



Installation Instructions

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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 basic maintenance functions of cleaning coils and filters and 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, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

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

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in

severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

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

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury and/or property damage.

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig (3450 Pa). Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

R-410A refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on R-410A refrigerant equipment.

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

Failure to follow this warning could cause personal injury or death.

Relieve pressure and recover all refrigerant before system repair or final unit disposal.

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.

⚠ CAUTION

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air conditioning equipment.

⚠ WARNING

CARBON-MONOXIDE POISONING HAZARD

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

⚠ AVERTISSEMENT

RISQUE D'INTOXICATION AU MONOXYDE DE CARBONE

Si ces directives ne sont pas suivies, cela peut entraîner des blessures graves ou une intoxication au monoxyde de carbone pouvant causer la mort, si des produits de combustion s'infiltrent dans le bâtiment.

Vérifier que toutes les ouvertures pratiquées dans le mur extérieur autour du ou des tuyaux d'évent (et de la prise d'air) sont scellées de manière à empêcher l'infiltration de produits de combustion dans le bâtiment.

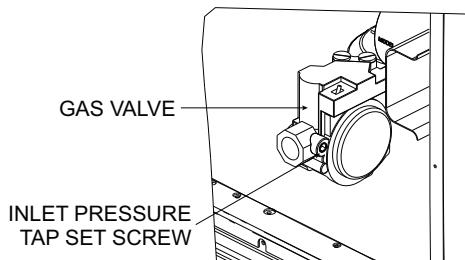
Veiller à ce que la ou les sorties de l'évent de l'appareil de chauffage (et la prise d'air) ne soient, en aucune façon, obstruées, quelle que soit la saison.

⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in severe personal injury and/or property damage.

Inlet pressure tap set screw must be tightened and 1/8-in. NPT pipe plug must be installed to prevent gas leaks.

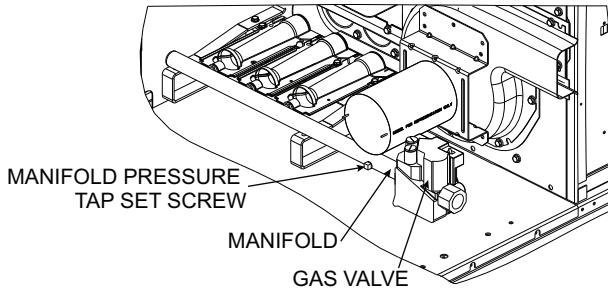


⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in severe personal injury and/or property damage.

Manifold pressure tap set screw must be tightened and 1/8-in. NPT pipe plug must be installed to prevent gas leaks.



MODEL NUMBER NOMENCLATURE AND DIMENSIONS

See Fig. 1 for 48KC model number nomenclature. See Fig. 2-6 for unit dimensional drawings. See Fit. 7 for roof curb information. Fig. 4 shows service clearance dimensions.

Rated Indoor Airflow

Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

Table 1 — Rated Indoor Airflow

| MODEL NUMBER | FULL LOAD AIRFLOW (CFM) |
|--------------|-------------------------|
| 48KC*A/B04 | 1050 |
| 48KC*A/B05 | 1400 |
| 48KC*A/B06 | 1750 |

| | | | | | | | | | | | | | | | | | | |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| Position: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Example: | 4 | 8 | K | C | D | A | 0 | 4 | A | 1 | A | 5 | - | 0 | A | 0 | A | 0 |

Unit Heat Type

48 - Gas Heat Packaged Rooftop

Model Series - WeatherMaker®

KC - Standard 14 SEER Efficiency

Heat Options

D = Low Gas Heat
 E = Medium Gas Heat
 F = High Gas Heat
 L = Low NOx — Low Gas Heat
 M = Low NOx — Medium Gas Heat
 N = Low NOx — High Gas Heat
 S = Low Heat w/ Stainless Steel Exchanger
 R = Medium Heat w/ Stainless Steel Exchanger
 T = High Heat w/ Stainless Steel Exchanger
 (Low NOx models include — Stainless Steel HX)

Refrig. Systems Options

A = Standard One Stage Cooling Models
 B = Standard One Stage Cooling Models with Humidi-MiZer®

Cooling Tons

04 - 3 ton
 05 - 4 ton
 06 - 5 ton

Sensor Options

A = None
 B = RA Smoke Detector
 C = SA Smoke Detector
 D = RA + SA Smoke Detector
 E = CO₂
 F = RA Smoke Detector and CO₂
 G = SA Smoke Detector and CO₂
 H = RA + SA Smoke Detector and CO₂

Indoor Fan Options

0 = Direct Drive ECM
 1 = Standard Static Option
 2 = Medium Static Option
 3 = High Static Option

Coil Options - Round Tube/Plate Fin Condenser Coil (Outdoor - Indoor - Hail Guard)

A = Al/Cu - Al/Cu
 B = Precoat Al/Cu - Al/Cu
 C = E-coat Al/Cu - Al/Cu
 D = E-coat Al/Cu - E-coat Al/Cu
 E = Cu/Cu - Al/Cu
 F = Cu/Cu - Cu/Cu
 M = Al/Cu - Al/Cu — Louvered Hail Guard
 N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
 P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
 Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
 R = Cu/Cu - Al/Cu — Louvered Hail Guard
 S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Factory Assigned

0 = Standard
 1 = LTL

Electrical Options

A = None
 C = Non-Fused Disconnect
 D = Thru-The-Base Connections
 F = Non-Fused Disconnect and Thru-The-Base Connections

Service Options

0 = None
 1 = Unpowered Convenience Outlet
 2 = Powered Convenience Outlet
 3 = Hinged Access Panels
 4 = Hinged Access Panels and Unpowered Convenience Outlet
 5 = Hinged Panels and Powered Convenience Outlet

Intake / Exhaust Options

A = None
 B = Temperature Economizer w/ Barometric Relief
 F = Enthalpy Economizer w/ Barometric Relief
 K = 2-Position Damper
 U = Temperature Ultra Low Leak Economizer w/ Barometric Relief
 W = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief

Base Unit Controls

0 = Electro-mechanical Controls can be used with W7212 EconoMi\$er IV (Non-Fault Detection and Diagnostic
 1 = PremierLink Controller
 2 = RTU Open Multi-Protocol Controller
 6 = Electro-mechanical with W7220 Economizer controller Controls. Can be used with W7220 EconoMi\$er X (with Fault Detection and Diagnostic)

Design Revision

- = Factory Design Revision

Voltage

1 = 575/3/60
 3 = 208-230/1/60
 5 = 208-230/3/60
 6 = 460/3/60

Note: On single phase (-3 voltage code) models, the following are not available as a factory installed option:

- Humidi-MiZer
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2 Position Damper
- Powered 115 Volt Convenience Outlet

Fig. 1 — 48KC 04-06 Model Number Nomenclature (Example)

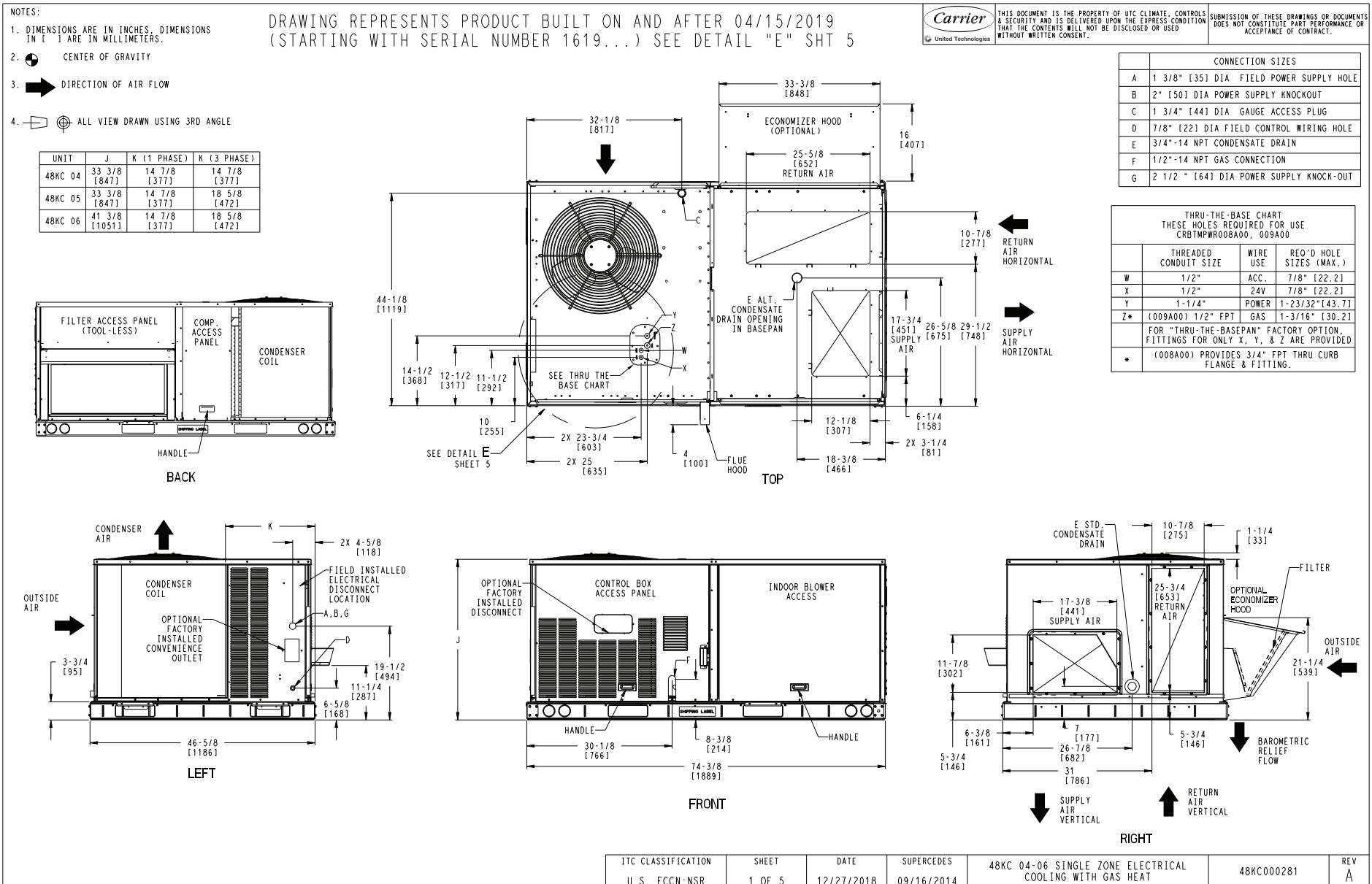


Fig. 2 — Dimensional Drawing of Units Built On and After 4/15/19

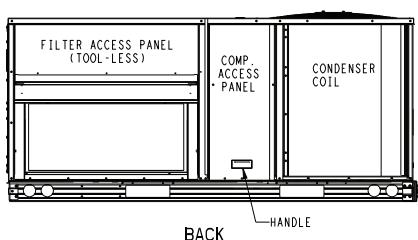
NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [] ARE IN MILLIMETERS.

2. CENTER OF GRAVITY

3. → DIRECTION OF AIR FLOW

4. → ALL VIEWS DRAWN USING 3RD ANGLE

| UNIT | J | K (1 PHASE) | K (3 PHASE) |
|---------|------------------|-----------------|-----------------|
| 48KC 04 | 33 3/8 [847] | 14 7/8 [377] | 14 7/8 [377] |
| 48KC 05 | 33 3/8 [847] | 14 7/8 [377] | 18 5/8 [472] |
| 48KC 06 | 41 3/8 [1051] | 14 7/8 [377] | 18 5/8 [472] |



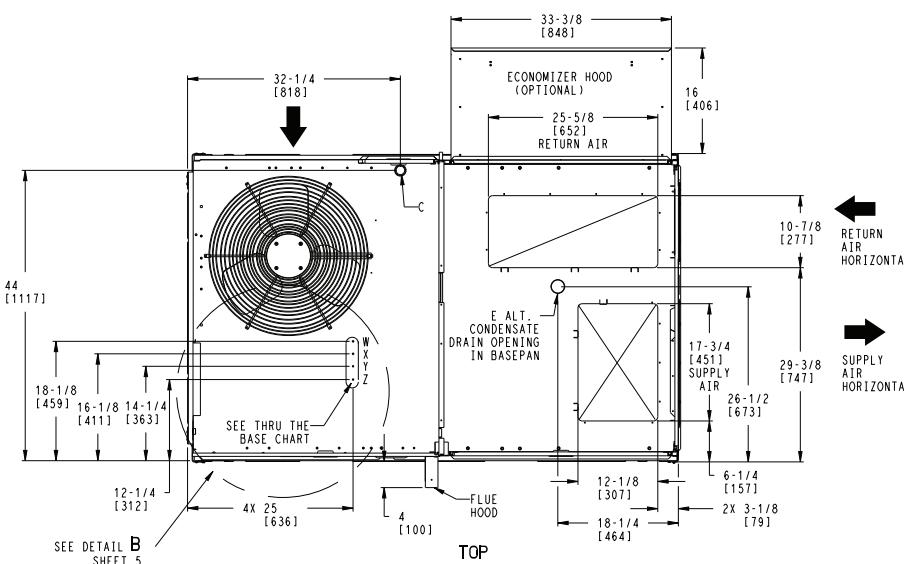
DRAWING REPRESENTS PRODUCT BUILT ON AND PRIOR TO 04/14/2019
SEE DETAIL "B" SHT 5



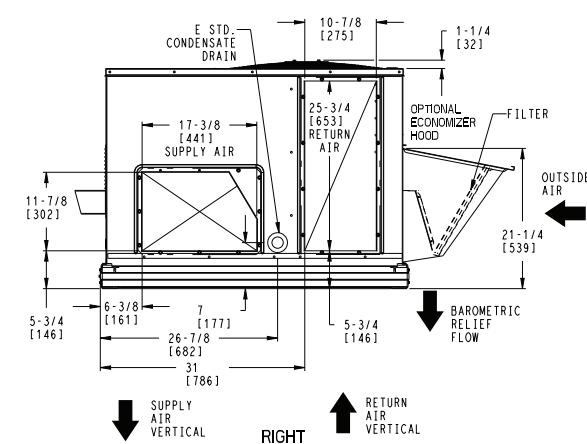
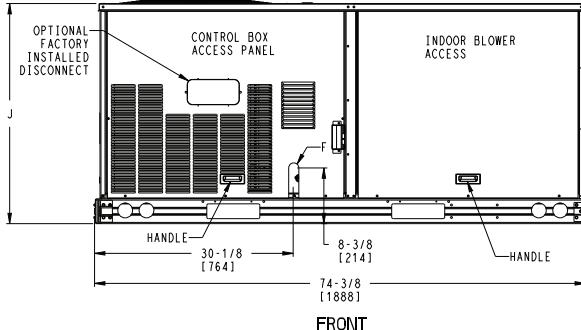
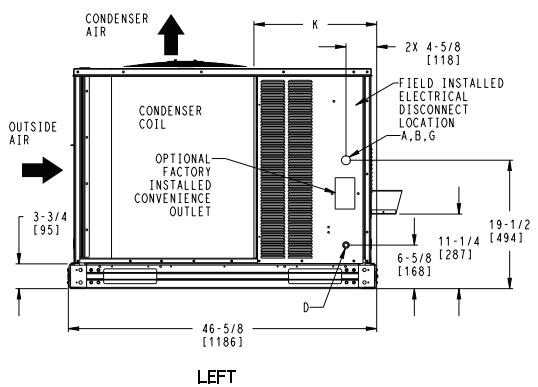
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| CONNECTION SIZES | |
|------------------|---|
| A | 1 3/8" [35] DIA FIELD POWER SUPPLY HOLE |
| B | 2" [50] DIA POWER SUPPLY KNOCKOUT |
| C | 1 3/4" [44] DIA GAUGE ACCESS PLUG |
| D | 7/8" [22] DIA FIELD CONTROL WIRING HOLE |
| E | 3/4"-14 NPT CONDENSATE DRAIN |
| F | 1 1/2" [40] NPT GAS CONNECTION |
| G | 2 1/2" [64] DIA POWER SUPPLY KNOCK-OUT |



| THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR001A01, 003A01 | | | |
|---|---|----------|-------------------------|
| | THREADED CONDUIT SIZE | WIRE USE | REO'D HOLE SIZES (MAX.) |
| W | 1/2" | ACC. | 7/8" [22.2] |
| X | 1/2" | 24V | 7/8" [22.2] |
| Y* | 3/4" | POWER | 1 1/8" [28.4] |
| Z** | (003A01) 1/2" FPT | GAS | 1 3/16" [30.0] |
| | FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X, Y, & Z ARE PROVIDED | | |
| * | SELECT EITHER 3/4" OR 1/2" FOR POWER, DEPENDING ON WIRE SIZE | | |
| ** | (001A01) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING. | | |



| | | | | | | |
|--------------------------------------|-----------------|--------------------|--------------------------|--|------------|----------|
| ITC CLASSIFICATION U.S. ECCN: NSR | SHEET 2 OF 5 | DATE 12/27/2018 | SUPERCEDES 09/16/2014 | 48KC 04-06 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT | 48KC000281 | REV A |
|--------------------------------------|-----------------|--------------------|--------------------------|--|------------|----------|

Fig. 3 — Dimensional Drawing for Units Built On and Prior to 4/14/19

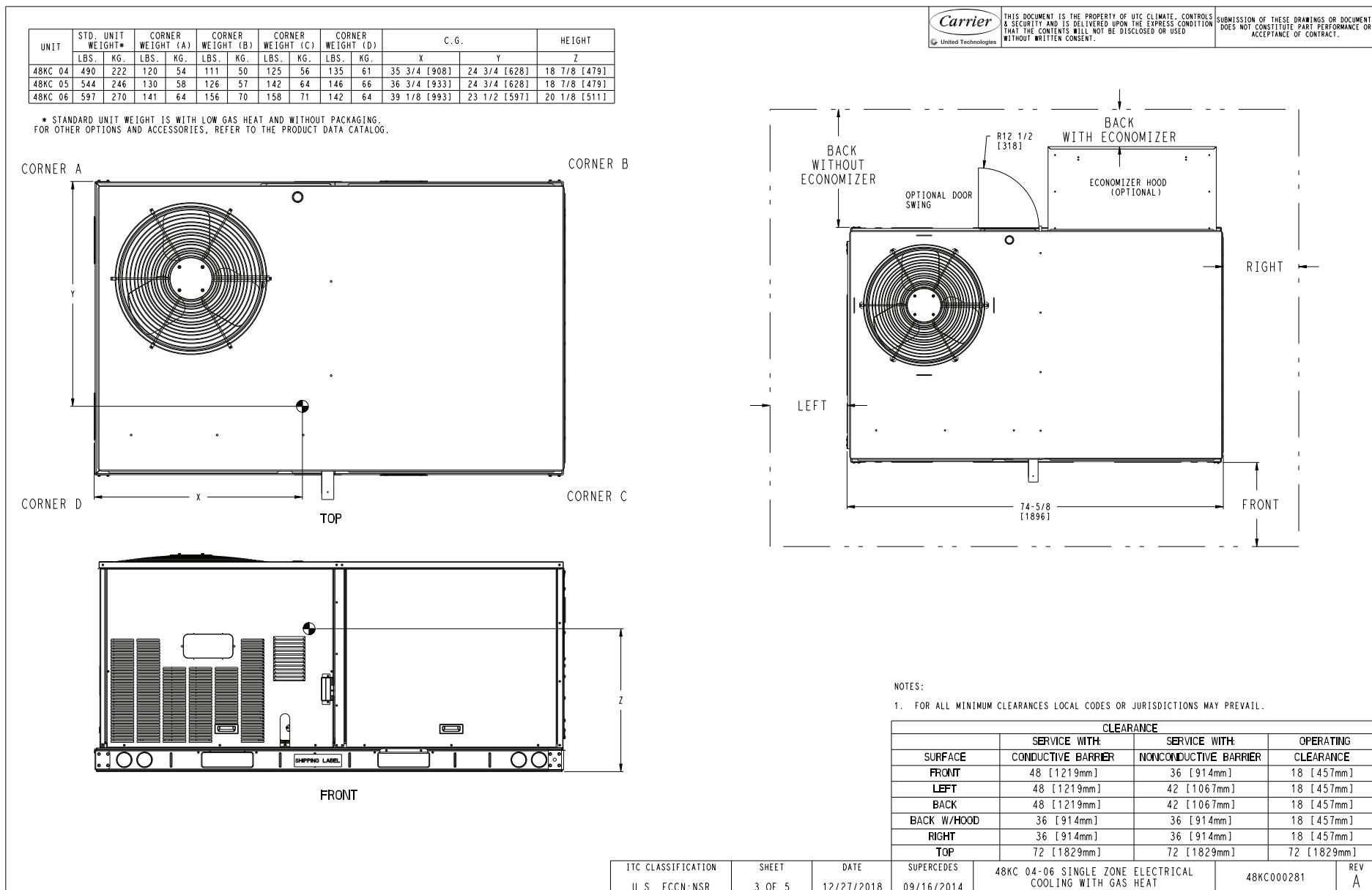


Fig. 4 — Unit Corner Weights and Clearances

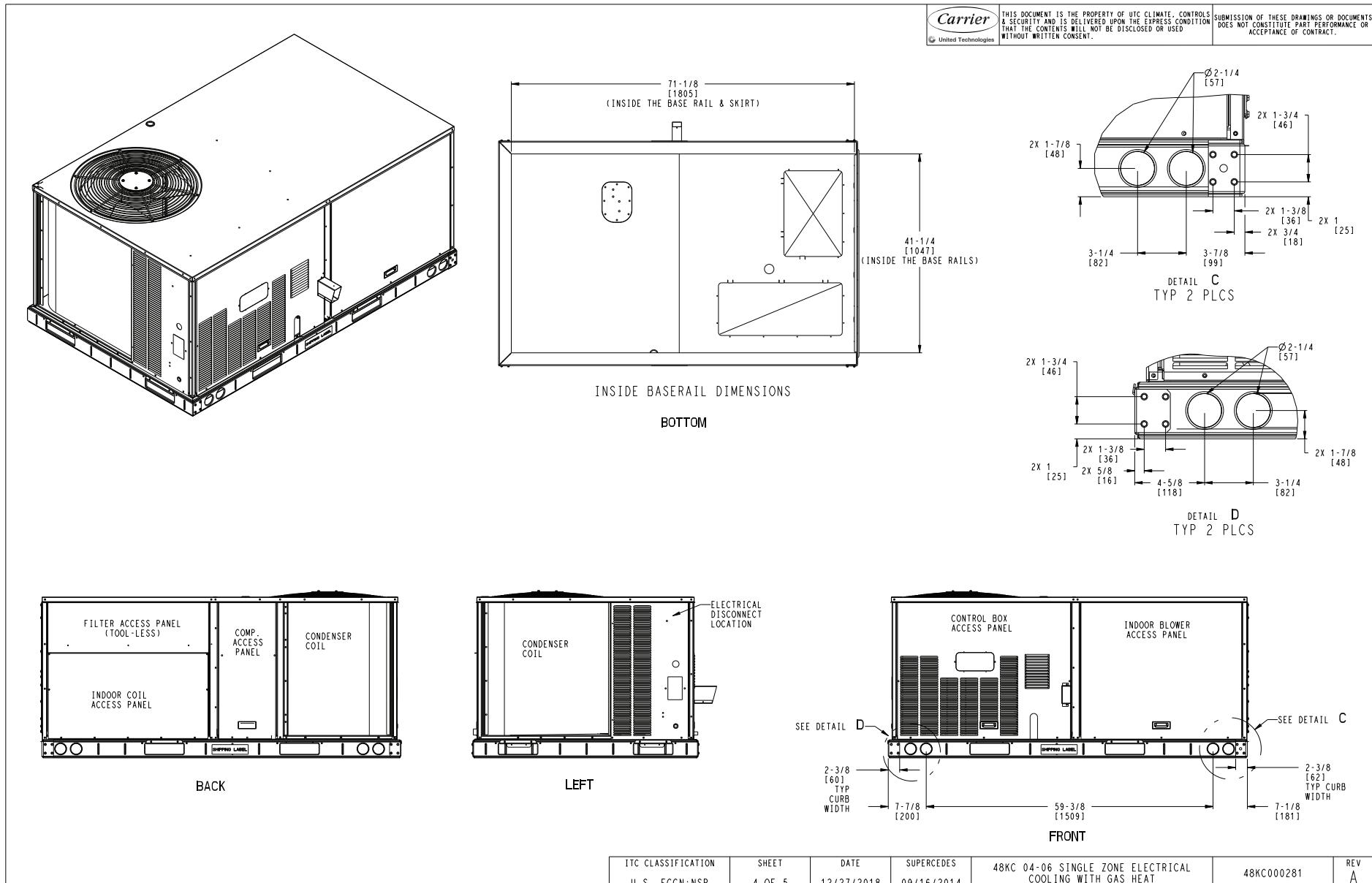


Fig. 5 — Base Rail Details



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| THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR001A01, 003A01 | | | |
|---|--------------------------|-------------|----------------------------|
| | THREADED CONDUIT SIZE | WIRE USE | REQ'D HOLE SIZES (MAX.) |
| W | 1/2" | 115V | 7/8" [22.2] |
| X | 1/2" | 24V | 7/8" [22.2] |
| Y * | 3/4" | POWER | 1 1/8" [28.6] |
| Z** | (003A01) 1/2" FPT | GAS | 1 1/8" [28.6] |

