Wiring Diagrams

INDEX

<table>
<thead>
<tr>
<th>UNIT 50BYN</th>
<th>V-PH-Hz</th>
<th>LABEL DIAGRAM</th>
<th>FIG. NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>006</td>
<td>208/230-3-60</td>
<td>11720011-C</td>
<td>1</td>
</tr>
<tr>
<td>008</td>
<td>208/230-3-60</td>
<td>11720011-C</td>
<td>1</td>
</tr>
<tr>
<td>012</td>
<td>208/230-3-60</td>
<td>11720960-B</td>
<td>2</td>
</tr>
<tr>
<td>014</td>
<td>208/230-3-60</td>
<td>11720960-B</td>
<td>2</td>
</tr>
<tr>
<td>016</td>
<td>208/230-3-60</td>
<td>1172007-C</td>
<td>3</td>
</tr>
<tr>
<td>024</td>
<td>208/230-3-60</td>
<td>1172007-C</td>
<td>3</td>
</tr>
<tr>
<td>024</td>
<td>460-3-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>024</td>
<td>575-3-60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACCESSORY WIRING

<table>
<thead>
<tr>
<th>UNIT 50BYN</th>
<th>ACCESSORY DESCRIPTION</th>
<th>FIG. NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>006-024</td>
<td>Winter Start</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Evaporator Defrost Thermostat</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>TEMP Thermostat</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Variable Volume and Temperature (VVT®) and Relay Pack</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Airside Economizer</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Airside Economizer with Indoor Air Quality (IAQ) Sensor</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Fire and Smoke Control</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Heater</td>
<td>11</td>
</tr>
</tbody>
</table>

CARRIER THERMOSTAT WIRING

<table>
<thead>
<tr>
<th>UNIT 50BYN</th>
<th>THERMOSTAT</th>
<th>DESCRIPTION</th>
<th>FIG. NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>006-024</td>
<td>33CS071-01</td>
<td>Non-Programmable</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>33CS220-01</td>
<td>Programmable; 7-Day and Non-Communicating</td>
<td>1, 2, 3</td>
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<tr>
<td></td>
<td>33CS250-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33CS220-LA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33CS250-LA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33CSVMT-32 and 920008</td>
<td>VVT; Programmable Without Clock</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>33CSVMT-32 and 920008</td>
<td>VVT; Programmable With Clock</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>33CSTM--01 and 33CSUCE-06</td>
<td>Programmable; 7-Day and Communicating Without Clock</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>33CSTMT-01 and 33CSUCE-06</td>
<td>Programmable; 7-Day and Communicating With Clock</td>
<td>6</td>
</tr>
</tbody>
</table>

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

All units require the addition of a thermostat accessory package to complete the control circuit. The sequence of operation may vary depending on which package is selected.

Room-Mounted Thermostat — These units use an electronic, communicating electronic, or mechanical thermostat mounted in the conditioned space.

FAN CIRCULATION — When the fan selector switch is set to the ON position, the indoor-fan motor is energized through G on the thermostat and the indoor-fan contactor is energized. This starts the indoor fan motor (IFM). The fan will operate to provide continuous air circulation.

COOLING — The indoor fan will operate continuously or when the compressor runs, depending on the setting of the thermostat fan selector switch. When the thermostat closes (on a call for cooling Y1 on the thermostat), the control relay (CR), outdoor-fan contactor (OFC) and compressor contactor(s) (C1 and C2 on 20 ton) close. The control relay will start the indoor fan if it is not already running. The outdoor fan contactor will start the condenser fan and the compressor contactors will immediately start the first stage compressor(s). The 50BYN024 unit as wired from the factory has two compressors on first stage and one on second stage. This may be altered (see application data section of the product data catalog).

A second stage on 50BYN012-024 units will close if additional cooling demand is required, and will then start the second-stage compressor. When the thermostat is satisfied, the second stage compressor will stop first, and then the first stage compressors will stop when cooling demand is satisfied. The outdoor fan will also stop as soon as the first stage cooling is satisfied.

