_I
Economizer PID – kD	0.0 – 99.9	1.0		ECONO_D
Economizer PID – rate	0.0 – 99.9	15.0	sec	ECONO_DT

REHTCFG (Reheat Configurations) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Reheat Equipped Unit	Yes/No	No		REHEAT
Number of Reheat Cirs.	0 – 2	2		NUM_REHT
Reheat Heat SP Deadband	–5.0 – 5.0	2.0	F	RH_HSPDB
Reheat Minimum Off Time	10 – 300	30	sec	RMIN_OFF
Humidistat Control Type	1 = 1-Stage Y1 2 = 2-Stage Y1 3 = Digital 4 = Exclusive	4		HUMTYPE
Humidistat Input	0 = No Switch 1 = Normally Open 2 = Normally Closed	0		HUMSTCFG
Flush Reheat Circuits	Yes/No	NO		RHFLUSH
Runtime Between RH Flush	0 – 99.9	10.0	hr	FLUSH_T
RH Flush Duration (Secs)	15 – 900	120	sec	FLUSH_D
Lev 2 ON Reheat Offset	0 – 100	10	PSIG	LEV2UPRH
Lev 2 OFF Reheat Delta	20 – 200	50	PSIG	LEV2DNRH
Lev 2 Reheat Eval Time	0 – 9999	60	sec	LEV2TMRH

APPENDIX A — CCN TABLES (cont)
SET_PNT (Unit Set Points) — SET POINT SCHEDULE

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Occupied Cool Set Point	55 – 80	78	dF	OCSP
Occupied Heat Set Point	55 – 80	68	dF	OHSP
Unoccupied Cool Set Point	75 – 95	85	dF	UCSP
Unoccupied Heat Set Point	40 – 80	60	dF	HCSP
Heat-Cool Set Point Gap	2 – 10	5	^F	HCSP_GAP
SPT Offset Range (+/-)	1 – 5	5	dF	SPTO_RNG
Space RH Setpoint	30.0 – 95.0	50.0	%	SPRH_SP
Space RH Setpoint Deadband	2.0 – 20.0	2.0	%	SPRH_DB
Heating Lockout Temp	55 – 90	75	dF	OATLHEAT
Compressor Lockout Temp	0 – 75	0	dF	OATLCOMP
Econ High Temp Lockout	40 – 75	65	dF	OATLECLH
Econ Low Temp Lockout	0 – 50	0	dF	OATLECLL
Free Cool Low Temp Limit	0 – 70	50	dF	OATLUEFC
Minimum SAT Upper Level	35.0 – 65.0	58.0	dF	SATMIN_H
Minimum SAT Lower Level	35.0 – 65.0	48.0	dF	SATMIN_L
Low Cool SAT Set Point	55 – 75	65	dF	LCSASP
High Cool SAT Set Point	50 – 70	55	dF	HCSASP

APPENDIX A — CCN TABLES (cont)

