# Installation, Start-up and Service Instructions

## CONTENTS



## SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils 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 local building codes and appropriate national electrical codes (in USA, ANSI/NFPA 70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

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

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

**⚠DANGER**

ELECTRICAL SHOCK HAZARD

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

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lock(s) and lockout tag(s). Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate. Unit may have more than one power switch.

**⚠ 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.

**⚠ CAUTION**

UNIT OPERATION HAZARD

Failure to follow this caution could cause equipment damage.

Ensure voltage listed on unit data plate agrees with electrical supply provided for the unit.

## PRE-INSTALLATION

1. The power supply (v, ph, and Hz) must correspond to that specified on unit rating plate.
2. The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.
3. Refer to Installation, General section (page 2), Fig. 3 and 4 for locations of electrical inlets, condensate drain, duct connections, and required clearances before setting unit in place.
4. This installation must conform with local building codes and with the NEC (National Electrical Code) or ANSI (American National Standards Institute)/NFPA (National Fire Protection Association) latest revision. Refer to provincial and local plumbing or wastewater codes and other applicable local codes.

### Moving and Storage

To transfer unit from truck to storage site, use a fork truck. Do not stack units more than 2 high during storage. If unit is to be stored for more than 2 weeks before installation, choose a level, dry storage site free from vibration. Do not remove plastic wrap or skid from unit until final installation.

### Rigging

All 40RU Series units can be rigged by using the shipping skid. Units are shipped fully assembled. Do not remove shipping skids or protective covering until unit is ready for final placement; damage to bottom panels can result. Use slings and spreader bars as applicable to lift unit.

## INSTALLATION

### General

Allow the following clearances for service access and airflow:

- Rear: 762 mm (2-1/2 ft) [762 mm (2-1/2 ft) with electric heat accessory]
- Front: 762 mm (2-1/2 ft)
- Right Side: 1067 mm (3-1/2 ft)
- Left Side: 762 mm (2-1/2 ft)

For units equipped with an economizer, refer to the accessory installation instructions for additional clearance requirements. Be sure floor, wall, or ceiling can support unit weight (Table 1). See Fig. 3 and 4 for dimensions.

### Uncrating

Move unit as near as possible to final location before removing shipping skid.

Remove metal banding, top skid, and plastic wrap. Examine unit for shipping damage. If shipping damage is evident, file claim with transportation agency. Remove base skid just prior to actual installation.

Check nameplate information against available power supply and model number description in Fig. 1 and 2.

NOTE: Be sure to remove the Styrofoam™[1] shipping pad from the thermostatic expansion valve (TXV). Verify that it has been removed. (See Fig. 5.)

### Accessories

Refer to instructions shipped with each accessory for specific information.

1. Third-party trademarks and logos are the property of their respective owners.

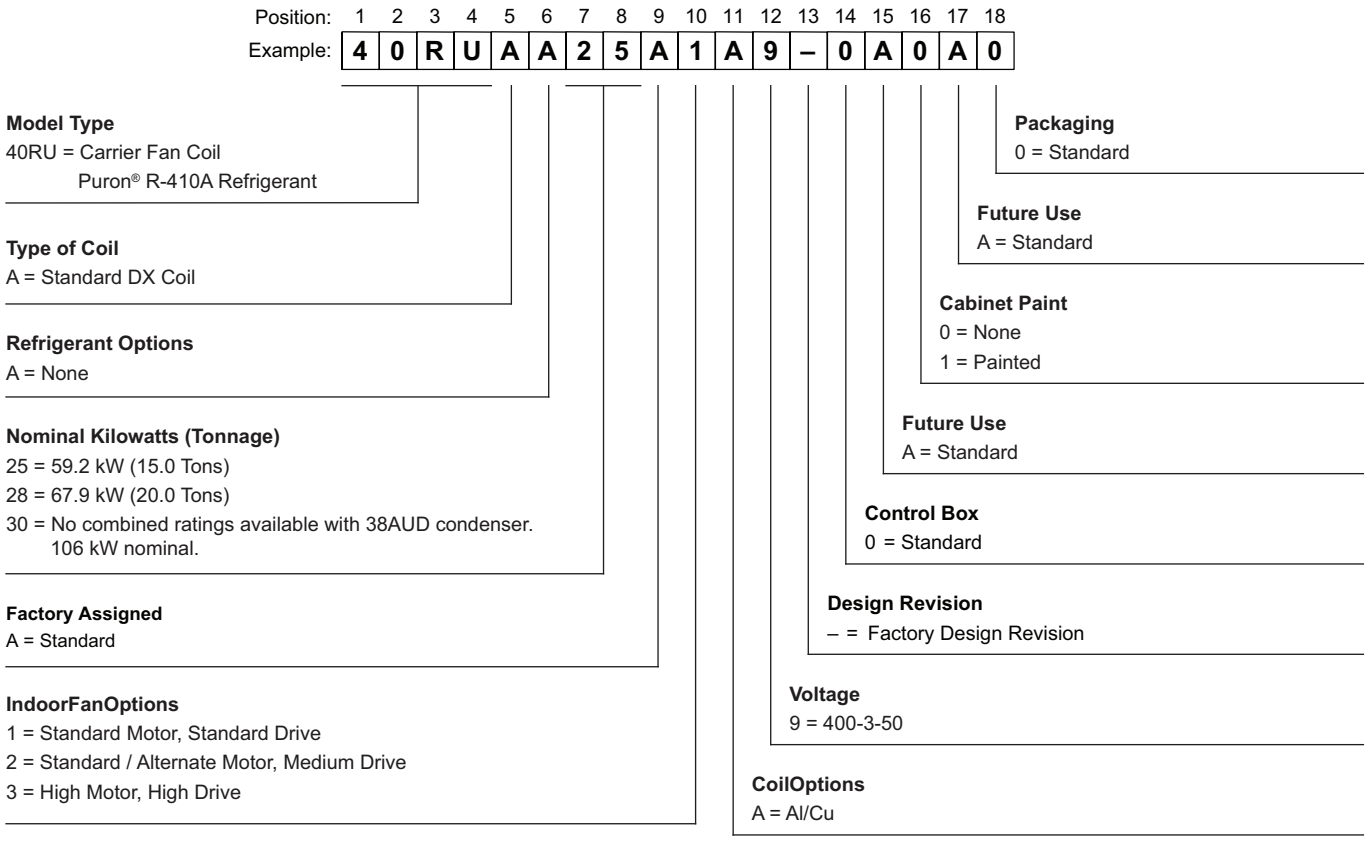



**Fig. 1 — Model Number Nomenclature**

| POSITION NUMBER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| TYPICAL | 2 | 6 | 2 | 3 | G | 1 | 2 | 3 | 4 | 5 |

| POSITION | DESIGNATES |
|---|---|
| 1−2 | Week of Manufacture (fiscal calendar) |
| 3−4 | Year of Manufacture (“23” = 2023) |
| 5 | Manufacturing Location |
| 6−10 | Sequential Number |

**Fig. 2 — Serial Number Nomenclature**

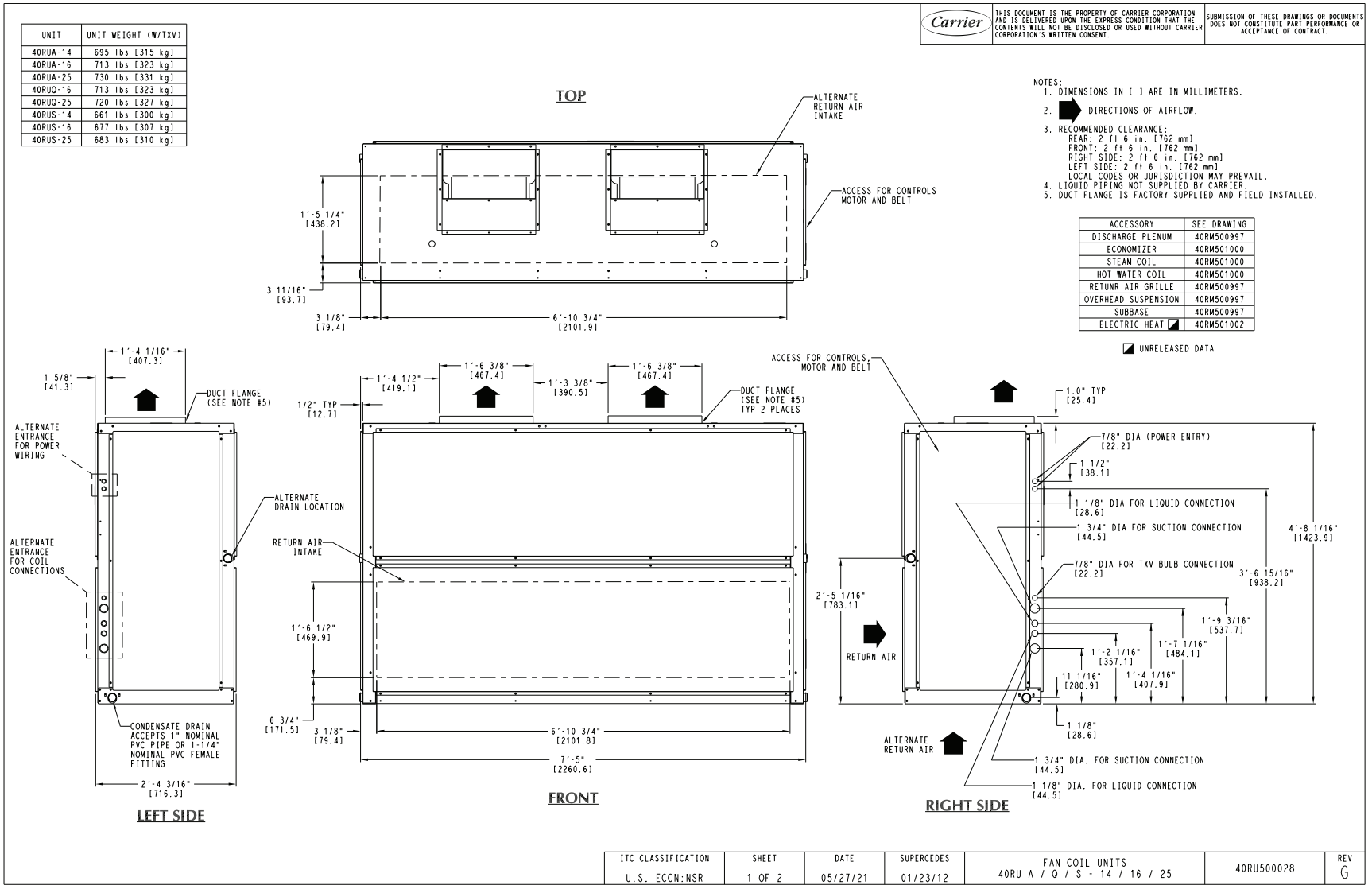
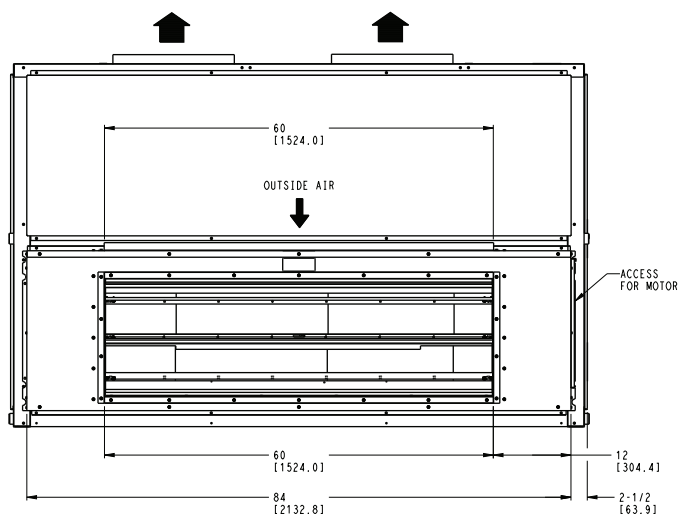
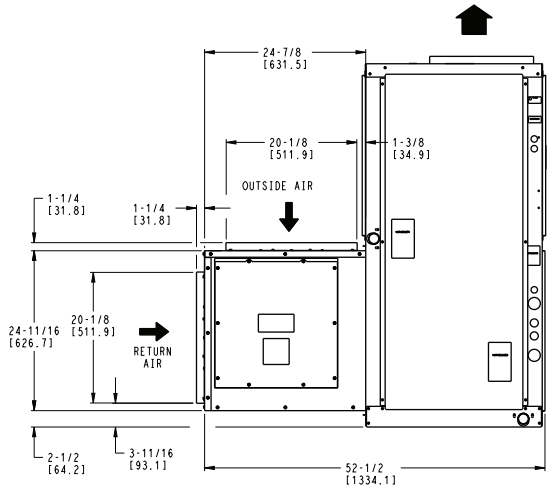



**Fig. 3 — Dimensions — Size 25**




FRONT




RIGHT SIDE

UNIT WITH ECONOMIZER

| ITC CLASSIFICATION | SHEET | DATE | SUPERCEDES | FAN COIL UNITS | | REV |
|---|---|---|---|---|---|---|
| U.S. ECCN:NSR | 2 OF 2 | 05/27/21 | 01/23/12 | 40RU A / Q / S - 14 / 16 / 25 | 40RU500028 | G |