FOR "THRU-THE-BASEPAN" FACTORY OPTION,
FITTINGS FOR ONLY X, Y, & Z ARE PROVIDED

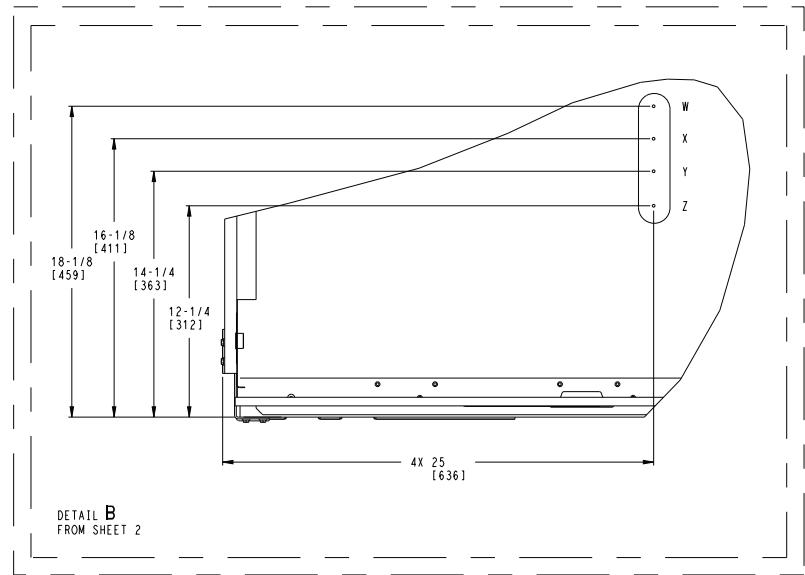
* SELECT EITHER 3/4" OR 1/2"
FOR POWER, DEPENDING ON WIRE SIZE

** (001A01) PROVIDES 3/4" FPT THRU CURB
FLANGE & FITTING.

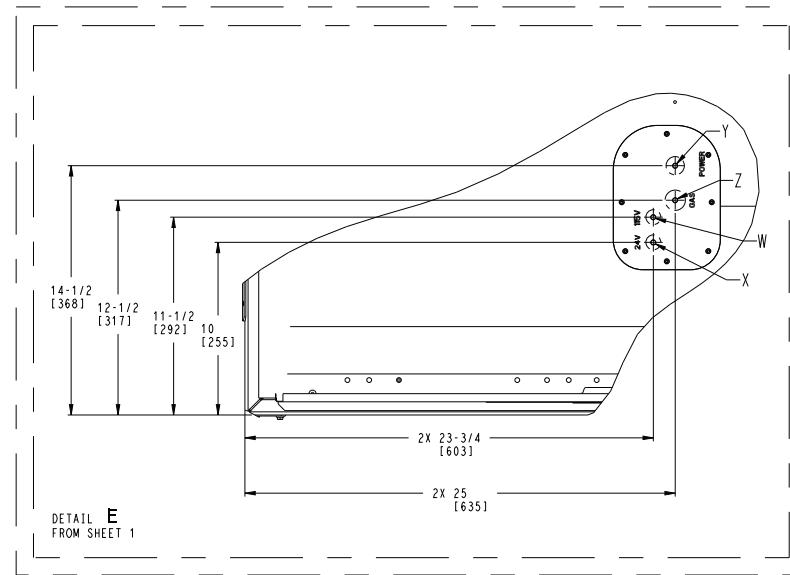
| THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWR008A00, 009A00 | | | |
|---|--------------------------|-------------|----------------------------|
| | THREADED CONDUIT SIZE | WIRE USE | REQ'D HOLE SIZES (MAX.) |
| W | 1/2" | 115V | 7/8" [22.2] |
| X | 1/2" | 24V | 7/8" [22.2] |
| Y | 3/4" | POWER | 1 1/8" [28.6] |
| Z* | (009A00) 1/2" FPT | GAS | 1 1/8" [28.6] |

FOR "THRU-THE-BASEPAN" FACTORY OPTION,
FITTINGS FOR ONLY X, Y, & Z ARE PROVIDED

* (008A00) PROVIDES 3/4" FPT THRU CURB
FLANGE & FITTING.



THIS VIEW REPRESENTS PRODUCT BUILT ON AND PRIOR TO 04/14/2019



THIS VIEW REPRESENTS PRODUCT BUILT ON AND AFTER 04/15/2019

| | | | | | | |
|--------------------------------------|-----------------|--------------------|--------------------------|--|------------|----------|
| ITC CLASSIFICATION U.S. ECCN: NSR | SHEET 5 OF 5 | DATE 12/27/2018 | SUPERCEDES 09/16/2014 | 48KC 04-06 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT | 48KC000281 | REV A |
|--------------------------------------|-----------------|--------------------|--------------------------|--|------------|----------|

Fig. 6 — Thru-the-Base Charts

| ROOF CURB ACCESSORY # | A |
|--------------------------|-----------|
| CRRFCURB001A01 | 14" [356] |
| CRRFCURB002A01 | 24" [610] |

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 25.4 [1"] THK. POLYURETHANE FOAM, 44.5 [1-3/4] # DENSITY.
3. DIMENSIONS IN [] ARE IN MILLIMETERS.
4. ROOFCURB: 18 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB. (FLANGES OF DUCT REST ON CURB).
6. SERVICE CLEARANCE 4 FEET ON EACH SIDE.
7.  DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGE CRBTMPWR001A01 IS FOR THRU-THE-CURB GAS TYPE
PACKAGE CRBTMPWR003A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

| CONNECTOR PKG. ACC. | GAS CONNECTION TYPE | GAS FITTING | POWER WIRING FITTING | CONTROL WIRING FITTING | ACCESSORY CONVENIENCE OUTLET WIRING CONNECTOR |
|---------------------|---------------------|-----------------|----------------------|------------------------|---|
| CRBTMPWR001A01 | THRU THE CURB | 3/4" [19] NPT | 3/4" [19] NPT | 1/2" [12.7] NPT | 1/2" [12.7] NPT |
| CRBTMPWR003A01 | THRU THE BOTTOM | 1/2" [12.7] NPT | | | |

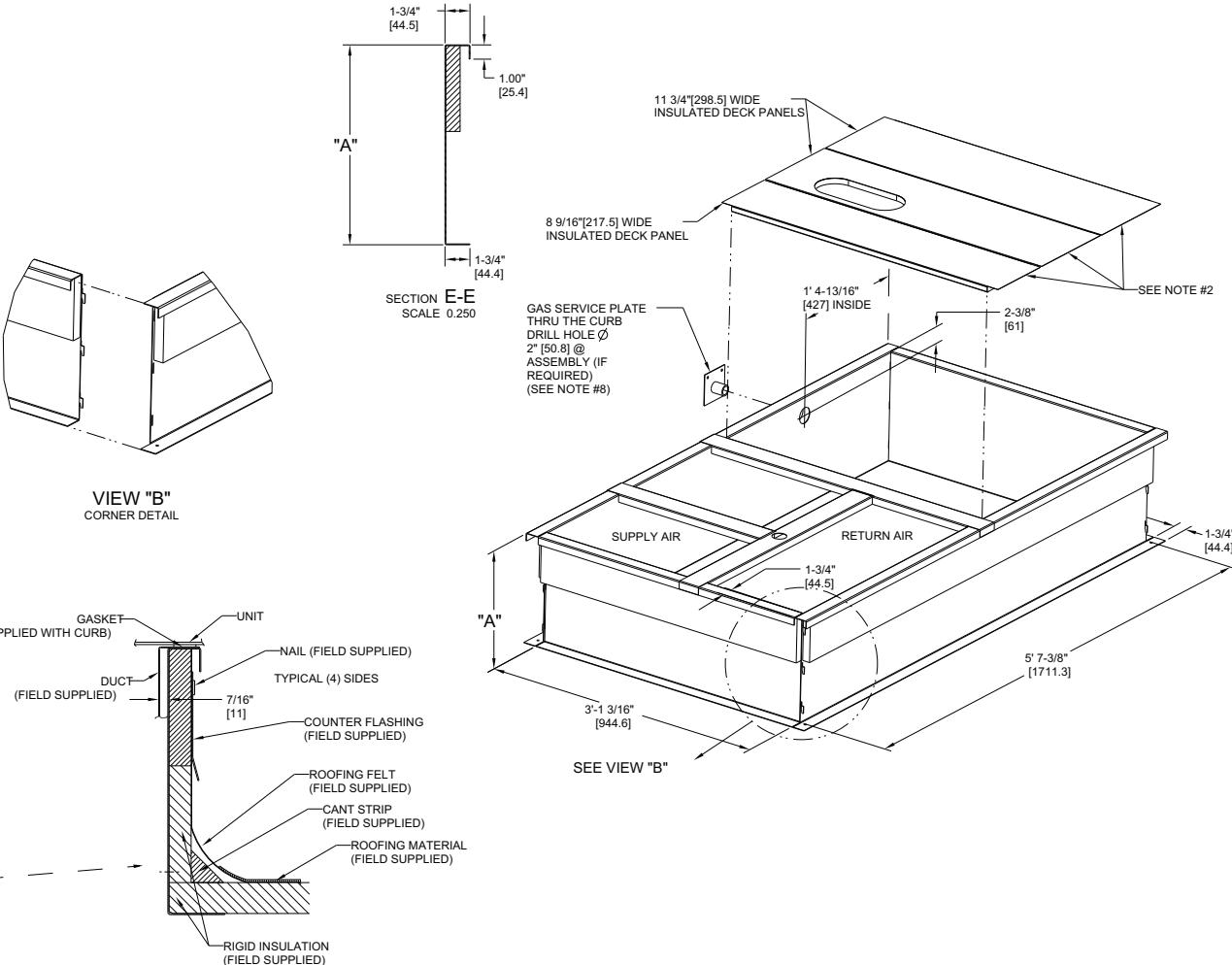
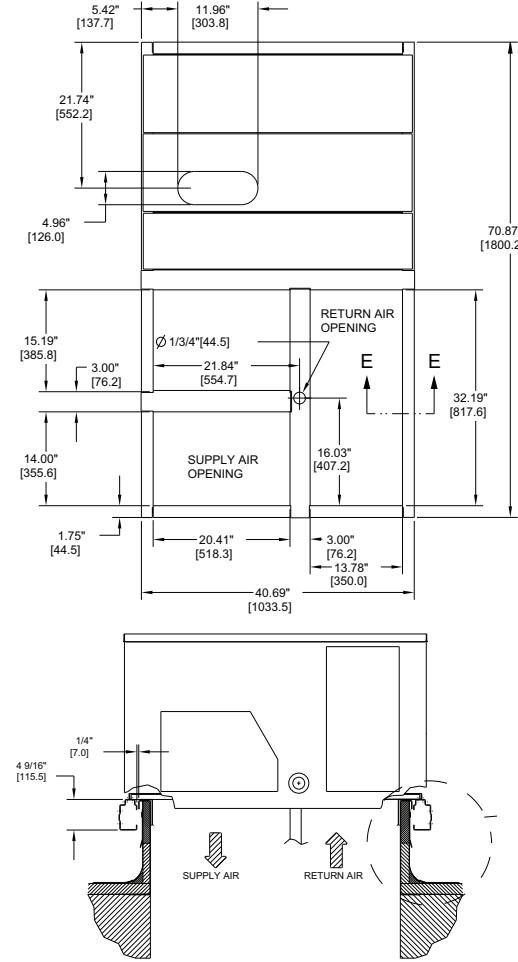


Fig. 7 — Roof Curb Details

48TC400427

INSTALLATION

Jobsite Survey

Complete the following checks before installation.

1. Consult local building codes and the NEC (National Electrical Code) ANSI/NFPA 70 for special installation requirements.
2. Determine unit location (from project plans) or select unit location.
3. Check for possible overhead obstructions which may interfere with unit lifting or rigging.

Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 7.

NOTE: Consider also the effect of adjacent units.

Be sure that unit is installed such that snow will not block the combustion intake or flue outlet.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used..

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute) and NFPA (National Fire Protection Association) 54 TIA-54-84-1. In Canada, installation must be in accordance with the CAN1-B149 installation codes for gas burning appliances.

Although unit is weatherproof, avoid locations that permit water from higher level runoff and overhangs to fall onto the unit.

Locate mechanical draft system flue assembly at least 4 ft (1.2 m) from any opening through which combustion products could enter the building, and at least 4 ft (1.2 m) from any adjacent building (or per local code). Locate the flue assembly at least 10 ft (3.05 m) from an adjacent unit's fresh air intake hood if within 3 ft (0.91 m) of same elevation (or per local code). When unit is located adjacent to public walkways, flue assembly must be at least 7 ft (2.1 m) above grade.

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Install External Condensate Trap and Line on page 19 for required trap dimensions.

ROOF MOUNT

Check building codes for weight distribution requirements. Unit operating weights are shown in Table 2.

Table 2 — Operating Weights

| 48KC-- | UNIT LB (KG) | | |
|----------------------|--------------|-----------|-----------|
| | 04 | 05 | 06 |
| Base Unit | 490 (222) | 544 (246) | 597 (270) |
| Economizer | | | |
| Vertical | 50 (23) | 50 (23) | 50 (23) |
| Horizontal | 80 (36) | 80 (36) | 80 (36) |
| Humidi-MiZer® System | 50 (23) | 50 (23) | 50 (23) |
| Cu Fins | 25 (11) | 43 (20) | 56 (25) |
| Powered Outlet | 35 (16) | 35 (16) | 35 (16) |
| Curb | | | |
| 14 in. (356 mm) | 115 (52) | 115 (52) | 115 (52) |
| 24 in. (610 mm) | 197 (89) | 197 (89) | 197 (89) |

Step 2 — Plan for Sequence of Unit Installation

The support method used for this unit will dictate different sequences for the steps of unit installation. For example, on curb-mounted units, some accessories must be installed on the unit before the unit is placed on the curb. Review the following for recommended sequences for installation steps:

CURB-MOUNTED INSTALLATION

1. Install curb
2. Install field-fabricated ductwork inside curb
3. Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
4. Prepare bottom condensate drain connection to suit planned condensate line routing (refer to Install External Condensate Trap and Line on page 19 for details)
5. Rig and place unit
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

PAD-MOUNTED INSTALLATION

1. Prepare pad and unit supports
2. Check and tighten the bottom condensate drain connection plug
3. Rig and place unit
4. Convert unit to side duct connection arrangement
5. Install field-fabricated ductwork at unit duct openings
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

FRAME-MOUNTED INSTALLATION

Frame-mounted applications generally follow the sequence for a curb installation. Adapt the sequence as required to suit specific installation plan.

Step 3 — Inspect Unit

Inspect unit for transportation damage. File any claim with transportation agency.

Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

On units with hinged panel option, check to be sure all latches are snug and in closed position.

Locate the carton containing the outside air hood parts. Do not remove carton until unit has been rigged and located in final position.

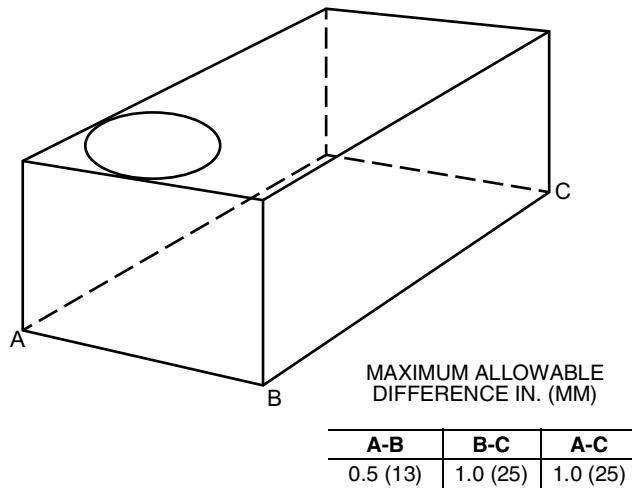


Fig. 8 — Unit Leveling Tolerances

Step 4 — Provide Unit Support

ROOF CURB MOUNT

Accessory roof curb details and dimensions are shown in Fig. 7. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 7. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 8. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit. The accessory thru-the-base power and gas connection package must be installed before the unit is set on the roof curb. If field-installed thru-the-roof curb gas connections are desired, use factory-supplied 1/2-in. pipe coupling and gas plate assembly to mount the thru-the-roof curb connection to the roof curb. Gas connections and power connections to the unit must be field-installed after the unit is installed on the roof curb.

If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-base service connections to the basepan in accordance with the accessory installation instructions.

SLAB MOUNT (HORIZONTAL UNITS ONLY)

Provide a level concrete slab that extends a minimum of 6 in. (150 mm) beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)

A non-combustible sleeper rail can be used in the unit curb support area. If sleeper rails cannot be used, support the long sides of the unit with a minimum of 3 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side.

Step 5 — Field Fabricate Ductwork

Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg (87 Pa) with economizer or 0.45 in. wg (112 Pa) without economizer.

For vertical ducted applications, secure all ducts to roof curb and building structure. Do not connect ductwork to unit.

Fabricate supply ductwork so that the cross sectional dimensions are equal to or greater than the unit supply duct opening dimensions for the first 18 in. (458 mm) of duct length from the unit basepan.

Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through unconditioned spaces must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork.

CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in damage to roofing materials.

Membrane roofs can be cut by sharp sheet metal edges. Be careful when placing any sheet metal parts on such roof.

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Rigging materials under unit (cardboard or wood) must be removed PRIOR to placing the unit on the roof curb. Level by using unit frame as a reference. See Table 2 and Fig. 9 for additional information.

Lifting holes are provided in base rails as shown in Fig. 9. Refer to rigging instructions on unit.

Rigging materials under unit (cardboard or wood to prevent base pan damage) must be removed PRIOR to placing the unit on the roof curb.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain plug can be tightened with a 1/2-in. square socket drive extension. For further details, see “Install External Condensate Trap and Line” on page 19.

Before setting the unit onto the curb, recheck gasketing on curb.

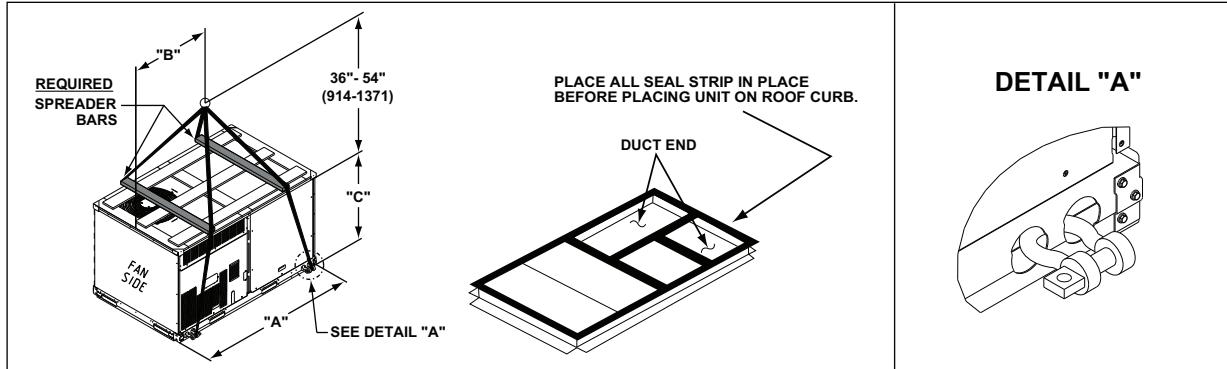
CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.

If using top crate as spreader bar, once unit is set, carefully lower wooden crate off building roof top to ground. Ensure that no people or obstructions are below prior to lowering the crate.



DETAIL "A"

| UNIT | MAX WEIGHT | | DIMENSIONS | | | | | |
|----------|------------|-----|------------|------|-----|-----|------|------|
| | lb | kg | in. | mm | in. | mm | in. | mm |
| 48KC-A04 | 795 | 361 | 74.5 | 1890 | 39 | 990 | 33.5 | 850 |
| 48KC-A05 | 890 | 405 | 74.5 | 1890 | 39 | 990 | 33.5 | 850 |
| 48KC-A06 | 1020 | 464 | 74.5 | 1890 | 39 | 990 | 41.5 | 1055 |

NOTES:

1. SPREADER BARS ARE REQUIRED. Top damage will occur if spreader bars are not used.
2. Dimensions in () are in millimeters.
3. Hook rigging shackles through holes in base rail, as shown in Detail A. Holes in base rails are centered around the unit center of gravity. Use wooden top to prevent rigging straps from damaging unit.

Fig. 9 — Rigging Details

POSITIONING ON CURB

Position unit on roof curb so that the following clearances are maintained: $1/4$ in. (6.4 mm) clearance between the roof curb and the base rail inside the front and rear, 0.0 in. clearance between the roof curb and the base rail inside on the duct end of the unit. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately $1/4$ in. (6.4 mm).