HEATING — The indoor fan will operate continuously or when the heater runs, depending on the setting of the thermostat fan selector switch. When the thermostat closes (on a call for heating), the thermostat activates the water or steam control valve or electric heater to meet heating requirements.

Carrier TEMP Thermostat — The Carrier TEMP System is a control system which includes a relay pack, TEMP system thermostat, sensors and appropriate wiring. The TEMP thermostat is the system controller and works much like a room thermostat, but provides for communicating control. The TEMP thermostat requires the addition of an accessory relay pack to interface with the unit. This relay pack may be mounted in the low-voltage control compartment. The system operation is the same as stated in the Room-Mounted Thermostat section above.

CARRIER VARIABLE VOLUME AND TEMPERATURE (VVTTM) SYSTEM — The VVT system is a control system that includes a relay pack (which may be mounted in the low voltage control compartment); monitor thermostat; zone controllers modulating supply duct dampers; modulating bypass controller sensors; and appropriate wiring. The VVT thermostat is the system controller. It sends messages to the relay pack which then sends the appropriate signals to the 50BYN unit for fan, heating and cooling. The monitor thermostat also gathers information from the zone controllers, which control the zone supply dampers. It provides a zoned, all-air system for both heating and cooling which supplies variable volume, variable temperature air to the zones conditioned.

ALL UNITS — The control circuit incorporates a current-sensing lockout relay (Cycle-LOC™ device) that locks off the compressor(s) when any safety device is activated (low- or high-pressure switches, outdoor-fan motor overload, or compressor internal overload). If any compressor safety device opens, the compressor(s) will stop and a 24-v signal will be sent to the X connection of the low-voltage terminal strip. The signal may be used to light an indicator light on the thermostat to show that service is required on the unit. Since the unit is protected by the Cycle-LOC device, the compressor(s) will not restart following a safety interruption unless the thermostat is satisfied without cooling operation. To reset the Cycle-LOC control device, manually turn the control power to the OFF, then back to the ON position.

High- and low-pressure switches and motor overload protectors will reset automatically when the condition which caused the device to trip has dropped below the reset condition.
A 5-minute timer (Time-Delay Relay [TDR]) will prevent the compressor(s) from restarting for 5 minutes after any compressor has stopped.

If the condenser-fan motor overheats due to motor overload or lack of cooling air, the internal fan protector will open the circuit internally in the motor, and the fan will stop. If a safety control in the unit opens, the condenser fan will also stop.

**Accessories** — Low ambient control on 50BYN units is accomplished with a refrigerant operated damper located on the condenser fan discharge. Low ambient operation does not affect operating sequence.

**WINTER START** (38AE900021) — Since these units are equipped with a 27 psig low-pressure switch, a 3-minute low-pressure switch bypass is recommended for operation below 50 F. Order Winter Start Control accessory no. 38AE900021 and install according to the instructions supplied with the kit. See Fig. 4 for low-pressure switch bypass wiring.

**DEFROST THERMOSTAT** (50BB-900---001) — This thermostat is installed on the evaporator coil and is recommended with Winter Start control. Install thermostat according to instructions supplied with the kit. See Fig. 5 for proper wiring of defrost thermostat.

**Economizer**

**ECONOMIZER SEQUENCE OF OPERATION** — When the thermostat turns the indoor fan on, the economizer relay is energized and the actuator is powered on. The actuator moves the dampers to the minimum position as determined by the adjustment potentiometer on the actuator. If the system uses a CO₂ sensor, the minimum position is determined by the potentiometer on the required field-supplied adapter. On a call for heating from the thermostat (W1 and/or W2 energized), the economizer remains at the minimum position.

**NOTE:** If a CO₂ sensor is used, the economizer can modulate based on the carbon dioxide level in the space. There is no low leaving-air temperature limit control. Controls to accomplish this must be field-supplied and installed.