**Fig. 3 — Dimensions — Size 25 (cont)**

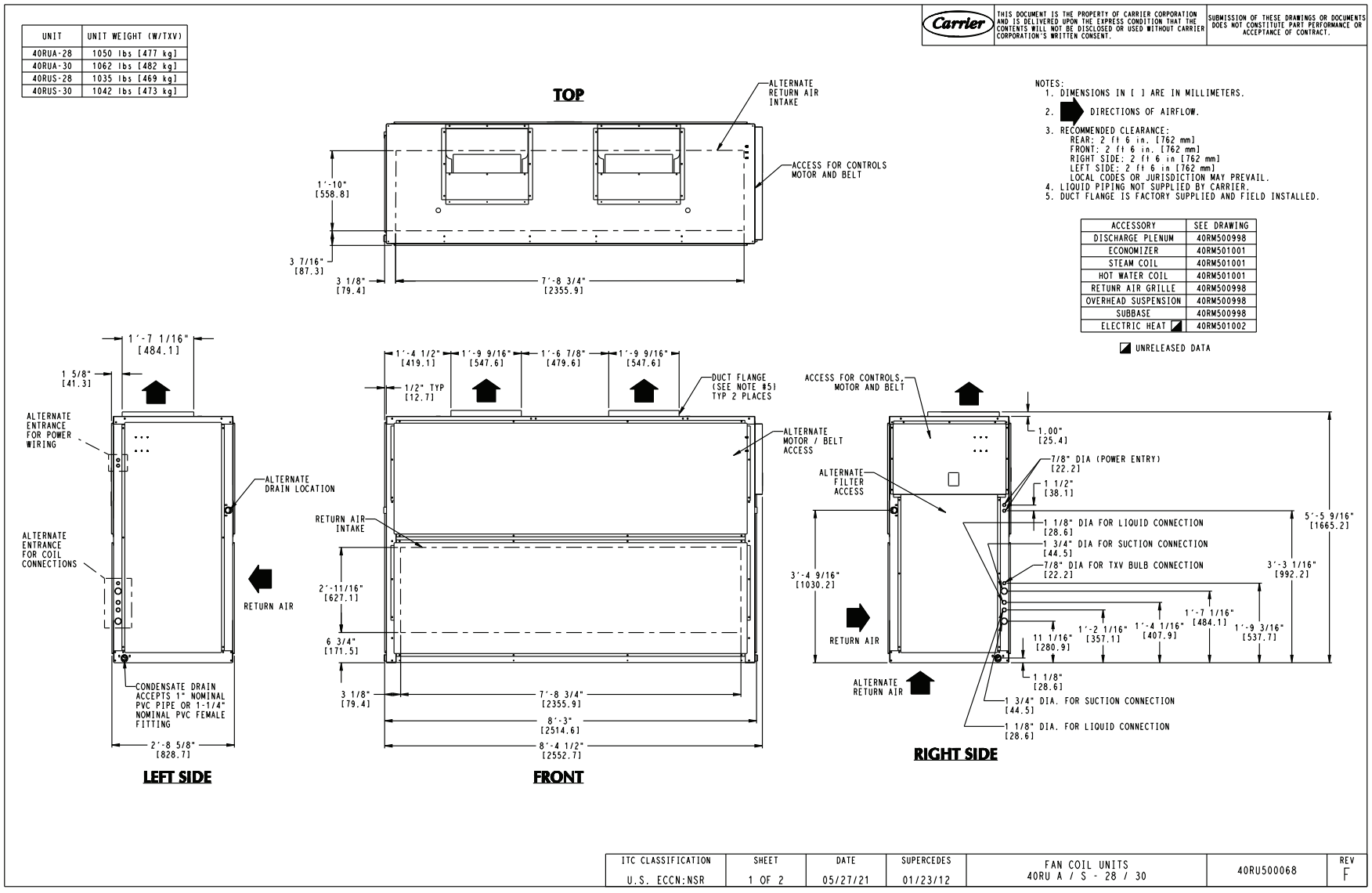
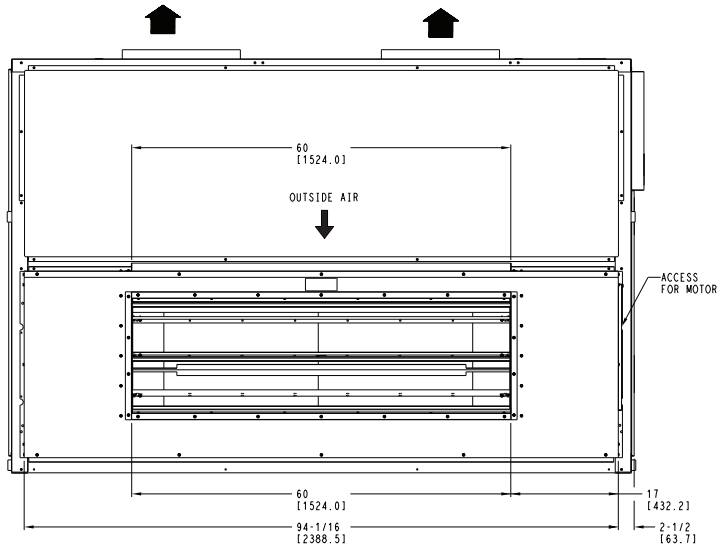
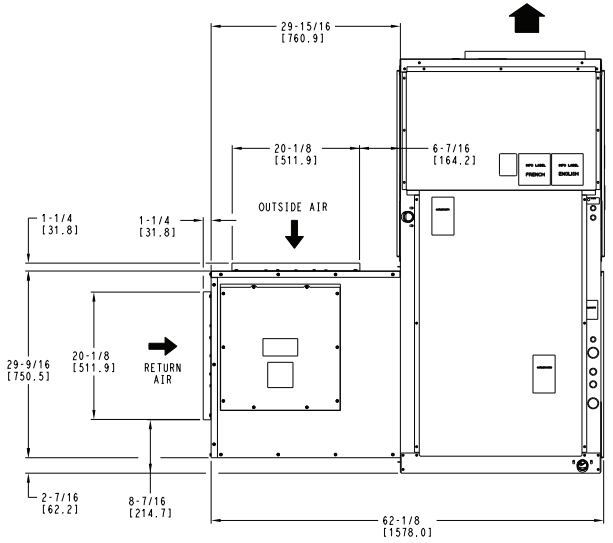



**Fig. 4 — Dimensions — Sizes 28 and 30**




FRONT




RIGHT SIDE

UNIT WITH ECONOMIZER

| ITC CLASSIFICATION | SHEET | DATE | SUPERCEDES | | | |
|---|---|---|---|---|---|---|
| U.S. ECCN:NSR | 2 OF 2 | 05/27/21 | 01/23/12 | FAN COIL UNITS 40RU A / S - 28 / 30 | 40RU500068 | REV F |

**Fig. 4 — Dimensions — Sizes 28 and 30 (cont)**

## Table 1 — 40 RUA Physical Data — Cooling Units

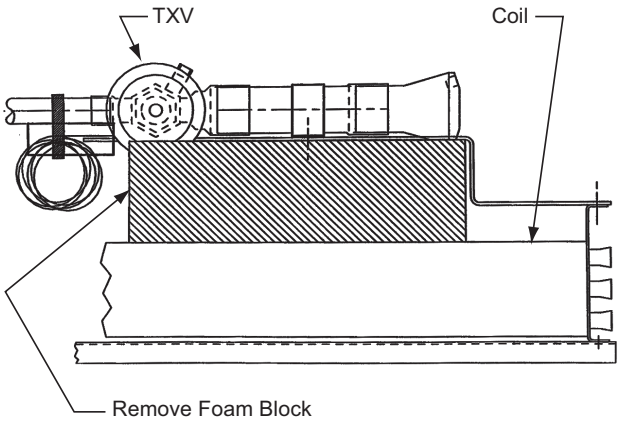
| UNIT 40RUA* | 25 | 28 | 30 |
|---|---|---|---|
| **NOMINAL CAPACITY (kW [tons])** | 70 [20] | 88 [25] | 106 [30] |
| **OPERATING WEIGHT (kg [lb])** | | | |
| **Base Unit with TXV — 4 Row** | 331 [730] | 476 [1,050] | 482 [1,062] |
| **Plenum** | 102 [225] | 147 [325] | 147 [325] |
| **Economizer** | 154 [340] | 154 [340] | 154 [340] |
| **Hot Water Coil**[a] | 129 [285] | 156 [345] | 156 [345] |
| **Steam Coil**[a] | 154 [340] | 184 [405] | 184 [405] |
| **FANS** | | | |
| **Qty / Diameter (mm [in.])** | 2 / 381 [15] | 2 / 457 [18] | 2 / 457 [18] |
| **Nominal Airflow (L/s [cfm])** | 3,775 [8,000] | 4,719 [10,000] | 5,663 [12,000] |
| **Airflow Range (L/s [cfm])** | 2,832-4,719 [6,000-10,000] | 3,539-5,899 [7,500-12,500] | 4,247-7,079 [9,000-15,000] |
| **Nominal Motor Hp (Standard Motor)** | 5.0 | 7.5 | 10.0 |
| **Motor Speed (rps [rpm])** | 29 [1,760] | 29 [1,760] | 29 [1,755] |
| **REFRIGERANT** | Puron® R-410A | Puron® R-410A | Puron® R-410A |
| **Shipping Charge (kg [lb])** | Nitrogen Purge | Nitrogen Purge | Nitrogen Purge |
| **Metering Device** | TXV | TXV | TXV |
| **Operating Charge (kg [lb]) (approx per circuit)**[b] | 1.6 / 1.6 [3.5 / 3.5] | 2.0 / 2.0 [4.5 / 4.5] | 2.3 / 2.3 [5.0 / 5.0] |
| **DIRECT — EXPANSION COIL** | Enhanced Copper Tubes, Aluminum Sine-Wave Fins | | |
| **Maximum Working Pressure (kPa [psig])** | 4482 [650] | 4482 [650] | 4482 [650] |
| **Face Area (m² [ft²])** | 1.85 [19.88] | 2.31 [24.86] | 2.77 [29.83] |
| **No. of Splits** | 2 | 2 | 2 |
| **No. of Circuits per Split** | 18 | 20 | 24 |
| **Split Type / Percentage** | Face / 50/50 | Face / 50/50 | Face / 50/50 |
| **Rows / FPI** | 4 / 15 | 4 / 15 | 4 / 15 |
| **PIPING CONNECTIONS** | | | |
| **Quantity / Size (in.)** | | | |
| **DX Coil — Suction (ODF)** | 2 / 1-1/8 | 2 / 1-3/8 | 2 / 1-3/8 |
| **DX Coil — Liquid Refrigerant (ODF)** | 2 / 5/8 | 2 / 5/8 | 2 / 5/8 |
| **Steam Coil, In (MPT)** | 1 / 2-1/2 | 1 / 2-1/2 | 1 / 2-1/2 |
| **Steam Coil, Out (MPT)** | 1 / 1-1/2 | 1 / 1-1/2 | 1 / 1-1/2 |
| **Hot Water Coil, In (MPT)** | 1 / 2 | 1 / 2 | 1 / 2 |
| **Hot Water Coil, Out (MPT)** | 1 / 2 | 1 / 2 | 1 / 2 |
| **Condensate (PVC)** | 1 / 5/8 ODM/1-1/4 IDF | 1 / 5/8 ODM/1-1/4 IDF | 1 / 5/8 ODM/1-1/4 IDF |
| **FILTERS** | Throwaway — Factory Supplied | | |
| **Quantity / Size (mm [in.])** | 4 / 406 x 508 x 51 [16 x 20 x 2]<br>4 / 406 x 610 x 51 [16 x 24 x 2] | 4 / 508 x 610 x 51 [20 x 24 x 2]<br>4 / 508 x 635 x 51 [20 x 25 x 2] | 4 / 508 x 610 x 51 [20 x 24 x 2]<br>4 / 508 x 635 x 51 [20 x 25 x 2] |
| **Access Location** | Either Side | Either Side | Either Side |
| **STEAM COIL**[a] | | | |
| **Maximum Working Pressure (kPa at 127°C [psig at 260°F])** | 138 [20] | 138 [20] | 138 [20] |
| **Total Face Area (m² [ft²])** | 1.24 [13.33] | 1.39 [15.0] | 1.39 [15.0] |
| **Rows / FPI** | 1 / 10 | 1 / 10 | 1 / 10 |
| **HOT WATER COIL**[a] | | | |
| **Maximum Working Pressure (kPa [psig])** | 1034 [150] | 1034 [150] | 1034 [150] |
| **Total Face Area (m² [ft²])** | 1.24 [13.33] | 1.39 [15.0] | 1.39 [15.0] |
| **Rows / FPI** | 2 / 8.5 | 2 / 12.5 | 2 / 12.5 |
| **Water Volume** | | | |
| **(L [gal])** | 52.6 [13.9] | 54.1 [14.3] | 54.1 [14.3] |
| **(m³ [ft³])** | 0.052 [1.85] | 0.054 [1.90] | 0.054 [1.90] |

NOTE(S):

a. Field-installed accessory only.
b. Units are shipped without refrigerant charge.

LEGEND

**DX** — Direct Expansion
**FPI** — Fins Per Inch
**IDF** — Inside Diameter, Female
**ODF** — Outside Diameter, Female
**ODM** — Outside Diameter, Male
**TXV** — Thermostatic Expansion Valve




LEGEND
**TXV —** Thermostatic Expansion Valve

**Fig. 5 — Foam Block Location**

## Unit Positioning

The unit can be mounted on the floor for vertical application with return air entering the face of the unit and supply air discharging vertically through the top of the unit. The unit can also be applied in a horizontal arrangement with return air entering horizontally and the supply air discharging horizontally. When applying the unit in a horizontal arrangement, ensure the condensate drain pan is located at the bottom center of the unit for adequate condensate disposal. See Fig. 6 for condensate connections for each unit position.

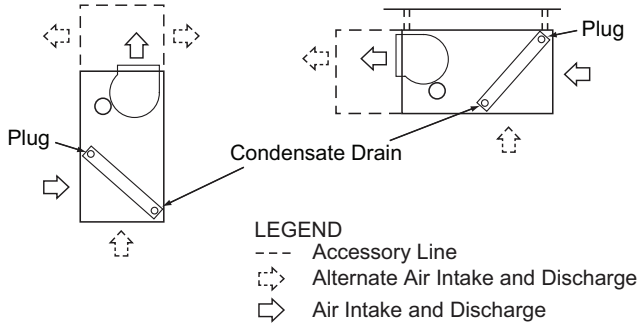



**Fig. 6 — Typical Unit Positioning**

Typical positioning and alternate return air locations are shown in Fig. 6. Alternate return air locations can be used by moving the unit panel from the alternate return air location to the standard return air location. Refer to overhead suspension accessory drawing. (See Fig. 7.) for preferred suspension technique. The unit needs support underneath to prevent sagging.

IMPORTANT: Do NOT attempt to install unit with return air entering top panel of unit. Condensate will not drain from unit.