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Flue vent discharge must have a minimum horizontal clearance of 4 ft (1220 mm) from electric and gas meters, gas regulators, and gas relief equipment. Minimum distance between unit and other electrically live parts is 48 inches (1220 mm).

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials. Locate mechanical draft system flue assembly at least 48 in. (1220 mm) from an adjacent building or combustible material.

Installation of accessory flue discharge deflector kit will reduce the minimum clearance to combustible material to 18 in. (460 mm).

After unit is in position, remove rigging skids and shipping materials.

Step 7 — Convert to Horizontal and Connect Ductwork (When Required)

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return-air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 10) and remove covers. Use the screws to install the covers on vertical duct openings with the insulation-side

down. The panels must be inserted into the notches on the basepan to properly seal. The notches are covered by the tape used to secure the insulation to the basepan and are not easily seen. See Fig. 11 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 12. Cover seams with foil duct tape.

Field-supplied flanges should be attached to horizontal duct openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof or building openings with counter flashing and mastic in accordance with applicable codes.

Do not cover or obscure visibility to the unit's informative data plate when insulating horizontal ductwork.

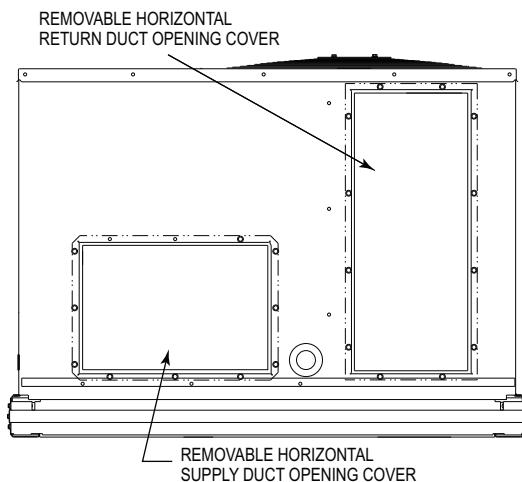


Fig. 10 — Horizontal Conversion Panels

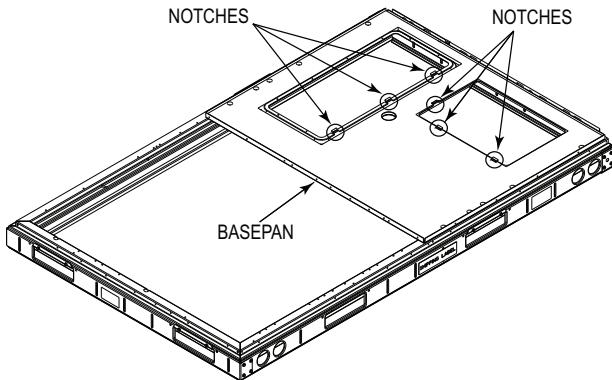


Fig. 11 — Location of Notches

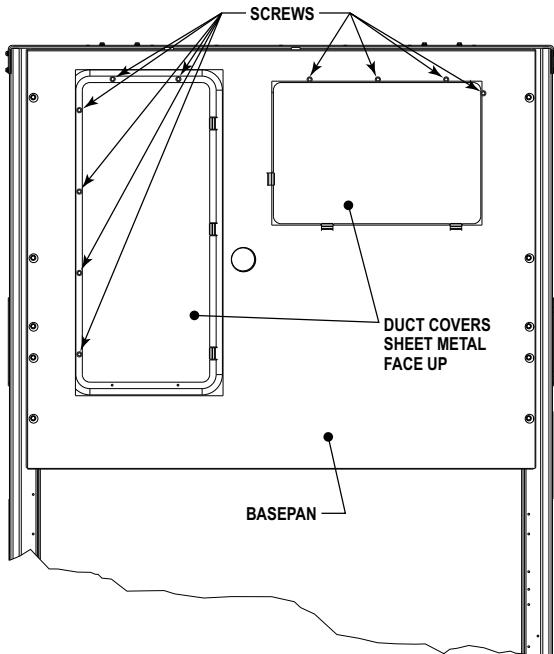


Fig. 12 — Horizontal Duct Panels In Place

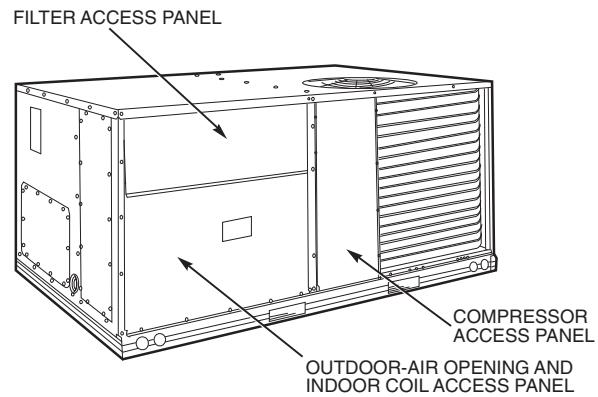


Fig. 13 — Typical Access Panel Locations

2. Locate the (2) screws holding the metal tray to the basepan and remove. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. See Fig. 14. Be careful to not damage any wiring or cut tie-wraps securing any wiring.

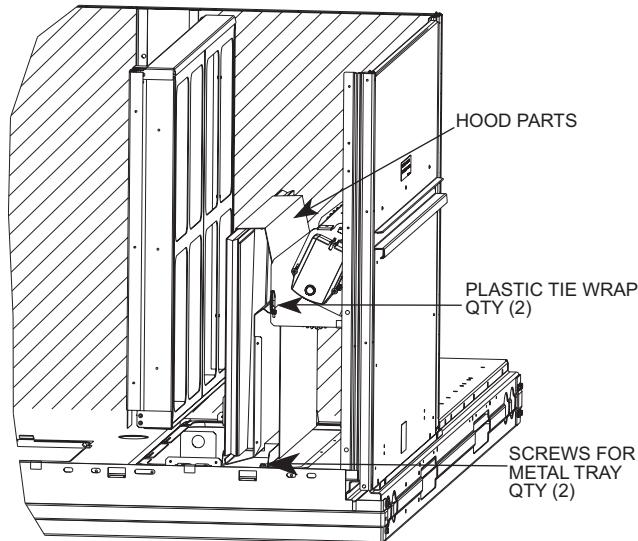


Fig. 14 — Economizer and Two-Position Damper Hood Parts Location

3. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in the Economizer Hood and Two-Position Hood section below.

ECONOMIZER AND TWO-POSITION HOOD

NOTE: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 15.

Step 8 — Install Outside Air Hood

ECONOMIZER AND TWO POSITION DAMPER HOOD PACKAGE REMOVAL AND SETUP (FACTORY OPTION)

NOTE: Economizer and two position damper are not available as factory installed options for single phase (-3 voltage code) models.

The hood is shipped in knock-down form and must be field assembled. The indoor coil access panel is used as the hood top while the hood sides, divider and filter are packaged together, attached to a metal support tray using plastic stretch wrap, and shipped in the return air compartment behind the indoor coil access panel. The hood assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.

1. To gain access to the hood, remove the filter access panel. See Fig. 13.

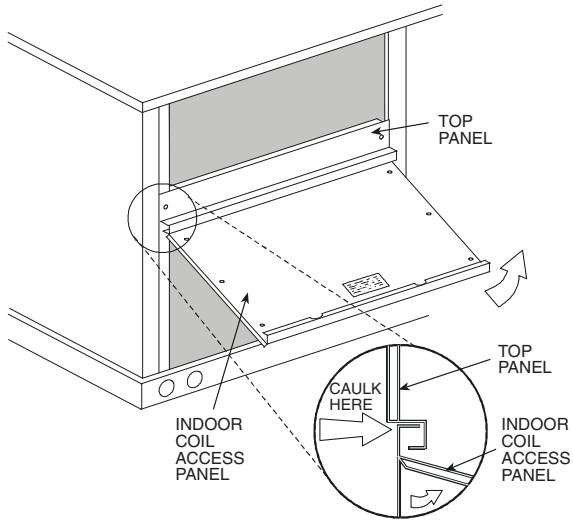


Fig. 15 — Indoor Coil Access Panel Relocation

2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 16.

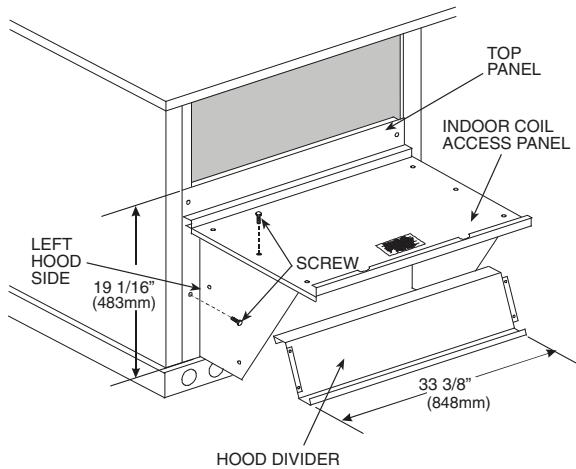


Fig. 16 — Economizer Hood Construction

3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
4. Insert the hood divider between the hood sides. See Fig. 16 and 17. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 17.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.

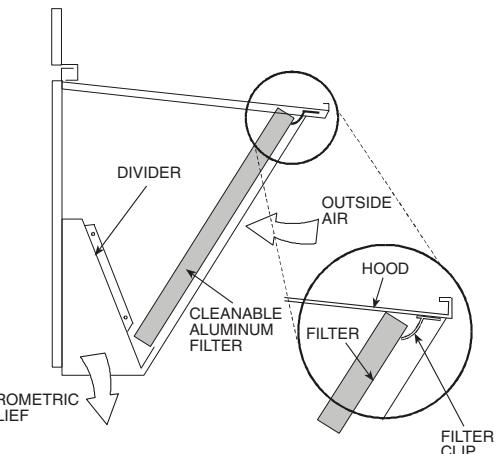


Fig. 17 — Economizer Filter Installation

Step 9 — Units with Hinged Panels Only

Relocate latch shipped inside the compressor compartment behind the hinged compressor door to location shown in Fig. 18 after unit installation.

If the unit does not have hinged panels, skip this step and continue at Step 10 below.

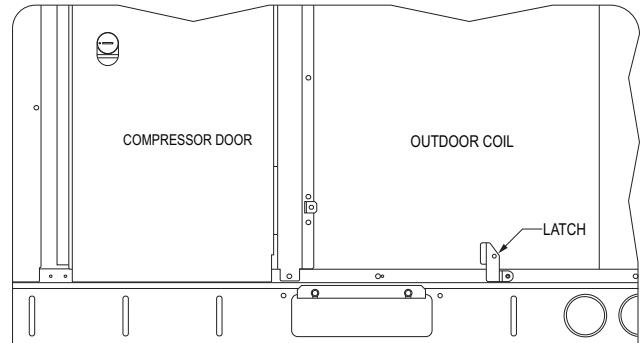


Fig. 18 — Compressor Door Latch Location

Step 10 — Install Flue Hood

Flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 19.

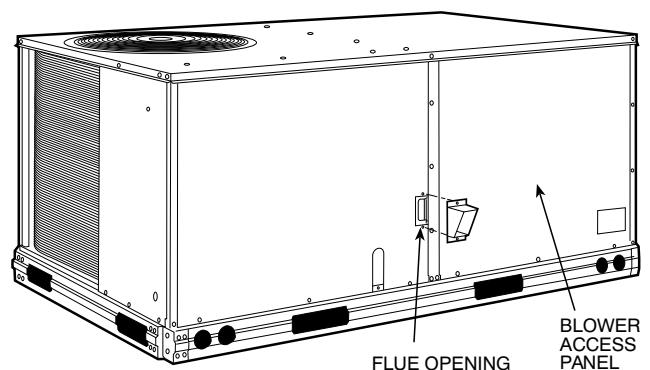


Fig. 19 — Flue Hood Details

Step 11 — Install Gas Piping

Installation of the gas piping must be accordance with local building codes and with applicable national codes. In U.S.A., refer to NFPA 54/ANSI Z223.1 National Fuel Gas Code (NFGC). In Canada, installation must be accordance with the CAN/CSA B149.1 and CAN/CSA B149.2 installation codes for gas burning appliances.

This unit is factory equipped for use with Natural Gas fuel at elevations up to 2000 ft (610 m) above sea level. Unit may be field converted for operation at elevations above 2000 ft (610 m) and/or for use with liquefied petroleum fuel. See accessory kit installation instructions regarding these accessories.

Furnace gas input rate on rating plate is for installation up to 2000 ft (610 m) above sea level. The input rating for altitudes above 2000 ft (610 m) must be derated by 4% for each 1000 ft (305 m) above sea level.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. On 48KCF*05-06 (high-heat) units, the gas pressure at unit gas connection must not be less than 5 in. wg (1245 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating, see Table 3. For liquified petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13.0 in. wg (3240 Pa) at the unit connection, see Table 4.

Table 3 — Natural Gas Supply Line Pressure Ranges

| UNIT MODEL | UNIT SIZE | MIN. | MAX. |
|-------------------------------------|------------|----------------------|-----------------------|
| 48KCD/E/L/M/S/R | 04, 05, 06 | 4.0 in. wg (996 Pa) | 13.0 in. wg (3240 Pa) |
| 48KCF/N/T (High Heat Units Only) | 05, 06 | 5.0 in. wg (1245 Pa) | 13.0 in. wg (3240 Pa) |

Table 4 — Liquid Propane Supply Line Pressure Ranges

| UNIT MODEL | UNIT SIZE | MIN. | MAX. |
|-----------------------------------|------------|-----------------------|-----------------------|
| 48KCD/E/S/R | 04, 05, 06 | 11.0 in. wg (2740 Pa) | 13.0 in. wg (3240 Pa) |
| 48KCF/T (High Heat Units Only) | 05, 06 | 11.0 in. wg (2740 Pa) | 13.0 in. wg (3240 Pa) |

The gas supply pipe enters the unit at the burner access panel on the front side of the unit, through the long slot at the bottom of the access panel. The gas connection to the unit is made to the 1/2-in. FPT gas inlet port on the unit gas valve.

Manifold pressure is factory-adjusted for natural gas fuel use. Adjust as required to obtain best flame characteristics. See Table 5.

Table 5 — Natural Gas Manifold Pressure Ranges

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|-------------------------------------|------------|---------------------|----------------|
| 48KCD/E/L/M/S/R | 04, 05, 06 | 3.5 in. wg (872 Pa) | SEE NOTE BELOW |
| 48KCF/N/T (High Heat Units Only) | 05, 06 | 3.5 in. wg (872 Pa) | SEE NOTE BELOW |

NOTE: LOW FIRE, 1.7 in. wg (423 Pa), applies to the following three phase voltage units only: 48KCE*04 and 48KCF*05/06.

Manifold pressure for LP fuel use must be adjusted to specified range. Follow instructions in the accessory kit to make initial readjustment, see Table 6.

Table 6 — Liquid Propane Manifold Pressure Ranges

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|-----------------------------------|------------|---------------------|----------------|
| 48KCD/E/S/R | 04, 05, 06 | 10 in. wg (2490 Pa) | SEE NOTE BELOW |
| 48KCF/T (High Heat Units Only) | 05, 06 | 10 in. wg (2490 Pa) | SEE NOTE BELOW |

NOTE: LOW FIRE, 5.0 in. wg (1245 Pa), applies to the following three phase voltage units only: 48KCE*04 and 48KCF*05/06.

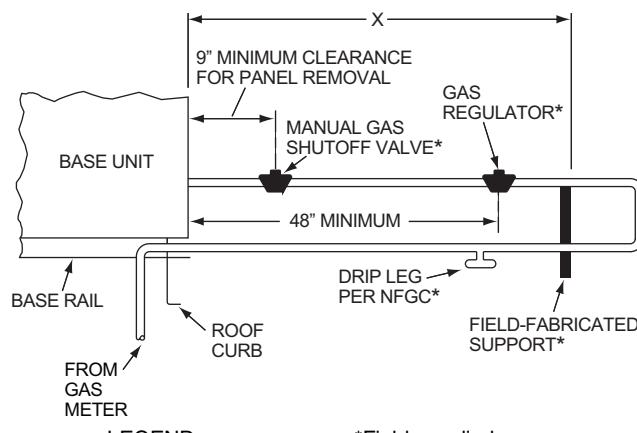
CAUTION

EQUIPMENT DAMAGE

Failure to follow this caution may result in equipment damage. When connecting the gas line to the unit gas valve, the installer **MUST** use a backup wrench to prevent damage to the valve.

Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFGC or equivalent code for gas pipe sizing data. Do not use a pipe size smaller than 1/2-in. Size the gas supply line to allow for a maximum pressure drop of 0.5 in. wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating at high-fire flow rate.

The gas supply line can approach the unit in three ways: horizontally from outside the unit (across the roof), thru-curb/under unit basepan (accessory kit required), or through unit basepan (factory option or accessory kit required). Consult accessory kit installation instructions for details on these installation methods. Observe clearance to gas line components per Fig. 20.



NFGC — National Fuel Gas Code

NOTE: Follow all local codes.

| STEEL PIPE NOMINAL DIAMETERS (IN.) | SPACING OF SUPPORTS X DIMENSION (FT.) |
|------------------------------------|---------------------------------------|
| 1/2 | 6 |
| 3/4 or 1 | 8 |
| 1-1/4 or larger | 10 |

Fig. 20 — Gas Piping Guide (with Accessory Thru-the-Curb Service Connections)

FACTORY OPTION THRU-BASE CONNECTIONS (GAS CONNECTIONS)

This service connection kit consists of a 1/2-in. electrical bulkhead connector and a 3/4-in. electrical bulkhead connector, connected to an "L" bracket covering the embossed (raised) section of the unit basepan in the condenser section (see Fig. 21 for shipping position).

The 3/4-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1/2-in. bulkhead connector

allows the high-voltage power wires to pass through the basepan. See Fig. 22.

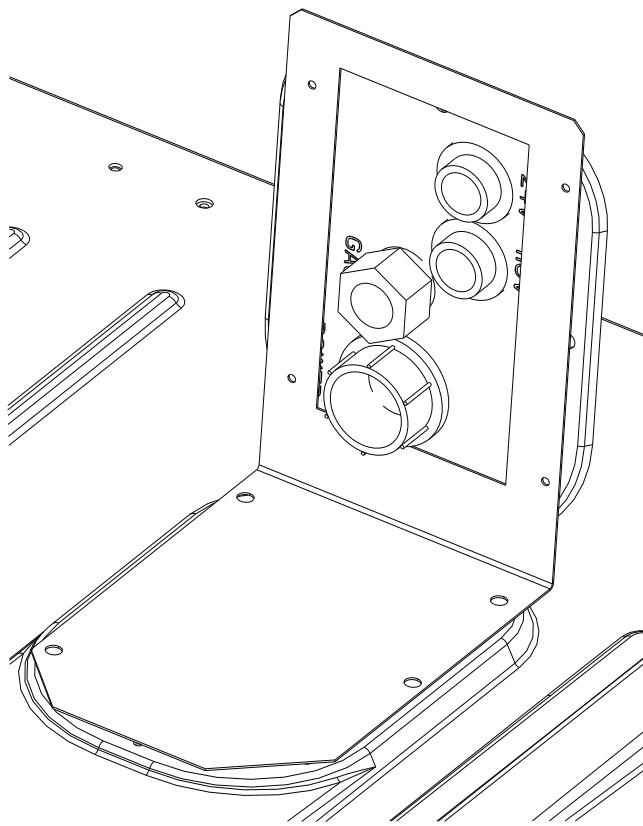


Fig. 21 — Thru-the-Base Fitting Assembly (Shown in Shipping Position)

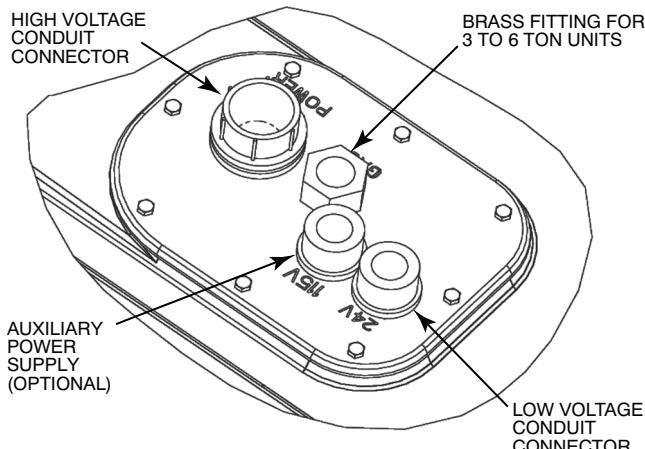


Fig. 22 — Thru-Base Connection Fittings

1. Remove the "L" bracket assembly from the unit.
2. Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws

and the gasket (located between the "L" bracket and the connector plate assembly).

NOTE: Take care not to damage the gasket, as it is reused in the following step.

3. Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 22.
4. Install the connector plate assembly to the basepan using 8 of the washer head screws.

The thru-base gas connector has male and female threads. The male threads protrude above the basepan of the unit; the female threads protrude below the basepan.

Check tightness of connector lock nuts before connecting gas piping.

Install a 1/2-in. NPT street elbow on the thru-base gas fitting. Attach a 1/2-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. See Fig. 23.

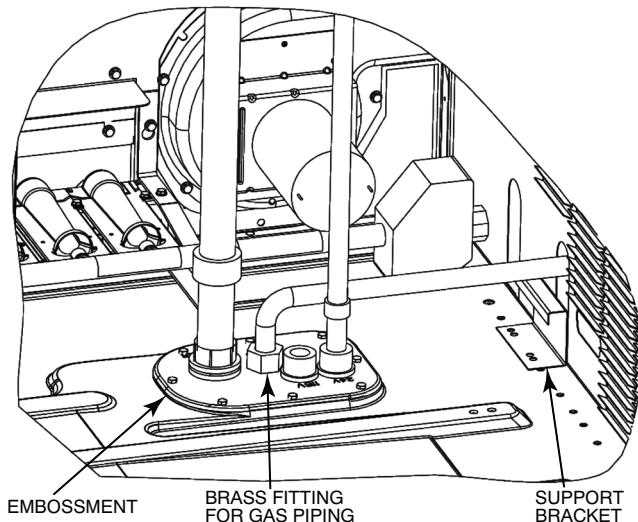


Fig. 23 — Gas Line Piping for 3 to 5 Ton Units Only

Other hardware required to complete the installation of the gas supply line includes a manual shutoff valve, a sediment trap (drip leg) and a ground-joint union. A pressure regulator valve may also be required (to convert gas pressure from pounds to inches of pressure). The manual shutoff valve must be located within 6 ft (1.83 m) of the unit. The union, located in the final leg entering the unit, must be located at least 9 in. (230 mm) away from the access panel to permit the panel to be removed for service. If a regulator valve is installed, it must be located a minimum of 4 ft (1220 mm) away from the unit's flue outlet. Some municipal codes require that the manual shutoff valve be located upstream of the sediment trap. See Fig. 24 and 25 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 26 for typical piping arrangement when thru-base is used. Ensure that all piping does not block access to the unit's main control box or limit the required working space in front of the control box.

