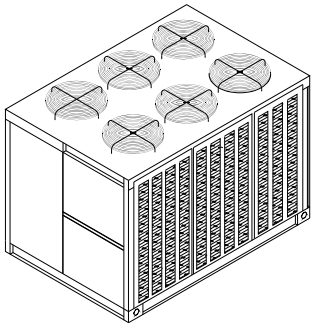
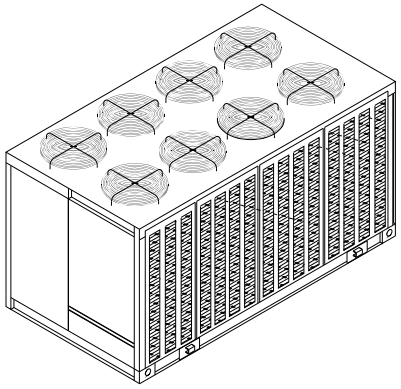
Installation, Operation, and Maintenance

Remote Air-Cooled Condensers





Models

CAUJ-C20
CAUJ-C25
CAUJ-C30

A and Later Design Sequences

CAUJ-C40
CAUJ-C50
CAUJ-C60
CAUJ-C80
CAUJ-D10
CAUJ-D12

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

January 2011

CAUJ-SVX01D-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

R-410A Refrigerant under Higher Pressure than R-22!

The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.
Failure to use R-410A rated service equipment or components could result in equipment exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

Trademarks

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Table of Contents

Model Number Descriptions

20 to 60 Ton

Digit 1 — Unit Type

C = Condenser

Digit 2 — Condenser

A = Air-Cooled

Digit 3 — Airflow

U = Upflow

Digit 4 — Development Sequence

J = Fourth

Digit s 5,6,7 — Nominal Capacity

C20= 20 Tons
C25= 25 Tons
C30= 30 Tons
C40= 40 Tons
C50= 50 Tons
C60= 60 Tons

Digit 8 — Power Supply

G = 200/230/60/3 XL
4 = 460/60/3 XL
5 = 575/60/3 XL

Digit 9 — Condenser Circuit

1 = Single (20-30 Ton)
2 = Dual (40-60 Ton)

Digit 10 — Design Sequence

* = Factory Assigned

Digit 11 — Ambient Control

0 = Standard
1 = 0 F

Digit 12 — Agency Approval

0 = None
3 = cULus

Digits 13, 14 — Miscellaneous

J = Corrosion Protected Cond Coil
1 = Spring Isolators
2 = Rubber Isolators

Note: *The service digit for each model number contains 14 digits; all 14 digits must be referenced.*

80 to 120 Ton

Digit 1 — Unit Type

C = Condenser

Digit 2 — Condenser

A = Air-Cooled

Digit 3 — Airflow

U = Upflow

Digit 4 — Development Sequence

J = Fourth

Digits 5,6,7 — Nominal Capacity

C80= 80 Tons
D10= 100 Tons
D12= 120 Tons

Digit 8 — Power Supply

F = 230/60/3
4 = 460/60/3
5 = 575/60/3
E = 200/60/3

Digit 9 — Condenser Circuit

2 = Dual Circuit

Digit 10 — Design Sequence

A = First

Digit 11 — Ambient Control

0 = Standard
1 = 0 F

Digit 12 — Agency Approval

0 = None
2 = CSA
3 = cULus

Digits 13, 14 — Miscellaneous

J = Corrosion Protected Cond Coil
1 = Spring Isolators

Note: *The service digit for each model number contains 14 digits; all 14 digits must be referenced.*

General Information

Unit Inspection

As soon as the unit arrives at the job site

- Verify nameplate data matches data on sales order and bill of lading (including electrical data).
- Verify that the power supply complies with the unit nameplate specifications.
- Visually inspect the exterior of the unit, including the roof, for signs of shipping damage.
- Check for material shortages. Refer to the Component Layout and Ship with Location illustration.

Important: ***If the job site inspection of the unit reveals damage or material shortages, file a claim with the carrier immediately. Specify the type and extent of the damage on the bill of lading before signing.***

- Visually inspect the internal components for shipping damage as soon as possible after delivery and before it is stored. Do not walk on the sheet metal base pans.

⚠WARNING

No Step Surface!

Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury.

Bridging between unit main supports may consist of multiple 2 by 12 boards or sheet metal grating.

- If concealed damage is discovered, notify the carrier's terminal of damage immediately by phone and by mail. Concealed damage must be reported within 15 days.
- Request an immediate joint inspection of the damage by the carrier and the consignee. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the appropriate Trane office before installing or repairing a damaged unit.

Unit Nameplate

One Mylar unit nameplate is located on the outside upper right corner of the control panel door. It includes the unit model number, serial number, electrical characteristics, weight, refrigerant charge, as well as other pertinent unit data. A small metal nameplate with the Model Number, Serial Number, and Unit Weight is located just above the Mylar nameplate, and a third nameplate is located on the inside of the control panel door.

When ordering replacement parts or requesting service, be sure to refer to the specific model number, serial number, and DL number (if applicable) stamped on the unit nameplate.

Unit Description

All air cooled condensing units are designed for outdoor installations with vertical air discharge. These units may be installed on a flat roof or placed on a concrete slab at ground level.

Before shipment, each unit is leak-tested, evacuated, a **Nitrogen** holding charge is added, and the controls are tested for proper operation.

The condenser coils are an all aluminum Microchannel design. Louvered condenser grilles for coil protection are standard. Direct-drive, vertical discharge condenser fans are provided with built-in current and overload protection.

For “Ship with” items, see Figure 1, p. 8 for 20-60T units, or Figure 2, p. 8 for 80-120 T units.

If low ambient operation is required, low ambient dampers are available as a field or factory installed option.

The unit control panel contains all required fan cycling controls, compressor interlocks, and a 115 volt control power transformer. Field wiring, electrical schematics and panel connection diagrams are located inside the control panel access door.

Figure 1. Unit component layout and 'shipwith' locations 20 - 60 ton units

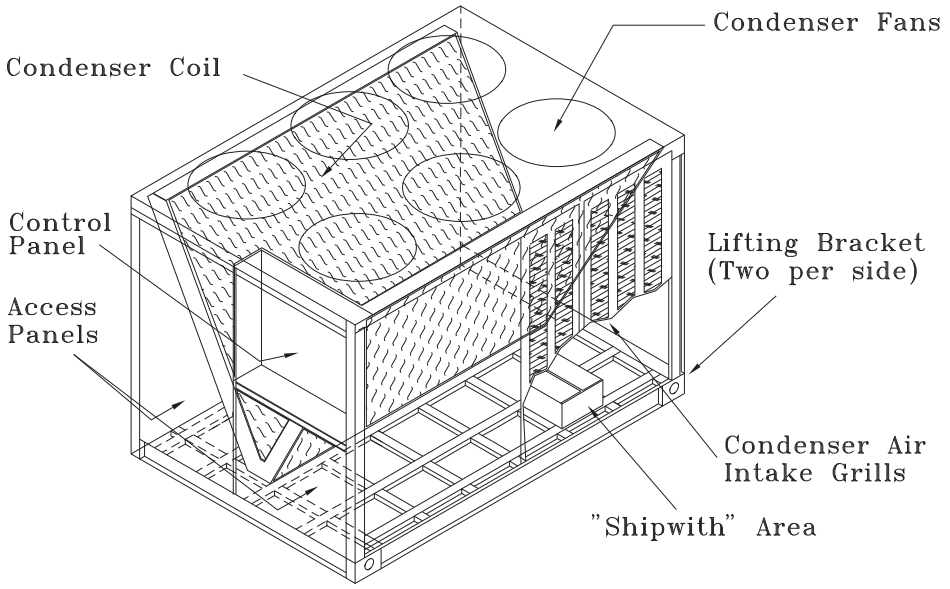


Figure 2. Unit component layout and 'shipwith' locations 80 - 120 ton units

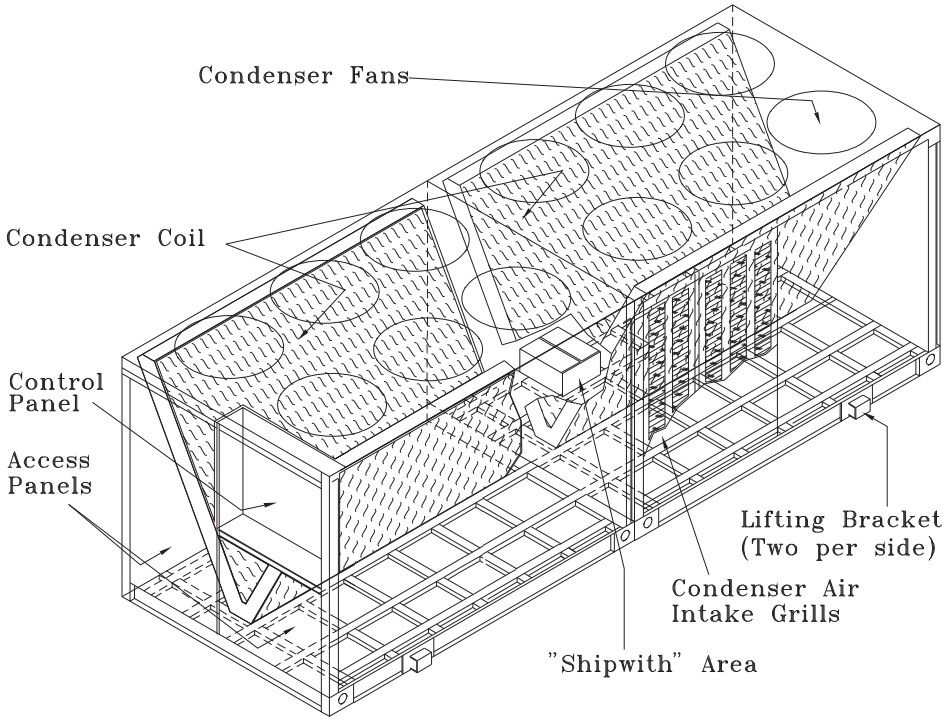


Table 1. General data

	20 Ton	25 Ton	30 Ton	40 Ton	50 Ton	60 Ton	80 Ton	100 Ton	120 Ton
Model Number	**CAUJC-20**	**CAUJC-25**	**CAUJ-C30**	**CAUJ-C40**	**CAUJ-C50**	**CAUJ-C60**	**CAUJ-C80**	**CAUJ-D10**	**CAUJ-D12**
Gross Heat Rejection (MBh)[a]	**350**	**402**	**456**	**635**	**819**	**1002**	**1269**	**1639**	**2004**
Condenser Fan Data									
Quantity/Fan Dia. Type	2/26"/Prop	3/26"/Prop	3/26"/Prop	4/26"/Prop	6/26"/Prop	6/26"/Prop	8/26"/Prop	12/26"/Prop	12/26"/Prop
Fan Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
No. of Motors/HP Each	2/1.0	3/1.0	3/1.0	4/1.0	6/1.0	6/1.0	8/1.0	12/1.0	12/1.0
Nominal Total CFM	14600	20700	20700	26790	36890	40490	56490	73890	76280
Condenser Coil Data									
Number of Coils/Size (Inches)	2/42x71	2/42x71	2/42x71	2/59x71	2/51x96	2/64x96	4/59x71	4/51x96	4/64x96
Size (ft^2)	41.4	41.4	41.4	58.2	68.0	85.4	116.4	136	170.7
Rows/Fin per ft	1/276	1/276	1/276	1/240	1/240	1/240	1/240	1/240	1/240
Condenser Storage Capacity (lbs)[b]	18.7	18.7	18.7	23.5	25.0	31.5	47.1	50.0	62.9
Type	Microchannel								
Refrigerant Data[c]									
No. Refrigerant Circuits	1	1	1	2	2	2	2	2	2
Refrigerant Type	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant Operating Charge (Lbs.)[d]	11.9	11.8	11.8	22.7	23.4	26.4	57.1	59.1	65.3
Minimum Outdoor Air Temperature for Mechanical Cooling									
Standard Ambient Operating Range (F)	40-125	40-125	40-125	40-125	40-125	40-125	40-125	40-125	40-125
Low Ambient Option (F)	0	0	0	0	0	0	0	0	0

(a) Gross Heat Rejection is at a 30 F ITD (Initial Temperature Difference) between condensing temperature and ambient air entering condenser (includes the effect of subcooling).
(b) At conditions of 95° ambient, condenser is 95 percent full
(c) Condensing units are shipping with nitrogen holding charge only.
(d) Operating charge is for condensing unit only, and does not include charge for low side or interconnecting lines.

Dimensions and Weights

Unit Clearances

Figure 3, p. 11 and Figure 4, p. 11 illustrate the minimum operating and service clearances for either a single, multiple, or pit application. These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit capacity, and peak operating efficiency.

NOTICE:

Equipment Damage!

Providing less than the recommended clearances may result in condenser coil starvation or recirculation of hot condenser air.

Locate the unit as close to the applicable system support equipment as possible, to minimize refrigerant piping lengths.

Unit Dimensions & Weight Information

Overall unit dimensional data for each unit are illustrated in Figure 5, p. 12 to Figure 18, p. 25.

A Center-of-Gravity illustration and the dimensional data are shown in Figure 20, p. 28, Figure 21, p. 28, and Table 3, p. 26.

Table 2, p. 26 lists the typical unit operating and point loading weights.

Foundation

If the unit is installed at ground level, elevate it above the snow line. Provide concrete footings at each support location or a slab foundation for support. See Table 2, p. 26 for the unit operating and point loading weights when constructing the footing foundation.

Anchor the unit to the footings or slab using hold down bolts or isolators. Isolators should be installed to minimize the transmission of vibrations into the building. See "Unit Isolation," p. 28 for isolator installation instructions.

For rooftop applications, ensure the roof is strong enough to support the unit. See Table 2, p. 26 for the unit operating weights.

⚠WARNING

Risk of Roof Collapsing!

Confirm with a structural engineer that the roof structure is strong enough to support the combined weight of the roofcurb and the unit. Refer to the 'Weights' Table 2, p. 26 section for typical unit and curb weights. Failure to ensure proper structural roof support could cause the roof to collapse, which could result in death or serious injury and property damage.

Anchor the unit to the roof with hold-down bolts or isolators. Follow the instructions in section "Unit Isolation," p. 28 for proper isolator placement and installation.

Check with a roofing contractor for proper waterproofing procedures.

Figure 3. Typical installation clearances for single, multiple, or pit applications: 20-60 ton units

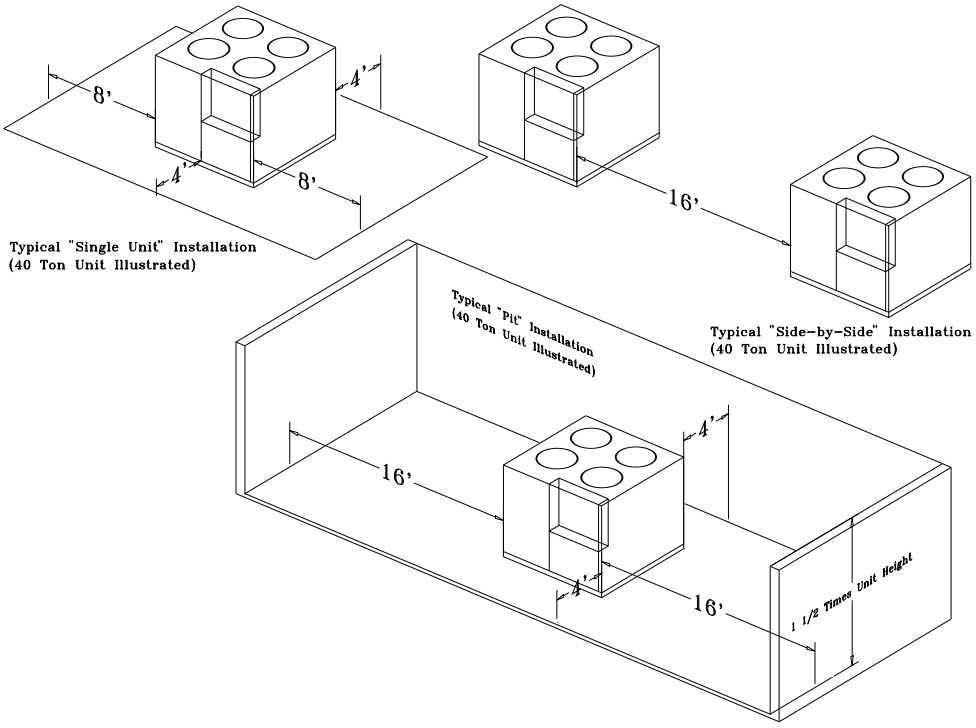


Figure 4. Typical installation clearances for single, multiple, or pit applications: 80-120 ton units