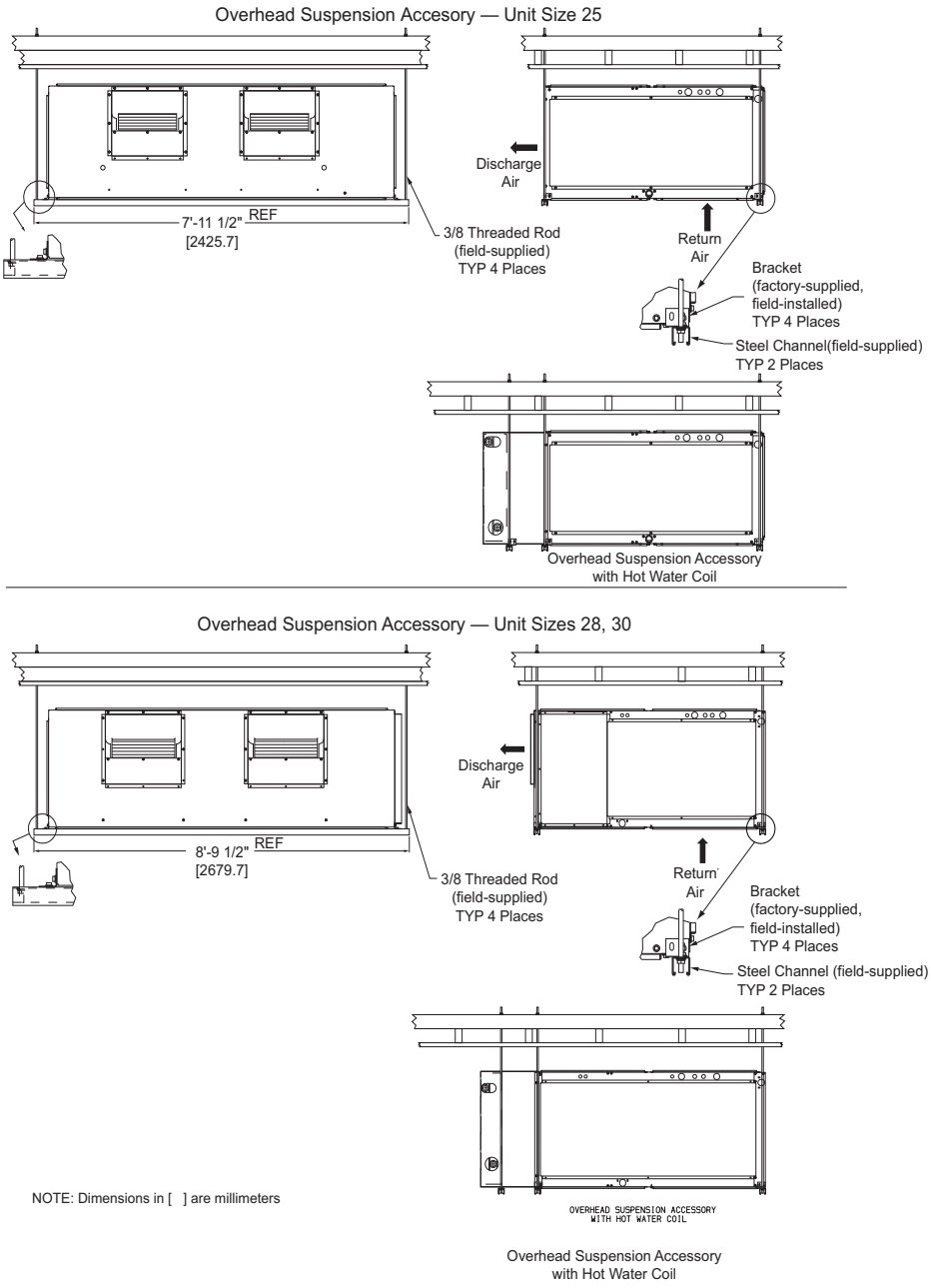



**Fig. 7 — Preferred Suspension Technique**

## Unit Isolation

Where extremely quiet operation is essential, install isolators between floor and base of unit, or between ceiling and top section of unit.

Be sure that unit is level and adequately supported. Use channels at front and sides of unit for reference points when leveling.

## Refrigerant Piping Access

The 40RU Series units come with standard knockouts for refrigerant. These knockouts are located on both sides of the unit for installation flexibility. The standard knockouts provide sufficient access to the unit's coils for all 40RUA*25, 28, and 30 units. Recommended access hole use is listed for all units. Note that Fig. 8 shows the access holes on the control-box side of the unit; this is the side of the unit with the coil headers, which is used most often for piping access.

IMPORTANT: Do not bury refrigerant piping underground.

## Refrigerant Piping

See Table 1 for refrigerant pipe connection sizes. For ease in brazing, it is recommended that all internal solder joints be made before unit is placed in final position.

The 40RU direct-expansion units have internal factory-installed thermostatic expansion valves (TXVs), distributors, and nozzles for use with R-410A. See Table 2 for part numbers. Knockouts are provided in the unit corner posts for 40RU refrigerant piping. See Fig. 8, which also lists recommended knockouts and access holes to use for each 40RU unit size. Recommended fittings are listed in Table 3.

The sensor bulb capillary tubes must be routed from the TXVs inside the unit through one of the piping access holes. Clamp the TXV sensor bulb on a vertical portion of the suction line, outside the unit. (See Fig. 9.)

NOTE: Be sure to remove the Styrofoam™ [1] shipping pad from the TXV. Verify that it has been removed. (See Fig. 5.)

IMPORTANT: Never attach the sensor to the suction manifold. Do NOT mount the sensor on a trapped portion of the suction line.

The 40RU Series evaporator coils have a face-split design. Ensure that lower circuit of coil is first on/last off when connected to the condensing unit and/or system controls. (See Fig. 10.)

External TXV equalizer connections are provided and factory-brazed into the coil suction manifolds.

If suction line must be horizontal, clamp bulb to suction line at least 45 degrees above bottom, at approximately the 4 o'clock or 8 o'clock position. (See Fig. 11.).

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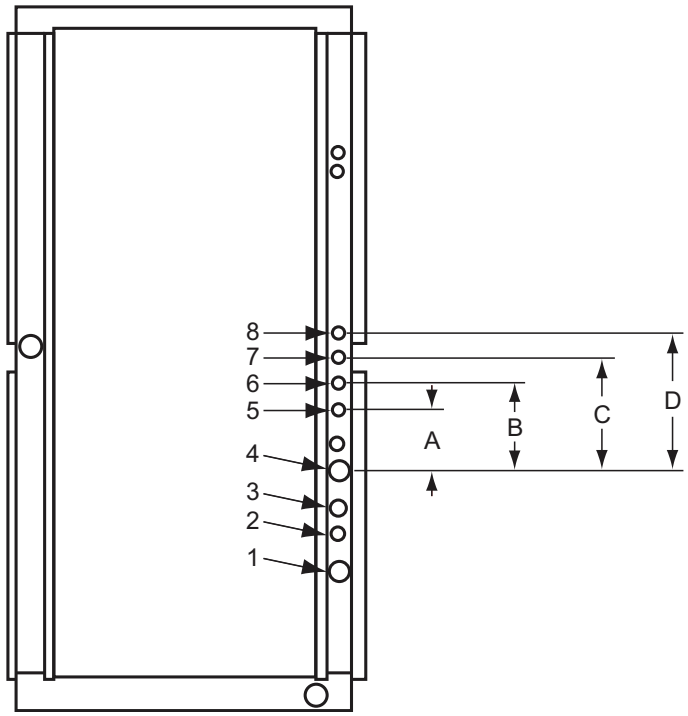
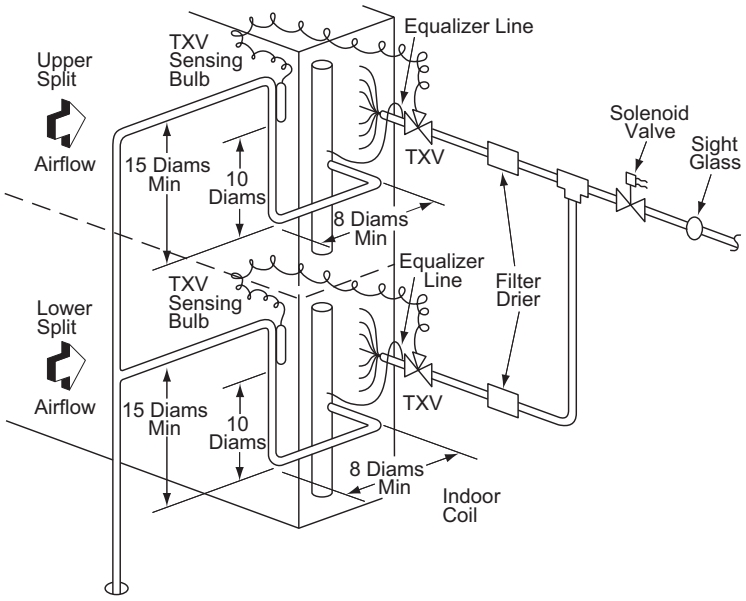



| UNIT | USE HOLE NO.[a] | FIELD-FABRICATED HOLE DIAMETERS in (mm) | | | | FIELD-FABRICATED HOLE POSITION DIMENSIONS mm (in.) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. 5 | No. 6 | No. 7 | No. 8 | A | B | C | D |
| 40RUA*25,28,30 | 1,2,3,4 | — | — | — | — | — | — | — | — |

NOTE(S):

a. Access hole knockouts 1-4 are factory-supplied.

**Fig. 8 — Refrigerant Piping Access Holes**

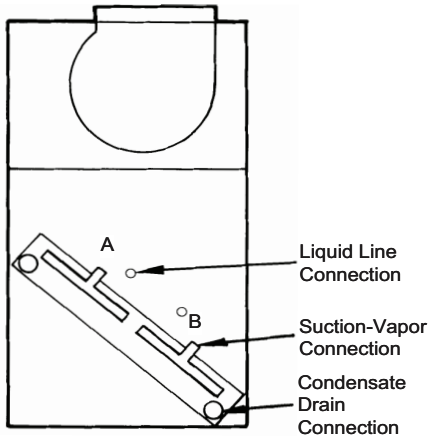



LEGEND

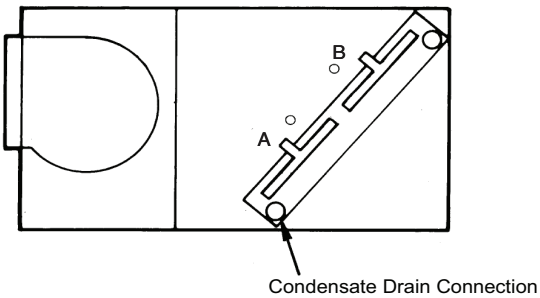
**TXV** — Thermostatic Expansion Valve

NOTE: Component location arrangement shown for field installation of sight glasses, solenoid valves, filter driers, and TXV sensing bulbs. The TXVs and equilizer lines are factory installed.

**Fig. 9 — Face-Split Coil and Liquid Line Piping (Typical)**

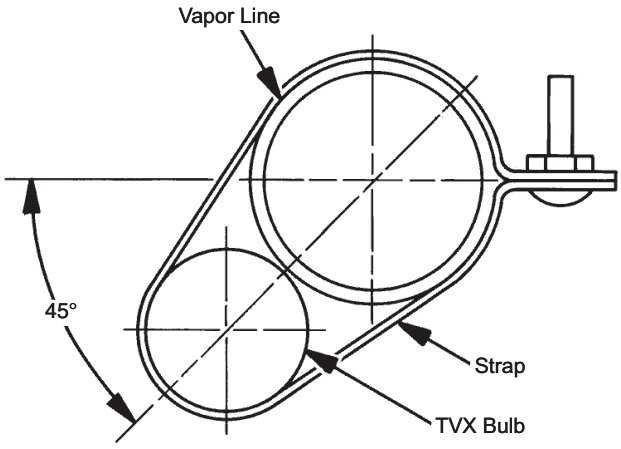



**First On/Last Off = B**
**Vertical Installation**




**First On/Last Off = A**
**Horizontal Installation**

**Fig. 10 — Typical Evaporator Coil Connections (40RU)**




LEGEND

**TXV —** Thermostatic Expansion Valve

NOTE: The 8 o'clock position is shown above.

**Fig. 11 — TXV Sensing Bulb Location**

## Table 2 — Factory-Installed Nozzle and Distributor Data[a]

| UNIT | COIL TYPE STD | TXV QTY / PART NO. | DISTRIBUTOR QTY / PART NO. | FEEDER TUBES PER DISTRIBUTOR[b] QTY / SIZE (in.) | NOZZLE QTY / PART NO. |
|---|---|---|---|---|---|
| **40RUA*25** | 4 Row | 2 / BBIZE-8-GA | 2 / D196-18-3/16 | 18 / 3/16 | 2 / G6 |
| **40RUA*28** | 4 Row | 2 / BBIZE-15-GA | 2 / 1126 | 20 / 3/16 | 2 / C15 |
| **40RUA*30** | 4 Row | 2 / BBIZE-15-GA | 2 / 1126 | 24 / 3/16 | 2 / C17 |

NOTE(S):

a. Hot gas bypass applications require field-supplied auxiliary side connector.
b. Feeder tube size is 6.35 mm (1/4 in.).