On a call for cooling from the thermostat (Y1 energized), the actuator logic module determines if the outdoor air enthalpy is acceptable according to the set point on the actuator. If the outdoor air enthalpy is acceptable, the economizer begins to modulate open and is controlled to maintain a 56 F leaving air temperature. If outdoor air enthalpy is unacceptable, the logic module bypasses the use of outdoor air and energizes Y1 of the unit. On a call for a second stage of cooling (Y2 energized), the actuator energizes Y1 on the unit if the outdoor air enthalpy is acceptable. If the outdoor air is unacceptable, the actuator logic module energizes Y2 of the unit. When the system is equipped with a CO₂ sensor in a modulating configuration, the following applies: If the system is operating in the Cooling mode and the demand for fresh air to reduce the carbon dioxide level in the space is greater than the cooling load demand, the actuator modulates to reduce the carbon dioxide level and does not modulate towards closed if the leaving-air temperature is below 56 F. If, however, the cooling demand is greater than the demand to reduce the carbon dioxide level, the actuator modulates open and controls to a 56 F leaving-air temperature. The damper modulates open when the leaving-air temperature demand is greater than the airflow demand required for the CO₂ sensor to reduce carbon dioxide levels. When the CO₂ sensor is installed, there is no minimum leaving air temperature control at the economizer.

**USING A CO₂ SENSOR WITH THE ECONOMIZER** — A separately ordered carbon dioxide sensor (Fig. 9) can be used to signal the economizer to open the outdoor-air dampers to admit fresh air and dilute the indoor CO₂ level. Sensor descriptions and part numbers are shown below.

### CO₂ Sensor Accessories

<table>
<thead>
<tr>
<th>CO₂ Sensor Accessory Part Numbers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGCDXSEN001A00</td>
<td>Wall Mount Sensor (No Display)</td>
</tr>
<tr>
<td>CGCDXSEN002A00</td>
<td>Wall Mount Sensor With Display</td>
</tr>
<tr>
<td>CGCDXSEN003A00</td>
<td>Duct Mount Sensor (No Display)</td>
</tr>
<tr>
<td>CGCDXGAS001A00</td>
<td>Sensor Calibration Service Kit</td>
</tr>
<tr>
<td>CGCDXPRM001A00</td>
<td>User Interface Program (UIP)</td>
</tr>
</tbody>
</table>

The CO₂ sensors listed above are all factory set for a range of 0 to 2000 ppm and a linear voltage output of 2 to 10 vdc. The relay normally open dry contacts (TB-3 and TB-4) are factory set to close at 1000 ppm. Refer to the installation instructions with the CO₂ sensor for electrical ratings of contacts and information on connecting to power supply. Switch contacts can be used to set off an alarm or light to indicate CO₂ levels higher than the switch set point. Any changes to the factory configuration require the purchase of the User Interface Program (UIP) or Sensor Calibration Service Kit, which also contains the UIP. For correct modulation of the economizer actuator motor, a separately ordered adapter (Honeywell part no. Q769C1007) is required.
Fig. 1 — Wiring Schematic and Component Arrangement; 50BYN006-008; 208/230-3-60, 460-3-60, 575-3-60
Fig. 2 — Wiring Schematic and Component Arrangement; 50BYN012-016; 208/230-3-60, 460-3-60, 575-3-60
Fig. 3 — Wiring Schematic and Component Arrangement; 50BYN024; 208/230-3-60, 460-3-60, 575-3-60
Fig. 4 — Accessory Winter Start
Fig. 5 — Accessory Evaporator Defrost Thermostat
NOTE: Filter status and humidity sensor may not be used simultaneously. Only one may be wired to the relay pack.