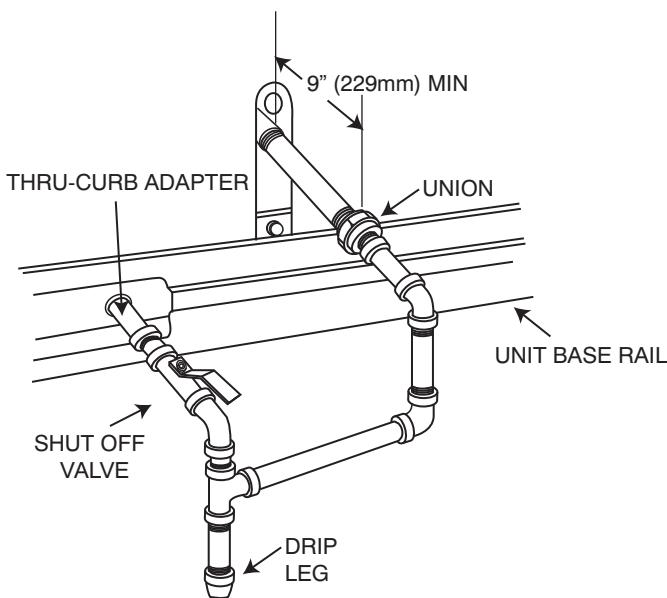


Fig. 24 — Gas Piping, Typical Curb Sidewall Piping (Example 1)

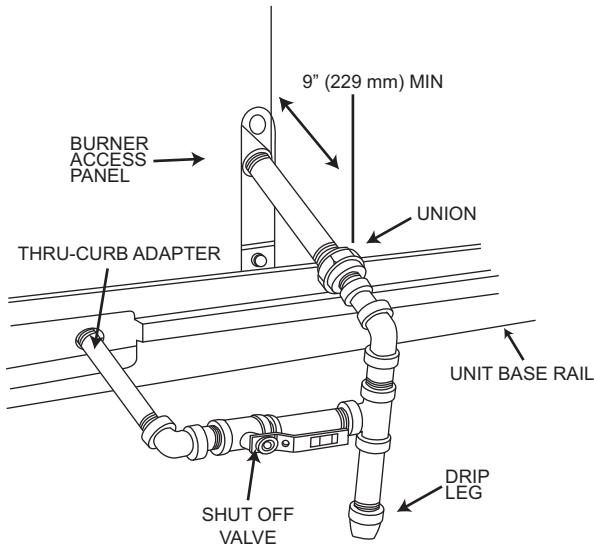


Fig. 25 — Gas Piping, Typical Curb Sidewall Piping (Example 2)

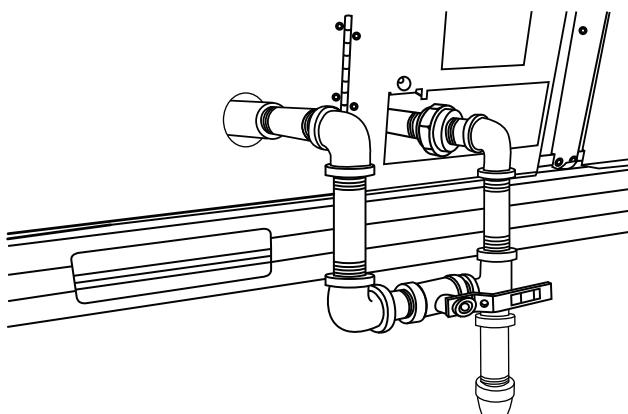


Fig. 26 — Gas Piping, Typical Thru-Base Connections

When installing the gas supply line, observe local codes pertaining to gas pipe installations. Refer to the NFPA 54/ANSI Z223.1 NFCC latest edition (in Canada, CAN/CSA B149.1). In the absence of local building codes, adhere to the following pertinent recommendations:

- Avoid low spots in long runs of pipe. Grade all pipe $1/4$ -in. per every 15 ft (7 mm per every 5 m) to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.
- Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft (1.8 m). For pipe sizes larger than $1/2$ -in., follow recommendations of national codes.
- Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. If using PTFE (Teflon¹) tape, ensure the material is Double Density type and is labeled for use on gas lines. Apply tape per manufacturer's instructions.
- Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

NOTE: Pressure test the gas supply system after the gas supply piping is connected to the gas valve. The supply piping must be disconnected from the gas valve during the testing of the piping systems when test pressure is in excess of 0.5 psig (3450 Pa). Pressure test the gas supply piping system at pressures equal to or less than 0.5 psig (3450 Pa). The unit heating section must be isolated from the gas piping system by closing the external main manual shutoff valve and slightly opening the ground-joint union.

Check for gas leaks at the field-installed and factory-installed gas lines after all piping connections have been completed. Use soap-and-water solution (or method specified by local codes and/or regulations).

⚠ WARNING

Failure to follow this warning could result in personal injury, death and/or property damage.

- Connect gas pipe to unit using a backup wrench to avoid damaging gas controls.
- Never purge a gas line into a combustion chamber.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.
- Use proper length of pipe to avoid stress on gas control manifold.

NOTE: If orifice hole appears damaged or it is suspected to have been redrilled, check orifice hole with a numbered drill bit of correct size. Never redrill an orifice. A burr-free and squarely aligned orifice hole is essential for proper flame characteristics. See Fig. 27.

1. Teflon is a registered trademark of DuPont.

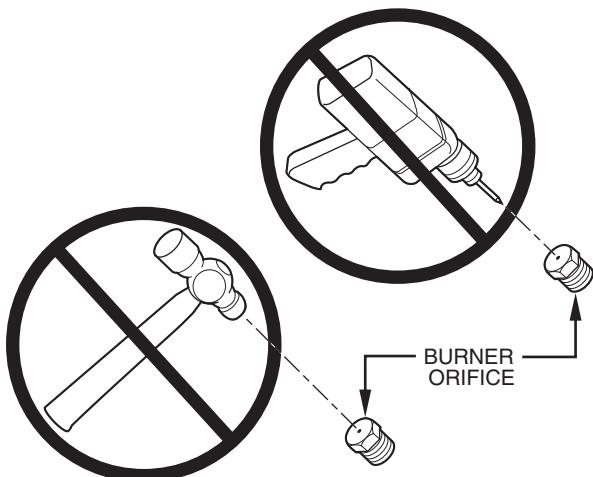


Fig. 27 — Orifice Hole

Step 12 — Install External Condensate Trap and Line

The unit has one $\frac{3}{4}$ -in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 28. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan can be tightened with a $\frac{1}{2}$ -in. square socket drive extension.

To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a $\frac{1}{2}$ -in. square socket drive extension) and install it in the side drain connection.

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 29.

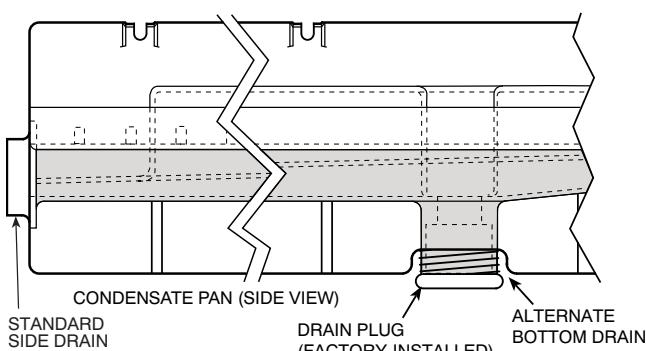
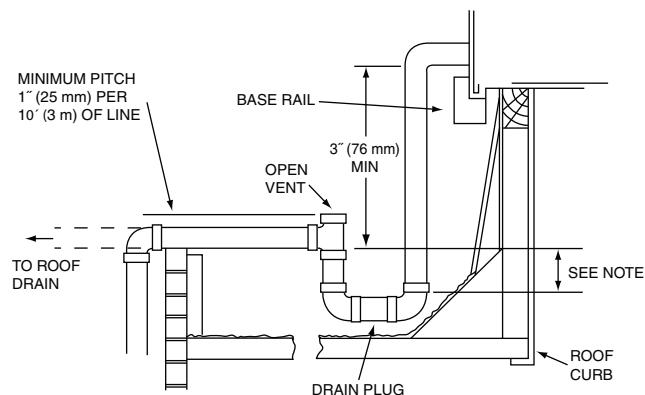


Fig. 28 — Condensate Drain Pan (Side View)



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. (102 mm) trap is recommended.

Fig. 29 — Condensate Drain Pan Piping Details

All units must have an external trap for condensate drainage. Install a trap at least 4 in. (102 mm) deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft (25 mm per 3 m) of run. Do not use a pipe size smaller than the unit connection ($\frac{3}{4}$ -in.).

Step 13 — Make Electrical Connections

WARNING

Failure to follow this warning could result in personal injury or death.

Do not use gas piping as an electrical ground.

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

NOTE: Field-supplied wiring shall conform with the limitations of minimum 63°F (33°C) rise.

FIELD POWER SUPPLY

If equipped with optional Powered Convenience Outlet, the power source leads to the convenience outlet's transformer primary are not factory connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor IFC pressure lugs with unit field power leads. See Convenience Outlets on page 22 for power transformer connections.

The field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch or HACR. Maximum wire size is #2ga AWG (copper only) per pole on contactors and #2ga AWG (copper only) per pole on optional

disconnect or HACR. See Fig. 30 and unit label diagram for field power wiring connections.

NOTE: Unit may be equipped with short test leads (pigtails) on the field line connection points on contactor C or optional disconnect switch. These leads are for factory-run test purposes only; remove and discard before connecting field power wires to unit connection points. Make field power connections directly to line connection pressure lugs only. See Fig. 31 for proper wiring details.

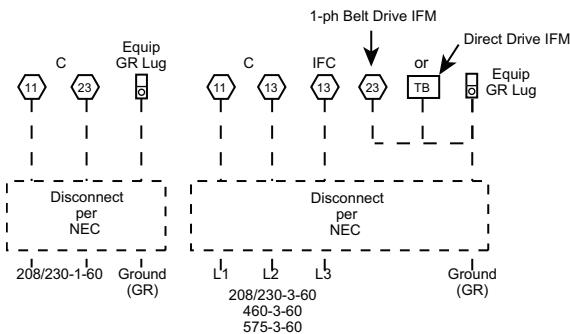
⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in personal injury, death, or property damage.

Do not connect aluminum wire between disconnect switch and unit. Use only copper wire.

Units Without Disconnect or HACR Option



Units With Disconnect or HACR Option

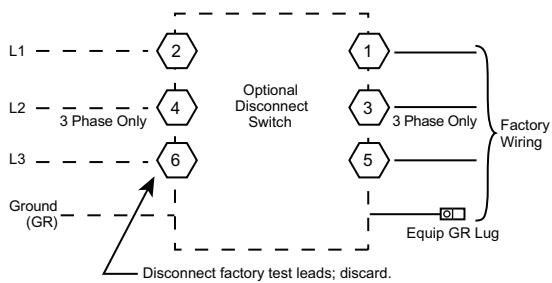


Fig. 30 — Power Wiring Connections

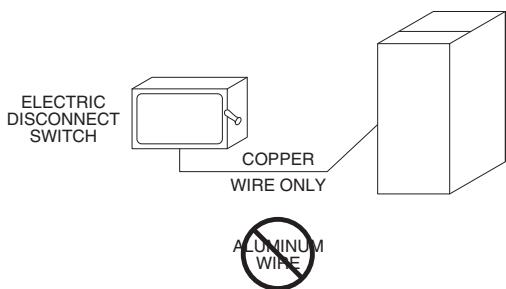


Fig. 31 — Disconnect Switch and Unit

UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

The factory-installed option non-fused disconnect (NFD) or HACR switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect or HACR enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 32).

Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

Field-Install the NFD Shaft and Handle

1. Remove unit front panel (see Fig. 2 or 3).
2. Remove (3) hex screws on the NFD enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 32.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position. See Fig. 33.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 to 3.88 in. (95 to 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.

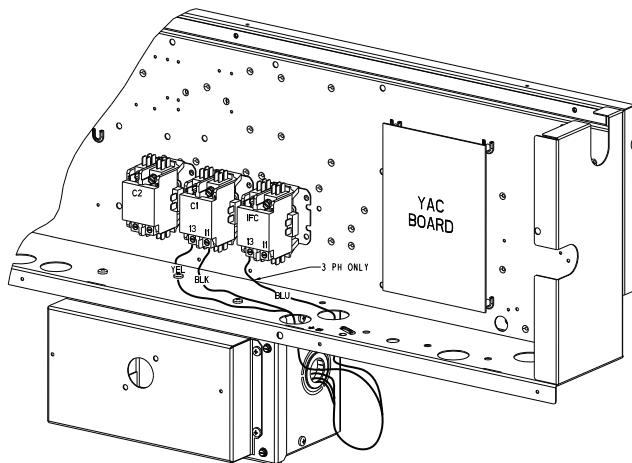


Fig. 32 — NFD Enclosure Location

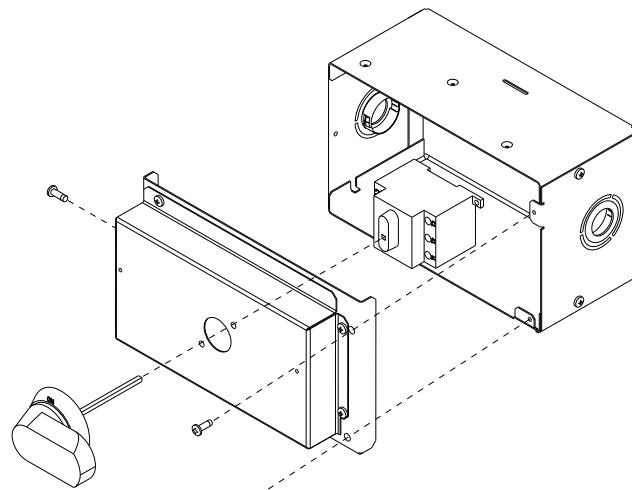


Fig. 33 — NFD Handle and Shaft Assembly

Field-Install the HACR Shaft and Handle

1. Remove unit front panel (see Fig. 2 and 3).
2. Remove (3) hex screws on the HACR enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 34.
3. Remove the front cover of the HACR enclosure.
4. Make sure the HACR shipped from the factory is at OFF position (the white arrow pointing at OFF).
5. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position. See Fig. 35.
6. Tighten the locking screw to secure the shaft to the HACR.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, re-install (3) hex screws on the HACR enclosure.
11. Re-install the unit front panel.

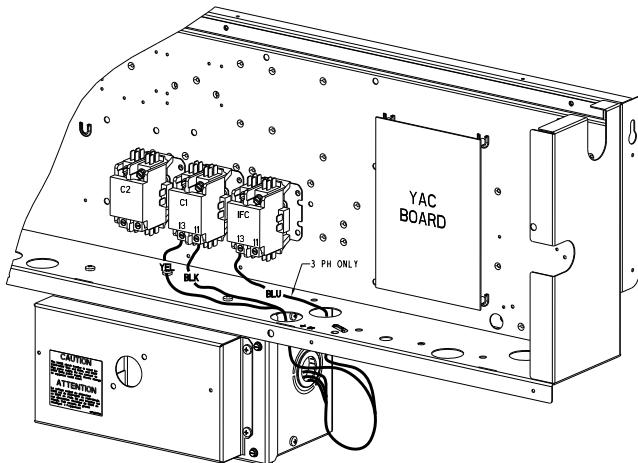


Fig. 34 — HACR Enclosure Location

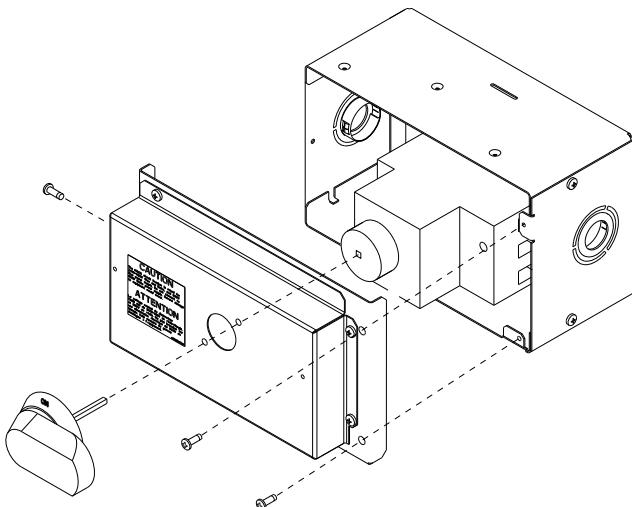


Fig. 35 — HACR Handle and Shaft Assembly

UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

When installing units, provide a disconnect switch per NEC (National Electrical Code) of adequate size. Disconnect sizing data is provided on the unit informative plate. Locate on unit cabinet or within sight of the unit per national or local codes. Do not cover unit informative plate if mounting the disconnect on the unit cabinet.

ALL UNITS

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 30 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2ga AWG (copper only) per pole on contactors. See Fig. 30 and unit label diagram for field power wiring connections.

Provide a ground fault and short circuit over-current protection device (fuse or breaker) per NEC Article 440 (or local codes). Refer to unit informative data plate for MOCP (Maximum Over-Current Protection) device size.

Units ordered with factory installed HACR do not need an additional ground fault and short circuit over-current protective device unless required by local codes.

All field wiring must comply with the NEC and local requirements.

All units except 208/230v units are factory wired for the voltage shown on the nameplate. *If the 208/230v unit is to be connected to a 208v power supply, the control transformer must be rewired by moving the black wire with the 1/4-in. female spade connector from the 230v connection and moving it to the 200v 1/4-in. male terminal on the primary side of the transformer. Refer to unit label diagram for additional information. Field power wires will be connected at line-side pressure lugs on the power terminal block or at factory-installed option non-fused disconnect.*

Check all factory and field electrical connections for tightness.

CONVENIENCE OUTLETS

⚠️ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.

Two types of convenience outlets are offered on 48KC models: non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit interrupter) duplex receptacle rated at 15A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 36.

NOTE: Unit powered convenience outlets are not available as factory-installed options for single phase (-3 voltage code models).

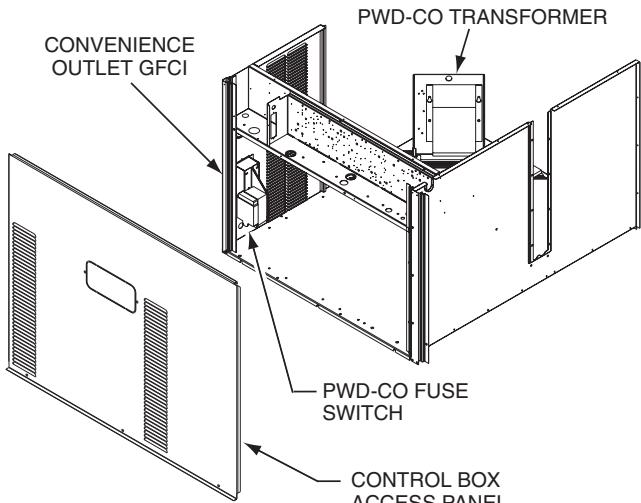


Fig. 36 — Convenience Outlet Location

Installing Weatherproof Cover

A weatherproof while-in-use cover for the factory-installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due to its depth; it must be installed at unit installation. For shipment, the convenience outlet is covered with a blank cover plate.

The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate, and gasket.

⚠️ WARNING

PERSONAL INJURY HAZARD

Failure to follow this caution could result in personal injury or death.

Disconnect all power to unit and convenience outlet. Lock-out and tag-out all power.

1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. Loosen the two screws at the GFCI duplex outlet, until approximately $1\frac{1}{2}$ -in. (13 mm) under screw heads is exposed. Press the gasket over the screw heads.

3. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 37.
5. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check for full closing and latching.

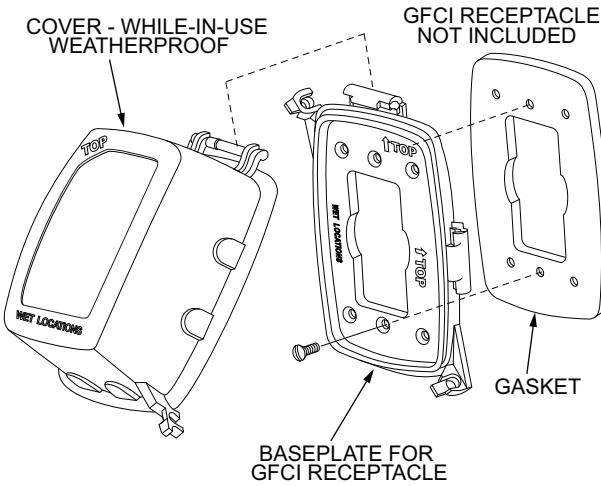


Fig. 37 — Weatherproof Cover Installation

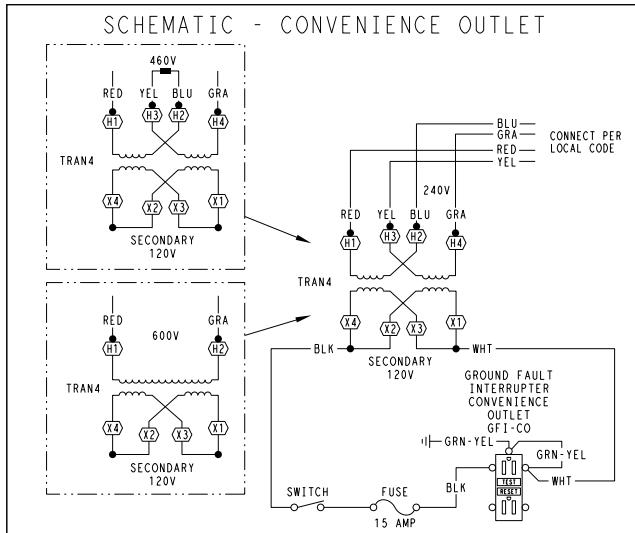
Non-Powered Convenience Outlet

This type requires the field installation of a general-purpose 125v 15A circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size, fuse or breaker requirements, and disconnect switch size and location. Route 125v power supply conductors into the bottom of the utility box containing the duplex receptacle.

Unit-Powered Convenience Outlet

A unit-mounted transformer is factory-installed to step down the main power supply voltage to the unit to 115v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 36.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 38.



| UNIT VOLTAGE | CONNECT AS | PRIMARY CONNECTIONS | TRANSFORMER TERMINALS |
|--------------|------------|--|-----------------------|
| 208, 230 | 240 | L1: RED + YEL L2: BLU + GRA | H1 + H3 H2 + H4 |
| 460 | 480 | L1: RED Splice BLU + YEL L2: GRA | H1 H2 + H3 H4 |
| 575 | 600 | L1: RED L2: GRA | H1 H2 |

Fig. 38 — Powered Convenience Outlet Wiring

Using Unit-Mounted Convenience Outlets

Units with unit-mounted convenience outlet circuits will often require that two disconnects be opened to de-energize all power to the unit. Treat all units as electrically energized until the convenience outlet power is also checked and de-energization is confirmed. Observe National Electrical Code Article 210, Branch Circuits, for use of convenience outlets.