## Table 3 — Fitting Requirements

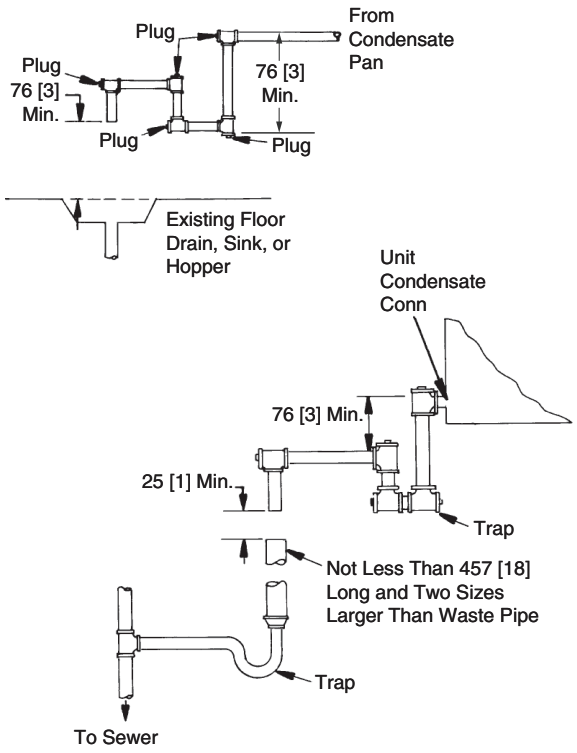
| UNIT | ACCESS HOLE NO.[a] | CONNECTION TYPE | CIRCUIT | FITTING REQUIRED[b] (in.) |
|---|---|---|---|---|
| **40RUA*25** | 1 | Suction | Lower | 1-1/8 Street Elbow<br>1-1/8 Nipple, 7-5/8 L<br>1-1/8 Long Radius Elbow |
| | 2 | Liquid | Lower | 5/8 Street Elbow<br>5/8 Nipple, 6-1/2 L<br>5/8 Long Radius Elbow |
| | 3 | Liquid | Upper | 5/8 Street Elbow<br>5/8 Nipple, 9-1/2 L<br>5/8 Long Radius Elbow |
| | 4 | Suction | Upper | 1-1/8 Nipple, 5-5/8 L<br>1-1/8 Long Radius Elbow<br>1-1/8 Nipple, 11 L<br>1-1/8 Long Radius Elbow |
| **40RUA*28** | 1 | Suction | Lower | 1-3/8 Street Elbow<br>1-3/8 Nipple, 11 L<br>1-3/8 Long Radius Elbow |
| | 2 | Liquid | Lower | 5/8 Street Elbow<br>5/8 Nipple, 1-1/2 L<br>5/8 Long Radius Elbow |
| | 3 | Liquid | Upper | 5/8 Street Elbow<br>5/8 Nipple, 19-1/2 L<br>5/8 Long Radius Elbow |
| | 4 | Suction | Upper | 1-3/8 Nipple, 4-3/16 L<br>1-3/8 Long Radius Elbow<br>1-3/8 Nipple, 23-1/4 L<br>1-3/8 Long Radius Elbow |
| **40RUA*30** | 1 | Suction | Lower | 1-3/8 Street Elbow<br>1-3/8 Nipple, 3 L<br>1-3/8 Long Radius Elbow |
| | 2 | Liquid | Lower | 5/8 Street Elbow<br>5/8 Nipple, 7-3/4 L<br>5/8 Long Radius Elbow |
| | 3 | Liquid | Upper | 5/8 Street Elbow<br>5/8 Nipple, 18-1/2 L<br>5/8 Long Radius Elbow |
| | 4 | Suction | Upper | 1-3/8 Nipple, 4-3/16 L<br>1-3/8 Long Radius Elbow<br>1-3/8 Nipple, 19-1/4 L<br>1-3/8 Long Radius Elbow |

NOTE(S):

a. Fittings are listed on order from header or tee stub connection out to access hole in corner support post.
b. See Fig. 8 for access hole location by number.

## Condensate Drain

Install a trapped condensate drain line to unit connection as shown in Fig. 12. The unit drain connection is a PVC stub. (See Fig. 13.) Some areas may require an adapter to connect to either galvanized steel or copper pipe. For these applications, install a field-supplied threaded PVC adapter.




NOTE: Dimensions in mm [in.]

**Fig. 12 — Condensate Drain**

NOTE: A trap must be installed in the condensate drain line to ensure that the static pressure of fans is balanced with the water column in the drain line and that condensate can drain completely from pan. Without a trap, air can be drawn up drain line until water level in condensate pan becomes equal to static pressure created by fans, preventing complete drainage. Conditions will worsen as filters become dirty.

Install clean-out plugs in trap. Pitch drain line downward to an open floor drain or sump. Provide service clearance around drain line to permit removal of unit panels. Observe all local sanitary codes.

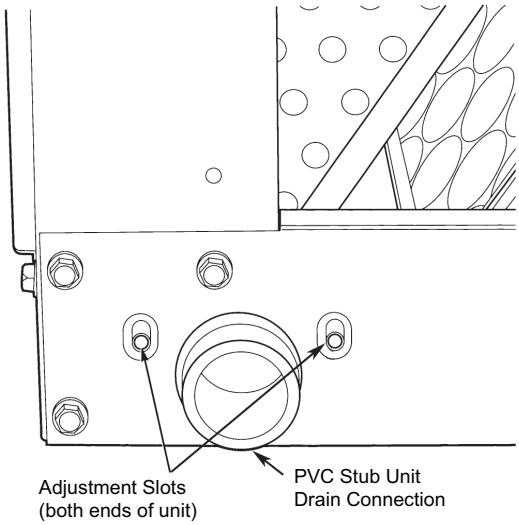



**Fig. 13 — Drain Pan Slope Adjustment**

As shipped, the unit's condensate drain pan is NOT sloped towards the drain connection. The pan slope must be changed to pitch towards the side of the unit with the drain connection. (See Fig. 13.) Loosen the 2 screws next to the drain outlet at both ends of the unit, push drain pan down in the slots near the drain connection, and up in the slots on the opposite end. Re-tighten screws. The pan should have a pitch of at least 6.35 mm (1/4 in.) over its length toward the drain connection.

## Fan Motors and Drives

Motor and drive packages are factory installed in all units. The motor and drive packages consist of the following items:

1 — Fan motor

1 — Adjustable motor pulley

1 — Fan pulley

2 — Matched fan belts (40RUA*25-30 units)

For instructions on changing fan rotation, changing drive speeds and adjusting drives, see Pulley and Drive Adjustment in the Service section.

## Power Supply and Wiring

Check the unit data plate to ensure that available power supply matches electrical characteristics of the unit. Provide a disconnect switch with an integrated lock-out feature of size required to provide adequate fan motor starting current. See Table 4 for unit electrical data.

**⚠ 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.

**⚠ 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.

## Table 4 — 40RU**25-30 Electrical Data

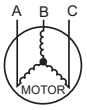
| UNIT[a, b] | V-PH-Hz | IFM TYPE | VOLTAGE LIMITS[c] | | FAN MOTOR | | | POWER SUPPLY[d] | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Hp | kW | FLA[e] | MCA | MOCP |
| **40RUA*25** | 400-3-50 | STD | 360 | 440 | 5.0 | 3.73 | 7.6 | 9.5 | 15 |
| | | MED | 360 | 440 | 5.0 | 3.73 | 7.6 | 9.5 | 15 |
| | | HIGH | 360 | 440 | 7.5 | 5.60 | 11.4 | 14.3 | 25 |
| **40RUA*28** | 400-3-50 | STD | 360 | 440 | 7.5 | 5.60 | 11.4 | 14.3 | 25 |
| | | MED | 360 | 440 | 10.0 | 7.46 | 16.8 | 21.0 | 35 |
| | | HIGH | 360 | 440 | 10.0 | 7.46 | 16.8 | 21.0 | 35 |
| **40RUA*30** | 400-3-50 | STD | 360 | 440 | 10.0 | 7.46 | 16.8 | 21.0 | 35 |
| | | MED | 360 | 440 | 10.0 | 7.46 | 16.8 | 21.0 | 35 |
| | | HIGH | 360 | 440 | 10.0 | 7.46 | 16.8 | 21.0 | 35 |

NOTE(S):

a. Unbalanced 3-Phase Supply Voltage: Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the formula in the example below to determine the percentage of voltage imbalance.
b. Installation with Accessory Electric Heaters: Size the Field Power Wiring between the heater TB1 and the 40RU indoor fan motor per NEC Article 430-28 (1) or (2) (depends on length of conduit between heater enclosure and 40RU power entry location). Install wires in field-installed conduit.
c. Motors are designed for satisfactory operation within 10% of normal voltage shown. Voltages should not exceed the limits shown in the Voltage Limits column.
d. Minimum circuit amps (MCA) and MOCP values are calculated in accordance with The NEC. Article 440.
e. Motor FLA values are established in accordance with Underwriters' Laboratories (UL). Standard 1995.

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

Example: Supply voltage is 230-3-60




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.
(AB) 227-224 = 3-v
(BC) 231-227 = 4-v
(AC) 227-226 = 1-v

Maximum deviation is 4-v.
Determine percent of voltage imbalance.

$$\text{\% Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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.

LEGEND

**FLA** — Full Load Amps
**MCA** — Minimum Circuit Amps
**MOCP** — Maximum Overcurrent Protection

Install disconnect switch and power wiring in accordance with all applicable local codes. See Fig. 14-17 and the unit label diagram. For units with motor sizes less than 3.7 kW (5 Hp), connect power wiring to unit with no. 10 ring terminal. For units with motor sizes of 3.7 kW (5 Hp) or more, connect power wiring with 1/4 in. ring terminal.

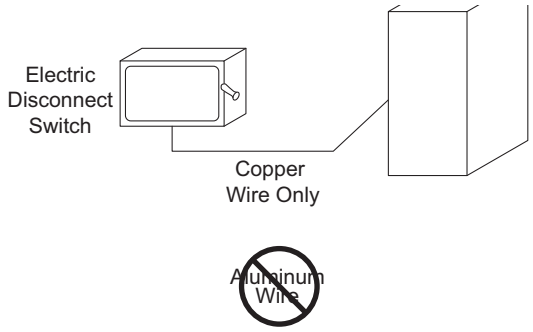
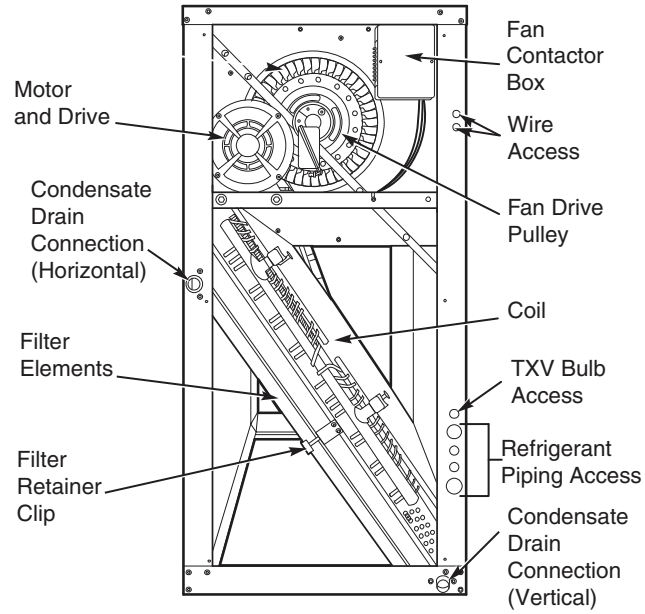



**Fig. 14 — Disconnect Switch and Unit**




LEGEND
**TXV —**Thermostatic Expansion Valve

**Fig. 15 — Wiring and Service Access (Side Panel Removed)**

Fan motors are factory-installed on all units. Indoor fan contactors are located in the fan contactor box behind the side access panel (see Fig. 15 and 16). Wire the thermostat to the 24-v control circuit terminal block located in the side of the fan contactor control box, according to Fig. 17 or the unit label diagram. If the air handler is part of a split system, complete the wiring from the condensing unit to the thermostat shown in Fig. 17.

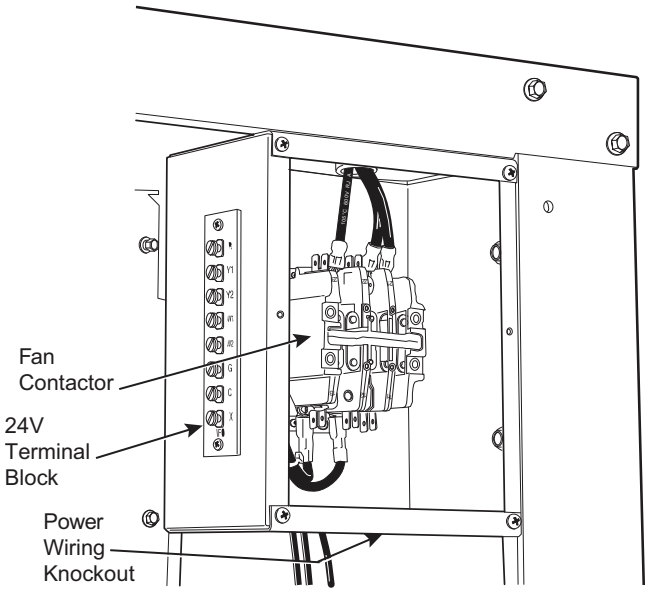



**Fig. 16 — Control Box (Cover Removed) (Typical)**

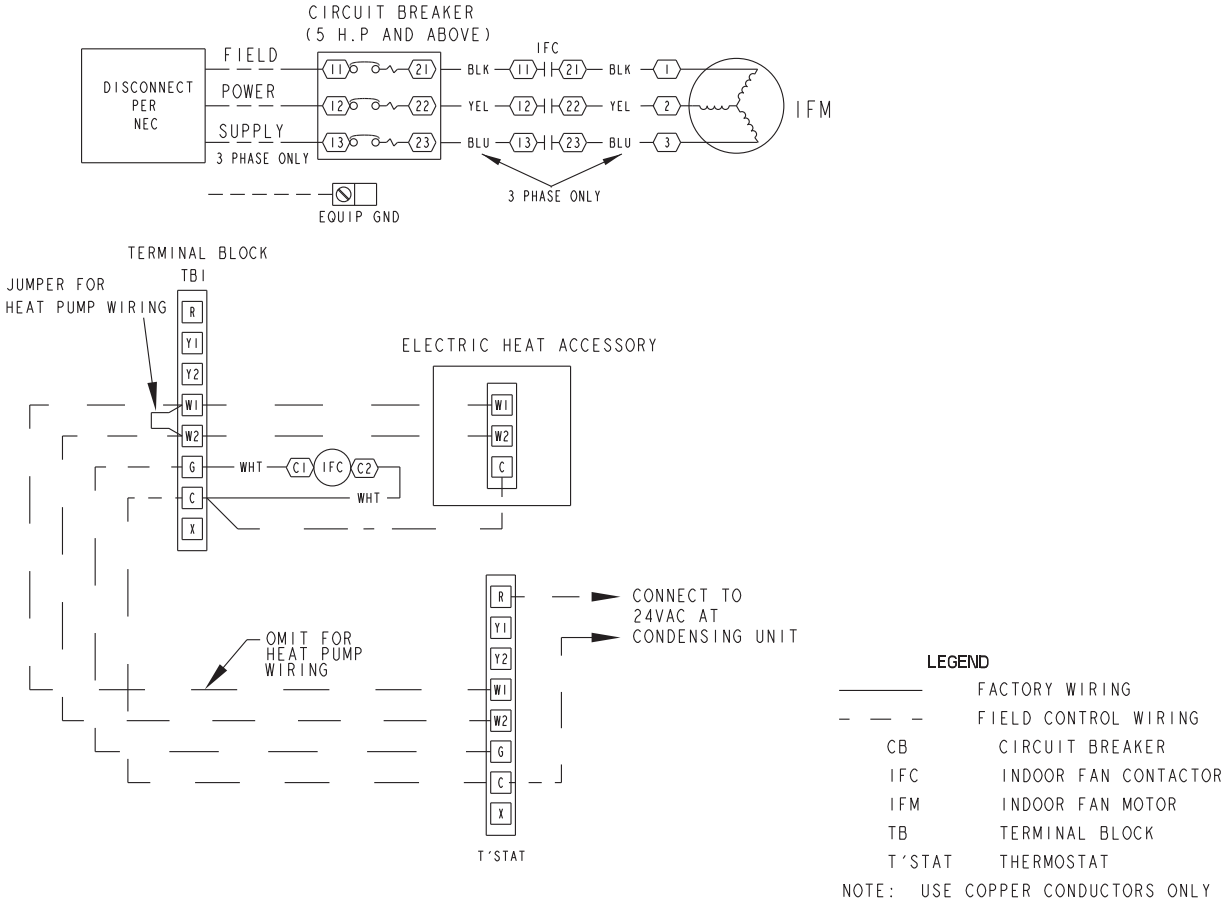



**Fig. 17 — Unit Wiring**

## Connecting Ductwork

Refer to the Carrier System Design Manual for the recommended design and layout of ductwork. Figure 18 shows recommended duct connection to units with 2 fans.