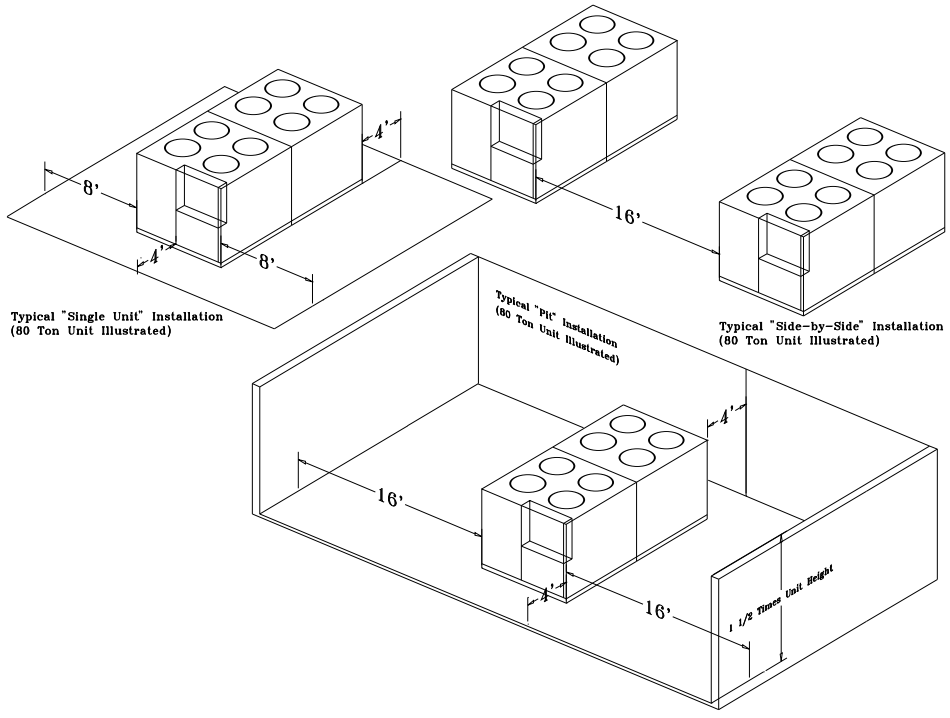


Figure 5. 20-ton air-cooled condenser

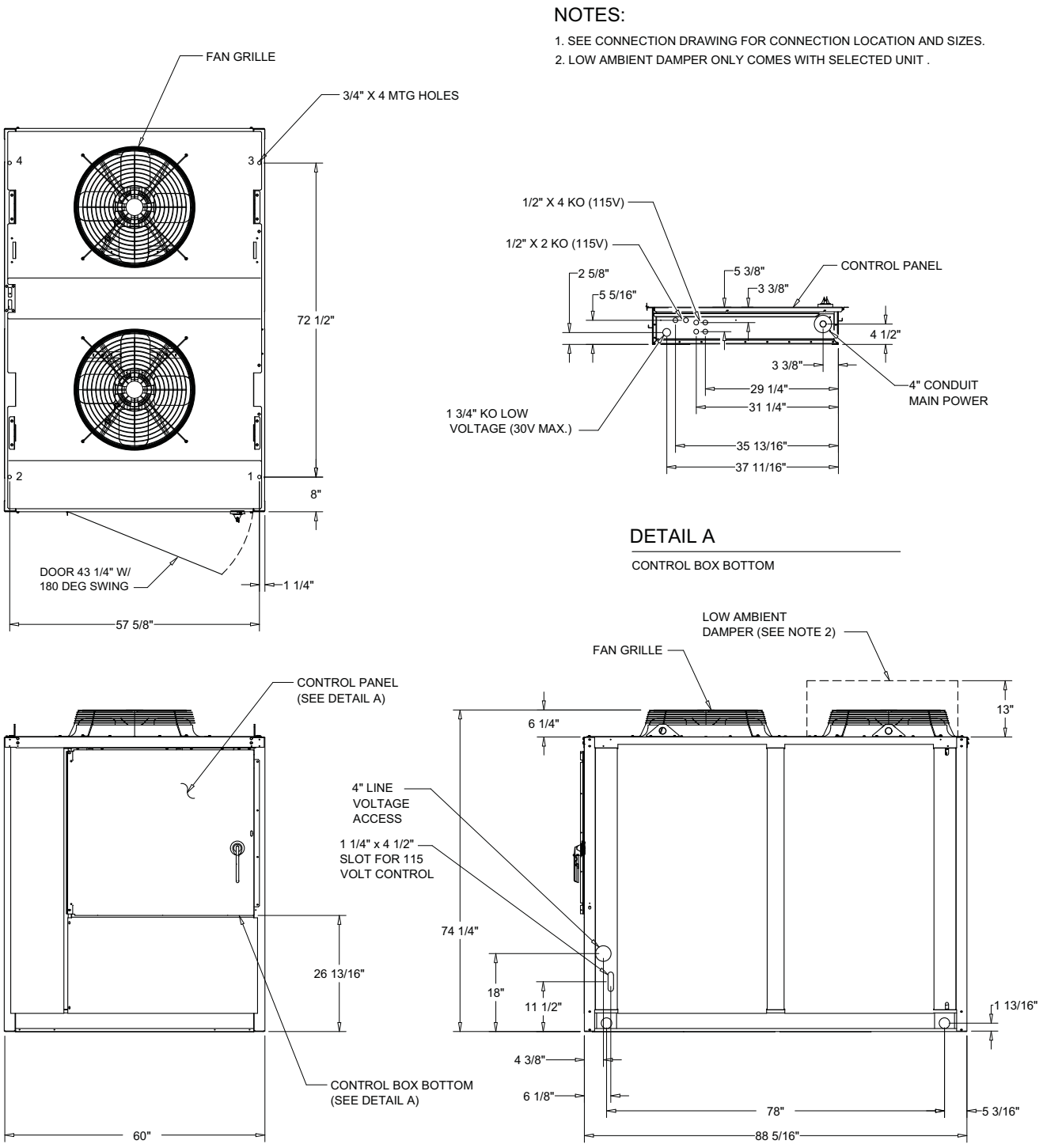
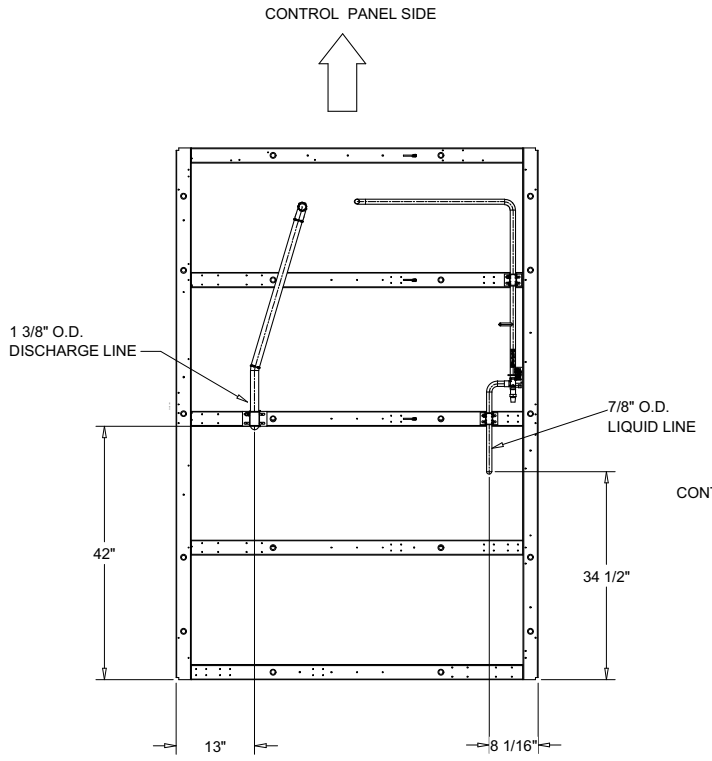


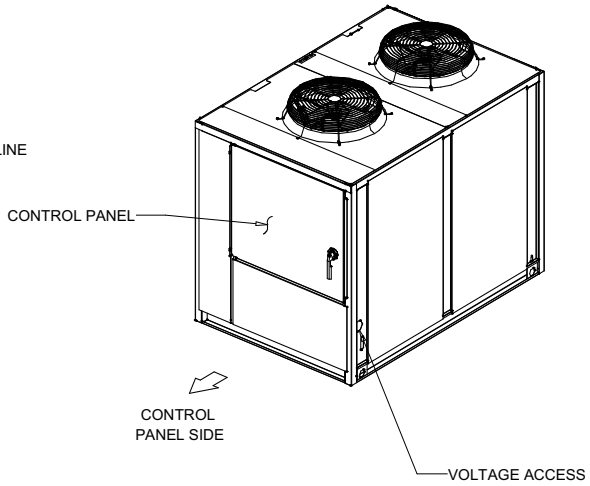
Figure 6. 20-ton air-cooled condenser (connections)



PLAN VIEW OF UNIT

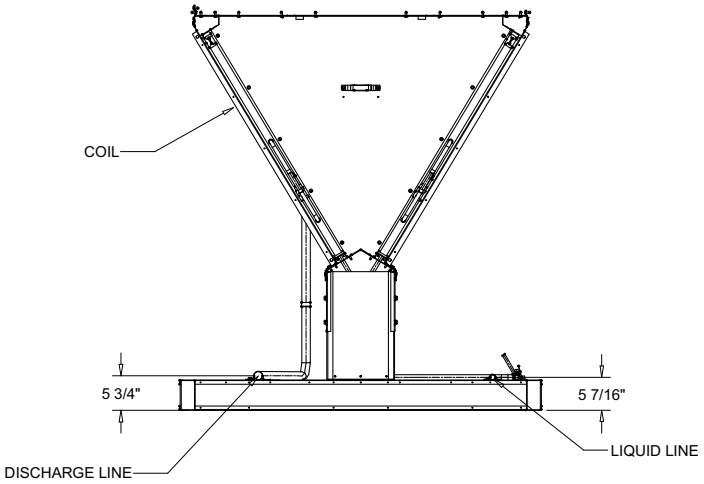
CONNECTION DRAWING

NOTES:
1. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION



ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING



CONTROL PANEL SIDE VIEW OF UNIT

CONNECTION DRAWING

Figure 7. 25- and 30-ton air-cooled condenser

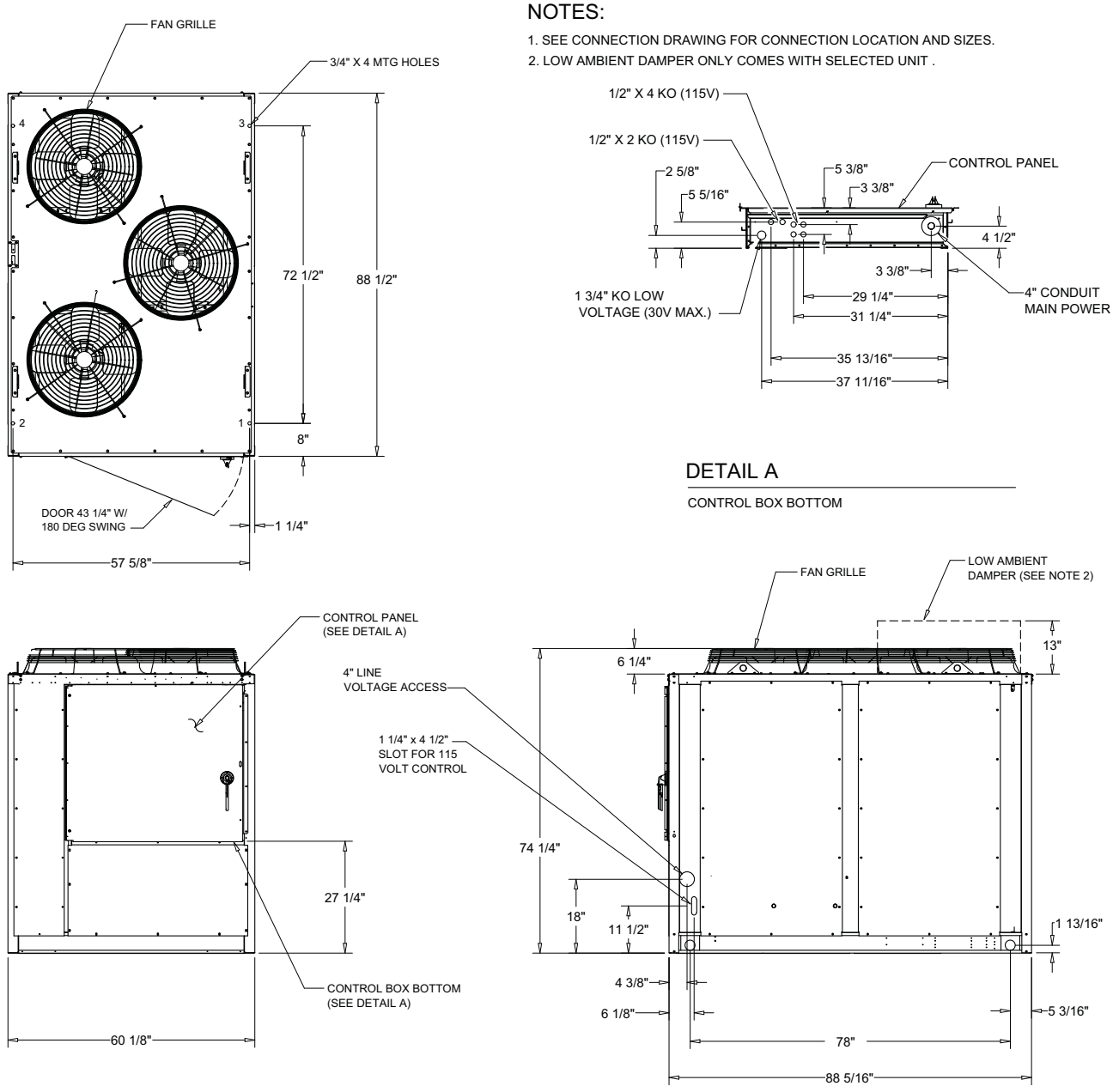
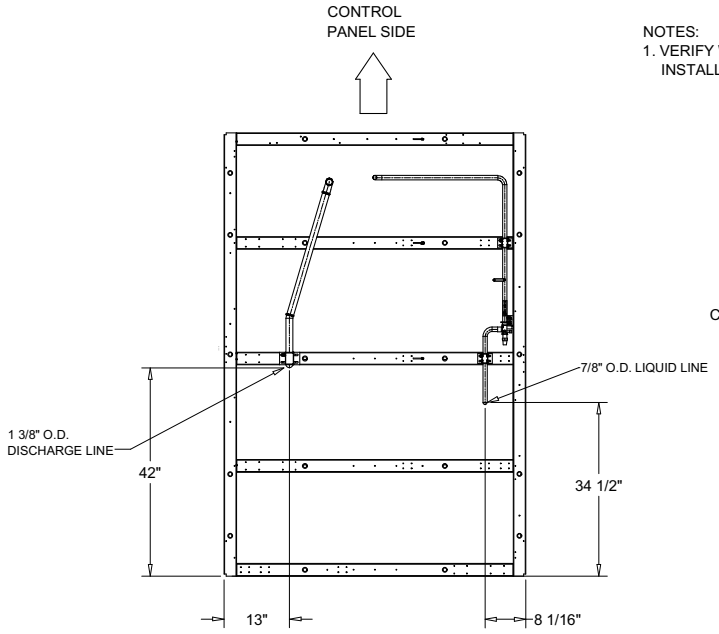


Figure 8. 25- and 30-ton air-cooled condenser (connections)



PLAN VIEW OF UNIT

CONNECTION DRAWING

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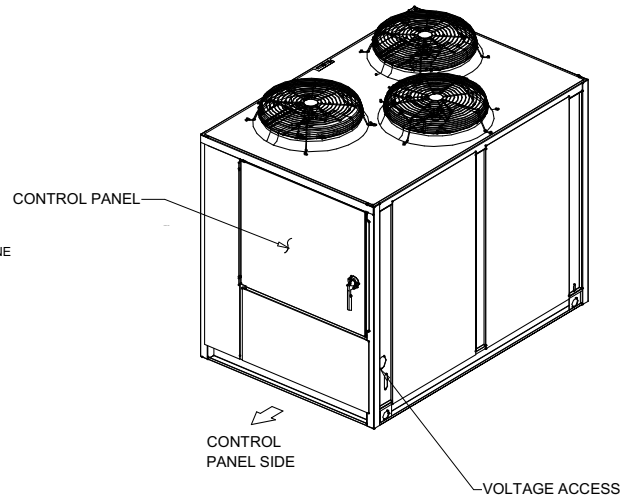
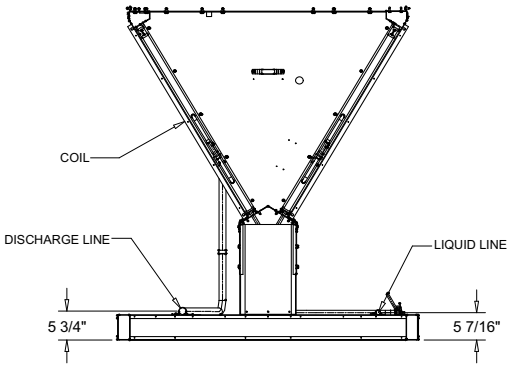


ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING



CONTROL PANEL SIDE VIEW OF UNIT

CONNECTION DRAWING

Figure 9. 40-ton air-cooled condenser

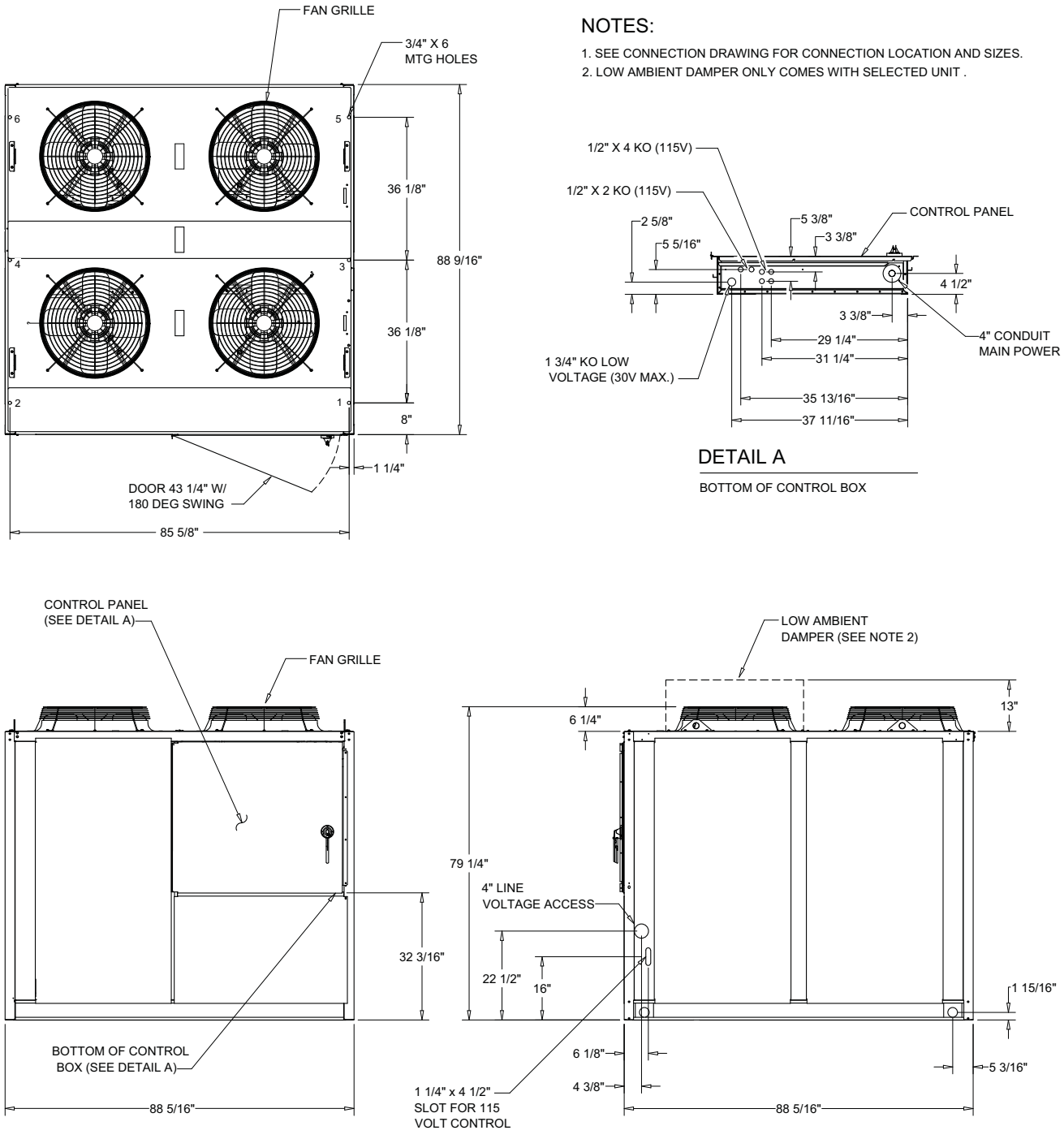
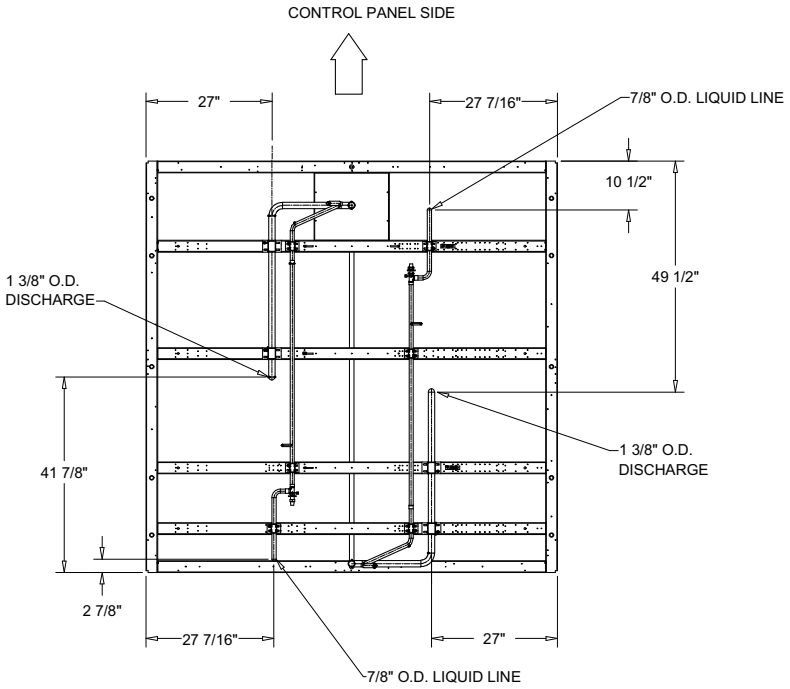


Figure 10. 40-ton air-cooled condenser (connections)



PLAN VIEW OF UNIT

CONNECTION DRAWING

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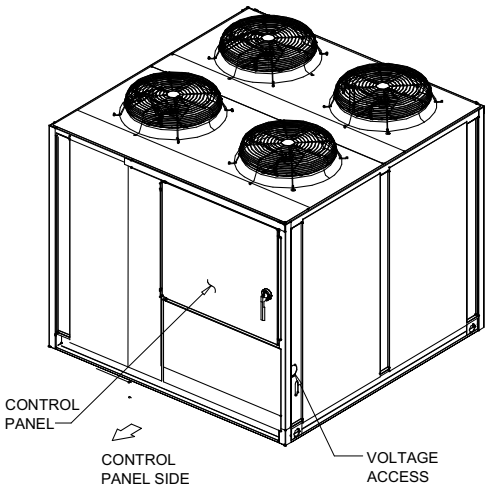
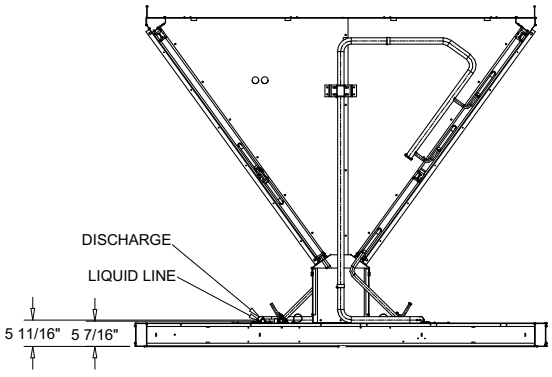


ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING



CONTROL PANEL SIDE VIEW OF UNIT

CONNECTION DRAWING

Figure 11. 50-ton air-cooled condenser

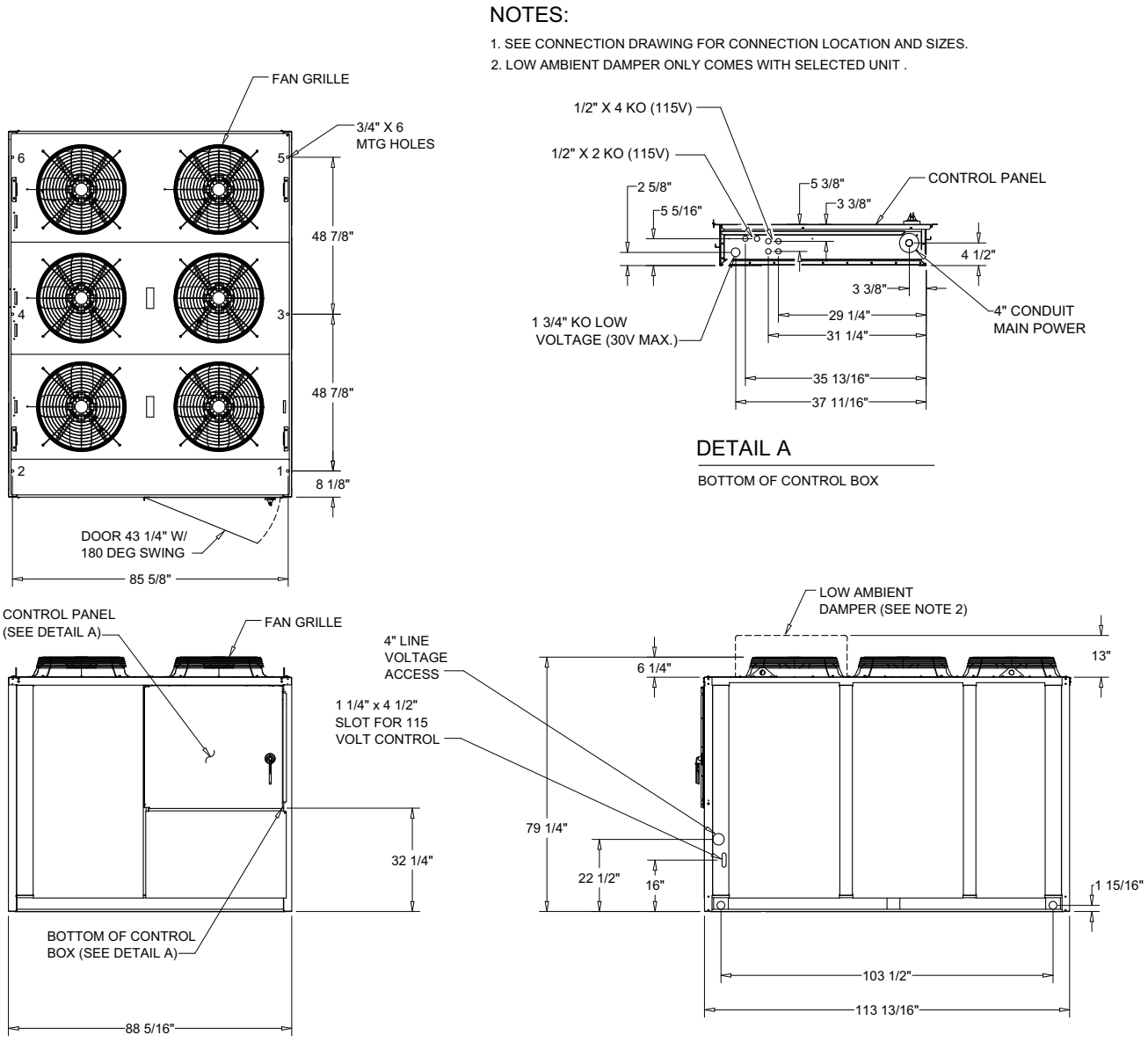
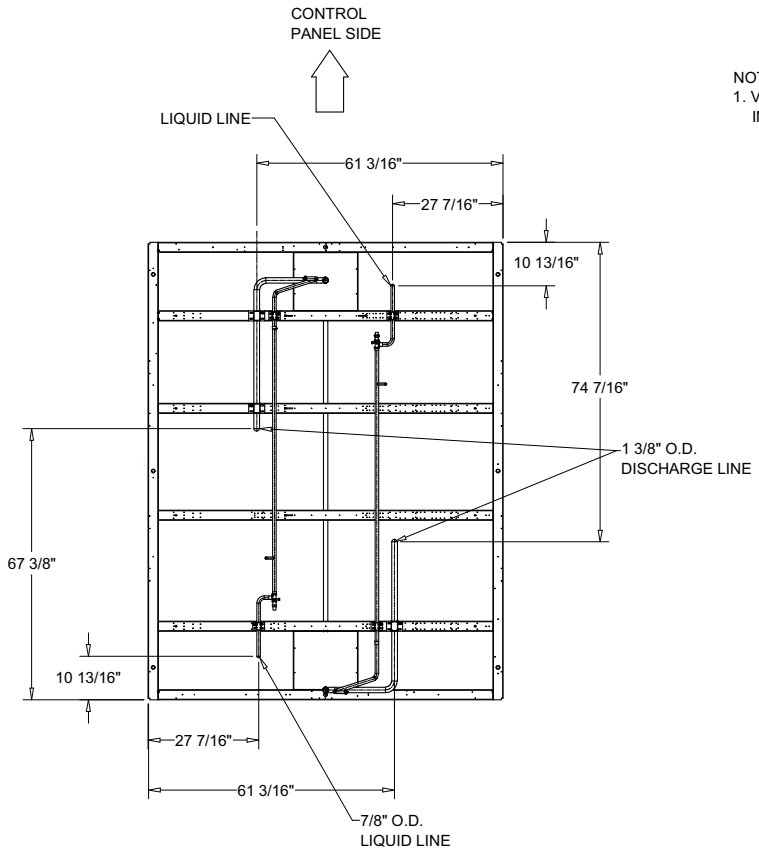


Figure 12. 50-ton air-cooled condenser (connections)



PLAN VIEW OF UNIT

CONNECTION DRAWING

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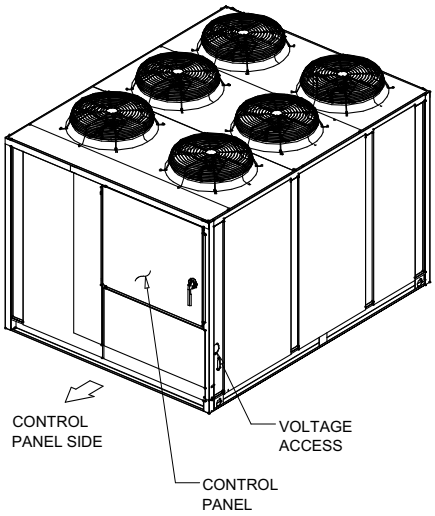
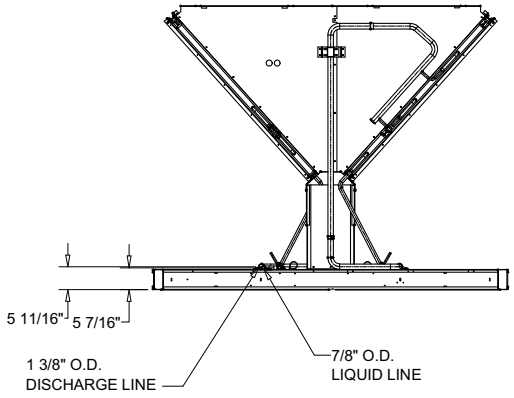


ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING

Note List - 97075



CONTROL PANEL SIDE VIEW OF UNIT

CONNECTION DRAWING

Figure 13. 60-ton air-cooled condenser

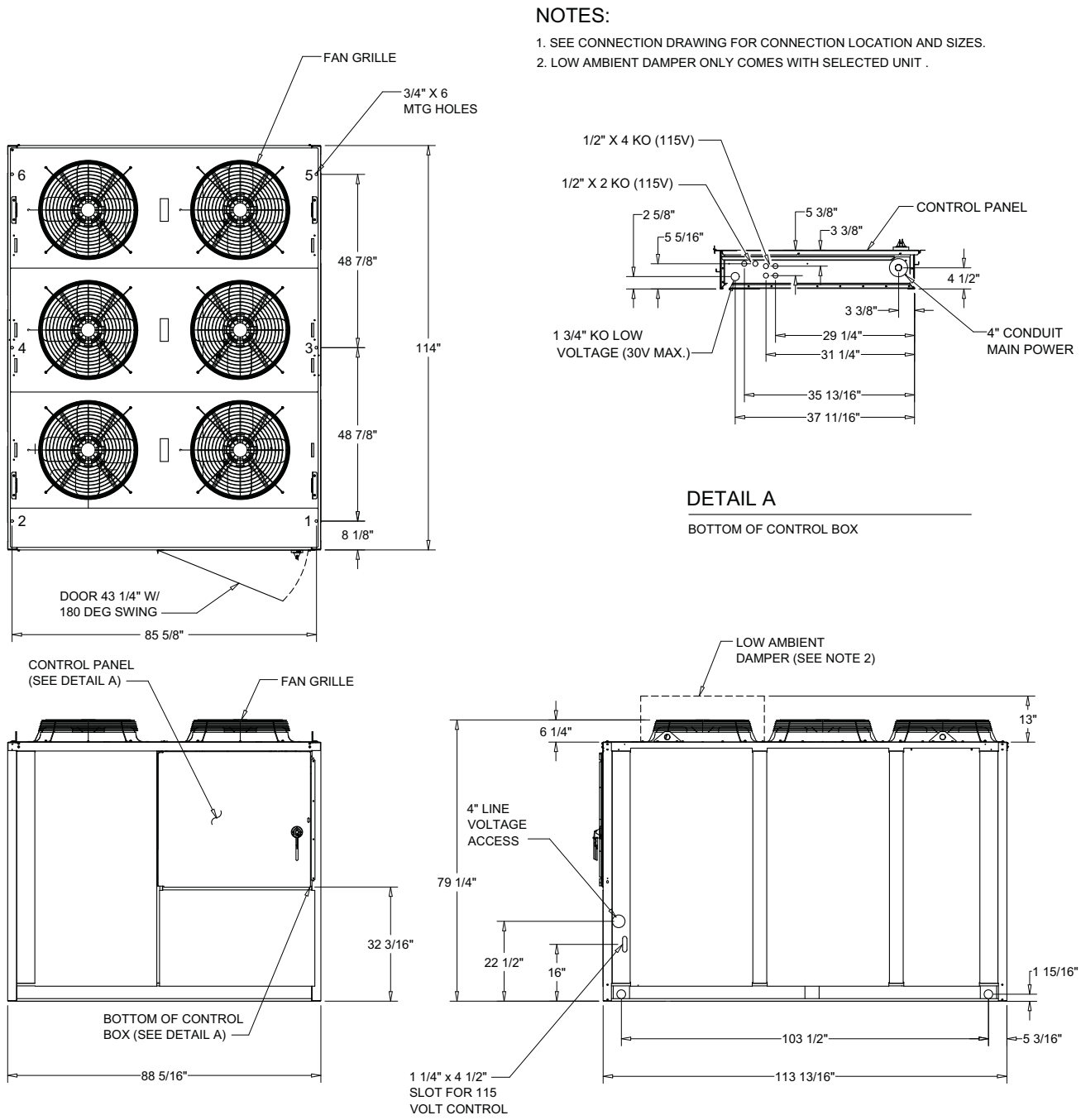
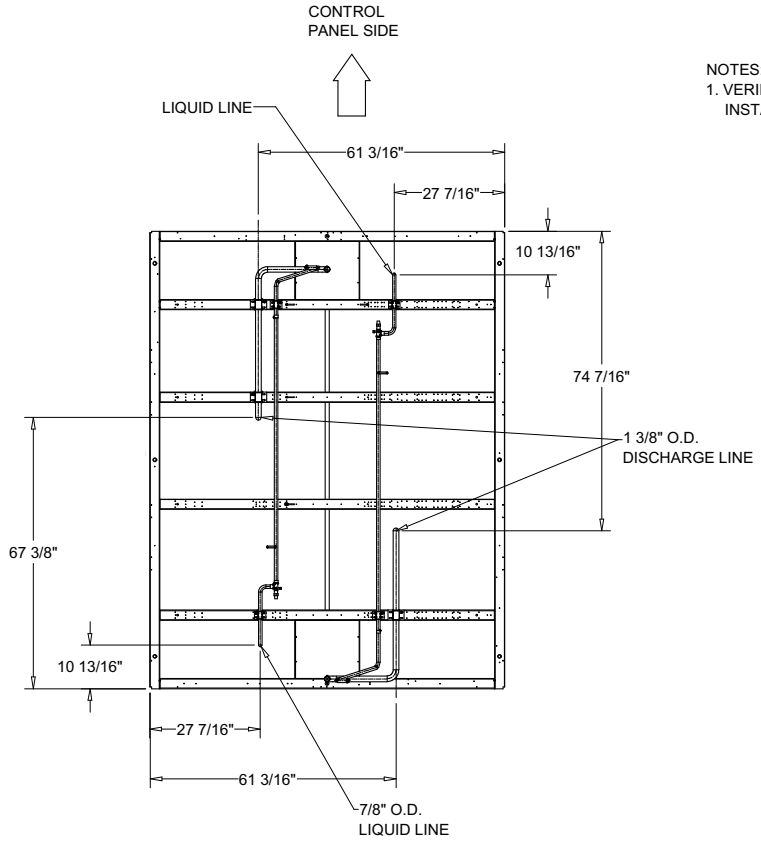


Figure 14. 60-ton air-cooled condenser (connections)