GENERAL — POINTS

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
UNIT:				
Currently Occupied	Yes/No		OCCUPIED	Y
Supply Air Temperature	snnn.n	dF	SAT	N
Return Air Temperature	snnn.n	dF	RAT	Y
Outdoor Air Temperature	snnn.n	dF	OAT	Y
Space Temperature	snnn.n	dF	SPACE_T	Y
Space Temperature Offset	sn.n	dF	SPTO	Y
Space Relative Humidity	nnn.n	%	SPRH	Y
Cooling Demand	snn.n	^F	COOL_DMD	N
Heating Demand	snn.n	^F	HEAT_DMD	N
Unit Shutdown Input	On/Off		FIREDOWN	Y
Fan Status	On/Off		FAN_STAT	N
Filter Status	Dirty/Clean		FILTSTAT	N
Remote Occupancy Input	On/Off		REM_OCC	Y
Indoor Fan	On/Off		IDF	N
Indoor Fan Feedback	On/Off		IDF_FDBK	N
Indoor Fan Power	On/Off		IDFPWR	N
Outdoor Fan Contactor 1	On/Off		OFC_1	N
Outdoor Fan Contactor 2	On/Off		OFC_2	N
Outdoor Fan Contactor 3	On/Off		OFC_3	N
Heat Stage 1	On/Off		HEAT_1	N
Heat 1 Timeguard (secs)	nnn		TIMGD_H1	N
Heat Stage 2	On/Off		HEAT_2	N
Heat 2 Timeguard (secs)	nnn		TIMGD_H2	N
CIRCUIT A:				
Saturated Suct Temp A	snnn.n	dF	SST_A	N
Saturated Suct Press A	nnn.n	PSIG	SSP_A	N
Saturated Cond Temp A	snnn.n	dF	SCT_A	N
Saturated Cond Press A	nnn.n	PSIG	SCP_A	N
Compressor A1	On/Off		COMP_A1	N
A1 Current Sensor	On/Off		CS_A1	N
A1 Timeguard (secs)	nnn		TIMGD_A1	N
Circuit A Fan Level	n		A_FANLEV	N
Circuit A Strikes	n		ASTRIKES	N
CIRCUIT B:				
Saturated Suct Temp B	snnn.n	dF	SST_B	N
Saturated Suct Press B	nnn.n	PSIG	SSP_B	N
Saturated Cond Temp B	snnn.n	dF	SCT_B	N
Saturated Cond Press B	nnn.n	PSIG	SCP_B	N
Compressor B1	On/Off		COMP_B1	N
B1 Current Sensor	On/Off		CS_B1	N
B1 Timeguard (secs)	nnn		TIMGD_B1	N
Circuit B Fan Level	n		B_FANLEV	N
Circuit B Strikes	n		BSTRIKES	N
CIRCUIT C:				
Saturated Suct Temp C	snnn.n	dF	SST_C	N
Saturated Suct Press C	nnn.n	PSIG	SSP_C	N
Saturated Cond Temp C	snnn.n	dF	SCT_C	N
Saturated Cond Press C	nnn.n	PSIG	SCP_C	N
Compressor C1	On/Off		COMP_C1	N
C1 Current Sensor	On/Off		CS_C1	N
C1 Timeguard (secs)	nnn		TIMGD_C1	N
Circuit C Fan Level	n		C_FANLEV	N
Circuit C Strikes	n		CSTRIKES	N

APPENDIX A — CCN TABLES (cont)

TSTAT (Thermostat) — POINTS

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
Thermostat Y1 Input	On/Off		Y1	Y
Thermostat Y2 Input	On/Off		Y2	Y
Thermostat W1 Input	On/Off		W1	Y
Thermostat W2 Input	On/Off		W2	Y
Thermostat G Input	On/Off		G	Y