**⚠ CAUTION**

UNIT OPERATION HAZARD

Failure to follow this caution could cause equipment damage.

Do not operate unit without ductwork or discharge plenum unless fan speed has been adjusted for external static pressure of 0 in. wg. Failure to do so may result in motor overload.

DISCHARGE CONNECTIONS

Duct flanges are factory-supplied; they are shipped inside the unit attached to the hairpin end of the coil tube sheet for field installation. Using the existing screws, install the duct flanges on the unit's fan deck. Each fan discharge requires 2 flanges; each flange must be bent in the middle to conform to the discharge opening. (See Fig. 19.) After flanges are installed, connect them to the supply duct using a canvas connection to prevent vibration. It is important that this connection be properly fabricated to prevent high air friction losses and air noise.

RETURN CONNECTIONS

When using return-air ductwork, route return-air duct to the unit's return air inlet near the filter rack, using a canvas connection to prevent transmission of unit vibration. If the duct blocks off the unit's access panel, provide a slip joint in the ductwork to permit removal for servicing.

OUTDOOR-AIR INLET CONNECTIONS

Connect outdoor-air inlet to field-installed accessory economizer. Refer to Economizer Installation Instructions.

## Return-Air Filters

Type and size of filters are shown in Table 1 and are factory-supplied and factory-installed. In all units with 2 fans, a filter replacement tool (hook) is shipped inside the unit for field use when replacing filters. See the Service section for instructions on filter element replacement.

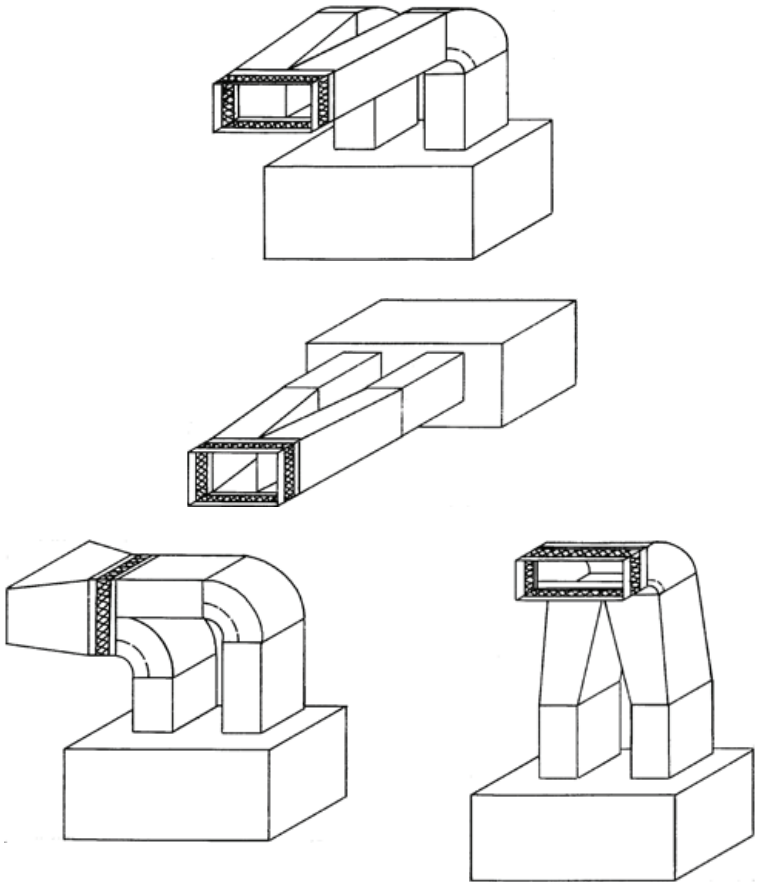


**Fig. 18 — Typical Fan Discharge Connections for Multiple Fan Units**

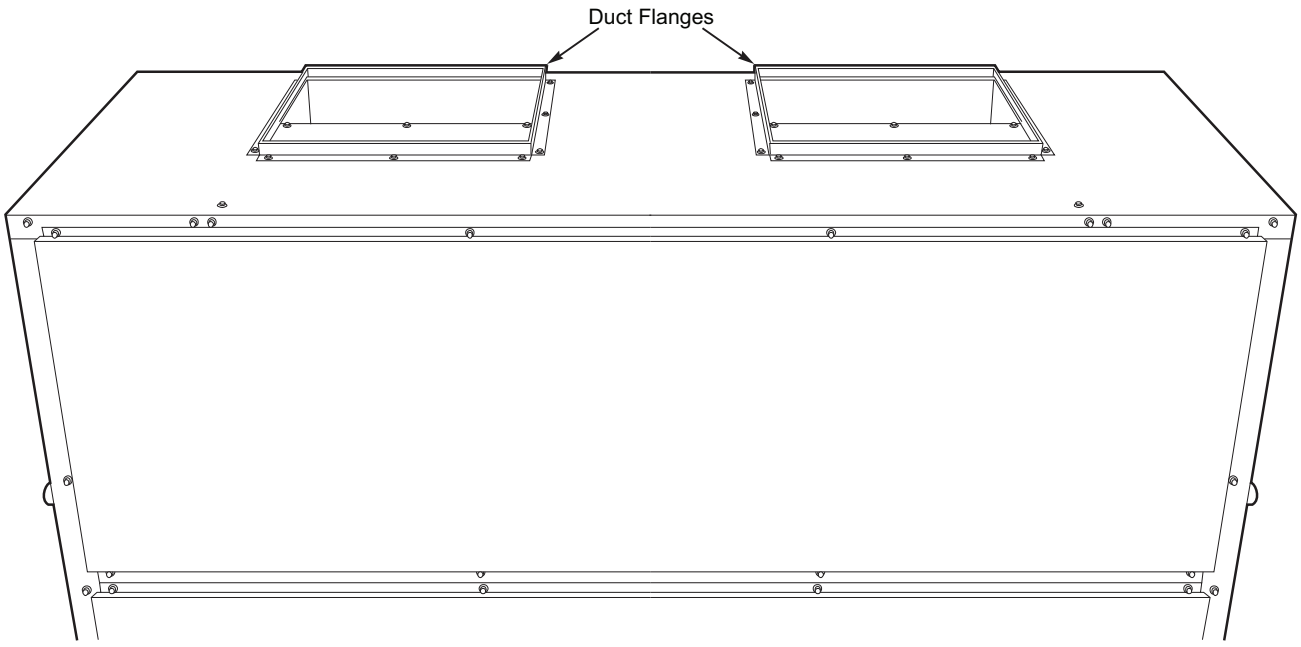



**Fig. 19 — Duct Flange Installation**

## START-UP

Before starting unit, check the following and correct as necessary:

- Is unit solidly supported?
- Is fan adjusted for speed and pulley alignment?
- Are pulleys, motor, and bearings securely mounted?
- Are there any loose parts that will rattle or vibrate?
- Is condensate drain pan pitched for correct drainage?
- Are coil baffle plates tight against coil to prevent air bypass?
- Are all panels securely fastened?
- Are all electrical connections correct and tight?
- Are there any loose or disconnected wires in the control box? Are any wires in contact with sharp edges or moving parts (e.g., pulley, belt, etc.)?
- Have all safety, caution, and warning labels been read?

### 40RUA ONLY

- Is TXV bulb located on suction tube per Fig. 20?
- Is the capillary tube to the bulb free of kinks and not subject to pinching?
- Is the bulb well secured to the suction tube with strap?

Also refer to condensing unit or outdoor heat pump section instructions before starting a split system. A split system start-up checklist is provided at the end of these instructions.

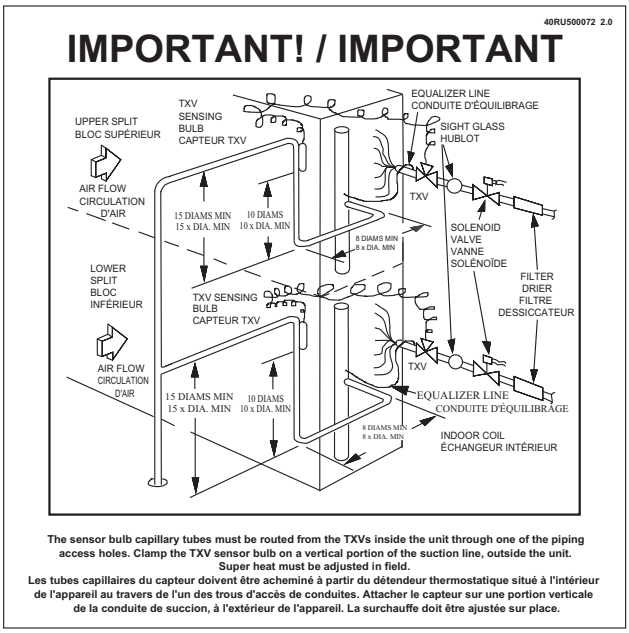



**Fig. 20 — TXV Bulb Location Label**

### Adjusting TXV for Superheat (40RUA only)

The unit-mounted thermostatic expansion valve(s) is/are factory set to provided superheat at the bulb location in 5.5°C to 8.3°C (10°F to 15°F) range. Actual system load conditions may require adjustment of the factory setting. (See Fig. 21.)

To adjust the TXV superheat setting:

1. Remove the seal cap from the bottom of the TXV body.
2. To increase superheat, turn the stem clockwise. To decrease the superheat, turn the stem counterclockwise. Do not turn the stem more than one full turn.
3. Wait until suction pressure and superheat stabilize. This may take more than 30 minutes.
4. Continue adjustment until superheat reaches 5.5°C to 8.3°C (10°F to 15°F).
5. Replace the seal cap; tighten.

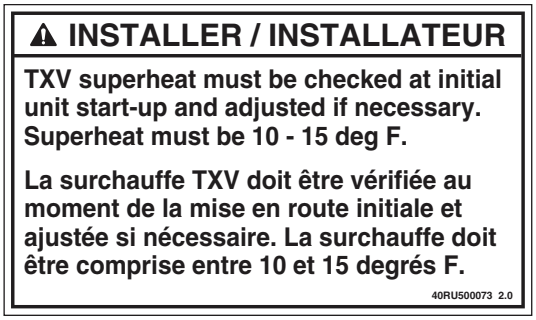



**Fig. 21 — TXV Adjustment Label**

### Compressor Rotation

Follow instructions in Condensing Unit installation instructions. Pressure gages MUST BE USED during cooling system start-up to confirm correct compressor rotation and operation.

## MAINTENANCE

These items should be part of a routine maintenance program, to be checked every month or two, until a specific schedule for each can be identified for this installation:

### Quarterly Inspection (and 30 days after initial start)

INDOOR SECTION

- Condenser coil cleanliness checked.
- Return air filter replacement
- Outdoor hood inlet filters cleaned
- Fan shaft bearing locking collar tightness checked
- Condensate drain checked

***Heating***

- Power wire connections
- Fuses ready
- Manual-reset limit switch is closed

See Tables 5 and 6 for unit specific maintenance checklists.

### Seasonal Maintenance

These items should be checked at the beginning of each season (or more often if local conditions and usage patterns dictate):

AIR CONDITIONING

- Condenser fan motor mounting bolts tightness
- Compressor mounting bolts
- Condenser fan blade positioning
- Control box cleanliness and wiring condition
- Wire terminal tightness
- Refrigerant charge level
- Evaporator coil cleaning
- Evaporator blower motor amperage

### Table 5 — Outdoor Unit Maintenance Checklist

| MAINTENANCE CHECKLIST[a] | RECOMMENDED INTERVAL[b] | |
|---|---|---|
| **Outdoor unit specific:** | **Monthly** | **Annual** |
| **Clear away debris and vegetation near unit.** | X | |
| **Inspect cabinet for damage. Replace components that are damaged or severely rusted.** | | X |
| **Inspect electrical disconnect for proper function. Repair or replace as necessary.** | | X |
| **Inspect electrical wiring and connections. Tighten loose connections. Inspect and perform functional test of equipment as needed to ensure proper function. Repair or replace damaged or overheated components and wiring.** | | X |
| **Check refrigerant system subcooling and superheat.** | | X |
| **Inspect inside of unit. Clean if debris is present.** | | X |
| **Inspect condenser coil. Clean if dust, dirt, or debris is present. Rinse unit with fresh water.[c]** | | X[d] |
| **Inspect motor and fan for damage. Make sure fans spin freely.** | | X |

NOTE(S):

a. The above list may not include all maintenance items. Inspection intervals may vary depending on climate and opening hours. Consult your Carrier dealer about a service contact for seasonal inspections
b. Monthly maintenance items and outdoor unit rinsing may be performed by the customer. All other maintenance items and all service work must be performed by a qualified service technician. Read all warning labels.
c. Do not use harsh chemicals or high pressure water on coils. More frequent rinsing is required near a sea cost.
d. Monthly rinsing of the condenser coil is recommended if the unit is located in a corrosive climate.

