



CUSTOM AIR PRODUCTS & SERVICES, INC.

35 Southbelt Industrial Drive • Houston, Texas 77047

(713) 460-9009 • Fax (713) 460-9499

www.customairproducts.com

HERC RENTALS

2018 FLEET

-

17F-0872

(4) 5 TON (GP NON-XP) PACKAGE UNITS

HOT DIPPED GALVANIZED LIFTING STACKING CAGE

20 KW HEATER

PPKH-5TD-0NN20KE-5E5-P1-G2CEUP

460V/3PH/60HZ

GENERAL PURPOSE

5/7/2018

INSTALLATION & OPERATION MANUAL

BOOK ASSEMBLED BY: JONATHAN O'MALLEY

DATE: 5/7/2018

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SECTION

01

JOB SCOPE



Quote No:	DW17-11-08-13
Quote Date:	11-08-2017
Project Type:	(4) 5 Ton AC General Purpose Package Unit with Lifting Stacking Cage & 20 kW Heat
Drawing Delivery:	2 weeks after receipt of order
Equipment Delivery:	12-14 weeks After Receipt of Approved Drawings (ARAD)
Freight Terms:	FOB HERC
Payment Terms:	Net 45 *100% upon completion

Item	Qty	Description
1.	4	Provide the labor and material to modify one (1) factory package unit for rental industry application with hot dipped galvanized lifting stacking cage: CAPS Model #: PPKH-5TD-0NN20KE-5E5-P1-G2CEUP - Provide one (1) 5 ton commercial package unit with 20 kW heat: - Single-stage compressor model 460-3-60 - Environmental friendly R410A refrigerant 11.8 EER energy rating - Single stage cooling control and 2 stage heating controls 20kW electric heat is included - Direct drive fan 1" filters - Al/Cu evaporator coil construction - Simplicity lite controller - Galvanized steel drain pan - Base electro-mechanical controls - The skid shall be fabricated from steel tubing and / or channel. The skid size is length and width plus piping so that no part of the unit is outside of the skid. The fork truck lifting slots are made of the same steel tubing and are incorporated into the design on 48" centers; fork slots, on all sides. The skid components are continuously welded at all joints. All tubing ends are capped and continuously welded. - The lifting frame shall be fabricated from steel tubing. This frame is designed for overhead lifting and stacking of the units. All tubing ends are capped and continuously welded. The tubing is cut and fit to the height, width, and length of the unit. All corners have a 45 degree, steel plate gusset. The top of the frame has a steel plate superman gusset welded to the horizontal tubing and incorporates a 1½ inch hole that aligns with the drag eye to secure stacking of units.

Item	Qty	Description		
		- The entire skid and cage assembly shall be provided with a hot dipped galvanized coating process. <u>The skid shall be provided with four (4) integrated swivel casters to provide unit rolling mobility</u> - The following electrical components shall be factory installed and wired per approved wiring diagram furnished by CAPS. - o Main power disconnect switch - o Phase monitor - o Power light - o Phase incorrect light - o Hour meter - o 2 stage thermostat - o Fridge dry / DH override switch - o Master system switch (off/on) - All electrical components, wire, and electrical material shall be furnished by CAPS. - The package unit shall be provided with a single point Camlok electrical connection (dual "series" feed), power on light, phase incorrect light and on/off switch located on the exterior panel. - The exterior of the unit shall be provided with the standard Herc required exterior cabinet color. Any CAPS provided accessories; hardware and components mounted to the exterior of the cabinet shall be painted to match the standard Herc painting specification. - Evaporative and condenser coils shall be coated with EnergyGuard. - Units shall be furnished with one (1) 20" supply and one (1) 20" return duct collars constructed of galvanealed steel. All corners shall be continuously welded to prevent leakage. - Each duct collar shall be furnished with a cap that is attached with a stainless steel hinge. - Each duct collar shall be furnished with (4) stainless steel duct clamps to hold flex duct in place. - Each cap shall be held closed with (2) rubber hood type latches and be lined with a 1/8" gasket. Each duct cap shall have a latching device to hold it in the open position. - Provide and install condenser coil guards. - CAPS will install the Herc decal package as per provided layout drawing by Herc. - Herc Representatives will also have full access to schedules and production progress as units are being manufactured. - Units will be tested, logged and documented at CAPS facility with Herc personnel welcome during testing if required.		
		<u>EXCLUSIONS</u> - Site Installation, Equipment and Start-up Commissioning by others - Sales tax not included - Freight not included - Overtime not included - Proposal valid for 30 days - Any items not listed in the above scope of work to be performed		



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SECTION

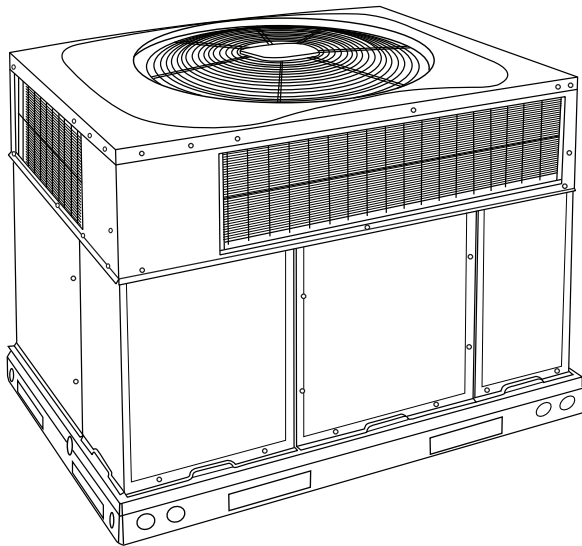
02

UNIT SUBMITTAL

50VL-C
Comfort™ 14 SEER Single-Packaged
Air Conditioner System with Puron® (R-410A)
Refrigerant
Single Phase 2-5 Nominal Tons (Sizes 24-60)
Three Phase 3-5 Nominal Tons (Sizes 36-60)



Product Data



A09034

Fig. 1 - Unit 50VL-C

Single-Packaged Products with Energy-Saving Features and Puron® refrigerant.

- 14.0 SEER / 11.5 EER
- ECM Motor-Standard
- Low Sound Levels

FEATURES/BENEFITS

One-piece cooling unit with optional electric heater, low sound levels, easy installation, low maintenance, and dependable performance.

Puron is Carrier's unique refrigerant designed to be environmentally balanced. Puron is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. Puron refrigerant is in service in millions of systems proving highly reliable and is non-ozone depleting.

Easy Installation

Factory-assembled package is a compact, fully self-contained, electric cooling unit that is prewired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard cooling sizes with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or at ground level. The high tech composite base eliminates rust problems associated with ground level applications.

Innovative Unit Base Design

On the inside a high-tech composite material will not rust and incorporates a sloped drain pan which improves drainage and helps inhibit mold, algae and bacterial growth. On the outside metal base rails provide added stability as well as easier handling and rigging.

Convertible duct configuration

Unit is designed for use in either downflow or horizontal applications. Each unit is converted from horizontal to downflow and includes horizontal duct covers. Downflow operation is provided in the field to allow vertical ductwork connections. The basepan seals on the bottom openings to ensure a positive seal in the vertical airflow mode.

Efficient operation High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of 14.0. (See page 4.)

Durable, dependable components

ECM Motor is standard on all models.

Direct-drive PSC (Permanent Split Capacitor) condenser-fan motors are designed to help reduce energy consumption and provide for cooling operation down to 40°F (4.4°C) outdoor temperature. Motormaster® II low ambient kit is available as a field-installed accessory.

Refrigerant system is designed to provide dependability. Liquid filter driers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge. Refrigerant service connections make checking operating pressures easier.

High Pressure Switch provide added reliability for the compressor.

Indoor and Outdoor coils are computer-designed for optimum heat transfer and efficiency. The indoor coil is fabricated from copper tube and aluminum fins and is located inside the unit for protection against damage. The outdoor coil is internally mounted on the top tier of the unit.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 73dBA. (See Page 4.)

Easy to service cabinets provide easy 3 panel accessibility to serviceable components during maintenance and installation. The basepan with integrated drain pan provides easy ground level installation with a mounting pad. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.05 mm) wide perimeter flange makes frame mounting on a rooftop easy.

Standard horizontal metal duct covers with insulation come with the unit and cover the horizontal duct openings. These can be left in place if the units are converted to downflow.

Cabinets are constructed of heavyduty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours in salt spray. Interior surfaces of the evaporator/heat exchanger compartment are insulated with cleanable semi-rigid insulation board, which keeps the conditioned air from being affected by the outdoor ambient temperature and provides improved indoor air quality. (Conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers No. 62P.) The sloped drain pan minimizes standing water in the drain. An external drain is provided.

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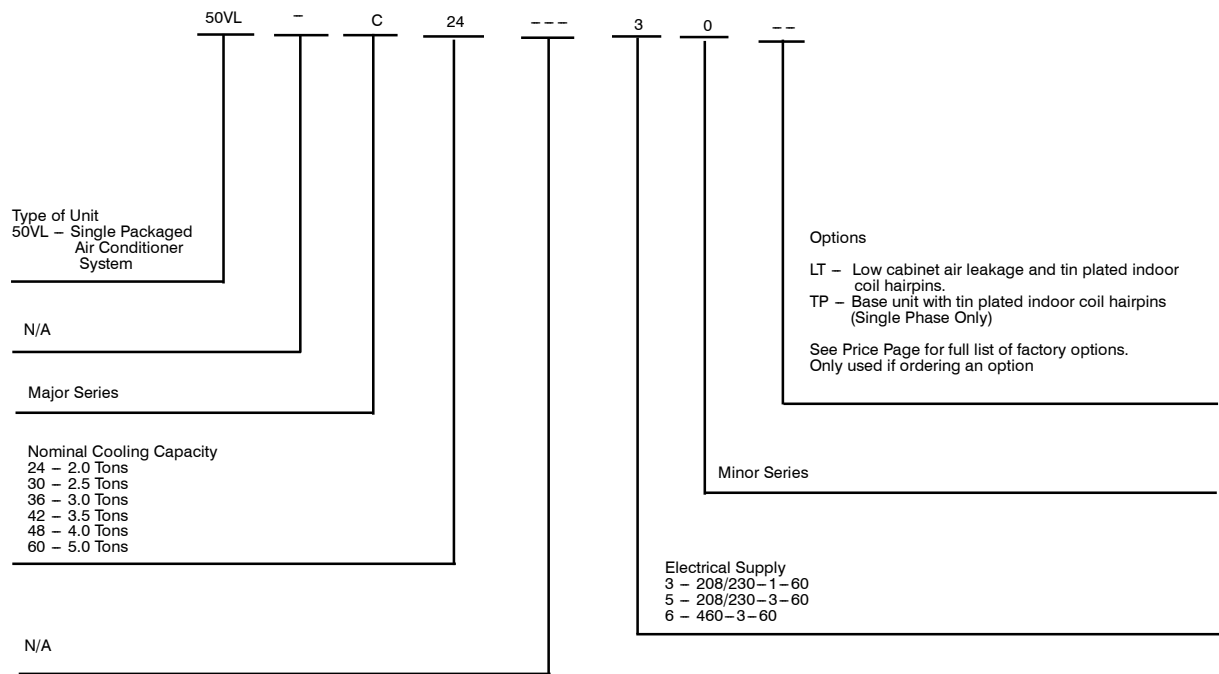
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MODEL NUMBER NOMENCLATURE



50VL–C



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.



AHRI* CAPACITIES

Cooling Capacities and Efficiencies

UNIT SIZE	NOMINAL TONS	STANDARD CFM	COOLING CAPACITY	EER	SEER
24	2	800	23000	11.5	14.0
30	2.5	1000	28600	11.5	14.0
36	3	1150	34800	11.5	14.0
42	3.5	1350	40000	11.5	14.0
48	4	1550	46000	11.5	14.0
60	5	1750	56000	11.5	14.0

LEGEND

dB—Sound Levels (decibels)

db—Dry Bulb

SEER—Seasonal Energy Efficiency Ratio

wb—Wet Bulb

COP—Coefficient of Performance

* Air Conditioning, Heating & Refrigeration Institute.

**At "A" conditions—80°F (26.7°C) indoor db/67°F (19.4°C) indoor wb & 95°F (35°C) outdoor db.

† Rated in accordance with U.S. Government DOE Department of Energy) test procedures and/or AHRI Standards 210/240.

Notes:

1. Ratings are net values, reflecting the effects of circulating fan heat.

Ratings are based on:

Cooling Standard: 80°F (26.7°C) db, 67°F wb (19.4°C) indoor entering—air temperature and 95°F db (35°C) outdoor entering—air temperature.

2. Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

50VL—C

A-WEIGHTED SOUND POWER LEVEL (dBA)

UNIT SIZE	SOUND RATING	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24	73	54.3	61.3	55.2	54.8	57.1	53.6	43.1
30	73	58.1	59.4	61.2	64.1	59.2	56.8	50.9
36	74	58.7	62.8	65.7	67.8	63.7	58.9	51.7
42	74	54.4	59.0	61.2	62.1	58.9	53.5	46.7
48	73	57.1	57.6	60.5	62.7	58.2	56.4	50.7
60	76	64.4	59.7	59.6	60.6	59.8	55.5	47.8

NOTE: Tested in accordance with AHRI Standard 270—1995 (not listed in AHRI).

PHYSICAL DATA

UNIT SIZE	24	30	36	42	48	60
NOMINAL CAPACITY (ton)	2	2-1/2	3	3-1/2	4	5
SHIPPING WEIGHT lb.	329	361	390	455	480	497
SHIPPING WEIGHT (kg)	149	164	177	206	218	225
COMPRESSORS	Rotary	Reciprocating	Scroll			
Quantity	1					
REFRIGERANT (R-410A)						
Quantity lb	5.3	5.5	8.2	6.2	9.2	9.8
Quantity (kg)	2.4	2.5	3.7	2.8	4.2	4.5
REFRIGERANT METERING DEVICE	Orifice		TXV	Orifice		
ORIFICE ID in./mm	.059 / 1.5	.061 / 1.55	N/A	.073 / 1.85	.080 / 2.03	.084 / 2.14
OUTDOOR COIL						
Rows...Fins/in.	1...21	1...21	1...21	1...21	1...21	1...21
Face Area (sq ft)	11.9	13.6	18.8	13.6	21.4	23.3
OUTDOOR FAN						
Nominal Cfm	2500	2700	3200	3600	3600	4200
Diameter in.	24	24	24	26	26	26
Diameter (mm)	609.6	609.6	609.6	660.4	660.4	660.4
Motor Hp (Rpm)	1/12 (810)	1/10 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)
INDOOR COIL						
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	4.7	4.7	5.6
INDOOR BLOWER						
Nominal Cooling Airflow (Cfm)	800	1000	1150	1350	1550	1750
Size in.	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	3/4 (1000)	1/2 (1075)	1.0 (1075)	1.0 (1040)
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25					
LOSS-OF-CHARGE / LOW-PRES-SURE SWITCH (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10	N/A				
RETURN-AIR FILTERS†‡				1 each 24x14x1 610x356x25 24x15x1 610x406x25		1 each 24x16x1 610x406x25 24x18x1 610x457x25
Throwaway Size in.	2 each 20x12x1					
Throwaway Size (mm)	508x305x25					

† Required filter sizes shown are based on the larger of the AHRI (Air Conditioning Heating and Refrigeration Institute) rated cooling airflow or the heating air-flow velocity of 300 to 350 ft/minute for throwaway type or 450 ft/minute for high-capacity type. Air filter pressure drop for non-standard filters must not exceed 0.08 in. W.C.

‡ If using accessory filter rack refer to the filter rack installation instructions for correct filter sizes and quantity.

Electric Heat Pressure Drop Tables (IN. W.C.)

Small Cabinet: 24-36

STATIC	CFM											
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
5 kW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07
10 kW	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07	0.09	0.10	0.11
15 kW	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20 kW	0.00	0.00	0.02	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19

Large Cabinet: 42-60

STATIC	CFM														
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
5 kW	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12
10 kW	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
15 kW	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15
20 kW	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16

50VL-C

OPTIONS AND ACCESSORIES

ITEM	DESCRIPTION	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
Coil Options	Base unit with tin plated indoor coil hairpins	X	
Compressor Start Kit	Compressor Start Kit assists compressor start-up by providing additional starting torque on sing phase units only.		X
Corporate Thermostats	Thermostats provide control for the system heating and cooling functions.		X
Crankcase Heater	Crankcase Heater provides anti-floodback protection for low-load cooling applications.		X*
Economizer	Horizontal Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.		X
	Vertical Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.		X
Electric Heaters	Electric Heat Supplement		X
Filter Rack	Filter Rack features easy installation, serviceability, and high-filtering performance for vertical applications. Includes 1-in. filter.		X
Flat Roof Curb	14-in. (356 mm) Flat Roof Curb is available for roof mounted applications.		X
Low Ambient Kit	Low Ambient Kit (Motormaster II Control) allows the use of mechanical cooling down to outdoor temperatures as low as 0°F (-18°C) when properly installed.		X
Manual Outside Air Damper	Manual Outside Air Damper includes hood and filter rack with adjustable damper blade for up to 25% outdoor air.		X
Square-to-Round Duct Transition Kit	Square-to-Round Duct Transition Kit enable 24-48 size units to be fitted to 14 in (356 mm). round ductwork.		X
Time Guard II	Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU-MP control.		X
Dual Point Electric Heaters	Allows you to power the electric heater and unit contactor separately by having two individual field power supply circuits connected respectively.		X
Louver Metal Outdoor Coil Grilles	Louver Metal Outdoor Coil Grilles provide hail and vandalism protection.		X
Low Cabinet Air Leakage	Cabinet air leakage less than 2.0% at 1.0 in. W.C. and cabinet air leakage less than 1.4% at 0.5 in. W.C., when tested in accordance with ASHRAE standard 193.	X	
Low Pressure Switch Kit	This kit is designed for use when a low pressure control is desired.		X

*Refer to Price Page for application detail.

Electric Heaters

CATALOG ORDERING NO.	NOMINAL CAPACITY (kW)	FUSE QTY	USED WITH SIZES					
			24	30	36	42	48	60
ELECTRIC HEATERS (208/230 — SINGLE PHASE — 60 Hz)								
CPHEATER052A0*	5.0	—	X	X	X	X	X	X
CPHEATER064A0*	5.0	4	X	X	X	X	X	X
CPHEATER069A0*	7.2	—	X	X	X	X	X	X
CPHEATER070A0*	7.2	4	X	X	X	X	X	X
CPHEATER065A0*	10.0	—	X	X	X	X		
CPHEATER050A0*	10.0	4	X	X	X	X	X	X
CPHEATER051A0*	15.0	4		X	X	X		
CPHEATER066A0*	15.0	6		X	X	X	X	X
CPHEATER053A0*	20.0	6				X		
CPHEATER054A0*	20.0	6				X	X	X
ELECTRIC HEATERS (208/230 — THREE PHASE — 60 Hz)								
CPHEATER055A0*	5.0	—			X	X	X	X
CPHEATER056A0*	10.0	—			X	X	X	X
CPHEATER068A0*	10.0	6			X	X	X	X
CPHEATER057A0*	15.0	—			X	X	X	X
CPHEATER058A0*	20.0	6			X	X	X	X
CPHEATER059A0*	20.0	6					X	X
ELECTRIC HEATERS (460 — THREE PHASE — 60 Hz)								
CPHEATER061A0*	10.0	—			X	X	X	X
CPHEATER062A0*	15.0	—			X	X	X	X
CPHEATER063A0*	20.0	—				X	X	X

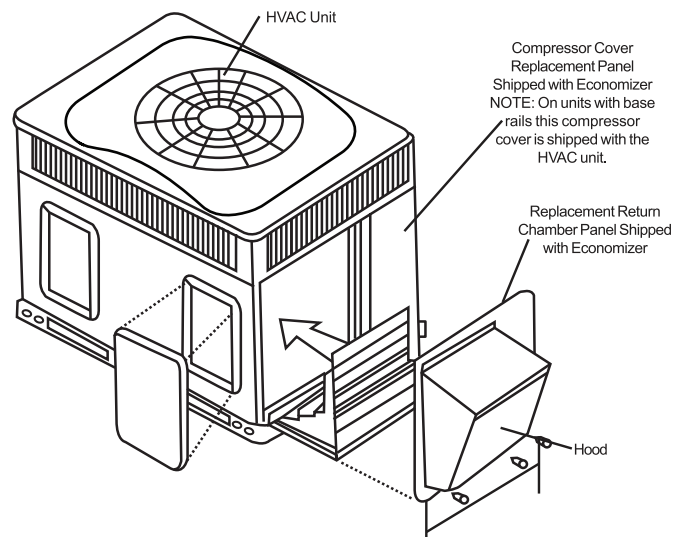
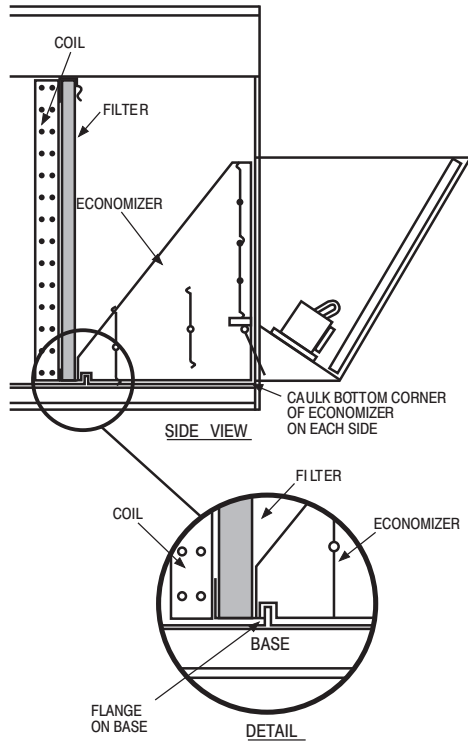
NOTE: Electric heaters are rated at 240v. Refer to Multiplication Factors table for other voltages.

X = Approved combinations.

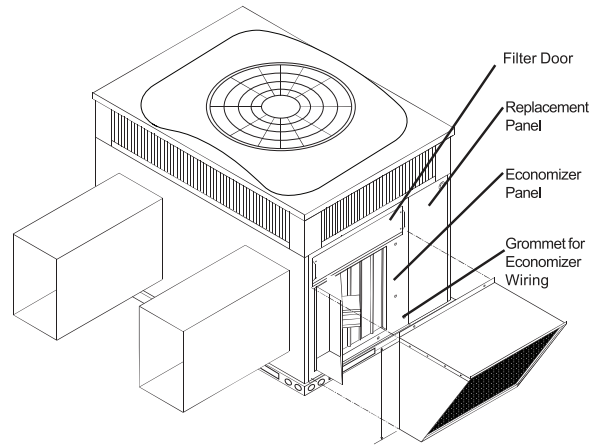
Minimum Airflow for Safe Electric Heater Operation (CFM)

SIZE	24	30	36	42	48	60
Cfm	800	1000	1200	1400	1600	1750

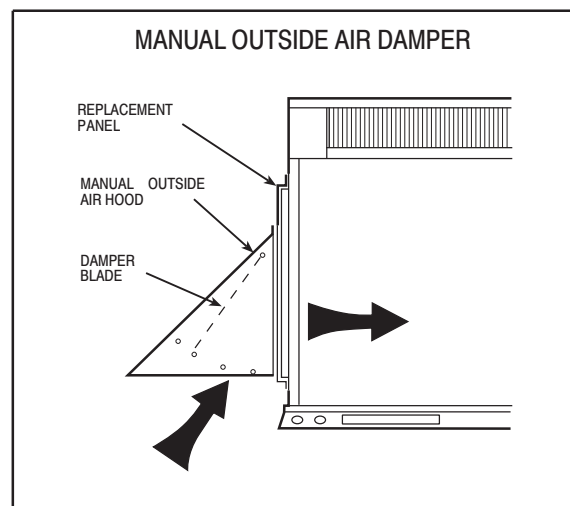
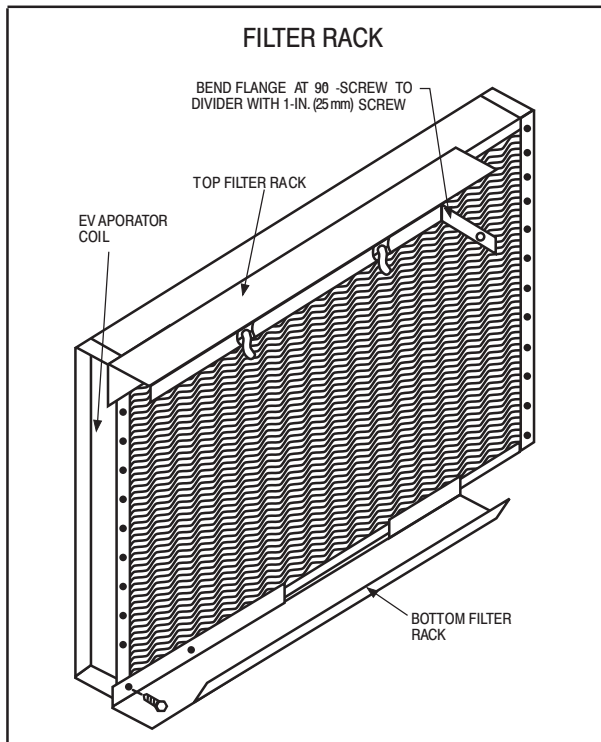
ECONOMIZER



Vertical Economizer



Horizontal Economizer



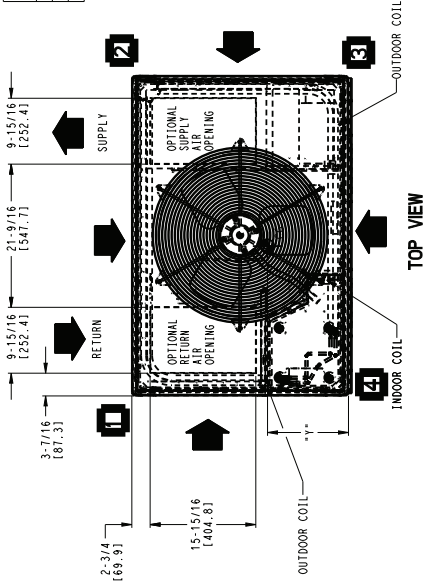
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50VL-C

UNIT DIMENSIONS - 24-36

UNIT	ELECTRICAL CHARACTERISTICS		UNIT WT.		UNIT HEIGHT IN/MM		CENTER OF GRAVITY IN/MM	
	LB	KG	LB	KG	"A"	X	Y	Z
50VL-C24--30	304	138.0	43-3/4	1111	20-1/2	520.7	15-3/4	400.1
50VL-C30--30	338	152.0	45-3/4	1162	20-1/2	520.7	15-3/4	400.1
50VL-C36--30	349	158.0	51-3/4	1315	20-1/2	520.7	15-3/4	400.1

UNIT	VOLTAGE	CORNER WEIGHT LB/KG			
		"1"	"2"	"3"	"4"
24	208/230	45.6	20.7	60.8	27.6
30	208/230	50.4	22.9	67.2	30.5
36	208/230/460	52.4	23.7	69.8	31.7



REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

	INCHES (MM)
TOP OF UNIT.....	14 [355.6]
DUCT SIDE OF UNIT.....	2 [50.8]
SIDE OPPOSITE DUCTS.....	14 [355.6]
BOTTOM OF UNIT.....	0 [0.0]
ELECTRICAL PANEL.....	36 [914.4]

NEC REQUIRED CLEARANCES

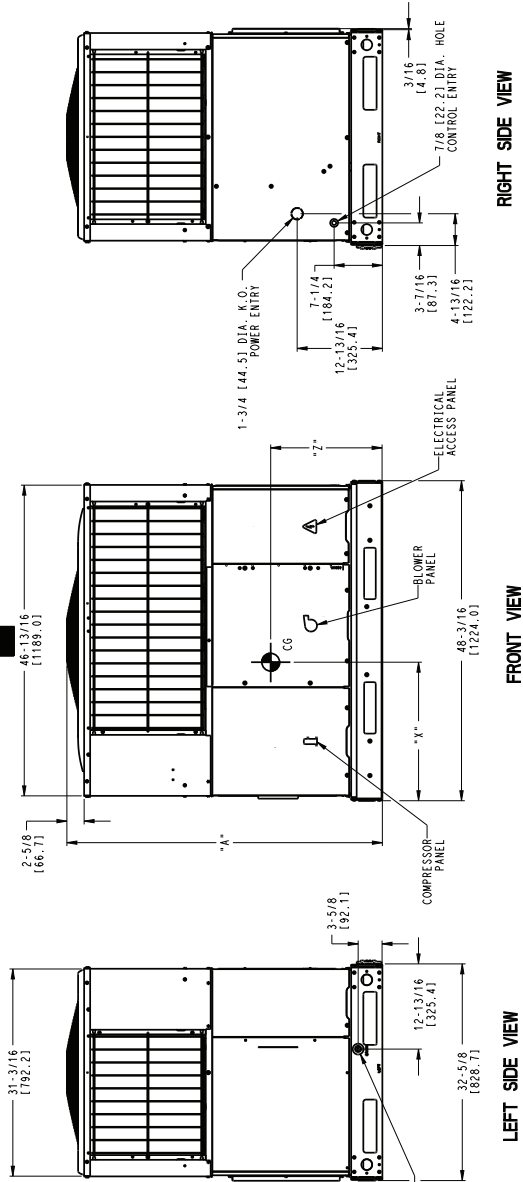
	INCHES (MM)
BETWEEN UNITS, POWER ENTRY SIDE.....	12 [304.8]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE.....	36 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE.....	42 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

	INCHES (MM)
EMP., COIL ACCESS SIDE.....	36 [914.0]
POWER ENTRY SIDE.....	42 [1066.8]
ACCESS FOR SERVICE.....	48 [1219.2]
UNIT TOP FOR NEC REQUIREMENTS.....	36 [914.0]
SIDE OPPOSITE DUCTS.....	12 [304.8]
DUCT PANEL.....	12 [304.8]

*MINIMUM DISTANCES-IF UNIT IS PLACED LESS THAN 12 [304.8] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISED.

DIMENSIONS IN [] ARE IN MILLIMETERS

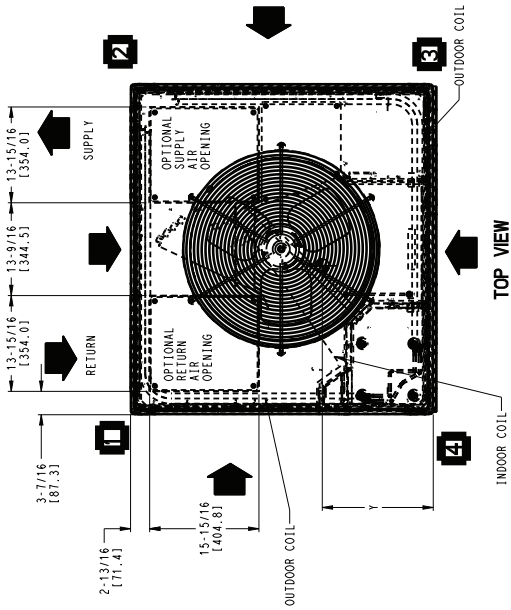


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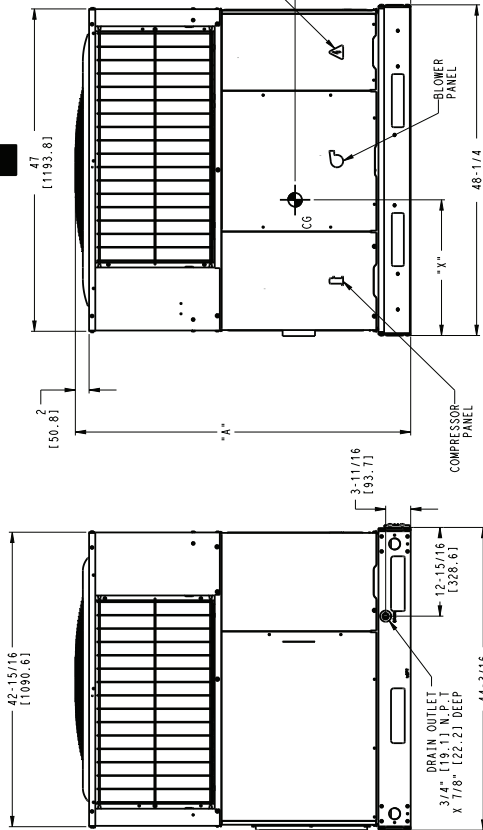
UNIT DIMENSIONS - 42-60

UNIT	ELECTRICAL CHARACTERISTICS			UNIT WT.		UNIT HEIGHT IN MM		CENTER OF GRAVITY IN MM					
				LB	KG	"A"		X	Y	Z			
50VL-C42-...-(3/5/6)10	208/230-1-60	208/230-3-60	460-3-60	413	187.0	44-3/4	1137	20-1/4	514.4	17-1/2	444.5	17-5/8	447.7
50VL-C48-...-(3/5/6)10	208/230-1-60	208/230-3-60	460-3-60	438	199.0	52-3/4	1340	20-1/4	514.4	17-1/2	444.5	17-5/8	447.7
50VL-C60-...-(3/5/6)10	208/230-1-60	208/230-3-60	460-3-60	455	206.0	54-3/4	1391	20-1/4	514.4	17-1/2	444.5	18	457.2

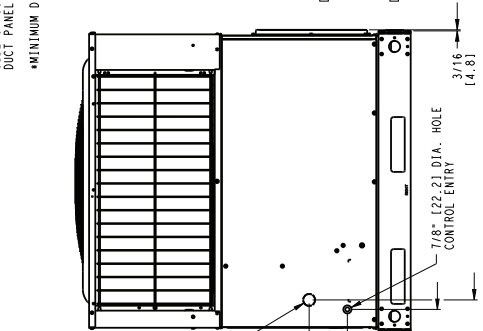
UNIT	VOLTAGE	CORNER WEIGHTS LB/KG							
		"1"	"2"	"3"	"4"				
42	208/230/460	62.0	28.1	82.6	37.5	123.9	56.2	144.6	65.6
48	208/230/460	65.7	29.8	87.6	39.7	131.4	59.6	153.3	69.5
60	208/230/460	68.3	31.0	91.0	41.3	136.5	61.9	159.3	72.2



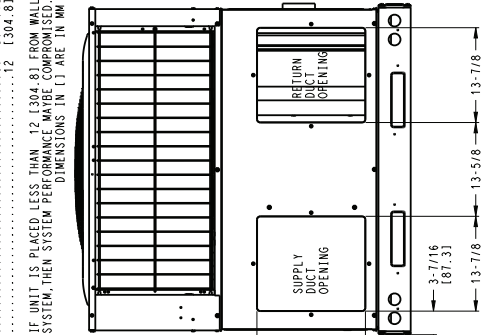
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



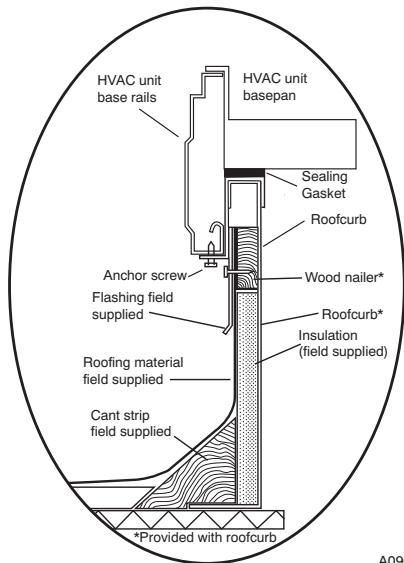
REAR VIEW

50VL500567	-
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50VL-C

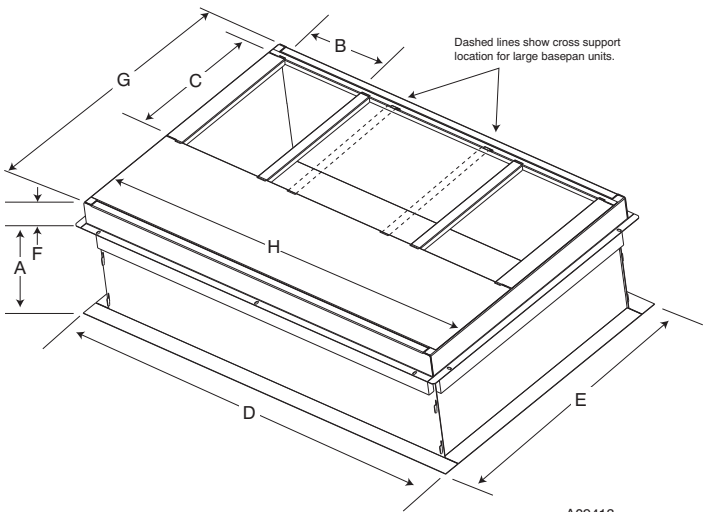
ROOF CURB ACCESSORY - 24-60

50VL-C



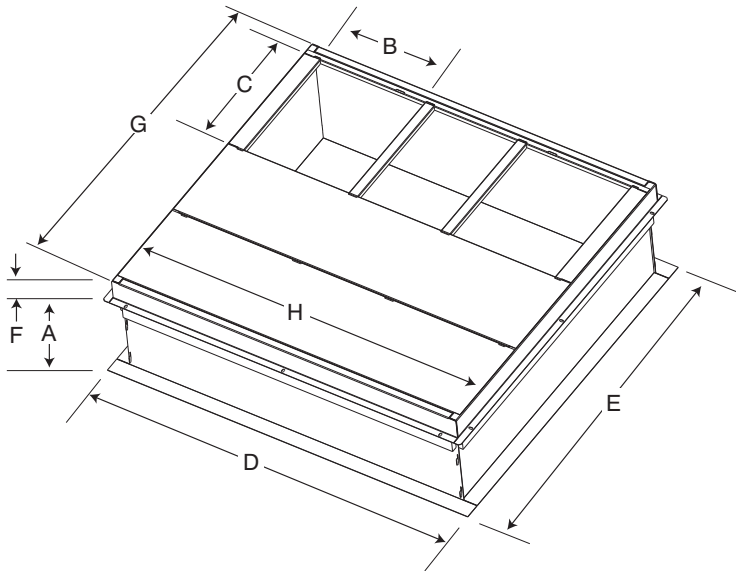
A09090

ROOF CURB DETAIL



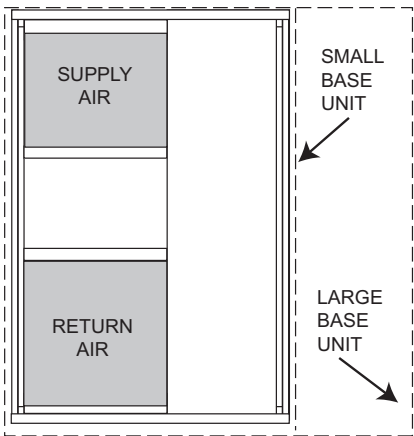
A09413

SMALL/COMMON CURB



A09415

LARGE CURB



A09094

UNIT PLACEMENT ON
COMMON CURB

SMALL OR LARGE BASE UNIT

A09414

UNIT SIZE	CATALOG NUMBER	A IN. (mm)	B (small/common base) IN. (mm)*	B (large base) IN. (mm)*	C IN. (mm)	D IN. (mm)	E IN. (mm)	F IN. (mm)	G IN. (mm)	H IN. (mm)
Small or Large	CPRFCURB011A00	14 (356)	10 (254)	14 (356)	16 (406)	47.8 (1214)	32.4 (822)	2.7 (69)	30.6 (778)	46.1 (1170)
Large	CPRFCURB013A00	14 (356)	14 (356)				43.9 (1116)		42.2 (1072)	

* Part Number CPRFCURB011A00 can be used on both small and large basepan units. The cross supports must be located based on whether the unit is a small basepan or a large basepan.

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Roof curb is made of 16-gauge steel.
4. Attach ductwork to curb (flanges of duct rest on curb).
5. Insulated panels: 1-in. (25.4 mm) thick fiberglass 1 lb. density.

SELECTION PROCEDURE (WITH EXAMPLE)

1. Determine cooling and heating requirements at design conditions:

Given:

Required Cooling Capacity (TC)	34,000 Btuh
Sensible Heat Capacity (SHC)	24,000 Btuh
Required Heating Capacity	12,500 Btuh
Condenser Entering Air Temperature	95°F(35°C)
Indoor-Air Temperature	80°F (26°C) edb 67°F (19°C) ewb
Evaporator Air Quantity	1200 CFM
External Static Pressure	0.20 IN. W.C.
Electrical Characteristics	230-1-60

2. Select unit based on required cooling capacity.

Enter Net Cooling Capacities table at condenser entering temperature of 95°F (35°C), indoor air entering at 1200 cfm and 67°F (19°C) ewb (entering wet bulb). The unit will provide a total capacity of 34,200 Btuh and a SHC of 24,500 Btuh.

3. Select electric heat.

The required heating capacity is 15,000 Btuh.

Determine additional electric heat capacity in kW.

$$\frac{15,000 \text{ Btuh}}{3,414 \text{ Btuh/kW}} = 4.4 \text{ kW of heat required}$$

Enter the electric Heater Packages table for 208/240, single-phase, 36 unit. The 5 kW heater at 240v most closely satisfies the heating required. To calculate kW at the 208v, multiply the heater kW by multiplication factor 0.75 found in the Wattage Multiplication Factors table.

$$5 \text{ kW} \times 0.75 = 3.75 \text{ kW}$$

$$3.75 \text{ kW} \times 3414 = 12802.50 \text{ Btuh}$$

4. Determine fan speed and power requirements at design conditions.

Before entering the air delivery tables, calculate the total static pressure required. From the given example, the Wet Coil Pressure Drop Table, and the Filter Pressure Drop Table:

External Static Pressure	0.200 IN. W.C.
Filter	0.000 IN. W.C.
Wet Coil Pressure Drop	<u>0.130 IN. W.C.</u>
Total Static Pressure	0.330 IN. W.C.

Enter the table for Wet Coil Air Delivery—horizontal discharge, 230. At 0.33 IN. W.C. ESP (external static pressure) and medium speed, the fan will deliver 1293 cfm. Adjusting for 208v, the motor delivers 114 cfm (deduct 10%).

5. Select unit that corresponds to power source available.

The Electrical Data Table shows that the unit is designed to operate at 208-1-60.

PERFORMANCE DATA

24 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)															125 (51.7)		
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			Capacity MBtuh		Total Sys KW
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW			
700	CFM	EWB F (°C)	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total
			23.62	23.62	1.55	21.90	21.90	20.07	20.07	1.75	17.88	17.88	15.87	15.87	14.01	14.01	2.38	2.38	2.64
			24.47	21.38	1.56	22.45	20.24	19.02	20.32	1.75	17.92	17.92	15.90	15.90	14.03	14.03	2.38	2.38	2.64
			24.99	17.43	1.56	22.88	16.39	15.32	20.71	1.76	18.05	14.06	15.56	12.87	13.28	11.77	2.36	2.36	2.61
			27.02	18.13	1.55	24.79	17.09	16.03	22.51	1.76	19.92	14.86	17.28	13.67	14.91	12.59	2.42	2.42	2.67
800	CFM	EWB F (°C)	29.59	14.70	1.55	27.20	13.77	12.86	24.84	1.76	22.48	11.95	19.68	10.89	17.14	9.92	2.51	2.51	2.77
			24.74	24.74	1.57	22.92	22.92	21.02	21.02	1.77	18.78	18.78	16.65	16.65	14.70	14.70	2.42	2.42	2.69
			25.14	23.06	1.57	23.07	21.80	21.05	21.05	1.78	18.81	18.81	16.68	16.68	14.72	14.72	2.42	2.42	2.69
			25.59	18.60	1.57	23.43	17.53	16.43	21.18	1.77	18.51	15.14	15.93	13.90	13.61	12.73	2.39	2.39	2.64
			27.63	19.36	1.56	25.32	18.28	17.20	23.00	1.77	20.41	16.03	17.67	14.78	15.25	13.64	2.45	2.45	2.71
900	CFM	EWB F (°C)	30.16	15.42	1.56	27.69	14.48	13.55	25.27	1.77	22.88	12.64	20.12	11.62	17.47	10.60	2.53	2.53	2.80
			25.69	25.69	1.58	23.77	23.77	21.80	21.80	1.79	19.55	19.55	17.32	17.32	15.29	15.29	2.46	2.46	2.73
			25.74	25.74	1.58	23.81	23.81	21.84	21.84	1.79	19.58	19.58	17.35	17.35	15.31	15.31	2.46	2.46	2.73
			26.07	19.72	1.58	23.84	18.62	17.49	21.55	1.79	18.84	16.17	16.24	14.87	13.92	13.92	2.42	2.42	2.67
			28.08	20.52	1.58	25.72	19.42	18.31	23.37	1.79	20.82	17.17	17.98	15.84	15.54	14.63	2.48	2.48	2.74
	CFM	EWB F (°C)	30.58	16.10	1.58	28.07	15.15	14.21	25.58	1.79	23.17	13.29	20.45	12.30	17.73	11.25	2.56	2.56	2.83

See Legend and Notes on Page 18.

30 SIZE

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

36 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES ° F (° C)																							
		75 (23.9)				85 (29.4)				95 (35)				105 (40.6)				115 (46.1)				125 (51.7)			
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW			
CFM	EWB F (°C)	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens	Total	Sens				
1000	57 (13.8)	34.58	34.58	2.40	2.40	32.46	32.46	2.66	2.66	30.31	30.31	2.94	2.94	28.08	28.08	3.27	3.27	25.78	25.78	3.65	3.65	23.44	23.44	4.08	4.08
	62 (16.6)	36.10	31.44	2.41	2.41	33.65	29.92	2.67	2.95	28.38	31.16	2.95	2.95	26.75	28.62	3.27	3.27	26.05	25.03	3.65	3.65	23.48	23.48	4.08	4.08
	63* (17.2)	36.53	25.60	2.42	2.42	34.01	24.25	2.67	2.95	22.90	31.48	2.95	2.95	21.49	28.86	3.28	3.28	26.20	20.05	3.65	3.65	23.49	18.58	4.08	4.08
	67 (19.4)	39.44	26.70	2.43	2.43	36.74	25.34	2.69	2.97	23.95	34.00	2.97	3.30	22.53	31.20	3.30	3.30	28.34	21.07	3.67	3.67	25.45	19.58	4.09	4.09
	72 (22.2)	43.05	21.95	2.46	2.46	40.11	20.71	2.72	3.00	19.45	37.12	3.00	3.32	18.16	34.07	3.32	3.32	30.95	16.85	3.69	3.69	27.81	15.51	4.11	4.11
1150	57 (13.8)	36.19	36.19	2.46	2.46	33.98	33.98	2.71	3.00	31.67	31.67	3.00	3.32	29.30	29.30	3.32	3.32	26.84	26.84	3.70	3.70	24.34	24.34	4.12	4.12
	62 (16.6)	37.15	33.84	2.46	2.46	34.60	32.19	2.72	3.00	30.46	32.03	3.00	3.32	29.41	29.42	3.32	3.32	26.90	26.90	3.70	3.70	24.38	24.38	4.12	4.12
	63* (17.2)	37.52	27.28	2.47	2.47	34.89	25.86	2.72	3.01	24.43	32.23	3.01	3.33	22.95	29.50	3.33	3.33	26.72	21.43	3.70	3.70	23.92	19.88	4.12	4.12
	67 (19.4)	40.47	28.51	2.48	2.48	37.67	27.07	2.74	3.03	25.60	34.80	3.03	3.35	24.11	31.88	3.35	3.35	28.91	22.56	3.72	3.72	25.90	20.99	4.14	4.14
1300	72 (22.2)	44.12	23.06	2.51	2.51	41.04	21.76	2.77	3.06	20.44	37.93	3.06	3.38	19.10	34.77	3.38	3.38	31.54	17.73	3.74	3.74	28.28	16.32	4.16	4.16
	57 (13.8)	37.56	37.56	2.51	2.51	35.24	35.24	2.77	3.05	32.79	32.79	3.05	3.38	30.30	30.30	3.38	3.38	27.71	27.71	3.75	3.75	25.08	25.08	4.17	4.17
	62 (16.6)	38.06	35.99	2.51	2.51	35.47	34.14	2.77	3.05	32.84	32.84	3.05	3.38	30.34	30.34	3.38	3.38	27.75	27.75	3.75	3.75	25.12	25.12	4.17	4.17
	63* (17.2)	38.23	28.87	2.51	2.51	35.57	27.41	2.77	3.05	25.90	32.80	3.05	3.38	24.35	29.99	3.38	3.38	27.14	22.76	3.75	3.75	24.25	21.11	4.17	4.17
	67 (19.4)	41.26	30.24	2.53	2.53	38.33	28.73	2.79	3.08	27.20	35.38	3.08	3.40	25.62	32.36	3.40	3.40	29.31	24.01	3.76	3.76	26.22	22.34	4.18	4.18
72 (22.2)	44.94	24.09	2.56	2.56	41.77	22.75	2.82	3.11	21.38	38.55	3.11	3.43	19.98	35.28	3.43	3.43	31.96	18.56	3.79	3.79	28.62	17.10	4.21	4.21	

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

42 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES ° F (° C)														
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
CFM	EWB F (° C)	Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
1175	57 (13.8)	38.66	38.66	2.51	36.66	36.66	2.87	34.60	34.60	3.30	32.45	32.45	3.80	30.07	30.07	4.39
	62 (16.6)	40.29	35.16	2.54	37.87	33.90	2.90	35.39	32.59	3.32	32.82	31.18	3.82	30.12	30.12	4.39
	63* (17.2)	41.08	28.70	2.54	38.62	27.55	2.92	36.06	26.34	3.34	33.40	25.10	3.84	30.40	23.73	4.40
	67 (19.4)	44.34	29.79	2.59	41.80	28.66	2.97	39.16	27.52	3.42	36.41	26.33	3.95	33.45	25.06	4.57
	72 (22.2)	48.52	24.17	2.66	45.92	23.18	3.05	43.20	22.16	3.52	40.37	21.10	4.06	37.44	20.00	4.70
1350	57 (13.8)	40.50	40.50	2.58	38.39	38.39	2.95	36.24	36.24	3.40	34.01	34.01	3.92	31.54	31.54	4.51
	62 (16.6)	41.38	37.85	2.59	38.93	36.52	2.96	36.44	36.11	3.41	34.06	34.06	3.92	31.59	31.59	4.52
	63* (17.2)	42.06	30.61	2.60	39.52	29.42	2.97	36.90	28.24	3.41	34.16	26.96	3.92	31.10	25.56	4.49
	67 (19.4)	45.33	31.78	2.64	42.72	30.67	3.03	40.00	29.50	3.48	37.18	28.29	4.01	34.18	27.02	4.64
	72 (22.2)	49.45	25.33	2.72	46.79	24.36	3.12	44.00	23.33	3.58	41.11	22.27	4.13	38.09	21.17	4.78
1525	57 (13.8)	41.99	41.99	2.63	39.82	39.82	3.02	37.59	37.59	3.47	35.28	35.28	4.01	32.78	32.78	4.63
	62 (16.6)	42.32	40.26	2.64	39.90	39.90	3.02	37.64	37.64	3.47	35.33	35.33	4.01	32.82	32.82	4.64
	63* (17.2)	42.81	32.42	2.65	40.22	31.23	3.02	37.53	30.01	3.47	34.76	28.74	3.99	31.66	27.29	4.56
	67 (19.4)	46.08	33.66	2.70	43.40	32.57	3.08	40.64	31.35	3.54	37.75	30.14	4.07	34.73	28.86	4.70
	72 (22.2)	50.14	26.41	2.78	47.44	25.44	3.18	44.60	24.44	3.64	41.64	23.37	4.20	38.57	22.27	4.85

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

48 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES ° F (° C)															
		75 (23.9)				85 (29.4)				95 (35)				105 (40.6)			
		Capacity MBtuh		Total Sys KW		Capacity MBtuh		Total Sys KW		Capacity MBtuh		Total Sys KW		Capacity MBtuh		Total Sys KW	
CFM	EWB F (° C)	Total	Sens	Total	Sys KW	Total	Sens	Total	Sys KW	Total	Sens	Total	Sys KW	Total	Sens	Total	Sys KW
1400	57 (13.8)	45.45	45.45	3.10	42.83	42.83	42.83	3.46	40.16	40.16	37.26	37.26	4.36	33.52	33.52	29.80	29.80
	62 (16.6)	47.27	42.17	3.13	44.15	40.29	40.29	3.49	41.03	38.39	37.61	36.29	4.36	33.57	33.57	29.84	29.84
	63* (17.2)	48.20	34.32	3.13	45.02	32.66	32.66	3.50	41.76	30.98	38.24	29.20	4.38	33.54	26.93	28.81	24.65
	67 (19.4)	52.06	35.63	3.15	48.74	34.02	34.02	3.52	45.33	32.35	41.77	30.64	4.44	37.35	28.63	32.39	26.38
	72 (22.2)	56.98	28.79	3.18	53.50	27.36	27.36	3.56	49.89	25.89	46.16	24.36	4.48	42.23	22.80	37.37	21.00
1550	57 (13.8)	47.02	47.02	3.17	44.27	44.27	44.27	3.54	41.50	41.50	38.53	38.53	4.44	34.79	34.79	30.91	30.91
	62 (16.6)	48.16	44.46	3.17	45.01	42.51	42.51	3.55	41.85	40.45	38.60	38.60	4.44	34.83	34.83	30.95	30.95
	63* (17.2)	49.02	35.96	3.18	45.75	34.27	34.27	3.55	42.41	32.55	38.87	30.75	4.45	34.15	28.45	29.32	26.09
	67 (19.4)	52.88	37.35	3.20	49.49	35.71	35.71	3.57	46.00	34.00	42.38	32.25	4.49	38.03	30.31	32.93	27.95
	72 (22.2)	57.73	29.76	3.23	54.20	28.31	28.31	3.61	50.51	26.84	46.68	25.28	4.53	42.70	23.71	37.92	21.96
1800	57 (13.8)	49.14	49.14	3.25	46.25	46.25	46.25	3.63	43.34	43.34	40.29	40.29	4.55	36.55	36.55	32.46	32.46
	62 (16.6)	49.49	47.88	3.25	46.34	46.34	46.34	3.63	43.39	43.39	40.34	40.34	4.55	36.60	36.60	32.49	32.49
	63* (17.2)	50.04	38.56	3.25	46.70	36.84	36.84	3.63	43.27	35.06	39.66	33.20	4.54	34.96	30.85	30.05	28.30
	67 (19.4)	53.94	40.13	3.28	50.43	38.42	38.42	3.65	46.85	36.63	43.16	34.80	4.57	38.95	32.92	33.66	30.41
	72 (22.2)	58.67	31.28	3.31	55.06	29.83	29.83	3.69	51.26	28.32	47.34	26.73	4.62	43.27	25.12	38.61	23.50

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

60 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)														
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)		
		Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW	Capacity MBtuh		Total Sys KW
CFM	EWB °F (°C)	Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
1750	57 (13.8)	57.04	57.04	3.68	53.71	53.71	4.20	50.37	50.37	4.81	46.94	46.94	5.51	42.94	42.94	6.27
	62 (16.6)	58.59	49.98	3.70	54.72	48.26	4.22	50.83	46.41	4.82	47.02	47.02	5.51	43.00	43.00	6.28
	63* (17.2)	59.69	40.44	3.70	55.67	38.90	4.23	51.62	37.32	4.83	47.50	35.70	5.52	42.48	33.69	6.25
	67 (19.4)	64.43	42.04	3.73	60.26	40.56	4.26	56.00	39.00	4.87	51.67	37.39	5.57	47.05	35.71	6.38
	72 (22.2)	70.39	33.58	3.78	66.06	32.25	4.31	61.55	30.87	4.93	56.94	29.39	5.64	52.21	27.88	6.45
2000	57 (13.8)	59.44	59.44	3.78	55.93	55.93	4.31	52.41	52.41	4.92	48.83	48.83	5.62	44.92	44.92	6.44
	62 (16.6)	60.04	53.50	3.78	56.07	56.07	4.31	52.48	52.48	4.92	48.90	48.90	5.62	44.98	44.98	6.44
	63* (17.2)	60.84	43.04	3.78	56.74	41.49	4.31	52.56	39.87	4.92	48.32	38.18	5.62	43.48	36.25	6.39
	67 (19.4)	65.61	44.79	3.81	61.36	43.29	4.34	56.95	41.68	4.96	52.51	40.02	5.66	47.83	38.30	6.47
	72 (22.2)	71.45	35.11	3.87	67.02	33.78	4.40	62.40	32.37	5.02	57.67	30.89	5.73	52.81	29.36	6.55
2250	57 (13.8)	61.37	61.37	3.86	57.76	57.76	4.39	54.09	54.09	5.01	50.36	50.36	5.72	46.38	46.38	6.54
	62 (16.6)	61.42	61.42	3.86	57.83	57.83	4.40	54.15	54.15	5.01	50.42	50.42	5.72	46.44	46.44	6.54
	63* (17.2)	61.75	45.60	3.86	57.57	43.99	4.39	53.29	42.29	5.00	48.99	40.55	5.71	44.27	38.64	6.52
	67 (19.4)	66.46	47.42	3.89	62.10	45.93	4.43	57.67	44.25	5.04	53.13	42.53	5.75	48.44	40.74	6.56
	72 (22.2)	72.23	36.56	3.95	67.73	35.23	4.48	63.02	33.84	5.11	58.17	32.33	5.82	53.23	30.78	6.65

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

* At 75°F (24°C) entering dry bulb – Tennessee Valley Authority (TVA) rating conditions; all others at 80° F (27°C) dry bulb.

LEGEND

- BF— Bypass Factor
- edb— Entering Dry – Bulb
- Ewb— Entering Wet – Bulb
- kW — Total Unit Power Input
- SHC— Sensible Heat Capacity (1000 Btuh)
- TC — Total Capacity (1000 Btuh) (net)
- rh—Relative Humidity

COOLING NOTES:

- 1. Ratings are net; they account for the effects of the evaporator – fan motor power and heat.
- 2. Direct interpolation is permissible. Do not extrapolate.
- 3. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{Sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

$$t_{lwb} = \text{Wet-bulb temperature corresponding to enthalpy air leaving evaporator coil (} t_{lwb} \text{)}$$

$$h_{lwb} = \frac{\text{Total Capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: hewb = Enthalpy of air entering evaporator coil

- 4. The SHC is based on 805 F (26.6°C) edb temperature of air entering evaporator coil. Below 80° F (26.6°C) edb, subtract (corr factor x cfm) from SHC.

Above 80° F (26.6°C) edb, add (corr factor x cfm) to SHC.

Correction Factor = 1.10 x (1 + BF) x (edb – 80).

- 5. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Multiplication Factors

HEATER KW RATING	VOLTAGE DISTRIBUTION V/3/60	MULTIPLICATION FACTOR
240	200	0.69
	208	0.75
	230	0.92
	240	1.00

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Sizes 24-60 208/230VAC 1 Phase Models

Unit Size	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
24	Low ¹	Blue	CFM	669	580	525	423	303	---	---	---	---	---
			BHP	0.09	0.10	0.11	0.11	0.12	---	---	---	---	---
	Med – Low ²	Pink	CFM	829	752	680	602	549	455	313	---	---	---
			BHP	0.14	0.15	0.15	0.16	0.17	0.17	0.18	---	---	---
	Medium ³	Red	CFM	1014	929	884	818	746	683	600	537	405	305
			BHP	0.24	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.27	0.29
30	Med – High	Orange	CFM	1041	972	916	850	782	713	631	581	465	340
			BHP	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.31
	High	Black	CFM	1187	1124	1061	996	930	896	840	776	698	610
			BHP	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40
	Low ¹	Blue	CFM	669	580	525	423	303	---	---	---	---	---
			BHP	0.09	0.10	0.11	0.11	0.12	---	---	---	---	---
	Med – Low ³	Pink	CFM	829	752	680	602	549	455	313	---	---	---
			BHP	0.14	0.15	0.15	0.16	0.17	0.17	0.18	---	---	---
	Medium ²	Red	CFM	1014	929	884	818	746	683	600	537	405	305
			BHP	0.24	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.27	0.29
	Med – High	Orange	CFM	1041	972	916	850	782	713	631	581	465	340
			BHP	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.31
36	High	Black	CFM	1187	1124	1061	996	930	896	840	776	698	610
			BHP	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40
	Low ³	Blue	CFM	1056	982	911	882	812	740	667	564	486	361
			BHP	0.24	0.24	0.24	0.26	0.26	0.27	0.28	0.29	0.30	0.30
	Med – Low ¹	Pink	CFM	1174	1107	1045	985	914	890	825	760	673	572
			BHP	0.32	0.32	0.33	0.33	0.34	0.35	0.36	0.37	0.37	0.37
	Medium ²	Red	CFM	1246	1195	1148	1081	1019	953	884	859	795	690
			BHP	0.38	0.39	0.39	0.40	0.40	0.41	0.42	0.42	0.42	0.43
	Med – High	Orange	CFM	1361	1299	1229	1210	1152	1092	1025	958	889	822
			BHP	0.48	0.49	0.49	0.50	0.50	0.51	0.51	0.51	0.51	0.52
	High	Black	CFM	1596	1542	1482	1424	1362	1304	1238	1173	1201	1143
			BHP	0.74	0.74	0.74	0.75	0.75	0.75	0.76	0.76	0.77	0.77
42	Low ³	Blue	CFM	1001	902	833	777	717	650	575	527	466	419
			BHP	0.13	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20
	Med – Low ¹	Pink	CFM	1016	950	902	842	783	721	655	590	541	480
			BHP	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22
	Medium ²	Red	CFM	1403	1358	1316	1265	1217	1167	1116	1067	1012	956
			BHP	0.29	0.30	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39
	Med – High	Orange	CFM	1461	1411	1367	1327	1275	1220	1174	1127	1074	1022
			BHP	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42
	High	Black	CFM	1575	1528	1488	1447	1406	1360	1314	1264	1213	1159
			BHP	0.40	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50

50VL – C

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Sizes 24-60 208/230VAC 1 Phase Models (Cont.)

Unit Size	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
48	Low ¹	CFM	1378	1344	1295	1260	1216	1179	1135	1087	1035	995
		BHP	0.26	0.27	0.29	0.31	0.31	0.33	0.34	0.36	0.36	0.38
	Med – Low ²	CFM	1696	1671	1631	1607	1574	1539	1507	1463	1432	1393
		BHP	0.45	0.47	0.49	0.50	0.52	0.52	0.54	0.55	0.57	0.58
	Medium ³	CFM	1994	1968	1943	1910	1882	1835	1774	1702	1614	1512
		BHP	0.72	0.73	0.75	0.76	0.78	0.78	0.76	0.73	0.70	0.66
	Med – High	CFM	2054	2013	1986	1964	1919	1854	1779	1695	1605	1498
		BHP	0.77	0.79	0.80	0.82	0.81	0.80	0.76	0.74	0.69	0.65
60	High	CFM	2267	2201	2133	2071	1997	1923	1835	1739	1654	1551
		BHP	1.03	1.00	0.97	0.93	0.89	0.86	0.82	0.78	0.74	0.69
	Low ³	CFM	1330	1277	1232	1191	1147	1103	1060	1004	963	919
		BHP	0.26	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37
	Med – Low ¹	CFM	1475	1436	1399	1351	1317	1270	1236	1188	1152	1105
		BHP	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.45
	Medium ²	CFM	1736	1710	1668	1630	1600	1557	1522	1479	1450	1406
		BHP	0.53	0.54	0.55	0.58	0.59	0.60	0.62	0.63	0.64	0.65
	Med – High	CFM	1935	1909	1867	1836	1808	1766	1696	1619	1535	1454
		BHP	0.71	0.73	0.74	0.76	0.78	0.79	0.77	0.75	0.72	0.68
	High	CFM	2205	2150	2078	2011	1941	1852	1779	1672	1572	1473
		BHP	1.04	1.02	0.99	0.95	0.92	0.87	0.85	0.79	0.75	0.70

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed

² Factory-shipped cooling speed

³ Factory-shipped continuous fan speed

"NA" = Not allowed for heating speed

NOTE: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Dry Coil Air Delivery* - Horizontal Discharge Sizes 36-60 3 Phase Models Only

Unit	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
36	Low	Blue	CFM	979	912	859	789	731	654	556	454	374
	Med – Low ¹	Pink	CFM	1136	1080	1015	957	912	861	808	723	633
	Medium ²	Red	CFM	1208	1144	1091	1025	964	902	886	830	746
	Med – High	Orange	CFM	1495	1439	1376	1303	1221	1207	1137	1052	981
	High	Black	CFM	1560	1491	1416	1337	1255	1233	1160	1082	998
42	Low	Blue	CFM	952	882	806	746	671	605	530	551	486
	Med – Low ¹	Pink	CFM	1002	936	875	821	748	687	613	554	565
	Medium	Red	CFM	1255	1210	1145	1074	1008	940	878	895	838
	Med – High ²	Orange	CFM	1335	1267	1246	1176	1109	1049	988	926	872
	High	Black	CFM	1472	1401	1326	1251	1275	1198	1139	1085	1023
48	Low ¹	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
	Med – Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
	Medium ²	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
	Med – High	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
	High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
60	Low ¹	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
	Med – Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
	Medium ²	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
	Med – High	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
	High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed

² Factory-shipped cooling speed

"NA" = Not allowed for heating speed

Note: Duct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Dry Coil Air Delivery – Downflow Discharge Sizes 36-60 3 Phase Models Only

Unit	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
36	Low	Blue	CFM	979	912	859	789	731	654	556	454	374
			WATTS	202	212	217	221	231	236	245	251	259
			BHP	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.28
	Med – Low ¹	Pink	CFM	1136	1080	1015	957	912	861	808	723	633
			WATTS	294	309	310	322	325	333	341	349	354
			BHP	0.32	0.33	0.33	0.35	0.35	0.36	0.37	0.37	0.38
	Medium ²	Red	CFM	1208	1144	1091	1025	964	902	886	830	746
			WATTS	345	350	358	366	373	377	390	396	407
			BHP	0.37	0.38	0.38	0.39	0.40	0.40	0.42	0.42	0.44
	Med – High	Orange	CFM	1495	1439	1376	1303	1221	1207	1137	1052	981
			WATTS	625	634	635	633	624	613	598	583	573
			BHP	0.67	0.68	0.68	0.68	0.67	0.66	0.64	0.63	0.61
42	High	Black	CFM	1560	1491	1416	1337	1255	1233	1160	1082	998
			WATTS	708	699	683	674	660	634	624	606	581
			BHP	0.76	0.75	0.73	0.72	0.71	0.68	0.67	0.65	0.62
	Low	Blue	CFM	952	882	806	746	671	605	530	551	486
			WATTS	124	134	140	150	156	166	171	182	188
			BHP	0.13	0.14	0.15	0.16	0.17	0.18	0.18	0.20	0.21
	Med – Low ¹	Pink	CFM	1002	936	875	821	748	687	613	554	565
			WATTS	144	155	161	171	176	187	193	203	209
			BHP	0.15	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.24
	Medium	Red	CFM	1255	1210	1145	1074	1008	940	878	895	838
			WATTS	249	272	284	292	305	319	320	329	336
			BHP	0.27	0.29	0.30	0.31	0.33	0.34	0.34	0.35	0.36
	Med – High ²	Orange	CFM	1335	1267	1246	1176	1109	1049	988	926	872
			WATTS	311	323	330	342	356	367	378	385	395
			BHP	0.33	0.35	0.35	0.37	0.38	0.39	0.41	0.41	0.43
	High	Black	CFM	1472	1401	1326	1251	1275	1198	1139	1085	1023
			WATTS	401	414	426	440	471	462	473	478	486
			BHP	0.43	0.44	0.46	0.47	0.51	0.50	0.51	0.51	0.52

Dry Coil Air Delivery – Downflow Discharge Sizes 36-60 3 Phase Models Only (Cont.)

Unit	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
48	Low ¹	Blue	CFM	1503	1457	1423	1374	1330	1287	1241	1199	1153
			WATTS	225	233	246	254	269	282	292	307	314
			BHP	0.24	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34
	Med – Low	Pink	CFM	1556	1508	1461	1432	1388	1346	1302	1256	1221
			WATTS	244	261	268	281	290	305	319	330	345
			BHP	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37
	Medium ²	Red	CFM	1861	1822	1786	1758	1716	1688	1660	1619	1583
			WATTS	400	417	426	441	452	467	482	492	507
			BHP	0.43	0.45	0.46	0.47	0.48	0.50	0.52	0.53	0.54
	Med – High	Orange	CFM	2319	2291	2255	2230	2193	2166	2118	2057	1992
			WATTS	758	769	787	799	808	823	822	805	780
			BHP	0.81	0.82	0.84	0.86	0.87	0.88	0.88	0.86	0.84
60	Low ¹	Blue	CFM	2532	2487	2444	2391	2330	2259	2179	2111	2033
			WATTS	1014	1022	1015	994	965	935	898	858	823
			BHP	1.09	1.10	1.09	1.07	1.03	1.00	0.96	0.92	0.88
	Med – Low	Pink	CFM	1479	1436	1387	1346	1298	1253	1206	1160	1114
			WATTS	224	239	247	262	270	284	300	307	319
			BHP	0.24	0.26	0.26	0.28	0.29	0.30	0.32	0.33	0.34
	Medium ²	Red	CFM	1841	1796	1761	1724	1690	1651	1616	1578	1527
			WATTS	425	434	453	460	476	485	501	508	525
			BHP	0.46	0.47	0.49	0.49	0.51	0.52	0.54	0.54	0.56
	Med – High	Orange	CFM	1944	1913	1872	1838	1801	1771	1731	1698	1655
			WATTS	486	501	511	529	537	554	565	578	595
			BHP	0.52	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.64
High	Med – High	Black	CFM	2178	2148	2105	2073	2036	2002	1967	1919	1845
			WATTS	674	691	703	717	733	743	758	754	734
			BHP	0.72	0.74	0.75	0.77	0.79	0.80	0.81	0.81	0.79
	High	Black	CFM	2480	2432	2375	2322	2236	2161	2085	2006	1917
			WATTS	1029	1012	995	975	941	908	869	836	796
			BHP	1.10	1.09	1.07	1.05	1.01	0.97	0.93	0.90	0.85

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed

² Factory-shipped cooling speed

"NA" = Not allowed for heating speed

NOTE: Duct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.
 Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

PERFORMANCE DATA (CONT)

Wet Coil Pressure Drop (IN. W.C.)

UNIT SIZE	STANDARD CFM (SCFM)														
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
24	0.03	0.04	0.04	0.05	0.06										
30				0.05	0.06	0.07	0.08	0.11							
36				0.06	0.06	0.09	0.10	0.11	0.14						
42					0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.09	0.11		
48							0.04	0.06	0.09	0.10	0.10	0.11	0.12	0.13	0.14
60										0.06	0.07	0.01	0.08	0.09	0.10
														0.12	0.13

Economizer with 1-in. Filter Pressure Drop (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)														
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
600-1400CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	2.0, 2.5, 3.0	-	-	0.09	0.14	0.16	0.18	0.25	0.28	0.3	-	-	-	-	-	-
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	3.5, 4.0	-	-	-	-	-	-	0.10	0.11	0.12	0.13	0.14	0.16	0.16	-	-
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	5.0	-	-	-	-	-	-	-	-	-	0.15	0.17	0.18	0.20	0.21	0.22
															0.23	0.23

Horizontal and Downflow Filter Pressure Drop Table (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)														
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
600-1400CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	2.0, 2.5, 3.0	0.03	0.05	0.06	0.08	0.10	0.11	0.13	0.14	0.16	-	-	-	-	-	-
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	3.5, 4.0	-	-	-	-	-	-	0.07	0.08	0.09	0.09	0.10	0.11	0.12	-	-
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	5.0	-	-	-	-	-	-	-	-	-	0.04	0.06	0.08	0.10	0.11	0.13
															0.14	0.15

**Electric Heat Pressure Drop Tables (IN. W.C.)
Small Cabinet: 24-36**

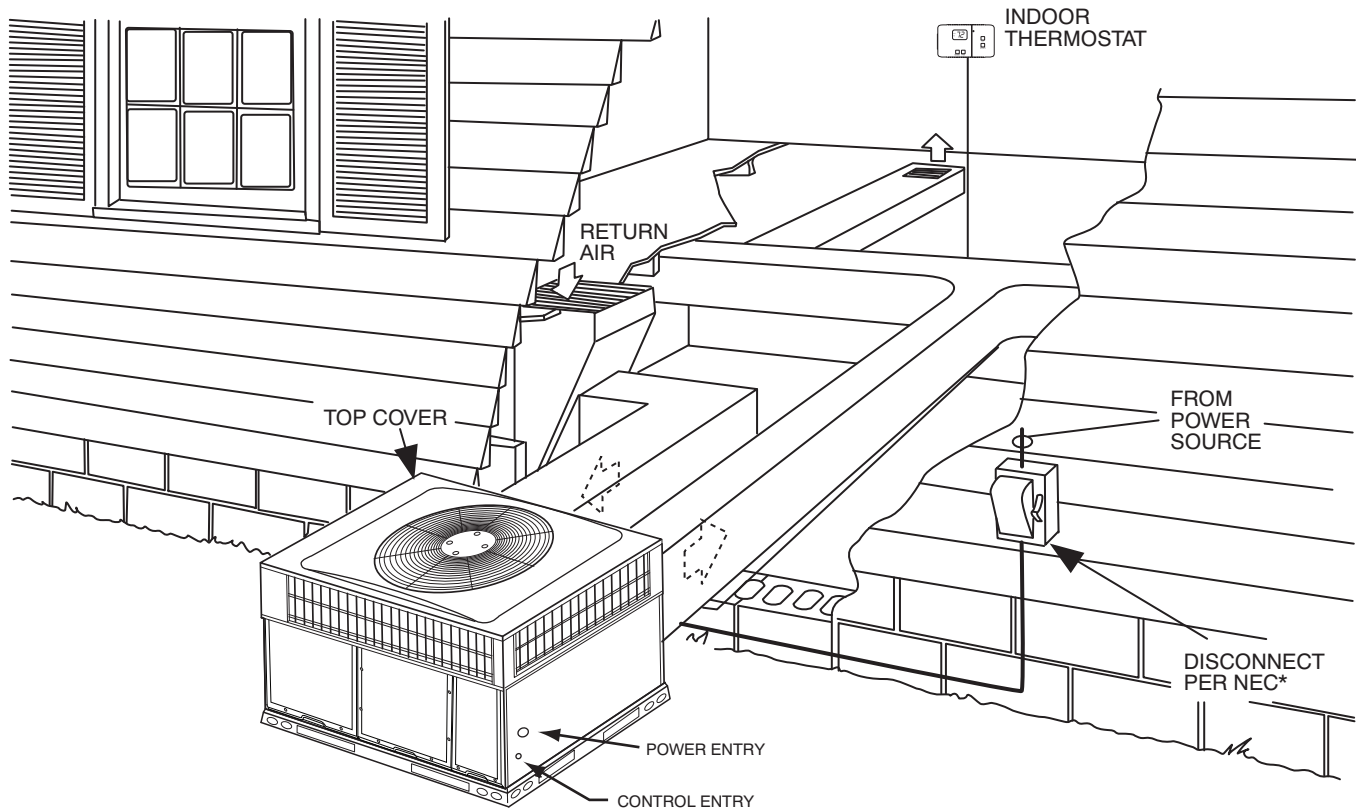
STATIC	STANDARD CFM (SCFM)											
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
5 kW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07
10 kW	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07	0.09	0.10	0.11
15 kW	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20 kW	0.00	0.00	0.02	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19

Large Cabinet: 42-60

STATIC	STANDARD CFM (SCFM)															
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	
5 kW	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	
10 kW	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	
15 kW	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	
20 kW	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	

TYPICAL PIPING AND WIRING

50VL-C



*NEC - National Electrical Code

A09240

APPLICATION DATA

Condensate trap — A 2-in. (50.8 mm) condensate trap must be field supplied.

Ductwork — Secure downflow discharge ductwork to roof curb. For horizontal discharge applications, attach ductwork to unit with flanges.

To convert a unit to downflow discharge — Units are equipped with factory-installed inserts in the downflow openings. Removal of the inserts is similar to removing an electrical knock-out.

Maximum cooling airflow — To minimize the possibility of condensate blow-off from the evaporator, airflow through the units should not exceed 450 cfm per ton.

Minimum cooling airflow — Minimum cooling airflow is 350 cfm per ton.

Minimum ambient cooling operation temperature — All standard units have a minimum ambient operating temperature of 40°F (4°C). With accessory low ambient temperature kit, units can operate at temperatures down to 0°F (-17°C).

ELECTRICAL DATA

MODEL SIZE	NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	NOMINAL ELECTRIC HEAT	POWER SUPPLY		
		MIN	MAX	RLA	LRA	FLA	FLA	kW	FLA	MCA	MOCP
24	208/230-1-60	197	253	8.7	46	0.6	3.8	-/-	-/-	15.2	20
								3.8/5	18.1/20.8	27.4/30.8	30/35
								5.4/7.2	25.9/30	37.1/42.3	40/45
								7.5/10	36.1/41.7	49.9/56.9	50/60
30	208/230-1-60	197	253	11.2	57	0.7	3.8	-/-	-/-	18.5	25
								3.8/5	18.1/20.8	27.4/30.8	30/35
								5.4/7.2	25.9/30	37.1/42.3	40/45
								7.5/10	36.1/41.7	49.9/56.9	50/60
36	208/230-1-60	197	253	16.7	79	1	5.4	11.3/15	54.2/62.5	72.5/82.9	80/90
								-/-	-/-	27.4	40
								3.8/5	18.1/20.8	29.4/32.8	40/40
								5.4/7.2	25.9/30	39.1/44.3	40/45
	208/230-3-60	197	253	10.4	73	1	6	7.5/10	36.1/41.7	51.9/58.9	60/60
								11.3/15	54.2/62.5	74.5/84.9	80/90
								-/-	-----	20.1	30
								3.8/5	10.4/12	20.5/22.5	30/30
	460-3-60	414	506	5.8	38	0.5	3.2	7.5/10	20.8/24.1	33.5/37.6	35/40
								11.3/15	31.2/36.1	46.5/52.6	50/60
								-/-	-/-	11	15
42	208/230-1-60	197	253	16.7	109	1	3.8	10	12/12	19/19	20/20
								15	18/18	26.5/26.5	30/30
								-/-	-/-	25.8	40
								3.8/5	18.1/20.8	27.4/30.8	40/40
	208/230-3-60	197	253	11.2	88	1	4.1	5.4/7.2	25.9/30	37.1/42.3	40/45
								7.5/10	36.1/41.7	49.9/56.9	50/60
								11.3/15	54.2/62.5	72.5/82.9	80/90
								15/20	72.2/83.3	95/108.9	100/110
	460-3-60	414	506	5.6	44	0.5	3.2	-/-	-----	19.2	30
								3.8/5	10.4/12	19.2/20.1	30/30
								7.5/10	20.8/24.1	31.1/35.3	35/40
								11.3/15	31.2/36.1	44.1/50.3	45/60
48	208/230-1-60	197	253	19.6	130	1	7.6	15/20	41.4/47.9	56.9/65	60/70
								-/-	-----	10.7	15
								10	12/12	19/19	20/20
								15	18/18	26.5/26.5	30/30
	208/230-3-60	197	253	13.7	83.1	1	7.6	20	24.1/24.1	34.1/34.1	35/35
								-/-	-/-	33.2	50
								3.8/5	18.1/20.8	33.2/35.5	50/50
								5.4/7.2	25.9/30	41.9/47	50/50
	460-3-60	414	506	6.2	41	0.5	4	7.5/10	36.1/41.7	54.6/61.6	60/70
								11.3/15	54.2/62.5	77.3/87.6	80/90
								15/20	72.2/83.3	99.8/113.6	100/125
								-/-	-----	25.8	35
60	208/230-1-60	197	253	23.7	152.5	1	7.6	3.8/5	10.4/12	25.8/25.8	35/35
								5.4/7.2	20.8/24.1	35.5/39.6	40/40
								7.5/10	31.2/36.1	48.5/54.6	50/60
								11.3/15	41.4/47.9	61.3/69.4	70/70
	208/230-3-60	197	253	15.9	110	1	7.6	-/-	-/-	12.3	15
								10	12/12	20/20	20/20
								15	18/18	27.5/27.5	30/30
								20	24.1/24.1	35.1/35.1	40/40
	460-3-60	414	506	7.1	52	0.5	4	-/-	-/-	38.3	60
								3.8/5	18.1/20.8	38.3/38.3	60/60
								5.4/7.2	25.9/30	41.9/47	60/60
								7.5/10	36.1/41.7	54.6/61.6	60/70
60	208/230-1-60	197	253	23.7	152.5	1	7.6	11.3/15	54.2/62.5	77.3/87.6	80/90
								15/20	72.2/83.3	99.8/113.6	100/125
								-/-	-----	28.6	40
								3.8/5	10.4/12	28.6/28.6	40/40
	208/230-3-60	197	253	15.9	110	1	7.6	5.4/7.2	20.8/24.1	35.5/39.6	40/40
								7.5/10	31.2/36.1	48.5/54.6	50/60
								11.3/15	41.4/47.9	61.3/69.4	70/70
								15/20	72.2/83.3	99.8/113.6	100/125
	460-3-60	414	506	7.1	52	0.5	4	-/-	-/-	14.2	20
								10	12/12	20/20	20/20
								15	18/18	27.5/27.5	30/30
								20	24.1/24.1	35.1/35.1	40/40

50VL-C

ELECTRICAL DATA (CONT)

LEGEND

- FLA - Full Load Amps
- IDM - Inducer Motor
- IFM - Indoor Fan Motor
- LRA - Locked Rotor Amps
- MCA - Minimum Circuit Amps
- MOCP - Maximum Over Current Protection
- OFM - Outdoor Fan Motor
- RLA - Rated Load Amps

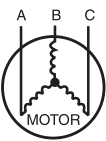
NOTES:

1. In compliance with NEC (National Electrical Code) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be Power Supply fuse or circuit breaker.
2. Minimum wire size is based on 60 C copper wire. If other than 60 C wire is used, or if length exceeds wire length in table, determine size from NEC.
3. Unbalanced 3-Phase Supply Voltage
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance

% Voltage imbalance

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

EXAMPLE: Supply voltage is 230-3-60.



AB = 228 v
BC = 231 v
AC = 227 v

$$\text{Average Voltage} = \frac{228 + 231 + 227}{3}$$
$$= \frac{686}{3}$$
$$= 229$$

Determine maximum deviation from average voltage.

(AB) 229 - 228 = 1 v
(BC) 231 - 229 = 2 v
(AC) 229 - 227 = 2 v

Maximum deviation is 2 v.

Determine percent of voltage imbalance

$$\% \text{ Voltage Imbalance} = 100 \times \frac{2}{229}$$
$$= 0.8\%$$

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

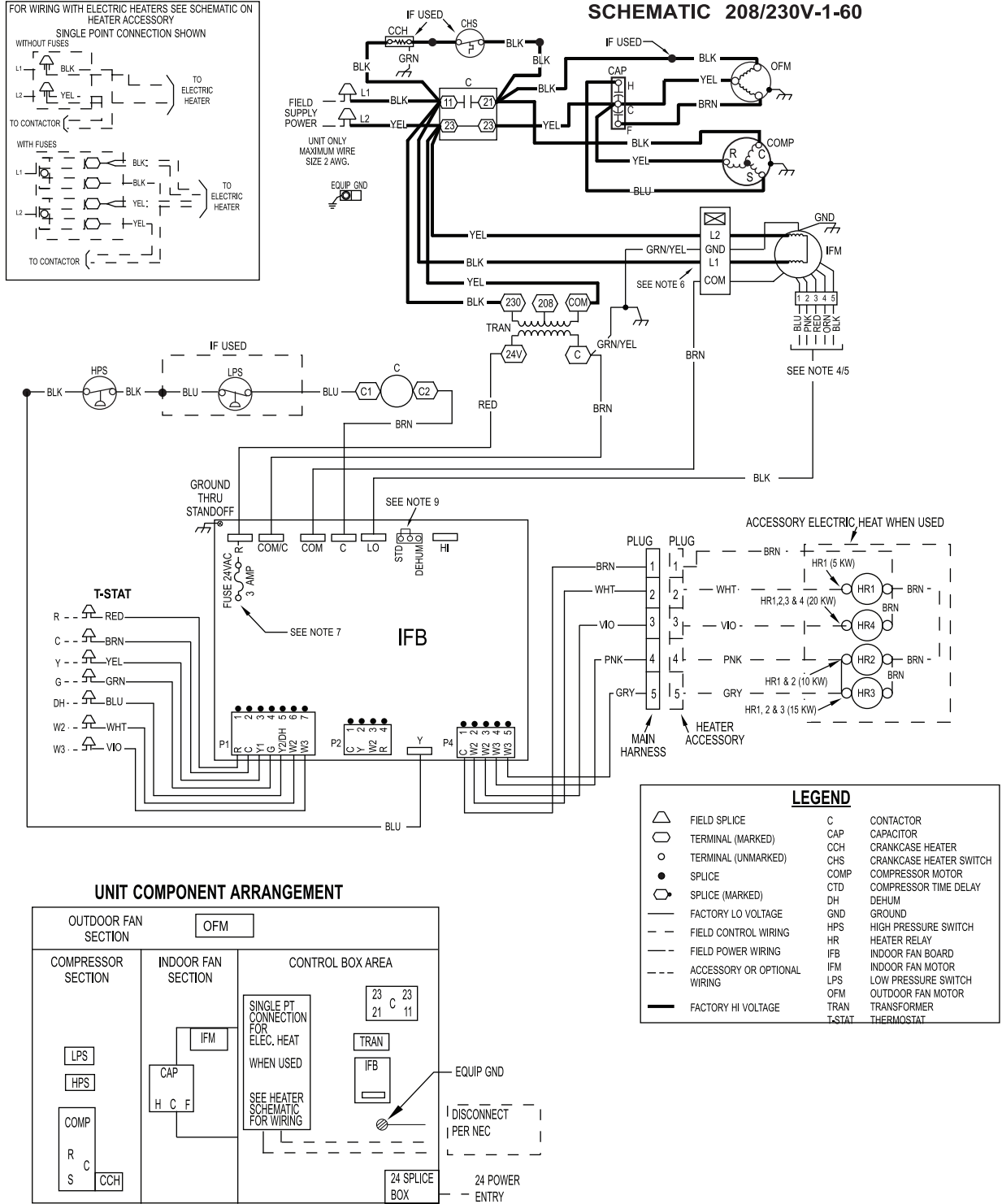
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

A06564

CONNECTION WIRING SCHEMATIC 208/230-1-60

CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



50VL-C

LADDER WIRING DIAGRAM

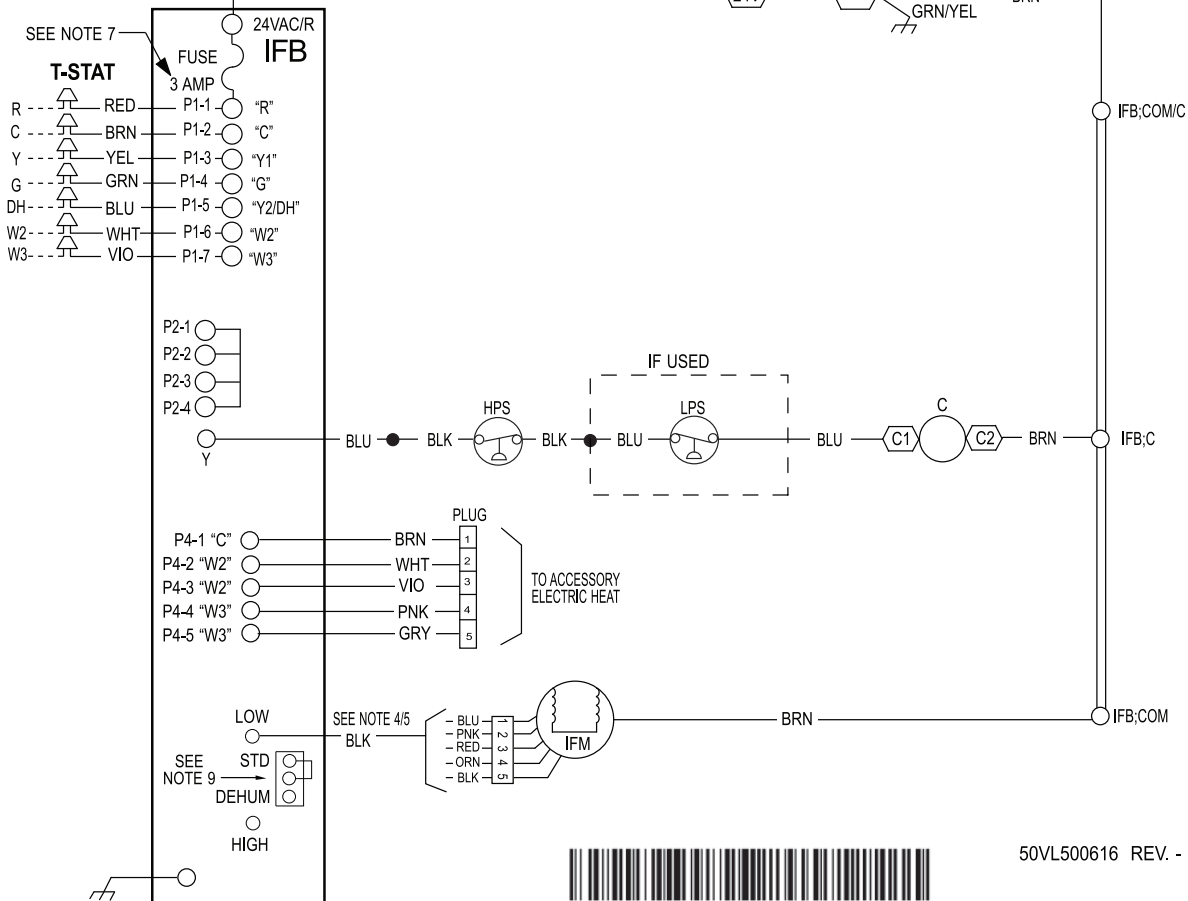
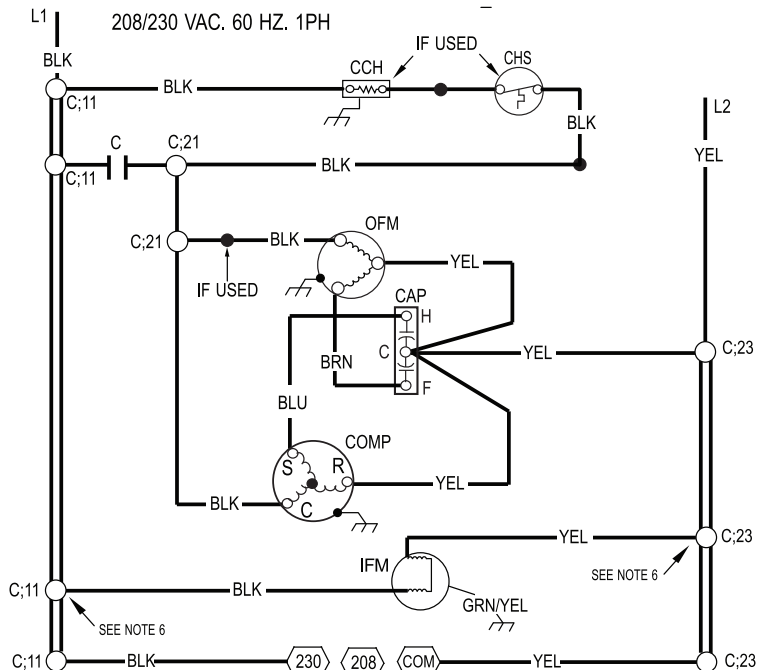
DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

USE COPPER CONDUCTORS ONLY

FIELD SUPPLY

208/230 VAC. 60 HZ. 1PH

EQUIP GND



50VL500616 REV. -



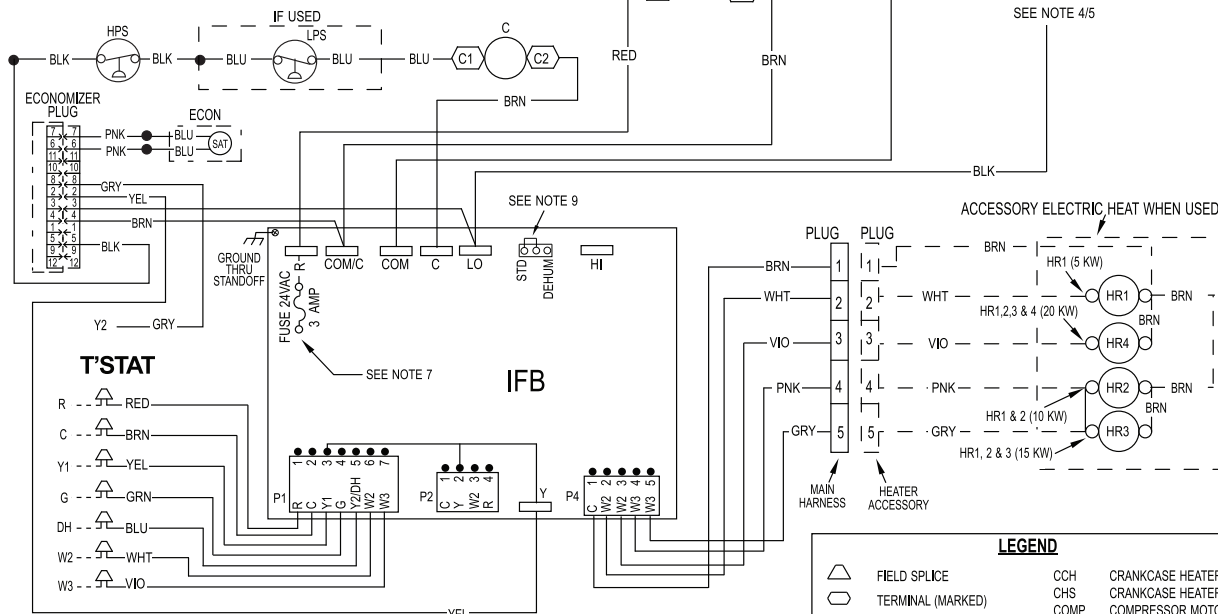
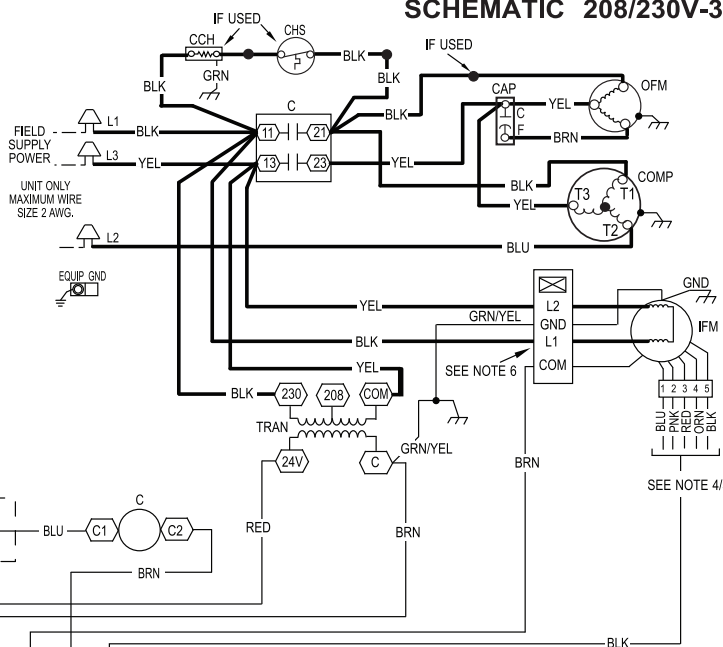
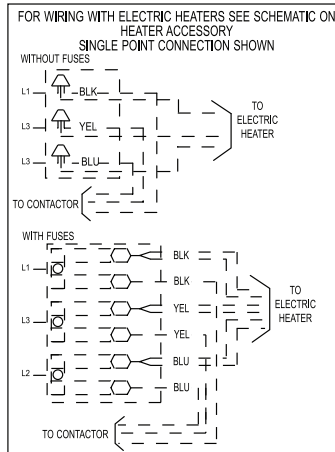
A150513

CONNECTION WIRING SCHEMATIC 208/230-3-60

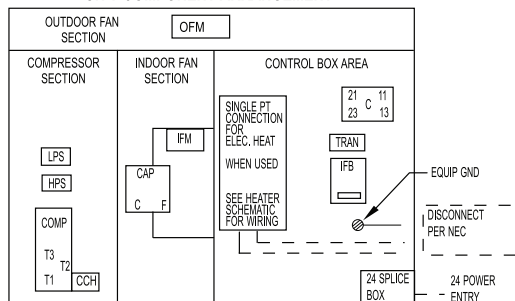
CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

SCHEMATIC 208/230V-3-60



UNIT COMPONENT ARRANGEMENT



LEGEND	
	FIELD SPLICE
	TERMINAL (MARKED)
	TERMINAL (UNMARKED)
	SPLICE
	SPLICE (MARKED)
	FACTORY LO VOLTAGE
	FIELD CONTROL WIRING
	FIELD POWER WIRING
	ACCESSORY OR OPTIONAL WIRING
	FACTORY HI VOLTAGE
C	CONTACTOR
CAP	CAPACITOR
CCH	CRANKCASE HEATER
CHS	CRANKCASE HEATER SWITCH
COMP	COMPRESSOR MOTOR
CTD	COMPRESSOR TIME DELAY
DH	DEHUMIDIFICATION MODE
DEHUM	DEHUMIDIFICATION MODE
ECON	ECONOMIZER
GND	GROUND
HPS	HIGH PRESSURE SWITCH
HR	HEATER RELAY
IFB	INDOOR FAN BOARD
IFM	INDOOR FAN MOTOR
LPS	LOW PRESSURE SWITCH
OFM	OUTDOOR FAN MOTOR
STD	STANDARD MODE
TRAN	TRANSFORMER
T-STAT	THERMOSTAT

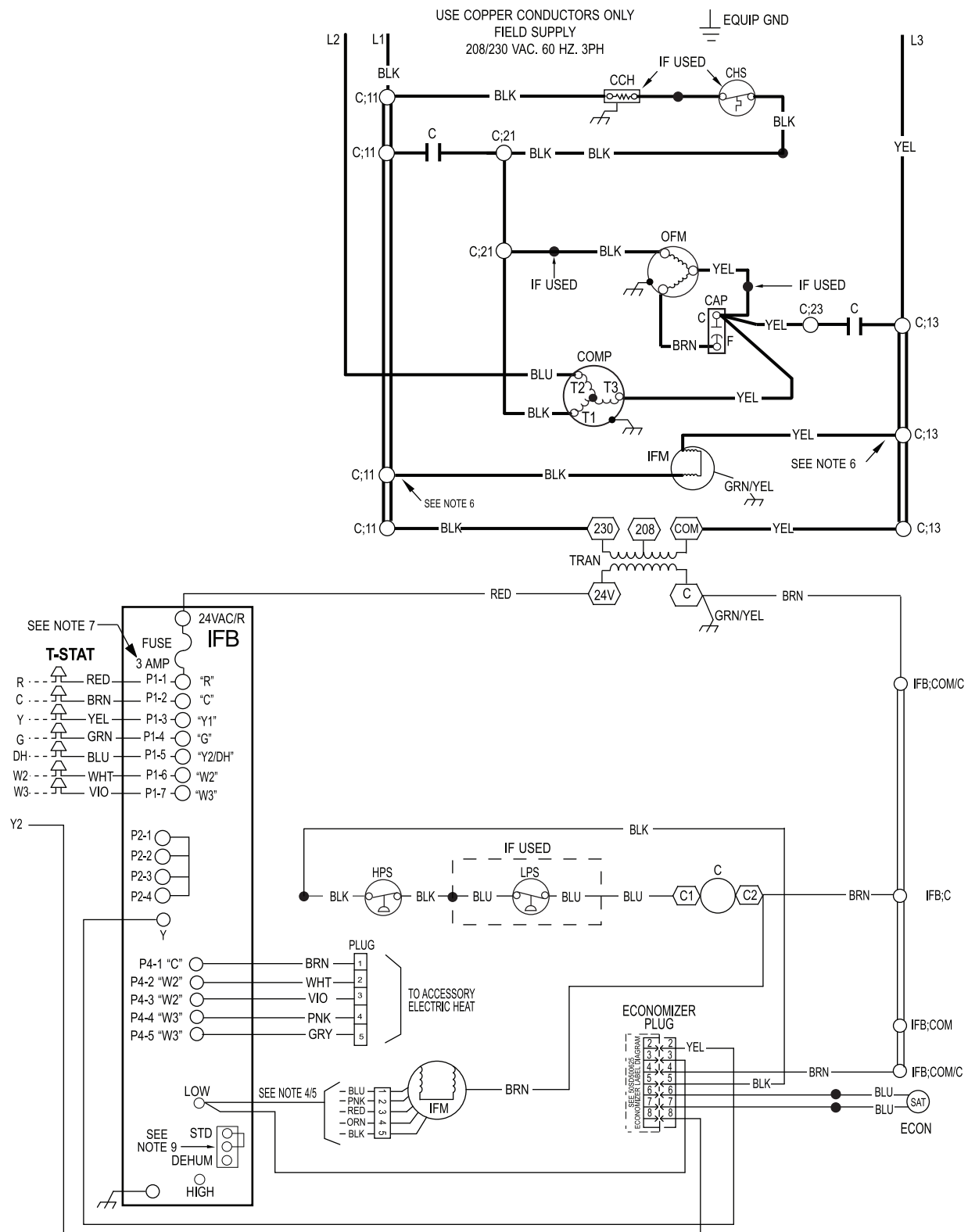
NOTES:

- IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED IT MUST BE REPLACED WITH THE SAME OR IT'S EQUIVALENT.
- SEE PRE SALE LITERATURE FOR THERMOSTATS.
- USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
- REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
- RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
- "DO NOT DISCONNECT PLUG UNDER LOAD".
- THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 287003.
- N.E.C. CLASS 2, 24V.
- DEHUM FEATURE CANNOT BE USED WHEN ECONOMIZER IS INSTALLED.
- UNIT FACTORY - SHIPPED IN STD MODE.
- CCH NOT USED ON ALL UNITS.

A150504

50VL-C

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



50VL500617 REV. -



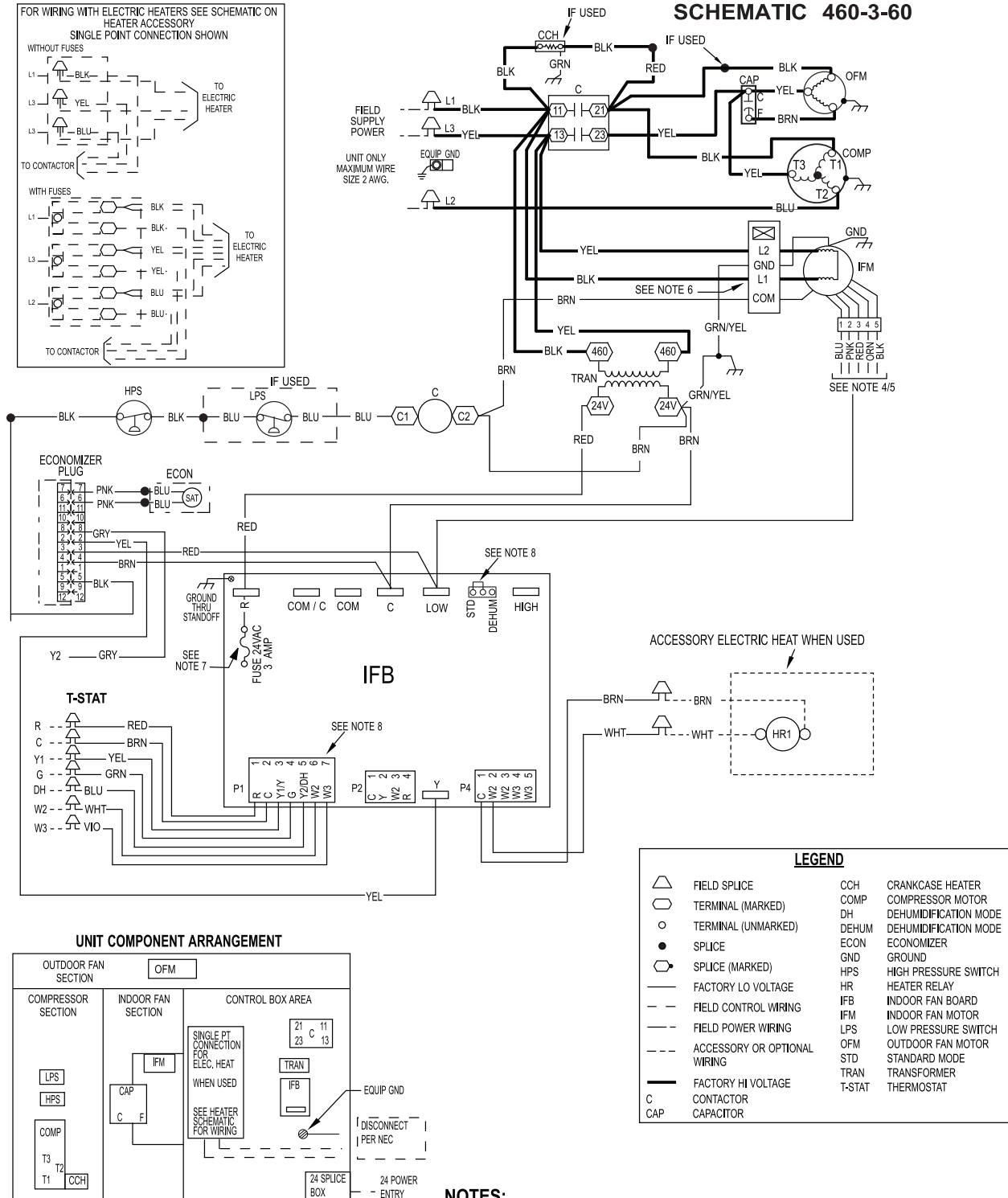
A150514

CONNECTION WIRING SCHEMATIC 460-3-60

CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

SCHEMATIC 460-3-60



NOTES:

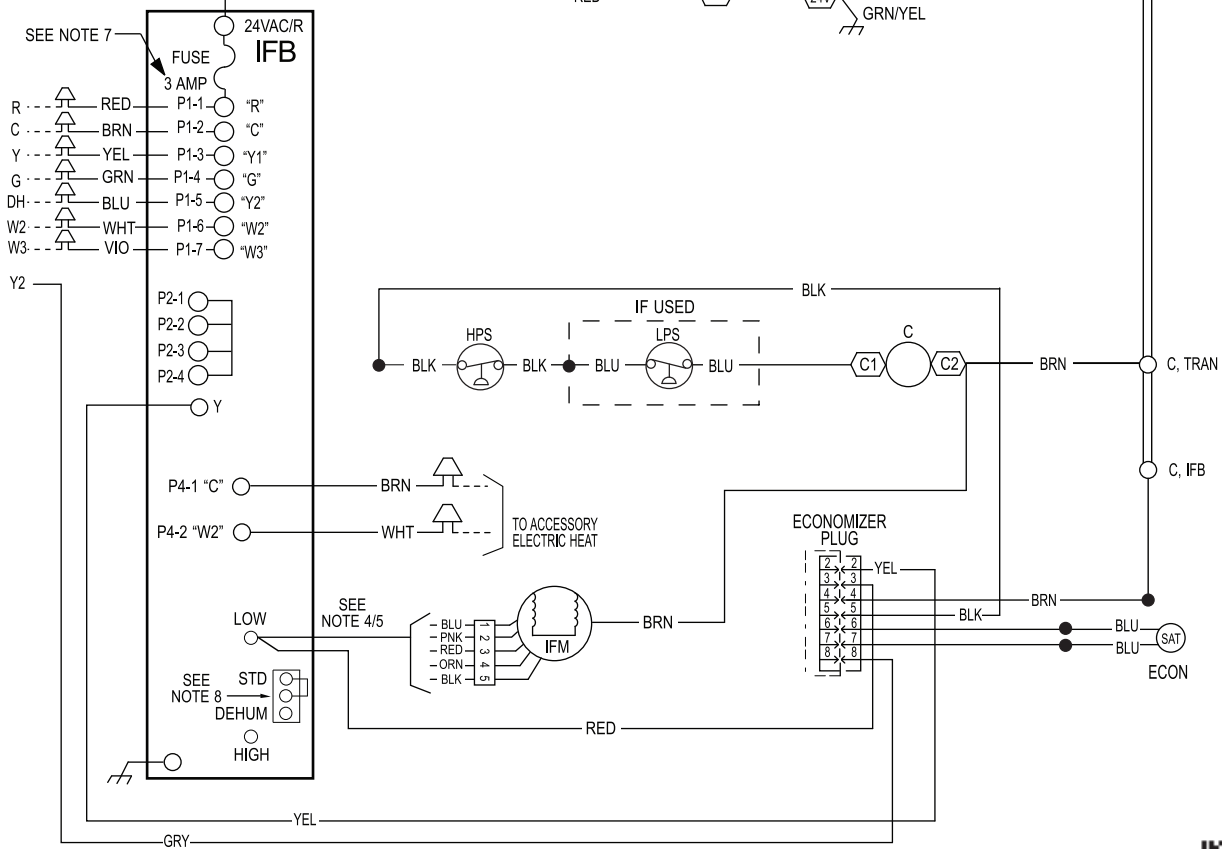
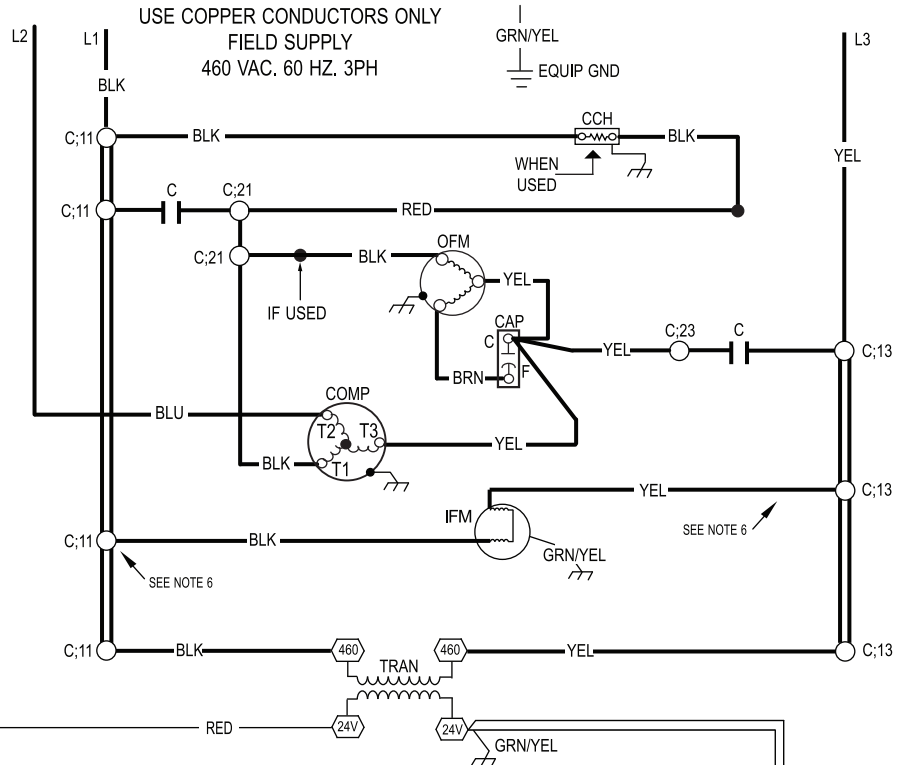
- IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED IT MUST BE REPLACED WITH THE SAME OR IT'S EQUIVALENT.
- SEE PRE SALE LITERATURE FOR THERMOSTATS.
- USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
- REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
- RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
- "DO NOT DISCONNECT PLUG UNDER LOAD".
- THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 287003.
- DEHUM FEATURE CANNOT BE USED WHEN ECONOMIZER IS INSTALLED.
- UNIT FACTORY - SHIPPED IN STD MODE.
- N.E.C. CLASS 2, 24V.
- CCH NOT USED ON ALL UNITS.

A150505

LADDER WIRING SCHEMATIC 460-3-60

LADDER WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



50VL500619 REV. -

50VL500619 REV. -



A150515

CONTROLS

Operating sequence

Cooling — When the system thermostat calls for cooling, 24 V is supplied to the “Y” and “G” terminals of the thermostat. This completes the circuit to the contactor coil (C) and indoor (evaporator) fan relay (IFR). The normally open contacts of energized C close and complete the circuit through compressor motor (COMP) to outdoor (condenser) fan motor (OFM). Both motors start instantly. The set of normally open contacts of energized IFR close and complete the circuit through IFM. The IFM starts instantly.

On the loss of the thermostat call for cooling, 24 V is removed from both the “Y” and “G” terminals (provided the fan switch is in the “AUTO” position) de-energizing the compressor contactor and opening the contacts supplying power to compressor/OFM. After a 90-second delay, the IFM shuts off. If the thermostat fan selector switch is in the “ON” position, the IFM will run continuously. For the 460 V units there is a step down autotransformer supplying 230 V to the Indoor Fan Motor.

NOTE: On units with a Time Guard® II device: Once the compressor has started and then stopped, it cannot be restarted again until 5 minutes have elapsed.

Heating — If accessory electric heaters are installed, on a call for heat, circuit R-W is made through the thermostat contacts. Circuit R-G is made which energizes the IFR. If the heaters are staged, then the thermostat closes a second set of contacts (W2) when second stage is required. When thermostat is satisfied, contacts open, deenergizing the heater relay and the IFR.

GUIDE SPECIFICATIONS

Packaged Air Conditioner System Constant Volume Application HVAC Guide Specifications

Size Range: **2 to 5 Tons, Nominal Cooling**

SYSTEM DESCRIPTION

Outdoor rooftop mounted or ground mounted, electric cooling unit utilizing a hermetic scroll compressor for cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings. Condenser fan/coil section shall have a draw-thru design with vertical discharge for minimum sound levels.

QUALITY ASSURANCE

- A. Unit shall be rated in accordance with AHRI Standards 210/240 and 270-1995.**
- B. Unit shall be designed in accordance with UL Standard 1995.**
- C. Unit shall be manufactured in a facility registered to ISO 9001 manufacturing quality standard.**
- D. Unit shall be UL listed and c-UL certified as a total package for safety requirements.**
- E. Roof curb shall be designed to conform to NRCA Standards.**
- F. Insulation and adhesives shall meet NFPA 90A requirements for flame spread and smoke generation.**
- G. Cabinet insulation shall meet ASHRAE Standard 62P.**

DELIVERY, STORAGE AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

EQUIPMENT

A. General:

Factory-assembled, single-piece, heating and cooling unit. Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge with R-410A refrigerant, and special features required prior to field start-up.

B. Unit Cabinet:

- 1. Unit cabinet shall be constructed of phosphated, zinc-coated, pre-painted steel capable of with-standing 500 hours in salt spray.
- 2. Normal service shall be through 3 removable cabinet panels.
- 3. The unit shall be constructed on a rust proof unit base that has an externally trapped, integrated sloped drain.
- 4. Evaporator fan compartment top surface shall be insulated with a minimum 1/2-in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The evaporator wall sections will be insulated with a minimum semi-rigid foil-faced board capable of being wiped clean. Aluminum foil-faced fiberglass insulation shall be used in the entire indoor air cavity section.
- 5. Unit shall have a field-supplied condensate trap.

C. Fans:

- 1. The evaporator fan shall be an ECM Motor.
- 2. Fan wheel shall be made from steel, be double-inlet type with forward curved blades with corrosion resistant finish. Fan wheel shall be dynamically balanced.
- 3. Condenser fan shall be direct drive propeller type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically.

D. Compressor:

- 1. Fully hermetic compressors with factory-installed vibration isolation.

E. Coils:

Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed. Tube sheet openings shall be belled to prevent tube wear.

F. Refrigerant Components:

Refrigerant expansion device shall be of the TXV (thermostatic expansion valve) or fixed orifice type.

G. Filters:

Filter section shall consist of field-installed, throwaway, 1-in. (25 mm) thick fiberglass filters of commercially available sizes.

H. Controls and Safeties:

- 1. Unit controls shall be complete with a self-contained low voltage control circuit.
- 2. Compressors shall incorporate a solid-state compressor protector that provides reset capability.

I. Operating Characteristics:

- 1. Unit shall be capable of starting and running at 125°F (51°C) ambient outdoor temperature per maximum load criteria of AHRI Standard 210.
- 2. Compressor with standard controls shall be capable of operation down to 40°F (4°C) ambient outdoor temperature.
- 3. Units shall be provided with fan time delay to prevent cold air delivery before the heat exchanger warms up.
- 4. Unit shall be provided with 60-second fan time delay after the thermostat is satisfied.

J. Electrical Requirements:

All unit power wiring shall enter the unit cabinet at a single location.

K. Motors:

- 1. Compressor motors shall be of the refrigerant-cooled type with line-break thermal and current overload protection.
- 2. All fan motors shall have permanently lubricated bearings, and inherent, automatic reset, thermal overload protection.

L. Special Features:

- 1. Coil Options:
Base unit with tin plated indoor coil hairpins.
- 2. Compressor Start Kit (single phase units only):
Shall provide additional starting torque for single-phase compressors.
- 3. Thermostat:
To provide for one-stage heating and cooling in addition manual or automatic changeover and indoor fan control.
- 4. Crankcase Heater:
Shall provide anti-floodback protection for low-load cooling applications.
- 5. Economizer:
(Horizontal - Field installed accessory)
(Vertical - Field installed accessory)
 - a. Economizer controls capable of providing free cooling using outside air.
 - b. Equipped with low leakage dampers not to exceed 3% leakage, at 1.0 IN. W.C. pressure differential.
 - c. Spring return motor shuts off outdoor damper on power failure.

GUIDE SPECIFICATIONS (CONT)

6. Electric Heaters:
 - a. Electric heater shall be available as a field-installed option.
 - b. Heater elements shall be open wire type, adequately supported and insulated with ceramic bushings.
 - c. Electric heater packages must provide single point power connection capability.
7. Filter Rack Kit:

Shall provide filter mounting for downflow applications. Offered as a field installed accessory.
8. Flat Roof Curb:

Curbs shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.
9. Low Ambient Package:

Shall consist of a solid-state control and condenser coil temperature sensor for controlling condenser-fan motor operation, which shall allow unit to operate down to 0°F (-17.7°C) outdoor ambient temperature when properly installed.
10. Manual Outdoor Air Damper:

Package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
11. Square-To-Round Duct Transitions (24-48 size):

Shall have the ability to convert the supply and return openings from rectangular to round.
12. Time Guard II
Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU-MP control. Offered as a field installed accessory.
13. Dual Point Electric Heaters
Allows you to power the electric heater and unit contactor separately by having two individual field power supply circuits connected respectively.
14. Low Cabinet Air Leakage
Cabinet air leakage less than 2.0% at 1.0 in. W.C. and cabinet air leakage less than 1.4% at 0.5 in. W.C., when tested in accordance with ASHRAE standard 193. Available as a factory installed option.
15. Louver Metal Outdoor Coil Grille
Shall provide hail and vandalism protection. Available as a field installed accessory.
16. Low Pressure Switch
Kit is designed for use when a low pressure control is desired. This kit provides added reliability for the compressor. Offered as a field installed accessory.

50VL-C

**Comfort™ 14 SEER Single-Packaged Air
Conditioner System with Puron® (R-410A) Refrigerant
Single Phase 2-5 Nominal Tons (Sizes 24-60)
Three Phase 3-5 Nominal Tons (Sizes 36-60)**



Installation Instructions

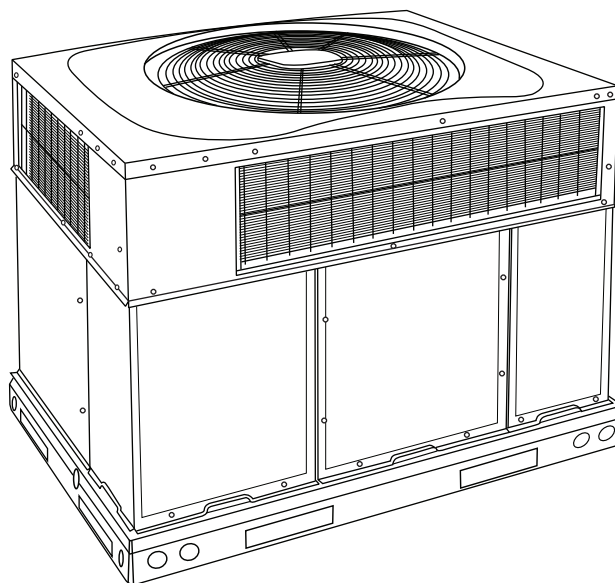
IMPORTANT: Effective January 1, 2015, all split system and packaged air conditioners must be installed pursuant to applicable regional efficiency standards issued by the Department of Energy.

NOTE: Read the entire instruction manual before starting the installation.

NOTE: Installer: Make sure the Owner's Manual and Service Instructions are left with the unit after installation.

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A09034

Fig. 1 - Unit 50VL-C

SAFETY CONSIDERATIONS

Improper installation adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes, the current editions of the National Electrical Code (NEC) NFPA 70. In Canada refer to the current editions of the Canadian electrical Code CSA C22.1.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing or servicing system, always turn off main power to system and install lockout tag. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

Failure to relieve system pressure could result in personal injury and/or death.

1. Relieve pressure and recover all refrigerant before servicing existing equipment, and before final unit disposal. Use all service ports and open all flow-control devices, including solenoid valves.
2. Federal regulations require that you do not vent refrigerant into the atmosphere. Recover during system repair or final unit disposal.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

When removing access panels (see Fig. 17) or performing maintenance functions inside your unit, be aware of sharp sheet metal parts and screws. Although special care is taken to reduce sharp edges to a minimum, be extremely careful and wear appropriate clothing, safety glasses and gloves when handling parts or reaching into the unit.

INTRODUCTION

This packaged air conditioner is fully self-contained and designed for outdoor installation (See Fig.1). See Fig. 2 and 3 for unit dimensions. All unit sizes have discharge openings for both horizontal and downflow configurations, and are factory shipped with all downflow duct openings covered. The unit may be installed either on a rooftop or on a ground-level cement slab. (See Fig. 4 for roof curb dimensions.)

RECEIVING AND INSTALLATION

Step 1 — Check Equipment

IDENTIFY UNIT

The unit model number and serial number are printed on the unit informative plate. Check this information against shipping papers.

INSPECT SHIPMENT

Inspect for shipping damage before removing packaging materials. If unit appears to be damaged or is torn loose from its anchorage, have it examined by transportation inspectors before removal. Forward claim papers directly to transportation company. Manufacturer is not responsible for any damage incurred in transit. Check all items against shipping list. Immediately notify the nearest equipment distribution office if any item is missing. To prevent loss or damage, leave all parts in original packages until installation.

If the unit is to be mounted on a curb in a downflow application, review Step 7 to determine which method is to be used to remove the downflow panels before rigging and lifting into place. The panel removal process may require the unit to be on the ground.

Step 2 — Provide Unit Support

IMPORTANT: The unit must be secured to the curb by installing screws through the bottom of the curb flange and into the unit base rails. When installing large base units onto the common curb, the screws must be installed before allowing the full weight of the unit to rest on the curb. A minimum of six screws are required for large base units. Failure to secure unit properly could result in an unstable unit. See Warning near Rigging/Lifting information and accessory curb instructions for more details.

For hurricane tie downs, contact distributor for details and PE (Professional Engineering) Certificate if required.

ROOF CURB

Install accessory roof curb in accordance with instructions shipped with curb (See Fig. 4). Install insulation, cant strips, roofing, and flashing. Ductwork must be attached to curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a water tight seal. Install gasketing material supplied with the roof curb. Improperly applied gasketing also can result in air leaks and poor unit performance.

Curb should be level to within 1/4 in. (6.35 mm) (See Fig 6). This is necessary for unit drain to function properly. Refer to accessory roof curb installation instructions for additional information as required.

Installation on older “G” series roof curbs.

Two accessory kits are available to aid in installing a new “G” series unit on an old “G” roof curb.

1. Accessory kit number CPADCURB001A00, (small chassis) and accessory kit number CPADCURB002A00, (large chassis) includes roof curb adapter and gaskets for the perimeter seal and duct openings. No additional modifications to the curb are required when using this kit.
2. An alternative to the adapter curb is to modify the existing curb by removing the outer horizontal flange and use accessory kit number CPGSKTKIT001A00 which includes spacer blocks (for easy alignment to existing curb) and gaskets for the perimeter seal and duct openings. This kit is used when existing curb is modified by removing outer horizontal flange.

⚠ CAUTION

UNIT/STRUCTURAL DAMAGE HAZARD

Failure to follow this caution may result in property damage.

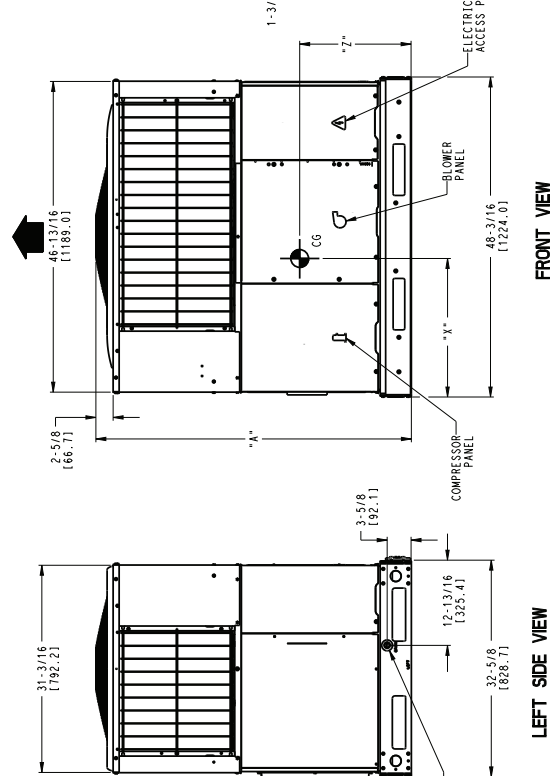
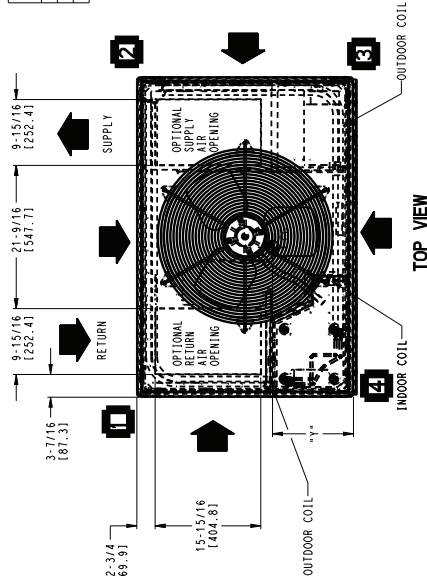
Ensure there is sufficient clearance for saw blade when cutting the outer horizontal flange of the roof curb so there is no damage to the roof or flashing.

SLAB MOUNT

Place the unit on a solid, level pad that is at least 2 in. (51 mm) above grade. The pad should extend approximately 2 in. (51 mm) beyond the casing on all 4 sides of the unit (See Fig. 7). Do not secure the unit to the pad *except* when required by local codes.

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT. LB. KG.	UNIT HEIGHT IN/MM	Y	X	Y	X	CENTER OF GRAVITY IN/MM
			"A"					
50VL-C24--30	208/230-1 60	304 138.0	43-3/4 1111	20-1/2 520.7	15-3/4 400.1	16-5/8 422.3		
50VL-C30--30	208/230-1 60	338 152.0	45-3/4 1162	20-1/2 520.7	15-3/4 400.1	16-5/8 422.3		
50VL-C36--30	208/230-1 60, 208/230-3 60, 460-3 60	349 158.0	51-3/4 1315	20-1/2 520.7	15-3/4 400.1	17-5/8 441.3		

UNIT	VOLTAGE	CORNER WEIGHT LB/KG	"A"	"B"	"C"	"D"
24	208/230	45.6 20.7	60.8 27.6	91.2 41.4	106.4 48.3	
30	208/230	50.4 22.9	67.2 30.5	100.8 45.7	117.6 53.3	
36	208/230/460	52.4 23.7	69.8 31.7	104.7 47.5	122.2 55.4	



REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

	INCHES (MM)
TOP OF UNIT.....	14 (355.6)
DUCT SIDE OF UNIT.....	2 (50.8)
SIDE OPPOSITE DUCTS.....	14 (355.6)
BOTTOM OF UNIT.....	6 (152.4)
ELECTRICAL PANEL.....	36 (914.4)

NEC REQUIRED CLEARANCES:

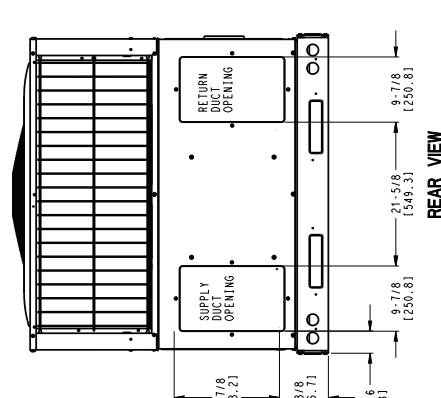
	INCHES (MM)
BETWEEN UNITS, POWER ENTRY SIDE.....	12 (304.8)
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE.....	36 (914.0)
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE.....	42 (1066.8)

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

	INCHES (MM)
EMAP, COIL ACCESS SIDE.....	36 (914.0)
POWER ENTRY SIDE.....	42 (1066.8)
DUCT SIDE OF UNIT.....	14 (355.6)
UNIT TOP (FOR NEC REQUIREMENTS).....	48 (1219.2)
SIDE OPPOSITE DUCTS.....	36 (914.0)
DUCT PANEL.....	12 (304.8)

*MINIMUM DISTANCES IF UNIT IS PLACED LESS THAN 12 (304.8) FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAY BE COMPROMISED.

DIMENSIONS IN () ARE IN MILLIMETERS



50VL500566

Fig. 2 - 24-36 Unit Dimensions

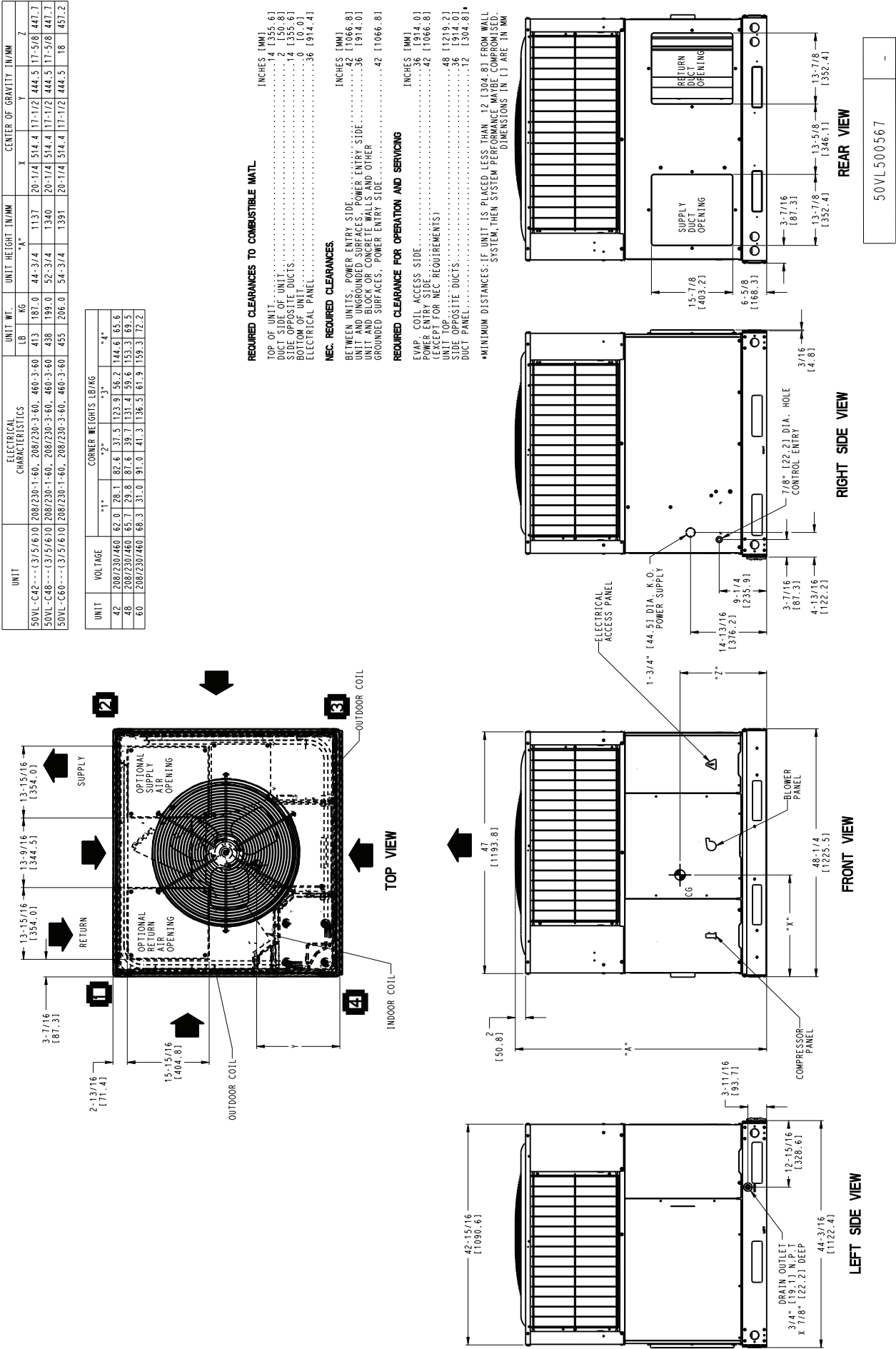
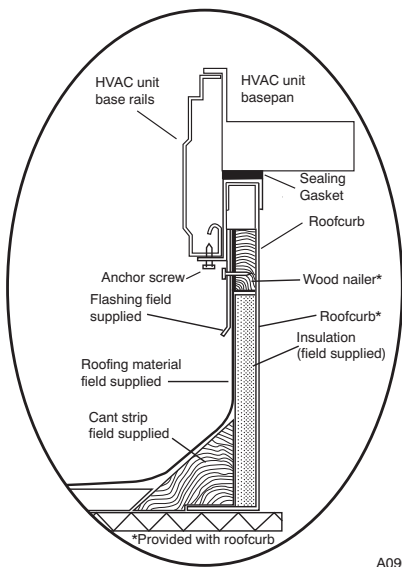
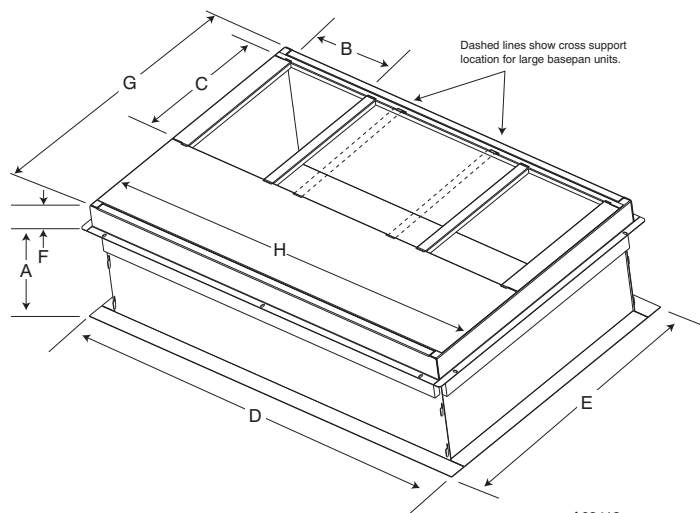


Fig. 3 - 42-60 Unit Dimensions



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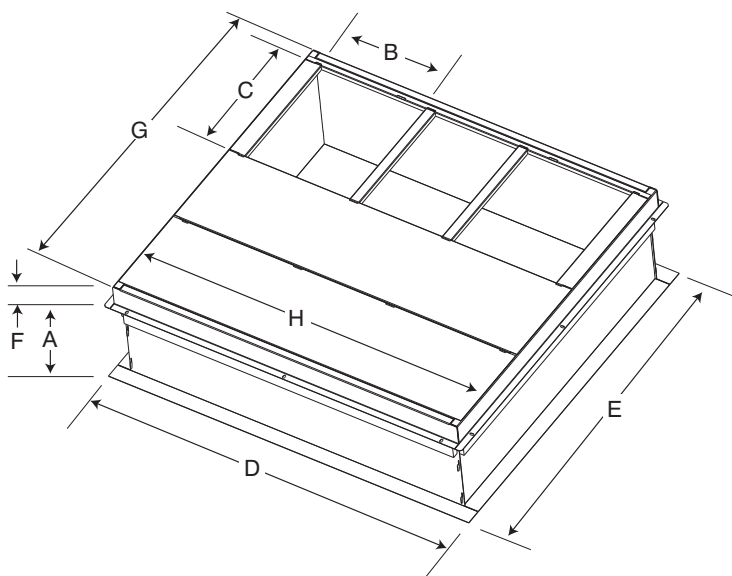
ROOF CURB DETAIL



SMALL/COMMON CURB

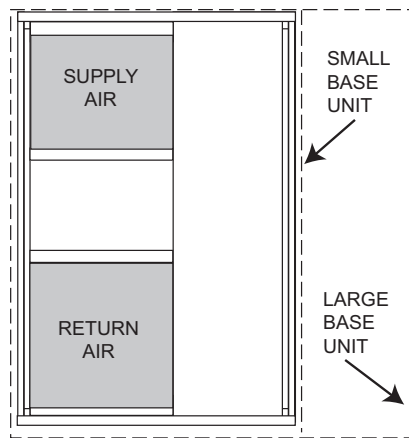
A09413

50VL--C



LARGE CURB

A09415



UNIT PLACEMENT ON
COMMON CURB

A09094

SMALL OR LARGE BASE UNIT

A09414

UNIT SIZE	CATALOG NUMBER	A IN. (mm)	B (small/common base) IN. (mm)*	B (large base) IN. (mm)*	C IN. (mm)	D IN. (mm)	E IN. (mm)	F IN. (mm)	G IN. (mm)	H IN. (mm)			
Small or Large	CPRFCURB010A00	11 (279)	10 (254)	14 (356)	16 (406)	47.8 (1214)	32.4 (822)	2.7 (69)	30.6 (778)	46.1 (1170)			
	CPRFCURB011A00	14 (356)											
Large	CPRFCURB012A00	11 (279)	14 (356)								43.9 (1116)	42.2 (1072)	
	CPRFCURB013A00	14 (356)											

* Part Numbers CPRFCURB010A00 and CPRFCURB011A00 can be used on both small and large basepan units. The cross supports must be located based on whether the unit is a small basepan or a large basepan.

NOTES:

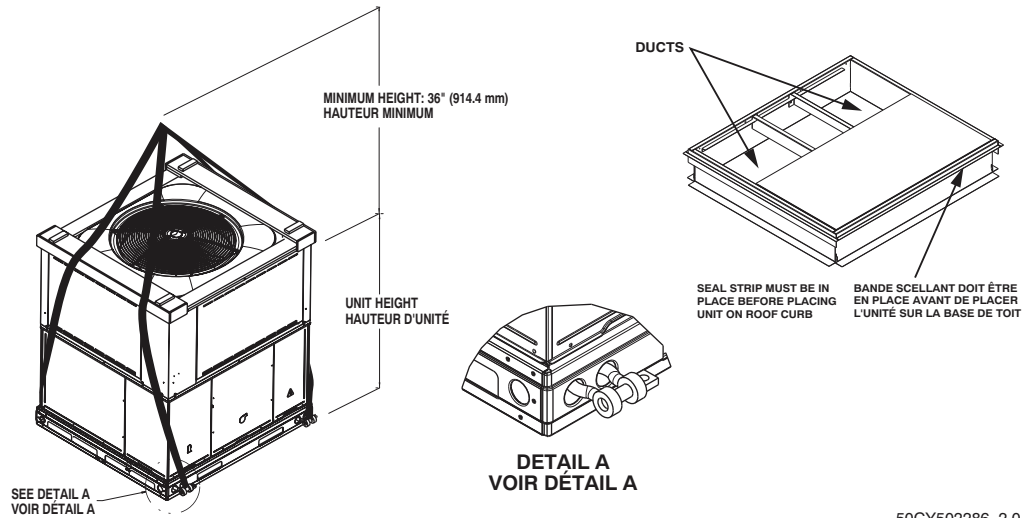
1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Roof curb is made of 16-gauge steel.
4. Attach ductwork to curb (flanges of duct rest on curb).
5. Insulated panels: 1-in. (25.4 mm) thick fiberglass 1 lb. density.

Fig. 4 - Roof Curb Dimensions

⚠ CAUTION - NOTICE TO RIGGERS
⚠ PRUDENCE - AVIS AUX MANIPULATEUR

ACCESS PANELS MUST BE IN PLACE WHEN RIGGING.
PANNEAUX D'ACCES DOIT ÊTRE EN PLACE POUR MANIPULATION.

Use top skid as spreader bar. / Utiliser la palette du haut comme barre de répartition



50CY502286 2.0

A09051

SMALL CABINET							LARGE CABINET						
Unit	24		30		36		Unit	42		48		60	
	lb	kg	lb	kg	lb	kg		lb	kg	lb	kg	lb	kg
Rigging Weight	329	149	361	164	390	177	Rigging Weight	455	206	480	218	497	225

NOTE: See dimensional drawing for corner weighs.

Fig. 5 - Unit Suggested Rigging

Step 3 — Provide Clearances

The required minimum service clearances are shown in Fig. 2 and 3. Adequate ventilation and outdoor air must be provided. The outdoor fan draws air through the outdoor coil and discharges it through the top fan grille. Be sure that the fan discharge does not recirculate to the outdoor coil. Do not locate the unit in either a corner or under an overhead obstruction. The minimum clearance under a partial overhang (such as a normal house overhang) is 48 in. (1219 mm) above the unit top. The maximum horizontal extension of a partial overhang must not exceed 48 in. (1219 mm) **IMPORTANT:** Do not restrict outdoor airflow. An air restriction at either the outdoor-air inlet or the fan discharge may be detrimental to compressor life.

Do not place the unit where water, ice, or snow from an overhang or roof will damage or flood the unit. Do not install the unit on carpeting or other combustible materials. Slab-mounted units should be at least 2 in. (51 mm) above the highest expected water and runoff levels. Do not use unit if it has been under water.

Step 4 — Field-Fabricate Ductwork

Secure all ducts to roof curb and building structure on vertical discharge units. Do not connect ductwork to unit. For horizontal applications, unit is provided with flanges on the horizontal openings. All ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier. If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes. See unit rating plate for any required clearances around ductwork. Cabinet return-air static shall not exceed -.25 IN. W.C.

Step 5 — Rig and Place Unit

Rigging and handling of this equipment can be hazardous for many reasons due to the installation location (roofs, elevated structures, etc.).

Only trained, qualified crane operators and ground support staff should handle and install this equipment.

When working with this equipment, observe precautions in the literature, on tags, stickers, and labels attached to the equipment, and any other safety precautions that might apply.

Training for operators of the lifting equipment should include, but not be limited to, the following:

1. Application of the lifter to the load, and adjustment of the lifts to adapt to various sizes or kinds of loads.
2. Instruction in any special operation or precaution.
3. Condition of the load as it relates to operation of the lifting kit, such as balance, temperature, etc.

Follow all applicable safety codes. Wear safety shoes and work gloves.

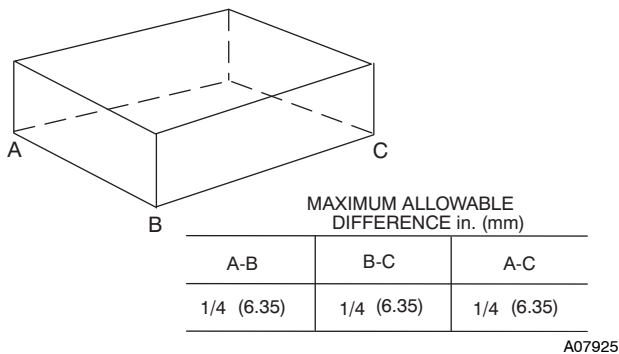


Fig. 6 - Unit Leveling Tolerances

INSPECTION

Prior to initial use, and at monthly intervals, all rigging shackles, clevis pins, and straps should be visually inspected for any damage, evidence of wear, structural deformation, or cracks. Particular attention should be paid to excessive wear at hoist hooking points and load support areas. Materials showing any kind of wear in these areas must not be used and should be discarded.

⚠ WARNING

UNIT FALLING HAZARD

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

Never stand beneath rigged units or lift over people.

1. Leave top shipping skid on the unit for use as a spreader bar to prevent the rigging straps from damaging the unit. If the skid is not available, use a spreader bar of sufficient length to protect the unit from damage.

⚠ WARNING

PROPERTY DAMAGE HAZARD

Failure to follow this warning could result in personal injury.

When straps are taut, the clevis should be a minimum of 36 in. (914 mm) above the unit top cover.

Rigging/Lifting of Unit (See Fig. 5)

⚠ WARNING

UNIT FALLING HAZARD

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

Large base units must be secured to common curb before allowing full weight of unit to rest on curb. Install screws through curb into unit base rails while rigging crane is still supporting unit.

Lifting holes are provided in base rails as shown.

1. Attach shackles, clevis pins, and straps to the base rails of the unit. Be sure materials are rated to hold the weight of the unit (See Fig. 5).
2. Attach a clevis of sufficient strength in the middle of the straps. Adjust the clevis location to ensure unit is lifted level with the ground.

After the unit is placed on the roof curb or mounting pad, remove the top skid.

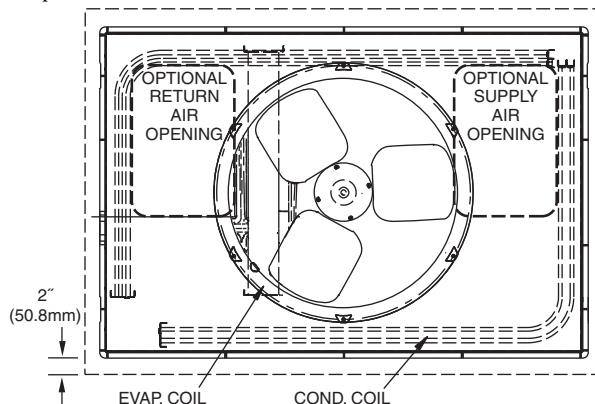


Fig. 7 - Slab Mounting Detail

Step 6 — Connect Condensate Drain

NOTE: When installing condensate drain connection be sure to comply with local codes and restrictions.

Unit disposes of condensate water through a 3/4 in. NPT fitting which exits through the base on the evaporator coil access side. See Fig. 2 and 3 for location.

Condensate water can be drained directly onto the roof in rooftop installations (where permitted) or onto a gravel apron in ground level installations. Install a field-supplied 2-in. (51 mm) condensate trap at end of condensate connection to ensure proper drainage. Make sure that the outlet of the trap is at least 1 in. (25 mm) lower than the drain pan condensate connection to prevent the pan from overflowing (See Fig. 8). When using a gravel apron, make sure it slopes away from the unit.

Connect a drain tube using a minimum of 3/4 -in. PVC or 3/4 -in. copper pipe (all field-supplied) at the outlet end of the 2-in. (51 mm) trap. Do not undersize the tube. Pitch the drain tube downward at a slope of at least 1-in. (25 mm) for every 10 ft (3.1 m) of horizontal run. Be sure to check the drain tube for leaks. Prime trap at the beginning of the cooling season start-up.

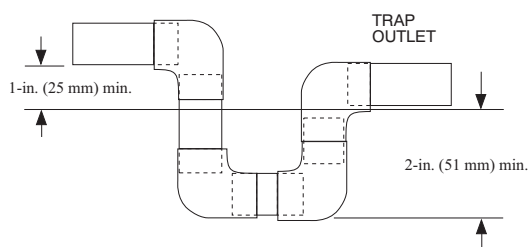


Fig. 8 - Condensate Trap

Step 7 — Install Duct Connections

The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of non-residence type air conditioning and ventilating systems, NFPA 90A or residence type, NFPA 90B and/or local codes and ordinances.

Select and size ductwork, supply-air registers, and return air grilles according to ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) recommendations. The unit has duct flanges on the supply- and return-air openings on the side of the unit.

When designing and installing ductwork, consider the following:

1. All units should have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
2. Avoid abrupt duct size increases and reductions. Abrupt change in duct size adversely affects air performance.

IMPORTANT: Use flexible connectors between ductwork and unit to prevent transmission of vibration. Use suitable gaskets to ensure weather-tight and airtight seal. When electric heat is installed, use fireproof canvas (or similar heat resistant material) connector between ductwork and unit discharge connection. If flexible duct is used, insert a sheet metal sleeve inside duct. Heat resistant duct connector (or sheet metal sleeve) must extend 24-in. (610 mm) from electric heater element.

3. Size ductwork for cooling air quantity (cfm). The minimum air quantity for proper electric heater operation is listed in Table 2. Heater limit switches may trip at air quantities below those recommended.
4. Seal, insulate, and weatherproof all external ductwork. Seal, insulate and cover with a vapor barrier all ductwork passing through conditioned spaces. Follow latest Sheet Metal and Air Conditioning Contractors National Association

(SMACNA) and Air Conditioning Contractors Association (ACCA) minimum installation standards for residential heating and air conditioning systems.

5. Secure all ducts to building structure. Flash, weatherproof, and vibration-isolate duct openings in wall or roof according to good construction practices.

CONFIGURING UNITS FOR DOWNFLOW (VERTICAL) DISCHARGE

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before performing service or maintenance operations on the system, turn off main power to unit and install lockout tag. There may be more than one disconnect switch.

1. Open all electrical disconnects and install lockout tag before starting any service work.
2. Remove horizontal (metal) ductcovers to access vertical (downflow) discharge duct knockouts in unit basepan. (See Fig. 9.)

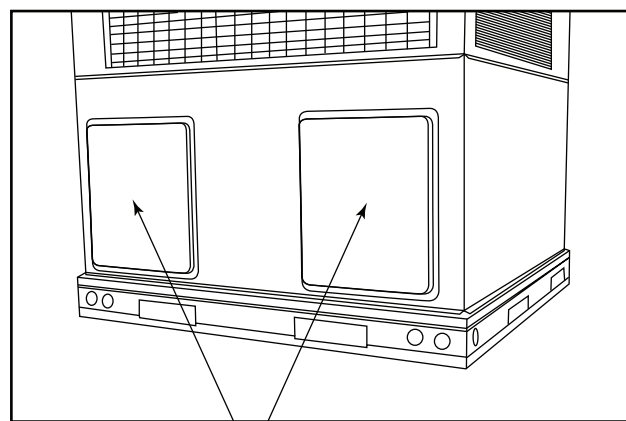
To remove downflow return and supply knockout covers, break front and right side connecting tabs with a screwdriver and hammer. Push cover down to break rear and left side tabs.

NOTE: These panels are held in place with tabs similar to an electrical knockout. Reinstall horizontal duct covers (Fig. 9) shipped on unit from factory. Insure openings are air and watertight.

NOTE: The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of nonresidence-type air conditioning and ventilating systems, NFPA 90A or residence-type, NFPA 90B; and/or local codes and ordinances.

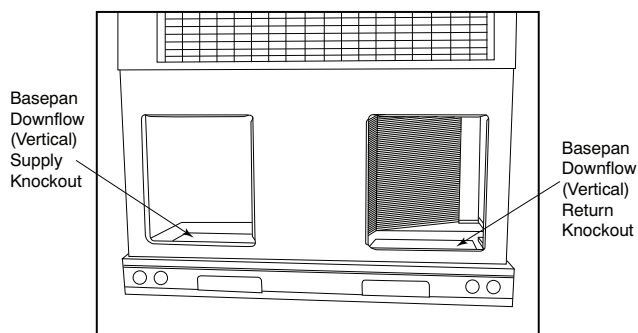
Adhere to the following criteria when selecting, sizing, and installing the duct system:

1. Units are shipped for side shot installation.
2. Select and size ductwork, supply-air registers, and return-air grilles according to American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommendations.
3. Use flexible transition between rigid ductwork and unit to prevent transmission of vibration. The transition may be screwed or bolted to duct flanges. Use suitable gaskets to ensure weather-tight and airtight seal.
4. All units must have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
5. Size all ductwork for maximum required airflow (either heating or cooling) for unit being installed. Avoid abrupt duct size increases or decreases or performance may be affected.
6. Adequately insulate and weatherproof all ductwork located outdoors. Insulate ducts passing through unconditioned space, and use vapor barrier in accordance with latest issue of Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors of America (ACCA) minimum installation standards for heating and air conditioning systems. Secure all ducts to building structure.
7. Flash, weatherproof, and vibration-isolate all openings in building structure in accordance with local codes and good building practices.



Horizontal Duct Covers

A09061



A09088

Fig. 9 - Supply and Return Duct Opening

Step 8 — Install Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

⚠ CAUTION

UNIT COMPONENT DAMAGE HAZARD

Failure to follow this caution may result in damage to the unit being installed.

1. Make all electrical connections in accordance with NFPA 70 (NEC) (latest edition) and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA standard C22.1 Canadian Electrical Code Part 1 and applicable local codes. Refer to unit wiring diagram.
2. Use only copper conductor for connections between field-supplied electrical disconnect switch and unit. **DO NOT USE ALUMINUM WIRE.**
3. Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate. On 3-phase units, ensure phases are balanced within 2 percent. Consult local power company for correction of improper voltage and/or phase imbalance.
4. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc.

HIGH-VOLTAGE CONNECTIONS

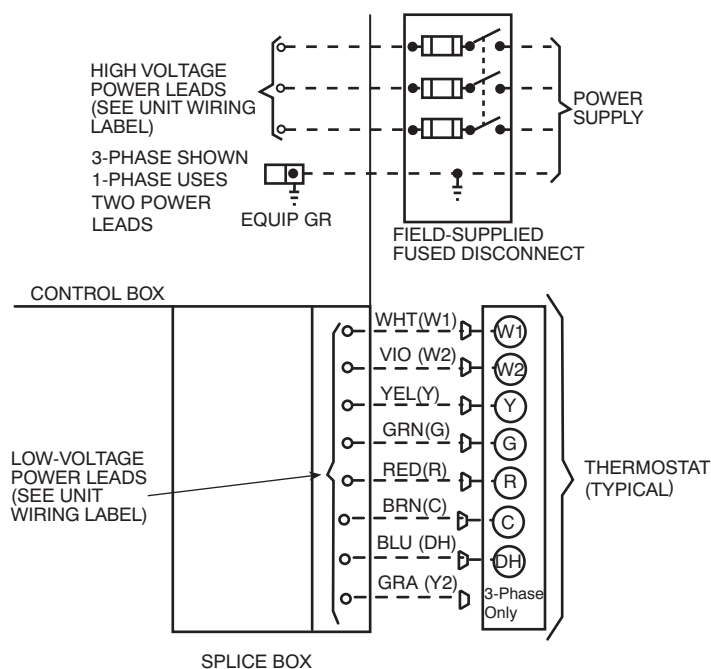
The unit must have a separate electrical service with a field-supplied, waterproof disconnect switch mounted at, or within sight from the unit. Refer to the unit rating plate, NEC and local codes for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing.

The field-supplied disconnect may be mounted on the unit over the high-voltage inlet hole when the standard power and low-voltage entry points are used. See Fig. 2 and 3 for acceptable location.

See unit wiring label (Fig. 12, 13 and 14) and Fig. 10 for reference when making high voltage connections. Proceed as follows to complete the high-voltage connections to the unit.

Single phase units:

1. Run the high-voltage (L1, L2) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.



A09066

Fig. 10 - High- and Control-Voltage Connections

5. Connect field wire L2 to yellow wire on connection 23 of the compressor contactor.

Three-phase units:

1. Run the high-voltage (L1, L2, L3) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.
5. Connect field wire L3 to yellow wire on connection 13 of the compressor contactor.
6. Connect field wire L2 to blue wire from compressor.

SPECIAL PROCEDURES FOR 208-V OPERATION**⚠ WARNING****ELECTRICAL SHOCK HAZARD**

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

Before installing or servicing system, always turn off main power to system and install lockout tag. With disconnect switch open, move black wire from transformer (3/16 in.)(4.8 mm) terminal marked 230 to terminal marked 208. This retaps transformer to primary voltage of 208 vac.

CONTROL VOLTAGE CONNECTIONS

NOTE: Do not use any type of power-stealing thermostat. Unit control problems may result.

Use no. 18 American Wire Gage (AWG) color-coded, insulated (35°C minimum) wires to make the control voltage connections between the thermostat and the unit. If the thermostat is located more than 100 ft (30.5 m) from the unit (as measured along the control voltage wires), use no. 16 AWG color-coded, insulated (35° C minimum) wires.

STANDARD CONNECTION

Locate the seven (eight for 3-phase) low voltage thermostat leads in 24 volt splice box. A gray wire is standard on 3-phase units for connection to an economizer. See Fig. 10 for connection diagram. Run the low-voltage leads from the thermostat, through the control wiring inlet hole grommet (Fig. 2 and 3), and into the low-voltage splice box. Provide a drip loop before running wires through panel. Secure and strain relief all wires so that they do not interfere with operation of unit.

If an accessory electric heater is installed, low voltage leads from heater must be connected to factory supplied control leads from Indoor Fan Board P4 connector.

NOTE: If the unit 24V wires do not have a matching receptacle, cut the 24V wires from the electric heater plug, strip the ends, and wire nut together to match the schematic connections. If the electric heater 24V wires do not have a matching plug, cut the 24V wires from the unit receptacle, strip the ends, and wire nut together to match the schematic connections.

Factory wires are provided for electric heat staging W1 and W2 (W2 and W3 on IFB). If room thermostat has only one stage of supplemental heat, connect white and violet wires shown in Fig. 10 to second stage heat field wire.

Some electric heaters have four control wires (plus common wire). Consult unit wiring diagram and electric heater wiring diagram for additional details.

TRANSFORMER PROTECTION

The transformer is of the energy-limiting type, however a direct short will likely blow a secondary fuse. If an overload or short is present, correct overload condition and check for blower fuse on Indoor Fan Board. Replace fuse as required with correct size and rating.

Table 1 – Physical Data-Unit

UNIT SIZE	24	30	36	42	48	60
NOMINAL CAPACITY (ton)	2	2 – 1/2	3	3 – 1/2	4	5
SHIPPING WEIGHT lb.	329	361	390	455	480	497
SHIPPING WEIGHT (kg)	149	164	177	206	218	225
COMPRESSORS	Rotary	Reciprocating	Scroll			
Quantity	1					
REFRIGERANT (R – 410A)						
Quantity lb	5.3	5.5	8.2	6.2	9.2	9.8
Quantity (kg)	2.4	2.5	3.7	2.8	4.2	4.5
REFRIGERANT METERING DEVICE	Orifice		TXV	Orifice		
ORIFICE ID in./mm	.059 / 1.5	.061 / 1.55	N/A	.073 / 1.85	.080 / 2.03	.084 / 2.14
OUTDOOR COIL						
Rows...Fins/in.	1...21	1...21	1...21	1...21	1...21	1...21
Face Area (sq ft)	11.9	13.6	18.8	13.6	21.4	23.3
OUTDOOR FAN						
Nominal Cfm	2500	2700	3200	3600	3600	4200
Diameter in.	24	24	24	26	26	26
Diameter (mm)	609.6	609.6	609.6	660.4	660.4	660.4
Motor Hp (Rpm)	1/12 (810)	1/10 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)
INDOOR COIL						
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	4.7	4.7	5.6
INDOOR BLOWER						
Nominal Cooling Airflow (Cfm)	800	1000	1150	1350	1550	1750
Size in.	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	3/4 (1000)	1/2 (1075)	1.0 (1075)	1.0 (1040)
HIGH – PRESSURE SWITCH (psig) Cut – out Reset (Auto)	650 +/- 15 420 +/- 25					
LOSS – OF – CHARGE / LOW – PRES- SURE SWITCH (psig) cut – out Reset (auto)	20 +/- 5 45 +/- 10	N/A				
RETURN – AIR FILTERS†‡				1 each 24x14x1 610x356x25 24x15x1 610x406x25		1 each 24x16x1 610x406x25 24x18x1 610x457x25
Throwaway Size in.	2 each 20x12x1					
Throwaway Size (mm)	508x305x25					

† Required filter sizes shown are based on the larger of the AHRI (Air Conditioning Heating and Refrigeration Institute) rated cooling airflow or the heating air-flow velocity of 300 to 350 ft/minute for throwaway type or 450 ft/minute for high – capacity type. Air filter pressure drop for non – standard filters must not exceed 0.08 in. W.C.

‡ If using accessory filter rack refer to the filter rack installation instructions for correct filter sizes and quantity.

Table 2 – Minimum Airflow for Safe Electric Heater Operation (CFM)

SIZE	24	30	36	42	48	60
Cfm	800	1000	1200	1400	1600	1750

PRE-START-UP

WARNING

ENVIRONMENTAL, FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

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

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Relieve and recover all refrigerant from system before touching or disturbing compressor plug if refrigerant leak is suspected around compressor terminals.
3. Never attempt to repair soldered connection while refrigerant system is under pressure.
4. Do not use torch to remove any component. System contains oil and refrigerant under pressure.
5. To remove a component, wear protective goggles and proceed as follows:
 - a. Shut off electrical power to unit and install lockout tag.
 - b. Relieve and reclaim all refrigerant from system using both high- and low-pressure ports.
 - c. Cut component connecting tubing with tubing cutter and remove component from unit.
 - d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels (see Fig. 17).
2. Read and follow instructions on all DANGER, WARNING, CAUTION, and INFORMATION labels attached to, or shipped with unit.
3. Make the following inspections:
 - a. Inspect for shipping and handling damages, such as broken lines, loose parts, disconnected wires, etc.
 - b. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
 - c. Ensure wires do not touch refrigerant tubing or sharp sheet metal edges.
 - d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
 - a. Make sure that condensate drain pan and trap are filled with water to ensure proper drainage.
 - b. Make sure that all tools and miscellaneous loose parts have been removed.

START-UP

Step 1 — Check for Refrigerant Leaks

WARNING



EXPLOSION HAZARD

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

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

Proceed as follows to locate and repair a refrigerant leak and to charge the unit:

1. Locate leak and make sure that refrigerant system pressure has been relieved and reclaimed from both high- and low-pressure ports.
2. Repair leak following accepted practices.

NOTE: Install a filter drier whenever the system has been opened for repair.

3. Add a small charge of Puron (R-410A) refrigerant vapor to system and leak-test unit.
4. Recover refrigerant from system and evacuate to 500 microns if no additional leaks are found.
5. Charge unit with Puron (R-410A) refrigerant, using an accurate scale. Refer to unit rating plate for required charge.

Step 2 — Start-Up Cooling Section And Make Adjustments

Complete the required procedures given in the Pre-Start-Up section before starting the unit. Do not jumper any safety devices when operating the unit. Do not operate the unit when the outdoor temperature is below 40°F (4°C) (unless accessory low-ambient kit is installed). Do not rapid cycle the compressor. Allow 5 minutes between “on” cycles to prevent compressor damage.

CHECKING COOLING CONTROL OPERATION

Start and check the unit for proper cooling control operation as follows:

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down when FAN switch is placed in AUTO position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO position. Set cooling control below room temperature. Observe that compressor, condenser fan, and evaporator blower motors start. Observe that compressor and outdoor fan shut down when control setting is satisfied and that indoor blower shuts down after 90 second fan time delay expires.

IMPORTANT: Three-phase, scroll compressors are direction oriented. Unit must be checked to ensure proper compressor 3-phase power lead orientation. If not corrected within 5 minutes, the internal protector will shut off the compressor. The 3-phase power leads to the unit must be reversed to correct rotation. When turning backwards, the difference between compressor suction and discharge pressures may be minimal.

CHECKING AND ADJUSTING REFRIGERANT CHARGE

The refrigerant system is fully charged with Puron (R-410A) refrigerant and is tested and factory sealed.

⚠ WARNING



EXPLOSION HAZARD

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

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper Puron (R-410A) charge.

NOTE: Some units have fixed orifice refrigerant metering devices. There is a different charging procedure for both expansion devices. Refer to the correct procedure for your unit.

The charging label and the tables shown refer to system temperatures and pressures in cooling mode only. A refrigerant charging label is attached to the inside of the compressor access panel. (See Fig. 15 Subcool chart for units with TXV and superheat chart for units with fixed orifice.) The chart includes the required liquid line temperature at given discharge line pressures and outdoor ambient temperatures.

A superheat chart is attached to the inside of the compressor access panel for the unit with fixed metering device. Refer to the charging procedure on the label.

An accurate thermocouple- or thermistor-type thermometer, and a gauge manifold are required when using the subcooling charging method for evaluating the unit charge. Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.

NOTE: Allow system to operate for a minimum of 15 minutes before checking or adjusting refrigerant charge.

IMPORTANT: When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system, such as insufficient airflow across either coil or both coils.

Proceed as follows:

1. Remove caps from low- and high-pressure service fittings.
2. Using hoses with valve core depressors, attach low- and high-pressure gauge hoses to low- and high-pressure service fittings, respectively.
3. Start unit and let run until system pressures stabilize.
4. Measure and record the following:
 - a. Outdoor ambient-air temperature (°F [°C] db).
 - b. Liquid line temperature (°F [°C]) at TXV.
 - c. Discharge (high-side) pressure (psig).
 - d. Suction (low-side) pressure (psig) (for reference only).
5. Using Cooling Charging Charts compare outdoor-air temperature (°F [°C] db) with the discharge line pressure (psig) to determine desired system operating liquid line temperature (See Fig. 15).
6. Compare actual liquid line temperature with desired liquid line temperature. Using a tolerance of $\pm 2^{\circ}\text{F}$ ($\pm 1.1^{\circ}\text{C}$), add refrigerant if actual temperature is more than 2°F (1.1°C) higher than proper liquid line temperature, or remove refrigerant if actual temperature is more than 2°F (1.1°C) lower than required liquid line temperature.

NOTE: If the problem causing the inaccurate readings is a refrigerant leak, refer to Check for Refrigerant Leaks section.

INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit damage.

For cooling operation, the recommended airflow is 350 to 450 cfm for each 12,000 Btuh of rated cooling capacity. For heating operation, the airflow must produce a temperature rise that falls within the range stamped on the unit rating plate.

NOTE: Be sure that all supply-and return-air grilles are open, free from obstructions, and adjusted properly.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect electrical power to the unit and install lockout tag before changing blower speed.

This unit is factory-set up for use with a single cooling fan speed. In addition, this unit has the field-selectable capability to run two different cooling fan speeds: The rated cooling fan speed (350~400 CFM/Ton) and an enhanced dehumidification fan speed (As low as 320 CFM/Ton) for use with either a dehumidistat or a thermostat that supports dehumidification.

The cooling speed is marked "LOW" on the interface fan board (IFB) (See Fig. 11) . The factory-shipped settings are noted in Table 5. There are 4 additional speed tap wires available for use in either electric heating or cooling (For color coding on the indoor fan motor leads, see Table 3). The additional 4 speed tap wires are shipped loose with vinyl caps and are located in the control box, near the interface fan board (IFB) (See Fig. 11).

SINGLE COOLING FAN SPEED SET-UP (Dehumidification feature not used)

To change cooling speed:

1. Remove the vinyl cap off of the desired speed tap wire (Refer to Table 3 for color coding). Add the wet coil pressure drop in Table 7 to the system static to determine the correct cooling airflow speed in Table 5 that will deliver the nominal cooling airflow as listed in Table 1 for each size.
2. Remove the current speed tap wire from the "LOW" terminal on the interface fan board (IFB) (See Fig. 11) and place vinyl cap over the connector on the wire.
3. Connect the desired speed tap wire to the "LOW" terminal on the interface fan board (IFB).

NOTE: If accessory electric heat is installed, and the electric heat fan speed is chosen to be the same as the normal cooling fan speed, the dry airflow must meet or exceed the minimum airflow speed specified in Table 2 for the specific size unit.

TWO COOLING FAN SPEEDS SET-UP (Dehumidification feature used)

IMPORTANT: Dehumidification control must open control circuit on humidity rise above set point.

Use of the dehumidification cooling fan speed requires use of either a 24 VAC dehumidistat or a thermostat which includes control of a 24 VAC dehumidistat connection. In either case, the dehumidification control must open the control circuit on humidity rise above the dehumidification set point.

1. Using Fig. 11, move the two pin DEHUM jumper from the “STD” position to the “DEHUM” position.
2. Remove fan speed tap wire from the “LOW” terminal on the interface fan board (IFB) (See Fig. 11).
3. Determine correct normal cooling fan speed for unit and application. Add the wet coil pressure drop in Table 7 to the system static to determine the correct cooling airflow speed in Table 5 that will deliver the nominal cooling airflow as listed in Table 1 for each size.

NOTE: If accessory electric heat is installed, the dry airflow must meet or exceed the minimum airflow speed specified in Table 2 for the specific size unit. The electric heat fan speed will be the same as the normal cooling fan speed.

4. Remove the vinyl cap off of the desired speed tap wire (Refer to Table 3 for color coding) for the normal cooling fan speed and place desired speed tap wire on “HIGH” on the interface board.
5. Refer to airflow tables (Table 5) to determine allowable speeds for the dehumidification cooling fan speed. In Table 5, speeds that are not allowed for dehumidification cooling are shaded.
6. Remove the vinyl cap off of the desired speed tap wire (Refer to Table 3 for color coding) for the dehumidification cooling fan speed and place desired speed tap wire on the “LOW” connection on the interface board (IFB). Verify that static pressure is in the acceptable range for the speed tap to be used for dehumidification cooling.
7. Use any spare vinyl plugs to cap any unused speed tap wires.

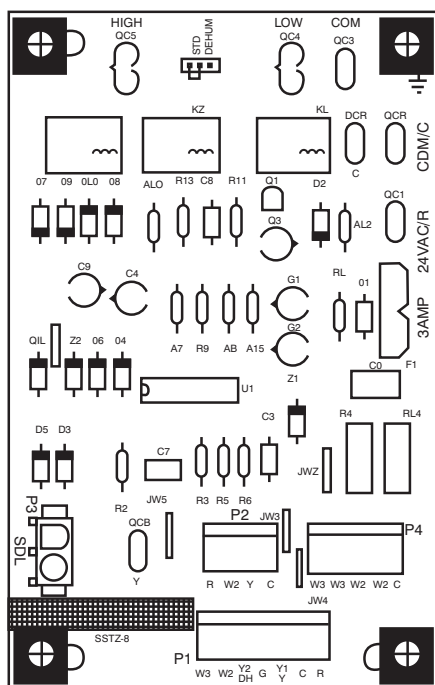


Fig. 11 - Interface Fan Board (IFB)

SINGLE SPEED COOLING WITH HIGHER ELECTRIC HEAT SPEED

This unit can also be configured to operate with single speed cooling and a higher speed for an accessory electric heater.

1. Using Fig. 11, move the two pin DEHUM jumper from the “STD” position to the “DEHUM” position.
2. See Table 2 for minimum airflow for electric heat operation. Add electric heater and filter pressure drop to duct system static pressure to determine total external static pressure.

3. Select speed tap from Table 5 that will achieve required airflow from Table 2.
4. Remove the vinyl cap off of the desired speed tap wire (Refer to Table 3 for color coding).
5. Connect the desired speed tap wire to the “HIGH” terminal on the interface fan board (IFB).

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit component damage or improper operation.

To use this mode, a speed connection must be made on the “HIGH” terminal that meets or exceeds the minimum airflow found in Table 2.

Table 3 – Color Coding for Indoor Fan Motor Leads

Black = High Speed
Orange = Med-High Speed
Red = Med Speed
Pink = Med-Low Speed
Blue = Low Speed

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect electrical power to the unit and install lockout tag before changing blower speed.

CONTINUOUS FAN OPERATION

When the DEHUM feature is not used, the continuous fan speed will be the same as cooling fan speed. When the DEHUM feature is used, the continuous fan will operate on IFB “LOW” speed when the DH control lead is not energized, or IFB “HIGH” speed when the DH lead is energized (see Fig. 11).

COOLING SEQUENCE OF OPERATION

With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO position, the cooling sequence of operation is as follows:

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat completes the circuit between thermostat terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil (C) (through unit wire Y) and time delay relay (TDR) (through unit wire G) across the 24-V secondary of transformer (TRAN).

The normally open contacts of energized contactor (C) close and complete the circuit through compressor motor (COMP) to condenser (outdoor) fan motor (OFM). Both motors start instantly.

A set of normally open contacts on the interface fan board (IFB) are closed which energizes a circuit to the indoor fan motor (IFB).

NOTE: Once the compressor has started and then has stopped, it should not be started again until 5 minutes have elapsed.

The cooling cycle remains on until the room temperature drops to a point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat breaks the circuit between thermostat terminal R to terminals Y and G. These open circuits deenergize contactor coil C and IFB. The condenser and compressor motors stop. After a 90-second delay, the blower motor stops. The unit is in a standby condition, waiting for the next call for cooling from the room thermostat.

Table 4 – Dry Coil Air Delivery* - Horizontal and Downflow Discharge Sizes 24-60 208/230VAC 1 Phase Models

Unit Size	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)											
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1		
24	Low ¹	CFM	669	580	525	423	303	---	---	---	---	---	---	---
		BHP	0.09	0.10	0.11	0.11	0.12	---	---	---	---	---	---	---
	Med – Low ²	CFM	829	752	680	602	549	455	313	---	---	---	---	---
		BHP	0.14	0.15	0.15	0.16	0.17	0.17	0.18	---	---	---	---	---
	Medium ³	CFM	1014	929	884	818	746	683	600	537	405	305	---	---
		BHP	0.24	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.27	0.29	---	---
	Med – High	CFM	1041	972	916	850	782	713	631	581	465	340	---	---
		BHP	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.31	---	---
30	High	CFM	1187	1124	1061	996	930	896	840	776	698	610	---	---
		BHP	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40	---	---
	Low ¹	CFM	669	580	525	423	303	---	---	---	---	---	---	---
		BHP	0.09	0.10	0.11	0.11	0.12	---	---	---	---	---	---	---
	Med – Low ³	CFM	829	752	680	602	549	455	313	---	---	---	---	---
		BHP	0.14	0.15	0.15	0.16	0.17	0.17	0.18	---	---	---	---	---
	Medium ²	CFM	1014	929	884	818	746	683	600	537	405	305	---	---
		BHP	0.24	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.27	0.29	---	---
36	Med – High	CFM	1041	972	916	850	782	713	631	581	465	340	---	---
		BHP	0.25	0.26	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.31	---	---
	High	CFM	1187	1124	1061	996	930	896	840	776	698	610	---	---
		BHP	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40	---	---
	Low ³	CFM	1056	982	911	882	812	740	667	564	486	361	---	---
		BHP	0.24	0.24	0.24	0.26	0.26	0.27	0.28	0.29	0.30	0.30	---	---
	Med – Low ¹	CFM	1174	1107	1045	985	914	890	825	760	673	572	---	---
		BHP	0.32	0.32	0.33	0.33	0.34	0.35	0.36	0.37	0.37	0.37	---	---
42	Medium ²	CFM	1246	1195	1148	1081	1019	953	884	859	795	690	---	---
		BHP	0.38	0.39	0.39	0.40	0.40	0.41	0.42	0.42	0.42	0.43	---	---
	Med – High	CFM	1361	1299	1229	1210	1152	1092	1025	958	889	822	---	---
		BHP	0.48	0.49	0.49	0.50	0.50	0.51	0.51	0.51	0.51	0.52	---	---
	High	CFM	1596	1542	1482	1424	1362	1304	1238	1173	1201	1143	---	---
		BHP	0.74	0.74	0.74	0.75	0.75	0.75	0.76	0.76	0.77	0.77	---	---
	Low ³	CFM	1001	902	833	777	717	650	575	527	466	419	---	---
		BHP	0.13	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	---	---
48	Med – Low ¹	CFM	1016	950	902	842	783	721	655	590	541	480	---	---
		BHP	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	---	---
	Medium ²	CFM	1403	1358	1316	1265	1217	1167	1116	1067	1012	956	---	---
		BHP	0.29	0.30	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39	---	---
	Med – High	CFM	1461	1411	1367	1327	1275	1220	1174	1127	1074	1022	---	---
		BHP	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	---	---
	High	CFM	1575	1528	1488	1447	1406	1360	1314	1264	1213	1159	---	---
		BHP	0.40	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50	---	---

Table 4 - Dry Coil Air Delivery* - Horizontal and Downflow Discharge Sizes 24-60 208/230VAC 1 Phase Models (Cont.)

Unit Size	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
48	Low ¹	CFM	1378	1344	1295	1260	1216	1179	1135	1087	1035	995
		BHP	0.26	0.27	0.29	0.31	0.31	0.33	0.34	0.36	0.36	0.38
	Med – Low ²	CFM	1696	1671	1631	1607	1574	1539	1507	1463	1432	1393
		BHP	0.45	0.47	0.49	0.50	0.52	0.52	0.54	0.55	0.57	0.58
	Medium ³	CFM	1994	1968	1943	1910	1882	1835	1774	1702	1614	1512
		BHP	0.72	0.73	0.75	0.76	0.78	0.78	0.76	0.73	0.70	0.66
	Med – High	CFM	2054	2013	1986	1964	1919	1854	1779	1695	1605	1498
		BHP	0.77	0.79	0.80	0.82	0.81	0.80	0.76	0.74	0.69	0.65
60	High	CFM	2267	2201	2133	2071	1997	1923	1835	1739	1654	1551
		BHP	1.03	1.00	0.97	0.93	0.89	0.86	0.82	0.78	0.74	0.69
	Low ³	CFM	1330	1277	1232	1191	1147	1103	1060	1004	963	919
		BHP	0.26	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37
	Med – Low ¹	CFM	1475	1436	1399	1351	1317	1270	1236	1188	1152	1105
		BHP	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.45
	Medium ²	CFM	1736	1710	1668	1630	1600	1557	1522	1479	1450	1406
		BHP	0.53	0.54	0.55	0.58	0.59	0.60	0.62	0.63	0.64	0.65
	Med – High	CFM	1935	1909	1867	1836	1808	1766	1696	1619	1535	1454
		BHP	0.71	0.73	0.74	0.76	0.78	0.79	0.77	0.75	0.72	0.68
	High	CFM	2205	2150	2078	2011	1941	1852	1779	1672	1572	1473
		BHP	1.04	1.02	0.99	0.95	0.92	0.87	0.85	0.79	0.75	0.70

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed² Factory-shipped cooling speed³ Factory-shipped continuous fan speed

"NA" = Not allowed for heating speed

NOTE: Duct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Table 5 – Dry Coil Air Delivery* - Horizontal Discharge Sizes 36-60 3 Phase Models Only

Unit	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
36	Low	Blue	CFM	979	912	859	789	731	654	556	454	374
	Med – Low ¹	Pink	CFM	1136	1080	1015	957	912	861	808	723	633
	Medium ²	Red	CFM	1208	1144	1091	1025	964	902	886	830	746
	Med – High	Orange	CFM	1495	1439	1376	1303	1221	1207	1137	1052	981
	High	Black	CFM	1560	1491	1416	1337	1255	1233	1160	1082	998
42	Low	Blue	CFM	952	882	806	746	671	605	530	551	486
	Med – Low ¹	Pink	CFM	1002	936	875	821	748	687	613	554	565
	Medium	Red	CFM	1255	1210	1145	1074	1008	940	878	895	838
	Med – High ²	Orange	CFM	1335	1267	1246	1176	1109	1049	988	926	872
	High	Black	CFM	1472	1401	1326	1251	1275	1198	1139	1085	1023
48	Low ¹	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
	Med – Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
	Medium ²	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
	Med – High	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
	High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
60	Low ¹	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
	Med – Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
	Medium ²	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
	Med – High	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
	High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1988	1874

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed

² Factory-shipped cooling speed

"NA" = Not allowed for heating speed

Note: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Table 6 – Dry Coil Air Delivery - Downflow Discharge Sizes 36–60 3 Phase Models Only

Unit	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)										
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
36	Low	Blue	CFM	979	912	859	789	731	654	556	454	374	255
			WATTS	202	212	217	221	231	236	245	251	259	253
			BHP	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.28	0.27
	Med – Low ¹	Pink	CFM	1136	1080	1015	957	912	861	808	723	633	545
			WATTS	294	309	310	322	325	333	341	349	354	367
			BHP	0.32	0.33	0.33	0.35	0.35	0.36	0.37	0.37	0.38	
	Medium ²	Red	CFM	1208	1144	1091	1025	964	902	886	830	746	663
			WATTS	345	350	358	366	373	377	390	396	407	410
			BHP	0.37	0.38	0.38	0.39	0.40	0.40	0.42	0.42	0.44	0.44
	Med – High	Orange	CFM	1495	1439	1376	1303	1221	1207	1137	1052	981	894
			WATTS	625	634	635	633	624	613	598	583	573	551
			BHP	0.67	0.68	0.68	0.68	0.67	0.66	0.64	0.63	0.61	0.59
42	High	Black	CFM	1560	1491	1416	1337	1255	1233	1160	1082	998	911
			WATTS	708	699	683	674	660	634	624	606	581	566
			BHP	0.76	0.75	0.73	0.72	0.71	0.68	0.67	0.65	0.62	0.61
	Low	Blue	CFM	952	882	806	746	671	605	530	551	486	435
			WATTS	124	134	140	150	156	166	171	182	188	198
			BHP	0.13	0.14	0.15	0.16	0.17	0.18	0.18	0.20	0.20	0.21
	Med – Low ¹	Pink	CFM	1002	936	875	821	748	687	613	554	565	518
			WATTS	144	155	161	171	176	187	193	203	209	220
			BHP	0.15	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.24
	Medium	Red	CFM	1255	1210	1145	1074	1008	940	878	895	838	785
			WATTS	249	272	284	292	305	319	320	329	336	347
			BHP	0.27	0.29	0.30	0.31	0.33	0.34	0.34	0.35	0.36	0.37
Med – High ²	Orange	CFM	1335	1267	1246	1176	1109	1049	988	926	872	891	
		WATTS	311	323	330	342	356	367	378	385	395	403	
		BHP	0.33	0.35	0.35	0.37	0.38	0.39	0.41	0.41	0.42	0.43	
High	Black	CFM	1472	1401	1326	1251	1275	1198	1139	1085	1023	961	
		WATTS	401	414	426	440	471	462	473	478	486	491	
		BHP	0.43	0.44	0.46	0.47	0.51	0.50	0.51	0.51	0.52	0.53	

Table 6 - Dry Coil Air Delivery - Downflow Discharge Sizes 36-60 3 Phase Models Only (Cont.)

Unit	Motor Speed	Wire Color	External Static Pressure (IN. W.C.)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
48	Low ¹	Blue	CFM	1503	1457	1423	1374	1330	1287	1241	1199	1153
			WATTS	225	233	246	254	269	282	292	307	314
			BHP	0.24	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34
	Med – Low	Pink	CFM	1556	1508	1461	1432	1388	1346	1302	1256	1221
			WATTS	244	261	268	281	290	305	319	330	345
			BHP	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37
	Medium ²	Red	CFM	1861	1822	1786	1758	1716	1688	1660	1619	1583
			WATTS	400	417	426	441	452	467	482	492	507
			BHP	0.43	0.45	0.46	0.47	0.48	0.50	0.52	0.53	0.54
	Med – High	Orange	CFM	2319	2291	2255	2230	2193	2166	2118	2057	1992
			WATTS	758	769	787	799	808	823	822	805	780
			BHP	0.81	0.82	0.84	0.86	0.87	0.88	0.88	0.86	0.84
60	High	Black	CFM	2532	2487	2444	2391	2330	2259	2179	2111	2033
			WATTS	1014	1022	1015	994	965	935	898	858	823
			BHP	1.09	1.10	1.09	1.07	1.03	1.00	0.96	0.92	0.88
	Low ¹	Blue	CFM	1479	1436	1387	1346	1298	1253	1206	1160	1114
			WATTS	224	239	247	262	270	284	300	307	319
			BHP	0.24	0.26	0.26	0.28	0.29	0.30	0.32	0.33	0.34
	Med – Low	Pink	CFM	1841	1796	1761	1724	1690	1651	1616	1578	1527
			WATTS	425	434	453	460	476	485	501	508	525
			BHP	0.46	0.47	0.49	0.49	0.51	0.52	0.54	0.54	0.56
	Medium ²	Red	CFM	1944	1913	1872	1838	1801	1771	1731	1698	1655
			WATTS	486	501	511	529	537	554	565	578	595
			BHP	0.52	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.64
	Med – High	Orange	CFM	2178	2148	2105	2073	2036	2002	1967	1919	1845
			WATTS	674	691	703	717	733	743	758	754	734
			BHP	0.72	0.74	0.75	0.77	0.79	0.80	0.81	0.81	0.79
	High	Black	CFM	2480	2432	2375	2322	2236	2161	2085	2006	1917
			WATTS	1029	1012	995	975	941	908	869	836	796
			BHP	1.10	1.09	1.07	1.05	1.01	0.97	0.93	0.90	0.85

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).

¹ Factory-shipped heating speed

² Factory-shipped cooling speed

"NA" = Not allowed for heating speed

NOTE: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.
Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Table 7 – Wet Coil Pressure Drop (IN. W.C.)

UNIT SIZE	STANDARD CFM (SCFM)																
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
24	0.03	0.04	0.04	0.05	0.06												
30				0.05	0.06	0.07	0.08	0.11									
36				0.06	0.06	0.09	0.10	0.11	0.14								
42					0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.09	0.11				
48							0.04	0.06	0.09	0.10	0.10	0.11	0.12	0.13	0.14		
60									0.06	0.06	0.07	0.01	0.08	0.09	0.10	0.12	0.13

Table 8 – Economizer with 1-in. Filter Pressure Drop (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)																
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
600-1400CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	2.0, 2.5, 3.0	-	-	0.09	0.14	0.16	0.18	0.25	0.28	0.3	-	-	-	-	-	-	-	-
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	3.5, 4.0	-	-	-	-	-	-	0.10	0.11	0.12	0.13	0.14	0.16	0.16	-	-	-	-
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	5.0	-	-	-	-	-	-	-	-	-	0.15	0.17	0.18	0.20	0.21	0.22	0.23	0.23

Table 9 – Filter Pressure Drop Table (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)																	
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	
600-1400 CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	2.0,																		
	2.5, 3.0	0.03	0.05	0.06	0.08	0.10	0.11	0.13	0.14	0.16	-	-	-	-	-	-	-	-	
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	3.5,																		
	4.0	-	-	-	-	-	-	0.07	0.08	0.09	0.09	0.10	0.11	0.12	-	-	-	-	
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	5.0																		
		-	-	-	-	-	-	-	-	-	0.04	0.06	0.08	0.10	0.11	0.13	0.14	0.15	

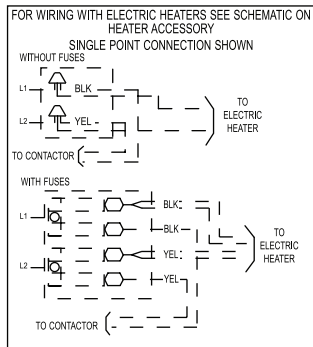
Table 10 – Electric Heat Pressure Drop Tables (IN. W.C.)
Small Cabinet: 24-36

STATIC	STANDARD CFM (SCFM)											
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
5 kW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07
10 kW	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07	0.09	0.10	0.11
15 kW	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20 kW	0.00	0.00	0.02	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19

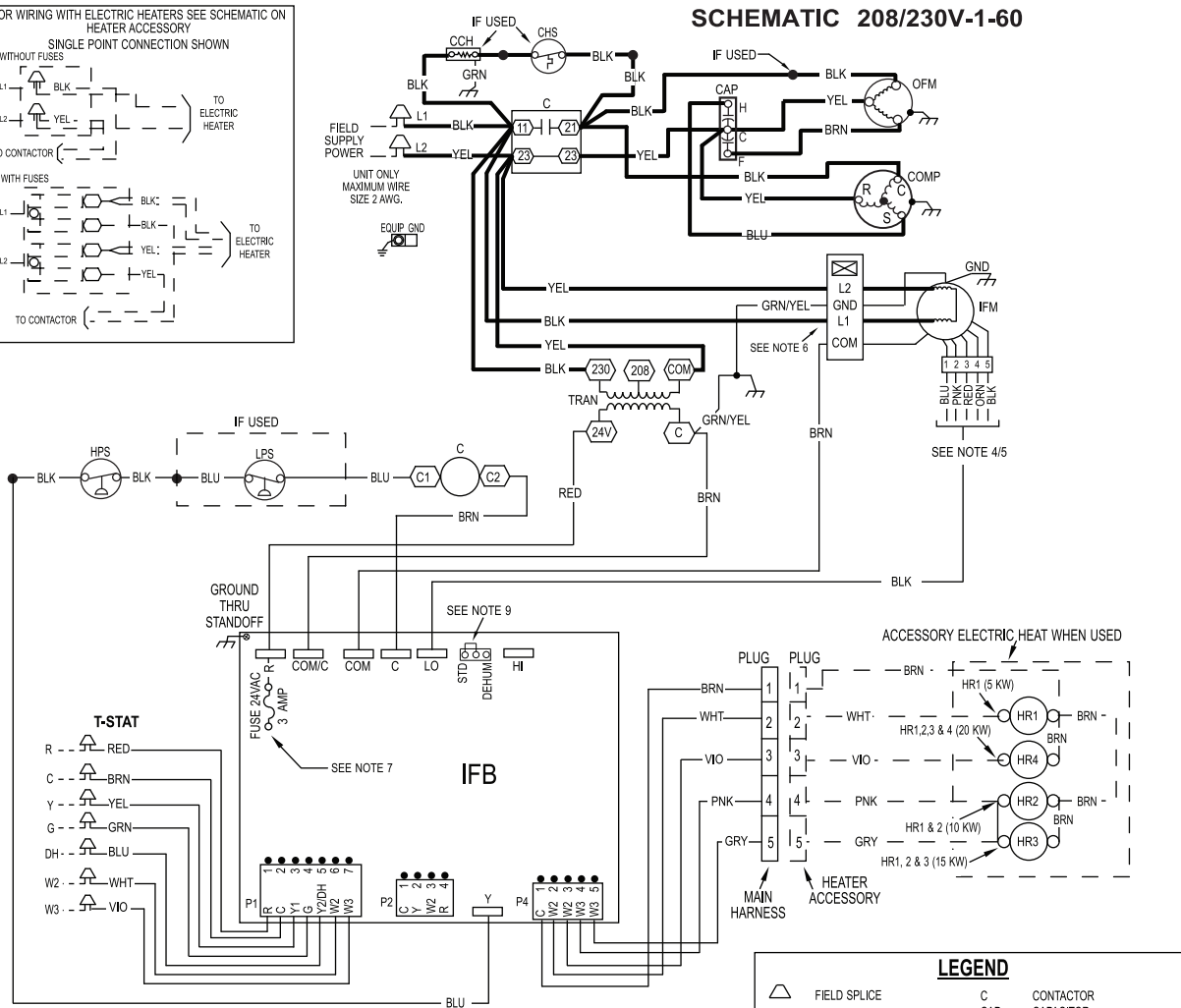
Large Cabinet: 42-60

STATIC	STANDARD CFM (SCFM)													
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2500
5 kW	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12
10 kW	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.13
15 kW	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.15
20 kW	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.16

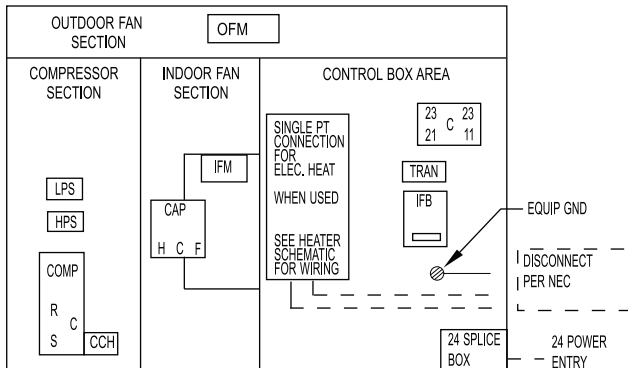
CONNECTION WIRING DIAGRAM
DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



SCHEMATIC 208/230V-1-60



UNIT COMPONENT ARRANGEMENT



LEGEND	
	FIELD SPLICE
	TERMINAL (MARKED)
	TERMINAL (UNMARKED)
	SPLICE
	SPLICE (MARKED)
	FACTORY LO VOLTAGE
	FIELD CONTROL WIRING
	FIELD POWER WIRING
	ACCESSORY OR OPTIONAL WIRING
	FACTORY HI VOLTAGE
	C CONTACTOR
	CAP CAPACITOR
	CCH CRANKCASE HEATER
	CHS CRANKCASE HEATER SWITCH
	COMP COMPRESSOR MOTOR
	CTD COMPRESSOR TIME DELAY
	DH DEHUM
	GND GROUND
	HPS HIGH PRESSURE SWITCH
	HR HEATER RELAY
	IFB INDOOR FAN BOARD
	IFM INDOOR FAN MOTOR
	LPS LOW PRESSURE SWITCH
	OFM OUTDOOR FAN MOTOR
	TRAN TRANSFORMER
	T-STAT THERMOSTAT

NOTES:

- IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED IT MUST BE REPLACED WITH THE SAME OR IT'S EQUIVALENT.
- SEE PRE SALE LITERATURE FOR THERMOSTATS.
- USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
- REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
- RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
- "DO NOT DISCONNECT PLUG UNDER LOAD".
- THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 287003.
- N.E.C. CLASS 2, 24V.
- UNIT FACTORY - SHIPPED IN STD MODE.
- CCH NOT USED ON ALL UNITS.

Fig. 12 - Connection Wiring Diagram 208/230-1-60

A150503

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

FIELD SUPPLY

208/230 VAC, 60 HZ, 1PH

 EQUIP GND

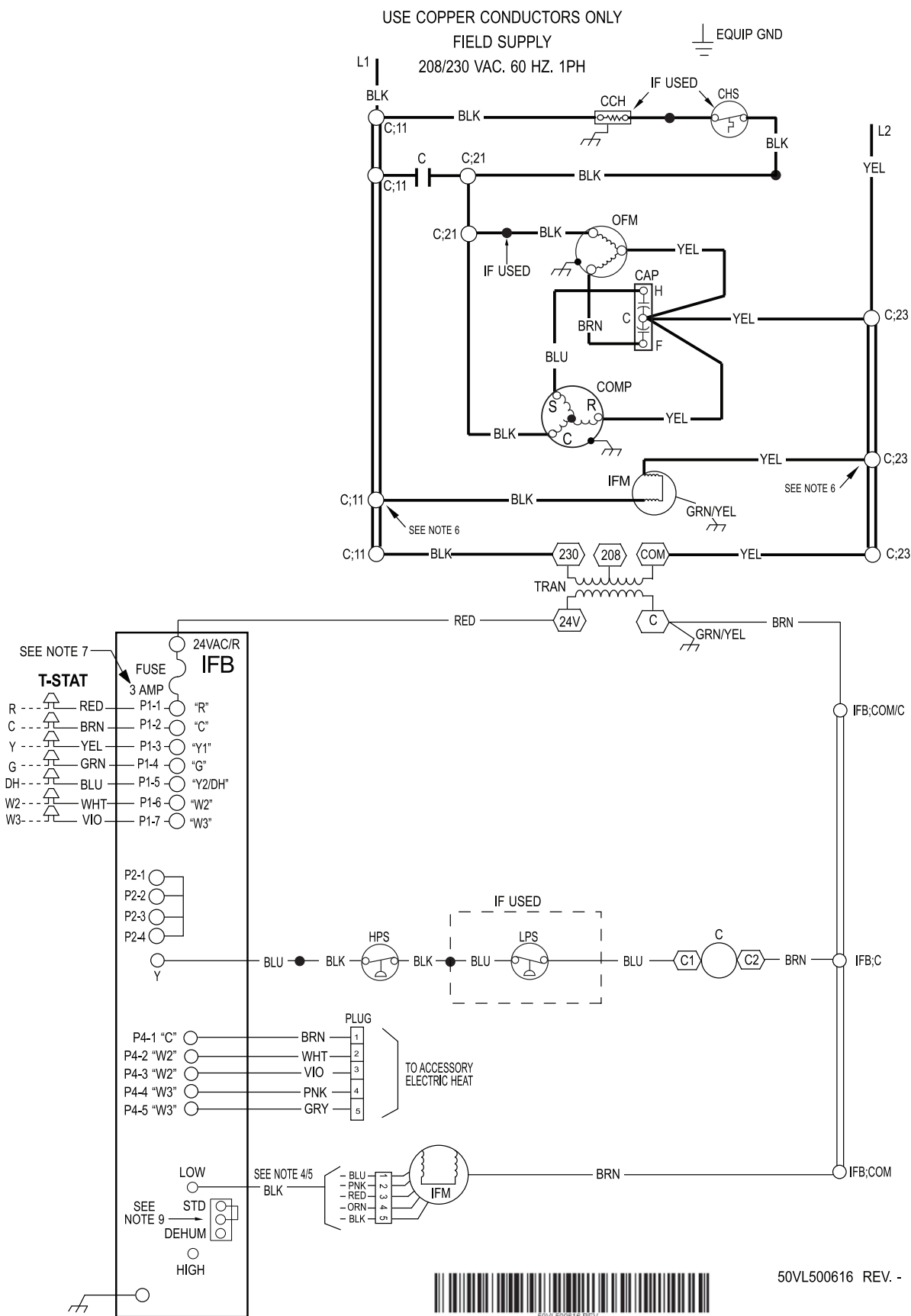


Fig. 12 Cont. - Ladder Wiring Diagram 208/230-1-60

SCHEMATIC 208/230V-3-60

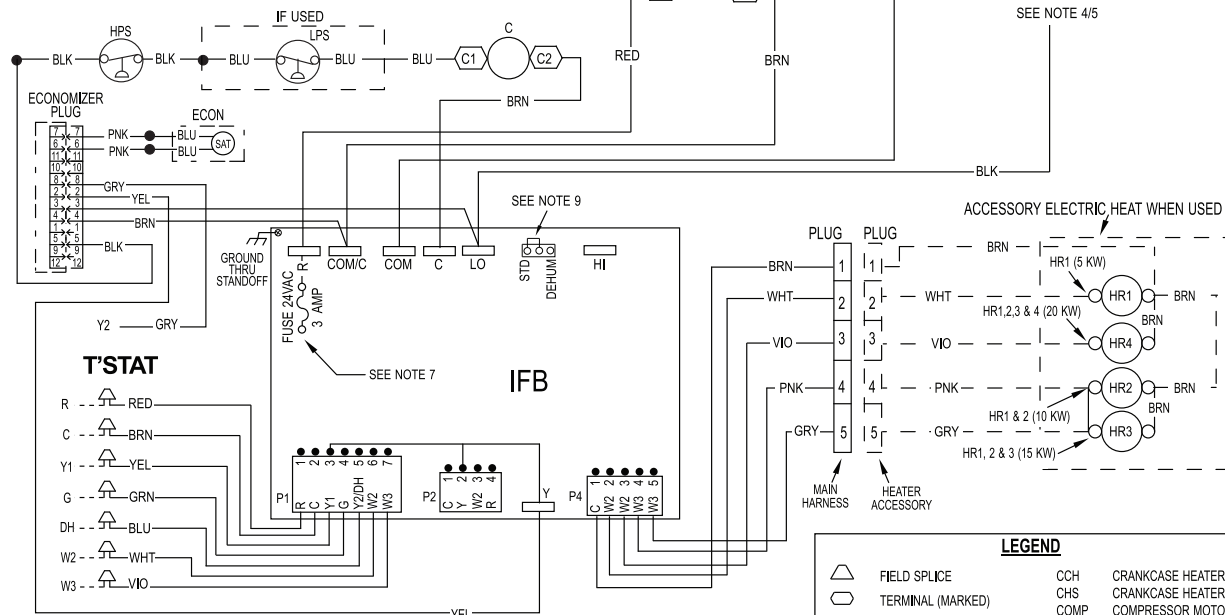
SCHEMATIC 208/230V-3

The diagram illustrates the electrical connections for a 208/230V-3 phase system. Key components and their connections include:

- Field Supply Power:** L1 (BLK) and L3 (YEL) are connected to the main power lines.
- Unit Only:** L2 (BLU) is connected to the main power lines.
- Equipment Ground (EQUIP GND):** Connected to the main power lines.
- Transformer (TRAN):** A 24V transformer with a 208V primary and a 24V secondary. The primary is connected to the main power lines, and the secondary is connected to the 24V line.
- Capacitors (C):** Two capacitors are shown. One is connected to the 208V line, and the other is connected to the 24V line.
- Motor (M):** A 208/230V-3 motor with terminals T1, T2, and T3. The motor is connected to the main power lines.
- Compressor (COMP):** A compressor with terminals T1, T2, and T3. The compressor is connected to the main power lines.
- Other Components:** A CCH (Circuit Breaker) is connected to the main power lines. A CHS (Control Housing Switch) is connected to the main power lines. A CAP (Capacitor) is connected to the main power lines.

SEE NOTE 4/

50VL-C

[illegible]

1. IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED IT MUST BE REPLACED WITH THE SAME OR IT'S EQUIVALENT.
2. SEE PRE SALE LITERATURE FOR THERMOSTATS.
3. USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
4. REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
5. RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
6. "DO NOT DISCONNECT PLUG UNDER LOAD".
7. THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 287003.
8. N.E.C. CLASS 2, 24V.
9. DEHUM FEATURE CANNOT BE USED WHEN ECONOMIZER IS INSTALLED.
- UNIT FACTORY - SHIPPED IN STD MODE.
10. CCH NOT USED ON ALL UNITS.

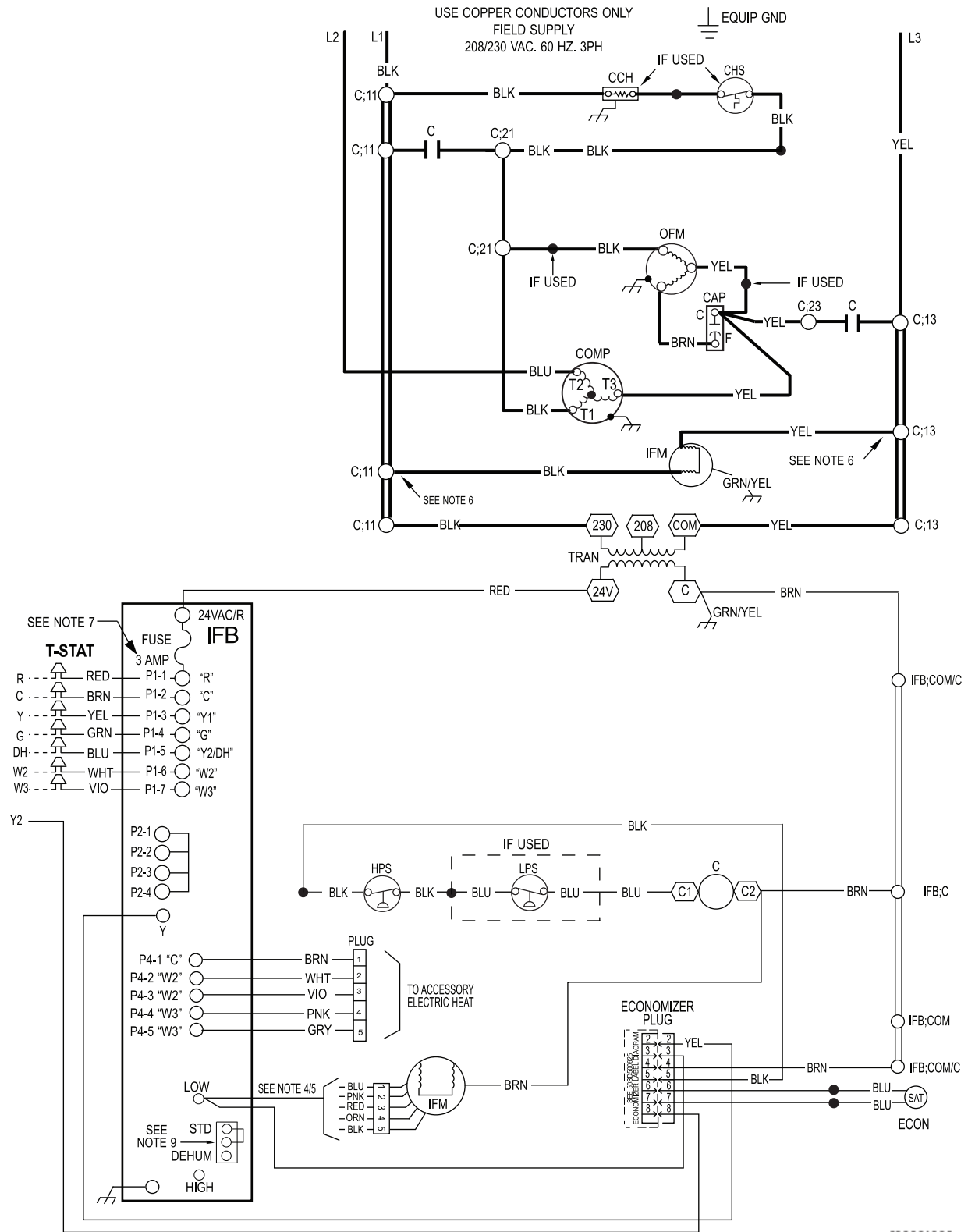
LEGEND

	FIELD SPLICE	CCH	CRANKCASE HEATER
	TERMINAL (MARKED)	CHS	CRANKCASE HEATER SWITCH
	TERMINAL (UNMARKED)	COMP	COMPRESSOR MOTOR
	SPLICE	CTD	COMPRESSOR TIME DELAY
	SPLICE (MARKED)	DH	DEHUMIDIFICATION MODE
	FACTORY LO VOLTAGE	DEHUM	DEHUMIDIFICATION MODE
	FIELD CONTROL WIRING	ECON	ECONOMIZER
	ACCESSORY OR OPTIONAL WIRING	GND	GROUND
	FACTORY HI VOLTAGE	HPS	HIGH PRESSURE SWITCH
C	CONTACTOR	HR	HEATER RELAY
CAP	CAPACITOR	IFB	INDOOR FAN BOARD
		IFM	INDOOR FAN MOTOR
		LPS	LOW PRESSURE SWITCH
		OFM	OUTDOOR FAN MOTOR
		STD	STANDARD MODE
		TRAN	TRANSFORMER
		T-STAT	THERMOSTAT

Fig. 13 - Connection Wiring Diagram 208/230-3-60

LADDER WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



50VL500617 REV. -



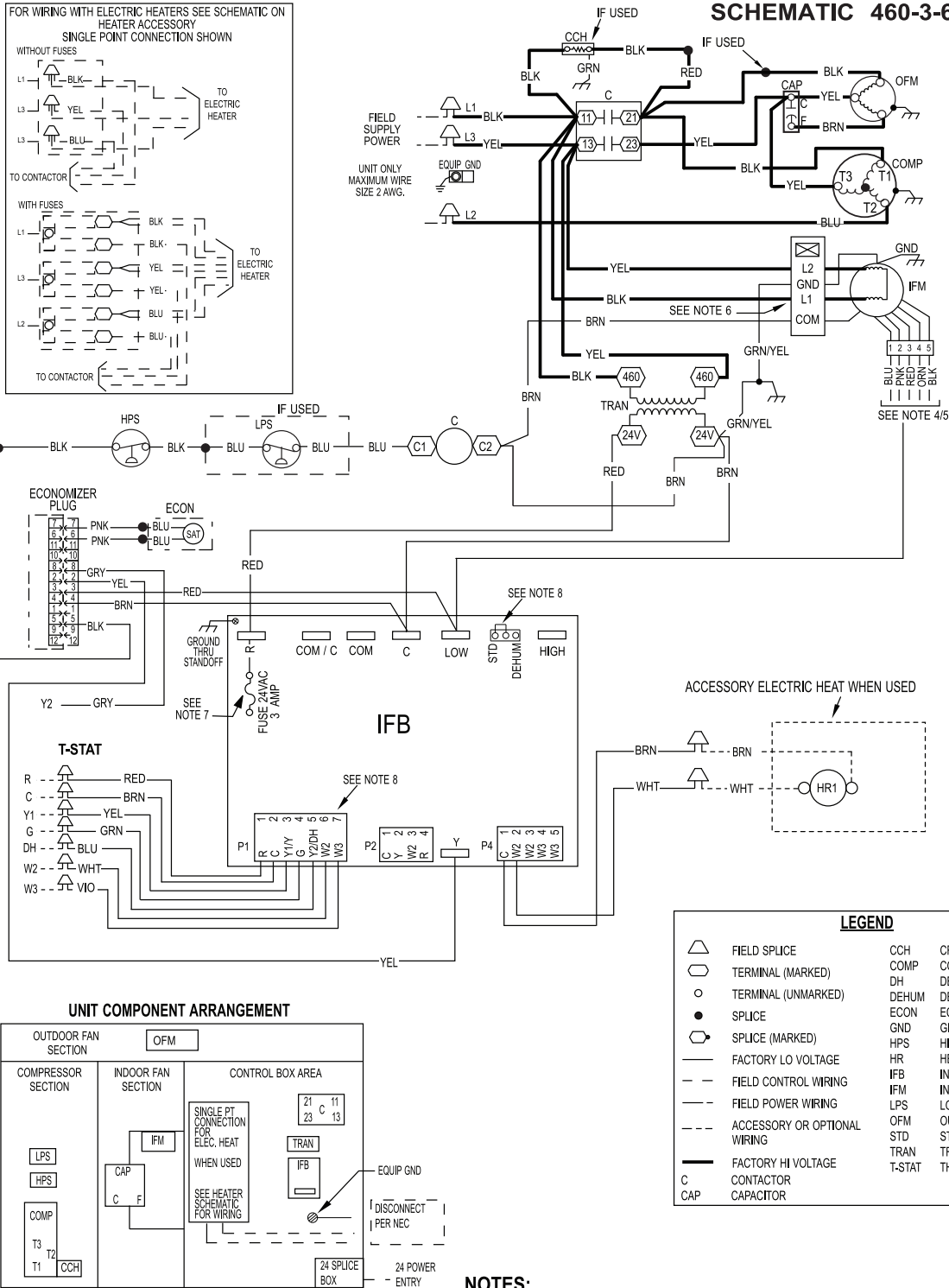
Fig. 13 Cont. - Ladder Wiring Diagram 208/230-3-60

A150514

CONNECTION WIRING DIAGRAM

ANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

SCHEMATIC 460-3-60



NOTES:

- IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED IT MUST BE REPLACED WITH THE SAME OR ITS EQUIVALENT.
- SEE PRE SALE LITERATURE FOR THERMOSTATS.
- USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
- REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
- RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
- "DO NOT DISCONNECT PLUG UNDER LOAD".
- THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 287003.
- DEHUM FEATURE CANNOT BE USED WHEN ECONOMIZER IS INSTALLED. UNIT FACTORY - SHIPPED IN STD MODE.
- N.E.C. CLASS 2, 24V.
- CCH NOT USED ON ALL UNITS.

Fig. 14 - Connection Wiring Diagram 460-3-60

A150505

SUPERHEAT CHARGING TABLE (SUPERHEAT °F (°C) AT COMPRESSOR SUCTION SERVICE PORT)																
OUTDOOR TEMP °F (°C)	EVAPORATOR ENTERING AIR °F (°C) WB															
	50 (10)	52 (11)	54 (12)	56 (13)	58 (14)	60 (16)	62 (17)	64 (18)	66 (19)	68 (20)	70 (21)	72 (22)	74 (23)	76 (24)		
55 (12.7)	9 (5.0)	12 (6.7)	14 (7.8)	17 (9.4)	20 (11)	23 (13)	26 (14)	29 (16)	32 (18)	35 (19)	37 (21)	40 (22)	42 (23)	45 (25)		
60 (15.6)	7 (3.9)	10 (5.6)	12 (6.7)	15 (8.3)	18 (10)	21 (12)	24 (13)	27 (15)	30 (17)	33 (18)	35 (19)	38 (21)	40 (22)	43 (24)		
65 (18.3)	—	6 (3.3)	10 (5.6)	13 (7.2)	16 (8.9)	19 (11)	21 (12)	24 (13)	27 (15)	30 (17)	33 (18)	36 (20)	38 (21)	41 (23)		
70 (21.1)	—	—	7 (3.9)	10 (5.6)	13 (7.2)	16 (8.9)	19 (11)	21 (12)	24 (13)	27 (15)	30 (17)	33 (18)	36 (20)	39 (22)		
75 (23.9)	—	—	—	6 (3.3)	9 (5.0)	12 (6.7)	15 (8.3)	18 (10)	21 (12)	24 (13)	28 (16)	31 (17)	34 (19)	37 (21)		
80 (26.7)	—	—	—	—	5 (2.8)	8 (4.4)	12 (6.7)	15 (8.3)	18 (10)	21 (12)	25 (14)	28 (16)	31 (17)	35 (19)		
85 (29.4)	—	—	—	—	—	—	8 (4.4)	11 (6.1)	15 (8.3)	19 (11)	22 (12)	26 (14)	30 (17)	33 (18)		
90 (32.2)	—	—	—	—	—	—	5 (2.8)	9 (5.0)	13 (7.2)	16 (8.9)	20 (11)	24 (13)	27 (15)	31 (17)		
95 (35.0)	—	—	—	—	—	—	—	6 (3.3)	10 (5.6)	14 (7.8)	18 (10)	22 (12)	25 (14)	29 (16)		
100 (37.7)	—	—	—	—	—	—	—	—	8 (4.4)	12 (6.7)	15 (8.3)	20 (11)	23 (13)	27 (15)		
105 (40.6)	—	—	—	—	—	—	—	—	5 (2.8)	9 (5.0)	13 (7.2)	17 (9.4)	22 (12)	26 (14)		
110 (43.3)	—	—	—	—	—	—	—	—	—	6 (3.3)	11 (6.1)	15 (8.3)	20 (11)	25 (14)		
115 (46.1)	—	—	—	—	—	—	—	—	—	—	8 (4.4)	14 (7.8)	18 (10)	23 (13)		
REQUIRED SUCTION TUBE TEMPERATURE °F (°C) (MEASURED AT COMPRESSOR SUCTION SERVICE PORT)																
SUPERHEAT TEMP °F (°C)	SUCTION PRESSURE AT SUCTION SERVICE PORT PSIG (kPa)															
	107 (738)	111 (766)	116 (800)	120 (828)	125 (862)	130 (897)	135 (931)	140 (966)	145 (1000)							
0 (0)	35 (1.7)	37 (2.8)	39 (3.9)	41 (5.0)	43 (6.1)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)							
2 (1.1)	37 (2.8)	39 (3.9)	41 (5.0)	43 (6.1)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)	53 (12)							
4 (2.2)	39 (3.9)	41 (5.0)	43 (6.1)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)	53 (12)	55 (13)							
6 (3.3)	41 (5.0)	43 (6.1)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)	53 (12)	55 (13)	57 (14)							
8 (4.4)	43 (6.1)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)							
10 (5.6)	45 (7.2)	47 (8.3)	49 (9.4)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)	61 (16)							
12 (6.7)	47 (8.3)	49 (9.4)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)	61 (16)	63 (17)							
14 (7.8)	49 (9.4)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)	61 (16)	63 (17)	65 (18)							
16 (8.9)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)							
18 (10.0)	53 (12)	55 (13)	57 (14)	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)	69 (21)							
20 (11.1)	55 (13)	57 (14)	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)	69 (21)	71 (22)							
22 (12.2)	57 (14)	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)							
24 (13.3)	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)							
26 (14.4)	61 (16)	63 (17)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)							
28 (15.6)	63 (17)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)	79 (26)							
30 (16.7)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)	79 (26)	81 (27)							
32 (17.8)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)	79 (26)	81 (27)	83 (28)							
34 (18.9)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)	79 (26)	81 (27)	83 (28)	85 (29)							
36 (20.0)	71 (22)	73 (23)	75 (24)	77 (25)	79 (26)	81 (27)	83 (28)	85 (29)	87 (31)							
38 (21.1)	73 (23)	75 (24)	77 (25)	79 (26)	81 (27)	83 (28)	85 (29)	87 (31)	89 (32)							
40 (22.2)	75 (24)	77 (25)	79 (26)	81 (27)	83 (28)	85 (29)	87 (31)	89 (32)	91 (33)							

COOLING ONLY CHARGING PROCEDURE

- Operate unit a minimum of 10 minutes before checking charge.
- Measure suction pressure by attaching an accurate gauge to compressor suction side service port.
- Measure suction side temperature by attaching an accurate thermistor type or electronic thermometer to suction line about 10 inches from compressor.
- Measure outdoor air dry-bulb temperature with thermometer.
- Measure indoor air (return air) wet-bulb temperature with a sling psychrometer or electronic equivalent.
- Using Superheat Charging Table find outdoor temperature and indoor air wet-bulb temperature. At this intersection note superheat. Where a dash (–) appears on table do not attempt to charge unit under these conditions or refrigerant slugging may occur. In this situation refrigerant must be evacuated and weighed in. See rating plate for charge quantity.
- Refer to Required Suction Tube Temp. table. Find superheat temperature located in step 6 and suction pressure. At this intersection note suction line temperature.
- If unit has a higher suction line temperature than charted temperature, add refrigerant until charted temperature is reached.
- If unit has a lower suction line temperature than charted temperature, reclaim refrigerant until charted temperature is reached.
- If outdoor air temperature or pressure at suction port changes, charge to new suction line temperature indicated on chart.

50ZH500518 REV.A

50ZH500518 REV.A



50ZH500518 REV. A



50ZH500518 REV. A

Superheat charging table is derived from optimum performance point. (95°F [35°C] outdoor ambient and (80°F [27°C] dry bulb; 67°F [19°C] wet bulb indoor condition.) Where a dash (—) appears do not attempt to check charge or charge unit under these conditions using the superheat method. (Weigh in method should be used.)

A150625

Required Subcooling °F(°C)						Required Liquid Line Temperature for a Specific Subcooling (R-410A)											
Model Size	Outdoor Ambient Temperature °F(°C)					Pressure (psig)	Required Subcooling (°F)					Pressure (kPa)	Required Subcooling (°C)				
	75 (24)	85 (29)	95 (35)	105 (41)	115 (46)		5	10	15	20	25		3	6	8	11	14
036	13 (7)	13 (7.2)	13 (7.3)	13(7.4)	14(7.7)	189	61	56	51	46	41	1303	16	13	11	8	5
						196	63	58	53	48	43	1351	17	15	12	9	6
						203	66	61	56	51	46	1399	19	16	13	10	8
						210	68	63	58	53	48	1448	20	17	14	11	9
						217	70	65	60	55	50	1496	21	18	15	13	10
						224	72	67	62	57	52	1544	22	19	16	14	11
						231	74	69	64	59	54	1593	23	20	18	15	12
						238	76	71	66	61	56	1641	24	21	19	16	13
						245	77	72	67	62	57	1689	25	22	20	17	14
						252	79	74	69	64	59	1737	26	23	21	18	15
						260	81	76	71	66	61	1792	27	25	22	19	16
						268	83	78	73	68	63	1848	29	26	23	20	17
						276	85	80	75	70	65	1903	30	27	24	21	19
						284	87	82	77	72	67	1958	31	28	25	22	20
						292	89	84	79	74	69	2013	32	29	26	23	21
						300	91	86	81	76	71	2068	33	30	27	24	22
						309	93	88	83	78	73	2130	34	31	28	26	23
						318	95	90	85	80	75	2192	35	32	29	27	24
						327	97	92	87	82	77	2254	36	33	31	28	25
						336	99	94	89	84	79	2316	37	34	32	29	26
						345	101	96	91	86	81	2378	38	35	33	30	27
						354	103	98	93	88	83	2440	39	36	34	31	28
						364	105	100	95	90	85	2509	40	38	35	32	29
						374	107	102	97	92	87	2578	41	39	36	33	30
						384	108	103	98	93	88	2647	42	40	37	34	31
						394	110	105	100	95	90	2716	44	41	38	35	32
						404	112	107	102	97	92	2785	45	42	39	36	33
						414	114	109	104	99	94	2854	46	43	40	37	34
						424	116	111	106	101	96	2923	47	44	41	38	35
						434	118	113	108	103	98	2992	48	45	42	39	36
						444	119	114	109	104	99	3061	48	46	43	40	37
						454	121	116	111	106	101	3130	49	47	44	41	38
						464	123	118	113	108	103	3199	50	48	45	42	39
						474	124	119	114	109	104	3268	51	48	46	43	40
						484	126	121	116	111	106	3337	52	49	47	44	41
						494	127	122	117	112	107	3406	53	50	47	45	42
						504	129	124	119	114	109	3475	54	51	48	46	43
						514	131	126	121	116	111	3544	55	52	49	46	44
						524	132	127	122	117	112	3612	56	53	50	47	45
						534	134	129	124	119	114	3681	56	54	51	48	46
 50VL500709 REV. -						 50VL500709 REV. -											
Charging Procedure																	
1- Measure Discharge line pressure by attaching a gauge to the service port.																	
2- Measure the Liquid line temperature by attaching a temperature sensing device to it.																	
3- Insulate the temperature sensing device so that the Outdoor Ambient doesn't affect the reading.																	
4- Refer to the required Subcooling in the table based on the model size and the Outdoor Ambient temperature.																	
5- Interpolate if the Outdoor ambient temperature lies in between the table values.																	
6- Find the Pressure Value in the table corresponding to the the measured Pressure of the Compressor Discharge line.																	
7- Read across from the Pressure reading to obtain the Liquid line temperature for a required Subcooling																	
8- Add Charge if the measured temperature is higher than the table value.																	
9 - Remove charge if the measured temperature is lower than the table value.																	

MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This cooling unit should be inspected at least once each year by a qualified service person. To troubleshoot unit, refer to Table 8, Troubleshooting Chart.

NOTE TO EQUIPMENT OWNER: Consult your local dealer about the availability of a maintenance contract.

WARNING

PERSONAL INJURY AND UNIT DAMAGE HAZARD

Failure to follow this warning could result in personal injury or death and possible unit component damage.

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment, other than those procedures recommended in the Owner's Manual.

WARNING

ELECTRICAL SHOCK AND FIRE HAZARD

Failure to follow these warnings could result in personal injury or death:

1. Turn off electrical power to the unit and install lockout tag before performing any maintenance or service on this unit.
2. Use extreme caution when removing panels and parts.
3. Never place anything combustible either on or in contact with the unit.

CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Errors made when reconnecting wires may cause improper and dangerous operation. Label all wires prior to disconnecting when servicing.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filter(s) each month. Clean or replace when necessary.
2. Inspect indoor coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness each cooling season. Clean when necessary.
4. Check electrical connections for tightness and controls for proper operation each cooling season. Service when necessary.
5. Ensure electric wires are not in contact with refrigerant tubing or sharp metal edges.

Air Filter

IMPORTANT: Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Table 1 for recommended filter sizes.

Inspect air filter(s) at least once each month and replace (throwaway-type) or clean (cleanable-type) at least twice during each cooling season and twice during the heating season, or whenever the filter becomes clogged with dust and lint.

Indoor Blower and Motor

NOTE: All motors are pre-lubricated. Do not attempt to lubricate these motors.

For longer life, operating economy, and continuing efficiency, clean accumulated dirt and grease from the blower wheel and motor annually.

WARNING

ELECTRICAL SHOCK HAZARD

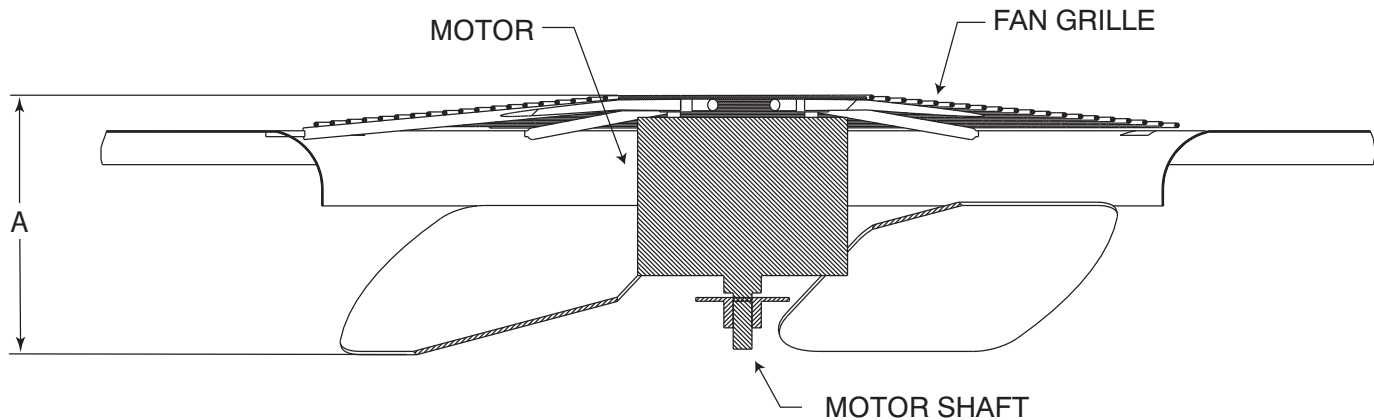
Failure to follow this warning could result in personal injury or death.

Disconnect and tag electrical power to the unit before cleaning the blower motor and wheel.

To clean the blower motor and wheel:

1. Remove and disassemble blower assembly as follows:
 - a. Remove blower access panel (see Fig. 17).
 - b. Disconnect 5 pin plug and 4 pin plug from indoor blower motor. Remove capacitor if required.
 - c. On all units remove blower assembly from unit. Remove screws securing blower to blower partition and slide assembly out. Be careful not to tear insulation in blower compartment.
 - d. Ensure proper reassembly by marking blower wheel and motor in relation to blower housing before disassembly.
 - e. Loosen setscrew(s) that secures wheel to motor shaft, remove screws that secure motor mount brackets to housing, and slide motor and motor mount out of housing.
2. Remove and clean blower wheel as follows:
 - a. Ensure proper reassembly by marking wheel orientation.
 - b. Lift wheel from housing. When handling and/or cleaning blower wheel, be sure not to disturb balance weights (clips) on blower wheel vanes.
 - c. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.
 - d. Reassemble wheel into housing.
 - e. Reassemble motor into housing. Be sure setscrews are tightened on motor shaft flats and not on round part of shaft. Reinstall blower into unit.
 - f. Connect 5 pin plug and 4 pin plug to indoor blower motor. Reinstall capacitor if required.
 - g. Reinstall blower access panel (see Fig. 17).
3. Restore electrical power to unit. Start unit and check for proper blower rotation and motor speeds during cooling cycles.

50VL-C

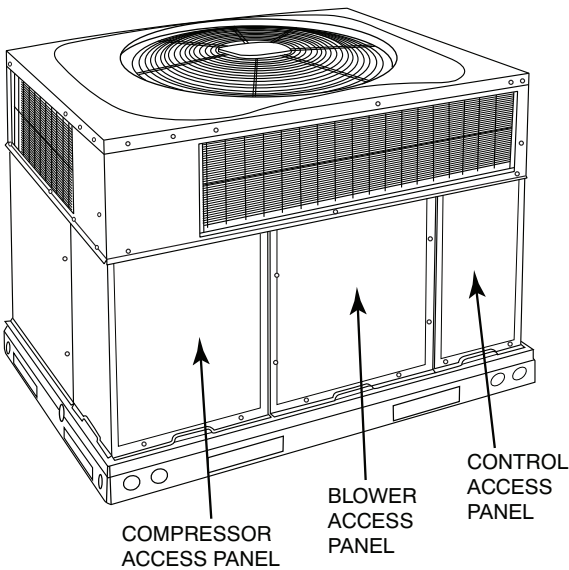


A08505

MAX DISTANCE BETWEEN TOP OF FAN GRILLE AND BOTTOM OF FAN BLADE

SIZE	"A"	
	IN.	MM
24	9.0	228
30	7.1	180
36	8.0	203
42	7.6	193
48	7.6	193
60	7.6	193

Fig. 16 - Fan Blade Position



A09207

Fig. 17 - Unit Access Panels

Outdoor Coil, Indoor Coil, and Condensate Drain Pan

Inspect the condenser coil, evaporator coil, and condensate drain pan at least once each year.

The coils are easily cleaned when dry; therefore, inspect and clean the coils either before or after each cooling season. Remove all obstructions, including weeds and shrubs, that interfere with the airflow through the condenser coil.

Straighten bent fins with a fin comb. If coated with dirt or lint, clean the coils with a vacuum cleaner, using the soft brush attachment. Be careful not to bend the fins. If coated with oil or grease, clean the coils with a mild detergent and water solution. Rinse coils with clear water, using a garden hose. Be careful not to splash water on motors, insulation, wiring, or air filter(s). For best results, spray condenser coil fins from inside to outside the unit. On units with an outer and inner condenser coil, be sure to clean between the coils. Be sure to flush all dirt and debris from the unit base.

Inspect the drain pan and condensate drain line when inspecting the coils. Clean the drain pan and condensate drain by removing all foreign matter from the pan. Flush the pan and drain trough with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain trough is restricted, clear it with a "plumbers snake" or similar probe device.

OUTDOOR FAN

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in damage to unit components.

Keep the condenser fan free from all obstructions to ensure proper cooling operation. Never place articles on top of the unit.

1. Remove 6 screws holding condenser grille and motor to top cover.
2. Turn motor/grille assembly upside down on top cover to expose the fan blade.
3. Inspect the fan blades for cracks or bends.
4. If fan needs to be removed, loosen the setscrew and slide the fan off the motor shaft.
5. When replacing fan blade, position blade as shown in Fig. 16.
6. Ensure that setscrew engages the flat area on the motor shaft when tightening
7. Replace grille.

Electrical Controls and Wiring

Inspect and check the electrical controls and wiring annually. Be sure to turn off the electrical power to the unit.

Remove access panels (see Fig. 17) to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections. If any smoky or burned connections are noticed, disassemble the connection, clean all the parts, restrip the wire end and reassemble the connection properly and securely.

After inspecting the electrical controls and wiring, replace the access panels (see Fig. 17). Start the unit, and observe at least one complete heating cycle and one complete cooling cycle to ensure proper operation. If discrepancies are observed in either or both operating cycles, or if a suspected malfunction has occurred, check each electrical component with the proper electrical instrumentation. Refer to the unit wiring label when making these checkouts.

NOTE: Refer to the heating and/or cooling sequence of operation in this publication as an aid in determining proper control operation

Refrigerant Circuit

Inspect all refrigerant tubing connections.

⚠ WARNING

EXPLOSION, SAFETY AND ENVIRONMENTAL HAZARD

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

This system uses Puron (R-410A) refrigerant which has higher operating pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gauge set, hoses, and recovery system must be designed to handle Puron. If you are unsure, consult the equipment manufacturer.

If low cooling performance is suspected, leak-test all refrigerant tubing using an electronic leak-detector or liquid-soap solution. If a refrigerant leak is detected, refer to the Check for Refrigerant Leaks section.

If no refrigerant leaks are found and low cooling performance is suspected, refer to the Checking and Adjusting Refrigerant Charge section.

Evaporator Airflow

The heating and/or cooling air-flow does not require checking unless improper performance is suspected. If a problem exists, be sure that all supply- and return-air grilles are open and free from obstructions, and that the air filter is clean. When necessary, refer to Indoor Airflow and Airflow Adjustments section to check the system airflow.

Puron Items

The indoor metering device is a TXV type device.

Pressure Switches

Pressure switches are protective devices wired into the control circuit (low voltage). They shut off compressor if abnormally high or low pressures are present in the refrigeration circuit. These pressure switches are specifically designed to operate with Puron (R-410A) systems. R-22 pressure switches must not be used as replacements for the Puron (R-410A) air conditioner.

Low Pressure Switch (24 size only)

This switch is located on the suction line and protects against low suction pressures caused by such events as loss of charge, low airflow across indoor coil, dirty filters, etc. It opens at 50± psig (957 Pa). If system pressure is above this, switch should be closed.

To check switch:

1. Turn off all power to unit.
2. Disconnect leads on switch.
3. Apply ohmmeter leads across switch. You should have continuity on a closed switch.

NOTE: Because these switches are attached to refrigeration system under pressure, it is not advisable to remove this device for troubleshooting unless you are reasonably certain that a problem

exists. If switch must be removed, remove and recover all system charge so that pressure gauges read 0 psi (0 Pa). Never open system without breaking vacuum with dry nitrogen.

High-Pressure Switch

The high-pressure switch is located in the discharge line and protects against excessive condenser coil pressure. It opens at 650 psig (31.1 kPa). High pressure may be caused by a dirty condenser coil, failed fan motor, or condenser air recirculation.

To check switch:

1. Turn off all power to unit.
2. Disconnect leads on switch.
3. Apply ohmmeter leads across switch. You should have continuity on a good switch.

Copeland Scroll Compressor (Puron Refrigerant)

The compressor used in this product is specifically designed to operate with Puron (R-410A) refrigerant and cannot be interchanged.

The compressor is an electrical (as well as mechanical) device. Exercise extreme caution when working near compressors. Power should be shut off, if possible, for most troubleshooting techniques. Refrigerants present additional safety hazards.

⚠ WARNING



FIRE/EXPLOSION HAZARD

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

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

The scroll compressor pumps refrigerant throughout the system by the interaction of a stationary and an orbiting scroll. The scroll compressor has no dynamic suction or discharge valves, and it is more tolerant of stresses caused by debris, liquid slugging, and flooded starts. The compressor is equipped with a noise reducing shutdown device and an internal pressure relief port. The pressure relief port is a safety device, designed to protect against extreme high pressure. The relief port has an operating range between 550 (26.3 kPa) and 625 (29.9 kPa) psig differential pressure.

Refrigerant

⚠ WARNING

EXPLOSION, ENVIRONMENTAL HAZARD

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

This system uses Puron (R-410A) refrigerant which has higher operating pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gauge set, hoses, and recovery system must be designed to handle Puron. If you are unsure, consult the equipment manufacturer.

This system uses Puron (R-410A) refrigerant which has higher operating pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gauge set, hoses, and recovery system must be designed to handle Puron. If you are unsure, consult the equipment manufacturer. Failure to use Puron compatible servicing equipment or replacement components may result in property damage or injury.

Compressor Oil

The Copeland scroll compressor uses 3MAF POE oil. If additional oil is needed, use Uniqema RL32-3MAF. If this oil is not available, use Copeland Ultra 32 CC or Mobil Arctic EAL22 CC. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

Reciprocating Compressor

Some sizes may include a traditional reciprocating compressor. These compressors have standard pistons valves, overloads, and internal pressure relief. Refer to Troubleshooting section or Service Manual for more information.

Rotary Compressor

The 24 size unit uses a single cylinder rotary compressor. This compressor utilizes a rotor which is positioned eccentrically with respect to the shell. Refrigerant gas is ported directly into the compression chamber and discharged into the surrounding area. It is also known as a “high-side” design since high pressure gas surrounds the motor and compression chamber. The majority of the shell will be hot to the touch. The rotary compressor also utilizes an external built-in accumulator to reduce the likelihood of refrigerant liquid from entering the compressor.

Servicing Systems on Roofs with Synthetic Materials

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials. Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device, coil, accumulator, or reversing valve.

Synthetic Roof Precautionary Procedure

1. Cover extended roof working area with an impermeable polyethylene (plastic) drip cloth or tarp. Cover an approximate 10 x 10 ft (3 x 3 m) area.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills, prevent run-offs, and protect drop cloth from tears caused by tools or components.
3. Place terry cloth shop towel inside unit immediately under component(s) to be serviced and prevent lubricant run-offs through the louvered openings in the unit base.
4. Perform required service.
5. Remove and dispose of any oil contaminated material per local codes.

Liquid Line Filter Drier

The filter drier is specifically designed to operate with Puron. Use only factory-authorized components. Filter drier must be replaced whenever the refrigerant system is opened. When removing a filter drier, use a tubing cutter to cut the drier from the system. Do not unsweat a filter drier from the system. Heat from unsweating will release moisture and contaminants from drier into system.

Puron (R-410A) Refrigerant Charging

Refer to unit information plate and charging chart. Some R-410A refrigerant cylinders contain a dip tube to allow liquid refrigerant to flow from cylinder in upright position. For cylinders equipped with a dip tube, charge Puron units with cylinder in upright position and a commercial metering device in manifold hose. Charge refrigerant into suction-line.

TROUBLESHOOTING

Refer to the Troubleshooting Chart (Table 11) for troubleshooting information.

START-UP CHECKLIST

Use the Start-Up Checklist at the back of this manual.

Table 11 – Troubleshooting Chart

SYMPTOM	CAUSE	REMEDY
Compressor and outdoor fan will not start	Power failure	Call power company
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker
	Defective contactor, transformer, control relay, or high-pressure, loss-of-charge or low-pressure switch	Replace component
	Insufficient line voltage	Determine cause and correct
	Incorrect or faulty wiring	Check wiring diagram and rewire correctly
	Thermostat setting too low/too high	Reset thermostat setting
Compressor will not start but condenser fan runs	Faulty wiring or circuit Loose connections in compressor	Check wiring and repair or replace
	Compressor motor burned out, seized, or internal overload open	Determine cause Replace compressor
	Defective run capacitor, overload, or PTC (positive temperature coefficient) thermistor	Determine cause and replace
	One leg of 3-phase power dead	Replace fuse or reset circuit breaker Determine cause
	Low input voltage	Determine cause and correct
Three-phase scroll compressor (size 30-60 unit) has a low pressure differential	Scroll compressor is rotating in the wrong direction	Correct the direction of rotation by reversing the 3-phase power leads to the unit
Compressor cycles (other than normally satisfying) cooling/heating calls	Refrigerant overcharge or undercharge	Recover refrigerant, evacuate system, and recharge to capacities shown on rating plate
	Defective compressor	Replace and determine cause
	Insufficient line voltage	Determine cause and correct
	Blocked outdoor coil	Determine cause and correct
	Defective run/start capacitor, overload or start relay	Determine cause and replace
	Faulty outdoor fan motor or capacitor	Replace
	Restriction in refrigerant system	Locate restriction and remove
Compressor operates continuously	Dirty air filter	Replace filter
	Unit undersized for load	Decrease load or increase unit size
	Thermostat temperature set too low	Reset thermostat setting
	Low refrigerant charge	Locate leak, repair, and recharge
	Air in system	Recover refrigerant, evacuate system, and recharge
	Outdoor coil dirty or restricted	Clean coil or remove restriction
Excessive head pressure	Dirty air filter	Replace filter
	Dirty indoor or outdoor coil	Clean coil
	Refrigerant overcharged	Recover excess refrigerant
	Air in system	Recover refrigerant, evacuate system, and recharge
	Indoor or outdoor air restricted or air short-cycling	Determine cause and correct
Head pressure too low	Low refrigerant charge	Check for leaks, repair and recharge
	Restriction in liquid tube	Remove restriction
Excessive suction pressure	Refrigerant overcharged	Recover excess refrigerant
Suction pressure too low	Dirty air filter	Replace filter
	Low refrigerant charge	Check for leaks, repair and recharge
	Metering device or low side restricted	Remove source of restriction
	Insufficient coil airflow	Check filter—replace if necessary
	Temperature too low in conditioned area	Reset thermostat setting
	Outdoor ambient below 55°F (13°C)	Install low-ambient kit
	Filter drier restricted	Replace

AIR CONDITIONER WITH PURON (R-410A) QUICK REFERENCE GUIDE

Puron refrigerant operates at 50–70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron. Puron refrigerant cylinders are rose colored.

- Puron refrigerant cylinders manufactured prior to March 1, 1999, have a dip tube that allows liquid to flow out of cylinder in upright position.
Cylinders manufactured March 1, 1999 and later DO NOT have a dip tube and MUST be positioned upside down to allow liquid to flow.
- Recovery cylinder service pressure rating must be 400 psig. DOT 4BA400 or DOT BW400.
- Puron systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.
- Manifold sets should be minimum 700 psig high-side and 180 psig low-side with 550 psig low-side retard.
- Use hoses with minimum 700 psig service pressure rating.
- Leak detectors should be designed to detect HFC refrigerant.
- Puron, as with other HFCs, is only compatible with POE synthetic oils.
- Vacuum pumps will not remove moisture from oil.
- Only use factory specified liquid-line filter driers with rated working pressures no less than 600 psig.
- Do not install a suction-line filter drier in liquid line.
- POE synthetic oils absorb moisture rapidly. Do not expose oil to atmosphere.
- POE synthetic oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- A Puron liquid-line filter drier is provided with every unit.
- Do not use an R-22 TXV.
- Never open system to atmosphere while it is under a vacuum.
- When system must be opened for service, break vacuum with dry nitrogen and replace filter driers.
- Always replace filter drier after opening system for service.
- Do not vent Puron into the atmosphere.
- Observe all warnings, cautions, and bold text.

START-UP CHECKLIST

(Remove and Store in Job Files)

I. PRELIMINARY INFORMATION

MODEL NO.: _____
SERIAL NO.: _____
DATE: _____
TECHNICIAN: _____

II. PRESTART-UP (Insert check mark in box as each item is completed)

- () VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- () REMOVE ALL SHIPPING HOLD DOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS
- () CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- () CHECK THAT INDOOR (EVAPORATOR) AIR FILTER IS CLEAN AND IN PLACE
- () VERIFY THAT UNIT INSTALLATION IS LEVEL
- () CHECK FAN WHEEL, AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE _____
COMPRESSOR AMPS _____
INDOOR (EVAPORATOR) FAN AMPS _____

TEMPERATURES

OUTDOOR (CONDENSER) AIR TEMPERATURE _____ DB
RETURN-AIR TEMPERATURE _____ DB _____ WB
COOLING SUPPLY AIR _____ DB _____ WB

PRESSURES

REFRIGERANT SUCTION _____ PSIG, SUCTION LINE TEMP* _____
REFRIGERANT DISCHARGE _____ PSIG, LIQUID TEMP† _____

- () VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

* Measured at suction inlet to compressor

† Measured at liquid line leaving condenser.

50VL-C



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SECTION

03

MISC COMPONENTS



VT7600 Series Programmable & Non-Programmable Thermostats For Commercial HVAC Applications

(Issue Date June 17, 2008 – 028-0132 R8)

Product overview

The VT7600 PI thermostat family is specifically designed for single stage and multi-stage control of heating/cooling equipment such as rooftop and self-contained units. The product features an intuitive, menu-driven, back-lit LCD display which walks users through the programming steps, making the process extremely simple. Accurate temperature control is achieved due to the product's PI time proportional control algorithm, which virtually eliminates temperature offset associated with traditional, differential-based thermostats.

All models contain two digital inputs, which can be set by the user to monitor filter status, activate a remote temporary occupancy switch, and/or used as a general purpose service indicator. In addition, depending on the model, up to three remote sensor inputs are available. All models contain a SPST auxiliary switch, which can be used to control lighting or disable the economizer function and a discharge air sensor input. For more advanced applications, an economizer control logic has been integrated onto the thermostat for use with proportional damper economizer actuators.



Fig.1 - VT7600 Series

The additional following documentation is available on www.viconics.com

- Information on the LON models (VT76xxX1000E), is available on document ITG-VT7600-LON-Exx
- Information on the BACnet models (VT76xxX1000B), is available on document ITG-VT7600-BAC-Exx
- Information on the Wireless models (VT76xx0X1000W), is available on documents: ITG-VWG-40-BAC-Exx and LIT-VWG-40-SETUP-Exx

Models available

Application	1 Heat / 1 Cool	2 Heat / 2 Cool	2 Heat / 2 Cool with economizer	3 Heat / 2 Cool heat pump
Model (programmable)	VT7652A1000	VT7652B1000	VT7656B1000	VT7652H1000
Model (non-programmable)	VT7600A1000	VT7600B1000	VT7605B1000	VT7600H1000

Features and benefits

Features	Benefits
• PI time proportioning algorithm	⇒ Increased comfort , accuracy, and energy savings
• 2 digital inputs	⇒ Adds functionality
• Smart fan	⇒ Saves energy during night mode
• Unique configuration key	⇒ Minimizes parameter tampering
• Lockable keypad	⇒ Tamper proof, no need for thermostat guards
• Freeze protection	⇒ Prevents costly freeze damage
• EEPROM memory	⇒ No loss of program
• 6 hour reserve time for clock	⇒ No need to reprogram day/time after power shortage
• Remote room and outdoor temperature sensor	⇒ Increase flexibility and functionality
• Auxiliary output	⇒ Can be used for lighting and/or economizer override
• Discharge air sensor	⇒ Can be used to monitor unit efficiency
• Intuitive, menu-driven programming (7 day, 2/4 events - on programmable models only)	⇒ Can be used for all types of establishments
• Economizer output (0-10 V d.c.) (on economizer models only)	⇒ Excellent retrofit opportunities
• Low/High balance point (on heat pump models only)	⇒ Protect and optimize systems performances
• 3 Heat/2 Cool (on heat pump models only)	⇒ Support single and two stages heat pump with one auxiliary heat stage

Theory of operation

The VT7600 uses a Viconics proprietary adaptive logic algorithm to control the space temperature. This algorithm controls the heating / air conditioning system to minimize overshoot while still providing comfort. It provides exceptional accuracy due to its unique PI time proportioning control algorithm, which virtually eliminates temperature offset associated with traditional, differential-based on/off thermostats.

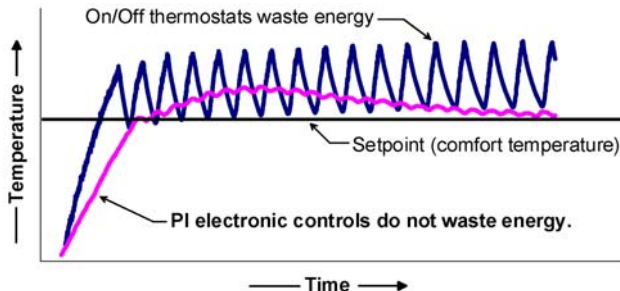


Fig.2 - On/Off mechanical control vs PI electronic control.

Features overview

- 7 day programmable models, 2 or 4 events
 - Gas/oil or electric system compatibility for all type of applications
 - Remote indoor averaging sensing capability
 - Temperature averaging with 2, 3, 4, 9 or 16 sensors
 - Remote outdoor sensing capability for added flexibility
 - System mode lock out
 - Heat pump balance point settings
 - Remote discharge air sensor input for monitoring purpose
 - System efficiency feedback
 - Lockable keypads for tamper proofing. No need for thermostat guards
 - Automatic frost protection to prevents costly freeze damage
 - Anti short cycle and minimum on/off run time protection. Reduces wear and maximizes life span of mechanical equipment.
 - 2 programmable digital inputs for added flexibility. Each input can be programmed as the following:
 - **None:** No function will be associated with the input
 - **Service:** a backlit flashing **Service** alarm will be displayed on the thermostat LCD screen when the input is energized. It can be tied in to the AC unit control card, which provides an alarm in case of malfunction.
 - **Filter:** a backlit flashing **Filter** alarm will be displayed on the thermostat LCD screen when the input is energized. It can be tied to a differential pressure switch that monitor filters
 - **Rem NSB:** remote NSB timer clock input. Will disable the internal scheduling of the thermostat. The scheduling will now be set as per the digital input. The menu part related to scheduling is disabled and no longer accessible. It provides low cost setback operation via occupancy sensor or from a dry contact
 - **RemOVR:** temporary occupancy contact. Disables all override menu function of the thermostat. . The override function is now controlled by a manual remote momentarily closed contact. When configured in this mode, the input operates in a toggle mode.
- With this function enabled it is now possible to toggle between unoccupied & occupied setpoints for the amount of time set by parameter (TOccTime) temporary occupancy time.
- Programmable smart fan operation saves energy during night mode
 - Non volatile EEPROM memory prevents loss of parameters during power shortage
 - Built in default profile set-up for easier start up and commissioning
 - Configurable SPST output relay on programmable models for lighting, exhaust fan or fresh air control
 - 6 hour typical reserve time for clock in case of power loss
 - 0 to 10 Vdc economizer output for more retrofit opportunities
 - Built in dry bulb economizer logic using outdoor temperature sensor
 - Input for supply/mixed air temperature sensor

Heat pump model specific features

- Selectable single or dual stage compressor stages
- High balance point: Locks out auxiliary heating when outside air temperature is above this value
- Low balance point: Locks out heat pump compressor operation when outside air temperature is below this value
- Comfort/economy mode: In economy mode, heat pump use is maximized before turning On auxiliary heating
- Compressor/auxiliary interlock: Adds flexibility by locking out heat pump operation during auxiliary heating to prevent high pressure trip when the coil is downstream of the auxiliary heat source.

Installation

- Remove security screw on the bottom of thermostat cover.
- Open up by pulling on the bottom side of thermostat.
- Remove Assembly and remove wiring terminals from sticker. **(Fig. 3)**
- Please note the FCC ID and IC label installed in the cover upon removal of cover for the wireless products.

A) Location:

- 1- Should not be installed on an outside wall.
- 2- Must be installed away from any heat source.
- 3- Should not be installed near an air discharge grill.
- 4- Should not be affected by direct sun radiation.
- 5- Nothing must restrain vertical air circulation to the thermostat.

B) Installation:

- 1- Swing open the thermostat PCB to the left by pressing the PCB locking tabs. **(Fig. 4)**
- 2- Pull out cables 6" out of the wall.
- 3- Wall surface must be flat and clean.
- 4- Insert cable in the central hole of the base.
- 5- Align the base and mark the location of the two mounting holes on the wall. Install proper side of base up.
- 6- Install anchors in the wall.
- 7- Insert screws in mounting holes on each side of the base. **(Fig. 4)**
- 8- Gently swing back the circuit board on the base and push on it until the tabs lock it.
- 10- Strip each wire 1/4 inch.
- 11- Insert each wire according to wiring diagram.
- 13- Gently push back into hole excess wiring **(Fig. 5)**
- 14- Re-Install wiring terminals in correct location. **(Fig. 5)**
- 15- Reinstall the cover (top side first) and gently push back extra wire length into the hole in the wall.
- 16- Install security screw.



- If replacing an old thermostat, label the wires before removal of the old thermostat.
- Electronic controls are static sensitive devices. Discharge yourself properly before manipulation and installing the thermostat.
- Short circuit or wrong wiring may permanently damage the thermostat or the equipment.
- Anti-short cycling can be set to 0 minutes for equipment that possesses their own anti cycling timer. Do not use that value unless the equipment is equipped with such internal timer. Failure to do so can damage the equipment.
- All VT7600 series thermostats are to be used only as operating controls. Whenever a control failure could lead to personal injury and/or loss of property, it becomes the responsibility of the user to add safety devices and/or alarm system to protect against such catastrophic failures.

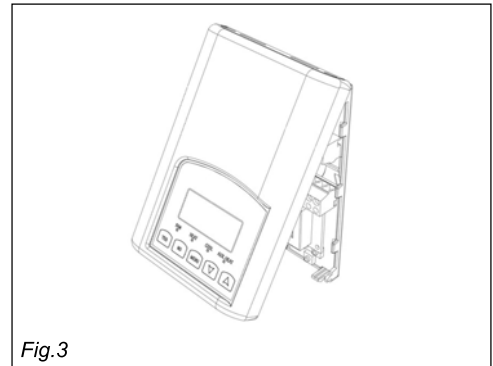


Fig.3

Location of PCB retaining tabs

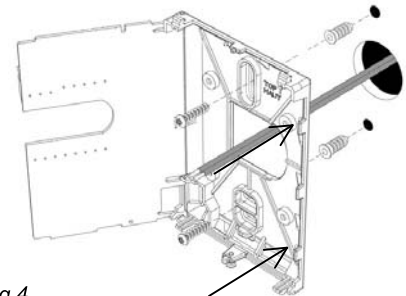


Fig.4

Re-install terminal blocks

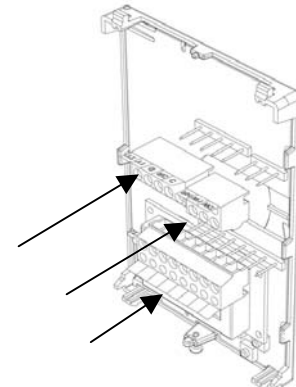


Fig.5

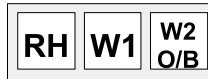
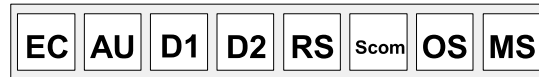
Thermostat assembly
(VT7300F1000 shown)



Fig.6

Wiring**Terminal identification**

Multistage					1H / 1C		Heat Pump		
Part Number	VT7656B	VT7605B	VT7652B	VT7600B	VT7652A	VT7600A	Part Number	VT7652H	VT7600H
Programmable	Yes	No	Yes	No	Yes	No	Programmable	Yes	No
Top left terminal block					Top left terminal block				
Y2	X	X	X	X			Y2	X	X
Y1	X	X	X	X	X	X	Y1	X	X
G	X	X	X	X	X	X	G	X	X
RC	X	X	X	X	X	X	RC	X	X
C	X	X	X	X	X	X	C	X	X
Top right terminal block					Top right terminal block				
RH	X	X	X	X	X	X	RH	X	X
W1	X	X	X	X	X	X	W1	X	X
W2	X	X	X	X			O/B	X	X
Bottom terminal block					Bottom terminal block				
Econo	X	X							
Aux	X	X	X	X	X	X	Aux	X	X
DI1	X	X	X	X	X	X	DI1	X	X
DI2	X	X	X	X	X	X	DI2	X	X
RS	X	X	X	X	X	X	RS	X	X
Scom	X	X	X	X	X	X	Scom	X	X
OS	X	X	X	X	X	X	OS	X	X
MS	X	X	X	X	X	X	MS	X	X

Screw terminal arrangement**5 pole left top connector****3 pole left top connector****8 pole bottom connector****Wiring notes:**

Note 1: If the same power source is used for the heating stages, install jumper across RC & RH. Maximum current is 2.0 amps.

Note 2: If auxiliary output is used to toggle occupancy of the electronic control card inside the equipment, configure the relay parameter (Aux cont) to the N.O. setting. A second relay can be added for additional functionality of the occupancy output.

Note 3: Economizer output uses a half bridge rectifier. Reference of the control signal is the common of the power supply of the thermostat. (terminal C)

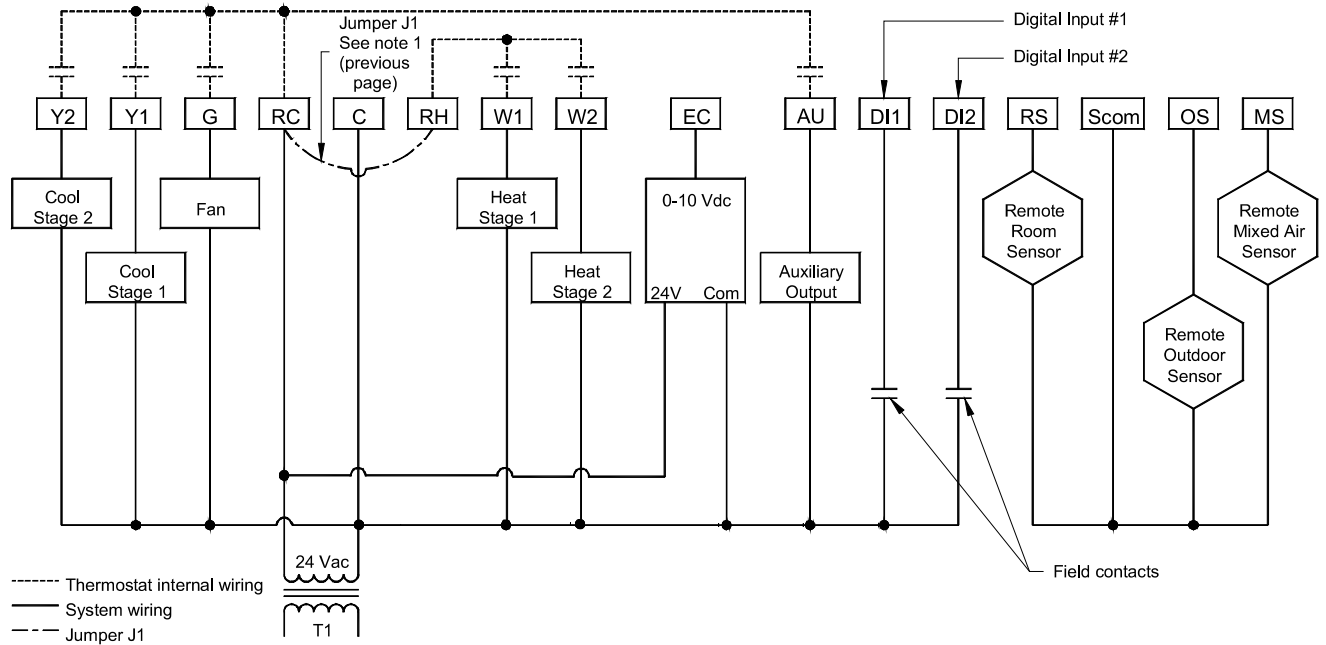
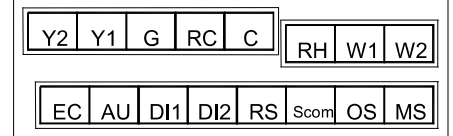
Note 4: Electromechanical contacts are to be used with the digital inputs. Electronic triacs cannot be used as mean of switching for the input. The switched leg to the input for the input to activate is terminal C (common)

Note 5: The transformer of the unit provides power to the thermostat and the additional loads that will be wired to the thermostat.

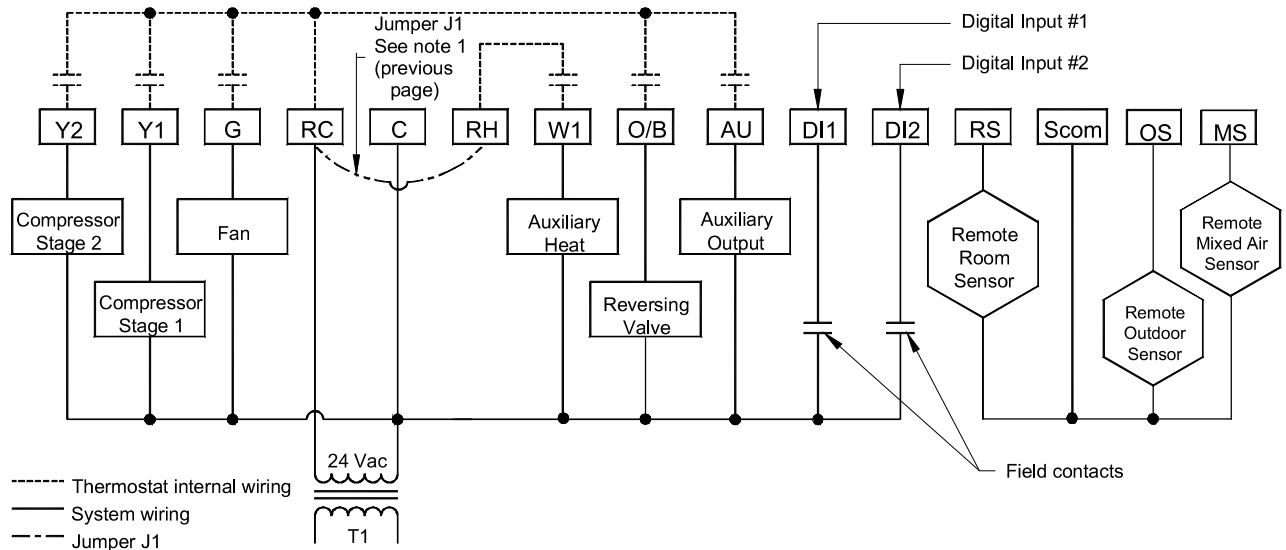
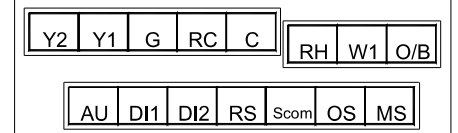
Detailed wiring diagrams for selected models

VT7656B1000**2 Heat / 2 Cool / Economizer / Programmable**

Thermostat Terminals -VT7656B1000

**VT7652H1000****Heat pump / Programmable**

Thermostat Terminals - VT7652H1000



Remote sensor accessories

Model no.	Description
S3010W1000	Wall mounted temperature sensor
S3020W1000	Wall mounted temperature sensor with override button and occupancy status LED
S2020E1000	Outdoor temperature sensor
S2060A1000	Averaging temperature sensor
S2000D1000	Duct mounted temperature sensor



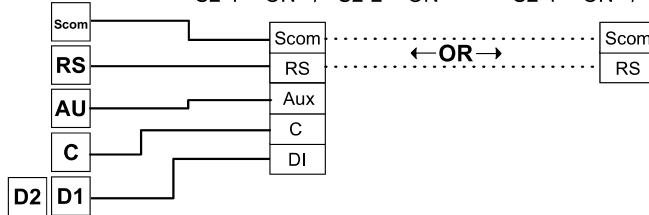
Fig.8 – S3020W1000 wall mounted sensor

Remote mount temperature sensors use 10K NTC thermistors.

- This sensor can be used for:
- 3 thermistors with 2 dip switches are provided with each sensor for various averaging combinations
- Optional occupancy led
- Optional override key

Wiring example of single remote room sensor:

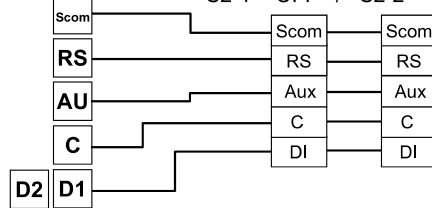
VT7600 Series Thermostat 1x S3020W1000 S3010W1000
Remote wiring 1 sensor Remote wiring 1 sensor
S2-1 = ON / S2-2 = ON S2-1 = ON / S2-2 = ON



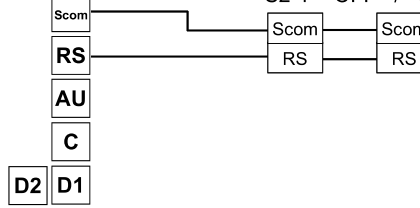
Dip switch S2-1 = ON
setting for: S2-2 = ON
1 sensor

Wiring examples of 2 remote room sensors for averaging applications:

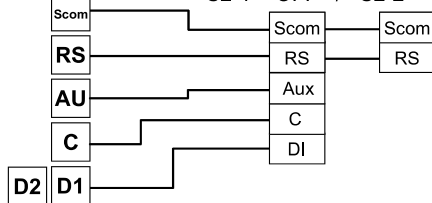
VT7600 Series Thermostat 2x S3020W1000
Remote wiring 2 sensors
S2-1 = OFF / S2-2 = ON



VT7600 Series Thermostat 2x S3010W1000
Remote wiring 2 sensors
S2-1 = OFF / S2-2 = ON



VT7600 Series Thermostat 1x S3010W1000 and 1x S3020W1000
Remote wiring 2 sensors
S2-1 = OFF / S2-2 = ON



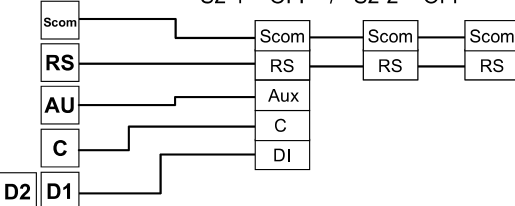
Notes for averaging applications:

- S3010W1000 and S3020W1000 can be mixed matched.
- S3010W1000 and S3020W1000 are to be wired in parallel.
- Respect the dip switch setting in each remote sensor.

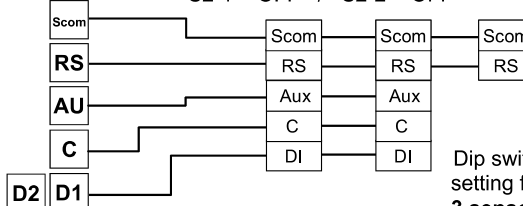
Dip switch S2-1 = OFF
setting for: S2-2 = ON
2 sensors

Wiring examples of 3 remote room sensors for averaging applications:

VT7600 Series Thermostat 2x S3010W1000 and 1x S3020W1000
Remote wiring 3 sensors
S2-1 = OFF / S2-2 = OFF



VT7600 Series Thermostat 1x S3010W1000 and 2x S3020W1000
Remote wiring 3 sensors
S2-1 = OFF / S2-2 = OFF



Dip switch S2-1 = OFF
setting for: S2-2 = OFF
3 sensors

Temperature vs resistance chart for 10 Kohm NTC thermistor

($R_{25^{\circ}\text{C}} = 10\text{K}\Omega \pm 3\%$ - $B_{25/85^{\circ}\text{C}} = 3975\text{K} \pm 1.5\%$)

°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm
-40	-40	324.3197	-20	-4	94.5149	0	32	32.1910	20	68	12.4601	40	104	5.3467
-39	-38	303.6427	-19	-2	89.2521	1	34	30.6120	21	70	11.9177	41	106	5.1373
-38	-36	284.4189	-18	0	84.3147	2	36	29.1197	22	72	11.4018	42	108	4.9373
-37	-35	266.5373	-17	1	79.6808	3	37	27.7088	23	73	10.9112	43	109	4.7460
-36	-33	249.8958	-16	3	75.3299	4	39	26.3744	24	75	10.4443	44	111	4.5631
-35	-31	234.4009	-15	5	71.2430	5	41	25.1119	25	77	10.0000	45	113	4.3881
-34	-29	219.9666	-14	7	67.4028	6	43	23.9172	26	79	9.5754	46	115	4.2208
-33	-27	206.5140	-13	9	63.7928	7	45	22.7861	27	81	9.1711	47	117	4.0607
-32	-26	193.9703	-12	10	60.3980	8	46	21.7151	28	82	8.7860	48	118	3.9074
-31	-24	182.2686	-11	12	57.2044	9	48	20.7004	29	84	8.4190	49	120	3.7607
-30	-22	171.3474	-10	14	54.1988	10	50	19.7390	30	86	8.0694	50	122	3.6202
-29	-20	161.1499	-9	16	51.3692	11	52	18.8277	31	88	7.7360	51	124	3.4857
-28	-18	151.6239	-8	18	48.7042	12	54	17.9636	32	90	7.4182	52	126	3.3568
-27	-17	142.7211	-7	19	46.1933	13	55	17.1440	33	91	7.1150	53	127	3.2333
-26	-15	134.3971	-6	21	43.8268	14	57	16.3665	34	93	6.8259	54	129	3.1150
-25	-13	126.6109	-5	23	41.5956	15	59	15.6286	35	95	6.5499	55	131	3.0016
-24	-11	119.3244	-4	25	39.4921	16	61	14.9280	36	97	6.2866	56	133	2.8928
-23	-9	112.5028	-3	27	37.5056	17	63	14.2629	37	99	6.0351	57	135	2.7886
-22	-8	106.1135	-2	28	35.6316	18	64	13.6310	38	100	5.7950	58	136	2.6886
-21	-6	100.1268	-1	30	33.8622	19	66	13.0307	39	102	5.5657	59	138	2.5926

S3010W1000 remote wall mounted temperature sensor, dip switch location

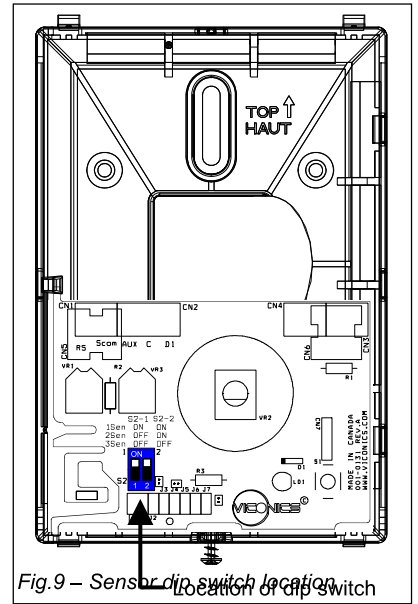


Fig.9 – Sensor dip switch location

S2000D1000, remote duct mounted temperature sensor c/w junction box.

This sensor can be used for:

- Remote return air temperature sensing with the sensor mounted on the return air duct.
- Outside air temperature sensing with the sensor installed in the fresh air plenum.
- Supply air temperature sensor

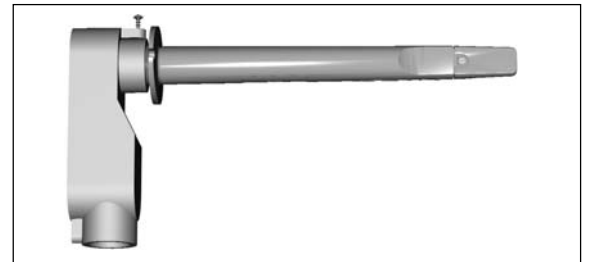


Fig.10 – Remote duct mounted temperature sensor

S2060A1000, remote averaging duct mounted temperature sensor c/w junction box.

This sensor can be used for:

- Remote averaging return air temperature sensing with the sensor mounted on the return air duct.
- Outside air temperature averaging sensing with the sensor installed in the fresh air plenum.
- Mixed air temperature averaging sensor for economizer models with the sensor in the mixing plenum.

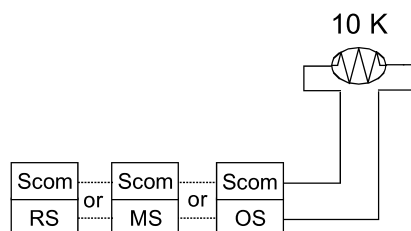
S2020E1000, outdoor air temperature sensor

This sensor can be used for:

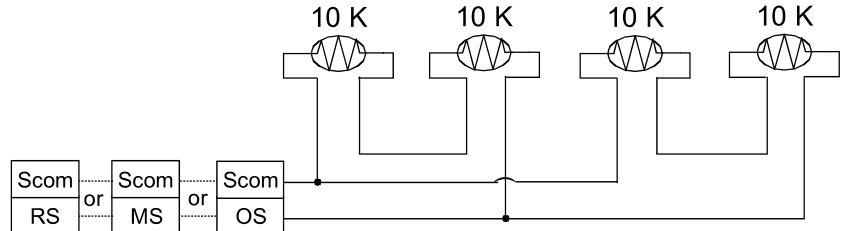
- Outside air temperature sensing with the sensor installed directly exposed to the elements.
- Sensor uses a water resistant NEMA 4 ABS enclosure for outdoor applications

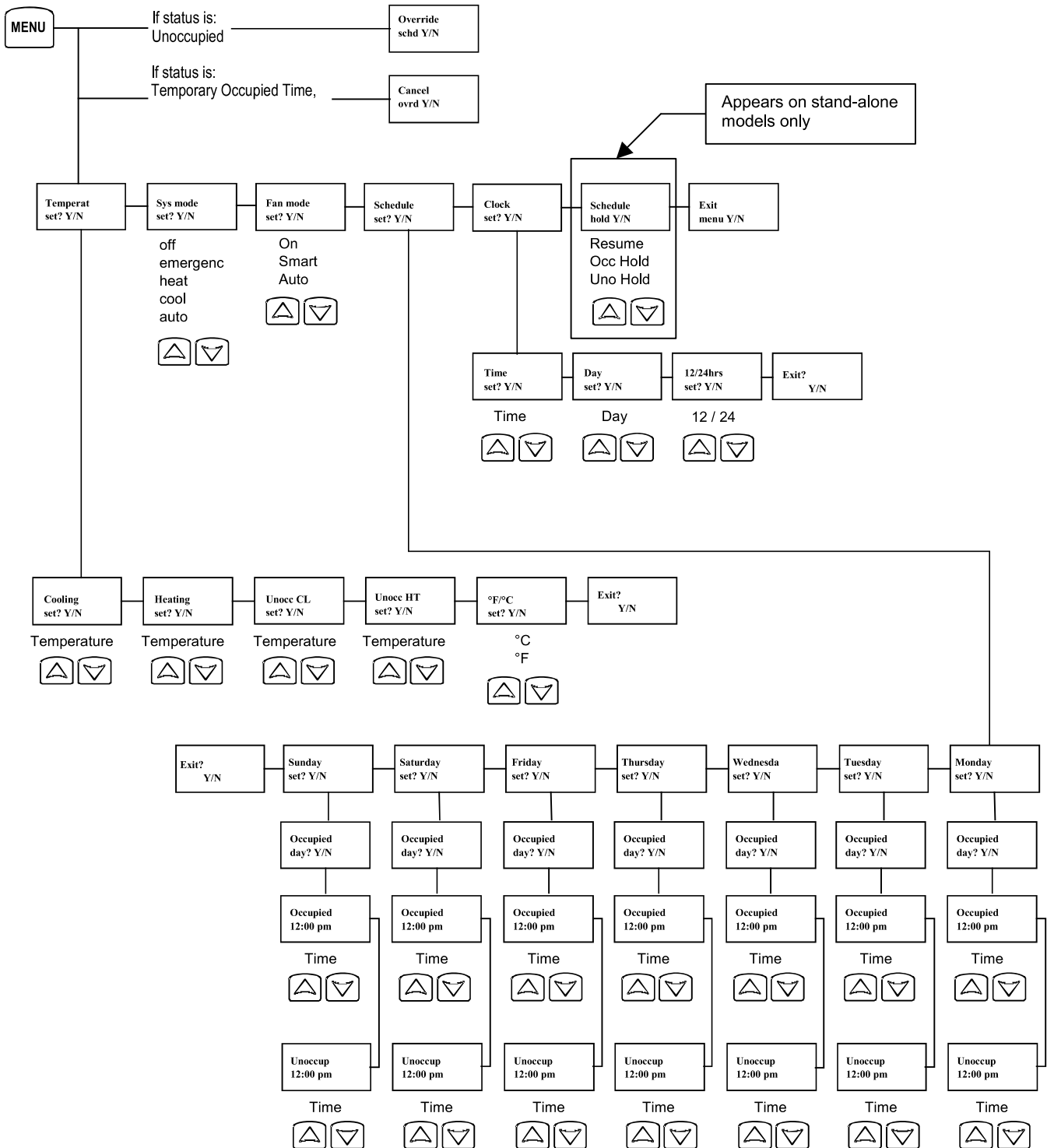
WIRING S2000D1000, S2060A1000 and S2020E1000

Remote wiring 1 sensor



Remote wiring 4 sensors



User menu flow chart:**NOTE:** Prompts may not all be present depending on model selected

Programming and status display instructions

1. Status display

The thermostat features a two-line, eight-character display. There is a low level back-light level that is always active and can only be seen at night. When left unattended, the thermostat has an auto scrolling display that shows the actual status of the system. Each item is scrolled one by one with the back lighting off. Pressing any key will cause the back light to come on.

Sequence of auto-scroll status display:

Room temperature	Clock status	System mode	Schedule status	Outdoor temperature	Alarms
RoomTemp x.x °C or °F	Monday 12.00 AM	Sys mode auto	Occupied	Outdoor x.x °C or °F	Service
		Sys mode off	Occupied hold		Frost ON
		Sys mode heat	Unoccup		SetClock
		Sys mode cool	Unoccup hold		Filter
		Sys mode emergenc	Override		

Manual scroll of each menu item is achieved by pressing the Yes (scroll) key repetitively. The last item viewed will be shown on the display for 30 seconds before returning to automatic scrolling. Temperature is automatically updated when scrolling is held.

Outdoor air temperature display is only enabled when outdoor air temperature sensor is connected.

- A maximum range status display of 50 °C (122 °F) indicates a shorted sensor. Associated functions, such as mode lockouts and economizer function are automatically disabled.
- A minimum range status -40 °C (-40 °F) is not displayed and indicates a opened sensor or a sensor not connected. Associated functions, such as mode lockouts and economizer function are automatically disabled.

If alarms are detected, they will automatically be displayed at the end of the status display scroll. During an alarm message display, the back lit screen will light up at the same time as the message and shut off during the rest of the status display. Two alarms maximum can appear at any given time. The priority for the alarms is as follows:

Frost ON	Indicates that the heating is energized by the low limit frost protection room temperature setpoint 5.6 °C (42 °F)
SetClock	Indicates that the clock needs to be reset. There has been a power failure which has lasted longer than 6 hours
Service	Indicates that there is a service alarm as per one of the programmable digital input (DI1 or DI2)
Filter	Indicates that the filters are dirty as per one of the programmable digital input (DI1 or DI2)

Three status LEDs on the thermostat cover are used to indicate the status of the fan, a call for heat, or a call for cooling.

Multistage and single stage models

- When the fan is on, the FAN LED will illuminate.
- When heating is on, the HEAT LED will illuminate.
- When cooling is on, the COOL LED will illuminate.

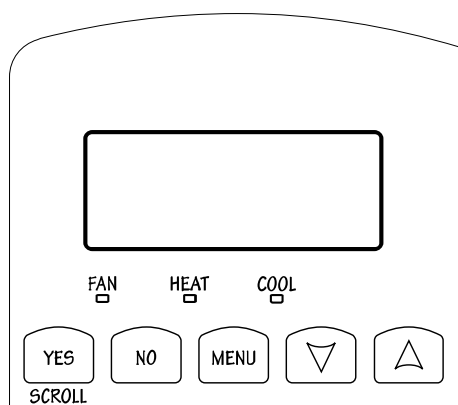


Fig. 11 - Multistage and single stage models

Heat pump models

- When the fan is on, the FAN LED will illuminate.
- When auxiliary heat is on, the AUX HEAT LED will illuminate.
- When compressor is on, the HEAT-PUMP LED will illuminate.

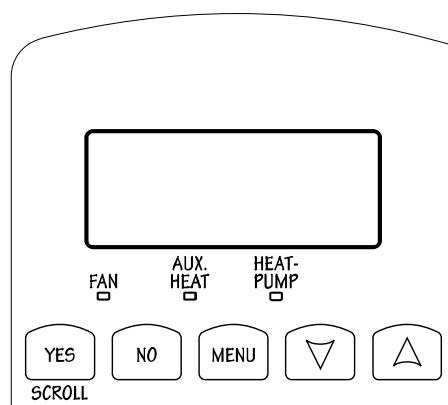


Fig. 12 – Heat pump models

2. User programming instructions menu

The VT7600 series of thermostat feature an intuitive, menu-driven, back-lit LCD display that walks users through the programming steps, making the programming process extremely simple. This menu is typically accessed by the user to set the parameters such as temperature and time events, system mode, fan mode, etc.

It is possible to bring up the user menu at any time by depressing the MENU key. The status display automatically resumes after exiting the user-programming menu.

If the user pauses at any given time during programming, **Auto Help** text is displayed to help and guide the user through the usage and programming of the thermostat.

Ex.: Press yes key to change cooling temperature setpoint
Use the up or down arrow to adjust cooling setpoint

Each of the sections in the menu are accessed and programmed using 5 keys on the thermostat cover.

The priority for the alarms is as follows:



The YES key is used to confirm a selection, to move onto the next menu item and to manually scroll through the displayed information.



The NO key is used when you do not desire a parameter change, and to advance to the next menu item. Can also be used to toggle between heating and cooling setpoints.



The MENU key is used to access the Main User Menu or exit the menu.



The down arrow key is used to decrease temperature setpoint and to adjust the desired values when programming and configuring the thermostat.



The up arrow key is used to increase temperature setpoint and to adjust the desired values when programming and configuring the thermostat.

When left unattended for 45 seconds, the display will resume automatic status display scrolling.

To turn on the back light, press any key on the front panel. The back lit display will turn off when the thermostat is left unattended for 45 seconds

Sequence of user menu:

Override Resume	Temperature setpoints	System mode setting	Fan mode setting	Schedules setting	Clock setting	Schedule hold
Override schd Y/N	Temperat set Y/N	Sys mode set Y/N	Fan mode set Y/N	Schedule set Y/N	Clock set Y/N	Schedule hold Y/N
Appears only in unoccupied mode						Appears only on stand-alone models
Cancel ovrdr Y/N						
Appears only in override mode						

There is a default profile set in the thermostat from the factory.

This enables the thermostat to operate as a non-programmable unit in day mode operation at start up.

Programmed default temperature setpoints:	Programmed default modes:
Occupied cooling setpoint = 24 °C (75 °F)	System mode = Auto
Occupied heating setpoint = 22 °C (72 °F)	Fan mode = Smart (for models with a communication module or programmable stand-alone models)
Unoccupied cooling setpoint = 28 °C (82 °F)	Fan mode = Auto (for non-programmable stand-alone models)
Unoccupied heating setpoint = 18 °C (65 °F)	Programmed default schedules:
Fahrenheit scale	Monday through Sunday
Setpoint type = permanent	Occupied time is: 12 00 AM
	Unoccupied time is: 11:59 PM

There will be a 1 minute unoccupied period every night at 11:59 PM with this default configuration.

A) Override an unoccupied period

Override
schd Y/N

This menu will appear only when the thermostat is in unoccupied mode. The unoccupied mode is enabled either by the internal timer scheduling or by a remote NSB contact via DI1 or DI2.

If DI1 or DI2 is configured to operate as a remote temporary override contact, this menu will be disabled.

Answering yes to this prompt will cause the thermostat to go into occupied mode for an amount of time equal to the parameter "TOccTime" (1 to 12 hours).

B) Resume regular scheduling

Cancel
ovrd Y/N

This menu does not appear in regular operation. It will appear only when the thermostat is in Unoccupied override mode.

Answering "Yes" to this question will cause the thermostat to resume the regular programmed setpoints & scheduling.

C) Temperature setpoints

Permanent setpoint changes

Temperat
set Y/N

This menu permits the adjustment of all permanent temperature setpoints (occupied and unoccupied) as well as the desired temperature units (°F or °C). Permanent setpoints are written to RAM and EEPROM

Cooling setpoint Occupied mode		Heating setpoint Occupied mode		Cooling setpoint Unoccupied mode		Heating setpoint Unoccupied mode		°F or °C display setting	
Cooling set? Y/N	No next → Yes down ↓	Heating set? Y/N	No next → Yes down ↓	Unocc CL set? Y/N	No next → Yes down ↓	Unocc HT set? Y/N	No next → Yes down ↓	°F or °C set? Y/N	No next → Yes down ↓
Use ▲▼ keys to set value, Yes key to confirm									
Cooling 70.0 °F	Use ▲▼ To set value	Heating 68.00 °F	Use ▲▼ To set value	Unocc CL 80.0 °F	Use ▲▼ To set value	Unocc HT 60.0 °F	Use ▲▼ To set value	Units °F	Use ▲▼ To set value

Temporary setpoint changes

Temporary setpoints can be modified through the Up arrow key (▲) and the Down arrow keys (▼).

User will be prompted with the present mode (Heating or Cooling) of the thermostat and its setpoint.

The Up (▲) arrow key will increment the setpoint by 0.5 degree (F or C).

The Down (▼) arrow key will decrement the setpoint by 0.5 degree (F or C).

Press the Yes key to accept the new setpoint.

Local changes to the heating or cooling setpoints made by the user directly using the up or down arrow are temporary.

They will remain effective for the duration specified by TOccTime.

Setpoints will revert back to their default value after internal timer TOccTime expires.

If a permanent change to the setpoints is required, use the Temperat set ? menu

D) System mode setting

Sys mode
set Y/N

This menu is accessed to set system mode operation

Use ▲▼ to set value, Yes key to confirm

Sys mode auto	Automatic mode Automatic changeover mode between heating and cooling operation
Sys mode cooling	Cooling mode Cooling operation mode only
Sys mode heating	Heating mode Heating operation mode only
Sys mode emergency	Emergency heat mode (heat pump models only) Forced auxiliary heat operation mode only
Sys mode off	Off mode Normal cooling or heating operation disabled If enabled in installer parameters, only the automatic heating frost protection at 50 °F (10 °C) is enabled

E) Fan mode setting

Fan mode
set Y/N

This section of the menu is permits the setting of the fan mode operation.
Use ▲▼ to set value, Yes key to confirm

Fan mode On	On fan mode Fan is on continuously, even when system mode is OFF.
Fan mode Auto	Automatic fan mode Fan cycles on a call for heating or cooling for both occupied & unoccupied periods.
Fan mode Smart	Smart fan mode During occupied periods, fan is on continuously. In unoccupied mode, fan cycles on a call for heating or cooling. This selection is available on all models with a communication module, on all stand-alone programmable models or if DI1 or DI2 is set to RemNSB on stand-alone non-programmable models

F) Schedule set (2 events)

Scheduling can have 2 or 4 events per day. This is set in the configuration menu as per parameter (2/4event)

Schedule
set Y/N

This section of the menu permits the user to set the whether 2 or 4 events is needed. Each day can be tailored to specific schedules if needed.

- 2 events can be programmed per day.
- Occupied & unoccupied periods can be set for each day.

Monday timer Schedule set		Tuesday timer Schedule set		Wednesday timer Schedule set		Other days are identical
Monday set? Y/N	No next → Yes down ↓	Tuesday set? Y/N	No next → Yes down ↓	Wednesda set? Y/N	No next → Yes down ↓	Selects the day to be programmed or modified
Yes key to access day scheduling, No key to jump to next day						
Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Yes = Daily schedules will be accessed No = Unoccupied mode all day
Yes key to access day scheduling, No key to jump to next day						
		Copy Y/N Previous	Yes next → No down ↓	Copy Y/N Previous	Yes next → No down ↓	Yes = Will copy previous day schedule No = Daily schedules will be accessed
Yes key to copy previous day, No key to set new time value for each day						
Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Sets Event # 1 Occupied time Will activate occupied setpoints
Use ▲▼ to set value, Yes key to confirm						
Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Sets Event # 2 Unoccupied time Will activate unoccupied setpoints
Use ▲▼ to set value, Yes key to confirm						

Typical examples of a 2 event office schedule

Ex. #1 Office building closed all weekend

Event	Period #1 - Event #1		Period #1 - Event #2	
	Occupied		Unoccupied	
Setpoint	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F
Monday	7.00 AM		6.00 PM	
Tuesday	7.00 AM		6.00 PM	
Wednesday	7.00 AM		6.00 PM	
Thursday	7.00 AM		6.00 PM	
Friday	7.00 AM		6.00 PM	
Saturday	12.00 PM *		12.00 PM *	
Sunday	12.00 PM *		12.00 PM *	

Note: 12:00 PM = Noon

12:00 AM = Midnight

Daily Occupancy
Day time only
Day time only
Day time only
Day time only
Day time only
Day time only
Unoccupied
Unoccupied

*Programming consecutive events to the same time will cause the thermostat to choose the last event as the time at which it will set its schedule. In the above example, the thermostat will control to the unoccupied set point until 7:00 AM Monday.

Ex. #2 Commercial building which is occupied all weekend

Event	Period #1 - Event #1		Period #1 - Event #2	
	Occupied		Unoccupied	
Setpoint	Cool 72 °F	Heat 70 °F	Cool 80 °F	Heat 62 °F
Monday	8.00 AM		5.00 PM	
Tuesday	8.00 AM		5.00 PM	
Wednesday	8.00 AM		5.00 PM	
Thursday	8.00 AM		5.00 PM	
Friday	8.00 AM		5.00 PM	
Saturday	12.00 AM **		11.59 PM **	
Sunday	12.00 AM **		11.59 PM **	

Daily Occupancy
Day time only
Day time only
Day time only
Day time only
Day time only
Day time only
Occupied
Occupied

** To program a day as occupied for 24 hours, set that day Occupied time to 12:00 AM and Unoccupied time to 11:59 PM There will be a 1 minute unoccupied period every night at 11:59 PM with this schedule configuration.

G) Schedule set (4 events)

Schedule set Y/N

This section of the menu permits the user to set the whether 2 or 4 events is needed. Each day can be tailored to specific schedules if needed.

- 4 events can be programmed per day.
- Occupied & Unoccupied periods can be set for each day.
- Programming the 3 rd. & 4 th. events to the same time will cancel the last period.

Monday timer Schedule set		Tuesday timer Schedule set		Wednesday timer Schedule set		Other days are identical
Monday set? Y/N	No next → Yes down ↓	Tuesday set? Y/N	No next → Yes down ↓	Wednesday set? Y/N	No next → Yes down ↓	Selects the day to be programmed or modified
Yes key to access day scheduling, No key to jump to next day						
Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Occupied Day? Y/N	No next → Yes down ↓	Yes = Daily schedules will be accessed No = Unoccupied mode all day
Yes key to access day scheduling, No key to jump to next day						
	Copy Y/N Previous		Yes next → No down ↓	Copy Y/N Previous	Yes next → No down ↓	Yes = Will copy previous day schedule No = Daily schedules will be accessed
Yes key to copy previous day, No key to set new time value for each day						
Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Occupied 00:00 AM	Use ▲▼ To set value	Sets Event # 1 Occupied time Will activate occupied setpoints
Use ▲▼ to set value, Yes key to confirm						
Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Unoccup 00:00 AM	Use ▲▼ To set value	Sets Event # 2 Unoccupied time Will activate unoccupied setpoints
Use ▲▼ to set value, Yes key to confirm						
Occupie2 00:00 AM	Use ▲▼ To set value	Occupie2 00:00 AM	Use ▲▼ To set value	Occupie2 00:00 AM	Use ▲▼ To set value	Sets Event # 3 Occupied time Will activate occupied setpoints
Use ▲▼ to set value, Yes key to confirm						
Unoccup2 00:00 AM	Use ▲▼ To set value	Unoccup2 00:00 AM	Use ▲▼ To set value	Unoccup2 00:00 AM	Use ▲▼ To set value	Sets Event # 4 Unoccupied time Will activate unoccupied setpoints
Use ▲▼ to set value, Yes key to confirm						

Ex. #1 Four event retail establishment schedule

Ex: #1 Four event retail establishment schedule									
Event	Period 1 - Event 1		Period 1 - Event 2		Period 2 - Event 3		Period 2 - Event 4		Daily Occupancy
Setpoint	Occupied		Unoccupied		Occupied		Unoccupied		
	Cool	Heat	Cool	Heat	Cool	Heat	Cool	Heat	
	72 °F	70 °F	80 °F	62 °F	72 °F	70 °F	80 °F	62 °F	
Monday	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Day time only
Tuesday	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Day time only
Wednesday	7.00 AM		5.00 PM		12.00 PM *		12.00 PM *		Day time only
Thursday	7.00 AM		5.00 PM		7.00 PM		10.30 PM		Day/evening time only
Friday	7.00 AM		5.00 PM		7.00 PM		10.30 PM		Day/evening time only
Saturday	12.00 PM *		12.00 PM *		12.00 PM *		12.00 PM *		Unoccupied
Sunday	12.00 PM *		12.00 PM *		12.00 PM *		12.00 PM *		Unoccupied

* Programming events to the same time will cancel the last period and leave the thermostat in unoccupied mode

Ex. #2 Residential

Event	Period 1 - Event 1		Period 1 - Event 2		Period 2 - Event 3		Period 2 - Event 4		Daily Occupancy
Setpoint	Occupied		Unoccupied		Occupied		Unoccupied		
	Cool	Heat	Cool	Heat	Cool	Heat	Cool	Heat	
	72 °F	70 °F	80 °F	62 °F	72 °F	70 °F	80 °F	62 °F	
Monday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Tuesday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Wednesday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Thursday	6:00 AM		8:00 AM		4:00 PM		10:00 PM		Day/evening time only
Friday	6:00 AM		8:00 AM		4:00 PM		11:30 PM		Day/evening time only
Saturday	8:00 AM *		8:00 AM *		8:00 AM *		11:59 PM *		Day time only
Sunday	12:00 AM *		12:00 AM *		12:00 AM *		11:59 PM *		Occupied all day

* Programming consecutive events to the same time will cause the thermostat to choose the last event as the time at which it will set its schedule. In the above example for Saturday, the thermostat will control to the occupied set point from 8:00 AM until 11:59 PM. Since it is desired to be in occupied mode throughout the night, then it is necessary to program the first event on Sunday at 12:00 AM. The thermostat will force a one minute unoccupied period for a one minute period (between 11:59 PM and 12:00 AM on Saturday)

H) Clock/Day Settings

Clock set Y/N

This section of the menu permits the user to set the time and day.

Time setting		Day setting		Time format setting	
Time set? Y/N	No next → Yes down ↓	Day set? Y/N	No next → Yes down ↓	12/24hrs set? Y/N	No = exit Yes down ↓
Time 0:00	Use ▲▼ To set value	Day Monday	Use ▲▼ To set value	12/24hrs 12 hrs	Use ▲▼ To set value

J) Schedule hold

Schedule hold Y/N

This menu

- This menu will only appear on stand-alone thermostat, e.i. without a BACnet / Echelon module.
- This section of the menu permits the user to set a permanent schedule hold, which bypasses the internal thermostat scheduling.
- The permanent schedule hold function is typically used for non-scheduled events that extend for various periods of time.
- Enabling a permanent occupied or permanent unoccupied schedule hold will cancel any active override.
- The use of temporary setpoints during permanent hold is permitted. The duration of the temporary setpoint is as set per the TOccTime parameter. Ex. 3 hours

Use ▲▼ to set value, Yes key to confirm

Schedule resume	Resume regular scheduling cancels the permanent hold and re-enables the regular programming as set per internal scheduling or as per remote NSB via one of the DI's configured as remote NSB. This action can also be accomplished by using the Resume menu. Any temporary setpoint that are active will be left active for the duration of the period as set per the TOccTime parameter.
Schedule occ hold	Hold permanent occupied forces the thermostat into a permanent occupied mode using the occupied setpoints. All timed scheduling functions are by-passed. The PERMANENT OCCUPIED status will appear in the automatic status scroll. To resume to regular scheduling, user must scroll to the Schedule Hold menu and select the Schedule resume option..
Schedule uno hold	Hold permanent unoccupied forces the thermostat into a permanent unoccupied mode using the unoccupied setpoints. All timed scheduling functions are by-passed. The PERMANENT UNOCCUPIED status will appear in the automatic status scroll. To resume to regular scheduling, user must scroll to the Schedule Hold menu and select the Schedule resume option..

Installer configuration parameter menu

Configuration can be done through the network or locally at the thermostat.

- To enter configuration, press and hold the middle button (**Menu**) for 8 seconds
- Press the same middle button repetitively to scroll between all the available parameters
- Use the up and down key to change the parameter to the desired value.
- To acknowledge and save the new value, press the middle button again.
- The next listed parameter is now displayed

Configuration parameters	Significance Default value				Adjustments			
DI 1	Digital input no.1 configuration Open contact input = function not energized Closed contact input = function energized Default value = None				None , No function will be associated with the input Rem NSB , remote NSB timer clock input. Will disable the internal scheduling of the thermostat. The scheduling will now be set as per the digital input. The time is still displayed as information, but the menu part related to scheduling is disabled and no longer accessible. Open contact = occupied setpoints Closed contacts = unoccupied setpoints RemOVR Temporary override remote contact. Disables all override menu function of the thermostat. The override function is now controlled by a manual remote momentarily closed contact. When configured in this mode, the input operates in a toggle mode. With this function enabled it is now possible to toggle between unoccupied & occupied setpoints for the amount of time set by parameter (TOccTime) temporary occupancy time. When Override is enabled, an Override status message will be displayed Filter , a back-lit flashing Filter alarm will be displayed on the thermostat LCD screen when the input is energized Service , a back-lit flashing Service alarm will be displayed on the thermostat LCD screen when the input is energized			
DI 2	Digital input no. 2 configuration Default value = None				Same as above. It is possible to configure both inputs to have the same function.			
lockout	Keypad lockout levels Default value = 0 No lock				0 = No lock 1 = Low level 2 = High level			
Level	Resume/ Override scheduling	Permanent Occupied and Unoccupied Setpoints	Temporary setpoints using arrows	System mode setting	Fan mode setting	Schedules setting	Clock setting	Permanent hold
	Resume sched Y/N	RoomTemp set Y/N	Up key (▲) Down key (▼)	Sys mode set Y/N	Fan mode set Y/N	Schedule set Y/N	Clock set Y/N	Schedule hold Y/N
0	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access
1	Yes access	No access	Yes access	No access	No access	No access	Yes access	No access
2	No access	No access	No access	No access	No access	No access	Yes access	No access
pwr del	Power-up delay Default value = 10 seconds				On initial power up of the thermostat (each time 24 Vac power supply is removed & re-applied) there is a delay before any operation is authorized (fan, cooling or heating). This can be used to sequence start up multiple units / thermostat in one location. 10 to 120 seconds			

Frost pr	Frost protection enabled Default value = Off On heat pump models the system mode will be forced to EMERGENCY mode if frost protection is activated	Off: no room frost protection On: room frost protection enabled in all system mode at: 42 °F (5.6 °C) Frost protection is enabled even in system Off mode Off or On
heat max	Maximum heating setpoint limit Default value = 90 °F (32 °C)	Maximum occupied & unoccupied heating setpoint adjustment. Heating setpoint range is: 40 to 90 °F (4.5 to 32.0 °C)
cool min	Minimum cooling setpoint limit Default value = 54 °F (12 °C)	Minimum occupied & unoccupied cooling setpoint adjustment. Cooling setpoint range is: 54 to 100 °F (12.0 to 37.5 °C)
Anticycle	Minimum on/off operation time for stages Default value = 2 minutes Anti-short cycling can be set to 0 minutes for equipment that posses their own anti cycling timer. Do not use that value unless the equipment is equipped with such internal timer. Failure to do so can damage the equipment.	Minimum On/Off operation time of cooling & heating stages. <i>IMPORTANT, anti-short cycling can be set to 0 minutes for equipment that posses their own anti cycling timer. Do <u>not</u> use this value unless the equipment is equipped with such internal timer. Failure to do so can damage the equipment.</i> 0, 1, 2, 3, 4 & 5 minutes
Heat cph	Heating stages cycles per hour Default value = 4 C.P.H. For multi stage models, heat cph applies to W1 & W2 For heat pump models, heat cph applies to W1 only (Emergency heat)	Will set the maximum number of heating stage cycles per hour under normal control operation. It represents the maximum number of cycles that the equipment will turn ON and OFF in one hour. Note that a higher C.P.H will represent a higher accuracy of control at the expense of wearing mechanical components faster. 3, 4, 5, 6,7 & 8 C.P.H.
cool cph	Cooling stages cycles per hour Default value = 4 C.P.H. For multi stage models, cool cph applies to Y1 & Y2 For heat pump models, cool cph applies to Y1 & Y2 in cooling and heating independently of the reversing valve position	Will set the maximum number of cooling stage cycles per hour under normal control operation. It represents the maximum number of cycles that the equipment will turned on and off in one hour. Note that a higher C.P.H will represent a higher accuracy of control at the expense of wearing mechanical components faster. 3 or 4 C.P.H.
Deadband	Minimum deadband Default value = 2.0 °F (1.1 °C)	Minimum deadband value between the heating and cooling setpoints. If modified, it will be applied only when any of the setpoints are modified. 2, 3 or 4 °F (1.0 to 2.0 °C)
fan cont	Fan control Default value = On For multi stage models, fan control applies to W1 & W2 For heat pump models, fan control applies to W1 only (Emergency heat)	Fan control in heating mode. When selecting On ; the thermostat in all cases will always control the fan (terminal G). Valid for On or Auto fan mode When selecting Off ; the fan (terminal G), when heating stages (terminals W1 & W2) are solicited, will not be energized. The fan in this case will be controlled by the equipment fan limit control. Valid only for Auto fan mode. On fan mode will leave the fan always on. On or Off

fan del	Fan delay Default value = Off	Fan delay extends fan operation by 60 seconds after the call for heating or cooling ends. Valid only for Auto fan mode. "On" fan mode will leave the fan always on. Off or On
Com Addr	Thermostat networking address Default value = 4 Range is: 0 to 254 • For BACnet MS-TP models valid range to use is from 1 to 127 • For wireless models valid range is 0 to 254 with a maximum of 30 thermostat per VGG	Conditional parameter to BACnet MS-TP models (VT76xxX1000B) Conditional parameter to Wireless models (VT76xxX1000W) This parameter will only appear when a BACnet or wireless network adapter is present. If the thermostat is installed as a stand-alone unit or with an Echelon adapter, this parameter will not be used or displayed
ToccTime	Temporary occupancy time Default value = 3 hours	Temporary occupancy time with occupied mode setpoints when override function is enabled When the thermostat is in unoccupied mode, function is enabled with either the menu or DI1 or DI2 configured as remote override input. 0,1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 & 12 hours
cal RS	Room air temperature sensor calibration Default value = 0.0 °F or °C	Offset that can be added/subtracted to actual displayed room temperature ± 5.0 °F (± 2.5 °C)
cal OS	Outside air temperature sensor calibration Default value = 0.0 °F or °C	Offset that can be added/subtracted to actual displayed outside air temperature ± 5.0 °F (± 2.5 °C)
H stage	Number of heating stages. Applicable to 2 stage models only Default value = 2 stages For heat pump models, H stage is limited to 1 stage only (W1 – Aux. Heat)	Will revert the operation of 2 stages thermostat to single stage operation only when the second heating step is not needed. 1 or 2 stages
C stage Or HP stage	Number of cooling stages 2 stages model only Default value = 2 stages For heat pump models, HP stage selects the number of compressor stages	Will revert the operation of 2 stage thermostat to single stage operation only when the second cooling step is not needed. 1 or 2 stages
H lock	Outside air temperature heating lockout Default value = 120 °F (49 °C)	Disables heating stage operation based on outdoor air temperature. Function will only be enabled if OS (outside air temperature sensor) is connected. From -15 °F up to 120 °F (-26 °C up to 49 °C)
C lock	Outside air temperature mechanical cooling lockout. Default value = -40 °F (-40 °C)	Disables cooling stage operation based on outdoor air temperature. On economizer model, free cooling will not be disabled by this function. Function will only be enabled if OS (outside air temperature sensor) is connected. From -40 °F up to 95 °F (-40 °C up to 35 °C)

2/4event	Number of events configuration Default value = 2 event	2 events , will set up programming for the following Event 1 is for Occupied setpoints Event 2 is for Unoccupied setpoints 4 events , will set up programming for the following Event 1 is for Occupied setpoints Event 2 is for Unoccupied setpoints Event 3 is for Occupied setpoints Event 4 is for Unoccupied setpoints		
aux cont	Auxiliary contact configuration Default value = N.O. normally open	This contact can be used to energize peripheral devices such as: lighting equipment, exhaust fans, economizers, etc. This contact will operate in parallel with the internal occupied/unoccupied schedule of the thermostat or the remote NSB contact if DI1 or DI2 is used. When the system is in OFF mode , the contact will remain in its unoccupied status independently of the occupied / unoccupied schedule.		
		Configured	Contact occupied status	Contact unoccupied status
		N.O.	Closed	Opened
		N.C.	opened	Closed
Prog rec	Progressive recovery enabled Default value = Off Progressive recovery is automatically disabled if DI 1 and / or DI 2 are configured remote NSB	Off , = no progressive recovery The programmed occupied schedule time is the time at which the system will restart. On , = progressive recovery active. The programmed occupied schedule time is the time at which the desired occupied temperature will be attained. The thermostat will automatically optimize the equipment start time. In any case, the latest a system will restart is 10 minutes prior to the occupied period time.		
Heat Pump models only				
high bp	High balance point Default value = 90 °F (32.0 °C) Function will only be enabled if OS (outside air temperature sensor) is connected.	In <i>Heating or Auto mode</i> , it is the outside air temperature value at which the auxiliary heat will be cut off. Above that value, only the heat pump will be used to maintain the heating setpoint 34 to 90 °F (1.0 to 32.0 °C)		
low bp	Low balance point Default value = -12 °F (-24 °C) Function will only be enabled if OS (outside air temperature sensor) is connected.	In <i>Heating, Cooling or Auto mode</i> , it is the outside air temperature value at which the heat pump operation will be cut off. Below that value, only the auxiliary heat will be used to maintain the heating setpoint -40 to 30 °F (-40 to -1.0 °C)		

Comf/eco	Comfort or economy mode Default value = Comfort	Sets the operation and interaction mode of the heat pump with the auxiliary heat. Comfort mode. In <i>Heating mode</i>. If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat will be energized to satisfy the same heating setpoint. Economy mode. In <i>Heating mode</i>. If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat will be energized to satisfy only when the temperature has dropped 2.0 °F (1.1 °C) below the heating setpoint. Selecting economy mode will add a deadband between the heatpump & auxiliary heat in heating mode. The actual temperature maintained will be lower than the true heating setpoint to maximize the heat pump operation. When the outdoor air temperature drops below the <i>low balance point</i>, the deadband will be eliminated and the auxiliary heat will maintain the true heating setpoint alone. Economy mode. In <i>Emergency mode</i>. If <i>Emergency heat mode</i> is selected, the setpoint maintained, will be the heating setpoint.
re valve	Reversing valve operation O/B Default value = O	Heat pump reversing valve operation O will energize the valve in cooling operation. B will energize the valve in heating operation O or B
comp/aux	Compressor/auxiliary interlock Default value = Off	Sets the operation and interaction mode of the heat pump with the auxiliary heat. Interlock Off. In <i>Heating mode</i>. If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat will be energized at the same time as the heat pump stage. Typically applies when the air handler heat pump coil is installed before the auxiliary heat. (all electric systems) Interlock On. In <i>Heating mode</i>. If the heat pump is not able to satisfy the heating setpoint, the auxiliary heat will be energized and the heat pump will be cut off. Typically applies when the air handler heat pump coil is installed after the auxiliary heat. (add on systems) There is a 2 minute delay to restart the heat pump, when the auxiliary heat is shut down Off or On

Notes for Heat Pump models:

When the outside air sensor is not connected or is shorted, the thermostat bypasses:

- The heating lockout
- The cooling lockout
- The low balance point
- The high balance point

Heat Pump model when set in Emergency mode bypasses heating lockout and permits auxiliary heating whenever a heating demand occurs.

Economizer Model only								
Chngstpt	Changeover setpoint Default value = 55 °F (13.0 °C)			In <i>Cooling</i> mode. The outside air temperature value at which the cooling will be switched over from mechanical (compressor) to free cooling (economizer) 14 to 70 °F (-10.0 to 21.0 °C)				
min pos	Minimum position Default value = 0%			Outside air damper minimum position. Will be active only when fan is on (G terminal) and the internal or remote scheduling is in occupied mode. When internal or remote scheduling is in unoccupied mode and/or fan is off, minimum position will be set to 0% 0 to 100 % = 0 to 10 Vdc output range				
	Outside air percentage	0%	5%	10%	15%	20%	25%	30%
	Setting for 0-10 Vdc Autuator	0%	5%	10%	15%	20%	25%	30%
	Setting for 2-10 Vdc Autuator	0 to 20%	24%	28%	32%	36%	40%	44%
C mech	Mechanical cooling allowed Default value = Off			In <i>Cooling</i> mode. Allows the operation of the mechanical cooling if the free cooling (economizer) cannot maintain the cooling setpoint. Off Typically applies when the MS (mixed air temperature sensor) is installed after the mechanical cooling refrigeration coils. In this case, mechanical cooling will never operate at the same time as free cooling. On Typically applies when the MS (mixed air temperature sensor) is installed before the mechanical cooling refrigeration coils in the mixing plenum. In this case, mechanical cooling is allowed when the free cooling (economizer operation) cannot maintain the cooling setpoint. Off or On				
mix stpt	Mixed air setpoint Default value = 55 °F (13.0 °C)			Free cooling mixed air setpoint when economizer mode is enabled. 50 to 90 °F (10.0 to 32.0 °C)				
MS dis	Display mixed air temperature Economizer model only, only if sensor is installed			Used as diagnostic / service help to troubleshoot and diagnose economizer operation.				

Wireless Model only		
PAN ID	Personal Area Network Identification Default value = 0 Range is: 0 to 500	Conditional parameter to Wireless models (VT76xxX1000W) This parameter will only appear when a wireless network adapter is present. If the thermostat is installed as a stand-alone unit or with a BACnet or Echelon adapter, this parameter will not be used or displayed This parameter (Personal Area Network Identification) is used to link specific thermostats to a single specific Viconics wireless gateway (VWG) For every thermostat reporting to a gateway (maximum of 30 thermostats per gateway), be sure you set the SAME PAN ID value both at the gateway and the thermostat(s). The default value of 0 is NOT a valid PAN ID. The valid range of available PAN ID is from 1 to 500
Channel	Channel selection Default value = 10 Range is: 10 to 26	Conditional parameter to Wireless models (VT76xxX1000W) This parameter will only appear when a wireless network adapter is present. If the thermostat is installed as a stand-alone unit or with a BACnet or Echelon adapter, this parameter will not be used or displayed This parameter (Channel) is used to link specific thermostats to specific Viconics wireless gateway(s) (VWG) For every thermostat reporting to a gateway (maximum of 30 thermostats per gateway), be sure you set the SAME channel value both at the gateway and the thermostat(s). <i>Viconics recommends using only the 2 last channels (25-2575MHz and 26-2580MHz)</i> The default value of 10 is NOT a valid channel. The valid range of available channel is from 11 to 26
Get From	Thermostat Get From another device configuration utility Default value = 0 Range is: 0 to 254	Conditional parameter to Wireless models (VT76xxX1000W) This parameter / function is not currently supported by the wireless thermostats.

Troubleshooting guide

All models

Symptom	Possible Cause	Corrective Action
No display on the thermostat	Absent or incorrect supply voltage	1. Check power supply voltage between C & RC to be from 19-30 Vac 2. Check for tripped fuse or circuit breaker
	Overloaded power transformer	Verify that the transformer used is powerful enough (enough VA's) to supply all controlled devices including the thermostat
Keyboard menu does not access all functions	Keyboard locked	Change configuration parameter LOCKOUT to value "0" to access all levels of the menu
Temperature setpoints revert to original value after a certain time period	Temporary setpoint option selected	1. The thermostat needs to be in Permanent setpoint mode for the new setpoint to be kept and memory and used all the time 2. Go to the Set temperature menu. 3. The last prompt is setpoint type. Set it to Permanent setpoint
Thermostat will not call for heating	Wrong mode selected	Select heating mode
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start
	Heating setpoint is satisfied	Raise the Heating setpoint
	Heating lockout attained	1. Mode is locked out based on outside air temperature 2. Change configuration parameter H Lock to value 120 °F (49 °C) to by-pass lockout
	Wiring error	1. Start the Fan by forcing the Fan ON mode 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH
Thermostat will not call for cooling	Wrong mode selected	Select cooling mode
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied cooling setpoint
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start
	Cooling setpoint is satisfied	Lower the cooling setpoint
	Cooling lockout attained	1. Mode is locked out based on outside air temperature 2. Change configuration parameter C Lock to value - 40 °F (-40 °C) to by-pass lockout
	Wiring error	1. Start the Fan by forcing the Fan ON mode 2. Put a jumper across terminals RC & Y1. The cooling should come ON. If it does not, verify wiring
The thermostat will not turn on the fan	Wrong mode selected	1. Start the Fan by forcing the Fan ON mode 2. Put a jumper across terminals RC & G. The fan should come ON. If it does not, verify wiring
	Wiring error	
Digital display shows missing digits or erratic segments	Defective display	Replace thermostat

Troubleshooting guide

Heatpump models

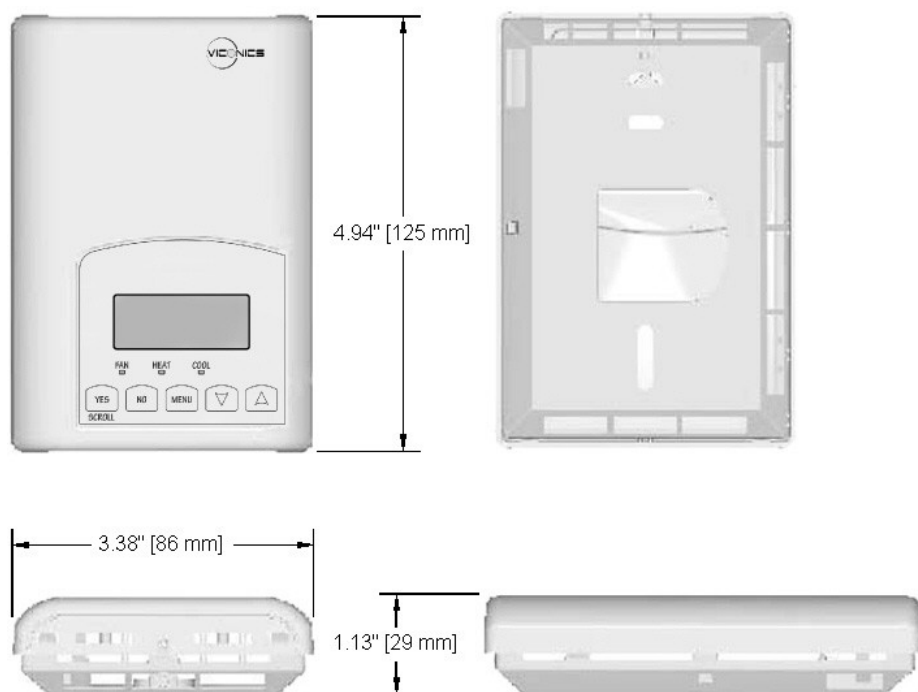
Auxiliary heat does not operate	Wrong mode selected	Select emergency heat mode
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start
	Heating setpoint is satisfied	Raise the Heating setpoint
	High Balance point attained	1.Mode is locked out based on outside air temperature 2.Change configuration parameter High BP to value 90 °F (32 °C) to by-pass lockout
	Heating lockout attained	1.Mode is locked out based on outside air temperature 2.Change configuration parameter H Lock to value 120 °F (49 °C) to by-pass lockout
	Wiring error	1. Start the Fan by forcing the Fan ON mode 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH
Heat pump does not operate in heating mode	Wrong mode selected	Select heating mode
	Thermostat in Unoccupied mode	Select Occupied Hold in Schedule hold or Override to force the thermostat Occupied heating setpoint
	Anticycle delay active	Wait, the anticycling period will end and the equipment will start
	Heating setpoint is satisfied	Raise the Heating setpoint
	Low Balance point attained	1.Mode is locked out based on outside air temperature 2.Change configuration parameter Low BP to value - 12 °F (-24 °C) to by-pass lockout
	Heating lockout attained	1.Mode is locked out based on outside air temperature 2.Change configuration parameter H Lock to value 120 °F (49 °C) to by-pass lockout
	Wiring error	1. Start the Fan by forcing the Fan ON mode 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH
	Wrong reversing valve configuration	1.Wrong selection of parameter Re Valve 2.Select O will energize the valve in cooling operation. Valve is normally heat. 3.Select B will energize the valve in heating operation. Valve is normally cool.

Specifications

Thermostat power requirements:	19-30 Vac 50 or 60 Hz; 2 VA (RC & C) Class 2 RC to RH jumper 2.0 Amps 48 VA maximum
Operating conditions:	0 °C to 50 °C (32 °F to 122 °F) 0% to 95% R.H. non-condensing
Storage conditions:	-30 °C to 50 °C (-22 °F to 122 °F) 0% to 95% R.H. non-condensing
Sensor:	Local 10 K NTC thermistor
Resolution:	± 0.1 °C (± 0.2 °F)
Control accuracy:	± 0.5 °C (± 0.9 °F) @ 21 °C (70 °F) typical calibrated
Occupied and unoccupied setpoint range cooling:	12.0 to 37.5 °C (54 to 100 °F)
Occupied and unoccupied setpoint range heating:	4.5 °C to 32 °C (40 °F to 90 °F)
Room and outdoor air temperature range	-40 °C to 50 °C (-40 °F to 122 °F)
Proportional band for room temperature control:	Both outputs: 1.1°C (2.0°F)
Digital inputs:	Relay dry contact only across C terminal to DI1 or DI2
Contact output rating:	Each relay output: (Y1, Y2, G, W1, W2 & AU) 30 Vac, 1 Amp. maximum 30 Vac, 3 Amp. in-rush
Economizer analog output rating:	0 to 10 Vdc into 2KΩ resistance min.
Economizer analog output accuracy:	± 3% typical
Wire gauge	18 gauge maximum, 22 gauge recommended
Dimensions:	4.94" x 3.38" x 1.13"
Approximate shipping weight:	0.75 lb (0.34 kg)
Agency Approvals all models:	UL: UL 873 (US) and CSA C22.2 No. 24 (Canada), File E27734 with CCN XAPX (US) and XAPX7 (Canada) Industry Canada: ICES-003 (Canada) FCC: Compliant to CFR 47, Part 15, Subpart B, Class A (US) CE: EMC Directive 89/336/EEC (Europe Union) C-Tick: AS/NZS CISPR 22 Compliant (Australia / New Zealand) Supplier Code Number N10696
Agency Approvals Stand-Alone, BACnet & LON models	FCC: Compliant to: Part 15, Subpart C
Agency Approvals Wireless models	

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

Drawing & dimensions



Important notice



All VT7600 series controls are for use as operating controls only and are not safety devices. These instruments have undergone rigorous tests and verifications prior to shipment to ensure proper and reliable operation in the field. Whenever a control failure could lead to personal injury and/or loss of property, it becomes the responsibility of the user / installer / electrical system designer to incorporate safety devices (such as relays, flow switch, thermal protections, etc...) and/or alarm system to protect the entire system against such catastrophic failures. Tampering of the devices or miss application of the device will void warranty.

Fig.13 – Thermostat dimensions



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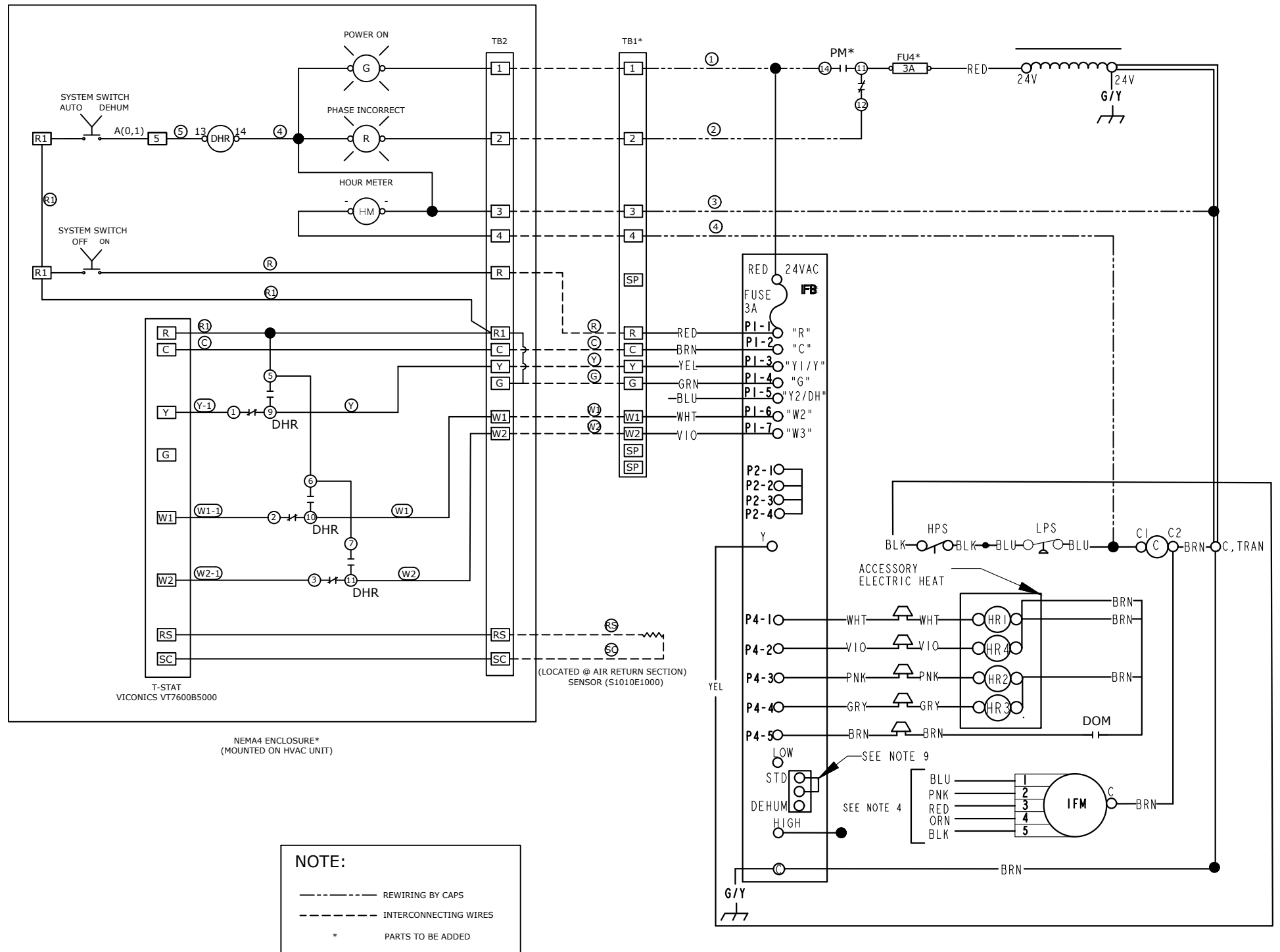
*35 Southbelt Industrial Drive • Houston, Texas 77047
(713) 460-9009 • Fax (713) 460-9499
www.customairproducts.com*

SECTION

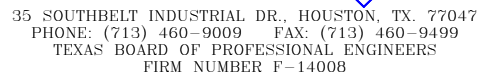
04

ELECTRICAL DRAWINGS

LOW VOLTAGE



1. IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED, IT MUST BE REPLACED WITH TYPE 90 DEGREE C WIRE OR IT'S EQUIVALENT.
2. SEE PRICE PAGES FOR THERMOSTAT AND SUBBASES.
3. USE 75 DEGREE COPPER CONDUCTORS FOR FIELD INSTALLATION.
4. REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SECTION OR RPM.
5. RELOCATION OF SPEED TAPS MAY BE REQUIRED WHEN USING FIELD INSTALLED ELECTRIC HEATERS. CONSULT INSTALLATION INSTRUCTIONS TO DETERMINE CORRECT SPEED TAP SETTING.
6. "DO NOT DISCONNECT PLUG UNDER LOAD."
7. THIS FUSE IS MANUFACTURED BY WESTINGHOUSE, P/N# 257003.
8. THESE FUSES ARE MANUFACTURED BY COPPER BUSSMAN, P/N# F90-R-5.
9. DEHUM FEATURE CANNOT BE USED WHEN ECONOMIZER IS INSTALLED. UNIT FACTORY SHIPPED IN STD MODE.

[illegible]

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APPROVER: _____ DATE: _____

SIZE: B

REV: 1

APPROVED BY:
DAVID NGUYEN

DATE:
03/30/2018

HERC RENTALS

5 TON PACKAGE UNIT WITH 20KW HEAT
460V/3P/60HZ

ELECTRICAL DESIGN

HVAC RETROFITTING WIRING DIAGRAM



35 SOUTHBELT INDUSTRIAL DR., HOUSTON, TX. 77047
PHONE: (713) 460-9009 FAX: (713) 460-9499
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER P-14008

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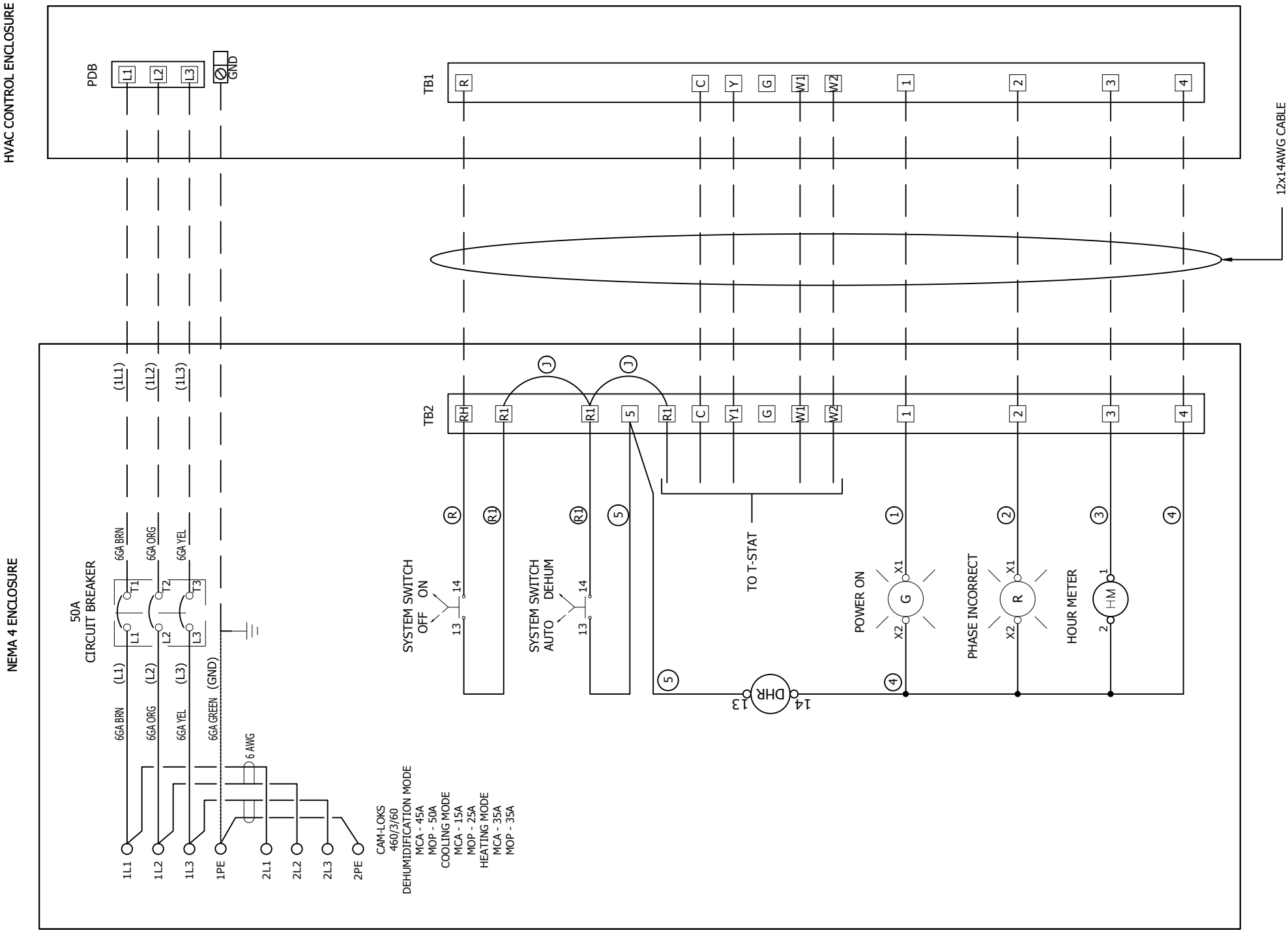
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CAPS NO.:	17F-0872	DRAWING:	AE2	DRAWN BY:	JDOMALLEY	DATE:	12/06/2017
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SIZE:	B	REV:	1	APPROVED BY:	DAVID NGUYEN	DATE:	03/30/2018

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1	03/30/2018	J.OMALLEY	AS BUILT

CUSTOMER:	HERC RENTALS
	5 TON PACKAGE UNIT WITH 20KW HEAT 460V/3P/60HZ
	ELECTRICAL DESIGN INTERCONNECTING WIRING DIAGRAM



--- INTERCONNECTING WIRES

WIRING NOTES

THREE PHASE 208/240V	THREE PHASE 480V	SINGLE PHASE 208/240V	24VAC
PHASE A BLACK	PHASE A BROWN	LINE 1 BLACK	RED
PHASE B RED	PHASE B ORANGE	LINE 2 RED	GREY
PHASE C BLUE	PHASE C YELLOW	NEUTRAL WHITE	
NEUTRAL WHITE	NEUTRAL GRAY	24VDC POSITIVE RED	
GROUND GREEN	GROUND GREEN	NEGATIVE BLACK	

INTRINSICALLY SAFE WIRING SHALL BE LIGHT BLUE 18AWG AND MUST BE SEPARATED FROM ALL OTHER WIRING BY A MINIMUM OF 2" IF CABLE IS USED THE CABLE MUST BE SHIELDED WITH THE SHIELD GROUNDED AT A MINIMUM OF ONE END.
IF VAC WIRING GAUGE IS NOT SPECIFIED USE 18 AWG
IF VDC WIRING GAUGE IS NOT SPECIFIED USE 18 AWG

20"

1 1/2"

THERMOSTAT

Room Temp
70.0°F

HOUR METER

POWER ON

PHASE INCORRECT

SYSTEM SWITCH
OFF

SYSTEM SWITCH
AUTO DEHUM

3 1/2"

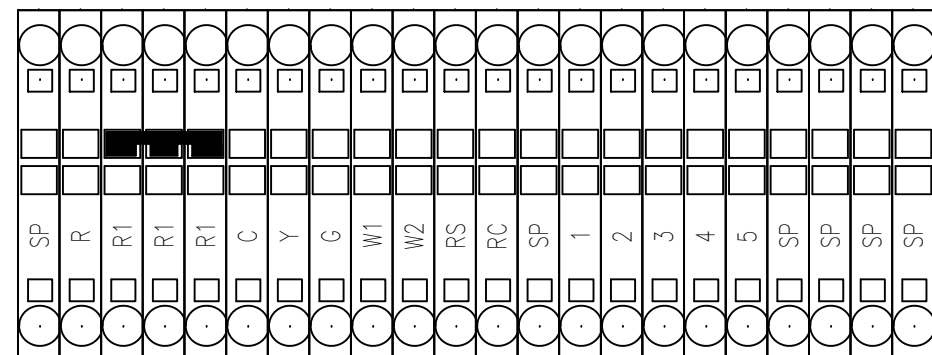
5 1/8"

4"

Diagram of the electrical control panel components:

- 50A CIRCUIT BREAKER**: A vertical breaker unit with four terminals at the top and bottom.
- GROUND LUG**: A component with two terminals, located to the right of the circuit breaker.
- T20 SPIRAL WIRE DUCT**: A horizontal duct located below the circuit breaker.
- GROUND BAR**: A horizontal bar with eight terminals, located below the T20 spiral wire duct.
- TB2**: A terminal block with 24 terminals (12 on top, 12 on bottom), located below the ground bar.
- DHR**: A component with a single terminal, located to the right of the terminal block TB2.

HARDWARE
PROVIDED WITH
BREAKER

[illegible]

CUSTOMER:	HERC RENTALS
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5 TON PACKAGE UNIT WITH 20KW HEAT 460V/3P/60HZ

ELECTRICAL DESIGN

NEMA 4 CONTROL ENCLOSURE LAYOUT



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CUST. PO#:

SIZE: B

DRAWING:
AE3

SHEET:
3 OF 4

REV: 1

DRAWN BY:
JDOMALLEY

CHECKED BY:
DAVID NGUYEN

APPROVED BY:
DAVID NGUYEN

DATE:	12/06/2017
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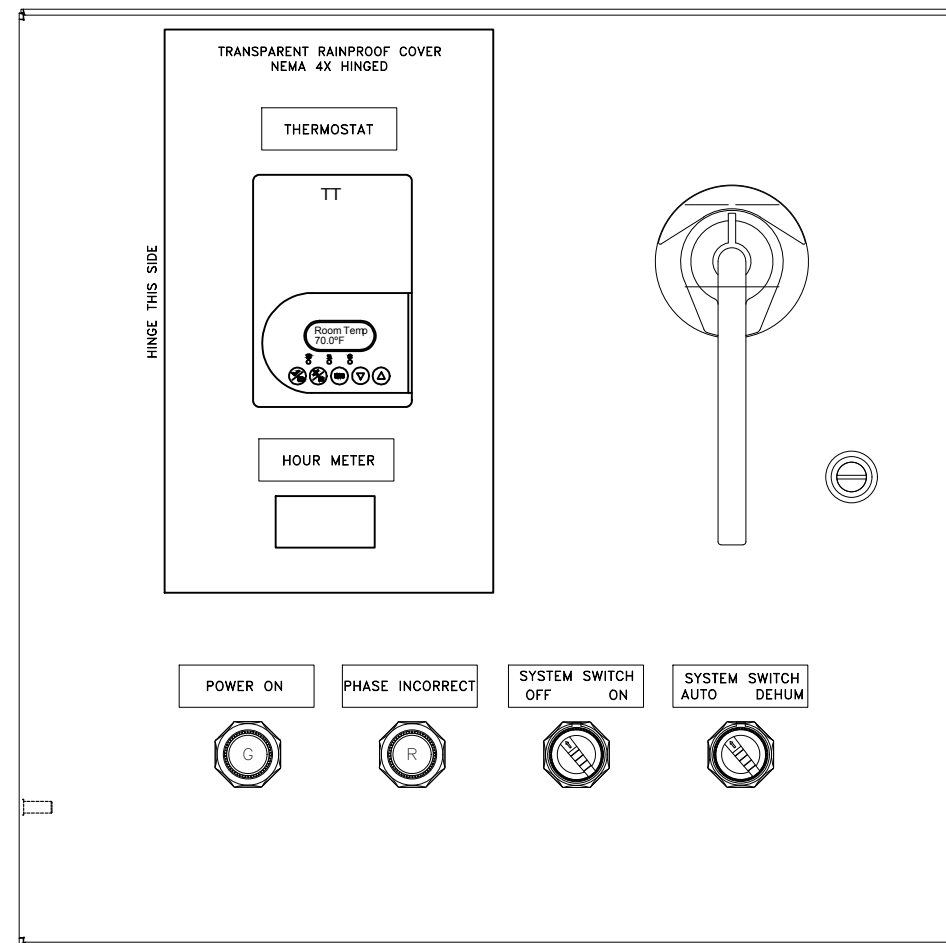
DATE:
12/06/2017

DATE:
03/30/2018

SEQUENCE OF OPERATION

The system is placed into initial operation as follows:

- Turn Master Switch to "OFF" and System Switch to "AUTO"
- Turn Circuit Breaker "ON"
 - If the "Phase Incorrect" light is on, turn off the circuit breaker; reverse two (2) phases of incoming power for proper phase sequencing then check the incoming power source to be sure the unit has a good power source - 460V/3P/60HZ)
 - If the "Power On" light is on and the "Phase Incorrect" light is off, the unit is ready for operation
- Turn Master Switch to "ON"
- Set the Thermostat (Auto changeover) to your desired setpoint temperature: Depending on difference between setpoint temperature and air return temperature, unit can run at cooling or heating mode
- System Switch settings:
 - 1- AUTO: Unit is controlled by the Thermostat
 - 2- Dehum: HVAC controls will bypass the Thermostat and both heat and cool are energized
- Turn the System Switch to "AUTO" and Master Switch to "OFF" to turn off the unit



REV#	DATE	DESIGNER	DESCRIPTION
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SIZE: B	REV: 1	APPROVED BY: DAVID NGUYEN	DATE: 03/30/2018

CUSTOMER:	HERC RENTALS
	5 TON PACKAGE UNIT WITH 20KW HEAT 460V/3P/60HZ
	ELECTRICAL DESIGN SEQUENCE OF OPERATION



CUSTOM AIR PRODUCTS & SERVICES, INC.

35 Southbelt Industrial Drive • Houston, Texas 77047

(713) 460-9009 • Fax (713) 460-9499

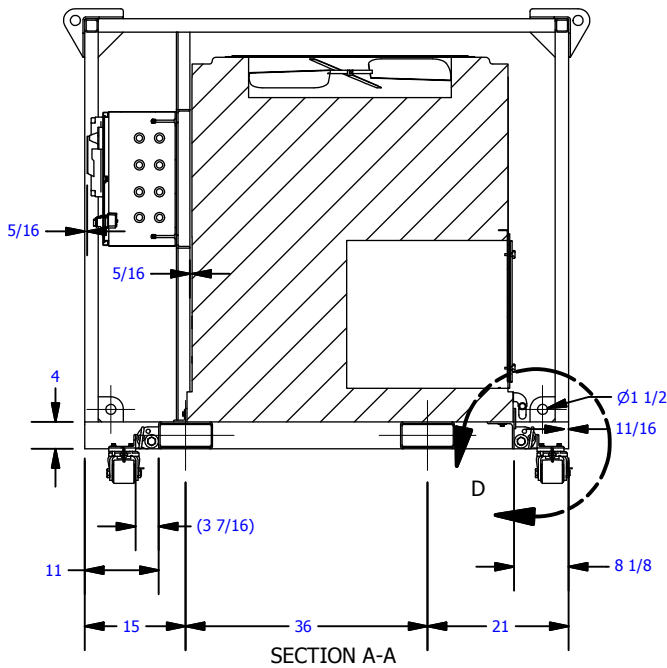
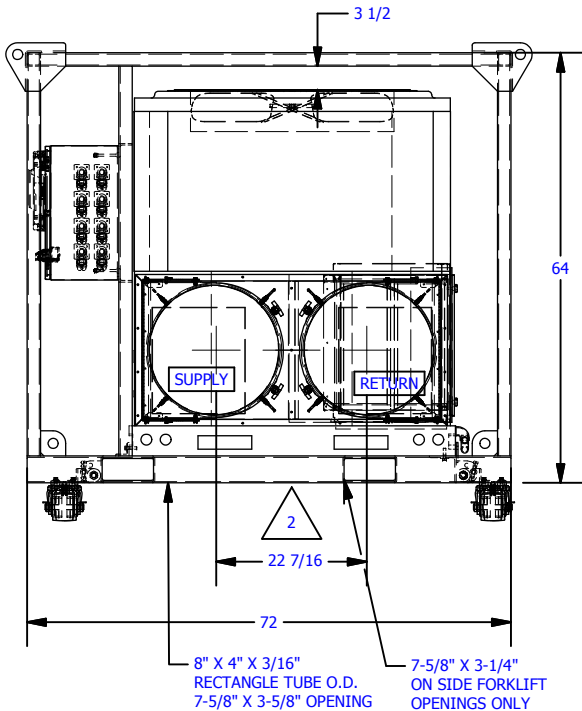
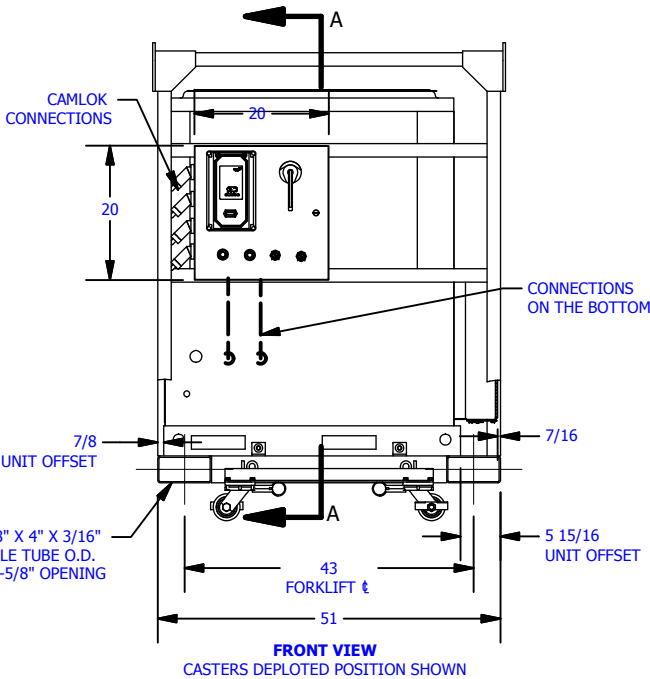
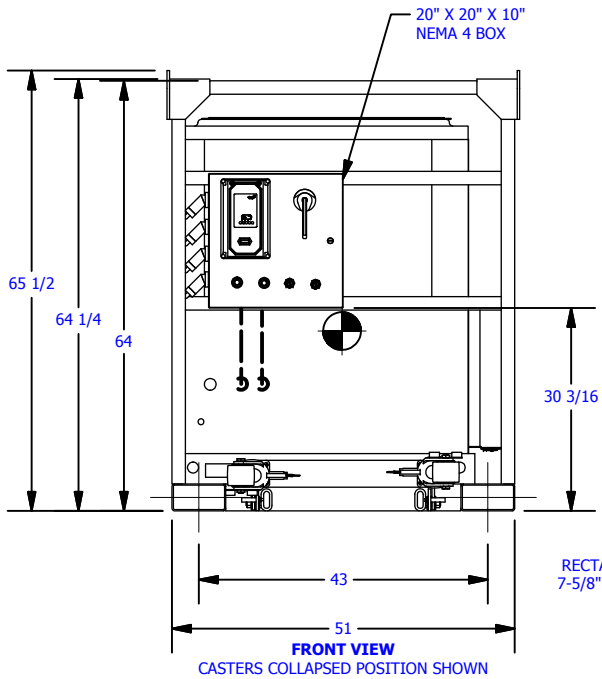
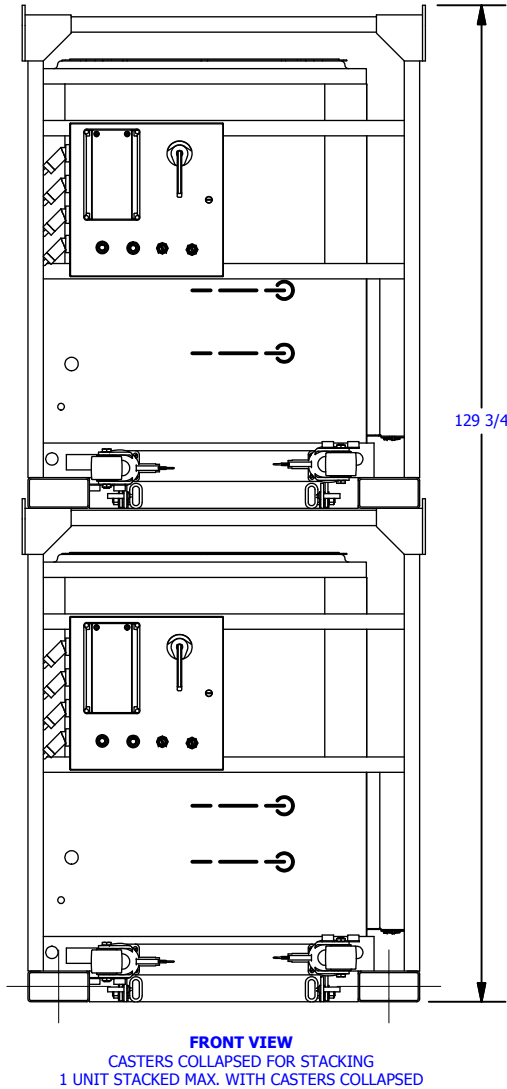
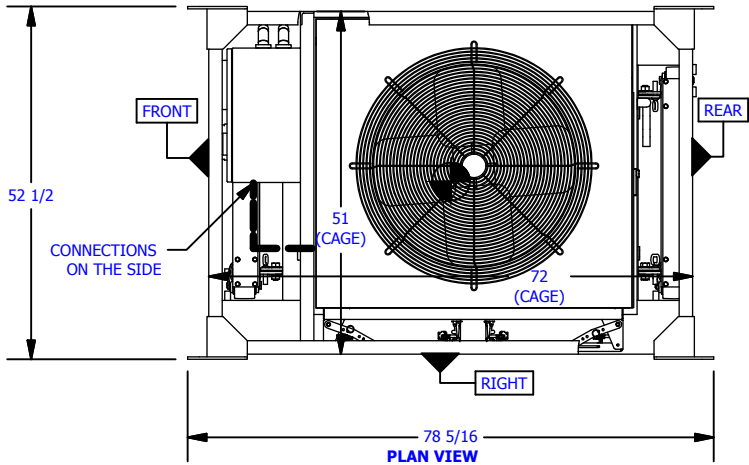
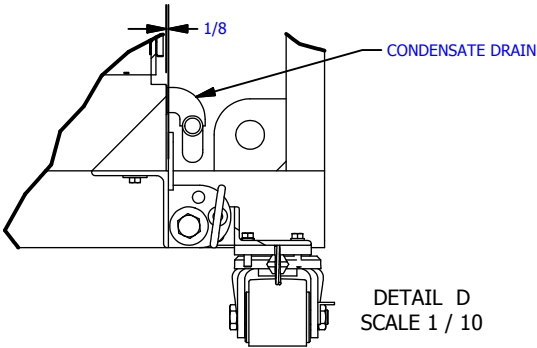
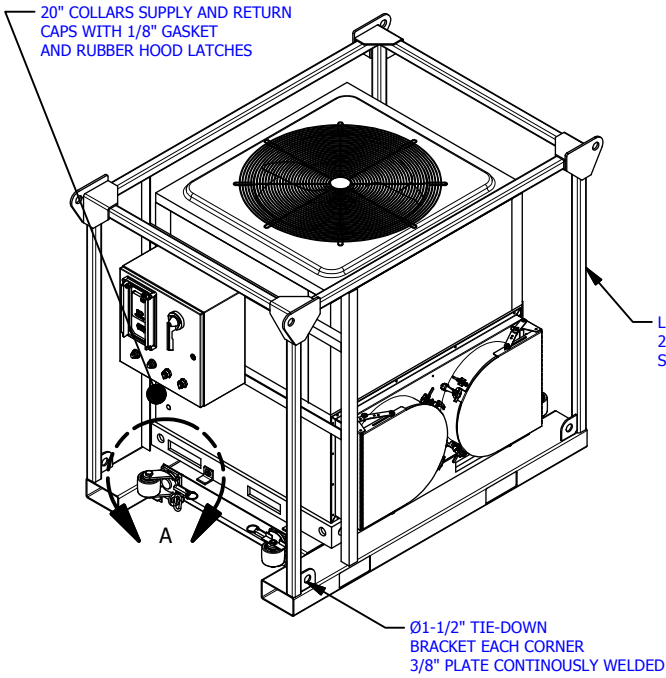
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SECTION

05

MECHANICAL DRAWINGS

UNIT CLEARANCES			
DIRECTION	DISTANCE (in.)	DIRECTION	DISTANCE (in.)
TOP	36	RIGHT	24
FRONT	12	LEFT	24
REAR	0	BOTTOM	0



- NOTES:**
1. DIMENSIONS ARE SHOWN IN INCHES UNLESS OTHERWISE NOTED.
 2. 20" ROUND DUCT COLLARS PREPARATIONS FOR SUPPLY AND RETURN AIR
 3. UNIT IS BOLTED TO SKID.
 4. SKID AND CAGE ASSEMBLY ARE CONTINUOUSLY WELDED ALL AROUND ON ALL JOINTS AND HOT DIPPED GALVANIZED COATING PROCESS.
 5. UNIT PAINTED/COATED AND CUSTOMER LOGO LOCATIONS PER CUSTOMER SPECIFICATION.
 6. UNIT SKID IS PREPARED FOR 1 UNIT STACKED MAX. FOR STORAGE ONLY. UNIT SHALL NOT BE STACK FOR SHIPPING OR DURING OPERATION.
 7. SOME ELECTRICAL FITTINGS OR PIPING MAY NOT BE SHOWN FOR CLARITY.
 8. THERMOSTAT IS INSTALLED INSIDE AIR CONDITIONING UNIT ELECTRICAL PANEL.
 9. AIR CONDITIONING MODEL#D6EQ060A46 (5 TON, JOHNSON CONTROLS SERIES 20 SINGLE PACKAGED R-410A)
 10. TOTAL WEIGHT PER UNIT: 1,200 Lbs.

REVISION HISTORY			
REV	DATE	DESIGNER	DESCRIPTION
1	1/25/2017	ALEX BANNISTER	INITIAL RELEASE
2	12/7/2017	ALEX BANNISTER	DIMENSION BETWEEN DUCT COLLARSCHANGED



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CERTIFIED AS BUILT

CHECKER: _____ DATE: _____

APPROVER: _____ DATE: _____

CAPS NO.:

17F-XXXX

CUST. PO#:

SIZE:
B

DRAWING:

D1

SHEET:

1 OF 1

REV:

2

DESIGNER:

ALEX BANNISTER

CHECKER:

J.REYNOLDS

APPROVER:

JOHN PHAN

DATE:

1/25/2017

DATE:

1/25/2017

DATE:

1/25/2017

CUSTOMER:

HERC

(4) 5 TON GENERAL PURPOSE PACKAGE UNITS
CAPS RENTAL MODIFICATION
20KW HEATER/480V 3 PHASE
MECHANICAL DESIGN
AVAILABLE DECAL DECAL AREAS



CUSTOM AIR PRODUCTS & SERVICES, INC.

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SECTION

06

SPARE PARTS LIST

SUGGESTED SPARE PARTS						
JOB #:	17F-0872			REVISION #:	0	
CUSTOMER	HERC RENTALS					
PROJECT	2018 FLEET					
1	CIRCUIT BREAKER	SQUARE D	HDL36050	CIRCUIT BREAKER 600V 50A SQD	1	
2	OPERATOR MECHANISMS	SQUARE D	9421LJ1	ROTARY OPERATING MECH 250A SQD, 1/3R/12, 5.5-10.75 ENCL DEPTH"	1	
3	MASTER SWITCH	SQUARE D	9001KS11B	SEL SW, 2 POS, MAIN, 30MM	1	
4	CONTACT BLOCK	SQUARE D	9001KA2	CONTACT BLOCK 1-N0	1	
5	CONTACT BLOCK	SQUARE D	9001KA3	NC CONTACT BLOCK	1	
6	SYSTEM SWITCH	SQUARE D	9001KS11B	2 POSITION SWITCH	1	
7	PL	SQUARE D	9001KP35G31	PILOT LIGHT GRN 24VAC/DC 30MM	1	
8	PL	SQUARE D	9001KP35R31	PILOT LIGHT RED 24VAC/DC 30MM	1	
9	PHASE MONITOR	SQUARE D	RM17U00	3 PHASE MONITOR	1	
10	HM	REDINGTON	3410-0000	AC/DC HOUR METER 2-HOLE 1/4" RECTANGULAR, SPADE TERMINALS, NON-RESET	1	
11	PDB	SQUARE D	9080LBA362104	3 POLE POWER DISTRIBUTION BLOCK (HVAC CONTROL ENCLOSURE)	1	
12	FUSE	MERSEN	ATQR1/4	1/4A FUSE FOR PHASE MONITOR	1	
13	FUSE	MERSEN	ATQR3	3A FUSE FOR TRANSFORMER	1	
14	DHR	EATON	D2RR4T	RELAY, 4PDT, 24VAC COIL	1	
15	T-STAT	VICONICS	VT7600B5000	THERMOSTAT, PROGRAMMABLE MULTI STAGE(2HEAT/2 COOL)	1	
16	T-STAT SENSOR	VICONICS	S1010E1000	REMOTE INDOOR SENSOR, 10K OHMS	1	