Fuse On Power Type

The factory fuse is a Bussman "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse.

Duty Cycle

The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15-amps loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8 amps. Convenience outlet usage rating:

- Continuous usage: 8 amps maximum
- Intermittent usage: Up to 15 amps maximum for up to 2 hours maximum

See Fig. 39.

Test the GFCI receptacle by pressing the TEST button on the face of the receptacle to trip and open the receptacle. Check for proper grounding wires and power line phasing if the GFCI receptacle does not trip as required. Press the RESET button to clear the tripped condition.



Fig. 39 — Convenience Outlet Utilization Notice Label

HACR AMP RATING

The amp rating of the HACR factory-installed option is based on the size, voltage, indoor motor and other electrical options of the unit as shipped from the factory. If field-installed accessories are added or changed in the field (for example, power exhaust, ERV), the HACR may no longer be of the proper amp rating and therefore will need to be removed from the unit. See unit nameplate and label on factory-installed HACR for the amp rating of the HACR that was shipped with the unit from the factory (Fig. 40). See unit nameplates for the proper fuse, HACR or maximum over-current protection device required on the unit with field-installed accessories.

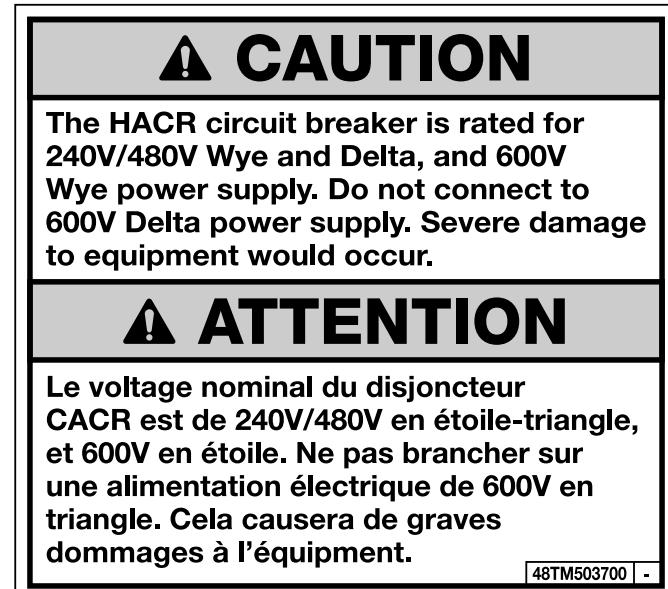


Fig. 40 — HACR Caution Label

FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2-in. NPT gas adapter fitting (brass), a 1/2-in. electrical bulkhead connector, and a 3/4-in. electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The 3/4-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1/2-in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 21 on page 17.

Check tightness of connector lock nuts before connecting electrical conduits.

Field-supplied and field-installed liquid tight conduit connectors and conduit may be attached to the connectors on the basepan. Pull correctly rated high voltage and low voltage through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). A hole must be field cut in the main control box bottom on the left side so the 24-v control connections can be

made. Connect the control power conduit to the unit control box at this hole.

UNITS WITHOUT THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 30 on page 19.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the example below to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

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

Example: Supply voltage is 230-3-60

| A | B | C |
|------------|---|---|
| AB = 224 v | | |
| BC = 231 v | | |
| AC = 226 v | | |

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.

$$\begin{aligned} (\text{AB}) 227-224 &= 3 \text{ v} \\ (\text{BC}) 231-227 &= 4 \text{ v} \\ (\text{AC}) 227-226 &= 1 \text{ v} \end{aligned}$$

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.78\%$$

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

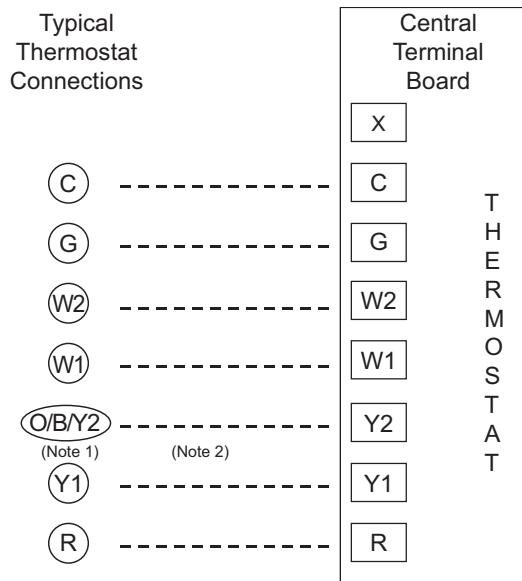
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

FIELD CONTROL WIRING

The 48KC unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a Premier-Link™ controller (available as factory-installed option or as field-installed accessory, for use on a Carrier Comfort Network® or as a stand alone control) or the RTU Open Controller for Building Management Systems using non-CCN protocols (RTU Open is available as a factory-installed option only).

THERMOSTAT

Install a Carrier-approved accessory thermostat according to installation instructions included with the accessory. For complete economizer function, select a two-stage cooling thermostat. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions. Typical low-voltage connections are shown in Fig. 41.



Note 1: Typical multi-function marking. Follow manufacturer's configuration Instructions to select Y2.

Note 2: Y2 to Y2 connection required on single-stage cooling units when integrated economizer function is desired.

— Field Wiring

Fig. 41 — Low-Voltage Thermostat Connections

If the thermostat contains a logic circuit requiring 24v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24v source (no "C" connection required), use a thermostat cable or equivalent with minimum of six leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable.

For wire runs up to 50 ft (15 m), use no. 18 AWG (American Wire Gage) insulated wire [95°F (35°C) minimum]. For 50 to 75 ft (15 to 23 m), use no. 16 AWG insulated wire [95°F (35°C) minimum]. For over 75 ft (23 m), use no. 14 AWG insulated wire [95°F (35°C) minimum]. Wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Thermostat Wiring, Units Without Thru-Base Connection Kit

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Central Terminal Board (CTB). See Fig. 42.

If thru-the-bottom connections accessory is used, refer to the accessory installation instructions for information on routing power and control wiring.

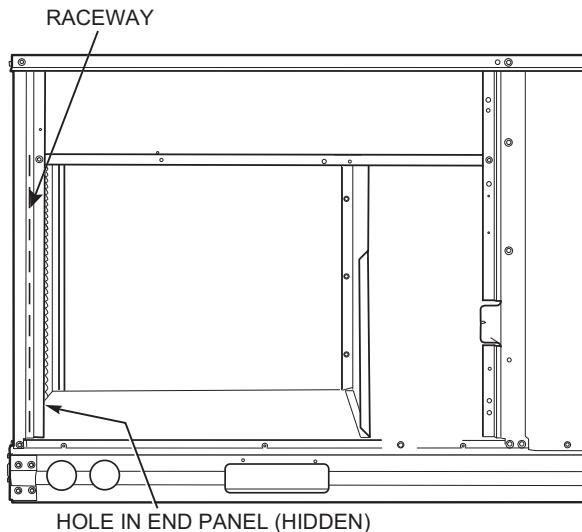


Fig. 42 — Field Control Wiring Raceway

HEAT ANTICIPATOR SETTINGS

Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second-stage heating, when available.

HUMIDI-MIZER® CONTROL CONNECTIONS

Humidi-MiZer® Space RH Controller

NOTE: The Humidi-MiZer system is a factory-installed option which is only available for units equipped with belt-drive motors. Humidi-MiZer system is not available for single phase (-3 voltage code) models.

The Humidi-MiZer dehumidification system requires a field-supplied and field-installed space relative humidity control device. This device may be a separate humidistat control (contact closes on rise in space RH above control setpoint) or a combination thermostat-humidistat control device such as Carrier's Edge® Pro Thermidistat™ device with isolated contact set for dehumidification control. See Fig. 43 and 44. The humidistat is normally used in applications where a temperature control is already provided (units with PremierLink™ control).

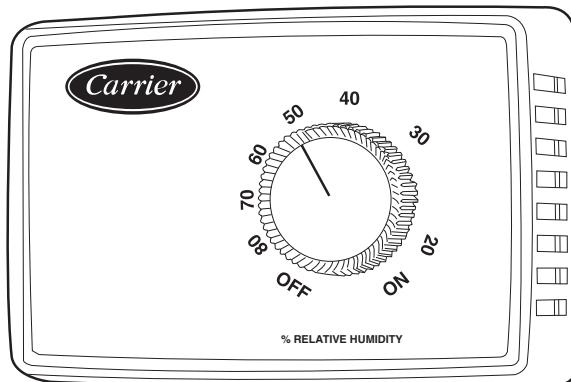


Fig. 43 — Accessory Field-Installed Humidistat



Fig. 44 — Edge® Pro Thermidistat

Connecting the Carrier Humidistat (HL38MG029)

1. Route the humidistat 2-conductor cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 42) to the 24v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Use wire nuts to connect humidistat cable to two PINK leads in the low-voltage wiring as shown in Fig. 45.

Connecting the Thermidistat device (33CS2PPRH-01)

1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 42) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. The Thermidistat has dry contacts at terminals D1 and D2 for dehumidification operation (see Fig. 46). The dry contacts must be wired between CTB terminal R and the PINK lead to the LTLO switch with field-supplied wire nuts. Refer to the installation instructions included with the Carrier Edge® Pro Thermidistat device for more information.

TYPICAL UNIT WIRING DIAGRAMS

See Fig. 47 and 48 for examples of typical unit control and power wiring diagrams. These wiring diagrams are mounted on the inside of the unit control box cover.

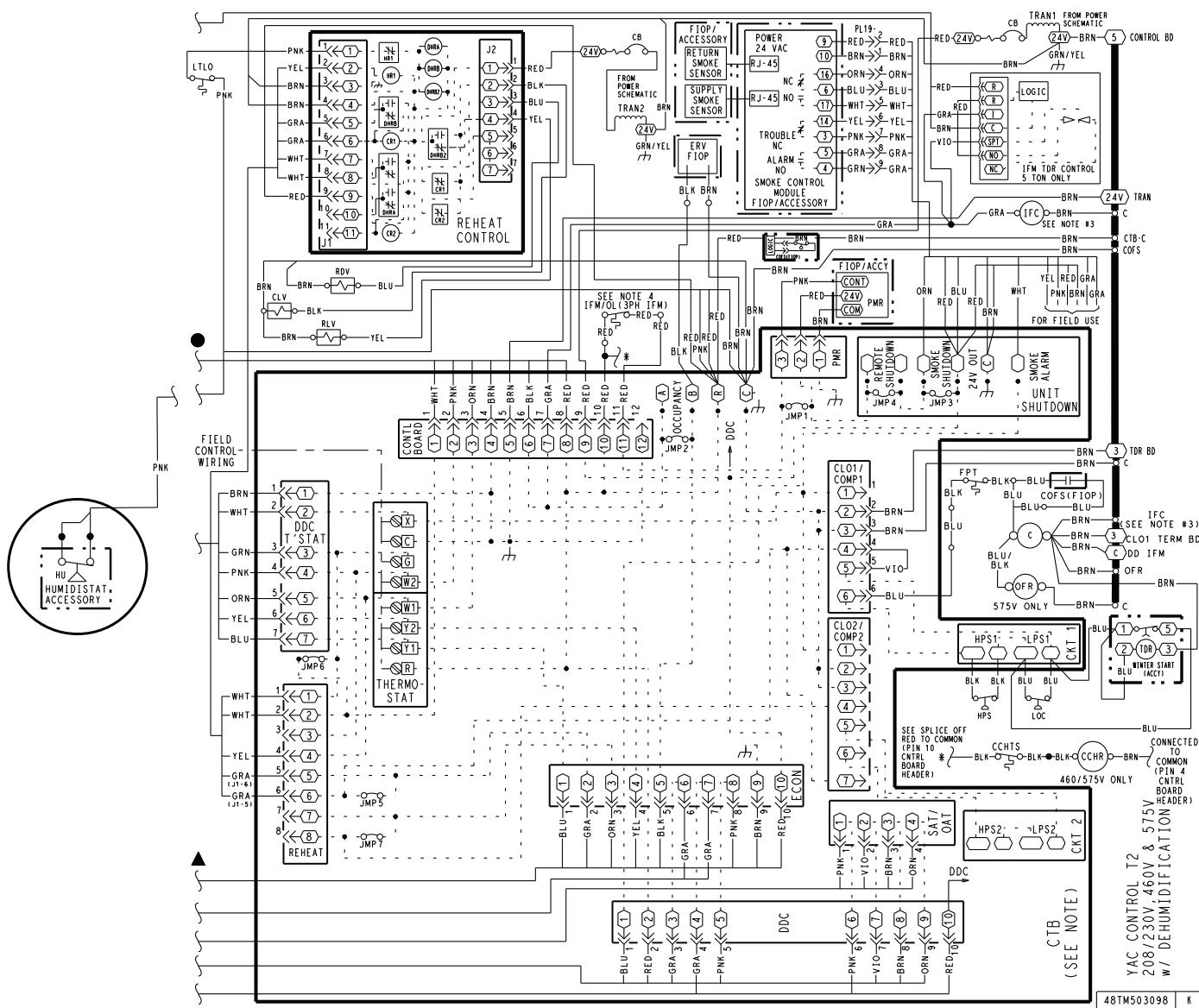
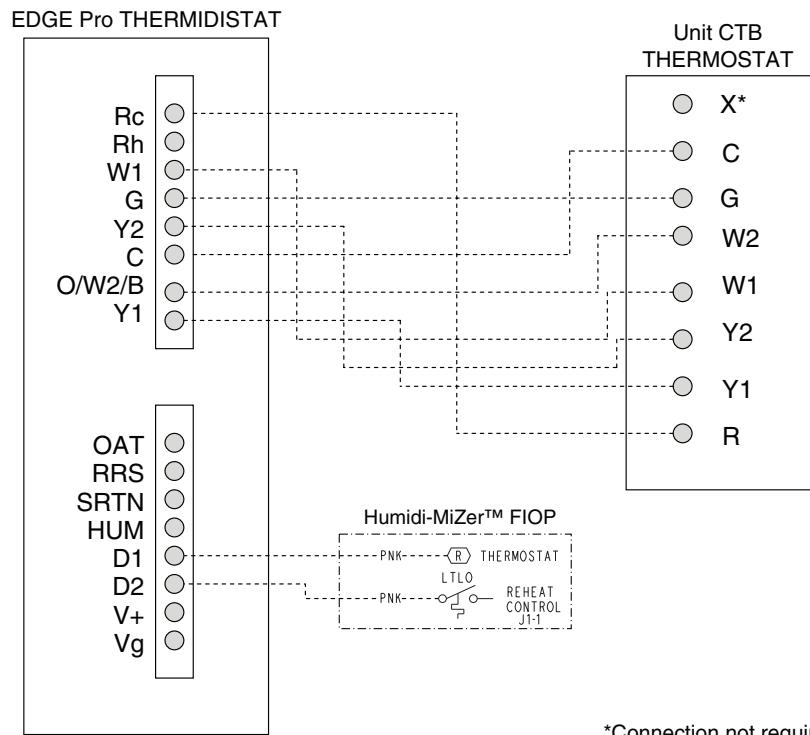


Fig. 45 — Typical Humidi-MiZer® Adaptive Dehumidification System Humidistat Wiring



*Connection not required.

Fig. 46 — Typical Rooftop Unit with Humidi-MiZer® Adaptive Dehumidification System and Edge® Pro Thermidistat Device

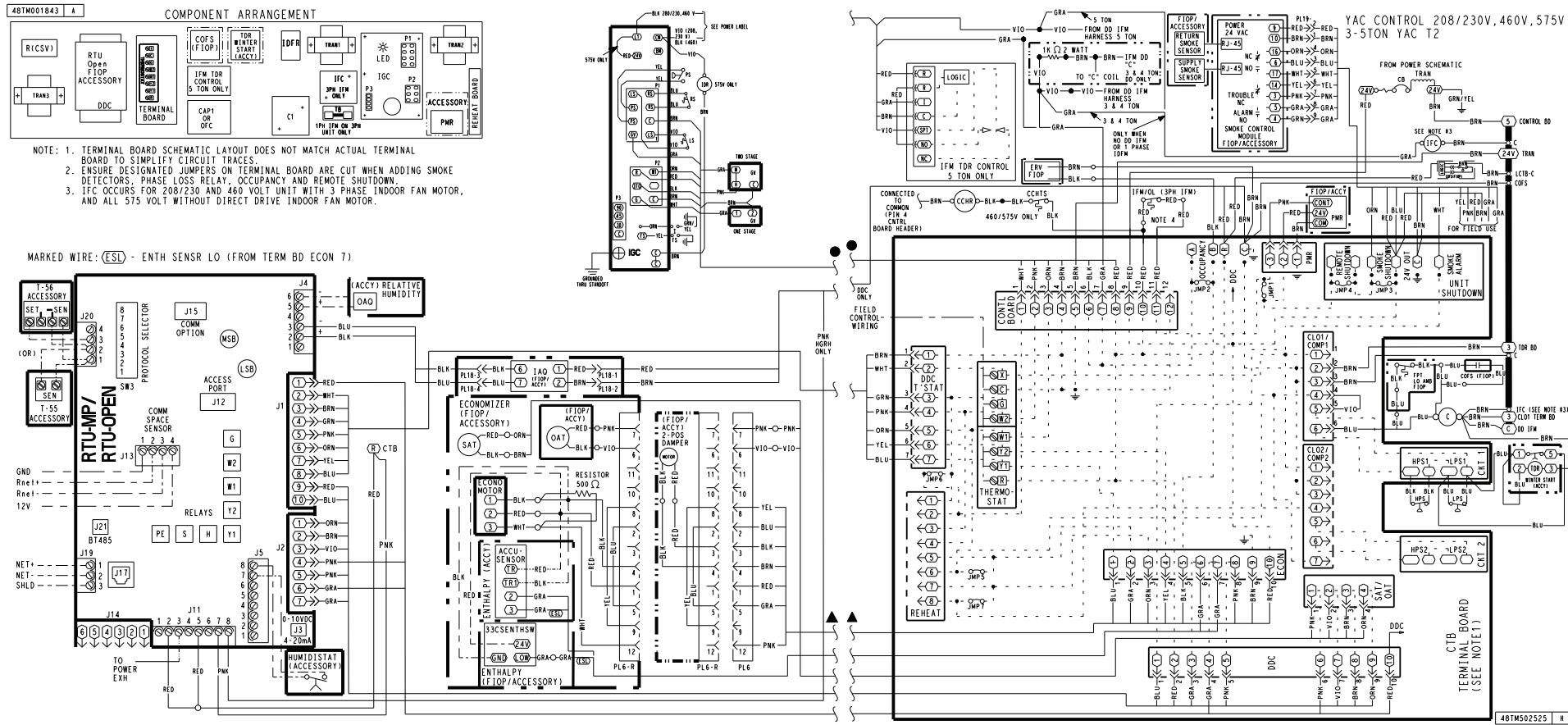
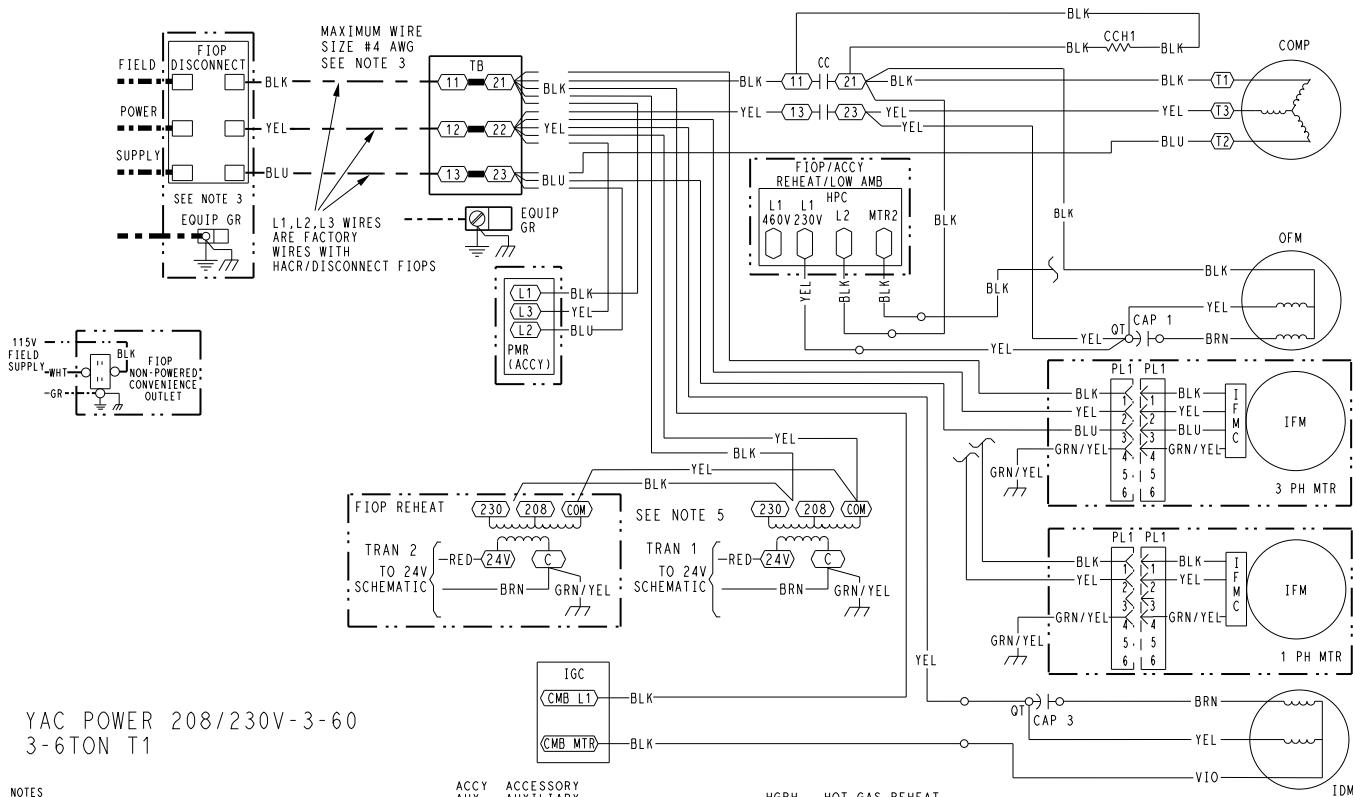


Fig. 47 — Typical Control Wiring Diagram Electro-Mechanical with W7212



YAC POWER 208/230V-3-60
3-6TON T1

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90° C WIRE OR ITS EQUIVALENT.
 2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
 3. USE COPPER CONDUCTOR ONLY.
 4. DO NOT CONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
 5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- LEGEND