Fig. 6 — Wiring Diagram; 50BYN Unit With Temp Thermostat
COMMUNICATION BUS

BLACK (+)
RED
BLACK (-)
WHITE
YELLOW
GREEN
BLUE

REMOTE ROOM SENSOR (RRS) (OPTIONAL)

MONITOR STAT W/TIME CLOCK

DC CONNECTOR HARNESS TO DAMPER ACTUATOR BOARD

CHR06 RELAY PACK (LOCATE IN LOW VOLTAGE COMPARTMENT)

TRANSFORMER 24 VAC/25VA

24 VAC POWER CONNECTOR TO ZONE DAMPER BOARD

WHITE H1
BROWN H2
YELLOW C1
RED 24 VAC
BLACK (RVH)
ORANGE (RVC)

TO HEATING COIL (IF USED)

HUMIDITY SENSOR
VELOCITY SENSOR
DX COIL SENSOR
OUTSIDE AIR SENSOR

COMMUNICATION BUS

Fig. 7 — Wiring Diagram; 50BYN With VVT® and Relay Pack
NOTES:

1. If system has single-stage cooling, disregard and terminate blue wire in harness. If thermostat is single stage cooling, disregard and terminate brown wire.

2. Factory installed 620 ohm, 1 watt, 5% resistor should be removed only if a C7400 enthalpy sensor is added to SR and + for differential enthalpy.

3. Economizer relay closes outside air damper when fan is not powered.

Fig. 8 — Wiring Diagram; Airside Economizer
OPTIONAL HIGH AND/OR LOW TEMPERATURE SWITCH

24V-DO NOT USE HVAC UNIT TRANSFORMER. PROVIDE 24V BY NON-GROUNDING TRANSFORMER

CO₂ VENTILATION CONTROLLER

MINIMUM POSITION POTENTIOMETER SET TO FULL OPEN POSITION. THIS WILL ALLOW FOR 100% OUTSIDE AIR AT 2250 PPM

LEGEND

P — Pressurization Relay
PPM — Parts per Million
TB — Terminal Block

NOTES:
1. CO₂ Ventilation controller can be mounted in return-air duct or wall mounted. Locate for best room air sampling. If duct mounted, install in aspiration box.
2. Damper actuator and logic module ordered separately.
3. The CO₂ ventilation controller has a range of 350 to 2250 PPM and has a hysteresis of 50 PPM.
4. Optional temperature switches can be added to lockout occupied modes setting for extreme high or low temperatures.

Fig. 9 — Wiring Diagram; Airside Economizer With Indoor Air Quality (IAQ) Sensor
Fig. 10 — Wiring Diagram; Accessory Fire and Smoke Control

NOTES:
1. If system has single-stage cooling, disregard and terminate blue wire in harness. If thermostat is single stage cooling, disregard and terminate brown wire.
2. Factory installed 620 ohm, 1 watt, 5% resistor should be removed only if a C7400 enthalpy sensor is added to SR and + for differential enthalpy.
3. Economizer relay closes outside air damper when fan is not powered.

LEGEND
- C — Compressor Contactor
- CB — Circuit Breaker
- CLO — Compressor Lockout
- CR — Control Relay
- ER — Economizer Relay
- HPS — High-Pressure Switch
- IFC — Indoor-Fan Contactor
- IFP — Indoor-Fan Protector
- LPS — Low-Pressure Switch
- NEC — National Electrical Code
- OFC — Outdoor-Fan Contactor
- OFP — Outdoor-Fan Protector
- P1 — Pressurization Relay
- R — Resistor
- SAT — Supply-Air Temperature
- TB — Terminal Block
- TDR — Time-Delay Relay
- TRAN — Transformer

- Wire Nut or Equivalent Connection
- Field Wiring
- Factory Wiring
LEGEND

- AHA — Adjustable Heat Anticipator
- C — Compressor Contactor
- CB — Circuit Breaker
- CLO — Compressor Lockout
- CR — Control Relay
- H1, H2 — Heater Relay
- HPS — High-Pressure Switch
- IFC — Indoor-Fan Contactor
- IFP — Indoor-Fan Protector
- LPS — Low-Pressure Switch
- OFC — Outdoor-Fan Contactor
- OFP — Outdoor-Fan Protector
- R — Resistor
- TB — Terminal Block
- TDR — Time-Delay Relay
- TRAN — Transformer
- X — Terminal Block Connection
- ☐ — Marked Terminal
- ○ — Unmarked Terminal
- ——— — Factory Wiring
- ——— — Field Wiring

Fig. 11 — Wiring Diagram; Accessory Heater