### Table 6 — Indoor Unit Maintenance Checklist

| MAINTENANCE CHECKLIST[a] | RECOMMENDED INTERVAL[b] | |
|---|---|---|
| **Indoor unit specific: (for accessories refer to unit specific literature)** | **Monthly** | **Annual** |
| **Inspect, clean, or replace air filter if dirty.** | X | |
| **Inspect and clean blower assembly (includes blower housing, wheel, and motor). Lubricate shaft bearings.** | | X |
| **Inspect internal and external cabinet. Clean as needed.** | | X |
| **Inspect electrical disconnect for proper function. Repair or replace as necessary.** | | X |
| **Inspect electrical components, wiring, and connections. Tighten loose connections. Repair or replace damaged components and wiring.** | | X |
| **Inspect evaporator coil. Clean if dust, dirt, or debris is present.[c]** | | X |
| **Clean condensate pan, trap, and drain lines (more frequent maintenance may be required in humid climates — consult your local HVAC dealer).** | | X |
| **Inspect motor and fan for damage. Make Inspect airflow system (ductwork). Check for leaks and repair as needed.** | | X |

NOTE(S):

a. The above list may not include all maintenance items. Inspection intervals may vary depending on climate and opening hours. Consult your Carrier dealer about a service contact for seasonal inspections
b. Monthly maintenance items and outdoor unit rinsing may be performed by the customer. All other maintenance items and all service work must be performed by a qualified service technician. Read all warning labels.
c. Do not use harsh chemicals or high pressure water on coils. More frequent rinsing is required near a sea cost.

## SERVICE

Inspection and maintenance should be performed at regular intervals and should include the following:

- Complete cleaning of cabinet, fan wheel, cooling coil, condensate pan and drain, heating coils, and return-air grille (if present).
- Inspection of panels and sealing of unit against air leakage.
- Adjustment of fan motor, belt, bearings, and wheels.
- Cleaning or replacement of filters.
- Testing for cooling/heating system leaks.
- Checking of all electrical connections.

**⚠ DANGER**

ELECTRICAL SHOCK HAZARD

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

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lock(s) and lockout tag(s). Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate. Unit may have more than one power switch.

Most unit service can be performed by removing one or both of the unit's side panels. Coil cleaning, removal or insulation cleaning may require removal of a rear, top, or bottom panel, depending on the unit's orientation. When service is completed, replace unit panels.

### Panels

Panels are fastened to unit frame with sheet metal screws. Fan and coil compartment must be sealed tightly after service to prevent air from bypassing the cooling coil.

### Fan Motor Lubrication

Fan motor supplied with unit is permanently lubricated and requires no further lubrication.

### Fan Shaft Bearings

Size 25-30 units have pillow-block bearings (Fig. 22) that must be lubricated with suitable bearing grease approximately every 3 months. See Table 7 for suitable lubricants.

### Table 7 — Lubricant Data

| MANUFACTURER | LUBRICANT |
|---|---|
| **Mobil** | Mobilplex EP No. 2 |
| **Sunoco** | Prestige 42 |
| **Texaco** | Multifak 2 |
| **Texaco** | Regal AFB-2[a] |

NOTE(S):

a. Preferred lubricant, contains rust and oxidation inhibitors.

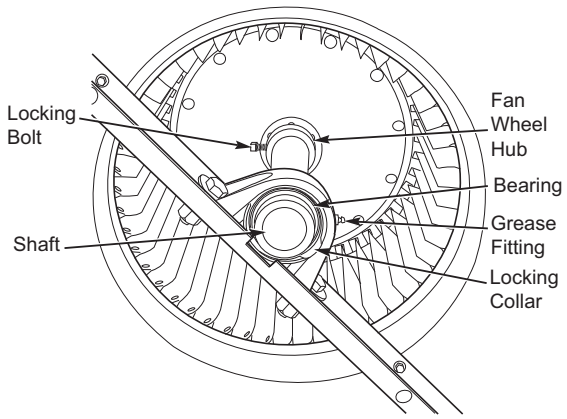



**Fig. 22 — Fan Shaft, Bearings, and Fan Wheel (Typical)**

## Centering Fan Wheel

If fan and fan shaft assembly are not properly centered, blades may scrape against the blower side scroll plate or may create an objectionable whistling noise. It may be necessary to adjust individual fan wheels or move entire fan shaft. See the Fan Shaft Position Adjustment and Individual Fan Wheel Adjustment sections that follow.

## Fan Shaft Position Adjustment

Loosen setscrew or locking collar of each fan shaft bearing. Slide shaft into correct position and replace locking collar. (See Fig. 23). To replace locking collar, push collar up against inner face of bearing. Turn collar in direction of fan rotation until tight, and tighten setscrew. Tightening locking collar in direction of fan rotation results in further tightening of collar should setscrew work itself loose.

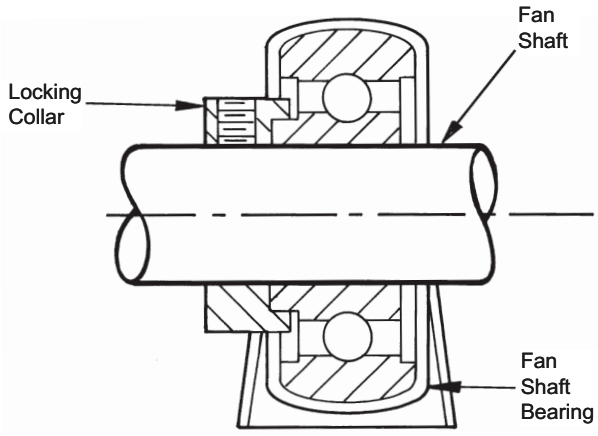



**Fig. 23 — Fan Shaft Bearing**

## Individual Fan Wheel Adjustment

Loosen the 2 locking bolts holding the fan wheel hub to shaft. (See Fig. 22.) Position fan wheel in center of the fan housing and tighten locking bolts. Clearance between wheel and housing should be the same on both sides.

## Fan Belts

Motor mounting plate and motor support angles are slotted to permit both vertical and horizontal adjustment. Adjust belt(s) for correct deflection by loosening motor plate mounting bolts, moving motor/plate assembly forward or back, and re-tightening bolts. Press down on belt with one finger midway between fan and motor pulleys to check deflection. The correct deflection is 3.2 mm (1/8 in.). (See Fig. 24.)

If complete belt replacement is required during servicing, loosen the motor plate mounting bolts (Fig. 24), move motor/plate assembly towards fan pulley, and pull belt(s) off pulleys. Reverse the procedure with new bolts and readjust deflection.

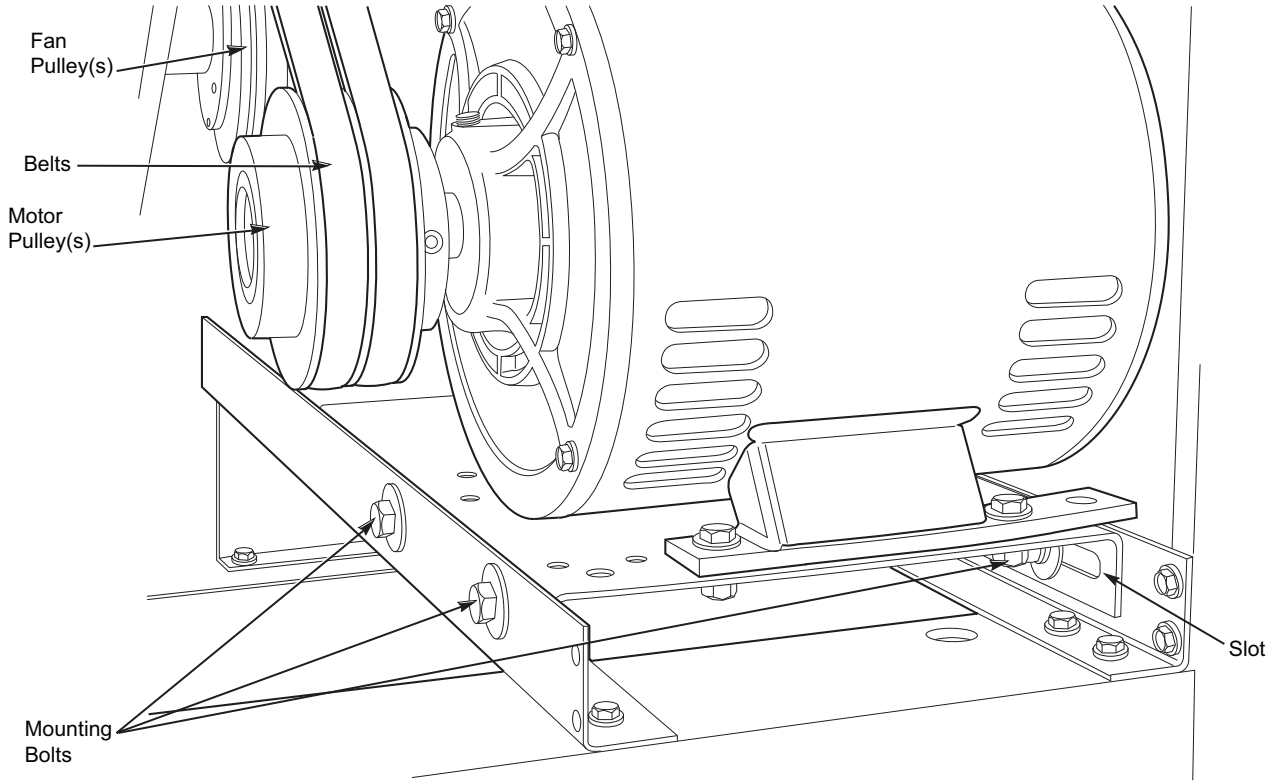



**Fig. 24 — Fan Motor Mounting**

## Fan Rotation

Correct fan rotation with respect to fan outlet is shown in Fig. 25.

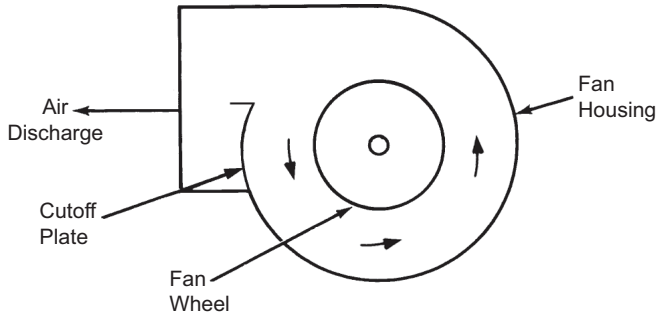



**Fig. 25 — Fan Rotation**

To reverse the direction of rotation of a 3-phase fan motor, reverse any 2 of the power leads. Refer to the connection diagram on the inside of motor terminal box cover for proper reversing procedure of a single-phase motor.

## Fan Pulley Alignment

Align as follows:

1. Loosen setscrews on pulleys.
2. Align pulleys visually and tighten setscrews on fan pulley to lock it in place.
3. Use the methods shown in Fig. 26 to check proper pulley alignment.

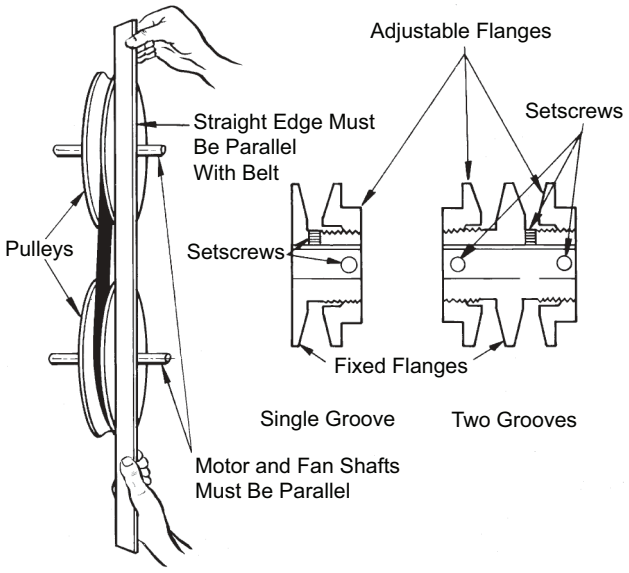



**Fig. 26 — Fan Pulley Adjustments**

4. If pulleys are not in correct alignment, loosen the motor holddown bolts and slide the motor axially until the pulleys are aligned.
5. Tighten motor holddown bolts.

## Pulley and Drive Adjustment

To obtain desired fan speed, refer to the fan motor, drive data and performance data in Tables 8-19 and adjust fan motor pulley as follows:

1. Remove belt from fan motor pulley after loosening motor from motor base.
2. Loosen setscrew in movable flange of pulley. Screw movable flange toward fixed flange to increase the fan speed and away from fixed flange to reduce speed. Before tightening setscrew, make certain that setscrew is over nearest flat surface of pulley hub. (See Fig. 26.)

**⚠ CAUTION**

UNIT OPERATION HAZARD

Failure to follow this caution could cause equipment damage.

Increasing fan speed produces a greater load on motor. Do not exceed rated capacity of motor.

**Table 8 — Motor Efficiency 40RUA — Two-Speed Motor**

| MOTOR (kW [HP]) | EPACT MINIMUM (%) | MOTOR EFFICIENCY (%) |
|---|---|---|
| **3.73 (5.00)** | 89.5 | 89.5 |
| **5.59 (7.50)** | 91.0 | 91.0 |
| **7.46 (10.00)** | 91.7 | 91.7 |

**Table 9 — Fan Motor Data, Standard Motor — SI**

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **400-3-50** | | | |
| **Speed (rps [rpm])** | 24.38 | 25.00 | 24.56 |
| **Shaft kW** | 3.73 | 5.59 | 7.46 |
| **Frame (NEMA)** | 184T | S213T | S215T |
| **Shaft Diameter (mm)** | 28.6 | 34.9 | 34.9 |

**Table 10 — Fan Motor Data, Standard Motor — English**

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **400-3-50** | | | |
| **Speed (rpm)** | 1463 | 1500 | 1473 |
| **Shaft Hp** | 5.00 | 7.50 | 10.00 |
| **Frame (NEMA)** | 184T | S213T | S215T |
| **Shaft Diameter (in.)** | 1-1/8 | 1-3/8 | 1-3/8 |

**Table 11 — Fan Motor Data, Alternate Motor — SI**

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **400-3-50** | | | |
| **Speed (rps)** | 25.00 | 24.56 | 24.56 |
| **Shaft kW** | 5.59 | 7.46 | 7.46 |
| **Frame (NEMA)** | S213T | S215T | S215T |
| **Shaft Diameter (mm)** | 34.9 | 34.9 | 34.9 |

**Table 12 — Fan Motor Data, Alternate Motor — English**

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **400-3-50** | | | |
| **Speed (rpm)** | 1500 | 1473 | 1473 |
| **Shaft kW [Hp]** | 7.5 | 10.0 | 10.0 |
| **Frame (NEMA)** | S213T | S215T | S215T |
| **Shaft Diameter (in.)** | 1-3/8 | 1-3/8 | 1-3/8 |

LEGEND

**NEMA** — National Electrical Manufacturers Association

## Table 13 — Standard Drive Data

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **Motor Drive** | | | |
| **Motor Pulley Pitch Diameter (mm [in.])** | 94.0-119.4 [3.7-4.7] | 109.2-134.6 [4.3-5.3] | 109.2-134.6 [4.3-5.3] |
| **Pulley Factory Setting Full Turns Open** | 3.0 | 3.0 | 3.0 |
| **Fan Drive** | | | |
| **Pulley Pitch Diameter (mm [in.])** | 239 [9.4] | 279 [11.0] | 279 [11.0] |
| **Pulley Bore (mm [in.])** | 36.5 [1-1/16] | 49.2 [1-15/16] | 49.2 [1-15/16] |
| **Belt No. — Section** | 1 — B | 2 — B[a] | 2 — B[a] |
| **Belt Pitch (mm [in.])** | 1062 [41.8] | (2) 1087 [42.8]<br>(2) 1113 [43.8] | (2) 1087 [42.8]<br>(2) 1113 [43.8] |
| **Fan Speeds (rps [rpm])** | | | |
| **Factory Setting** | 12.9 [771] | 12.5 [752] | 12.5 [752] |
| **Range** | 11.3-14.4 [679-863] | 11.4-14.0 [682-841] | 11.2-13.9 [674-831] |
| **Maximum Allowable Speed (rps [rpm])** | 20.0 [1200] | 18.3 [1100] | 18.3 [1100] |
| **Change per 1/2 Turn of Movable Motor Pulley Flange** | 15.3 | 13.1 | 13.1 |
| **Maximum Full Turn From Closed Position** | 6 | 6 | 6 |
| **Shafts Center Distance (mm [in.])** | 232-279 [9.12-10.99] | 169-240 [6.67-9.43] | 169-240 [6.67-9.43] |

## Table 14 — Medium-Static Drive Data

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **Motor Drive** | | | |
| **Motor Pulley Pitch Diameter (mm [in.])** | 109.2-134.6 [4.3-5.3] | 109.2-134.6 [4.3-5.3] | 109.2-134.6 [4.3-5.3] |
| **Pulley Factory Setting Full Turns Open** | 3.0 | 3.0 | 3.0 |
| **Fan Drive** | | | |
| **Pulley Pitch Diameter (mm [in.])** | 239 [9.4] | 239 [9.4] | 239 [9.4] |
| **Pulley Bore (mm [in.])** | 36.5 [1-1/16] | 49.2 [1-15/16] | 49.2 [1-15/16] |
| **Belt No. — Section** | 1 — B | 2 — B[a] | 2 — B[a] |
| **Belt Pitch (mm [in.])** | 1062 [41.8] | (2) 986 [38.8]<br>(2) 1011 [39.8] | (2) 986 [38.8]<br>(2) 1011 [39.8] |
| **Fan Speeds (rps [rpm])** | | | |
| **Factory Setting** | 14.7 [881] | 14.7 [881] | 14.7 [881] |
| **Range** | 13.3-16.4 [798-984] | 13.3-16.4 [798-984] | 13.3-16.4 [798-984] |
| **Maximum Allowable Speed (rps [rpm])** | 20.0 [1200] | 18.3 [1100] | 18.3 [1100] |
| **Change per 1/2 Turn of Movable Motor Pulley Flange** | 15.3 | 15.3 | 15.3 |
| **Maximum Full Turn From Closed Position** | 6 | 6 | 6 |
| **Shafts Center Distance (mm [in.])** | 232-279 [9.16-10.99] | 169-240 [6.67-9.43] | 169-240 [6.67-9.43] |

## Table 15 — High-Static Drive Data

| UNIT | 40RUA*25 | 40RUA*28 | 40RUA*30 |
|---|---|---|---|
| **Motor Drive** | | | |
| **Motor Pulley Pitch Diameter (mm [in.])** | 109.2-134.6 [4.3-5.3] | 109.2-134.6 [4.3-5.3] | 109.2-134.6 [4.3-5.3] |
| **Pulley Factory Setting Full Turns Open** | 3.0 | 3.0 | 3.0 |
| **Fan Drive** | | | |
| **Pulley Pitch Diameter (mm [in.])** | 188 [7.4] | 203 [8.6] | 203 [8.6] |
| **Pulley Bore (mm [in.])** | 36.5 [1-1/16] | 49.2 [1-15/16] | 49.2 [1-15/16] |
| **Belt No. — Section** | 2 — B[a] | 2 — B[a] | 2 — B[a] |
| **Belt Pitch (mm [in.])** | 935 [36.8] | 960 [37.8] | 960 [37.8] |
| **Fan Speeds (rps [rpm])** | | | |
| **Factory Setting** | 18.6 [1118] | 17.1 [1024] | 17.1 [1024] |
| **Range** | 16.9-20.0 [1014-1200[b]] | 14.6-17.9 [873-1075] | 14.6-17.9 [873-1075] |
| **Maximum Allowable Speed (rps [rpm])** | 20.0 [1200] | 18.3 [1100] | 18.3 [1100] |
| **Change Per 1/2 Turn of Movable Motor Pulley Flange** | 19.4 | 16.7 | 16.7 |
| **Maximum Full Turn From Closed Position** | 6 | 6 | 6 |
| **Shafts Center Distance (mm [in.])** | 207-255 [8.16-10.02] | 169-240 [6.67-9.43] | 169-240 [6.67- 9.43] |

NOTE(S):

a. Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.
b. It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 20 rps (1200 rpm).

## Table 16 — 40RU Standard Fan Performance Data — 0-600 Pa External Static Pressure — 50 Hz — SI

| UNIT[a,b] | AIRFLOW (L/s)[c] | EXTERNAL STATIC PRESSURE (Pa)[d] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | | 50 | | 100 | | 150 | | 200 | | 250 | | 300 | |
| | | rps | kW | rps | kW | rps | kW | rps | kW | rps | kW | rps | kW | rps | kW |
| 40RUA*25 | 2830 | **8.86** | **0.94** | **9.48** | **1.04** | **10.65** | **1.26** | **11.84** | **1.53** | 13.01 | 1.85 | 14.1 | 2.19 | 15.08 | 2.53 |
| | 3300 | **10.14** | **1.44** | **10.69** | **1.56** | **11.7** | **1.81** | 12.71 | 2.08 | 13.73 | 2.41 | 14.74 | 2.77 | 15.71 | 3.15 |
| | 3780 | 11.43 | 2.11 | 11.93 | 2.25 | 12.84 | 2.52 | 13.71 | 2.81 | 14.6 | 3.14 | 15.49 | 3.51 | 16.39 | 3.91 |
| | 4250 | 12.74 | 2.96 | 13.19 | 3.12 | 14.02 | 3.43 | 14.81 | 3.74 | 15.59 | 4.08 | 16.37 | 4.45 | 17.17 | 4.85 |
| | 4720 | 14.05 | 4.01 | 14.47 | 4.19 | 15.23 | 4.54 | 15.96 | 4.88 | 16.66 | 5.24 | 17.36 | 5.62 | 18.07 | 6.03 |
| 40RUA*28 | 3540 | **7.93** | **1.04** | **8.50** | **1.18** | **9.65** | **1.48** | **10.73** | **1.79** | 11.68 | 2.10 | 12.53 | 2.45 | 13.40 | 2.95 |
| | 4130 | **9.08** | **1.60** | **9.57** | **1.75** | **10.55** | **2.10** | 11.52 | 2.45 | 12.45 | 2.81 | 13.28 | 3.17 | 14.03 | 3.55 |
| | 4720 | **10.25** | **2.33** | **10.68** | **2.51** | 11.53 | 2.89 | 12.38 | 3.29 | 13.23 | 3.70 | 14.05 | 4.11 | 14.80 | 4.51 |
| | 5310 | 11.42 | 3.26 | 11.82 | 3.46 | 12.57 | 3.88 | 13.33 | 4.32 | 14.08 | 4.77 | 14.85 | 5.23 | 15.58 | 5.70 |
| | 5900 | 12.60 | 4.41 | 12.97 | 4.64 | 13.65 | 5.09 | 14.33 | 5.57 | 15.02 | 6.07 | 15.70 | 6.58 | 16.38 | 7.10 |
| 40RUA*30 | 4250 | **8.98** | **1.63** | **9.48** | **1.78** | **10.43** | **2.13** | 11.38 | 2.49 | 12.32 | 2.86 | 13.18 | 3.22 | 13.95 | 3.59 |
| | 4960 | **10.33** | **2.51** | **10.77** | **2.70** | 11.58 | 3.08 | 12.40 | 3.49 | 13.22 | 3.91 | 14.03 | 4.35 | 14.80 | 4.78 |
| | 5660 | 11.68 | 3.68 | 12.07 | 3.89 | 12.82 | 4.33 | 13.52 | 4.77 | 14.23 | 5.25 | 14.95 | 5.73 | 15.67 | 6.23 |
| | 6370 | 13.05 | 5.18 | 13.40 | 5.42 | 14.07 | 5.90 | 14.72 | 6.39 | 15.33 | 6.91 | 15.97 | 7.43 | 16.60 | 7.99 |
| | 7080 | 14.42 | 7.05 | 14.73 | 7.32 | 15.35 | 7.84 | 15.93 | 8.38 | 16.52 | 8.93 | 17.08 | 9.51 | 17.65 | 10.10 |

| UNIT[a,b] | AIRFLOW (L/s)[c] | EXTERNAL STATIC PRESSURE (Pa)[d] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 350 | | 400 | | 450 | | 500 | | 550 | | 600 | |
| | | rps | kW | rps | kW | rps | kW | rps | kW | rps | kW | rps | kW |
| 40RUA*25 | 2830 | 15.9 | 2.86 | 16.75 | 3.18 | 17.53 | 3.52 | 18.3 | 3.89 | 19.03 | 4.23 | — | — |
| | 3300 | 16.5 | 3.53 | 17.33 | 3.91 | 18.17 | 4.32 | 18.92 | 4.70 | 19.6 | 5.10 | — | — |
| | 3780 | 17.13 | 4.32 | 17.97 | 4.76 | 18.83 | 5.22 | 19.55 | 5.67 | — | — | — | — |
| | 4250 | 17.88 | 5.30 | 18.67 | 5.76 | 19.48 | 6.24 | — | — | — | — | — | — |
| | 4720 | 18.77 | 6.52 | 19.43 | 6.99 | — | — | — | — | — | — | — | — |
| 40RUA*28 | 3540 | 14.57 | 3.97 | 14.95 | 4.41 | 15.67 | 5.07 | 16.50 | 5.59 | — | — | — | — |
| | 4130 | 14.77 | 4.00 | 15.50 | 4.71 | 16.37 | 5.46 | 17.00 | 6.04 | — | — | — | — |
| | 4720 | 15.50 | 4.92 | 16.15 | 5.22 | 16.78 | 5.88 | 17.42 | 6.50 | — | — | — | — |
| | 5310 | 16.27 | 6.15 | 16.90 | 6.61 | 17.52 | 7.08 | **18.10** | **7.58** | — | — | — | — |
| | 5900 | 17.05 | 7.61 | 17.68 | 8.11 | **18.28** | **8.62** | — | — | — | — | — | — |
| 40RUA*30 | 4250 | 14.68 | 4.00 | 15.38 | 4.50 | 16.12 | 5.14 | 17.00 | 6.15 | — | — | — | — |
| | 4960 | 15.50 | 5.20 | 16.17 | 5.63 | 16.80 | 6.09 | 17.42 | 6.61 | — | — | — | — |
| | 5660 | 16.35 | 6.73 | 17.02 | 7.21 | — | — | — | — | — | — | — | — |
| | 6370 | 17.25 | 8.54 | — | — | — | — | — | — | — | — | — | — |
| | 7080 | — | — | — | — | — | — | — | — | — | — | — | — |

NOTE(S):

a. Refer to fan motor and drive tables for additional data.
b. Maximum allowable fan speed is 18.33 rps for unit sizes 28 and 30; 20.00 rps for all other sizes.
c. Fan performance is based on deductions for wet coil, clean 51mm filters, and unit casing. See table below for factory-supplied filter pressure drop.
d. **Bold** indicates field-supplied drive is required.
Plain type indicates standard motor and standard drive.
Underline indicates a different motor and drive combination other than the standard motor and standard drive combination is required. Refer to fan motor and drive tables to complete selection.

LEGEND

**kW** — Kilowatts
**rps** — Rotations per second

## Table 17 — Factory-Supplied Pressure Drop — SI

| UNIT | AIRFLOW (L/s) | PRESSURE DROP (Pa) |
|---|---|---|
| 40RUA*25 | 2900 | 32 |
| | 3800 | 47 |
| | 4700 | 64 |
| 40RUA*28 | 3500 | 36 |
| | 4700 | 55 |
| | 5900 | 76 |
| 40RUA*30 | 4250 | 47 |
| | 5650 | 71 |
| | 7050 | 98 |

## Table 18 — 40RU Standard Fan Performance Data — 0-2.4 in. wg External Static Pressure — 50 Hz — English

| Unit[a,b] | Airflow (cfm)[c] | EXTERNAL STATIC PRESSURE (in. wg)[d] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.0 | | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | |
| | | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 40RU*25 | 5,996 | **531.60** | **1.26** | **568.80** | **1.39** | **639.00** | **1.69** | **710.40** | **2.05** | 780.60 | 2.48 | 846.00 | 2.94 | 904.80 | 3.39 |
| | 6,992 | **608.40** | **1.93** | **641.40** | **2.09** | **702.00** | **2.43** | 762.60 | 2.79 | 823.80 | 3.23 | 884.40 | 3.71 | 942.60 | 4.22 |
| | 8,009 | 685.80 | 2.83 | 715.80 | 3.02 | 770.40 | 3.38 | 822.60 | 3.77 | 876.00 | 4.21 | 929.40 | 4.71 | 983.40 | 5.24 |
| | 9,005 | 764.40 | 3.97 | 791.40 | 4.18 | 841.20 | 4.60 | 888.60 | 5.02 | 935.40 | 5.47 | 982.20 | 5.97 | 1,030.20 | 6.50 |
| | 10,001 | 843.00 | 5.38 | 868.20 | 5.62 | 913.80 | 6.09 | 957.60 | 6.54 | 999.60 | 7.03 | 1,041.60 | 7.54 | 1,084.20 | 8.09 |
| 40RU*28 | 7,501 | **476.00** | **1.39** | **510.00** | **1.58** | **579.00** | **1.99** | **644.00** | **2.40** | 701.00 | 2.81 | 752.00 | 3.29 | 804.00 | 3.96 |
| | 8,751 | **545.00** | **2.14** | **574.00** | **2.35** | **633.00** | **2.81** | 691.00 | 3.29 | 747.00 | 3.77 | 797.00 | 4.25 | 842.00 | 4.76 |
| | 10,001 | **615.00** | **3.12** | **641.00** | 3.36 | 692.00 | 3.87 | 743.00 | 4.41 | 794.00 | 4.96 | 843.00 | 5.51 | 888.00 | 6.05 |
| | 11,251 | 685.00 | 4.37 | 709.00 | 4.64 | 754.00 | 5.20 | 800.00 | 5.79 | 845.00 | 6.40 | 891.00 | 7.02 | 935.00 | 7.64 |
| | 12,501 | 756.00 | 5.92 | 778.00 | 6.22 | 819.00 | 6.83 | 860.00 | 7.47 | 901.00 | 8.14 | 942.00 | 8.83 | 983.00 | 9.52 |
| 40RU*30 | 9,005 | **539.00** | **2.18** | **569.00** | **2.39** | **626.00** | **2.85** | 683.00 | 3.34 | 739.00 | 3.83 | 791.00 | 4.32 | 837.00 | 4.82 |
| | 10,499 | **620.00** | **3.37** | **646.00** | **3.62** | 695.00 | 4.13 | 744.00 | 4.68 | 793.00 | 5.25 | 842.00 | 5.83 | 888.00 | 6.41 |
| | 12,003 | 701.00 | 4.94 | 724.00 | 5.22 | 769.00 | 5.80 | 811.00 | 6.40 | 854.00 | 7.04 | 897.00 | 7.69 | 940.00 | 8.36 |
| | 13,497 | 783.00 | 6.95 | 804.00 | 7.27 | 844.00 | 7.91 | 883.00 | 8.57 | 920.00 | 9.26 | 958.00 | 9.97 | 996.00 | 10.71 |
| | 15,002 | 865.00 | 9.45 | 884.00 | 9.81 | 921.00 | 10.52 | 956.00 | 11.24 | 991.00 | 11.98 | 1,025.00 | 12.75 | 1,059.00 | 13.54 |

| Unit[a,b] | Airflow (cfm)[c] | EXTERNAL STATIC PRESSURE (in. wg)[d] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.4 | | 1.6 | | 1.8 | | 2.0 | | 2.2 | | 2.4 | |
| | | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 40RU*25 | 5,996 | 954.00 | 3.84 | 1,005.00 | 4.26 | 1,051.80 | 4.72 | 1,098.00 | 5.22 | 1,141.80 | 5.67 | — | — |
| | 6,992 | 990.00 | 4.73 | 1,039.80 | 5.24 | 1,090.20 | 5.79 | 1,135.20 | 6.30 | 1,176.00 | 6.84 | — | — |
| | 8,009 | 1,027.80 | 5.79 | 1,078.20 | 6.38 | 1,129.80 | 7.00 | 1,173.00 | 7.60 | — | — | — | — |
| | 9,005 | 1,072.80 | 7.11 | 1,120.20 | 7.72 | 1,168.80 | 8.37 | — | — | — | — | — | — |
| | 10,001 | 1,126.20 | 8.74 | 1,165.80 | 9.37 | — | — | — | — | — | — | — | — |
| 40RU*28 | 7,501 | 874.00 | 5.33 | 897.00 | 5.91 | 940.00 | 6.80 | 990.00 | 7.50 | — | — | — | — |
| | 8,751 | 886.00 | 5.36 | 930.00 | 6.31 | 982.00 | 7.32 | 1,020.00 | 8.10 | — | — | — | — |
| | 10,001 | 930.00 | 6.60 | 969.00 | 7.00 | 1,007.00 | 7.89 | 1,045.00 | 8.71 | — | — | — | — |
| | 11,251 | 976.00 | 8.25 | 1,014.00 | 8.86 | 1,051.00 | 9.49 | **1,086.00** | **10.17** | — | — | — | — |
| | 12,501 | 1,023.00 | 10.20 | 1,061.00 | 10.88 | **1,097.00** | **11.56** | — | — | — | — | — | — |
| 40RU*30 | 9,005 | 881.00 | 5.37 | 923.00 | 6.03 | 967.00 | 6.89 | 1,020.00 | 8.25 | — | — | — | — |
| | 10,499 | 930.00 | 6.97 | 970.00 | 7.55 | 1,008.00 | 8.17 | 1,045.00 | 8.86 | — | — | — | — |
| | 12,003 | 981.00 | 9.02 | 1,021.00 | 9.67 | — | — | — | — | — | — | — | — |
| | 13,497 | 1,035.00 | 11.45 | — | — | — | — | — | — | — | — | — | — |
| | 15,002 | — | — | — | — | — | — | — | — | — | — | — | — |

NOTE(S):

a. Refer to fan motor and drive tables for additional data.
b. Maximum allowable fan speed is 1100 rpm for unit sizes 28 and 30; 1200 rpm for all other sizes.
c. Fan performance is based on deductions for wet coil, clean 2-in. filters, and unit casing. See table below for factory-supplied filter pressure drop.
d. **Bold** indicates field-supplied drive is required.
Plain type indicates standard motor and standard drive.
Underline indicates a different motor and drive combination other than the standard motor and standard drive combination is required. Refer to fan motor and drive tables to complete selection.

LEGEND

**bhp** — Brake horsepower
**rpm** — Rotations per minute

## Table 19 — Factory-Supplied Pressure Drop — English

| UNIT | AIRFLOW (cfm) | PRESSURE DROP (in.wg) |
|---|---|---|
| 40RUA*25 | 6145 | 0.13 |
| | 8052 | 0.19 |
| | 9959 | 0.26 |
| 40RUA*28 | 7416 | 0.14 |
| | 9959 | 0.22 |
| | 12501 | 0.31 |
| 40RUA*30 | 9005 | 0.19 |
| | 11972 | 0.29 |
| | 14938 | 0.39 |

## Condensate Drains

Keep condensate drains free of dirt and foreign matter.

## Return-Air Filters

Refer to Replacing Filters section for filter accessibility and removal. Replace with clean filters of the sizes listed in Table 1.

## Coil Removal

Remove unit panels and corner posts as required. Disconnect coil connections and remove fastening screws. Remove coil through end or side sections of unit.

## Cleaning Cooling Coil

Remove return-air filters. Remove any heavy dirt that may have accumulated on underside of coil. Coil can be cleaned more easily with a stiff brush, vacuum cleaner, or compressed air when coil is dry. If coil is wet or if water is to be used for cleaning, guard against splashing water on electrical components or damaging surrounding area. Clean coil baffles as applicable and check for tight fit to be sure air does not bypass coil.

## Cleaning Insulation

Clean the inner surface of the insulation according to the separate maintenance instructions shipped with the unit.

## Replacing Filters

Filters can be removed and installed from either side of the unit. Install new filters in units that have one fan as follows:

1. Remove the side access panel (retain screws).
2. Remove the filter retainer clip (see Fig. 27).
3. Remove old filters by lifting and tilting them out of the filter track. (See Fig. 15 and 28). Use the factory-supplied filter hook to slide filters within reach for removal. The filter hook is shipped inside the unit in the filter track.
4. Reverse the procedure to install new filters.

To install new filters in larger units that have 2 fans, follow the preceding steps, but use the factory-supplied filter hook to slide filters within reach for removal. The filter hook is shipped inside the unit in the filter track.

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

Failure to follow this CAUTION can result in premature wear and damage to equipment.

DO NOT OPERATE THE UNIT WITHOUT THE RETURN AIR FILTERS IN PLACE.

Dirt and debris can collect on heat exchangers and coils possibly resulting in a small fire. Dirt buildup on components can cause excessive current used resulting in motor failure.

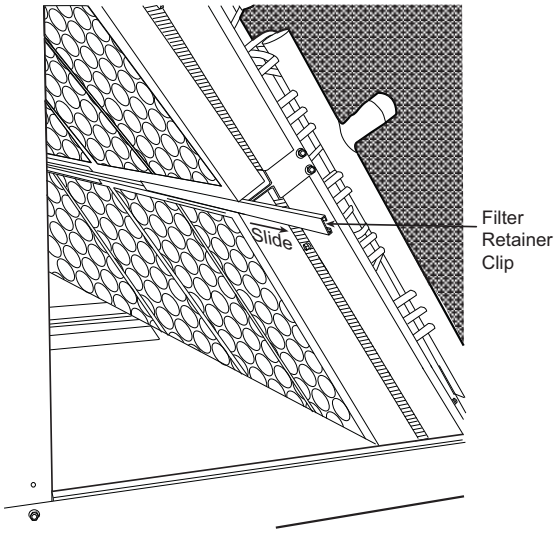



**Fig. 27 — Remove Filter Retainer Clip**

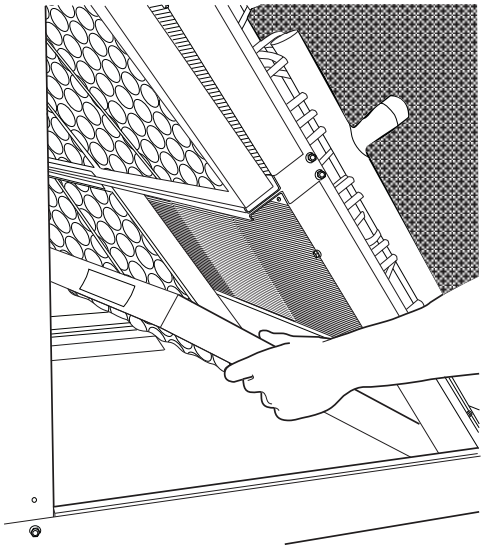


**Fig. 28 — Filter Removal/Replacement**

## START-UP CHECKLIST

(SPLIT SYSTEMS WITH 40RU UNITS)

**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, Start-Up, and Service document.**

### I. PRELIMINARY INFORMATION

Outdoor: Model No. _____ Indoor: Model No. _____

Serial No. _____ Serial No. _____

Additional Accessories: _____

_____

### II. PRE-START-UP

### OUTDOOR UNIT

Is there any shipping damage? (Y/N) _____

If so, where: _____

_____

Will this damage prevent unit start-up? (Y/N) _____

Check power supply. Does it agree with unit? (Y/N) _____

Has the ground wire been connected? (Y/N) _____

Verify ground integrity with a continuity test (Y/N) _____

Has the circuit protection been sized and installed properly? (Y/N) _____

Are the power wires to the unit sized and installed properly? (Y/N) _____

Have compressor holddown bolts been loosened? (Y/N) _____

### CONTROLS

Are thermostat(s) and indoor fan control wiring connections made and checked? (Y/N) _____

Are all wiring terminals (including main power supply) tight? (Y/N) _____

Have outdoor unit crankcase heaters been energized for 24 hours? (Y/N) _____

### INDOOR UNIT

Has water been placed in drain pan to confirm proper drainage? (Y/N) _____

Are proper air filters in place? (Y/N) _____

Have fan and motor pulleys been checked for proper alignment? (Y/N) _____

Do the fan belts have proper tension? (Y/N) _____

### PIPING

Has foam shipping blocks been removed from the TXV (Thermostatic Expansion Valve)? (Y/N) _____

Are liquid line solenoid valves located at the indoor unit coils as required? (Y/N) _____

Have leak checks been made at compressors, condensers, indoor coils, TXVs (Thermostatic Expansion Valves), solenoid valves, filter driers, and fusible plugs with a leak detector? (Y/N) _____

Locate, repair, and report any leaks. (Y/N) _____

Have all compressor service valves been fully opened (backseated)? (Y/N) _____

Are the compressor oil sight glasses showing correct levels? (Y/N) _____

**CHECK VOLTAGE IMBALANCE**

Lint-to-line volts: AB _____ V AC _____V BC _____ V

(AB + AC + BC)/3 = Average Voltage = _____ V

Maximum deviation from average voltage = _____V

Voltage imbalance = 100 X (Max Deviation)/(Average Voltage) = _____

**If more than 2% voltage imbalance, DO NOT attempt to start system!**

Call the local power company for assistance.

**III. START-UP**

Check indoor fan motor speed and record.

After at least 10 minutes running time, record the following measurements:

| | COMP A1 | COMP B1 |
|---|---|---|
| Oil pressure | | |
| Suction pressure | | |
| Suction LINE temperature | | |
| Discharge pressure | | |
| Discharge line temperature | | |
| Entering outdoor unit air temperature | | |
| Leaving outdoor unit air temperature | | |
| Indoor unit entering air dry bulb temperature | | |
| Indoor unit entering air wet bulb temperature | | |
| Indoor unit leaving air dry bulb temperature | | |
| Indoor unit leaving air wet bulb temperature | | |

Compressor amps L1 _____ L2 _____ L3 _____ L1 _____ L2 _____ L3 _____

Check the compressor oil level sight glasses, are the sight glasses showing oil level at 1/8 to 1/3 full? (Y/N) _____

NOTES:

_____

_____

_____

_____

_____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE



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

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