X MARKED WIRE
 X (MARKED) TERMINAL (MARKED)
 ○ TERMINAL (UNMARKED)
 X TERMINAL BLOCK
 ● SPLICE
 ○ SPLICE (MARKED)
 — FACTORY WIRING
 — FIELD CONTROL WIRING
 - - - FIELD POWER WIRING
 — CIRCUIT BOARD TRACE
 - - - ACCESSORY OR OPTIONAL WIRING

| ACCCY | ACCESSORY | HGRH | HOT GAS REHEAT | PER | POWER EXHAUST RELAY |
|---------|------------------------------|----------|-----------------------------|------|---------------------------|
| AUX | AUXILIARY | HPC | HEAD PRESSURE CONTROL | PH | PHASE |
| AWG | AMERICAN WIRE GAGE | HPS | HIGH PRESSURE SWITCH | PL | PLUG ASSEMBLY |
| BA | BUILDING AUTOMATION NETWORK | HR | HEATER RELAY | POT | POTENTIOMETER |
| CC | CONTACTOR,COMPRESSOR | HUM | HUMIDISTAT | PMR | PHASE MONITOR RELAY |
| C | COMMON | IOM | INDOOR AIR QUALITY SENSORS | PS | PRESSURE SWITCH |
| CAP | CAPACITOR | IDMR | INDUCED DRAFT MOTOR | PWM | PULSE WIDTH MODULATION |
| CB | CONTINUOUS BREAKER | IFM | INDOOR FAN MOTOR | QT | QUADRUPLE TERMINAL |
| CCHCR | CRANKCASE HEATER | IFMC | INDOOR FAN MOTOR CONTROL | R | THERMOSTAT POWER |
| CCHTS | CRANKCASE HEATER TEMP SWITCH | IFO | INDOOR FAN ON SIGNAL | RAT | RETURN AIR TEMP. SEN |
| CLO | COMPRESSOR LOCKOUT | IGC | INTEGRATED GAS CONTROL | RDV | REHEAT DISCHARGE VALVE |
| CLV | COOLING LIQUID VALVE | IGN | IGNITOR | RH | RELATIVE HUMIDITY |
| CMB | CENTRIFUGAL MOTOR BLOWER | IRH | INDOR RELATIVE HUMIDITY | RLV | REHEAT LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH | JMP | JUMPER | RNET | ROCAN ACCESSORY NETWORK |
| COMP | SUPERCOMPRESSOR MOTOR | LT | LINE 1 | RS | ROLLOUT SWITCH |
| DDC | DIRECT DIGITAL CONTROL | LA | LOW AMBIENT LOCKOUT | PVS | REVERSING VALVE SOLENOID |
| DFB | DEFROST BOARD | LAR | LOW AMBIENT RELAY | SAT | SUPPLY AIR TEMP SENSOR |
| DFT | DEFROST THERMOSTAT | LAS | LOW AMBIENT SWITCH | SDP | SYSTEM DISCHARGE PRESSURE |
| EHR | ELECTRIC HEAT RELAY | LDR | COMPRESSOR LOADER | SPRH | SPACE RELATIVE HUMIDITY |
| ENTH | ENTHALPY | LEN | LOCAL EQUIPMENT NETWORK | SPT | SPACE TEMPERATURE SENSOR |
| EQUIP | EQUIPMENT | LOC | LOSE OF CHARGE | SPTO | SPACE TEMPERATURE OFFSET |
| ERV | EXHAUST RECOVERY VENTILATOR | LOOP PWR | COMPRESSOR POWER | SSP | SPRING SUCTION PRESSURE |
| FSL | ENTHALPY SENSOR - LOW | LFS | LOW PRESSURE SWITCH | STD | STANDARD |
| FB | FUSE BLOCK | LSM | LIMIT SWITCH | SW | SWITCH |
| FIOP | FACTORY INSTALLED OPTION | LTL0 | LIMIT SWITCH (MANUAL RESET) | TB | TERMINAL BLOCK |
| FPT | FREEZE PROTECTION THERMOSTAT | MBB | LOW TEMP LOCKOUT | TDR | TIME DELAY RELAY |
| FS | FLAME SWITCH | MOV | MAIN BASE BOARD | TRAN | TRANSFORMER |
| FST | FAN HOUSING TEMP SENSOR | MTR | METAL OXIDE VARISTOR | UCB | UNIT CONTROL BOARD |
| FU | FUSE | MOX | MOISTURE | W1 | 1st STAGE OF HEATING CALL |
| G | THERMOSTAT FAN CALL | OAO | OUTDOOR AIR QUALITY | W2 | 2nd STAGE OF HEATING CALL |
| GR(GND) | GROUND | OAT | OUTDOOR AIR TEMP. SEN | Y1 | 1st STAGE OF COOLING CALL |
| GV | GV GAS VALVE | OPM | OUTDOOR FAN MOTOR | Y2 | 2nd STAGE OF COOLING CALL |
| HACR | HEATING, AIR-CONDITIONING, | OPR | OUTDOOR FAN RELAY | | |
| | REFRIGERATION BREAKER | OL | OVERLOAD | | |

48TC002991 -

Fig. 48 — Typical 48KC 04-06 Power Wiring Diagram, 208-230/3/60 Unit Shown

Low Ambient Control (Factory Option)

If the unit comes with Electro-Mechanical (EM) control, then no adjustment is necessary.

If the unit comes with PremierLink™ or RTU Open control option, then refer to its installation control manual for details on adjusting “Cooling Lock-Out” setting and configure for the specific job requirements.

Integrated Gas Controller

This unit contains an Integrated Gas Controller (IGC) board. The IGC control board uses a flue gas pressure switch that senses pressure drop in the heat exchanger due to the combustion inducer. See Fig. 49.

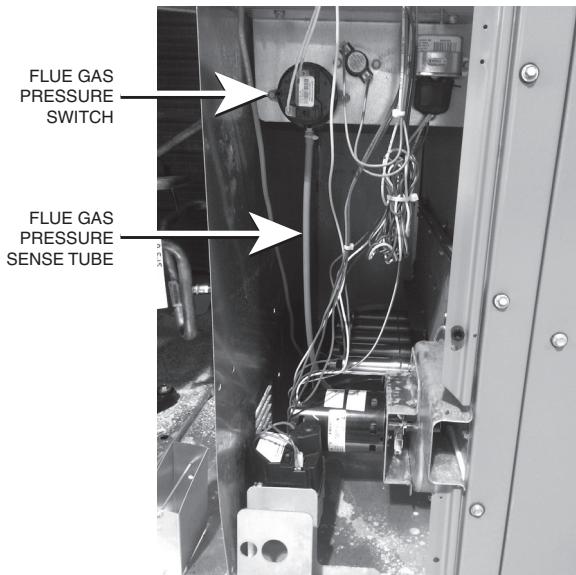


Fig. 49 — Flue Gas Pressure Switch and Pressure Sense Tube (Typical Location)

When the thermostat calls for heating, power is sent to W on the Integrated Gas Controller (IGC) board. An LED (light emitting diode) on the IGC board turns on and remains on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed, and that the pressure switch is open. If the check was successful, the induced draft motor is energized. When the pressure in the heat exchanger is low enough to close the pressure switch, the ignition activation period begins. Once ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the pressure switch, and the flame sensor. Assuming the unit is controlled through a room thermostat set for “fan auto,” 45 seconds after ignition occurs, the indoor fan motor will energize, and the outdoor air dampers will open to their minimum position. If the “over temperature limit” opens prior to the start of the indoor fan blower, the IGC will shut down the burners, and the control will shorten the 45 second delay to 5 seconds less than the time to trip the limit. For example, if the limit trips at 37 seconds, the control will change the “fan on delay” from 45 seconds to 32 seconds. Once the “fan on delay” has been modified, it will not change back to 45 seconds unless power is reset to the control. On units with 2 stages of heat, W2 closes and initiates power to the second stage of the main gas valve when additional heat is required.

When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. 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. An LED indicator is provided on the IGC to monitor operation.

See Fig. 50 for IGC board component layout. Figure 51 is a typical IGC control wiring diagram.

Table 7 lists the IGC board LED alarm codes.

Table 7 — IGC Board LED Alarm Codes

| LED FLASH CODE | DESCRIPTION | ACTION TAKEN BY CONTROL | RESET METHOD | PROBABLE CAUSE |
|----------------|----------------------------------|--|---|--|
| On | Normal | — | — | — |
| Off | Hardware Failure | No gas heating. | — | Loss of power to the IGC. Check 5 amp fuse on IGC, power to unit, 24V circuit breaker, transformer, and wiring to the IGC. |
| 1 Flash | Indoor Fan On/Off Delay Modified | 5 seconds subtracted from On delay. 5 seconds added to Off delay (3 min max). | Power reset. | High temperature limit switch opens during heat exchanger warm-up period before fan-on delay expires. High temperature limit switch opens within 10 minutes of heat call (W) Off. See Limit Switch Fault. |
| 2 Flashes | Limit Switch Fault | Gas valve and igniter Off. Indoor fan and inducer On. | Limit switch closed, or heat call (W) Off. | High temperature limit switch is open. Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is within the range on the unit nameplate. Check wiring and limit switch operation. |
| 3 Flashes | Flame Sense Fault | Indoor fan and inducer On. | Flame sense normal. Power reset for LED reset. | The IGC sensed a flame when the gas valve should be closed. Check wiring, flame sensor, and gas valve operation. |
| 4 Flashes | Four Consecutive Limit | No gas heating. | Heat call (W) Off. Power reset for LED reset. | 4 consecutive limit switch faults within a single call for heat. See Limit Switch Fault. |
| 5 Flashes | Ignition Fault | No gas heating. | Heat call (W) Off. Power reset for LED reset. | Unit unsuccessfully attempted ignition for 15 minutes. Check igniter and flame sensor electrode spacing, gaps, etc. Check flame sense and igniter wiring. Check gas valve operation and gas supply. |
| 6 Flashes | Induced Draft Motor Fault | If heat off: no gas heating. If heat on: gas valve Off and inducer On. | Inducer sense normal, or heat call (W) Off. | Inducer sense On when heat call Off, or inducer sense Off when heat call On. Check wiring, voltage, and operation of IGC motor. Check speed sensor wiring to IGC. |
| 7 Flashes | Rollout Switch Lockout | Gas valve and igniter Off. Indoor fan and inducer On. | Power reset. | Rollout switch has opened. Check gas valve operation. Check induced-draft blower wheel is properly secured to motor shaft. |
| 8 Flashes | Internal Control Lockout | No gas heating. | Power reset. | IGC has sensed internal hardware or software error. If fault is not cleared by resetting 24 v power, replace the IGC. |
| 9 Flashes | Temporary Software | No gas heating. | 1 hour auto reset, or power reset. | Electrical interference is disrupting the IGC software. |

LEGEND

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

NOTES:

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

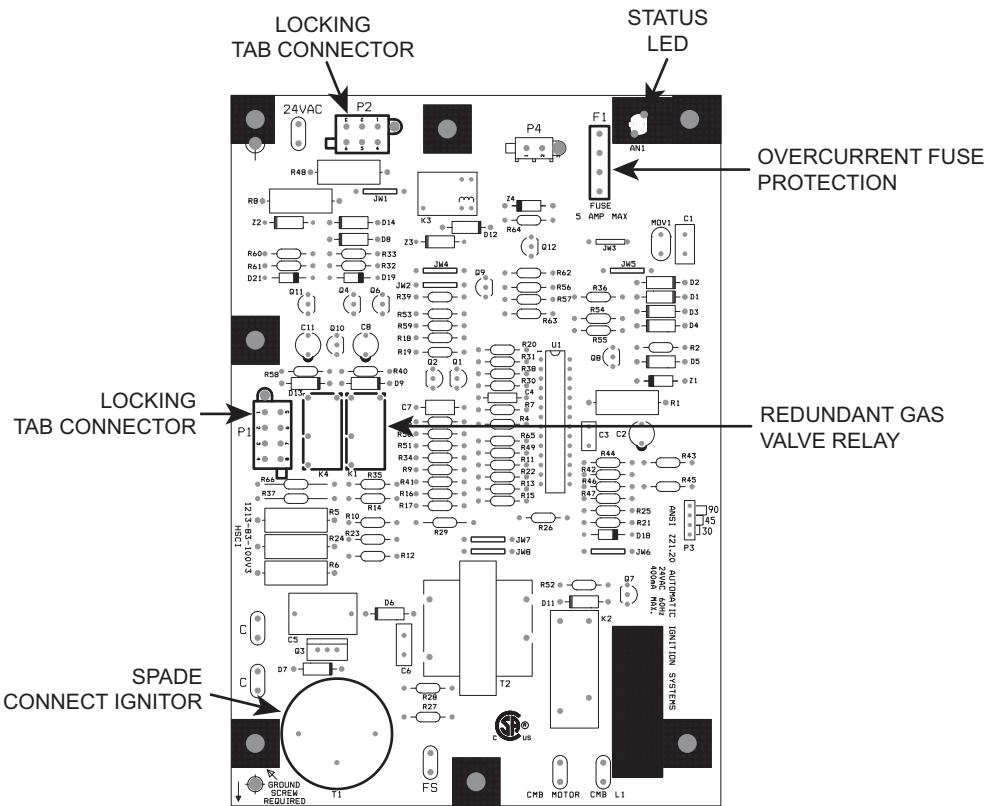


Fig. 50 — IGC Board Component Layout

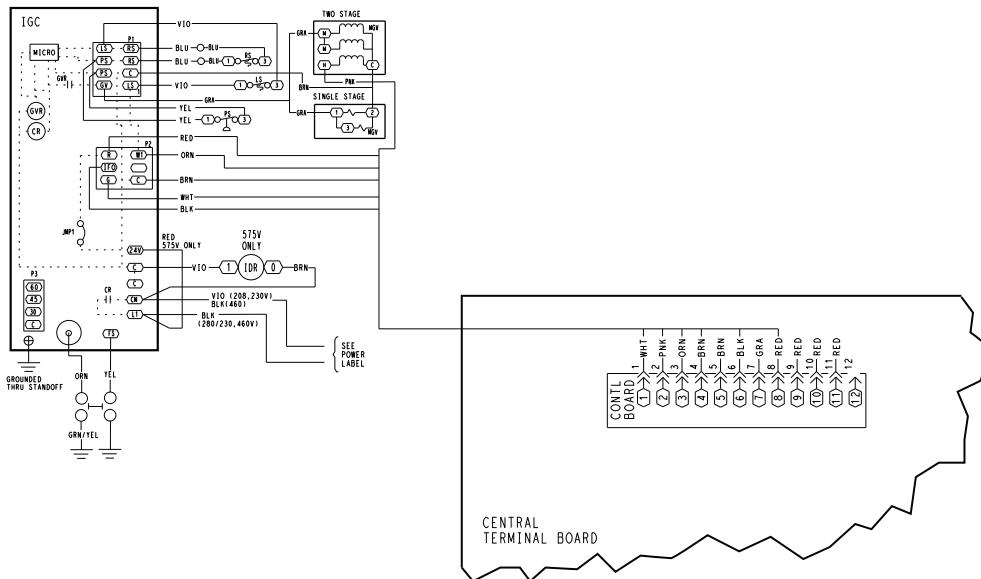


Fig. 51 — Typical IGC Control Wiring Diagram

EconoMi\$er® X (Factory Option)

The EconoMi\$er X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (see Fig. 52). The W7220 can be configured with optional sensors.



Fig. 52 — W7220 Economizer Module

The W7220 economizer module can be used as a stand-alone economizer module wired directly to a commercial set-back space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 economizer module can be connected to optional sensors for single or differential enthalpy control. The W7220 economizer module provides power and communications for the sensors.

The W7220 economizer module automatically detects sensors by polling to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 economizer controller indicates a device fail error on its LCD.

SYSTEM COMPONENTS

The EconoMi\$er X system includes an economizer module, 20k mixed air sensor, damper actuator, and either a 20k outdoor air temperature sensor or S-Bus enthalpy sensors.

Economizer Module

The module is the core of the EconoMi\$er X system. The module is mounted in the unit's control box, and includes the user interface for the system. The W7220 economizer module provides the basic inputs and outputs to provide simple economizer control. When used with the optional sensors, the economizer module provides more advanced economizer functionality.

S-Bus Enthalpy Control Sensors

The sensor is a combination temperature and humidity sensor which is powered by and communicates on the S-Bus. Up to three sensors may be configured with the W7220 economizer module.

CO₂ Sensor (optional)

The sensor can be added for Demand Controlled Ventilation (DCV).

SPECIFICATIONS

W7220 Economizer Module

The module is designed for use with 2 to 10 vdc or bus communicating actuator. The module includes terminals for CO₂ sensor, Mixed Air sensor, and an Outdoor Dry Bulb sensor. Enthalpy and other options are available with bus sensors.

User Interface

Provides status for normal operation, setup parameters, checkout tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

Electrical

- Rated Voltage — 20 to 30 vac RMS, 50/60 Hz
- Transformer — 100 va maximum system input
- Nominal Power Consumption (at 24 vac, 60 Hz) — 11.5 VA without sensors or actuators
- Relay Digital Output Rating at 30 vac (maximum power from Class 2 input only) — 1.5A run:
3.5A inrush at 0.45PF (200,000 cycles) or
7.5A inrush at 0.45PF (100,000 cycles)
- External Sensors Power Output — 21 vdc ± 5% at 48mA

IMPORTANT: All inputs and outputs must be Class 2 wiring.

INPUTS

Sensors

NOTE: A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb change over or an OA bus sensor for outdoor enthalpy change over is required in addition to the MA sensor. An additional Return Air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. For differential dry bulb changeover a 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC

2-wire (18 to 22 AWG);

Temperature range -40°F to 150°F (-40°C to 65°C)

Temperature accuracy: 0°F/+2°F

Temperature and Humidity, C7400S1000 (optional)

S-Bus; 2-wire (18 to 22 AWG)

Temperature: range -40°F to 150°F (-40°C to 65°C)

Temperature accuracy: 0°F/+2°F

Humidity: range 0 to 100% RH with 5% accuracy.

NOTE: Up to three (3) S-Bus sensors may be connected to the W7220 economizer module for outdoor air (OA), return air (RA) and discharge (supply) air (DA).

4 Binary Inputs

1-wire 24 vac + common GND (see page 34 for wiring details).

24 vac power supply

20 to 30 vac 50/60 Hz; 100 VA Class 2 transformer.

OUTPUTS

Actuator Signal

2 to 10 vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

Exhaust fan, Y1, Y2 and AUX1 O

All Relay Outputs (at 30 vac):

Running: 1.5A maximum

Inrush: 7.5A maximum

ENVIRONMENTAL

Operating Temperature

-40°F to 150°F (-40°C to 65°C).

Exception of display operation down to -4°F (-20°C) with full recovery at -4°F (-20°C) from exposure to -40°F (-40°C)

Storage Temperature

-40°F to 150°F (-40°C to 65°C)

Shipping Temperature

-40°F to 150°F (-40°C to 65°C)

Relative Humidity

5% to 95% RH non-condensing

ECONOMIZER MODULE WIRING DETAILS

Use Fig. 53 and Tables 8 and 9 to locate the wiring terminals for the economizer module.

NOTE: The four terminal blocks are removable. Slide out each terminal block, wire it, and then slide it back into place.

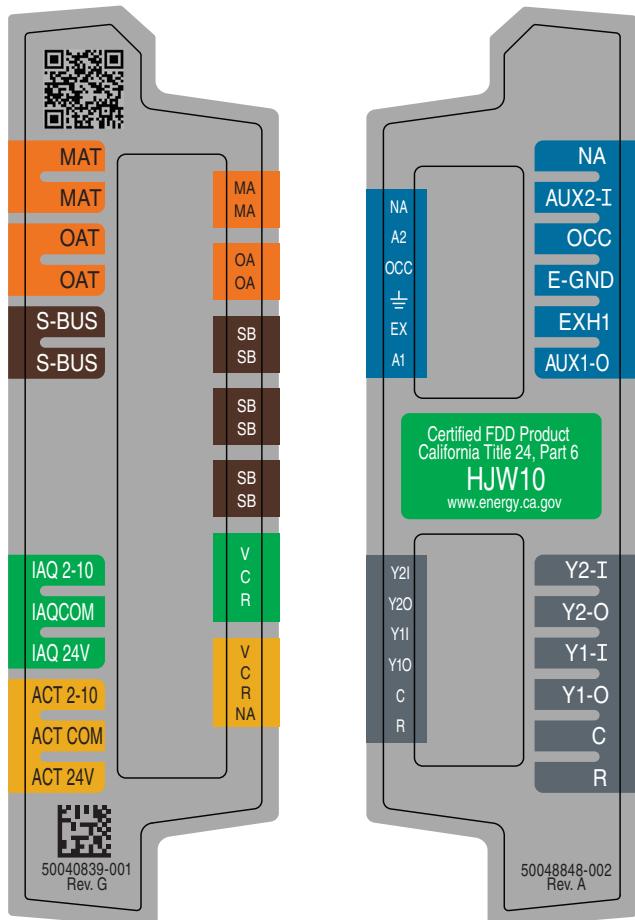


Fig. 53 — W7220 Wiring Terminals

Table 8 — Economizer Module - Left Hand Terminal Blocks

| LABEL | TYPE | DESCRIPTION |
|----------------------------|-------------------|--|
| Top Left Terminal Block | | |
| MAT | 20k NTC and COM | Mixed Air Temperature Sensor (Polarity Insensitive Connection) |
| MAT | 20k NTC and COM | Outdoor Air Temperature Sensor (Polarity Insensitive Connection) |
| S-BUS | S-BUS (Sylk* Bus) | Enthalpy Control Sensor (Polarity Insensitive Connection) |
| Bottom Left Terminal Block | | |
| IAQ 2-10 | 2-10 vdc | Air Quality Sensor Input (e.g. CO ₂ sensor) |
| IAQ COM | COM | Air Quality Sensor Common |
| IAQ 24V | 24 vac | Air Quality Sensor 24 vac Source |
| ACT 2-10 | 2-10 vdc | Damper Actuator Output (2-10 vdc) |
| ACT COM | COM | Damper Actuator Output Common |
| ACT 24v | 24 vac | Damper Actuator 24 vac Source |

*Sylk is a trademark of Honeywell International Inc.

Table 9 — Economizer Module - Right Hand Terminal Blocks

| LABEL | TYPE | DESCRIPTION |
|------------------------------|------------|--|
| Top Right Terminal Blocks | | |
| AUX2 I | 24 vac IN | The first terminal is not used. |
| OCC | 24 vac IN | Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode. |
| E-GND | E-GND | Occupied/Unoccupied Input |
| EXH1 | 24 vac OUT | Exhaust Fan 1 Output |
| AUX1 O | 24 vac OUT | Programmable: Exhaust fan 2 output or ERV or System alarm output |
| Bottom Right Terminal Blocks | | |
| Y2-I | 24 vac IN | Y2 in - Cooling Stage 2 Input from space thermostat |
| Y2-O | 24 vac OUT | Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling |
| Y1-I | 24 vac IN | Y1 in - Cooling Stage 2 Input from space thermostat |
| Y1-O | 24 vac OUT | Y1 out - Cooling Stage 2 Output to stage 2 mechanical cooling |
| C | COM | 24 vac Common |
| R | 24 vac | 24 vac Power (hot) |

S-Bus Sensor Wiring

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 54 and Table 10 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 53 and Table 10 to locate the wiring terminals for each enthalpy control sensor.