LON_DATA — POINTS

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
nviSpacetemp	nnn.n	dF	NVI_SPT	Y
nviSetPoint	nnn.n	dF	NVI_SP	Y
nvoSpaceTemp	nnn.n	dF	NVO_SPT	Y
nvoUnitStatus.mode	nnnn		NVO_MODE	Y
nvoUnitStatus.heat_out_p	nnn.n	%	NVO_HPRI	Y
nvoUnitStatus.heat_out_s	nnn.n	%	NVO_HSEC	Y
nvoUnitStatus.cool_out	nnn.n	%	NVO_COOL	Y
nvoUnitStatus.econ_out	nnn.n	%	NVO_ECON	Y
nvoUnitStatus.fan_out	nnn	%	NVO_FAN	Y
nvoUnitStatus.in_alarm	nnn		NVO_ALRM	Y
nviSetPtOffset	nnn.n	^F	NVI_SPTO	Y
nviOutsideTemp	nnn.n	dF	NVI_OAT	Y
nviOutsideRH	nnnn.n	%	NVI_OARH	Y
nvoEffectSetPt	nnn.n	dF	NVO_EFSP	Y
nvoOutsideTemp	nnnn.n	dF	NVO_OAT	Y
nvoOutsideRH	nnn.n	%	NVO_OARH	Y
nviSpaceRH	nnn.n	%	NVI_SPRH	Y
nviCO2	nnnnn		NVI_CO2	Y
nvoCO2	nnnnn		NVO_CO2	Y
nvoTEMP1	nnn.n	dF	NVO_SAT	Y
nvoTEMP2	nnn.n	dF	NVO_RAT	Y
nviPCT1	nnn.n	%	NVI_RHSP	Y
nvoPCT1	nnn.n	%	NVO_SPRH	Y
nviDISCRETE1	Off/On		NVI_FSD	Y
nviDISCRETE2	no/Yes		NVI_OCC	Y
nviDISCRETE3	Off/On		NVI_IAQD	Y
nvoDISCRETE1	Off/On		NVO_FSD	Y
nvoDISCRETE2	no/Yes		NVO_OCC	Y
nvoDISCRETE3	Off/On		NVO_IAQD	Y
nciCO2Limit	nnnnn		NCI_CO2	Y
nciSetPnts.occupied_cool	nnn.n	dF	NCI_OCSP	Y
nciSetPnts.standby_cool	nnn.n	dF	NCI_SCSP	Y
nciSetPnts.unoccupd_cool	nnn.n	dF	NCI_UCSP	Y
nciSetPnts.occupied_heat	nnn.n	dF	NCI_OHSP	Y
nciSetPnts.standby_heat	nnn.n	dF	NCI_SHSP	Y
nciSetPnts.unoccupd_heat	nnn.n	dF	NCI_UHSP	Y

APPENDIX A — CCN TABLES (cont)

ECONOMZR (Economizer) — POINTS

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
Economizer Power	On/Off		ECON_PWR	N
Economizer Commanded Pos	nn	%	ECONOCMD	N
Economizer Position	nn	%	ECONOPOS	N
Minimum Position in Effect	nnn	%	MIN_POS	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air Temp Demand	snn.n	^F	SAT_DMD	N
Enthalpy	High/Low		ENTHALPY	Y
IAQ Level (Switch Input)	High/Low		IAQIN	Y
Indoor Air Quality	nnnn		IAQ	Y
Outdoor Air Quality	nnnn		OAQ	Y
Power Exhaust Relay 1	On/Off		PE_1	N
Power Exhaust Relay 2	On/Off		PE_2	N

REHEAT (Reheat) — POINTS

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
Humidistat Input	On/Off		HUM_STAT	Y
Thermostat Y1 Input	On/Off		Y1	Y
Thermostat Y2 Input	On/Off		Y2	Y
Reheat Cir. A Output	On/Off		REHEAT_A	N
ReheatA Timeguard (secs)	nnn		TIMGD_RA	N
Reheat Cir. B Output	On/Off		REHEAT_B	N
ReheatB Timeguard (secs)	nnn		TIMGD_RB	N
Circuit A:				
Saturated Suct Temp A	snnn.n	dF	SST_A	N
Saturated Suct Press A	nnn.n	PSIG	SSP_A	N
Saturated Cond Temp A	snnn.n	dF	SCT_A	N
Saturated Cond Press A	nnn.n	PSIG	SCP_A	N
Compressor A1	On/Off		COMP_A1	N
A1 Current Sensor	On/Off		CS_A1	N
A1 Timeguard (secs)	nnn		TIMGD_A1	N
Circuit A Fan Level	n		A_FANLEV	N
Circuit A Strikes	n		ASTRIKES	N
Circuit B:				
Saturated Suct Temp B	snnn.n	dF	SST_B	N
Saturated Suct Press B	nnn.n	PSIG	SSP_B	N
Saturated Cond Temp B	snnn.n	dF	SCT_B	N
Saturated Cond Press B	nnn.n	PSIG	SCP_B	N
Compressor B1	On/Off		COMP_B1	N
B1 Current Sensor	On/Off		CS_B1	N
B1 Timeguard (secs)	nnn		TIMGD_B1	N
Circuit B Fan Level	n		B_FANLEV	N
Circuit B Strikes	n		BSTRIKES	N
Circuit C:				
Saturated Suct Temp C	snnn.n	dF	SST_C	N
Saturated Suct Press C	nnn.n	PSIG	SSP_C	N
Saturated Cond Temp C	snnn.n	dF	SCT_C	N
Saturated Cond Press C	nnn.n	PSIG	SCP_C	N
Compressor C1	On/Off		COMP_C1	N
C1 Current Sensor	On/Off		CS_C1	N
C1 Timeguard (secs)	nnn		TIMGD_C1	N
Circuit C Fan Level	n		C_FANLEV	N
Circuit C Strikes	n		CSTRIKES	N

APPENDIX A — CCN TABLES (cont)

STATUS (Status of Modes) — POINTS

SYSTEM MODE:	Level 1 Description
	Level 2 Description
	Level 3 Description
HVAC MODE:	Level 1 Description
	Level 2 Description
	Level 3 Description

COOLING — MAINTENANCE

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
In Cooling Mode?	Yes/No		IN_COOL	N
Outdoor Air is Cool	Yes/No		OAT_COOL	N
OK to Use Compressors	Yes/No		MECHCOOL	N
Available Cooling Stages	n		AVLCSTGS	N
Requested Cooling Stages	n		REQCSTGS	N
Actual Cooling Stages	n		ACTCSTGS	N
Compressor A1	On/Off		COMP_A1	N
Compressor B1	On/Off		COMP_B1	N
Compressor C1	On/Off		COMP_C1	N
Available Reheat Stages	n		AVLRSTGS	N
Requested Reheat Stages	n		REQRSTGS	N
Actual Reheat Stages	n		ACTRSTGS	N
Reheat Cir. A Output	On/Off		REHEAT_A	N
Reheat Cir. B Output	On/Off		REHEAT_B	N
Space Temperature	snnn.n	dF	SPT	Y
Cooling Demand	snn.n	^F	COOL_DMD	N
Cool Demand d/dt (F/min)	snnn.n		CLDTREND	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air Temp Demand	snn.n	^F	SAT_DMD	N
Supply Air d/dt (F/min)	snnn.n		SATTREND	N
SAT Delta Reference Temp	snnn.n	dF	SAT_REF	N
Economizer Position	nnn	%	ECONOPOS	N
Cool Thermal Lag Factor	n.n		COOL_LAG	Y
SPT Cool Demand(+) Level	n.n	^F	DEM_POS	Y
SPT Cool Demand(-) Level	sn.n	^F	DEM_NEG	Y
SAT Cool Demand(+) Level	n.n	^F	SAT_POS	Y
SAT Cool Demand(-) Level	sn.n	^F	SAT_NEG	Y
MET2Add SAT Trend Level	sn.n	^F	M2ADC.T	Y

APPENDIX A — CCM TABLES (cont)

HEATING — MAINTENANCE

DESCRIPTION	STATUS	UNITS	POINT	FORCIBLE
in Heating Mode?	Yes/No		IN_HEAT	N
OK to Use Heat	Yes/No		OKTOHEAT	N
Available Heating Stages	n		AVLHSTGS	N
Requested Heating Stages	n		REQHSTGS	N
Actual Heating Stages	n		ACTHSTGS	N
Heat Stage 1	On/Off		HEAT_1	N
Heat Stage 2	On/Off		HEAT_2	N
Space Temperature	snnn.n	dF	SPT	Y
Heating Demand	snn.n	^F	HEAT_DMD	N
Heat Demand d/dt (F/min)	snnn.n		HTDTREND	N
Supply Air Temperature	snnn.n	dF	SAT	N
Supply Air d/dt (F/min)	snnn.n		SATTREND	N
Heat Thermal Lag Factor	n.n		HEAT_LAG	Y
SPT Heat Demand (+) Level	n.n	^F	HDEM_POS	Y
SPT Heat Demand (-) Level	sn.n	^F	HDEM_NEG	Y

ALARMOUT — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
ALARM OUTPUT ACTIVE FOR:				
SPT/SPRH Sensor Failure	Yes/No	Yes		SPACE_AL
SAT/RAT Sensor Failure	Yes/No	Yes		SATRATAL
OAT Thermistor Failure	Yes/No	Yes		OAT_AL
Current Sensor Failure	Yes/No	Yes		CS_AL
Compressor Failure	Yes/No	Yes		COMP_AL
Refrig Circuit Failure	Yes/No	Yes		CKT_AL
SSP Transducer Failure	Yes/No	Yes		SSP_AL
SCT Thermistor Failure	Yes/No	Yes		SCT_AL
Indoor Fan Failure	Yes/No	Yes		FAN_AL
Plugged Filter	Yes/No	Yes		FILT_AL
Thermostat Failure	Yes/No	Yes		TSTAT_AL
Economizer Failure	Yes/No	Yes		ECON_AL

APPENDIX A — CCN TABLES (cont)
STRTHOUR (Component Hours and Cycles) — MAINTENANCE

DESCRIPTION	STATUS	UNITS	POINT
Compressor A1 Run Hours	nnnnn.nn	hours	HR_A1
Compressor B1 Run Hours	nnnnn.nn	hours	HR_B1
Compressor C1 Run Hours	nnnnn.nn	hours	HR_C1
Compressor A1 Cycles	nnnnnn		CY_A1
Compressor B1 Cycles	nnnnnn		CY_B1
Compressor C1 Cycles	nnnnnn		CY_C1
Reheat A Run Hours	nnnn.nn	hours	HR_RHT_A
Reheat B Run Hours	nnnn.nn	hours	HR_RHT_B
Reheat Circuit A Cycles	nnnnnn	hours	CY_RHT_A
Reheat Circuit B Cycles	nnnnnn		CY_RHT_B
Indoor Fan Run Hours	nnnnn.nn	hours	HR_IDF
Indoor Fan Cycles	nnnnnn		CY_IDF
OD Fan Cont. 1 Run Hours	nnnnn.nn	hours	HR_OFC_1
OD Fan Cont. 2 Run Hours	nnnnn.nn	hours	HR_OFC_2
OD Fan Cont. 3 Run Hours	nnnnn.nn	hours	HR_OFC_3
OD Fan Contact. 1 Cycles	nnnnnn		CY_OFC_1
OD Fan Contact. 2 Cycles	nnnnnn		CY_OFC_2
OD Fan Contact. 3 Cycles	nnnnnn		CY_OFC_3
Heat Stage 1 Run Hours	nnnnn.nn	hours	HR_HTR_1
Heat Stage 2 Run Hours	nnnnn.nn	hours	HR_HTR_2
Heat Stage 1 Cycles	nnnnnn		CY_HTR_1
Heat Stage 2 Cycles	nnnnnn		CY_HTR_2
Power Exhaust1 Run Hours	nnnnn.nn	hours	HR_PE_1
Power Exhaust2 Run Hours	nnnnn.nn	hours	HR_PE_2
Power Exhaust 1 Cycles	nnnnnn		CY_PE_1
Power Exhaust 2 Cycles	nnnnnn		CY_PE_2
Economizer Pwr Run Hours	nnnnn.nn	hours	HR_ECPWR
Economizer Power Cycles	nnnnnn		CY_ECPWR
Alarm Output Run Hours	nnnnn.nn	hours	HR_ALM
Alarm Output Cycles	nnnnnn		CY_ALM

VERSIONS — MAINTENANCE

DESCRIPTION	VERSION NUMBER	STATUS
MBB	CESR131278-	nn-nn
ECB	CESR131249-	nn-nn
MARQUEE	CESR131171-	nn-nn

APPENDIX A — CCN TABLES (cont)

BRODEFS (Broadcast POC Definition Table) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
CCN Time/Date Broadcast	Yes/No	No		CCNBC
CCN OAT Broadcast	Yes/No	No		OATBC
Global Schedule Broadcast	Yes/No	No		GSBC
CCN Broadcast Ackr	Yes/No	No		CCNBCACK
Daylight Savings Start				
Start Month	1 to 12	4		STARTM
Start Week	1 to 5	1		STARTW
Start Day	1 to 7	7		STARTD
Minutes to add	0 to 60	60	min	MINADD
Daylight Savings Stop				
Stop Month	1 to 12	10		STOPM
Stop Week	1 to 5	5		STOPW
Stop Day	1 to 7	7		STOPD
Minutes to subtract	0 to 60	60	min	MINSUB

OCCUPANCY MAINTENANCE TABLE OCCUPANCY SUPERVISORY — MAINTENANCE

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		PRVUNDAY
Previous Unoccupied Time	hh:mm	PRVUNTIM

DISPLAY (STDU SETUP) — CONFIGURATION

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

SCHEDOVR (TIMED OVERRIDE SETUP) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Schedule Num	0-99	0		SCHEDNUM
Timed Override	Yes/No	Yes		TIMEOVER
Override Time Limit	0-4	4	hours	OTL
Timed Override Hours	0-4	0	hours	OTL_EXT
Accept Global Holidays	Yes/No	Yes		HOLIDAYT

APPENDIX A — CCN TABLES (cont)
ALARMDEF (Alarm Definition Table) — CONFIGURATION

DESCRIPTION	STATUS	DEFAULT	UNITS	POINT
Alarm Routing Control	00000000	00000000		ALRM_CNT
Equipment Priority	0 to 7	4		EQP_TYPE
Comm Failure Retry Time	1 to 240	10	min	RETRY_TM
Re-alarm Time	1 to 255	30	min	RE-ALARM
Alarm System Name	XXXXXXXX	48_50_HG		ALRM_NAM

ALARMS — MAINTENANCE

DESCRIPTION	STATUS	UNITS	POINT
Reset All Current Alarms	No		ALRESET
Reset Alarm History	No		ALHISCLR
Circuit A Strikes	n		ASTRIKES
Circuit B Strikes	n		BSTRIKES
Circuit C Strikes	n		CSTRIKES
Active Alarm #1	Axxx or Txxx		ALARM01C
Active Alarm #2	Axxx or Txxx		ALARM02C
Active Alarm #3	Axxx or Txxx		ALARM03C
Active Alarm #4	Axxx or Txxx		ALARM04C
Active Alarm #5	Axxx or Txxx		ALARM05C
Active Alarm #6	Axxx or Txxx		ALARM06C
Active Alarm #7	Axxx or Txxx		ALARM07C
Active Alarm #8	Axxx or Txxx		ALARM08C
Active Alarm #9	Axxx or Txxx		ALARM09C
Active Alarm #10	Axxx or Txxx		ALARM10C
Active Alarm #11	Axxx or Txxx		ALARM11C
Active Alarm #12	Axxx or Txxx		ALARM12C
Active Alarm #13	Axxx or Txxx		ALARM13C
Active Alarm #14	Axxx or Txxx		ALARM14C
Active Alarm #15	Axxx or Txxx		ALARM15C
Active Alarm #16	Axxx or Txxx		ALARM16C
Active Alarm #17	Axxx or Txxx		ALARM17C
Active Alarm #18	Axxx or Txxx		ALARM18C
Active Alarm #19	Axxx or Txxx		ALARM19C
Active Alarm #20	Axxx or Txxx		ALARM20C
Active Alarm #21	Axxx or Txxx		ALARM21C
Active Alarm #22	Axxx or Txxx		ALARM22C
Active Alarm #23	Axxx or Txxx		ALARM23C
Active Alarm #24	Axxx or Txxx		ALARM24C
Active Alarm #25	Axxx or Txxx		ALARM25C

NOTE: Alerts will displayed as Txxx.

CONTROL SET UP CHECKLIST

Model Number: _____
 Serial Number: _____
 Date: _____
 Technician: _____

Software Versions: _____
 MBB: CESR131278-- __ __
 SCB/ECB: CESR131249-- __ __
 MARQ: CESR131171-- __ __

INDICATE UNIT SETTINGS BELOW

Control Type: Thermostat / T-55 Space Temp. / T-56 Space Temp. / T-58 Space Temp.
 Set Points: Cooling Occupied: _____ Unoccupied: _____
 Heating Occupied: _____ Unoccupied: _____
 Relative Humidity _____
 Relative Humidity Deadband _____

Configurations UNIT

SETTING

Default

U.CTL	_____	Auto	Thermostat	Space Sensor
T.CTL	_____	Adaptive	1 Stage Y1	2 Stage Y1
OC.FN	_____	Y	N	
S.DLY	_____	30 sec		
ID.F	_____	Y	N	
FN.SW	_____	No Switch	Normal Open	Normal Close
FL.SW	_____	No Switch	Normal Open	Normal Close
FS.SW	_____	No Switch	Normal Open	Normal Close
RM.SW	_____	No Switch	Normal Open	Normal Close
SAT.T	_____	240 sec		
SAT.H	_____	Invalid (Horizontal DR0 unit or all DR1 units)	Accurate	Approximate (Vertical DR0 unit)
RAT.S	_____	N	Y	
RH.S	_____	N	Y	
THER	_____	1 (DR0) or 2 (DR1)		
FPR	_____	Y (DR0) or N (DR1)		
EPR	_____	Y (DR0) or N (DR1)		

COOL

N.CMP	_____	3 (016-024) or 2 (014,028)	
MC.LO	_____	0° F	
MRT.C	_____	180 sec	
MOT.C	_____	300 sec	
CL.PD	_____	1.0 ΔF	
CL.ND	_____	-1.0 ΔF	
C.LAG	_____	1.0 min	
SA.PD	_____	1.0 ΔF	
SA.ND	_____	-1.0 ΔF	
C.INC	_____	450 sec	
C.DEC	_____	300 sec	
A.NOW	_____	Y	N
IN.V	_____	Y	N
A1.CS	_____	Y	N
B1.CS	_____	Y	N
C1.CS	_____	Y	N

REHT

RHT.E	_____	N	Y		
N.RHT	_____	2			
RH.HB	_____	2 ΔF			
MOT.R	_____	30 sec			
H.CTL	_____	Exclusive	1 Stage Y1	2 Stage Y1	Digital
HM.SW	_____	No Switch	Normal Open	Normal Close	
RHF.E	_____	N	Y		
RHT.T	_____	10 hr			
RHT.D	_____	120 sec			
L2.UP	_____	10 PSIG			
L2.DN	_____	50 PSIG			
L2.TM	_____	60 sec			

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

HEAT

HT.TY	_____	No Heat	GAS	ELECTRIC
N.HTR	_____	2		
HT.LO	_____	75 F		
MRT.H	_____	120 sec		
MOT.H	_____	120 sec		
HT.PD	_____	1.0 ΔF		
HT.ND	_____	-1.0 ΔF		
H.LAG	_____	1.0 min		
H.INC	_____	450 sec		
H.DEC	_____	300 sec		

ECON

EC.EQ	_____	N	Y	
E.CTL	_____	Digital/Position	Digital/Command	Analog
MIN.P	_____	30 %		
ECL.H	_____	65 F		
ECL.L	_____	0° F		
UEFC	_____	Preoccupancy	Disabled	Unoccupied
FC.TM	_____	120 Sec		
FC.LL	_____	50 F		
EN.SW	_____	No Switch	Normal Open	Normal Close
PE.EN	_____	Disabled	Enabled	
PE1.P	_____	25 %		
PE2.P	_____	75 %		

IAQ

IA.CF	_____	No IAQ	DCV Override	Override IAQ Min Pos		
IA.FN	_____	Never	Occupied	Always		
IL.CF	_____	No Switch	DCV N/O	DCV N/C	OVERRIDE N/O	OVERRIDE N/C
IL.FN	_____	Never	Occupied	Always		
AQ.MP	_____	10 %				
MIN.P	_____	30 %				
OVR.P	_____	100%				
OA.CF	_____	No OAQ	DCV OAQ	Lockout OAQ		
OAQ.L	_____	600 ppm				
AQD.L	_____	100 ppm				
AQD.H	_____	700 ppm				
DF.ON	_____	600 ppm				
DF.OF	_____	200 ppm				
I.4M	_____	0 ppm				
I.20M	_____	2000 ppm				
O.4M	_____	0 ppm				
O.20M	_____	2000 ppm				
H.4M	_____	0%				
H.20M	_____	100%				
RH.SP	_____	50%				
RH.DB	_____	5%				

CCN

CCN.A	_____	1		
CCN.B	_____	0		
BAUD	_____	3 (9600 baud)		
B.TIM	_____	OFF	ON	
B.OAT	_____	OFF	ON	
B.GS	_____	OFF	ON	
B.ACK	_____	OFF	ON	

DISP

METR	_____	N	Y	
LANG	_____	0 (English)		
PROT	_____	Disabled	Enabled	
PSWD	_____	1111		

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

ALRM

A.SPC	_____	Y	N
A.SRT	_____	Y	N
A.OAT	_____	Y	N
A.CS	_____	Y	N
A.CMP	_____	Y	N
A.CKT	_____	Y	N
A.SSP	_____	Y	N
A.SCT	_____	Y	N
A.FAN	_____	Y	N
A.FIL	_____	Y	N
A.TST	_____	Y	N
A.ECO	_____	Y	N

Time/Date Set	Y	N
Occupancy Schedule Number	0	1-64
Occupancy Schedules Set	Y	N
Holiday Schedules Set	Y	N
Correct Compressor Rotation Verified	Y	N
Installation Checklist Completed	Y	N

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UNIT START-UP CHECKLIST

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

I. PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- ☐ VERIFY INSTALLATION OF FLUE EXHAUST AND INLET HOOD (48HG ONLY)
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ VERIFY GAS PRESSURE TO UNIT GAS VALVE IS WITHIN SPECIFIED RANGE (48HG ONLY)
- ☐ CHECK GAS PIPING FOR LEAKS (48HG ONLY)
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY INSTALLATION OF THERMOSTAT/SPACE SENSOR
- ☐ VERIFY SET UP OF ELECTRONIC CONTROLS (REFER TO CONTROLS AND TROUBLESHOOTING GUIDE)
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2 _____	L2-L3 _____	L3-L1 _____
COMPRESSOR AMPS — COMPRESSOR A1	L1 _____	L2 _____	L3 _____
— COMPRESSOR B1	L1 _____	L2 _____	L3 _____
— COMPRESSOR C1	L1 _____	L2 _____	L3 _____
(016-024 ONLY)			
SUPPLY FAN AMPS _____			
ELECTRIC HEAT AMPS (IF EQUIPPED)	L1 _____	L2 _____	L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	_____	F DB (Dry Bulb)
RETURN-AIR TEMPERATURE	_____	F DB _____ F WB (Wet Bulb)
COOLING SUPPLY AIR	_____	F
GAS HEAT SUPPLY AIR	_____	F (48HG ONLY)
ELECTRIC HEAT SUPPLY AIR	_____	F (50HG ONLY, IF EQUIPPED)

PRESSURES

GAS INLET PRESSURE (48HG ONLY)	_____	IN. WG
GAS MANIFOLD PRESSURE STAGE NO. 1	_____	IN. WG
REFRIGERANT SUCTION CIRCUIT A	_____	PSIG
CIRCUIT B	_____	PSIG
CIRCUIT C	_____	PSIG (016-024 ONLY)
REFRIGERANT DISCHARGE CIRCUIT A	_____	PSIG
CIRCUIT B	_____	PSIG
CIRCUIT C	_____	PSIG (016-024 ONLY)

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 80

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS
- ☐ VERIFY INSTALLATION OF ALL OPTIONS AND ACCESSORIES