PLAN VIEW OF UNIT

CONNECTION DRAWING

NOTES:
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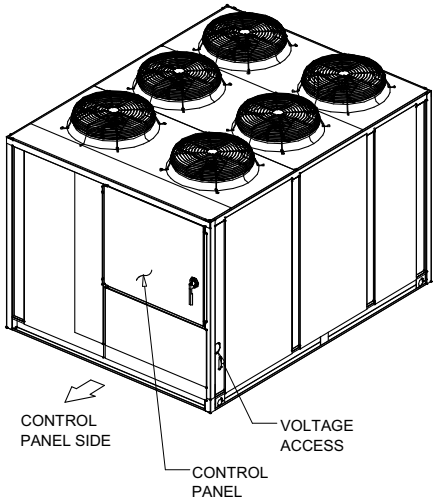
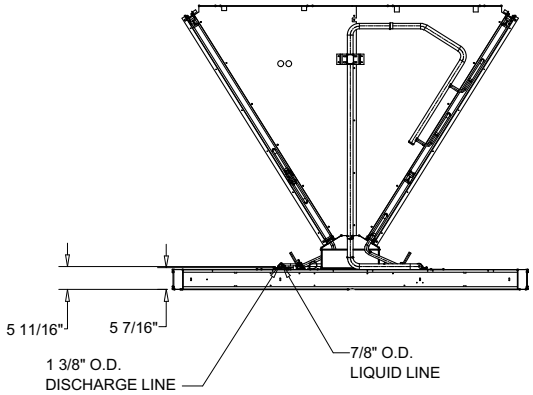


ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING



CONTROL PANEL SIDE VIEW OF UNIT

CONNECTION DRAWING

Figure 15. 80-ton air-cooled condenser

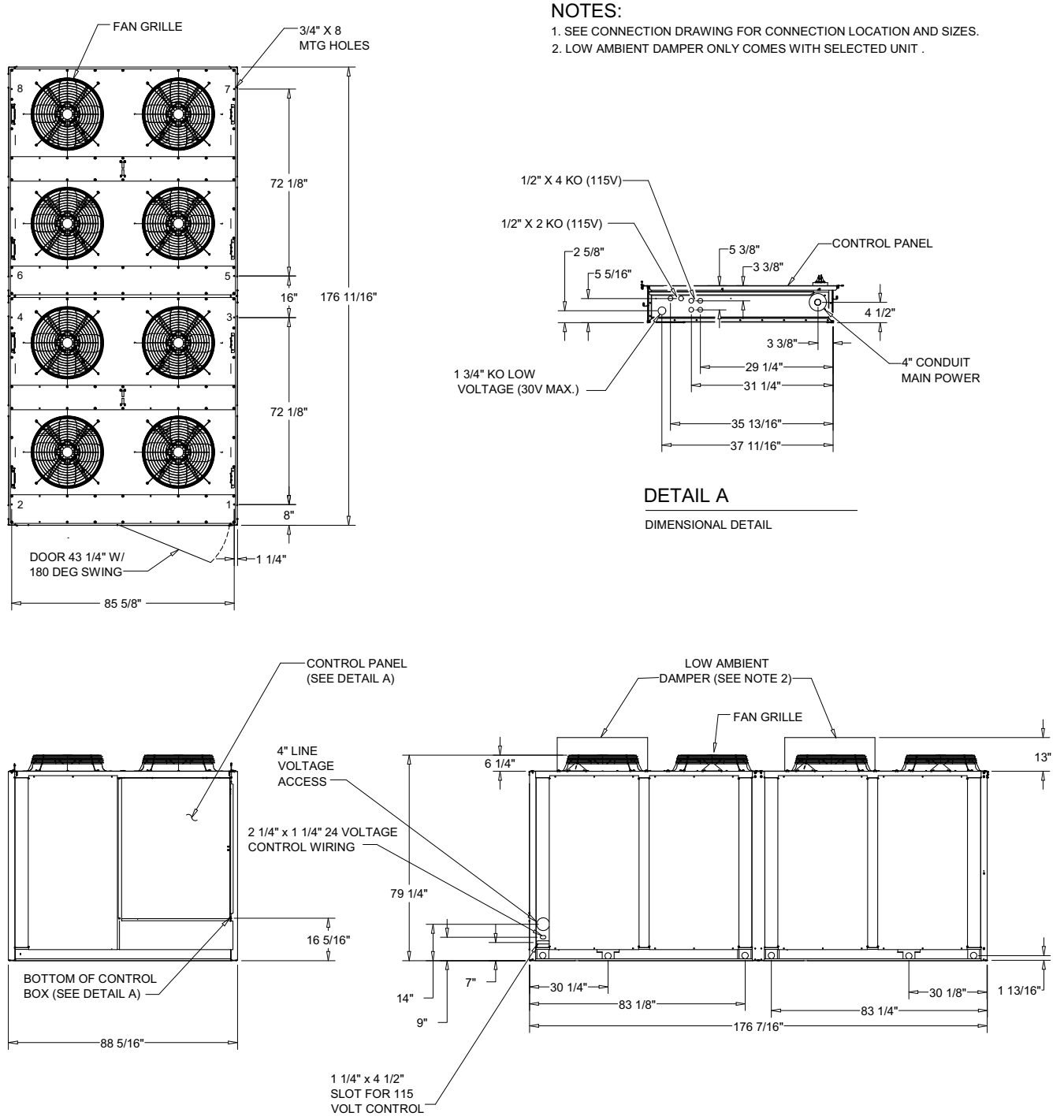


Figure 16. 80-ton air-cooled condenser (connections)

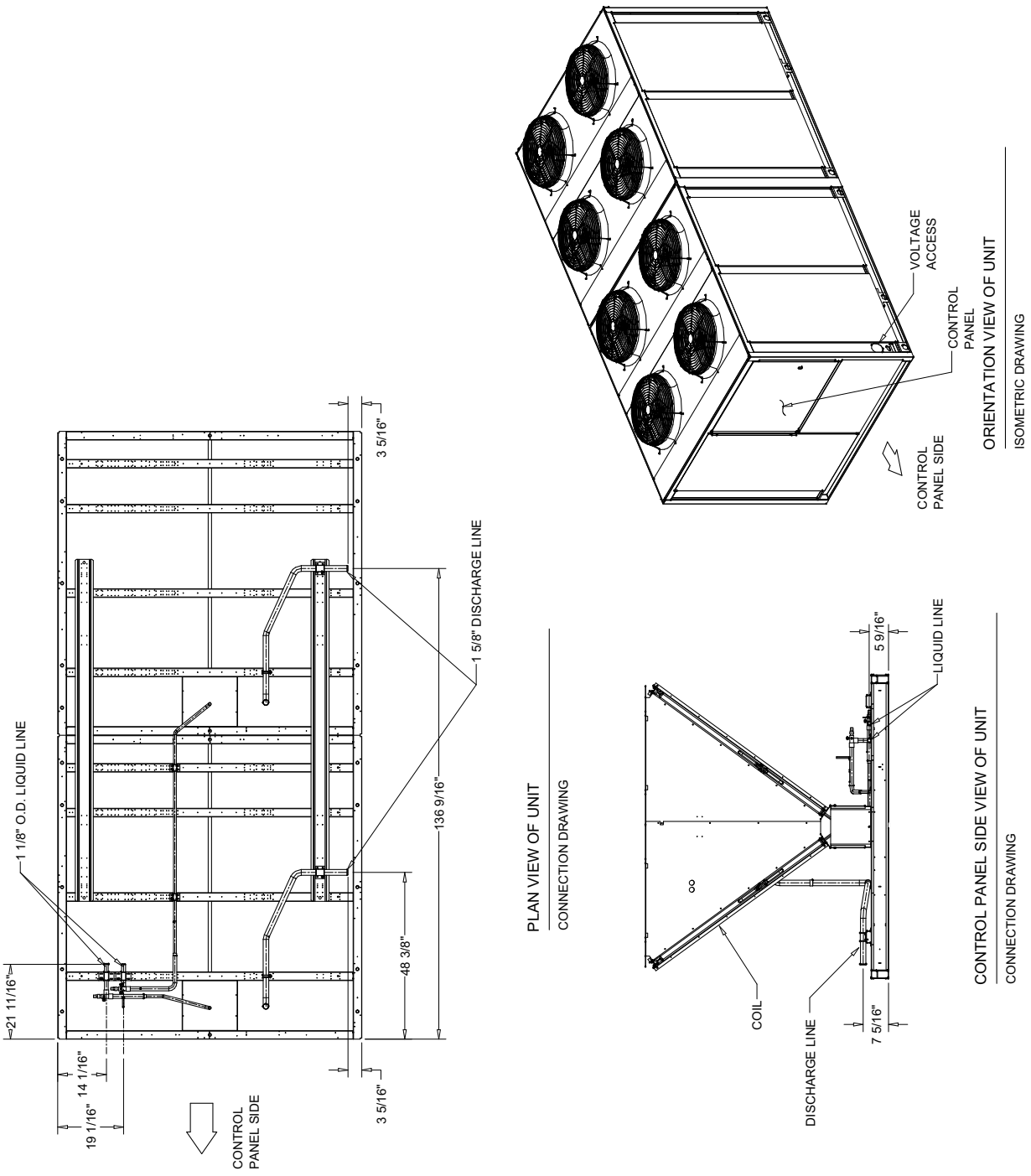


Figure 17. 100- and 120-ton air-cooled condenser

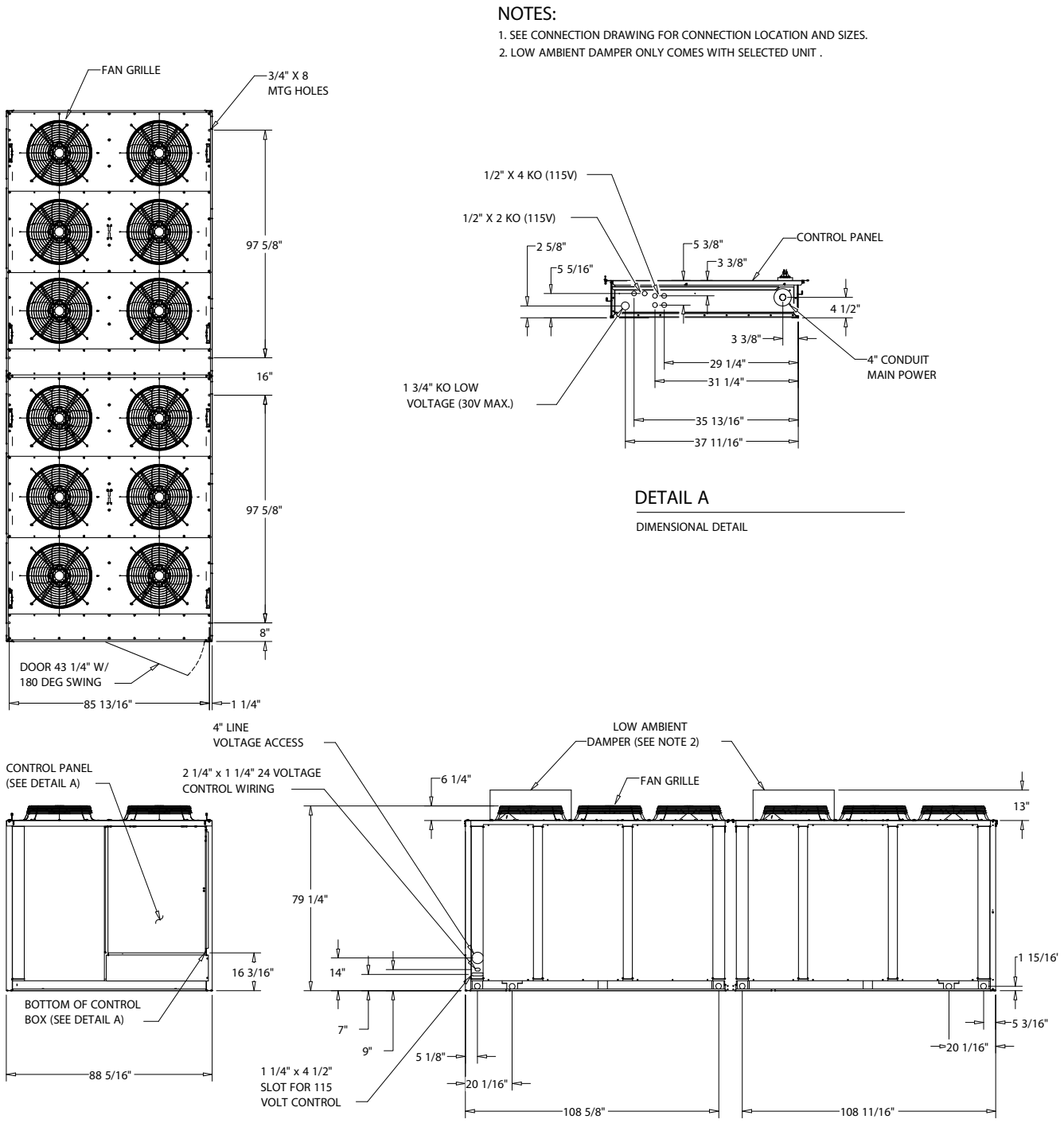
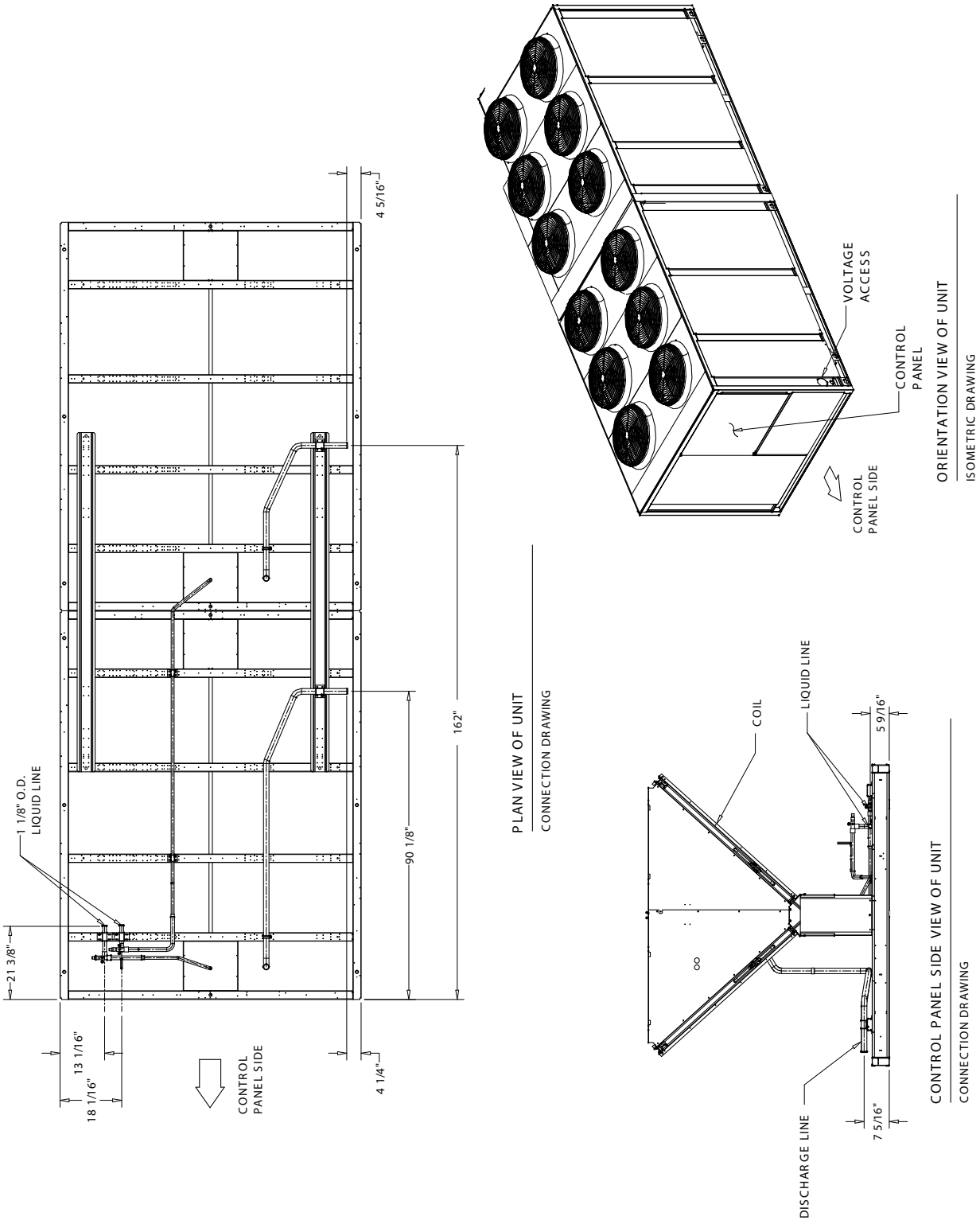


Figure 18. 100- and 120-ton air-cooled condenser (connections)



Weights

Table 2. 20 to 120 ton weights and point load data

		Weight		CG Locations		Weight on isolator mounting location (lbs.)							
Tons	Model	Shipping	Operating	X	Y	Loc. 1	Loc. 2	Loc 3.	Loc 4.	Loc. 5	Loc. 6	Loc. 7	Loc. 8
20	CAUJC20	1163	1188	41.5	32.5	296.3	340.8	358.8	192.1	---	---	---	---
25	CAUJC25	1213	1238	41.9	32.2	357.1	300.2	318.8	261.9	---	---	---	---
30	CAUJC30	1211	1236	41.5	32.3	360.9	302.0	316.0	257.1	---	---	---	---
40	CAUJC40	1758	1808	43.9	46.1	385.9	212.5	181.7	441.8	377.2	208.3	---	---
50	CAUJC50	2078	2120	52.8	45.8	239.4	211.3	367.5	339.4	495.5	466.6	---	---
60	CAUJC60	2086	2136	53.0	45.8	238.8	210.9	370.2	342.2	501.6	472.8	---	---
80	CAUJC80	3142	3212	85.3	54.3	513.5	474.4	459.6	200.2	452.1	196.7	561.6	354.0
100	CAUJC100	3877	3960	111.4	53.9	636.7	402.1	610.1	383.6	605.8	380.5	579.2	361.9
120	CAUJC120	4325	4451	112.2	52.6	687.8	461.8	667.7	447.8	664.4	445.5	644.4	431.5

Point load and isolator location

Figure 19. Mounting and isolator locations (see Table 3, p. 26)

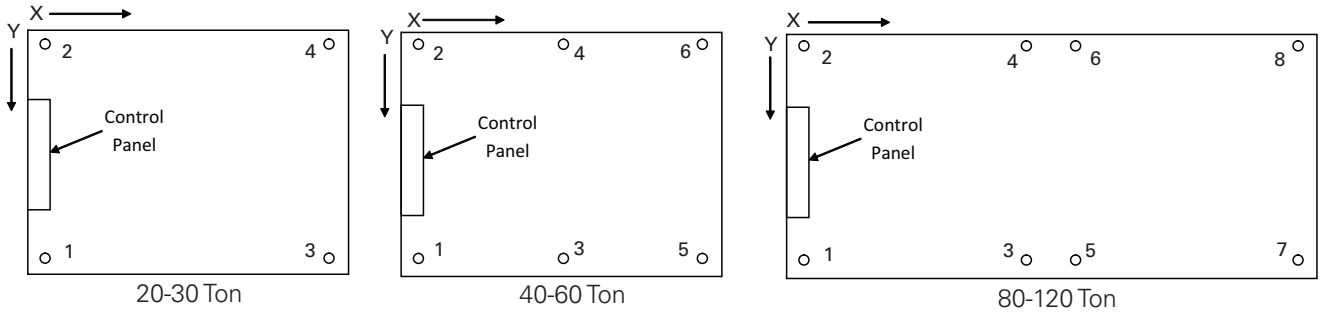


Table 3. Isolator mounting locations

		Mounting Location							
Unit Size		1	2	3	4	5	6	7	8
20/25/30	X	8″	8″	6' 8 1/8″	6' 8 1/8″	-	-	-	-
	Y	4' 10 3/4″	1 1/4″	4' 10 3/4″	1 1/4″	-	-	-	-
40	X	8″	8″	3' 8 1/8″	3' 8 1/8″	6' 8 1/4″	6' 8 1/4″	-	-
	Y	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	-	-
50/60	X	8″	8″	4' 8 7/8″	4' 8 7/8″	8' 9 3/4″	8' 9 3/4″	-	-
	Y	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	-	-
80	X	8″	8″	6' 8 1/8″	6' 8 1/8″	9' 1/8″	9' 1/8″	14' 1/4″	14' 1/4"
	Y	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4"
100/120	X	8″	8″	8' 9 5/8″	8' 9 5/8″	10' 1 5/8″	10' 1 5/8″	18' 3 1/4	18' 3 1/4″
	Y	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4″	7' 3 1/8″	1 1/4"

Installation

Rigging and Center-of-Gravity Data

A Rigging illustration and Center-of-Gravity dimensional data table is shown in Figure 20, p. 28, Figure 21, p. 28, and Table 2, p. 26. See Table 2, p. 26 for typical unit operating weights table before proceeding.

⚠WARNING

Improper Unit Lift!

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property-only damage.

⚠WARNING

Heavy Objects!

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury.

Note: *Use spreader bars as shown in diagram. Refer to installation manual or nameplate for unit weight. Refer to installation instructions located inside control panel for further rigging information.*

1. Rig the condensing unit as shown in Figure 20, p. 28 and Figure 21, p. 28. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
2. Install spreader bars, as shown in Figure 20, p. 28 and Figure 21, p. 28, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
3. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
4. Lift the unit and position it into place.

Figure 20. Rigging and center-of-gravity data: 20-60 ton units

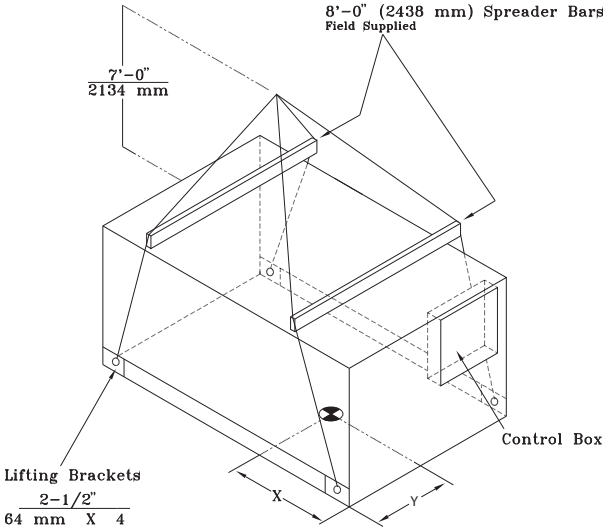
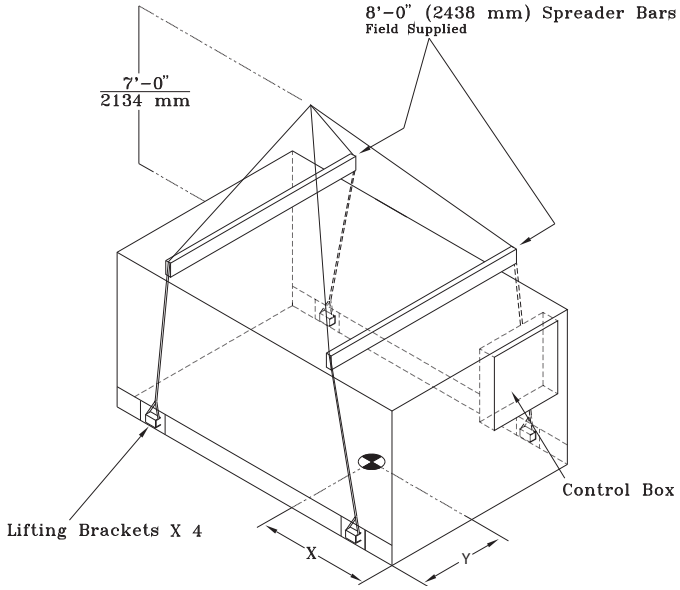


Figure 21. Rigging and center-of-gravity data: 80-120 ton units



Unit Isolation

To minimize unit sound and vibration transmission, us one of the following installation methods:

1. Install the unit directly on an isolated (detached) concrete pad or on isolated concrete footings located at each unit load point.
2. Install the optional spring isolators at each mounting location. See "Spring Isolators (available for 20-120 ton units)," p. 30.

Note: *20-60 ton units may install the optional neoprene isolators at each mounting location instead of the spring isolator. If this is the case, see "Neoprene Isolators (available for 20-60 ton units only)," p. 29.*

Neoprene Isolators (available for 20-60 ton units only)

Install the neoprene isolators at each unit mounting (load) point, using the following procedure:

1. Elevate the unit (one side at a time) to allow access to the base rail mounting holes.

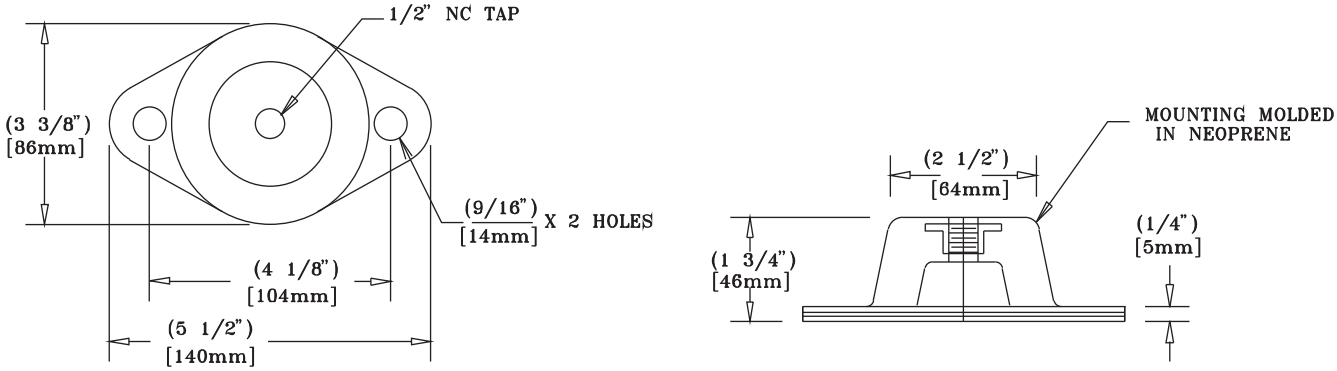
Note: *Use solid type blocks, i.e. 4" X 4" wood blocks or similar material to prevent collapsing. Keep hands and other body limbs clear of elevated base rail while installing isolators to prevent personal injury.*

2. Align the mounting holes in the base rail of the unit with the holes in the top of the appropriate isolator. Refer to Table 4, p. 29 for the appropriate isolator for each load point.
3. Install a 1/2" NC bolt (field supplied) through the base rail of the unit into the threaded bolt hole of the isolator. Position the isolator to allow access to the mounting holes in the base of the isolator, then tighten securely.
4. Lower the unit and isolator onto the mounting surface. The maximum isolator deflection should be approximately 1/4 inch.
5. Secure the isolator to the mounting surface using the base holes in the isolator.
6. Level the unit carefully. See "Leveling the Unit," p. 31.
7. After the unit is level, tighten isolator base mounting bolts to secure them to the mounting surface.

Table 4. Typical neoprene isolator selection & location (20-60 ton units only)

Tons	Model	Shipping Weight	Operating Weight	Isolator Part No. On Mounting Location					
				Loc. 1	Loc. 2	Loc 3.	Loc 4.	Loc. 5	Loc. 6
20	CAUJC20	1163	1188	R-3-RED	R-3-RED	R-3-RED	R-3-BLACK	---	---
25	CAUJC25	1213	1238	R-3-RED	R-3-RED	R-3-RED	R-3-RED	---	---
30	CAUJC30	1211	1236	R-3-RED	R-3-RED	R-3-RED	R-3-RED	---	---
40	CAUJC40	1758	1808	R-3-RED	R-3-BLACK	R-3-BLACK	R-3-RED	R-3-RED	R-3-BLACK
50	CAUJC50	2078	2120	R-3-BLACK	R-3-BLACK	R-3-RED	R-3-RED	R-3-RED	R-3-RED
60	CAUJC60	2086	2136	R-3-BLACK	R-3-BLACK	R-3-RED	R-3-RED	R-3-RED	R-3-RED

Figure 22. Neoprene 20-60 ton data



Spring Isolators (available for 20-120 ton units)

Install the spring isolators at each unit mounting (load) point using the following procedure:

1. Elevate the unit (one side at a time) to allow access to the base rail mounting holes.

Note: *Use solid type blocks, i.e. 4" X 4" wood blocks or similar material to prevent collapsing. Keep hands and other body limbs clear of elevated base rail while installing isolators to prevent personal injury.*

2. Align the mounting holes in the base rail of the unit with the positioning pin in the top of the appropriate isolator. See Table 5, p. 30 for the appropriate isolator for each load point.
3. Position the isolator to allow access to the mounting holes in the base of the isolator.
4. Lower the unit onto the isolator. The positioning pin on the isolator must engage into the hole of the base rail. The clearance between the upper and lower isolator housings should be approximately 1/4 to 1/2 inch. Refer to Figure 23, p. 30. A clearance greater than 1/2 inch indicates that shims are required to level the unit. See "Leveling the Unit," p. 31.
5. Make minor clearance adjustments by turning the isolator leveling bolt (Figure 23, p. 30) clockwise to increase the clearance and counterclockwise to decrease the clearance. If proper isolator clearance cannot be obtained by turning the leveling bolt, level the isolators themselves. A 1/4 inch variance in elevation is acceptable.
6. Secure the isolator to the mounting surface using the base holes in the isolator.
7. After the unit is level, tighten the isolator base mounting

Figure 23. Spring isolator 20-120 ton data

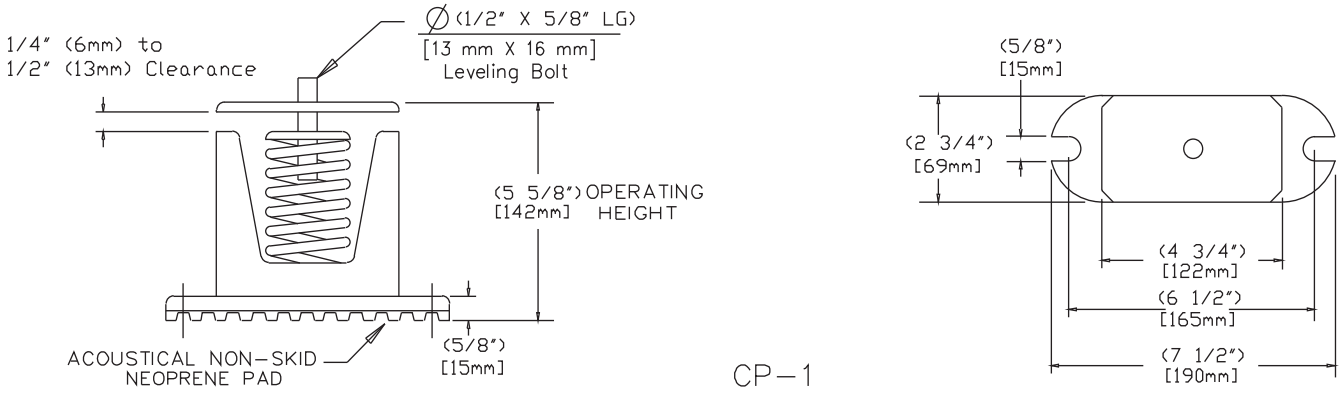


Table 5. Typical spring isolator selection and location

Mdl CA	Weights		CG Locations		Isolator Part No. On Mounting Location							
Tons	Ship	Oper	X	Y	Loc. 1	Loc. 2	Loc 3.	Loc 4.	Loc. 5	Loc. 6	Loc. 7	Loc. 8
20	1163	1188	41.5	32.5	CP-1D-340	CP-1D-510	CP-1D-510	CP-1D-340	---	---	---	---
25	1213	1238	41.9	32.2	CP-1D-510	CP-1D-340	CP-1D-340	CP-1D-340	---	---	---	---
30	1211	1236	41.5	32.3	CP-1D-510	CP-1D-340	CP-1D-340	CP-1D-340	---	---	---	---
40	1758	1808	43.9	46.1	CP-1D-510	CP-1D-340	CP-1D-340	CP-1D-510	CP-1D-510	CP-1D-340	---	---
50	2078	2120	52.8	45.8	CP-1D-340	CP-1D-340	CP-1D-510	CP-1D-340	CP-1D-510	CP-1D-510	---	---
60	2086	2136	53.0	45.8	CP-1D-340	CP-1D-340	CP-1D-510	CP-1D-510	CP-1D-510	CP-1D-510	---	---
80	3142	3212	85.3	54.3	CP-1D-675	CP-1D-510	CP-1D-510	CP-1D-340	CP-1D-510	CP-1D-340	CP-1D-675	CP-1D-510
100	3877	3960	111.4	53.9	CP-1D-675	CP-1D-510	CP-1D-675	CP-1D-510	CP-1D-675	CP-1D-510	CP-1D-675	CP-1D-510
120	4325	4451	112.2	52.6	CP-1D-900	CP-1D-510	CP-1D-675	CP-1D-510	CP-1D-675	CP-1D-510	CP-1D-675	CP-1D-510

Leveling the Unit

Before tightening the mounting bolts, level the unit carefully. Use the unit base rail as a reference. Level the unit to within 1/4 inch over its entire length. Use shims if adjustable isolators (neoprene) are not used.

If adjustable isolators (spring) are used, ensure that the proper isolator housing clearance is maintained while leveling the unit. Isolators are identified by color and/or an isolator part number. Shims under the isolators may be required if the unit can not be leveled using the isolator leveling bolt.

General Unit Requirements

The checklist listed below lists steps required to successfully install a commercial air cooled condenser. This checklist is intended to assist installing personnel with installation process. It does not replace detailed instruction called out in the applicable sections of this manual.

- Verify that the power supply complies with unit nameplate specifications.
- Check the unit for shipping damage and material shortage; file a freight claim and notify Trane office.
- Verify installation location of the unit will has required clearance for proper operation.
- Install appropriate isolators, if required.

Piping

- Install properly sized liquid line(s) between the liquid line connections on the unit and the evaporator. (i.e., DX evaporator or an EVP Chiller Barrel). Refer to the "Refrigerant Piping," p. 32 section for recommended liquid line components and guidelines.
- Install properly sized discharge (hot gas) line(s) between the discharge line connections on the unit and the compressor unit. Refer to the "Refrigerant Piping," p. 32 section for recommended discharge line components and guidelines.
- Install shutoff valves in the liquid line(s) to isolate the filter drier(s) for service.
- Install proper filter driers in each liquid line.
- Leak test the system. Refer to the "Leak Testing Procedure," p. 37 for recommended procedures.

Main Electrical Power Requirements

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

- Verify the power supply meets the required power requirements of the system.
- Install power wiring in accordance with all applicable codes.
- Install and connect properly sized power supply wiring, with over current protection, to the main power terminal block (1TB1) in the unit control panel.
- Install proper grounding wires to an earth ground.

Field Installed Control Wiring

- Verify the Control transformer (1T1) is wired for the proper operating voltage.
- Install the interlock circuitry wiring between the unit and the appropriate compressor unit to permit condenser fan operation when the compressor starter auxiliary contacts closes. Refer to the Field Connection Diagram that shipped with the unit for interlocking information.
- Verify the appropriate jumpers have been installed on the unit to allow proper condenser fan operation (If applicable). Refer to the control wiring diagram that shipped with the unit for jumper details.

Refrigerant Piping

Refrigerant piping must be properly sized and applied. These two factors have a very significant effect on both system performance and reliability.

Note: *Use Type "L" refrigerant grade copper tubing only.*

Refrigerant Piping should be sized and laid out according to the job plans and specifications. This should be done when the system components are selected. The primary objective when sizing refrigerant piping for this unit is to make refrigerant line sizes as small as possible while avoiding excessive refrigerant pressure drops.

Sizing refrigerant lines as small as possible minimizes the required refrigerant charge and maximizes compressor life.

Trane recommends that the Refrigerant Line Sizing program in the "Trane C.D.S. Application Toolbox" be used to size the refrigerant lines. This program supersedes the line sizing tables in both the Trane Reciprocating Refrigeration publication and the Trane Air Conditioning Manual. If you do not have access to this program, contact your local Trane Commercial Sales office for assistance.

Liquid Lines

Basic sizing parameters with the system operating at full load for liquid lines are:

- Maximum Liquid velocity: 600 fpm
- Maximum allowable pressure drop: 7 psig (1o F)

As the pressure drop in the liquid line increases, the potential for liquid flashing, due to reduced refrigerant pressure corresponding to a reduced liquid temperature (subcooling), increases. Under these conditions, liquid lines exposed to high surrounding ambient temperatures must be insulated.

Note: *Adding refrigerant to a system with improperly sized refrigerant lines will only decrease system performance and reliability and accentuate poor operating condition.*

Isolate all refrigerant lines from the building. This prevents transferring line vibration to the structure. Do not secure the lines rigidly to the building at any point since this will defeat the isolation system of the unit.

Refer to the appropriate unit illustration in Figure 5, p. 12 through Figure 18, p. 25 for refrigerant line size connections and locations. Connect the liquid line piping to the stubs provided at the liquid line shutoff valves.

Note: *The installer must cut an appropriately-sized opening in the unit sheet metal for the refrigerant piping entrance into the unit.*

Liquid Line Components

Filter driers and valves (expansion valves, charging valves, etc.) should be provided in the liquid lines just before the evaporator. Minimize the use of valves, reducers and tube bends as much as possible to avoid excessive pressure drop before the expansion valve.

Liquid Line Filter Drier

Install the filter driers (provided by the installer) in the liquid lines as close as possible to the expansion valves. Locate them upstream of the moisture indicator and solenoid valves (Solenoid valves may not be applicable).

Liquid Line Moisture Indicators

To aid in troubleshooting, charging and servicing the system, install moisture indicators in the liquid lines near the evaporator, down stream of the liquid line drier between the solenoid valve (if applicable) and the expansion valve.

Liquid Line Solenoid Valves

Liquid line solenoid valves are not recommended on units when they are connected to DX coils. Liquid line solenoid valves are recommended for refrigerant migration control when they are connected to an EVP chiller and should be connected as described in the "Electrical Wiring" section.

Thermostatic Expansion Valve (TXV)

Trane recommends a balance-ported externally equalized valve to maintain satisfactory superheat control down to lower valve loading conditions and to compensate for pressure drops between expansion valve and superheat control point (evaporator refrigerant outlet). For fin and tube evaporator applications, a 30% bleed port TXV is required for 20-60T units, and a 15% bleed port is required for 80-120T units.

For proper refrigerant distribution into coil, an expansion valve is required for each coil distributor.

NOTICE:

Equipment Damage!

Do not use any solenoid valve as a pumpdown device. Equipment damage will occur.

Table 6. Valve selections

Bleed	Applicable Units	Selection	Capacity	
			Minimum	Maximum
0	Any BPHE or any Fin and Tube OK Coils	BBIZE-1-1/2-GA	2	2
		BBIZE-2-GA	2	3
		BBIZE-3-GA	2.5	4
		BBIZE-4-GA	3.5	5.5
		BBIZE-5-GA	4.5	6.5
		BBIZE-6-GA	5.5	7.5
		BBIZE-8-GA	6.5	10.5
		BBIZE-12-1/2-GA	8.5	13.5
		BBIZE-15-GA	11	16.5
		OZE-20-GA	13	22
		OZE-25-GA	17	26
		OZE-35-GA	20.5	39
		OZE-50-GA	30.5	59
		OZE-60-GA	45.5	70
15%	80-120 MCHE	BBIZE-1-1/2-GA (BP/15)	2	2.5
		BBIZE-2-GA (BP/15)	2.5	3
		BBIZE-3-GA (BP/15)	3	4.5
		BBIZE-4-GA (BP/15)	4	6
		BBIZE-5-GA (BP/15)	5	7.5
		BBIZE-6-GA (BP/15)	6	9
		BBIZE-8-GA (BP/15)	7	12
		BBIZE-12-1/2-GA (BP/15)	9.5	15.5
		BBIZE-15-GA (BP/15)	12.5	19
		OZE-20-GA (BP/15)	15	25
		OZE-25-GA (BP/15)	19.5	30
		OZE-35-GA (BP/15)	23.5	45
		OZE-50-GA (BP/15)	35	68
		OZE-60-GA (BP/15)	52.5	70
30%	20-60T MCHE	BBIZE-1-1/2-GA (BP/30)	2	3
		BBIZE-2-GA (BP/30)	2.5	3.5
		BBIZE-3-GA (BP/30)	3.5	5
		BBIZE-4-GA (BP/30)	4.5	7
		BBIZE-5-GA (BP/30)	6	8.5
		BBIZE-6-GA (BP/30)	7	10
		BBIZE-8-GA (BP/30)	8	13.5
		BBIZE-12-1/2-GA (BP/30)	11	17.5
		BBIZE-15-GA (BP/30)	14	21.5
		OZE-20-GA (BP/30)	17	28.5
		OZE-25-GA (BP/30)	22	30

Discharge (Hot Gas) Lines

Discharge lines should be pitched downward 1/2 inch for each 10 feet of horizontal run in the direction of hot gas flow and away from the compressor. Insulate any portion of the discharge piping that is exposed to outdoor ambient temperature.

Discharge line sizing is based on minimum velocity required for good oil movement in system.

Basic discharge line parameters are:

- Maximum allowable pressure drop: 6 psig
- Maximum velocity: 3500 fpm

Minimum velocities at Minimum Load:

- Horizontal Lines: 500 fpm
- Vertical Lines: Refer to the Table 7, p. 35

A double riser system may be necessary to meet the discharge line velocity requirements.

When either a single or double discharge riser is used, the line should drop well below the discharge outlet of the compressor before starting the vertical rise to prevent the possibility of refrigerant draining back to the compressor during the “Off” cycle.\

Table 7. Minimum vertical line velocities

Line Dia.	Minimum Velocity (fpm)	Line Dia.	Minimum Velocity (fpm)
7/8"	470	2-1/8"	750
1-1/8"	540	2-5/8"	825
1-3/8"	600	3-1/8"	915
1-5/8"	650	3-5/8"	975

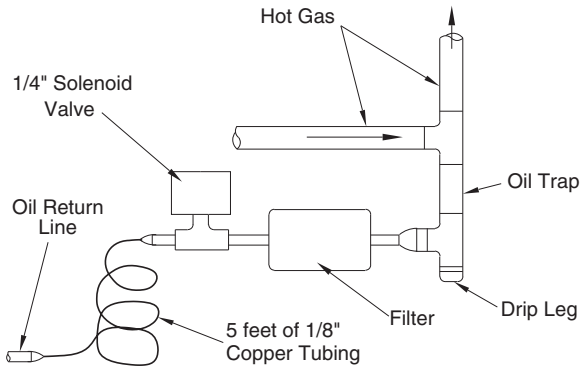
Discharge (Hot Gas) Line Components

Field supplied hot gas mufflers, pipe anchors, single or double risers, oil traps, etc. as applicable, should be provide to prevent excessive line vibration and assure proper oil return to the compressor for proper system operation.

A field supplied discharge “shutoff” valve in each hot gas line near the condenser is recommended to facilitate refrigerant storage in the condenser during service procedures.

A “constant drain” oil trap is illustrated below and can be used as an alternative to a double riser application. The constant drain oil trap assures adequate oil return to the suction line even at part load conditions. Refer to “Reciprocating Direct Expansion Piping Systems” (AM-REF 1/82) for suggested piping arrangement details.

Figure 24. Hot gas line components



Final Refrigerant Pipe Connections

To access the refrigerant pipe connections, remove the louvered side grills. Refer to Figure 5, p. 12 through Figure 18, p. 25.

These condensing units are shipped with a Nitrogen holding charge. Install pressure gauges to the appropriate access valve(s) and take a reading. If no pressure is present, refer to the "Leak Testing Procedure" section. If pressure is present, relieve the pressure before attempting to unsweat the "seal" caps. If refrigerant connections are not capped, but are "spun-end" tubes, use a tubing cutter to remove the end from the pipe.

NOTICE:

Equipment Damage!

To prevent damage to the system, do not drill a hole in the seal caps or saw the ends off pipe stubs. This could introduce copper chips into the system piping.

Brazing Procedures

Proper brazing techniques are essential when installing refrigerant piping. The following factors should be kept in mind when forming sweat connections.

⚠WARNING

Hazard of Explosion!

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units. Failure to follow these recommendations could result in death or serious injury or equipment or property-only damage.

1. When copper is heated in the presence of air, Copper oxide forms. To prevent copper oxide from forming inside the tubing during brazing, sweep an inert gas, such as dry nitrogen, through the tubing. Nitrogen displaces air in the tubing and prevents oxidation of the interior surfaces. A nitrogen flow of one to three cubic feet per minute is sufficient to displace the air. Use a pressure regulating valve or flow meter to control the flow.
2. Ensure that the tubing surfaces to be brazed are clean, and that the ends of the tubes have been carefully reamed to remove any burrs.
3. Make sure the inner and outer tubes of the joint are symmetrical and have a close clearance, providing an easy slip fit. If the joint is too loose, the tensile strength of the connection will be significantly reduced. The overlap distance should be equal to the diameter of the inner tube.
4. Wrap the body of each refrigerant line component with a wet cloth to keep it cool during brazing. Move any tube entrance grommets away for the brazing area.

   Note: *Use 40 to 45% silver brazing alloy (BAg-7 or BAg-28) on dissimilar metals. Use BCup-6 brazing alloy on copper to copper joints.*
5. If flux is used, apply it sparingly to the joint. Excessive flux can enter the system which will contaminate the refrigerant system.
6. Apply heat evenly over the length and circumference of the joint to draw the brazing material into the joint by capillary action. Remove the brazing rod and flame from the joint as soon as a complete fillet is formed to avoid possible restriction in the line.
7. Visually inspect the connection after brazing to locate any pin holes or crevices in the joint. The use of a mirror may be required, depending on the joint location.

Leak Testing Procedure

⚠WARNING

Hazard of Explosion!

Never use an open flame to detect gas leaks. It could result in an explosion. Use a leak test solution for leak testing. Failure to follow recommended safe leak test procedures could result in death or serious injury or equipment or property-only-damage.

⚠WARNING

Hazard of Explosion!

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units. Failure to follow these recommendations could result in death or serious injury or equipment or property-only damage.

When Leak-testing a refrigerant system, observe all safety precautions.

Trane condensing units are shipped with a Nitrogen holding charge. If there is no pressure, the unit must be leak tested to determine the location of leak as follows:

Note: *These service procedures require working with refrigerant, Do NOT release refrigerant to the atmosphere! The service technician must comply with all federal, state, and local laws. Refer to general service bulletin MSCU-SB-1 (latest edition).*

Use refrigerant gas as a tracer for leak detection and use oil-pumped dry nitrogen to develop the required test pressure. Test the high and low side of the system at pressures dictated by local codes.

1. Close the field supplied liquid line service valve(s) installed near the evaporator and the compressor discharge service valve to isolate the system's high side from the low side. Pressure test the liquid line, discharge line, and condenser coils at pressures dictated by local codes. Do not exceed 10# above the pressure control settings.
2. Connect a refrigerant cylinder to the charging port of the liquid line service valve. Use the refrigerant to raise the high side pressure to 12 to 15 psig.
3. Disconnect the refrigerant cylinder. Connect a dry nitrogen cylinder to the charging port and increase the high side pressure. Do not exceed the condenser maximum working pressure listed on the unit nameplate.
4. Use a halide torch, halogen leak detector or soap bubbles to check for leaks. Check all piping joints, valves, etc...
5. If a leak is located, use proper procedures to remove the refrigerant/nitrogen mixture, break the connection and remake as a new joint. Retest for leaks after making repairs.
6. Repeat the test procedure for the low side of the system, charging through the suction pressure gauge port or through an access provided on the suction line by the installer. Increase the system pressure to 100 psig.
7. If a leak is located, use proper procedures to remove the refrigerant/nitrogen mixture, break the connection and remake as a new joint. Retest for leaks after making repairs.
8. Open the liquid line service valve and the compressor discharge service valve.

Field Installed Power Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

An overall dimensional layouts for the field installed wiring entrance into the unit are illustrated in Figure 5, p. 12 through Figure 18, p. 25. To insure that the unit's supply power wiring is properly sized and installed, follow the guidelines outlined below.

Note: *All field installed wiring must conform to NEC guidelines as well as State and Local codes.*

Verify that the power supply available is compatible with the unit's nameplate ratings. The available supply power must be within 10% of the rated voltage stamped on the nameplate. Use only copper conductors to connect the 3-phase power supply to the unit.

Main Unit Power Wiring

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

Table 8, p. 39 and Table 9, p. 39 list the field connection wire ranges for the main power terminal block 1TB1. Table 10, p. 42 lists the condensing unit electrical data. The electrical service must be protected from over current and short circuit conditions in accordance with NEC requirements. Protection devices must be sized according to the electrical data on the nameplate. Refer to the "Electrical Service Sizing Equations", for determining;

- Electrical service wire size based on "Minimum Circuit Ampacity" (MCA).
- "Maximum Over Current Protection" (MOP) device.
- "Recommended Dual Element fuse size" (RDE).

1. A field supplied disconnect switch must be installed at or near the unit in accordance with the National Electrical Code (NEC latest addition). Refer to the "Electrical Service Sizing Equations" (DSS calculation), for determining the correct size.
2. Complete the unit's power wiring connections onto the main terminal block 1TB1 inside the unit control panel. Refer to the customer connection diagram that shipped with the unit for specific termination points.
3. Provide proper supply power (with over current protection) to the Compressor unit and Air Handling unit ("No Control", "VAV", and "Constant Volume") applications. For chilled water systems, provide a properly sized power supply to the circulating pump motor (EVP control applications). Be certain that these components are properly grounded.
4. Provide proper grounding for the unit in accordance with local and national codes.

Table 8. Customer connection wire range: 20-60 ton units

Customer wire selection and fuse replacement		
Power Wire Selection to Main Terminal Block (1TB1)		
Unit Voltage	Terminal Block Size	Connector Wire Range
All	175A	(1) #14-2/0
Control Wire Selection to Control Terminal Block (1TB2) "See Note 6"		
Wire Gauge	OHMS per 1000 Feet	
18	8	
16	5	
14	3	
12	2	

Table 9. Customer connection wire range (80-120 ton units)

Customer wire selection and fuse replacement		
Power Wire Selection to Main Terminal Block (1TB1)		
Unit Voltage	Terminal Block Size	Connector Wire Range
All	175 AMP	(1) #12-2/0
Control Wire Selection to Control Terminal Block (1TB4) "See Note 6"		
Wire Gauge	OHMS per 1000 Feet	Max Wire Length
18	8	500 FT
16	5	1000 FT
14	3	2000 FT
12	2	3000 FT

Power Wire Sizing and Protection Device Equations

To correctly size the main power wiring for the unit, use the appropriate calculation(s) listed below. Read the load definitions that follow and use Calculation #1 for determining the MCA (Minimum Circuit Ampacity), MOP (Maximum Over current Protection), and RDE (Recommended Dual Element fuse size) for each unit. Use Calculation #2 to determine the DSS (Disconnect Switch Size) for each unit.

Load Definitions:

- LOAD 1 = CURRENT OF THE LARGEST MOTOR (COMPRESSOR OR FAN MOTOR)
- LOAD 2 = SUM OF THE CURRENTS OF ALL REMAINING MOTORS
- LOAD 4 = CONTROL POWER TRANSFORMER = AND ANY OTHER LOAD RATED AT 1 AMP OR MORE

Calculation #1 (MCA, MOP, and RDE)

- MCA = (1.25 x LOAD 1) + LOAD 2 + LOAD 4
- MOP = (2.25 x LOAD 1) + LOAD 2 + LOAD 4

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240 - 6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

- RDE = (1.5 x LOAD 1) + LOAD 2 + LOAD 4

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240 - 6 select the next higher standard fuse rating.

Note: *Note: If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*

Calculation #2

Disconnect Switch Sizing (DSS)

- DSS = 1.15 X (LOAD 1 + LOAD 2 + LOAD 4)

Field Installed Control Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Before installing any connecting wiring, refer to Figure 5, p. 12 through Figure 18, p. 25 for the electrical access locations provided on the unit. Install appropriately sized control wiring for the 115 volt electrical components as required by the application.

Since the unit-mounted 115V control power transformer (1T1) is provided on all units, it is not necessary to run a separate 115 volt control power source to the unit.

Note: *200/230 Volt units are shipped with transformer 1T1 wired for 200 volt operation. If the unit is to be operated on a 230 volt power supply, rewire the transformer as shown on the unit schematic.*

When the 115 volt control circuit is properly connected to the field provided interlock contacts 5K1 for circuit #1 and 5K2 for circuit #2 (if applicable), proper condenser fan cycling and ambient control for the remaining fans is achieved with corresponding compressor operation.

Note: *All field wiring must conform to NEC guidelines as well as state and local codes.*

Electrical Data

Table 10. Electrical data

	Unit Characteristics					Condenser Fan Motor			
Nominal Tons	Model No.	Electrical Characteristics	Allowable Voltage Range	Minimum Circuit Ampacity (3),(5)	Maximum Fuse Size (2),(5)	No./HP (1)	FLA (Ea.) (1)	LRA (Ea.) (1)	KW (Ea.) (1),(4)
20	CAUJ-C20G	200-230/60/3	180-220/208-254	9.2	15	2/1.0	4.1	20.7	0.9
	CAUJ-C204	460/60/3	416-508	4.1	15	2/1.0	1.8	9.0	0.9
	CAUJ-C205	575/60/3	520-635	3.2	15	2/1.0	1.4	7.2	0.9
25	CAUJ-C25G	200-230/60/3	180-220/208-254	13.3	20	3/1.0	4.1	20.7	0.9
	CAUJ-C254	460/60/3	416-508	5.9	15	3/1.0	1.8	9.0	0.9
	CAUJ-C255	575/60/3	520-635	4.6	15	3/1.0	1.4	7.2	0.9
30	CAUJ-C30G	200-230/60/3	180-220/208-254	13.3	20	3/1.0	4.1	20.7	0.9
	CAUJ-C304	460/60/3	416-508	5.9	15	3/1.0	1.8	9.0	0.9
	CAUJ-C305	575/60/3	520-635	4.6	15	3/1.0	1.4	7.2	0.9
40	CAUJ-C40G	200-230/60/3	180-220/208-254	17.4	20	4/1.0	4.1	20.7	0.9
	CAUJ-C404	460/60/3	416-508	7.7	15	4/1.0	1.8	9.0	0.9
	CAUJ-C405	575/60/3	520-635	6.0	15	4/1.0	1.4	7.2	0.9
50	CAUJ-C50G	200-230/60/3	180-220/208-254	25.6	30	6/1.0	4.1	20.7	0.9
	CAUJ-C504	460/60/3	416-508	11.3	15	6/1.0	1.8	9.0	0.9
	CAUJ-C505	575/60/3	520-635	8.8	15	6/1.0	1.4	7.2	0.9
60	CAUJ-C60G	200-230/60/3	180-220/208-254	25.6	30	6/1.0	4.1	20.7	0.9
	CAUJ-C604	460/60/3	416-508	11.3	15	6/1.0	1.8	9.0	0.9
	CAUJ-C605	575/60/3	520-635	8.8	15	6/1.0	1.4	7.2	0.9
80	CAUJ-C80E	200/60/3	180-220	34	40	8/1.0	4.1	20.7	0.9
	CAUJ-C80F	230/60/3	208-254	34	40	8/1.0	4.1	20.7	0.9
	CAUJ-C804	460/60/3	416-508	15	20	8/1.0	1.8	9.0	0.9
	CAUJ-C805	575/60/3	520-635	12	15	8/1.0	1.4	7.2	0.9
100	CAUJ-D10E	200/60/3	180-220	50	60	12/1.0	4.1	20.7	0.9
	CAUJ-D10F	230/60/3	208-254	50	60	12/1.0	4.1	20.7	0.9
	CAUJ-D104	460/60/3	416-508	22	25	12/1.0	1.8	9.0	0.9
	CAUJ-D105	575/60/3	520-635	17	20	12/1.0	1.4	7.2	0.9
120	CAUJ-D12E	200/60/3	180-220	50	60	12/1.0	4.1	20.7	0.9
	CAUJ-D12F	230/60/3	208-254	50	60	12/1.01	4.1	20.7	0.9
	CAUJ-D124	460/60/3	416-508	22	25	12/1.0	1.8	9.0	0.9
	CAUJ-D125	575/60/3	520-635	17	20	12/1.0	1.4	7.2	0.9

Notes:
1. Electric information is for each individual motor.
2. Maximum fuse size is permitted by NEC 440-22 is 300 percent of one motor RLA plus the RLA of the remaining motors.
3. Minimum circuit ampacity equals 125 percent of the RLA of one motor plus the RLA of the remaining motors.
4. All Kw values taken at conditions of 45°F saturated suction temperature at the compressor and 95°F ambient.
5. Local codes may take precedence.

Operating Principals

Standard air cooled condensers function as the outdoor condensing units for appropriately sized split refrigeration systems. These units, operating in conjunction with a matched indoor compressor/evaporator configuration, provide refrigerant condensing for these systems down to a normal ambient temperature of 40° F. Operation to 0° F ambient is possible with the addition of externally mounted low ambient dampers.

All condenser fans are direct drive, 26 inch propeller type. They are driven by 1 HP thermally protected motors.

When wired properly, the unit will start and operate satisfactorily as long as the operating temperature is above the minimum operating temperature listed in Table 13, p. 52.

The condensing unit operation starts and stops automatically when the cooling demand is initiated and terminated by the cooling circuit interlock relays. (See illustrations in diagram numbers 2307-9123, 2307-9124, 2307-9125, and 2307-9126)

The control components are mounted in the various areas of the unit as illustrated in diagrams 2307-9123, 2307-9124, 2307-9125, and 2307-9126).

20-60 Ton Specs

Condenser fan cycling is accomplished through interlocking the fan operation with compressor operation (5K1 & 5K2), liquid line pressure switches (4S11 & 4S12). When the low ambient option is applied, ambient temperature thermostats (1S36 & 1S37) are used to provide additional fan cycling control. Table 11, p. 43 lists the condenser fan sequencing data and Figure 27, p. 49 illustrates the condenser fan locations with their respective fan and relay designators.

Table 11. Condenser fan sequencing data: 20-60 ton units

Controlling Device (3)	Fan "ON"	Fan "OFF"	Fan Identification
Customer Interlock Circuit 1	5K1 Closed	5K1 Open	2B1, 2B2, **2B3** (1)
Customer Interlock Circuit 2	5K2 Closed	5K2 Open	2B4, 2B5, **2B6** (1)
Fan Temperature Switch	67.5º F	65º F	**1S36** (2) **2B3** (1)
	67.5º F	65º F	**1S37** (2) 2B6
Fan Pressure Switch	444 psig	255 psig	**4S11** **2B1** (1)
	444 psig	255 psig	**4S12** 2B6

Notes:
1. Bold fan identifies fans used on 25, 30, 50 & 60 Ton units only.
2. 1S36 and 1S37 normally-closed contacts open on ambient temperature drop to 65ºF. Contacts reclose on ambient temperature rise to 65ºF and 67.5ºF.

80-120 Ton Specs

Condenser fan cycling is accomplished through interlocking the fan operation with compressor operation (6K1 & 6K2), and ambient temperature thermostats (1S42 & 1S43) are used to provide additional fan cycling control. Table 12, p. 44 lists the condenser fan sequencing data and Figure 28, p. 50 illustrates the condenser fan locations with their respective fan and relay designators.

Table 12. Condenser fan sequencing data: 80-120 ton units

Controlling Device	Fan ON	Fan OFF	Fan Identification
Customer Interlock Circuit 1	6K1 Closed	6K1 Open	4B2, 4B5, **4B6** (1)
Customer Interlock Circuit 2	6K2 Closed	6K2 Open	5B2, 5B5, **5B6** (1)
Fan Temperature Switch 1S42 (2)	Stage 1		
	53º F	45º F	**4B3** (1)
	Stage 2		
	73º F	65º F	4B1, 4B4 (1)
Fan Temperature Switch 1S43 (2)	Stage 1		
	53º F	45º F	**5B3** (1)
	Stage 2		
	73º F	65º F	5B1, 5B4

Notes:
1. Bold fan identifies fans used on CAUJ-D10 & D12 units only.
2. 1S42 and 1S43 normally-closed contacts open on ambient temperature drop to "OFF" setpoints. Contacts reclose on ambient temperature rise on "ON" setpoints.

System Pre-Start Procedures

Use the checklist provided below in conjunction with the "General Unit Requirement" checklist" to ensure that the unit is properly installed and ready for operation. Be sure to complete all of the procedures described in this section before starting the unit for the first time.

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

- Turn the field supplied disconnect switch, located upstream of the unit, to the "Off" position.
- Turn the "System" selection switch (at the Remote Panel) to the "Off" position and the "Fan" selection switch (if applicable) to the "Auto" or "Off" position.
- Check all electrical connections for tightness and "point of termination" accuracy.
- Verify that the condenser airflow will be unobstructed.
- Check the condenser fan blades. Ensure they rotate freely within the fan orifices and are securely fastened to the fan motor shaft.

NOTICE:

Compressor Damage!

Do not allow liquid refrigerant to enter the suction line. Excessive liquid accumulation in the liquid lines may result in compressor damage.

- Verify that all compressor service valves, discharge service valves, and liquid line service valves is back seated on each circuit.
- Inspect the interior of the unit for tools and debris.

System Evacuation Procedures

Each refrigeration circuit for split system applications must be evacuated before the unit can be started. Use a rotary type vacuum pump capable of pulling a vacuum of 100 microns or less. Verify that the unit disconnect switch and the system control circuit switches are "OFF".

The oil in the vacuum pump should be changed each time the pump is used with a high quality vacuum pump oil. Before using any oil, check the oil container for discoloration which usually indicates moisture in the oil and/or water droplets. Moisture in the oil adds to what the pump has to remove from the system, making the pump inefficient.

When connecting the vacuum pump to a refrigeration system, it is important to manifold the vacuum pump to both the high and low side of the system (liquid line access valve and suction line access valve). Follow the pump manufacturer's directions for the proper methods of using the vacuum pump.

NOTICE:

Motor Damage!

Do not, under any circumstances, use a megohm meter or apply power to the windings of a compressor while it is under a vacuum. Electrical shorting between motor windings and/or housing can occur while in a vacuum, causing motor burnout.

The lines used to connect the pump to the system should be copper and of the largest diameter that can practically be used. Using larger line sizes with minimum flow resistance can significantly reduce evacuation time. Rubber or synthetic hoses are not recommended for system evacuation because they have moisture absorbing characteristics which result in excessive rates of evaporation, causing pressure rise during the standing vacuum test. This makes it impossible to determine if the system has a leak, excessive residual moisture, or a continual or high rate of pressure increase due to the hoses.

An electronic micron vacuum gauge should be installed in the common line ahead of the vacuum pump shutoff valve, as shown in Figure 25, p. 47. Close Valves B and C, and open Valve A. Start the vacuum pump, after several minutes, the gauge reading will indicate the maximum vacuum the pump is capable of pulling. Rotary pumps should produce vacuums of 100 microns or less.

Open Valves B and C. Evacuate the system to a pressure of 300 microns or less. As the vacuum is being pulled on the system, there could be a time when it would appear that no further vacuum is being obtained, yet, the pressure is high. It is recommended that during the evacuation process, the vacuum be "Broken", to facilitate the evacuation process.

To break the vacuum: Shutoff valves A, B, & C and connect a refrigerant cylinder to the charging port on the manifold. Purge the air from the hose. Raise the standing vacuum pressure in the system to "zero" (0 psig) gauge pressure. Repeat this process two or three times during evacuation.

Note: *It is unlawful to release refrigerant into the atmosphere. When service procedures require working with refrigerants, the service technician must comply with all Federal, State, and local laws. Refer to the General Service Bulletin MSCU-SB-1 (latest edition).*

Standing Vacuum Test

Once 300 microns or less is obtained, close Valve A and leave valves B and C open. This will allow the vacuum gauge to read the actual system pressure. Let the system equalize for approximately 15 minutes. This is referred to as a "standing vacuum test" where, time versus pressure rise. The maximum allowable rise over a 15 minute period is 200 microns. If the pressure rise is greater than 200 microns but levels off to a constant value, excessive moisture is present. If the pressure steadily continues to rise, a leak is indicated. Figure 26, p. 47 illustrates three possible results of the "standing vacuum test". If a leak is encounter, repair the system and repeat the evacuation process until the recommended vacuum is obtained. Once the system has been evacuated, break the vacuum with refrigerant, and complete the remaining "Pre-Start Procedures" before starting the unit.

Figure 25. Typical vacuum pump hookup

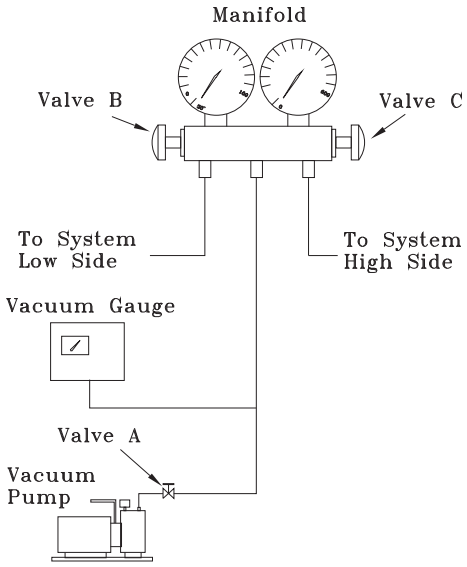
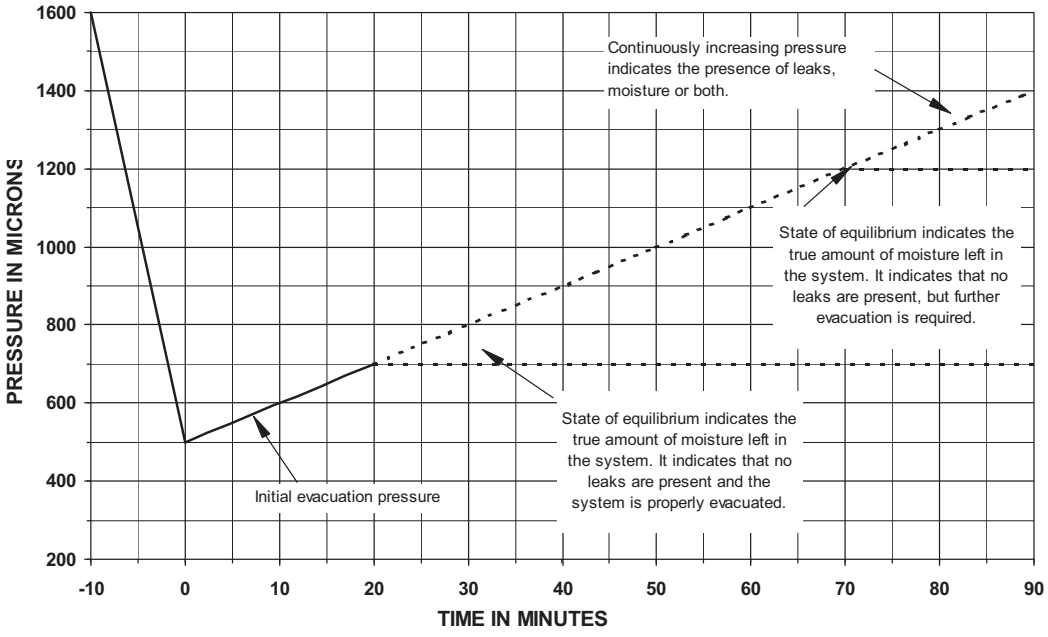


Figure 26. Evacuation time vs. pressure rise



Voltage Imbalance

Excessive three phase voltage imbalance between phases will cause motors to overheat and eventually fail. The maximum allowable voltage imbalance is 2%. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

% Voltage Imbalance = 100 X [(AV - VD)/(AV)] where;

AV (Average Voltage) = (Volt 1 + Volt 2 + Volt 3)/3

V1, V2, V3 = Line Voltage Readings

VD = Line Voltage reading that deviates the farthest from the average voltage.

Example: If the voltage readings of the supply power measured 221, 230, and 227, the average volts would be:

(221 + 230 + 227)/3 = 226 Avg.

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

100 X [(226 - 221)/226)] = 2.2%

The 2.2% imbalance in this example exceeds the maximum allowable imbalance of 2.0%. This much imbalance between phases can equal as much as a 20% current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2%, notify the proper agencies to correct the voltage problem before operating this equipment.

Electrical Phasing

Proper electrical phasing can be quickly determined and corrected before starting the unit by using an instrument such as an Associated Research Model 45 Phase Sequence Indicator and following the steps below:

- Turn the field supplied disconnect switch that provides power to terminal block 1TB1 to the "Off" position.

⚠WARNING

High Voltage is Present at Terminal Block 1TB1 or Unit Disconnect Switch 1S1!

To prevent injury or death form electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

- Connect the phase sequence indicator leads to the terminal block or to the "Line" side of the optional factory mounted disconnect switch as follows;

  Black (phase A) to L1

  Red (phase B) to L2

  Yellow (phase C) to L3
- Close the main power disconnect switch or circuit protector switch that provides the supply power to the condensing unit.
- Observe the ABC and CBA phase indicator lights on the face of the sequencer. The ABC indicator light will glow if the phase is ABC. If the CBA indicator light glows, open the disconnect switch or circuit protection switch and reverse any two power wires.
- Restore the main electrical power and recheck the phasing.
- If the phasing is correct, open the main power disconnect switch or circuit protection switch and remove the phase sequence indicator.

Start-Up

Low Ambient Damper Operation

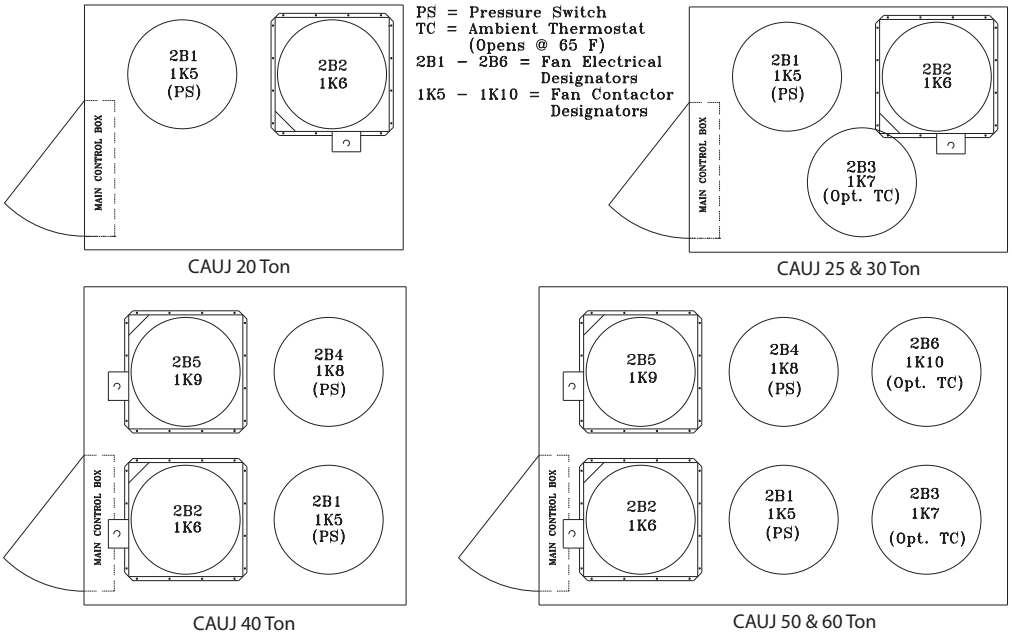
Low Ambient Dampers are available as a factory installed option or can be field-installed. Dampers are used to extend the operation of these units from the standard operational temperatures to a minimum of 0° F without hot gas bypass or 10° F with hot gas bypass. (These values apply when wind speed across the condenser coil is less than 5 m.p.h.). If typical wind speeds are higher than 5 m.p.h., a wind screen around the unit may be required. By restricting the airflow across the condenser coils, saturated condensing temperatures can be maintained as the ambient temperatures change.

The low ambient damper actuator controls damper modulation for each refrigerant circuit in response to saturated condensing temperature.

Low Ambient Thermostat Operation: 20-60 ton units

In addition to the low ambient dampers on 25, 30, 50 & 60 Ton units, a low ambient thermostat is installed to further restrict the airflow across the condenser by cycling the 2B3 condenser fan on 25 & 30 Ton units plus 2B6 on 50 & 60 Ton units. The thermostat opens when the ambient temperature approaches 65° F and closes at approximately 67.5° F.

Figure 27. Condenser fan locations: 20-60 ton units

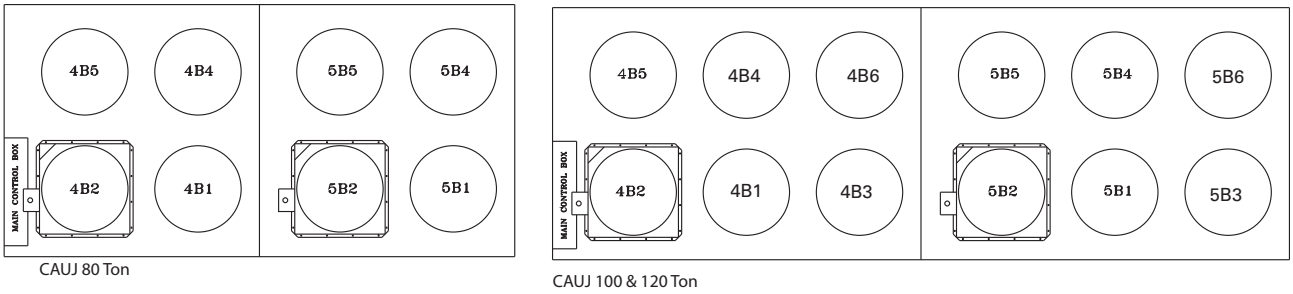


Low Ambient Thermostat Operation: 80-120 ton units

In addition to the low ambient dampers a two stage low ambient thermostat is installed to further restrict the airflow across the condenser by cycling the 4B1 + 4B6, 5B1 + 5B6 on 100 & 120 Ton units. The final stage thermostats opens when the ambient temperature approaches 65° F and closes at

approximately 73° F. The second stage opens when the ambient temperature approaches 45° F and closes at approximately 53° F.

Figure 28. Condenser fan locations: 80-120 ton units



Verifying Proper Condenser Fan Rotation

⚠WARNING

Rotating Components!

The following procedures involve working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

1. "Open" the field supplied disconnect switch or circuit protector switch that provides power to the compressor unit and lock it in the "Off" position.
2. Open the disconnect switch or circuit protector switch that provides power to the condensing unit.
3. To Install temporary jumpers:
   a. For 20-60 ton units: install temporary jumpers across terminals 1TB2-1 to 1TB2-3, 1TB2-1 to 1TB2-8, and the applicable cycling controls, i.e., pressure switches and ambient thermostats, to start the condenser fans, as illustrated in Figure 27, p. 49.
   b. For 80-120 ton units: Install temporary jumpers across terminals 1TB4-7 to 1TB4-9, 1TB4-7 to 1TB4-11, and the applicable cycling controls, i.e., pressure switches and ambient thermostats, to start the condenser fans, as illustrated in Figure 28, p. 50.
4. "Close" the disconnect switch or circuit protector switch that provides power to the condensing unit. Turn the control circuit switch 1S5 to the "On" position. The fans will start when the power is applied.
5. Check the condenser fans for proper rotation. The direction of rotation is clockwise when viewed from the top of the unit.

All Fans are Rotating Backwards

1. Turn the field supplied disconnect switch or circuit protector switch that provides power to the condensing unit to the "Off" position. Lock the disconnect switch in the open position while working at the unit.
2. Interchange any two of the field connected main power wires at the unit terminal block 1TB1 in the unit control panel.
3. Remove all temporary jumpers previously installed in step 3 of "Verifying Proper Condenser Fan Rotation".

Note: *Interchanging "Load" side power wires at the fan contactors will only affect the individual fan rotation. Ensure that the voltage phase sequence at the main terminal block 1TB1 is ABC as outlined in the "Electrical Phasing" section.*

Some Fans are Rotating Backwards;

1. "Open" the field supplied disconnect switch upstream of the unit. Lock the disconnect switch in the "Open" position while working at the unit.
2. Interchange any two of the fan motor leads at the fan contactor for each fan that is rotating backwards.
3. Remove all temporary jumpers previously installed in step 3 of "Verifying Proper Condenser Fan Rotation".

Low Ambient Damper Adjustment (Factory or Field Installed)

When a unit is ordered with the low ambient option (i.e., Digit 11 is a "1" in the model number), a damper is factory installed over the lead condenser fan for each refrigeration circuit. See Figure 27, p. 49 and Figure 28, p. 50 for damper locations.

For field installation, mount the dampers over the condenser fans at the locations shown in Figure 27, p. 49 and Figure 28, p. 50 and connect the actuator, controller, and sensor for each circuit. (Refer to the Installation Instructions provided with each low ambient damper kit.)

The controller has a factory default setpoint of 80 °F. This setpoint can be adjusted by installing a field supplied resistor on 2TB34 in the low ambient control panel located in the back of the main control panel. (See the low ambient wiring diagram, that shipped with the unit or with the field kit, for resistance values and installation location.)

Inspect the damper blades for proper alignment and operation. Dampers should be in the closed position during the "Off" cycle.

NOTICE:

Actuator Damage!

To prevent damage, do not depress actuator clutch while actuator is energized.

If adjustment is required:

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

1. Remove the sensor leads from the input terminals 6 and 7 for circuit #1 and/or 11 and 12 for circuit #2. (Controller output signal will go to 0.0 VDC and the damper will drive to the closed position.)
2. Loosen the actuator clamp.
3. Firmly hold the damper blades in the closed position.
4. Retighten the acuator clamp.

To check damper operation, jumper between the sensor input terminals 6 and 7 and/or 11 and 12 (if applicable). Controller output signal will go to 10 VDC and the damper will drive to the full open position.

Charging the System

1. Verify that all discharge service valves and liquid line service valves for each circuit is back seated.
2. Attach a set of service gauges onto the liquid line and discharge line gauge ports for each circuit.
3. Charge liquid refrigerant into the liquid line of each refrigerant circuit with the required amount of R-410A. Refrigerant should be charged into the system by weight.

   Use an accurate scale or a charging cylinder to monitor the amount of refrigerant entering the system. Refer to Table 14, p. 52 for the recommended refrigerant capacities for the condensing unit. The weight of refrigerant required for the liquid line and liquid line driers are listed in Table 15, p. 53.

   If the pressure within the system equalizes with the pressure in the charging cylinder before charging is completed, complete the process by vapor charging into the suction (low) side of the system after the system has been started.

   Table 13, p. 52 gives the minimum starting temperatures for both "Standard" & "Low" Ambient units.

   Do not attempt to charge the system with the low ambient dampers and/or hot gas bypass operating (if applicable). Disable the low ambient dampers in the "Open" position (refer to the "Low Ambient Damper Adjustment" section) and de-energize the hot gas bypass solenoid valves before proceeding.
4. On units with dual circuits, start only one circuit at a time. To disable the second circuit compressors, refer to the compressor sequencing information that shipped with the compressor unit.
5. With the compressors operating, slowly open the "Low Side" valve on the manifold gauge set. The remainder of the refrigerant will be drawn into the system.
6. Once the charging for the operating circuit has been completed, check and record the:
   - ambient temperature;
   - compressor oil level (each circuit); compressor suction and discharge pressures (each circuit);
   - superheat and subcooling (each circuit);

Record this data on an "operator's maintenance log" like the one shown in Table 16, p. 53. If the operating pressures indicate a refrigerant shortage, measure the system superheat and system subcooling. Repeat steps 1 through 6 for the second refrigeration circuit, if applicable.

Table 13. Minimum starting ambient temperatures

	Standard Units		Low Ambient Units	
Unit Size	**With HGBP**	**No HGBP**	**With HGBP**	**No HGBP**
20-60 Ton Units	40	30	10	0
80-120 Ton Units	80-120 Ton Units	40	10	0

Note: Minimum starting ambients in degrees F, based on unit at minimum step of unloading and 5 mph wind across condenser.

Table 14. Recommended refrigerant capacities

Unit Size	Operating Charge per Circuit[1]	Condenser Storage Capacity[2]
C20	12	19
C25	12	19

Table 14. Recommended refrigerant capacities

Unit Size	Operating Charge per Circuit[1]	Condenser Storage Capacity[2]
C30	12	19
C40	11	24
C50	12	25
C60	13	32
C80	29	47
D10	30	50
D12	33	63

Notes:
1. CAUJ-C20 - C30 are single-circuit units; CAUJ-40 - C60 are dual-circuit units; CAUJ 80-120 are dual-circuit units
2. Pounds R-410A per circuit @ 95°F ambient, 95% full

Table 15. Liquid line & drier refrigerant requirements

Liquid Line O.D.	Liquid Line Charge	Sporlan Part No	Drier Refrigerant Charge
5/8"	1.827	C-305-S	1 lb. - 1 oz.
3/4"	2.728	C-307-S C-417-S	1 lb. - 1 oz. 1 lb. - 8 oz.
7/8"	3.790	C-307-S C-417-S	1 lb. - 1 oz. 1 lb. - 8 oz.
1-1/8"	6.461	C-419-S	1 lb. - 8 oz.

Note: Refrigerant charge given in ounces per foot.

Table 16. Sample maintenance log

Date	Current Ambient Temp. (F)	Refrigerant Circuit #1						Refrigerant Circuit #2					
		Compr. Oil level	Suct. Press. (Psig)	Disch. Press. (Psig)	Liquid Press. (Psig)	Super-heat (F)	Subcool (f)	Compr. Oil level	Suct. Press. (Psig)	Disch. Press. (Psig)	Liquid Press. (Psig)	Super-heat (F)	Subcool (f)
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					
		- ok - Low						- ok - Low					

Note: Check and record the data requested above each month during the cooling season with the unit running

Service and Maintenance

Fuse Replacement Data

Table 17. Fuse replacement selection: 20-60 ton units

Fuse Description	Unit Size	Unit Voltage	Fuse Type	Fuse Size
Condenser Fan Fuse (1F1-1F3 on 20-30 ton) (1F1-1F6 on 40-60 ton)	All	200/230 Volt	RK5	25 AMP
		460/575 Volt 380/415 Volt		15 AMP
Control Ckt Fuse (1F7)	20-30 ton	All	FNQ-R	3.20 AMP
	40-60 ton	All	FNQ-R	6.25 AMP
Compr Protector Fuse (1F8 on 20-60 ton) (1F9 on 40-60 ton)	All	All	ABC-6	6 AMP

Table 18. Fuse replacement selection: 80-120 ton units

Fuse Description	Unit Size	Unit Voltage	Fuse Type	Fuse Size
Control Circuit Fuse (1F1)	All	All	Bussmann SRD-3.2	3.2 AMP
Transformer Fuse (1F12 & 1F13)	All	200 Volt 230 Volt 460 Volt	FNQ-R FNQ-R FNQ-R	3.5 AMP 3.2 AMP 1.6 AMP

Fall Restraint - Condenser Section Roof

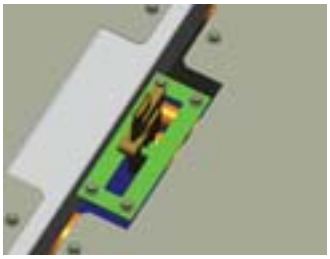
⚠WARNING

Falling Off Equipment!

This unit is built with fall restraint slots located on unit top that MUST be used during servicing. These slots are to be used with fall restraint equipment that will not allow an individual to reach the unit edge. However such equipment will NOT prevent falling to the ground, for they are NOT designed to withstand the force of a falling individual. Failure to use fall restraint slots and equipment could result in individual falling off the unit which could result in death or serious injury.

This unit is built with fall restraint slots located on unit top that must be used during servicing.

Figure 29. Fall restraint slot unit location and detail



Monthly Maintenance

Air Handling Equipment

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Before completing the following checks, turn the system control circuit switch 1S2 and 5S1 to the "Off" position. Open the main power disconnect switch for the Condensing Unit and Air Handling Unit and "lock it" in the "Off" position before removing any access panels.

- Inspect the return air filters. Clean or replace them if necessary.
- Check the evaporator drain pan and condensate piping to ensure that there are no blockages.
- Inspect the evaporator coils for dirt. If the coils appear dirty, clean them according to the instructions described in the "Coil Cleaning" section.
- Inspect the economizer damper hinges and pins (if applicable) to ensure that all moving parts are securely mounted. Clean the blades as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check Supply Fan motor bearings; repair or replace the motor as necessary.
- Check the fan shaft bearings for wear. Replace the bearings as necessary.
- Lubricate the supply fan bearings. Refer to the equipment manufacturer for their recommended greases.

Note: ***Over lubrication can be just as harmful as not enough grease.*** *Use a hand grease gun to lubricate these bearings; add grease until a light bead appears all around the seal. Do not over lubricate!*

Note: *After greasing the bearings, check the setscrews to ensure that the shaft is held securely to the bearings and Fan wheels. Make sure that all bearing supports are tight.*

- Check the supply fan belt(s). If the belts are frayed or worn, replace them.
- Verify that all wire terminal connections are tight.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.)
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.

Condensing Unit

⚠WARNING

Rotating Components!

The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

- Manually rotate the condenser fans to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Verify that all wire terminal connections are tight.

- Inspect the condenser coils for dirt and foreign debris. If the coils appear dirty, clean them according to the instructions described in the "Coil Cleaning" section.
- Inspect the compressor and condenser fan motor contactors. If the contacts appear severely burned or pitted, replace the contactor. Do not clean the contacts.
- Check the compressor oil level. (Compressors "Off")

System operation

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

- Close the main power disconnect switch for the condensing unit and all system support equipment. Turn all system control circuit switches to the "On" position.
- With the unit running, check and record the:
  - ambient temperature;
  - compressor oil level (each circuit);
  - compressor suction and discharge pressures (each circuit);
  - superheat and Subcooling (each circuit);
- Record this data on an "operator's maintenance log" similar to the one illustrated in the "Final Setup" section of this manual. If the operating pressures indicate a refrigerant shortage, measure the system Superheat and system Subcooling. For guidelines, refer to the "System Start-Up" section.

Note: *Do Not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws. Refer to general service bulletin MSCU-SB-1 (latest edition).*

Coil Cleaning

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NOTICE:

Coil Cleaners!

Coil cleaners can damage roofs, surrounding buildings, vehicles, etc. Cleaning substances should be checked to ensure that they will not cause damage to surroundings. Coils and roof (if applicable) should be rinsed thoroughly. Do not spray coil cleaners in windy conditions.

Regular coil maintenance, including annual cleaning enhances the unit's operating efficiency by minimizing:

- compressor head pressure and amperage draw;
- water carryover;
- fan brake horsepower; and,
- static pressure losses.

At least once each year—or more often if the unit is located in a "dirty" environment—clean the microchannel condenser using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

To clean refrigerant coils, use a soft brush and a sprayer.

Note: *DO NOT use detergents with microchannel condenser coils. Pressurized water or air ONLY.*

1. Remove enough panels from the unit to gain safe access to coils..

⚠WARNING

No Step Surface!

Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury.

Important: *Bridging between the main supports required before attempting to enter into the unit. Bridging may consist of multiple 2 by 12 boards or sheet metal grating.*

2. Straighten any bent coil fins with a fin comb.
3. For accessible areas, remove loose dirt and debris from both sides of the coil. For dual row microchannel condenser coil applications, seek pressure coil wand extension through the local Trane Parts Center.

Note: *DO NOT use any detergents with microchannel coils. Pressurized water or air ONLY.*

4. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
   a. The minimum nozzle spray angle is 15 degrees.
   b. Do not allow sprayer pressure to exceed 600 psi.
   c. Spray the solution perpendicular (at 90 degrees) to the coil face.
5. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. For evaporator and reheat coils, allow the cleaning solution to stand on the coil for five minutes.
6. Rinse both sides of the coil with cool, clean water.
7. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 6 and 7.
8. Reinstall all of the components and panels removed in Step 1; then restore power to the unit.

Microchannel Condenser Coil Repair and Replacement

If microchannel condenser coil repair or replacement is required, seek HVAC Knowledge Center information or Service Guide document RT-SVB83*-EN for further details.

Warranty and Liability Clause

COMMERCIAL EQUIPMENT RATED 20 TONS AND LARGER AND RELATED ACCESSORIES

PRODUCTS COVERED - This warranty* is extended by American Standard Inc. and applies only to commercial equipment rated 20 Tons and larger and related accessories.

The Company warrants for a period of 12 months from initial start-up or 18 months from date of shipment, whichever is less, that the Company products covered by this order (1) are free from defects in material and workmanship and (2) have the capacities and ratings set forth in the Company's catalogs and bulletins, provided that no warranty is made against corrosion, erosion or deterioration. The Company's obligations and liabilities under this warranty are limited to furnishing f.o.b. factory or warehouse at Company designated shipping point, freight allowed to Buyer's city (or port of export for shipment outside the conterminous United States) replacement equipment (or at the option of the Company parts therefore) for all Company products not conforming to this warranty and which have been returned to the manufacturer. The Company shall not be obligated to pay for the cost of lost refrigerant. No liability whatever shall attach to the Company until said products have been paid for and then said liability shall be limited to the purchase price of the equipment shown to be defective.

The Company makes certain further warranty protection available on an optional extra-cost basis. Any further warranty must be in writing, signed by an officer of the Company.

The warranty and liability set forth herein are in lieu of all other warranties and liabilities, whether in contract or in negligence, express or implied, in law or in fact, including implied warranties of merchantability and fitness for particular use. In no event shall the Company be liable for any incidental or consequential damages.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Manager - Product Service

Trane Inc.

Clarksville, Tn 37040-1008

PW-215-2688

*Optional Extended Warranties are available for compressors and heat exchangers of Combination Gas-Electric Air Conditioning Units.

Wiring Diagrams

Note: *For easier access, published unit wiring diagrams (individual, separate diagrams for unitary product lines) will become available via e-Library instead of through wiring manuals after 2007.*

Drawing Number	Description
2307-9123	Power Schematic Diagram - Air-Cooled Condensing Unit - Line Voltage 200-230-460-575V/60HZ/3PH - CA 20-60 Ton
2307-9124	Unit & Field Connection Wiring Diagram - Air-Cooled Condensing Unit - Line Voltage 200, 230, 460, 575V/60HZ/3PH - CA 20-60 Ton
2307-9125	Power Schematic Diagram - Split System Condensing Unit - Duplex Condenser Units - CA 80-120 ton
2307-9126	Unit & Field Connection Wiring Diagram - Air-Cooled Condenser Unit - Duplex Condenser Unit - CA 80-120 ton

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