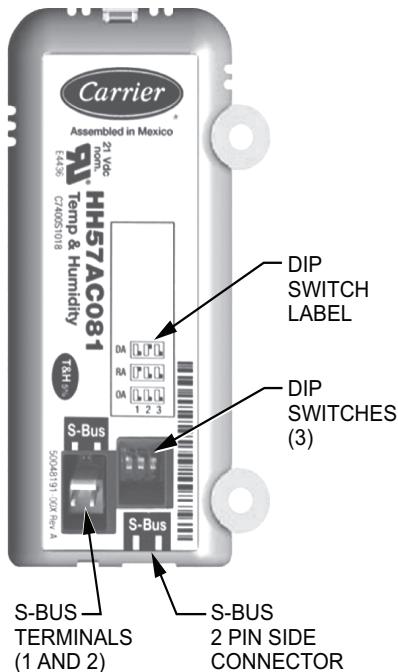


Fig. 54 — S-Bus Sensor DIP Switches

Table 10 — HH57AC081 Sensor Wiring Terminations

| TERMINAL NUMBER | LABEL | TYPE | DESCRIPTION |
|-----------------|-------|-------|--|
| 1 | S-BUS | S-BUS | S-BUS Communications (Enthalpy Control Sensor Bus) |
| 2 | S-BUS | S-BUS | S-BUS Communications (Enthalpy Control Sensor Bus) |

Use Fig. 54 and Table 11 to set the DIP switches for the desired use of the sensor.

Table 11 — HH57AC081 Sensor DIP Switch

| USE | DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3 | | |
|-----|---|-----|-----|
| | 1 | 2 | 3 |
| DA | OFF | ON | OFF |
| RA | ON | OFF | OFF |
| OA | OFF | OFF | OFF |

NOTE: When an S-Bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor.

During the 60 minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

CO₂ Sensor Wiring

When using a CO₂ sensor the black and brown common wires are internally connected and only one is connected to "IAQ COM" on the W7220. Use the power from the W7220 to power the CO₂ sensor OR make sure the ground for the power supplies are common. See Fig. 55 for CO₂ sensor wiring.

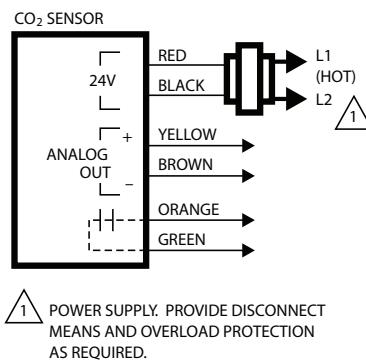


Fig. 55 — CO₂ Sensor Wiring

INTERFACE OVERVIEW

This section describes how to use the EconoMi\$er® X user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

User Interface

The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

Keypad

Use the four navigation buttons (see Fig. 56) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↲ (Enter) button to display the first item in the currently displayed menu.
- Press the ⌈ (Menu Up/Exit) button to exit a menu's item and return to the list of menus.

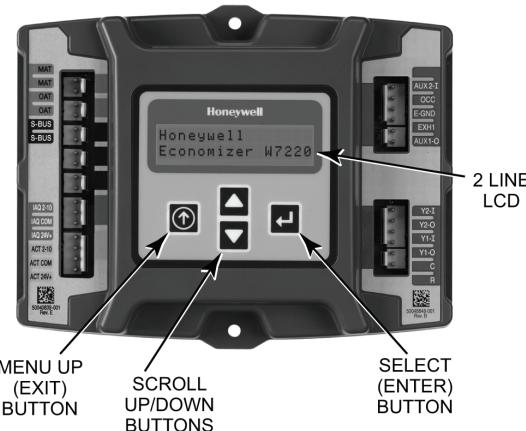


Fig. 56 — W7220 Controller Navigation Buttons

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desired menu.
2. Press the ↲ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press the ↲ (Enter) button to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

NOTE: When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment or decrement.

1. Press the ↲ (Enter) button to accept the displayed value and store it in nonvolatile RAM. "CHANGE STORED" displays.
2. Press the ↲ (Enter) button to return to the current menu parameter.
3. Press the ⌈ (Menu Up/Exit) button to return to the previous menu.

Menu Structure

Table 12 illustrates the complete hierarchy of menus and parameters for the EconoMi\$er® X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before

the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.

SETUP AND CONFIGURATION

Before being placed into service, the W7220 economizer module must be set up and configured for the installed system.

IMPORTANT: During setup, the economizer module is live at all times.

The setup process uses a hierarchical menu structure that is easy to use. Press the **▲** and **▼** arrow buttons to move forward and backward through the menus and press the button to select and confirm setup item changes.

Time-Out and Screensaver

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.

Table 12 — W7220 Menu Structure*

| MENU | PARAMETER | PARAMETER DEFAULT VALUE | PARAMETER RANGE AND INCREMENT† | EXPANDED PARAMETER NAME Notes |
|--------|-------------|--|--------------------------------------|--|
| STATUS | ECON AVAIL | NO | YES/NO | FIRST STAGE COOLING DEMAND (Y1-IN) YES = economizing available; the system can use outside air for free cooling when required. |
| | ECONOMIZING | NO | YES/NO | FIRST STAGE COOLING RELAY OUTPUT YES = outside air being used for first stage cooling |
| | OCCUPIED | NO | YES/NO | OCCUPIED YES = OCC signal received from space thermostat or unitary controller YES = 24 vac on terminal OCC NO = 0 vac on terminal OCC |
| | HEAT PUMP | N/A** | COOL HEAT | HEAT PUMP MODE Displays COOL or HEAT when system is set to heat pump (Non-conventional). |
| | COOL Y1-IN | OFF | ON/OFF | FIRST STAGE COOLING DEMAND (Y1-IN) Y1-I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 vac on terminal Y1-I OFF = 0 vac on terminal Y1-I |
| | COOL Y1-OUT | OFF | ON/OFF | FIRST STAGE COOLING RELAY OUTPUT Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1-OUT terminal). |
| | COOL Y2-IN | OFF | ON/OFF | SECOND STAGE COOLING DEMAND (Y2-IN) Y2-I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2-I OFF = 0 vac on terminal Y2-I |
| | COOL Y2-OUT | OFF | ON/OFF | SECOND STAGE COOLING RELAY OUTPUT Cool Stage 2 Relay Output to mechanical cooling (Y2-OUT terminal). |
| | MA TEMP | (or — — — — °F — — — — °C) | -40°F to 150°F (-40°C to 66°C) | SUPPLY AIR TEMPERATURE, Cooling Mode Displays value of measured mixed air from MAT sensor. Displays ____ F if not connected, short or out of range. |
| | DA TEMP | (or — — — — °F — — — — °C) | -40°F to 150°F (-40°C to 66°C) | DISCHARGE AIR TEMPERATURE, after Heating section Displays when Discharge Air Sylk Bus sensor is connected and displays measured discharge temperature. Displays ____ F if sensor sends invalid value, if not connected, short or out of range. |
| | OA TEMP | (or — — — — °F — — — — °C) | -40°F to 140°F (-40°C to 60°C) | OUTSIDE AIR TEMP Displays measured value of outdoor air temperature. Displays ____ F if sensor sends invalid value, short or out of range. |
| | OA HUM | — — % | 0 to 100% | OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays ____ % if not connected short, or out of range. |
| | RA TEMP | (or — — — — °F — — — — °C) | 0°F to 140°F (-18°C to 60°C) | RETURN AIR TEMPERATURE Displays measured value of return air temperature from RAT Sylk Bus sensor. Displays ____ F if sensor sends invalid value, if not connected, short or out of range. |
| | RA HUM | — — % | 0 to 100% | RETURN AIR RELATIVE HUMIDITY Displays measured value of return air humidity from RA Sylk Bus sensor. Displays ____ % if sensor sends invalid value, if not connected, short or out of range. |
| | IN CO2 | — — ppm | 0 to 2000 ppm | SPACE/RETURN AIR CO ₂ Displays value of measured CO ₂ from CO ₂ sensor. Invalid if not connected, short or out of range. May be adjusted in Advanced menu by Zero offset and Span. |
| | DCV STATUS | N/A | ON/OFF | DEMAND CONTROLLED VENTILATION STATUS Displays ON if above set point and OFF if below set point, and ONLY if a CO ₂ sensor is connected. |
| | DAMPER OUT | 2.0v | 2.0 to 10.0v | Displays voltage output to the damper actuator.*** |
| | ACT POS | N/A | 0 to 100% | Displays actual position of actuator. |
| | ACT COUNT | N/A | 1 to 65,535 | Displays number of times actuator has cycled. 1 cycle equals 180 degrees of actuator movement in any direction. |
| | ACTUATOR | N/A | OK/Alarm (on Alarm menu) | Displays ERROR if voltage or torque is below actuator range. |
| | EXH1 OUT | OFF | ON/OFF | EXHAUST STAGE 1 RELAY OUTPUT Displays ON when damper position reaches programmed percentage set point. Output of EXH1 terminal: ON = relay closed OFF = relay open |

Table 12 — W7220 Menu Structure* (cont)

| MENU | PARAMETER | PARAMETER DEFAULT VALUE | PARAMETER RANGE AND INCREMENT [†] | EXPANDED PARAMETER NAME Notes |
|------------------|--------------------------------------|-------------------------------|--|--|
| STATUS (cont) | EXH2 OUT | OFF | ON/OFF | EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage set point. ON = 24 vac output OFF = No output Displays only if AUX1 O = EXH2 |
| | ERV | OFF | ON/OFF | ENERGY RECOVERY VENTILATOR Output of AUX1 O terminal; displays only if AUX1 O = ERV ON = 24 vac output OFF = No Output |
| | MECH COOL ON or HEAT STAGES ON | 0 | 0, 1, or 2 | Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active. |
| | FAN SPEED | N/A | LOW or HIGH | SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit. |
| | W (HEAT IN) | N/A | ON/OFF | HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit. |
| SETPOINTS | MAT SET | 53°F (12°C) | 38°F to 70°F (3°C to 21°C); increment by 1 degree | SUPPLY AIR SETPOINT The economizer will modulate the OA damper to maintain the mixed air temperature at the set point |
| | LOW T LOCK | 32°F (0°C) | –45°F to 80°F (–43°C to 27°C); increment by 1°F | COMPRESSOR LOW TEMPERATURE LOCKOUT Set point determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller. |
| | DRYBLB SET | 63°F (17°C) | 48°F to 80°F (9°C to 27°C); increment by 1°F | OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Dry bulb set point will only appear if using dry bulb changeover. Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband. |
| | ENTH CURVE | ES3 | ES1,ES2,ES3,ES4, or ES5 | ENTHALPY CHANGEOVER CURVE ES curve will only appear if using enthalpy changeover. Enthalpy boundary “curves” for economizing using single enthalpy. See page 43 for description of enthalpy curves. |
| | DCV SET | 1100ppm | 500 to 2000 ppm; increment by 100 | DEMAND CONTROLLED VENTILATION Displays only if CO ₂ sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point. |
| | MIN POS | 2.8 V | 2 to 10 vdc | VENTILATION MINIMUM POSITION Displays ONLY if a CO ₂ sensor is NOT connected. |
| | VENTMAX | 2.8 V | 2 to 10 vdc | DCV MAXIMUM DAMPER POSITION Displays only if a CO ₂ sensor is connected. Used for Vbz (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO ₂ sensor. |
| | | | 100 to 9990 cfm; increment by 10 | If OA, MA, RA, and CO ₂ sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM. |
| | | | 2 to 10 vdc | With 2-speed fan units, VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V |
| | VENTMIN | 2.25 V | 2 to 10 vdc or 100 to 9990 cfm; increment by 10 | DCV MINIMUM DAMPER POSITION Displays only if a CO ₂ sensor is connected. Used for V _a (ventilation min cfm) set point. This is the ventilation for less than maximum occupancy of the space. |
| | | | 100 to 9990 cfm; increment by 10 | If OA, MA, RA, and CO ₂ sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM. |
| | | | 2 to 10 vdc | With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V |
| | ERV OAT SP ^{††} | 32°F (0°C) | 0°F to 50°F (–18°C to 10°C); increment by 1°F | ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV |
| | EXH1 SET | 50% | 0 to 100%; increment by 1 | EXHAUST FAN STAGE 1 SETPOINT Set point for OA damper position when exhaust fan 1 is powered by the economizer. |
| | EXH2 SET | 75% | 0 to 100%; increment by 1 | EXHAUST FAN STAGE 2 SETPOINT Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EXH2. |

Table 12 — W7220 Menu Structure* (cont)

| MENU | PARAMETER | PARAMETER DEFAULT VALUE | PARAMETER RANGE AND INCREMENT† | EXPANDED PARAMETER NAME Notes |
|-------------------|-----------------|-------------------------------|--|---|
| SYSTEM SETUP | INSTALL | 01/01/10 | N/A | Display order = MM/DD/YY Setting order = DD, MM, then YY. |
| | UNITS DEG | °F | °F or °C | Sets economizer controller in degrees Fahrenheit or Celsius |
| | EQUIPMENT | CONV | CONV or HP | CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller. |
| | AUX2 IN | W | Shutdown (SD) Heat (W1) HP(O) HP(B) | In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat. |
| | FAN SPEED | 2 speed | 1 speed/2 speed | Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode. |
| | FAN CFM | 5000 cfm | 100 to 15000 cfm; increment by 100 | UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCAL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit. |
| | AUX1 OUT | NONE | NONE ERV EXH2 SYS | Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal |
| | OCC | INPUT | INPUT or ALWAYS | OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input "INPUT" to the OCC terminal. If no occupancy output from the thermostat, then change program to "ALWAYS" OR add a jumper from terminal R to OCC terminal. |
| | FACTORY DEFAULT | NO | NO or YES | Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values. |
| ADVANCED SETUP | MA LO SET | 45°F (7°C) | 35°F to 65°F (2°C to 18°C); Increment by 1°F | SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value). |
| | FREEZE POS | CLO | CLO or MIN | FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS). |
| | CO2 ZERO | 0ppm | 0 to 500 ppm; Increment by 10 | CO ₂ ppm level to match CO ₂ sensor start level. |
| | CO2 SPAN | 2000ppm | 1000 to 3000 ppm; Increment by 50 | CO ₂ ppm span to match CO ₂ sensor, e.g.: 500-1500 sensor output would be 500 CO ₂ zero and 1000 CO ₂ span. |
| | STG3 DLY | 2.0h | 0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF | COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling |
| | SD DMPR POS | CLO | CLO or OPN | Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off. |
| | DA LO ALM | 45°F (7°C) | NONE 35°F to 65°F (2°C to 18°C); Increment by 5°F | Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display. |
| | DA HI ALM | 80°F (27°C) | NONE 70°F to 180°F (21°C to 82°C); Increment by 5°F | Used for alarm for when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display. |
| | DCVCAL ENA | MAN | MAN (manual) AUTO | Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO ₂) sensors. This operation is not operable with a 2-speed fan unit. |
| | MAT T CAL | 0.0°F | ± 2.5°F | SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor. |
| | OAS T CAL | 0.0°F | ± 2.5°F | OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor. |
| | OA H CAL | 0% RH | ±10% RH | OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor. |

Table 12 — W7220 Menu Structure* (cont)

| MENU | PARAMETER | PARAMETER DEFAULT VALUE | PARAMETER RANGE AND INCREMENT [†] | EXPANDED PARAMETER NAME Notes |
|--------------------------|---|-------------------------------|--|---|
| ADVANCED SETUP (cont) | RAT CAL | 0.0°F | ± 2.5°F | RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor. |
| | RA H CAL | 0% RH | ±10% RH | RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor. |
| | DAT CAL | 0.0°F | ± 2.5°F | DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor. |
| | 2SP FAN DELAY | 5 Minutes | 0 to 20 minutes in 1 minute increments | TIME DELAY ON SECOND STAGE ECONOMIZING When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled. |
| CHECKOUT*** | DAMPER MINIMUM POSITION | N/A | N/A | The checkout for the damper minimum position is based on the system. See Table 13. |
| | DAMPER OPEN | N/A | N/A | Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system. |
| | DAMPER CLOSE | N/A | N/A | Positions damper to the fully closed position. |
| | CONNECT Y1-O | N/A | N/A | Closes the Y1-O relay (Y1-O) |
| | CONNECT Y2-O | N/A | N/A | Closes the Y2-O relay (Y2-O) |
| | CONNECT AUX1-O | N/A | N/A | Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation. ^{††} • SYS — 24 vac out. Issues a system alarm |
| | CONNECT EXH1 | N/A | N/A | Closes the power exhaust fan 1 relay (EXH1) |
| ALARMS | Alarms display only when they are active. The menu title "ALARMS(#)" includes the number of active alarms in parenthesis (). When using SYLK bus sensors, "SYLK" will appear on the screen, and when using 20k OA temperature sensors, "SENS T" will appear on the screen. | | | |
| | MA T SENS ERR | N/A | N/A | SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | CO2 SENS ERR | N/A | N/A | CO ₂ SENSOR ERROR CO ₂ sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues. |
| | OA SYLK T ERR | N/A | N/A | OUTSIDE AIR S-BUS SENSOR ERROR |
| | OA SYLK H ERR | N/A | N/A | Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | RA SYLK T ERR | N/A | N/A | RETURN AIR S-BUS SENSOR ERROR |
| | RA SYLK H ERR | N/A | N/A | Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | DA SYLK T ERR | N/A | N/A | DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | OA SENS T ERR | N/A | N/A | OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues. |
| | ACT ERROR | N/A | N/A | ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu. |
| | FREEZE ALARM | N/A | N/A | Check if outdoor temperature is below the LOW Temp Lockout on set point menu. Check if Mixed air temperature on STATUS menu is below the Lo Set point on Advanced menu. When conditions are back in normal range, the alarm will go away. |
| | SHUTDOWN ACTIVE | N/A | N/A | AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal. |
| | DMP CAL RUNNING | N/A | N/A | DAMPER CALIBRATION ROUTINE RUNNING If DCV Auto enable has been programmed, this alarm will display when the W7220 is completing a calibration on the dampers. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up is in the Advanced setup menu. |
| | DA SENS ALM | N/A | N/A | DISCHARGE AIR TEMPERATURE SENSOR ALARM Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air. |
| | SYS ALARM | N/A | N/A | When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-O terminal has 24 vac out. |

Table 12 — W7220 Menu Structure* (cont)

| MENU | PARAMETER | PARAMETER DEFAULT VALUE | PARAMETER RANGE AND INCREMENT† | EXPANDED PARAMETER NAME Notes |
|------------------|-------------|-------------------------------|--------------------------------------|--|
| ALARMS (cont) | ACT UNDER V | N/A | N/A | ACTUATOR VOLTAGE LOW Voltage received by actuator is above expected range. |
| | ACT OVER V | N/A | N/A | ACTUATOR VOLTAGE HIGH Voltage received by actuator is below expected range. |
| | ACT STALLED | N/A | N/A | ACTUATOR STALLED Actuator stopped before achieving commanded position. |

LEGEND

CLO — Compressor Lockout
ERV — Energy Recovery Ventilator
LCD — Liquid Crystal Display
MA — Mixed Air
MAT — Mixed Air Temperature
N/A — Not Applicable
OA — Outdoor Air
OAT — Outdoor Air Temperature
OCC — Occupied
RA — Return Air
RAT — Return Air Temperature
RTU — Rooftop Unit
SYS — System

* Table 12 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO₂) sensor, then none of the DCV parameters appear.

† When values are displayed, pressing and holding the \blacktriangle or \blacktriangledown button causes the display to automatically increment.

** N/A = Not Applicable.

†† ERV Operation: When in cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode, the ERV terminal will be energized when the OA is below the ERV OAT set point in the set point menu.

*** After 10 minutes without a command or mode change, the controller will change to normal operation.

NOTES:

1. STATUS —> OCCUPIED — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Central Terminal Board's OCCUPANCY jumper to the ECONO connector and to the W7220's OCC input terminal. An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.
2. STATUS —> MA TEMP, SETPOINTS —> MAT SET — The W7220 menu parameters and labels include designations MA, MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.
3. SETPOINTS —> DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
4. SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:
 EQUIPMENT = CONV
 AUX2 I = W
 FAN SPEED = 2SPEED

For damper minimum position settings and checkout menu readings, see Table 13. For dry bulb operation with or without DCV, see Tables 14 and 15. For enthalpy operation with or without DCV, see Tables 16 and 17.

Table 13 — Damper Minimum Position Settings and Readings on Checkout Menu

| FAN SPEED | DEMAND CONTROLLED VENTILATION (CO ₂ SENSOR) | SETPOINTS | | CHECKOUT |
|-----------|--|-----------|---------|----------|
| | | MIN POS | VMAX-HS | |
| 1 | NO | N/A | N/A | |
| | | VENT MIN | VMAX-HS | |
| | YES | VENT MAX | VMAX-HS | |
| | | | | |

Table 14 — Dry Bulb Operation without DCV (CO₂ Sensor) — 1 Speed Fan

| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|---|-------------------------------------|------|------|-----------|---------|----------|----------------------|---------------------|
| NONE | No | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | MIN POS | Closed |
| | | On | On | High | 24-v/On | 24-v/On | MIN POS | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | MIN POS to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | MIN POS to Full-Open | Closed to Full-Open |

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 15 — Dry Bulb Operation with DCV (CO₂ Sensor) — 1 Speed Fan

| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|-------------------------------------|-------------------------------|------|------|-----------|---------|----------|----------------------|---------------------|
| Below CO ₂ set | No | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | VENTMIN | Closed |
| | | On | On | High | 24-v/On | 24-v/On | VENTMIN | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | VENTMIN to Full-Open | Closed to Full-Open |
| Above CO ₂ set | No | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | | On | On | High | 24-v/On | 24-v/On | VENTMIN to VENTMAX | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | VENTMIN to Full-Open | Closed to Full-Open |

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 16 — Enthalpy Operation without DCV (CO₂ Sensor) — 1 Speed Fan

| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|-------------------------------------|-------------------------------|------|------|-----------|---------|----------|----------------------|---------------------|
| NONE | No | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | MIN POS | Closed |
| | | On | On | High | 24-v/On | 24-v/On | MIN POS | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | MIN POS to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | MIN POS to Full-Open | Closed to Full-Open |

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 17 — Enthalpy Operation with DCV (CO₂ Sensor) — 1 Speed Fan

| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|-------------------------------------|-------------------------------|------|------|-----------|-------------------|----------|----------------------|---------------------|
| Below CO ₂ set | No | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | VENTMIN | Closed |
| | | On | On | High | 24-v/On | 24-v/On | VENTMIN | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off† | VENTMIN to Full-Open | Closed to Full-Open |
| Above CO ₂ set | No | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | | On | Off | High | 24-v/On | 0-v/Off | VENTMIN L to VENTMAX | Closed |
| | | On | On | High | 24-v/On | 24-v/On | VENTMIN H to VENTMAX | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN L to VENTMAX | Closed |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | DELAY* 24-v/On | 0-v/Off† | VENTMIN to Full-Open | Closed to Full-Open |

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

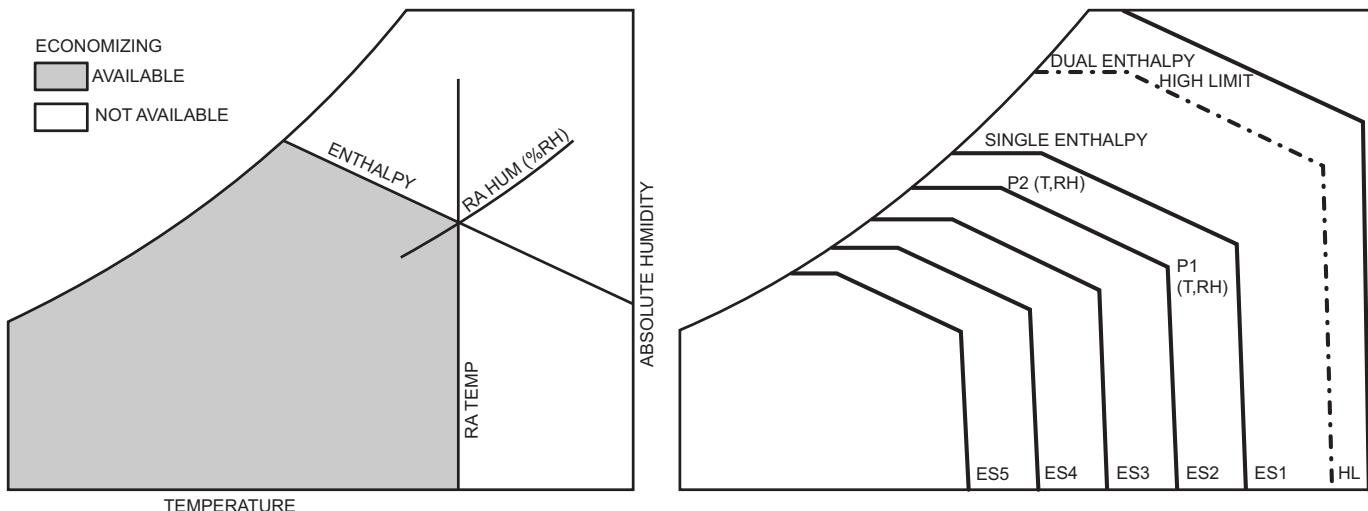


Fig. 57 — Single Enthalpy Curve Boundaries

Table 18 — Single Enthalpy and Dual Enthalpy High Limit Curves

| ENTHALPY CURVE | TEMP. DRY BULB (F) | TEMP. DEWPOINT (F) | ENTHALPY (btu/lb/da) | POINT P1 | | POINT P2 | |
|----------------|--------------------|--------------------|----------------------|-----------|----------------|-----------|----------------|
| | | | | TEMP. (F) | HUMIDITY (%RH) | TEMP. (F) | HUMIDITY (%RH) |
| ES1 | 80 | 60 | 28.0 | 80 | 36.8 | 66.3 | 80.1 |
| ES2 | 75 | 57 | 26.0 | 75 | 39.6 | 63.3 | 80.0 |
| ES3 | 70 | 54 | 24.0 | 70 | 42.3 | 59.7 | 81.4 |
| ES4 | 65 | 51 | 22.0 | 65 | 44.8 | 55.7 | 84.2 |
| ES5 | 60 | 48 | 20.0 | 60 | 46.9 | 51.3 | 88.5 |
| HL | 86 | 66 | 32.4 | 86 | 38.9 | 72.4 | 80.3 |

ENTHALPY SETTINGS

When the OA temperature, enthalpy and dew point are below the respective set points, the Outdoor Air can be used for economizing. Figure 57 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (set points ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 18 for ENTH CURVE set point values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Figure 57 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

CHECKOUT

Inspect all wiring connections at the economizer module's terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 35.

Power Up

After the W7220 module is mounted and wired, apply power.

Initial Menu Display

On initial start up, Honeywell displays on the first line and economizer W7220 on the second line. After a brief pause, the revision

of the software appears on the first line and the second line will be blank.

Power Loss (Outage or Brownout)

All set points and advanced settings are restored after any power loss or interruption.

NOTE: All settings are stored in non-volatile flash memory.

Status

Use the Status menu (see Table 12) to check the parameter values for the various devices and sensors configured.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 35.

Checkout Tests

Use the Checkout menu (see page 40) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 35.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↲ (Enter) button to select the item. RUN? appears.
3. Press the ↲ (Enter) button to start the test. The unit pauses and then displays IN PROGRESS. When the test is complete, DONE appears.
4. When all desired parameters have been tested, press the ⌈ (Menu Up) button to end the test.

The Checkout tests can all be performed at the time of installation or at any time during the operation of the system as a test that the system is operable.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

TROUBLESHOOTING

Alarms

The economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the SAT sensor which will alarm immediately.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menu at any time.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor) the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the  (Enter) button. ERASE? displays.
3. Press the  (Enter) button. ALARM ERASED displays.
4. Press the  (Menu up/Exit) button to complete the action and return to the previous menu.

If the alarm still exists after clearing it, it is redisplayed within 5 seconds.

Outdoor Air Enthalpy Control (P/N 33CSENTHSW)

The enthalpy control (33CSENTHSW) is available as a field-installed accessory to be used with the EconoMi\$er®2 damper system. The outdoor air enthalpy sensor is part of the enthalpy control. The separate field-installed accessory return air enthalpy sensor (33CSENTSEN) is required for differential enthalpy control. See Fig. 58.

Locate the enthalpy control in the economizer next to the actuator motor. Locate two GRA leads in the factory harness and connect the gray lead labeled "ESL" to the terminal labeled "LOW". See Fig. 58. Connect the enthalpy control power input terminals to economizer actuator power leads RED (connect to 24V) and BLK (connect to GND).

The outdoor enthalpy changeover setpoint is set at the enthalpy controller.

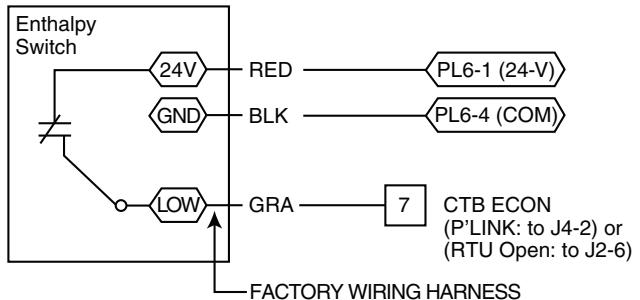


Fig. 58 — Enthalpy Switch (33CSENTHSW) Connections

DIFFERENTIAL ENTHALPY CONTROL

Differential enthalpy control is provided by sensing and comparing the outside air and return air enthalpy conditions. Install the outdoor air enthalpy control as described above. Add and install a return air enthalpy sensor.

RETURN AIR ENTHALPY SENSOR

Mount the return-air enthalpy sensor (33SENTSEN) in the return-air section of the economizer. The return air sensor is wired to the enthalpy controller (33CSENTHSW). See Fig. 59.

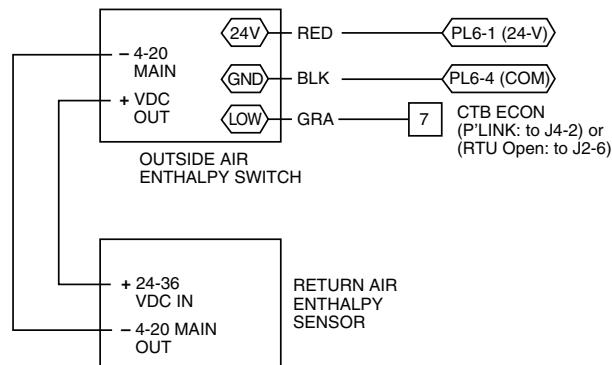


Fig. 59 — Outside and Return Air Enthalpy Sensor Wiring

Wiring the Return Air Enthalpy Sensor

1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (+) terminal on the enthalpy controller. Connect the BLK wire to (-) spade connector on the return air enthalpy sensor and the (-) terminal on the enthalpy controller.

Smoke Detectors

Smoke detectors are available as factory-installed options on 48KC models. Smoke detectors may be specified for Supply Air only or for Return Air without or with economizer, or in combination of Supply Air and Return Air. Return Air smoke detectors are arranged for vertical return configurations only. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory optional Return Air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 60 for the as-shipped location.

COMPLETING RETURN AIR SMOKE SENSOR INSTALLATION

1. Unscrew the two screws holding the Return Air Smoke Detector assembly. See Fig. 61, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 61, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 61, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

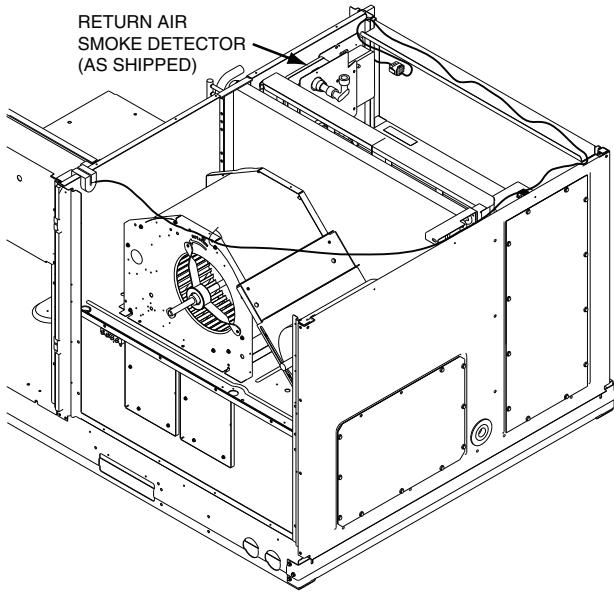


Fig. 60 — Return Air Smoke Detector, Shipping Position

ADDITIONAL APPLICATION DATA

Refer to the Application Data sheet titled Factory Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons for discussions on additional control features of these smoke detectors including multiple unit coordination.

PremierLink™ Controller (Factory Option)

For details on operating 48KC*04-06 units equipped with the factory-installed PremierLink controller option, refer to the PremierLink Retrofit Rooftop Controller Version 3.x Installation, Start-Up, and Configuration Installation manual.

RTU Open Controller (Factory-Installed Option)

For details on operating 48KC*04-06 units equipped with the factory-installed RTU Open controller refer to the “*Factory-Installed RTU Open Multi-Protocol Controller Control, Start-Up, Operation and Troubleshooting*” manual.

Step 14 — Adjust Factory-Installed Options

SMOKE DETECTORS

Smoke detector(s) will be connected at the Controls Connections Board, at terminals marked “Smoke Shutdown.” Cut jumper JMP 3 when ready to energize unit.

ECONOMI\$ER IV OCCUPANCY SWITCH

See Fig. 62 for general EconoMi\$er IV wiring. External occupancy control is managed through a connection on the Controls Connections Board.

If external occupancy control is desired, connect a time clock or remotely controlled switch (closed for Occupied, open for Unoccupied sequence) at terminals marked OCCUPANCY. Cut jumper JMP 2 to complete the installation.

Step 15 — Install Accessories

Available accessories include:

- Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- LP conversion kit
- Flue discharge deflector
- Manual outside air damper
- Two-position motorized outside air damper
- EconoMi\$er® IV (with control)
- EconoMi\$er2 (without control/for external signal)
- Power Exhaust
- Differential dry-bulb sensor (EconoMi\$er IV)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO₂ sensor
- DDC interface (PremierLink™ Controls)
- Louvered hail guard
- Motormaster® head pressure controls
- Phase monitor control

Refer to separate installation instructions for information on installing these accessories.

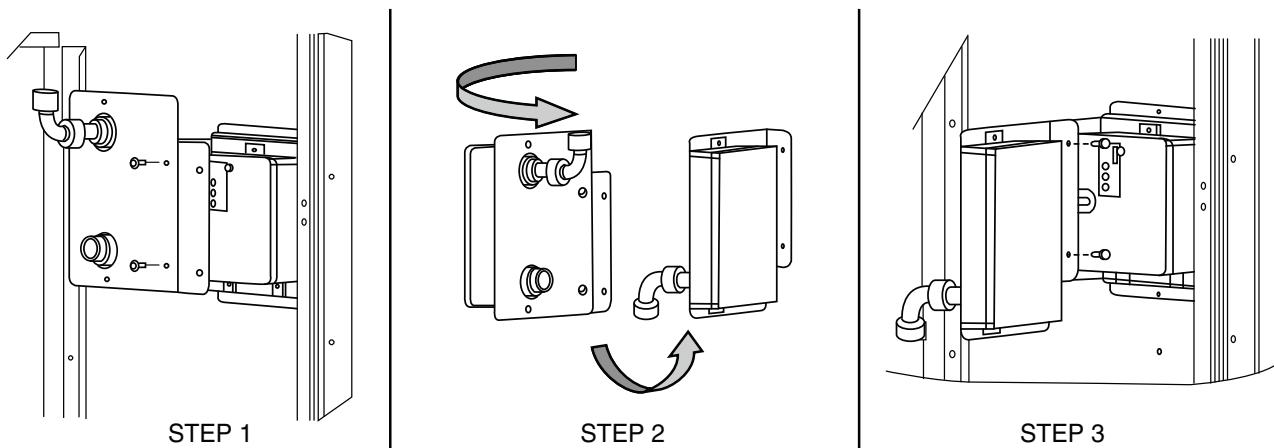


Fig. 61 — Completing Installation of Return Air Smoke Sensor

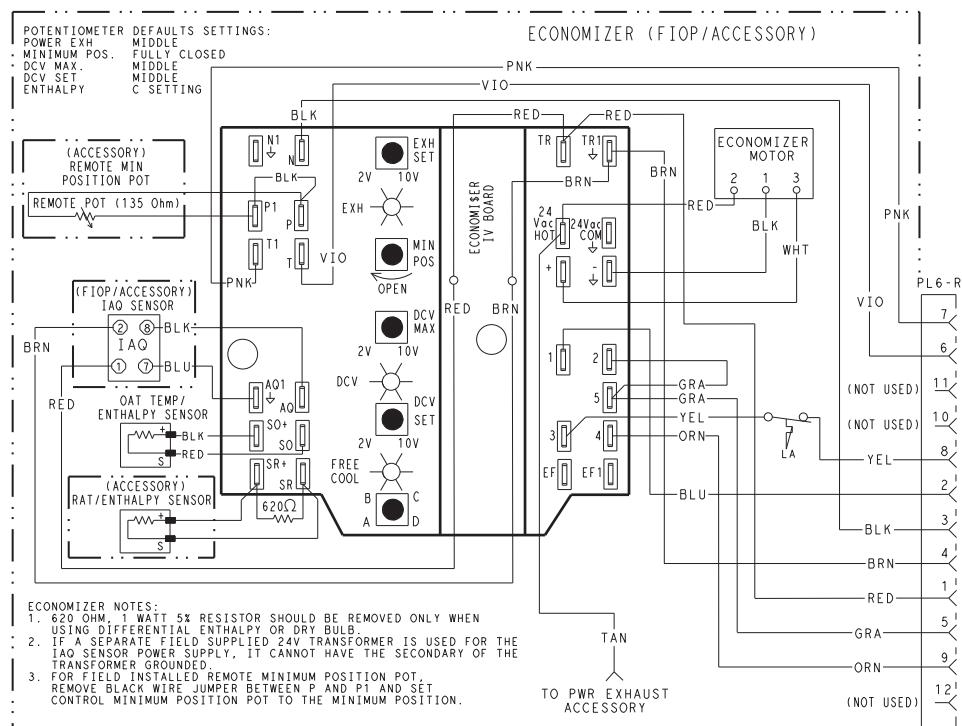


Fig. 62 — EconoMi\$er IV Wiring

Step 16 — Check Belt Tension

Measure the belt span length as shown in Fig. 63. Calculate the required deflection by multiplying the belt span length by $1/64$. For example, if the belt span length is 32 inches:

$$32 \times \frac{1}{64} = \frac{1}{2} \text{ in. deflection.}$$

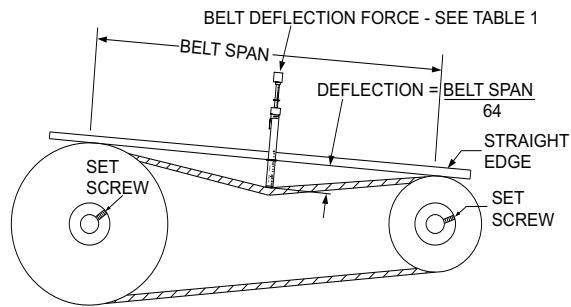
BELT FORCE — DEFLECTION METHOD

Check the belt tension with a spring-force belt force deflection gage (available from drive belt manufacturer).

1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.

2. Set the tension gage to the desired tension (see Table 1 in Fig. 63). Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt (see Fig. 64) and slide the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.



TORQUE ALL SHEAVE SET SCREWS TO 110-130 in. lbs

TABLE 1

| BELT CROSS SECTION | SMALLEST SHEAVE DIAMETER | BELT DEFLECTION FORCE (LBS) | | | |
|--------------------|--------------------------|-----------------------------|-----|---------------|------|
| | | UNNOTCHED BELTS | | NOTCHED BELTS | |
| | | USED | NEW | USED | NEW |
| A, AX | 3.0-3.6 | 3.7 | 5.5 | 4.1 | 6.1 |
| | 3.8-4.8 | 4.5 | 6.8 | 5.0 | 7.4 |
| | 5.0-7.0 | 5.4 | 8.0 | 5.7 | 8.4 |
| B, BX | 3.4-4.2 | — | — | 4.9 | 7.2 |
| | 4.4-5.6 | 5.3 | 7.9 | 7.1 | 10.5 |
| | 5.8-8.6 | 6.3 | 9.4 | 8.5 | 12.6 |

TABLE 2

| BELT CONDITION | TENSION FORCE IN BELT (LBS) |
|----------------|-----------------------------|
| New | 100 |
| Used | 80 |

Fig. 63 — V-Belt Force Label

BELT TENSION METHOD

Requires belt tension gage that measures tension in belt in units of lbs force.

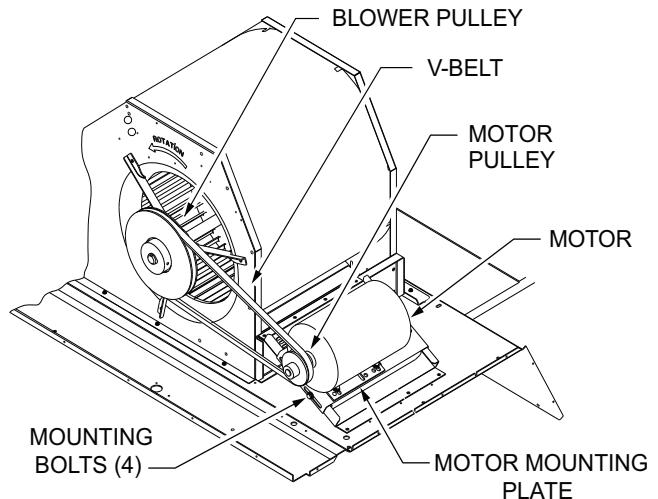


Fig. 64 — Belt Drive Motor Mounting

**START-UP CHECKLIST FOR 48KC04-06 SINGLE PACKAGE ROOFTOP
GAS HEATING/ELECTRIC COOLING UNIT
(REMOVE AND USE FOR JOB FILE)**

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instruction document.

I. PRELIMINARY INFORMATION

MODEL NO _____

JOB NAME _____

SERIAL NO _____

ADDRESS _____

START-UP DATE _____

TECHNICIAN NAME _____

ADDITIONAL ACCESSORIES

II. PRE-START-UP

Verify that all packaging materials have been removed from unit (Y/N) _____

Verify installation of outdoor air hood (Y/N) _____

Verify installation of flue exhaust and inlet hood (Y/N) _____

Verify that condensate connection is installed per instructions (Y/N) _____

Verify that all electrical connections and terminals are tight (Y/N) _____

Verify gas pressure to unit gas valve is within specified range (Y/N) _____

Check gas piping for leaks (Y/N) _____

Check that indoor-air filters are clean and in place (Y/N) _____

Check that outdoor air inlet screens are in place (Y/N) _____

Verify that unit is level (Y/N) _____

Check fan wheels and propeller for location in housing/orifice and verify setscrew is tight (Y/N) _____

Verify that fan sheaves are aligned and belts are properly tensioned (Y/N) _____

Verify that scroll compressors are rotating in the correct direction (Y/N) _____

Verify installation of thermostat (Y/N) _____

Verify that crankcase heaters have been energized for at least 24 hours (Y/N) _____

III. START-UP

ELECTRICAL

Supply Voltage _____

L1-L2 _____

L2-L3 _____

L3-L1 _____

Compressor Amps 1 _____

L1 _____

L2 _____

L3 _____

Compressor Amps 2 _____

L1 _____

L2 _____

L3 _____

Supply Fan Amps _____

L1 _____

L2 _____

L3 _____

TEMPERATURES

Outdoor-air Temperature _____ °F DB (Dry Bulb)

Return-air Temperature _____ °F DB

_____ °F Wb (Wet Bulb)

Cooling Supply Air Temperature _____ °F

Gas Heat Supply Air _____ °F

PRESSES

Gas Inlet Pressure in. wg _____ in. wg
Gas Manifold Pressure _____ in. wg
Refrigerant Suction STAGE 1 _____ in. wg
STAGE 2 _____ in. wg
CIRCUIT A _____ PSIG
CIRCUIT B _____ PSIG
Refrigerant Discharge CIRCUIT A _____ PSIG
CIRCUIT B _____ PSIG
Verify Refrigerant Charge using Charging Charts (Y/N) _____

GENERAL

Economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) _____
Verify smoke detector unit shutdown by utilizing magnet test (Y/N) _____

IV. HUMIDI-MIZER® START-UP

STEPS

1. Check CTB for jumper 5, 6, 7 (Jumper 5, 6, 7 must be cut and open) (Y/N) _____
2. Open humidistat contacts (Y/N) _____
3. Start unit In cooling (Close Y1) (Y/N) _____

OBSERVE AND RECORD

- A. Suction pressure _____ PSIG
- B. Discharge pressure _____ PSIG
- C. Entering air temperature _____ ° F
- D. Liquid line temperature at outlet or reheat coil _____ ° F
- E. Confirm correct rotation for compressor (Y/N) _____
- F. Check for correct ramp-up of outdoor fan motor as condenser coil warms (Y/N) _____
4. Check unit charge per charging chart (Y/N) _____
(Jumper 32L Motormaster® temperature sensor during this check. Remove jumper when complete.)
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (Y/N) _____

OBSERVE

- A. Reduction in suction pressure (5 to 7 psi expected) (Y/N) _____
- B. Discharge pressure unchanged (Y/N) _____
- C. Liquid temperature drops to 50 to 55°F range (Y/N) _____
- D. LSV solenoid energized (valve closes) (Y/N) _____
6. Switch unit to dehumid (reheat) by opening Y1 (Y/N) _____

OBSERVE

- A. Suction pressure increases to normal cooling level
- B. Discharge pressure decreases (35 to 50 psi) (Limited by Motormaster control)
- C. Liquid temperature returns to normal cooling level
- D. LSV solenoid energized (valve closes)
- E. DSV solenoid energized, valve opens
7. With unit in dehumid mode close W1 compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
8. Open W1 restore unit to dehumid mode (Y/N) _____
9. Open humidistat input compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
10. Restore set-points for thermostat and humidistat (Y/N) _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE