10641 Highway 36
Covington, GA
30014

www.sunbeltbuilders.com

t 770.786.3031
f 770.786.3046

HISTORIC JAIL RENOVATIONS

Covington Air Systems
P.O. Box 1526
Covington, GA 30015
ph: 770-385-0068
Byron Hopper
bhopper@covingtonairsystems.com

23-0000 HVAC O&M

27VNA0
Infinity® Variable Speed Heat Pump with Greenspeed® Intelligence and Puron Advance™ (R-454B) Refrigerant 2 to 5 Nominal Tons

Turn to the experts

PRODUCT DATA

Carrier's 27VNA0 with Greenspeed™ Intelligence is another breakthrough product providing up to 9.5 HSPF2 heating efficiency and up to 20 SEER2 cooling efficiency. The variable speed capacity control results in strong heating capacity as the outdoor temperature drops resulting in less reliance on auxiliary heat. Lower speed operation is available when needed in cooling, for enhanced comfort and dehumidification.

This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency when matched with appropriate coil components. Refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

Industry leading Features / Benefits

Energy Efficiency
- Up to 20 SEER2, 11.5 EER2, 9.5 HSPF2
- Microtube Technology™ refrigeration system
- Indoor air quality accessories available

Sound
- Sound level as low as 54 dBA in low speed

Comfort
- Variable speed compressor with capacity range from 20-100%
- Air cooled variable speed drive
  - Infinity® System Control with Greenspeed™ Intelligence required
  - Energy Tracking capability with the Infinity® System Control and latest software version
    (Energy Tracking has the ability to monitor and estimate the energy consumption of your Infinity® system.)

Reliability
- Non-ozone depleting, low global warming potential Puron Advance™ refrigerant
- Greenspeed Intelligence actively monitors critical system parameters
- High pressure switch
- Suction and discharge pressure transducer
- Electronic expansion valve (EXV) for optimum heating performance
- Filter drier
- Internal compressor stator heat standard
- Balanced refrigeration system for maximum reliability

Flexibility and Installation:
- Vertex™ Technology compatible
- 2 control wires to outdoor unit
- Minimum and maximum airflow adjustments
- Compressor heating capacity control
- Hybrid Heat™ Dual Fuel capable

Durability
WeatherArmor Ultra™ Protection Package:
- Solid, durable sheet metal construction
- Steel louver coil guard
- Baked-on, complete outer coverage, powder paint

Applications
- Heating mode operation down to -11°F (-23.9°C) outdoor ambient temperature.
- Cooling mode operation up to 125°F (51.7°C) outdoor ambient temperature.
- Long-line - up to 200 feet (61.0 m) equivalent length, up to 100 feet (30.5 m) condenser above evaporator, or up to 80 ft (24.4 m) evaporator above condenser (See Long Line Guide for more information.)
- Low ambient cooling down to 0°F (-17.8°C) when enabled with the Infinity® System Control.

Model Number Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13
N	N	A	A	A/N	N	N	N	A/N	A/N	A/N	N	N
2	**7**	**V**	**N**	**A**	**0**	**2**	**4**	**A**	**0**	**0**	**3**	**0**
Refrigerant &OD Type		OD Design type	Tier	Major Series	SEER2	Nominal Cooling Capacity		Variations	Feature	Open	Voltage	Minor Series
27 = Puron Advance™ (R-454B) HP		V = Variable Speed	N= Infinity®	A = Initial Series	0 = 20 SEER2	1,000 Btuh (nominal)		A = Standard HP	0=Standard	0=Not Defined	3=208-230-1	0, 1, 2...

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.

Quality ISO 9001

CATALOG ORDERING NUMBERS

Size	Model Number
24	27VNA024A003
36	27VNA036A003
48	27VNA048A003
60	27VNA060A003

STANDARD FEATURES

FEATURES	Unit Size			
	24	**36**	**48**	**60**
Puron Advance™ (R-454B) Refrigerant	X	X	X	X
Air-Cooling Variable Frequency Drive	X	X	X	X
Louvered Coil Guard	X	X	X	X
Factory Provided, Field-Installed Filter Drier	X	X	X	X
Front-Seating Service Valves	X	X	X	X
In-unit Pressure and Temperature Protection	X	X	X	X
Suction and Discharge Pressure Transducers	X	X	X	X
High Pressure Switch	X	X	X	X
Compressor Stator Heat	X	X	X	X
Utility Interface Connections	X	X	X	X
Bluetooth® Module	X	X	X	X
Enhanced Diagnostics using Greenspeed® Intelligence	X	X	X	X
Energy Tracking Capability	X	X	X	X
Sound Blanket	X	X	X	X
Outdoor Air Temperature Sensor	X	X	X	X
Long Line Capability	X	X	X	X

X = Standard

AHRI RATINGS

NOTE: Ratings contained in this document are subject to change at any time.

For AHRI ratings certificates, please refer to the AHRI directory www.ahridirectory.org
Additional ratings and system combinations can be accessed via the Ratings Database here: www.MyCarrierRatings.com

MIN/MAX AIRFLOW TABLES

The indoor airflow delivered by this system varies significantly based on outdoor temperature, indoor unit combination, and system demand. The airflows on these tables are for duct design considerations.

Duct systems capable of these ranges will ensure the system will deliver full capacity at all outdoor temperatures.
Minimum and maximum airflows can be adjusted from these numbers in the Infinity® System Control Heat Pump Setup screen.

Size	Cooling - Comfort Mode		Cooling - Efficiency Mode	
	Max Airflow	Min Airflow	Max Airflow	Min Airflow
24	650	300	900	485
36	900	400	1200	525
48	1150	500	1350	750
60	1700	500	1950	780

Size	Heating - Comfort Mode		Heating - Efficiency Mode	
	Max Airflow	Min Airflow	Max Airflow	Min Airflow
24	700	500	900	500
36	1000	550	1200	550
48	1450	800	1450	800
60	1750	700	1850	700

PHYSICAL DATA

UNIT SIZE	24	36	48	60
COMPRESSOR TYPE	Variable Speed Rotary			
REFRIGERANT	Puron Advance™ (R-454B)			
Charge lb* (kg)	4.9 (2.2)	6.7 (3.0)	7.9 (3.6)	8.2 (3.7)
Outdoor Htg Exp. Device	EXV	EXV	EXV	EXV
COND FAN	Forward Swept Propeller Type, Direct Drive			
Air Discharge	Vertical			
Maximum Air Qty (CFM)	2570	4190	5250	5250
Motor HP	1/5	1/3	1/3	1/3
Motor RPM	200-1000	200-850	200-825	200-825
COND COIL				
Face Area (sq ft.)	12.5	19.4	27.6	27.6
Fins per In.	20	20	20	20
Rows	1	1	1	1
Circuits	5	6	11	11
VALVE CONNECT. (In. ID)				
Vapor	3/4	3/4	7/8	7/8
Liquid	3/8			
REFRIGERANT TUBES† (In. OD)				
Rated Vapor†	3/4	7/8	7/8	1 - 1/8
Max Rated Liquid Line‡	3/8			

*.For 15 ft. lineset
†.Units are rated with 25 ft (7.6 m) of lineset length. See Vapor Line Sizing and Cooling Capacity Loss table when using other sizes and lengths of lineset.
‡.See Liquid Line Sizing For Cooling Only Systems with Puron Advance™ Refrigerant tables.
Note: See unit Installation Instruction for proper installation.

ELECTRICAL DATA

UNIT SIZE	V-PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE† or CKT BRK AMPS	SCCR
		MAX	MIN	MRC	RLA	FLA			
24	208-230-1	253	197	25	11.7	0.70	19.4	25	5kA rms
36				25	17.5	0.88	22.9	30	5kA rms
48				35	22.6	0.88	30.6	40	5kA rms
60				35	27.2	0.88	36.9	50	5kA rms

*. Permissible limits of the voltage range at which the unit will operate satisfactorily
†. Time-Delay fuse.
FLA - Full Load Amps, **MCA**-Minimum Circuit Amps, **MRC** - Maximum Rated Current**, RLA**-Rated Load Amps, **SCCR** - Short-Circuit Current Rating
NOTE: Control circuit is 24-V on all units and requires external power source. Copper wire must be used from service disconnect to unit.
All motors/compressors contain internal overload protection.

REFRIGERANT PIPING LENGTH LIMITATIONS

Maximum Line Lengths:

The maximum allowable total equivalent length for Heat Pumps varies depending on the vertical separation. See the tables below for allowable lengths depending on whether the outdoor unit is on the same level, above or below the outdoor unit.

Maximum Line Lengths for Heat Pump Applications

	MAXIMUM ACTUAL LENGTH* ft (m)	MAXIMUM EQUIVALENT LENGTH† ft (m)	MAXIMUM VERTICAL SEPARATION ft (m)
Units on equal level	200 (61.0)	200 (61.0)	N/A
Outdoor unit ABOVE indoor unit	200 (61.0)	200 (61.0)	100 (30.5)
Outdoor unit BELOW indoor unit	200 (61.0)	200 (61.0)	80 (24.4)

*. Maximum actual length not to exceed 200 ft (61 m)
†. Total equivalent length accounts for losses due to elbows or fitting. See the Long Line Guideline for details.

LONG LINE APPLICATIONS

An application is considered Long Line when the refrigerant level in the system requires the use of accessories to maintain acceptable refrigerant management for systems reliability. 27VNA0 heat pumps do not require any additional accessories for long line applications.
Defining a system as long line depends on the liquid line diameter, actual length of the tubing, and vertical separation between the indoor and outdoor units.

For heat pump systems, the chart below shows when an application is considered Long Line.

Refrigerant Long Line Description ft (m)

Liquid Line Size	Units On Same Level ft (m)	Outdoor Above Indoor ft (m)	Outdoor Below Indoor ft (m)
3/8	80 (24.4)	80 (24.4)	20 (6.1) vertical or 80 (24.4) total

NOTE: See Long Line Guideline for details

COOLING CAPACITY LOSS TABLE

Nominal Size (Btuh)	Line OD (in)	Cooling Capacity Loss (%) Equivalent Length (ft)								
		25	50	75	80	100	125	150	175	200
24000	5/8	0.7	2.0	3.4	2.3	3.3	4.6	5.8	6.9	8.0
	3/4	0.0	0.7	1.4	0.2	0.8	1.4	2.1	2.7	3.3
36000	5/8	1.6	3.8	5.9	6.3	7.8	9.7	11.4	13.0	14.6
	3/4	0.4	1.4	2.4	2.6	3.4	4.4	5.3	6.2	7.1
	7/8	0.0	0.7	1.4	1.5	2.0	2.7	3.3	3.9	4.5
48000	3/4	1.2	2.7	4.0	4.0	5.1	6.4	7.7	9.0	10.2
	7/8	0.5	1.3	2.0	1.9	2.5	3.2	4.0	4.7	5.5
	1 1/8	0.0	—	—	—	—	—	—	—	—
60000	3/4	1.8	3.9	5.8	6.2	7.7	9.5	11.2	12.9	14.5
	7/8	0.8	1.8	2.9	3.1	3.9	5.0	6.1	7.1	8.2
	1 1/8	0.0	—	—	—	—	—	—	—	—

Rated size Line OD and Rated Total Equivalent Length are in **BOLD**.

—= Applications in this range are disallowed

ACCESSORIES

KIT NUMBER	KIT NAME	24	36	48	60
KSASH2801COP	SOUND BLANKET (ACCUMULATOR)	X			
KSASH2901COP	SOUND BLANKET (ACCUMULATOR)		X		
KSASH2601COP	SOUND BLANKET (ACCUMULATOR)			S	S
KSASF0201AAA	SUPPORT FEET	X	X	X	X
KHASS0606MPK	SNOW STAND	X	X	X	X

X = Accessory, S = Standard

ACCESSORY USAGE GUIDELINE

ACCESSORY	REQUIRED FOR LOW-AMBIENT COOLING APPLICATIONS (Below 55°F/12.8°C)	REQUIRED FOR LONG LINE APPLICATIONS (Over 80 ft/24.38 m)	REQUIRED FOR SEA COAST APPLICATIONS (Within 2 miles/3.22 km)
Compressor Stator Heat	Standard with Infinity® System Control	No	No
Evaporator Freeze Protection	Standard with Infinity® System Control	No	No
Low-Ambient Control	Standard with Infinity® System Control	No	No
Support Feet	Recommended	No	Recommended
Winter Start Control	Standard with Infinity® System Control	No	No

Accessory Description and Usage

Snow Stand

Coated wire rack which supports unit 18 in. (457.2 mm) above mounting pad to allow for drainage from unit base.

Usage Guideline:

Suggested in the following applications:

- Unit installations in heavy snowfall areas.
- Unit installations in snow drift locations.
- Unit installations in areas of prolonged subfreezing temperatures.
- All commercial installations.

Sound Blanket (Accumulator)

Wraparound sound reducing cover for the accumulator. Reduces possible transient tones that may resonate in the accumulator due to variability in system operation.

Usage Guideline:

Although all units are designed and tested to eliminate unpleasant tones, in the unlikely event a transient tone is experienced, this sound blanket can reduce the tone by up to 10 dB.

Support Feet

Four or five stick-on plastic feet that raise the unit 4 in. (101.6 mm) above the mounting pad. This allows sand, dirt, and other debris to be flushed from the unit base, minimizing corrosion.

Usage Guideline:

Suggested in the following applications:

Coastal installations.

Windy areas or where debris is normally circulating.

Rooftop installations.

For improved sound ratings.

SOUND POWER LEVEL

Unit Size	Typical Octave Band Spectrum (dB, without tone adjustment)	Min Cooling	Nominal* Cooling	Min Heating	Nominal* Heating
24	Speed	900	4260	960	5100
	125	63	71	63	65
	250	55	66	54	63
	500	54	67	54	61
	1000	51	63	45	55
	2000	46	59	43	52
	4000	40	54	36	52
	8000	43	52	43	53
	Sound Rating (dBA)	56	68	56	71
36	Speed	900	4320	900	4680
	125	65	69	65	74
	250	55	69	55	67
	500	48	70	49	65
	1000	45	66	45	63
	2000	40	60	39	59
	4000	39	59	39	59
	8000	43	55	42	55
	Sound Rating (dBA)	55	72	54	72
48	Speed	900	3780	900	3780
	125	45	48	45	46
	250	38	55	40	55
	500	41	58	45	59
	1000	51	62	44	61
	2000	35	57	37	55
	4000	34	55	33	55
	8000	39	52	40	51
	Sound Rating (dBA)	64	72	56	73
60	Speed	900	4380	960	4440
	125	62	69	63	70
	250	62	72	56	71
	500	54	67	55	66
	1000	51	65	48	63
	2000	44	64	41	65
	4000	38	59	36	66
	8000	42	54	43	60
	Sound Rating (dBA)	58	72	55	73

*. Nominal condition data taken from maximum speed operation at 95°F in cooling and 47°F in heating
NOTE: Tested in compliance with AHRI 270-2015 but not listed with AHRI.

CHARGING SUBCOOLING

UNIT SIZE	MOMINAL SUBCOOLING*	REQUIRED SUBCOOLING °F (°C) - See System Control
24	14	Subcooling recommendation displayed on System Control in Charging Mode must be followed
36	12	
48	5	
60	7	

*. Nominal subcooling targets for use as reference or in specific applications with 25 ft. (7.6 m) lineset, 95°F outdoor ambient, and 80°F/67°F indoor DB/WB.

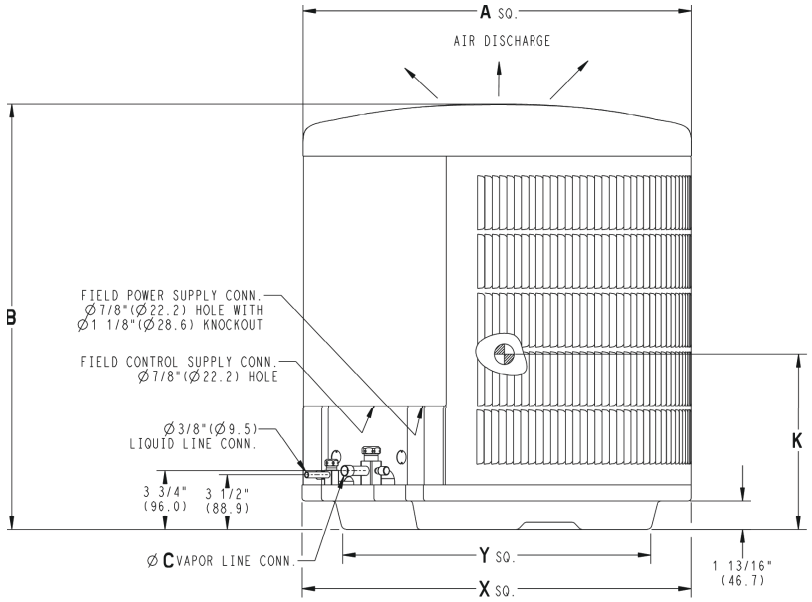
DIMENSIONS

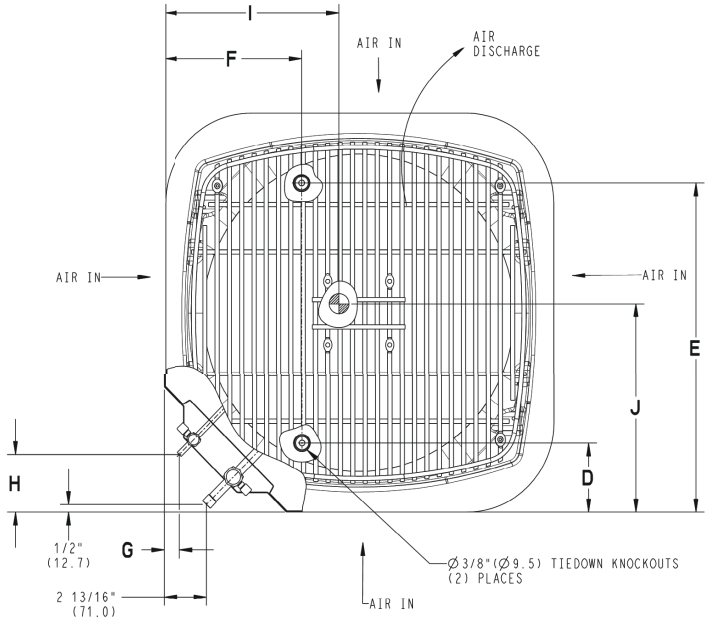
UNIT	SERIES	ELECTRICAL CHARACTERISTICS				A		B		C		D		E		F		G		H		I		J		K		OPERATING WEIGHT		SHIPPING WEIGHT		SHIPPING LENGTH / WIDTH (Sq.)		SHIPPING HEIGHT	
		208-230-1-60	208/230-3-60	460-3-60	575-3-60	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	Lbs	Kgs	Lbs	Kgs	INCH	MM	INCH	MM
27VNA024A*0	0	Y	N	N	N	23 1/8	587.3	35 1/2	902.0	3/4	19.1	4 7/16	113.0	18 1/16	459.0	7 13/16	197.9	1 1/8	28.2	3 13/16	97.4	10 1/4	260.4	12	304.8	18	457.2	147	66.7	165	74.8	26 1/8	664.0	40 13/16	1037.4
27VNA036A*0	0	Y	N	N	N	31 3/16	792.5	36	914.2	3/4	19.1	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 1/2	368.3	13 3/4	349.3	17 1/8	435.0	204	92.5	231	104.8	34 1/4	870.0	41 7/8	1064.2
27VNA048A*0	0	Y	N	N	N	35	889.0	43 13/16	1112.6	7/8	22.2	6 9/16	166.1	28 7/16	722.8	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 7/8	377.8	16	406.4	20	508.0	290	131.5	320	145.1	38	965.0	47 5/8	1209.0
27VNA060A*0	0	Y	N	N	N	35	889.0	43 13/16	1112.6	7/8	22.2	6 9/16	166.1	28 7/16	722.8	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 7/8	377.8	16	406.4	20	508.0	290	131.5	320	145.1	38	965.0	47 5/8	1209.0

Y=YES
N=NO

NOTES:

1. CENTER OF GRAVITY .





UNIT SIZE	"X" MINIMUM GROUND MOUNTING PAD APPLICATION DIMENSIONS		"Y" MINIMUM ROOF-TOP MOUNTING PAD APPLICATION DIMENSIONS	
24	23 1/8	587.3	17 7/8	454.6
-	25 3/4	654.0	20 7/16	518.5
36	31 3/16	792.5	22 15/16	583.2
48,60	35	889.0	26 3/4	679.7

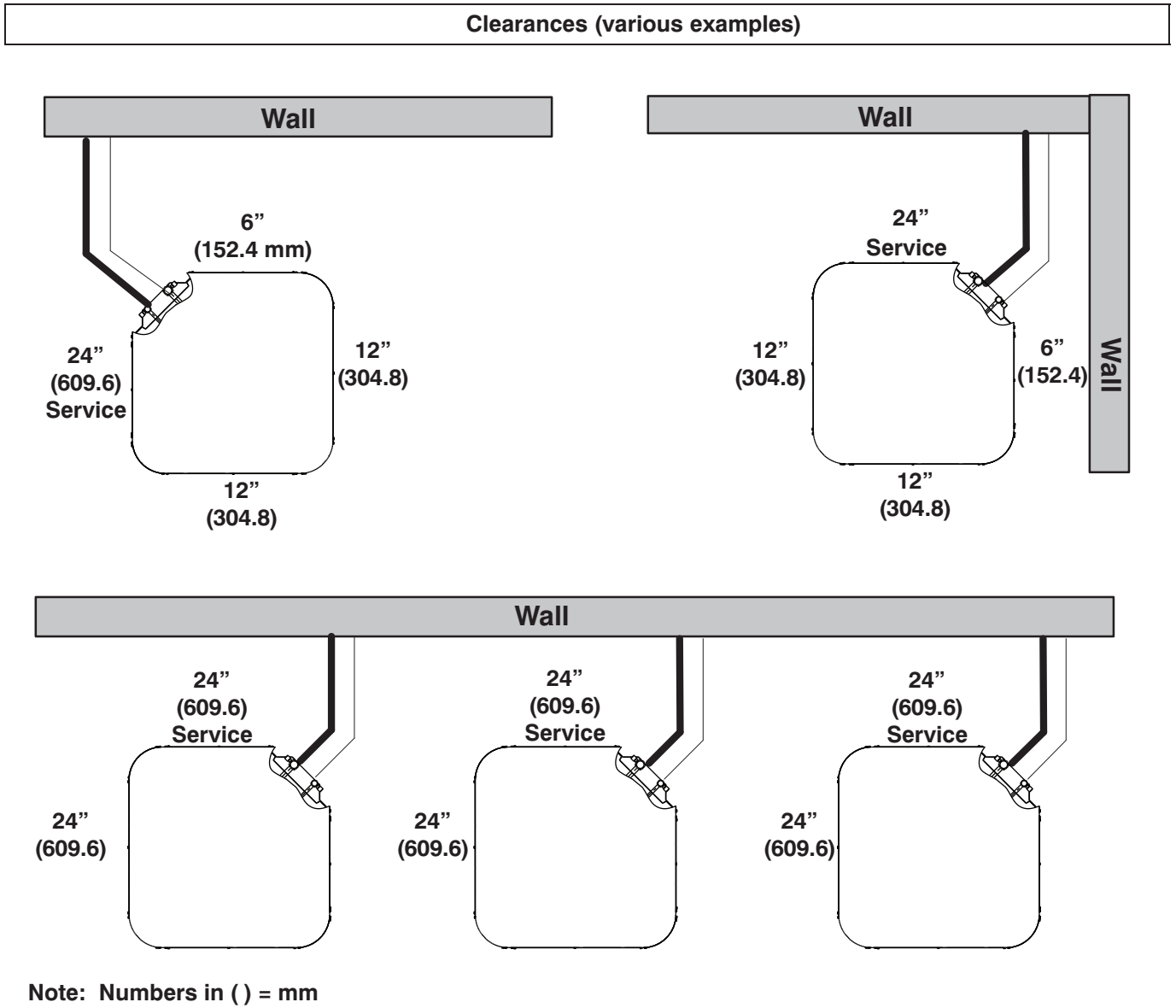
NOTE: ALL DIMENSIONS IN INCH (MM)

U.S. ECCN: Not Subject to Regulation (N.S.R.)

SD5959-4 REV. A

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

CLEARANCES



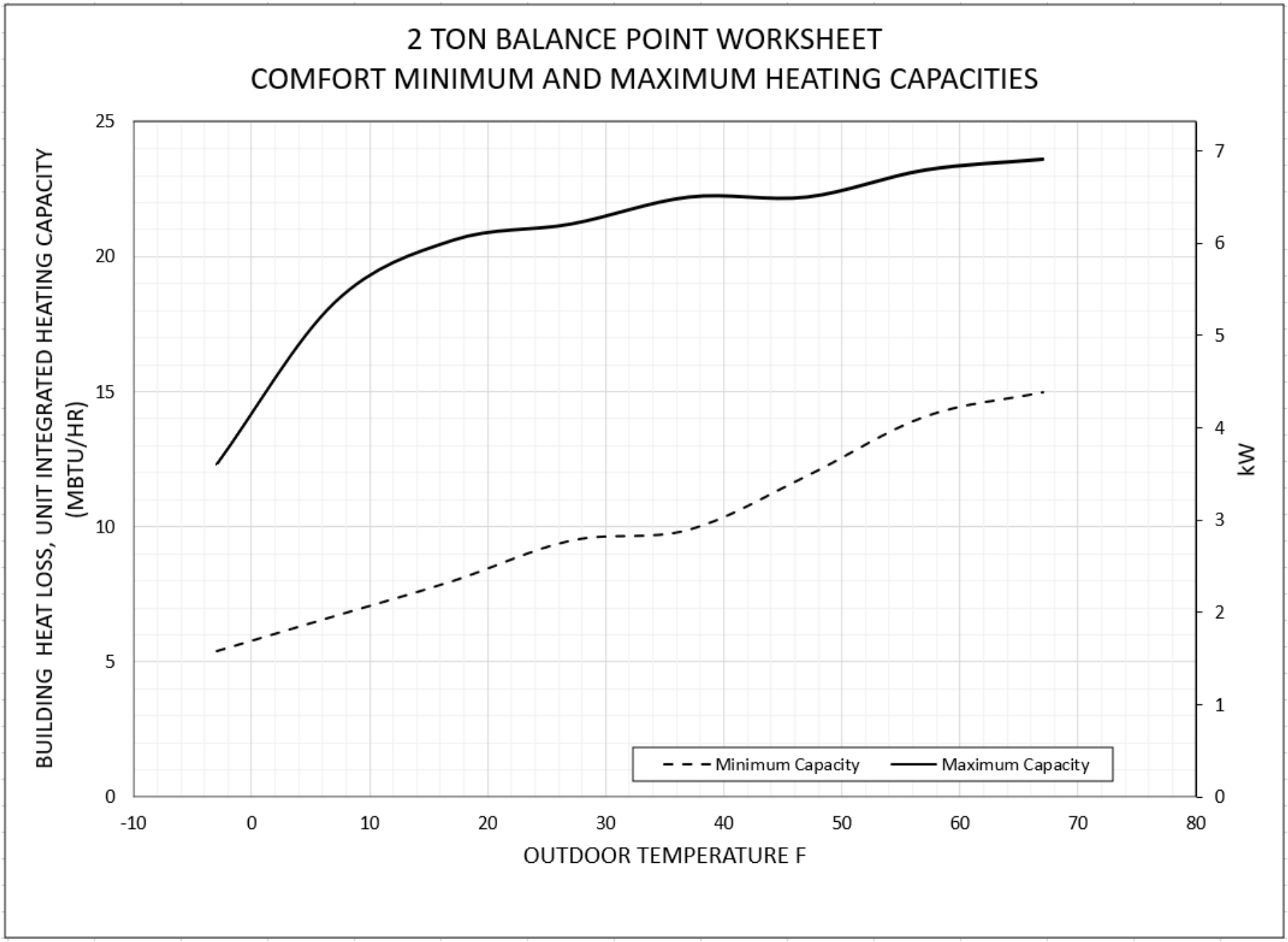
Note: Numbers in ( ) = mm

IMPORTANT: When installing multiple units in an alcove, roof well, or partially enclosed area, ensure there is adequate ventilation to prevent re-circulation of discharge air.

A07833

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

BALANCE POINT WORKSHEET



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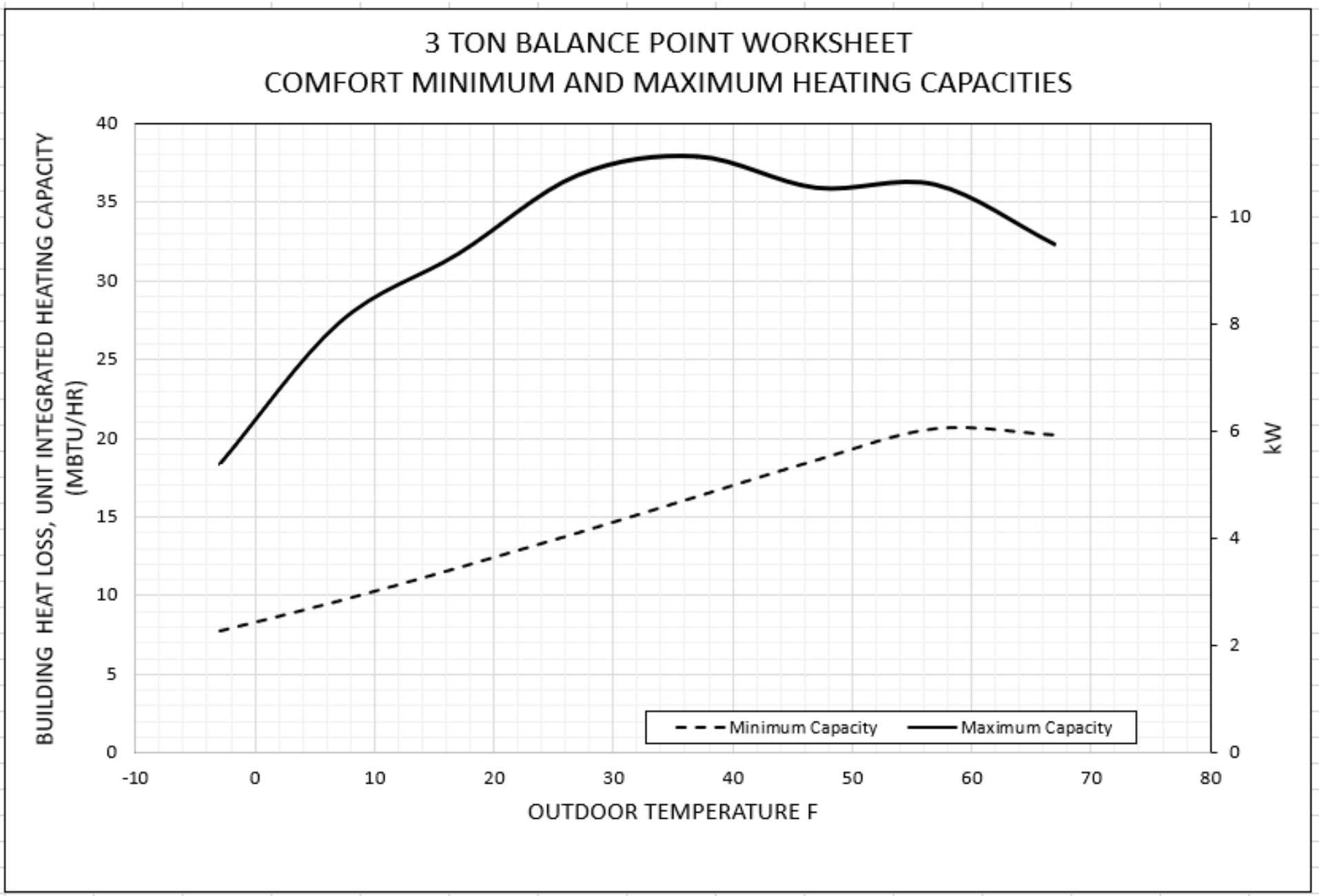
BALANCE POINT WORKSHEET - Continued



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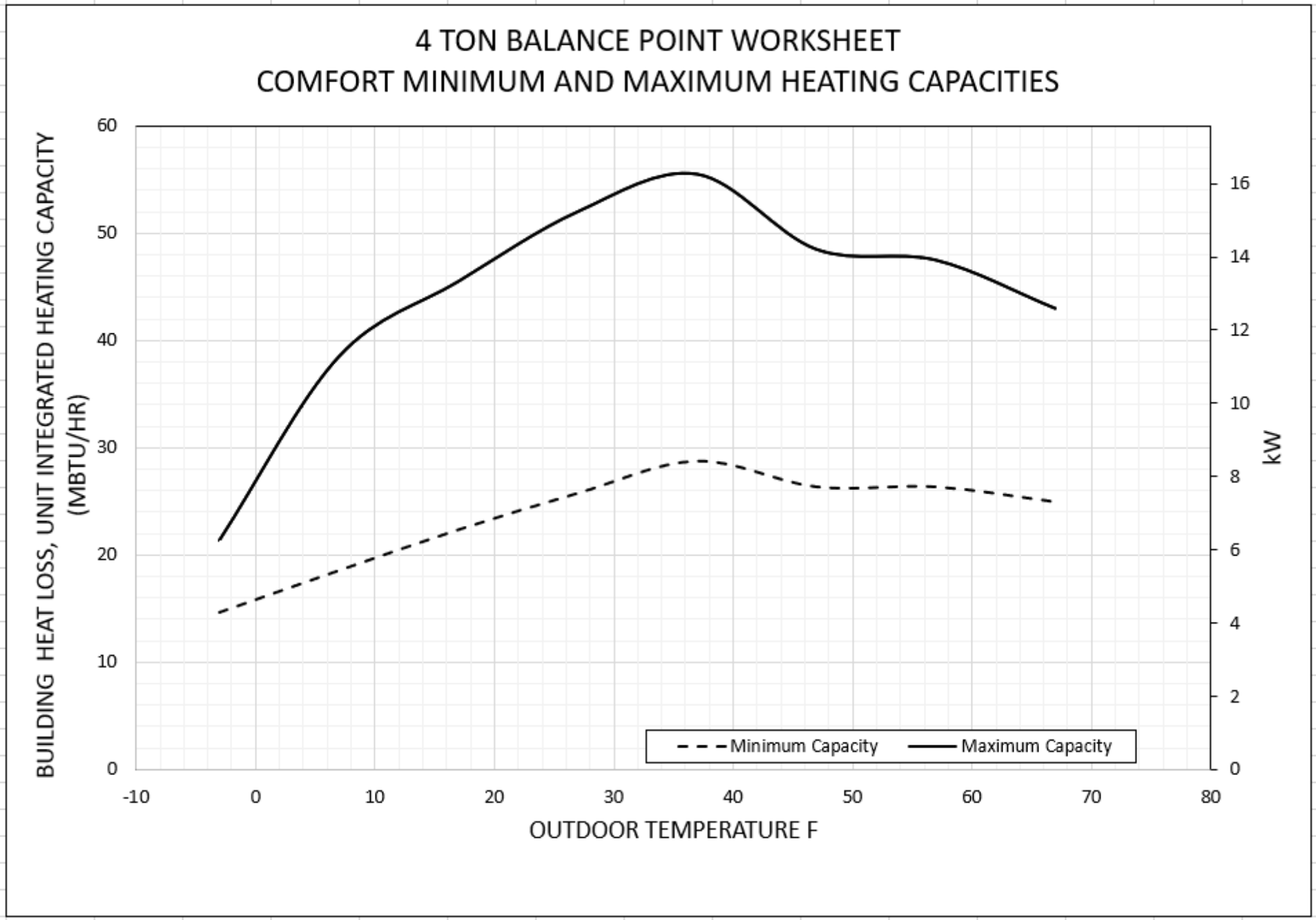
BALANCE POINT WORKSHEET - Continued



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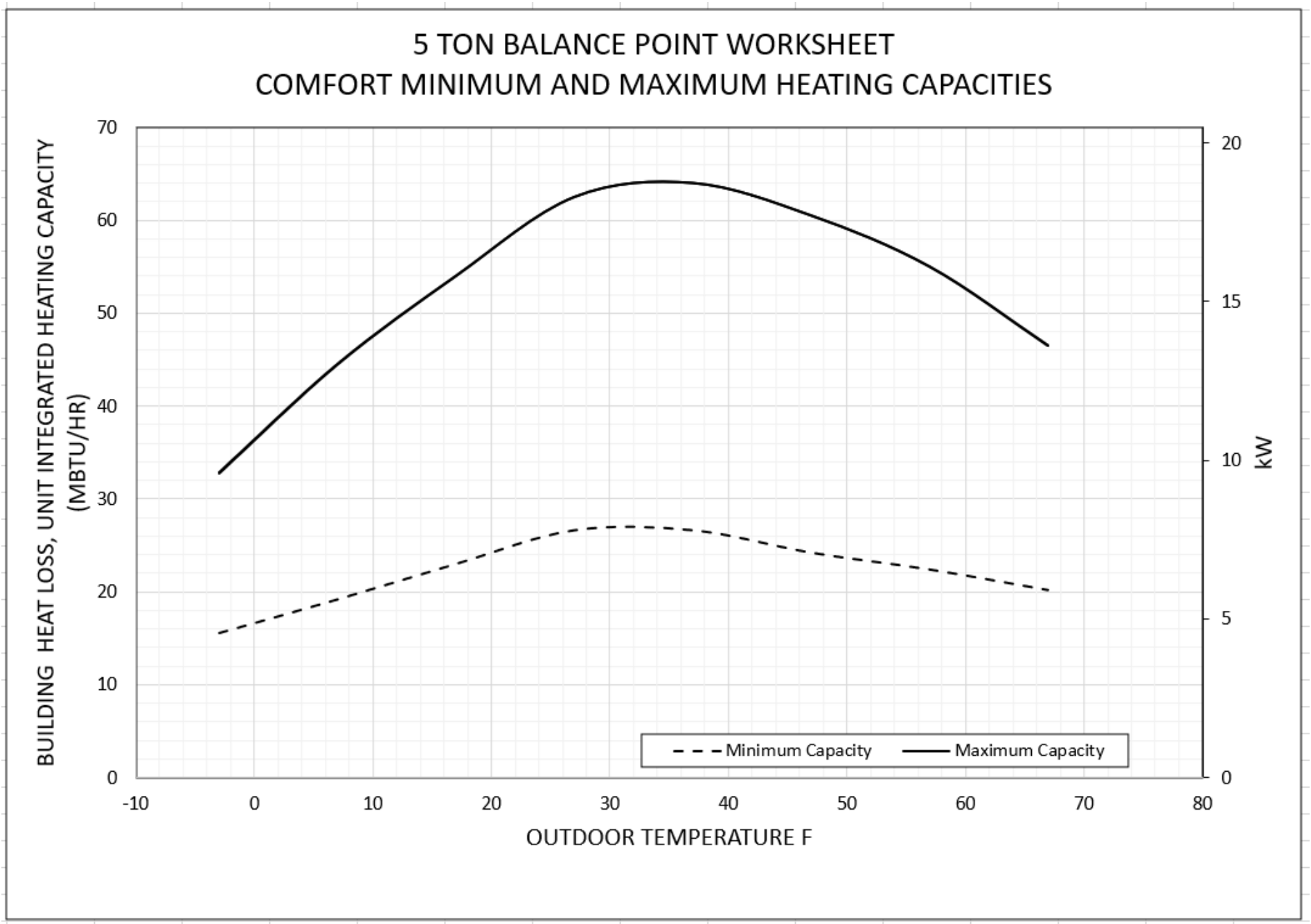
BALANCE POINT WORKSHEET - Continued



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

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA024 Maximum Demand																													
75 (23.9)	72.0 (22.2)	900	30	12.4	1.24	900	28.6	11.5	1.52	900	27.6	11.2	1.79	900	26	11	2.09	800	24.2	10.4	2.4	900	22.8	10.1	2.76	900	13.9	6.7	2.03
	67.0 (19.4)		27.2	17.1	1.26		26	16.1	1.53		25.2	15.8	1.81		23.6	15.6	2.09		22	14.6	2.39		20.6	14.9	2.72		12.5	11.1	2.02
	63.0 (17.2)††		25.4	20.8	1.29		24.2	19.6	1.54		23.2	19.4	1.81		22	19.2	2.10		20.4	18	2.37		19.3	18.5	2.72		12.2	12.1	2.01
	57.0 (13.9)		23.8	23.8	1.29		23	22.6	1.55		22.2	22	1.81		21.2	21.2	2.10		19.5	19.5	2.37		18.9	18.9	2.71		12.2	12.1	2.02
80 (26.7)	72.0 (22.2)	900	29.8	17	1.24	900	28.4	16	1.51	900	27.4	15.8	1.78	900	26	15.6	2.10	800	24.2	14.6	2.41	900	22.6	14.8	2.75	900	13.7	11.2	2.01
	67.0 (19.4)		27.2	21.6	1.27		26	20.6	1.53		25.0	20.2	1.8		23.6	19.2	2.15		22	18.9	2.39		21.6	17.6	2.82		13.2	13	2.02
	63.0 (17.2)††		25.6	25.2	1.28		24.4	23.8	1.53		24	22.2	1.81		22.8	21.6	2.10		21.2	20.4	2.39		20.2	20.2	2.72		13.2	13.1	2.02
	57.0 (13.9)		25.4	25.4	1.29		24.4	24	1.54		23.6	23.4	1.81		22.6	22.6	2.10		20.8	20.8	2.38		20.2	20.2	2.73		13.2	13.1	2.02
27VNA024 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	635	15.1	6.4	0.5	635	14.6	6	0.57	550	13.8	5.6	0.69	620	16.3	6.9	1.16	620	18.2	7.9	1.76	620	16.9	7.4	1.99	620	13.2	5.8	1.86
	67.0 (19.4)		13.6	9.6	0.52		13.1	9.1	0.59		12.3	8.3	0.71		14.6	10.1	1.16		16.3	11.2	1.76		15.2	10.9	1.97		11.8	9	1.84
	63.0 (17.2)††		12.7	12	0.53		12.2	11.3	0.6		11.4	10.3	0.72		13.5	12.5	1.17		15.2	13.9	1.76		14.1	13.5	1.96		11.1	10.6	1.83
	57.0 (13.9)		12.6	12.2	0.53		12.2	11.4	0.61		11.2	10.6	0.72		13.3	13.1	1.17		14.7	14.7	1.76		13.7	13.7	1.95		11	10.9	1.83
80 (26.7)	72.0 (22.2)	635	15	9.6	0.5	635	14.5	9.2	0.57	550	13.7	8.4	0.69	620	16.2	10.1	1.16	620	18.1	11.3	1.76	620	16.7	10.9	1.98	620	13	9.1	1.85
	67.0 (19.4)		13.7	12.7	0.52		13.2	12.1	0.59		12.4	11	0.71		14.6	13.2	1.16		16.5	14.6	1.77		15.2	14.2	1.97		12	11.4	1.84
	63.0 (17.2)††		13.5	13.1	0.52		13.1	12.3	0.59		12.1	11.4	0.71		14.2	14.1	1.16		15.7	15.7	1.76		14.7	14.7	1.97		11.9	11.8	1.84
	57.0 (13.9)		13.5	13.1	0.52		13.1	12.3	0.59		12.1	11.4	0.71		14.2	14.1	1.16		15.7	15.7	1.76		14.7	14.7	1.97		11.9	11.8	1.84
27VNA024 Minimum Demand																													
75 (23.9)	72.0 (22.2)	500	7.1	3.6	0.21	500	6.5	3.3	0.27	500	5.9	3.1	0.35	485	11	4.7	0.72	485	14.9	6.3	1.37	485	13.7	5.9	1.57	485	12.5	5.3	1.79
	67.0 (19.4)		6.4	6.1	0.22		5.9	5	0.28		5.3	5.2	0.36		9.8	7.1	0.73		13.4	8.9	1.37		12.3	8.5	1.56		11.1	7.8	1.76
	63.0 (17.2)††		6.3	6.3	0.23		5.8	5.7	0.28		5.3	5.2	0.36		9.1	8.5	0.73		12.3	10.9	1.37		11.3	10.5	1.56		10.2	9.7	1.74
	57.0 (13.9)		6.3	6.3	0.23		5.8	5.7	0.28		5.3	5.2	0.36		9.1	8.7	0.73		11.8	11.8	1.37		11	11	1.56		10.1	9.9	1.75
80 (26.7)	72.0 (22.2)	500	7.1	6.2	0.21	500	6.5	5.8	0.26	500	5.9	4.9	0.34	485	10.9	7.2	0.71	485	14.8	8.9	1.37	485	13.7	8.6	1.58	485	12.4	7.9	1.78
	67.0 (19.4)		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		10	9	0.73		13.4	11.5	1.38		12.2	11.1	1.56		11.1	10.3	1.76
	63.0 (17.2)††		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		9.8	9.5	0.72		12.7	12.7	1.37		11.8	11.8	1.56		10.9	10.8	1.76
	57.0 (13.9)		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		9.8	9.4	0.72		12.6	12.6	1.37		11.8	11.8	1.56		10.9	10.7	1.76

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA036 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1200	41	15.7	1.8	1200	42.5	16.7	2.47	1200	40.5	16.1	2.76	1200	38	15.4	3.08	1200	35.8	14.6	3.46	1200	34.2	13.9	3.89	1200	31.2	12.4	3.78
	67.0 (19.4)		37.4	21.8	1.86		38.5	22.8	2.48		36.8	22.2	2.77		34.6	21.4	3.09		32.6	20.6	3.44		31.2	20	3.86		28.2	18.8	3.74
	63.0 (17.2)††		34.8	26.6	1.9		35.8	27.6	2.5		34.2	27	2.78		32	26.2	3.08		30.2	25.2	3.42		28.8	24.6	3.82		26.2	23.6	3.7
	57.0 (13.9)		32.6	31	1.92		33.2	32.6	2.52		31.8	31.6	2.77		30	30	3.06		28.6	28.6	3.4		27.6	27.4	3.8		26	24.2	3.71
80 (26.7)	72.0 (22.2)	1200	41	21.8	1.8	1200	42	22.6	2.45	1200	40.5	22.2	2.77	1200	37.8	21.4	3.08	1200	35.6	20.6	3.45	1200	34.2	19.9	3.9	1200	30.8	18.8	3.76
	67.0 (19.4)		37.2	27.8	1.85		38.5	28.6	2.48		36.8	28.2	2.77		35	27.6	3.11		32.4	26.4	3.42		31.2	26	3.82		28.2	24.8	3.72
	63.0 (17.2)††		35	32.2	1.88		36	33.2	2.5		34.4	32.6	2.77		32.4	31.6	3.09		31	29	3.43		30	27.8	3.85		27.8	26	3.73
	57.0 (13.9)		34.6	32.8	1.89		35.2	34.6	2.5		33.8	33.6	2.77		32	32	3.07		30.4	30.4	3.41		29.6	29.2	3.84		27.8	26	3.74
27VNA036 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	750	20.6	8.5	0.58	750	21.6	8.9	0.8	670	20.2	8.3	0.94	830	23.4	9.6	1.43	985	21.8	9.4	1.71	985	20.8	9	1.97	985	17.8	8	2.03
	67.0 (19.4)		18.5	12.1	0.62		19.6	12.7	0.85		18.3	11.8	0.98		21	13.9	1.44		19.7	14.3	1.72		18.6	13.9	1.96		16	13	2.04
	63.0 (17.2)††		17.1	15	0.65		18.1	15.6	0.87		16.8	14.4	1		19.5	17.1	1.46		18.4	17.5	1.72		17.6	16.5	1.96		15.4	14.6	2.03
	57.0 (13.9)		16.6	16.1	0.67		17.5	16.9	0.88		16.1	15.7	1.01		18.9	18.4	1.47		18.3	17.9	1.73		17.5	16.9	1.96		15.4	14.6	2.03
80 (26.7)	72.0 (22.2)	750	20.4	12.2	0.57	750	21.6	12.7	0.81	670	20.2	11.8	0.95	830	23.2	13.9	1.43	985	21.6	14.4	1.7	985	20.4	14	1.95	985	17.6	13	2.04
	67.0 (19.4)		18.5	15.7	0.62		19.4	16.3	0.84		18.2	15.1	0.98		21	18	1.44		19.8	18.8	1.72		19	17.7	1.96		16.7	15.8	2.04
	63.0 (17.2)††		17.8	17.2	0.64		18.7	18.1	0.86		17.5	16.3	0.99		20.2	19.7	1.45		19.7	19.2	1.72		18.8	18.2	1.95		16.7	15.8	2.04
	57.0 (13.9)		17.8	17.2	0.64		18.7	18.1	0.86		17.3	16.9	0.99		20.2	19.7	1.45		19.7	19.2	1.73		18.8	18.2	1.96		16.7	15.8	2.04
27VNA036 Minimum Demand																													
75 (23.9)	72.0 (22.2)	525	10.3	4.7	0.22	525	9.7	4.5	0.31	525	8.8	4.3	0.4	705	13.7	6.2	0.82	880	12.6	6.2	1.03	880	11.5	5.9	1.17	880	11	5.7	1.37
	67.0 (19.4)		9.2	7.2	0.25		8.6	7.1	0.34		7.8	6.8	0.42		12.2	9.7	0.84		11.3	10.3	1.05		10.4	8.4	1.17		9.8	9.4	1.36
	63.0 (17.2)††		8.8	8.5	0.27		8.3	8.1	0.35		7.6	7.5	0.42		11.6	11.4	0.85		11.1	10.9	1.05		10.2	10.1	1.18		9.8	9.4	1.36
	57.0 (13.9)		8.7	8.5	0.27		8.3	8.1	0.35		7.6	7.5	0.43		11.6	11.4	0.85		11.1	10.9	1.05		10.2	10.1	1.18		9.8	9.4	1.36
80 (26.7)	72.0 (22.2)	525	10.2	7.3	0.22	525	9.6	7.2	0.31	525	8.7	6.9	0.39	705	13.6	9.7	0.82	880	12.5	10.4	1.03	880	11.4	10.1	1.17	880	10.9	9.9	1.37
	67.0 (19.4)		9.5	9.2	0.24		9	8.8	0.32		8.3	8.1	0.41		12.8	11.4	0.83		12.1	11.8	1.04		11.1	11	1.17		10.7	10.3	1.36
	63.0 (17.2)††		9.5	9.2	0.24		9	8.8	0.32		8.3	8.1	0.41		12.5	12.3	0.83		12.1	11.8	1.04		11.1	11	1.17		10.8	10.3	1.37
	57.0 (13.9)		9.4	9.2	0.24		9	8.7	0.32		8.3	8.1	0.41		12.5	12.3	0.83		12	11.8	1.03		11.1	11	1.17		10.7	10.3	1.36

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																							
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA048 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1350	50	20.8	2.01	1350	52	22.2	2.78	1350	55	22	3.77	1350	52.5	20.8	4.18	1350	50	19.4	4.63	1350	46.5	18.6	5.1	1350	34.4	16.3	4.25
	67.0 (19.4)		45.5	27.8	2.07		47	29.4	2.8		50	29	3.77		48	27.6	4.18		45.5	26.2	4.58		42.5	25.4	5.04		31.2	24	4.19
	63.0 (17.2)††		42.5	33.4	2.13		44	35.2	2.85		46.5	34.4	3.77		44.5	32.8	4.16		42.5	31.6	4.57		39.5	30.8	4.97		29.2	29.2	4.17
	57.0 (13.9)		39	39	2.16		40	40	2.84		42	42	3.75		40.5	40	4.12		39	38	4.51		36.8	36.6	4.92		28.4	28.4	4.16
80 (26.7)	72.0 (22.2)	1350	50	27.8	2.01	1350	51.5	29.4	2.76	1350	54.5	28.8	3.74	1350	52.5	27.4	4.19	1350	49.5	26	4.6	1350	46.5	25.4	5.12	1350	34	23.8	4.23
	67.0 (19.4)		45.5	34.8	2.07		47	36.4	2.81		50	35.6	3.77		46	33.6	4.24		45	32.6	4.57		44	32.8	5.06		31	31	4.18
	63.0 (17.2)††		42.5	40	2.11		44	42	2.84		46.5	41	3.77		44.5	39.5	4.15		42.5	38	4.55		39.5	37.4	4.95		30.2	30.2	4.18
	57.0 (13.9)		41	41	2.12		42	42	2.83		44.5	44.5	3.78		43	42.5	4.16		41	40.5	4.51		39	39	4.96		30.2	30.2	4.19
27VNA048 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	950	29.6	11.5	0.81	950	29.4	12	1.13	850	29.2	11.9	1.42	1045	33.4	13.9	2.14	1145	31.8	13.2	2.47	1145	29.4	12.6	2.75	1145	23	10.9	2.67
	67.0 (19.4)		26.8	16.2	0.87		26.6	16.9	1.17		26.4	16.3	1.46		30	19.3	2.15		28.8	19.1	2.47		26.4	18.6	2.73		20.8	17.1	2.67
	63.0 (17.2)††		24.8	19.9	0.91		24.6	20.6	1.2		24.4	19.7	1.48		28	23.6	2.16		26.6	23.6	2.46		24.8	23.2	2.74		19.7	19.7	2.66
	57.0 (13.9)		23.6	22.2	0.93		23.4	23	1.22		22.8	22.6	1.49		26.4	26.4	2.15		25.8	25.8	2.47		24.2	24.2	2.73		19.6	19.6	2.66
80 (26.7)	72.0 (22.2)	950	29.4	16.2	0.81	950	29.2	16.9	1.12	850	29	16.3	1.42	1045	33.2	19.4	2.13	1145	31.6	19.1	2.47	1145	29	18.6	2.74	1145	22.8	17.1	2.68
	67.0 (19.4)		26.6	20.8	0.86		26.4	21.6	1.17		26.2	20.6	1.45		30.2	24.8	2.15		28.6	24.8	2.46		26.6	24.4	2.74		21	21	2.66
	63.0 (17.2)††		25.6	22.4	0.89		25.4	23.4	1.19		24.4	23.8	1.46		28.4	28.4	2.16		27.6	27.6	2.47		25.8	25.8	2.73		21	21	2.67
	57.0 (13.9)		25.2	23.6	0.9		25	24.6	1.2		24.2	24.2	1.47		28.2	28.2	2.16		27.6	27.4	2.47		25.8	25.8	2.73		21	21	2.67
27VNA048 Minimum Demand																													
75 (23.9)	72.0 (22.2)	750	17.5	7.6	0.38	750	16.2	7.5	0.53	750	15	7.1	0.67	895	22.6	9.4	1.32	1040	21.4	9.1	1.6	1040	19.5	8.6	1.79	1040	17.3	8.5	2.01
	67.0 (19.4)		15.8	11.4	0.43		14.6	11.4	0.57		13.5	11	0.7		20.4	13.9	1.35		19.2	14.1	1.61		17.5	13.8	1.8		15.5	13.9	2.01
	63.0 (17.2)††		14.7	14.1	0.45		13.7	13.6	0.59		12.9	12.3	0.71		18.9	17.2	1.36		18.2	16.6	1.61		16.7	16.1	1.8		15	15	2.01
	57.0 (13.9)		14.6	14.3	0.46		13.6	13.6	0.59		12.7	12.7	0.71		18.6	17.9	1.36		18.1	17.1	1.62		16.7	16.1	1.8		15	15	2.01
80 (26.7)	72.0 (22.2)	750	17.4	11.4	0.38	750	16	11.4	0.52	750	14.9	11	0.67	895	22.4	13.9	1.32	1040	21	14.2	1.58	1040	19.2	13.8	1.78	1040	17.1	14	2.02
	67.0 (19.4)		15.9	14.9	0.42		14.7	14.7	0.56		13.8	13.6	0.69		20.4	18.1	1.35		19.7	17.4	1.6		18.1	17	1.79		16.2	16.2	2.01
	63.0 (17.2)††		15.7	15.4	0.43		14.6	14.6	0.56		13.7	13.7	0.69		20	19.2	1.35		19.4	18.4	1.6		18	17.3	1.79		16.2	16.2	2.01
	57.0 (13.9)		15.7	15.3	0.43		14.6	14.6	0.56		13.7	13.7	0.69		20	19.1	1.36		19.4	18.4	1.6		18	17.3	1.8		16.2	16.2	2.01

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

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																									
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA060 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1950	67	27.6	3.34	1950	65	27.8	3.94	1950	68	27.4	5.04	1950	64.5	26	5.6	1850	61	24.6	6.16	1700	57	23.6	6.83	1300	42.5	19.5	5.52
	67.0 (19.4)		60.5	37.6	3.35		59.5	38	3.98		61.5	37.2	4.98		58.5	35.6	5.52		55.5	33.8	6.07		52	32.2	6.68		38.5	27.2	5.44
	63.0 (17.2)††		56.5	45.5	3.39		55	46	3.99		57	45	4.95		54.5	43	5.51		51.5	41	6		48	39	6.54		35.6	33	5.38
	57.0 (13.9)		52	52	3.38		51	51	3.97		52.5	52.5	4.9		50.5	50.5	5.43		48	48	5.93		45	45	6.48		33.8	33.8	5.35
80 (26.7)	72.0 (22.2)	1950	67	37.4	3.35	1950	65	37.8	3.94	1950	68	37	5.05	1950	64.5	35.4	5.62	1850	60.5	33.6	6.14	1700	57	32	6.85	1300	42.5	27.2	5.53
	67.0 (19.4)		60.5	47	3.35		59	48	3.95		61.5	47	4.98		58	44.5	5.45		55	42.5	6.03		51.5	41.5	6.62		38.5	34.6	5.45
	63.0 (17.2)††		56.5	55	3.37		55.5	55.5	3.99		57.5	54	4.97		55	52.5	5.51		51.5	49.5	5.96		48.5	47	6.59		36.2	36.2	5.4
	57.0 (13.9)		55.5	55.5	3.39		54.5	54.5	3.99		56	56	4.94		54	54	5.5		51	51	5.99		48	48	6.59		36	36	5.39
27VNA060 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	1170	36.6	14.5	0.96	1170	35	14.4	1.24	1080	35.2	14.4	1.63	1220	39.5	16.4	2.49	1380	37.4	15.9	2.89	1300	35	15.1	3.26	1130	28.2	12.7	3.08
	67.0 (19.4)		33	20.2	1.01		31.8	20.4	1.29		31.8	20	1.67		35.8	22.8	2.5		33.8	23	2.89		31.6	22	3.24		25.4	19	3.07
	63.0 (17.2)††		30.6	24.8	1.05		29.4	25	1.31		29.2	24.4	1.68		33	27.8	2.5		31.4	28.4	2.89		29.4	27.2	3.23		23.4	23.4	3.02
	57.0 (13.9)		29.2	27.6	1.07		28.2	27.6	1.32		27.8	27.4	1.7		31.2	31.2	2.49		30.6	30.4	2.89		28.6	28.6	3.22		23.2	23.2	3.03
80 (26.7)	72.0 (22.2)	1170	36.4	20.2	0.96	1170	35	20.4	1.24	1080	35	20	1.62	1220	39.5	22.8	2.49	1380	37.2	23	2.88	1300	34.8	22	3.25	1130	28	19	3.08
	67.0 (19.4)		33	26	1.01		31.8	26.2	1.28		31.8	25.6	1.67		35.6	29.2	2.49		34.6	24.6	2.86		32.4	23.8	3.21		25.4	24.8	3.05
	63.0 (17.2)††		31.6	28	1.03		30.6	27.8	1.29		30.2	27.8	1.68		34	31.8	2.5		32.8	32.6	2.89		30.8	30.8	3.25		25	25	3.05
	57.0 (13.9)		31.2	29.6	1.04		30.2	29.4	1.3		29.8	29.2	1.69		33.4	33.4	2.5		32.8	32.6	2.9		30.6	30.6	3.23		25	25	3.05
27VNA060 Minimum Demand																													
75 (23.9)	72.0 (22.2)	780	18.4	8.2	0.34	780	17.4	8.1	0.49	780	16.3	7.7	0.64	850	24.2	10.1	1.26	1150	23	10.2	1.55	1100	21.4	9.7	1.78	1050	19.9	9.6	2.09
	67.0 (19.4)		16.5	12.2	0.38		15.6	12.2	0.53		14.6	11.8	0.67		21.8	14.4	1.29		20.6	15.8	1.56		19.1	15.2	1.78		17.8	15.1	2.08
	63.0 (17.2)††		15.4	15	0.41		14.7	14.6	0.55		14	12.8	0.68		20	17.7	1.29		19.7	18.3	1.57		18.4	17.1	1.78		17	17	2.07
	57.0 (13.9)		15.2	15.2	0.41		14.6	14.6	0.55		13.7	13.7	0.68		19.5	18.8	1.3		19.6	18.8	1.58		18.2	17.8	1.78		17	17	2.07
80 (26.7)	72.0 (22.2)	780	18.2	12.2	0.34	780	17.3	12.3	0.49	780	16.2	11.9	0.64	850	24.2	14.4	1.26	1150	22.8	15.9	1.54	1100	21.2	15.3	1.77	1050	19.7	15.3	2.08
	67.0 (19.4)		16.6	15.9	0.38		16	15	0.52		15.1	13.8	0.65		21.8	18.6	1.28		21.4	19.8	1.57		19.9	18.6	1.78		18.4	18.4	2.07
	63.0 (17.2)††		16.4	16.4	0.38		15.7	15.7	0.53		14.8	14.8	0.66		21	20.2	1.29		21.2	20.4	1.57		19.7	19.2	1.78		18.4	18.4	2.07
	57.0 (13.9)		16.4	16.4	0.38		15.7	15.7	0.53		14.8	14.8	0.66		21	20.2	1.29		21.2	20.4	1.57		19.7	19.2	1.78		18.4	18.4	2.08

† Total and sensible capacities are net capacities. Blower motor heat has been subtracted.

‡ Sensible capacities shown are based on 80°F (27°C) entering air at the indoor coil. For sensible capacities at other than 80°F (27°C), deduct 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air for each degree below 80°F (27°C), or add 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air per degree above 80°F (27°C).

** System kw is total of indoor and outdoor unit kilowatts.

Detailed cooling capacities are based on indoor and outdoor unit at the same elevation per AHRI standard 210/240-08. If additional tubing length and/or indoor unit is located above outdoor unit, a slight variation in capacity may occur.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB— Entering Dry Bulb **EWB** — Entering Wet Bulb

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

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA024 Maximum Demand																													
75 (23.9)	72.0 (22.2)	650	27.6	10.7	1.13	600	27.2	10.6	1.47	580	26	10.1	1.73	550	24.6	9.3	2.03	550	23.2	8.7	2.33	550	21.8	8.2	2.66	600	13.5	5.9	1.93
	67.0 (19.4)		25.2	14	1.16		24.6	13.8	1.47		23.6	13.1	1.74		22.2	12.2	2.01		21	11.5	2.31		19.7	11	2.61		12.1	9	1.93
	63.0 (17.2)††		23.2	16.6	1.17		22.8	16.2	1.48		21.8	15.5	1.73		20.6	14.4	2.01		19.4	13.7	2.29		18.2	13.2	2.59		11.3	10.9	1.92
	57.0 (13.9)		21.2	19.7	1.19		20.6	19.7	1.49		19.6	18.7	1.73		18.4	17.4	1.99		17.5	16.4	2.26		16.6	15.5	2.55		11.2	11.1	1.92
80 (26.7)	72.0 (22.2)	650	27.4	14	1.13	600	27	13.7	1.47	580	26	13.1	1.74	550	24.4	12.2	2.02	550	23.2	11.5	2.34	550	21.6	11	2.65	600	13.4	9.1	1.93
	67.0 (19.4)		25	17.3	1.15		24.6	16.8	1.48		23.6	16.1	1.74		22.2	14.9	2.02		21	14.2	2.32		19.7	13.7	2.62		12.2	11.9	1.92
	63.0 (17.2)††		23.2	19.9	1.17		22.8	19.3	1.48		21.8	18.4	1.73		20.6	17.1	2.01		19.4	16.3	2.29		18.2	15.8	2.59		12.1	12	1.92
	57.0 (13.9)		22.2	21.4	1.18		21.6	21.2	1.49		20.6	20	1.73		19.5	18.5	2.00		18.6	17.4	2.28		17.7	16.6	2.58		12.1	12	1.93
27VNA024 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	400	15.1	6	0.53	400	14.8	6	0.62	400	14.1	5.7	0.75	400	14.2	5.6	1	400	13.3	5.2	1.17	400	12.1	4.9	1.34	400	8.4	3.7	1.17
	67.0 (19.4)		13.6	8.1	0.54		13.3	8.2	0.64		12.7	7.8	0.77		12.7	7.7	1		11.8	7.3	1.17		10.8	6.9	1.34		7.3	5.8	1.17
	63.0 (17.2)††		12.6	9.8	0.55		12.3	9.8	0.65		11.6	9.5	0.78		11.6	9.3	1.01		10.8	8.8	1.17		9.9	8.4	1.34		6.8	6.8	1.16
	57.0 (13.9)		11.6	11.4	0.56		11.3	11.3	0.66		10.8	10.8	0.78		10.8	10.6	1.01		10.2	9.8	1.17		9.5	9.1	1.34		6.8	6.8	1.17
80 (26.7)	72.0 (22.2)	400	15	8.1	0.53	400	14.8	8.2	0.62	400	14.1	7.9	0.75	400	14.1	7.8	0.99	400	13.2	7.3	1.17	400	12.1	6.9	1.34	400	8.3	5.9	1.17
	67.0 (19.4)		13.5	10.2	0.54		13.3	10.3	0.64		12.6	9.9	0.76		12.6	9.8	1		11.8	9.3	1.17		10.8	8.9	1.34		7.5	7.5	1.17
	63.0 (17.2)††		12.6	11.8	0.55		12.3	11.9	0.65		11.7	11.5	0.77		11.7	11.3	1.01		11	10.6	1.18		10.2	9.8	1.34		7.5	7.4	1.17
	57.0 (13.9)		12.3	12.1	0.55		12.1	12.1	0.65		11.6	11.5	0.78		11.6	11.3	1.01		11	10.5	1.18		10.2	9.8	1.34		7.5	7.4	1.18
27VNA024 Minimum Demand																													
75 (23.9)	72.0 (22.2)	300	8.7	3.6	0.28	300	8.4	3.5	0.32	300	7.7	3.2	0.4	300	8.8	3.5	0.59	300	8	3.2	0.7	300	7	2.9	0.8	300	5.8	2.6	0.9
	67.0 (19.4)		7.8	5.1	0.3		7.4	5.1	0.33		6.8	4.8	0.41		7.7	5.1	0.6		7	4.7	0.71		6	4.4	0.8		4.9	4.1	0.9
	63.0 (17.2)††		7.2	6.3	0.31		6.8	6.3	0.35		6.2	6	0.42		7	6.3	0.6		6.3	5.9	0.71		5.5	5.3	0.8		4.6	4.6	0.9
	57.0 (13.9)		6.9	6.8	0.31		6.6	6.6	0.35		6.1	6.1	0.42		6.8	6.6	0.61		6.2	6	0.71		5.5	5.3	0.81		4.6	4.6	0.9
80 (26.7)	72.0 (22.2)	300	8.7	5.1	0.29	300	8.3	5.1	0.31	300	7.6	4.9	0.39	300	8.7	5.1	0.59	300	7.9	4.8	0.7	300	6.9	4.5	0.8	300	5.7	4.2	0.9
	67.0 (19.4)		7.8	6.7	0.3		7.4	6.7	0.33		6.8	6.4	0.41		7.7	6.6	0.6		7	6.3	0.71		6.2	5.6	0.81		5.2	5.1	0.9
	63.0 (17.2)††		7.5	7.3	0.31		7.2	7.2	0.34		6.7	6.6	0.42		7.4	7.2	0.6		6.8	6.5	0.7		6.1	5.8	0.81		5.2	5.1	0.91
	57.0 (13.9)		7.4	7.3	0.3		7.1	7.1	0.34		6.7	6.6	0.42		7.4	7.2	0.6		6.8	6.5	0.71		6.1	5.8	0.81		5.2	5.1	0.91

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA036 Maximum Demand																													
75 (23.9)	72.0 (22.2)	900	39	14.8	1.51	800	40	15.6	2.08	800	38.5	15.2	2.45	800	36.4	14.6	2.86	800	34.6	13.9	3.23	800	33.2	13.3	3.65	800	30.6	11.8	3.51
	67.0 (19.4)		35.4	19.5	1.56		36.6	19.8	2.12		35.2	19.4	2.48		33.2	18.8	2.86		31.4	18	3.2		30.2	17.4	3.61		27.8	16.2	3.48
	63.0 (17.2)††		32.8	23.2	1.6		33.8	23.2	2.13		32.4	22.6	2.47		30.6	22	2.84		29	21.2	3.18		27.8	20.6	3.56		25.6	19.6	3.44
	57.0 (13.9)		29.8	27.4	1.63		30.2	27.8	2.14		29	27.4	2.47		27.4	26.6	2.84		25.8	25.6	3.13		25	24.8	3.51		23.8	22.4	3.4
80 (26.7)	72.0 (22.2)	900	38.5	19.4	1.49	800	40	19.8	2.08	800	38.5	19.4	2.46	800	36.4	18.8	2.86	800	34.4	18	3.22	800	33.2	17.4	3.66	800	30.4	16.2	3.5
	67.0 (19.4)		35.2	24	1.55		36.4	24	2.11		35	23.6	2.46		33	22.8	2.84		31.2	22	3.19		30	21.6	3.6		27.6	20.6	3.47
	63.0 (17.2)††		32.8	27.6	1.59		33.8	27.2	2.13		32.4	26.8	2.47		30.6	26	2.84		29	25.2	3.18		27.8	24.6	3.56		25.8	23.6	3.45
	57.0 (13.9)		31.4	29.6	1.61		31.4	30.2	2.14		30.2	29.6	2.48		28.6	28.6	2.84		27.2	27.2	3.14		26.6	26.4	3.55		25.6	23.8	3.45
27VNA036 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	625	21.4	8.5	0.6	625	22.6	9	0.84	625	22	8.8	1.04	625	22.8	9.1	1.38	650	21.4	8.7	1.59	700	20.4	8.4	1.84	775	17.8	7.6	1.94
	67.0 (19.4)		19.4	11.7	0.65		20.2	12.1	0.88		19.8	12	1.07		20.6	12.4	1.4		19.2	12	1.59		18.4	12	1.85		16	11.6	1.94
	63.0 (17.2)††		17.9	14.1	0.68		18.8	14.7	0.91		18.2	14.5	1.09		18.9	14.8	1.4		17.7	14.6	1.6		16.9	14.8	1.84		15	13.8	1.93
	57.0 (13.9)		16.7	16.1	0.71		17.5	16.9	0.93		17	16.5	1.1		17.5	17	1.41		16.7	16.3	1.6		16.3	15.8	1.83		14.9	14.1	1.93
80 (26.7)	72.0 (22.2)	625	21.4	11.6	0.6	625	22.4	12.2	0.84	625	21.8	12.1	1.04	625	22.6	12.4	1.37	650	21.2	12.1	1.58	700	20.2	12	1.83	775	17.6	11.7	1.94
	67.0 (19.4)		19.3	14.7	0.65		20.4	15.4	0.88		19.5	15.1	1.06		20.4	15.5	1.39		19.2	15.3	1.6		18.3	15.6	1.84		16.4	14.1	1.94
	63.0 (17.2)††		18	17	0.68		18.9	17.7	0.9		18.4	17.6	1.09		19	17.9	1.4		18.1	16.7	1.6		17.6	17	1.84		16.1	15.2	1.94
	57.0 (13.9)		17.8	17.2	0.68		18.7	18	0.91		18.2	17.7	1.09		18.7	18.2	1.4		17.9	17.4	1.6		17.5	16.9	1.83		16.1	15.2	1.94
27VNA036 Minimum Demand																													
75 (23.9)	72.0 (22.2)	400	13.1	5.3	0.31	400	12.3	5.1	0.41	400	11.4	4.8	0.51	400	13.1	5.4	0.78	400	12.1	5	0.92	400	11.1	4.7	1.06	400	10.7	4.5	1.25
	67.0 (19.4)		11.7	7.2	0.35		11	7.1	0.44		10.1	6.8	0.53		11.6	7.3	0.79		10.7	7	0.93		9.8	6.7	1.06		9.4	6.5	1.25
	63.0 (17.2)††		10.7	8.7	0.38		10.1	8.6	0.46		9.3	8.3	0.55		10.6	8.9	0.81		9.8	8.5	0.94		8.9	8.2	1.07		8.5	8	1.24
	57.0 (13.9)		10.1	9.8	0.39		9.6	9.4	0.47		9	8.8	0.56		10	9.8	0.81		9.3	9.2	0.94		8.7	8.6	1.07		8.4	8.1	1.24
80 (26.7)	72.0 (22.2)	400	13	7.3	0.31	400	12.2	7.1	0.41	400	11.3	6.8	0.51	400	13	7.4	0.78	400	12	7	0.92	400	11	6.7	1.06	400	10.6	6.6	1.25
	67.0 (19.4)		11.6	9.2	0.35		11	9.1	0.44		10.1	8.8	0.53		11.6	9.3	0.8		10.7	9	0.94		9.8	8.7	1.07		9.3	8.6	1.24
	63.0 (17.2)††		11	10.2	0.37		10.3	10.1	0.45		9.7	9.6	0.54		10.9	10.3	0.81		10.1	9.9	0.94		9.4	9.3	1.07		9.2	8.8	1.25
	57.0 (13.9)		10.8	10.5	0.37		10.3	10.1	0.45		9.7	9.5	0.55		10.7	10.6	0.8		10.1	9.9	0.94		9.4	9.3	1.07		9.2	8.8	1.25

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Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA048 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1150	53	21.8	2.18	1150	50	21.6	2.58	1150	48	20.8	2.99	1150	51.5	20.4	4.04	1050	48.5	19	4.42	1000	45	18	4.84	1000	33.8	15.8	4.01
	67.0 (19.4)		48	28	2.22		45.5	28	2.61		44	27	3.03		47	26.4	4.03		44.5	24.4	4.4		41.5	23.2	4.81		31	21.8	3.99
	63.0 (17.2)††		44.5	32.6	2.25		42.5	32.8	2.66		40.5	32	3.01		43.5	31	4		41	28.6	4.32		38	27.4	4.7		28.6	26.2	3.93
	57.0 (13.9)		40	39.5	2.29		38	38	2.66		36.6	36.6	3.02		39.5	37.6	4		37	34.6	4.28		34.4	33.2	4.64		26.8	26.8	3.92
80 (26.7)	72.0 (22.2)	1150	52.5	27.8	2.16	1150	50	27.8	2.58	1150	48	27	2.99	1150	51.5	26.2	4.06	1050	48.5	24.2	4.43	1000	45	23.2	4.86	1000	33.8	21.6	4.04
	67.0 (19.4)		48	33.8	2.22		45.5	34	2.62		43.5	33.2	3		47	32	4.04		44	29.6	4.37		41	28.4	4.77		30.8	27.4	3.98
	63.0 (17.2)††		44.5	38.5	2.25		42.5	39	2.65		40.5	38	3.01		43.5	36.6	4.01		41	33.8	4.33		38.5	32.4	4.75		28.8	28.8	3.95
	57.0 (13.9)		41.5	41.5	2.28		40	40	2.67		38.5	38.5	3.02		41	40.5	4		38.5	37.6	4.31		36	35.8	4.69		28.4	28.4	3.94
27VNA048 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	825	33.4	12.9	0.97	825	31.4	12.8	1.22	850	29.8	12.3	1.47	875	32.8	13.5	2.06	875	31.2	12.7	2.34	875	29	12.2	2.63	950	23	10.6	2.58
	67.0 (19.4)		30.2	17.1	1.02		28.4	17.1	1.26		27	16.7	1.5		29.8	18.2	2.08		28.2	17.3	2.33		26.2	16.8	2.6		20.8	15.8	2.57
	63.0 (17.2)††		28	20.4	1.06		26.2	20.4	1.29		25	20.2	1.52		27.6	21.8	2.09		26	21	2.33		24.2	20.4	2.59		19.3	19.3	2.55
	57.0 (13.9)		25.4	24.2	1.1		24	24	1.32		23.2	23.2	1.53		25.4	25.4	2.09		24.2	24.2	2.33		22.8	22.8	2.58		19.1	19.1	2.56
80 (26.7)	72.0 (22.2)	825	33.2	17.1	0.96	825	31.2	17.1	1.22	850	29.8	16.7	1.47	875	32.8	18.2	2.07	875	31	17.3	2.33	875	28.8	16.8	2.62	950	22.8	15.8	2.58
	67.0 (19.4)		30.2	21.2	1.02		28.4	21.4	1.27		27	21	1.5		29.8	22.8	2.09		28.2	21.8	2.35		26.2	21.4	2.61		20.8	20.8	2.57
	63.0 (17.2)††		28	24.4	1.06		26.4	24.6	1.3		25.2	24.2	1.52		27.6	26.2	2.08		26.2	25.2	2.34		24.4	24.4	2.59		20.4	20.4	2.56
	57.0 (13.9)		27	25.8	1.07		25.6	25.6	1.3		24.8	24.8	1.53		27	27	2.09		25.8	25.8	2.33		24.4	24.4	2.6		20.4	20.4	2.57
27VNA048 Minimum Demand																													
75 (23.9)	72.0 (22.2)	500	21.2	8.2	0.5	500	19.8	8	0.67	500	18.6	7.6	0.83	500	21.4	8.3	1.25	500	20.2	7.8	1.45	500	18.6	7.4	1.64	500	16.7	7.2	1.86
	67.0 (19.4)		19.2	10.7	0.55		17.9	10.6	0.71		16.8	10.1	0.86		19.2	10.8	1.26		18.1	10.3	1.45		16.7	9.9	1.64		14.9	9.9	1.84
	63.0 (17.2)††		17.6	12.6	0.58		16.4	12.6	0.74		15.4	12.1	0.88		17.6	12.8	1.28		16.6	12.2	1.46		15.3	11.9	1.64		13.7	12	1.85
	57.0 (13.9)		15.8	15	0.61		14.9	14.7	0.76		14.2	14	0.9		15.8	15.1	1.28		15.1	14.2	1.46		14.1	13.6	1.63		12.8	12.8	1.82
80 (26.7)	72.0 (22.2)	500	21.2	10.7	0.5	500	19.7	10.6	0.67	500	18.5	10.2	0.83	500	21.2	10.9	1.25	500	20	10.3	1.44	500	18.4	10	1.63	500	16.5	10	1.85
	67.0 (19.4)		19.1	13.1	0.55		17.8	13.1	0.71		16.7	12.7	0.86		19.1	13.4	1.26		18	12.8	1.45		16.6	12.5	1.64		14.9	12.6	1.85
	63.0 (17.2)††		17.6	15	0.58		16.4	15.1	0.73		15.4	14.7	0.88		17.6	15.3	1.28		16.6	14.7	1.46		15.3	14.4	1.63		14	14	1.85
	57.0 (13.9)		16.9	16	0.6		15.9	15.7	0.74		15.2	15	0.89		16.9	16.2	1.28		16.1	15.2	1.46		15.1	14.5	1.64		13.8	13.8	1.84

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA060 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1600	69	27.8	3.41	1500	67	27.8	3.95	1400	63	26.6	4.41	1300	60	25	4.93	1150	55.5	23.2	5.43	1000	52	21.8	6.19	800	40	17.8	5.33
	67.0 (19.4)		62.5	36	3.4		61	35.8	3.95		57.5	34.2	4.4		54.5	32	4.88		50.5	29.4	5.35		47	27.4	6.03		36	22.6	5.23
	63.0 (17.2)††		58	42.5	3.4		56.5	42	3.94		53	40	4.35		50	37.4	4.8		46.5	34.2	5.26		43.5	31.8	5.91		33.2	26.4	5.17
	57.0 (13.9)		52.5	51.5	3.4		51	51	3.92		48	48	4.32		45	45	4.74		42	41.5	5.21		39	38	5.8		29.6	29.6	5.07
80 (26.7)	72.0 (22.2)	1600	69	35.8	3.42	1500	67	35.8	3.96	1400	63	34.2	4.41	1300	59.5	32	4.9	1150	55.5	29.4	5.44	1000	52	27.4	6.19	800	39.5	22.8	5.28
	67.0 (19.4)		62.5	44	3.4		60.5	43.5	3.92		57.5	41.5	4.4		54	39	4.84		50.5	35.6	5.36		47	32.8	6.03		36	27.4	5.23
	63.0 (17.2)††		58	50.5	3.4		56.5	50	3.93		53	47.5	4.34		50.5	44.5	4.85		46.5	40.5	5.26		43.5	37.2	5.93		33.2	31.2	5.17
	57.0 (13.9)		55	55	3.4		53	53	3.9		50	50	4.33		47	47	4.77		43.5	43.5	5.24		40	40	5.83		30.8	30.8	5.1
27VNA060 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	1030	40	15.8	1.26	1000	39	15.8	1.51	970	36.4	14.8	1.73	930	37.4	15.3	2.32	880	35.2	14.3	2.66	800	32.6	13.4	3.01	730	27	11.6	2.97
	67.0 (19.4)		36.4	21	1.29		35.4	21	1.55		32.8	19.9	1.75		33.8	20.2	2.33		31.8	18.9	2.66		29.4	17.8	2.99		24.4	15.6	2.96
	63.0 (17.2)††		33.6	25.2	1.31		32.6	25.2	1.57		30.4	23.8	1.78		31.2	24	2.34		29.2	22.6	2.64		27	21.2	2.97		22.2	18.8	2.91
	57.0 (13.9)		31	29.8	1.34		30	29.6	1.59		28	27.8	1.78		28.4	28.4	2.33		26.6	26.4	2.62		24.6	24.6	2.95		20.8	20.8	2.92
80 (26.7)	72.0 (22.2)	1030	40	21	1.26	1000	39	21	1.52	970	36.2	19.9	1.72	930	37.4	20.2	2.33	880	35	19	2.65	800	32.6	17.8	3.02	730	27	15.7	2.98
	67.0 (19.4)		36.2	26.2	1.29		35.2	26.4	1.54		32.8	25	1.75		33.8	25.2	2.34		31.6	23.6	2.65		29.4	22	3.01		24.2	19.7	2.94
	63.0 (17.2)††		33.8	30.2	1.31		32.8	30.4	1.57		30.4	28.8	1.76		31.4	28.8	2.34		29.2	27	2.64		27.2	25.4	2.99		22.4	22.4	2.92
	57.0 (13.9)		32.8	31.8	1.32		32	31.6	1.58		30	29.6	1.78		30.4	30.2	2.34		28.4	28.2	2.63		26.2	26.2	2.96		22.2	22.2	2.93
27VNA060 Minimum Demand																													
75 (23.9)	72.0 (22.2)	600	21.6	8.5	0.51	500	20.8	8.4	0.66	500	19.9	8.1	0.81	500	22.6	8.9	1.24	500	21.2	8.3	1.46	500	19.8	8	1.68	500	18.6	7.9	1.99
	67.0 (19.4)		19.5	11	0.55		18.7	11	0.69		17.8	10.7	0.84		20.2	11.4	1.25		19	10.8	1.47		17.7	10.5	1.69		16.6	10.6	1.99
	63.0 (17.2)††		17.9	13	0.57		17.1	13	0.71		16.3	12.7	0.86		18.5	13.4	1.27		17.3	12.8	1.47		16.1	12.5	1.68		15.1	12.7	1.97
	57.0 (13.9)		16	15.4	0.6		15.5	15.3	0.73		14.8	14.7	0.87		16.4	15.8	1.27		15.5	15	1.47		14.7	14.4	1.68		14	14	1.96
80 (26.7)	72.0 (22.2)	600	21.4	11	0.51	500	20.8	11.1	0.66	500	19.8	10.8	0.81	500	22.4	11.5	1.23	500	21.2	10.9	1.46	500	19.8	10.6	1.69	500	18.5	10.7	1.98
	67.0 (19.4)		20	14.9	0.55		18.6	13.6	0.69		17.8	13.3	0.84		20.2	14	1.26		18.9	13.4	1.47		17.6	13.1	1.68		16.5	13.4	1.98
	63.0 (17.2)††		17.9	15.5	0.57		17.2	15.6	0.71		16.3	15.3	0.85		18.5	15.9	1.27		17.3	15.3	1.47		16.2	15.1	1.69		15.2	15.2	1.97
	57.0 (13.9)		17.1	16.5	0.58		16.6	16.4	0.72		15.9	15.8	0.86		17.5	16.9	1.26		16.7	16	1.48		15.8	15.4	1.68		15.1	15.1	1.98

† Total and sensible capacities are net capacities. Blower motor heat has been subtracted.

‡ Sensible capacities shown are based on 80°F (27°C) entering air at the indoor coil. For sensible capacities at other than 80°F (27°C), deduct 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air for each degree below 80°F (27°C), or add 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air per degree above 80°F (27°C).

** System kw is total of indoor and outdoor unit kilowatts.

Detailed cooling capacities are based on indoor and outdoor unit at the same elevation per AHRI standard 210/240-08. If additional tubing length and/or indoor unit is located above outdoor unit, a slight variation in capacity may occur.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB— Entering Dry Bulb **EWB** — Entering Wet Bulb

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

Heat Pump Heating Performance - Efficiency Mode

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA024 Maximum Demand																																		
65 (18.3)	900	12.5	11.5	1.4	900	18.3	16.8	2.22	900	20.6	18.9	2.36	900	24	21.4	2.44	900	27.6	25.2	2.54	900	24.4	24.4	1.82	900	26.6	26.6	1.76	900	28.8	28.8	1.82
70 (21.1)		12.3	11.4	1.44		18.2	16.7	2.3		22	20	2.42		23.8	21.2	2.55		27.4	25	2.66		24.6	24.6	2.06		26.4	26.4	1.87		28.6	28.6	1.92
75 (23.9)		12.2	11.3	1.5		18.1	16.7	2.39		20.4	18.7	2.58		23.8	21	2.68		27.2	24.8	2.77		24	24	2.02		26.2	26.2	1.97		28.2	28.2	2.03
27VNA024 Intermediate Demand																																		
65 (18.3)	765	8	7.3	0.91	765	10.9	10	1.21	765	12.7	11.6	1.29	720	11.8	10.5	0.99	700	12.2	11.1	0.87	635	11.7	11.7	0.73	635	12.6	12.6	0.67	675	14.1	14.1	0.66
70 (21.1)		7.9	7.2	0.96		10.8	9.9	1.27		12.6	11.5	1.36		11.6	10.3	1.04		12	10.9	0.91		11.5	11.5	0.78		12.4	12.4	0.72		13.9	13.9	0.71
75 (23.9)		7.7	7.1	0.98		10.7	9.8	1.33		12.5	11.4	1.42		11.5	10.2	1.1		11.8	10.8	0.96		11.3	11.3	0.82		12.3	12.3	0.77		13.6	13.6	0.76
27VNA024 Minimum Demand																																		
65 (18.3)	500	5.7	5.2	0.67	500	6.9	6.4	0.79	500	8.3	7.5	0.85	500	5.3	4.7	0.44	500	3.8	3.5	0.25	500	4.8	4.8	0.3	500	5.2	5.2	0.27	500	5.7	5.7	0.24
70 (21.1)		5.6	5.1	0.71		6.8	6.3	0.83		8.1	7.4	0.89		5.2	4.6	0.47		3.9	3.5	0.31		5	5	0.3		5.1	5.1	0.29		5.7	5.7	0.27
75 (23.9)		5.4	5	0.73		6.7	6.2	0.87		8	7.3	0.93		5.1	4.5	0.5		3.8	3.4	0.33		4.5	4.5	0.34		5	5	0.31		5.6	5.6	0.29

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

Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA036 Maximum Demand																																
65 (18.3)	1200	19.3	17.7	2.28	1200	27.8	25.4	3.48	1200	32.2	29.4	3.84	1200	37	33	3.9	1170	39	35.4	3.46	1050	36.6	36.6	2.93	1155	37.2	37.2	2.65	1200	33.2	33.2	2.12
70 (21.1)		19.1	17.6	2.37		27.6	25.4	3.61		32.8	29.8	3.81		38.5	34.4	4.15		41	37.2	3.71		34.8	34.8	2.88		36.8	36.8	2.78		33.2	33.2	2.25
75 (23.9)		19	17.5	2.46		27.6	25.4	3.78		32.2	29.4	4.18		36.8	32.8	4.25		38.5	35	3.79		36	36	3.22		36.6	36.6	2.93		32.4	32.4	2.36
27VNA036 Intermediate Demand																																
65 (18.3)	900	11.8	10.9	1.33	900	16.4	15.1	1.75	900	19.6	17.9	1.9	830	17.6	15.6	1.39	800	16.3	14.8	1.09	750	16.3	16.3	1	785	17.2	17.2	0.93	785	16.6	16.6	0.78
70 (21.1)		11.7	10.8	1.39		16.3	15	1.84		19.4	17.7	1.99		17.4	15.4	1.47		16.1	14.6	1.16		16.1	16.1	1.07		17	17	1		16.4	16.4	0.85
75 (23.9)		11.6	10.7	1.45		16.1	14.8	1.92		19.3	17.6	2.08		17.2	15.3	1.54		15.8	14.4	1.22		15.9	15.9	1.14		16.8	16.8	1.07		16.1	16.1	0.91
27VNA036 Minimum Demand																																
65 (18.3)	750	8.4	7.7	0.95	750	10.2	9.4	1.08	750	12.4	11.3	1.14	645	7.5	6.6	0.56	600	5.4	4.9	0.34	600	6.6	6.6	0.36	600	7.5	7.5	0.34	580	8.2	8.2	0.32
70 (21.1)		8.2	7.6	0.99		10	9.2	1.12		12.2	11.1	1.2		7.3	6.5	0.59		5.3	4.8	0.38		6.4	6.4	0.36		7.3	7.3	0.37		8	8	0.36
75 (23.9)		8.1	7.5	1.04		9.9	9.1	1.18		12.1	11	1.27		7.2	6.4	0.63		5.1	4.7	0.4		6.2	6.2	0.42		7.2	7.2	0.41		7.8	7.8	0.39

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

Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA048 Maximum Demand																																		
65 (18.3)	1450	22.2	20.4	2.58	1450	39	35.8	4.36	1450	46	42	4.81	1450	52.5	46.5	4.96	1420	55.5	50.5	4.76	1300	48.5	48.5	3.88	1450	47.5	47.5	3.41	1450	43	43	2.84
70 (21.1)		22	20.2	2.69		39	35.8	4.54		46	42	4.88		52	46.5	5.15		55	50	4.94		48.5	48.5	4.04		47	47	3.59		42.5	42.5	3.01
75 (23.9)		21.8	20.2	2.78		38.5	35.6	4.7		46	42	5.27		52	46	5.37		55.5	46.5	4.7		51	47	4.11		46.5	46.5	3.74		42	42	3.16
27VNA048 Intermediate Demand																																		
65 (18.3)	1150	17.7	16.3	1.98	1150	25.8	23.8	2.63	1150	31	28.2	2.89	1130	27.4	24.4	2.19	1200	24.8	22.6	1.76	965	23.8	23.8	1.59	1015	24.2	24.2	1.44	1015	23.4	23.4	1.24
70 (21.1)		17.5	16.1	2.07		25.6	23.6	2.74		30.6	28	3.01		27.2	24.2	2.3		24.6	22.4	1.86		23.4	23.4	1.68		24	24	1.54		23	23	1.33
75 (23.9)		17.4	16	2.16		25.4	23.4	2.86		30.4	27.8	3.14		27	24	2.43		24.4	22.2	1.96		23	23	1.77		23.6	23.6	1.62		22.8	22.8	1.43
27VNA048 Minimum Demand																																		
65 (18.3)	1000	15.3	14.1	1.71	1000	19.3	17.7	1.98	1000	23.4	21.2	2.16	860	15.1	13.4	1.13	800	10.1	9.1	0.62	800	11.5	11.5	0.65	800	12.6	12.6	0.64	800	13.6	13.6	0.61
70 (21.1)		15.2	14	1.8		19.1	17.6	2.07		23	21	2.25		14.8	13.2	1.2		9.9	9	0.67		11.4	11.4	0.68		12.4	12.4	0.69		13.4	13.4	0.67
75 (23.9)		15	13.8	1.88		18.9	17.4	2.18		22.8	20.8	2.35		14.6	13	1.27		9.7	8.8	0.71		11.1	11.1	0.76		12.2	12.2	0.74		13.2	13.2	0.72

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Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA060 Maximum Demand																																		
65 (18.3)	1530	32.6	30	3.62	1850	45.5	42	4.8	1850	55	50	5.37	1850	63.5	56	5.61	1850	65	59	5.84	1850	61.5	61.5	5.67	1850	56	56	4.37	1770	48.5	48.5	2.97
70 (21.1)		33.2	30.6	3.86		45.5	42	5.01		54.5	50	6.14		63	56	5.84		64.5	58.5	6.1		59	59	4.78		55.5	55.5	4.62		48	48	3.17
75 (23.9)		33	30.4	4.03		45.5	41.5	5.25		54.5	49.5	5.83		62.5	55.5	6.07		63.5	58	6.33		60	60	6.19		55	55	4.86		47	47	3.33
27VNA060 Intermediate Demand																																		
65 (18.3)	980	22	20.2	2.37	1080	29.6	27.2	2.85	1080	35.6	32.4	3.12	1080	32.4	28.8	2.34	1135	29	26.4	1.98	1080	28.2	28.2	1.96	1180	28.6	28.6	1.66	1165	27.4	27.4	1.26
70 (21.1)		21.6	19.9	2.47		29.4	27	2.99		35.2	32.2	3.26		32	28.4	2.46		28.6	26	2.1		27.8	27.8	2.09		28	28	1.77		27	27	1.37
75 (23.9)		21.4	19.7	2.59		29	26.6	3.12		34.8	31.8	3.4		31.6	28	2.59		28	25.6	2.21		27.4	27.4	2.22		27.6	27.6	1.9		26.4	26.4	1.48
27VNA060 Minimum Demand																																		
65 (18.3)	700	16.1	14.8	1.79	700	19.8	18.2	1.92	700	23.6	21.6	2.03	700	14.8	13.1	0.98	700	11.5	10.5	0.73	700	13.1	13.1	0.82	840	15.1	15.1	0.76	860	17.3	17.3	0.7
70 (21.1)		15.8	14.6	1.87		19.5	17.9	2.01		23.2	21.2	2.12		14.4	12.8	1.04		11.2	10.2	0.79		12	12	0.69		14.7	14.7	0.83		16.8	16.8	0.77
75 (23.9)		15.6	14.3	1.95		19.2	17.6	2.1		23	21	2.23		14.1	12.5	1.1		10.9	9.9	0.84		12.4	12.4	0.95		14.3	14.3	0.91		16.4	16.4	0.85

NOTES:

† The kW values include the compressor, outdoor fan motor, and indoor blower motor. The kW from supplement heaters should be added to these values to obtain Total Sys. kilowatts.

‡ The Btuh heating capacity values shown are net integrated values from which the defrost effect has been subtracted. The Btuh heating from supplement heaters should be added to those values to obtain Total Sys. capacity.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB — Entering Dry Bulb

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

Heat Pump Heating Performance - Comfort Mode

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			
27VNA024 Maximum Demand																																		
65 (18.3)		12.3	11.3	1.4		18.3	16.8	2.27		20.6	18.8	2.45		21.2	18.9	2.09		22.2	20.2	1.89		22.2	22.2	1.69		23.2	23.2	1.55		23.6	23.6	1.45
70 (21.1)	635	12.2	11.2	1.47	690	18.1	16.7	2.37	690	20.6	18.7	2.58	700	21.2	18.7	2.19	700	22	20	1.98	700	22	22	1.78	700	23	23	1.64	700	23.2	23.2	1.52
75 (23.9)		12.1	11.1	1.52		18.1	16.6	2.46		20.4	18.6	2.67		21	18.6	2.28		21.8	19.9	2.06		21.8	21.8	1.87		22.6	22.6	1.72		22.8	22.8	1.6
27VNA024 Intermediate Demand																																		
65 (18.3)		7.9	7.2	0.91		10.9	10	1.22		12.7	11.6	1.31		13.6	12.1	1.19		14.2	12.9	1.07		15.8	15.8	1.1		17.5	17.5	1.07		17.8	17.8	1
70 (21.1)	570	7.7	7.1	0.94	650	10.7	9.9	1.26	650	12.5	11.4	1.37	650	13.5	11.9	1.25	600	14.1	12.8	1.14	600	15.6	15.6	1.16	600	17.3	17.3	1.14	600	17.9	17.9	1.07
75 (23.9)		7.6	7	0.98		10.6	9.8	1.33		12.4	11.3	1.43		13.3	11.8	1.31		13.9	12.6	1.19		15.4	15.4	1.23		17.1	17.1	1.2		17.6	17.6	1.14
27VNA024 Minimum Demand																																		
65 (18.3)		5.7	5.2	0.67		6.9	6.4	0.79		8.3	7.5	0.85		9.8	8.7	0.84		10.1	9.2	0.73		12.3	12.3	0.82		14.5	14.5	0.87		15.6	15.6	0.86
70 (21.1)	500	5.6	5.1	0.71	500	6.8	6.3	0.83	500	8.1	7.4	0.89	500	9.6	8.6	0.88	500	10	9.1	0.77	500	12.1	12.1	0.87	500	14.3	14.3	0.92	500	15.3	15.3	0.91
75 (23.9)		5.4	5	0.73		6.7	6.2	0.87		8	7.3	0.93		9.5	8.4	0.93		9.9	9	0.82		11.9	11.9	0.92		14.1	14.1	0.98		15	15	0.96

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA036 Maximum Demand																																
65 (18.3)	975	18.4	17	2.14	975	27.4	25.2	3.49	985	31.8	29	3.85	1000	36.8	32.6	3.97	1000	38	34.8	3.42	1000	36	36	2.88	990	36.2	36.2	2.61	975	32.4	32.4	2.11
70 (21.1)		18.3	16.9	2.23		27.4	25.2	3.65		32.2	29.2	4.07		36.6	32.6	4.13		40	36.2	3.69		35.6	35.6	3.02		35.8	35.8	2.75		31.8	31.8	2.22
75 (23.9)		18.2	16.8	2.32		27.4	25.2	3.79		32	29.2	4.22		36.6	32.4	4.29		37.6	34.4	3.75		35.2	35.2	3.15		35.4	35.4	2.88		31.4	31.4	2.34
27VNA036 Intermediate Demand																																
65 (18.3)	650	11.4	10.5	1.29	650	15.9	14.7	1.73	650	19.1	17.4	1.9	650	22	19.6	1.91	650	23.6	21.6	1.82	670	24.6	24.6	1.8	700	26.2	26.2	1.74	700	24.8	24.8	1.5
70 (21.1)		15.8	14.5	1.68		15.8	14.5	1.81		18.9	17.3	1.99		21.8	19.4	2		23.8	21.8	1.93		24.4	24.4	1.9		26	26	1.84		24.4	24.4	1.59
75 (23.9)		15.6	14.4	1.75		21	19.3	2.04		21.2	19.4	2.11		21.6	19.3	2.08		23.2	21.2	2.01		24	24	2		25.6	25.6	1.93		24	24	1.67
27VNA036 Minimum Demand																																
65 (18.3)	550	8.1	7.5	0.93	550	9.9	9.1	1.06	550	12.1	11	1.15	550	14.3	12.7	1.15	550	16.7	15.2	1.21	550	19.1	19.1	1.37	550	21.2	21.2	1.39	550	20.8	20.8	1.26
70 (21.1)		8	7.4	0.98		9.8	9	1.11		12	10.9	1.21		14.1	12.6	1.21		16.5	15	1.28		18.9	18.9	1.44		21	21	1.48		20.4	20.4	1.33
75 (23.9)		7.8	7.2	1.01		9.7	8.9	1.17		11.8	10.8	1.27		14	12.4	1.27		16.3	14.8	1.35		18.6	18.6	1.51		20.6	20.6	1.55		20.2	20.2	1.42

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA048 Maximum Demand																														
65 (18.3)	1040	21.4	19.6	2.43	1200	38.5	35.4	4.31	1240	45.5	41.5	4.8	1340	52	46.5	4.92	1420	55.5	50.5	4.76	1300	48.5	48.5	3.88	1450	47.5	47.5	3.41	1450	43	43	2.84
70 (21.1)		21.2	19.4	2.55		38.5	35.2	4.51		45.5	41.5	5.01		52	46	5.15		55	50	4.94		48	48	4.07		47	47	3.59		42.5	42.5	3.01
75 (23.9)		21	19.3	2.63		38	35	4.68		45.5	41.5	5.25		51.5	46	5.35		55.5	46.5	4.7		51	47	4.11		46.5	46.5	3.74		42	42	3.16
27VNA048 Intermediate Demand																														
65 (18.3)	850	17.2	15.9	1.92	850	25.4	23.2	2.64	870	30.4	27.8	2.91	900	34.6	30.6	2.93	950	37.2	33.8	2.9	950	34.6	34.6	2.6	950	33.4	33.4	2.26	1000	31.2	31.2	1.9
70 (21.1)		17.1	15.7	2.02		25.2	23	2.76		30.2	27.4	3.05		34.2	30.4	3.06		36.8	33.6	3.05		34.2	34.2	2.74		33	33	2.38		31.4	31.4	2.04
75 (23.9)		16.9	15.5	2.1		25	23	2.88		29.8	27.2	3.16		34	30.2	3.19		36.6	33.2	3.19		33.8	33.8	2.86		32.6	32.6	2.5		30.8	30.8	2.15
27VNA048 Minimum Demand																														
65 (18.3)	800	15.1	13.9	1.69	800	19	17.5	1.97	800	23	21	2.16	800	26.4	23.4	2.19	800	29.4	26.8	2.26	800	27.2	27.2	1.96	800	27.2	27.2	1.76	800	25.8	25.8	1.49
70 (21.1)		14.9	13.7	1.76		18.8	17.3	2.07		22.8	20.8	2.27		26	23.2	2.28		29	26.4	2.36		26.8	26.8	2.07		26.8	26.8	1.86		25.4	25.4	1.58
75 (23.9)		14.7	13.5	1.84		18.6	17.1	2.16		22.4	20.4	2.36		25.8	22.8	2.39		28.8	26.2	2.48		26.4	26.4	2.17		26.4	26.4	1.96		25	25	1.69

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA060 Maximum Demand																																		
65 (18.3)	1040	32.8	30.2	3.73	1240	44.5	41	4.76	1440	54	49	5.35	1620	62.5	55.5	5.55	1650	64	58.5	5.79	1690	60.5	60.5	5.61	1520	55	55	4.33	1200	46.5	46.5	2.98
70 (21.1)		32.6	30	3.92		44.5	40.5	5.02		53.5	49	5.56		62	55	5.79		63.5	58	6.04		60	60	5.9		54	54	4.55		45.5	45.5	3.13
75 (23.9)		32.4	29.8	4.06		44	40.5	5.16		53.5	48.5	5.81		61.5	54.5	6.05		63	57.5	6.32		59	59	6.13		53.5	53.5	4.78		45	45	3.33
27VNA060 Median Demand																																		
65 (18.3)	810	21.8	20	2.4	880	29.4	27	2.93	945	35.4	32.2	3.18	1010	40.5	36	3.23	1020	40	36.4	3.19	1030	37.2	37.2	2.96	970	33.6	33.6	2.23	870	29.4	29.4	1.52
70 (21.1)		21.4	19.8	2.51		29	26.8	3.06		35	32	3.33		40	35.6	3.37		39.5	36	3.35		36.6	36.6	3.14		33.2	33.2	2.37		28.8	28.8	1.64
75 (23.9)		21.2	19.5	2.61		28.8	26.4	3.2		34.6	31.6	3.47		39.5	35.2	3.51		39	35.4	3.51		36	36	3.28		32.6	32.6	2.51		28.2	28.2	1.74
27VNA060 Minimum Demand																																		
65 (18.3)	700	16.1	14.8	1.79	700	19.8	18.2	1.92	700	23.6	21.6	2.03	700	27.2	24.2	2.07	700	27.4	25	2.09	700	25	25	1.89	700	23.4	23.4	1.44	700	21.2	21.2	1
70 (21.1)		15.8	14.6	1.87		19.5	17.9	2.01		23.2	21.2	2.12		27	24	2.19		27	24.6	2.2		24.6	24.6	2		22.8	22.8	1.53		20.6	20.6	1.08
75 (23.9)		15.6	14.3	1.95		19.2	17.6	2.1		23	21	2.23		26.6	23.6	2.28		26.6	24.2	2.32		24.2	24.2	2.11		22.4	22.4	1.63		20.2	20.2	1.17

NOTES:
** The kW values include the compressor, outdoor fan motor, and indoor blower motor. The kW from supplement heaters should be added to these values to obtain Total Sys. kilowatts.
‡ The Btuh heating capacity values shown are net integrated values from which the defrost effect has been subtracted. The Btuh heating from supplement heaters should be added to those values to obtain Total Sys. capacity.
NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.
EDB — Entering Dry Bulb

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

Guide specifications
General

AIR-COOLED, SPLIT-SYSTEM HEAT PUMP
27VNA0
2 TO 5 NOMINAL TONS

System Description

Outdoor-mounted, air-cooled, split-system heat pump unit suitable for ground or rooftop installation. Unit consists of a hermetic compressor, an air-cooled coil, forward-swept blade propeller-type condenser fan, and a control box. Unit will discharge supply air upward as shown on contract drawings. Unit will be used in a refrigeration circuit to match up to a packaged fan coil or coil unit.

Quality Assurance

- Unit will be rated in accordance with the latest edition of AHRI Standard 240.
- Unit will be certified for capacity and efficiency, and listed in the latest AHRI directory.
- Unit construction will comply with latest edition of ASHRAE and with NEC.
- Unit will be constructed in accordance with UL standards and will carry the UL label of approval. Unit will have C-UL approval.
- Unit cabinet will be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 500-hr salt spray test.
- Air-cooled condenser coils are pressure tested and the outdoor units are leak tested.
- Unit constructed in ISO9001 approved facility.

Delivery, Storage, and Handling

- Unit will be shipped as single package only and is stored and handled per unit manufacturer's recommendations.

Warranty (for inclusion by specifying engineer)

- U.S. and Canada only.

PRODUCTS

Equipment

- Factory-assembled, single-piece, air-cooled heat pump. Contained within the unit enclosure is all factory wiring, piping, controls, compressor, refrigerant charge Puron Advance™ (R-454B) refrigerant, and special features required prior to field start-up.

Unit Cabinet

- Unit cabinet will be constructed of galvanized steel, bonderized, and coated with a powder coat paint.

Fans

- Condenser fan will be direct-drive propeller type, forward swept blade, discharging air upward.
- Condenser fan motors will be totally enclosed, 1-phase type with class B insulation and permanently lubricated.
- Fan blades will be statically and dynamically balanced.
- Condenser fan openings will be equipped with coated steel wire safety guards.

Compressor

- Compressor will be hermetically sealed.
- Compressor will be mounted on rubber vibration isolators.
- Compressor will be covered with a sound absorbing blanket.

Condenser Coil

- Condenser coil will be air cooled.
- Coil will be constructed of aluminum fins mechanically bonded to copper or aluminum tubes which are then cleaned, dehydrated, and sealed.

Refrigeration Components

- Refrigeration circuit components will include liquid-line and vapor line front-seating shutoff valve with provisions for sweat or mechanical connections, system charge of Puron Advance™ (R-454B) refrigerant, PVE compressor oil, accumulator, electronic expansion valve, reversing valve, and pressure equalization valve.
- Unit will be equipped with high-pressure switch, suction and discharge pressure transducers, and filter drier for Puron Advance™ (R-454B) refrigerant.

Operating Characteristics

- The capacity of the unit will meet or exceed _____ Btuh at a suction temperature of _____ °F (°C). The power consumption at full load will not exceed _____ kW.
- Combination of the unit and the evaporator or fan coil unit will have a total net cooling capacity of _____ Btuh or greater at conditions of _____ CFM entering air temperature at the evaporator at _____ °F (°C) wet bulb and _____ °F (°C) dry bulb, and air entering the unit at _____ °F (°C).
- The system will have a SEER2 of _____ Btuh/watt or greater at DOE conditions.

Electrical Requirements

- Nominal unit electrical characteristics will be _____ v, single phase, 60 hz. The unit will be capable of satisfactory operation within voltage limits of _____ v to _____ v.
- Unit electrical power will be single point connection.
- Control circuit will be 24v.

Special Features

- Refer to section of this literature identifying accessories and descriptions for specific features and available enhancements.
- Infinity® System Control with appropriate software version is required for full featured operation.

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

System Design Summary

1. System must be installed with factory approved R454B Indoor unit only.
2. Factory authorized dissipation control board must be installed with indoor unit.
3. Must use Infinity® System Control listed in pre-sale literature only
4. Intended for outdoor installation with free air inlet and outlet. Outdoor fan external static pressure available is less than 0.01-in. wc.
5. This product is qualified for low ambient cooling operation (below 55°F / 12.8°C) with an Infinity® System Control **ONLY**.
6. The maximum outdoor operating ambient in cooling mode is 125°F (51.7°C).
7. Minimum outdoor operating air temperature for heating mode is –11°F (–23.9°C).
8. For reliable operation, unit should be level in all horizontal planes.
9. For interconnecting refrigerant tube lengths greater than 80 ft (23.4 m) and/or elevation differences between indoor and outdoor units greater than 20 ft (6.1 m), consult Residential Piping and Long Line Guideline and Service Manual available from equipment distributor.
10. If any refrigerant tubing is buried, provide a 6 in. (152.4 mm) vertical rise to the valve connections at the unit. Refrigerant tubing lengths up to 36 in. (914.4 mm) may be buried without further consideration. Do not bury refrigerant lines longer than 36 in. (914.4 mm).
11. Use only copper wire for electrical connection at unit. Aluminum and clad aluminum are not acceptable for the type of connector provided.
12. Do not apply capillary tube indoor coils to these units.
13. Factory-supplied filter drier must be installed.

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Replaces: New

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27VNA0 Infinity®
Variable Speed Heat Pump
with Greenspeed® Intelligence
and Puron Advance™ (R-454B) Refrigerant
2 to 5 Nominal Tons

Carrier

Turn to the experts

Installation Instructions

NOTE: Read the entire instruction manual before starting the installation.
Unit **MUST** be installed with rated R-454B indoor with factory approved dissipation control board installed.

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SAFETY CONSIDERATIONS

This appliance shall only be installed by EPA qualified personnel and have Section 608 Technician Certification. This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

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 dry powder or CO_2 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 and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Proper tools should be used that are designed for the refrigerant of the unit being installed. For A2L refrigerants, non-sparking tools are required. A refrigerant detector should be used prior to and during the installation process to check for leaks. Open flames or other ignition sources should not be present except during brazing. Brazing should only take place on refrigerant tubes that are open to the atmosphere or have been properly evacuated.

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; WARNING, and CAUTION. These words are used with the safety-alert symbol. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which would 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

EXPLOSION HAZARD

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

Never use air or any gas containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion. Never allow compressor suction pressure to operate in a vacuum with service valves closed. See service manual for pump-down instructions.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example:

open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants do not contain an odor.

⚠ WARNING

ELECTRICAL HAZARD - HIGH VOLTAGE!

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

Electrical components may hold charge. D**O NOT** remove control box cover for 2 minutes after power has been removed from unit.

PRIOR TO TOUCHING ELECTRICAL COMPONENTS:

Verify zero (0) voltage at VFD connections shown on control box cover.

VFD Cover

IMPORTANT: The VFD cover should NEVER be removed because VFD components are not serviceable. The VFD can be removed from unit with cover installed.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

Puron Advance™ (R-454B) refrigerant systems operate at higher pressures than standard R-22 and similar pressures to R-410A systems. Do not use R-22 or R-410A service equipment or components on Puron Advance™ (R-454B) refrigerant equipment.

Indoor Thermostat Control Options

Model	Infinity® Control
27VNA0	Yes*

*.Requires latest infinity® System Control software version

General

Acronyms used in this publication

Acronym	Description
PCM	Primary Control Module
VFD	Variable Frequency Drive
DPT	Discharge Pressure Transducer
SPT	Suction Pressure Transducer
ODT	Outdoor Discharge Line Temperature
OST	Outdoor Suction Temperature
OCT	Outdoor Coil Temperature
LLT	Liquid Line Temperature
OAT	Outdoor Air Temperature
PEV	Pressure Equalization Valve
RVS	Reversing Valve
CCN	Carrier Communication Network
EXV-H	Heating Electronic Expansion Valve

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. This unit is intended to be installed in a location that is 10,000 feet (3000 meters) above sea level or lower.
2. Locate unit away from windows, patios, decks, etc. where unit operation sound may disturb customer.
3. Variable speed units have a wide airflow range. Consider ductwork limitations at both high and low airflows.
4. In noise sensitive applications (such as bedrooms), when a lineset is mounted to ceiling joists or floor joists, the outdoor unit must be located at least 10 ft (3.05 m) away. If this is not possible, create a line set configuration with enough bends to provide 10 ft (3.05 m) of total line set length outside the dwelling.
5. Ensure that vapor and liquid tube diameters are appropriate for unit capacity (see Table 1).
6. Run refrigerant tubes with no bends with centerline bend radius less than 2.5 times the external pipe diameter.
7. Leave some slack between structure and unit to absorb vibration.
8. When passing refrigerant tubes through the wall, seal opening with RTV or other pliable silicon-based caulk (see Fig. 1).
9. Avoid direct tubing contact with water pipes, duct work, floor joists, wall studs, floors, and walls.
10. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing (see Fig. 1).
11. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
12. When necessary, use hanger straps which are 1 in. (25 mm) wide and conform to shape of tubing insulation. (See Fig. 1)
13. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.
14. Provision shall be made for expansion and contraction of long runs of piping.
15. Piping and fittings shall be protected as far as possible against adverse environmental effects. For example, the accumulation of dirt and debris.
16. Piping should be installed to reduce the likelihood of hydraulic shock damaging the system.
17. Certified piping and components must be used in order to protect against corrosion.
18. Flexible pipe elements shall be protected against mechanical damage, excessive stress by torsion, or other forces. They should be checked for mechanical damage annually.
19. Piping material, routing, and installation shall be include protection from physical damage in operation and service, and be in compliance with the national and local codes and standards of the installation site.
20. When setting up refrigerant piping, precautions shall be taken to avoid excessive vibration or pulsation.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

If proper lineset routing techniques are not followed, variable speed systems can be susceptible to lineset transmitted noise inside the dwelling and, in extreme cases, tubing breakage.

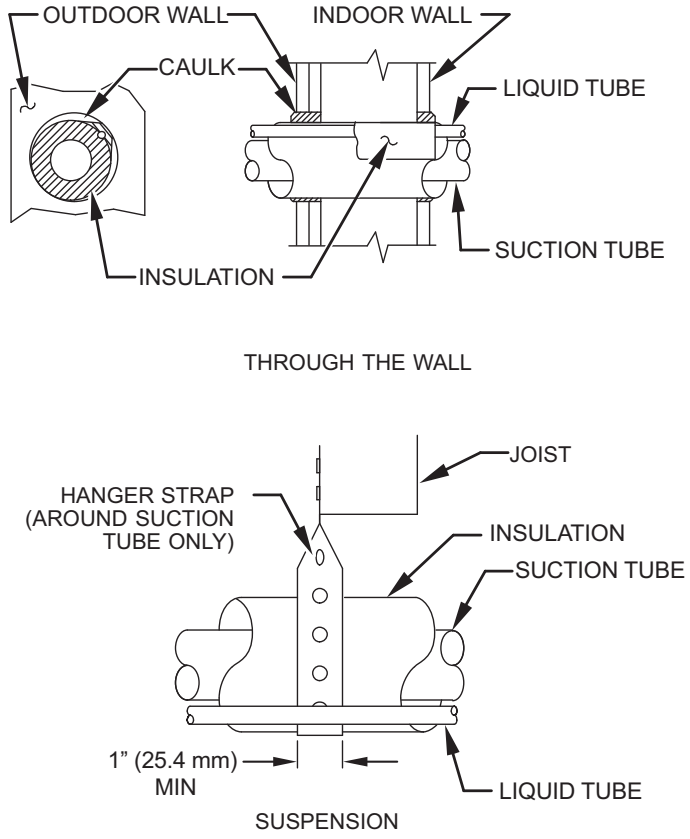

Fig. 1 – Connecting Tubing Installation

The outdoor unit contains the correct amount of refrigerant charge for operation with AHRI rated and factory-approved smallest indoor unit when connected by 15 ft (4.57 m) of field-supplied or factory accessory tubing.

Adjust refrigerant charge by adding or removing the charge to/from the unit depending on lineset length and indoor unit as calculated and displayed on the Infinity® System Control. The Infinity® System Control calculates required charge adjustment and total system charge required. For proper unit operation, check refrigerant charge using charging information in the Startup & Charge section of this instruction.

IMPORTANT: Liquid-line size is 3/8-in. OD for all 27VNA0 applications including long line applications. Refer to Residential Piping and Long Line Guideline for further information.

IMPORTANT: Always install the factory-supplied liquid-line filter drier. Obtain replacement filter driers from your distributor or branch.

Installation

IMPORTANT: All split system and packaged heat pumps must be installed pursuant to applicable regional efficiency standards issued by the Department of Energy.

Specifications for this unit in residential new construction market require the outdoor unit, indoor unit (including metering device), refrigerant tubing sets, and filter drier, and muffler listed in pre-sale literature. There can be no deviation. Consult the Application Guideline and Service Manual - Air Conditioners and Heat Pumps using Puron Advance™ (R-454B) Refrigerant.

Step 1 – Check Equipment and Job Site

Unpack Unit

Move to final location. Remove carton taking care not to damage unit.

This unit employs louver spacers on each of the four sides to prevent louver movement during operation. The louver spacers are installed between the coil surface and louver at the approximate center of each side (See Fig. 2). This louver spacer should be present and, if dislodged during shipment, must be reinstalled before unit is placed into operation.

NOTE: 2 Ton units use only two louver spacers on the sides opposite the control box.

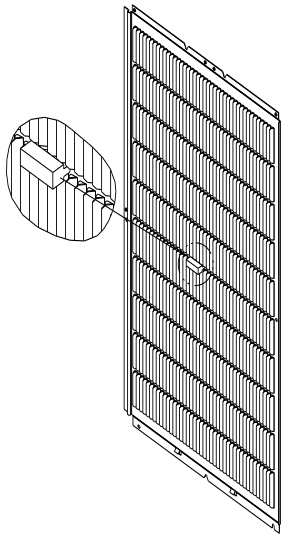

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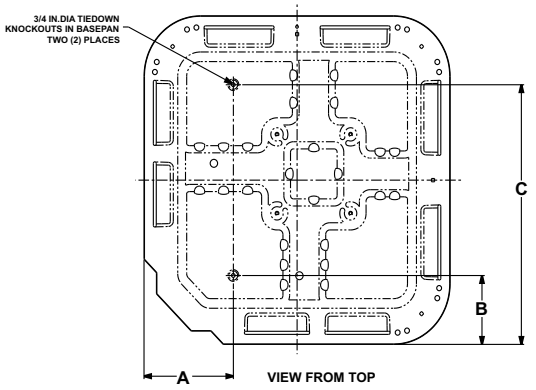
Fig. 2 – Louver Spacer Location

Inspect Equipment

File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit corner panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2 – Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tie down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 3 to determine base pan size and knockout hole location.



UNIT SIZE	UNIT BASE PAN Dimension in. (mm)	TIEDOWN KNOCKOUT LOCATIONS in. (mm)		
		A	B	C
2 Ton	23 X 23 (584 X 584)	7-13/16 (198)	4-7/16 (113)	18–1/8 (460)
3 Ton	31.2 X 31.2 (792 X 792)	9–1/8 (231.8)	6–9/16 (166.7)	28–7/16 (722.3)
4 & 5 Ton	35 X 35 (889 X 889)	9–1/8 (231.8)	6–9/16 (166.7)	28–7/16 (722.3)

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Fig. 3 – Tie-down Knockout Locations

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

On rooftop applications, mount on level platform or frame. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

Roof mounted units exposed to winds above 5 mph may require wind baffles. Consult the Service Manual - Residential Split System Air Conditioners and Heat Pumps Using Puron Advance™ (R-454B) Refrigerant for wind baffle construction.

NOTE: Unit must be level to within ±2° (±3/8 in./ft, ±9.5 mm/m.) per compressor manufacturer specifications.

Step 3 – Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 24 in. (609.6 mm) clearance to service end of unit and 48 in. (1219.2 mm) above unit. For proper airflow, a 6-in. (152.4 mm) clearance on 1 side of unit and 12-in. (304.8 mm) on all remaining sides must be maintained. Maintain a distance of 24 in. (609.6 mm) between units. Position so water, snow, or ice from roof or leaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. (152.4 mm) above roof surface.

Step 4 – Operating Ambient

The minimum outdoor operating ambient in cooling mode is 55°F (12.78°C) without low ambient cooling enabled in the Infinity® System Control.

The minimum outdoor operating ambient in heating mode is -11°F (-23.9°C).

Step 5 – Elevate Unit

Elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit.

⚠ CAUTION

UNIT OPERATION HAZARD

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

Do not allow water and/or ice to build up in base pan.

⚠ CAUTION

UNIT OPERATION HAZARD

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

Locate the unit in such a way that it is stable in all circumstances including adverse weather conditions.

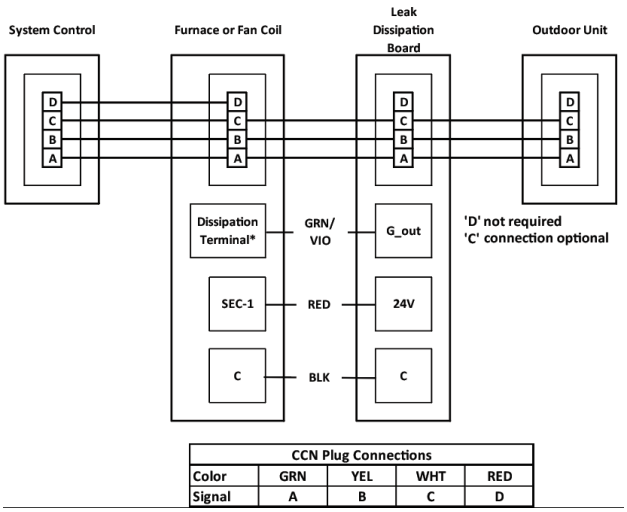

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Fig. 4 – Infinity® Furnace or Fan Coil Wiring with Communicating Variable Speed HP

Step 6 – Make Piping Connections

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

Relieve pressure and recover all refrigerant before system repair or final unit disposal. Use all service ports and open all flow-control devices, including solenoid valves.

Federal regulations require that refrigerant is not vented into the atmosphere. Recover during system repair or final unit disposal.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Do not leave system open to atmosphere any longer than minimum required for installation. PVE oil in compressor is extremely susceptible to moisture absorption. Always keep ends of tubing sealed during installation.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

If ANY refrigerant tubing is buried, provide a 6 in. (152.4 mm) vertical rise at service valve. Refrigerant tubing lengths up to 36 in. (914.4 mm) may be buried without further special consideration. Do not bury lines longer than 36 in. (914.4 mm).

Outdoor units may be connected to indoor section using accessory tubing package or field-supplied refrigerant grade tubing of correct size and condition. Federal regulations require that refrigerant is not vented into the atmosphere. Recover during system repair or final unit disposal. For tubing requirements beyond 80 ft. (24.38 m), substantial capacity and performance losses can occur. Follow the pipe sizing recommendations in the 27VNA0Product Data to manage these losses.

Refer to Table 1 for field tubing diameters. Refer to the Product Data for accessory requirements.

Refrigerant pipe should be installed with the minimum length possible and practical for the application. Piping should be protected from physical damage in operation and in service and be in compliance with national and local codes such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. When piping is installed through studs in a wall, steel plates should be used for protection with a minimum thickness of 16 gauge.

All field joints shall be accessible for inspection prior to being covered or enclosed.

Table 1 – Refrigerant Connections and Recommended Liquid and Vapor Tube Diameters (in.)

UNIT SIZE	LIQUID		VAPOR*		
	Connection Diameter	Tube Diameter	Connection Diameter	Max (Rated) Diameter	Minimum Tube Diameter
27VNA024	3/8	3/8	3/4	3/4	5/8
27VNA036	3/8	3/8	7/8	7/8	5/8
27VNA048	3/8	3/8	7/8	1-1/8† (7/8)	3/4
27VNA060	3/8	3/8	7/8	1-1/8†	3/4

*.Units are rated with 25 ft. (7.6 m) of lineset. See Product Data sheet for performance data when using different size and length line sets.
†.Required maximum diameter for applications using greater than 25 ft. (7.6 m) of lineset is 7/8 in.

Notes:
1.Do not apply capillary tube indoor coils to these units.

Outdoor Unit Connected to Factory-Approved R-454B Indoor Unit

When outdoor unit is connected to factory-approved R-454B indoor unit, the outdoor unit contains correct system refrigerant charge for operation with smallest factory-approved, AHRI-rated indoor unit when connected by 15 ft. (4.57 m) of field-supplied or factory-accessory tubing, and factory-supplied filter drier. Check refrigerant charge for maximum efficiency.

NOTE: If the indoor furnace coil width is more than the furnace casing width, refer to the indoor coil Installation Instructions for transition requirements.

Mechanical Line Set Connections

If using mechanical or crimp-type line set connections, follow crimp tool manufacturer's instructions.

NOTE: Should the use of mechanical fittings cause failure of the fittings or failure of the equipment, such would not be covered under the standard warranty.

Install Liquid-Line Filter Drier - Indoor

Refer to Fig. 5 and install filter drier as follows:

1. Braze 5-in. (127 mm) liquid tube to the indoor coil.
2. Wrap filter drier with damp cloth.
3. Braze filter drier to above 5-in. (127 mm) liquid tube.
4. Connect and braze liquid refrigerant tube to the filter drier.

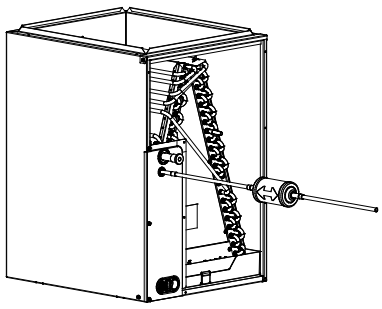
⚠ CAUTION

UNIT DAMAGE HAZARD

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

Installation of filter drier in liquid line is required.

Filter drier must be wrapped in a heat-sinking material such as a wet cloth while brazing



A05227

Fig. 5 – Liquid-Line Filter Drier

Refrigerant Tubing Connection - Outdoor

Connect vapor tube to fitting on outdoor unit vapor service valves (see Table 1).

No Installation of Adapter Tube

Although it is a heat pump this unit has a standard AC liquid service valve. An EXV inside the unit serves as the heating expansion device.

Sweat Connections

⚠ CAUTION

UNIT DAMAGE HAZARD

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

- Use a brazing shield
- Wrap service valves with wet cloth or heat sink material.

⚠ WARNING

FIRE HAZARD

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

Refrigerant and oil mixture could ignite and burn as it escapes and contacts brazing torch. Make sure the refrigerant charge is properly removed from both the high and low sides of the system before brazing any component or lines.

⚠ CAUTION

BURN HAZARD

Failure to follow this caution may result in personal injury.

Components will be HOT after brazing. Wear appropriate personal protective equipment and allow to cool before handling parts and equipment.

Use refrigerant grade tubing. Service valves are closed from factory and ready for brazing. Clean line set tube ends with emery cloth or steel brush. Remove any grit or debris.

Insert line set tube ends into service valve tube stubs.

Apply heat absorbing paste or heat sink product between service valve and joint. Wrap service valves with a heat sinking material such as a wet cloth.

Braze joints using a Sil-Fos or Phos-copper alloy. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

Pressure Test Tubing and Indoor Coil

Refrigerant tubes and indoor coil should be pressure tested with an inert gas such as nitrogen. Pressurize the system with the inert gas to the Low Side Test Pressure listed on the outdoor unit rating plate

⚠ WARNING

EXPLOSION HAZARD

Failure to follow this warning could result in equipment damage or improper operation

Never exceed the test pressures listed on the rating plate when pressure testing an outdoor unit.

Evacuate Refrigerant Tubing and Indoor Coil

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used. See Service Manual for triple evacuation method. Always break a vacuum with dry an inert gas prior to opening the refrigerant system for servicing.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gauge capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 6)

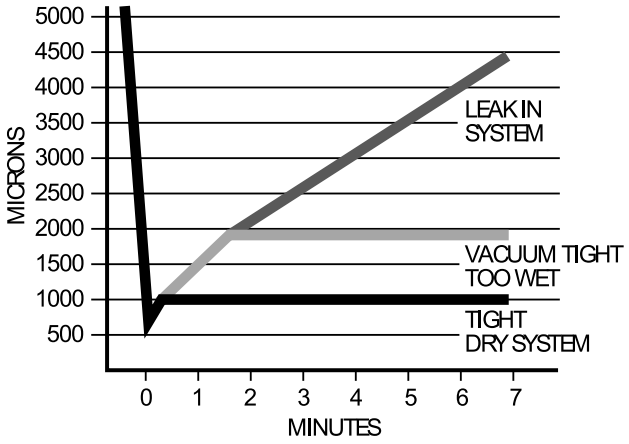


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Fig. 6 – Deep Vacuum Graph

Mandatory Requirements

Pressure Proof Check

Refrigerant tubes and indoor coil should be pressure tested with an inert gas such as nitrogen. Pressurize the system with the inert gas to the Low Side Test Pressure listed on the outdoor unit rating plate

1. Perform a pressure check of the unit with an inert gas charge of about 200 psi, not to exceed the Low Side Test Pressure.
2. The holding charge must NOT decrease in pressure for 1 hour, as indicated by the test gauge. The measuring test gauge resolution not exceeding 5% of the holding charge.

Leak Check

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gauge capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. A tight dry system will hold a vacuum of 1000 microns after approximately 7 minutes (See Fig. 6).

⚠ WARNING

FIRE HAZARD

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

DO NOT USE FLAMES OR IGNITION SOURCES TO LEAK CHECK.

Vacuum unit to 500 microns. When isolating the unit from the pump, the pressure shall not rise above 1500 microns in 10 minutes.

Final Tubing Check

IMPORTANT: Check to be certain factory tubing on both indoor and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to feeder tubes, making sure wire ties on feeder tubes are secure and tight.

Step 7 – Make Electrical Connections

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect of adequate size per NEC to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

Route Ground and Power Wires

Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box.

⚠ WARNING

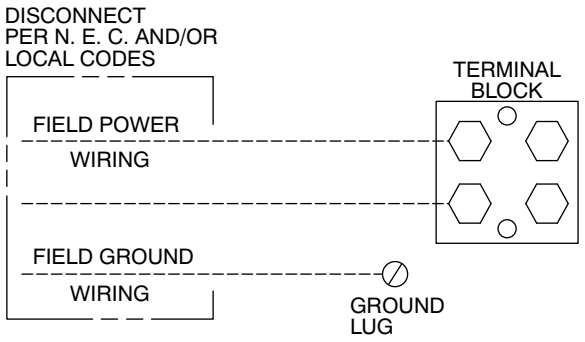
ELECTRICAL SHOCK HAZARD

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

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.

Connect Ground and Power Wires

This appliance incorporates an earth connection for safety purposes only. Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 7.



A14028

Fig. 7 – Line Power Connections

Connect Control Wiring

This appliance incorporates an earth connection for safety purposes only. Connect to Infinity® connections. Only two wires (AB) to Infinity® capable indoor unit (furnace or fan coil) is required. Typical 4 wire (ABCD) may be connected (see Fig. 4). C connection is not required but may be beneficial in certain installations that are experiencing communications issues.

IMPORTANT: This system requires the outdoor unit and the indoor unit to have power supplied in order for the Infinity® System Control to communicate with the outdoor unit.

General Information

Use No. 18 AWG or larger color-coded, insulated (35°C minimum) wire for low voltage control wires.

All wiring must be NEC Class 2 and must be separated from incoming power leads.

Use furnace transformer, fan coil transformer, or accessory transformer for control power requirement of system accessories external to the OD unit. The outdoor unit has its own transformer power.

Installations using greater than 200 feet of low voltage wiring should consult the Infinity® System Control manual for additional guidelines regarding daisy chaining wiring method and terminating resistors. Never route control wiring in parallel to high voltage power wires when possible as electrical noise may transfer and generate nuisance fault codes. Where low voltage control and high voltage wires must cross paths, do so at perpendicular angles to eliminate transferred noise.

If further communication issues exist, consider using shielded low voltage wires and only connect shielding to C terminal at end nearest indoor coil.

Final Wiring Check

IMPORTANT: Check factory wiring and field wire connections to ensure terminations are secured properly. Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

Step 8 – Compressor Stator Heat

This unit has an internal stator heating function that will be energized during the off cycle. Furnish power to the unit a minimum of 24 hours before starting the unit for the first time.

The internal stator heating function is intelligently demanded by the system to prevent the compressor from being the coldest part of the system and, thus, enhancing the reliability. The stator heat will function as needed any time the outdoor unit is powered. The indoor unit and Infinity® System Control do not need to be installed for the stator heat to operate properly.

Step 9 – Install Accessories

There are no refrigeration circuit or electrical accessories required or available for installation within the unit. External to the unit, the same accessories such as the support feet, snow rack, wind baffle etc., are available on other Carrier units can also be used on this line of product. Refer to the individual Installation Instructions packaged with kits or accessories when installing.

⚠ WARNING

PERSONAL INJURY AND/OR PROPERTY DAMAGE HAZARD

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

For continued performance, reliability, and safety, the only approved accessories and replacement parts are those specified by the equipment manufacturer. The use of non-manufacturer approved parts and accessories could invalidate the equipment limited warranty and result in fire risk, equipment malfunction, and failure.

Please review the manufacturer's literature and replacement parts catalogs available from your equipment supplier.

Step 10 – Start-Up & Charging

⚠ CAUTION

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this caution may result in minor personal injury, equipment damage or improper operation.

Observe the following:

1. Do not overcharge system with refrigerant.
2. Do not operate unit in a vacuum or at negative pressure.
3. Do not disable low pressure transducer or system safety devices such as discharge line thermistor or the high pressure switch.
4. Dome temperatures may be hot.
5. Discharge line thermistor is engaged tight on the discharge tube.

⚠ CAUTION

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:

– Service valves are equipped with Schrader valves.

⚠ CAUTION

ENVIRONMENTAL HAZARD

Failure to follow this caution may result in environmental damage.

Federal regulations require that you do not vent refrigerant to the atmosphere. Recover during system repair or final unit disposal.

⚠ WARNING

PERSONAL INJURY HAZARD

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

Do not use power tools to open and close service valves.

Power tools can cause valve stem to suddenly be ejected from the valve body followed by a high pressure refrigerant leak.

Factory charge amount and desired subcooling are shown in the Infinity® System Control. To properly check or adjust charge, conditions must be favorable for subcooling charging in cooling mode. Favorable conditions exist when the outdoor temperature is between 65°F (18°C) and 105°F (40.6°C) and the indoor temperature is between 65°F (18°C) and 80°F (26.7°C). If the temperatures are outside of these ranges, weigh in charge only. When the temperatures are in the desired range, you may return to the installation site and verify the subcooling to confirm system charge level..

Unit is factory charged for 15ft (4.57 m) of lineset and for smallest internal volume AHRI-rated indoor coil combinations. If any refrigerant charge adjustment is required based on the selected indoor coil combination, lineset dimensions, environment, and outdoor unit coil material, the Infinity® System Control will calculate and display the target subcooling and the amount of additional charge to be added. Therefore the Infinity® System Control is the source of information for charging the system correctly and is critical to accurately input system configuration parameters to ensure proper system operation. Perform a final charge check only when in cooling and OD is between 65°F (18°C) and 105°F (40.6°C).

Table 2 can be used as a guideline for determining which environment to select during system configuration setup.

Table 2 – Environment Type Guideline

Average Annual Relative Humidity (%)	Type
<45	Arid
45 - 65	Semi-Arid
65+	Humid

NOTE: Infinity® System Control indicates acceptable conditions for subcool charging mode. Do not use subcooling charge method if outside 65°F (18°C) and 105°F(40.6°C) outdoor temperature. Subcool charging mode will not be available if conditions are not acceptable.

Nominal subcooling targets are found in Table 3 for use as reference or in specific applications with 25 ft. (7.6 m) lineset, 95°F outdoor ambient, and 80°F/67°F indoor DB/WB.

Table 3 – Standard Subcooling Values

Model Number	Subcooling Value
27VNA024	14
27VNA036	12
27VNA048	5
27VNA060	7

Setup for Infinity® Control Furnace or FE Fan Coil (communicating)

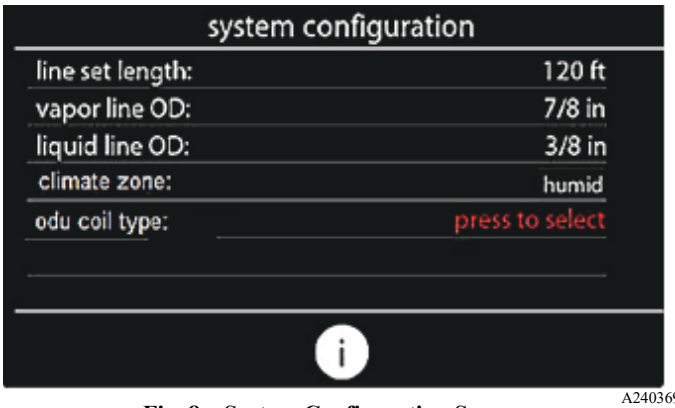
This system can only be installed with Infinity®-capable indoor and Infinity® System Control using the latest software version. When using an Infinity® Control, airflow is automatically selected based on equipment size. The user has the option of selecting Comfort, Efficiency and Max airflow for Heating and/or Cooling modes. These should be selected based on balance between the home owner's comfort and energy consumption expectations. Efficiency airflow is used to meet published AHRI performance ratings. See Infinity® System Control Installation Instructions for additional available adjustments.

Due to using a communicating control with the fan coil or the furnace, dip switch adjustments are not necessary. The outdoor unit configuration and the indoor airflows are determined by communicating control setup.

Verify that the PCM, VFD and Infinity® System Control are the latest software before proceeding with the next steps.

Follow these steps to properly start up the system

1. After system is evacuated, close the disconnects to energize indoor unit, outdoor unit, and Infinity® System Control. Do not attempt to operate the system in heating or cooling mode at this time. Mode: OFF. Vapor and liquid line service valves should be fully closed.
2. If the outdoor ambient temperature is between 65°F and 105°F and the indoor temperature is between 65°F and 80°F then the system may be charged using the subcooling method. At this time fully open the liquid and vapor service valves if the subcooling method is to be used.
3. The Infinity® System Control will proceed through a series of setup screens. Follow these setup screens to correctly configure the indoor unit, lineset configuration, climate zone, and outdoor unit coil material (Fig. 8). Selecting a line in the system configuration screen will take the user to the respective selection screen for the line item (Fig. 9 and Fig. 10). "Press to select" in red letters indicates the line must be pressed and the odu material type chosen before learning can continue.



A240369

Fig. 8 – System Configuration Screen

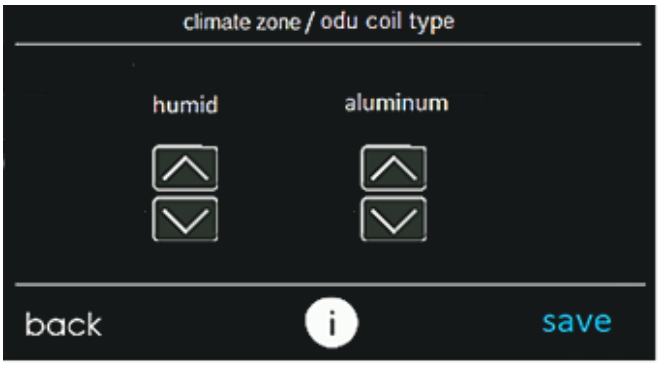


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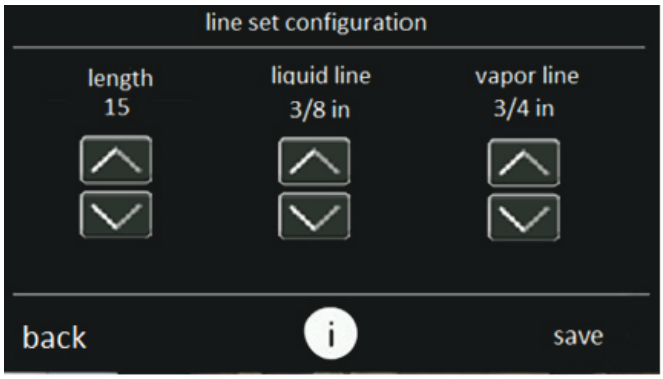
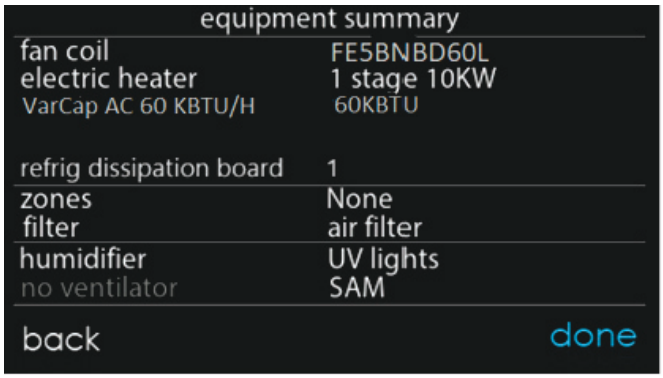
Fig. 9 – Select Environment and Material



A240350

Fig. 10 – Select Lineset

4. The Infinity® System Control will then advance through the remaining learning processes including the setup of accessories such as filter type, UV light, and humidifier. Upon completion of the setup screens, the equipment summary screen will be presented (Fig. 11). Verify the correct equipment is shown on this screen. Next an airflow verification test is executed before returning to the main screen.
5. Navigate to the "Installation and Service menu" by performing a long press on the service icon from the main screen (see Fig. 12). Once in the "Installation and Service" menu, select "Refrigerant Charging" (see Fig. 13).



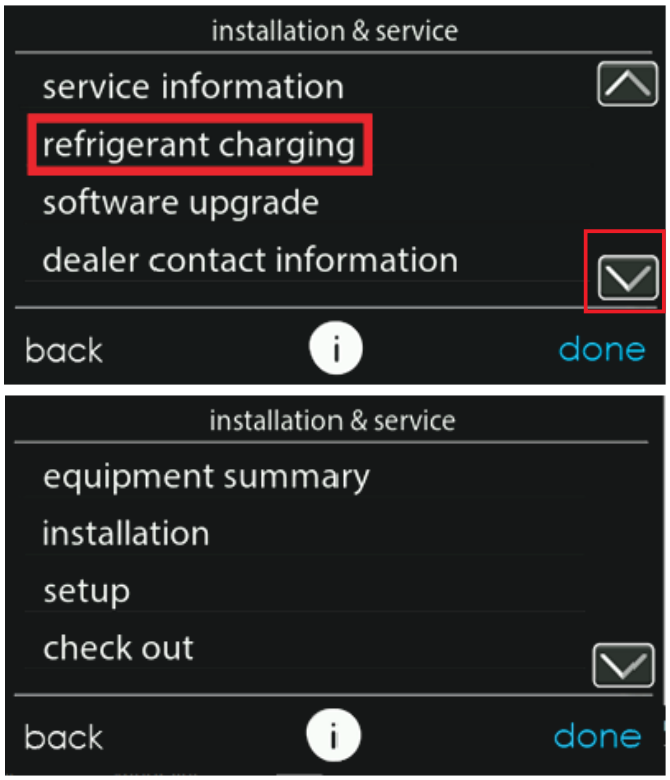
A240344

Fig. 11 – Equipment Summary Screen

NOTE: A leak dissipation board must be present for the Infinity® System Control to allow unit operation.

A200029

Fig. 12 – Entering Installation and Service Menu

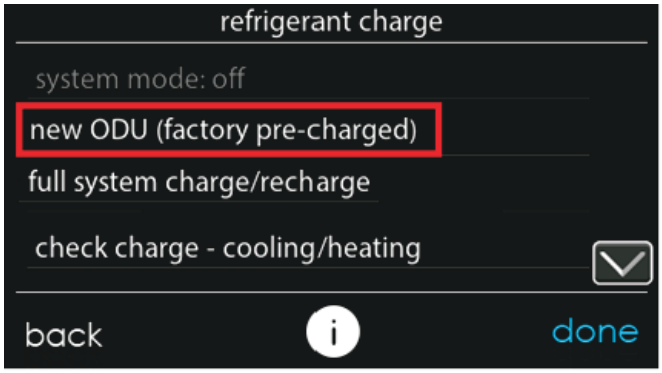


A200030

Fig. 13 – Installation and Service Menu

During initial installation, the system mode should be OFF. When system mode is OFF, all menu selections are available. When system mode is either in Cooling or Heating, only "check charge - cooling / heating" is available for selection.

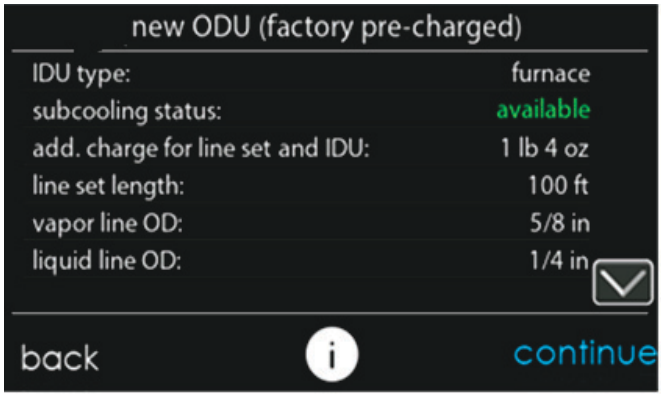
6. For new installations, select "new ODU (factory pre-charged)" from the refrigerant charge screen to begin charging the system (Fig. 14). For applications where there is no charge in the ODU, select “full system charge/recharge”.



A240370

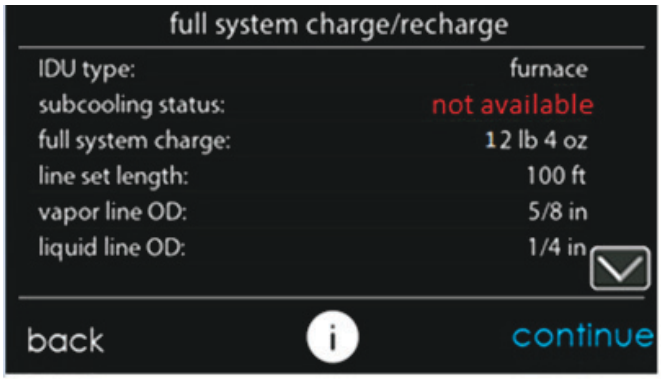
Fig. 14 – Refrigerant Charge Mode Selection

7. If indoor and outdoor conditions are in range, subcooling status will be green and available (Fig. 15). If conditions are outside the range, subcooling status will be red and unavailable and will require a partial weigh-in of charge (Fig. 16). Both “new ODU (factory pre-charged)” and “full system charge/recharge” modes will allow the user to move forward to start the system regardless of whether subcooling charging is available. Lineset configuration and climate zone / odu material type can be changed by selecting appropriate line if needed. For “new ODU (factory pre-charged)” record the ADDITIONAL charge amount listed. For "full system charge/recharge", record the FULL system charge amount listed. Press continue.



A240371

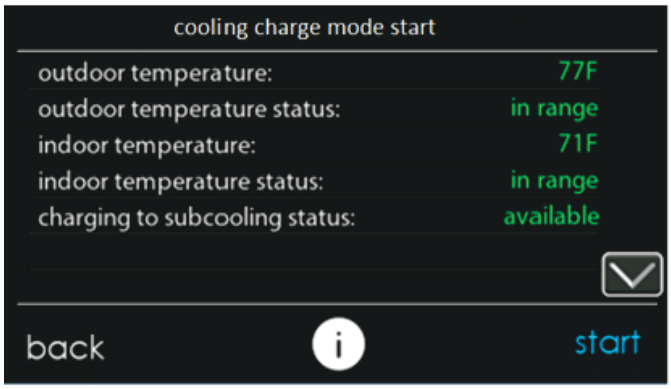
Fig. 15 – New ODU (factory pre-charged) - Subcooling Available



A240372

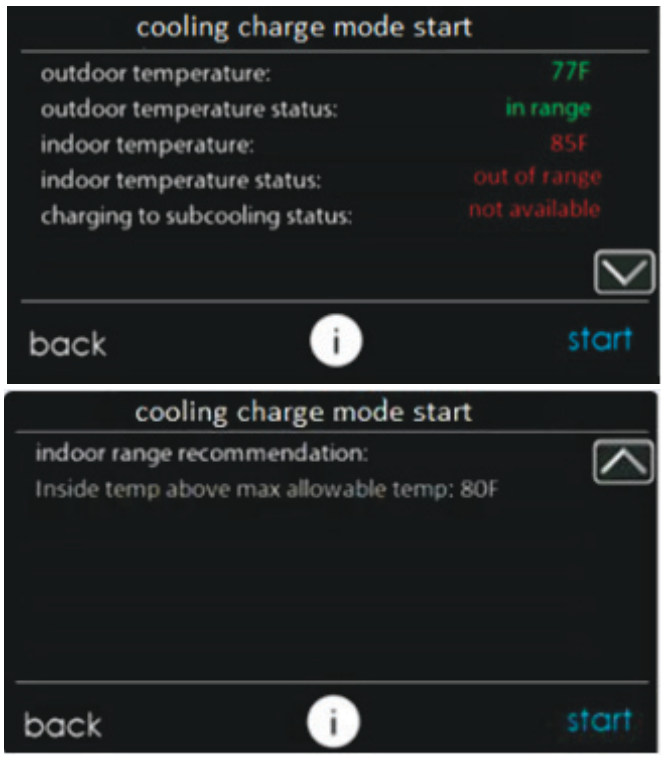
Fig. 16 – Full System Charge/Recharge - Subcooling Unavailable

8. The next screen, “cooling charge mode start” is shown in Fig. 17 or Fig. 18 depending on whether subcooling charging is available. The reason for unavailability of subcooling can be viewed by pressing the down arrow to go to the second page. Before selecting “Start”, verify that the service valves are open. Pressing start will turn on the system at a fixed set of operating parameters in COOLING mode.



A240373

Fig. 17 – Cooling Charge Mode Start Screen - Subcooling Available



A240385

Fig. 18 – Cooling Charge Mode Start Screen - Subcooling Unavailable

9. Once start has been pressed, the next screen will show the target subcooling that should be attained while charging. If subcooling mode is not available, the current subcooling and target will display as dashes and the refrigerant must be weighed in. Weigh in the charge amount recorded in Step 7. The charge level may then be checked at another time when both the indoor and outdoor temperatures are in a more favorable range that allow for subcooling charging.
   When subcooling is available, the current subcooling will appear in red (Fig. 19) until the stabilization timer is 0 where it will then turn green, indicating the system has stabilized. "Current subcooling" is calculated using sensors inside the ODU, but may be in error until stabilization time has completed. Compare the "current subcooling" to the “subcooling target” listed on the charging screen. Add refrigerant if the subcooling is low and remove refrigerant if subcooling is high. Tolerance should be ±1°F. It is recommended to validate the subcooling using traditional methods of measuring temperature and pressure at the liquid service valve when charging the system. Refer to Table 4 for guidance on required liquid line temperature for a given subcooling and liquid service valve pressure.

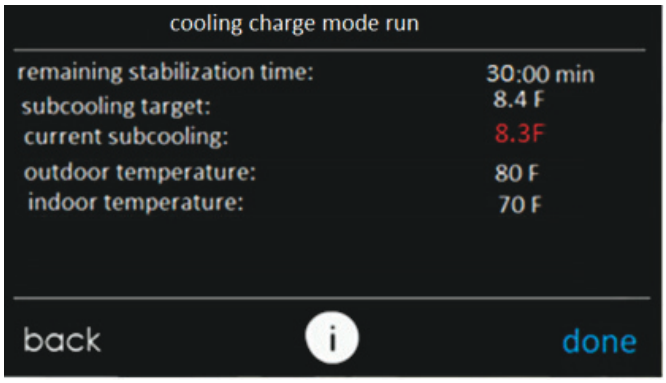


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Fig. 19 – Cooling Charge Mode Run Screen

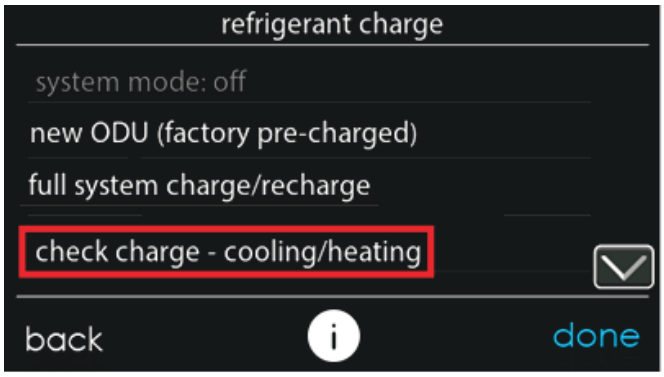
Table 4 – Required Liquid Line Temperature for R-454B

Liquid (PSIG) Pressure at Service Valve	R-454B Subcooling Temperature (F)					
	6	8	10	12	14	16
238	78	76	74	72	70	68
245	80	78	76	74	72	70
252	82	80	78	76	74	72
260	84	82	80	78	76	74
268	86	84	82	80	78	76
276	88	86	84	82	80	78
284	90	88	86	84	82	80
292	92	90	88	86	84	82
301	94	92	90	88	86	84
309	96	94	92	90	88	86
318	98	96	94	92	90	88
327	100	98	96	94	92	90
336	102	100	98	96	94	92
346	104	102	100	98	96	94
355	106	104	102	100	98	96
365	108	106	104	102	100	98
375	110	108	106	104	102	100
385	112	110	108	106	104	102
396	114	112	110	108	106	104
406	116	114	112	110	108	106
417	118	116	114	112	110	108
428	120	118	116	114	112	110
439	122	120	118	116	114	112
450	124	122	120	118	116	114

10. If any adjustment is necessary, add or remove the charge slowly (no greater than 0.5 lb per minute) and allow system to operate for at least 15 minutes to stabilize before declaring a properly charged system. The use of a commercial charge metering device (restrictor) such as Imperial liquid low side charger model 535-C or Watsco ChargeFaster model CH200 is recommended when adding refrigerant to an operating system. This prevents potential damage of liquid slugging of the compressor and allows the subcooling to stabilize quicker.
11. If the lineset is less than 15 ft. (4.57 m) in length, charge removal may be necessary and will be shown as a negative number on Infinity® System Control screen. Note that the Infinity® System Control screen displays charge in lb and oz, while unit rating plate is in decimal format.

Check Charge - Cooling / Heating

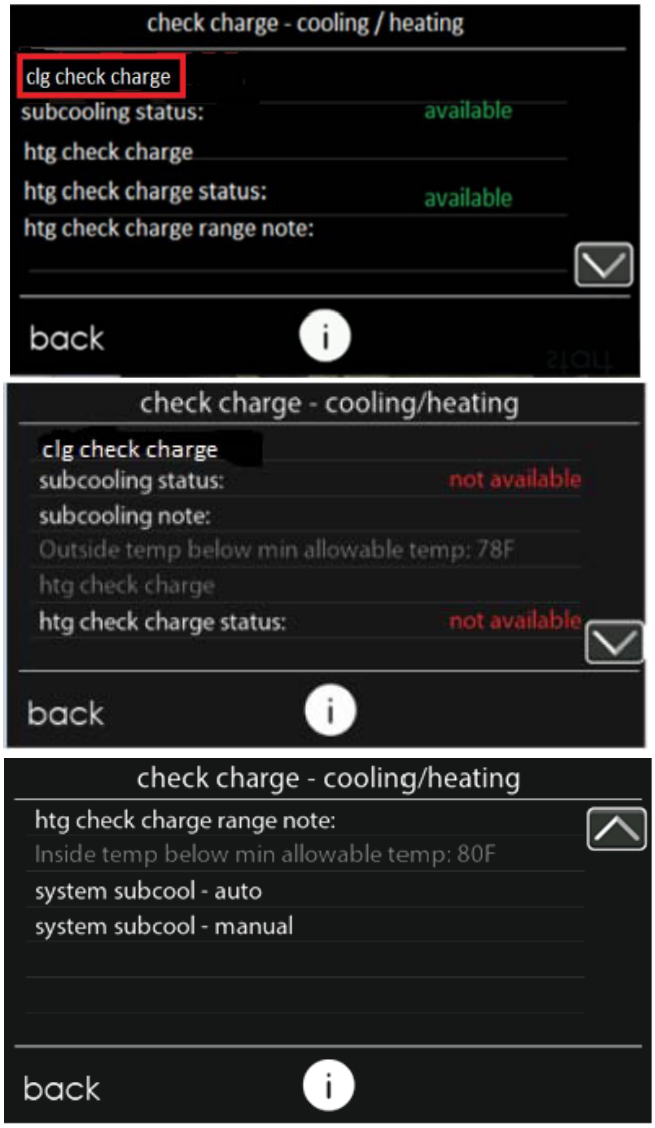
The check charge workflow allows a user to operate the system at fixed, charge mode operating parameters. In either heating or cooling modes cooling, this can be used to evaluate subcooling using the sensors on the unit. Before adjusting charge, it is recommended to verify subcooling measurements at the liquid service valve. In heating, this mode can be paired with the Heating Check Chart, located on the inside of the control box cover of the ODU, to evaluate if a system is significantly over or under charged by measuring suction and discharge pressures and superheat measured at the vapor service valve. DO NOT adjust charge using the Heating Check Chart. If system is suspected to be incorrectly charged, recover refrigerant according to the Service Manual and recharge using the "full system charge/recharge" method.



A240376

Fig. 20 – Selecting Charge Mode

When indoor and outdoor conditions are in range, "clg check charge" status will be green and available. If conditions are outside the range, "clg check charge" will still be available unless dissipation fault is active or outdoor ambient temperature is too low. Additionally, a note will be displayed below the status indicating the reason for why a given mode is not available.

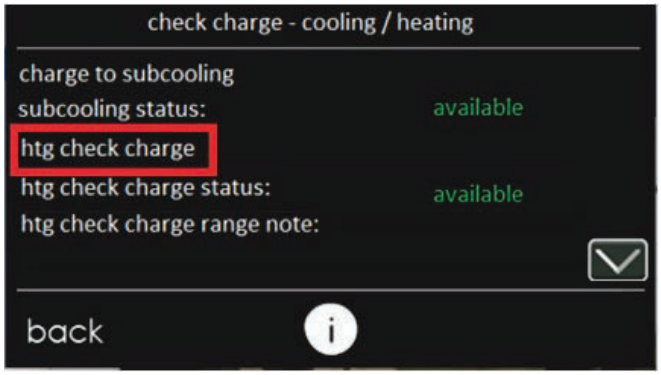


A240377

Fig. 21 – Cooling Charge Mode

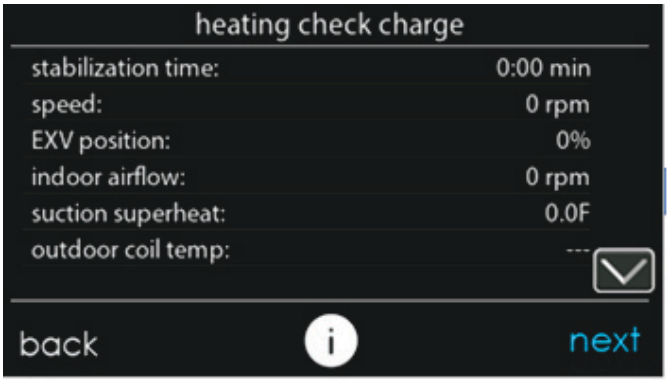
Pressing "clg check charge" in Fig. 21 will take the user to the "cooling charge mode start" screen that is outlined above in steps 8-11. Follow these steps to complete charge verification. Only use "clg check charge" mode to adjust charge when subcooling is available.

Pressing the "htg check charge" will take the user to the Heating Check Charge screen (see Fig. 22 - Fig. 23) After pressing start, observe operation and compare the system pressures and temperatures to those on the Heating Check Chart located on the inside of the control box cover of the ODU. If system is suspected to be incorrectly charged, recover refrigerant according to the Service Manual and recharge using the "full system charge/recharge" method. DO NOT adjust charge using the Heating Check Chart.



A240380

Fig. 22 – Heating Check Charge



A240382

Fig. 23 – Heating Check Charge Screen 1

Post Charging

Final charge should be recorded on the outdoor unit charging label with permanent and legible writing. Total refrigerant charge is factory charge plus any added charge. Verify the indoor space served by the indoor unit, including spaces connected by ductwork, exceeds the minimum room size as listed on the outdoor unit charging label. Refer to Table 5

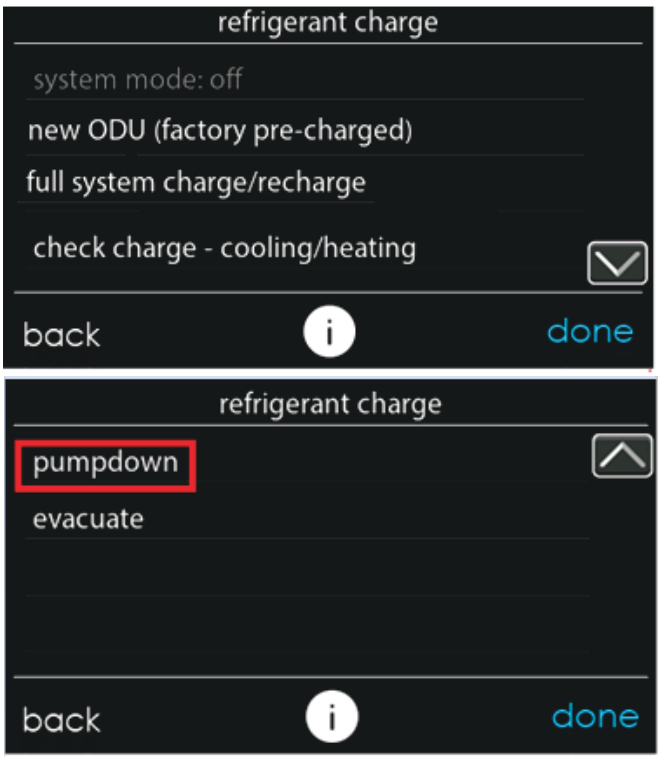
Table 5 – Minimum Room Area Charging Table

Total System Charge (lbs.)	Minimum Floor Area ft.^{2} (m^2)
4	61 (5.7)
5	76 (7.0)
6	91 (8.5)
7	106 (9.8)
8	122 (11.3)
9	137 (12.7)
10	152 (14.1)
11	167 (15.5)
12	182 (16.9)
13	198 (18.4)
14	213 (19.8)
15	228 (21.2)
16	243 (22.6)
17	258 (24.0)
18	274 (25.5)
19	289 (26.8)
20	304 (28.2)
21	319 (29.6)
22	335 (31.1)
23	350 (32.5)
24	365 (33.9)
25	380 (35.3)

Step 11 – Pump Down & Evacuation

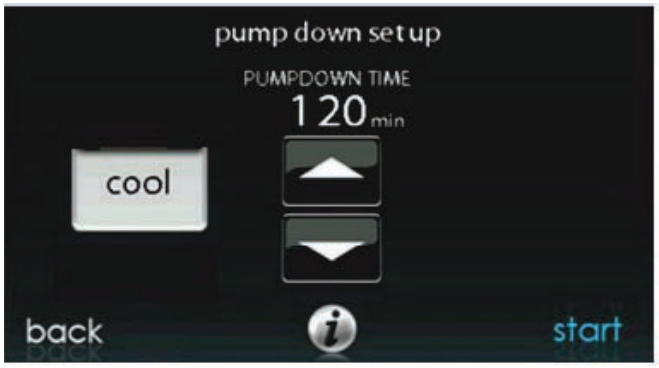
Because this system has a VFD controlled compressor the conventional procedure cannot be used to "pump down" and isolate the refrigerant into the outdoor unit. The Infinity® System Control has provisions to assist in performing this function.

1. Connect gauges to liquid and vapor or suction capillary service ports to monitor operating pressures during and at completion of the procedure.
2. In the "installation and service" menu of the Infinity® System Control (see Fig. 12), go to “refrigerant charging” and then “pump down” (see Fig. 13 and Fig. 24).
3. Pump down in COOL mode allows refrigerant to be isolated in outdoor unit. Set desired time period. Default time period for the procedure is 20 minutes. See Fig. 25.
4. Select Start on Infinity® System Control to begin the pump down process. Unit will begin running in cooling mode after a brief delay and a status screen will be displayed. See Fig. 26.
5. Close the liquid service valve.
6. The unit will run with the low pressure protection set to indicate pump down is complete when the suction pressure drops below 20 psig. Compressor protections are still active to prevent damage to the compressor or VFD (high pressure, high current, etc.).
7. Once system indicates pump down complete or failure to complete shutdown, close vapor service valve.
8. A recovery system will be required to remove final quantity of refrigerant from indoor coil and line set. Refer to Service Manual for specific evacuation and purge steps required after recovering refrigerant and before making any repairs to the indoor unit or lineset.
9. Remove power from indoor and outdoor unit prior to servicing unit.



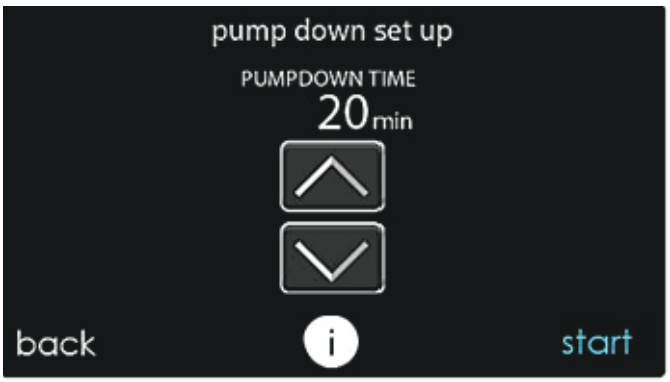
A240378

Fig. 24 – Pump Down and Evacuation Selection



A240390

Fig. 25 – Pump Down Setup Screen



A240342

Fig. 26 – Pump Down Active Screen

Evacuation and Recovery of Refrigerant from within 27VNA0

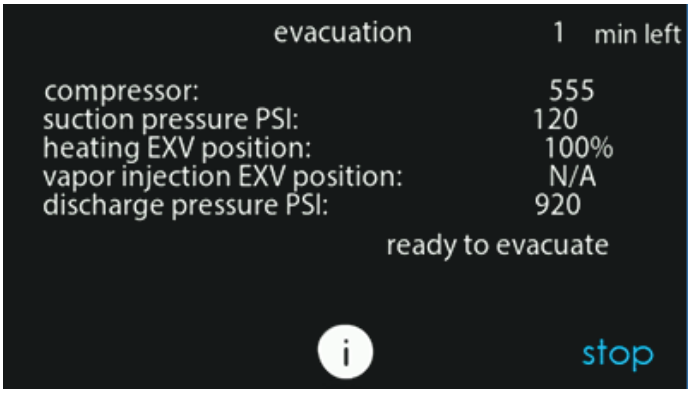
Because this system has an EXV for the heating expansion device, additional steps must be taken to open the EXV if the heat pump unit must be evacuated for service reasons. If the EXV is not open when pulling a vacuum or recovering refrigerant from the heat pump unit, extended evacuation time may be required and/or inadequate vacuum obtained. The Infinity® System Control has provisions to open the EXV for refrigerant recovery and/or evacuation.

1. Connect gauges to liquid and vapor or suction capillary service ports to monitor operating pressures during and at completion of the procedure. Attach recovery system or vacuum pump to gauge set as needed for the service procedure. The service valves must be open to evacuate the unit through the line set service ports. The suction capillary service port is a direct connection to the suction port of the compressor.
2. In the "installation and service" menu of the Infinity® System Control (see Fig. 12), go to "refrigerant charging" and then "evacuation" (see Fig. 13).
3. Set desired time period. Default time period for the procedure is 20 minutes. See Fig. 27.
4. Select START on Infinity® System Control to open the valve.
5. Begin evacuation or refrigerant recovery as required for the procedure after Infinity® System Control indicates the EXV is open. Power may be removed from heat pump after the Infinity® System Control indicates "READY TO EVACUATE." See Fig. 28.
6. Remove power from indoor and heat pump unit prior to servicing unit. The EXV will retain the open position.

NOTE: See service training materials for troubleshooting the EXV using EXV CHECK mode.

A20042

Fig. 27 – Evacuation Setup Screen



A20043

Fig. 28 – Evacuation Status Screen

Step 12 – System Functions and Major Components

The 27VNA0 models utilize a communicating Infinity® System Control. When a demand for cooling or heating exists, the Infinity® System Control will direct the outdoor unit to operate at the minimum required speed to satisfy demand. With a call for cooling or heating, the outdoor fan is first energized, followed shortly by the compressor, where they will both operate at a start speed for a brief period. Once certain start criteria are met, the compressor and fan will ramp to the target demand speeds. If continued operation at the initial speed does not satisfy demand, the system will ramp up in 60 RPM increments until it satisfies the demand. After the higher demand is met, the unit will modulate capacity such that demand is met and indoor conditions are maintained. Ideal performance is achieved when system operates continuously at the lowest speed possible, minimizing variation in conditioned space temperatures while using minimal power.

As the unit operates at lower capacity, system vapor (suction) pressure will be higher than it is during a standard single-stage system operation or during a higher capacity operation.

When all demand is satisfied, the compressor will shut off. An internal pressure equalization valve will energize during the off-cycle to allow for easy start up at the next call for cooling or heating.

The Infinity® System Control displays the operation mode and fault codes as specified in the troubleshooting section. See Table 11 for codes and definitions.

Primary Control Module

The Primary Control Module (PCM) controls the various functions of the outdoor unit. The PCM has the following outputs:

1. Main EXV (EXV-H)
2. VFD Modbus communication (VFD COMMS)
3. VFD low-voltage relay control
4. Reversing Valve (RVS)
5. Pressure Equalization valve (PEV)
6. O signal
7. W signal

The PCM has the following inputs:

1. Outdoor Discharge line Temperature (ODT) Thermistor
2. Outdoor Air Temperature (OAT) Thermistor
3. Outdoor Coil Temperature (OCT-HP) Thermistor
4. Outdoor Suction Temperature (OST) Thermistor
5. Liquid Line Temperature (LLT-HP) Thermistor
6. Discharge & suction pressure transducers (DPT & SPT). Labeled as P1 & P2 on the PCM
7. Service Interface communication port (SERVICE PORT)
8. CCN communication (ABCD plug)
9. Model plug
10. 24VAC input power

The PCM receives a cooling or heating demand from the Infinity® System Control and determines the appropriate compressor, fan, reversing valve and PEV action based upon the various sensor inputs.

Utility Interface With Infinity® Control

The utility curtailment relay should be wired between the two UTIL connections on the control board for this Infinity® Communicating System (see Fig. 29). This input allows a power utility device to interrupt compressor operation during peak load periods. When the utility sends a signal to shut the system down, the Infinity® System Control will display "Curtailment Active". See Infinity® System Control installation instructions for setup details.

Infinity® Control, Green Communications (COMM) Light

A green LED (COMM light) on the outdoor board (see Fig. 30) indicates successful communication with the other system products. The green LED will remain OFF until communication is established. Once a valid command is received, the green LED will turn ON continuously. If no communication is received within 2 minutes, the LED will be turned OFF until the next valid communication.

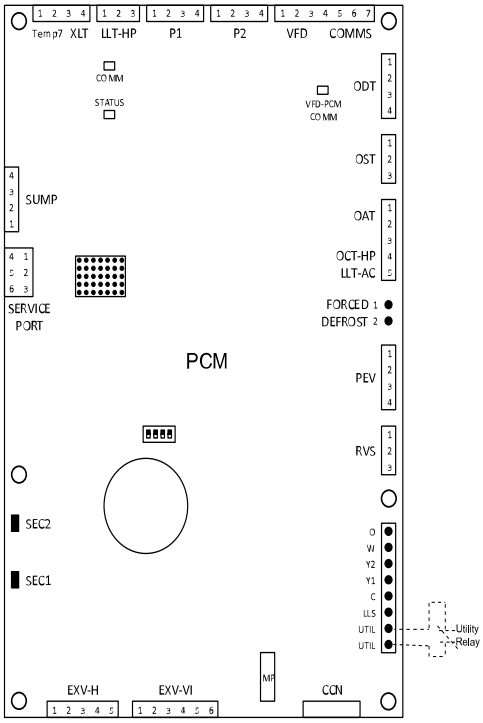


Fig. 29 – Control Board with optional Utility Relay

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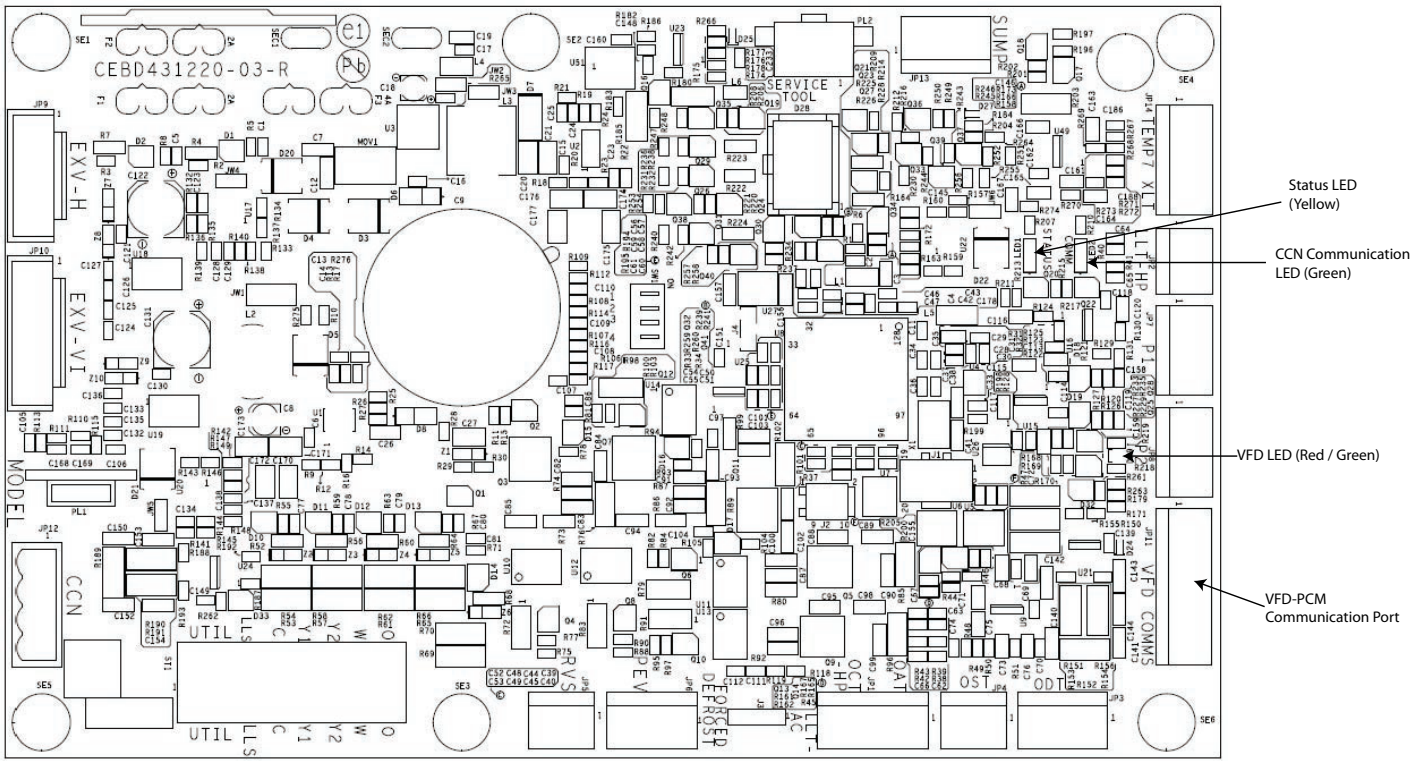

Fig. 30 – Primary Control Board

HK38EA069

Amber Status Light

The operation modes and meaning for each mode of the status light is described in the table below for PCM SW versions 1.0 and above.

Mode	Meaning
Off	Power is removed from the PCM or there is a fundamental PCM fault.
On	Equipment is in standby with no diagnostic conditions preventing or limiting operation.
1 Slow Flash	Equipment is operating at low capacity (low stage in emergency mode).
2 Slow Flashes	Equipment is operating at high capacity (high stage in emergency mode).
Continuous Slow Flash	Equipment operation has been interrupted or is being limited.
Continuous Fast Flash	Equipment is in a lockout condition as a result of a diagnostic condition or is in Diagnostic Code Recall mode.

5x7 LED Matrix

The Primary Control Module (PCM) is equipped with a 5x7 LED matrix. This matrix will display the 4 highest priority diagnostic codes in a scrolling fashion with 2 seconds in between each code. At the end of the 4th highest priority diagnostic code there is a 5 second pause before the list repeats.

VFD Communications Light

The PCM is equipped with a bi-color LED for indicating successful or unsuccessful communication with the VFD. This LED is located just below the VFD-PCM communication port on the PCM. The LED will flash green when good messages are received from the VFD and red when bad or no messages are received from the VFD.

Bluetooth® Module

This unit is equipped with a module, which includes Bluetooth wireless technology that allows a user to connect via an application on a phone or tablet. It is recommended that the Bluetooth Module be activated during the installation process.

Follow these steps to download and activate Bluetooth Module:

1. Download the app
   – Search the App Store™ or Google Play™ for Carrier Service Technician to download. The app is available on phone and tablet devices. If you already have the app downloaded, please ensure you have updated to latest version.

To Activate Bluetooth Module:

1. Login to the Carrier Service Technician app using your HVACPartners user name and password.
2. On the App Home screen, tap the Connect to Equipment button. Please ensure your equipment is powered on and your mobile device is within 10 feet of the equipment throughout this whole process

NOTE: In order to connect to equipment using Bluetooth, you must have Bluetooth enabled on your mobile device, and you must allow the Service Tech app to access Bluetooth and location services in your device permissions. For more information on how to enable these features and permissions, please consult documentation from your device manufacturer.

3. The app will scan for nearby Bluetooth enabled equipment. To activate a new unit, the app will display “New Equipment”. Tap on that item and then select the Pair button
4. The app will display the equipment Serial and Model number. Please confirm these are correct for the equipment you are trying to activate and tap continue.
5. The app will now automatically progress through the activation process. Once the steps are complete, the unit is activated successfully and your device will be automatically paired to the equipment.

NOTE: You will only have to perform this activation once and you will now be able to pair to this equipment directly with the app in the future.

Variable Frequency Drive (VFD)

The VFD or variable frequency drive is located inside the control box. This is an air-cooled device that communicates with the PCM and drives the compressor to the demanded RPM. The VFD provides DC voltage to the fan motor and sends a fan RPM signal to the electronics on the fan motor. The VFD changes single phase line voltage to a 3-phase output that varies in both voltage and frequency to drive the compressor.

The VFD is equipped with several LEDs that indicate different statuses. see Table 6 and Fig. 31.

Table 6 – VFD LED Indicator Functions

LED Identification	Color	Function
R1	Red	Used to indicate that high voltage is present in the DC capacitors. If this LED is lit then a DC voltage greater than 40V is present.
G1	Green	Blinks when the VFD receives a message from PCM.
G2	Green	On when VFD is in normal status. It is off when VFD is fault status.
G3	Green	On when the VFD micro-controller relay is closed. The signal of relay is controlled by PCM.
A1	Amber	On when 12V source is normal.
A2	Amber	On when the main relay is closed.

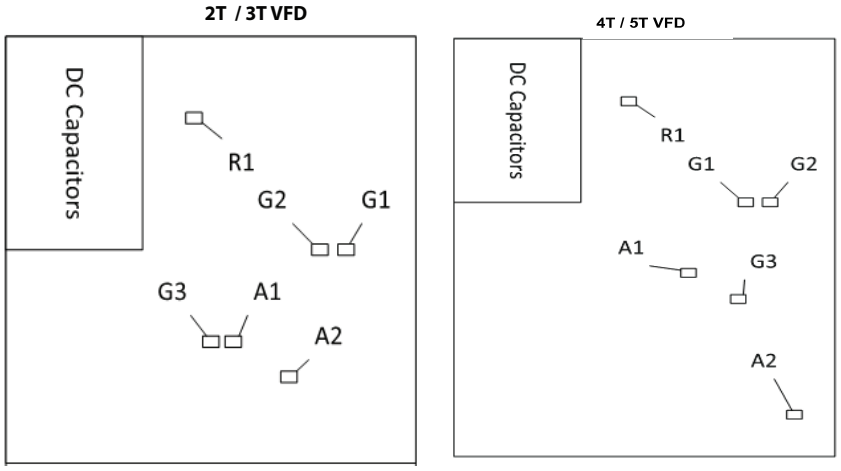

Fig. 31 – VFD LED Indicators

⚠ WARNING

ELECTRICAL HAZARD - HIGH VOLTAGE

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

Electrical components may hold charge. **DO NOT** remove control box cover for 2 minutes after power has been removed from unit.

PRIOR TO TOUCHING COMPONENTS:

Verify zero (0) voltage at VFD connections shown on control box cover.

Input Filter Board

The input filter board connects the line voltage to the VFD. The input filter board ensures the inherent electrical noise generated by VFD does not affect other electronics in the household and contains fuses to protect against excess input current.

Reactors

There are either 1 or 2 reactors per system depending on model. These reactors are large inductors and must be connected to the VFD to operate.

Variable Speed Compressor

This unit contains a high-side variable speed compressor that has a wide operating range. These models contain variable speed rotary compressors. All of the variable speed compressors operate on 3PH AC provided by the VFD. This compressor can only be operated by the specific VFD supplied with the unit.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Do not attempt to apply line voltage directly to the compressor. This will destroy the compressor

Time Delays

The unit time delays include:

- Five minute time delay to start cooling or heating operation when there is a call from the Infinity® System Control. To bypass this feature, momentarily short and release Forced Defrost pins.
- Five minute compressor re-cycle delay on return from a brown-out condition.

Heating Electronic Expansion Valve (EXV-H)

This unit uses an electronic expansion valve for refrigerant metering in the heating mode. The control board drives the EXV to its proper position based on the operating mode and conditions.

Variable Speed Fan Motor

The fan motor included in this unit is a Brushless DC motor with an integrated control module. The control module is supplied DC voltage from the VFD. The speed command is provided from the VFD through a 0-5V signal. The commanded speed is determined by the PCM and is communicated through Modbus to the VFD. The motor cannot be connect to line voltage. Fan motor speed varies based on outdoor ambient temperature, compressor, speed, and system demand. The fan motor will not operate during defrost and may cycle off and on if extremely low airflow is requested by the outdoor unit controls.

Pressure Equalization Valve (PEV)

The PEV is located at the discharge of the compressor and the inlet to the accumulator. The purpose of the PEV is to prevent the compressor from starting with a high pressure differential, which can cause compressor damage. Occasionally the unit may experience a brief starting delay while the PEV equalizes pressure before startup.

High Pressure Switch

This unit contains a high pressure switch to protect against high pressure conditions. This switch must be closed for the VFD to be powered.

Outdoor Pressure Transducers

There are two pressure transducers installed on this unit. The pressure transducers are connected to the P1 and P2 inputs on the PCM. Each transducer may be connected to either PCM input. These transducers have a range from 0 to 620 psig and are used for system protection, control, and diagnostics.

Stator Heater Operation

This unit has an internal stator heating function. The compressor windings will occasionally be energized during the OFF cycle to start the stator heat operation, thus maintaining a sump temperature that is essential for compressor reliability. The compressor will not run during this process.

Infinity® Controlled Low Ambient Cooling

This unit is capable of low ambient cooling down to 0°F (-17.8°C) with Low Ambient enabled on the Infinity® System Control. A low ambient kit is not required.

The Infinity® System Control provides an automatic evaporator coil freeze-protection algorithm that eliminates the need for an evaporator freeze thermostat. The only accessories that may be required are wind baffles in locations likely to experience cross winds in excess of 5 miles an hour. This generally occurs only on roof and open-area applications.

Low ambient cooling must be enabled in the Infinity® System Control setup. The outdoor unit fan will cycle on and off based on outdoor coil temperature, outdoor air temperature, and suction pressure measurements to keep the compressor running at the proper conditions.

Defrost

The Infinity® System Control offers 4 possible defrost interval times: 30, 60, 90 minutes or AUTO. The default is AUTO.

Defrost interval times: 30, 60, 90 minutes or AUTO are selected by the Infinity® System Control (dip switches are not used.)

Auto mode will adjust the defrost interval dynamically based on real-time frost accumulation and provide optimum system performance when a fixed defrost interval time is chosen. In Auto mode, defrost will begin when frost is detected on the coil. In non-frosting conditions, it is possible to the unit to run for several days without initiating defrost..

The defrost process begins when the defrost interval time is reached under frost-accumulating conditions. The defrost process ends when the coil has sufficiently thawed and been allowed time to drain. Defrost may also terminate as a result of a time limit - usually 15 minutes. If Defrost is forced via the Forced Defrost input, defrost will be initiated regardless of frost accumulation time or outdoor temperature. A forced defrost will run at least 30 seconds, but may not run longer than 30 seconds if ambient temperature is well above freezing.

NOTE: Compressor speed during defrost varies based on outdoor conditions and unit model

Troubleshooting

Systems Communication Failure

If communication with the Infinity® System Control is lost, the control will flash the appropriate fault code (see Table 11). Check the wiring to the Infinity® System Control and the indoor and outdoor units and power.

Model Plug

The system PCM has been pre-programmed with an electronic model plug that establishes the model configuration, i.e. size and type, of the unit. This electronic model plug removes the need for a physical model plug to be installed into the PCM. A set of physical model plugs for all sizes is available as a service component for use when replacing the PCM and/or the model configuration is missing or unknown. Additionally, the model configuration can be set using the Infinity® System Control, the Service Tech App, or the PCM dip switches. The correct model configuration must be set for the system to operate properly. (see Table 7). Refer to the Service Manual for more information on model configurations.

Table 7 – Model Plug Information

MODEL NUMBER	MODEL PLUG NUMBER	PIN RESISTANCE (K-ohms)		PCM Model
		Pins 1-4	Pins 2-3	HP
27VNA024	HK70EZ003	5.1K	24K	24K-HP
27VNA036	HK70EZ015	5.1K	360K	36K-HP
27VNA048	HK70EZ027	11K	150K	48K-HP
27VNA060	HK70EZ039	18K	62K	60K-HP

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Do not attempt to install an incorrect model plug as this could cause some units to operate incorrectly and fail prematurely.

NOTE: Model configuration diagnostics will occur while the equipment is operating, but changes to a model configuration using a physical model plug will not affect equipment operation until power is cycled. An electronically set model configuration will take effect immediately. The PCM remembers the most recent valid model configuration detected at power-up, regardless of that configuration coming from an electronic or physical model plug. Model configuration memory is preserved across power cycles, so proper equipment operation will continue even if power to the equipment is lost and then restored. An installed model plug at power-up takes precedence over a model configuration value stored in memory. If a new valid model plug value is detected at power-up, the model configuration memory will be updated to that new value.

Pressure Switch Protection

The outdoor unit is equipped with high pressure switch. If this switch opens the VFD will lose line power and the compressor and fan motor will not operate. The high pressure switch opens at 670 +/- 10 psig and closes at 470 +/- 25 psig. If this occurs the PCM will set a diagnostic code per Table 11. The outdoor pressure transducer installed at the discharge of the compressor is monitored by the PCM and the PCM will take action to avoid the high pressure switch from opening.

Compressor Protection

The Primary Control Module continuously monitors the operation of the compressor and takes action when it is nearing the edge of the boundaries of reliable operation. The PCM utilizes the pressure transducers to maximize the reliability and minimize the off time of the system due to operation outside of the compressor boundaries. The PCM takes different actions for each edge of the boundary, but each culminates in a reduction of compressor speed to the minimum allowable and, in the worst case, will power off the compressor to avoid excursions outside the boundaries. If a shutdown does occur then the PCM will set a diagnostic code per Table 11.

Line Voltage Diagnostics

The primary control module monitors the line voltage for low and high voltage events. If a low voltage or high voltage event occurs and another fault occurs simultaneously the PCM will set a fault that indicates this was due to the system conditions and not the components. If this occurs several times in a row the PCM will set a malfunction and lock out operation for 1-4 hours, depending on the condition. Refer to Table 11 for the list of fault codes and Table 12 for the list of malfunctions and the lockout times for each one.

Forced Defrost Pins

The forced defrost pins have several functions. When shorting the pins using a clip wire the below functions can be executed:

If the pins are shorted for more than 5 seconds and the unit is in heating mode, the unit will enter into a defrost.

If the pins are shorted more than 1 second and less than 5 seconds when the system has just turned off and an active call for cooling or heating is present, the 5 minute initial on-time will be defeated.

If the unit is in the OFF mode and the pins are shorted at power on the unit will enter into Status Code Recall Mode.

Temperature Thermistors

Thermistors are used to sense the outdoor ambient (OAT), outdoor coil (OCT-HP), liquid line (LLT-HP), any outdoor discharge (ODT) line temperatures. All thermistors are 10K thermistors except for the ODT, which is a 50k thermistor.

Refer to Table 8 and Table 9 for resistance values versus temperature for the OAT, OCT - HP, ODT, and LLT - HP.

Table 8 – 10K Thermistor Resistance Values

TEMPERATURE	RESISTANCE (K OHMS)
25.0°C (77.0°F)	10.0 + / - 2.3%
0.0°C (32.0°F)	32.6 + / - 3.2%
-17.8°C (0 °F)	85.5 + / - 3.4%

Table 9 – 50K Thermistor Resistance Values

TEMPERATURE (°C)	RESISTANCE (K OHMS)
25	50.15 + / - 5.0%
75	7.565 + / - 3.0%
125	1.7 + / - 1.4%

If the outdoor air or coil thermistor should fail, the control will flash the appropriate fault code (see Table 11.)

IMPORTANT: The OAT, OCT/LLT, OST, and ODT thermistors should be factory mounted in the final locations. Check to ensure thermistors are mounted properly (See Fig. 32, Fig. 33 and Fig. 34).

Outdoor Air Temperature (OAT)

The OAT is a 10K thermistor used for multiple system operations. It provides the outdoor air temperature to the primary control module and Infinity® System Control. It is essential for controlling the system and is used in almost all modes of operation. The sensor is mounted in the control box per Fig. 32. See Table 8 for proper resistances.

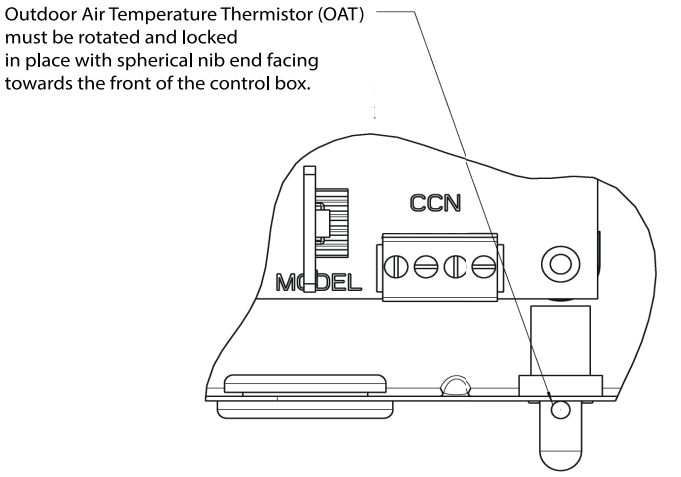

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Fig. 32 – OAT Thermistor Mounting Location

⚠ WARNING

PERSONAL INJURY AND/OR PROPERTY DAMAGE HAZARD

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

The appliance shall be stored in a room without continuously operating ignition sources (for example:

open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants do not contain an odor.

Outdoor Coil Temperature (OCT-HP)

The OCT-HP Thermistor is a 10K thermistor used for multiple system operations. This sensor is connected to the PCM through a shared 5-pin connector with OAT-HP and provides the coil temperature to the primary control module and Infinity® System Control. It is used for low ambient operation, defrost control, and other system operations. The sensor must be securely mounted to the stub tube on the outdoor coil. Note that there is only one stub tube used and on most units it is the bottom circuit. See Fig. 33 for proper placement. See Table 8 for proper resistances.

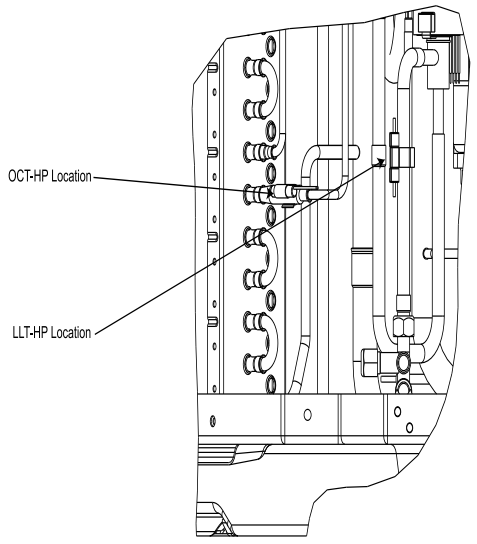

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Fig. 33 – OCT-HP and LLT-HP Thermistor Mounting Locations

Liquid Line Temperature (LLT-HP)

The LLT-HP is a 10K thermistor used for multiple system operations. LLT-HP is connected to the PCM through a separate 3-pin connector and provides to the primary control module and Infinity® System Control. It is used for heating control and subcooling calculation during charging. The sensor must be securely mounted to the liquid tube in between the liquid service valve and the EXV. See Fig. 34 for proper placement. See Table 8 for proper resistances.

Outdoor Suction Temperature (OST)

The OST is a 10K thermistor used for assisting in EXV control and must be secured on the suction tube and aligned longitudinally to the vertical surface of the tube axis (see Fig. 34). See Table 8 for proper resistances.

Outdoor Discharge Line Temperature (ODT)

The ODT is a 50k thermistor used for determining discharge superheat and protecting the compressor from over-temperature operation. Proper mounting is required to reduce the influence of ambient temperature and provide accurate tube temperature. ODT is located on the compressor discharge stub-out (see Fig. 34) and should be inside the compressor sound blanket.. See Table 9 for proper resistances.

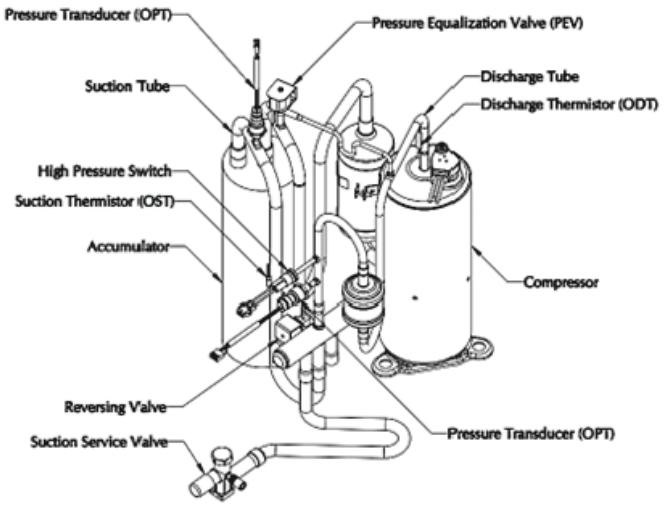

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Fig. 34 – OST Thermistor and ODT Thermistor Mounting Locations

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

In order to minimize the ambient influence, make sure the thermistor curved surface hugs the pipe surface and is secured tight using the wire tie fished through the original slot, insulating polymer body.

Failed Thermistor Default Operation

Factory defaults have been provided in the event of failure of any of the thermistors.

If the OAT sensor fails, the outdoor unit will operate at a fixed speed. The value of OST will be substituted for OAT when running in heating, and the value of OCT-HP will be reported when not running or running in cooling.

If the OCT-HP sensor fails. defrost will occur at a 60 minute time interval and run for 10 minutes during heating operation. Saturated suction temperature will be substituted for OCT-HP during heating operation, and discharge temperature will be substituted during cooling operation.

If the ODT sensor fails, the outdoor unit will operate at a fixed speed and a value of 47°F will be substituted.

If the OST sensor fails, the outdoor unit will not operate in heating, but will continue to operate in cooling. A value of 47°F will be substituted.

f the LLT-HP sensor fails, subcooling calculation during charging mode will not be available.

Variable Speed Compressor Winding Resistance

IThis compressor operates with 3-phase variable frequency PWM variable voltage. For troubleshooting certain fault codes related to compressor resistances, follow these steps:

1. Disconnect compressor power leads from the VFD terminals, U (YEL), V (RED), and W (BLK).
2. Measure the resistance between YEL to RED, YEL to BLK, and RED to BLK and compare to Table 10 values. Each resistance set should be equal.
3. Measure the resistance to ground for each lead.
4. If the resistances are correct then reconnect power leads to appropriate terminal.
5. If the resistances appear to be abnormal, it will be necessary to measure the resistance at the compressor fusite terminals.
6. Remove the sound blanket and harness plug, measure the resistances, and compare to Table 10.
7. Reinstall compressor sound blanket making sure discharge line thermistor and compressor power harness are routed as they were from the factory.

Table 10 – Variable Speed Compressor Resistances winding resistance at 68°F (20°F)

WINDING	24	36	48	60
Between terminals T1, T2, and T3	1.630	.460	0.424	0.424
Between terminal & ground	>1 mega OHM			

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Do not use Meggar for measuring the winding resistance.

Fan Motor

The fan motor requires 5 wires connected to VFD for operation. These wires are: DC BUS, GND, +15V DC, VSP, FG. Note high voltage present on ALL wires because they are not earth or chassis ground referenced. Do not attempt to measure voltages while running. Fan speed is monitored by VFD and PCM continuously. If fan faults occur verify the fan blade rotates freely without obstruction. Ensure all electrical connections are secure and wires are undamaged.

Status Codes

Table 11 shows the status codes flashed by the amber status light. Most system problems can be diagnosed by reading the status code as flashed by the amber status light on the control board.

The codes are flashed by a series of short and long flashes of the status light. The short flashes indicate the first digit in the status code, followed by long flashes indicating the second digit of the error code.

The short flash is 0.25 seconds ON and the long flash is 1.0 second ON. Time between flashes is 0.25 seconds. Time between short flash and first long flash is 1.0 second. Time between code repeating is 2.5 seconds with LED OFF.

Codes are easily read from Infinity® System Control or the 5x7 LED display on the PCM.

EXAMPLE:

3 short flashes followed by 2 long flashes indicates a 32 code. Table 11 shows this to be low pressure switch open.

Status Code Recall Mode

Active status codes are stored in memory even when power is absent. The most recent flashing status code (highest priority active) can be recalled from memory via Status Code Recall Mode is accessed by shorting (use a clip wire) the “force defrost” connector (labeled J2 on the board, and then power ON the unit.

Please make sure the unit is turned OFF before shorting the pins. Status Code Recall Mode will continue as long as the “force defrost” terminals remain shorted. The unit will not attempt to heat or cool while the terminals remain shorted. Once the status code is read, power-down the unit and remove the short.

Table 11 – Diagnostic Code Table

SERVICE

Base	Expansion Fault*	Expansion Malfunction**	Bluetooth®
13	82	53	System Control Upgrade Recommended
14	94		Line Voltage Low
15	94		Line Voltage High
17	06		Bluetooth Communication Error
18	11		Indoor Coil Freeze Protection
24		58	5V PCM External Power Out of Range
25		61	Invalid Model Configuration
		62	Model Configuration Missing
	24		Model Configuration Changed
		63	VFD/Equipment Model Mismatch
26	27		PCM Reprogramming Failure
	31		PCM EEPROM Write Failure
28		71	Fuse 1 Open (PEV / RVS)
		72	Fuse 2 Open (LLV)
31	11	58	Compressor High Pressure Limit
	16		High Pressure Switch Trip
	19		High Pressure Disable
32	15	55	Compressor Low Pressure Limit
		59	Low Pressure Disable
33	15	55	Compressor Low Discharge Limit
34	11	58	Compressor High Temperature Limit
35	11	58	Compressor High Compression Limit
36	15	55	Compressor Low Compression Limit
38	13	53	Compressor Starting Error
		54	Compressor No Pump
	18		High Differential Pressure Start Disable
	31	71	VFD Estimator Error
39	13	53	Fan Start Error
	14		Fan Speed Error
	15	55	Unexpected Fan Shutdown
		58	Fan Motor Error
41	13		Defrost Overrun
44	13		PEV Timeout
51	01		OAT (Outdoor Air Temp) Sensor Open/Low Temp
	02		OAT (Outdoor Air Temp) Sensor Shorted/High Temp
52	01		OCT-HP/LLT-AC (Outdoor Coil Temp(HP)/Liquid Line Temp (AC)) Sensor Open/Low Temp
	02		OCT-HP/LLT-AC (Outdoor Coil Temp(HP)/Liquid Line Temp (AC)) Sensor Shorted/High Temp
53	01	41	OST (Outdoor Suction Temp) Sensor Open/Low Temp
	02	42	OST (Outdoor Suction Temp) Sensor Shorted/High Temp
54	01		ODT (Outdoor Discharge Temp) Sensor Open/Low Temp
	02		ODT (Outdoor Discharge Temp) Sensor Shorted/High Temp
55	01		LLT-HP (Liquid Line Temp) Sensor Open/Low Temp (HP Only)
	02		LLT-HP (Liquid Line Temp) Sensor Shorted/High Temp (HP Only)
57	01	41	P1 Open
	02	42	P1 Shorted
		43	P1 Sensor Malfunction
58	01	41	P2 Open
	02	42	P2 Shorted
		43	P2 Sensor Malfunction
61		41	Reversing Valve Solenoid Open
	13	53	Reversing Valve Timeout
62	01		PEV Solenoid Open
64		41	EXV-H Phase Open (HP Only)
		44	EXV-H Power Short to Ground (HP Only)
		45	EXV-H Phase Short to Ground (HP Only)
66		41	VFD Control Relay Coil Open
		42	VFD Control Relay Coil Shorted
81	13	53	PFC Error
	14	54	Unbalanced PFCM Error
		58	VFD System Wiring Error
82	11		VFD Line Current Speed Reduction
	13	53	VFD Reset with Power Dropout
	15	55	VFD Shutdown with Power Dropout
	16	56	Low Voltage Shutdown
	17	57	High Voltage Shutdown
83	11		Compressor Current Limit 1 Speed Reduction
	12		Compressor Current Limit 2 Speed Reduction
	15	55	Compressor Current Limit 3 Shutdown
	16	56	Compressor Current Limit 4 Shutdown
		57	Compressor Underspeed Shutdown
84	11	58	VFD Heat Sink Overtemp
85	13	53	DC Under Voltage Shutdown
	14	54	DC Over Voltage Shutdown
86	06	46	VFD Communication Error
87	13	53	VFD Initialization Error
88	15	55	Unexpected VFD Reset
	27		VFD Reprogramming Failure
	31	71	VFD Internal Error - Current Sensor
	32		VFD Internal Error - IPM Temp Sensor
	33	73	VFD Internal Error - DC Link Sensor
	34	74	VFD Internal Error - PFCM Sensor A
	35	75	VFD Internal Error - PFCM Sensor B
	36	76	VFD Internal Error - Line Volt Sensor
	37		VFD Internal Error - PFCM Temp Sensor
	38	78	VFD Internal Error - DC Discharge
	39	79	VFD Internal Fault - Microprocessor

*Fault indicates a condition that interrupts or limits but does not prevent equipment operation. Faults may be temporary/intermittent or permanent.

**Malfunctions indicate a serious condition that significantly limits or prevents system operation. Malfunctions may be an escalation of a repetitive fault condition.

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Table 12 – Malfunction Lockout Durations

Code	Title	Time
13-53	System Control Upgrade Required	Permanent
24-58	5V PCM External Power Out of Range	Duration of Event
25-61	Invalid Model Plug Malfunction	Duration of Event
25-62	Model Plug Missing Malfunction	Duration of Event
25-63	VFD Model Mismatch	Permanent*
28-71	Fuse 1 Open Malfunction	Permanent*
28-72	Fuse 2 Open Malfunction	Permanent*
31-58	Compressor High Pressure Limit Malfunction	2 hours
32-55	Compressor Low Pressure Limit Lockout	2 hours
32-59	Low Pressure Disable	Permanent*
33-55	Compressor Low Discharge Limit Lockout	2 hours
34-58	Compressor High Temperature Limit Malfunction	2 hours
35-58	Compressor High Compression Limit Malfunction	2 hours
36-55	Compressor Low Compression Limit Lockout	2 hours
38-53	Compressor Starting Malfunction	4 hours
38-54	Compressor No Pump	30 minutes
38-71	VFD Estimator Malfunction	4 hours
39-53	Fan Start Malfunction	1 hour
39-55	Unexpected Fan Shutdown Malfunction	4 hours
39-58	Fan Motor Malfunction	30 minutes
53-41	OST Open / Low Temp	Duration of Event
53-42	OST Shorted / High Temp	Duration of Event
57-41	P1 Open Malfunction	Duration of Event
57-42	P1 Shorted Malfunction	Duration of Event
57-43	P1 Sensor Malfunction	Permanent*
58-41	P2 Open Malfunction	Duration of Event
58-42	P2 Shorted Malfunction	Duration of Event
58-43	P2 Sensor Malfunction	Permanent*

* unlikely to clear on its own; see Service Manual for troubleshooting steps

Table 12 – Malfunction Lockout Durations (Continued)

Code	Title	Time
61-41	Reversing Valve Solenoid Open	Duration of Event
61-53	Reversing Valve Timeout Malfunction	2 hours
64-41	EXV-H Phase Open	Duration of Event
64-44	EXV-H Power Short to Ground	Duration of Event
64-45	EXV-H Phase Short to Ground	Duration of Event
66-41	VFD Control Relay Coil Open	Duration of Event
66-42	VFD Control Relay Coil Shorted	Duration of Event
81-53	PFC Malfunction	2 hour
81-54	Unbalanced PFCM Malfunction	4 hours
81-58	VFD System Wiring Error	4 hours
82-53	VFD Reset with Power Dropout Malfunction	2 hour
82-55	VFD Shutdown with Power Dropout Malfunction	2 hours
82-56	Low Voltage Shutdown Malfunction	2 hour
82-57	Line Over Voltage Malfunction	2 hour
83-55	Compressor Current Limit 3 Lockout	2 hours
83-56	Compressor Current Limit 4 Lockout	2 hours
83-57	Compressor Under speed Shutdown	1 hour
84-58	VFD Overtemp Malfunction	2 hours
85-53	DC Under Voltage Malfunction	2 hour
85-54	DC Over Voltage Malfunction	1 hour
86-46	VFD Communication Malfunction	1 hour
87-53	VFD Initialization Malfunction	4 hours
88-55	Unexpected VFD Reset Malfunction	2 hour
88-71	VFD Internal Malfunction - Current Sensor	4 hours
88-73	VFD Internal Malfunction - DC Link Sensor	4 hours
88-74	VFD Internal Malfunction - PFCM Sensor A	4 hours
88-75	VFD Internal Malfunction - PFCM Sensor B	4 hours
88-76	VFD Internal Malfunction - Line Volt Sensor	4 hours
88-78	VFD Internal Malfunction - DC Discharge	4 hours
88-79	VFD Internal Malfunction - Microprocessor	4 hours

FINAL CHECKS

IMPORTANT: Before leaving job, be sure to do the following:

1. Ensure that all wiring is routed away from tubing and sheet metal edges to prevent rub-through or wire pinching.
2. Ensure all thermistors are making good contact with the tubes they are mounted to.
3. Record final charge on the outdoor unit charging label with permanent and legible writing.
4. Ensure that all wiring and tubing is secure in unit before adding panels and covers. Securely fasten all panels and covers.
5. Tighten service valve stem caps to 1/12-turn past finger tight.
6. Re-install red service port caps.
7. Leave Users Manual with owner. Explain system operation and periodic maintenance requirements outlined in manual.
8. Fill out Dealer Installation Checklist and place in customer file.

REPAIRING REFRIGERANT CIRCUIT

When breaking into the refrigerant circuit to make repairs, or for any other purpose, the following procedures shall be used.

1. Safely remove the refrigerant using a recovery pump certified for flammable refrigerants.
2. Purge the refrigerant circuit with an inert gas.
3. Evacuate the refrigerant circuit to 1500 microns.
4. Break vacuum with an inert gas purge of the refrigerant circuit ensuring that the outlet of the vacuum pump is not near a potential ignition source.
5. Open the circuit by cutting or brazing.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

Frequency of maintenance may vary depending upon geographic areas, such as coastal applications. See Owner's Manual for information.

Puron Advance™ (R-454B) Refrigerant — Quick Reference Guide

- Be sure that servicing equipment and replacement components are designed to operate with R-454B refrigerant.
- Recovery cylinder service pressure rating must be 400 psig, DOT 4BA400 or DOT 4BW400.
- R-454B refrigerant systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose when charging into suction line with compressor operating.
- Leak detectors should be designed to detect R-454B refrigerant.
- R-454B refrigerant is compatible with POE and PVE oils only.
- Vacuum pumps will not remove moisture from oil.
- Do not use liquid-line filter driers with rated working pressures less than 600 psig.
- Do not leave R-454B suction line filter driers in line longer than 72 hours.
- Do not install a suction-line filter drier in liquid line.
- POE and PVE oils absorb moisture rapidly. Do not expose oil to atmosphere.
- POE and PVE oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- A factory approved liquid-line filter drier is required on every unit.
- Do NOT use R-410A TXV. TXVs are not cross compatible between R-410A and R-454B.
- Do NOT convert a coil with a piston or R-410A metering device. Coils must come from the factory with an R-454B TXV and an A2L dissipation board already installed. Indoor unit is equipped with an R-410A TXV, it must be changed to a hard shutoff R-454B TXV.
- Never open system to atmosphere while it is under a vacuum.
- When system must be opened for service, recover refrigerant, evacuate then break vacuum with dry an inert gas and replace filter driers. Evacuate to 500 microns prior to recharging.
- Do not vent R-454B refrigerant into the atmosphere.
- Do not use capillary tube coils.
- Observe all **warnings**, **cautions**, and **bold** text.
- All indoor coils must be installed with a hard shutoff R-454B TXV metering device in long line applications.

Training

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Replaces: New

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

FE5B
Communicating Fan Coil for Puron Advance™ (R-454B) Refrigerant
Sizes 24, 36, 48, 60

Installation Instructions

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

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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 kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing and work gloves. 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 and 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 instruction manuals, be alert to the potential for personal injury.

Understand the 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

PROPERTY OR PERSONAL INJURY HAZARD

Risk of fire. Flammable refrigerant used.

To be repaired only by trained service personnel. Do not puncture refrigerant tubing.

Auxiliary devices which may be ignition sources shall not be installed in the ductwork, other than auxiliary devices listed for use with the specific appliance. See instructions.

Dispose of refrigerant properly in accordance with federal or local regulations.

Failure to follow proper R-454B mitigation system installation instructions can result in property damage, personal injury, or death. If any fault codes are listed, please troubleshoot to prevent system malfunction.

⚠ WARNING

PERSONAL INJURY / PROPERTY DAMAGE HAZARD

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

For continued performance, reliability, and safety, the only approved accessories and replacement parts are those specified by the equipment manufacturer. The use of non-manufacturer approved parts and accessories could invalidate the equipment limited warranty and result in fire risk, equipment malfunction, and failure. Please review manufacturer's instructions and replacement part catalogs available from your equipment supplier.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to maintain proper clearances could result in personal injury or death.

Before installing or servicing unit, always turn off all power to unit. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

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

⚠ CAUTION

HOT TUBE WARNING

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

Refrigerant lines can reach or exceed 130 °F (54 °C). Avoid contact with the vapor header or vapor line, especially in Heating Mode. Do not service A2L refrigerant fan coils while these components are hot to avoid risk of ignition source.

Introduction

Model FE5B fan coils are designed to be installed with a communicating User Interface. The FE5B fan coils will provide airflow at a rate commanded by the User Interface. The nominal airflow/ton rate is 350 CFM/ton. The User Interface will modify the commanded airflow under certain operating modes. Refer to the User Interface literature for further system control details. This fan coil will not respond to commands from a common thermostat except under certain emergency situations explained in this document. The instructions contained herein provide guidance to successfully install this fan coil.

Model FE5B fan coil units are designed for flexibility and can be used for upflow, horizontal, or downflow applications. These units are designed specifically for Puron Advance refrigerant and must be used only with applicable refrigerant air conditioners and heat pumps as shipped.

These units leave the factory compliant with low leak requirements of less than 2% cabinet leakage rate at 1.0 inches W.C. and 1.4% cabinet leakage rate at 0.5 inches W.C. when tested in accordance with ASHRAE 193 standard. Because of this, units need special attention in the condensate pan and drain connection area and when brazing tubing.

These units are available for application in systems of 18,000 through 60,000 Btuh nominal cooling capacities. Factory-authorized, field-installed electric heater packages are available in 5 through 30 kW. See Product Data for available accessory kits.

Installation

Check Equipment

Unpack unit and move to final location. Remove carton taking care not to damage unit.

Inspect equipment for damage prior to installation. File claim with shipping company if equipment is damaged or incomplete. Locate unit rating plate which contains proper installation information. Check rating plate to be sure unit matches job specifications.

NOTE: If the door gasket is damaged or missing, the unit may not meet the ASHRAE 193 standard for cabinet air leakage. See the Product Data for this model or contact your supplier to order the gasket kit..

Mount Fan Coil

FE5B units can stand or lie on floor, or hang from ceiling or wall. Allow space for wiring, piping, proper trapping and servicing unit.

The indoor equipment and pipes shall be securely mounted and guarded such that accidental rupture of equipment cannot occur from such events as moving furniture or reconstruction activities. When a Fresh Air Ventilator (HRV or ERV) is used, the air extraction opening from the room shall be located equal to or below the top of the unit. For floor mounted units, it shall be as low as practicable. The air extraction openings shall be located in a sufficient distance, BUT NOT LESS THAN 3ft 4in (3 m), from the air intake openings to prevent re-circulation to the space. When a Fresh Air Ventilator (HRV or ERV) is used, the lower edge of the air extraction opening where air is exhausted from the room SHALL NOT be more than 4in (100 mm) above the floor.

IMPORTANT: When unit is installed over a finished ceiling and/or living area, building codes may require a field-supplied secondary condensate pan to be installed under the entire unit. Some localities may allow as an alternative, the running of a separate, secondary condensate line. Consult local codes for additional restrictions or precautions.

NOTE: Nuisance sweating may occur if the unit is installed in a high humidity environment with low airflow.

FE5B fan coils can be installed for upflow and horizontal-left applications as factory shipped (Fig. 1, Fig. 2, Fig. 3), and may be converted for downflow applications using factory-authorized accessory kits.

NOTE: To ensure proper drainage for horizontal installations, unit must be installed so it is within 1/8" / 3.18 mm level of the length and width of unit.

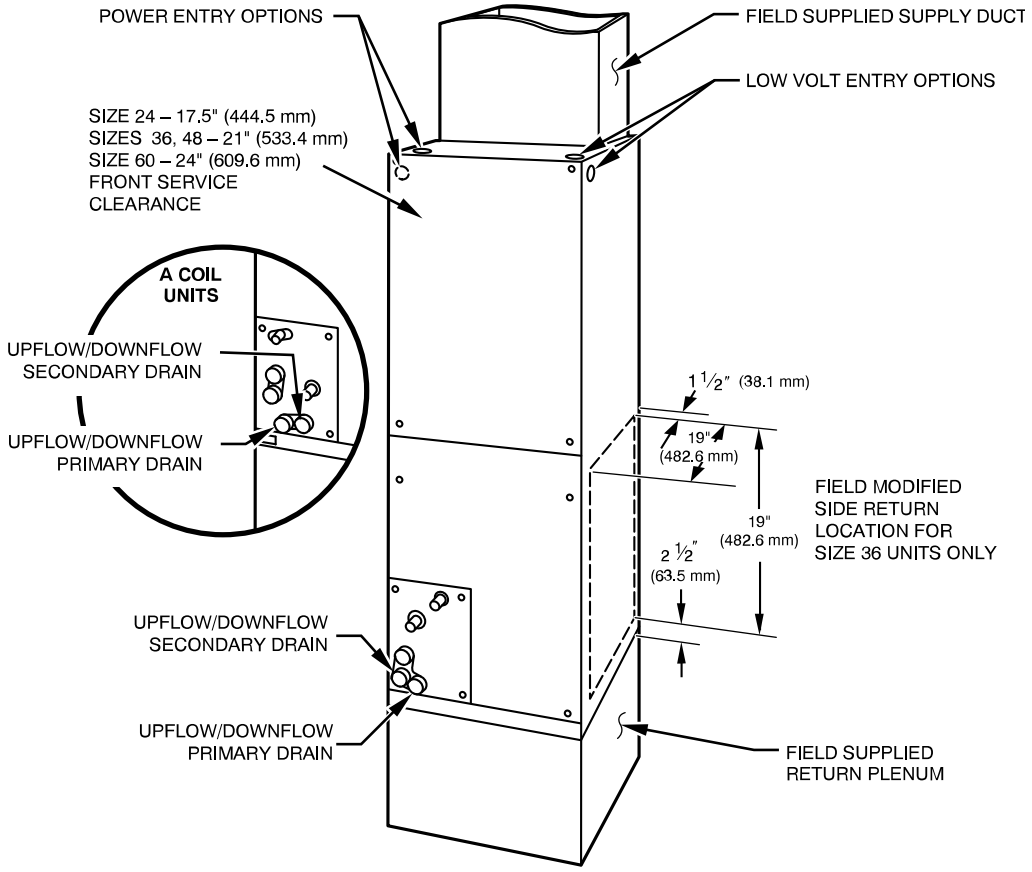

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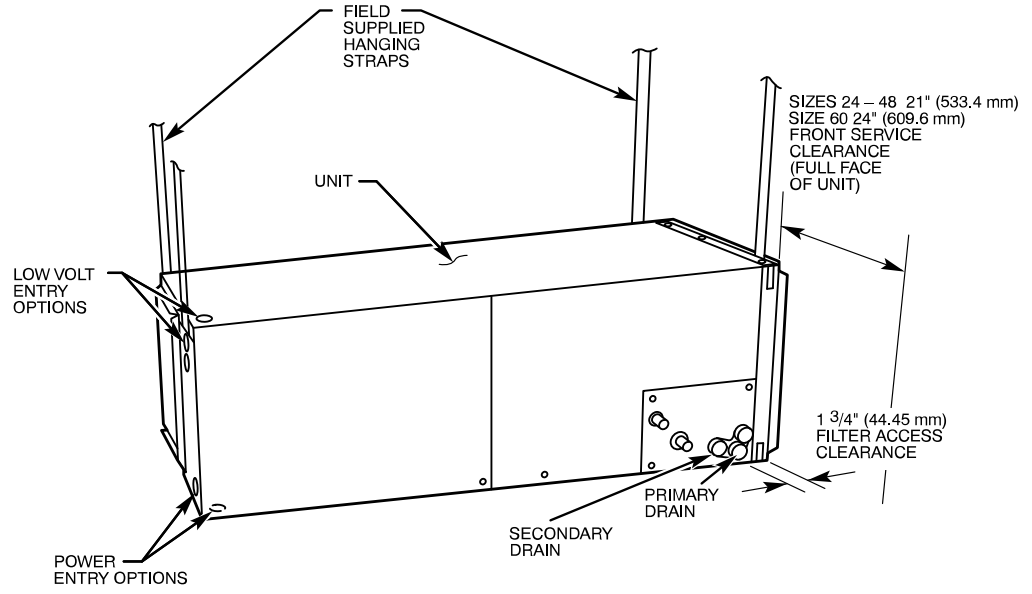
Fig. 1 – Slope Coil Unit in Upflow Application



A07140B

Fig. 2 – Slope Coil in Horizontal Left Application

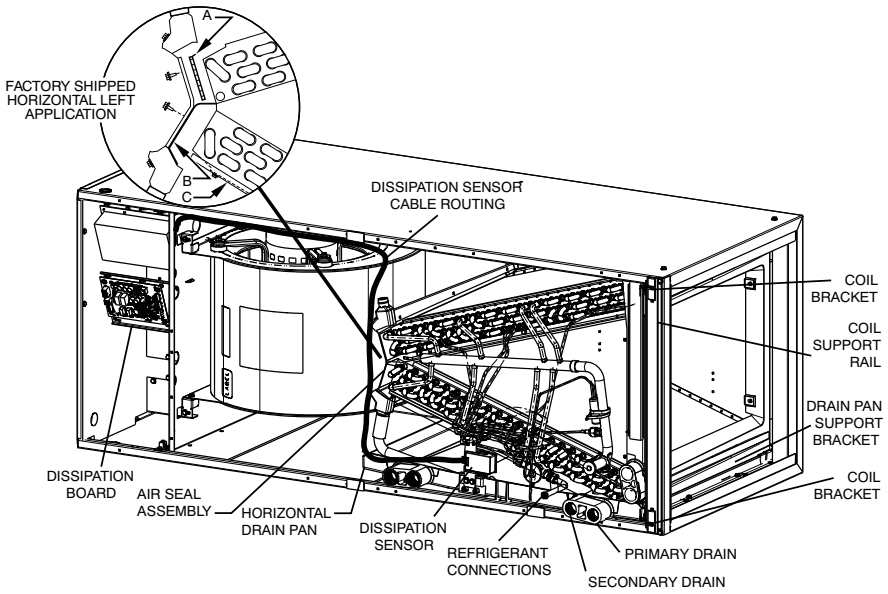


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Fig. 3 – A-Coil in Horizontal Left Application

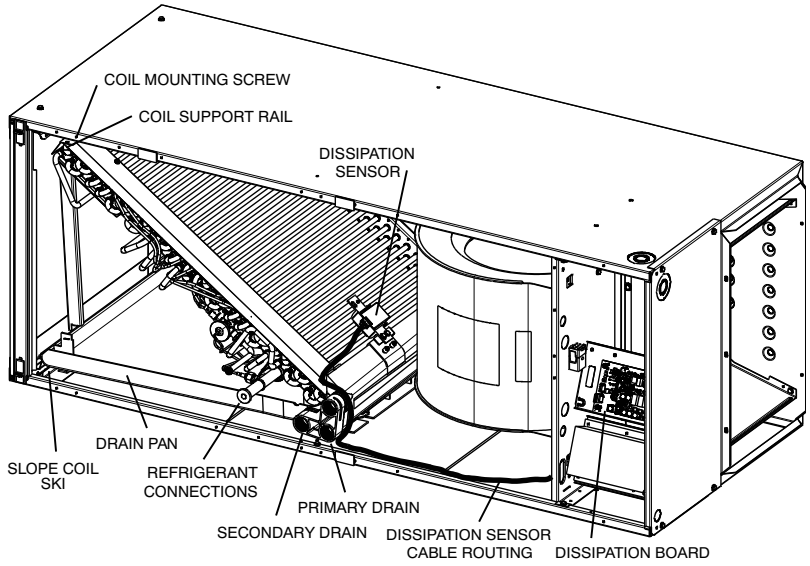

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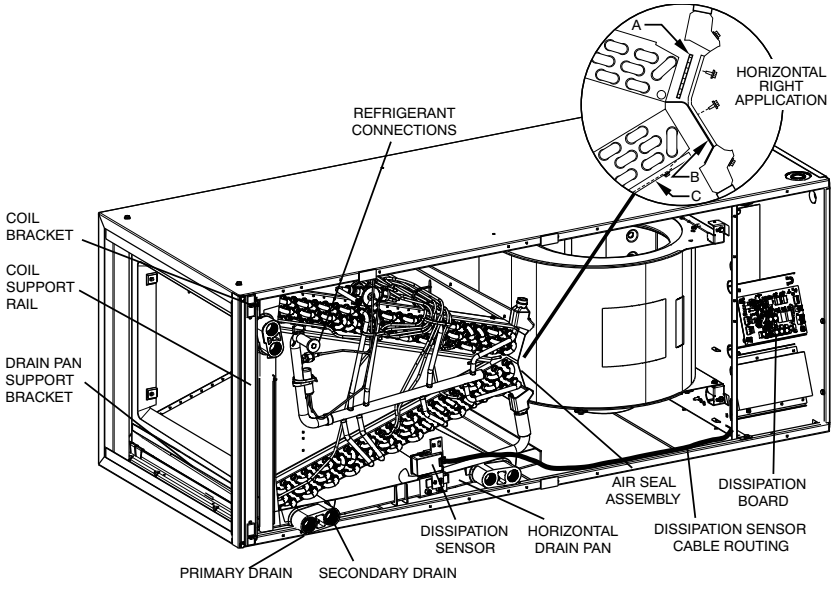
Fig. 4 – Conversion for Horizontal Right Applications - Slope Coil Only



A240080

Fig. 5 – Conversion for Horizontal Right Applications - A-Coil Only

Modular Units

The FE5B Fan Coil in sizes 36, 48, and 60 are available as 2-piece modular units. Modular construction allows installer to disassemble unit into 2 components, coil box and blower box, for ease of installation.

To disassemble unit, remove rear corner brackets by removing 2 screws which secure brackets. Remove either 2 screws in each front corner of coil box, or 2 screws in blower box (Fig. 6). Do not remove all 4 screws in each corner. Sections may now be separated by lifting top section from lower section.

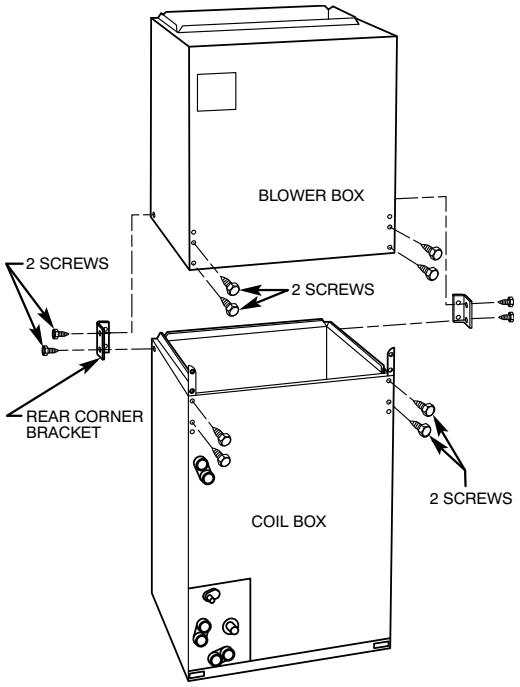
To reassemble, reverse above procedure. Be certain to reinstall all fasteners when reassembling.

Upflow Installation

If return air is to be ducted through a floor, set unit on floor over opening and use 1/8 to 1/4-in (3 to 6 mm) thick fireproof resilient gasket between duct, unit, and floor.

Side return is a field option on slope coil models. Cut opening per dimensions (Fig. 1). A field-supplied bottom closure is required.

All return-air must pass through the coil.



A95293

Fig. 6 – Removal of Brackets on Modular Unit

Downflow Installation

In this application, field conversion of the evaporator is required using accessory downflow kit along with an accessory base kit.

⚠ CAUTION

PRODUCT OR PROPERTY DAMAGE HAZARD

Failure to follow this warning caution may result in product or property damage.

The conversion of the fan coil to downflow requires special procedures for the condensate drains on both A-coil and Slope-coil units. The vertical drains have an overflow hole between the primary and secondary drain holes. This hole is plugged for all applications except downflow, and must be used for downflow. During conversion process, remove plastic cap covering vertical drains only and discard. Remove plug from overflow hole and discard. At completion of downflow installation, caulk around vertical pan fitting to door joint to retain low air leak performance of the unit.

NOTE: To convert units for downflow applications, refer to Installation Instructions supplied with kit for proper installation. See the Product Data or contact your supplier for the kit number. Use fireproof resilient gasket, 1/8- to 1/4-in. (3.2 to 6.4mm) thick, between duct, unit, and floor.

Horizontal Installation

Units must not be installed with access panels facing up or down.

For applications having high return static and humid return air, the Water Management Kit, KFAHC0125AAA, may need to be used to assist in water management.

Be sure installation complies with all applicable building codes that may require installation of a secondary condensate pan.

1. Arrange support for unit by setting it in or above secondary condensate pan.
2. When suspending unit from ceiling dimples in casing indicate proper location of screws for mounting metal support straps (Fig. 2).

Horizontal Right Conversion of Units with Slope Coils

NOTE: Gasket kit number KFAHD0101SLP is required for horizontal slope coil conversion to maintain low air leak/low sweat performance.

1. Remove blower and coil access panels and fitting panel (Fig. 4).
2. Disconnect sensor on drain pan and cut wire tie securing sensor harness to the coil.
3. Undo sensor wire routing and place entire harness in the control box.
4. Remove coil mounting screw securing coil assembly to right side casing flange.
5. Remove coil assembly.
6. Lay fan coil on its right side and reinstall coil assembly with condensate pan down (Fig. 4).
7. Attach coil to casing flange using previously removed coil mounting screw.
8. Reconnect sensor wire harness by following routing shown (Fig. 4).

IMPORTANT: Sensor must be installed with the connector facing down or facing horizontally. Sensor should never be positioned with connector facing upward. Incorrect sensor position could result in premature failure.

9. Make sure pan cap in fitting door is properly seated on fitting door to retain low air leak rating of the unit.
10. Add gaskets from kit - KFAHD.
11. Align holes with tubing connections and condensate pan connections. Reinstall access panels and fitting panel.
12. Make sure liquid and suction tube grommets are in place to prevent air leaks and cabinet sweating. Install grommets after brazing.

Horizontal Right Conversion of Units with A-Coils

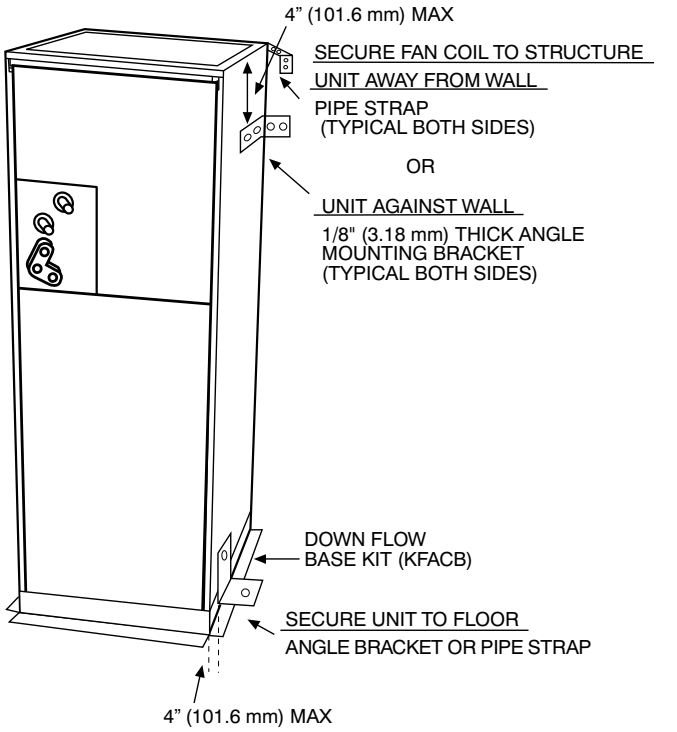
1. Remove blower and coil access panels (Fig. 5).
2. Disconnect and remove sensor on delta plate and install on horizontal drain pan clip **(**Fig. 16).

IMPORTANT: Sensor must be installed with the connector facing down or facing horizontally. Sensor should never be positioned with connector facing upward. Incorrect sensor position could result in premature failure.

3. Undo sensor wire harness routing and place entire harness in the control box.
4. Remove metal clip securing fitting panel to condensate pan. Remove fitting panel.
5. Remove 2 snap-in clips securing A-coil in unit.
6. Slide coil and pan assembly out of unit.
7. Remove horizontal drain pan support bracket from coil support rail on left side of unit and reinstall on coil support rail on right side of unit.
8. Convert air seal assembly for horizontal right.

a. Remove air seal assembly from coil by removing 4 screws (Fig. 5).
b. Remove air splitter (B) from coil seal assembly by removing 3 screws (Fig. 6 inset).
c. Remove filler plate (A) and install air splitter (B) in place of filler plate.
d. Install filler plate (A) as shown in horizontal right application.
e. Remove condensate troughs (C) and install on opposite tube sheets.
f. Install hose onto plastic spout.

9. Install horizontal pan on right side of coil assembly.
10. Slide coil assembly into casing. Be sure coil bracket on each corner of vertical pan engages coil support rails.
11. Reinstall 2 snap-in clips to correctly position and secure coil assembly in unit. Be sure clip with large offsets is used on right side of unit to secure horizontal pan.
12. Reconnect the sensor wire harness by following the routing shown in Fig. 5.
13. Remove two oval fitting caps from left side of the coil, access panel, and fitting panel.
14. Remove insulation knockouts on right side of coil access panel.
15. Remove 2 oval coil access panel plugs and reinstall into holes on left side of coil access panel and fitting panel.
16. Install condensate pan fitting caps (from Step 10) in right side of coil door making sure that cap snaps and seats cleanly on back side of the coil door. Make sure no insulation interferes with seating of cap.
17. Reinstall access and fitting panels, aligning holes with tubing connections and condensate pan connections. Be sure to reinstall metal clip between fitting panel and vertical condensate pan.
18. Make sure liquid and suction tube grommets are in place to prevent air leaks and cabinet sweating.



A07141

Fig. 7 – Mobile Home or Manufactured Housing Applications

Manufactured and Mobile Home Housing Applications

1. Fan coil unit must be secured to the structure using field-supplied hardware.
2. Allow a minimum of 24-in (610 mm) clearance from access panels.
3. Recommended method of securing for typical applications:
   a. If fan coil is away from wall, attach pipe strap to top of fan coil using no. 10 self-tapping screws. Angle strap down and away from back of fan coil, remove all slack, and fasten to wall stud of structure using 5/16-in. lag screws. Typical both sides of fan coil.
   b. If fan coil is against wall, secure fan coil to wall stud using 1/8-in (3 mm) thick right-angle brackets. Attach brackets to fan coil using no. 10 self-tapping screws and to wall stud using 5/16-in. lag screws (Fig. 7).

Air Ducts

⚠ WARNING

EXPLOSION AND PERSONAL HEALTH HAZARD

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

Ensure to keep any required ventilation openings clear of obstruction.

Air ducts connected to the appliance shall not contain a POTENTIAL IGNITION SOURCE.

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1292°F (700°C) and electric switching devices. Ensure only manufacturer approved auxiliary devices are installed.

Connect the supply-air duct over the outside of the 3/4-in. flange provided on the supply-air opening. Secure the duct to the flange with proper fasteners for type of duct used, and seal duct-to-unit joint.

Duct connection flanges are provided on unit air discharge connection.

Use flexible connectors between ductwork and unit to prevent transmission of vibration. When electric heater is installed, use heat resistant material for flexible connector between ductwork and unit at discharge connection. Ductwork passing through unconditioned space must be insulated and covered with vapor barrier.

Duct Work Acoustical Treatment

Metal duct systems that do not have a 90 degree elbow and 10 feet of main duct before first branch takeoff may require internal acoustical insulation lining. As an alternative, fibrous duct work may be used if constructed and installed in accordance with the latest edition of SMACNA construction standard on fibrous glass ducts. Both acoustical lining and fibrous duct work shall comply with National Fire Protection Association as tested by UL Standard 181 for Class 1 air ducts.

Electrical Connections

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before installing or servicing unit, always turn off all power to unit. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable.

⚠ WARNING

ELECTRICAL SHOCK OR UNIT DAMAGE HAZARD

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

If a disconnect switch is to be mounted on unit, select a location where drill and fasteners will not contact electrical or refrigeration components.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Field wires on the line side of the disconnect found in the fan coil unit remain live, even when the pull-out is removed. Service and maintenance to incoming wiring cannot be performed until the main disconnect switch (remote to the unit) is turned off.

Line Voltage Connections

If unit contains an electric heater, remove and discard power plug from fan coil and connect male plug from heater to female plug from unit wiring harness. (See Electric Heater Installation Instructions.)

For units without electric heat:

1. Connect 208/230V power leads from field disconnect to yellow and black stripped leads
2. Connect ground wire to unit ground lug.

Check all factory wiring per unit wiring diagram and inspect factory wiring connections to be sure none were loosened in transit or installation.

NOTE: Before proceeding with electrical connections, make certain that supply voltage, frequency, and phase are as specified on unit rating plate. Be sure that electrical service provided by the utility is sufficient to handle the additional load imposed by this equipment. See unit wiring label for proper field high- and low- voltage wiring. Make all electrical connections in accordance with NEC and any local codes or ordinances that may apply. Use copper wire only. The unit must have a separate branch electric circuit with a field-supplied disconnect switch located within sight from and readily accessible from the unit.

A factory-authorized disconnect kit is available for installation of 0- through 10-kW applications. When electric heat packages with circuit breakers are installed, the circuit breaker can be used as a disconnect.

Transformer is factory wired for 230V operation. For 208V applications, disconnect black wire from 230V terminal on transformer and connect it to 208V terminal (Fig. 8).

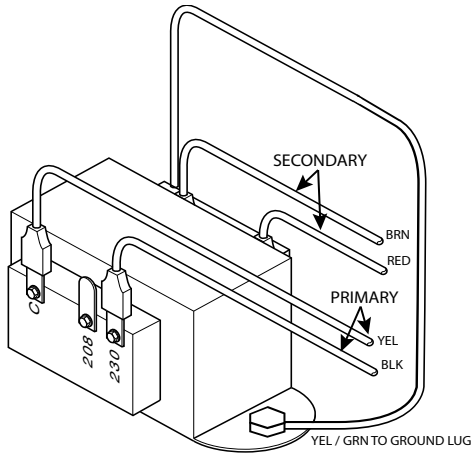


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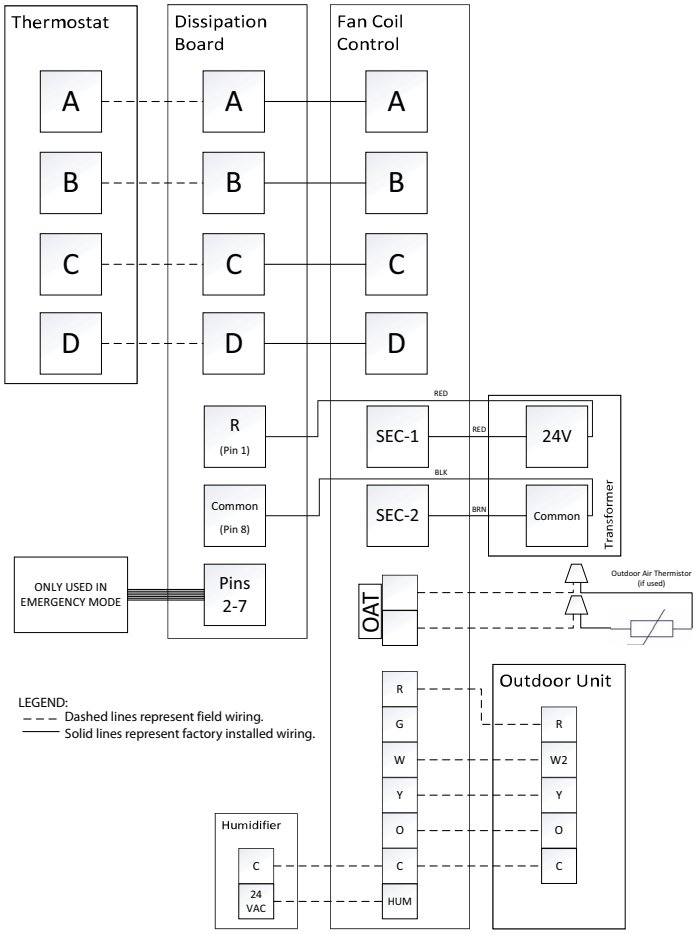
Fig. 8 – Transformer Connections

24V Control System Connections to Unit Printed-Circuit Board

Use No. 18 AWG color-coded, insulated (35°C minimum) wires to make low-voltage connections between User Interface (Thermostat) and unit. If User Interface is located more than 100 ft. from unit (as measured along the low-voltage wires), use No. 16 AWG color-coded, insulated (35°C minimum) wires or in accordance with local codes.

Connect low-voltage leads to User Interface and outdoor unit (Fig. 9 or Fig. 10).

NOTE: Where local codes require User Interface wiring be routed through conduit or raceways, splices can be made inside fan coil unit. All wiring must be NEC Class l and must be separated from incoming power leads.



A230532

Fig. 9 – Fan Coil Wiring with Non-Communicating Single-Stage AC/HP

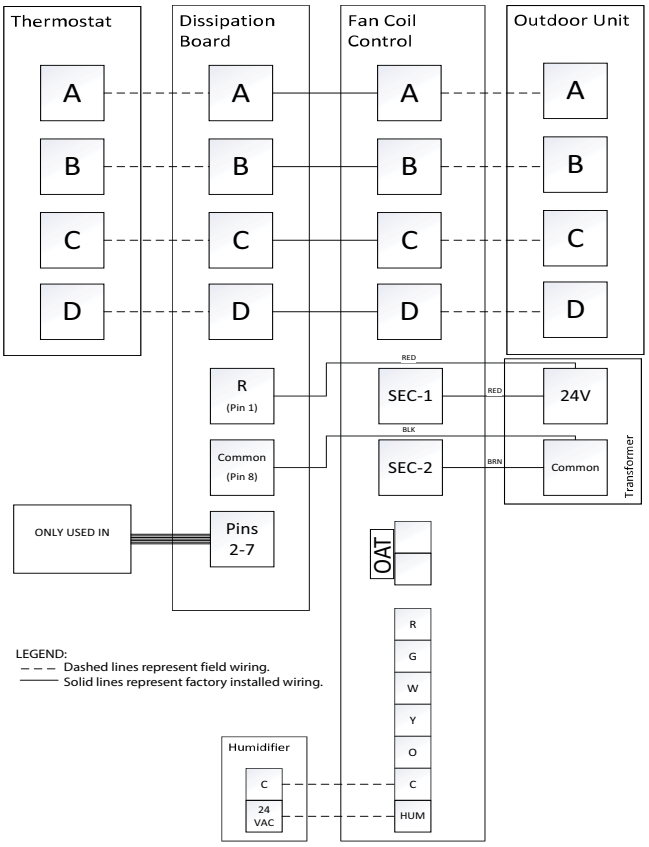


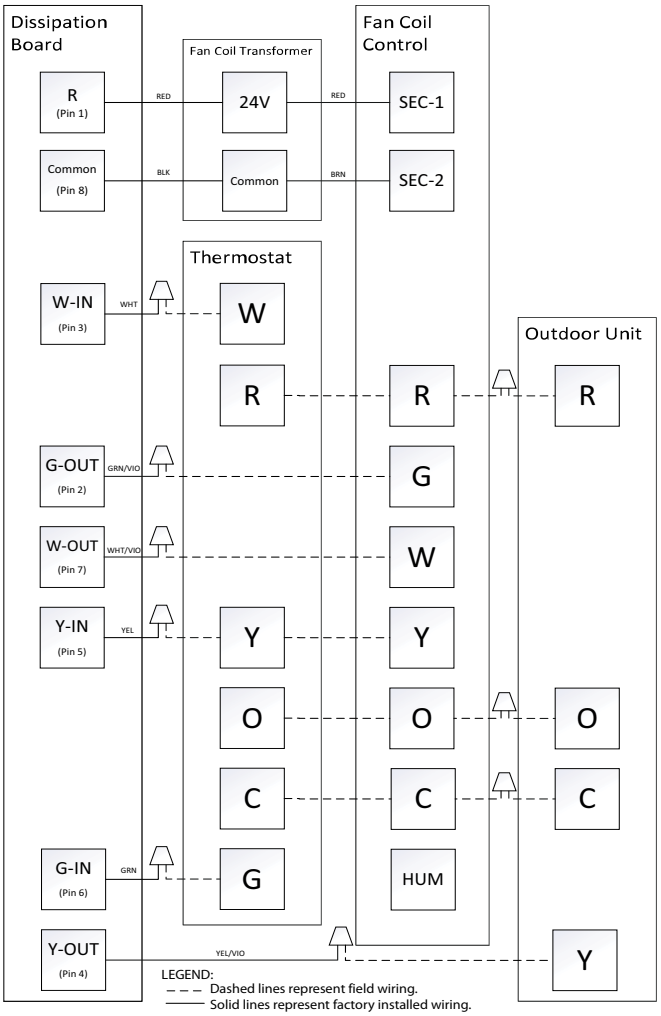
Fig. 10 – Fan Coil Wiring with Communicating AC/HP A230531

Manufactured Housing

In manufactured housing applications, the Code of Federal Regulations, Title 24, Chapter XX, Part 3280.714 requires that supplemental electric heat be locked out at outdoor temperatures above 40°F (4°C), except for a heat pump defrost cycle.

Emergency Mode

FE5B Units have the capability to be used in an emergency mode with a non-communicating thermostat. This instance will occur when the User Interface is damaged or inoperable. The emergency mode for the FE5B allows for basic heating and cooling operation, but loses all communicating functionality. The unit is shipped with the ability to be converted to emergency mode. All wires in the dissipation bundle are 18 gauge and will require installer to strip and connect to proper 24V connection as shown in Fig. 11.



A230530

Fig. 11 – Emergency Mode

Ground Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to establish uninterrupted or unbroken ground could result in personal injury and/or death.

According to NEC, NFPA 70, and local codes, the cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. If conduit connection uses reducing washers, a separate ground wire must be used.

NOTE: Use UL listed conduit and conduit connector to connect supply wire(s) to unit and obtain proper grounding. If conduit connection uses reducing washers, a separate ground wire must be used. Grounding may also be accomplished by using grounding lug provided in control box. Use of dual or multiple supply circuits will require grounding of each circuit to ground lugs provided on unit and heaters.

Refrigerant Tubing Connection and Evacuation

Use accessory tubing package or field-supplied tubing of refrigerant grade. Suction tube must be insulated. Do not use damaged, dirty, or contaminated tubing because it may plug refrigerant flow-control device. ALWAYS evacuate the coil and field-supplied tubing to 500 microns before opening outdoor unit service valves.

⚠ CAUTION

PRODUCT DAMAGE HAZARD

Failure to follow this caution may result in product or property damage.

A brazing shield MUST be used when tubing sets are being brazed to the unit connections to prevent damage to the unit surface and condensate pan fitting caps.

Units have sweat suction and liquid tube connections. Make suction tube connection first.

IMPORTANT: Federal regulations require that you do not vent refrigerant to the atmosphere. Recover during system repair or final unit disposal.

- Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
- Make provision for expansion and contraction of long piping runs.
- Protect piping and fittings as much as possible against adverse environmental effects; for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris.
- Install piping to reduce the likelihood of hydraulic shock damaging the system.
- Always use certified steel piping and components to protect against corrosion.
- Protect flexible pipe elements against mechanical damage and excessive stress by torsion or other forces. Check flexible pipes for mechanical damage annually.

1. Cut tubing to correct length.
2. Insert tube into sweat connection on unit until it bottoms.
3. All fittings need to withstand 700 PSIG (Mechanical Fittings or Brazing). When brazing, use silver bearing or non-silver bearing brazing material. Do not use solder (materials which melt below 800° F / 427° C). Consult local code requirements.
4. Perform a pressure check of the unit with a nitrogen charge of about 200 psi. The Nitrogen holding charge must not decrease in pressure for 1 hour.
5. Perform leak check on the unit. Vacuum unit to 500 microns. When isolating the unit from the pump, the pressure shall not rise above 1500 microns in 10 minutes.

Mechanical Line Set Connections

If using mechanical or crimp-type line set connections, follow crimp tool manufacturer's instructions.

NOTE: Should the use of mechanical fittings cause failure of the fittings or failure of the equipment, such would not be covered under the standard warranty.

⚠ CAUTION

PRODUCT DAMAGE HAZARD

Failure to follow this caution may result in product or property damage.

Wrap a wet cloth around rear of fitting to prevent damage to TXV and factory-made joints.

Condensate Drains

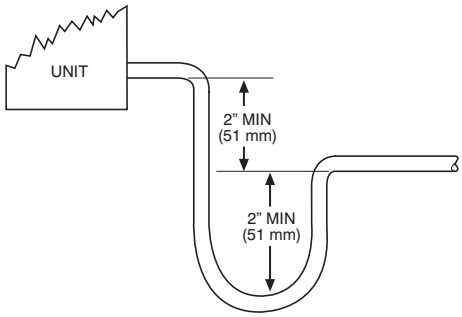
⚠ CAUTION

UNIT OR PROPERTY DAMAGE HAZARD

Failure to follow this warning caution may result in product or property damage.

The conversion of the fan coil to downflow requires special procedures for the condensate drains on both A-coil and Slope-coil units. The vertical drains have an overflow hole between the primary and secondary drain holes. This hole is plugged for all applications except downflow, and must be used for downflow. During conversion process, remove plastic cap covering vertical drains only and discard. Remove plug from overflow hole and discard. At completion of downflow installation, caulk around vertical pan fitting to door joint to retain low air leak performance of the unit.

To connect drains, the cap openings must be removed. Use a knife to start opening near tab and using pliers, pull tab to remove disk. Clean edge of opening if necessary and install the condensate line. Finally, caulk around lines where they exit fitting to retain low leak rating of the unit. Units are equipped with primary and secondary 3/4-in. FPT drain connections. For proper condensate line installation see Fig. 1 thru Fig. 5. To prevent property damage and achieve optimum drainage performance, BOTH primary and secondary drain lines should be installed and include properly sized condensate traps (Fig. 12, Fig. 14). Factory-approved condensate traps are available. Be sure to install plastic push-in plugs in unused condensate drain fittings. It is recommended that PVC fittings be used on plastic condensate pan. Do not over-tighten. Finger-tighten plus 1-1/2 turns. Use pipe dope.

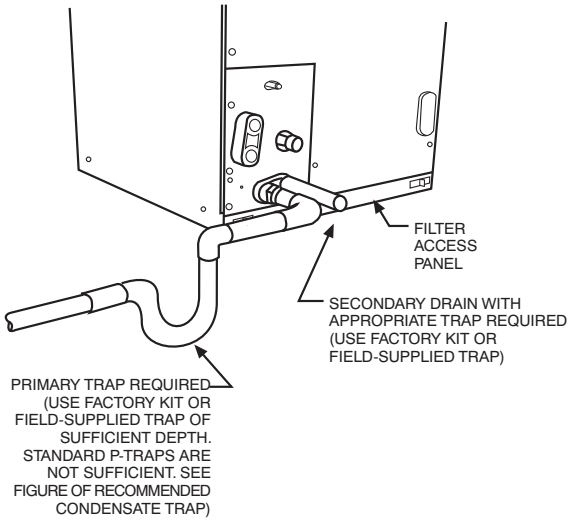


A03002

Fig. 12 – Recommended Condensate Trap

A03013

Fig. 13 – Insufficient Condensate Trap



A03003

Fig. 14 – Condensate Drain

⚠ CAUTION

PRODUCT DAMAGE HAZARD

Failure to follow this caution may result in product or property damage.

Use only full size P-traps in the condensate line (Fig. 12). Shallow running traps are inadequate and DO NOT allow proper condensate drainage (Fig. 13).

NOTE: When connecting condensate drain lines, avoid blocking filter access panel, thus preventing filter removal. After connection, prime both primary and secondary condensate traps.

NOTE: If unit is located in or above a living space where damage may result from condensate overflow, a field-supplied, external condensate pan should be installed underneath the entire unit, and a secondary condensate line (with appropriate trap) should be run from the unit into the pan. Any condensate in this external condensate pan should be drained to a noticeable place. As an alternative to using an external condensate pan, some localities may allow the use of a separate 3/4-in (19 mm) condensate line (with appropriate trap) to a place where the condensate will be noticeable. The owner of the structure must be informed that when condensate flows from the secondary drain or external condensate pan, the unit requires servicing or water damage will occur.

Install traps in the condensate lines as close to the coil as possible (Fig. 14). Make sure that the outlet of each trap is below its connection to the condensate pan to prevent condensate from overflowing the drain pan. Prime all traps, test for leaks, and insulate traps if located above a living area. Condensate drain lines should be pitched downward at a minimum slope of 1-in (25 mm) for every 10-ft (3 m) of length. Consult local codes for additional restrictions or precautions.

⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in product or property damage.

Never operate unit without a filter or with filter access door removed.

IMPORTANT: Factory authorized filters must be used when locating the filter inside the unit (Table 1). For those applications where access to an internal filter is impractical, a field-supplied filter must be installed in return duct system.

Table 1 – Filter Kits

	PART NUMBER	SIZE USED WITH
FILTER KIT (12 PACK)	AFAFLTMED12A	24
	AFAFLTLRG12A	36, 48
	AFAFLTXXL12A	60

Leak Dissipation System

⚠ WARNING

PERSONAL INJURY OR PROPERTY DAMAGE HAZARD

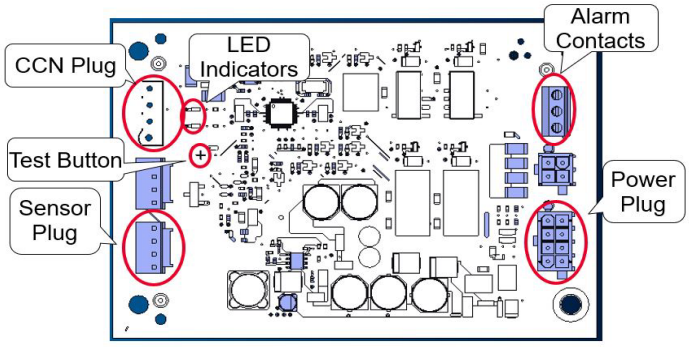
Failure to follow proper R-454B mitigation system installation instructions can result in property damage, personal injury, or death.

If any fault codes are listed, please troubleshoot to prevent system malfunction.

The 24-60 size units come equipped with a communicating factory wired R-454B leak detection and dissipation system to ensure safe operation during a leak. The system consists of a bracket, a PCB, a A2L Detection Sensor, and a drain pan clip. Failure to install this system will result in potentially hazardous conditions and improper equipment operation, and void all system warranties and liabilities.

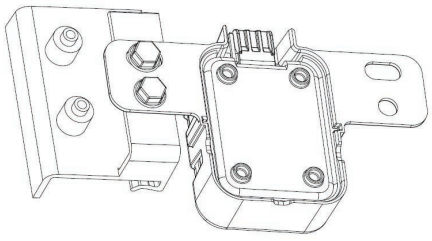
All units are shipped with the A2L Detection Sensor located in the upflow position. For size 36, the sensor will always be installed on the drain pan clip.

The leak dissipation control board will be factory installed inside of the dissipation board housing (Fig. 15).



A230455

Fig. 15 – Leak Dissipation Control Board



A2304490

Fig. 16 – Dissipation Sensor Mounted on Drain Clip

For sizes 24, and 48–60, the sensor comes factory installed on the delta plate (Fig. 17, Fig. 18). As described in the Installation section, for horizontal right and left, the sensor will need to be moved to the drain pan clip (Fig. 16, Fig. 3, Fig. 4, Fig. 5). Follow the wire routing as shown in the applicable graphic.

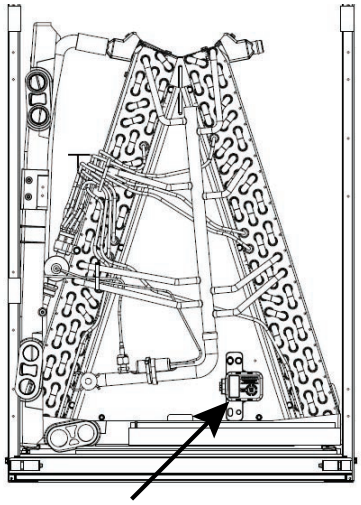
⚠ WARNING

PRODUCT OPERATION / INJURY HAZARD

Failure to follow this warning could cause product damage or personal injury.

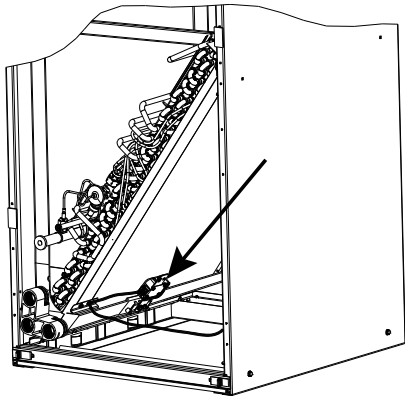
Make sure the sensor is not exposed to significant amounts of dust/dirt contamination. This could clog the sensor and prevent proper functioning. For sensor cleaning instructions, refer to service manual.

IMPORTANT: Sensor must be installed with the connector facing down or facing horizontally. Sensor should never be positioned with connector facing upward. Incorrect sensor position could result in premature failure.



A230501

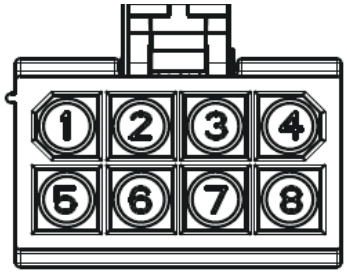
Fig. 17 – A-Coil Vertical Dissipation Sensor Factory Location



A230502

Fig. 18 – Slope Coil Vertical Dissipation Sensor Factory Location

The A2L Detection Sensor is attached to a wiring harness that connects the sensor to the dissipation board (Fig. 19). In upflow, the routing of the wire harness is up the right side of the unit behind the wire retainers for the cabinet insulation. At each wire retainers, the harness is attached using two wire ties.



A230457

Fig. 19 – Front View of Power Wire Harness Pin Layout

Confirm that the harness routing does not interfere with other fan coil components. Place special consideration when routing the harness around the blower. Make sure no loose harness can be pulled into the blower. When routing on the side of the unit, place the harness behind the retainers. Bundle excess harness and secure in the control box. When converting the unit to any orientation, make sure the sensor wiring harness is disconnected and the wire harness has been placed in the control box before any components are moved.

Refer to Fig. 9 through Fig. 11 for low voltage field connections between the dissipation board and the thermostat. All control wires are labeled with the wire function and landing point.

Leak Dissipation System Self-Test

Power on the unit and verify proper functioning of equipment. To find the Dissipation Board, refer to Fig. 3, Fig. 4, or Fig. 5.

When no leak is detected, the system operates normally. In this state, the Dissipation Board Status LED remains solid yellow and the communicating LED remains solid green. When the A2L Detection Sensor reaches a threshold of detected R-454B refrigerant, the Status LED flashes. In that case, see Troubleshooting on p12.

NOTE: Operation of the Test Mode is only possible if no faults exist on the dissipation board.

IMPORTANT: Press the Test button for roughly ONE SECOND to enter Test Mode. Pressing the Test button for a longer periods enables different functions (Table 2).

Press the Test button on the dissipation system control board to ensure proper dissipation system operation under each test condition listed below. After pressing the Test button, system will enter Dissipation Mode for 60 seconds to help verify correct operation.

Table 2 – Dissipation Board Test Button Functions

Hold Button Time (sec)	Function
1 - 4	Dissipation Mode for 60 seconds
5 - 29	Display flash code history
30+	Flash code 6
3 rapid presses	Clear flash code history

Ensure that the fan coil is able to meet the minimum required dissipation mode airflows. These required minimum airflow rates during Dissipation Mode are listed in Table 4. They are based on the total system refrigerant charge quantity.

Table 3 – Required Operational Checks to Ensure Proper Dissipation System Function

Normal Operation				
Test #	**T-Stat Call**	**Compressor**	**Indoor Fan**	**Electric/Gas Heat**
1	None	Off	Off	Off
2	Cool	On	On	Off
3	Heat	Off	On	On
Dissipation Activated				
4	None	Off	On	Off
5	Cool	Off	On	Off
6	Heat	Off	On	Off

Table 4 – Required Minimum Dissipation Mode Airflows, based on Total System Refrigerant Charge Quantity

Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)	Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)
5	133	16	426
6	160	17	452
7	186	18	479
8	213	19	505
9	239	20	532
10	266	21	559
11	293	22	585
12	319	23	612
13	346	24	639
14	372	25	665
15	399		

Troubleshooting

For all flash codes, first try power cycling the system to remove the code. Refer to Table 5.

No power

Verify the wiring to/from pins 1 and 8 on the power harness plug. Check the 24V system wiring from the transformer.

Flashing 1

Check for refrigerant leaks using an independent R-454B detector. If no leaks are present, replace the sensor.

Flashing 2

Check both ends of the sensor wire harness to ensure proper attachment. Power cycle the system to check whether the flash code has been removed. If the flash code is still present, replace the sensor.

Flashing 3

Check for refrigerant leaks using an independent R-454B detector.

Flashing 4

If the code does not clear after power cycling the system, replace the dissipation board.

Flashing 5

If the code does not clear after power cycling the system, replace the sensor.

Flashing 6

Press the test button repeatedly. Power cycle the system. If the button cannot be reset, replace the dissipation board.

Flashing 7

Verify wiring of all "Y" and "W" wires in the applicable wiring diagram.

Flashing 8

Verify wiring of all "Y" and "W" wires in the applicable wiring diagram.

Table 5 – Flash Code Chart

Yellow LED	Reason	Mode
Solid	Normal Operation	Normal Operation
Flashing 1	Sensor >= 20% LFL	Dissipation
Flashing 2	Sensor Open	Dissipation
Flashing 3	Normal Mitigation after Leak	Dissipation
Flashing 4	No Power to G Output	Dissipation with no Blower
Flashing 5	Fault with A2L Digital Sensor	Dissipation
Flashing 6	Test Button Stuck (>30 s)	Dissipation
Flashing 7	Y or W Wiring Inverted	Normal Operation
Flashing 8	Y or W Shorted	Normal Operation

Unit Start-Up

Refer to outdoor unit Installation Instructions for system start-up instructions and refrigerant charging method details.

IMPORTANT: Make sure that the User Interface (Thermostat) software and the outdoor unit software are updated to the latest versions. Failure to do so may cause the dissipation system to be inoperable as it is not compatible with older versions of system control and outdoor unit software.

IMPORTANT: .

Low-Voltage Circuit Fusing and Reference

The low-voltage circuit is fused by a board-mounted 3-Amp. automotive fuse placed in series with transformer SEC1 and R circuit. The C circuit of transformer circuit is referenced to chassis ground through a printed circuit run at SEC2 and metal PC board mounting eyelets. Check to be sure PC Board is mounted securely using both factory installed screws.

NOTE: Mis-wiring or shorting any of the low voltage connections may cause the low voltage fuse to open but will not damage the User Interface or fan coil control. Simply rewire and replace fuse to correct fault.

Accessory Installation

Accessory Electric Heaters

Electric heaters may be installed with FE5B fan coil per instructions supplied with electric heater package. See unit rating plate for factory-approved electric heater kits.

For 3-phase heaters, the Dissipation System will need to be removed from the inside of the unit and installed on the outside of the unit per electric heater kit installation instructions.

Hydronic Heat Applications

The FE fan coil supports 2 types of Hydronic Heat applications:

1. Hot water coil in combination with a heat pump, or hot water coil as sole heat source.
2. FE fan coil combined with radiant hot water heat.

In either application, a Relay Interface Kit (refer to Product Data) must be installed in place of an electric heater. The system will identify that Hydonic Heat has been installed during the initial commissioning process. The system will treat the hot water coil as either auxiliary heat in a heat pump application, or as the sole heat source. Setup options for Hydronic Heat applications are described in the User Interface Installation Instructions. Options include: Hot Water Only Operation, Heat Pump Only Operation, Hot Water Operation during Defrost, Airflow Level Selection, and Blower ON/OFF Delays.

Outdoor Air Thermistor (OAT)

A 2-screw terminal strip is provided for connection of an outdoor temperature thermistor. This strip is marked OAT. The installation of an outdoor temperature sensor using the fan coil OAT terminals is optional. If the outdoor unit is not equipped for communications, fan coil OAT input can be used to supply outdoor temperature data for system level functions and for temperature display on User Interface. Outdoor units with a communicating control are shipped with a factory installed OAT. This factory installed OAT is used for all outdoor unit specific and system level functions requiring outdoor temperature if an OAT is not added to fan coil. If an OAT is added in the fan coil, the fan coil connected OAT will be used for system level functions and the factory supplied outdoor unit OAT will be used for outdoor unit control functions.

Using two wires of field-supplied thermostat wire cable, wire one lead of thermistor to one screw terminal and the other lead to remaining screw terminal; there is no polarity to be observed. It is strongly recommended that two wires be used to connect the thermistor to eliminate noise interference in temperature reading. If there are not two spare wires available in cable, one wire may be used to connect thermistor to OAT screw terminal 1 and the other lead of the thermistor can be wired to 24VAC COM (C) wire. OAT screw terminal 1 is terminal located closest to the ABCD system communications and is marked with a small number 1 next to the terminal strip.

NOTE: Mis-wiring OAT inputs will not cause damage to either fan coil control or thermistor. If the thermistor is wired incorrectly, no reading will appear at User Interface. Re-wire thermistor correctly for normal operation.

Electronic Air Cleaner Connections

When using an electronic air cleaner with FE5B fan coil, use airflow sensor part no. KEAAC0101AAA. The airflow sensor turns on electronic air cleaner when fan coil blower is operating.

Humidifier Connections

The fan coil control terminal marked “HUM” is provided for low voltage (24VAC) control of a humidifier. No humidistat is required as User Interface monitors indoor humidity. When commanded to operate humidifier, the fan coil control will energize the “HUM” output to turn humidifier on and de-energize HUM output to turn humidifier off. Wire “HUM” and “C” terminals directly to humidifier.

System Shutdown Accessories

The FE5B fan coil G thermostat terminal input can be configured through the User Interface to recognize accessories that will shut the system down in response to a malfunction. Types of devices may include a Condensate Overflow Switch that is designed for this purpose. The fan coil can be configured to recognize either Normally Open or Normally Closed (default) contact devices through the User Interface Set-Up screens. Wire the accessory device contacts in series with the R and G thermostat connections at the fan coil control board. The User Interface will respond to the accessory device signal by ordering a shutdown of the indoor and outdoor equipment and will display SYSTEM MALFUNCTION on its screen. Refer to the User Interface Installation Instructions for more detail.

Generator

The FE5B fan coil G thermostat terminal input can be configured through the User Interface to recognize a Generator Normally Open dry-contact output to signal the system that a generator malfunction condition exists. Wire the generator output in series with the R and G thermostat connections at the fan coil control board. The User Interface will display GENERATOR MALFUNCTION when the G thermostat input is energized. This function requires the addition of a Generator Self Test Verifier (Part No. GSV200) which must be purchased separately. Visit www.GeneratorVerifier.com for details and ordering information. Refer to the User Interface Installation Instructions for more detail.

Ventilation Accessory

The FE5B fan coil G thermostat terminal input can be configured through the User Interface to recognize a Normally Open dry-contact output to signal the system that a Ventilation Accessory requires fan coil blower operation. Blower operation can be configured for Low, Med or High speed when the G terminal is energized. Wire the Accessory output in series with the R and G thermostat connections at the fan coil control board. Refer to the User Interface Installation Instructions for more detail.

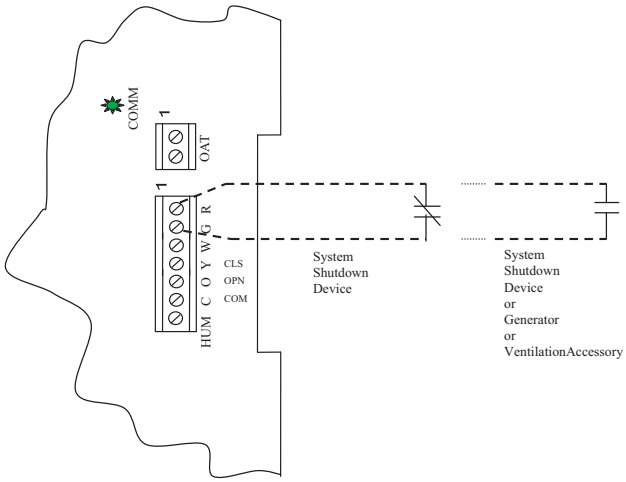


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Fig. 20 – “G” Terminal Accessory Wiring

Start-Up and Troubleshooting

NOTE: Always check high and low voltage supply to the fan coil components. Check the integrity of the plug receptacle connections and fan coil wiring harness prior to assuming a component failure.

LED Description:

LEDs built into fan coil control provide installer or service person information concerning operation and/or fault condition of the fan coil control and ECM motor. This information is also available at system User Interface in text with basic troubleshooting instructions. Careful use of information displayed will reduce the need for extensive manual troubleshooting.

The amber LED located at bottom center of control adjacent to motor harness plug is motor status LED and it is labeled MOTOR. A second amber LED located in upper right center of control adjacent to System Communications connector (A,B,C,D) is the System Status LED and it is labeled STATUS. The green LED labeled COMM is also located adjacent to System Communications connector, below STATUS LED, and is used as an indicator of system communications status. Status Codes will be displayed on the STATUS LED using the following protocol:

1. The number of short flashes indicates first digit of code.
2. The number of long flashes indicates second digit of code.
3. A short flash is 0.25 seconds on. A long flash is 1 second on.
4. The time between flashes is 0.25 seconds.
5. The time between last short flash and first long flash is 1 second.
6. The LED will be off for 2.5 seconds before repeating code.

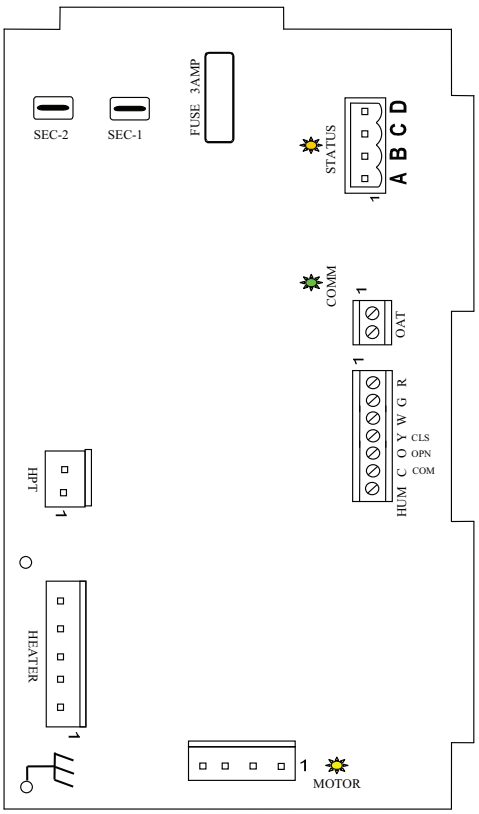

Fig. 21 – Detail of Printed-Circuit Board (PCB) Connections

Fan Coil Control Start-Up and System Communications Troubleshooting:

On power up, green COMM LED will be turned off until successful system communications are established (this should happen within 10 seconds). Once communications with User Interface are successful, COMM LED will be lit and held on. At the same time, amber STATUS LED will be lit and held continuously on until a request for operating mode is received. The STATUS LED will be on any time fan coil is in idle mode. If, at any time, communications are not successful for a period exceeding 2 minutes, fan coil control will only allow emergency heating or cooling operation using a common thermostat, a non-communicating outdoor unit and the R, C, Y, O, W outdoor unit terminal strip connections and will display **Status Code 16, System Communication Fault**, on amber STATUS LED. No further fan coil troubleshooting information will be available at User Interface until communications are re-established.

If COMM LED does not light within proper time period and Status Code is not displayed:

1. Check system transformer high and low voltage to be sure the system is powered.
2. Check fuse on fan coil control to be sure it is not blown. If fuse is open, check system wiring before replacing it to be sure a short does not cause a failure of replacement fuse.

If COMM LED does not light within proper time period and Status Code is displayed:

Check system wiring to be sure User Interface is powered and connections are made A to A, B to B, etc. and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications.

NOTE: Shorting or mis-wiring low voltage system wiring **will not** cause damage to fan coil control or User Interface but may cause low voltage fuse to open.

ECM Motor Troubleshooting

The ECM motor used in this product consists of two parts: the Control Module and the motor winding section. Do not assume motor or module is defective if it will not start. Use the designed-in LED information aids and follow troubleshooting steps described below before replacing motor Control Module or entire motor. Motor Control Module is available as a replacement part.

Verify Motor Winding Section:

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

After disconnecting power from the ECM motor, wait at least 5 minutes before removing the control section. Internal capacitors require time to discharge.

Before proceeding to replace a motor Control Module:

1. Check motor winding section to be sure it is functional.
2. Remove motor Control Module section and unplug winding plug. Motor shaft should turn freely, resistance between any two motor leads should be similar and resistance between any motor lead and unpainted motor end should exceed 100,000 ohms.
3. Failing any of these tests, entire ECM motor must be replaced.
4. Passing all of the tests, motor Control Module alone can be replaced.

MOTOR TURNS SLOWLY:

1. Low static pressure loading of blower while access panel is removed will cause blower to run slowly, particularly at low airflow requests. This is normal, do not assume a fault exists.
2. Recheck airflow and system static pressure using User Interface service screens with access panel in place.

NOTE: Blower motor faults will not cause a lockout of blower operation. Fan coil control will attempt to run the blower motor as long as User Interface maintains a demand for airflow. Fan coil control will not operate electric heaters while a fault condition exists. The fan coil control communicates with the motor at least once every 5 seconds, even when the motor is idle. If, during operation, the fan coil control does not communicate with the motor for more than 25 seconds, the motor will shut itself down and wait for communications to be reestablished.

Using Motor LED in Troubleshooting

The MOTOR LED is connected to the blower motor communication line and works with the fan coil control microprocessor and the STATUS LED to provide fan coil operation and troubleshooting information. When the motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor. When the motor is commanded to stop, the MOTOR LED will be turned off.

If the MOTOR LED is lit, flashing and the motor is running or if the MOTOR LED is off and the motor is stopped, operation is normal and no motor fault exists.

If the MOTOR LED is lit, flashing and the motor does not run, or if the MOTOR LED is off and the motor is running, check the STATUS LED for the Status Code. Refer to the troubleshooting instructions for the indicated Status Code in Fan Coil Control Start-Up and System Communications Troubleshooting: on p14.

Fan Coil Troubleshooting

Fan coil faults indicated by flashing codes on the amber system STATUS LED can be resolved using troubleshooting information provided below. Codes are listed in order of their priority, highest to lowest. Though

multiple faults can exist at any time, only the highest priority code will be displayed on STATUS LED. Clearing the indicated fault when multiple faults exist will cause the next highest priority Status Code to be flashed. All existing faults, as well as a fault history, can be viewed at User Interface.

Status Code 45, Control Board Test Fault:

Fan coil control has failed internal start-up tests and must be replaced. No other service procedure will correct.

Status Code 37, Heater Output Sensed "ON" When Not Energized:

Fan coil control is provided with circuitry to detect presence of a 24VAC signal on Electric Heater stage 1 and stage 2 outputs. If fan coil control detects a 24VAC signal on either heater stage output and it is not supplying signal, Status Code 37 will be displayed on STATUS LED. Fan coil control will turn off output and command blower motor to supply an airflow determined to be safe for current operation mode with electric heaters energized.

To find the fault:

1. Stop all system operations at User Interface and check heater stage 24VAC outputs.
2. Disconnect electric heater at plug/receptacle 2 and check heater wiring for faults. See Status Code 36 for more information.

Status Code 44, Motor Communication Fault:

The MOTOR LED is connected to the blower motor communication line and works with the fan coil control microprocessor and STATUS LED to provide fan coil operation and troubleshooting information. When motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor.

When the motor is commanded to stop, the MOTOR LED will be turned off. The MOTOR LED will not flash to indicate communications when it is turned off.

Fan coil control is constantly communicating with the motor, even when the motor and MOTOR LED are off. If motor does not acknowledge receipt of communications, the control will display Status Code 44 on STATUS LED and continue to try to communicate with the motor. If motor acknowledges communication, Status Code will be cleared.

If MOTOR LED is lit and flashing and motor does not run:

1. Check the STATUS LED. If STATUS LED is indicating a Status 44 code, check the motor wiring harness for proper connection to control and motor receptacles.
2. Check motor wiring harness to be sure all wiring complies with wiring diagram description, makes a complete circuit from connector to connector and is not shorted.
3. Check 12VDC low voltage supply to motor at pins 1 (+) and 2 (-) of motor header connection to fan coil control.

If all checks are normal, fan coil control is good and Control Module on motor may need replacement. Check motor and Motor Control Module following the instructions in Section C. ECM Motor Troubleshooting.

Shorted or mis-wiring of the low voltage motor harness wiring will not cause damage to fan coil control or to motor Control Module.

If the MOTOR LED is off, STATUS LED is indicating a Status Code 44 and motor is running:

Disconnect the motor harness at the fan coil control. If motor continues to run, fan coil control is good and Control Module on motor may need replacement.

Status Code 25, Invalid Motor / Model Selection:

On initial start-up, fan coil control shall poll motor for its size data and check fan coil size data stored in fan coil control memory.

1. If motor size is incorrect for fan coil size or fan coil size data is invalid, Status Code 25 will be displayed on STATUS LED.
2. If model size data is missing (as is the case when a replacement fan coil control is installed), system User Interface will prompt installer to enter correct model size from a list of valid sizes.
3. If motor size is incorrect for model size, motor must be replaced with proper size motor. **Fan coil control will not respond to operation requests until this fault condition is resolved.**

Status Code 27, Invalid Outdoor Unit Size:

On initial power-up, fan coil control will write into memory outdoor unit size as provided by User Interface in a fully communicating system.

1. If outdoor unit size is invalid, Status Code 27 will be displayed on STATUS LED.
2. User Interface will prompt the installer to choose size from a list of valid sizes for application with fan coil.
3. Check communications wiring to be sure User Interface has established communications with outdoor unit or select proper size from valid size list provided at User Interface.
4. Check motor and motor Control Module following the instructions in Section C. ECM Motor Troubleshooting.

Status Code 26, Invalid Heater Size:

On initial power-up, fan coil control will write into memory electric heater size as read from heater if heater is provided with Identifier Resistor (IDR). Heater size must be valid for combination of indoor and outdoor components installed. Fan coil control will read IDR value connected to pins 5 and 8 of heater harness connector. If no resistor is found, system User Interface will prompt installer to verify that no heater is installed. Verifying that this is correct will establish that fan coil is operating without an electric heater accessory. Upon choosing negative option, installer will be prompted to select heater size installed from a list of valid heater sizes for fan coil and outdoor unit size installed. If heater ID resistor value read is invalid, Status Code 26 will be displayed on STATUS LED. If heater installed is equipped with a resistor connected to pins 5 and 8 of heater harness connector and Status Code 26 is displayed on STATUS LED:

1. Check wiring harness connections to be sure connections are secure.
2. If symptoms persist, disconnect wiring harness at fan coil control heater header and check for a resistance value greater than 5000 ohms.
3. Check for proper wiring of resistor assembly.
4. Make sure heater size installed is an approved size for outdoor unit and fan coil sizes installed.

NOTE: Fan coil control will not operate electric heater until this Status Code is resolved. If the heater size is set through the User Interface, the heater will be operated as a single stage heater. If staging is desired, the IDR value must be read in by the fan coil control.

Status Code 36, Heater Output Not Sensed When Energized:

Fan coil control is provided with circuitry to detect presence of a 24VAC signal on Electric Heater stage 1 and stage 2 outputs. If fan coil control energizes either heater stage and does not detect the 24VAC signal on output, Status Code 36 will be displayed on the STATUS LED Fan coil control will continue to energize heater output(s) and adjust blower operation to a safe airflow level for energized electric heat stage(s).

To find the fault:

Check for 24VAC on heater stage outputs. Fan coil control or sensing circuit may be bad.

NOTE: It may be useful as an electric heater troubleshooting procedure to disconnect the system communications to force Status Code 16 enabling of emergency heat mode. It is difficult to know which heater output is energized or not energized in normal operation. When fan coil is operated in emergency heat mode using electric heaters, both outputs

are energized and de-energized together. Terminal strip inputs to control can then be connected R to W to turn on both electric heat outputs. Heater output sensing circuits can then be checked to resolve Status Code 36 or 37 problems.

Status Code 41, Blower Motor Fault:

If MOTOR LED is lit and flashing and motor does not run:

1. Check STATUS LED. If STATUS LED is indicating Status Code 41, motor control has detected that the motor will not come up to speed within 30 seconds of being commanded to run or that the motor has been slowed to below 250 rpm for more than 10 seconds after coming up to speed. Motor wiring harness and fan coil control are operating properly, do not replace.
2. Check to be sure that the blower wheel is not rubbing the housing.
3. Check motor to be sure that the motor shaft is not seized (motor Control Module must be removed and electronics disconnected from windings to perform this check properly).
4. Check motor windings section following instructions in Section C. ECM Motor Troubleshooting.

If all these checks are normal, the motor Control Module may need replacement.

Status Code 16, System Communication Fault:

On initial power-up and at any time system communications are not successful for a period exceeding 2 minutes following successful communications, the fan coil control will only allow emergency heating or cooling operation using a common thermostat, a non-communicating outdoor unit, and the RGWYO outdoor unit terminal strip connections and will display Status code 16 on the amber STATUS LED (see section E, Emergency Heating and Cooling Modes). No further fan coil troubleshooting information will be available at the User Interface until communications are reestablished.

Check system wiring to be sure the User Interface is powered and connections are made A to A, B to B, etc. and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications. Correcting wiring faults will clear the code and reestablish communications.

Shorting or mis-wiring the low voltage system wiring will not cause damage to fan coil control or to User Interface but may cause the low voltage fuse to open.

Status Code 46, Brownout Condition:

If the secondary voltage of the transformer falls below 15VAC for a period exceeding 4 seconds, Status Code 46 will be displayed on STATUS LED. If system includes a non-communicating outdoor air conditioner or heat pump, the User Interface will command the fan coil to turn off Y output controlling compressor.

When secondary voltage rises above 17VAC for more than 4 seconds, the brownout condition is cleared and normal system operation will resume subject to any minimum compressor off delay function which may be in effect. Brownout does not affect blower or electric heater operation.

Status Code 53, Outdoor Air Temperature Sensor Fault:

If an OAT (Outdoor Air Thermistor) sensor is found at power-up, input is constantly checked to be within a valid temperature range. If sensor is found to be open or shorted at any time after initial validation, Status Code 53 will be displayed at amber STATUS LED.

Check for faults in wiring connecting sensor to OAT terminals. Using an Ohmmeter, check resistance of thermistor for a short or open condition. If thermistor is shorted or open, replace it to return the system to normal operation. If fault is in the wiring connections, correcting the fault will clear the code and return the system to normal operation.

NOTE: If fault condition is an open thermistor or a wiring problem that appears to be an open thermistor and the power to the fan coil control is cycled off, the fault code will be cleared on the next power-up but the fault will remain and system operation will not be as expected. This is because on power-up, the fan coil control cannot discern the difference between an open sensor or if a sensor is not installed.

Emergency Heating and Cooling Modes

Fan coil control can provide **emergency** heating or cooling using a common heat/cool thermostat in the event that there are no system communications, fault is in User Interface and no replacement is immediately available.

To activate these modes, the thermostat and outdoor unit must be wired as a common heating/cooling system to fan coil control RGWYOC terminals.

NOTE: These emergency modes do not provide the level of comfort and efficiency expected by the consumer and should only be activated when User Interface cannot be replaced immediately.

Fan Coil Sequence of Operation

The FE5B Fan Coil is designed for installation with a communicating User Interface. This fan coil will not respond to commands provided by a common thermostat except under certain emergency situations described in START-UP AND TROUBLESHOOTING section.

The User Interface (Thermostat) uses temperature; humidity and other data supplied from indoor and outdoor system components to control heating or cooling system for optimum comfort. The fan coil will be commanded by User Interface to supply airflow and, in the case of a non-communicating outdoor unit, Air Conditioner or Heat Pump control. The fan coil will operate blower at requested airflow for most modes.

The nominal requested airflow will be 350 cfm per ton of nominal cooling capacity as defined by outdoor unit size. Actual airflow request will be adjusted from nominal using indoor and outdoor temperature and indoor humidity data to optimize the system operation for occupant comfort and system efficiency. Refer to User Interface literature for further system control details.

Airflow during electric heater operation must be greater than a minimum level for safe operation. If User Interface instructs fan coil to turn on electric heat and the requested airflow is less than the minimum value required for safe operation of installed heater, the fan coil control will override requested value with the value shown in Table 7.

Care and Maintenance

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. The only required maintenance that may be performed by the consumer is filter maintenance.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect all power to unit before servicing field wires or removing control package. The disconnect (when used) on access panel does not disconnect power to the line side of disconnect, but does allow safe service to all other parts of unit. If unit does not have a disconnect, disregard the foregoing. Instead, make sure that a disconnecting means is within sight from, and is readily accessible from, the unit. Disconnect all electrical power to unit before performing any maintenance or service on it.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect and clean or replace air filter each month or as required.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary. An inspection port is provided on all A-coil delta plates. Remove plastic plug to inspect.

3. Inspect blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.
4. Inspect electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

Consult Fan Coil Service Manual available from equipment distributor for maintenance procedures.

Using the Owner's/User Manual furnished in outdoor unit, the installing technician should explain system operation to the consumer with particular emphasis on indoor fan coil operation sounds and filter maintenance.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

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

Table 6 – Fan Coil Airflow Delivery Chart (CFM) - Electric Heating Models

FAN UNIT SIZE (TON)	OUTDOOR UNIT CAPACITY BTUH	ELECTRIC HEATER kW RANGE											
		0-5			0-10			0-15			0-20		
		Lo	Nom	High	Lo	Nom	High	Lo	Nom	High	Lo	Nom	High
24 (2)	18,000	700	700	805	750	750	863	-	-	-	-	-	-
	24,000	700	700	805	750	750	863	1050	1050	1208	-	-	-
	30,000	875	875	1006	875	875	1006	1050	1050	1208	1200	1200	1380
	36,000	1050	1050	1208	1050	1050	1208	1050	1050	1208	1200	1200	1380
36 (3)	24,000	700	700	805	750	750	863	1050	1050	1208	1225	-	-
	30,000	875	875	1006	875	875	1006	1050	1050	1208	1225	-	-
	36,000	1050	1050	1208	1050	1050	1208	1050	1050	1208	1225	1225	1409
	42,000	1225	1225	1409	1225	1225	1409	1225	1225	1409	1225	1225	1409
FAN UNIT SIZE (TON)	OUTDOOR UNIT CAPACITY BTUH	ELECTRIC HEATER kW RANGE											
		0-10			0-15			0-20			0-30		
		Lo	Nom	High	Lo	Nom	High	Lo	Nom	High	Lo	Nom	High
48 (3½)	30,000	1000	1000	1150	1200	1200	1380	–	–	–	–	–	–
	36,000	1100	1100	1265	1200	1200	1380	1300	1300	1495	–	–	–
	42,000	1225	1225	1409	1225	1225	1409	1350	1350	1553	–	–	–
	48,000	1400	1400	1610	1400	1400	1610	1400	1400	1610	1500	1500	1725
60 (5)	36,000	1200	1200	1380	1250	1250	1438	1350	1350	1553	–	–	–
	42,000	1225	1225	1409	1300	1300	1495	1350	1350	1553	–	–	–
	48,000	1400	1400	1610	1400	1400	1610	1400	1400	1610	1750	1750	2013
	60,000	1750	1750	2013	1750	1750	2013	1750	1750	2013	1750	1750	2013

NOTE: Lo, Nom, and Hi refer to AC, HP CFM ADJUST selection.

"–" Airflow not recommended for heater/system size

Table 7 – Minimum CFM for Electric Heater Application*

FAN COIL UNIT SIZE (TON)	HEAT PUMP UNIT SIZE (TON)	CFM				
		HEATER SIZE kW				
		5	8, 9, 10	12, 15	18, 20	24, 30
24 (2)	Emergency	700	750	1050	1200	
	18 (1½)	700	750	1050	1200	—
	24 (2)	700	750	1050	1200	—
	30 (2½)	875	875	1050	1200	—
	36 (3)	1050	1050	1050	1200	—
36 (3)	Emergency	700	750	1050	1225	
	24 (2)	700	750	1050	1225	—
	30 (2½)	875	875	1050	1225	—
	36 (3)	1050	1050	1050	1225	—
	42 (3½)	1225	1225	1225	1225	—
48 (4)	Emergency	1000	1000	1200	1300	1450
	30 (2½)	1000	1000	1200	1300	1450
	36 (3)	1100	1100	1200	1300	1450
	42 (3½)	1225	1225	1225	1350	1450
	48 (4)	1400	1400	1400	1400	1450
60 (5)	Emergency	1200	1200	1300	1350	1750
	36 (3)	1200	1200	1250	1350	1750
	42 (3½)	1225	1225	1300	1350	1750
	48 (4)	1400	1400	1400	1400	1750
	60 (5)	1750	1750	1750	1750	1750

*. These airflows are minimum acceptable airflows as UL listed. Actual airflow delivered will be per airflow delivery chart for Electric Heating Modes.

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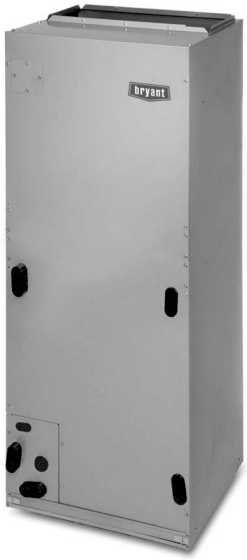
Replaces: New
Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

FE5B Evolution® Series

Communicating Variable–Speed Multipoise Fan Coil with Puron Advance™ (R-454B) Refrigerant Sizes 24 thru 60

Product Data



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PREMIUM ENVIRONMENTALLY RESPONSIBLE FAN COIL

The latest in technology makes the FE5B fan coil models the most advanced air handlers available. With attention to quiet, efficient, and comfortable operation, Bryant has developed a new benchmark for homeowner comfort and ease of installation.

The FE5B utilizes the Evolution Control as a required accessory to enable state of the art smart-diagnostics capability. This enables faster troubleshooting, providing ease of service and repair. The FE5B also provides a 4-wire hook up with matching outdoor unit and the Evolution Control. This makes installation simpler and a lot quicker than with conventional fan coils. The FE5B has advanced technology that allows the fan coil to self-configure with a matching outdoor unit and the Evolution Control, cutting down on installation time. Always update to the latest software version when installing the FE5B fan coil.

The FE5B features Puron Advance refrigerant, the low-GWP (Global Warming Potential) and chlorine-free alternate that is the future for the residential heating and cooling industry. The FE5B using Puron Advance refrigerant maximizes performance for environmentally responsible systems. In addition to environmental safety, these systems are 30 to 40% more efficient than standard heating and cooling systems, thereby combining excellence in efficiency and environmental sustainability.

The FE5B provides these benefits due to Bryant's command of Electronically Commutating Motor (ECM) technology. These motors are extremely efficient at all speeds, and enable the FE5B to operate at the correct speed to deliver airflow precisely, ensuring proper performance across a wide range of duct static pressures. This adaptive efficiency also makes installation quality easier to achieve for today's demanding homeowner.

Bryant's command of ECM technology may be most evident in the comfort advantages that an ECM can deliver. For true comfort, the homeowner can achieve command of both temperature and humidity in cooling and heating modes.

Another feature which sets the FE5B apart is the factory-installed TXV, which enhances efficiency and provides compressor-protecting operation at all recommended conditions. Grooved tubing, louvered aluminum fins, and the large face areas of the FE5B refrigerant coils also provide superior efficiency, for high SEER2 and HSPF2 performance.

Bryant leads the way in condensate control, a hallmark of these multipoise fan coils. All of these featured components are protected within a rugged, pre-painted metal cabinet lined with super-thick, high-density insulation. For neat, high quality installations, the unit exterior features sweat refrigerant connections for simple leak free performance, and multiple electrical entry for both high and low voltage service.

Assembled at the factory compliant with low leak requirements of less than 2% cabinet leakage rate at 1.0 inches W.C. and 1.4% cabinet leakage rate at 0.5 inches W.C. when tested in accordance with ASHRAE 193 standard.

FEATURES

Smart Diagnostics

- Self configuring (ease of installation).
- Easier troubleshooting, providing faster service and repair.
- Energy Tracking capability with the Evolution Wall Control. (Energy Tracking has the ability to monitor and estimate the energy consumption of your Evolution system.)
- Compatibility with wall control depends on software version. Check the installation instructions for minimum requirements.

Environmentally Responsible Refrigerant Technology

- Puron Advance refrigerant – the low-GWP, chlorine-free, non-ozone depleting refrigerant.
- Refrigerant leak detection dissipation system for added safety and peace of mind for the homeowner.
- Thermostatic Expansion Valve (TXV) designed to maximize performance with Puron Advance refrigerant. Bi-flow hard-shutoff with mechanical fittings.

Energy Efficient Operation

- Electronically Commutated Motor (ECM) operates efficiently at all speeds.
- Maximizes efficiency of heating and cooling systems.
- Ultra-low power consumption during fan only operation.

Comfort Control

- Warm, comfortable heating air temperatures.
- Unmatched humidity control

Airflow and Sound Technology

- Logarithmic spiral blower housings for high blower efficiency and quiet operation.
- Diffuser air discharge section for high airflow efficiency and quiet, smooth operation.
- High duct static capability.
- Design meets stringent regulations for cabinet air leakage of less than 2% cabinet leakage rate at 1.0 inches W.C. and 1.4% cabinet leakage rate at 0.5 inches W.C. when tested in accordance with ASHRAE 193 standard.

Condensate Control and Disposal Technology

- Minimal standing water - less microbial growth for improved IAQ and reduced condensate line clogging and related condensate leakage.
- Condensate fittings relocated away from turbulent airflow patterns at the blower entrance for improved condensate control performance.
- Overflow feature for slope coil units allows condensate to exit the unit without damage to product under clogged primary and secondary line conditions.
- Tested for condensate disposal at conditions much more severe than those required by ARI.
- Primary and secondary drain connections to comply with HUD.
- All pans constructed of an injection molded glass-filled polycarbonate engineered resin material, with brass drain connections.
- High density, super thick cabinetry insulation with vapor barrier.
- Pre-painted galvanized sheet metal cabinet.

Heat Transfer Technology

- Grooved tubing.
- Lanced sine wave aluminum fins.
- Discreet refined counterflow refrigerant circuitry.
- Bi-flow hard-shutoff TXV metering device with mechanical fittings.

Quality Assisting, Ease of Installation and Service Features

- Easy 4-wire hook up: convenient and reduces installation time.
- Multipoise unit.
- Provision made for suspending from roof or ceiling joints.
- Modular cabinet for size 60, and available for sizes 36 and 48.
- Sweat connections for leak free service.
- Straight stub-outs on liquid and vapor service lines, long enough to either swage for brazing or use for brazeless press fittings.
- Multiple electrical entry for application flexibility (high and low voltage).
- Low voltage terminal strip, to safely hold connections within the cabinet.
- Cabinet construction features innovations designed to prevent cabinet sweating.

Controls and Electrical Features

- Easy plug connection provided for quick installation of accessory heater packages.
- 40VA 208/230v transformer.
- Replaceable 3-amp blade-type auto fuse protects against transformer secondary short.

Filter Features

- Factory supplied filter.
- Standard sized filter rack fits most common size replacement filters.

Warranty

- Default 5-year parts limited warranty:
  - 10-year parts limited warranty with timely registration*.
    Equipment must be registered within 90 days of original installation, except in jurisdictions where warranty benefits cannot be conditioned on registration.
    * Applies to original purchaser/homeowner and not available to subsequent owners, except in jurisdictions where laws dictate otherwise.

See Warranty certificate for complete details and restrictions.

MODEL NUMBER NOMENCLATURE

1	2	3	4	5	6	7	8	9	10	11	12
F	E	5	B	N	B	C	3	6	L	0	0

Product

F = Fan Coil

Type

E = Evolution, Variable Speed Constant Airflow (VCA) ECM Motor, multipoise

Refrigerant

5 = Puron Advance (R-454B) Refrigerant

Series

Electrical

N = 208/230v, 1 ph-60 Hz

Cabinet Configuration

B = Modular, Hard Shutoff TXV

X = Single Piece, Hard Shutoff TXV

Cabinet Width

B = 17-5/8"; C = 21-1/8"; D = 24-11/16"

Capacity

24 = 24,000

36 = 36,000

48= 48,000

60 = 60,000

Coil Type

L00 = Aluminum

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.

A230446B

Table 1 – Models Available

2 Ton	3 Ton	4 Ton	5 Ton
FE5BNXB24L00	FE5BNXB36L00 FE5BNBB36L00	FE5BNXC48L00 FE5BNBC48L00	FE5BNBD60L00

DIMENSIONS

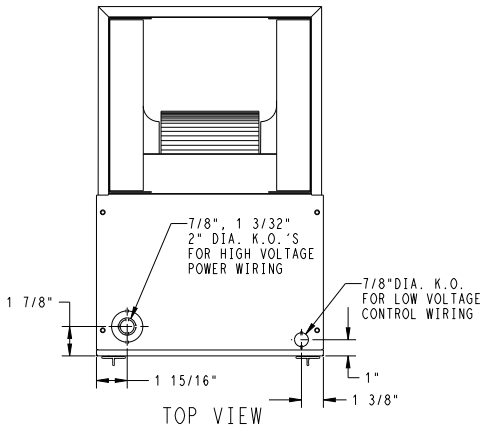
UNIT	SERIES	ELECTRICAL CHARACTERSTICS				A	B	C	D	E	F	G	H	J	COIL CONFIGURATION		SHIPPING WT (LBS)
															SLOPE	"A"	
FE5BNXB24L	A	X	*			42 11/16"	17 5/8"	15 3/4"	15 5/8"	10 3/4"	18 9/16"	18 1/4"	-	-	-	X	124
FE5BNBC36L	A	X	*			53 7/16"	21 1/8"	19 1/4"	19 1/8"	19 3/16"	26 15/16"	27 1/2"	28 5/16"	19"	X	-	146
FE5BNXC36L	A	X	*			53 7/16"	21 1/8"	19 1/4"	19 1/8"	19 3/16"	26 15/16"	27 1/2"	-	19"	X	-	146
FE5BNBC48L	A	X	*			53 7/16"	21 1/8"	19 1/4"	19 1/8"	19 1/2"	27 1/4"	26 15/16"	28 5/16"	-	-	X	168
FE5BNXC48L	A	X	*			53 7/16"	21 1/8"	19 1/4"	19 1/8"	19 1/2"	27 1/4"	26 15/16"	-	-	-	X	168
FE5BNBD60L	A	X	*			59 3/16"	24 11/16"	22 3/4"	22 11/16"	25 1/4"	32 15/16"	32 5/8"	34 1/16"	-	-	X	203
		208/230-1-60	208/230-3-60														

X=YES
O=NO
*=YES, DUE TO AVAILABLE FIELD INSTALLED HEATERS.

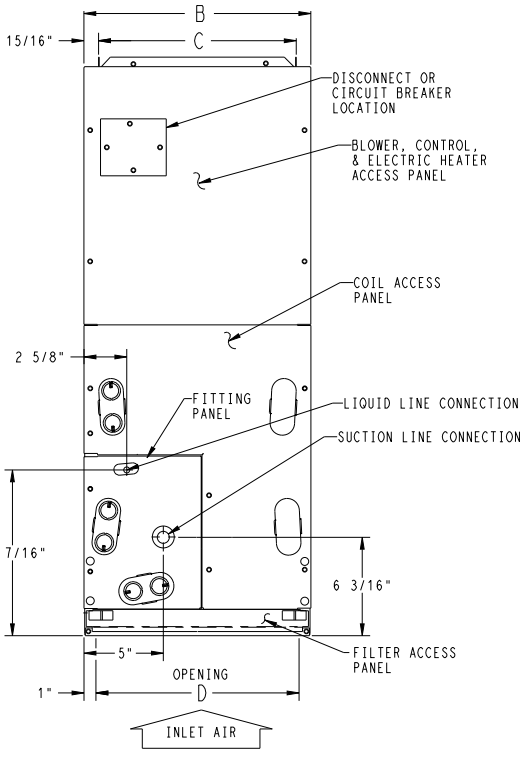
NOTE:

1. SERIES DESIGNATION IS THE 14TH POSITION OF UNIT PRODUCT NUMBER.
2. ALL DIMENSIONS ARE IN "INCHES" UNLESS NOTED.

NOTE: ALLOW 21" FROM FRONT FOR SERVICE



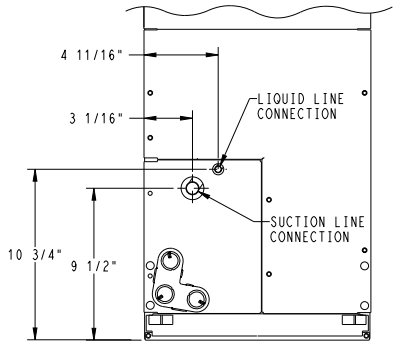
TOP VIEW



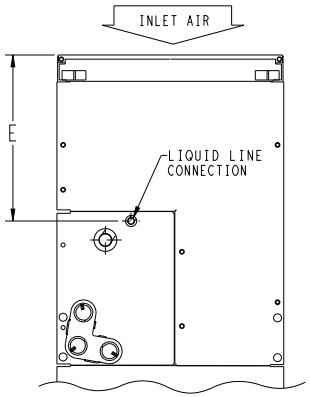
FRONT VIEW
SHOWN WITH "A" COIL DETAILS CONNECTION LOCATIONS FOR UPFLOW OR HORIZ. APPLICATIONS

UNIT CONNECTION SIZES

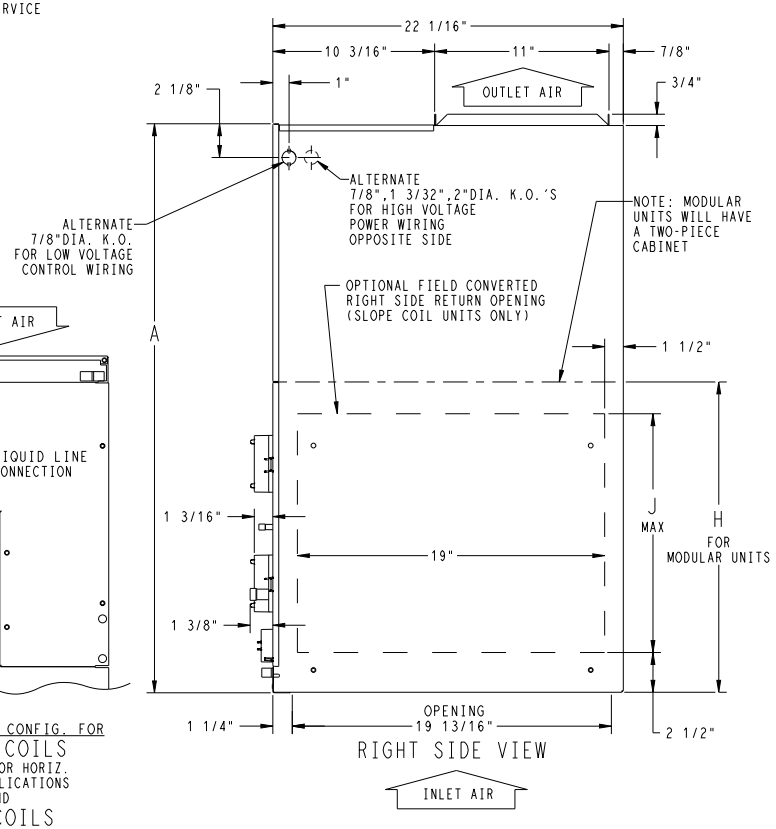
SUCTION: 24 & 36 - 3/4" I.D. SWEAT
48 & 60 - 7/8" I.D. SWEAT
LIQUID: 3/8" I.D. SWEAT
CONDENSATE: 3/4" FPT



SLOPE COIL DETAILS
CONNECTION LOCATIONS SHOWN FOR UPFLOW OR HORIZ. LEFT APPLICATIONS



ACCESS PANEL CONFIG. FOR
SLOPE COILS
DOWNFLOW OR HORIZ. RIGHT APPLICATIONS
AND
"A" COILS
DOWNFLOW APPLICATIONS



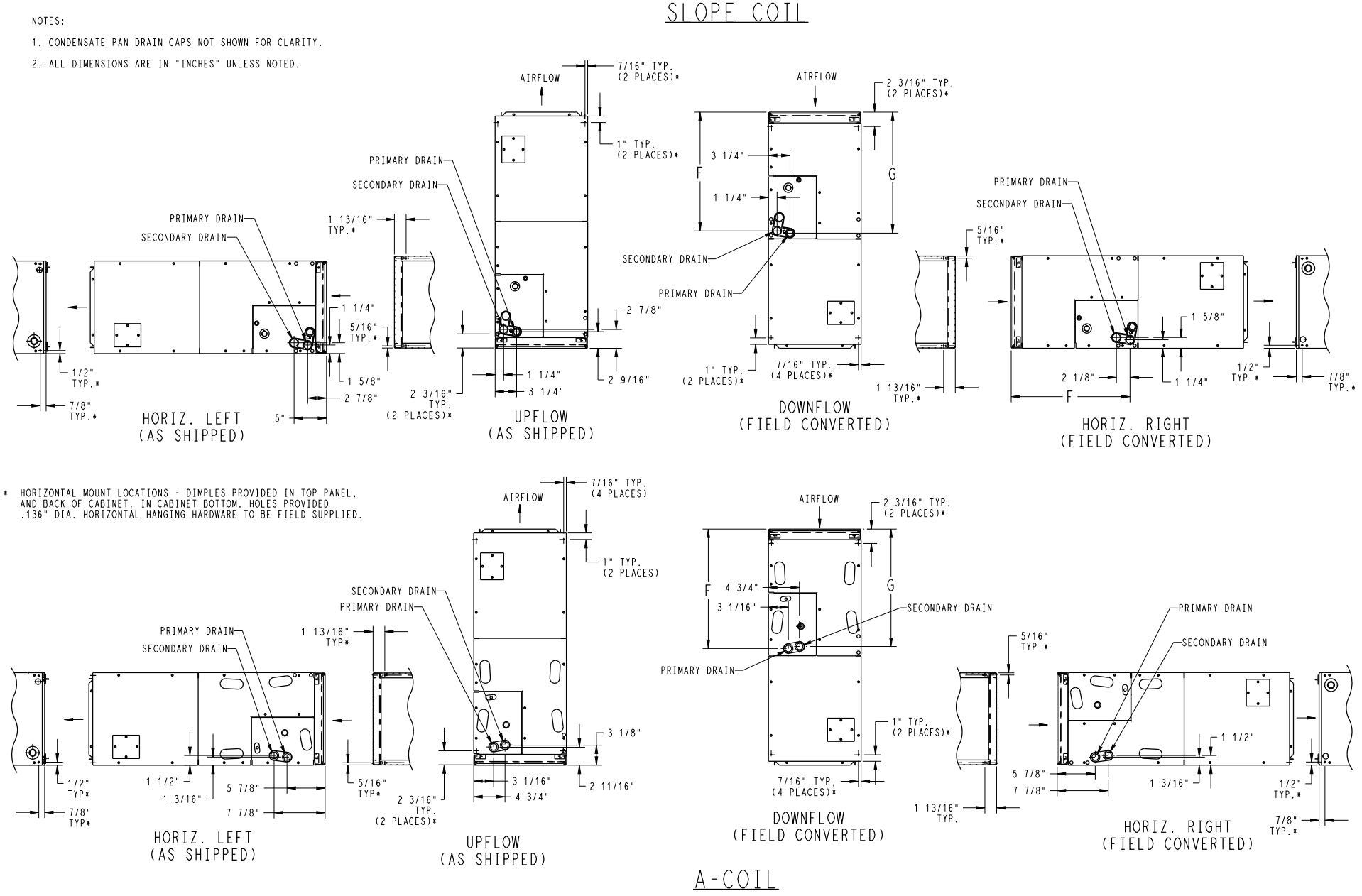
RIGHT SIDE VIEW

A240093

Fig. 1 – FE5 Dimensional Drawing, sheet 1

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

DIMENSIONS (cont.)



A240094

Fig. 2 – FE5 Dimensional Drawing, sheet 2

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

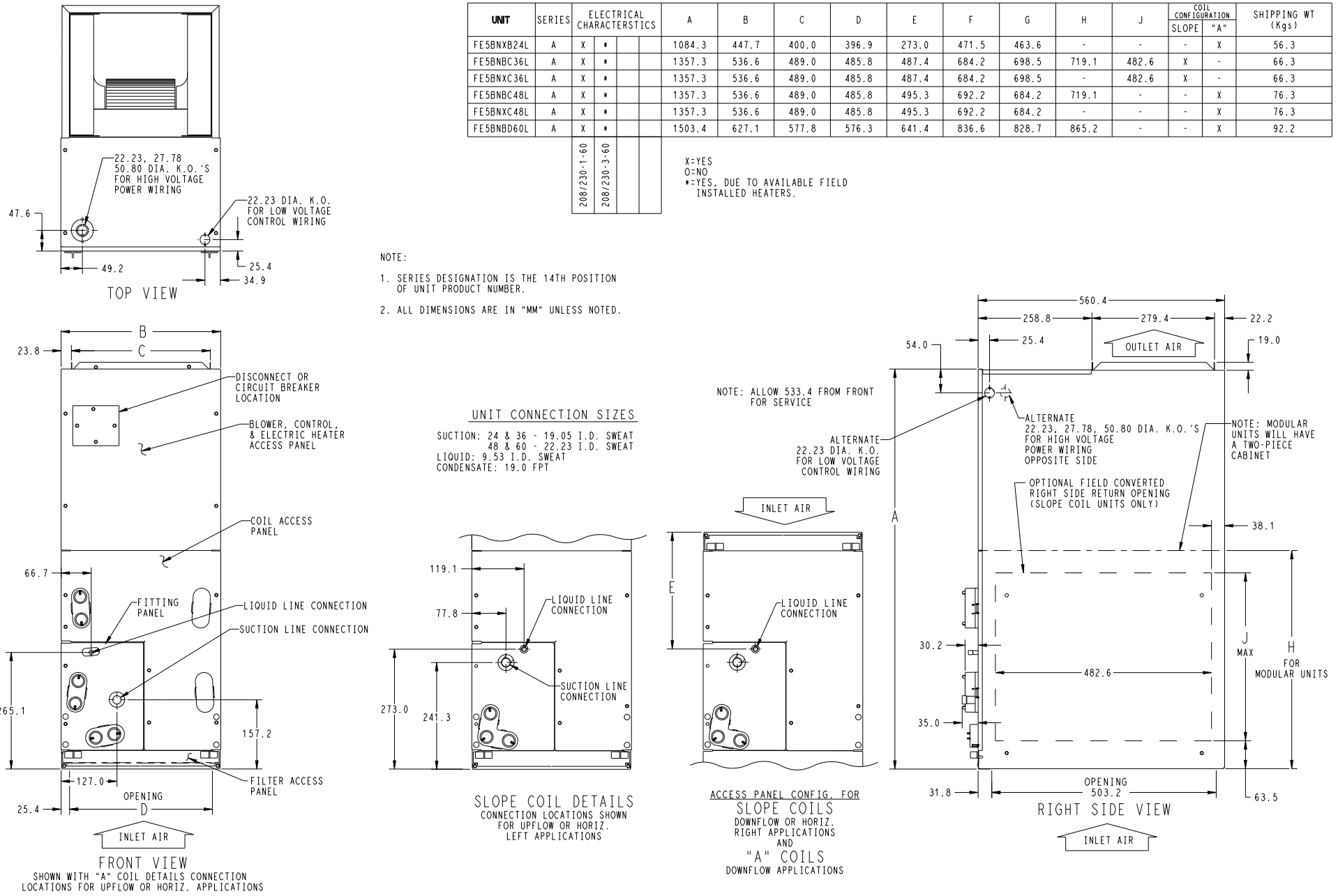
DIMENSIONS (cont.)

UNIT	SERIES	ELECTRICAL CHARACTERSTICS				A	B	C	D	E	F	G	H	J	COIL CONFIGURATION		SHIPPING WT (Kgs)
		208/230-1-60	208/230-3-60												SLOPE	"A"	
FE5BNXB24L	A	X	*			1084.3	447.7	400.0	396.9	273.0	471.5	463.6	-	-	-	X	56.3
FE5BNBC36L	A	X	*			1357.3	536.6	489.0	485.8	487.4	684.2	698.5	719.1	482.6	X	-	66.3
FE5BNXC36L	A	X	*			1357.3	536.6	489.0	485.8	487.4	684.2	698.5	-	482.6	X	-	66.3
FE5BNBC48L	A	X	*			1357.3	536.6	489.0	485.8	495.3	692.2	684.2	719.1	-	-	X	76.3
FE5BNXC48L	A	X	*			1357.3	536.6	489.0	485.8	495.3	692.2	684.2	-	-	-	X	76.3
FE5BNBD60L	A	X	*			1503.4	627.1	577.8	576.3	641.4	836.6	828.7	865.2	-	-	X	92.2

X=YES
O=NO
*=YES, DUE TO AVAILABLE FIELD INSTALLED HEATERS.

NOTE:

1. SERIES DESIGNATION IS THE 14TH POSITION OF UNIT PRODUCT NUMBER.
2. ALL DIMENSIONS ARE IN "MM" UNLESS NOTED.



A240095

Fig. 3 – FE5 Dimensional Drawing, sheet 3

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

DIMENSIONS (cont.)

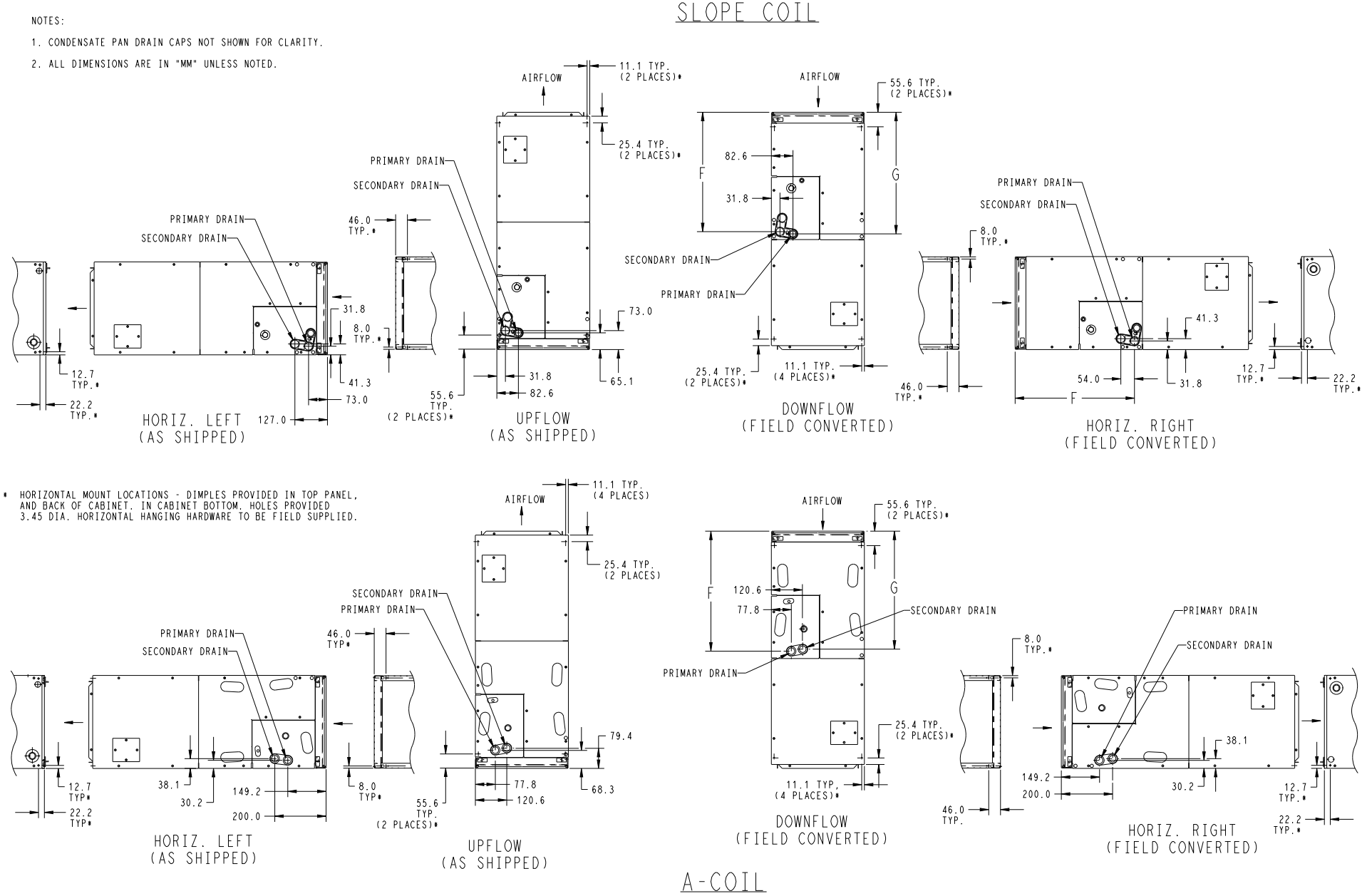


Fig. 4 – FE5 Dimensional Drawing, sheet 4

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

Table 2 – Physical Data

SIZE (TON)	FIELD-INSTALLED HEAT (kW)	NOMINAL COOLING CAPACITY (BTUH)	DIMENSIONS (In/mm)			SHIPPING WEIGHT (LBS / KG)
			HEIGHT	WIDTH	DEPTH	
24 (2)	5, 8, 9, 10, 15, 20	18,000 to 36,000	42-11/16 in 1084.3 mm	17-5/8 in 447.7 mm	22-1/16 in 560.4 mm	124 lbs / 56.3 kg
36 (3)	5, 8, 9, 10, 15, 18, 20	24,000 to 42,000	53-7/16 in 1357.3 mm	21-1/8 in 536.6 mm	22-1/16 in 560.4 mm	146 lbs / 66.3 kg
48 (4)	5, 8, 9, 10, 15, 18, 20, 24, 30	30,000 to 48,000	53-7/16 in 1357.3 mm	21-1/8 in 536.6 mm	22-1/16 in 560.4 mm	168 lbs / 76.3 kg
60 (5)	5, 8, 9, 10, 15, 18, 20, 24, 30	36,000 to 60,000	59-3/16 in 1503.4 mm	24-11/16 in 627.1 mm	22-1/16 in 560.4 mm	203 lbs / 92.2 kg

Table 3 – Specifications

Size	24	36	48	60
COIL				
Refrigerant Metering Device	Puron Advance TXV			
TXV Size	2 Ton	3 Ton	4 Ton	5 Ton
Rows/Fins Per In.	3/14.5			
Face Area (Sq. Ft.)	3.46		5.93	7.42
Configuration	A	Slope	A	
BLOWER AND MOTOR				
Air Discharge	Upflow, Downflow, Horizontal			
CFM (Nominal Cooling/Heating)	525	700	875	1050
	700	875	1050	1225
	875	1050	1225	1400
	1050	1225	1400	1750
Motor HP (ECM)	1/2		3/4	
FILTER SIZE (W x L), in (mm)	16 x 20 (406 x 508)	20 x 20 (508 x 508)		24 x 20 (610 x 508)
CABINET CONFIGURATION OPTIONS	1 Piece	1 Piece or Modular		Modular

PERFORMANCE DATA

AIRFLOW DELIVERY — COOLING, HEATING, ELECTRIC HEATING MODES

These fan coils will provide airflow at a rate that is requested by the Integrated System User Interface during air conditioning or heat pump heating (without electric heat) modes. The nominal airflow for both heating and cooling modes is 350 cfm/ton nominal size of the outdoor unit installed. The airflow actually requested by the User Interface is modified by its internal algorithms for zoning, comfort or efficiency concerns. Refer to the documentation for the User Interface for more information on how the User Interface controls the fan coil. Safe operation of electric heaters requires airflow delivery at or above the minimum CFM for electric heater application listed in the chart below. The fan coil will adjust its airflow delivery to maintain safe airflow as operating mode and staging conditions require. See Table 4.

Table 4 – Airflow Delivery (CFM) — Electric Heating Modes

FAN UNIT SIZE (TON)	OUTDOOR UNIT CAPACITY BTUH	ELECTRIC HEATER kW RANGE											
		0-5			0-10			0-15			0-20		
		Lo	Nom	High	Lo	Nom	High	Lo	Nom	High	Lo	Nom	High
24 (2)	18,000	700	700	805	750	750	863	—	—	—	—	—	—
	24,000	700	700	805	750	750	863	1050	1050	1208	—	—	—
	30,000	875	875	1006	875	875	1006	1050	1050	1208	1200	1200	1380
	36,000	1050	1050	1208	1050	1050	1208	1050	1050	1208	1200	1200	1380
36 (3)	24,000	700	700	805	750	750	863	1050	1050	1208	1225	—	—
	30,000	875	875	1006	875	875	1006	1050	1050	1208	1225	—	—
	36,000	1050	1050	1208	1050	1050	1208	1050	1050	1208	1225	1225	1409
	42,000	1225	1225	1409	1225	1225	1409	1225	1225	1409	1225	1225	1409
FAN UNIT SIZE (TON)	OUTDOOR UNIT CAPACITY BTUH	ELECTRIC HEATER kW RANGE											
		0-10			0-15			0-20			0-30		
		Lo	Nom	High	Lo	Nom	High	Lo	Nom	High	Lo	Nom	High
48 (4)	30,000	1000	1000	1150	1200	1200	1380	—	—	—	—	—	—
	36,000	1100	1100	1265	1200	1200	1380	1300	1300	1495	—	—	—
	42,000	1225	1225	1409	1225	1225	1409	1350	1350	1553	—	—	—
	48,000	1400	1400	1610	1400	1400	1610	1400	1400	1610	1500	1500	1725
60 (5)	36,000	1200	1200	1380	1250	1250	1438	1350	1350	1553	—	—	—
	42,000	1225	1225	1409	1300	1300	1495	1350	1350	1553	—	—	—
	48,000	1400	1400	1610	1400	1400	1610	1400	1400	1610	1750	1750	2013
	60,000	1750	1750	2013	1750	1750	2013	1750	1750	2013	1750	1750	2013

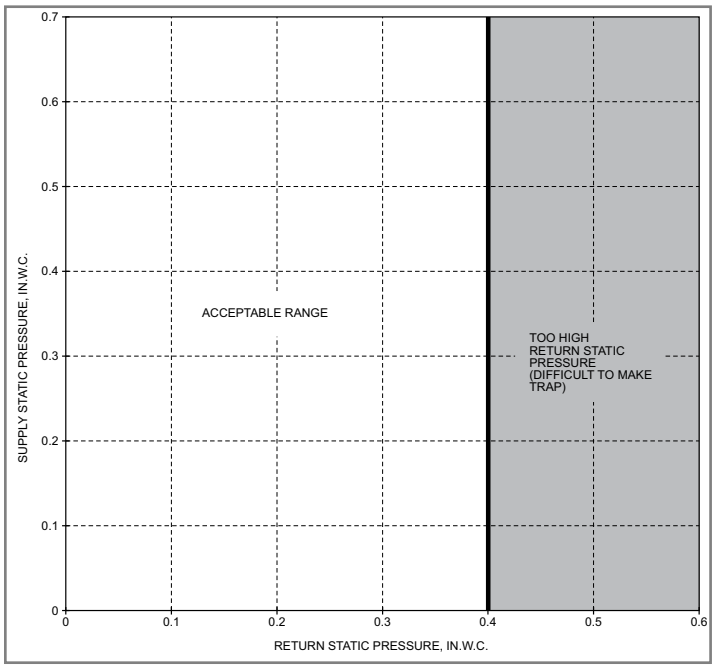
NOTE: Lo, Nom, and Hi refer to AC, HP, CFM ADJUST Section
" — " Airlow not recommended for heater/system size.

Table 5 – Minimum CFM for Electric Heater Application*

FAN COIL UNIT SIZE (TON)	HEAT PUMP UNIT SIZE (TON)	CFM				
		HEATER SIZE kW				
		5	8, 9, 10	12, 15	18, 20	24, 30
24 (2)	Emergency	700	750	1050	1200	
	18 (1½)	700	750	1050	1200	—
	24 (2)	700	750	1050	1200	—
	30 (2½)	875	875	1050	1200	—
	36 (3)	1050	1050	1050	1200	—
36 (3)	Emergency	700	750	1050	1225	
	24 (2)	700	750	1050	1225	—
	30 (2½)	875	875	1050	1225	—
	36 (3)	1050	1050	1050	1225	—
	42 (3½)	1225	1225	1225	1225	—
48 (4)	Emergency	1000	1000	1200	1300	1450
	30 (2½)	1000	1000	1200	1300	1450
	36 (3)	1100	1100	1200	1300	1450
	42 (3½)	1225	1225	1225	1350	1450
	48 (4)	1400	1400	1400	1400	1450
60 (5)	Emergency	1200	1200	1300	1350	1750
	36 (3)	1200	1200	1250	1350	1750
	42 (3½)	1225	1225	1300	1350	1750
	48 (4)	1400	1400	1400	1400	1750
	60 (5)	1750	1750	1750	1750	1750

*. These airflows are minimum acceptable airflows as UL listed. Actual airflow delivered will be per airflow delivery chart for Electric Heating Modes.

ACCEPTABLE DUCT CONDITIONS



A02296

Acceptable Duct Conditions

For satisfactory operation (specifically making dry secondary trap), subject fan coils must be installed with duct systems which fall within the "Acceptable Range" illustrated above.

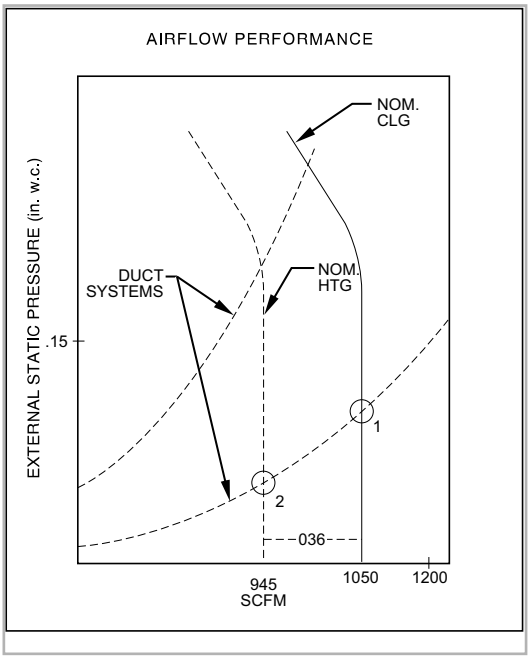
The airflow performance charts for the fan coil depict nominal airflow delivery for heating and cooling mode operation versus duct system static pressure drop. Cooling mode operation is shown as solid vertical lines for all 4 system size selections. Heating mode operation for the 4 system size selections are shown as dashed vertical lines.

The dotted curved lines are static pressure drop characteristics for several fixed-duct systems. These lines can be used to predict the system static pressure drop at any airflow given the actual drop at 1 known point.

For example, a duct system is designed for 0.15 in. water column (in. w.c.) drop at 1200 CFM. The 5-ton unit operating at nominal cooling airflow would deliver 1050 CFM with a duct system drop of 0.11 in. w.c. (See point 1 in the Airflow Performance/Static Pressure figure below.) On the same duct system, the 5-ton unit operating at nominal heating airflow would deliver 945 CFM with a duct system drop of 0.09 in. w.c. (See point 2.)

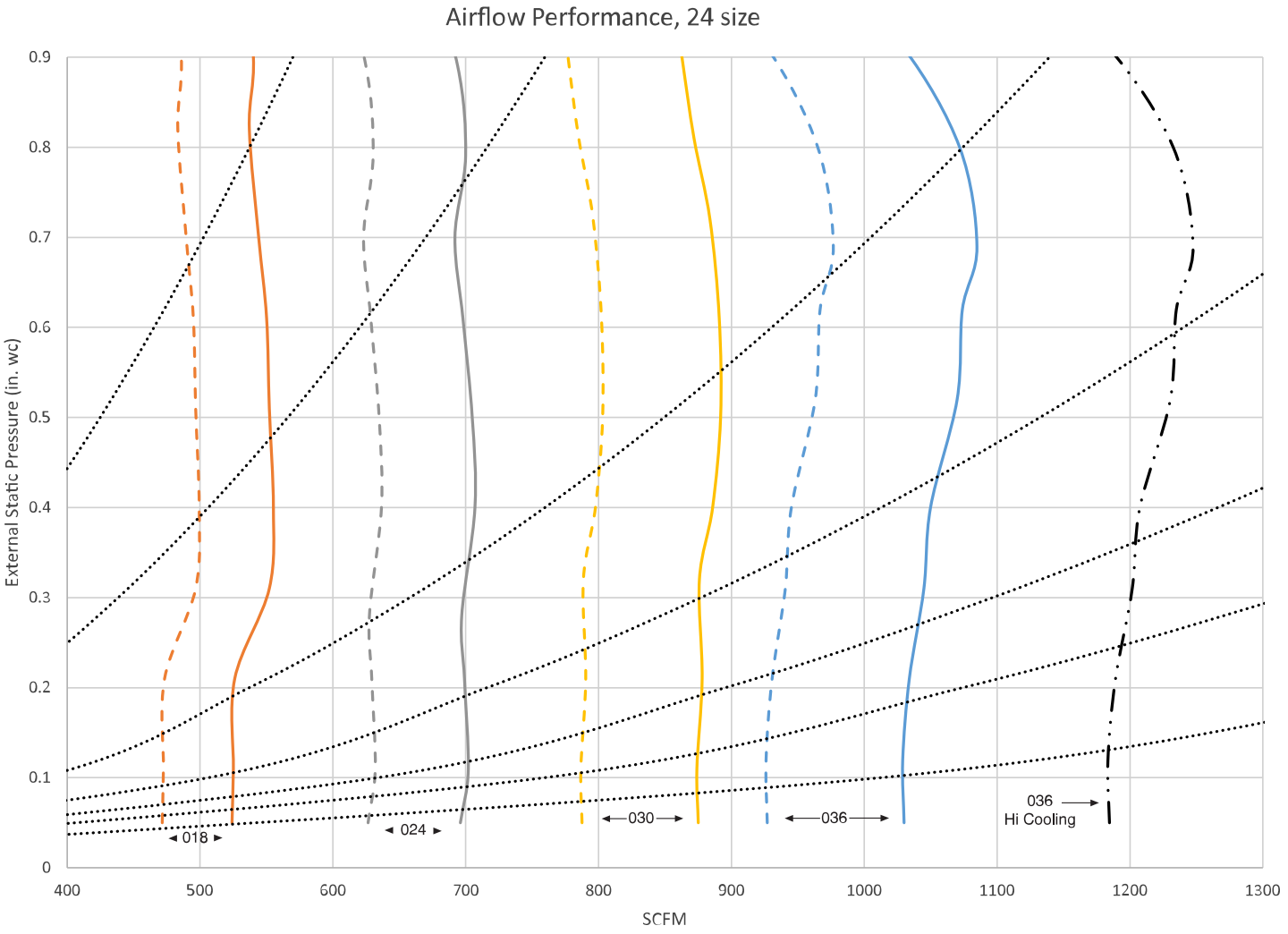
This example is but one of many possible duct system designs. The 5-ton unit will deliver the above airflows against much higher static pressures.

The following airflow performance data was measured using the standard metal filter as shipped from the factory.



A09339

PERFORMANCE DATA (cont)

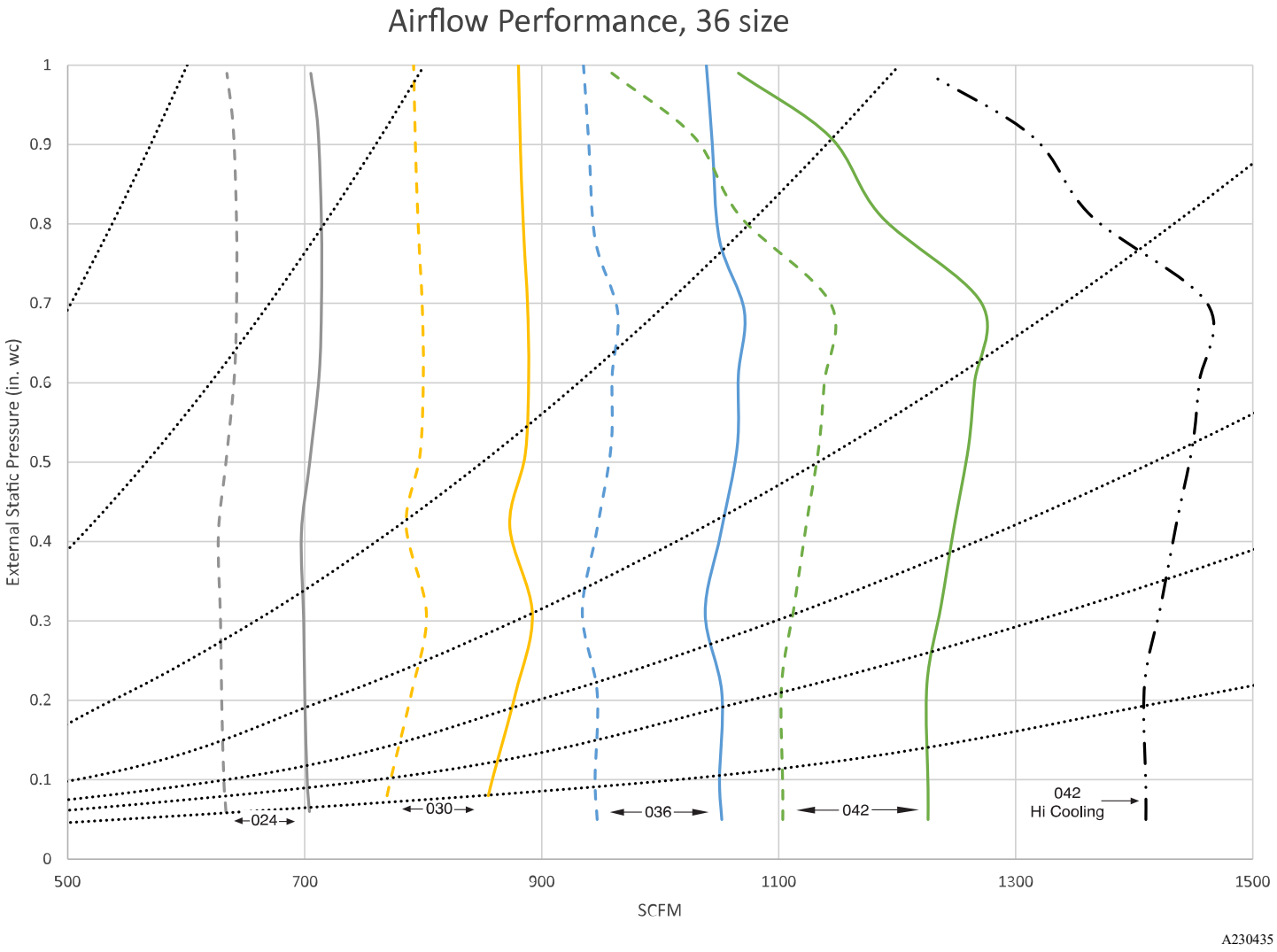


A230434

2 Ton

——— Nominal Cooling and Heat Pump Efficiency airflow for each size selection. Airflow can be adjusted +15% to -10%.
---- Nominal Heat Pump Comfort airflow for each size selection. Airflow can be adjusted +15% to -10%.
· - · - Maximum cooling airflow for largest size selection. Adjusted +15% from nominal.
· · · · · · Fixed Duct Systems (See description under Acceptable Duct Conditions.)

PERFORMANCE DATA (cont)

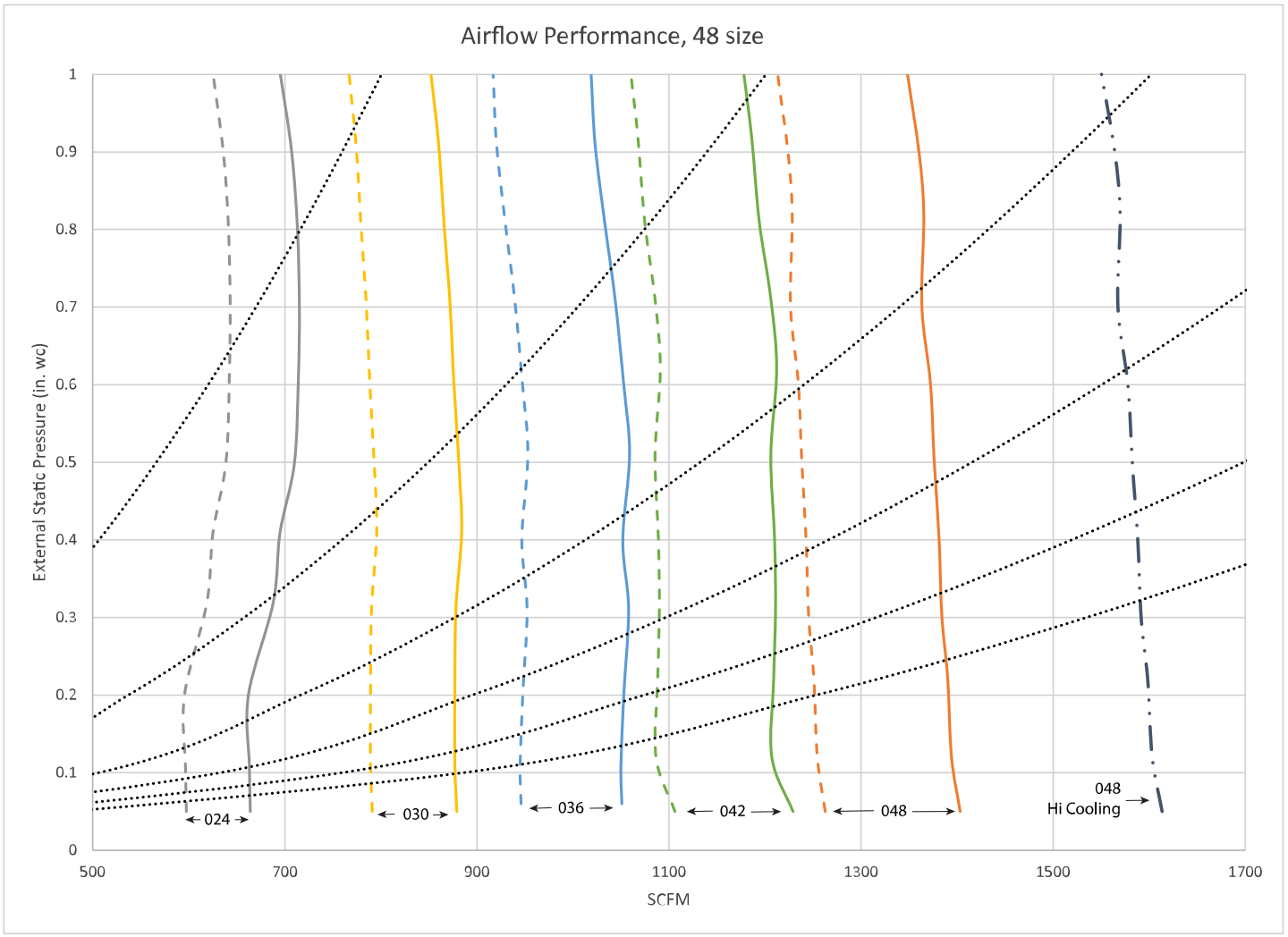


A230435

3 Ton

——— Nominal Cooling and Heat Pump Efficiency airflow for each size selection. Airflow can be adjusted +15% to -10%.
---- Nominal Heat Pump Comfort airflow for each size selection. Airflow can be adjusted +15% to -10%.
· - · - Maximum cooling airflow for largest size selection. Adjusted +15% from nominal.
· · · · · · Fixed Duct Systems (See description under Acceptable Duct Conditions.)

PERFORMANCE DATA (cont)

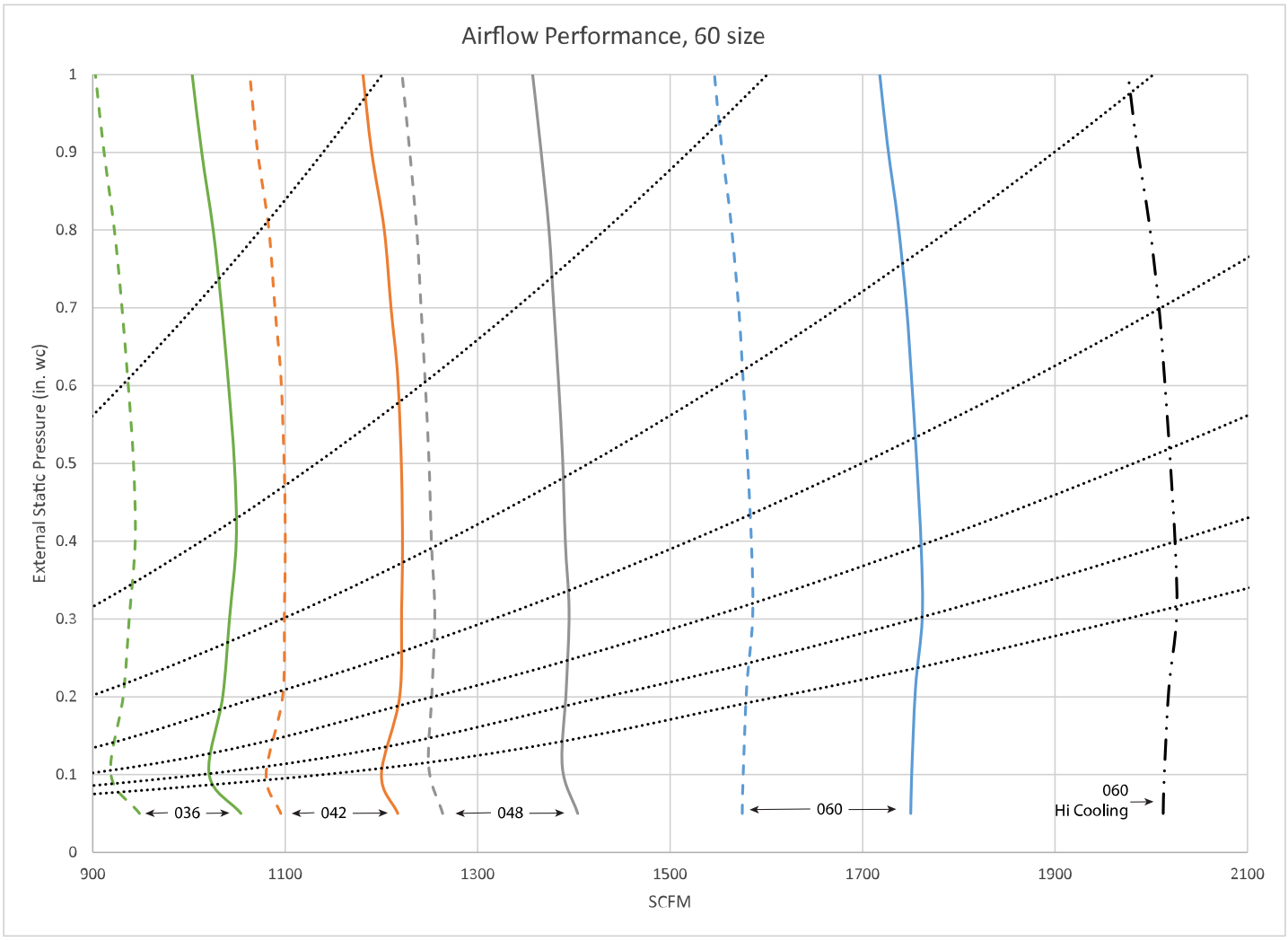


A230436

4 Ton

——— Nominal Cooling and Heat Pump Efficiency airflow for each size selection. Airflow can be adjusted +15% to -10%.
---- Nominal Heat Pump Comfort airflow for each size selection. Airflow can be adjusted +15% to -10%.
· - · - Maximum cooling airflow for largest size selection. Adjusted +15% from nominal.
· · · · · · Fixed Duct Systems (See description under Acceptable Duct Conditions.)

PERFORMANCE DATA (cont)



A230437

5 Ton

——— Nominal Cooling and Heat Pump Efficiency airflow for each size selection. Airflow can be adjusted +15% to -10%.
---- Nominal Heat Pump Comfort airflow for each size selection. Airflow can be adjusted +15% to -10%.
· - · - Maximum cooling airflow for largest size selection. Adjusted +15% from nominal.
· · · · · · Fixed Duct Systems (See description under Acceptable Duct Conditions.)

Table 6 – Cooling Capacities (MBtuh)

INDOOR COIL AIR		SATURATED TEMPERATURE LEAVING EVAPORATOR (deg F)														
		35			40			45			50			55		
CFM	EWB	TC	SHC	BF	TC	SHC	BF	TC	SHC	BF	TC	SHC	BF	TC	SHC	BF
SIZE 24																
525	72	37.50	19.04	0.00	33.96	17.17	0.00	29.95	15.18	0.00	25.35	13.07	0.00	20.11	10.83	0.00
	67	30.71	19.50	0.00	27.01	17.49	0.00	22.82	15.38	0.00	18.08	13.17	0.00	12.92	10.93	0.00
	62	24.45	19.79	0.00	20.62	17.68	0.00	16.51	15.56	0.01	12.74	12.74	0.05	10.53	10.53	0.21
700	72	46.28	23.46	0.00	42.01	21.31	0.00	37.11	18.99	0.00	31.54	16.50	0.00	25.10	13.80	0.01
	67	38.08	24.46	0.01	33.62	22.14	0.01	28.52	19.62	0.01	22.62	16.92	0.01	16.16	14.14	0.01
	62	30.57	25.26	0.01	25.94	22.75	0.01	20.81	20.13	0.02	16.58	16.58	0.08	13.73	13.73	0.23
875	72	53.42	27.14	0.00	48.58	24.80	0.00	42.99	22.24	0.00	36.57	19.46	0.00	29.26	16.44	0.01
	67	44.14	28.75	0.02	39.07	26.18	0.02	33.23	23.40	0.01	26.53	20.34	0.02	19.00	17.14	0.02
	62	35.64	30.11	0.02	30.44	27.37	0.02	24.72	24.45	0.03	20.16	20.16	0.11	16.72	16.72	0.26
1050	72	59.25	30.25	0.00	54.00	27.79	0.01	47.91	25.05	0.02	40.85	22.05	0.02	32.69	18.77	0.02
	67	49.16	32.52	0.02	43.60	29.78	0.03	37.18	26.76	0.03	29.81	23.50	0.03	21.58	19.97	0.04
	62	39.88	34.49	0.03	34.24	31.56	0.03	28.13	28.41	0.04	23.44	23.44	0.14	19.43	19.43	0.28
1225	72	64.10	32.93	0.02	58.53	30.39	0.02	52.02	27.54	0.03	44.44	24.38	0.03	35.61	20.89	0.03
	67	53.37	35.88	0.04	47.43	33.02	0.04	40.52	29.84	0.04	32.58	26.37	0.04	23.87	22.63	0.05
	62	43.50	38.51	0.04	37.52	35.42	0.04	31.22	32.09	0.06	26.46	26.46	0.17	21.98	21.98	0.31
SIZE 36																
700	72	46.73	23.71	0.00	42.21	21.42	0.00	37.03	18.95	0.00	31.12	16.32	0.00	24.47	13.58	0.00
	67	38.23	24.55	0.01	33.46	22.07	0.00	28.13	19.46	0.00	22.20	16.73	0.01	15.77	13.96	0.01
	62	30.47	25.19	0.01	25.73	22.64	0.01	20.64	20.02	0.02	16.45	16.45	0.08	13.57	13.57	0.24
875	72	54.14	27.50	0.00	49.01	25.01	0.00	43.08	22.29	0.00	36.32	19.31	0.01	28.48	16.14	0.01
	67	44.54	28.96	0.01	39.13	26.21	0.02	32.90	23.21	0.02	25.90	20.10	0.01	18.55	16.94	0.02
	62	35.68	30.12	0.02	30.20	27.22	0.02	24.46	24.28	0.03	20.00	20.00	0.11	16.52	16.52	0.26
1050	72	60.23	30.73	0.00	54.65	28.07	0.02	48.16	25.17	0.01	40.65	21.97	0.02	31.96	18.47	0.02
	67	49.80	32.84	0.02	43.85	29.89	0.03	36.97	26.66	0.03	29.12	23.18	0.03	21.00	19.69	0.04
	62	40.12	34.60	0.03	34.09	31.45	0.03	27.83	28.19	0.04	23.19	23.19	0.14	19.17	19.17	0.29
1225	72	65.33	33.52	0.01	59.35	30.77	0.02	52.41	27.71	0.03	44.36	24.34	0.03	34.94	20.62	0.03
	67	54.19	36.28	0.04	47.86	33.21	0.04	40.43	29.78	0.04	31.95	26.07	0.04	23.18	22.28	0.05
	62	43.93	38.70	0.04	37.54	35.38	0.04	30.91	31.83	0.06	26.14	26.14	0.17	21.63	21.63	0.31
1400	72	69.64	35.98	0.03	63.37	33.15	0.04	56.04	29.99	0.04	47.51	26.47	0.04	37.51	22.57	0.04
	67	57.94	39.40	0.05	51.25	36.22	0.05	43.43	32.67	0.05	34.46	28.78	0.05	25.18	24.72	0.07
	62	47.26	42.51	0.05	40.58	39.04	0.06	33.84	35.26	0.08	28.85	28.85	0.20	23.92	23.91	0.34
SIZE 48																
875	72	55.50	29.11	0.00	50.59	26.54	0.00	44.88	23.71	0.00	38.24	20.63	0.00	30.68	17.36	0.00
	67	45.72	30.33	0.00	40.45	27.50	0.00	34.52	24.46	0.00	27.67	21.20	0.00	19.98	17.78	0.00
	62	36.75	31.31	0.00	31.36	28.31	0.00	25.38	25.13	0.01	20.06	20.06	0.06	16.66	16.66	0.22
1050	72	62.61	32.86	0.00	57.23	30.14	0.00	50.90	27.09	0.00	43.49	23.73	0.00	34.84	20.06	0.00
	67	51.82	34.75	0.00	45.98	31.70	0.00	39.25	28.31	0.00	31.53	24.69	0.01	22.90	20.87	0.01
	62	41.81	36.27	0.01	35.78	32.96	0.01	29.15	29.47	0.01	23.60	23.60	0.08	19.62	19.62	0.24
1225	72	68.60	36.10	0.00	62.85	33.28	0.00	56.08	30.11	0.00	48.02	26.55	0.00	38.54	22.55	0.00
	67	57.05	38.72	0.01	50.81	35.50	0.01	43.41	31.92	0.00	34.94	27.95	0.01	25.54	23.82	0.01
	62	46.23	40.86	0.01	39.68	37.32	0.01	32.60	33.60	0.02	26.95	26.95	0.10	22.46	22.46	0.25

Table 6 – Cooling Capacities (MBtuh)

SIZE 48 (cont.)																
1400	72	73.71	38.97	0.00	67.64	36.08	0.00	60.51	32.80	0.00	52.06	29.07	0.01	41.85	24.88	0.01
	67	61.55	42.32	0.01	54.96	38.99	0.01	47.17	35.23	0.01	37.95	31.04	0.01	27.97	26.64	0.02
	62	50.14	45.16	0.02	43.27	41.48	0.02	35.80	37.53	0.03	30.14	30.14	0.12	25.15	25.15	0.27
1600	72	78.67	41.89	0.00	72.30	38.96	0.00	64.83	35.58	0.01	55.92	31.76	0.01	45.16	27.34	0.02
	67	65.91	46.06	0.02	59.04	42.67	0.02	50.80	38.77	0.02	41.09	34.39	0.02	30.45	29.70	0.03
	62	54.03	49.74	0.02	46.89	45.95	0.03	39.16	41.76	0.04	33.49	33.49	0.15	28.02	28.02	0.29
1750	72	81.90	43.87	0.01	75.39	40.88	0.01	67.68	37.48	0.02	58.47	33.58	0.02	47.34	29.06	0.02
	67	68.76	48.66	0.02	61.68	45.22	0.02	53.22	41.25	0.02	43.19	36.78	0.02	32.18	31.88	0.04
	62	56.62	52.98	0.03	49.32	49.11	0.03	41.57	41.19	0.05	35.82	35.82	0.17	30.02	30.02	0.30
SIZE 60																
1050	72	79.55	38.39	0.00	72.99	35.30	0.00	65.21	31.82	0.00	56.07	27.96	0.00	45.28	23.69	0.00
	67	65.98	40.54	0.00	58.84	37.05	0.00	50.47	33.18	0.00	40.84	28.98	0.00	29.88	24.50	0.00
	62	53.30	42.23	0.00	45.80	38.43	0.00	37.36	34.36	0.01	29.92	29.92	0.07	24.95	24.95	0.22
1225	72	87.50	42.31	0.00	80.43	39.08	0.00	72.12	35.46	0.00	62.20	31.35	0.00	50.39	26.76	0.00
	67	72.90	45.29	0.00	65.20	41.61	0.00	56.12	37.49	0.00	45.43	32.88	0.00	33.42	28.01	0.01
	62	59.18	47.71	0.01	50.98	43.61	0.01	41.86	39.23	0.01	34.26	34.26	0.08	28.63	28.63	0.23
1400	72	94.29	45.76	0.00	86.84	42.45	0.00	78.04	38.71	0.00	67.56	34.46	0.00	54.92	29.60	0.00
	67	78.85	49.60	0.01	70.71	45.82	0.00	61.08	41.50	0.01	49.58	36.61	0.01	36.65	31.38	0.01
	62	64.33	52.82	0.01	55.68	48.55	0.01	45.98	43.88	0.02	38.38	38.38	0.10	32.14	32.14	0.25
1600	72	100.91	49.28	0.00	93.10	45.91	0.00	83.86	42.08	0.00	72.84	37.68	0.00	59.46	32.60	0.01
	67	84.67	54.09	0.01	76.18	50.22	0.01	66.02	45.76	0.01	53.86	40.66	0.01	40.02	35.07	0.02
	62	69.49	58.29	0.01	60.49	53.89	0.01	50.41	49.00	0.02	42.85	42.85	0.13	35.97	35.97	0.26
1750	72	105.21	51.67	0.00	97.24	48.25	0.01	87.70	44.38	0.01	76.28	39.90	0.01	62.50	34.70	0.01
	67	88.49	57.22	0.01	79.74	53.27	0.01	69.29	48.78	0.01	56.75	43.55	0.01	42.37	37.74	0.02
	62	72.94	62.18	0.02	63.73	57.71	0.02	53.59	52.69	0.03	46.02	46.02	0.14	38.71	38.71	0.28
2000	72	111.40	55.29	0.01	103.09	51.86	0.01	93.23	47.91	0.01	81.31	43.32	0.01	66.94	38.00	0.01
	67	93.99	62.07	0.02	84.88	58.05	0.02	74.05	53.44	0.02	61.00	48.09	0.02	46.00	41.99	0.03
	62	77.95	68.26	0.02	68.57	63.72	0.03	58.99	58.28	0.06	51.02	51.02	0.17	42.96	42.96	0.30

CFM - Cubic Ft per Minute **EWB** - Entering Wet Bulb (_F / _C) **LWB** - Leaving Wet Bulb (_F / _C) **TC** - Gross Cooling Capacity 1000 Btuh

SHC - Gross Sensible Capacity 1000 Btuh **BF** - Bypass Factor **MBH** - 1000 Btuh

NOTES:

1. Contact manufacturer for cooling capacities at conditions other than shown in table.
2. Formulas:
   Leaving db = entering db - $\frac{\text{sensible heat cap.}}{1.09 \times \text{CFM}}$
   Leaving wb = wb corresponding to enthalpy of air leaving coil (h_{lwb})
   $h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{CFM}}$
   where h_{ewb} = enthalpy of air entering coil. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 80_F (27_C) db temperature of air entering coil. Below 80_F (27_C) db, subtract (Correction Factor x CFM) from SHC. Above 80_F (27_C) db, add (Correction Factor x CFM) to SHC.
4. Bypass Factor = 0 indicates no psychometric solution. Use bypass factor of next lower EWB for approximation.

SHC CORRECTION FACTOR

	ENTERING AIR DRY-BULB TEMPERATURE (°F)					
BYPASS FACTOR	79	78	77	76	75	Under 75
	81	82	83	84	85	Over 85
	Correction Factor					
0.10	.098	1.96	2.94	3.92	4.91	Use formula shown below
0.20	0.87	1.74	2.62	3.49	4.36	
0.30	0.76	1.53	2.29	3.05	3.82	

Interpolation is permissible.
Correction Factor = 1.09 x (1 - BF) x (db - 80)

PERFORMANCE DATA (cont.)

Table 7 – Estimated Sound Power Level of Airflow from Duct (dB)

UNIT SIZE	CONDITIONS		OCTAVE BAND CENTER FREQUENCY*						
	CFM	Ext Static Pressure	63	125	250	500	1000	2000	4000
24	400	0.50	69.0	65.0	61.0	58.0	56.0	54.0	50.0
	600	0.50	70.8	66.8	62.8	59.8	57.8	55.8	51.8
	800	0.50	72.0	68.0	64.0	61.0	59.0	57.0	53.0
	1000	0.50	73.0	69.0	65.0	62.0	60.0	58.0	54.0
	1200	0.50	73.8	69.8	65.8	62.8	60.8	58.8	54.8
	1400	0.50	74.4	70.4	66.4	63.4	61.4	59.4	55.4
36	400	0.50	69.0	65.0	61.0	58.0	56.0	54.0	50.0
	600	0.50	70.8	66.8	62.8	59.8	57.8	55.8	51.8
	800	0.50	72.0	68.0	64.0	61.0	59.0	57.0	53.0
	1000	0.50	73.0	69.0	65.0	62.0	60.0	58.0	54.0
	1200	0.50	73.8	69.8	65.8	62.8	60.8	58.8	54.8
	1400	0.50	74.4	70.4	66.4	63.4	61.4	59.4	55.4
	1600	0.50	75.0	71.0	67.0	64.0	62.0	60.0	56.0
48	400	0.50	69.0	65.0	61.0	58.0	56.0	54.0	50.0
	600	0.50	70.8	66.8	62.8	59.8	57.8	55.8	51.8
	800	0.50	72.0	68.0	64.0	61.0	59.0	57.0	53.0
	1000	0.50	73.0	69.0	65.0	62.0	60.0	58.0	54.0
	1200	0.50	73.8	69.8	65.8	62.8	60.8	58.8	54.8
	1400	0.50	74.4	70.4	66.4	63.4	61.4	59.4	55.4
	1600	0.50	75.0	71.0	67.0	64.0	62.0	60.0	56.0
60	600	0.50	70.8	66.8	62.8	59.8	57.8	55.8	51.8
	800	0.50	72.0	68.0	64.0	61.0	59.0	57.0	53.0
	1000	0.50	73.0	69.0	65.0	62.0	60.0	58.0	54.0
	1200	0.50	73.8	69.8	65.8	62.8	60.8	58.8	54.8
	1400	0.50	74.4	70.4	66.4	63.4	61.4	59.4	55.4
	1600	0.50	75.0	71.0	67.0	64.0	62.0	60.0	56.0
	1800	0.50	75.5	71.5	67.5	64.5	62.5	60.5	56.5
	2000	0.50	76.0	72.0	68.0	65.0	63.0	61.0	57.0
	2150	0.50	76.3	72.3	68.3	65.3	63.3	61.3	57.3

*. Estimated sound power levels have been derived using the method described in the 1987 ASHRAE HVAC Systems & Applications Handbook, Chapter 52, p. 52.7.

Table 8 – Air Delivery Performance Correction Component Pressure Drop (in. wc) at Indicated Airflow (Dry to Wet Coil)

UNIT SIZE	CFM										
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
24	0.012	0.016	0.022	0.028	0.034	0.040	0.049	—	—	—	—
36	—	0.026	0.034	0.042	0.052	0.063	0.075	0.083	0.091	0.098	0.110
48	—	0.006	0.008	0.010	0.012	0.015	0.017	0.020	0.023	0.027	0.030
	CFM										
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
60	0.013	0.016	0.018	0.020	0.023	0.027	0.030	0.034	0.039	0.044	0.048

Table 9 – Factory-Installed Filter Static Pressure Drop (in wc)

	CFM								
Size	400	600	800	1000	1200	1400	1600	1800	2000
24	0.020	0.044	0.048	0.072	0.100	—	—	—	—
36	—	0.020	0.035	0.051	0.070	0.092	—	—	—
48	—	—	0.035	0.051	0.070	0.092	0.120	—	—
60	—	—	—	0.038	0.053	0.070	0.086	0.105	0.133

Table 10 – Units Without Electric Heat

UNIT SIZE	VOLTS/PH/HZ	MTR HP	MTR FLA	SINGLE CIRCUIT		BRANCH CIRCUIT
				MCA	MOCP	Min Wire Size Awg*
24	208/230/1/60	1/2	4	5	15	14
36	208/230/1/60	1/2	4	5	15	14
48	208/230/1/60	3/4	5.7	7.1	15	14
60	208/230/1/60	3/4	5.7	7.1	15	14

* Use copper wire only to connect unit. If other than uncoated (non-plated) 75°C ambient, copper wire (solid wire for 10 AWG and smaller, stranded wire for larger than 10 AWG) is used consult applicable tables of the National Electric Code (ANSI/NFPA 70).
NOTE: If branch circuit wire length exceeds 100 ft / 30.5 m, consult NEC 210-19a to determine maximum wire length. Use 2% voltage drop.
FLA - Full Load Amps

Table 11 – Electrical Data for Units with Factory-Installed Heat

HEATER PART NO.	kW @ 240 V	VOLTS/PH	STAGES (kW OPERATING)	INTERNAL CIRCUIT PROTECTION	USED WITH OUTDOOR UNIT SIZE	HEATING CAP.‡ @ 230V	INTELLIGENT HEAT CAPABLE* (kW)
KFFEH0501N05	5	230/1	5	None	All	15,700	-
KFFEH0801N08	8	230/1	8	None	All	25,100	-
KFFEH0901N10	10	230/1	10	None	All	31,400	-
KFFEH3001F15	15	230/1	5, 15	Fuse†	All	47,100	5, 10, 15
KFFEH3201F20	20	230/1	5, 20	Fuse†	30 thru 60	62,800	5, 15, 20
KFFEH2901N09	9	230/1‡	3, 9	None	36 thru 60	28,200	3, 6, 9
KFFEH1601315	15	230/3	5, 15	None	36 thru 60	47,100	-
KFFEH2001318	18	230/3	6, 12, 18	None	42 thru 60	56,500	-
KFFEH3401F24	24	230/1**	8, 16, 24	Fuse	48, 60	78,300	8, 16, 24
KFFEH3501F30	30	230/1**	10, 20, 30	Fuse	48, 60	94,100	10, 20, 30
KFFEH2401C05	5	230/1	5	Circuit Breaker	All	15,700	-
KFFEH2501C08	8	230/1	8	Circuit Breaker	All	25,100	-
KFFEH2601C10	10	230/1	10	Circuit Breaker	All	31,400	-
KFFEH3101C15	15	230/1	5, 15	Circuit Breaker	All	47,100	5, 10, 15
KFFEH3301C20	20	230/1	5, 20	Circuit Breaker	30 thru 60	62,800	5, 15, 20

*. Heaters designed with kW operating values are intelligent heat capable when used with compatible thermostat.
†. Single circuit application of F15 and F20 heaters requires Single-point wiring kit accessory.
‡. Field convertible to 3 phase.
**. These heaters are field convertible to 1 phase, single or multiple supply circuit.

NOTE: for 240 volts, multiply 230V heater amps by 1.04.

Table 12 – Electric Heater Internal Protection

HEATER kW	PHASE	FUSES QTY / SIZE	CKT BKR QTY / SIZE*
5	1	—	1/60
8	1	—	1/60
9	1/3	—	—
10	1	—	1/60
15	1	2/30, 2/60	2/60
15	3	—	—
18	3	—	—
20	1	4/60	2/60
24	1/3	6/60	—
30	1/3	6/60	—

* All circuit breakers are 2 pole.

Table 13 – Electric Heater Electrical Data

FC Size	Motor FLA used	HEATER PART NO.	kW		PHASE	Internal Circuit Protection	HEATER AMPS 208/230V*			MIN AMPACITY 208/230V*			BRANCH CIRCUIT								
													Min Wire Size (AWG) 208/230V†			Min Gnd Wire Size 208/230V†			Max Fuse/Ckt Bkr Amps 208/230V		
							Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit	
			240V	208V				L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4
24	4.0	KFFEH0401N03	3	2.3	1	None	10.7/11.9	—	—	18.4/19.9	—	—	12/12	—	—	12/12	—	—	20/20	—	—
24-36	4.0	KFFEH0501N05	5	3.8	1	None	17.8/19.7	—	—	27.3/29.6	—	—	10/10	—	—	10/10	—	—	30/30	—	—
24-36	4.0	KFFEH2401C05	5	3.8	1	Ckt Bkr	17.8/19.7	—	—	27.3/29.6	—	—	10/10	—	—	10/10	—	—	30/30	—	—
48-60	5.7	KFFEH0501N05	5	3.8	1	None	17.8/19.7	—	—	29.4/31.8	—	—	10/8	—	—	10/10	—	—	30/35	—	—
48-60	5.7	KFFEH2401C05	5	3.8	1	Ckt Bkr	17.8/19.7	—	—	29.4/31.8	—	—	10/8	—	—	10/10	—	—	30/35	—	—
24-36	4.0	KFFEH0801N08	8	6.0	1	None	28.5/31.5	—	—	40.6/44.4	—	—	8/8	—	—	10/10	—	—	45/45	—	—
24-36	4.0	KFFEH2501C08	8	6.0	1	Ckt Bkr	28.5/31.5	—	—	40.6/44.4	—	—	8/8	—	—	10/10	—	—	45/45	—	—
48-60	5.7	KFFEH0801N08	8	6.0	1	None	28.5/31.5	—	—	42.8/46.5	—	—	8/8	—	—	10/10	—	—	45/50	—	—
48-60	5.7	KFFEH2501C08	8	6.0	1	Ckt Bkr	28.5/31.5	—	—	42.8/46.5	—	—	8/8	—	—	10/10	—	—	45/50	—	—
24-36	4.0	KFFEH0901N10	10	7.5	1	None	35.6/39.4	—	—	49.5/54.3	—	—	8/6	—	—	10/10	—	—	50/60	—	—
24-36	4.0	KFFEH2601C10	10	7.5	1	Ckt Bkr	35.6/39.4	—	—	49.5/54.3	—	—	8/6	—	—	10/10	—	—	50/60	—	—
48-60	5.7	KFFEH0901N10	10	7.5	1	None	35.6/39.4	—	—	51.6/56.4	—	—	6/6	—	—	10/10	—	—	60/60	—	—
48-60	5.7	KFFEH2601C10	10	7.5	1	Ckt Bkr	35.6/39.4	—	—	51.6/56.4	—	—	6/6	—	—	10/10	—	—	60/60	—	—
36	4.0	KFFEH2901N09‡	9	6.8	1	None	32.2/35.6	—	—	45.3/49.5	—	—	8/6	—	—	10/10	—	—	50/50	—	—
36	4.0	KFFEH2901N09	9	6.8	3	None	18.6/20.6	—	—	28.3/30.8	—	—	8/8	—	—	10/10	—	—	30/35	—	—
48-60	5.7	KFFEH2901N09‡	9	6.8	1	None	32.2/35.6	—	—	47.4/51.6	—	—	8/6	—	—	10/10	—	—	50/60	—	—
48-60	5.7	KFFEH2901N09	9	6.8	3	None	18.6/20.6	—	—	30.4/32.9	—	—	8/8	—	—	10/10	—	—	35/35	—	—
24-36	4.0	KFFEH3001F15**	15	11.3	1	Fuse	53.4/59.1	35.6/39.4	17.8/19.7	71.8/78.9	49.5/54.3	22.3/24.6	4/4	8/6	10/10	8/8	10/10	10/10	80/80	50/60	25/25
24-36	4.0	KFFEH3101C15	15	11.3	1	Ckt Bkr	53.4/59.1	35.6/39.4	17.8/19.7	71.8/78.9	49.5/54.3	22.3/24.6	4/4	8/6	10/10	8/8	10/10	10/10	80/80	50/60	25/25
48-60	5.7	KFFEH3001F15**	15	11.3	1	Fuse	53.4/59.1	35.6/39.4	17.8/19.7	73.9/81.0	51.6/56.4	22.3/24.6	4/4	6/6	10/10	8/8	10/10	10/10	80/90	60/60	25/25
48-60	5.7	KFFEH3101C15	15	11.3	1	Ckt Bkr	53.4/59.1	35.6/39.4	17.8/19.7	73.9/81.0	51.6/56.4	22.3/24.6	4/4	6/6	10/10	8/8	10/10	10/10	80/90	60/60	25/25
36	4.0	KFFEH1601315	15	11.3	3	None	30.8/34.1	—	—	43.5/47.6	—	—	8/6	—	—	10/10	—	—	50/50	—	—
48-60	5.7	KFFEH1601315	15	11.3	3	None	30.8/34.1	—	—	45.6/49.8	—	—	8/6	—	—	10/10	—	—	50/50	—	—
48-60	5.7	KFFEH3601318	18	13.5	3	None	37.2/41.2	—	—	53.6/58.6	—	—	6/6	—	—	10/10	—	—	60/60	—	—
36	4.0	KFFEH3201F20**	20	15.0	1	Fuse	71.2/78.8	35.6/39.4	35.6/39.4	94.0/103.5	49.5/54.3	44.5/49.3	3/2	6/6	8/8	8/6	10/10	10/10	100/110	50/60	45/50
36	4.0	KFFEH3301C20	20	15.0	1	Ckt Bkr	71.2/78.8	35.6/39.4	35.6/39.4	94.0/103.5	49.5/54.3	44.5/49.3	3/2	6/6	8/8	8/6	10/10	10/10	100/110	50/60	45/50
48-60	5.7	KFFEH3201F20**	20	15.0	1	Fuse	71.2/78.8	35.6/39.4	35.6/39.4	96.3/105.6	51.6/56.4	44.5/49.3	3/2	6/6	8/8	8/6	10/10	10/10	100/110	60/60	45/50
48-60	5.7	KFFEH3301C20	20	15.0	1	Ckt Bkr	71.2/78.8	35.6/39.4	35.6/39.4	96.3/105.6	51.6/56.4	44.5/49.3	3/2	6/6	8/8	8/6	10/10	10/10	100/110	60/60	45/50
48-60	5.7	KFFEH3701F24††	24	18.0	3	Fuse	49.3/54.6	—	—	68.8/75.4	—	—	4/4	—	—	8/8	—	—	70/80	—	—
48-60	5.7		24	18.0	1	Fuse	85.5/94.5	—	—	114.0/125.3	—	—	2/1	—	—	6/6	—	—	125/150	—	—
48-60	5.7	KFFEH3801F30‡‡	30	22.5	3	Fuse	61.7/68.2	—	—	84.3/92.4	—	—	4/3	—	—	8/8	—	—	90/100	—	—
48-60	5.7		30	22.5	1	Fuse	106.8/118.1	—	—	140.6/154.8	—	—	0/00	—	—	6/6	—	—	150/175	—	—

*. For 240V, multiply 230V heater amps by 1.04. Wire sizing and over-current protection may need adjustment per local code requirements.
†. Copper wire must be used. If other than uncoated (non-plated), 75°C ambient, copper wire (solid wire for smaller, and stranded wire for larger than 10 AWG) is used, consult applicable tables of the National Electric Code (ANSI/NFPA 70).
‡. Field convertible to 3 phase.
**. Single circuit application of F15 and F20 heaters requires Single-point wiring kit accessory.
††. Field convertible to 1 phase, single or multiple supply circuit.

Table 14 – Field Multipoint Wiring or 24- and 30-kW Single Phase

FC Size	Motor FLA used	HEATER PART NO.	kW		PHASE	HEATER AMPS 208/230V			MIN AMPACITY 208/230V*			MIN WIRE SIZE (AWG) 208/230V†			MIN GND WIRE SIZE	MAX FUSE/CKT BKR AMPS 208/230V		
			240V	208V		L1,L2	L3,L4	L5,L6	L1,L2	L3,L4	L5,L6	L1,L2	L3,L4	L5,L6	208/230V	L1,L2	L3,L4	L5,L6
48-60	5.7	KFFEH3701F24‡	24	18.0	1	28.5/31.5	28.5/31.5	28.5/31.5	42.8/46.5	35.6/39.4	35.6/39.4	8/8	8/8	8/8	10/10	50/50	40/40	40/40
48-60	5.7	KFFEH3801F30‡	30	22.5	1	35.6/39.4	35.6/39.4	35.6/39.4	51.6/56.4	44.5/49.3	44.5/49.3	6/6	8/8	8/8	10/10	60/60	45/50	45/50

*. Includes blower motor amps of largest fan coil used with heater.
†. Copper wire must be used. If other than uncoated (non-plated), 75°C ambient, copper wire (solid wire for 10 AWG and smaller, stranded wire for larger than 10 AWG) is used, consult applicable tables of the NEC (ANSI/NFPA 70).
‡. Field convertible to 1 phase, single or multiple supply circuit.

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

Accessories

REQUIRED ACCESSORY

ITEM		ACCESSORY PART NO.*	FAN COIL SIZE USED WITH
1.	Evolution Black System Control (Wi-Fi®) Evolution White System Control (Wi-Fi®)	SYSTXCCITC01-C SYSTXBBECC01 SYSTXCCWIC01-B	All
	or		
	Evolution Control Wi-Fi with bundled router	SYSTXBBECW01	All
	or		
1.	Evolution Control	SYST0101CW SYSTXBBECN01	All

ADDITIONAL ACCESSORIES

ITEM		ACCESSORY PART NO.*	FAN COIL SIZE USED WITH
2	Evolution Series 4 Zone Board	SYSTXBB4ZC01	All
3	Evolution Series Smart Sensor	SYSTXBBSMS01-D	All
4	Evolution Remote Room Sensor	SYSTXBBRRS01	All
5	Evolution Series Network Interface Module	SYSTXBBNIM01	All
6	Disconnect Kit	KFADK0301DSC	Cooling controls and heaters 3—10-kW
7	Downflow Base Kit	KFACB0201CFB	24, 36
		KFACB0301CFB	48
		KFACB0401CFB	60
8	Downflow Conversion Kit	KFADC0201SLP	Slope Coil Units—36
		KFADC0401ACL	A-Coil Units—24, 48, 60
9	Single-Point Wiring Kit	KFASP0101SPK	Only with 15- and 20-kW Fused Heaters
10	Filter	See Table 3 for filter dimension details	
11.	Fan Coil Filter Cabinet (Fan Coil Filter Media)	FNCCABXX0017 (MERV 8—FILXXFNC0017) (MERV 11—FILXXFNC0117) (MERV 13—FILXXFNC0317)	24
		FNCCABXX0021 (MERV 8—FILXXFNC0021) (MERV 11—FILXXFNC0121) (MERV 13—FILXXFNC0321)	36, 48
		FNCCABXX0024 (MERV 8—FILXXFNC0024) (MERV 11—FILXXFNC0124) (MERV 13—FILXXFNC0324)	60
12	Evolution® Series Air Purifier (Purifier Replacement Cartridge)	GAPABXBB1620 (PGAPXCAR1620-A02)	24
		GAPABXBB1620 (PGAPXCAR2020-A02)	36, 48
		GAPABXBB1620 (PGAPXCAR2420-A02)	60
13	PVC Condensate Trap Kit (50 pack)	KFAET0150ETK	All
14	Air Cleaner 240-volt Conversion Kit	KEAVC0201240	All
15	Downflow/Horizontal Conversion Gasket Kit	KFAHD0101SLP	All
16	Horizontal Water Management Kit (25 pack)	KFAHC0125AAA	All
17	Door Gasket Kit **	344994-751	All
18	Hydronic Heat Interface Relay Kit	AFAINTHWC01A	All

* Factory authorized and listed, field installed.
**This kit is for replacement of factory installed gaskets if they are damaged or removed from the fan coil.

Accessory Kits Description Suggested and Required Use

1. **Control with Integrated Wi-Fi**
   Deluxe programmable wall-mounted system control with integrated Wi-Fi.
   or
   Control Wi-Fi with bundled router
   Deluxe programmable wall-mounted system control with integrated Wi-Fi.
   Sold bundled with Wi-Fi router
   or
   Evolution **Control**
   Deluxe programmable wall-mounted system control without remote access.

2. Evolution **4 Zone Board**
   4-Zone Damper Control Module wall-mounted control.

   REQUIRED USE: For all four-zone systems. For systems with 5 to 8 zones, a second Damper Control Module is required.

3. Evolution **Smart Sensor**
   Wall control used to monitor temperature and/or fan control.

   SUGGESTED USE: For use in zone systems.

4. Evolution **Remote Room Sensor**
   Wired remote temperature sensor for zone control.

   SUGGESTED USE: For use in zone systems.

5. Evolution **Series Network Interface Module**
   Connects Heat Recovery and Energy Recovery Ventilators on non-zoning applications and non-communicating 2-speed units.

   REQUIRED USE: For non-zoned systems installed with HRV or ERV, Hybrid Heat with non-communicating heat pumps or non-communicating 2-speed units.

6. **Disconnect Kit**
   The kit is used to disconnect electrical power to the fan coil so service or maintenance may be performed safely.

   SUGGESTED USE: Units for 3- through 10-kW electric resistance heaters and cooling controls.

7. **Downflow Base Kit**
   This kit is designed to provide a 1-in. minimum clearance between unit discharge plenum, ductwork, and combustible materials. It also provides a gap-free seal with the floor.

   REQUIRED USE: This kit must be used whenever fan coils are used in downflow applications.

8. **Downflow Conversion Kit**
   Fan coils are shipped from the factory for upflow or horizontal-left applications. Downflow conversion kits provide proper condensate water drainage and support for the coil when used in downflow applications. Separate kits are available for slope coils and A-coils.

   REQUIRED USE: This kit must be used whenever fan coils are used in downflow applications.

9. **Single Point Wiring Kit**
   The single point wiring kit acts as a jumper between L1 and L3 lugs, and between the L2 and L4 lugs. This allows the installer to run 2 heavy-gauge, high-voltage wires into the fan coil rather than 4 light-gauge, high-voltage wires.

   SUGGESTED USE: Fan coils with 15- and 20-kW fused heaters only.

10. **Filter Kit (12 pack)**
    The kit consists of 12 fan coil framed filters. These filters collect large dust particles from the return air entering the fan coil and prevents them from collecting on the coil. This process helps to keep the coil clean, which increases heat transfer and, in turn, the efficiency of the system.

    SUGGESTED USE: To replace filters in fan coils.
    REQUIRED USE: All units unless a filter grille is used.

11. **Filter Media Cabinet and Cartridges**
    This cabinet is mounted to the fan coil on the return air end and designed to slip over the outer fan coil casing. The cabinets are insulated using the same insulation as production fan coils. They are designed for the removal of particulates from indoor air using FILCCFNC00(14, 17, 21, 24) media filter cartridges.

    SUGGESTED USE: All fan coils.

12. **Air Purifier and Cartridges**
    The InfinityEvolution® Series Air Purifier wires directly to fan coil and requires no duct transitions with CarrierBryant units. It comes with an airflow sensor.

    SUGGESTED USE: All fan coils.

13. **PVC Condensate Drain Trap Kit**
    This kit consists of 50 PVC condensate traps. Each trap is pre-formed and ready for field installation. This deep trap helps the system make and hold proper condensate flow even during blower initiation.

    SUGGESTED USE: All fan coils.

14. **Air Cleaner 240-volt Conversion Kit**
    The AIRA electronic air cleaner comes ready for 115-v operation.

    REQUIRED USE: This kit is required when running 240-volt circuit to air cleaner.

15. **Downflow/Horizontal Conversion Gasket Kit**
    This kit provides the proper gasketing of units when applied in either a downflow or horizontal application.

    REQUIRED USE: Fan coils in either downflow or horizontal applications.

16. **Horizontal Water Management Kit**
    This kit provides proper installation of fan coils under conditions of high static pressure and high relative humidity.

    SUGGESTED USE: All fan coils (except FE5 and FF1).

17. **Door Gasket Kit**
    This kit consists of specific adhesive-backed foam strips which are applied to the unit door and frame, limiting air leakage.

18. **Hydronic Heat Interface Relay Kit**
    This kit provides interface of the communicating fan coils with Hydronic Heat equipment.

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KFADK0301DSC
Electrical Disconnect Kit

Installation Instructions

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

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 fire extinguisher available. Read these instructions thoroughly and follow all warning or cautions included in literature and attached to the unit. Consult local building codes and 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. When you see this symbol ⚠ on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which may result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing, modifying or servicing system, always turn off main power to system. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label.

INTRODUCTION

This instruction covers the installation of electrical disconnect kit Part No. KFADK0301DSC used with FCMB4, FCMA5, FE(4, 5)B, FG, FHMA5, FJ, FJM, FT, FTM, PF(4, 5)MNX, PF(4, 5)T, W(B, C)GL, and W(B, C)HL fan coils.

The kit is designed to provide a manual electrical disconnect for units with cooling controls and heaters 3kw through 10kw.

DESCRIPTION AND USAGE

When pull-out is removed on access panel the disconnect allows safe service and maintenance to be performed on the load side of disconnect.

Kit Contents

- Disconnect Assembly (1)
- Window Bezel (1)
- #10 Hex Head Screw (3)
- Installation Instructions (1)

⚠ WARNING

Personal Injury Hazard

Field wires on the line side of the disconnect are live even with the pull-out removed. Any service or maintenance to incoming wiring must be performed with the main disconnect switch tuned off. Failure to do so will result in electrical shock causing personal injury or death.

INSTALLATION

1. Turn off electrical supply to fan coil unit.
2. Remove cover plate on blower access panel.
3. Remove blower access panel.
4. Remove pull-out and cover plate from disconnect assembly. Retain cover plate screw.
5. Attach disconnect mounting bracket to unit casing and blower shelf with 2 #10 hex head screws provided in kit. Bracket will mount near high-voltage line entry (Fig. 1).

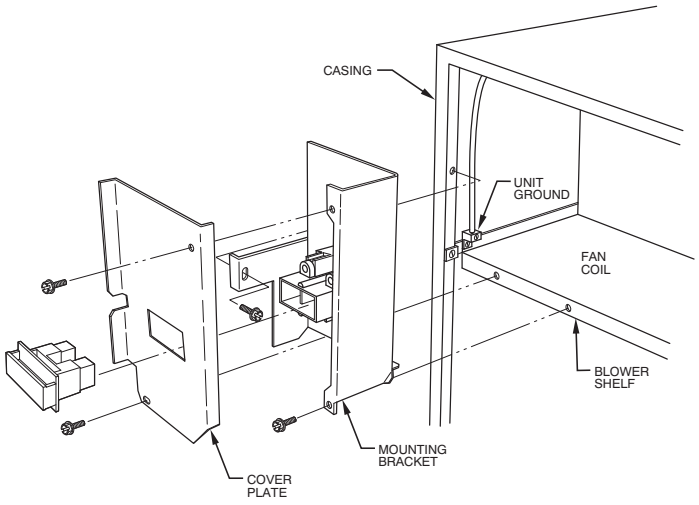

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Fig. 1 – Installation of Disconnect Kit

6. Replace yellow and black high voltage pigtail wires from heater with yellow and black wires supplied with disconnect kit. Make sure new wires are installed at the same location from which they were removed.
7. Attach load and line wires to disconnect (Fig. 2). Insert wires into wire connectors. Tighten lugs on line side. Connect ground wire to unit ground lug.

8. Replace cover plate on disconnect assembly using 1 No. 10 hex head screw provided and retained cover plate screw (Fig. 1).
9. Cut insulation away from rectangular access hole in blower access panel.
10. Remove adhesive backing from window bezel. From the outside of the door, insert the window through the rectangular hole in the door. Press the frame firmly on the door surface to seat the adhesive (Fig. 3).
11. Replace blower access panel.
12. Insert pull-out into disconnect assembly so copper conductors engage for continuity.
13. Turn on electrical power supply to fan coil unit and check operation.

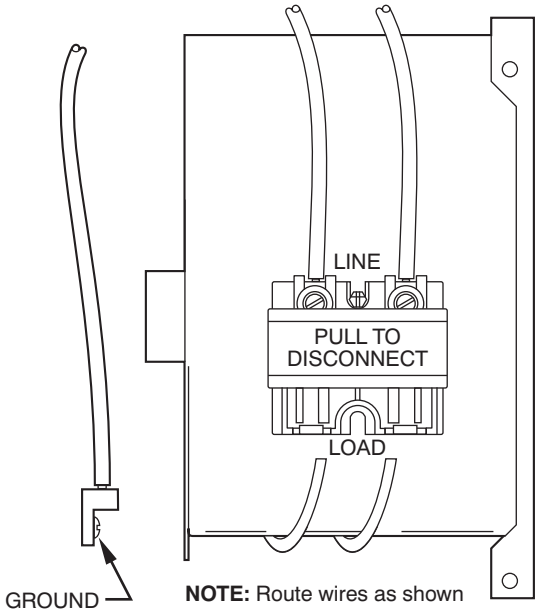

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Fig. 2 – Wiring Connections

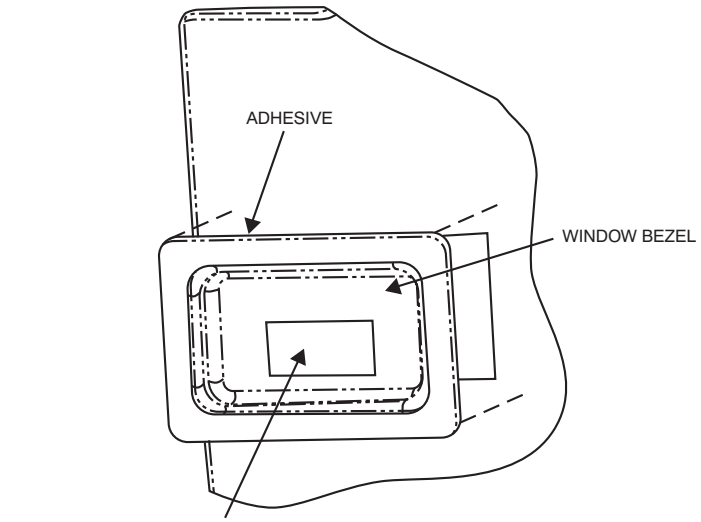

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Fig. 3 – Installation of Bezel

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AFAINTHWC01A
Interface Relay Kit
Hydronic Heat for Communicating Fan Coils

Installation Instructions

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

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 cloths for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the current editions of the National Electrical Codes (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 the 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.

INTRODUCTION

Systems with FE4B, FE5B, FCMB4, and FCMA5 communicating fan coils do not use 24VAC signals to communicate system operation commands. System control is accomplished through computer level commands on a system "bus" that requires fewer low voltage interconnecting wiring. System components that are not capable of communication through this bus require an interface kit. This kit provides interface of FE4B, FE5B, FCMB4, and FCMA5 communicating fan coils with Hydronic Heat equipment.

NOTE: This kit will provide the necessary interface function when applied with communicating wall controls.

DESCRIPTION AND USAGE

The Interface Relay Kit consists of:

- a 22 VDC relay fitted with a rectifier circuit board that can be mounted within the fan coil
- a wiring harness that is pre-wired to the relay and terminated with a 12-pin AMP Mate-N-Lok receptacle that connects to the fan coil's heater control connector
- two No. 16 AWG stripped leads for connecting the relay normally open contacts into the Hydronic system control circuit
- two mounting screws
- two wire nuts
- instructions

The wiring harness includes an ID device (270k resistor) that is recognized by the fan coil control as assigned to Hydronic Heat equipment. The relay provides switching control of the Hydronic equipment through its normally open contacts. Refer to the User Interface literature for further configuration information.

NOTE: The relay provided with this kit may not be suitable for use with electronic control inputs using very low level current. Review the Hydronic equipment control power requirements prior to use of this kit. The minimum load rating for reliable switching of the relay contacts is 500 mA at 12VAC/VDC, additional loading may be required. The maximum relay ratings are:

Table 1 – Volt Load Ratings

30 A @ 120/277 VAC resistive
1.5 HP (10 A) @ 220/240 VAC
1.5 HP (5 A) @ 440/480 VAC

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing, modifying or servicing system, always turn off main power to system. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ CAUTION

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

INSTALLATION

1. Turn off all electrical supply to the fan coil and the Hydronic equipment.
2. Remove fan coil upper door.
3. Unplug and discard the factory provided power harness that is connected to the 12-pin heater control connector.
4. Remove the blank plate that is installed over the heater installation opening.
5. Punch or drill two 1/8” (3.175 mm) diameter holes in the center of the blank plate, 2-3/8” (60.325 mm) apart (Fig. 1).
6. Mount the relay using 2 sheet metal screws.
7. Replace the heater blank plate with the relay mounted to it in its original location.
8. Connect the 12-pin receptable to the heater control connector.
9. Use wire nuts to connect stripped red leads to the incoming Hydronic equipment control power wires (Fig. 2).
10. Use field supplied wire nuts to connect the stripped black and yellow leads to the fan coil 240VAC power supply connection.

IMPORTANT: Be sure to consult local building codes and the National Electrical Code (NEC) for special requirements.

11. Reinstall the upper door.
12. Turn on electrical supply to both fan coil and Hydronic equipment.

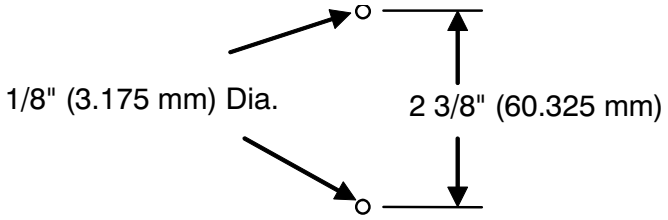

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Fig. 1 – Relay Mounting Hole Detail

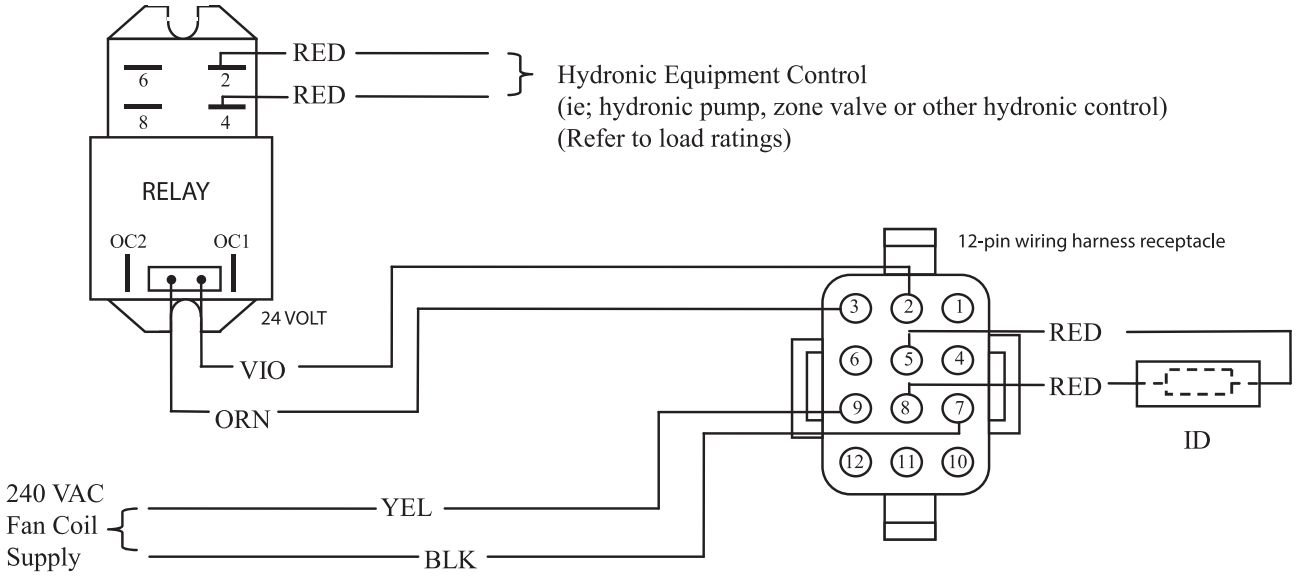

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Fig. 2 – Interface Relay Kit Wiring Schematic

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FB, FE, FF1E, FFM, FG, FH, FJ, FMA, FT, FV, FX, FY, FZ, F54, PF
Residential Fan Coil Units

Service and Maintenance Instructions

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

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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 kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing and work gloves. 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 and 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 instruction manuals, be alert to the potential for personal injury.

Understand the 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

UNIT OPERATION AND SAFERTY HAZARD

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

R-454B systems operate at higher pressures than R-410A systems. Do not use R-410A service equipment or components on R-454B equipment. Ensure service equipment is rated for R-454B.

⚠ WARNING

PERSONAL INJURY AND PROPERTY DAMAGE HAZARD

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

For continued performance, reliability, and safety, the only approved accessories and replacement parts are those specified by the equipment manufacturer. The use of non-manufacturer approved parts and accessories could invalidate the equipment limited warranty and result in fire risk, equipment malfunction, and failure. Please review manufacturer's instructions and replacement part catalogs available from your equipment supplier.

⚠ CAUTION

HOT TUBE WARNING

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

Refrigerant lines can reach or exceed 130 °F (54 °C). Avoid contact with the vapor header or vapor line, especially in Heating Mode. Do not service A2L refrigerant (ex; R-454B) fan coils while these components are hot to avoid risk of ignition source.

INTRODUCTION

These fan coil units are designed for flexibility in a variety of applications that meet upflow, horizontal, or downflow requirements. Units are available in 1-1/2 through 5 ton nominal cooling capacities. Factory-authorized, field-installed electric heater packages are available in 3 through 30 kilowatts.

FMA family Fan Coils are designed with application flexibility in mind and are suitable for closet and flush mount installations. Units are available with field-installed electric heat with circuit breaker. Units are used indoors as the fan coil for split-system heat pumps or air conditioners. The FMA5L uses a refrigerant piston metering device and a 3 speed PSC Motor. FMA5X uses a TXV and a 5 speed multi-tap ECM Motor for efficiency. Units are available in 18,000 through 36,000 Btuh nominal cooling capacities.

NOTE: Nuisance sweating may occur if the unit is installed in a humid location with low airflow.

Units are designed for upflow application only. Local codes may linit this free-air-return type unit to installation in single-level applications.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before installing or servicing unit, always turn off all power to unit. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Lock out and tag switch with a suitable warning label.

Fan Coil Description and Troubleshooting

FY5, FH4, PF4 (even sizes) and FF1E (even sizes)

Fan Motor

The motor is two or three speed direct drive. High-speed lead is black, low-speed lead is red, and common lead is yellow. Be sure proper blower speed has been selected.

The motor is turned on through two different routes. The first occurs when thermostat calls for the fan in cooling, heat pump, or fan-only mode. A 24VAC signal is sent to relay, causing relay to close its normally open contacts, turning fan on.

The second occurs when there is a call for electric heat. A 24VAC signal is sent to heater sequencer/relay, causing it to close, directing 230V through the normally closed contact of fan relay, turning fan on. The fan remains on until sequencer/relay opens.

If motor does run, test motor for an open winding or a winding shorted to motor case. If either is present, replace motor.

Electric Heater Service

Service can be completed with heater in place. Shut off power before servicing.

Limit Switch

Refer to the (Electric Heater Function and Troubleshooting on p24) section of this manual.

Sequencer

Refer to the (Electric Heater Function and Troubleshooting on p24) section of this manual.

Transformer

A 40-VA transformer supplies 24V power for control circuit. Check for 208/230V on primary side of transformer. If present, check for 24V on secondary side.

NOTE: Transformer is fused. Do not short circuit.

Fan Relay

Relay coil is 24V. Check for proper control voltage. Replace relay if faulty.

Cleaning or Replacing Refrigerant Flow-Control Device

Refer to Fig. 28 and instructions given in (Piston Body Cleaning and Replacement on p30).

The refrigerant flow-control device is protected by a wire mesh strainer. It is located inside the 3/8-in. liquid tube at field braze joint next to flow-control device. Access to strainer is through field braze joint.

Sequence of Operation

Condensing Unit

COOLING—When thermostat calls for cooling, the circuit between R and G is complete and single-pole single-throw relay FR is energized. The normally open contacts close causing blower to operate.

The circuit between R and Y is also complete. This completed circuit causes contactor in outdoor unit to close which starts compressor and outdoor fan.

HEATING—When thermostat calls for heating and FAN switch is set on AUTO, the circuit between R and W is complete. The heater sequence SEQ is energized which closes contacts of relay. There will be a time delay. This completed circuit energizes all heating elements HTR and blower motor.

Heat Pump

COOLING—On a call for cooling, the thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes reversing valve, switching it to cooling position. Circuit R-Y energizes contactor starting outdoor fan motor and compressor. Circuit R-G energizes indoor unit blower relay starting indoor blower motor.

When thermostat is satisfied, its contacts open de-energizing contactor reversing valve and blower relay. This stops compressor and fan motors.

HEATING—On a call for heating, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor starting outdoor fan motor and compressor. Circuit R-G energizes indoor blower relay starting blower motor.

Should temperature continue to fall, R-W circuit is made through second-stage room thermostat bulb. Circuit R-W energizes a sequencer bringing on supplemental electric heat.

When thermostat is satisfied, its contacts open de-energizing contactor and sequencer. All heaters and motors should stop.

CES013003-00, 01 (HK61EA002, HK61EA006) Control Boards

This section examins the functional operation of the PCB components.

Printed Circuit Board (PCB) Component

Layout of the actual PCB is depicted inFig. 1 and Fig. 2.

1. The low-voltage stripped leads are used to connect the 24V side of transformer to indoor thermostat and outdoor section.
2. A 5A fuse is used to protect the low-voltage transformer secondary.
3. The fan relay is controlled by thermostat and turns fan on and off.
4. A plug is used as the connection for PCB power and electric heaters. Note the pin numbers on plug.
5. A time-delay relay circuit keeps fan motor running for approximately 90 seconds after G is de-energized. The time-delay can be defeated by cutting jumper JW1.

Unit Functions

Transformer

1. Proper Wiring of Transformer Primary or High Side
   Yellow wire from Molex plug is wired to C terminal on transformer and black wire from PCB relay (normally-open) terminal is wired to 208V or 230V terminal on transformer. Units are factory wired at 230V terminal.
2. Proper Wiring of Transformer Secondary or 24V Side
   Red wire of transformer is wired to T terminal on PCB and brown wire of transformer is wired to C terminal on PCB.

NOTE: T terminal on PCB is used to protect the transformer. T terminal is connected through the fuse to R terminal on PCB.

Indoor Fan

1. Wiring
   Indoor fan motor yellow lead is wired to C terminal on transformer. The red, blue, or black speed lead is wired to SPT terminal on fan relay part of PCB. Units are factory wired on medium speed (blue lead connected).

NOTE: Unused fan speed leads must be capped or taped off to prevent direct short to cabinet surface.

2. Functional Control
   a. Thermostat and Relay Control
      When thermostat calls for the fan in cooling, heat pump, heating, or fan-only mode, a 24VAC signal is sent to relay. This causes

the relay to close its normally-open contacts, turning on fan. When thermostat no longer calls for the fan, the signal sent to relay is turned off and relay opens causing fan to turn off after a 90-second fan-off delay.

b. Sequencer/Electric Heat Relay Interlock
The fan will also operate whenever there is a call for electric heat, even if fan relay is not energized. This happens because fan is interlocked with first stage of electric heat through the normally-closed contact of fan relay.

NOTE: The fan interlock is only connected to first stage electric heat (W2). W3 and E do not contain an interlock with fan. See outdoor thermostat installation instructions when electric heat staging is desired.

Electric Heat

When thermostat calls for electric heat, a 24VAC signal is sent to sequencer/heat relay through W2, causing first stage to turn on. W3 and E also receive signal if wired in with W2. If W3 and E are not wired to W2, the sequencers/heat relays can be controlled individually to stage additional electric heat. The sequence control is described in the following section:

1. **W2**
When thermostat sends a signal to W2, a 24VAC signal is applied across sequencer/relay No. 1, causing it to close. When sequencer/relay No. 1 closes, first stage of electric heat is energized. In straight electric heat, fan is also energized through the normally closed contacts of fan relay. In cooling, heat pump, or manual fan mode, fan will already be running since fan relay would have been energized. When thermostat stops calling for electric heat, the 24VAC signal to sequencer/relay No. 1 turns off and sequencer opens after a delay of 60 to 90 seconds. Heaters equipped with relays will be de-energized immediately. When sequencer/relay opens, first stage of heat turns off along with fan, providing thermostat is not calling for the fan.
2. **W3**
When a signal is sent to W3, a 24VAC signal to sequencer/relay No. 2 causes it to close, with second stage of electric heat turning on. The 24VAC signal applied to sequencer/relay No. 1 causes fan to operate. Timing is such that sequencer/relay No. 1 will turn on before sequencer/relay No. 2. When signal to W3 is turned off, sequencer/relay No. 2 opens. If W2 is also satisfied, first stage of electric heat and fan will also turn off, providing thermostat is not calling for the fan.
3. **E**
When thermostat sends a signal to E, a 24VAC signal is sent to sequencer/relay No. 3. The 24VAC signal applied to sequencer/relay No. 3 turns on third stage of electric heat. The 24VAC signal applied to sequencer/relay No. 1 turns on first stage of electric heat and fan. When thermostat stops calling for electric heat, the signal to sequencers/relays 1, 2, and 3 are turned off, and sequencers/relays open. This causes electric heat to turn off with fan, providing thermostat is not calling for the fan.

NOTE: Electric heaters are factory wired with all stages tied together. If independent staging is desired, consult outdoor thermostat installation instructions, or corporate thermostat instructions.

Troubleshooting the Printed Circuit Board (CES013000-00, 01 / HK61EA002 / HK61EA006)

Use wiring schematics shown in Fig. 1 and Fig. 2 as a guide in troubleshooting PCB unless otherwise noted.

If Fan Will Not Turn On from Thermostat:

- IF THERE IS NO HIGH VOLTAGE TO TRANSFORMER:
  (1.) Check plug/receptacle connection. This supplies power from heaters to PCB Fan Relay. Be sure plug is connected properly.
  (2.) Check sequencer/relay No. 1 and plug wiring. Yellow wire should be connected to Pin No. 9 of plug and to limit switch. Black wire should be connected to Pin No. 7 of plug and to sequencer/relay No. 1.
  (3.) Check field power leads L1 and L2. If these are not receiving power, system cannot function.
- IF TRANSFORMER HAS HIGH VOLTAGE APPLIED TO IT:
  (1.) Check low-voltage transformer leads R (red) and C (brown). Be sure they are wired to correct locations.
  (2.) Check output voltage of transformer secondary side R (red) and C (brown). Be sure transformer output is between 18VAC and 30VAC. If transformer output is incorrect and transformer is receiving correct input voltage (208V or 230V), then transformer needs to be replaced with recommended transformer. If no problem exists with transformer secondary, proceed to items 3 and 4.
  (3.) Check low-voltage fuse shown in Fig. 1 or Fig. 2. If fuse is blown, replace it with an identical 5A fuse. The transformer cannot supply power to board with fuse blown or loose. If fuse blows when unit has power applied to it, the system most likely has one of the following problems:
    - Check all 24V wiring for an electrical short.
    - The maximum load on transformer is 40VA. If load on transformer is excessive, the low-voltage 5A fuse will blow to protect transformer. If load exceeds VA rating of transformer, a larger VA rated transformer needs to be installed. Check sequencers/relays for excessive current draw.
    - Check wiring of heaters. If a heater is miswired, fuse may blow. If a heater is miswired, correct miswiring by comparing it to heater wiring label.
  (4.) Check connections on primary side of transformer. If they are not connected properly, the transformer secondary cannot supply the 24V signal to energize fan relay. If transformer is receiving correct primary voltage but is not putting out correct secondary voltage, transformer needs to be replaced.

If Electric Heat Stages Will Not Turn On But Fan Will Turn On:

- IF THERE IS NO HIGH VOLTAGE TO TRANSFORMER:
  (1.) Check plug connection between heaters and board. This supplies power to transformer and fan. Be sure plug is connected properly.
  (1.) Check sequencer/relay No. 1 and plug wiring. Yellow wire should be connected to Pin No. 9 of plug and to limit switch. Black wire should be connected to Pin No. 7 of plug and to sequencer/relay No. 1.
  (1.) Check incoming high-voltage power leads. If these are not receiving power, system cannot function.
- IF TRANSFORMER HAS VOLTAGE APPLIED TO IT:
  (1.) Check low-voltage transformer leads R (red) and C (brown). Make sure they are wired to correct location. The unit will not function without proper connections.
  (1.) Check output voltage of transformer secondary side R (red) and C (brown). If transformer output is low (less than 18VAC), refer to items 3 and 4 of previous "IF TRANSFORMER HAS HIGH VOLTAGE APPLIED TO IT" section.
- IF TRACES ARE OVERHEATED ON BACK OF PCB:

Usually whenever a trace is blown on PCB, it means either there has been a high-voltage short or high voltage has been applied to low-voltage circuit. This can be prevented by making sure PCB is wired correctly before PCB has power applied to it.

- If Transformer Fuse Keeps Blowing:

When low-voltage fuse blows, it means transformer would have blown if fuse had not been in circuit to protect it. The fuse usually

blows when there is a high current draw on transformer, high voltage applied to low-voltage circuit, or a direct secondary short. When there is a high current draw on transformer, it is most likely because transformer has been shorted or system is trying to draw more VA than transformer rating allows. When fuse blows because of high voltage, the system has mixed high- and low-voltage signals.

(1.) Check wiring of sequencers/relays as shown in Fig. 1 and Fig. 2. Be sure transformer is not shorting out because thermostat wires are miswired.

(1.) Check wiring of relays as shown in Fig. 1 and Fig. 2. Be sure low-voltage and high-voltage wiring is correct.

(1.) Check VA draw on transformer. If VA draw is more than VA rating of transformer, fuse will blow. If this is the case, replace transformer with one that has a higher VA rating and meets system specifications.

If Fan Runs Continuously:

(1.) If PCB has no low-voltage power, check blue and black fan leads. These may be switched at sequencer/relay.

(1.) If PCB has low-voltage power, check fan relay to see if it is opening and closing. It may be stuck in the normally closed position due to debris in relay.

Transformer Failure:

Check 208V and 230V transformer connections. They may be miswired.

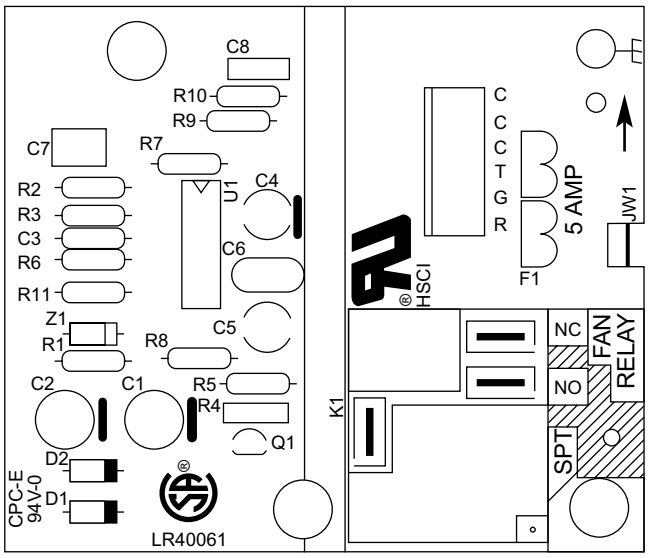

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Fig. 1 – Fan Coil Printed Circuit Board (HK61EA006)

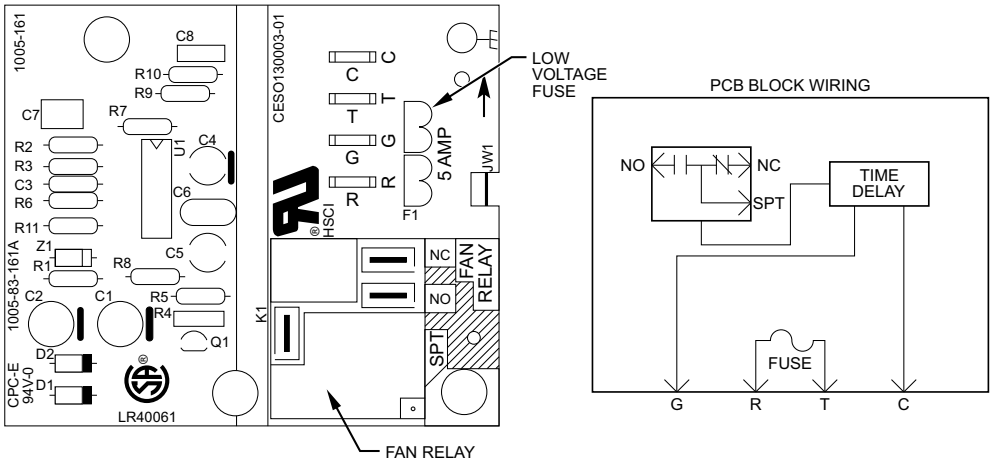

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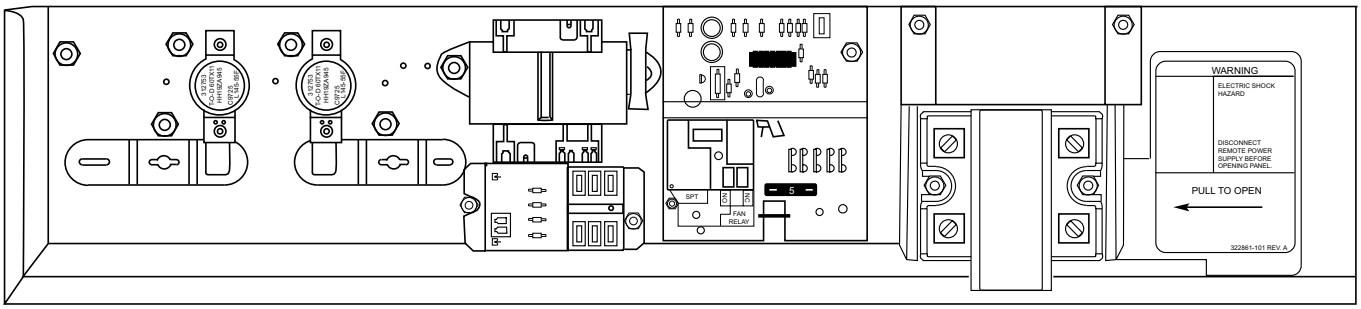
Fig. 2 – Fan Coil Printed Circuit Board (CES013003-00, 01 / HK61EA002)



FF1E CONTROL BOX

A13032

Fig. 3 – Electric Heater Control Box

FB4C, FJ4, FX4D, F54, PF4, FF1E, and FZ (odd sizes)

Fan Motor

The multi-speed ECM motor used with this product contains two parts: the control module and the motor winding section. Do not assume the motor or module is defective if it will not start. Go through the steps described below before replacing control module or entire motor. The control module is available as a replacement part.

1. It is normal for the motor to rock back and forth on startup. Do not replace the motor if this is the only problem identified.
   (1.) If the motor is not running:
   • Check for proper high voltage and ground at the L,G, and N connections at the motor. Correct any voltage issue before proceeding to the next step.

- The motor is communicated through 24VAC signals to the 1, 2, 3, 4, 5 and C (common) terminals. Not all taps are programmed, if low voltage is applied to an non-programmed terminal, the motor will not operate, which is normal. Verify the part number of the motor matches the correct replacement motor part number for the unit model number.
- Initiate a demand from the thermostat and check the voltage between C (common) and terminal 1- 5. If voltage is present and the motor isn't operating, then the motor/control module is failed.

(2.) Prior to installing the replacement control module, the motor section condition needs to be verified.

- Check to see if the blower wheel spins freely.
- To check for short to ground, use an ohmmeter to measure the resistance from any one of the motor connector pins to the aluminum end plate of the motor. This resistance should be greater than 100,000 ohms.
- Check the motor phase-to-phase resistance between each of the leads in the three-pin motor connector. The lead-to-lead resistance across any two leads should be less than 20 ohms. Each lead-to-lead resistance should be the same within ± 10 percent.
- If any motor fails any of the three tests, do not install a new control module. The new control can fail if placed on a defective motor.

The prior fan coil models with multi-speed ECM blower motors used a printed circuit board, similar to the PSC models. The current fan coils do not use the printed circuit board and rely on the motor control programming to provide the off-delay timing.

Another design aspect of the control board was to provide a resistor in the "G" circuit in case a power stealing thermostat was used. This resistor is no part of the wiring harness, as shown on wiring diagram. The resistor is a 2W, 1500-ohm resistor.

If the resistor has failed open, a likely cause is due to the power stealing thermostat. Connecting C (common) may resolve the issue. Having an open resistor should not affect the operation of the motor.

Fan Speed Selection

The fan speed selection is done at the motor connector. Units with or without electric heaters require a minimum CFM. Refer to the unit wiring label to ensure that the fan speed selected is not lower than the minimum fan speed indicated.

To change motor speeds disconnect the BLUE fan lead from motor connector terminal No. 2 (factory default position) and move to desired speed-tap; 1, 2, 3, or 5.

Speed-taps 1, 2, and 3 have a 90-second blower off time delay pre-programmed into the motor. Speed-tap 4 is used for electric heat only (with 0 second blower time delay) and the WHITE wire should remain on tap 4. Speed-tap 5 is used for high static applications, but has a 0-second blower time delay pre-programmed into the motor. See Airflow Performance tables for actual CFM. Also, see Fig. 4 for motor speed selection location.

NOTE: In low static applications, lower motor speed tap should be used to reduce possibility of water being blown off coil.

Tap 1	Low	90 sec off delay
Tap 2	Medium	90 sec off delay
Tap 3	High	90 sec off delay
Tap 4	Electric heat †	0 sec off delay
Tap 5	Max ‡	0 sec off delay

† electric heat airflow is same CFM as Tap 3, except 0 sec off delay
‡ high static applications, see airflow tables for max airflow

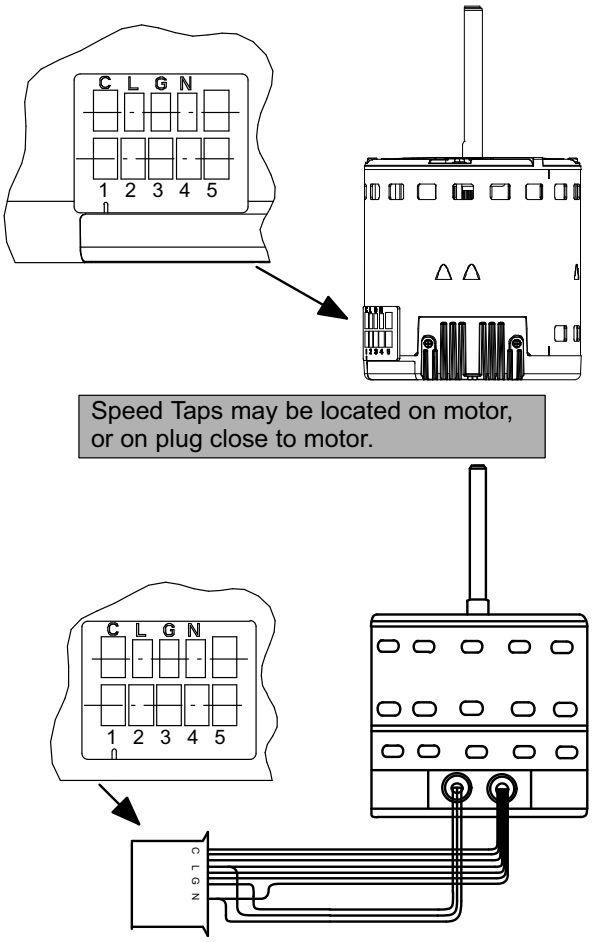


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Fig. 4 – Motor Speed Selection for FB4C, FJ4, FX4D, FZ4A, F54 & PF4 (odd sizes)

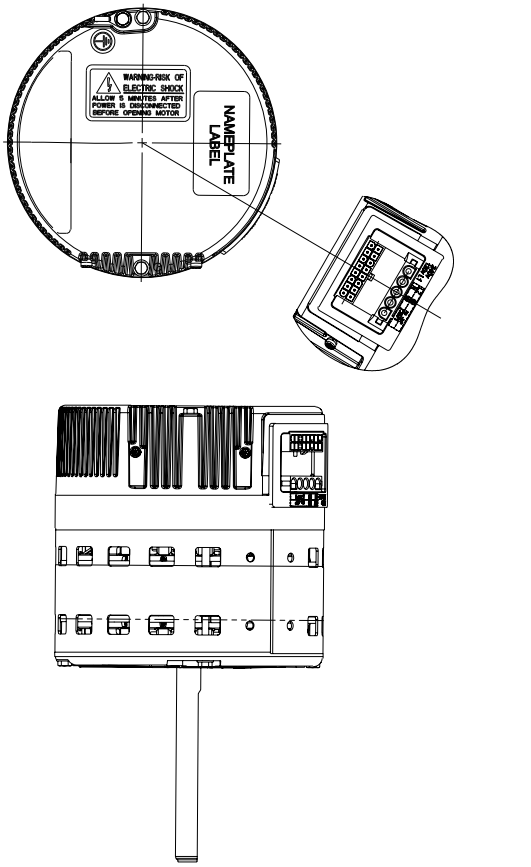

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Fig. 5 – FV4 Motor / ECM5.0 Motor (pre-2023)

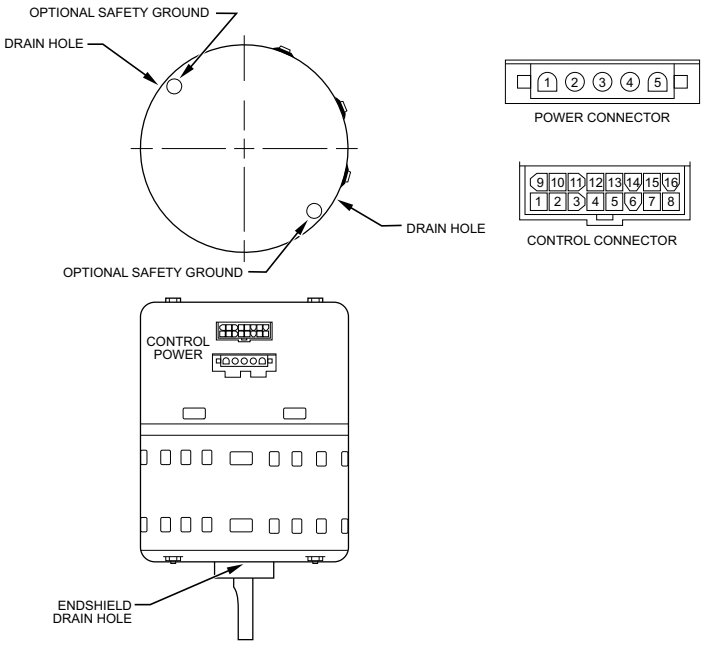

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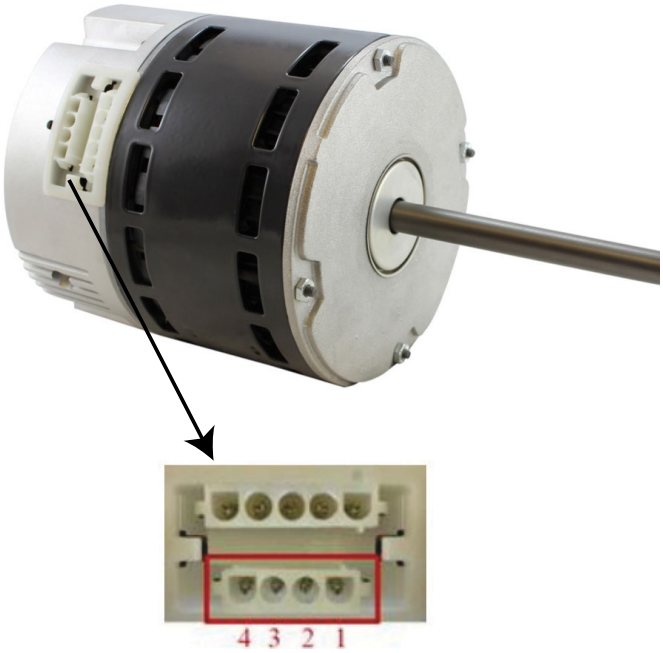
Fig. 6 – FV4 Motor / ECM2.3 Motor (pre-2023)



A230463

Fig. 7 – ECM Motor, post-2023

FV, FT4, FG4

Constant Air Flow

Unlike fan coils using induction motors where static pressure affects airflow, these fan coils are constant airflow units. The blower delivers requested airflow regardless of static pressure. Consult fan coil Product Data for static pressure limits. The ECM2.3/5.0 is pre-programmed and contains airflow tables for all modes of operation. Blower characteristics (requested airflow, torque, and speed) are known from laboratory testing If any two characteristics are known, the third is defined.

Requested airflow is known from Easy Select board configuration and thermostat signals. Torque is known because it is directly related to stator current, which is measured by motor control. Speed is measured by counting back EMF pulses from stator windings. This information is entered into an expression that calculates torque from speed and airflow numbers. If calculation does not match stored blower characteristics, torque is adjusted until agreement is reached. This calculation and adjustment is performed every 0.8 seconds while motor is in operation. There is no direct measure of static pressure, but unit does react to a change in static to maintain constant airflow. A change in pressure will result in a change in stator speed and torque. The motor will begin to adjust on the next sampling, calculate new desired speed and torque, and adjust as necessary.

Integrated Controls and Motor ECM2.3/5.0

An ECM2.3/5.0 is fed high voltage AC power through the 5-pin connector (Fig. 6 or Fig. 5). The AC power is then internally rectified to DC by a diode module. After rectification, DC signal is electronically communicated and fed in sequential order to three stator windings. The frequency of these commutation pulses determines motor speed. The rotor is permanently magnetized.

An ECM2.3/5.0 is powered with high voltage at all times. The motor will not run with high voltage alone. Low voltage must be applied to control plug to run motor.

ECM2.3/5.0 Control Power

The ECM2.3/5.0 control power is supplied from R circuit through printed circuit runs to motor control Connector-Pin 8, through motor control harness to motor. The C side of low-voltage control power circuit is connected by printed circuit runs to motor Connector pins 9, 10, and 11, then through motor control harness to motor.

Low-Voltage Circuit Fusing and Reference

The low-voltage circuit is fused by a board-mounted 5A automotive-type fuse placed in series with transformer SEC2 and R circuit. The C circuit of transformer is referenced to chassis ground through a printed circuit run at SEC1 connected to metal standoff marked.

For FT: The low-voltage circuit is fused by a board-mounted 5A automotive fuse placed in series with the transformer SEC1 (24VAC) and the R circuit. The C circuit of the transformer is referenced to chassis ground through a printed circuit run at SEC2 (COM) connected to metal standoff marked with ground symbol.

NOTE: The PCB must be mounted with two screws and motor ground lead secured to blower housing or erratic motor operation can result.

Transformer, Motor, and Electric Heater Power Connection

Transformer high voltage supplied from electric heater package or high voltage leads through 12-pin heater connector plug/recp2. The ECM2.3/5.0 power connections are made at the transformer primary terminals. The transformer secondary connections are made at SEC1 and SEC2 connectors.

PCB Layout and Description (FT4, FV4)

NOTE: Layout of actual PCB is depicted in Fig. 8.

The Easy Select Board is the interface between the ECM motor and other system components. The board offers choices of electric heater size, outdoor unit size and type, comfort or efficiency settings, on and off delay profiles, and continuous fan speed. The installer should select the correct size of components that are being installed in each installation. If no selections are made, the factory default settings are for the largest heater, largest outdoor unit, AC system type, nominal airflow adjust, and 0/90 time delay.

A 16x4 motor signal translator is present for the translation of data from the board to the motors and is mounted on the back of the PCB bracket.

NOTE: Outdoor unit model should have an AHRI rating with the variable speed fan coil. Some outdoor unit models will not work properly with this fan coil.

- Power for system is supplied from a 230VAC, 60-Hz line. Class 2 voltage (24VAC nom.), used for thermostat connections, is derived from transformer located in close proximity to PCB.
  - The 24VAC secondary circuit includes 5A automotive type fuse.
- Connection to heater panel is made through 12-pin connector PL-1. Connections to thermostat are made at screw terminals. Twenty-one pin terminals comprise field select taps for motor.
- Fuse Data: 5A automotive-type ATC/ATO (tan)
- 32V
- 200 percent current opening time of five seconds maximum

Electrical Connections

Twenty-one 0.110-in pin terminals are used to provide programming selections for operating modes of ECM2.3/5.0. The selection modes are listed below. For additional information, refer to Easy Select Configuration Taps section.

- AUX Heat Range—(Violet Wire)
- AC/HP Size—(Blue Wire) Type—(Orange Wire)
- AC/HP CFM Adjust—(Black Wire)
- AC/HP Time Delay—(Grey Wire)
- Continuous Fan—(Yellow Wire)

Sequence of Operation (FT4, FV4)

Continuous Fan Mode

The thermostat closes circuit R to G. The unit delivers the airflow selected for fan only operation.

Cooling Mode—Single Speed or Two-Speed High

Thermostat closes circuits R to G, R to Y/Y2 and R to O (heat pump only). A circuit R to Y1 is required for two-speed high operation. Airflow delivered the airflow selected by AC/HP SIZE selection and CFM ADJUST selection.

Cooling Mode—Two-Speed Low

Thermostat closes R to G and R to Y1 and R to O (heat pump only). Unit delivers two-speed low airflow for AC/HP SIZE and CFM ADJUST selected.

Cooling + Dehumidify Mode (Thermidistat or Comfort Zone II-B and Single-Speed Outdoor Unit Installed)

J1 jumper must be pulled from Easy Select Board. Control closes R to G, R to Y/Y2, and R to O (heat pump only) and open R to DH. Dehumidification is active when 24VAC is removed from DH terminal. Unit delivers 20 percent less airflow.

SuperDehumidify Mode (Thermidistat or Comfort Zone II-B indoor control, Single-Speed Outdoor Unit)

This mode is only activated by the indoor control when COOL to DEHUMIDIFY and SUPERDEHUMIDIFY are configured at the control and there is a call for dehumidfication without a call for cooling. The control closes R to Y/Y2, R to O (heat pump only) and opens R to DH and R to G. This signals the fan coil to run at minimum airflow for maximum humidity removal. The control will cycle the equipment 10 minutes on and 10 minutes off until satisfied.

NOTE: Super Dehumidification and Thermidistat functionality is not available with certain thermostat models. Verify with the thermostat manufacturer if this functionality is critical to the application.

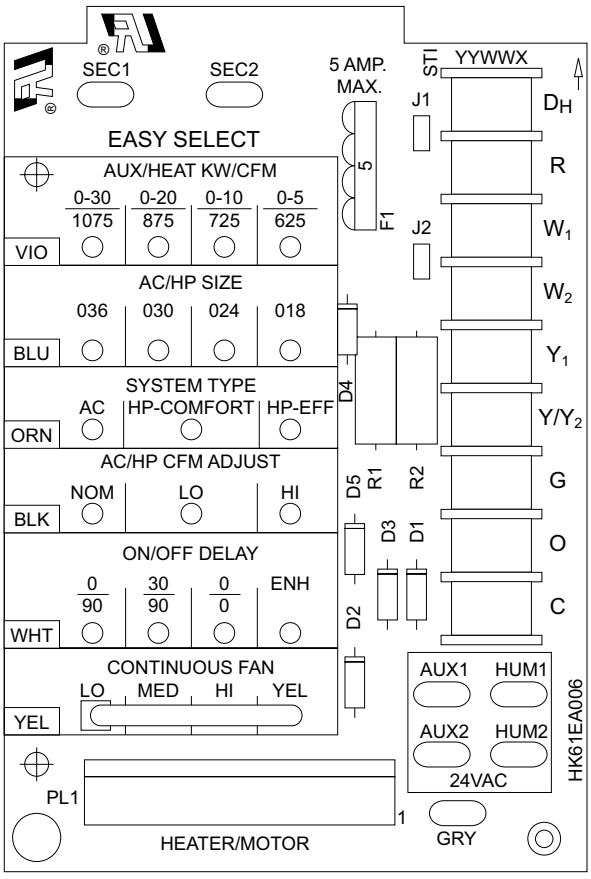
Table 1 – Motor and Modules

Model Size	Motor Type	Current Blower Motor P/N	Required Control Module Replacement Kit Number
FV4B_002	ECM2.3	HD44AE131	RMOD44AE131
FV4B_003	ECM2.3	HD44AE132	RMOD44AE132
FV4B_005	ECM2.3	HD44AE133	RMOD44AE133
FV4B_006	ECM2.3	HD46AE244	RMOD46AE244
FV4C_002 (Series A)	ECM2.3	HD44AR131	RMOD44AR131
FV4C_003 (Series A)	ECM2.3	HD44AR132	RMOD44AR132
FV4C_005 (Series A)	ECM2.3	HD44AR133	RMOD44AR133
FV4C_006 (Series A)	ECM2.3	HD46AR244	RMOD46AR244
FV4C_002 (Series B)	ECM5.0	HD44AR120	HK44ER120
FV4C_003 (Series B)	ECM5.0	HD44AR121	HK44ER121
FV4C_005 (Series B)	ECM5.0	HD44AR122	HK44ER122
FV4C_006 (Series B)	ECM5.0	HD46AR223	HK46ER223

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

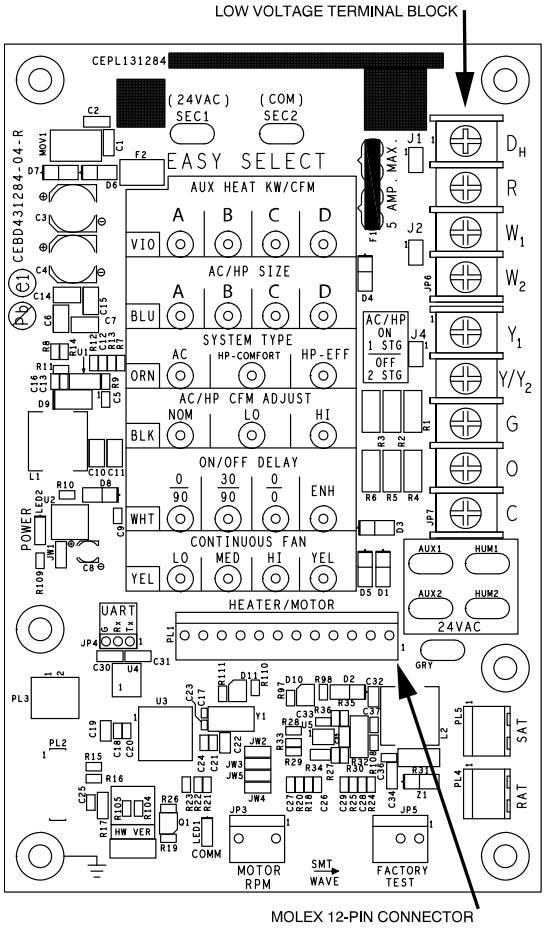
Table 2 – Motor and Modules – post-2023 (Mid and Deluxe Tier)

Configuration	Fan Coil Model Family	Size	Motor Type	Motor P/N	Motor Signal Translator P/N	Control Module P/N
Singular	FT4, FT5	24	ECM	HD44RM600	HK43EJ001	HK38EA060
Singular	FT4, FT5	36	ECM	HD44RM600	HK43EJ002	HK38EA060
Singular	FT4, FT5	48	ECM	HD46RM600	HK43EJ003	HK38EA060
Modular	FT4, FT5	60	ECM	HD44RM600	HK43EJ002	HK38EA060
Modular	FT4, FT5	48	ECM	HD46RM600	HK43EJ003	HK38EA060
Modular	FT4, FT5	60	ECM	HD46RM600	HK43EJ004	HK38EA060
Singular	FG4, FG5	24	ECM	HD44RM600	HK43EJ001	HK61EA024
Singular	FG4, FG5	36	ECM	HD44RM600	HK43EJ002	HK61EA024
Singular	FG4, FG5	48	ECM	HD46RM600	HK43EJ003	HK61EA024
Modular	FG4, FG5	60	ECM	HD46RM600	HK43EJ004	HK61EA024
Singular	FE4, FE5	24	ECM	HD44RM600	n/a	HK38EA061
Singular	FE4, FE5	36	ECM	HD44RM600	n/a	HK38EA061
Singular	FE4, FE5	48	ECM	HD46RM600	n/a	HK38EA061
Modular	FE4, FE5	36	ECM	HD44RM600	n/a	HK38EA061
Modular	FE4, FE5	48	ECM	HD46RM600	n/a	HK38EA061
Modular	FE4, FE5	60	ECM	HD46RM600	n/a	HK38EA061



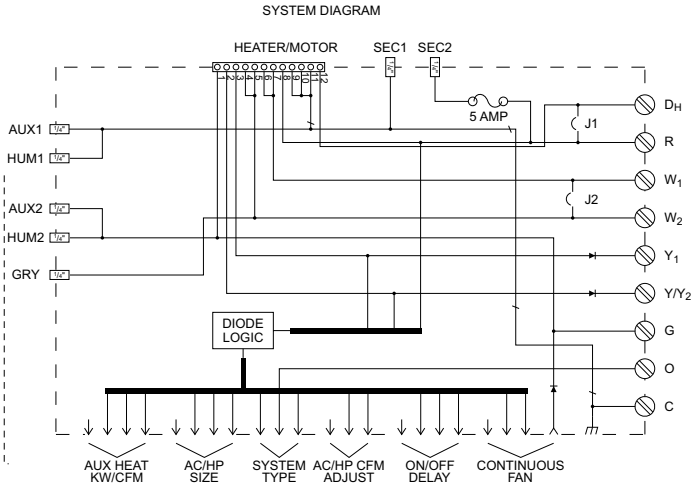
A13029

Fig. 8 – Easy Select Board
(for non-Limitless models; see Table 1 and Table 2 for P/N)



A95275B

Fig. 9 – Detail of Limitless Printed-Circuit Board
(FT4B/FT5 only; see Table 2 for P/Ns) and Table 5 for Adjustments



NOTE: On FT4, SEC1 and SEC2 are reversed in the above image. See (Low-Voltage Circuit Fusing and Reference on p7)

A96431

Fig. 10 – Easy Select Board Schematic

Table 3 – Connections and Connectors (FK4, FV4)

Type Connection	Type Connector	Pin No.	Description
Heater Connection	12-Pin	Pin 1	Common to screw terminal G
		Pin 2	Common to screw terminal Y/Y2 through diode D3
		Pin 3	Common through Y1 through diode D2
		Pin 4	Common to W2 screw terminal
		Pin 5	Common to W2 screw terminal
		Pin 6	Common to W1 screw terminal
		Pin 7	Common to W1 screw terminal
		Pin 8	R 24Vac
		Pin 9	Common to transformer C
		Pin 10	Common to transformer C
		Pin 11	Common to transformer C
		Pin 12	Common to DH screw terminal

Table 4 – Typical Operating Modes

Operating Mode	Terminals Energized
Heat Pump Only Heating	R, Y/Y2, G, DH
Heat Pump Only Heating + Super Comfort Heat Mode	R, Y/Y2, DH
Heat Pump Heating + Auxiliary Heat (non-staged)	R, Y/Y2, G, DH, W2
Cooling	R, Y/Y2, G, DH, O
Cooling + Dehumidification	R, Y/Y2, G, O

Heat Pump Heating Mode — Single Speed or Two-Speed High

Thermostat closes R to Y/Y2 and R to G. A circuit R to Y1 is required for two-speed high operation. The unit delivers airflow selected by AC/HP SIZE selection and CFM ADJUST selection. Selected delay profile is active in this mode.

Heat Pump Heating Mode — 2-Speed Low

Thermostat closes R to G and R to Y1. Unit delivers two-speed low airflow for AC/HP SIZE and CFM ADJUST selected. Selected delay profile is active in this mode.

Non-Staged Auxiliary with Heat Pump Heating Mode

Thermostat should already have closed R to G, R to Y2 for heat pump heating operation. With J2 jumper in place, energizing either W1 or W2 will produce the W2 airflow. This is the greater of heat pump heating and auxiliary heat airflow plus an additional 15 percent. The elected delay profile is not active in this mode.

Staged Auxiliary Heat with Heat Pump Heating Mode

The auxiliary heat can be staged by removing the J2 jumper that ties W1 and W2 terminals together. Staging can be done by using outdoor thermostats or by using the Intelligent Heat Staging option where the indoor control can be configured for three-stage electric heat. The unit will automatically adjust airflow when the different stages of heat are energized. The airflow delivered will depend on the heat pump size selected and electric heat size selected. The greater of the two airflows will be delivered. The selected delay profile is not active in this mode.

Electric Heat without Heat Pump

Thermostat closes R to W and thermostat should be set up to energize G with W. This is due to the Super Comfort Heat programming in the

motor. Energizing W without G will result in 25% lower airflow delivery. The selected delay profile is not active in this mode.

Super Comfort Heat Mode

This is a special heating mode only available on FV4 fan coils combined with a Thermidistat Control or Comfort Zone II-B. When this option is selected, the indoor control will monitor the outdoor temperature. The control will drop the G signal to the fan coil when the outdoor temperature is between 10° and 40° F. This triggers the motor to slow to approximately 213 CFM per ton. The heaters will stage as needed during this mode and the motor will adjust airflow as required. Below 10° F, the W1 control output will automatically energize on a call for heat. The ECM2.3/5.0 power connections are made at the transformer primary terminals. The transformer secondary connections are made at SEC1 and SEC2 connectors.

Easy Select Configuration Taps

The Easy Select taps are used by installer to configure system. The ECM2.3/5.0 uses selected taps to modify its operation to a pre-programmed table of airflows. Airflows are based on system size and mode of operation and those airflows are modified in response to other inputs such as the need for de-humidification (Fig. 8).

The FV4 and FT4 Fan Coils must be configured to operate properly with system components with which it is installed. To successfully configure a basic system (see information printed on circuit board located next to select pins), move the six select wires to pins which match components used, along with homeowner preferences.

Auxiliary Heat Range

The installer must select the auxiliary heat airflow approved for application with kW size heater installed. Each select pin is marked with a range of heaters for which airflow (also marked) is approved. For increased comfort select the narrowest kW range matching the heater size, for example, 0-10 for a 10-kW heater. This airflow must be greater than the minimum CFM for electric heater application with the size system installed for safe and continuous operation. Note that airflow marked is the airflow which will be supplied in emergency heat mode and heating mode on air conditioners when electric heat is primary heating source. To ensure safe heater operation in heat-pump heating mode, when electric heaters are energized, the ECM2.3/5.0 will run the higher of heat pump airflow and electric heater airflow. The factory default selection is largest heater range approved (Fig. 8).

AC/HP Size

The factory default setting for air conditioner or heat pump size is largest unit meant for application with model of fan coil purchased. The installer needs to select air conditioner or heat pump size to ensure that airflow delivered falls within proper range for size of unit installed in all operational modes (Fig. 8).

The letters A, B, C, D may be marked on the silk screen. In that case, use the unit's installation instructions to determine the Aux heat and AC/HP size. See Fig. 9.

Table 5 – Airflow Adjustment Table

Unit Size	AUX Heat Range (kW/CFM)			
VIO	A	B	C	D
24	0-20 / 1200	0-15 / 1050	0-10 / 750	0-5 / 700
36	0-20 / 1225	0-15 / 1050	0-10 / 750	0-5 / 700
48	0-30 / 1500	0-20 / 1350	0-15 / 1200	0-10 / 1000
60	0-30 / 1750	0-20 / 1350	0-15 / 1250	0-10 / 1200
	AC/HP Size			
BLU	A	B	C	D
24	036	030	024	018
36	042	036	030	024
48	048	042	036	030
60	060	048	042	036

Unpack unit and move to final location. Remove carton taking care not to damage unit. Inspect equipment for damage prior to installation. File claim with shipping company if shipment is damaged or incomplete.

Locate unit rating plate which contains proper installation information. Check rating plate to be sure unit matches job specifications.

System Type

The type of system must be selected.

1. AC—air conditioner (approx. 350 CFM/ton)
2. HP-COMFORT—provides lower airflow than air conditioner selection (approximately 315 CFM/ton) in heating mode. In cooling mode supplies 350 CFM/ton.
3. HP-EFF—provides same airflow for heat pump heating and cooling modes (approximately 350 CFM/ton).

The factory setting is AC (Fig. 8).

AC/HP CFM Adjust

Select low, nominal, or high airflow. The factory selection is NOM. The adjust selections HI/LO will regulate airflow supplied for cooling and heat pump heating modes only, +15 percent and -10 percent respectively. The adjust selection options are provided to adjust airflow supplied to meet individual installation needs for such things as noise, comfort, and humidity removal (Fig. 8).

ON/OFF Delay

NOTE: ON/OFF Delay is active only in cooling and heat pump only heating modes. In auxiliary heat mode or emergency heat mode, the ON delay is 0 seconds and the OFF delay is fixed and cannot be overridden.

Select desired time delay profile. Four motor-operation delay profiles are provided to customize and enhance system operation (Fig. 8). The selection options are:

1. The standard 90-seconds OFF delay (factory setting 0/90).
2. No delay option used for servicing unit or when a thermostat is utilized to perform delay functions (0/0).
3. A 30–seconds ON / 90–seconds OFF delay profile is used when it is desirable to allow system coils time to heat up/cool down prior to airflow. This profile will minimize cold blow in heat pump operation and could enhance system efficiency (30/90).
4. ENH, enhanced selection provides a 30–seconds ON / 150–seconds at 70 percent airflow and no OFF delay.

Continuous Fan

Select desired continuous-fan profile LO, MED, or HI. Airflow are provided to customize and enhance the continuous fan functions (Fig. 8). The possible selections are:

1. LO – provides 50 percent of Y/Y2 Cool airflow.

2. MED – provides 80 percent of Y/Y2 Cool airflow.
3. HI – provides 100 percent of Y/Y2 Cool airflow.

The factory setting is LO.

NOTE: If applied to two-speed unit, do not select continuous fan as HI since low speed cooling will also run at HIGH airflow and insufficient dehumidification may result.

Easy Select Board Jumpers

J1 – This jumper must be pulled to activate dehumidification mode. The jumper connects R to DH. With the jumper in, the DH terminal is always energized. With the jumper pulled, the DH terminal is de-energized. A control such as the Thermidistat must be used to supply the 24V signal when there is no call for dehumidification, and turn off the 24V when there is a call for dehumidfication.

J2 – This jumper activates heat staging. The jumper connects the W1 and W2 terminals together. If either is energized, W2 airflow is delivered. With the jumper pulled, there are separate airflows for W1 and W2.

J4 – This jumper is for InteliSense™ operation (FT4B/FT5). As shipped, Y1 is connected to Y/Y2 by a field-removable jumper J4. With the jumper in place, in single stage operation InteliSense™ communication is enabled. For 2-stage application, remove jumper J4.

Airflow Delivery

These units deliver airflow depending on the system size selections and operating mode. The thermostat energizes a combination of terminals on the Easy Select Board which tells the motor what CFM to deliver. The following are typical operating modes and the terminals that should be energized on the Easy Select Board.

NOTE: The DH terminal on the Easy Select Board is for dehumidification. It is de-energized on a call for dehumidification.

Variable Speed Motor Logic Sequence:

The ECM motors in these fan coils are programmed to deliver a variety of airflows. The motor goes through:

COOLING – The nominal cooling airflow for these fan coils is 350 CFM per ton. Selecting the HI adjust tap increases the airflow to 400 CFM per ton. The LO tap decreases airflow to 315 CFM per ton. The low adjustment is only active during normal cooling mode. Removing the signal from the DH terminal reduces the airflow to 80 percent of cooling airflow. Removing the G signal for Superdehumidify reduces the airflow to 50 percent of cooling.

HEATING – The base heat pump only heating airflow is determined by the SYSTEM TYPE selection on the Easy Select Board. If HP-EFFICIENCY is selected, the airflow is the same as Cooling. IF HP-COMFORT is selected, the airflow is 315 CFM per ton. The airflow will adjust up if necessary when auxiliary heating is required. When both the Y/Y2 and W1 or W2 terminals are energized, the motor will run the higher of the heat pump or electric heat airflows. During Super Comfort Heat mode, the indoor control removes the G signal from the board. This slows the motor to 75 percent of heat pump airflow. If the CFM adjust is set to LO, it will deliver 67.5 percent of heat pump airflow during Super Comfort Heat mode.

Troubleshooting

Troubleshooting Easy Select Board (FV, FT4)

If Traces Are Overheated on Back of PCB:

Usually whenever there is a trace broken on PCB, it means either there has been a high-voltage short or high voltage has been applied to low-voltage circuit. This can be prevented by making sure PCB is wired correctly before fan coil has power applied to it.

If PCB Fuse Keeps Blowing:

When low-voltage fuse blows, it means transformer would have blown if fuse had not been in circuit to protect it. The fuse usually blows when there is a high current drawn on transformer, high voltage applied to low-voltage circuit, or a direct secondary short. When there is a high current drawn on transformer, it is most likely because transformer has been shorted or system is trying to draw more VAC than transformer rating allows. When fuse blows because of high voltage, the system has mixed high and low-voltage signals.

1. Check transformer and thermostat wiring (Fig. 8). Be sure transformer is not shorting out because thermostat wires are miswired.
2. Check wiring of relays (Fig. 8). Be sure low-voltage and high-voltage wiring are connected to proper sequencers.
3. Check VA draw on transformer. If VA draw is more than VA rating of transformer, fuse will blow. If this is the case, replace transformer with one that has a higher VA rating.

Troubleshooting Common Problems

Airflow Too Low:

- Y1 instead of Y/Y2 on single-speed air conditioner or heat pump application. Y1 input is only for two-speed applications. Using this terminal will deliver about 60 percent of full cooling airflow.
- Wrong Easy Select Board selection. Selecting an outdoor unit or electric heater smaller than actually installed will result in low airflow for the application.
- G not energized with call for cooling or heating. This triggers Super Comfort Heat or SuperDehumidify mode which delivers 50 percent of cooling airflow.
- J1 jumper pulled with no thermidistat or dehumidistat installed. The J1 jumper ties the DH terminal to R and is installed at the factory. When pulled, a Thermidistat or dehumidistat supplies a 24V signal to DH when there is no call for dehumidification (reverse logic). When there is no signal on DH, the motor reduces airflow to 80 percent for better dehumidification.

Airflow Too High:

- Wrong Easy Select Board selection. Fan coil is factory set for the largest outdoor unit and largest electric heater. Select sizes that are actually installed.
- Continuous fan set too high for two-speed applications. Set to MED or LO.

Motor Will Not Stop:

- Allow time for off delay to time out. In units built before serial number 0101A, any W call will have a two-minute off delay independent of delay selection. This is programmed into the motor and cannot be overridden.
- In units built after 0101A, the off delay on any W call is one minute and cannot be overridden.
- Some power-stealing thermostats could bleed enough voltage to cause motor to run slowly when there is no heating or cooling call. Disconnect thermostat wires and wait two minutes to see if motor stops. If it stops, replace thermostat, or install resistor per thermostat installation instructions.

Motor Will Not Start:

- See following section, “Troubleshooting ECM2.3/5.0 Motor and Controls.”

Troubleshooting ECM2.3/5.0 Motor and Controls

⚠ CAUTION

ELECTRICAL OPERATIONS HAZARD

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

High voltage is always present at motor. Disconnect power to unit before removing or replacing connectors or servicing motor. Wait at least five minutes after disconnecting power before opening motor.

The ECM/ICM motor used with this product contains two parts: the control module and the motor winding section. Do not assume the motor or module is defective if it will not start. Go through the steps described below before replacing control module, Easy Select Board or entire motor. The control module is available as a replacement part.

If Motor Turns Slowly:

1. It is normal operation to run noticeably slower if G terminal is not energized in cooling or heat pump heating modes.
2. Attach blower access panel. Motor may appear to run slowly if access panel is removed.

If Motor Does Not Run:

Turn power off, wait five minutes and check the following:

1. With power turned off, check 5A fuse on Easy Select Board.
2. Check all plugs and receptacles for any deformation or corrosion that could cause bad connections. Be sure plugs are fully seated.

⚠ CAUTION

ELECTRICAL OPERATION HAZARD

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

DO NOT remove or apply 5-pin plug on motor with power on. Arcing could occur, which can damage control module.

Turn power back on and check the following:

3. Check for 24VAC on SEC1 and SEC2. If no voltage is present, check transformer.
4. Verify that approximately 230VAC is present at motor.
5. Verify low voltage control signals to motor according to procedure below.

Use following procedure to check low voltage signals:

The ECM motor in these fan coils receive low voltage signals from the Easy Select Board through the wiring harness assembly. The combination of pins energized at the motor determines the speed the motor will run. The procedure below isolates the fan coil from all external devices such as a thermostat, condensing unit, humidifier or electronic air cleaner. There is also a specific troubleshooting example to demonstrate the process. Table 6 provides information needed to verify that the correct voltages are present at the motor and the Easy Select Board.

THERMOSTAT:

1. Remove all thermostat and accessory wires from Easy Select Board.
2. On Easy Select Board, jumper screw terminals (1 at a time): R-G, R-Y/Y2, R-Y1, R-W1, R-W2. If motor runs in all cases, check thermostat outputs. Thermostat wires may be broken, or thermostat may be miswired, configured incorrectly, or defective. If the motor does not run, or runs in some cases, but not others, continue this procedure to check wiring harness and circuit board.

WIRING HARNESS:

1. Remove 16-pin/4-pin plug from motor.
2. Check for appropriate voltages on 16-pin/4-pin connector with screw terminals jumpered (Table 3).
3. If signals check correctly, and motor does not run, inspect wiring harness for loose pins or damaged plastic that could cause poor connections.
4. If connections are good, either control module or motor is defective.
5. If proper signals are not present, check circuit board using procedure below:
6. If the unit contains a motor signal translator box (16X4), repeat these steps with the connections on these connectors.

12-PIN PLUG (PL-1) ON EASY SELECT BOARD:

1. Completely disconnect wire harness from Easy Select Board.
2. Jumper the screw terminals one at a time; R-G, R-Y/Y2, R-Y1, R-W1, R-W2 and check for appropriate voltages on the Easy Select Board pins. If proper signals are not present, replace Easy Select Board. If proper signals are present at the pins and not at 16-pin connector to the motor, the wiring harness is defective.

TROUBLESHOOTING EXAMPLE:

Motor is not running on a call for heat pump heating after jumpering the Easy Select Board screw terminals as described in Thermostat section above.

With all thermostat wires removed from Easy Select Board, place a jumper wire between R and Y/Y2 low-voltage screw terminals on the Easy Select Board.

1. Check Table 6 for pin number on 16-pin connector associated with the Y/Y2 signal. The correct pin is No. 14. The far right column of the table shows that (-)12VDC should be present between Pin No. 14 and Pin No. 1 (common) on the 16-pin connector.
2. Set meter to read DC voltage. Place meter leads between Pins No. 1 (common) and No. 14 and check for (-)12VDC. If signal is present, the problem is in the module or motor. If signal is not present, the problem is either in wiring harness or Easy Select Board.

These steps can be repeated for other modes of operation.

To check Easy Select Board:

1. Leave jumper wire in place between R and Y/Y2.
2. Check Table 6 under "Volt Meter on Easy Select Board Plug" column and row for Pin No. 14 on motor plug to see pin number on Easy Select Board that should have voltage. The correct pin is No. 2. The column on far right will show voltage that should be present between Pin No. 2 and Pin No. 9 (common).
3. Place meter leads between Pins No. 2 and No. 9 on Easy Select Board and check for (-)12VDC.
4. If voltage is present, the wiring harness is bad. If not, the Easy Select Board is bad.

Verify Motor Winding Section:

Before proceeding with module replacement, check the following to ensure motor winding section is functional. With control module removed and unplugged from winding section:

1. The resistance between any two motor leads should be similar.
2. The resistance between any motor lead and the unpainted motor end plate should be greater than 100,000 ohms.

If motor winding fails one of these tests, it is defective and must be replaced.

Accessories

AUXILIARY TERMINALS—The AUX and HUM terminals on the Easy Select Board are tied directly to the G terminal, and provide a 24VAC signal whenever the G terminal is energized (Fig. 10). During Superdehumidify mode, the G signal is not present and the auxiliary terminals are not energized. If the installation includes the use of this operating mode, do not use these terminals to control accessories. See Electronic Air Cleaner and Humidifier sections for further information.

ELECTRONIC AIR CLEANER CONNECTIONS—The AUX1 and AUX2 terminals are not always energized during blower operation, as described above. When using an electronic air cleaner with the FV4 fan coil, use an Airflow Sensor or Airflow Verification switch. The airflow sensor turns on the electronic air cleaner when the fan coil blower is operating.

HUMIDIFIER/HUMIDISTAT CONNECTIONS—Easy Select Board terminals HUM1 and HUM2 are provided for direct connection to the

low-voltage control of a humidifier through a standard humidistat. These terminals are energized with 24VAC when G thermostat signal is present. Alternately, the 24VAC signal may be sourced from the W and C terminal block connections when electric heaters are used as primary heating source. When using a Thermidistat™ Control, Zone Perfect Plus, or Comfort Zone II, the 24VAC signal may be source directly from the Thermidistat HUM terminal.

Dehumidify Mode

NOTE: Humidistat must open on humidity rise.

Latent capacities for systems using the FK4, FT4, FV4, and 40FK fan coils are better than average systems. If increased latent capacity is an application requirement, the field wiring terminal block provides connection terminals for use of a standard humidistat. The FK4, FT4, FV4, and 40FK fan coils will detect the humidistat contacts opening on increasing humidity and reduce its airflow to approximately 80 percent of nominal cooling mode airflow. This reduction will increase the system latent capacity until the humidity falls to a level which causes the humidistat to close its contacts. When the contacts close, airflow will return to 100 percent of the selected cooling airflow. To activate this mode, remove jumper J1 and wire in a standard humidistat. Carefully consult product airflow data for cooling and dehumidification modes.

Table 6 – FV4/FT4 Motor Control Test Values (With 16-pin connector at motor unplugged)

Terminals Jumpered	Volt Meter on 16-pin Harness Plug		Volt Meter on 12-pin Easy Select Board Plug		Voltage
	+	–	+	–	
R to W1	Pin 2	Pin 1	Pin 7	Pin 9	24VAC
R to W2	Pin 13	Pin 1	Pin 4	Pin 9	24VAC
R to Y1	Pin 6	Pin 1	Pin 3	Pin 9	(-)12VDC
R to Y/Y2	Pin 14	Pin 1	Pin 2	Pin 9	(-)12VDC
R to G (LO)	Pin 15	Pin 1	Pin 3	Pin 9	0VAC
R to G (MED)	Pin 6	Pin 1	Pin 3	Pin 9	(-)12VDC
R to G (HI)	Pin 14	Pin 1	Pin 2	Pin 9	(-)12VDC

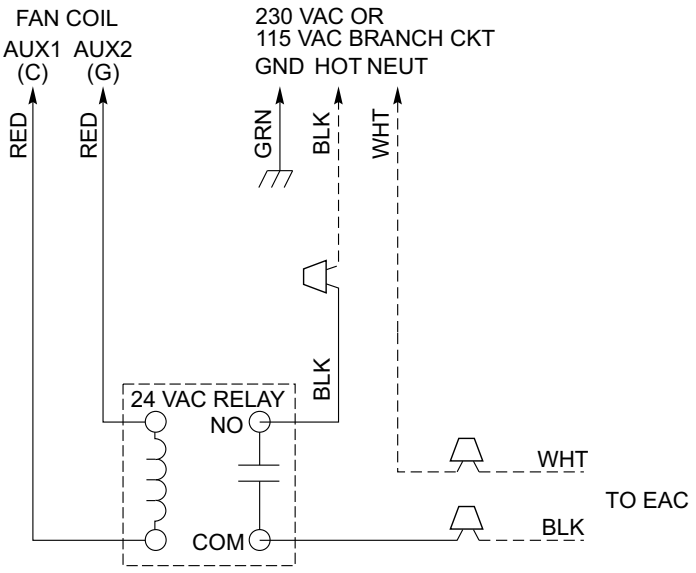


Fig. 11 – KFAIR0201ACR Relay Kit Wiring Schematic A98625

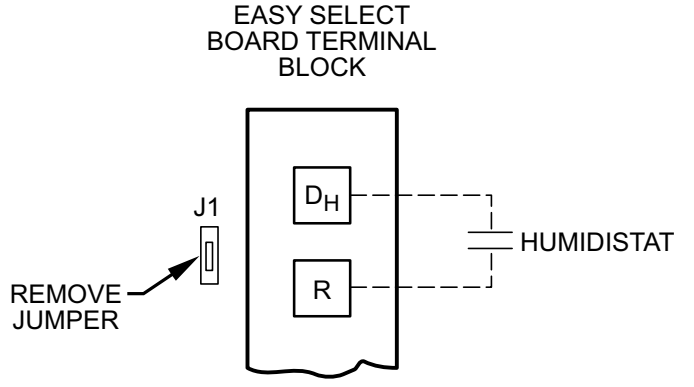


Fig. 12 – Humidistat Wiring for De-Humidify Mode A95316

InteliSense™ Technology (FT4, FT5)

This unit is InteliSense capable when used with an InteliSense thermostat. InteliSense allows for the collection of performance data in the cloud. The unit comes with two interchangeable sensors: a Return Air Temperature (RAT) sensor and a Supply Air Temperature (SAT) sensor for installation in the field. Make sure the sensors are connected to the appropriate terminals for proper temperature data collection when used with the InteliSense board. See installation instructions for detailed information on RAT/SAT placement and installation.

The InteliSense board uses the existing Easy Select layout for airflow selection with additional circuitry to manage the InteliSense data collection. Refer to the thermostat instructions for Easy Select operation details.

NOTE: When installing and servicing electronic equipment use appropriate safety PPE and avoid damaging system components by utilizing electrostatic discharge protection.

Connected Portal and Service Tech App

The Carrier Connected portal and Service Tech App provide a connection between the dealer/service tech and the homeowner's system. They can provide information about the homeowner's account, equipment configuration, operating performance and fault code history, current equipment status, and allow you to view and update thermostat settings. They can perform remote service diagnostics using real time suction line temperature and pressure w/ superheat calculation, liquid line temperature and pressure with subcooling calculation, outdoor air temperature, supply and return air temperatures, and blower motor RPMs. The dealer's unique contractor PIN can be located through either of these applications.

Power On LED/Board States

The amber LED is illuminated solid when there is power to the product. The green LED is illuminated solid when there is communication between the board and the InteliSense-enabled thermostat.

Table 7 – Diagnostic Code List*

Code	Description
30.1	InteliSense Communication Loss
30.2	InteliSense Communication Board Fault
52.1	Supply Air Temperature Open Fault
52.2	Supply Air Temperature Short Fault
53.1	Return Air Temperature Open Fault
53.2	Return Air Temperature Short Fault

*. Refer to the Service Tech App or Connected Portal for more information. Timestamps shall be applied to the fault when it occurs. Fault codes can be read through the dealer portal or through the service tech app.

How to Troubleshoot

RAT/SAT Functionality

One method of determining RAT/SAT functionality is to compare the actual resistance of the sensor with the nominal resistance at sample temperatures. The table below indicates several example values in the operating range of the sensors.

Communication Loss and Board Fault

Refer to thermostat advanced installation and configuration instructions found at carrier.hvacpartners.com/InteliSense.

Table 8 – RAT/SAT Sensor Values

Temperature (°F)	Nominal Resistance (K-ohms)	Tolerance (± %)
23	42.6	5.92
32	32.8	2.85
41	25.5	2.76
50	19.9	2.68
59	15.7	2.59
68	12.5	2.51
77	10.0	2.44
86	8.1	2.37
95	6.5	2.30
104	5.3	4.48

How Does the Service Tech Know when the System is Functioning Properly?

InteliSense is fully functioning when communication is established (indicated by LED or through the thermostat) and the thermostat has successfully fully learned all of the equipment and data is being displayed on the Connected Portal/service tech app.

FE, FT

Model FE and FT fan coil is designed to be installed with a communicating user interface. The FE and FT fan coil will provide airflow at a rate commanded by the User Interface. The nominal airflow/ton rate is 350 CFM/ton. The User Interface will modify the commanded airflow under certain operating modes. Refer to the User Interface literature for further system control details. This fan coil will not respond to commands from a common thermostat except under certain emergency situations explained in this document.

Electronically Commutated Motor ECM

An ECM motor is fed high voltage AC power through the 5-pin connector. The AC power is then internally rectified to DC by a diode module. After rectification, DC signal is electronically communicated and fed in sequential order to 3 stator windings. The frequency of these communication pulses determines motor speed. The rotor is permanently magnetized.

ECM Control Power

The ECM control power is supplied from R circuit through printed circuit runs to motor control connector Plug 1, Pin 1, through motor control harness to motor. The C side of low-voltage control power circuit is connected by printed circuit runs to motor connector Plug 1, Pin 2 then through motor control harness to motor. A digital signal is sent from Plug 1, Pins 3 and 4 to communicate with the motor including all airflow requirements.

Low-Voltage Circuit Fusing and Reference

The low-voltage circuit is fused by a board-mounted 5A automotive type fuse placed in series with transformer SEC2 and R circuit. The C circuit of transformer is referenced to chassis ground through a printed circuit run at SEC1 connected to metal standoff.

NOTE: The PCB must be mounted with two screws and motor ground lead secured to blower housing or erratic motor operation can result.

Transformer, Motor, and Electric Heater Power Connection

Transformer high voltage supplied from electric heater package or high voltage leads through 12-pin heater connector plug/recp2. The ECM 3.0 power connections are made at the transformer primary terminals. The transformer secondary connections are made at SEC1 and SEC2 connectors.

Troubleshooting (FE4/FE5A/FE5B)

NOTE: Always check high and low voltage supply to the fan coil components. Check the integrity of the plug receptacle connections and fan coil wiring harness prior to assuming a component failure.

LED Description

LEDs built into fan coil control provide installer or service person information concerning operation and/or fault condition of the fan coil control and ECM motor. This information is also available at system User Interface in text with basic troubleshooting instructions. Careful use of information displayed will reduce the need for extensive manual troubleshooting.

The amber LED located at bottom center of control adjacent to motor harness plug is Motor Status LED, and it is labeled MOTOR. A second amber LED, located in upper right center of control adjacent to System Communications connector (A,B,C,D) is the System Status LED, and it is labeled STATUS. The green LED labeled COMM is also located adjacent to System Communications connector, below STATUS LED, and is used as an indicator of system communications status. Status Codes will be displayed on the STATUS LED using the following protocol:

1. The number of short flashes indicates first digit of code.
2. The number of long flashes indicates second digit of code.
3. A short flash is 0.25 seconds on. A long flash is one second on.
4. The time between flashes is 0.25 seconds.
5. The time between last short flash and first long flash is 1 second.
6. The LED will be off for 2.5 seconds before repeating code.

Fan Coil Control Start-Up and System Communications Troubleshooting

On power up, green COMM LED will be turned off until successful system communications are established (this should happen within 10 seconds). Once communications with User Interface are successful, COMM LED will be lit and held on. At the same time, amber STATUS LED will be lit and held continuously on until a request for operating mode is received. The STATUS LED will be on any time fan coil is in idle mode.

If, at any time, communications are not successful for a period exceeding two minutes, fan coil control will only allow emergency heating or cooling operation using a common thermostat, a non-communicating

outdoor unit and the R, C, Y, O, W outdoor unit terminal strip connections and will display Status Code 16, System Communication Fault, on amber STATUS LED. No further fan coil troubleshooting information will be available at User Interface until communications are re-established.

If COMM LED does not light within proper time period and status code is not displayed:

1. Check system transformer high and low voltage to be sure the system is powered.
2. Check fuse on fan coil control to be sure it is not blown. If fuse is open, check system wiring before replacing it to be sure a short does not cause a failure of replacement fuse.

If COMM LED does not light within proper time period and status code is displayed:

Check system wiring to be sure User Interface is powered and connections are made A to A, B to B, etc. and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications.

NOTE: Shorting or mis-wiring low voltage system wiring will not cause damage to fan coil control or User Interface but may cause low voltage fuse to open.

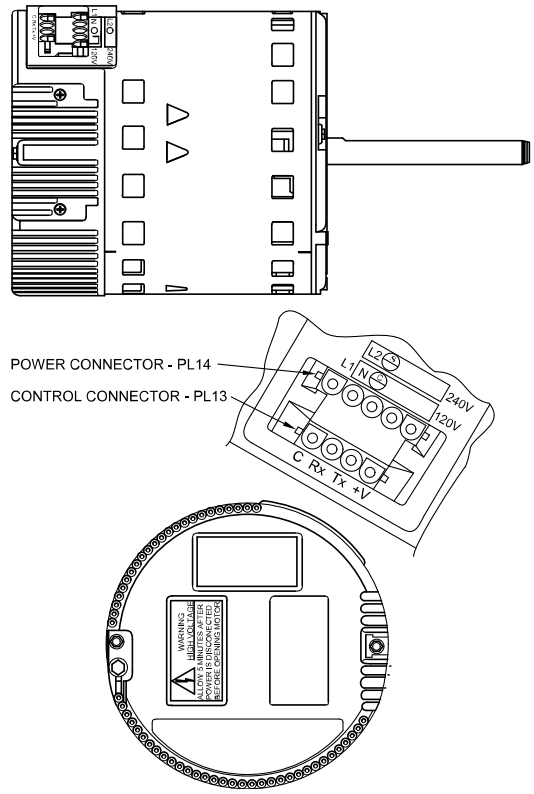
Table 9 – Troubleshooting Status Codes

Code	Description / Procedure Link to Text
16	(STATUS CODE 16, SYSTEM COMMUNICATION FAULT: on p17)
45	(STATUS CODE 45, CONTROL BOARD TEST FAULT: on p16)
37	(STATUS CODE 37, HEATER OUTPUT SENSED “ON” WHEN NOT ENERGIZED: on p16)
44	(STATUS CODE 44, MOTOR COMMUNICATION FAULT: on p16)
25	(STATUS CODE 25, INVALID MOTOR / MODEL SELECTION: on p16)
27	(STATUS CODE 27, INVALID OUTDOOR UNIT SIZE: on p16)
26	(STATUS CODE 26, INVALID HEATER SIZE: on p16)
36	(STATUS CODE 36, HEATER OUTPUT NOT SENSED WHEN ENERGIZED: on p17)
41	(STATUS CODE 41, BLOWER MOTOR FAULT: on p17)
46	(STATUS CODE 46, BROWNOUT CONDITION: on p17)
53	(STATUS CODE 53, OUTDOOR AIR TEMPERATURE SENSOR FAULT: on p17)

ECM Motor Troubleshooting

The ECM motor used in this product consists of two parts: the control module and the motor winding section. Do not assume motor or module is defective if it will not start. Use the designed-in LED information aids and follow troubleshooting steps described below before replacing motor control module or entire motor. Motor control module is available as a replacement part.

motor will shut itself down and wait for communications to be reestablished.



A12231

Fig. 13 – FE4/FE5 ECM Motor

Vefify Motor Winding Section

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

After disconnecting power from the ECM motor, wait at least five minutes before removing the control section. Internal capacitors require time to discharge. Minor injury from electrical shock may result from early contact with live metal parts.

Before proceeding to replace a motor control module:

1. Check motor winding section to be sure it is functional.
2. Remove motor control module section and unplug winding plug. Motor shaft should turn freely, resistance between any two motor leads should be similar and resistance between any motor lead and unpainted motor end should exceed 100,000 ohms.
3. Failing any of these tests, entire ECM motor must be replaced.
4. Passing all of the tests, motor control module alone can be replaced.

Motor Turns Slowly

1. Low static pressure loading of blower while access panel is removed will cause blower to run slowly. Particularly at low airflow requests. This is normal, do not assume a fault exists.
2. Recheck airflow and system static pressure using User Interface service screens with access panel in place.

NOTE: Blower motor faults will not cause a lockout of blower operation. Fan coil control will attempt to run the blower motor as long as User Interface maintains a demand for airflow. Fan coil control will not operate electric heaters while a fault condition exists. The fan coil control communicates with the motor at least once every five seconds, even when the motor is idle. If, during operation, the fan coil control does not communicate with the motor for more than 25 seconds, the

Using Motor LED in Troubleshooting

The MOTOR LED is connected to the blower motor communication line and works with the fan coil control microprocessor and the STATUS LED to provide fan coil operation and troubleshooting information. When the motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor. When the motor is commanded to stop, the MOTOR LED will be turned off.

If the MOTOR LED is lit, flashing and the motor is running or if the MOTOR LED is off and the motor is stopped, operation is normal and no motor fault exists.

If the MOTOR LED is lit, flashing and the motor does not run, or if the MOTOR LED is off and the motor is running, check the STATUS LED for the Status Code. Refer to the troubleshooting instructions for the indicated Status Code in Section E, Fan Coil Troubleshooting.

Fan Coil Troubleshooting

Fan coil faults indicated by flashing codes on the amber system STATUS LED can be resolved using troubleshooting information provided below. Codes are listed in order of their priority, highest to lowest. Though multiple faults can exist at any time, only the highest priority code will be displayed on STATUS LED. Clearing the indicated fault when multiple faults exist will cause the next highest priority Status Code to be flashed. All existing faults, as well as a fault history, can be viewed at User Interface.

STATUS CODE 45, CONTROL BOARD TEST FAULT:

Fan coil control has failed internal start-up tests and must be replaced. No other service procedure will correct.

STATUS CODE 37, HEATER OUTPUT SENSED "ON" WHEN NOT ENERGIZED:

Fan coil control is provided with circuitry to detect presence of a 24VAC signal on Electric Heater stage 1 and stage 2 outputs.

If fan coil control detects a 24VAC signal on either heater stage output and it is not supplying signal, Status Code 37 will be displayed on STATUS LED. Fan coil control will turn off output and command blower motor to supply an airflow determined to be safe for current operation mode with electric heaters energized.

To find the fault:

1. Stop all system operations at User Interface and check heater stage 24VAC outputs.
2. Disconnect electric heater at plug/receptacle 2 and check heater wiring for faults. See Status Code 36 for more information.

STATUS CODE 44, MOTOR COMMUNICATION FAULT:

The MOTOR LED is connected to the blower motor communication line and works with the fan coil control microprocessor and STATUS LED to provide fan coil operation and troubleshooting information.

When motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor.

When the motor is commanded to stop, the MOTOR LED will be turned off. The MOTOR LED will not flash to indicate communications when it is turned off.

Fan coil control is constantly communicating with the motor, even when the motor and MOTOR LED are off. If motor does not acknowledge receipt of communications, the control will display Status Code 44 on STATUS LED and continue to try to communicate with the motor. If motor acknowledges communication, status code will be cleared.

If MOTOR LED is lit and flashing and motor does not run:

1. Check the STATUS LED. If STATUS LED is indicating a Status 44 code, check the motor wiring harness for proper connection to control and motor receptacles.
2. Check motor wiring harness to be sure all wiring complies with wiring diagram description, makes a complete circuit from connector to connector and is not shorted.
3. Check 12VDC low-voltage supply to motor at Pins 1 (+) and 2 (-) of motor header connection to fan coil control.

If all checks are normal, fan coil control is good and control module on motor may need replacement. Check motor and Motor Control Module following the instructions in (ECM Motor Troubleshooting on p15).

Shorted or mis-wiring of the low voltage motor harness wiring will not cause damage to fan coil control or to motor control module.

If the MOTOR LED is off, STATUS LED is indicating a Status Code 44 and motor is running:

Disconnect the motor harness at the fan coil control. If motor continues to run, fan coil control is good and control module on motor may need replacement

STATUS CODE 25, INVALID MOTOR / MODEL SELECTION:

On initial start-up, fan coil control shall poll motor for its size data and check fan coil size data stored in fan coil control memory.

1. If motor size is incorrect for fan coil size or fan coil size data is invalid, Status Code 25 will be displayed on STATUS LED.
2. If model size data is missing (as is the case when a replacement fan coil control is installed), system User Interface will prompt installer to enter correct model size from a list of valid sizes.
3. If motor size is incorrect for model size, motor must be replaced with proper size motor. Fan coil control will not respond to operation requests until this fault condition is resolved.

STATUS CODE 27, INVALID OUTDOOR UNIT SIZE:

On initial power-up, fan coil control will write into memory outdoor unit size as provided by User Interface in a fully communicating system.

1. If outdoor unit size is invalid, Status Code 27 will be displayed on STATUS LED.
2. User Interface will prompt the installer to choose size from a list of valid sizes for application with fan coil.
3. Check communications wiring to be sure User Interface has established communications with outdoor unit or select proper size from valid size list provided at User Interface.
4. Check motor and motor control module following the instructions in (ECM Motor Troubleshooting on p15).

STATUS CODE 26, INVALID HEATER SIZE:

On initial power-up, fan coil control will write into memory electric heater size as read from heater if heater is provided with Identifier Resistor (IDR). Heater size must be valid for combination of indoor and outdoor components installed. Fan coil control will read IDR value connected to Pins 5 and 8 of heater harness connector. If no resistor is found, system User Interface will prompt installer to verify that no heater is installed.

Verifying that this is correct will establish that fan coil is operating without an electric heater accessory. Upon choosing negative option, installer will be prompted to select heater size installed from a list of valid heater sizes for fan coil and outdoor unit size installed.

If heater ID resistor value read is invalid, Status Code 26 will be displayed on STATUS LED.

If heater installed is equipped with a resistor connected to Pins 5 and 8 of heater harness connector and Status Code 26 is displayed on STATUS LED:

1. Check wiring harness connections to be sure connections are secure.
2. If symptoms persist, disconnect wiring harness at fan coil control heater header and check for a resistance value greater than 5000 ohms.
3. Check for proper wiring of resistor assembly.

4. Make sure heater size installed is an approved size for outdoor unit and fan coil sizes installed.

NOTE: Fan coil control will not operate electric heater until this Status Code is resolved. If the heater size is set through the User Interface, the heater will be operated as a single stage heater. If staging is desired, the IDR value must be read in by the fan coil control.

Table 10 – FE4/FE5 Self-identifying Resistor Values

Heater Size kW	Resistor Ohms Nominal
No heater	Open
9	11k
15	18k
20	24k
24	33k
30	39k
Hydronic Heat	270k

STATUS CODE 36, HEATER OUTPUT NOT SENSED WHEN ENERGIZED:

Fan coil control is provided with circuitry to detect presence of a 24VAC signal on Electric Heater stage 1 and stage 2 outputs.

If fan coil control energizes either heater stage and does not detect the 24VAC signal on output, Status Code 36 will be displayed on the STATUS LED Fan coil control will continue to energize heater output(s) and adjust blower operation to a safe airflow level for energized electric heat stage(s).

To find the fault, check for 24VAC on heater stage outputs. Fan coil control or sensing circuit may be bad.

NOTE: It may be useful as an electric heater troubleshooting procedure to disconnect the system communications to force Status Code 16 enabling of emergency heat mode. It is difficult to know which heater output is energized or not energized in normal operation. When fan coil is operated in emergency heat mode using electric heaters, both outputs are energized and de-energized together. Terminal strip inputs to control can then be connected R to W to turn on both electric heat outputs. Heater output sensing circuits can then be checked to resolve Status Code 36 or 37 problems.

STATUS CODE 41, BLOWER MOTOR FAULT:

If MOTOR LED is lit and flashing and motor does not run:

1. Check STATUS LED. If STATUS LED is indicating Status Code 41, motor control has detected that the motor will not come up to speed within 30 seconds of being commanded to run or that the motor has been slowed to below 250 rpm for more than 10 seconds after coming up to speed. Motor wiring harness and fan coil control are operating properly, do not replace.
2. Check to be sure that the blower wheel is not rubbing the housing.
3. Check motor to be sure that the motor shaft is not seized (motor control module must be removed and electronics disconnected from windings to perform this check properly).
4. Check motor windings section following instructions in (ECM Motor Troubleshooting on p15).

If all these checks are normal, the motor control module may need replacement.

STATUS CODE 16, SYSTEM COMMUNICATION FAULT:

If, at any time, system communications are not successful for a period exceeding two minutes, the fan coil control will only allow emergency heating or cooling operation using a common thermostat, a non-communicating outdoor unit, and the R, C, Y, O,W outdoor unit terminal strip connections and will display Status Code 16 on the amber STATUS LED. See (Emergency Heating and Cooling Modes on p17).

No further fan coil troubleshooting information will be available at the User Interface until communications are reestablished.

Check system wiring to be sure the User Interface is powered and connections are made A to A, B to B, etc. and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications. Correcting wiring faults will clear the code and reestablish communications.

Shorting or mis-wiring the low voltage system wiring will not cause damage to fan coil control or to User Interface but may cause the low voltage fuse to open.

STATUS CODE 46, BROWNOUT CONDITION:

If the secondary voltage of the transformer falls below 15VAC for a period exceeding four seconds, Status Code 46 will be displayed on STATUS LED.

If system includes a non-communicating outdoor air conditioner or heat pump, the User Interface will command the fan coil to turn off Y output controlling compressor.

When secondary voltage rises above 17VAC for more than four seconds, the brownout condition is cleared and normal system operation will resume subject to any minimum compressor off delay function which may be in effect. Brownout does not affect blower or electric heater operation.

STATUS CODE 53, OUTDOOR AIR TEMPERATURE SENSOR FAULT:

If an OAT sensor is found at power-up, input is constantly checked to be within a valid temperature range. If sensor is found to be open or shorted at any time after initial validation, Status Code 53 will be displayed at amber STATUS LED.

Check for faults in wiring connecting sensor to OAT terminals. Using an Ohmmeter, check resistance of thermistor for a short or open condition.

If thermistor is shorted or open, replace it to return the system to normal operation. If fault is in the wiring connections, correcting the fault will clear the code and return the system to normal operation.

NOTE: If fault condition is an open thermistor or a wiring problem that appears to be an open thermistor and the power to the fan coil control is cycled off, the fault code will be cleared on the next power-up but the fault will remain and system operation will not be as expected. This is because on power-up, the fan coil control cannot discern the difference between an open sensor or if a sensor is not installed.

Emergency Heating and Cooling Modes

Fan coil control can provide emergency heating or cooling using a common heat/cool thermostat in the event that there are no system communications, fault is in User Interface and no replacement is immediately available.

To activate these modes, the thermostat and outdoor unit must be wired as a common heating/cooling system to fan coil control RYWC terminals. Fan coil control must be powered and displaying Status Code 16, System Communication Fault.

NOTE: These emergency modes do not provide the level of comfort and efficiency expected by the consumer and should only be activated when User Interface cannot be replaced immediately.

SEQUENCE OF OPERATION

The FE4/FE5 fan coil is designed for installation with a communicating User Interface. This fan coil will not respond to commands provided by a common thermostat except under certain emergency situations described in the Start Up and Troubleshooting sub-section.

The User Interface uses temperature; humidity and other data supplied from indoor and outdoor system components to control heating or cooling system for optimum comfort.

ADVANCED TROUBLESHOOTING:

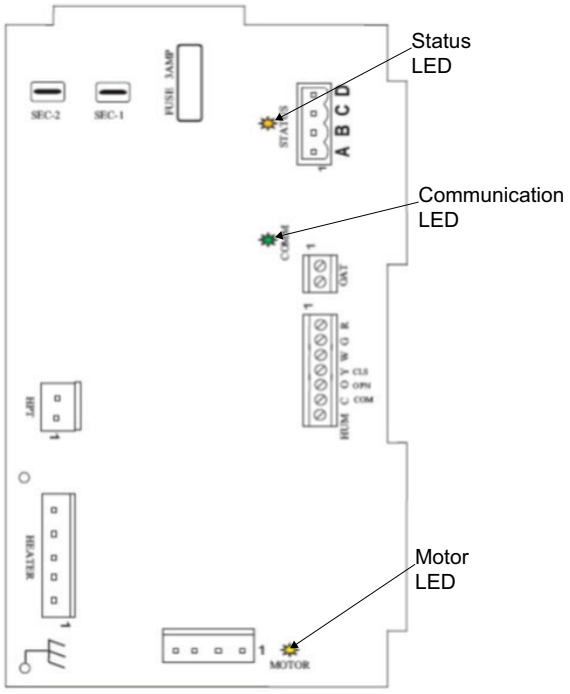


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Fig. 14 – Circuit Board LED Locations

Troubleshooting the FE4/FE5 Fan Coil Circuit Board:

- Production Unit circuit board Fan Coil part number HK38EA061
- RCD Replacement circuit board HK38EA061
- Older circuit board part numbers HK38EA006, HK38EA009, and HK38EA011

Primary test that should be performed:

Motor Line Voltage Check

1. Turn off power (240V).
2. Remove Plug 3 from ECM motor
3. Turn on power.
4. Check Plug 3, terminals 4 and 5, to ensure there are 240V.
5. Turn off power.
6. Reconnect Plug 3 to motor.

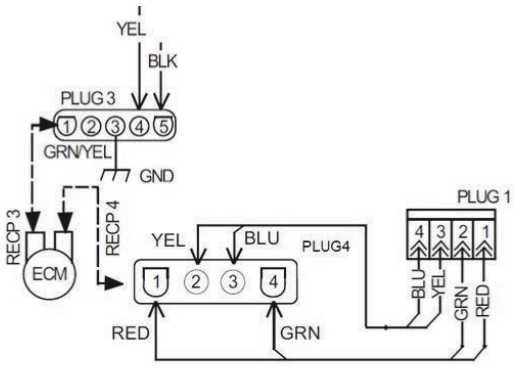

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Fig. 15 – ECM / Plug Wiring Diagram

The following troubleshooting techniques will assist in determining the correct component to replace when the Fan Coil Board presents a Fault Code 44 or 41:

1. Disconnect power from the unit (240V).
2. Disconnect the ABCD connector from the board.
3. Disconnect Plug 1 from the board (Fig. 15).
4. Turn on power (240V).
5. After reestablishing power, you should receive Fault Code 44, and the motor LED should be off.
6. Place a jumper across the R and G terminals on the low voltage terminal block
7. Fault Code 44 should still be flashing.
8. The Motor LED should be flashing, indicating the board is able to transmit a signal to the motor.
9. If Motor LED is not flashing, check to ensure that 24V is present across R and C on the low voltage terminal block and that there is a good connection with the R and G jumper.
10. If 24V is present and the jumper/connections are good,
11. Replace the board.

Check Board

1. If Fault Code 44 and the Motor LED are both flashing, place a DC voltmeter across terminals PL1-1 Red (+) to PL1-2 Green (-) (Fig. 15).
2. Across terminal PL1-1 and PL1-2, a 12VDC should be present. If 12VDC is not present, replace circuit board.
3. If Fault Code 44 is flashing and the Motor LED is flashing, place a DC voltmeter across terminal PL1-3 (+) and PL1-2 (-).
4. Across terminal PL1-3 (+) and PL1-2 (-), the DC volt meter should display 5VDC. The voltage should be very stable and should not fluctuate more than 0.02VDC. If the voltage fluctuates, get a different voltmeter before proceeding to the following steps.
5. Reconnect Plug 1 to circuit board and connect DC voltmeter across terminals PL1-3 Yellow (+) and PL1-2 Green (-). Does the voltage appear to fluctuate more than in step 15? Typical voltmeters will show a fluctuation of 0.2VDC to 1VDC. The amount of fluctuation is not important. You could see even more fluctuation depending on the voltmeter used.
6. Check the blower motor serial output signal. The blinking LED on the control board represents the serial output signal. You can measure the signal with a DC voltmeter by removing Plug 1 from the circuit board and connecting the DC voltmeter across PL1-4 (+) and PL1-2 (-). The voltage should be near 0VDC but it will fluctuate briefly several times per second. If you have an analog voltmeter, the needle briefly will go high several times per second. If you have a digital voltmeter with a bar graph, it will show a large change in magnitude on the bar graph several times per second. If you have a plain, digital voltmeter, it will show a brief fluctuation in voltage, and the magnitude may vary depending on the voltmeter used.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect all power to the unit before servicing the field wires or removing the control package. The disconnect (when used) on the access panel does not disconnect power to the line side of the disconnect, but does allow safe service to all other parts of the unit.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect and clean or replace air filter each month or as required.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary. An inspection port is provided on all A-coil delta plates. Remove plastic plug to inspect. Replace plug after inspection.
3. Inspect blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.

4. Inspect electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

Filter Assembly

To clean or replace air filter, push plastic connectors toward center of unit and remove filter access panel outward. Push filter up and back into unit. Then slide filter out.

Clean filter by using cold water and mild detergent. Rinse and allow filter to dry. No oiling or coating of filter is required. New filters are available from your local distributor. Place filter in slot with cross-mesh binding up or facing cooling coil and replace filter access panel.

Cooling Coil, Drain Pan, and Condensate Drain

The cooling coil is easily cleaned when it is dry. Inspect the coil and clean (if necessary) before each cooling season. To check or clean cooling coil, remove coil access panel. If coil is coated with dirt or lint, vacuum it with a soft brush attachment.

Be careful not to bend coil fins. If coil is coated with oil or grease, clean it with a mild detergent and water solution. Rinse coil thoroughly with clear water. Be careful not to splash water on insulation.

FFM and FMA

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before installation or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Lock out and tag switch with a suitable warning label.

Fan Motor

The FFMANP (018,024,030,036), FMA4P and FMA5L motor is three-speed PSC direct drive. High-speed lead is black, medium-speed lead is red, low-speed lead is blue, and common lead is purple. The FFMANP (019,025,031,037) and FMA4X/5Xmotor is a five speed ECM direct drive. The cooling speed tap is selected by connecting the green wire to the desired motor tap number indicated on the motor plug. For the electric heat fan speed selection connect the white wire to the desired motor tap number indicated on the motor plug. Be sure proper blower speed has been selected.

The blower motor in this unit has blower-off delays. The blower-off delay is 30–90 seconds and will keep the motor running after a heating or cooling call ends.

The motor is turned on through two different routes. The first occurs when thermostat calls for the fan in cooling, heat pump, or fan-only mode. A 24VAC signal is sent to relay, causing relay to close its normally open contacts, turning fan on.

The second occurs when there is a call for electric heat. A 24VAC signal is sent to heater sequencer/relay, causing it to close, directing 230V through the normally closed contact of fan relay, turning fan on. The fan remains on until sequencer/relay/PCB opens.

FMA5 only—has a third way to start the fan motor. If the dissipation system detects a refrigerant leak, G is energized and completes the circuit to the indoor blower motor.

If motor does not run, test motor for an open winding or a winding shorted to motor case. If either is present, replace motor.

Time Delay

FFMANP (019,025,031,037) and FMA4X/5X have time delay built into the motor logic. FFMANP (018,024,030,036), FMA4P and FMA5L units with date codes prior to 1715V have sequencers. FFMANP (018,024,030,036), FMA4P and FMA5L units with date codes 1715V or later have a time delay printed circuit board.

The Time Delay Printed Circuit Board (PCB) s a logic controlled time delay activated by low-voltage control signal (G) from thermostat. The PCB includes a normally open relay which closes to energize the blower motor when the G terminal is energized. Then when the G terminal is de-energized the relay energizing the blower motor remains closed for 90–100 seconds before opening.

NOTE: Aluminum coil models with PSC motor can be wired to different OFF time delay. See installation instructions for wiring diagram.

FMA5X units have time delay built into the motor logic. See the Motor Speed Taps table in the installation instructions. FMA5L have the time delay functionality integrated into the control board.

Table 11 – Speed Tap and Off -Delay Time (FMA4)

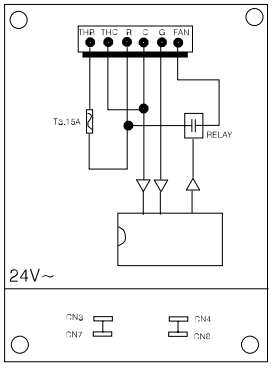
Speed Tap	Off-Delay Time	18	24	30	36
Tap 1	30	-	-	-	-
Tap 2	90	Default	-	Default	-
Tap 3	30	-	-	-	-
Tap 4	90	-	Default	-	Default
Tap 5	30	-	-	-	-

Table 12 – FMA5X ECM Motor Speed Taps Delay Off Time Setting

Tap	18	24	30	36
Tap 1	30	30	30	30
Tap 2	30	30	30/90*	30/90
Tap 3	90*	90	90/30	90/30
Tap 4	90/0	90/0	90	90*
Tap 5	90	90*	90/0	90/0

*. Default setting

Where two numbers are shown, left represents Minor series 1 and right represents Minor series 2.



Comments:

1. The THR and THC are connected to transformer output.
2. When the G has signal, the FAN will supply 24VAC power to control fan relay.
3. Whe the G signal is gone, the FAN will stop 24 VAC output after 90 seconds.
4. CN3, CN7 are dummy connection terminals.

A150455B

Fig. 1 – Time Delay PCB Schematic

NOTE: The following sequence of operation is based on units installed with PSC motor and Time Delay Printed Circuit Board (PCB), and all FMA5L units. For units with ECM motor, the off-delay is programmed into the motor. Follow Table 11 below, ECM Motor Speed Taps & the corresponding blower OFF delays for each speed tap. For FMA5X units, see the Motor Speed Taps table in the Installation Instructions.

Continuous Fan

Thermostat closes R to G. G energizes and completes circuit to indoor blower motor. When G is de-energized, there is a 90-second blower off-delay.

Cooling Mode

Thermostat energizes R to G, R to Y, and R to O (heat pump only). G energizes and completes indoor blower motor. Y energizes outdoor unit (O is energized for heat pump). When cooling call is satisfied, G is de-energized, there is a 90-second blower off-delay.

Heat Pump Heating Mode

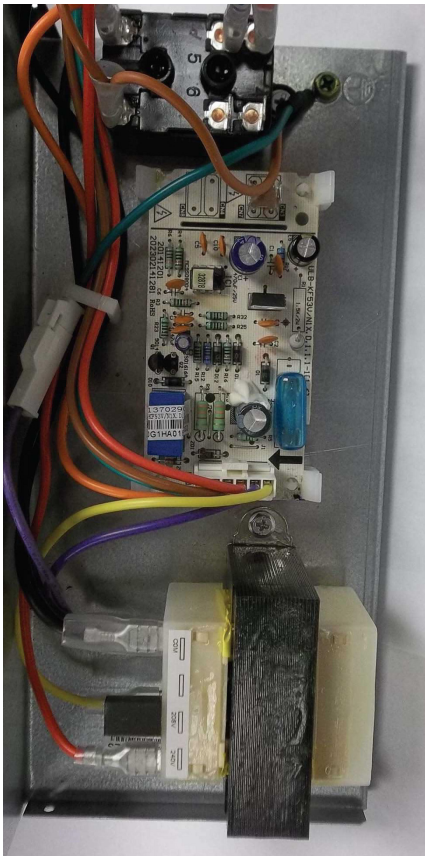
Thermostat energizes R to G and R to Y. G energizes and completes circuit to indoor blower motor. When heating call is satisfied, G is de-energized, there is a 90-second blower off-delay.

Heat Pump Heating with Auxiliary Electric Heat

Thermostat energizes R to G, R to Y, and R to W1. G energizes and completes circuit to indoor blower motor. W1 energizes electric heat relay(s) which completes circuit to heater element(s). When W1 is de-energized, electric heat relay(s) open, turning off heater elements. When G is de-energized there is a 90-second blower off-delay.

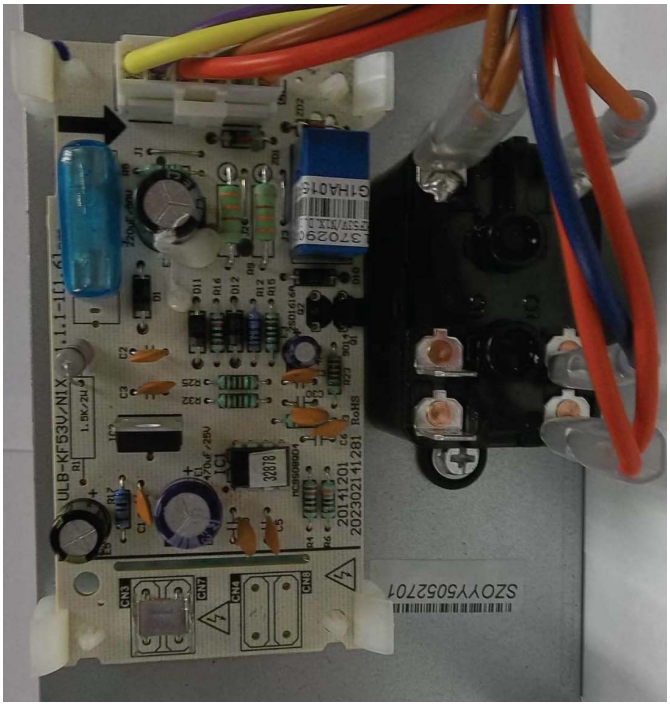
Electric Heat or Emergency Heat Mode

Thermostat closes R to W1. W1 energizes electric heat relay(s) which completes circuit to heater element(s). Blower motor is energized through normally closed contacts on fan relay. When W1 is de-energized, electric heat relay(s) opens, there is no blower off-delay. (units with ECM motor will have a blower off-delay based on motor speed tap selection).



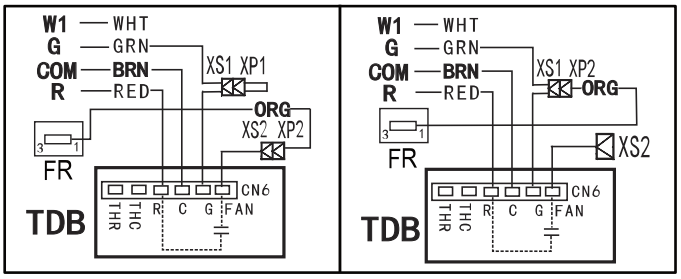
A150462

Fig. 16 – FMA4 Size 18 & 24 PCB



A150463

Fig. 17 – SMA4 Size 30 & 36 PCB



A180074

Fig. 18 – Time Delay Schematic

Electric Heater Service

Service can be completed with heater in place. Shut off power before servicing.

Limit Switch

Refer to (Electric Heater Function and Troubleshooting on p24).

Sequencer

Early EHK2 heater kits included sequencers instead of relays. Refer to (Electric Heater Function and Troubleshooting on p24).

Transformer

A 40VA transformer supplies 24V power for control circuit. Check for 208/230V on primary side of transformer. If present, check for 24V on secondary side.

NOTE: Transformer is fused. Do not short circuit.

Fan Relay

Later EHK2 heater kits included relays instead of sequencers. Relay coil is 24V. Check for proper control voltage. Replace relay if faulty.

Cleaning or Replacing Refrigerant Flow-Control Device

FFM, FMA4P

The piston can be removed and cleaned if believed to be plugged. This unit's piston is unique and replacements are available from RCD.

The filter drier should be located on the liquid line at the indoor unit to prevent particulate from plugging the piston.

FFM, FMA4X, FMA5L, FMA5X

These fan coils use a TXV. The TXV's are preset at the factory and do not need adjustment for reliable operation. Reference the outdoor unit instructions to properly charge the unit to the correct subcooling. For optimal performance, adjust the TXV so that 6º F of superheat is measured at the outdoor unit's vapor service valve when the indoor return air is 80º F DB/67º F WB and outdoor ambient is 82º F DB. To increase superheat turn the TXV adjustment stem clockwise no more than one rotation at a time. After an adjustment is made, wait until the superheat temperature has been stable for 15 minutes before making further adjustments.

Sequence of Operation

Condensing Unit

COOLING—When thermostat calls for cooling, the circuit between R and G is complete and single-pole single-throw relay FR is energized. The normally open contacts close causing blower to operate.

The circuit between R and Y is also complete. This completed circuit causes contactor in outdoor unit to close which starts compressor and outdoor fan. When thermostat is satisfied, its contacts open de-energizing contactor and blower relay. This stops compressor and outdoor fan motor. The indoor fan motor will stop after 90-100 seconds on the FFMANP(018,024,030,036) and FMA4P, and 30 or 90 seconds on the FFMANP(019,025,031,037), FMA4X, and FMA5L/X.

HEATING—When thermostat calls for heating and FAN switch is set on AUTO, the circuit between R and W is complete. The heater sequence SEQ is energized which closes contacts of relay. There will be a time delay. This completed circuit energizes all heating elements HTR and blower motor. When thermostat is satisfied, its contacts open de-energizing heat relay. This de-energizes the sequencer. All heaters should stop. The indoor fan motor will stop after 90-100 seconds on the FFMANP(018,024,030,036) and FMA4P, and 30 or 90 seconds on the FFMANP(019,025,031,037), FMA4X and FMA5L/X.

Heat Pump

COOLING—On a call for cooling, the thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes reversing valve, switching it to cooling position. Circuit R-Y energizes contactor starting outdoor fan motor and compressor. Circuit R-G energizes indoor unit blower relay starting indoor blower motor.

When thermostat is satisfied, its contacts open de-energizing contactor reversing valve and blower relay. This stops compressor and outdoor fan motor. The indoor fan motor will stop after 90-100 seconds on the FFMANP(018,024,030,036) and FMA4P, and 30 or 90 seconds on the FFMANP(019,025,031,037), FMA4X and FMA5L/X.

HEATING—On a call for heating, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor starting outdoor fan motor and compressor. Circuit R-G energizes indoor blower relay starting blower motor.

Should temperature continue to fall, R-W circuit is made through second-stage room thermostat bulb. Circuit R-W energizes a sequencer bringing on supplemental electric heat.

When thermostat is satisfied, its contacts open de-energizing contactor and sequencer. All heaters should stop. The indoor fan motor will stop after 90-100 seconds on the FFMANP(018,024,030,036) and FMA4P, and 30 or 90 seconds on the FFMANP(019,025,031,037) and FMA4X.

FMA5L and FMA5X units are equipped with an R-454B refrigerant dissipation system. This system comes with a leak detection sensor located behind the slope coil. While a leak event is being detected by the sensor, the EHK2 (heater kit) will be inoperable until the unit is no longer in dissipation mode.

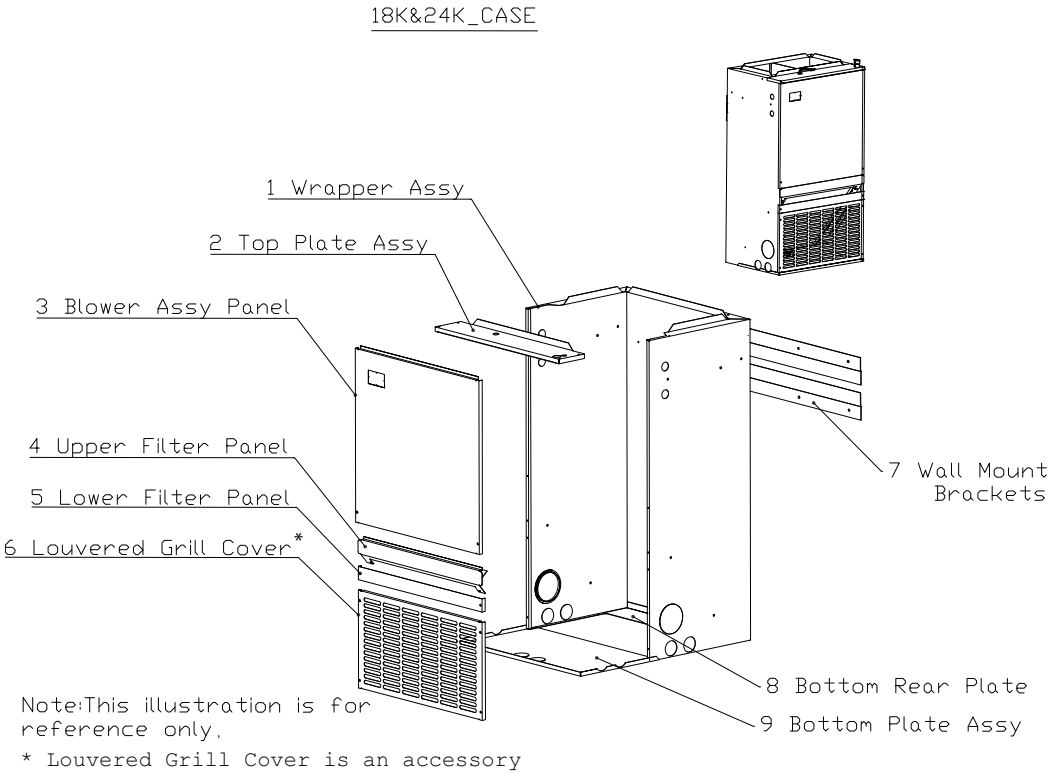


Fig. 19 – FFMA, FMA4, FMA5 (Sizes 18 & 24) Expanded View - Case

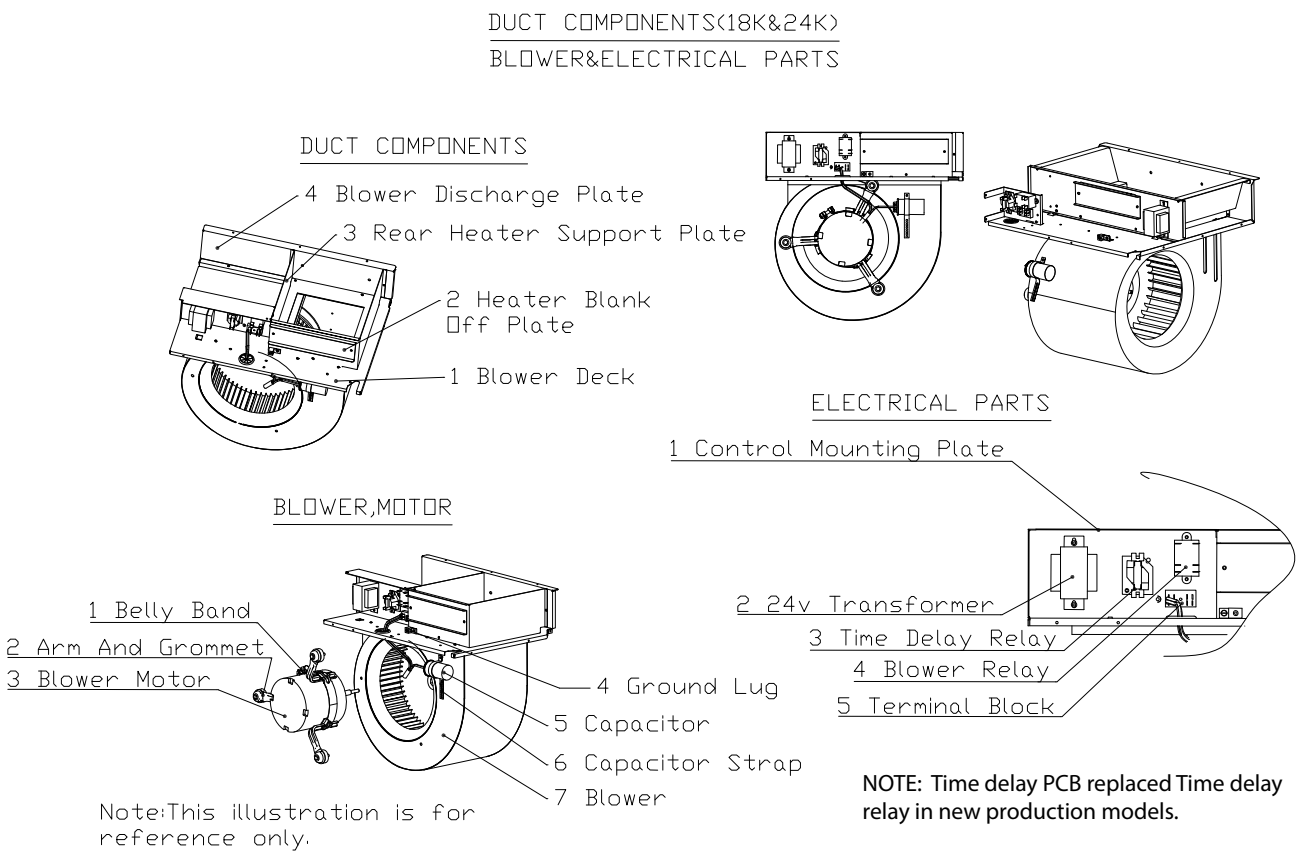


Fig. 20 – FFMA, FMA4, FMA5 (Sizes 18 & 24) Expanded View - Duct Components, Blower & Electrical Parts

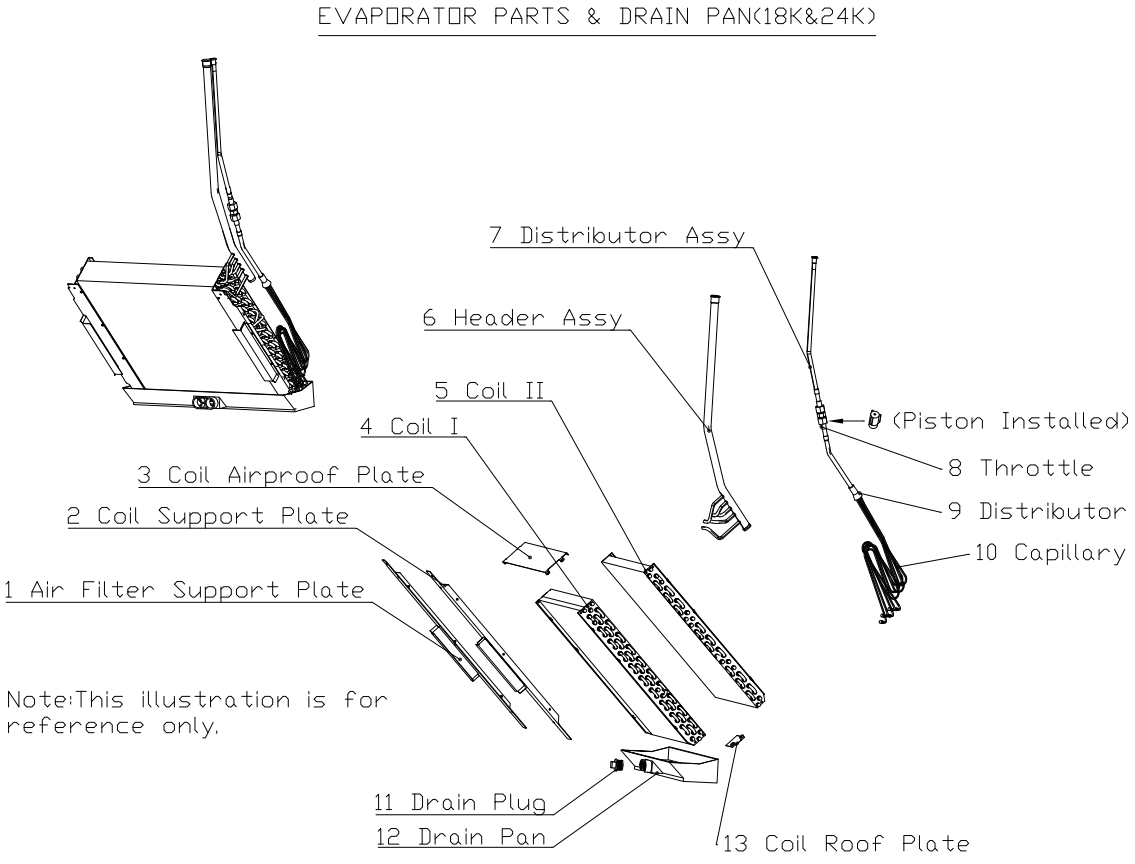


Fig. 21 – FFMA, FMA4, FMA5 (Sizes 18 & 24) Expanded View - Evaporator Parts & Drain Pan

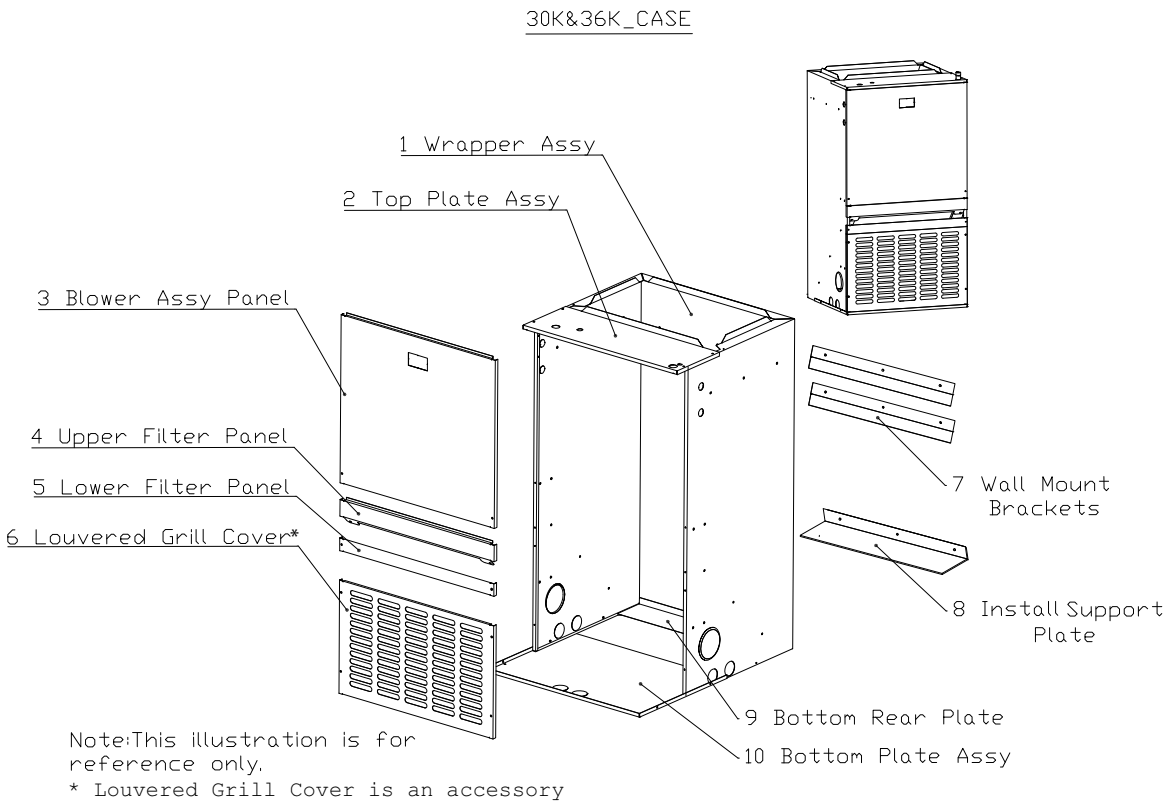


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Fig. 22 – FFMA, FMA4, FMA5 (Sizes 30 & 36) Expanded View - Case

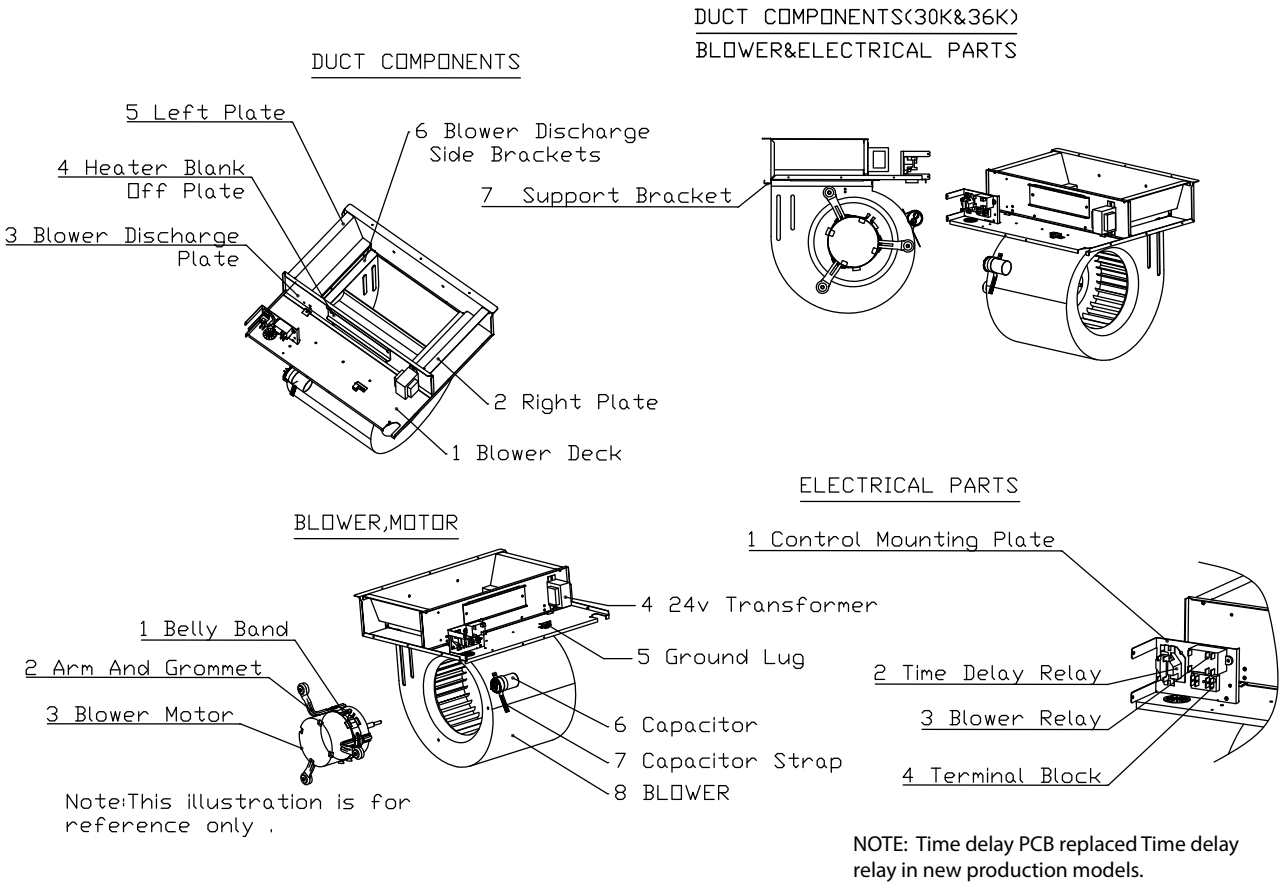

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Fig. 23 – FFMA, FMA4, FMA5 (Sizes 30 & 36) Expanded View - Duct Components, Blower & Electrical Parts

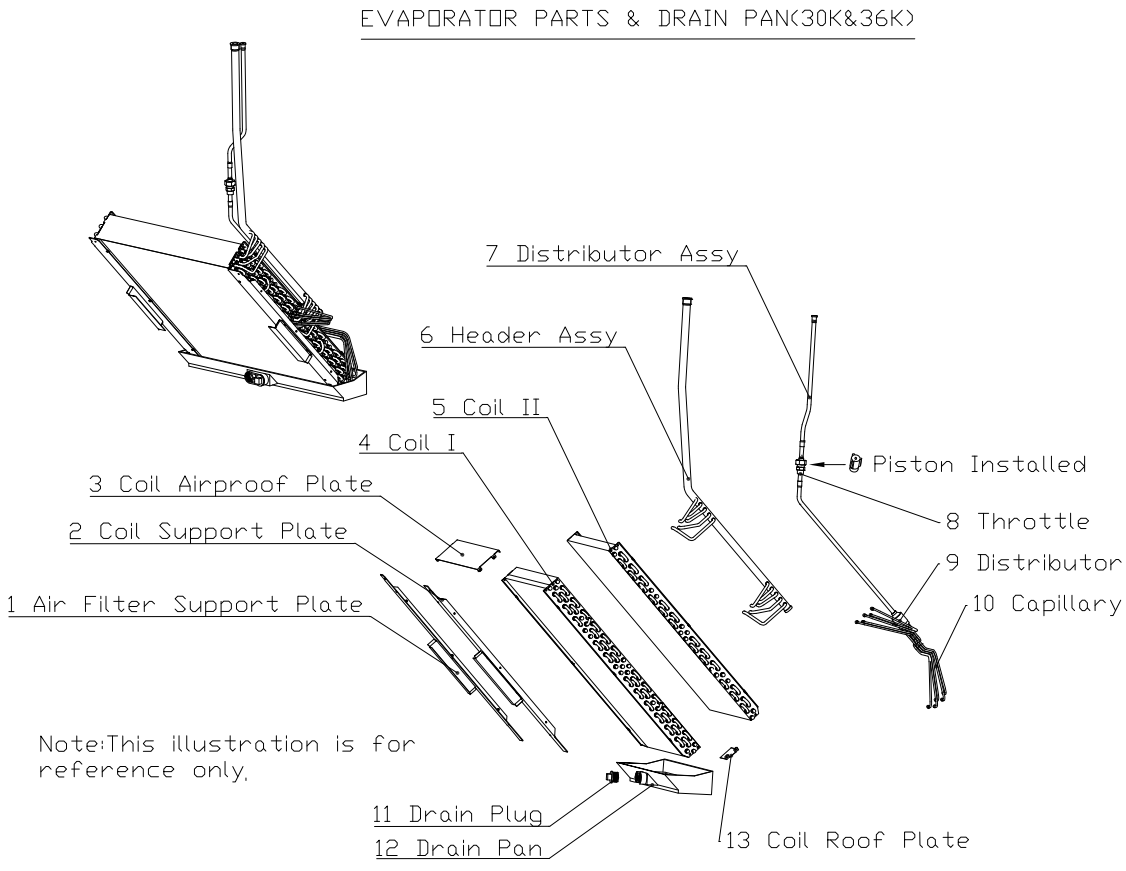


Fig. 24 – FFMA, FMA4, FMA5 (Sizes 30 & 36) Expanded View - Evaporator Parts & Drain Pan

Electric Heater Function and Troubleshooting

FB4, FE4, FE5B, FF1E, FG5, FH4, FJ4, FJ5, FT4, FT5, FV4, FX4, FZ, PF4, PF5

IMPORTANT: 2023 model fan coils (FJ4/5, FT4/5, FE4B/FE5) are designed to use KFFEH electric heaters, and are not compatible with KFCEH heaters – they use different and incompatible plugs and polarities.

This section describes KFC, and KFD series electric heaters in exclusion of Smart Heat by examining the functional operation of these heaters.

Description of Electric Heater Components

Limit Switch

The limit switch is a temperature sensitive control whose function is to prevent system from overheating in abnormal conditions. The temperature settings often vary from heater to heater due to variations in airflow patterns and element radiant heat conditions.

The devices are sized to remain on-line under heat pump conditions (115° air off coil) and minimum CFM, but trip to prevent outlet air conditions above 200° F or excessive component or duct temperatures.

The device itself consists of a bimetallic disc, which when overheated ”snaps through” to open a normally closed high-voltage, high-current switch. When system temperatures cool sufficiently, the switch will automatically reset to its closed position. Normal failure mode for this switch is open.

If a limit switch has been determined to be defective, NEVER BYPASS THE LIMIT SWITCH. When replacing limit switch, ensure that it is replaced with a limit switch of identical opening temperature and closing differential. Limit switches are typically color coded to identify their range.

KFC and KFD Electric Heat Relay

KFC and KFD electric heater packages have relays controlling the heater elements instead of sequencers. A small rectifier PCB is mounted to each relay which converts the incoming 24VAC control signal to DC.

In addition to the rectifier circuit, the second and third stage relays contain a time-on delay circuit of five seconds for second stage, and eight seconds for third stage. When the control signal is removed from the relays, all relays will open with no time-off delay.

Troubleshooting KFC and KFD Series Electric Heaters

Discolored Wire Insulation at Terminal

Check quick-connect terminal at discoloration. Connection may be loose, creating a high resistance through connection point.

Fuse Failure

1. Check for shorted wire. Replace wire. Never try to fix wire using electrical tape.
2. Check shorted element. If element is shorted, replace heater.

No Heat

1. Check fuse for failure. If fuse has failed, refer to (Fuse Failure on p24).
2. Check for faulty transformer. Check output voltage of transformer secondary side R (red) and C (brown). Make sure output is between 18VAC and 30VAC. If output voltage is low and input voltage tests normal, replace transformer.
3. Check for miswired heater plug harness.
4. Check limit switch or sequencer failure. These switches should have failed in open position. If output voltage is zero volts, replace switch.
5. Check heater relay and PCB. Control voltage input to PCB should be 24VAC. Output to relay should be 18VDC minimum. If input is

present but no output, replace PCB. If output is present, replace relay.

Heater Will Not Turn Off

1. Check low-voltage wiring for miswire.
2. Check for shorted elements to ground.
3. Replace sequencer/relays. They may be stuck closed.

Nuisance Trips

1. Check for low airflow due to dirty filters, blocked registers, or undersized duct.
2. Check blower motor and wheel for proper operation. Excessive current draw of motor will cause internal overload to trip.
3. The fan speed may be low.

FFM, FMA

This section describes EHK2 series electric heaters by examining functional operation of this heater.

Service can be completed with heater in place. Shut off power before servicing.

Description of Electric Heater Components

Limit Switch

The limit switch is a temperature sensitive control that's function is to prevent system from overheating in abnormal conditions. The temperature settings often vary from heater to heater due to variations in airflow patterns and element radiant heat conditions.

The devices are sized to remain on-line under heat pump conditions (115° F air off coil) and minimum CFM, but trip to prevent outlet air conditions above 200° F or excessive component or duct temperatures. The device itself consists of a bimetallic disc, which when overheated "snaps through" to open a normally closed high-voltage, high-current switch. When system temperatures cool sufficiently, the switch will automatically reset to its closed position. Normal failure mode for this switch is open.

If a limit switch has been determined to be defective, NEVER BYPASS THE LIMIT SWITCH. When replacing limit switch, ensure that it is replaced with a limit switch of identical opening temperature and closing differential. Limits switches are typically color-coded to identify their range.

Sequencer

Early production EHK2 heaters have sequences controlling the heater elements. The sequencer is essentially a thermally-activated time-delay relay normally activated by low-voltage control signals from thermostat. The typical sequencer is a 1- or 2-pole normally open device which energizes within 30 to 70 seconds after application of control signal and de-energizes 60 to 90 seconds after control signal is removed.

In simplistic terms, the sequencers which we use are nothing more than normally open limit switches which sit on top of a small resistive heater. When voltage is applied to this heater, a positive temperature coefficient resistor (PTC), heat is supplied to a bimetallic disc which "snaps through" and closes switch.

The time required for PTC to heat to a sufficient point controls ON timing of device. The time required for disc to cool down when power is removed controls OFF time of device. The PTC can be varied to provide varied timing. Typically a short ON equates to a long OFF.

Because this is a thermally-activated device, ambient conditions affect the ON/OFF cycle. Higher ambient temperature means shorter ON times and longer OFF times.

Application of these devices is such that the first switch ON not only turns on first heater element, but also ensures that indoor fan is energized, because first ON is last OFF. This ensures fan remains ON until the last heater de-energizes. The Time Delay Printed Circuit Board (PCB) is a logic controlled time delay activated by low-voltage control signal (G) from thermostat. The PCB includes a normally open relay which closes to energize the blower motor when the G terminal is energized. Then when the G terminal is de-energized the relay energizing the blower motor remains closed for 90 – 100 seconds before opening.

Relays

Later production EHK2 heaters have relays controlling the heater elements instead of sequencers. A small rectifier PCB is mounted to each relay which converts the incoming 24VAC control signal to DC.

In addition to the rectifier circuit, the second and third stage relays contain a time-on delay circuit of five seconds for second stage, and eight seconds for third stage. When the control signal is removed from the relays, all relays will open with no time-off delay.

Leak Dissipation System

Operation (Models with R-454B Refrigerant)

When no leak is detected, G, Y, and W pass through the dissipation board and operate normally. In this state, the Dissipation Board Status LED remains solid yellow. When the A2L Detection Sensor reaches a threshold of detected R-454B refrigerant, the Status LED flashes one time and the dissipation board enters dissipation mode. While the detected refrigerant is over the threshold, the Status LED will continue to flash a Fault Code of 1. After the level is lower than the threshold, the Status LED flashes a code of 3 as the dissipation board completes its dissipation actions. These actions include de-energizing Y and W and energizing G for 15 minutes. After the 15 minutes if the refrigerant detected is below the threshold, there is a 5 minute delay before returning to normal operation. If the refrigerant detected is above the threshold, G continues to be energized until refrigerant is below the threshold. At that point the 5-minute delay begins.

After dissipation is complete, the unit returns to normal operation with the Status LED being solid.

System Self-Test

Power on the unit and verify proper functioning of equipment. The yellow LED on the dissipation board should be steady. If flash codes are present, see (Troubleshooting on p26).

NOTE: Operation of the Test Mode is only possible if no faults exist on the dissipation board.

IMPORTANT: Press the Test button for roughly ONE SECOND to enter Test Mode. Pressing the Test button for a longer periods enables different functions (Table 13).

Press the Test button on the dissipation system control board to ensure proper dissipation system operation under each test condition listed below. After pressing the Test button, system will enter Dissipation Mode for 60 seconds to help verify correct operation.

Table 13 – Dissipation Board Test Button Functions

Hold Button Time (sec)	Function
1 - 4	Dissipation Mode for 60 seconds
5 - 29	Display flash code history
30+	Flash code 6
3 rapid presses	Clear flash code history

Ensure that the fan coil is able to meet the minimum required dissipation mode airflows. These required minimum airflow rates during Dissipation Mode are listed in Table 15. They are based on the total system refrigerant charge quantity.

Table 14 – Required Operational Checks to Ensure Proper Dissipation System Function

Normal Operation				
Test #	**T-Stat Call**	**Compressor**	**Indoor Fan**	**Electric/Gas Heat**
1	None	Off	Off	Off
2	Cool	On	On	Off
3	Heat	Off	On	On
Dissipation Activated				
4	None	Off	On	Off
5	Cool	Off	On	Off
6	Heat	Off	On	Off

Table 15 – Required Minimum Dissipation Mode Airflows, based on Total System Refrigerant Charge Quantity

Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)	Total System Charge (lb)	Minimum Required Dissipation Airflow (CFM)
5	133	16	426
6	160	17	452
7	186	18	479
8	213	19	505
9	239	20	532
10	266	21	559
11	293	22	585
12	319	23	612
13	346	24	639
14	372	25	665
15	399		

Troubleshooting

For all flash codes, first try power cycling the system to remove the code. Refer to Table 16 and Table 17.

No power

Verify the wiring to/from pins 1 and 8 on the power harness plug. Check the 24V system wiring from the transformer.

Flashing 1

Check for refrigerant leaks using an independent R-454B detector. If no leaks are present, replace the sensor.

Flashing 2

Check both ends of the sensor wire harness to ensure proper attachment. Power cycle the system to check whether the flash code has been removed. If the flash code is still present, replace the sensor.

Flashing 3

Check for refrigerant leaks using an independent R-454B detector.

Flashing 4

If the code does not clear after power cycling the system, replace the dissipation board.

Flashing 5

If the code does not clear after power cycling the system, replace the sensor.

Flashing 6

Press the test button repeatedly. Power cycle the system. If the button cannot be reset, replace the dissipation board.

Flashing 7

Verify wiring of all "Y" and "W" wires in the applicable wiring diagram.

Flashing 8

Verify wiring of all "Y" and "W" wires in the applicable wiring diagram.

Table 16 – Flash Code Chart

Yellow LED	Reason	Mode
Solid	Normal Operation	Normal Operation
Flashing 1	Sensor >= 20% LFL	Dissipation
Flashing 2	Sensor Open	Dissipation
Flashing 3	Normal Mitigation after Leak	Dissipation
Flashing 4	No Power to G Output	Dissipation with no Blower
Flashing 5	Fault with A2L Digital Sensor	Dissipation
Flashing 6	Test Button Stuck (>30 s)	Dissipation
Flashing 7	Y or W Wiring Inverted	Normal Operation
Flashing 8	Y or W Shorted	Normal Operation

Table 17 – Wall-Hung FMA5 Control Board Test Functions

LED Status	Description
Steady ON	Normal Operation
OFF	Power Supply Failure
Steady Flashing	Dissipation Mode Active
3 Flash / Cycle	A2L Sensor Error
4 Flash / Cycle	A2L Sensor Communication Error
8 Flash / Cycle	A2L Sensor Over Service Life

Care and Maintenance

To continue high performance, and minimize possible equipment failure, it is essential periodic maintenance be performed on this equipment.

The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. The only consumer service recommended or required is filter maintenance (Filter Assembly on p27)

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect all power to the unit before servicing the field wires or removing the control package. The disconnect (when used) on the access panel does not disconnect power to the line side of the disconnect, but does allow safe service to all other parts of the unit.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect and clean or replace air filter each month or as required.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary.
3. Inspect blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.
4. Inspect electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

Filter Assembly

To clean or replace air filter, push plastic connectors toward center of unit and remove filter access panel outward. Push filter up and back into unit. Then slide filter out.

Clean filter by using cold water and mild detergent. Rinse and allow filter to dry. No oiling or coating of filter is required. New filters are available from your local distributor. Place filter in slot with cross-mesh binding up or facing cooling coil and replace filter access panel.

Cooling Coil, Drain Pan, and Condensate Drain

The cooling coil is easily cleaned when it is dry. Inspect the coil and clean (if necessary) before each cooling season. To check or clean cooling coil, remove coil access panel. If coil is coated with dirt or lint, vacuum it with a soft brush attachment.

Be careful not to bend coil fins. If coil is coated with oil or grease, clean it with a mild detergent and water solution. Rinse coil thoroughly with clear water. Be careful not to splash water on insulation.

Inspect drain pan and condensate drain at the same time cooling coil is checked. Clean drain pan and condensate drain by removing any foreign matter from pan. Flush pan and drain tube with clear water.

If drain tube is restricted, it can generally be cleared by high-pressure water. Cut plastic line and work outside condensate pan and away from coil to clean drain tube.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Do not use caustic household drain cleaners in the condensate pan or near the coil. Drain cleaners can quickly destroy a coil.

Blower Motor and Wheel

Clean blower motor and wheel when cooling coil is cleaned.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect electrical power before removing any access panels. Lock out and tag switch with a suitable warning label.

To clean blower motor or blower wheel:

1. Remove blower access panel.
2. Remove motor leads from fan coil control. Note lead location for ease of reassembly.
3. Remove the two outside screws holding blower/motor assembly against blower deck flange and slide assembly out of cabinet.
   - Servicing the blower assembly may require the removal of two screws that attach the blower housing to the fan deck. It is not necessary to reinstall these screws after service.
4. (If applicable) Remove screw in strap holding motor capacitor to blower housing and slide capacitor out from under strap. Remove screw with green wire from blower housing. Mark blower wheel, motor, and motor support in relation to blower housing before disassembly to ensure proper reassembly. Note position of blades on wheel.
5. Loosen setscrew holding blower wheel onto motor shaft.
6. Remove the three bolts holding motor mount to blower housing and slide motor and mount out of housing. Further disassembly should not be necessary as adequate clearance is available.
7. Remove blower wheel from housing by removing cutoff plate from blower housing outlet. Note wheel orientation and cutoff location for reassembly. The blower motor and wheel may be cleaned by using a vacuum with a soft brush attachment.
8. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb balance weights (clips) on blower-wheel vanes. Also, do not drop or bend wheel, as balance will be affected.

To reassemble blower:

1. Place blower wheel back into housing. Be sure to position correctly for proper location.
2. Reassemble cutoff plate to housing using identified holes from disassembly procedure.
3. Position motor and mount in same position as when blower housing was in unit. Secure motor mount on housing, using removed bolts. Make sure mount or motor is grounded to blower housing.
4. Locate blower wheel setscrew over flat on motor shaft. Rotate wheel in housing. It should not rub housing and should be centered in inlet opening. If not, loosen setscrew and align as necessary.
5. Attach green wire to blower housing with screw.
6. (If applicable). Secure motor capacitor under strap and tighten strap screw.
7. Slide blower assembly to blower deck. Be sure (once blower is within the unit casing) to force blower assembly toward control box while sliding assembly into unit to ensure that blower assembly engages deck properly.
8. Fasten blower assembly to deck with screws previously removed.
9. Reconnect electrical leads to fan coil control.
10. Reconnect electrical power to unit and test fan for proper rotation.

FF1E, FFMA, FMA

The minimum maintenance requirements for this equipment are as follows:

1. Inspect and clean or replace air filter each month or as required.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary.
3. Inspect blower motor and wheel for cleanliness each heating and cooling season. Clean as necessary.
4. Inspect electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.
5. **FMA5 units only**—verify dissipation system is in normal operation by verifying the status LED on the control board is Steady ON and not blinking or OFF.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

Air Filter

The air filter should be replaced as needed.

NOTE: Refer to the installation instructions and product data for filter dimensions. 2023 product has been designed to accommodate common sized filters.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Never operate unit without a filter.

Cooling Coil, Drain Pan, and Condensate Drain

The cooling coil is easily cleaned when it is dry. Inspect coil and clean (if necessary) before each cooling season. To check or clean cooling coil, remove blower/heater access panel to gain full access to cooling coil. If coil is coated with dirt or lint, vacuum with a soft brush attachment.

Be careful not to bend coil fins. If coil is coated with oil or grease, clean it with a mild detergent and water solution. Rinse coil with clear water.

Be careful not to splash water onto insulation.

Inspect drain pan and condensate drain at same time cooling coil is checked. Clean drain pan and condensate drain by removing any foreign matter from pan. Flush pan and drain tube with clear water.

If drain tube is restricted, it can generally be cleared by high-pressure water. Cut plastic line and work outside condensate pan and away from coil to clear drain tube.

NOTE: There MUST be a trap in the condensate line. The trap must be at least 3-in. deep, not higher than the bottom of unit condensate drain opening, and pitched downward to an open drain or sump.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Do not use caustic household drain cleaners in the condensate pan or near the coil. Drain cleaners can quickly destroy a coil.

Blower Motor and Wheel

Clean blower motor and wheel when cooling coil is cleaned.

To clean or service wheel or motor, proceed as follows:

1. Pull unit disconnect (when used) and remove blower access panel.
2. Disconnect motor electrical leads from control box and capacitor. Mark location of wires for reassembly.
3. Remove the three bolts holding motor mount to blower housing while supporting motor shell with hand.
4. Pull motor inlet ring and blower wheel assembly out of blower housing.
5. With blower wheel, inlet ring, and motor mount still attached to motor, place motor on flat, horizontal surface, shaft up. Mark position of wheel on motor shaft for reassembly.
6. Loosen blower wheel setscrew and remove blower wheel from motor shaft.

NOTE: Further disassembly of motor and mount is not necessary as adequate clearance is available to clean motor.

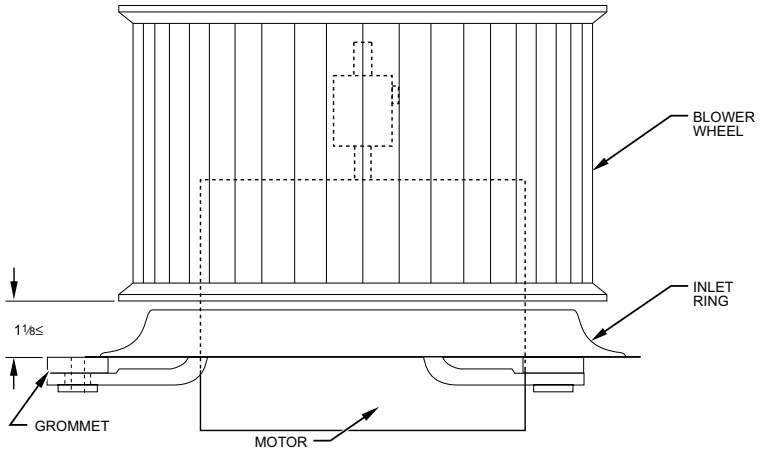
7. Clean blower motor and wheel using a vacuum with a soft brush attachment. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb balance weights (clips) on blower wheel vanes. Do not drop or bend wheel as balance will be affected.

To reassemble unit, proceed as follows:

1. Place motor with mount attached on flat, horizontal surface with shaft up.
2. Set inlet ring on top of motor mount grommets. Center inlet ring flush on all three grommets.
3. Slide blower wheel onto motor shaft with setscrew upward and aligned with shaft flat portion. Vertically position wheel along shaft to position marked during disassembly.

NOTE: If previous shaft was not marked or if replacing previous motor, set blower wheel position by sliding blower wheel along motor shaft to 1-1/8-in. above rubber grommets (Fig. 25).

4. Hold blower wheel in place and carefully tighten setscrew.
5. Position motor and blower wheel assembly to blower housing as originally oriented.
6. Secure motor mount to blower housing using bolts previously removed.
7. Attach green wire to blower housing with screw.
8. Connect electrical and capacitor leads to original terminals.
9. Replace blower access door and tighten all four screws.
10. Reinsert disconnect pullout only after blower access door is secured. Test blower for proper operation.



A86006

Fig. 25 – Motor, Inlet Ring, and Blower Wheel Assembly

Refrigerant Flow-Control Devices

Thermostatic Expansion Valves (TXV)

NOTE: 2023 models (FE4B, FE5B, FJ4, FJ5, F54, FT4, FT5, PF5) and beyond (R-454B models) use a mechanical TXV. Refer to the TXV Installation Instructions. Torque the equalizer fitting to 10–20ft-lb; do not exceed 20 ft-lb.

All Fan Coils with a TXV are factory equipped with a hard shutoff (HSO) TXV. The hard shutoff TXV has no bleed port and allows no bleed-through after system is shutdown.

The TXV is a bi-flow metering device that is used in condensing and heat pump systems to adjust to changing load conditions by maintaining a preset superheat temperature at the outlet of the evaporator coil. The volume of refrigerant metered through the valve seat is dependent upon the following:

1. Superheat temperature is sensed by a sensing bulb on the suction tube at the outlet of the evaporator coil. As long as this bulb contains some liquid refrigerant, this temperature is converted into pressure pushing downward on the diaphragm, which opens the valve via push rods.

2. The suction pressure at the outlet of the evaporator coil is transferred via the external equalizer tube to the underside of the diaphragm.

The bi-flow TXV is used on split system heat pumps. In cooling mode, the TXV operates the same as a standard TXV previously explained. However, when the system is switched to heating mode of operation, refrigerant flow is reversed.

The bi-flow TXV has an additional internal check valve and tubing. These additions allow refrigerant to bypass TXV when refrigerant flow is reversed with only a 1-psig to 2-psig pressure drop through device.

When heat pump switches to defrost mode, refrigerant flows through a completely open (not throttled) TXV. The bulb senses the residual heat of outlet tube of coil that had been operating in heating mode (about 85° F and 155 psig). This temporary, not-throttled valve decreases indoor pressure drop, which in turn increases refrigerant flow rate, decreases overall defrost time, and enhances defrost efficiency.

Problems Affecting TXV

Low Suction Pressure

1. Restriction in TXV
2. Low refrigerant charge
3. Low indoor load
4. Low evaporator airflow

High Suction Pressure

1. Overcharging
2. Sensing bulb not secure to vapor tube
3. High indoor load
4. Large evaporator face area

NOTE: When installing or removing TXV, wrap TXV with a wet cloth. When reattaching TXV, make sure sensing bulb is in good thermal contact with suction tube.

5. The needle valve on pin carrier is spring-loaded, which also exerts pressure on underside of diaphragm via push rods, which closes valve. Therefore, bulb pressure equals evaporator pressure at outlet of coil plus spring pressure. If load increases, temperature increases at bulb, which increases pressure on topside of diaphragm, which pushes pin carrier away from seal, opening valve and increasing flow of refrigerant. The increased refrigerant flow causes increased leaving evaporator pressure which is transferred via the equalizer tube to underside of diaphragm, with which the pin carrier spring pressure closes valve. The refrigerant flow is effectively stabilized to load demand with negligible change in superheat.

Aluminum Coil Unit TXV's

The distributor used on the all-aluminum coils is also made of aluminum. The TXV connection to the distributor is accomplished with a 3/4" Chatleff nut (Fig. 26). The threads are coated with Loctite Heavy Duty Anti-Seize which is a graphite/calcium fluoride formulation, for applications that is free from copper, lead and sulfur. This product is typically used in applications with an operating range of -20° F to +2400° F. When replacing a TXV it is recommended to reapply with the same thread sealer.

Extra care should be taken during brazing of copper equalizer on the aluminum coils to prevent the braze material from splattering on the aluminum. Also, route the copper equalizer so that it doesn't touch the aluminum components.

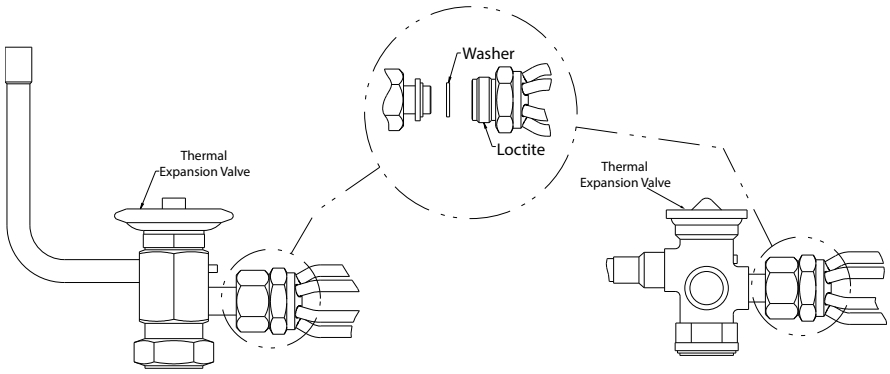


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Fig. 26 – Aluminum Coil Unit TXV's

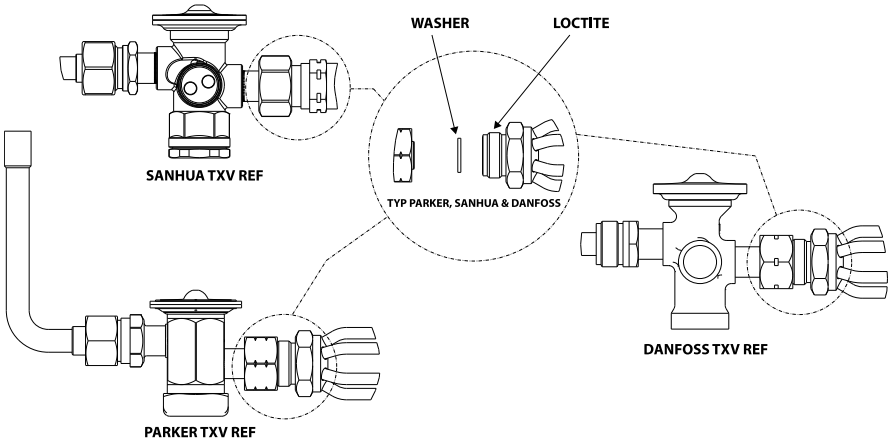

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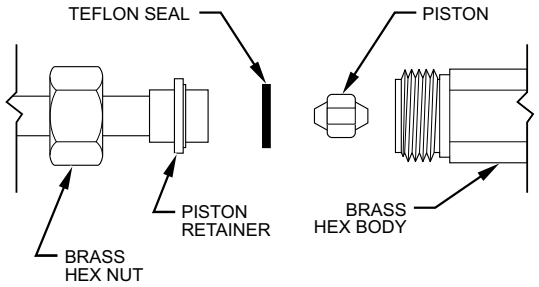
Fig. 27 – TXV Examples (Mechanical)



A93530

Fig. 28 – Refrigerant Flow-Control Device (For FB and FMA4P)

Piston Body Cleaning and Replacement

⚠ CAUTION

ENVIRONMENTAL HAZARD

Failure to follow this caution may result in environmental damage.

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution could result in equipment damage.

Damage may occur to the scroll compressor if operated at a negative suction pressure during a system pumpdown.

1. Pump down outdoor unit. Close service valves at outdoor unit.
2. Recover remaining refrigerant from tubing and coil through gage port on vapor-tube service valve. Disconnect refrigerant (liquid) tube from piston body (Fig. 28).
3. Avoid damaging seal ring or machined surfaces on piston, bore, and retainer.
4. Using small wire with a hook on end of it, remove piston from body.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution could result in equipment damage.

When cleaning the piston orifice, be careful not to scratch or enlarge the opening, as this will affect operation.

1. Install new or cleaned piston into body.
2. Replace seal ring on retainer.
3. The threads are coated with Loctite Heavy Duty Anti-Seize. It is recommended to reapply with the same thread sealer.
4. Reconnect refrigerant tube to piston body.
5. Pressurize tubing and coil, then leak check.
6. Evacuate tubing and coil as necessary.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution could result in equipment damage.

Use a backup wrench and do not over tighten, as deformation of the piston body will occur, causing the piston to lodge in a partially open or closed position.

Liquid Tube Strainer

In R-22 all units, the TXV and refrigerant flow-control device is protected on the indoor coil by a wire mesh strainer. It is located inside the 3/8" liquid tube at field braze joint just outside unit casing. Access to strainer is through field braze joint.

Aluminum Coil Repair

Repairing leaks on aluminum coils is possible using the aluminum brazing method. Specific braze and flux material designed for aluminum are necessary for aluminum brazing. A kit containing all materials necessary for making and aluminum braze repair is available through Replacement Components (kit No. 337748-751).

Do not use a previously-used wire brush to clean copper when preparing an aluminum braze site. Copper particles in contact with an aluminum coil may cause premature failure. Service aluminum coils are also available as a coil repair option.

NOTE: Replacement of an indoor slope or A-coil must include recovery and recycling of refrigerant currently in the system. Provided the refrigerant has not been contaminated with moisture, acid, solid particulate, or non-condensibles, it may be recovered by following the procedures listed below. However, if the refrigerant is contaminated, recycling or reclaiming methods are required. If leaks are present in the system, meaning the refrigerant may be contaminated, recycling or reclaiming methods MUST be used. Installation of new filter drier(s) is required. The filter drier-type will depend upon the contaminants in the system. See Split-System Residential Air Conditioners and Heat Pumps Service Manuals for further information.

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

Pre-Installation

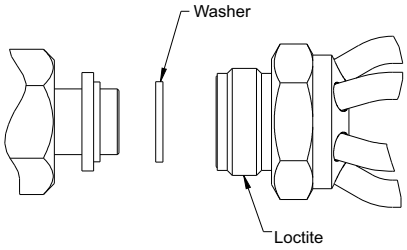
Except for coils only used with TXV fan coils, all-aluminum replacement coils are shipped with a piston body distributor, piston, and 90 degree inlet tube with piston retainer (including Teflon seal). Coil sizes used only with TXV fan coils include the TXV as part of the replacement coil.

Before installation of replacement coil, verify the piston is the correct orifice size. The correct size should be on the outdoor unit rating plate. If in doubt, reuse the piston from the old indoor coil.

Use two wrenches to separate the 13/16" Chatleff nut from the distributor body. The threads will contain Loctite anti-seize, do not remove this from the threads.

Install the piston and reattach nut to finger tight plus 1/2 turn.

The distributor used on the all-aluminum replacement coil is also made of aluminum. The distributor threads are coated with Loctite Heavy Duty Anti-Seize which is a graphite/calcium fluoride formulation, for applications that are free from copper, lead and sulfur. This product is typically used in applications with an operating range of -20° F to +2400° F (Fig. 29). When replacing a TXV it is recommended to reapply with the same thread sealer. Extra care should be taken during brazing of copper equalizer on the aluminum coils to prevent the braze material from splattering on the aluminum. Also, route the copper equalizer so that it doesn't touch the aluminum components.

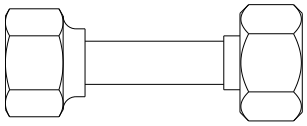


A14398

Fig. 29 – TXV Thread (Sealer) Location

Old Copper or Tin-Plated Coils with TXV

The all-aluminum replacement coil with piston will also be used for TXV style coils by reusing the original TXV. An adapter is provided to connect the replacement coil distributor to the original TXV (Fig. 30). Insulation is also provided to wrap the copper adapter tube and brass nuts to prevent any copper or brass particles from coming in contact with the aluminum coil. Even if the adapter tube is not in contact with the aluminum coil dripping condensation from the adapter tube can be a mechanism of particulate transport.



A14397

Fig. 30 – Replacement Coil Distributor Adapter

If it is preferred to install the old TXV external to the cabinet due to access, follow the steps below:

1. Field fabricate a piece of 3/8" OD copper tubing with flare and nut to attach to the TXV outlet.
2. The piston in the replacement coil must be removed. Use two wrenches to separate the 13/16" Chatleff nut from the distributor body. The threads will contain Loctite anti-seize, do not remove this from the threads.
3. Remove the piston
4. Reattach the inlet tube and tighten the nut finger tight plus 1/2 turn.
5. Remove the old coil and install replacement coil per instructions below. Reinstall the fitting door to the cabinet.
6. Field fabricate a 3/8" OD copper tubing with flare and nut.
7. Braze this tubing and nut onto the liquid stub out.
8. Attach flare and nut to TXV outlet by tightening to finger tight plus 1/2 turn with two wrenches.
9. Drill equalizer hole into suction line and braze the equalizer into the hole.
10. Attach the TXV bulb onto the suction line and insulate.
11. Insulate the entire TXV body and outlet tubing to prevent sweating.

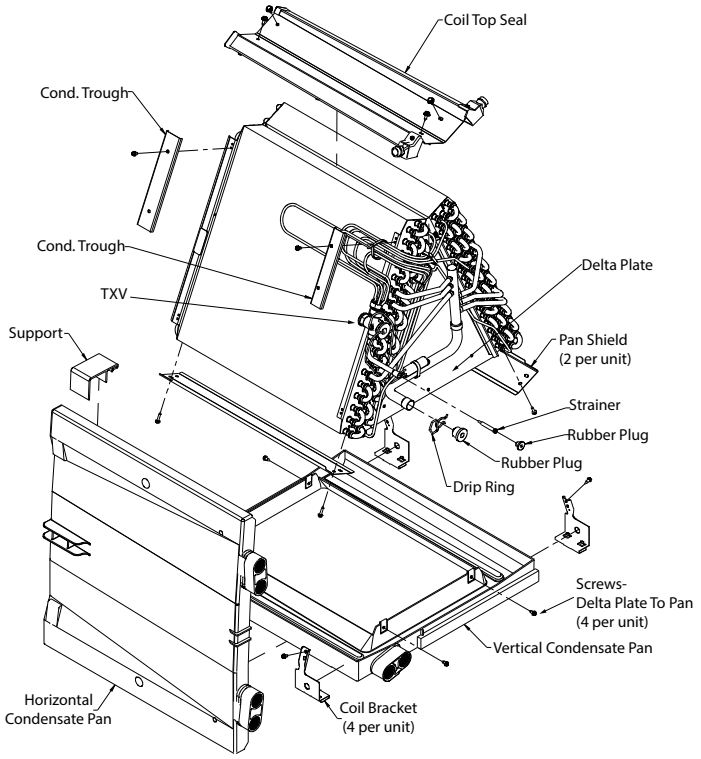
Old All-Aluminum Coils with TXV

When replacing a previous all-aluminum coil that contains a TXV, the old TXV can be reused and mounted inside the cabinet.

1. After removal of the distributor inlet tube and piston, the old TXV is attached to the distributor with 13/16" Chatleff nut. The threads contain Loctite anti-seize that can be reused.
2. Tighten the nut finger tight plus 1/2 turn.
3. The vapor header contains a small diameter stub tube for the equalizer line.
4. Cut the end of the stub tube.
5. Insert TXV equalizer and braze together. Caution must be taken to avoid braze splatter from the aluminum surfaces of the new coil. Caution must be taken to avoid heating the factory joint of the stub tube to the vapor header.
6. The vapor header contains an indentation for the TXV bulb. Attach the bulb and insulate.

Installation – A-Coil Units Only

1. Recover system refrigerant.
   a. Attach gage/manifold set to service valves.
   b. Start unit in cooling mode.
   c. Front seat (close) liquid line service valve.
   d. Operate unit until vapor pressure reaches 5 psig (35kPa), or until suction line LPS opens.
   e. Turn off electrical supply to outdoor unit.
   f. Front seat (close) vapor service valve.
   g. Recover any remaining refrigerant.



A13359

Fig. 31 – A-Coil Component Location

NOTE: All condenser coils hold only a factory-supplied amount of refrigerant. Excess refrigerant, such as in long-line applications, may cause compressor internal pressure relief valve to open (indicated by sudden rise in vapor pressure) before refrigerant is recovered. If this occurs, turn off electrical supply to outdoor unit immediately, front seat (close) vapor service valve, and recover any remaining refrigerant.

2. Turn off electrical supply to indoor unit.

3. Disconnect condensate drain line.

WARNING

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Use of torch may cause oil to catch fire, resulting in personal injury or death. To remove components use tubing cutter only.

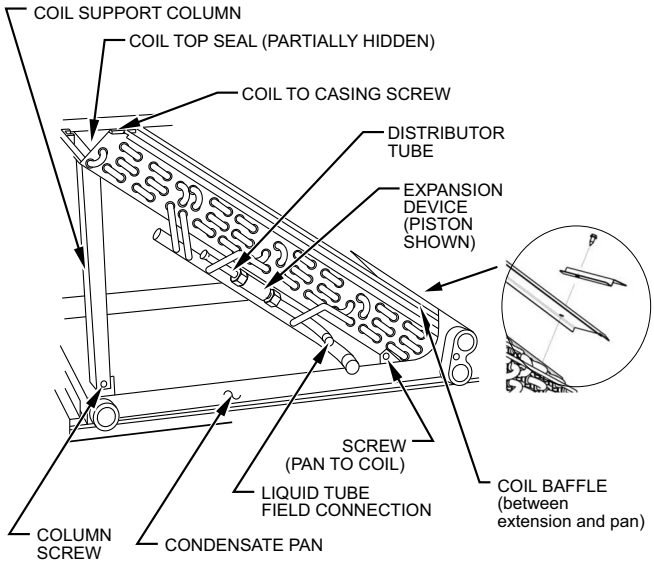
4. Disconnect liquid and vapor lines from indoor coil. Use a tubing cutter to cut the lines.
5. Remove coil access panel.
6. Remove clip securing fitting panel to condensate drain pan and remove fitting panel.
7. Remove all shipping clips (if present), including horizontal pan clip. Slide coil and condensate pan assembly out of unit.
8. Remove horizontal condensate drain pan from coil (if present) and condensate pan assembly (Fig. 31).
9. Remove 4 coil brackets if present (Fig. 31).
10. Remove screws at delta plates and remove coil from vertical condensate drain pan (Fig. 31).
11. Horizontal Applications Only—Remove drain connections and J-shaped tube from original coil, and install them in same position on new coil (Fig. 31).
12. Place coil assembly in plastic condensate pan and secure with 4 screws through delta plate (Fig. 31).
13. Horizontal and Upflow Applications Only—Attach 4 coil brackets to coil and pan assembly (Fig. 31).
14. Horizontal Applications Only—Place horizontal condensate pan into position on coil and pan assembly.

NOTE: Installation of horizontal condensate pan is not necessary for upflow or downflow applications.

15. Slide completed assembly into unit.
16. Reinstall fitting panel and reconnect clip securing fitting panel to condensate drain pan.
17. Horizontal Applications Only—Reinstall horizontal pan clip and secure with 1 screw (Fig. 31).
18. Reinstall coil access panel.
19. Reconnect liquid and vapor refrigerant lines and condensate drain line. Install new filter drier(s).

NOTE: If a torch is used to unbraze the line set, protect the fitting panel with a wet cloth or braze shield as necessary.

20. Evacuate line set and indoor coil to 500 microns, back seat (open) liquid and vapor service valves.
21. Turn on electrical supplies to indoor and outdoor units.
22. Check system refrigerant charge and operation. See Split-System Residential Air Conditioners and Heat Pump Service Manuals for further information.



A14304

Fig. 32 – Slope Coil Component Location (Prior to 1996)

Installation – Slope Coil Units Only

1. Recover system refrigerant.
   a. Attach gage/manifold set to service valves.
   b. Start unit in cooling mode.
   c. Front seat (close) liquid line service valve.
   d. Operate unit until vapor pressure reaches 5 psig (35kPa), or until suction line LPS opens.
   e. Turn off electrical supply to outdoor unit.
   f. Front seat (close) vapor service valve.
   g. Recover any remaining refrigerant.

NOTE: All condenser coils hold only a factory-supplied amount of refrigerant. Excess refrigerant, such as in long-line applications, may cause compressor internal pressure relief valve to open (indicated by sudden rise in vapor pressure) before refrigerant is recovered. If this occurs, turn off electrical supply to outdoor unit immediately, front seat (close) vapor service valve, and recover any remaining refrigerant.

2. Turn off electrical supply to indoor unit.
3. Disconnect condensate drain line.
4. Disconnect liquid and vapor lines from indoor coil. Use a tubing cutter to cut the lines.
5. Remove coil access and fitting panels.

WARNING

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Use of torch may cause oil to catch fire, resulting in personal injury or death. To remove components use tubing cutter only.

6. Remove 1 screw securing coil to unit casing.
7. Remove coil/pan assembly from unit.
8. Place assembly on a flat surface. On units manufactured prior to 1996, remove two screws securing coil support columns to pan (Fig. 32).
9. Rotate columns 90°, pull away from coil, and remove columns from assembly.
10. Remove two screws securing coil to condensate pan (Fig. 32 and Fig. 33).
11. Remove coil from condensate pan.
12. Attach new painted Top Seal to new coil using brass colored screws included with packaging (Fig. 32 and Fig. 33).

13. 1Remove screw at bottom of coil extension and reuse to attached Coil Baffle in same location. Long side of baffle toward pan (Fig. 32 and Fig. 33).
14. Install new coil into condensate pan using two original screws and two support columns.
15. Install new coil pan assembly into unit and secure with one screw previously removed from unit casing (Fig. 32).
16. Reinstall coil access panel.
17. Reconnect liquid and vapor refrigerant lines and condensate drain line. Install new filter drier(s).

NOTE: If a torch is used to unbraze the line set, protect the fitting panel with a wet cloth or braze shield as necessary.

18. Evacuate line set and indoor coil to 500 microns, back seat (open) liquid and vapor service valves.
19. Turn on electrical supplies to indoor and outdoor units.
20. Check system refrigerant charge and operation. See Split- System Residential Air Conditioners and Heat Pump Service Manuals for further information.

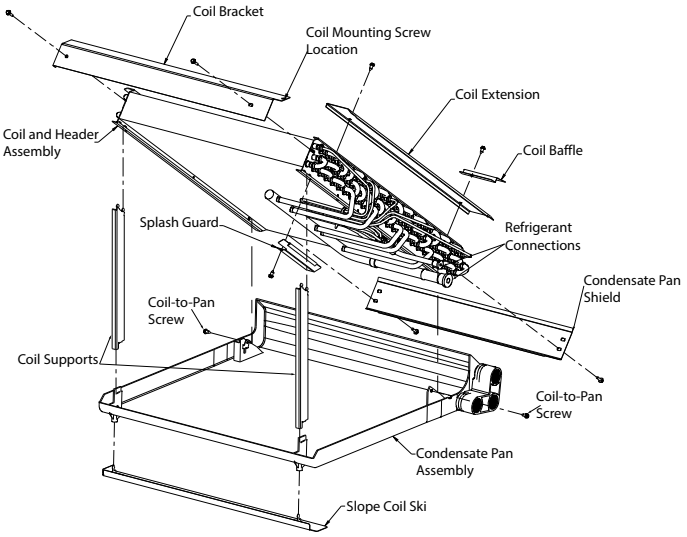


Fig. 33 – Slope Coil Component Location (1996 and Later)

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KFFEH
Electric Heater Packages

Installation Instructions

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

SAFETY CONSIDERATIONS

Installing and servicing of heating and air conditioning equipment can be hazardous due to system pressures and electrical components. Only trained personnel should install or service heating and air conditioning equipment.

Untrained personnel can perform basic maintenance functions such as cleaning coils, or cleaning and replacing filters. All other operations should be performed by trained personnel. When working on heating and air conditioning equipment, observe precautions in literature, on tags, and on labels attached to the unit.

Follow all safety codes. Wear safety glasses and work gloves. Have a fire extinguisher available.

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

Understand the signal words DANGER, WARNING, 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 beginning any installation or modification, be sure the main electrical disconnect switch(es) is in the OFF position. There may be more than one power supply. Tag the disconnect switch(es) with a suitable warning label.

Table 1 – Electric Heater Summary Table

HEATER PART NO.	kW @ 240V	VOLTS/PH	STAGES (kW OPERATING)	INTERNAL CIRCUIT PROTECTION	FAN COIL SIZE USED WITH	HEATING CAP.* @ 230V	Intelligent Heat Capable?
KFFEH8401N03	3	230/1	3	None	18†	9,400	
KFFEH8501N05	5	230/1	5	None	18†	15,700	NO
KFFEH8801N08	8	230/1	8	None	18†	25,100	
KFFEH8901N10	10	230/1	10	None	18†	31,400	
KFFEH0401N03	3	230/1	3	None	24	9,400	
KFFEH0501N05	5	230/1	5	None	24–60	15,700	
KFFEH0801N08	8	230/1	8	None	24–60	25,100	
KFFEH0901N10	10	230/1	10	None	24–60	31,400	
KFFEH3201F20	20	230/1	5, 20	Fuse‡	30–60	62,800	YES
KFFEH8401C05	5	230/1	5	Circuit Breaker	18†	15,700	NO
KFFEH8501C08	8	230/1	8	Circuit Breaker	18†	25,100	
KFFEH8601C10	10	230/1	10	Circuit Breaker	18†	31,400	
KFFEH2401C05	5	230/1	5	Circuit Breaker	24–60	15,700	
KFFEH2501C08	8	230/1	8	Circuit Breaker	24–60	25,100	
KFFEH2601C10	10	230/1	10	Circuit Breaker	24–60	31,400	
KFFEH3301C20	20	230/1	5, 20	Circuit Breaker	30–60	62,800	YES
KFFEH2901N09	9	230/1**	3, 9	None	36–60	28,200	
KFFEH3001F15	15	230/1	5, 15	Fuse‡	24–60	47,100	
KFFEH3101C15	15	230/1	5, 15	Circuit Breaker	24–60	47,100	
3 Phase Only							
KFFEH1601315	15	230/3	5, 15	None	36–60	47,100	NO
KFFEH2001318	18	230/3	6, 18	None	42–60	56,500	
KFFEH3601318	18	230/3	6, 18	None	42–60	56,500	
3 Phase, Factory Shipped (field convertible to single phase)							
KFFEH3401F24	24	230/3	8, 16, 24	Fuse	48, 60	78,300	YES
KFFEH3701F24	24	230/3	8, 16, 24	Fuse	48, 60	78,300	
KFFEH3501F30	30	230/3	10, 20, 30	Fuse	48, 60	94,100	
KFFEH3801F30	30	230/3	10, 20, 30	Fuse	48, 60	94,100	

*. Does not include heat from blower motor.
†. Size 18 fan coil has a special 6-pin connector. Do not modify wiring.
‡. Single point wiring kit required for these heaters.
**. Field convertible to 3 phase.

NOTE: Use an accessory downflow base to maintain proper clearance on downflow installations.

Introduction

This instruction describes the installation of Part No. KFFEH accessory heaters in FE4B, FE5B, FG, FJ, FT, PF4MNX, PF5T, and PF4T fan coils.

⚠ WARNING

FIRE HAZARD

Failure to follow this warning may cause personal injury, death, or property damage.

Flame resistant materials must be used for ductwork for fan coils with combustible clearance requirements.

- For 24 through 60 size, 3 through 18 kW, standard heaters there are no combustible clearance requirements for the first 36 in. (914 mm) of ductwork.
- For 18 size with 8 kW and 10 kW heaters, a 1 in. (25 mm) combustible clearance is required for the first 12 in. (305 mm) of ductwork.
- For 20 kW through 30 kW heaters, a 1 in. (25 mm) combustible clearance is required for the first 36 in. (914 mm) of ductwork.

Procedure 1 — Prepare Fan Coil for Electric Heater Assembly (FE5B, FT5, PF5T, or FG5 ONLY)

NOTE: This section is only relevant for R-454B Models with two PCBs in the Control Box when paired with the 24 and 30-kW heater models.

1. Verify you have a FE5B, FT5, PF5T, or FG5 Fan Coil. Also verify you are using an 24 or 30-kW heater model.
2. Make sure power to unit is off.
3. Remove blower access panel of Fan Coil Unit.

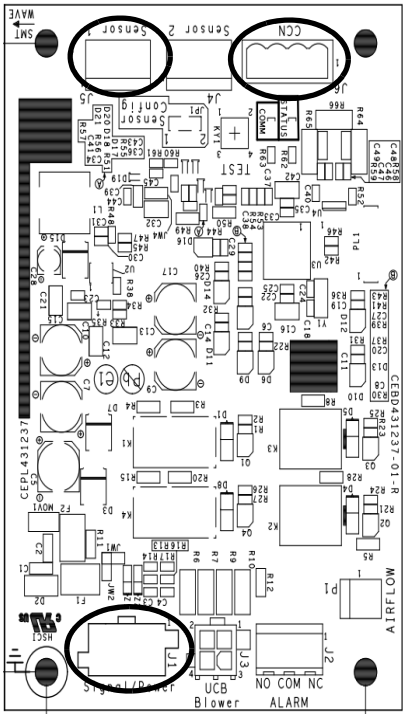
⚠ CAUTION

ELECTRICAL OPERATION HAZARD

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

Before installation of heater, the black and yellow pigtail leads must be removed from the fan coil PCB or wire harness to prevent possible damage to the product. Electrical power will be provided to the board through the heater circuit plug.

4. Disconnect all connections to the dissipation board. Fig. 1 shows all connections that might need disconnected.
5. Remove screw that secures bracket to Fan Coil Casing. This screw will be in the upper panel of the control box when unit is in upflow.
6. Remove bracket and dissipation board from the unit.
7. Remove screws from dissipation board on the bracket to separate the bracket from the dissipation board. Dispose of bracket.
8. Place dissipation board inside enclosure in the orientation shown. The 8-Pin Connector should line up with the protrusion on the bottom of the enclosure top cover.



DB1A

Fig. 1 – Dissipation Board

9. Install enclosure in the location shown in the images below. Ensure the enclosure opening is facing the ground to allow for any moisture build up inside the enclosure to flow out the bottom without contacting the PCB.

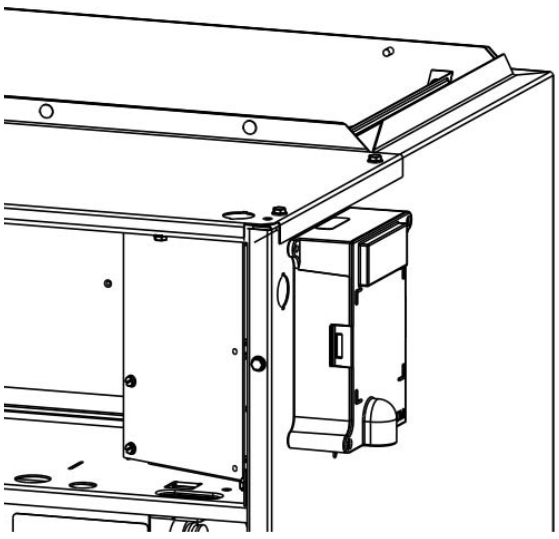


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Fig. 2 – Enclosure Location for Vertical Upflow

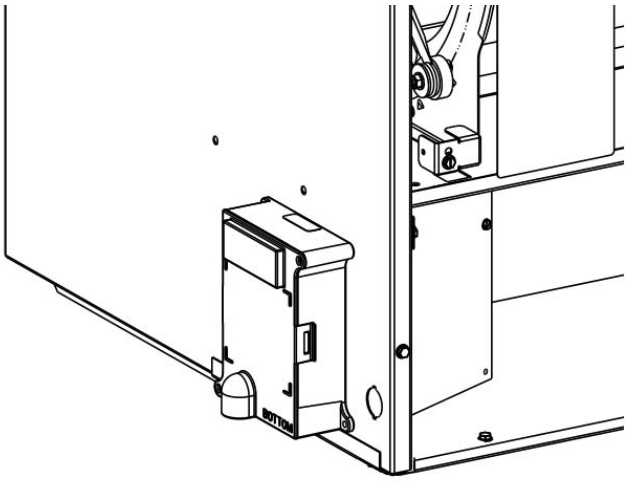

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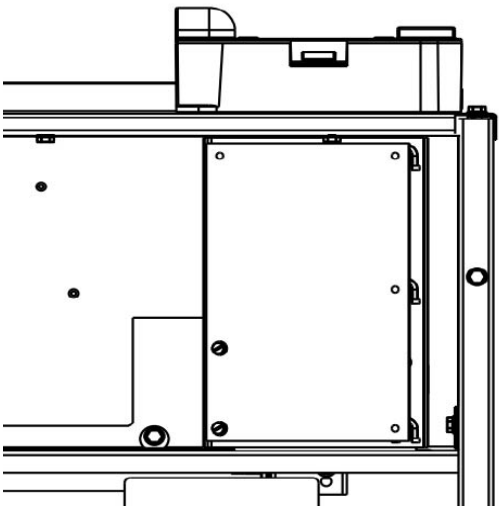
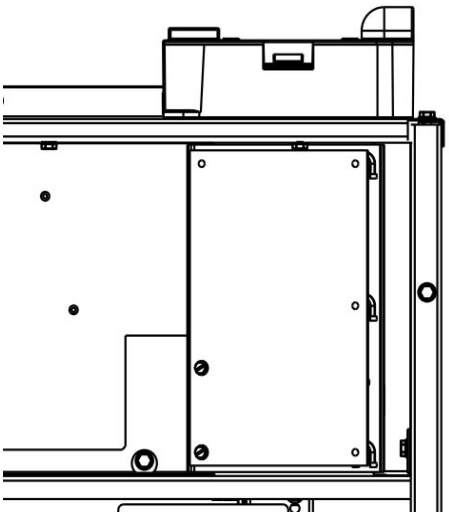
Fig. 3 – Enclosure Location for Vertical Downflow



A240297

Fig. 4 – Enclosure Location for Horizontal Left



A240296

Fig. 5 – Enclosure Location for Horizontal Right

10. With the enclosure installed, feed all the plugs originally disconnected in step 4 through the closest knock out to the enclosure. Reconnect all connections to dissipation board for proper operation. All wires should feed out the bottom of the enclosure through the opening.

Procedure 2 — Install Electric Heater Assembly

NOTE: Ensure heater coils are not deformed or damaged during heater installation.

11. Make sure power to unit is off.
12. Remove blower access panel of fan coil unit.

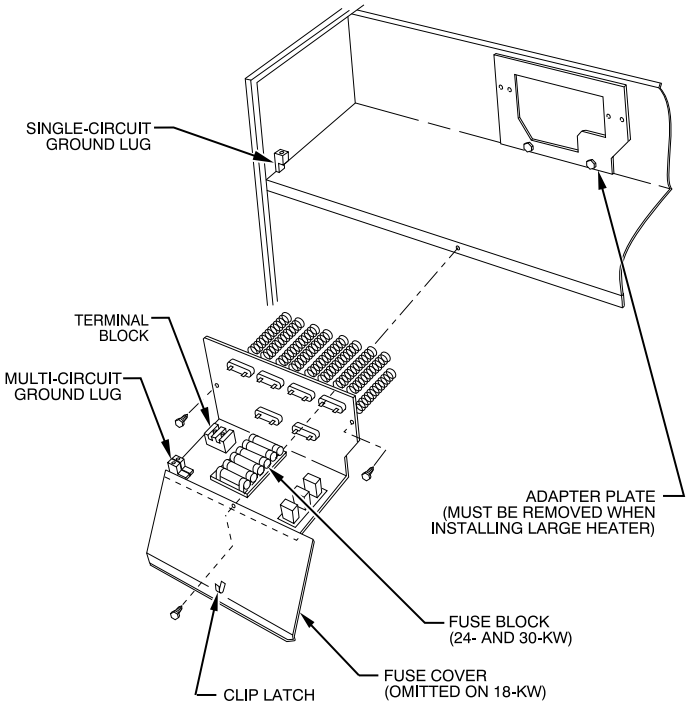
⚠ CAUTION

ELECTRICAL OPERATION HAZARD

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

Before installation of heater, the black and yellow pigtail leads must be removed from the fan coil PCB or wire harness to prevent possible damage to the product. Electrical power will be provided to the board through the heater circuit plug.

13. Disconnect 2 power wires (black and yellow pigtail leads) from PCB or wire harness (if applicable) and discard. Wires may be part of a plug assembly or attached to terminals L1 and L2. Remove cooling control plate from fan coil (if equipped). For 18-, 24-, and 30-kW heaters, remove adapter plate (Fig. 6).



A90154

Fig. 6 – Installation of 18-, 24-, and 30-kW Model Heaters

14. Insert heater assembly into front of fan coil so that element rods engage holes in rear heat shield.
15. Attach heater control plate to fan coil using 2 screws provided. For 18-, 24-, and 30-kW heater models, attach front of heater to fan deck using third screw (Fig. 6).

Procedure 3 — Attach Fuse Box or Circuit Breaker Box

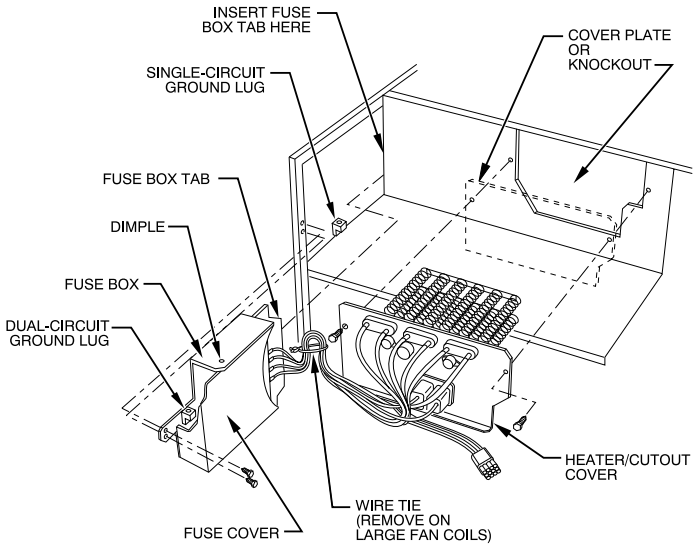
1. For 15- and 20-kW fused models:
   After installing heater assembly, attach fuse assembly to side of fan coil unit by inserting fuse box tab between insulation and to left side of unit and fan deck. Mount front of assembly to side flange with 2 screws provided. On fan coil units size 42 and larger, remove wire tie that shortens wire length between heater and fuses. Fuse cover is closed by engaging dimples in fuse box (Fig. 7).
2. For 24- and 30-kW fused models:
   Fuse assembly is mounted on heater. Be sure fuse cover is closed by engaging clip latch on unit top panel (Fig. 6).

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

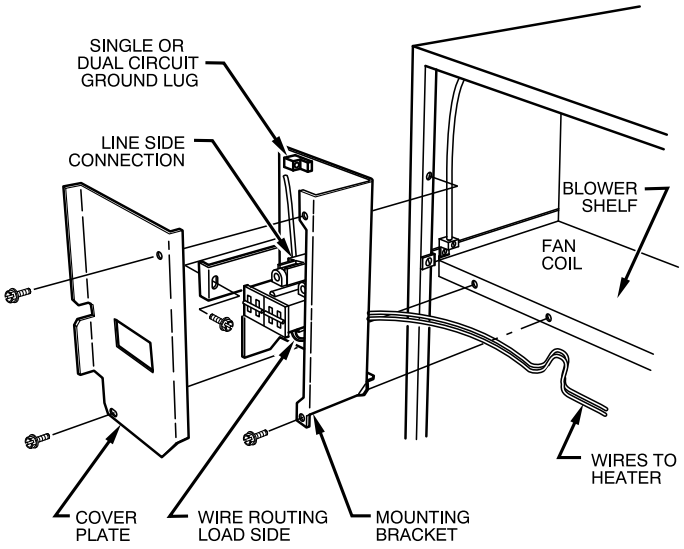
Ensure fuse box is closed before power is turned to ON position. There may be more than one power supply.



A90151

Fig. 7 – Installation of Fused Model Heater

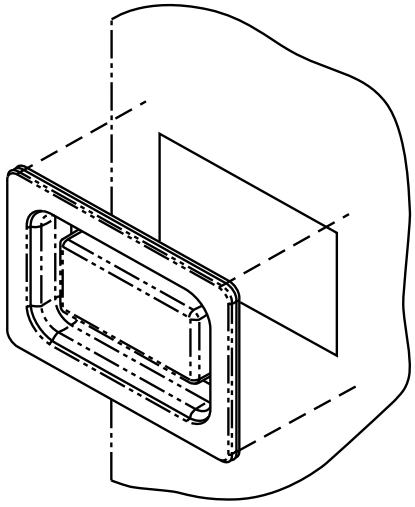
3. For 5- through 20-kW circuit breaker models: After installing heater assembly, attach circuit breaker assembly to unit with screws provided (Fig. 8). On fan coil units size 42 and larger, remove wire tie that shortens wire length between heater and circuit breaker assembly to allow mounting of circuit breaker assembly (Fig. 8).



A90153A

Fig. 8 – Installation of Circuit Breaker Model Heater

4. Circuit breaker models require installing a window bezel in unit door to provide safe access to circuit breakers. The window bezel mounts on the outside of the blower door (Fig. 9).
   a. Cut insulation away from rectangular access hole in blower access panel.
   b. Remove adhesive backing from window bezel and from the outside. Insert the window through the rectangular hole and seat firmly on the door surface. Press firmly in place to seat the adhesive (Fig. 9).



A03069

Fig. 9 – Installation of Window Bezel for Circuit Breaker Model Heater

Procedure 4 — Electrical Connections

Refer to unit instructions for recommended wiring procedures. Install wiring in accordance with all applicable local and national codes, see Table 2 and Table 3. Connect heater wiring harness plug to receptacle on PCB or wire harness. A positive connection must be made between plug and receptacle. Plug will interlock with receptacle when properly seated. Harness contains both 24V control and high-voltage wiring. Blower power is provided through heater harness.

NOTE: Units with or without electric heaters require a minimum CFM. Refer to unit wiring label to ensure the fan speed selected with electric heaters is equal to or greater than the minimum fan speed indicated. The minimum CFM for cooling is determined by the outdoor unit requirements. Use the higher of the 2 for year-round operation.

Wire 24V Control Systems

1. **Connections to Unit**
   Use No. 18 AWG color-coded, insulated (35°C minimum) wire to make low-voltage connections between thermostat, fan coil unit, and outdoor unit. If thermostat is located more than 100 ft (20 m) from unit (as measured along the low-voltage wire), use No. 16 AWG color-coded, insulated (35°C minimum) wire. All wiring must be separated from line voltage power leads. Refer to outdoor unit wiring instructions for additional wiring procedure recommendations.
2. **Transformer**
   Transformer is factory wired for 230V operation. For 208V applications, disconnect black wire on transformer 230-v terminal and reconnect it to 208V terminal (Fig. 10). The secondary circuit of transformer is protected by a 5A fuse mounted on PCB.

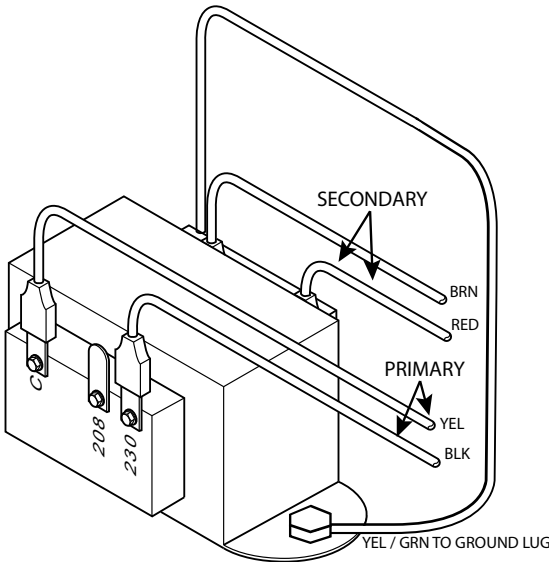


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Fig. 10 – Connection of Transformer

For 3 kW through 10 kW non-fused or non-circuit breaker models:

Refer to unit Installation Instructions for recommended wiring procedures.

Install wiring in accordance with all applicable local and national codes (see Table 2 and Table 3).

3 kW through 10 kW non-fused or non-circuit breaker models have high voltage terminal block to connect the high voltage field wiring as shown in Fig. 11.

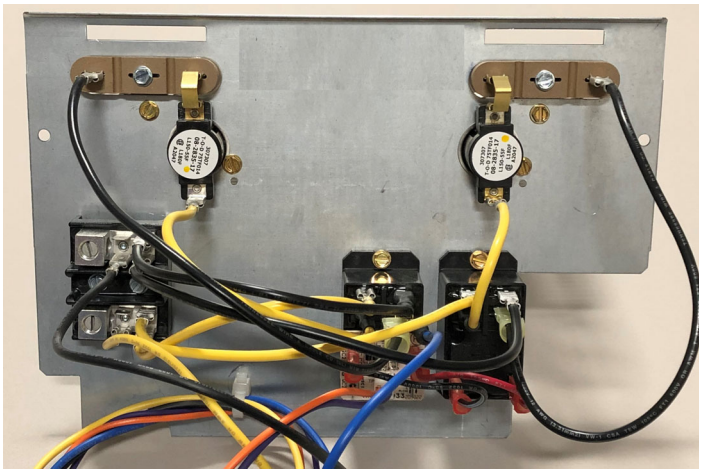

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Fig. 11 – 3kW through 10kW High Voltage Terminal Block for High Voltage Field Wiring

1. Connect heater wiring harness plug to receptacle on PCB or wire harness. A positive connection must be made between plug and receptacle. Plug will interlock with receptacle when properly seated. Harness contains both 24V control and high voltage wiring. Blower power is provided through heater harness.
2. **Heater Staging**
   If electric heat staging is required, a multi-stage heating room thermostat is required. Consult your equipment supplier for a suitable thermostat.
   a. The 3-, 5-, 8-, and 10-kW heaters are single stage only.
   b. The 9- and 15-kW heaters are adaptable for 2-stage operation.
   c. The 18-, 20-, 24-, and 30-kW heaters are adaptable for 3-stage operation.
3. **Intelligent Heat™ Staging**
   An FE Fan Coil plus the Infinity™ or Evolution™ control combination is capable of Intelligent Heat™ staging. Consult the Fan Coil Installation and Start-Up Instructions for wiring details. Do not install with outdoor thermostats when installing for Intelligent Heat™ staging.
4. **Rectifier and Time Delay Boards**
   Each heater element is controlled by a relay mounted on the heater panel. The relay has a 24V DC coil. Each relay has a small rectifier board attached directly to relay coil terminals. The rectifier board converts incoming 24V AC control signal to DC. Some heaters may have up to three relays. The second and/or third relay rectifier board also has a time delay feature and a small jumper wire built into it. With the jumper uncut, the time delay allows the second-stage heat to be energized approximately 5 seconds after the first stage. On 18-, 24-, and 30-kW heaters, the third-stage relay board jumper is cut at the factory. This provides an 8-second delay after first-stage relay closes.

Table 2 – Electric Heater Data

FC Size	HEATER PART NO.	kW		PHASE	Internal Circuit Protection	HEATER AMPS* 208/230V†			MIN AMPACITY* 208/230V†			BRANCH CIRCUIT								
												Min Wire Size (AWG) 208/230V‡			Min Gnd Wire Size 208/230V‡			Max Fuse/Ckt Bkr Amps 208/230V		
						Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		Single Circuit	Dual Circuit	
		240V	208V				L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4		L1,L2	L3,L4
24	KFFEH0401N03	3	2.3	1	None	10.7/11.9	—	—	18.4/19.9	—	—	12/12	—	—	12/12	—	—	20/20	—	—
18	KFFEH8401N03	3	2.3	1	None	10.7/11.9	—	—	17.0/18.5	—	—	12/12	—	—	12/12	—	—	20/20	—	—
24-42	KFFEH0501N05	5	3.8	1	None	17.8/19.7	—	—	27.5/29.9	—	—	10/10	—	—	10/10	—	—	30/30	—	—
24-42	KFFEH2401C05	5	3.8	1	Ckt Bkr	17.8/19.7	—	—	27.5/29.9	—	—	10/10	—	—	10/10	—	—	30/30	—	—
48-60	KFFEH0501N05	5	3.8	1	None	17.8/19.7	—	—	29.9/32.3	—	—	10/8	—	—	10/10	—	—	30/35	—	—
48-60	KFFEH2401C05	5	3.8	1	Ckt Bkr	17.8/19.7	—	—	29.9/32.3	—	—	10/8	—	—	10/10	—	—	30/35	—	—
18	KFFEH8501N05	5	3.8	1	None	17.8/19.7	—	—	25.9/28.3	—	—	10/10	—	—	10/10	—	—	30/30	—	—
18	KFFEH8401C05	5	3.8	1	Ckt Bkr	17.8/19.7	—	—	25.9/28.3	—	—	10/10	—	—	10/10	—	—	30/30	—	—
24-60	KFFEH0801N08	8	6.0	1	None	28.5/31.5	—	—	43.3/47.0	—	—	8/8	—	—	10/10	—	—	45/50	—	—
24-60	KFFEH2501C08	8	6.0	1	Ckt Bkr	28.5/31.5	—	—	43.3/47.0	—	—	8/8	—	—	10/10	—	—	45/50	—	—
18	KFFEH8801N08	8	6.0	1	None	28.5/31.5	—	—	39.3/43.0	—	—	8/8	—	—	10/10	—	—	40/45	—	—
18	KFFEH8501C08	8	6.0	1	Ckt Bkr	28.5/31.5	—	—	39.3/43.0	—	—	8/8	—	—	10/10	—	—	40/45	—	—
24-60	KFFEH0901N10	10	7.5	1	None	35.6/39.4	—	—	52.1/56.9	—	—	6/6	—	—	10/10	—	—	60/60	—	—
24-60	KFFEH2601C10	10	7.5	1	Ckt Bkr	35.6/39.4	—	—	52.1/56.9	—	—	6/6	—	—	10/10	—	—	60/60	—	—
18	KFFEH8901N10	10	7.5	1	None	35.6/39.4	—	—	48.1/52.9	—	—	8/6	—	—	10/10	—	—	50/60	—	—
18	KFFEH8601C10	10	7.5	1	Ckt Bkr	35.6/39.4	—	—	48.1/52.9	—	—	8/6	—	—	10/10	—	—	50/60	—	—
36-60	KFFEH2901N09**	9	6.8	1	None	32.2/35.6	—	—	47.9/52.1	—	—	8/6	—	—	10/10	—	—	50/60	—	—
36-60	KFFEH2901N09	9	6.8	3	None	18.6/20.6	—	—	30.9/33.4	—	—	8/8	—	—	10/10	—	—	35/35	—	—
24-60	KFFEH3001F15††	15	11.3	1	Fuse	53.4/59.1	35.6/39.4	17.8/19.7	74.4/81.5	52.1/56.9	22.3/24.6	4/4	6/6	10/10	8/8	10/10	10/10	80/90	60/60	25/25
24-60	KFFEH3101C15	15	11.3	1	Ckt Bkr	—	35.6/39.4	17.8/19.7	—	52.1/56.9	22.3/24.6	—	6/6	10/10	—	10/10	10/10	—	60/60	25/25
36-60	KFFEH1601315	15	11.3	3	None	30.8/34.1	—	—	46.1/50.3	—	—	8/6	—	—	10/10	—	—	50/60	—	—
42-60	KFFEH2001318	18	13.5	3	None	37.2/41.2	—	—	54.1/59.1	—	—	6/6	—	—	10/10	—	—	60/70	—	—
42-60	KFFEH3601318***	18	13.5	3	None	37.2/41.2	—	—	54.1/59.1	—	—	6/6	—	—	10/10	—	—	60/70	—	—
30-60	KFFEH3201F20††	20	15.0	1	Fuse	71.2/78.8	35.6/39.4	35.6/39.4	96.6/106.1	52.1/56.9	44.5/49.3	3/2	6/6	8/8	8/6	10/10	10/10	100/110	60/60	45/50
30-60	KFFEH3301C20	20	15.0	1	Ckt Bkr	—	35.6/39.4	35.6/39.4	—	52.1/56.9	44.5/49.3	—	6/6	8/8	—	10/10	10/10	—	60/60	45/50
48-60	KFFEH3401F24‡‡	24	18.0	3	Fuse	49.3/54.6	—	—	69.3/75.9	—	—	4/4	—	—	8/8	—	—	80/80	—	—
48-60	KFFEH3701F24***	24	18.0	1	Fuse	85.5/94.5	—	—	114.5/125.8	—	—	2/1	—	—	6/6	—	—	125/150	—	—
48-60	KFFEH3501F30‡‡	30	22.5	3	Fuse	61.7/68.2	—	—	84.8/92.9	—	—	4/3	—	—	8/8	—	—	90/100	—	—
48-60	KFFEH3801F24***	30	22.5	1	Fuse	106.8/118.1	—	—	141.1/155.3	—	—	0/00	—	—	6/6	—	—	150/175	—	—

*. Includes blower motor amps of largest fan coil used with heater. Consult Product Data for specific motor amps.
†. For 240V, multiply 230V heater amps by 1.04. Wire sizing and over-current protection may need adjustment per local code requirements.
‡. Copper wire must be used. If other than uncoated (non-plated), 75°C ambient, copper wire (solid wire for smaller, and stranded wire for larger than 10 AWG) is used, consult applicable tables of the National Electric Code (ANSI/NFPA 70).
**. Field convertible to 3 phase.
††. Single circuit application of F15 and F20 heaters requires single-point wiring kit accessory.
‡‡. Field convertible to 1 phase, single or multiple supply circuit.
***.Mid and deluxe tier R-454B, refer to fan coil Product Data for applications.

Table 3 – Field Multipoint Wiring or 24- and 30-kW Single Phase

HEATER PART NO.	kW		PHASE	HEATER AMPS 208/230V			MIN AMPACITY 208/230V*			MIN WIRE SIZE (AWG) 208/230V†			MIN GND WIRE SIZE 208/230V	MAX FUSE/CKT BKR AMPS 208/230V		
	240V	208V		L1,L2	L3,L4	L5,L6	L1,L2	L3,L4	L5,L6	L1,L2	L3,L4	L5,L6		L1,L2	L3,L4	L5,L6
KFFEH3401F24‡ KFFEH3701F24**	24	18.0	1	28.5/31.5	28.5/31.5	28.5/31.5	43.3/47.0	35.6/39.4	35.6/39.4	8/8	8/8	8/8	10/10	50/50	40/40	40/40
KFFEH3501F30‡ KFFEH3801F24**	30	22.5	1	35.6/39.4	35.6/39.4	35.6/39.4	52.1/56.9	44.5/49.3	44.5/49.3	6/6	8/8	8/8	10/10	60/60	45/50	45/50

*. Includes blower motor amps of largest fan coil used with heater.
†. Copper wire must be used. If other than uncoated (non-plated), 75°C ambient, copper wire (solid wire for 10 AWG and smaller, stranded wire for larger than 10 AWG) is used, consult applicable tables of the NEC (ANSI/NFPA 70).
‡. Field convertible to 1 phase, single or multiple supply circuit.
**. Mid and deluxe tier R-454B, refer to fan coil Product Data for applications.

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

Power Connections

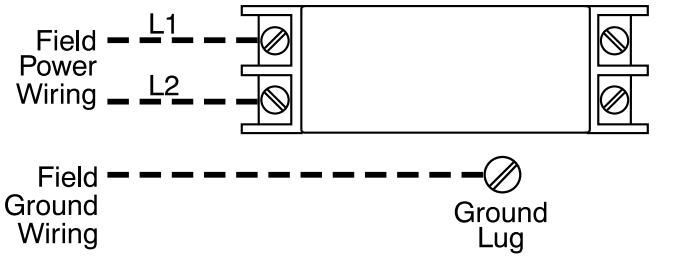
NOTE: Heater supply circuit wire size and over-current protection must comply with National Electrical Code (NEC) and UL branch circuit requirements, see Table 2 and Table 3. Wires and over-current protection, integral to the heater, are not required to meet branch circuit requirements. Internal circuit protection of 60A (maximum) is acceptable.

1. Unprotected heaters: See Fig. 12, Fig. 16, and Fig. 17.)
   a. The 5- through 10-kW single-phase and 15- and 18-kW 3-phase heaters can be wired for single-supply circuit only. Supply circuit connects to terminal block. For 15 and 18kW 3-phase heaters, wire the supply circuit to the heater pigtail leads.
   b. The 3- through 10-kW single-phase heaters can use a separate field-installed, factory-authorized disconnect kit which installs in the fan coil.

NOTE: Refer to wiring label for component locations.

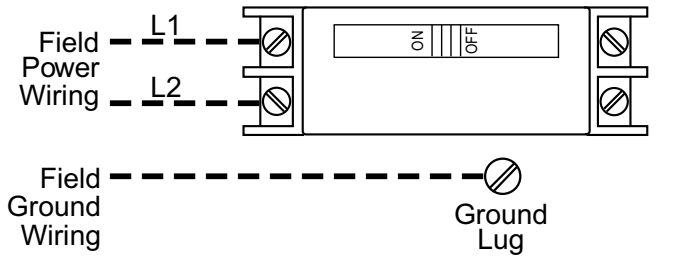
   c. The 9-kW heater is factory wired for a single supply circuit, single phase. To convert the heater to a single supply circuit, 3-phase:
      (1.) Disconnect the blue wire from Relay 1, Terminal 6. Cut, strip, and connect to field wire L3.
      (2.) Disconnect the yellow wire from Relay 3, Terminal 6 and connect to Relay 1, Terminal 6.
      (3.) Disconnect the blue wire from Relay 3, Terminal 2 and connect to Relay 3, Terminal 6.

2. Circuit breaker heaters: See Fig. 13 and Fig. 15.
   a. The 3- through 10-kW heaters can be wired for a single-supply circuit only.
   b. The 15- and 20-kW heaters can be wired for dual-supply circuits only.



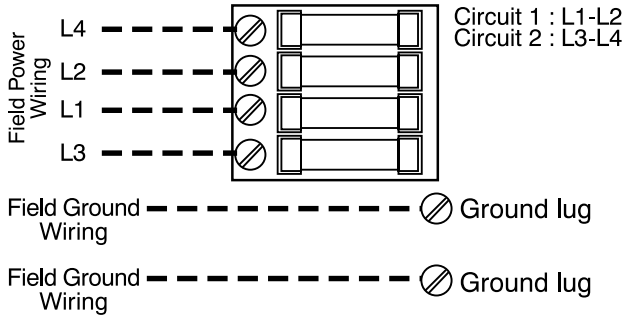
A221145

Fig. 12 – 3, 5, 8, 9 10 kW Non-fused Heaters (9 kW is field convertible to 3-phase. See (Power Connections on p7).



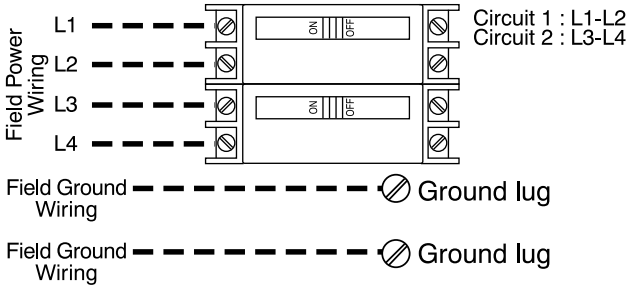
A00077

Fig. 13 – 5, 8 10 kW Circuit Breaker and Disconnect Heaters



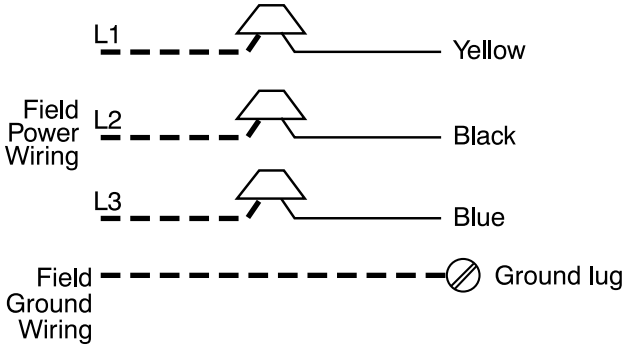
A00078

Fig. 14 – 15 and 20 kW Fused Heaters (15 and 20 kW fused heaters are factory wired for dual supply circuits. Single supply circuit is possible with approved single point wiring kit.)



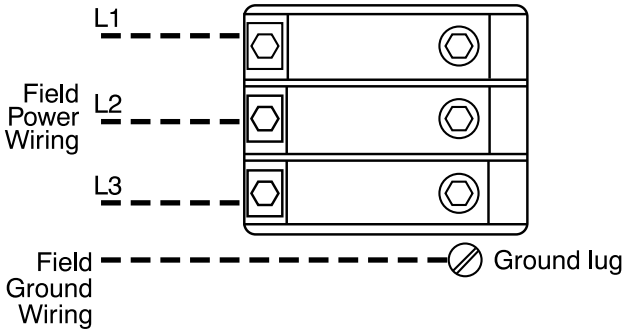
A00079

Fig. 15 – 15 and 20 kW Circuit Breaker Heaters



A00080

Fig. 16 – 15 kW 3-Phase Heater

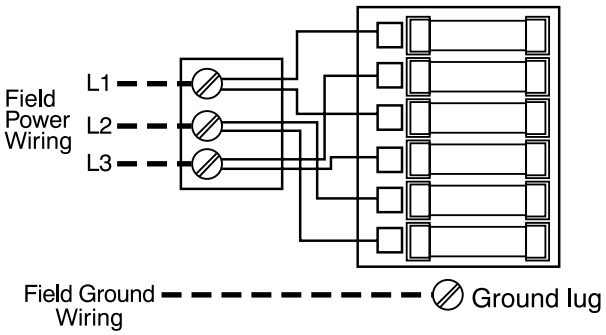


A00081

Fig. 17 – 18 kW 3-Phase Heater

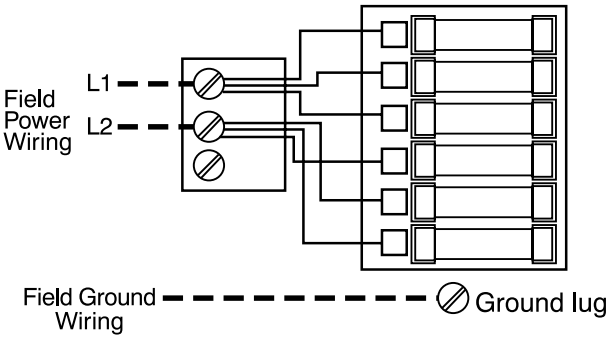
3. Fused heaters: See Fig. 14, Fig. 18, Fig. 19, and Fig. 20.
   a. The 15- and 20-kW heaters can be wired for single- or dual-supply circuits. Single-supply circuit wiring requires a factory-authorized, single-point adapter kit.
   b. The 24- and 30-kW heaters can be wired for single- or multiple-supply circuits. Heaters are factory wired for single circuit 3-phase. To convert heaters to single-circuit single-phase, disconnect the yellow lead from L3 and connect it to L1. Disconnect the black lead from L3 and connect it to L2. To convert heaters to multiple-supply circuit single-phase, remove and discard the leads between the single-circuit terminal block

and fuse block. Remove and discard the single-circuit terminal block. Attach L1 through L6 power leads as indicated on the label next to the fuse block.



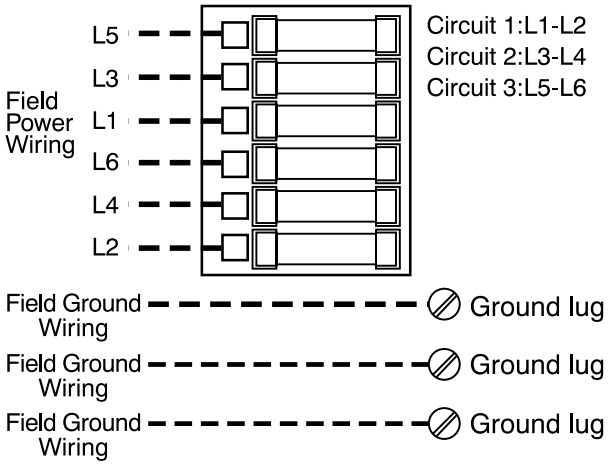
A00082

Fig. 18 – 24 and 30 kW Heaters (3-Phase Wiring Factory Supplied)



A00083

Fig. 19 – 24 and 30 kW Heaters (Single Phase, Single Supply Circuit-Field Modified)



A00084

Fig. 20 – 24 and 30 kW Heaters (Single Phase, Multiple Supply Circuits-Field Modified)

Ground Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

According to NEC, ANSI/NFPA 70, and local codes, cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. (See Ground/Conduit NOTE below.)

NOTE: Use UL-listed conduit and conduit connector for connecting supply wire(s) to unit to obtain proper grounding. If the conduit connection uses reducing washers, a separate ground wire must be used.

Grounding may also be accomplished by using grounding lugs provided in the control box.

1. For unprotected or single-circuit heaters, one (1) equipment ground connection is provided on the fan coil unit (Fig. 6 or Fig. 7).
2. For 15- and 20-kW circuit breaker heaters, an additional ground lug is provided on the circuit breaker mounting bracket for dual-circuit grounding (Fig. 8).
3. For 15- and 20-kW fused heaters, an additional ground lug is provided on the fuse mounting bracket for dual-circuit grounding (Fig. 7).
4. For 24- and 30-kW fused heaters, two (2) additional ground lugs are provided for single-phase, multi-circuit wiring (Fig. 6).

Fan Speeds for FJ and PF4MNX

1. Speed tap selection is done at the fan relay. To change motor speeds, disconnect the fan lead on the relay and replace with the motor speed tap desired. Save the insulating cap and place it on the motor lead that was removed from the relay (Fig. 21). Refer to Table 4 for further clarification of speed tap selections.

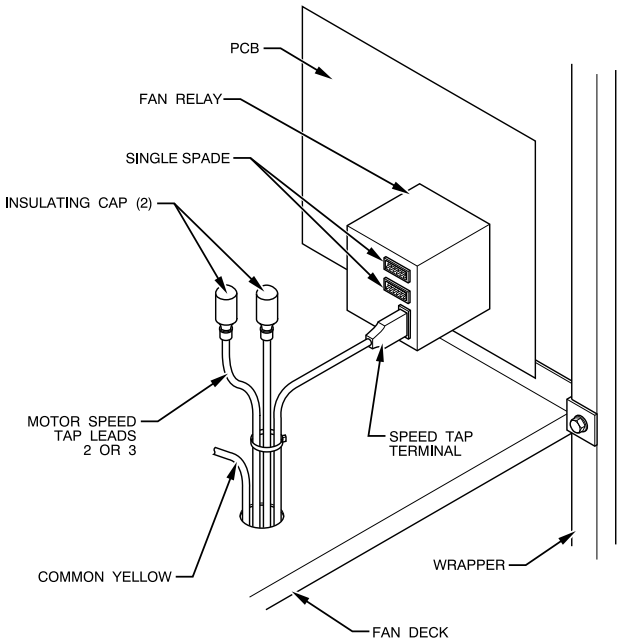


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Fig. 21 – PSC Motor Speed Tap and Fan Relay

Table 4 – Color Code for Motor Lead Wires FJ and PF4MNX

MOTOR SPEED TAP	WIRE COLOR
Common	Yellow
High	Black
Medium	Blue (Factory selected)
Low	Red (Blue on 2-speed models)

FJ and PF4MNX with Discrete Tap BLDC Motors

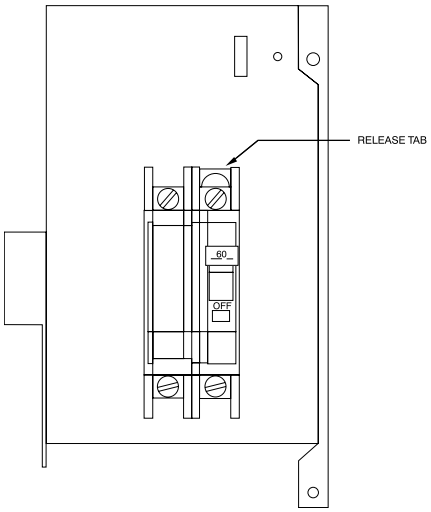
1. Speed tap selection is done at the motor terminals. To change motor speed, disconnect the motor lead from the factory terminal and move it to the desired speed tap based on published airflow tables and desired unit function.
2. Electric heat (white wire) should remain plugged into Tap 4.

FG4, FT4, and FE4B with Variable Speed Airflow

Refer to the Fan Coil Specifications or Installation Instructions for minimum CFM and airflow delivery.

Procedure 5 — Conversion of Circuit Breaker for Downflow Applications

1. Tag and disconnect factory wiring from terminals on circuit breaker(s).
2. Pull the white plastic release tab on the bottom of circuit breaker straight out to release the circuit breaker from the bracket (Fig. 22).
3. Remove the quick connect adapters from the factory side of the breaker(s). Reinstall the adapters on the other end of the breaker(s). Be sure the adapter is located between the lug screw and plate. Torque the lug screw to 30 in-lb.
4. Rotate the breaker 180° from its original position and reinstall in the bracket. Slide the breaker slot into the sheet metal tab and snap the breaker into place. Make sure both tabs engage the breaker. Reconnect wiring on the opposite end. Make sure the wires are positioned as before.
5. Remount the circuit breaker bracket into the unit so that the switch will be in the UP position when ON.



A99094

Fig. 22 – Conversion of Circuit Breaker

Procedure 6 — Attach Wiring Diagram and Rating Label

For R-410A, attach the heater rating label included with the kit over the existing electrical information label located on the front access panel of the fan coil (Fig. 23). If the kit contains multiple rating labels, make sure the correct label is applied (check phase and supply circuits).

For all fan coils, affix the wiring diagram label #3, included with the kit, on the blower housing above the fan coil wiring label. Do not cover up the existing wiring label.

NOTE: The fact there is a label #3 does not imply there should be label #1 or #2. These kits have only one wiring label – label #3.

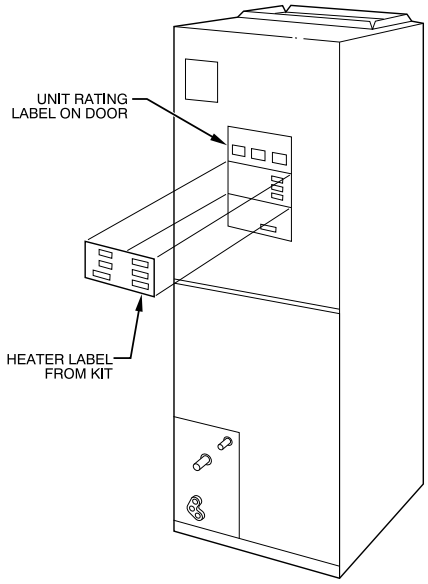


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Fig. 23 – Heater Rating Label Location

Procedure 7 — Verify Installation

After completion of the heater installation, check the wiring to ensure tightness and that proper connections and routings have been made. Make sure all electrical covers are in place and proper labels have been applied. Reinstall the blower access panel before turning on the unit power.

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Edition Date: 07/24
Catalog No: IIK-KFFEH-03
A Proud Member of the Carrier Family
Replaces: **IIK-KFFEH-02**

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

27VNA0
Infinity® Variable Speed Heat Pump with Greenspeed® Intelligence and Puron Advance™ (R-454B) Refrigerant 2 to 5 Nominal Tons

Turn to the experts

PRODUCT DATA

Carrier's 27VNA0 with Greenspeed™ Intelligence is another breakthrough product providing up to 9.5 HSPF2 heating efficiency and up to 20 SEER2 cooling efficiency. The variable speed capacity control results in strong heating capacity as the outdoor temperature drops resulting in less reliance on auxiliary heat. Lower speed operation is available when needed in cooling, for enhanced comfort and dehumidification.

This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency when matched with appropriate coil components. Refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

Industry leading Features / Benefits

Energy Efficiency
- Up to 20 SEER2, 11.5 EER2, 9.5 HSPF2
- Microtube Technology™ refrigeration system
- Indoor air quality accessories available

Sound
- Sound level as low as 54 dBA in low speed

Comfort
- Variable speed compressor with capacity range from 20-100%
- Air cooled variable speed drive
  - Infinity® System Control with Greenspeed™ Intelligence required
  - Energy Tracking capability with the Infinity® System Control and latest software version
    (Energy Tracking has the ability to monitor and estimate the energy consumption of your Infinity® system.)

Reliability
- Non-ozone depleting, low global warming potential Puron Advance™ refrigerant
- Greenspeed Intelligence actively monitors critical system parameters
- High pressure switch
- Suction and discharge pressure transducer
- Electronic expansion valve (EXV) for optimum heating performance
- Filter drier
- Internal compressor stator heat standard
- Balanced refrigeration system for maximum reliability

Flexibility and Installation:
- Vertex™ Technology compatible
- 2 control wires to outdoor unit
- Minimum and maximum airflow adjustments
- Compressor heating capacity control
- Hybrid Heat™ Dual Fuel capable

Durability
WeatherArmor Ultra™ Protection Package:
- Solid, durable sheet metal construction
- Steel louver coil guard
- Baked-on, complete outer coverage, powder paint

Applications
- Heating mode operation down to -11°F (-23.9°C) outdoor ambient temperature.
- Cooling mode operation up to 125°F (51.7°C) outdoor ambient temperature.
- Long-line - up to 200 feet (61.0 m) equivalent length, up to 100 feet (30.5 m) condenser above evaporator, or up to 80 ft (24.4 m) evaporator above condenser (See Long Line Guide for more information.)
- Low ambient cooling down to 0°F (-17.8°C) when enabled with the Infinity® System Control.

Model Number Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13
N	N	A	A	A/N	N	N	N	A/N	A/N	A/N	N	N
2	**7**	**V**	**N**	**A**	**0**	**2**	**4**	**A**	**0**	**0**	**3**	**0**
Refrigerant &OD Type		OD Design type	Tier	Major Series	SEER2	Nominal Cooling Capacity		Variations	Feature	Open	Voltage	Minor Series
27 = Puron Advance™ (R-454B) HP		V = Variable Speed	N= Infinity®	A = Initial Series	0 = 20 SEER2	1,000 Btuh (nominal)		A = Standard HP	0=Standard	0=Not Defined	3=208-230-1	0, 1, 2...

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.

Quality ISO 9001

CATALOG ORDERING NUMBERS

Size	Model Number
24	27VNA024A003
36	27VNA036A003
48	27VNA048A003
60	27VNA060A003

STANDARD FEATURES

FEATURES	Unit Size			
	24	**36**	**48**	**60**
Puron Advance™ (R-454B) Refrigerant	X	X	X	X
Air-Cooling Variable Frequency Drive	X	X	X	X
Louvered Coil Guard	X	X	X	X
Factory Provided, Field-Installed Filter Drier	X	X	X	X
Front-Seating Service Valves	X	X	X	X
In-unit Pressure and Temperature Protection	X	X	X	X
Suction and Discharge Pressure Transducers	X	X	X	X
High Pressure Switch	X	X	X	X
Compressor Stator Heat	X	X	X	X
Utility Interface Connections	X	X	X	X
Bluetooth® Module	X	X	X	X
Enhanced Diagnostics using Greenspeed® Intelligence	X	X	X	X
Energy Tracking Capability	X	X	X	X
Sound Blanket	X	X	X	X
Outdoor Air Temperature Sensor	X	X	X	X
Long Line Capability	X	X	X	X

X = Standard

AHRI RATINGS

NOTE: Ratings contained in this document are subject to change at any time.

For AHRI ratings certificates, please refer to the AHRI directory www.ahridirectory.org
Additional ratings and system combinations can be accessed via the Ratings Database here: www.MyCarrierRatings.com

MIN/MAX AIRFLOW TABLES

The indoor airflow delivered by this system varies significantly based on outdoor temperature, indoor unit combination, and system demand. The airflows on these tables are for duct design considerations.

Duct systems capable of these ranges will ensure the system will deliver full capacity at all outdoor temperatures.
Minimum and maximum airflows can be adjusted from these numbers in the Infinity® System Control Heat Pump Setup screen.

Size	Cooling - Comfort Mode		Cooling - Efficiency Mode	
	Max Airflow	Min Airflow	Max Airflow	Min Airflow
24	650	300	900	485
36	900	400	1200	525
48	1150	500	1350	750
60	1700	500	1950	780

Size	Heating - Comfort Mode		Heating - Efficiency Mode	
	Max Airflow	Min Airflow	Max Airflow	Min Airflow
24	700	500	900	500
36	1000	550	1200	550
48	1450	800	1450	800
60	1750	700	1850	700

PHYSICAL DATA

UNIT SIZE	24	36	48	60
COMPRESSOR TYPE	Variable Speed Rotary			
REFRIGERANT	Puron Advance™ (R-454B)			
Charge lb* (kg)	4.9 (2.2)	6.7 (3.0)	7.9 (3.6)	8.2 (3.7)
Outdoor Htg Exp. Device	EXV	EXV	EXV	EXV
COND FAN	Forward Swept Propeller Type, Direct Drive			
Air Discharge	Vertical			
Maximum Air Qty (CFM)	2570	4190	5250	5250
Motor HP	1/5	1/3	1/3	1/3
Motor RPM	200-1000	200-850	200-825	200-825
COND COIL				
Face Area (sq ft.)	12.5	19.4	27.6	27.6
Fins per In.	20	20	20	20
Rows	1	1	1	1
Circuits	5	6	11	11
VALVE CONNECT. (In. ID)				
Vapor	3/4	3/4	7/8	7/8
Liquid	3/8			
REFRIGERANT TUBES† (In. OD)				
Rated Vapor†	3/4	7/8	7/8	1 - 1/8
Max Rated Liquid Line‡	3/8			

*.For 15 ft. lineset
†.Units are rated with 25 ft (7.6 m) of lineset length. See Vapor Line Sizing and Cooling Capacity Loss table when using other sizes and lengths of lineset.
‡.See Liquid Line Sizing For Cooling Only Systems with Puron Advance™ Refrigerant tables.
Note: See unit Installation Instruction for proper installation.

ELECTRICAL DATA

UNIT SIZE	V-PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE† or CKT BRK AMPS	SCCR
		MAX	MIN	MRC	RLA	FLA			
24	208-230-1	253	197	25	11.7	0.70	19.4	25	5kA rms
36				25	17.5	0.88	22.9	30	5kA rms
48				35	22.6	0.88	30.6	40	5kA rms
60				35	27.2	0.88	36.9	50	5kA rms

*. Permissible limits of the voltage range at which the unit will operate satisfactorily
†. Time-Delay fuse.
FLA - Full Load Amps, **MCA**-Minimum Circuit Amps, **MRC** - Maximum Rated Current**, RLA**-Rated Load Amps, **SCCR** - Short-Circuit Current Rating
NOTE: Control circuit is 24-V on all units and requires external power source. Copper wire must be used from service disconnect to unit.
All motors/compressors contain internal overload protection.

REFRIGERANT PIPING LENGTH LIMITATIONS

Maximum Line Lengths:

The maximum allowable total equivalent length for Heat Pumps varies depending on the vertical separation. See the tables below for allowable lengths depending on whether the outdoor unit is on the same level, above or below the outdoor unit.

Maximum Line Lengths for Heat Pump Applications

	MAXIMUM ACTUAL LENGTH* ft (m)	MAXIMUM EQUIVALENT LENGTH† ft (m)	MAXIMUM VERTICAL SEPARATION ft (m)
Units on equal level	200 (61.0)	200 (61.0)	N/A
Outdoor unit ABOVE indoor unit	200 (61.0)	200 (61.0)	100 (30.5)
Outdoor unit BELOW indoor unit	200 (61.0)	200 (61.0)	80 (24.4)

*. Maximum actual length not to exceed 200 ft (61 m)
†. Total equivalent length accounts for losses due to elbows or fitting. See the Long Line Guideline for details.

LONG LINE APPLICATIONS

An application is considered Long Line when the refrigerant level in the system requires the use of accessories to maintain acceptable refrigerant management for systems reliability. 27VNA0 heat pumps do not require any additional accessories for long line applications.
Defining a system as long line depends on the liquid line diameter, actual length of the tubing, and vertical separation between the indoor and outdoor units.

For heat pump systems, the chart below shows when an application is considered Long Line.

Refrigerant Long Line Description ft (m)

Liquid Line Size	Units On Same Level ft (m)	Outdoor Above Indoor ft (m)	Outdoor Below Indoor ft (m)
3/8	80 (24.4)	80 (24.4)	20 (6.1) vertical or 80 (24.4) total

NOTE: See Long Line Guideline for details

COOLING CAPACITY LOSS TABLE

Nominal Size (Btuh)	Line OD (in)	Cooling Capacity Loss (%) Equivalent Length (ft)								
		25	50	75	80	100	125	150	175	200
24000	5/8	0.7	2.0	3.4	2.3	3.3	4.6	5.8	6.9	8.0
	3/4	0.0	0.7	1.4	0.2	0.8	1.4	2.1	2.7	3.3
36000	5/8	1.6	3.8	5.9	6.3	7.8	9.7	11.4	13.0	14.6
	3/4	0.4	1.4	2.4	2.6	3.4	4.4	5.3	6.2	7.1
	7/8	0.0	0.7	1.4	1.5	2.0	2.7	3.3	3.9	4.5
48000	3/4	1.2	2.7	4.0	4.0	5.1	6.4	7.7	9.0	10.2
	7/8	0.5	1.3	2.0	1.9	2.5	3.2	4.0	4.7	5.5
	1 1/8	0.0	—	—	—	—	—	—	—	—
60000	3/4	1.8	3.9	5.8	6.2	7.7	9.5	11.2	12.9	14.5
	7/8	0.8	1.8	2.9	3.1	3.9	5.0	6.1	7.1	8.2
	1 1/8	0.0	—	—	—	—	—	—	—	—

Rated size Line OD and Rated Total Equivalent Length are in **BOLD**.

—= Applications in this range are disallowed

ACCESSORIES

KIT NUMBER	KIT NAME	24	36	48	60
KSASH2801COP	SOUND BLANKET (ACCUMULATOR)	X			
KSASH2901COP	SOUND BLANKET (ACCUMULATOR)		X		
KSASH2601COP	SOUND BLANKET (ACCUMULATOR)			S	S
KSASF0201AAA	SUPPORT FEET	X	X	X	X
KHASS0606MPK	SNOW STAND	X	X	X	X

X = Accessory, S = Standard

ACCESSORY USAGE GUIDELINE

ACCESSORY	REQUIRED FOR LOW-AMBIENT COOLING APPLICATIONS (Below 55°F/12.8°C)	REQUIRED FOR LONG LINE APPLICATIONS (Over 80 ft/24.38 m)	REQUIRED FOR SEA COAST APPLICATIONS (Within 2 miles/3.22 km)
Compressor Stator Heat	Standard with Infinity® System Control	No	No
Evaporator Freeze Protection	Standard with Infinity® System Control	No	No
Low-Ambient Control	Standard with Infinity® System Control	No	No
Support Feet	Recommended	No	Recommended
Winter Start Control	Standard with Infinity® System Control	No	No

Accessory Description and Usage

Snow Stand

Coated wire rack which supports unit 18 in. (457.2 mm) above mounting pad to allow for drainage from unit base.

Usage Guideline:

Suggested in the following applications:

- Unit installations in heavy snowfall areas.
- Unit installations in snow drift locations.
- Unit installations in areas of prolonged subfreezing temperatures.
- All commercial installations.

Sound Blanket (Accumulator)

Wraparound sound reducing cover for the accumulator. Reduces possible transient tones that may resonate in the accumulator due to variability in system operation.

Usage Guideline:

Although all units are designed and tested to eliminate unpleasant tones, in the unlikely event a transient tone is experienced, this sound blanket can reduce the tone by up to 10 dB.

Support Feet

Four or five stick-on plastic feet that raise the unit 4 in. (101.6 mm) above the mounting pad. This allows sand, dirt, and other debris to be flushed from the unit base, minimizing corrosion.

Usage Guideline:

Suggested in the following applications:

Coastal installations.

Windy areas or where debris is normally circulating.

Rooftop installations.

For improved sound ratings.

SOUND POWER LEVEL

Unit Size	Typical Octave Band Spectrum (dB, without tone adjustment)	Min Cooling	Nominal* Cooling	Min Heating	Nominal* Heating
24	Speed	900	4260	960	5100
	125	63	71	63	65
	250	55	66	54	63
	500	54	67	54	61
	1000	51	63	45	55
	2000	46	59	43	52
	4000	40	54	36	52
	8000	43	52	43	53
	Sound Rating (dBA)	56	68	56	71
36	Speed	900	4320	900	4680
	125	65	69	65	74
	250	55	69	55	67
	500	48	70	49	65
	1000	45	66	45	63
	2000	40	60	39	59
	4000	39	59	39	59
	8000	43	55	42	55
	Sound Rating (dBA)	55	72	54	72
48	Speed	900	3780	900	3780
	125	45	48	45	46
	250	38	55	40	55
	500	41	58	45	59
	1000	51	62	44	61
	2000	35	57	37	55
	4000	34	55	33	55
	8000	39	52	40	51
	Sound Rating (dBA)	64	72	56	73
60	Speed	900	4380	960	4440
	125	62	69	63	70
	250	62	72	56	71
	500	54	67	55	66
	1000	51	65	48	63
	2000	44	64	41	65
	4000	38	59	36	66
	8000	42	54	43	60
	Sound Rating (dBA)	58	72	55	73

*. Nominal condition data taken from maximum speed operation at 95°F in cooling and 47°F in heating
NOTE: Tested in compliance with AHRI 270-2015 but not listed with AHRI.

CHARGING SUBCOOLING

UNIT SIZE	MOMINAL SUBCOOLING*	REQUIRED SUBCOOLING °F (°C) - See System Control
24	14	Subcooling recommendation displayed on System Control in Charging Mode must be followed
36	12	
48	5	
60	7	

*. Nominal subcooling targets for use as reference or in specific applications with 25 ft. (7.6 m) lineset, 95°F outdoor ambient, and 80°F/67°F indoor DB/WB.

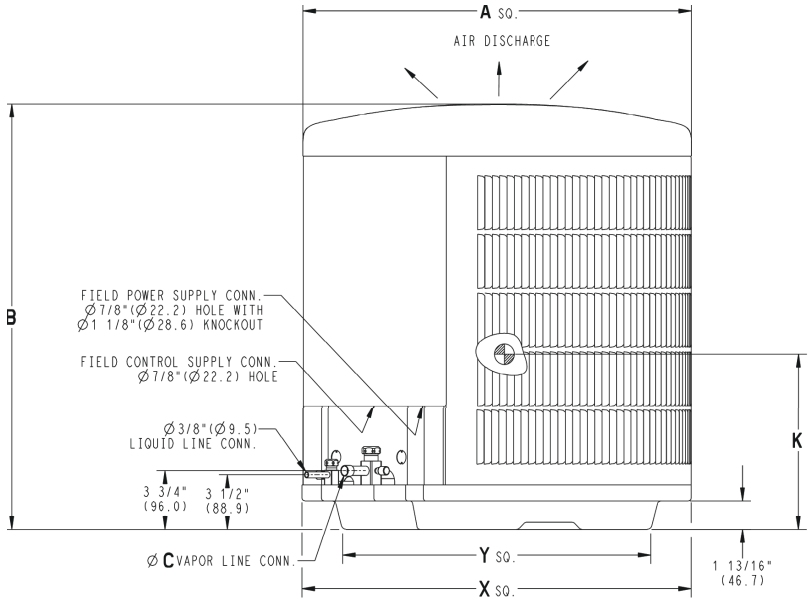
DIMENSIONS

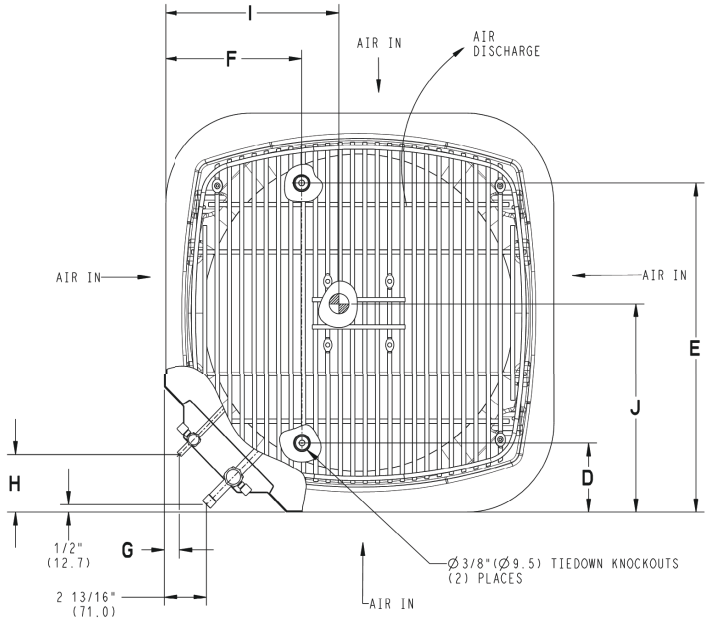
UNIT	SERIES	ELECTRICAL CHARACTERISTICS				A		B		C		D		E		F		G		H		I		J		K		OPERATING WEIGHT		SHIPPING WEIGHT		SHIPPING LENGTH / WIDTH (Sq.)		SHIPPING HEIGHT	
		208-230-1-60	208/230-3-60	460-3-60	575-3-60	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	Lbs	Kgs	Lbs	Kgs	INCH	MM	INCH	MM
27VNA024A*0	0	Y	N	N	N	23 1/8	587.3	35 1/2	902.0	3/4	19.1	4 7/16	113.0	18 1/16	459.0	7 13/16	197.9	1 1/8	28.2	3 13/16	97.4	10 1/4	260.4	12	304.8	18	457.2	147	66.7	165	74.8	26 1/8	664.0	40 13/16	1037.4
27VNA036A*0	0	Y	N	N	N	31 3/16	792.5	36	914.2	3/4	19.1	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 1/2	368.3	13 3/4	349.3	17 1/8	435.0	204	92.5	231	104.8	34 1/4	870.0	41 7/8	1064.2
27VNA048A*0	0	Y	N	N	N	35	889.0	43 13/16	1112.6	7/8	22.2	6 9/16	166.1	28 7/16	722.8	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 7/8	377.8	16	406.4	20	508.0	290	131.5	320	145.1	38	965.0	47 5/8	1209.0
27VNA060A*0	0	Y	N	N	N	35	889.0	43 13/16	1112.6	7/8	22.2	6 9/16	166.1	28 7/16	722.8	9 1/8	231.3	1 1/8	28.2	3 13/16	97.4	14 7/8	377.8	16	406.4	20	508.0	290	131.5	320	145.1	38	965.0	47 5/8	1209.0

Y=YES
N=NO

NOTES:

1. CENTER OF GRAVITY .





UNIT SIZE	"X" MINIMUM GROUND MOUNTING PAD APPLICATION DIMENSIONS		"Y" MINIMUM ROOF-TOP MOUNTING PAD APPLICATION DIMENSIONS	
24	23 1/8	587.3	17 7/8	454.6
-	25 3/4	654.0	20 7/16	518.5
36	31 3/16	792.5	22 15/16	583.2
48,60	35	889.0	26 3/4	679.7

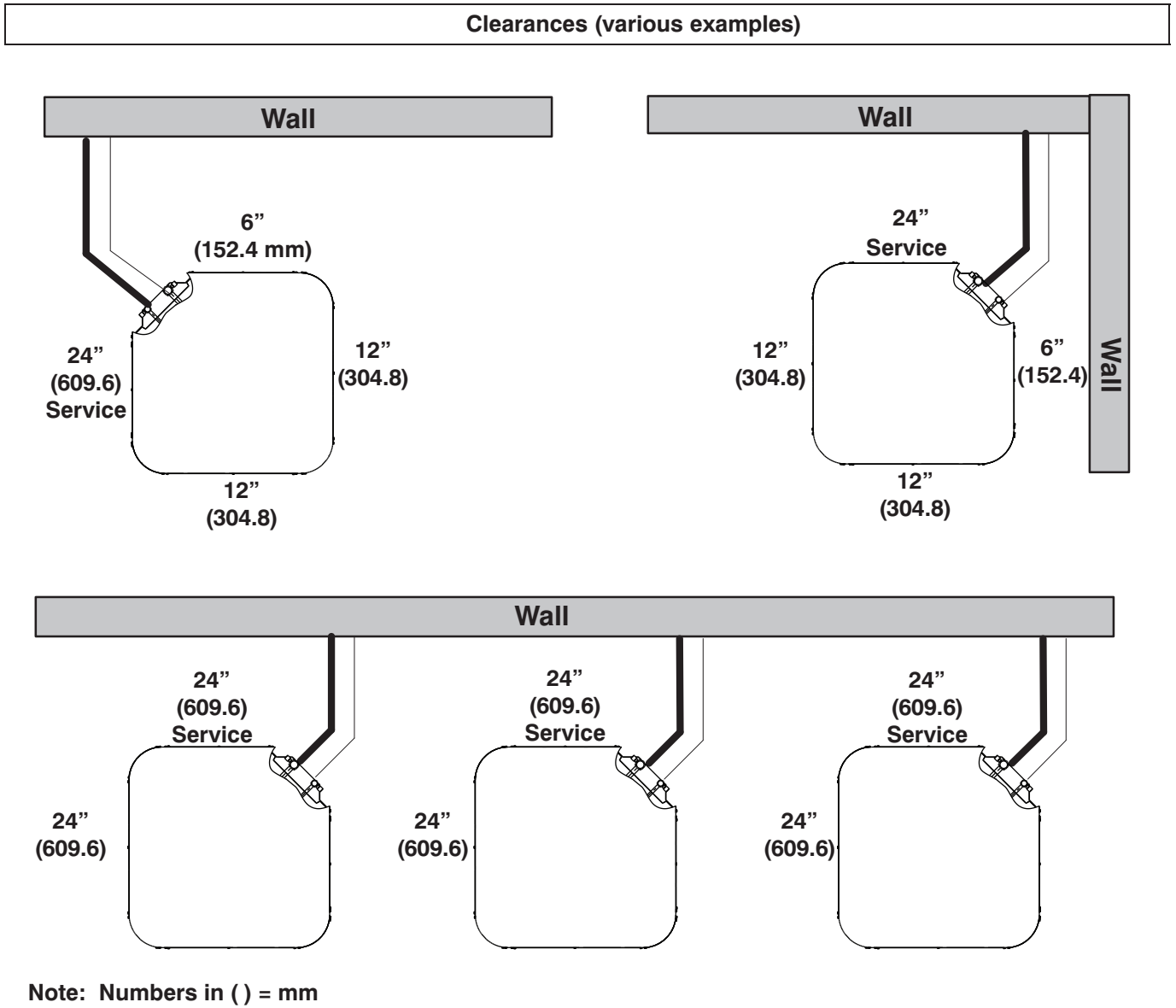
NOTE: ALL DIMENSIONS IN INCH (MM)

U.S. ECCN: Not Subject to Regulation (N.S.R.)

SD5959-4 REV. A

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

CLEARANCES



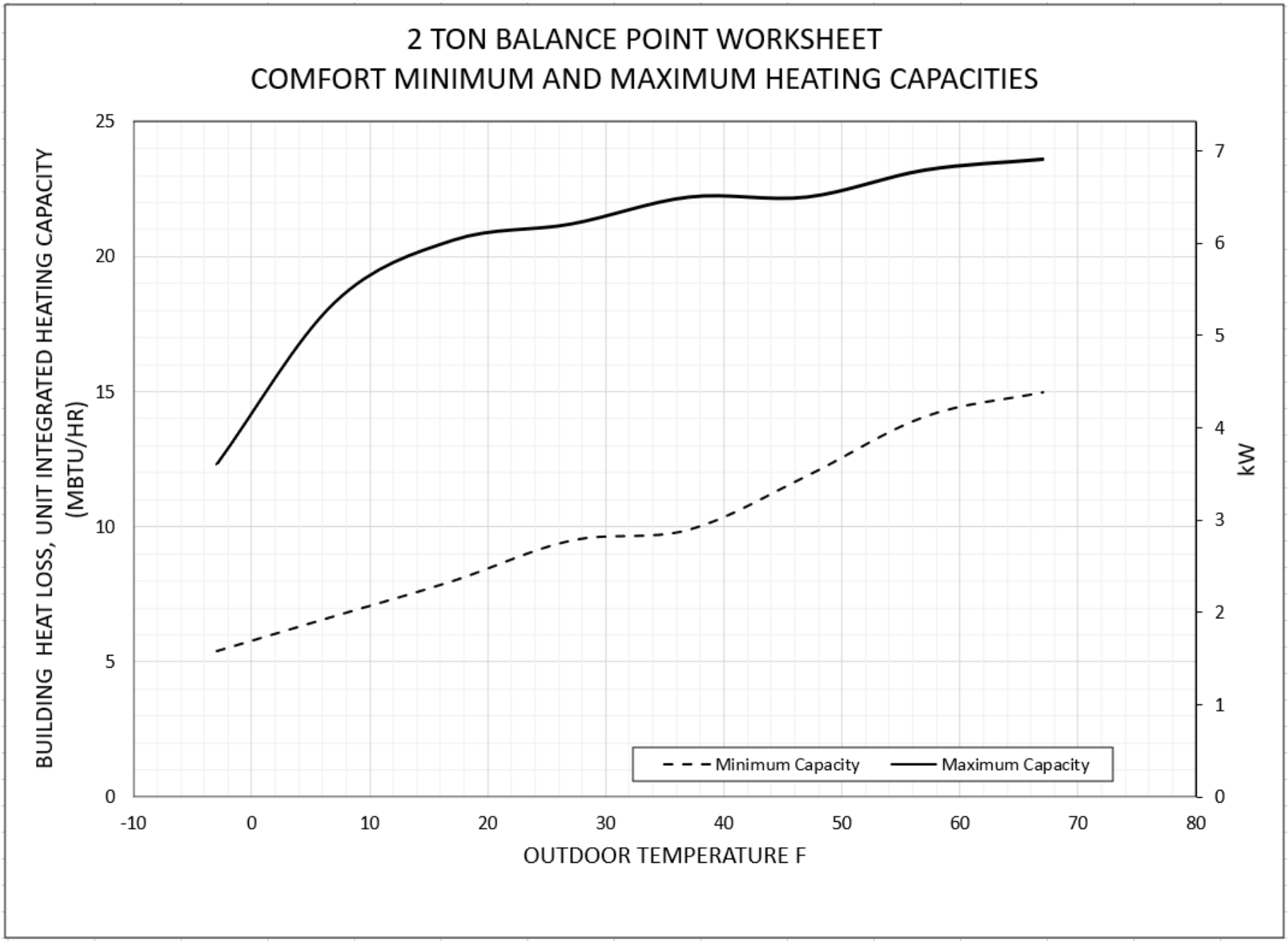
Note: Numbers in ( ) = mm

IMPORTANT: When installing multiple units in an alcove, roof well, or partially enclosed area, ensure there is adequate ventilation to prevent re-circulation of discharge air.

A07833

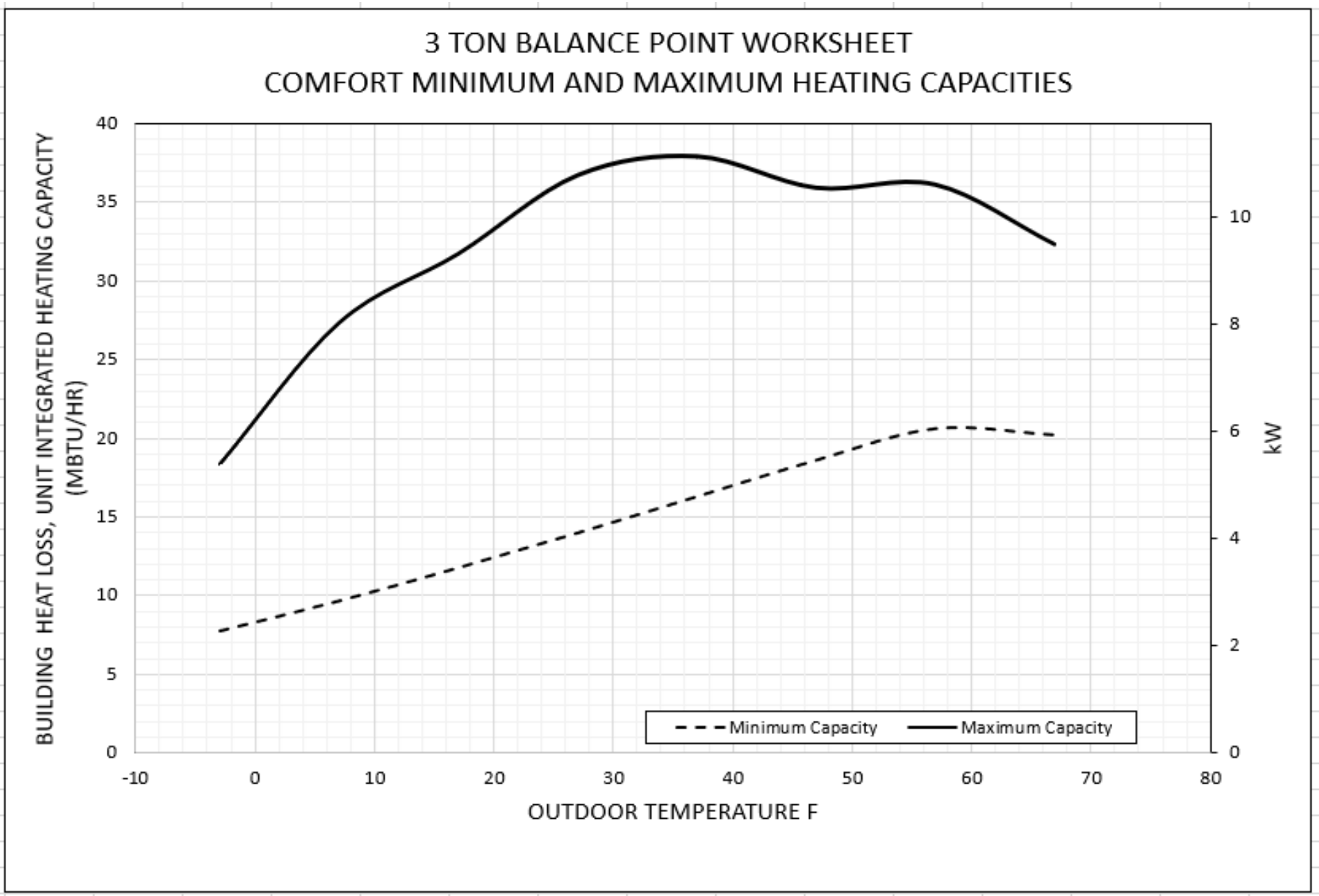
Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

BALANCE POINT WORKSHEET



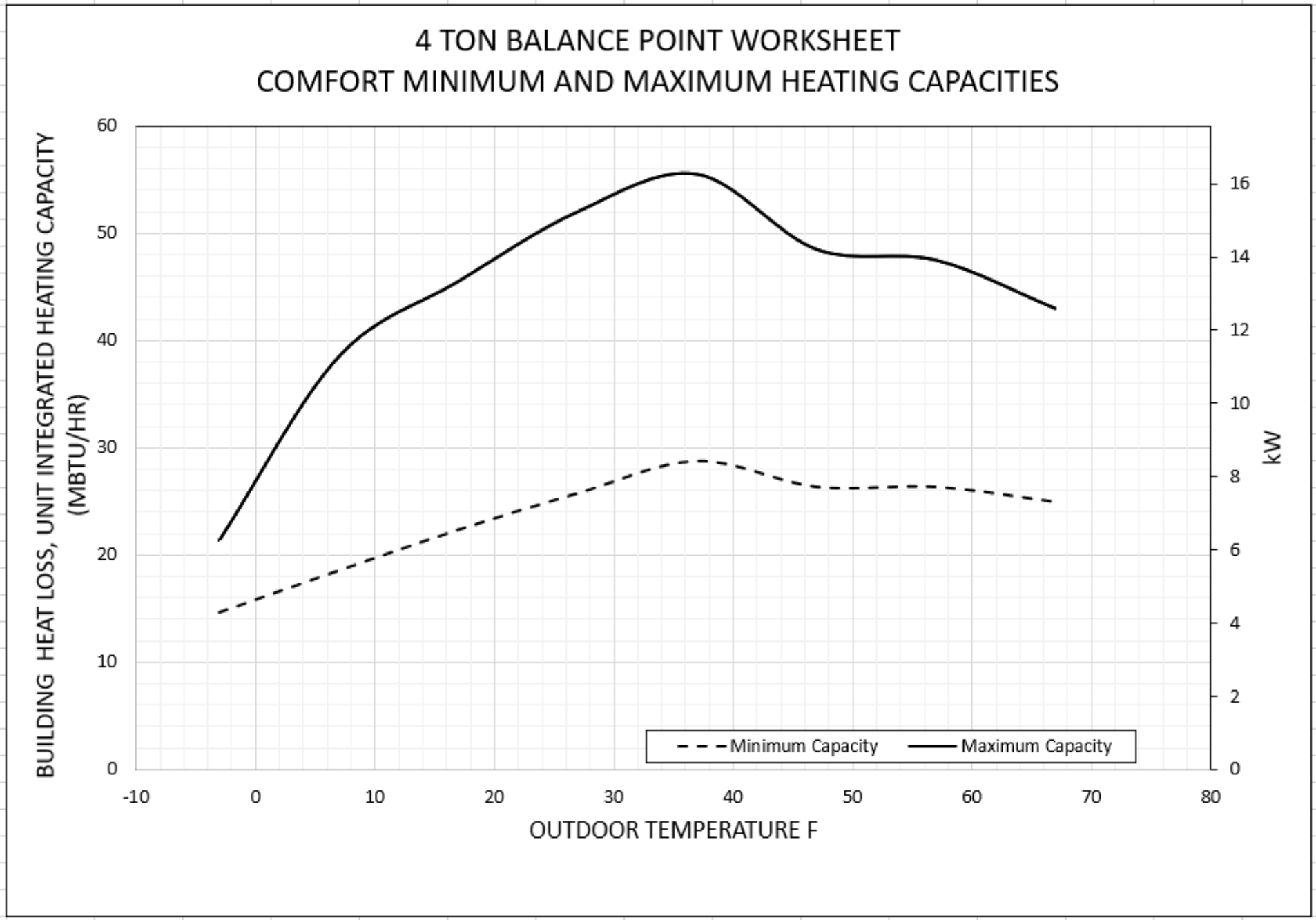
Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

BALANCE POINT WORKSHEET - Continued



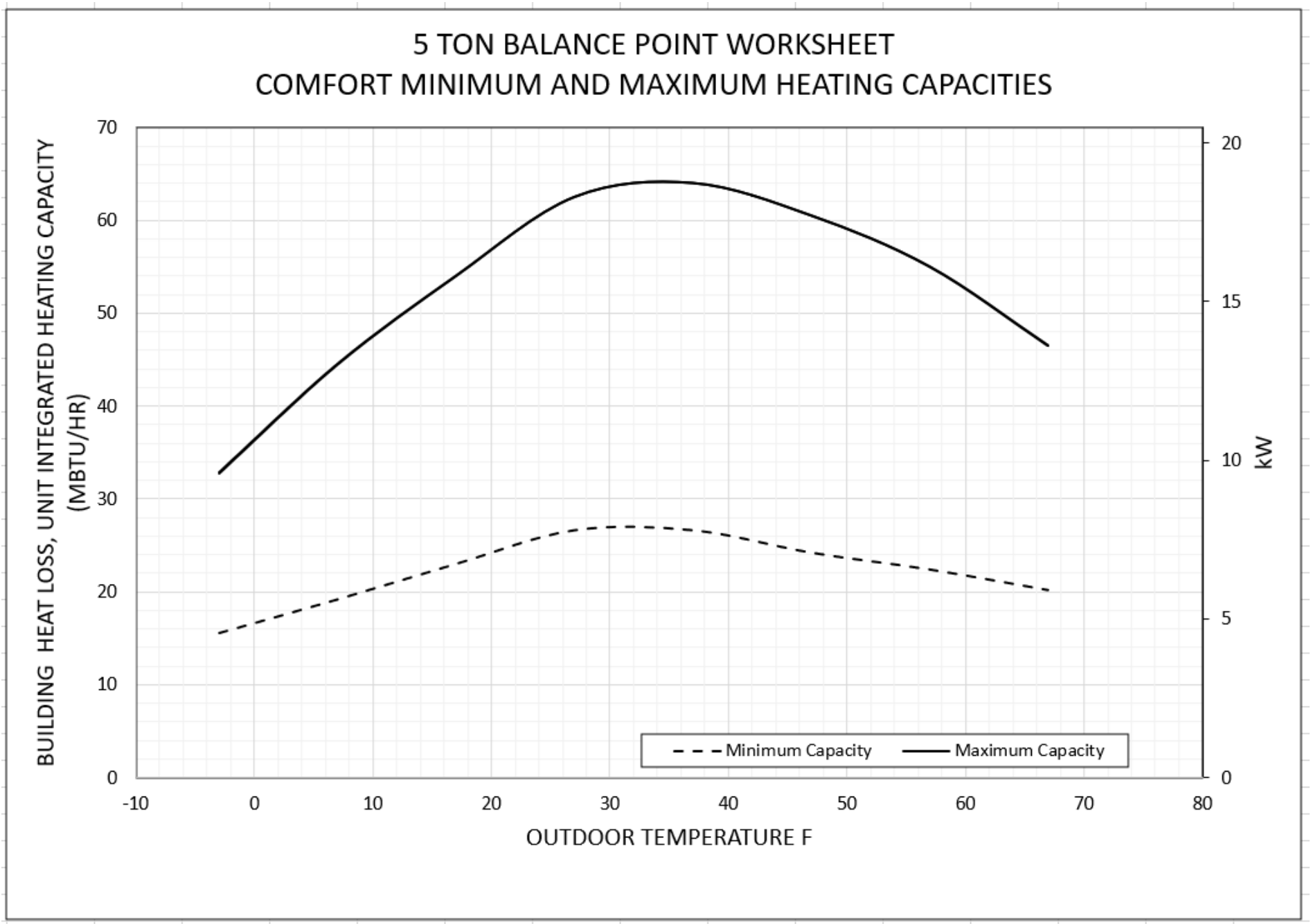
Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

BALANCE POINT WORKSHEET - Continued



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

BALANCE POINT WORKSHEET - Continued



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

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA024 Maximum Demand																													
75 (23.9)	72.0 (22.2)	900	30	12.4	1.24	900	28.6	11.5	1.52	900	27.6	11.2	1.79	900	26	11	2.09	800	24.2	10.4	2.4	900	22.8	10.1	2.76	900	13.9	6.7	2.03
	67.0 (19.4)		27.2	17.1	1.26		26	16.1	1.53		25.2	15.8	1.81		23.6	15.6	2.09		22	14.6	2.39		20.6	14.9	2.72		12.5	11.1	2.02
	63.0 (17.2)††		25.4	20.8	1.29		24.2	19.6	1.54		23.2	19.4	1.81		22	19.2	2.10		20.4	18	2.37		19.3	18.5	2.72		12.2	12.1	2.01
	57.0 (13.9)		23.8	23.8	1.29		23	22.6	1.55		22.2	22	1.81		21.2	21.2	2.10		19.5	19.5	2.37		18.9	18.9	2.71		12.2	12.1	2.02
80 (26.7)	72.0 (22.2)	900	29.8	17	1.24	900	28.4	16	1.51	900	27.4	15.8	1.78	900	26	15.6	2.10	800	24.2	14.6	2.41	900	22.6	14.8	2.75	900	13.7	11.2	2.01
	67.0 (19.4)		27.2	21.6	1.27		26	20.6	1.53		25.0	20.2	1.8		23.6	19.2	2.15		22	18.9	2.39		21.6	17.6	2.82		13.2	13	2.02
	63.0 (17.2)††		25.6	25.2	1.28		24.4	23.8	1.53		24	22.2	1.81		22.8	21.6	2.10		21.2	20.4	2.39		20.2	20.2	2.72		13.2	13.1	2.02
	57.0 (13.9)		25.4	25.4	1.29		24.4	24	1.54		23.6	23.4	1.81		22.6	22.6	2.10		20.8	20.8	2.38		20.2	20.2	2.73		13.2	13.1	2.02
27VNA024 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	635	15.1	6.4	0.5	635	14.6	6	0.57	550	13.8	5.6	0.69	620	16.3	6.9	1.16	620	18.2	7.9	1.76	620	16.9	7.4	1.99	620	13.2	5.8	1.86
	67.0 (19.4)		13.6	9.6	0.52		13.1	9.1	0.59		12.3	8.3	0.71		14.6	10.1	1.16		16.3	11.2	1.76		15.2	10.9	1.97		11.8	9	1.84
	63.0 (17.2)††		12.7	12	0.53		12.2	11.3	0.6		11.4	10.3	0.72		13.5	12.5	1.17		15.2	13.9	1.76		14.1	13.5	1.96		11.1	10.6	1.83
	57.0 (13.9)		12.6	12.2	0.53		12.2	11.4	0.61		11.2	10.6	0.72		13.3	13.1	1.17		14.7	14.7	1.76		13.7	13.7	1.95		11	10.9	1.83
80 (26.7)	72.0 (22.2)	635	15	9.6	0.5	635	14.5	9.2	0.57	550	13.7	8.4	0.69	620	16.2	10.1	1.16	620	18.1	11.3	1.76	620	16.7	10.9	1.98	620	13	9.1	1.85
	67.0 (19.4)		13.7	12.7	0.52		13.2	12.1	0.59		12.4	11	0.71		14.6	13.2	1.16		16.5	14.6	1.77		15.2	14.2	1.97		12	11.4	1.84
	63.0 (17.2)††		13.5	13.1	0.52		13.1	12.3	0.59		12.1	11.4	0.71		14.2	14.1	1.16		15.7	15.7	1.76		14.7	14.7	1.97		11.9	11.8	1.84
	57.0 (13.9)		13.5	13.1	0.52		13.1	12.3	0.59		12.1	11.4	0.71		14.2	14.1	1.16		15.7	15.7	1.76		14.7	14.7	1.97		11.9	11.8	1.84
27VNA024 Minimum Demand																													
75 (23.9)	72.0 (22.2)	500	7.1	3.6	0.21	500	6.5	3.3	0.27	500	5.9	3.1	0.35	485	11	4.7	0.72	485	14.9	6.3	1.37	485	13.7	5.9	1.57	485	12.5	5.3	1.79
	67.0 (19.4)		6.4	6.1	0.22		5.9	5	0.28		5.3	5.2	0.36		9.8	7.1	0.73		13.4	8.9	1.37		12.3	8.5	1.56		11.1	7.8	1.76
	63.0 (17.2)††		6.3	6.3	0.23		5.8	5.7	0.28		5.3	5.2	0.36		9.1	8.5	0.73		12.3	10.9	1.37		11.3	10.5	1.56		10.2	9.7	1.74
	57.0 (13.9)		6.3	6.3	0.23		5.8	5.7	0.28		5.3	5.2	0.36		9.1	8.7	0.73		11.8	11.8	1.37		11	11	1.56		10.1	9.9	1.75
80 (26.7)	72.0 (22.2)	500	7.1	6.2	0.21	500	6.5	5.8	0.26	500	5.9	4.9	0.34	485	10.9	7.2	0.71	485	14.8	8.9	1.37	485	13.7	8.6	1.58	485	12.4	7.9	1.78
	67.0 (19.4)		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		10	9	0.73		13.4	11.5	1.38		12.2	11.1	1.56		11.1	10.3	1.76
	63.0 (17.2)††		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		9.8	9.5	0.72		12.7	12.7	1.37		11.8	11.8	1.56		10.9	10.8	1.76
	57.0 (13.9)		6.9	6.9	0.21		6.4	6.2	0.27		5.8	5.7	0.34		9.8	9.4	0.72		12.6	12.6	1.37		11.8	11.8	1.56		10.9	10.7	1.76

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA036 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1200	41	15.7	1.8	1200	42.5	16.7	2.47	1200	40.5	16.1	2.76	1200	38	15.4	3.08	1200	35.8	14.6	3.46	1200	34.2	13.9	3.89	1200	31.2	12.4	3.78
	67.0 (19.4)		37.4	21.8	1.86		38.5	22.8	2.48		36.8	22.2	2.77		34.6	21.4	3.09		32.6	20.6	3.44		31.2	20	3.86		28.2	18.8	3.74
	63.0 (17.2)††		34.8	26.6	1.9		35.8	27.6	2.5		34.2	27	2.78		32	26.2	3.08		30.2	25.2	3.42		28.8	24.6	3.82		26.2	23.6	3.7
	57.0 (13.9)		32.6	31	1.92		33.2	32.6	2.52		31.8	31.6	2.77		30	30	3.06		28.6	28.6	3.4		27.6	27.4	3.8		26	24.2	3.71
80 (26.7)	72.0 (22.2)	1200	41	21.8	1.8	1200	42	22.6	2.45	1200	40.5	22.2	2.77	1200	37.8	21.4	3.08	1200	35.6	20.6	3.45	1200	34.2	19.9	3.9	1200	30.8	18.8	3.76
	67.0 (19.4)		37.2	27.8	1.85		38.5	28.6	2.48		36.8	28.2	2.77		35	27.6	3.11		32.4	26.4	3.42		31.2	26	3.82		28.2	24.8	3.72
	63.0 (17.2)††		35	32.2	1.88		36	33.2	2.5		34.4	32.6	2.77		32.4	31.6	3.09		31	29	3.43		30	27.8	3.85		27.8	26	3.73
	57.0 (13.9)		34.6	32.8	1.89		35.2	34.6	2.5		33.8	33.6	2.77		32	32	3.07		30.4	30.4	3.41		29.6	29.2	3.84		27.8	26	3.74
27VNA036 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	750	20.6	8.5	0.58	750	21.6	8.9	0.8	670	20.2	8.3	0.94	830	23.4	9.6	1.43	985	21.8	9.4	1.71	985	20.8	9	1.97	985	17.8	8	2.03
	67.0 (19.4)		18.5	12.1	0.62		19.6	12.7	0.85		18.3	11.8	0.98		21	13.9	1.44		19.7	14.3	1.72		18.6	13.9	1.96		16	13	2.04
	63.0 (17.2)††		17.1	15	0.65		18.1	15.6	0.87		16.8	14.4	1		19.5	17.1	1.46		18.4	17.5	1.72		17.6	16.5	1.96		15.4	14.6	2.03
	57.0 (13.9)		16.6	16.1	0.67		17.5	16.9	0.88		16.1	15.7	1.01		18.9	18.4	1.47		18.3	17.9	1.73		17.5	16.9	1.96		15.4	14.6	2.03
80 (26.7)	72.0 (22.2)	750	20.4	12.2	0.57	750	21.6	12.7	0.81	670	20.2	11.8	0.95	830	23.2	13.9	1.43	985	21.6	14.4	1.7	985	20.4	14	1.95	985	17.6	13	2.04
	67.0 (19.4)		18.5	15.7	0.62		19.4	16.3	0.84		18.2	15.1	0.98		21	18	1.44		19.8	18.8	1.72		19	17.7	1.96		16.7	15.8	2.04
	63.0 (17.2)††		17.8	17.2	0.64		18.7	18.1	0.86		17.5	16.3	0.99		20.2	19.7	1.45		19.7	19.2	1.72		18.8	18.2	1.95		16.7	15.8	2.04
	57.0 (13.9)		17.8	17.2	0.64		18.7	18.1	0.86		17.3	16.9	0.99		20.2	19.7	1.45		19.7	19.2	1.73		18.8	18.2	1.96		16.7	15.8	2.04
27VNA036 Minimum Demand																													
75 (23.9)	72.0 (22.2)	525	10.3	4.7	0.22	525	9.7	4.5	0.31	525	8.8	4.3	0.4	705	13.7	6.2	0.82	880	12.6	6.2	1.03	880	11.5	5.9	1.17	880	11	5.7	1.37
	67.0 (19.4)		9.2	7.2	0.25		8.6	7.1	0.34		7.8	6.8	0.42		12.2	9.7	0.84		11.3	10.3	1.05		10.4	8.4	1.17		9.8	9.4	1.36
	63.0 (17.2)††		8.8	8.5	0.27		8.3	8.1	0.35		7.6	7.5	0.42		11.6	11.4	0.85		11.1	10.9	1.05		10.2	10.1	1.18		9.8	9.4	1.36
	57.0 (13.9)		8.7	8.5	0.27		8.3	8.1	0.35		7.6	7.5	0.43		11.6	11.4	0.85		11.1	10.9	1.05		10.2	10.1	1.18		9.8	9.4	1.36
80 (26.7)	72.0 (22.2)	525	10.2	7.3	0.22	525	9.6	7.2	0.31	525	8.7	6.9	0.39	705	13.6	9.7	0.82	880	12.5	10.4	1.03	880	11.4	10.1	1.17	880	10.9	9.9	1.37
	67.0 (19.4)		9.5	9.2	0.24		9	8.8	0.32		8.3	8.1	0.41		12.8	11.4	0.83		12.1	11.8	1.04		11.1	11	1.17		10.7	10.3	1.36
	63.0 (17.2)††		9.5	9.2	0.24		9	8.8	0.32		8.3	8.1	0.41		12.5	12.3	0.83		12.1	11.8	1.04		11.1	11	1.17		10.8	10.3	1.37
	57.0 (13.9)		9.4	9.2	0.24		9	8.7	0.32		8.3	8.1	0.41		12.5	12.3	0.83		12	11.8	1.03		11.1	11	1.17		10.7	10.3	1.36

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																							
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA048 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1350	50	20.8	2.01	1350	52	22.2	2.78	1350	55	22	3.77	1350	52.5	20.8	4.18	1350	50	19.4	4.63	1350	46.5	18.6	5.1	1350	34.4	16.3	4.25
	67.0 (19.4)		45.5	27.8	2.07		47	29.4	2.8		50	29	3.77		48	27.6	4.18		45.5	26.2	4.58		42.5	25.4	5.04		31.2	24	4.19
	63.0 (17.2)††		42.5	33.4	2.13		44	35.2	2.85		46.5	34.4	3.77		44.5	32.8	4.16		42.5	31.6	4.57		39.5	30.8	4.97		29.2	29.2	4.17
	57.0 (13.9)		39	39	2.16		40	40	2.84		42	42	3.75		40.5	40	4.12		39	38	4.51		36.8	36.6	4.92		28.4	28.4	4.16
80 (26.7)	72.0 (22.2)	1350	50	27.8	2.01	1350	51.5	29.4	2.76	1350	54.5	28.8	3.74	1350	52.5	27.4	4.19	1350	49.5	26	4.6	1350	46.5	25.4	5.12	1350	34	23.8	4.23
	67.0 (19.4)		45.5	34.8	2.07		47	36.4	2.81		50	35.6	3.77		46	33.6	4.24		45	32.6	4.57		44	32.8	5.06		31	31	4.18
	63.0 (17.2)††		42.5	40	2.11		44	42	2.84		46.5	41	3.77		44.5	39.5	4.15		42.5	38	4.55		39.5	37.4	4.95		30.2	30.2	4.18
	57.0 (13.9)		41	41	2.12		42	42	2.83		44.5	44.5	3.78		43	42.5	4.16		41	40.5	4.51		39	39	4.96		30.2	30.2	4.19
27VNA048 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	950	29.6	11.5	0.81	950	29.4	12	1.13	850	29.2	11.9	1.42	1045	33.4	13.9	2.14	1145	31.8	13.2	2.47	1145	29.4	12.6	2.75	1145	23	10.9	2.67
	67.0 (19.4)		26.8	16.2	0.87		26.6	16.9	1.17		26.4	16.3	1.46		30	19.3	2.15		28.8	19.1	2.47		26.4	18.6	2.73		20.8	17.1	2.67
	63.0 (17.2)††		24.8	19.9	0.91		24.6	20.6	1.2		24.4	19.7	1.48		28	23.6	2.16		26.6	23.6	2.46		24.8	23.2	2.74		19.7	19.7	2.66
	57.0 (13.9)		23.6	22.2	0.93		23.4	23	1.22		22.8	22.6	1.49		26.4	26.4	2.15		25.8	25.8	2.47		24.2	24.2	2.73		19.6	19.6	2.66
80 (26.7)	72.0 (22.2)	950	29.4	16.2	0.81	950	29.2	16.9	1.12	850	29	16.3	1.42	1045	33.2	19.4	2.13	1145	31.6	19.1	2.47	1145	29	18.6	2.74	1145	22.8	17.1	2.68
	67.0 (19.4)		26.6	20.8	0.86		26.4	21.6	1.17		26.2	20.6	1.45		30.2	24.8	2.15		28.6	24.8	2.46		26.6	24.4	2.74		21	21	2.66
	63.0 (17.2)††		25.6	22.4	0.89		25.4	23.4	1.19		24.4	23.8	1.46		28.4	28.4	2.16		27.6	27.6	2.47		25.8	25.8	2.73		21	21	2.67
	57.0 (13.9)		25.2	23.6	0.9		25	24.6	1.2		24.2	24.2	1.47		28.2	28.2	2.16		27.6	27.4	2.47		25.8	25.8	2.73		21	21	2.67
27VNA048 Minimum Demand																													
75 (23.9)	72.0 (22.2)	750	17.5	7.6	0.38	750	16.2	7.5	0.53	750	15	7.1	0.67	895	22.6	9.4	1.32	1040	21.4	9.1	1.6	1040	19.5	8.6	1.79	1040	17.3	8.5	2.01
	67.0 (19.4)		15.8	11.4	0.43		14.6	11.4	0.57		13.5	11	0.7		20.4	13.9	1.35		19.2	14.1	1.61		17.5	13.8	1.8		15.5	13.9	2.01
	63.0 (17.2)††		14.7	14.1	0.45		13.7	13.6	0.59		12.9	12.3	0.71		18.9	17.2	1.36		18.2	16.6	1.61		16.7	16.1	1.8		15	15	2.01
	57.0 (13.9)		14.6	14.3	0.46		13.6	13.6	0.59		12.7	12.7	0.71		18.6	17.9	1.36		18.1	17.1	1.62		16.7	16.1	1.8		15	15	2.01
80 (26.7)	72.0 (22.2)	750	17.4	11.4	0.38	750	16	11.4	0.52	750	14.9	11	0.67	895	22.4	13.9	1.32	1040	21	14.2	1.58	1040	19.2	13.8	1.78	1040	17.1	14	2.02
	67.0 (19.4)		15.9	14.9	0.42		14.7	14.7	0.56		13.8	13.6	0.69		20.4	18.1	1.35		19.7	17.4	1.6		18.1	17	1.79		16.2	16.2	2.01
	63.0 (17.2)††		15.7	15.4	0.43		14.6	14.6	0.56		13.7	13.7	0.69		20	19.2	1.35		19.4	18.4	1.6		18	17.3	1.79		16.2	16.2	2.01
	57.0 (13.9)		15.7	15.3	0.43		14.6	14.6	0.56		13.7	13.7	0.69		20	19.1	1.36		19.4	18.4	1.6		18	17.3	1.8		16.2	16.2	2.01

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

Detailed Cooling Capacities# - Cooling Efficiency Mode

EDB	EVAP AIR EWB	CONDENSER ENTERING AIR TEMPERATURES °F (°C)																									
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
		ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**	ID SCFM	Capacity MBtuh†		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA060 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1950	67	27.6	3.34	1950	65	27.8	3.94	1950	68	27.4	5.04	1950	64.5	26	5.6	1850	61	24.6	6.16	1700	57	23.6	6.83	1300	42.5	19.5	5.52
	67.0 (19.4)		60.5	37.6	3.35		59.5	38	3.98		61.5	37.2	4.98		58.5	35.6	5.52		55.5	33.8	6.07		52	32.2	6.68		38.5	27.2	5.44
	63.0 (17.2)††		56.5	45.5	3.39		55	46	3.99		57	45	4.95		54.5	43	5.51		51.5	41	6		48	39	6.54		35.6	33	5.38
	57.0 (13.9)		52	52	3.38		51	51	3.97		52.5	52.5	4.9		50.5	50.5	5.43		48	48	5.93		45	45	6.48		33.8	33.8	5.35
80 (26.7)	72.0 (22.2)	1950	67	37.4	3.35	1950	65	37.8	3.94	1950	68	37	5.05	1950	64.5	35.4	5.62	1850	60.5	33.6	6.14	1700	57	32	6.85	1300	42.5	27.2	5.53
	67.0 (19.4)		60.5	47	3.35		59	48	3.95		61.5	47	4.98		58	44.5	5.45		55	42.5	6.03		51.5	41.5	6.62		38.5	34.6	5.45
	63.0 (17.2)††		56.5	55	3.37		55.5	55.5	3.99		57.5	54	4.97		55	52.5	5.51		51.5	49.5	5.96		48.5	47	6.59		36.2	36.2	5.4
	57.0 (13.9)		55.5	55.5	3.39		54.5	54.5	3.99		56	56	4.94		54	54	5.5		51	51	5.99		48	48	6.59		36	36	5.39
27VNA060 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	1170	36.6	14.5	0.96	1170	35	14.4	1.24	1080	35.2	14.4	1.63	1220	39.5	16.4	2.49	1380	37.4	15.9	2.89	1300	35	15.1	3.26	1130	28.2	12.7	3.08
	67.0 (19.4)		33	20.2	1.01		31.8	20.4	1.29		31.8	20	1.67		35.8	22.8	2.5		33.8	23	2.89		31.6	22	3.24		25.4	19	3.07
	63.0 (17.2)††		30.6	24.8	1.05		29.4	25	1.31		29.2	24.4	1.68		33	27.8	2.5		31.4	28.4	2.89		29.4	27.2	3.23		23.4	23.4	3.02
	57.0 (13.9)		29.2	27.6	1.07		28.2	27.6	1.32		27.8	27.4	1.7		31.2	31.2	2.49		30.6	30.4	2.89		28.6	28.6	3.22		23.2	23.2	3.03
80 (26.7)	72.0 (22.2)	1170	36.4	20.2	0.96	1170	35	20.4	1.24	1080	35	20	1.62	1220	39.5	22.8	2.49	1380	37.2	23	2.88	1300	34.8	22	3.25	1130	28	19	3.08
	67.0 (19.4)		33	26	1.01		31.8	26.2	1.28		31.8	25.6	1.67		35.6	29.2	2.49		34.6	24.6	2.86		32.4	23.8	3.21		25.4	24.8	3.05
	63.0 (17.2)††		31.6	28	1.03		30.6	27.8	1.29		30.2	27.8	1.68		34	31.8	2.5		32.8	32.6	2.89		30.8	30.8	3.25		25	25	3.05
	57.0 (13.9)		31.2	29.6	1.04		30.2	29.4	1.3		29.8	29.2	1.69		33.4	33.4	2.5		32.8	32.6	2.9		30.6	30.6	3.23		25	25	3.05
27VNA060 Minimum Demand																													
75 (23.9)	72.0 (22.2)	780	18.4	8.2	0.34	780	17.4	8.1	0.49	780	16.3	7.7	0.64	850	24.2	10.1	1.26	1150	23	10.2	1.55	1100	21.4	9.7	1.78	1050	19.9	9.6	2.09
	67.0 (19.4)		16.5	12.2	0.38		15.6	12.2	0.53		14.6	11.8	0.67		21.8	14.4	1.29		20.6	15.8	1.56		19.1	15.2	1.78		17.8	15.1	2.08
	63.0 (17.2)††		15.4	15	0.41		14.7	14.6	0.55		14	12.8	0.68		20	17.7	1.29		19.7	18.3	1.57		18.4	17.1	1.78		17	17	2.07
	57.0 (13.9)		15.2	15.2	0.41		14.6	14.6	0.55		13.7	13.7	0.68		19.5	18.8	1.3		19.6	18.8	1.58		18.2	17.8	1.78		17	17	2.07
80 (26.7)	72.0 (22.2)	780	18.2	12.2	0.34	780	17.3	12.3	0.49	780	16.2	11.9	0.64	850	24.2	14.4	1.26	1150	22.8	15.9	1.54	1100	21.2	15.3	1.77	1050	19.7	15.3	2.08
	67.0 (19.4)		16.6	15.9	0.38		16	15	0.52		15.1	13.8	0.65		21.8	18.6	1.28		21.4	19.8	1.57		19.9	18.6	1.78		18.4	18.4	2.07
	63.0 (17.2)††		16.4	16.4	0.38		15.7	15.7	0.53		14.8	14.8	0.66		21	20.2	1.29		21.2	20.4	1.57		19.7	19.2	1.78		18.4	18.4	2.07
	57.0 (13.9)		16.4	16.4	0.38		15.7	15.7	0.53		14.8	14.8	0.66		21	20.2	1.29		21.2	20.4	1.57		19.7	19.2	1.78		18.4	18.4	2.08

† Total and sensible capacities are net capacities. Blower motor heat has been subtracted.

‡ Sensible capacities shown are based on 80°F (27°C) entering air at the indoor coil. For sensible capacities at other than 80°F (27°C), deduct 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air for each degree below 80°F (27°C), or add 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air per degree above 80°F (27°C).

** System kw is total of indoor and outdoor unit kilowatts.

Detailed cooling capacities are based on indoor and outdoor unit at the same elevation per AHRI standard 210/240-08. If additional tubing length and/or indoor unit is located above outdoor unit, a slight variation in capacity may occur.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB— Entering Dry Bulb **EWB** — Entering Wet Bulb

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

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA024 Maximum Demand																													
75 (23.9)	72.0 (22.2)	650	27.6	10.7	1.13	600	27.2	10.6	1.47	580	26	10.1	1.73	550	24.6	9.3	2.03	550	23.2	8.7	2.33	550	21.8	8.2	2.66	600	13.5	5.9	1.93
	67.0 (19.4)		25.2	14	1.16		24.6	13.8	1.47		23.6	13.1	1.74		22.2	12.2	2.01		21	11.5	2.31		19.7	11	2.61		12.1	9	1.93
	63.0 (17.2)††		23.2	16.6	1.17		22.8	16.2	1.48		21.8	15.5	1.73		20.6	14.4	2.01		19.4	13.7	2.29		18.2	13.2	2.59		11.3	10.9	1.92
	57.0 (13.9)		21.2	19.7	1.19		20.6	19.7	1.49		19.6	18.7	1.73		18.4	17.4	1.99		17.5	16.4	2.26		16.6	15.5	2.55		11.2	11.1	1.92
80 (26.7)	72.0 (22.2)	650	27.4	14	1.13	600	27	13.7	1.47	580	26	13.1	1.74	550	24.4	12.2	2.02	550	23.2	11.5	2.34	550	21.6	11	2.65	600	13.4	9.1	1.93
	67.0 (19.4)		25	17.3	1.15		24.6	16.8	1.48		23.6	16.1	1.74		22.2	14.9	2.02		21	14.2	2.32		19.7	13.7	2.62		12.2	11.9	1.92
	63.0 (17.2)††		23.2	19.9	1.17		22.8	19.3	1.48		21.8	18.4	1.73		20.6	17.1	2.01		19.4	16.3	2.29		18.2	15.8	2.59		12.1	12	1.92
	57.0 (13.9)		22.2	21.4	1.18		21.6	21.2	1.49		20.6	20	1.73		19.5	18.5	2.00		18.6	17.4	2.28		17.7	16.6	2.58		12.1	12	1.93
27VNA024 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	400	15.1	6	0.53	400	14.8	6	0.62	400	14.1	5.7	0.75	400	14.2	5.6	1	400	13.3	5.2	1.17	400	12.1	4.9	1.34	400	8.4	3.7	1.17
	67.0 (19.4)		13.6	8.1	0.54		13.3	8.2	0.64		12.7	7.8	0.77		12.7	7.7	1		11.8	7.3	1.17		10.8	6.9	1.34		7.3	5.8	1.17
	63.0 (17.2)††		12.6	9.8	0.55		12.3	9.8	0.65		11.6	9.5	0.78		11.6	9.3	1.01		10.8	8.8	1.17		9.9	8.4	1.34		6.8	6.8	1.16
	57.0 (13.9)		11.6	11.4	0.56		11.3	11.3	0.66		10.8	10.8	0.78		10.8	10.6	1.01		10.2	9.8	1.17		9.5	9.1	1.34		6.8	6.8	1.17
80 (26.7)	72.0 (22.2)	400	15	8.1	0.53	400	14.8	8.2	0.62	400	14.1	7.9	0.75	400	14.1	7.8	0.99	400	13.2	7.3	1.17	400	12.1	6.9	1.34	400	8.3	5.9	1.17
	67.0 (19.4)		13.5	10.2	0.54		13.3	10.3	0.64		12.6	9.9	0.76		12.6	9.8	1		11.8	9.3	1.17		10.8	8.9	1.34		7.5	7.5	1.17
	63.0 (17.2)††		12.6	11.8	0.55		12.3	11.9	0.65		11.7	11.5	0.77		11.7	11.3	1.01		11	10.6	1.18		10.2	9.8	1.34		7.5	7.4	1.17
	57.0 (13.9)		12.3	12.1	0.55		12.1	12.1	0.65		11.6	11.5	0.78		11.6	11.3	1.01		11	10.5	1.18		10.2	9.8	1.34		7.5	7.4	1.18
27VNA024 Minimum Demand																													
75 (23.9)	72.0 (22.2)	300	8.7	3.6	0.28	300	8.4	3.5	0.32	300	7.7	3.2	0.4	300	8.8	3.5	0.59	300	8	3.2	0.7	300	7	2.9	0.8	300	5.8	2.6	0.9
	67.0 (19.4)		7.8	5.1	0.3		7.4	5.1	0.33		6.8	4.8	0.41		7.7	5.1	0.6		7	4.7	0.71		6	4.4	0.8		4.9	4.1	0.9
	63.0 (17.2)††		7.2	6.3	0.31		6.8	6.3	0.35		6.2	6	0.42		7	6.3	0.6		6.3	5.9	0.71		5.5	5.3	0.8		4.6	4.6	0.9
	57.0 (13.9)		6.9	6.8	0.31		6.6	6.6	0.35		6.1	6.1	0.42		6.8	6.6	0.61		6.2	6	0.71		5.5	5.3	0.81		4.6	4.6	0.9
80 (26.7)	72.0 (22.2)	300	8.7	5.1	0.29	300	8.3	5.1	0.31	300	7.6	4.9	0.39	300	8.7	5.1	0.59	300	7.9	4.8	0.7	300	6.9	4.5	0.8	300	5.7	4.2	0.9
	67.0 (19.4)		7.8	6.7	0.3		7.4	6.7	0.33		6.8	6.4	0.41		7.7	6.6	0.6		7	6.3	0.71		6.2	5.6	0.81		5.2	5.1	0.9
	63.0 (17.2)††		7.5	7.3	0.31		7.2	7.2	0.34		6.7	6.6	0.42		7.4	7.2	0.6		6.8	6.5	0.7		6.1	5.8	0.81		5.2	5.1	0.91
	57.0 (13.9)		7.4	7.3	0.3		7.1	7.1	0.34		6.7	6.6	0.42		7.4	7.2	0.6		6.8	6.5	0.71		6.1	5.8	0.81		5.2	5.1	0.91

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA036 Maximum Demand																													
75 (23.9)	72.0 (22.2)	900	39	14.8	1.51	800	40	15.6	2.08	800	38.5	15.2	2.45	800	36.4	14.6	2.86	800	34.6	13.9	3.23	800	33.2	13.3	3.65	800	30.6	11.8	3.51
	67.0 (19.4)		35.4	19.5	1.56		36.6	19.8	2.12		35.2	19.4	2.48		33.2	18.8	2.86		31.4	18	3.2		30.2	17.4	3.61		27.8	16.2	3.48
	63.0 (17.2)††		32.8	23.2	1.6		33.8	23.2	2.13		32.4	22.6	2.47		30.6	22	2.84		29	21.2	3.18		27.8	20.6	3.56		25.6	19.6	3.44
	57.0 (13.9)		29.8	27.4	1.63		30.2	27.8	2.14		29	27.4	2.47		27.4	26.6	2.84		25.8	25.6	3.13		25	24.8	3.51		23.8	22.4	3.4
80 (26.7)	72.0 (22.2)	900	38.5	19.4	1.49	800	40	19.8	2.08	800	38.5	19.4	2.46	800	36.4	18.8	2.86	800	34.4	18	3.22	800	33.2	17.4	3.66	800	30.4	16.2	3.5
	67.0 (19.4)		35.2	24	1.55		36.4	24	2.11		35	23.6	2.46		33	22.8	2.84		31.2	22	3.19		30	21.6	3.6		27.6	20.6	3.47
	63.0 (17.2)††		32.8	27.6	1.59		33.8	27.2	2.13		32.4	26.8	2.47		30.6	26	2.84		29	25.2	3.18		27.8	24.6	3.56		25.8	23.6	3.45
	57.0 (13.9)		31.4	29.6	1.61		31.4	30.2	2.14		30.2	29.6	2.48		28.6	28.6	2.84		27.2	27.2	3.14		26.6	26.4	3.55		25.6	23.8	3.45
27VNA036 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	625	21.4	8.5	0.6	625	22.6	9	0.84	625	22	8.8	1.04	625	22.8	9.1	1.38	650	21.4	8.7	1.59	700	20.4	8.4	1.84	775	17.8	7.6	1.94
	67.0 (19.4)		19.4	11.7	0.65		20.2	12.1	0.88		19.8	12	1.07		20.6	12.4	1.4		19.2	12	1.59		18.4	12	1.85		16	11.6	1.94
	63.0 (17.2)††		17.9	14.1	0.68		18.8	14.7	0.91		18.2	14.5	1.09		18.9	14.8	1.4		17.7	14.6	1.6		16.9	14.8	1.84		15	13.8	1.93
	57.0 (13.9)		16.7	16.1	0.71		17.5	16.9	0.93		17	16.5	1.1		17.5	17	1.41		16.7	16.3	1.6		16.3	15.8	1.83		14.9	14.1	1.93
80 (26.7)	72.0 (22.2)	625	21.4	11.6	0.6	625	22.4	12.2	0.84	625	21.8	12.1	1.04	625	22.6	12.4	1.37	650	21.2	12.1	1.58	700	20.2	12	1.83	775	17.6	11.7	1.94
	67.0 (19.4)		19.3	14.7	0.65		20.4	15.4	0.88		19.5	15.1	1.06		20.4	15.5	1.39		19.2	15.3	1.6		18.3	15.6	1.84		16.4	14.1	1.94
	63.0 (17.2)††		18	17	0.68		18.9	17.7	0.9		18.4	17.6	1.09		19	17.9	1.4		18.1	16.7	1.6		17.6	17	1.84		16.1	15.2	1.94
	57.0 (13.9)		17.8	17.2	0.68		18.7	18	0.91		18.2	17.7	1.09		18.7	18.2	1.4		17.9	17.4	1.6		17.5	16.9	1.83		16.1	15.2	1.94
27VNA036 Minimum Demand																													
75 (23.9)	72.0 (22.2)	400	13.1	5.3	0.31	400	12.3	5.1	0.41	400	11.4	4.8	0.51	400	13.1	5.4	0.78	400	12.1	5	0.92	400	11.1	4.7	1.06	400	10.7	4.5	1.25
	67.0 (19.4)		11.7	7.2	0.35		11	7.1	0.44		10.1	6.8	0.53		11.6	7.3	0.79		10.7	7	0.93		9.8	6.7	1.06		9.4	6.5	1.25
	63.0 (17.2)††		10.7	8.7	0.38		10.1	8.6	0.46		9.3	8.3	0.55		10.6	8.9	0.81		9.8	8.5	0.94		8.9	8.2	1.07		8.5	8	1.24
	57.0 (13.9)		10.1	9.8	0.39		9.6	9.4	0.47		9	8.8	0.56		10	9.8	0.81		9.3	9.2	0.94		8.7	8.6	1.07		8.4	8.1	1.24
80 (26.7)	72.0 (22.2)	400	13	7.3	0.31	400	12.2	7.1	0.41	400	11.3	6.8	0.51	400	13	7.4	0.78	400	12	7	0.92	400	11	6.7	1.06	400	10.6	6.6	1.25
	67.0 (19.4)		11.6	9.2	0.35		11	9.1	0.44		10.1	8.8	0.53		11.6	9.3	0.8		10.7	9	0.94		9.8	8.7	1.07		9.3	8.6	1.24
	63.0 (17.2)††		11	10.2	0.37		10.3	10.1	0.45		9.7	9.6	0.54		10.9	10.3	0.81		10.1	9.9	0.94		9.4	9.3	1.07		9.2	8.8	1.25
	57.0 (13.9)		10.8	10.5	0.37		10.3	10.1	0.45		9.7	9.5	0.55		10.7	10.6	0.8		10.1	9.9	0.94		9.4	9.3	1.07		9.2	8.8	1.25

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

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA048 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1150	53	21.8	2.18	1150	50	21.6	2.58	1150	48	20.8	2.99	1150	51.5	20.4	4.04	1050	48.5	19	4.42	1000	45	18	4.84	1000	33.8	15.8	4.01
	67.0 (19.4)		48	28	2.22		45.5	28	2.61		44	27	3.03		47	26.4	4.03		44.5	24.4	4.4		41.5	23.2	4.81		31	21.8	3.99
	63.0 (17.2)††		44.5	32.6	2.25		42.5	32.8	2.66		40.5	32	3.01		43.5	31	4		41	28.6	4.32		38	27.4	4.7		28.6	26.2	3.93
	57.0 (13.9)		40	39.5	2.29		38	38	2.66		36.6	36.6	3.02		39.5	37.6	4		37	34.6	4.28		34.4	33.2	4.64		26.8	26.8	3.92
80 (26.7)	72.0 (22.2)	1150	52.5	27.8	2.16	1150	50	27.8	2.58	1150	48	27	2.99	1150	51.5	26.2	4.06	1050	48.5	24.2	4.43	1000	45	23.2	4.86	1000	33.8	21.6	4.04
	67.0 (19.4)		48	33.8	2.22		45.5	34	2.62		43.5	33.2	3		47	32	4.04		44	29.6	4.37		41	28.4	4.77		30.8	27.4	3.98
	63.0 (17.2)††		44.5	38.5	2.25		42.5	39	2.65		40.5	38	3.01		43.5	36.6	4.01		41	33.8	4.33		38.5	32.4	4.75		28.8	28.8	3.95
	57.0 (13.9)		41.5	41.5	2.28		40	40	2.67		38.5	38.5	3.02		41	40.5	4		38.5	37.6	4.31		36	35.8	4.69		28.4	28.4	3.94
27VNA048 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	825	33.4	12.9	0.97	825	31.4	12.8	1.22	850	29.8	12.3	1.47	875	32.8	13.5	2.06	875	31.2	12.7	2.34	875	29	12.2	2.63	950	23	10.6	2.58
	67.0 (19.4)		30.2	17.1	1.02		28.4	17.1	1.26		27	16.7	1.5		29.8	18.2	2.08		28.2	17.3	2.33		26.2	16.8	2.6		20.8	15.8	2.57
	63.0 (17.2)††		28	20.4	1.06		26.2	20.4	1.29		25	20.2	1.52		27.6	21.8	2.09		26	21	2.33		24.2	20.4	2.59		19.3	19.3	2.55
	57.0 (13.9)		25.4	24.2	1.1		24	24	1.32		23.2	23.2	1.53		25.4	25.4	2.09		24.2	24.2	2.33		22.8	22.8	2.58		19.1	19.1	2.56
80 (26.7)	72.0 (22.2)	825	33.2	17.1	0.96	825	31.2	17.1	1.22	850	29.8	16.7	1.47	875	32.8	18.2	2.07	875	31	17.3	2.33	875	28.8	16.8	2.62	950	22.8	15.8	2.58
	67.0 (19.4)		30.2	21.2	1.02		28.4	21.4	1.27		27	21	1.5		29.8	22.8	2.09		28.2	21.8	2.35		26.2	21.4	2.61		20.8	20.8	2.57
	63.0 (17.2)††		28	24.4	1.06		26.4	24.6	1.3		25.2	24.2	1.52		27.6	26.2	2.08		26.2	25.2	2.34		24.4	24.4	2.59		20.4	20.4	2.56
	57.0 (13.9)		27	25.8	1.07		25.6	25.6	1.3		24.8	24.8	1.53		27	27	2.09		25.8	25.8	2.33		24.4	24.4	2.6		20.4	20.4	2.57
27VNA048 Minimum Demand																													
75 (23.9)	72.0 (22.2)	500	21.2	8.2	0.5	500	19.8	8	0.67	500	18.6	7.6	0.83	500	21.4	8.3	1.25	500	20.2	7.8	1.45	500	18.6	7.4	1.64	500	16.7	7.2	1.86
	67.0 (19.4)		19.2	10.7	0.55		17.9	10.6	0.71		16.8	10.1	0.86		19.2	10.8	1.26		18.1	10.3	1.45		16.7	9.9	1.64		14.9	9.9	1.84
	63.0 (17.2)††		17.6	12.6	0.58		16.4	12.6	0.74		15.4	12.1	0.88		17.6	12.8	1.28		16.6	12.2	1.46		15.3	11.9	1.64		13.7	12	1.85
	57.0 (13.9)		15.8	15	0.61		14.9	14.7	0.76		14.2	14	0.9		15.8	15.1	1.28		15.1	14.2	1.46		14.1	13.6	1.63		12.8	12.8	1.82
80 (26.7)	72.0 (22.2)	500	21.2	10.7	0.5	500	19.7	10.6	0.67	500	18.5	10.2	0.83	500	21.2	10.9	1.25	500	20	10.3	1.44	500	18.4	10	1.63	500	16.5	10	1.85
	67.0 (19.4)		19.1	13.1	0.55		17.8	13.1	0.71		16.7	12.7	0.86		19.1	13.4	1.26		18	12.8	1.45		16.6	12.5	1.64		14.9	12.6	1.85
	63.0 (17.2)††		17.6	15	0.58		16.4	15.1	0.73		15.4	14.7	0.88		17.6	15.3	1.28		16.6	14.7	1.46		15.3	14.4	1.63		14	14	1.85
	57.0 (13.9)		16.9	16	0.6		15.9	15.7	0.74		15.2	15	0.89		16.9	16.2	1.28		16.1	15.2	1.46		15.1	14.5	1.64		13.8	13.8	1.84

Detailed Cooling Capacities# - Comfort + Dehumidify Mode

EVAPORATOR AIR °F (°C)		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																											
		65.0 (18.3)				75.0 (23.9)				85.0 (29.4)				95.0 (35.0)				105.0 (40.6)				115.0 (46.1)				125.0 (51.7)			
EDB	EWB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡			Total	Sens‡	
27VNA060 Maximum Demand																													
75 (23.9)	72.0 (22.2)	1600	69	27.8	3.41	1500	67	27.8	3.95	1400	63	26.6	4.41	1300	60	25	4.93	1150	55.5	23.2	5.43	1000	52	21.8	6.19	800	40	17.8	5.33
	67.0 (19.4)		62.5	36	3.4		61	35.8	3.95		57.5	34.2	4.4		54.5	32	4.88		50.5	29.4	5.35		47	27.4	6.03		36	22.6	5.23
	63.0 (17.2)††		58	42.5	3.4		56.5	42	3.94		53	40	4.35		50	37.4	4.8		46.5	34.2	5.26		43.5	31.8	5.91		33.2	26.4	5.17
	57.0 (13.9)		52.5	51.5	3.4		51	51	3.92		48	48	4.32		45	45	4.74		42	41.5	5.21		39	38	5.8		29.6	29.6	5.07
80 (26.7)	72.0 (22.2)	1600	69	35.8	3.42	1500	67	35.8	3.96	1400	63	34.2	4.41	1300	59.5	32	4.9	1150	55.5	29.4	5.44	1000	52	27.4	6.19	800	39.5	22.8	5.28
	67.0 (19.4)		62.5	44	3.4		60.5	43.5	3.92		57.5	41.5	4.4		54	39	4.84		50.5	35.6	5.36		47	32.8	6.03		36	27.4	5.23
	63.0 (17.2)††		58	50.5	3.4		56.5	50	3.93		53	47.5	4.34		50.5	44.5	4.85		46.5	40.5	5.26		43.5	37.2	5.93		33.2	31.2	5.17
	57.0 (13.9)		55	55	3.4		53	53	3.9		50	50	4.33		47	47	4.77		43.5	43.5	5.24		40	40	5.83		30.8	30.8	5.1
27VNA060 Intermediate Demand																													
75 (23.9)	72.0 (22.2)	1030	40	15.8	1.26	1000	39	15.8	1.51	970	36.4	14.8	1.73	930	37.4	15.3	2.32	880	35.2	14.3	2.66	800	32.6	13.4	3.01	730	27	11.6	2.97
	67.0 (19.4)		36.4	21	1.29		35.4	21	1.55		32.8	19.9	1.75		33.8	20.2	2.33		31.8	18.9	2.66		29.4	17.8	2.99		24.4	15.6	2.96
	63.0 (17.2)††		33.6	25.2	1.31		32.6	25.2	1.57		30.4	23.8	1.78		31.2	24	2.34		29.2	22.6	2.64		27	21.2	2.97		22.2	18.8	2.91
	57.0 (13.9)		31	29.8	1.34		30	29.6	1.59		28	27.8	1.78		28.4	28.4	2.33		26.6	26.4	2.62		24.6	24.6	2.95		20.8	20.8	2.92
80 (26.7)	72.0 (22.2)	1030	40	21	1.26	1000	39	21	1.52	970	36.2	19.9	1.72	930	37.4	20.2	2.33	880	35	19	2.65	800	32.6	17.8	3.02	730	27	15.7	2.98
	67.0 (19.4)		36.2	26.2	1.29		35.2	26.4	1.54		32.8	25	1.75		33.8	25.2	2.34		31.6	23.6	2.65		29.4	22	3.01		24.2	19.7	2.94
	63.0 (17.2)††		33.8	30.2	1.31		32.8	30.4	1.57		30.4	28.8	1.76		31.4	28.8	2.34		29.2	27	2.64		27.2	25.4	2.99		22.4	22.4	2.92
	57.0 (13.9)		32.8	31.8	1.32		32	31.6	1.58		30	29.6	1.78		30.4	30.2	2.34		28.4	28.2	2.63		26.2	26.2	2.96		22.2	22.2	2.93
27VNA060 Minimum Demand																													
75 (23.9)	72.0 (22.2)	600	21.6	8.5	0.51	500	20.8	8.4	0.66	500	19.9	8.1	0.81	500	22.6	8.9	1.24	500	21.2	8.3	1.46	500	19.8	8	1.68	500	18.6	7.9	1.99
	67.0 (19.4)		19.5	11	0.55		18.7	11	0.69		17.8	10.7	0.84		20.2	11.4	1.25		19	10.8	1.47		17.7	10.5	1.69		16.6	10.6	1.99
	63.0 (17.2)††		17.9	13	0.57		17.1	13	0.71		16.3	12.7	0.86		18.5	13.4	1.27		17.3	12.8	1.47		16.1	12.5	1.68		15.1	12.7	1.97
	57.0 (13.9)		16	15.4	0.6		15.5	15.3	0.73		14.8	14.7	0.87		16.4	15.8	1.27		15.5	15	1.47		14.7	14.4	1.68		14	14	1.96
80 (26.7)	72.0 (22.2)	600	21.4	11	0.51	500	20.8	11.1	0.66	500	19.8	10.8	0.81	500	22.4	11.5	1.23	500	21.2	10.9	1.46	500	19.8	10.6	1.69	500	18.5	10.7	1.98
	67.0 (19.4)		20	14.9	0.55		18.6	13.6	0.69		17.8	13.3	0.84		20.2	14	1.26		18.9	13.4	1.47		17.6	13.1	1.68		16.5	13.4	1.98
	63.0 (17.2)††		17.9	15.5	0.57		17.2	15.6	0.71		16.3	15.3	0.85		18.5	15.9	1.27		17.3	15.3	1.47		16.2	15.1	1.69		15.2	15.2	1.97
	57.0 (13.9)		17.1	16.5	0.58		16.6	16.4	0.72		15.9	15.8	0.86		17.5	16.9	1.26		16.7	16	1.48		15.8	15.4	1.68		15.1	15.1	1.98

† Total and sensible capacities are net capacities. Blower motor heat has been subtracted.

‡ Sensible capacities shown are based on 80°F (27°C) entering air at the indoor coil. For sensible capacities at other than 80°F (27°C), deduct 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air for each degree below 80°F (27°C), or add 835 Btuh (245 kW) per 1000 CFM (480 L/S) of indoor coil air per degree above 80°F (27°C).

** System kw is total of indoor and outdoor unit kilowatts.

Detailed cooling capacities are based on indoor and outdoor unit at the same elevation per AHRI standard 210/240-08. If additional tubing length and/or indoor unit is located above outdoor unit, a slight variation in capacity may occur.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB— Entering Dry Bulb **EWB** — Entering Wet Bulb

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

Heat Pump Heating Performance - Efficiency Mode

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA024 Maximum Demand																																		
65 (18.3)	900	12.5	11.5	1.4	900	18.3	16.8	2.22	900	20.6	18.9	2.36	900	24	21.4	2.44	900	27.6	25.2	2.54	900	24.4	24.4	1.82	900	26.6	26.6	1.76	900	28.8	28.8	1.82
70 (21.1)		12.3	11.4	1.44		18.2	16.7	2.3		22	20	2.42		23.8	21.2	2.55		27.4	25	2.66		24.6	24.6	2.06		26.4	26.4	1.87		28.6	28.6	1.92
75 (23.9)		12.2	11.3	1.5		18.1	16.7	2.39		20.4	18.7	2.58		23.8	21	2.68		27.2	24.8	2.77		24	24	2.02		26.2	26.2	1.97		28.2	28.2	2.03
27VNA024 Intermediate Demand																																		
65 (18.3)	765	8	7.3	0.91	765	10.9	10	1.21	765	12.7	11.6	1.29	720	11.8	10.5	0.99	700	12.2	11.1	0.87	635	11.7	11.7	0.73	635	12.6	12.6	0.67	675	14.1	14.1	0.66
70 (21.1)		7.9	7.2	0.96		10.8	9.9	1.27		12.6	11.5	1.36		11.6	10.3	1.04		12	10.9	0.91		11.5	11.5	0.78		12.4	12.4	0.72		13.9	13.9	0.71
75 (23.9)		7.7	7.1	0.98		10.7	9.8	1.33		12.5	11.4	1.42		11.5	10.2	1.1		11.8	10.8	0.96		11.3	11.3	0.82		12.3	12.3	0.77		13.6	13.6	0.76
27VNA024 Minimum Demand																																		
65 (18.3)	500	5.7	5.2	0.67	500	6.9	6.4	0.79	500	8.3	7.5	0.85	500	5.3	4.7	0.44	500	3.8	3.5	0.25	500	4.8	4.8	0.3	500	5.2	5.2	0.27	500	5.7	5.7	0.24
70 (21.1)		5.6	5.1	0.71		6.8	6.3	0.83		8.1	7.4	0.89		5.2	4.6	0.47		3.9	3.5	0.31		5	5	0.3		5.1	5.1	0.29		5.7	5.7	0.27
75 (23.9)		5.4	5	0.73		6.7	6.2	0.87		8	7.3	0.93		5.1	4.5	0.5		3.8	3.4	0.33		4.5	4.5	0.34		5	5	0.31		5.6	5.6	0.29

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Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA036 Maximum Demand																																
65 (18.3)	1200	19.3	17.7	2.28	1200	27.8	25.4	3.48	1200	32.2	29.4	3.84	1200	37	33	3.9	1170	39	35.4	3.46	1050	36.6	36.6	2.93	1155	37.2	37.2	2.65	1200	33.2	33.2	2.12
70 (21.1)		19.1	17.6	2.37		27.6	25.4	3.61		32.8	29.8	3.81		38.5	34.4	4.15		41	37.2	3.71		34.8	34.8	2.88		36.8	36.8	2.78		33.2	33.2	2.25
75 (23.9)		19	17.5	2.46		27.6	25.4	3.78		32.2	29.4	4.18		36.8	32.8	4.25		38.5	35	3.79		36	36	3.22		36.6	36.6	2.93		32.4	32.4	2.36
27VNA036 Intermediate Demand																																
65 (18.3)	900	11.8	10.9	1.33	900	16.4	15.1	1.75	900	19.6	17.9	1.9	830	17.6	15.6	1.39	800	16.3	14.8	1.09	750	16.3	16.3	1	785	17.2	17.2	0.93	785	16.6	16.6	0.78
70 (21.1)		11.7	10.8	1.39		16.3	15	1.84		19.4	17.7	1.99		17.4	15.4	1.47		16.1	14.6	1.16		16.1	16.1	1.07		17	17	1		16.4	16.4	0.85
75 (23.9)		11.6	10.7	1.45		16.1	14.8	1.92		19.3	17.6	2.08		17.2	15.3	1.54		15.8	14.4	1.22		15.9	15.9	1.14		16.8	16.8	1.07		16.1	16.1	0.91
27VNA036 Minimum Demand																																
65 (18.3)	750	8.4	7.7	0.95	750	10.2	9.4	1.08	750	12.4	11.3	1.14	645	7.5	6.6	0.56	600	5.4	4.9	0.34	600	6.6	6.6	0.36	600	7.5	7.5	0.34	580	8.2	8.2	0.32
70 (21.1)		8.2	7.6	0.99		10	9.2	1.12		12.2	11.1	1.2		7.3	6.5	0.59		5.3	4.8	0.38		6.4	6.4	0.36		7.3	7.3	0.37		8	8	0.36
75 (23.9)		8.1	7.5	1.04		9.9	9.1	1.18		12.1	11	1.27		7.2	6.4	0.63		5.1	4.7	0.4		6.2	6.2	0.42		7.2	7.2	0.41		7.8	7.8	0.39

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Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA048 Maximum Demand																																		
65 (18.3)	1450	22.2	20.4	2.58	1450	39	35.8	4.36	1450	46	42	4.81	1450	52.5	46.5	4.96	1420	55.5	50.5	4.76	1300	48.5	48.5	3.88	1450	47.5	47.5	3.41	1450	43	43	2.84
70 (21.1)		22	20.2	2.69		39	35.8	4.54		46	42	4.88		52	46.5	5.15		55	50	4.94		48.5	48.5	4.04		47	47	3.59		42.5	42.5	3.01
75 (23.9)		21.8	20.2	2.78		38.5	35.6	4.7		46	42	5.27		52	46	5.37		55.5	46.5	4.7		51	47	4.11		46.5	46.5	3.74		42	42	3.16
27VNA048 Intermediate Demand																																		
65 (18.3)	1150	17.7	16.3	1.98	1150	25.8	23.8	2.63	1150	31	28.2	2.89	1130	27.4	24.4	2.19	1200	24.8	22.6	1.76	965	23.8	23.8	1.59	1015	24.2	24.2	1.44	1015	23.4	23.4	1.24
70 (21.1)		17.5	16.1	2.07		25.6	23.6	2.74		30.6	28	3.01		27.2	24.2	2.3		24.6	22.4	1.86		23.4	23.4	1.68		24	24	1.54		23	23	1.33
75 (23.9)		17.4	16	2.16		25.4	23.4	2.86		30.4	27.8	3.14		27	24	2.43		24.4	22.2	1.96		23	23	1.77		23.6	23.6	1.62		22.8	22.8	1.43
27VNA048 Minimum Demand																																		
65 (18.3)	1000	15.3	14.1	1.71	1000	19.3	17.7	1.98	1000	23.4	21.2	2.16	860	15.1	13.4	1.13	800	10.1	9.1	0.62	800	11.5	11.5	0.65	800	12.6	12.6	0.64	800	13.6	13.6	0.61
70 (21.1)		15.2	14	1.8		19.1	17.6	2.07		23	21	2.25		14.8	13.2	1.2		9.9	9	0.67		11.4	11.4	0.68		12.4	12.4	0.69		13.4	13.4	0.67
75 (23.9)		15	13.8	1.88		18.9	17.4	2.18		22.8	20.8	2.35		14.6	13	1.27		9.7	8.8	0.71		11.1	11.1	0.76		12.2	12.2	0.74		13.2	13.2	0.72

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Heat Pump Heating Performance - Efficiency Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†	ID SCFM	Capacity MBtuh		Total Sys. KW†
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA060 Maximum Demand																																		
65 (18.3)	1530	32.6	30	3.62	1850	45.5	42	4.8	1850	55	50	5.37	1850	63.5	56	5.61	1850	65	59	5.84	1850	61.5	61.5	5.67	1850	56	56	4.37	1770	48.5	48.5	2.97
70 (21.1)		33.2	30.6	3.86		45.5	42	5.01		54.5	50	6.14		63	56	5.84		64.5	58.5	6.1		59	59	4.78		55.5	55.5	4.62		48	48	3.17
75 (23.9)		33	30.4	4.03		45.5	41.5	5.25		54.5	49.5	5.83		62.5	55.5	6.07		63.5	58	6.33		60	60	6.19		55	55	4.86		47	47	3.33
27VNA060 Intermediate Demand																																		
65 (18.3)	980	22	20.2	2.37	1080	29.6	27.2	2.85	1080	35.6	32.4	3.12	1080	32.4	28.8	2.34	1135	29	26.4	1.98	1080	28.2	28.2	1.96	1180	28.6	28.6	1.66	1165	27.4	27.4	1.26
70 (21.1)		21.6	19.9	2.47		29.4	27	2.99		35.2	32.2	3.26		32	28.4	2.46		28.6	26	2.1		27.8	27.8	2.09		28	28	1.77		27	27	1.37
75 (23.9)		21.4	19.7	2.59		29	26.6	3.12		34.8	31.8	3.4		31.6	28	2.59		28	25.6	2.21		27.4	27.4	2.22		27.6	27.6	1.9		26.4	26.4	1.48
27VNA060 Minimum Demand																																		
65 (18.3)	700	16.1	14.8	1.79	700	19.8	18.2	1.92	700	23.6	21.6	2.03	700	14.8	13.1	0.98	700	11.5	10.5	0.73	700	13.1	13.1	0.82	840	15.1	15.1	0.76	860	17.3	17.3	0.7
70 (21.1)		15.8	14.6	1.87		19.5	17.9	2.01		23.2	21.2	2.12		14.4	12.8	1.04		11.2	10.2	0.79		12	12	0.69		14.7	14.7	0.83		16.8	16.8	0.77
75 (23.9)		15.6	14.3	1.95		19.2	17.6	2.1		23	21	2.23		14.1	12.5	1.1		10.9	9.9	0.84		12.4	12.4	0.95		14.3	14.3	0.91		16.4	16.4	0.85

NOTES:

† The kW values include the compressor, outdoor fan motor, and indoor blower motor. The kW from supplement heaters should be added to these values to obtain Total Sys. kilowatts.

‡ The Btuh heating capacity values shown are net integrated values from which the defrost effect has been subtracted. The Btuh heating from supplement heaters should be added to those values to obtain Total Sys. capacity.

NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.

EDB — Entering Dry Bulb

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Heat Pump Heating Performance - Comfort Mode

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			
27VNA024 Maximum Demand																																		
65 (18.3)		12.3	11.3	1.4		18.3	16.8	2.27		20.6	18.8	2.45		21.2	18.9	2.09		22.2	20.2	1.89		22.2	22.2	1.69		23.2	23.2	1.55		23.6	23.6	1.45
70 (21.1)	635	12.2	11.2	1.47	690	18.1	16.7	2.37	690	20.6	18.7	2.58	700	21.2	18.7	2.19	700	22	20	1.98	700	22	22	1.78	700	23	23	1.64	700	23.2	23.2	1.52
75 (23.9)		12.1	11.1	1.52		18.1	16.6	2.46		20.4	18.6	2.67		21	18.6	2.28		21.8	19.9	2.06		21.8	21.8	1.87		22.6	22.6	1.72		22.8	22.8	1.6
27VNA024 Intermediate Demand																																		
65 (18.3)		7.9	7.2	0.91		10.9	10	1.22		12.7	11.6	1.31		13.6	12.1	1.19		14.2	12.9	1.07		15.8	15.8	1.1		17.5	17.5	1.07		17.8	17.8	1
70 (21.1)	570	7.7	7.1	0.94	650	10.7	9.9	1.26	650	12.5	11.4	1.37	650	13.5	11.9	1.25	600	14.1	12.8	1.14	600	15.6	15.6	1.16	600	17.3	17.3	1.14	600	17.9	17.9	1.07
75 (23.9)		7.6	7	0.98		10.6	9.8	1.33		12.4	11.3	1.43		13.3	11.8	1.31		13.9	12.6	1.19		15.4	15.4	1.23		17.1	17.1	1.2		17.6	17.6	1.14
27VNA024 Minimum Demand																																		
65 (18.3)		5.7	5.2	0.67		6.9	6.4	0.79		8.3	7.5	0.85		9.8	8.7	0.84		10.1	9.2	0.73		12.3	12.3	0.82		14.5	14.5	0.87		15.6	15.6	0.86
70 (21.1)	500	5.6	5.1	0.71	500	6.8	6.3	0.83	500	8.1	7.4	0.89	500	9.6	8.6	0.88	500	10	9.1	0.77	500	12.1	12.1	0.87	500	14.3	14.3	0.92	500	15.3	15.3	0.91
75 (23.9)		5.4	5	0.73		6.7	6.2	0.87		8	7.3	0.93		9.5	8.4	0.93		9.9	9	0.82		11.9	11.9	0.92		14.1	14.1	0.98		15	15	0.96

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA036 Maximum Demand																																
65 (18.3)	975	18.4	17	2.14	975	27.4	25.2	3.49	985	31.8	29	3.85	1000	36.8	32.6	3.97	1000	38	34.8	3.42	1000	36	36	2.88	990	36.2	36.2	2.61	975	32.4	32.4	2.11
70 (21.1)		18.3	16.9	2.23		27.4	25.2	3.65		32.2	29.2	4.07		36.6	32.6	4.13		40	36.2	3.69		35.6	35.6	3.02		35.8	35.8	2.75		31.8	31.8	2.22
75 (23.9)		18.2	16.8	2.32		27.4	25.2	3.79		32	29.2	4.22		36.6	32.4	4.29		37.6	34.4	3.75		35.2	35.2	3.15		35.4	35.4	2.88		31.4	31.4	2.34
27VNA036 Intermediate Demand																																
65 (18.3)	650	11.4	10.5	1.29	650	15.9	14.7	1.73	650	19.1	17.4	1.9	650	22	19.6	1.91	650	23.6	21.6	1.82	670	24.6	24.6	1.8	700	26.2	26.2	1.74	700	24.8	24.8	1.5
70 (21.1)		15.8	14.5	1.68		15.8	14.5	1.81		18.9	17.3	1.99		21.8	19.4	2		23.8	21.8	1.93		24.4	24.4	1.9		26	26	1.84		24.4	24.4	1.59
75 (23.9)		15.6	14.4	1.75		21	19.3	2.04		21.2	19.4	2.11		21.6	19.3	2.08		23.2	21.2	2.01		24	24	2		25.6	25.6	1.93		24	24	1.67
27VNA036 Minimum Demand																																
65 (18.3)	550	8.1	7.5	0.93	550	9.9	9.1	1.06	550	12.1	11	1.15	550	14.3	12.7	1.15	550	16.7	15.2	1.21	550	19.1	19.1	1.37	550	21.2	21.2	1.39	550	20.8	20.8	1.26
70 (21.1)		8	7.4	0.98		9.8	9	1.11		12	10.9	1.21		14.1	12.6	1.21		16.5	15	1.28		18.9	18.9	1.44		21	21	1.48		20.4	20.4	1.33
75 (23.9)		7.8	7.2	1.01		9.7	8.9	1.17		11.8	10.8	1.27		14	12.4	1.27		16.3	14.8	1.35		18.6	18.6	1.51		20.6	20.6	1.55		20.2	20.2	1.42

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																													
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA048 Maximum Demand																														
65 (18.3)	1040	21.4	19.6	2.43	1200	38.5	35.4	4.31	1240	45.5	41.5	4.8	1340	52	46.5	4.92	1420	55.5	50.5	4.76	1300	48.5	48.5	3.88	1450	47.5	47.5	3.41	1450	43	43	2.84
70 (21.1)		21.2	19.4	2.55		38.5	35.2	4.51		45.5	41.5	5.01		52	46	5.15		55	50	4.94		48	48	4.07		47	47	3.59		42.5	42.5	3.01
75 (23.9)		21	19.3	2.63		38	35	4.68		45.5	41.5	5.25		51.5	46	5.35		55.5	46.5	4.7		51	47	4.11		46.5	46.5	3.74		42	42	3.16
27VNA048 Intermediate Demand																														
65 (18.3)	850	17.2	15.9	1.92	850	25.4	23.2	2.64	870	30.4	27.8	2.91	900	34.6	30.6	2.93	950	37.2	33.8	2.9	950	34.6	34.6	2.6	950	33.4	33.4	2.26	1000	31.2	31.2	1.9
70 (21.1)		17.1	15.7	2.02		25.2	23	2.76		30.2	27.4	3.05		34.2	30.4	3.06		36.8	33.6	3.05		34.2	34.2	2.74		33	33	2.38		31.4	31.4	2.04
75 (23.9)		16.9	15.5	2.1		25	23	2.88		29.8	27.2	3.16		34	30.2	3.19		36.6	33.2	3.19		33.8	33.8	2.86		32.6	32.6	2.5		30.8	30.8	2.15
27VNA048 Minimum Demand																														
65 (18.3)	800	15.1	13.9	1.69	800	19	17.5	1.97	800	23	21	2.16	800	26.4	23.4	2.19	800	29.4	26.8	2.26	800	27.2	27.2	1.96	800	27.2	27.2	1.76	800	25.8	25.8	1.49
70 (21.1)		14.9	13.7	1.76		18.8	17.3	2.07		22.8	20.8	2.27		26	23.2	2.28		29	26.4	2.36		26.8	26.8	2.07		26.8	26.8	1.86		25.4	25.4	1.58
75 (23.9)		14.7	13.5	1.84		18.6	17.1	2.16		22.4	20.4	2.36		25.8	22.8	2.39		28.8	26.2	2.48		26.4	26.4	2.17		26.4	26.4	1.96		25	25	1.69

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Heat Pump Heating Performance - Comfort Mode (Continued)

INDOOR AIR °F (°C)	OUTDOOR ENTERING AIR TEMPERATURES °F (°C)																																	
	-3 (-19.4)				7 (-13.9)				17 (-8.3)				27 (-2.8)				37 (2.7)				47 (8.3)				57 (13.9)				67 (19.4)			
EDB	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**	ID SCFM	Capacity		Total Sys. KW**
		Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡			Total	Integ‡	
27VNA060 Maximum Demand																																		
65 (18.3)	1040	32.8	30.2	3.73	1240	44.5	41	4.76	1440	54	49	5.35	1620	62.5	55.5	5.55	1650	64	58.5	5.79	1690	60.5	60.5	5.61	1520	55	55	4.33	1200	46.5	46.5	2.98
70 (21.1)		32.6	30	3.92		44.5	40.5	5.02		53.5	49	5.56		62	55	5.79		63.5	58	6.04		60	60	5.9		54	54	4.55		45.5	45.5	3.13
75 (23.9)		32.4	29.8	4.06		44	40.5	5.16		53.5	48.5	5.81		61.5	54.5	6.05		63	57.5	6.32		59	59	6.13		53.5	53.5	4.78		45	45	3.33
27VNA060 Median Demand																																		
65 (18.3)	810	21.8	20	2.4	880	29.4	27	2.93	945	35.4	32.2	3.18	1010	40.5	36	3.23	1020	40	36.4	3.19	1030	37.2	37.2	2.96	970	33.6	33.6	2.23	870	29.4	29.4	1.52
70 (21.1)		21.4	19.8	2.51		29	26.8	3.06		35	32	3.33		40	35.6	3.37		39.5	36	3.35		36.6	36.6	3.14		33.2	33.2	2.37		28.8	28.8	1.64
75 (23.9)		21.2	19.5	2.61		28.8	26.4	3.2		34.6	31.6	3.47		39.5	35.2	3.51		39	35.4	3.51		36	36	3.28		32.6	32.6	2.51		28.2	28.2	1.74
27VNA060 Minimum Demand																																		
65 (18.3)	700	16.1	14.8	1.79	700	19.8	18.2	1.92	700	23.6	21.6	2.03	700	27.2	24.2	2.07	700	27.4	25	2.09	700	25	25	1.89	700	23.4	23.4	1.44	700	21.2	21.2	1
70 (21.1)		15.8	14.6	1.87		19.5	17.9	2.01		23.2	21.2	2.12		27	24	2.19		27	24.6	2.2		24.6	24.6	2		22.8	22.8	1.53		20.6	20.6	1.08
75 (23.9)		15.6	14.3	1.95		19.2	17.6	2.1		23	21	2.23		26.6	23.6	2.28		26.6	24.2	2.32		24.2	24.2	2.11		22.4	22.4	1.63		20.2	20.2	1.17

NOTES:
** The kW values include the compressor, outdoor fan motor, and indoor blower motor. The kW from supplement heaters should be added to these values to obtain Total Sys. kilowatts.
‡ The Btuh heating capacity values shown are net integrated values from which the defrost effect has been subtracted. The Btuh heating from supplement heaters should be added to those values to obtain Total Sys. capacity.
NOTE: When the required data falls between the published data, interpolation may be performed. Extrapolation is not an acceptable practice.
EDB — Entering Dry Bulb

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Guide specifications
General

AIR-COOLED, SPLIT-SYSTEM HEAT PUMP
27VNA0
2 TO 5 NOMINAL TONS

System Description

Outdoor-mounted, air-cooled, split-system heat pump unit suitable for ground or rooftop installation. Unit consists of a hermetic compressor, an air-cooled coil, forward-swept blade propeller-type condenser fan, and a control box. Unit will discharge supply air upward as shown on contract drawings. Unit will be used in a refrigeration circuit to match up to a packaged fan coil or coil unit.

Quality Assurance

- Unit will be rated in accordance with the latest edition of AHRI Standard 240.
- Unit will be certified for capacity and efficiency, and listed in the latest AHRI directory.
- Unit construction will comply with latest edition of ASHRAE and with NEC.
- Unit will be constructed in accordance with UL standards and will carry the UL label of approval. Unit will have C-UL approval.
- Unit cabinet will be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 500-hr salt spray test.
- Air-cooled condenser coils are pressure tested and the outdoor units are leak tested.
- Unit constructed in ISO9001 approved facility.

Delivery, Storage, and Handling

- Unit will be shipped as single package only and is stored and handled per unit manufacturer's recommendations.

Warranty (for inclusion by specifying engineer)

- U.S. and Canada only.

PRODUCTS

Equipment

- Factory-assembled, single-piece, air-cooled heat pump. Contained within the unit enclosure is all factory wiring, piping, controls, compressor, refrigerant charge Puron Advance™ (R-454B) refrigerant, and special features required prior to field start-up.

Unit Cabinet

- Unit cabinet will be constructed of galvanized steel, bonderized, and coated with a powder coat paint.

Fans

- Condenser fan will be direct-drive propeller type, forward swept blade, discharging air upward.
- Condenser fan motors will be totally enclosed, 1-phase type with class B insulation and permanently lubricated.
- Fan blades will be statically and dynamically balanced.
- Condenser fan openings will be equipped with coated steel wire safety guards.

Compressor

- Compressor will be hermetically sealed.
- Compressor will be mounted on rubber vibration isolators.
- Compressor will be covered with a sound absorbing blanket.

Condenser Coil

- Condenser coil will be air cooled.
- Coil will be constructed of aluminum fins mechanically bonded to copper or aluminum tubes which are then cleaned, dehydrated, and sealed.

Refrigeration Components

- Refrigeration circuit components will include liquid-line and vapor line front-seating shutoff valve with provisions for sweat or mechanical connections, system charge of Puron Advance™ (R-454B) refrigerant, PVE compressor oil, accumulator, electronic expansion valve, reversing valve, and pressure equalization valve.
- Unit will be equipped with high-pressure switch, suction and discharge pressure transducers, and filter drier for Puron Advance™ (R-454B) refrigerant.

Operating Characteristics

- The capacity of the unit will meet or exceed _____ Btuh at a suction temperature of _____ °F (°C). The power consumption at full load will not exceed _____ kW.
- Combination of the unit and the evaporator or fan coil unit will have a total net cooling capacity of _____ Btuh or greater at conditions of _____ CFM entering air temperature at the evaporator at _____ °F (°C) wet bulb and _____ °F (°C) dry bulb, and air entering the unit at _____ °F (°C).
- The system will have a SEER2 of _____ Btuh/watt or greater at DOE conditions.

Electrical Requirements

- Nominal unit electrical characteristics will be _____ v, single phase, 60 hz. The unit will be capable of satisfactory operation within voltage limits of _____ v to _____ v.
- Unit electrical power will be single point connection.
- Control circuit will be 24v.

Special Features

- Refer to section of this literature identifying accessories and descriptions for specific features and available enhancements.
- Infinity® System Control with appropriate software version is required for full featured operation.

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System Design Summary

1. System must be installed with factory approved R454B Indoor unit only.
2. Factory authorized dissipation control board must be installed with indoor unit.
3. Must use Infinity® System Control listed in pre-sale literature only
4. Intended for outdoor installation with free air inlet and outlet. Outdoor fan external static pressure available is less than 0.01-in. wc.
5. This product is qualified for low ambient cooling operation (below 55°F / 12.8°C) with an Infinity® System Control **ONLY**.
6. The maximum outdoor operating ambient in cooling mode is 125°F (51.7°C).
7. Minimum outdoor operating air temperature for heating mode is –11°F (–23.9°C).
8. For reliable operation, unit should be level in all horizontal planes.
9. For interconnecting refrigerant tube lengths greater than 80 ft (23.4 m) and/or elevation differences between indoor and outdoor units greater than 20 ft (6.1 m), consult Residential Piping and Long Line Guideline and Service Manual available from equipment distributor.
10. If any refrigerant tubing is buried, provide a 6 in. (152.4 mm) vertical rise to the valve connections at the unit. Refrigerant tubing lengths up to 36 in. (914.4 mm) may be buried without further consideration. Do not bury refrigerant lines longer than 36 in. (914.4 mm).
11. Use only copper wire for electrical connection at unit. Aluminum and clad aluminum are not acceptable for the type of connector provided.
12. Do not apply capillary tube indoor coils to these units.
13. Factory-supplied filter drier must be installed.

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Replaces: New

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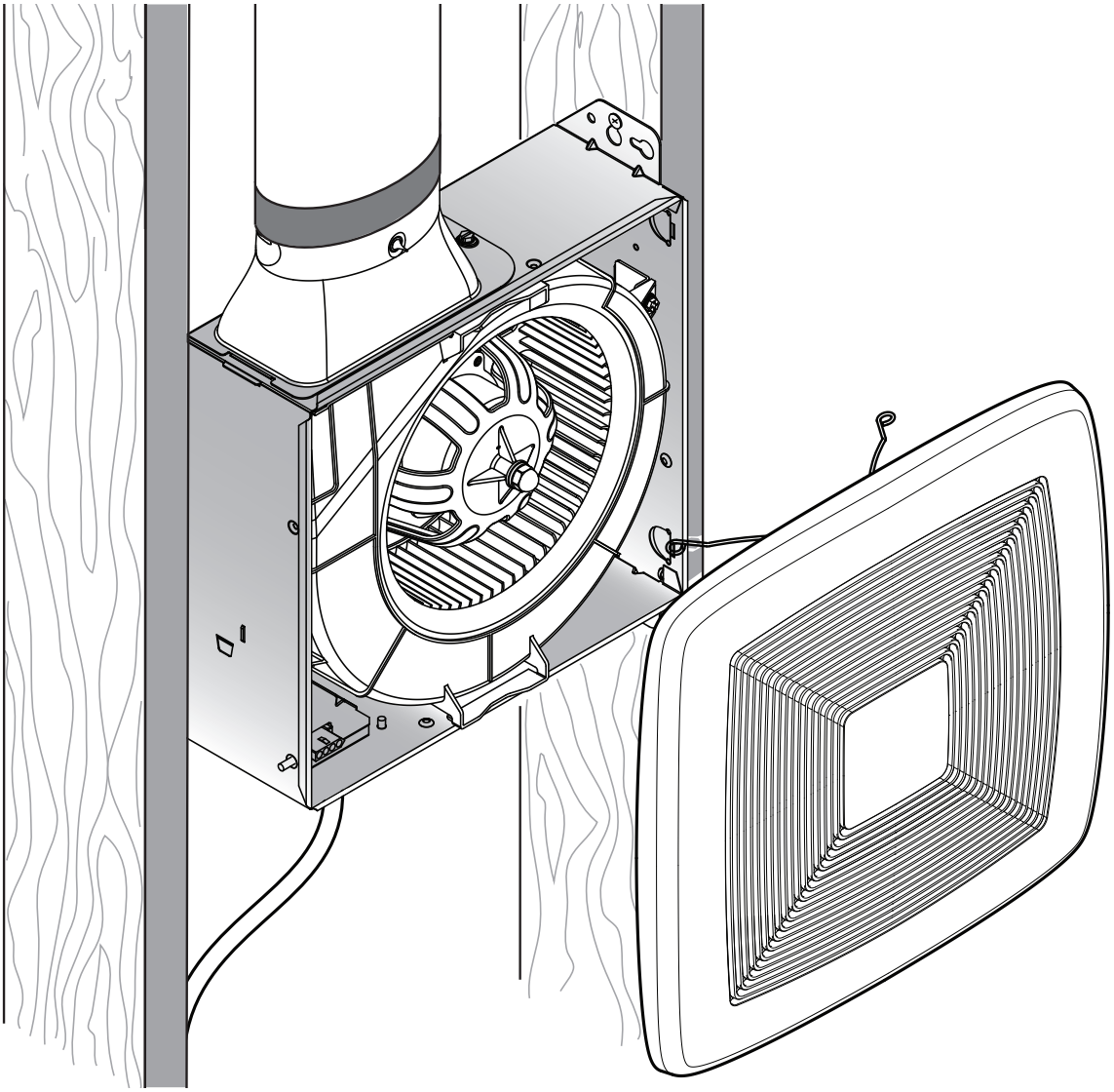
BROAN®

READ AND SAVE THESE INSTRUCTIONS

Installer: leave this guide with homeowner.
Register your product online at **www.broan.com/register.**

LP80 & LP110
Lo Profile
Ventilation Fan
INSTALLATION GUIDE



Easy installation

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WARNING

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

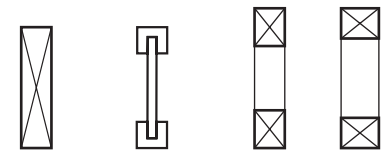
1. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer at the address or telephone number listed in the warranty.
2. Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
3. Installation work and electrical wiring must be done by a qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction codes and standards.
4. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
5. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
6. Ducted fans must always be vented to the outdoors.
7. Acceptable for use over a tub or shower (in the ceiling only) when connected to a GFCI (Ground Fault Circuit Interrupter) - protected branch circuit.
8. This unit must be grounded.

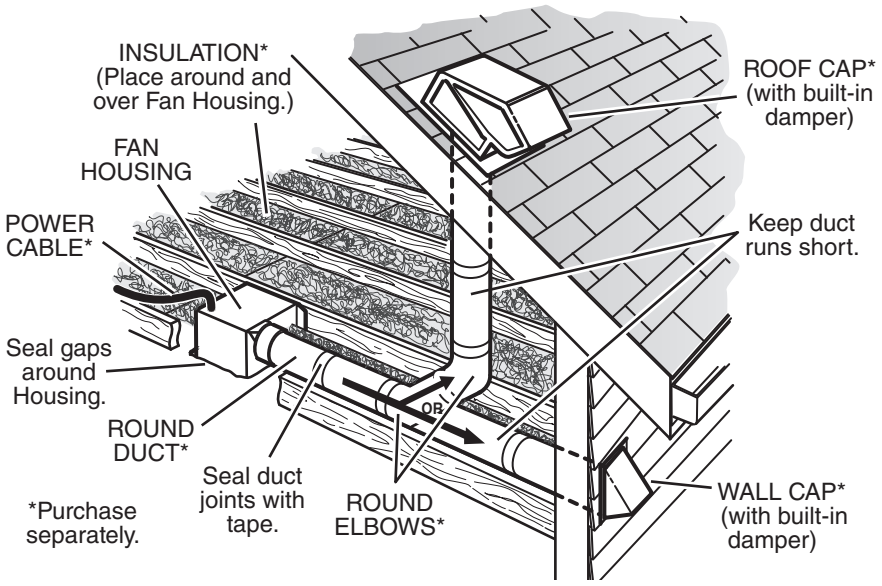
CAUTION

1. For general ventilating use only. Do not use to exhaust hazardous or explosive materials and vapors.
2. When installed in a wall or sloped ceiling, the duct connector must point up.
3. To avoid motor bearing damage and noisy and/or unbalanced impellers, keep drywall spray, construction dust, etc. off power unit.
4. Please read specification label on product for further information and requirements.

Typical Installation

- Attaches to 2" x 4" or greater wall studs or ceiling joists.





CEILING INSTALLATION SHOWN

The ducting from this fan to the outside of the building has a strong effect on the air flow, noise and energy use of the fan. Use the shortest, straighest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

4-inch round rigid metal duct is recommended for best performance.

Installation

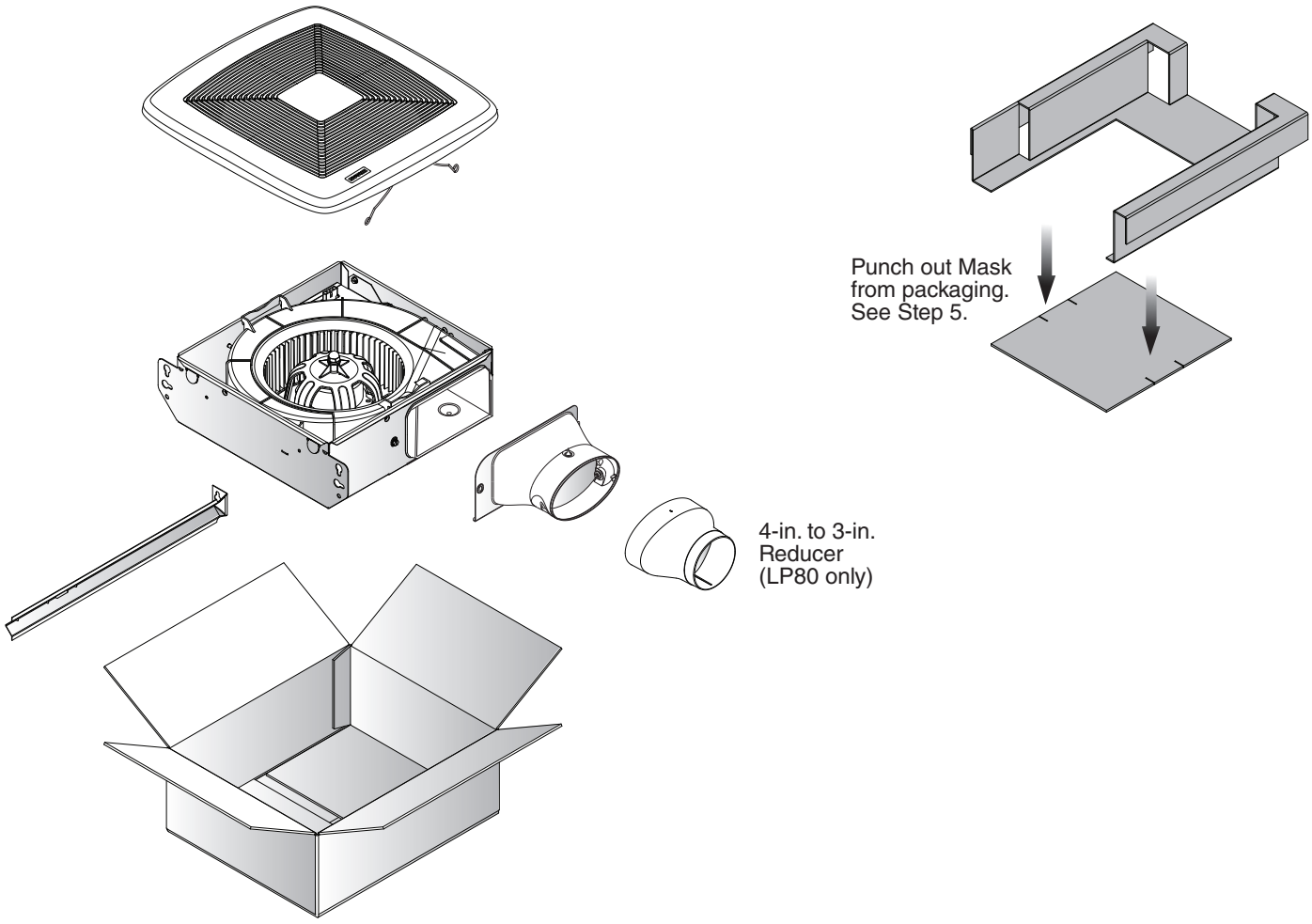
Tools needed

- Power screwdriver with a Phillips bit
- Phillips screwdriver
- Wire insulation stripper
- Wire cutter

Materials needed

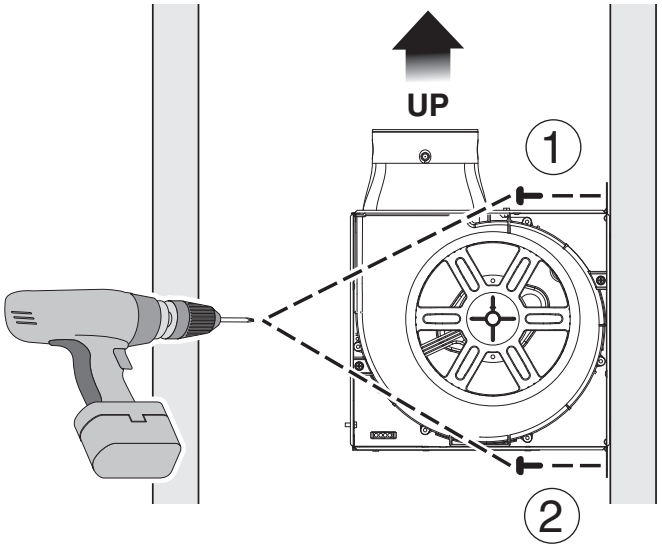
- 4" round metal ducting recommended for best performance. Use of other ducting is acceptable but may impact performance.
- Roof cap or wall cap (built-in damper recommended)
- Tape to seal duct connections
- Drywall screws, sheet metal screws or wire
- Electrical wiring and supplies per local code requirements

1 Remove from Packaging

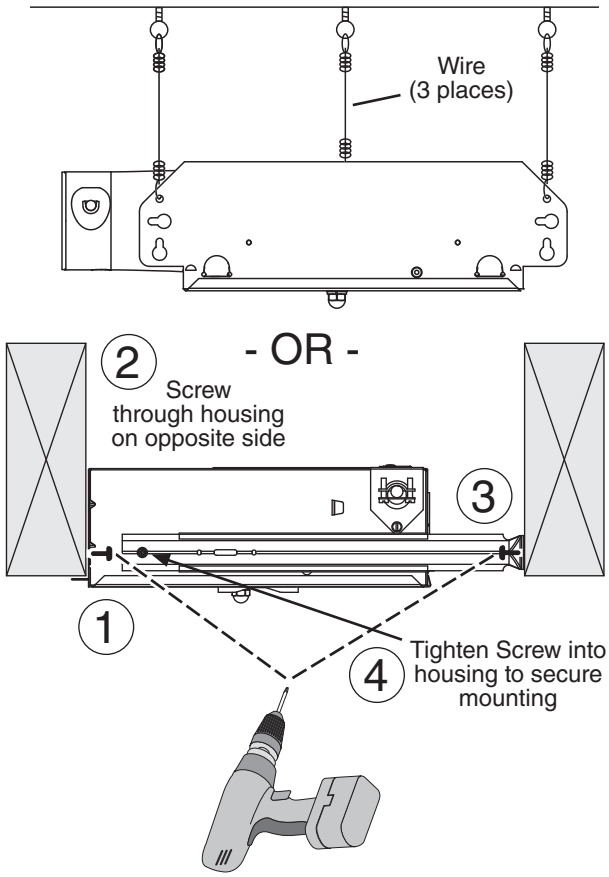


Installation

2 Install in Wall or Ceiling

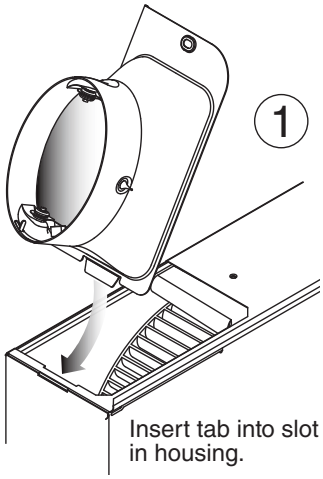


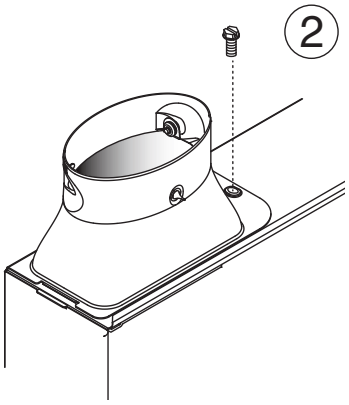
Wall

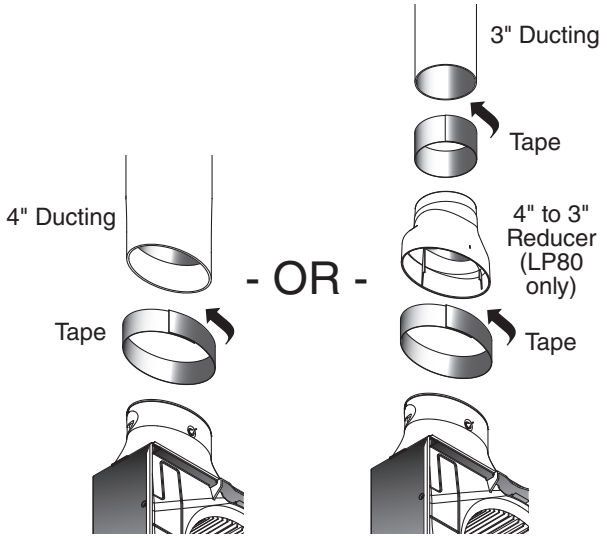


Ceiling

3 Install Ducting



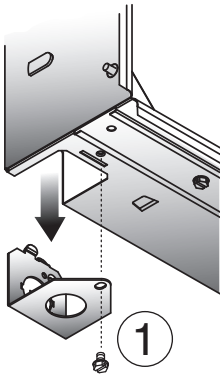


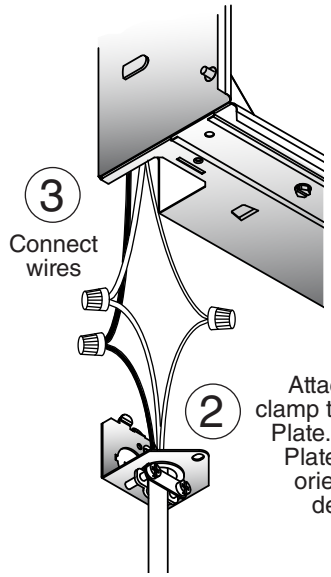


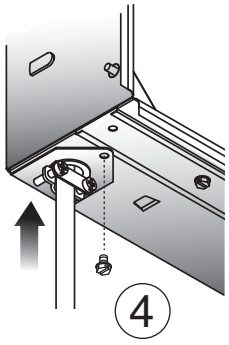
Installation

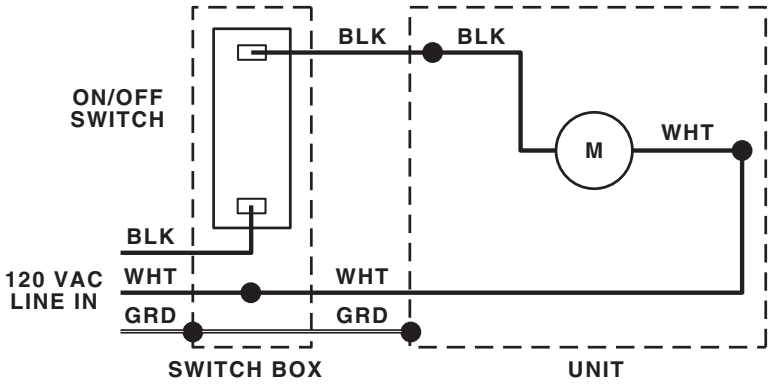
4 Connect Wires

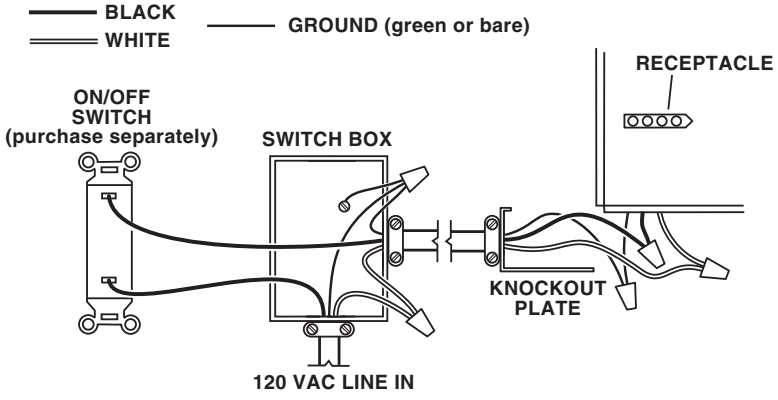
- Run 120VAC electrical wiring to the installation location.
- Use proper UL-approved connectors to secure wiring to the Knockout Plate.
- Connect wires as shown in wiring diagram.





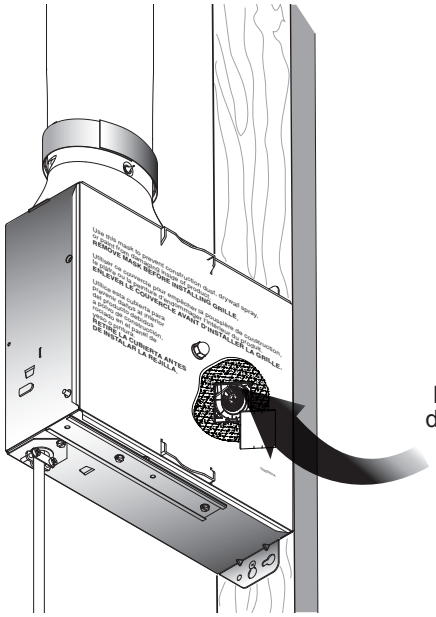






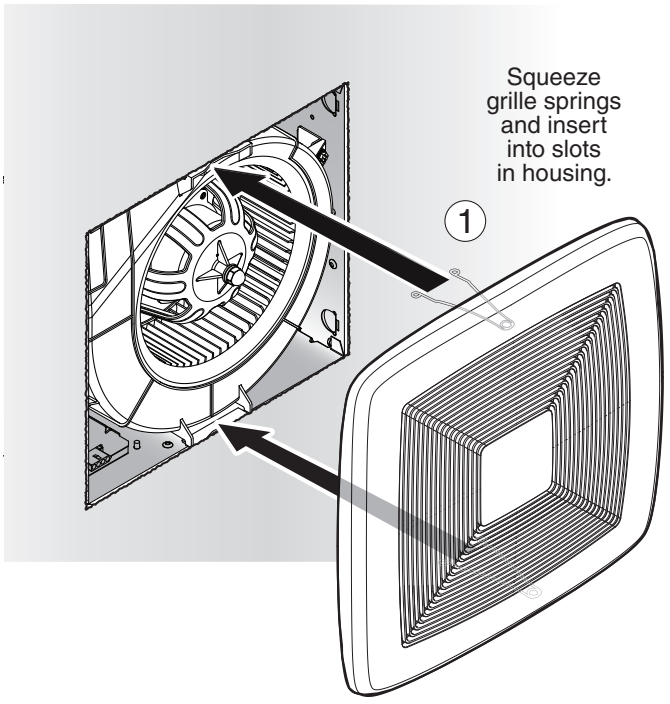
Installation

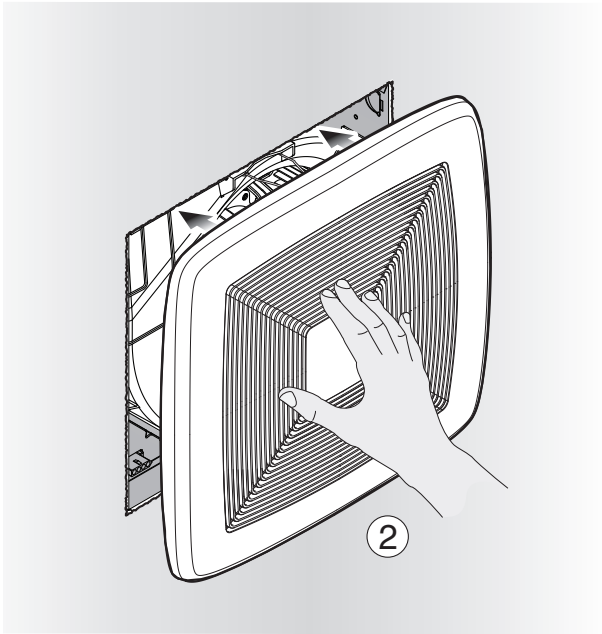
5 Insert Mask and Finish Wall or Ceiling



Mask protects unit during construction. Remove before installing Grille.

6 Install Grille





Operation

To Operate Fan

Use an ON/OFF switch or speed control to operate this ventilator.

WARNING **Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.**

Cleaning and Maintenance

To Clean

For quiet and efficient operation, long life and attractive appearance, remove Grille and vacuum interior of unit with a dusting brush attachment.

The Motor is permanently lubricated and never needs oiling. If the motor bearings are making excessive or unusual noises, replace the Motor.

Troubleshooting

Symptom: The fan does not run.

- Check for an open fuse or circuit breaker in the building's service panel.
- Check that the plug-in connection for the Motor is seated firmly in place.
- Check that the Blower Wheel spins freely.

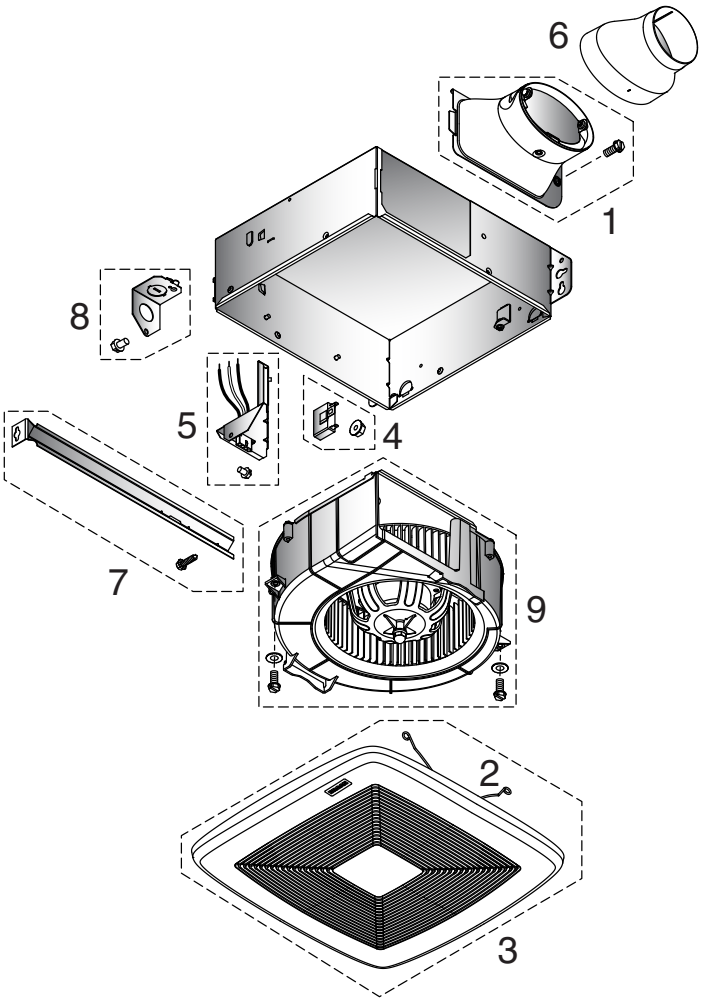
Symptom: The fan runs erratically.

- Check that the Blower Wheel is firmly attached to the Motor shaft and both spin freely.

Symptom: The fan seems noisy.

- Check that the back draft damper in the fan's Duct Connector pivots freely. Screws used to attach the ducting to the Duct Connector may be preventing the damper from opening.
- Check that the back draft damper in the wall or roof cap pivots freely. These dampers are sometimes mistakenly painted shut or obstructed by bird and insect debris.

Service Parts



Key No.	Part No.	Description
1	77001277	Duct Connector Assembly
2	79140014	Grille Spring (2 included)
3	77001280	Grille Assembly (includes 2 grille springs)
4	77001297	Capacitor (LP80)
	1100050	Capacitor (LP110)
5	77001298	Wire Panel Assembly
6	79110158	4" to 3" Reducer (LP80 only)
7	77001299	Hanger Bar
8	77001300	Knockout Plate
9	97020043	Blower Assembly (LP80)
	1100048	Blower Assembly (LP110)

Order replacement parts by Part No., not by Key No.

Warranty

BROAN ONE YEAR LIMITED WARRANTY

Broan warrants to the original consumer purchaser of its products that such products will be free from defects in materials or workmanship for a period of one year from the date of original purchase. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

During this one-year period, Broan will, at its option, repair or replace, without charge, any product or part which is found to be defective under normal use and service.

THIS WARRANTY DOES NOT EXTEND TO FLUORESCENT LAMP STARTERS, TUBES, HALOGEN AND INCANDESCENT BULBS, FUSES, FILTERS, DUCTS, ROOF CAPS, WALL CAPS AND OTHER ACCESSORIES FOR DUCTING. This warranty does not cover (a) normal maintenance and service or (b) any products or parts which have been subject to misuse, negligence, accident, improper maintenance or repair (other than by Broan), faulty installation or installation contrary to recommended installation instructions.

The duration of any implied warranty is limited to the one-year period as specified for the express warranty. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

BROAN'S OBLIGATION TO REPAIR OR REPLACE, AT BROAN'S OPTION, SHALL BE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. BROAN SHALL NOT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH PRODUCT USE OR PERFORMANCE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty supersedes all prior warranties.

To qualify for warranty service, you must (a) notify Broan at the address or telephone number below, (b) give the model number and part identification and (c) describe the nature of any defect in the product or part. At the time of requesting warranty service, you must present evidence of the original purchase date.

Broan
926 W. State Street, Hartford, Wisconsin 53027
www.broan.com 800-558-1711

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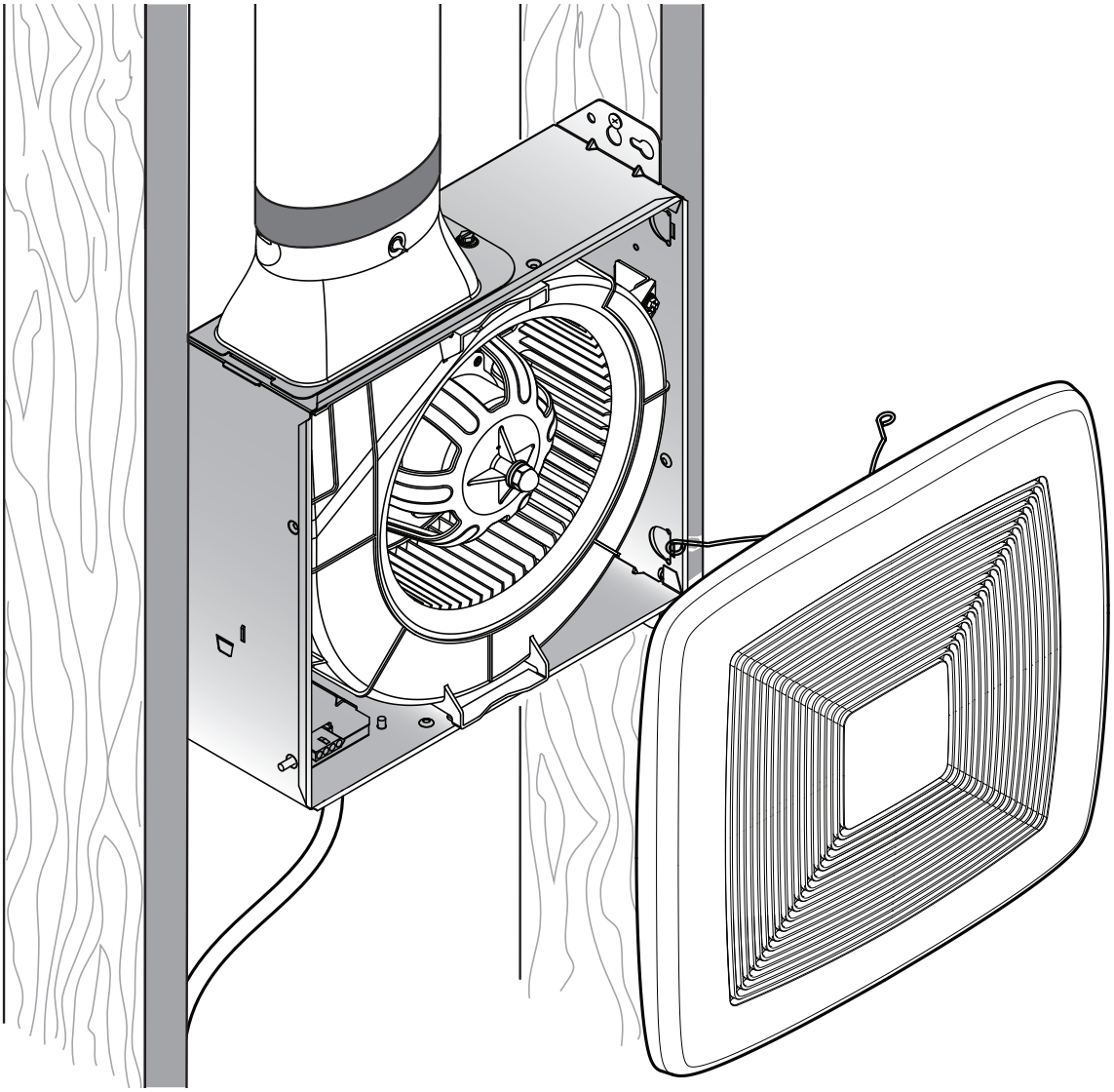
LIRE CES DIRECTIVES ET LES CONSERVER

Installateur : veuillez laisser ce guide au propriétaire.
Enregistrez votre produit en ligne à : **www.broan.com/register**.

LP80 et LP110
Ventilateur à
profil surbaissé
GUIDE D'INSTALLATION



Installation facile

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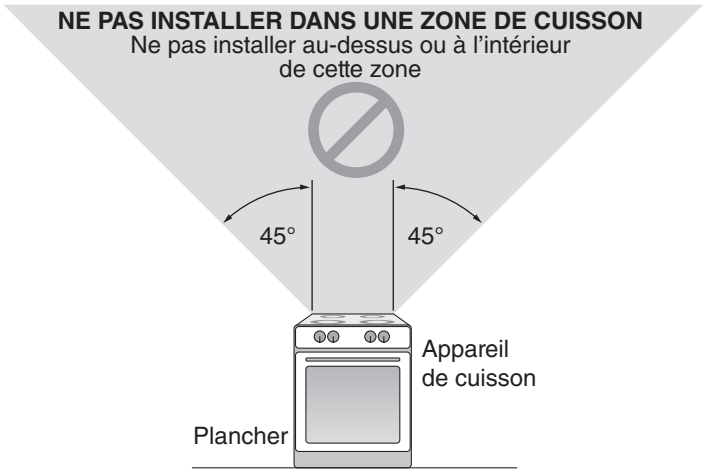
AVERTISSEMENT

OBSERVEZ LES DIRECTIVES CI-DESSOUS AFIN DE RÉDUIRE LES RISQUES D'INCENDIE, DE CHOC ÉLECTRIQUE OU DE BLESSURES CORPORELLES :

1. N'utilisez cet appareil que de la manière prévue par le fabricant. Si vous avez des questions, communiquez avec le fabricant à l'adresse ou au numéro de téléphone indiqués dans la garantie.
2. Avant de procéder à l'entretien ou au nettoyage de l'appareil, coupez l'alimentation du panneau électrique et verrouillez l'interrupteur principal afin d'empêcher que le courant ne soit accidentellement rétabli. S'il est impossible de verrouiller l'interrupteur principal, fixez solidement un message d'avertissement, par exemple une étiquette, sur le panneau électrique.
3. La pose de l'appareil et les travaux d'électricité doivent être effectués par des personnes qualifiées conformément à la réglementation en vigueur, notamment les normes de la construction ayant trait à la protection contre les incendies.
4. Pour éviter les refoulements, l'apport d'air doit être suffisant pour brûler les gaz produits par les appareils à combustion et les évacuer dans le conduit de fumée (cheminée). Respectez les directives du fabricant de l'appareil de chauffage et les normes de sécurité, notamment celles publiées par la National Fire Protection Association (NFPA), l'American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) et les codes des autorités locales.
5. Veillez à ne pas endommager le câblage électrique ou d'autres équipements non apparents lors de la découpe ou du perçage du mur ou du plafond.
6. Les ventilateurs canalisés doivent toujours rejeter l'air à l'extérieur.
7. Cet appareil peut être installé au-dessus d'une baignoire ou d'une douche (uniquement dans le plafond) s'il est branché sur un circuit de dérivation protégé par un disjoncteur de fuite à la terre.
8. Cet appareil doit être relié à une mise à la terre.

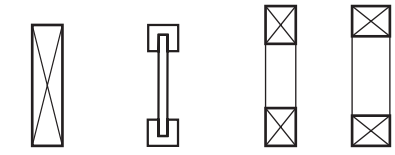
ATTENTION

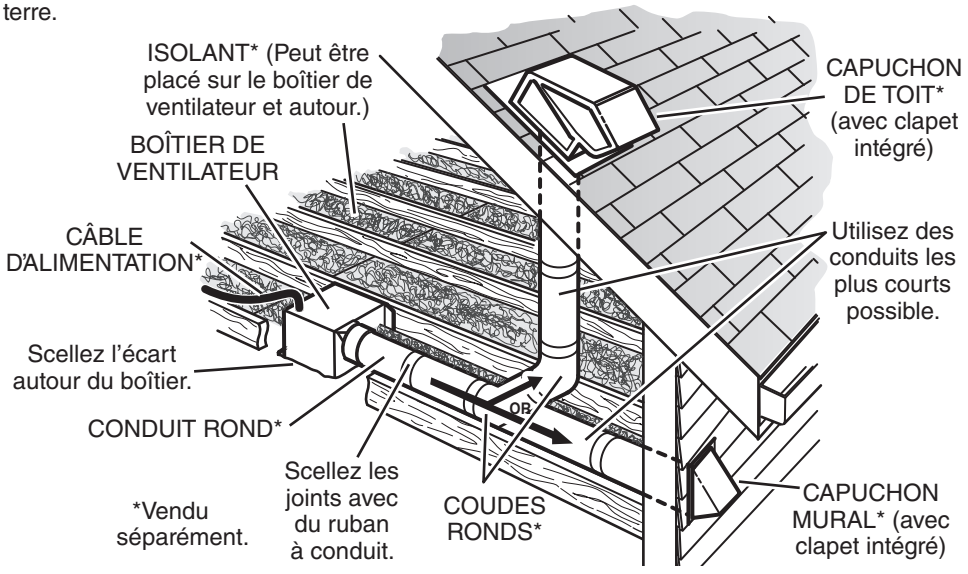
1. Pour ventilation générale uniquement. N'utilisez pas cet appareil pour évacuer des matières ou des vapeurs dangereuses ou explosives.
2. Lorsque installé dans un mur ou un plafond en pente, le raccord du conduit doit être tourné vers le haut.
3. Pour éviter d'endommager les roulements de moteur, de déséquilibrer les pales ou de les rendre bruyantes, débarrassez l'appareil de la poussière de plâtre, de construction, etc.
4. Veuillez lire l'étiquette de spécifications du produit pour obtenir plus de renseignements, notamment sur les exigences.



Installation type

- Se fixe aux montants de 2 po x 4 po ou plus des murs ou aux solives du plafond.





INSTALLATION DANS UN PLAFOND

Les conduits allant de ce ventilateur jusqu'à l'extérieur de l'habitation ont une grande influence sur le débit d'air, le bruit du ventilateur et sa consommation d'énergie. Pour obtenir le meilleur rendement, utilisez les conduits les plus courts et les plus droits que possible et évitez d'utiliser des conduits plus petits que ceux recommandés. L'isolation des conduits peut contribuer à réduire les pertes d'énergie et éviter la prolifération de moisissures. Les ventilateurs installés sur d'anciens conduits pourraient ne pas produire leur débit d'air nominal.

Pour un rendement optimal, il est recommandé d'utiliser des conduits métalliques ronds de 10 cm (4 po) de diamètre.

Installation

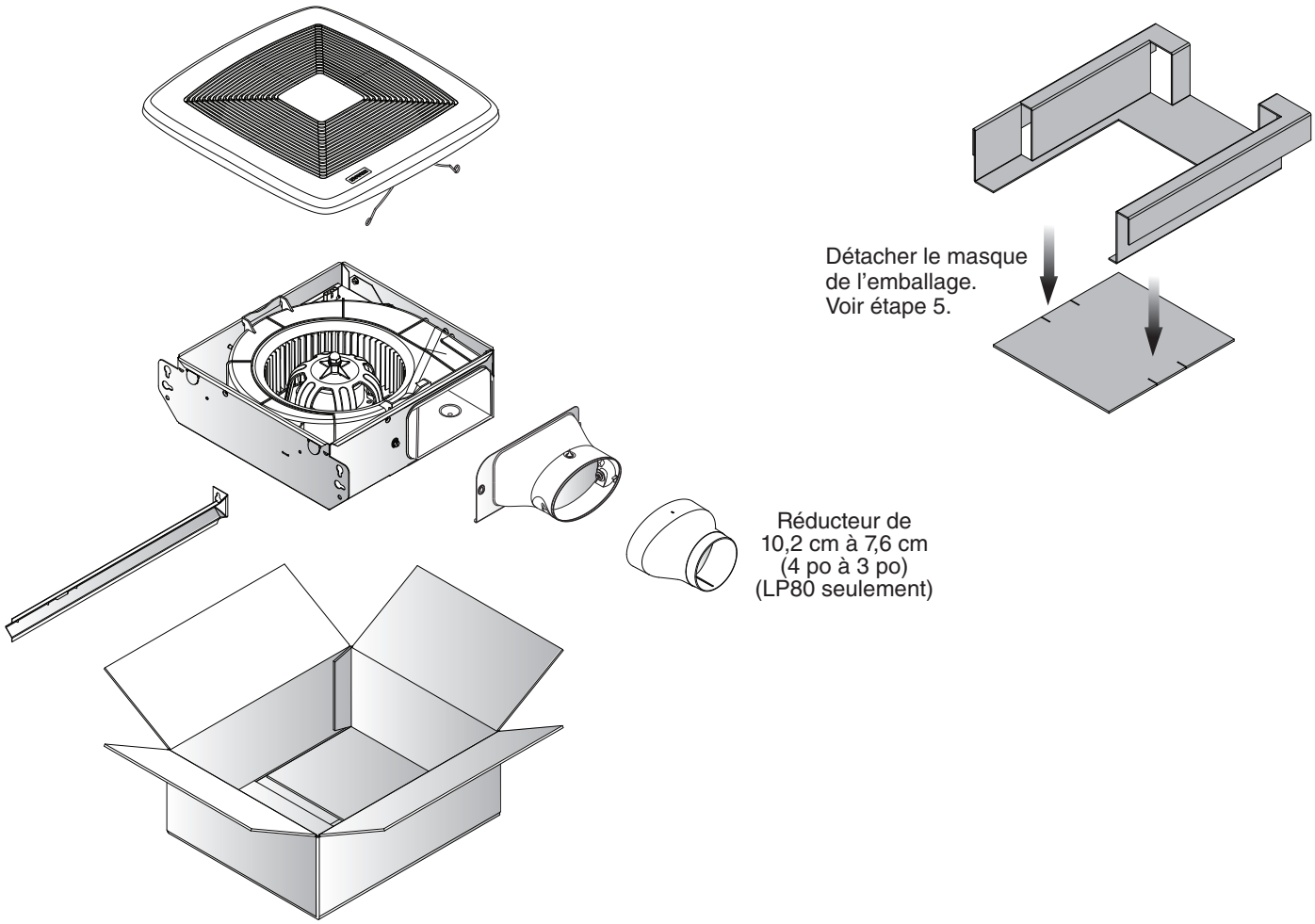
Outils requis

- Tournevis électrique à pointe cruciforme
- Tournevis cruciforme
- Pince à dénuder les fils
- Pince coupante

Matériel requis

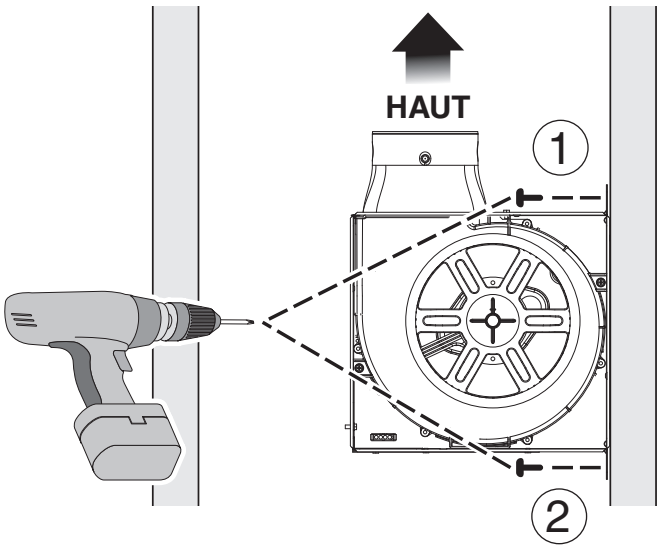
- Conduit rond de 10,2 cm (4 po) recommandé pour un meilleur rendement. D'autres types de conduits sont acceptables mais peuvent affecter le rendement.
- Capuchon de toit ou mural (clapet intégré recommandé)
- Ruban pour sceller les raccords du conduit
- Vis à cloisons sèches, vis à tôle ou suspendre
- Fils électriques et fournitures conformes au code local

1 Sortir de l'emballage

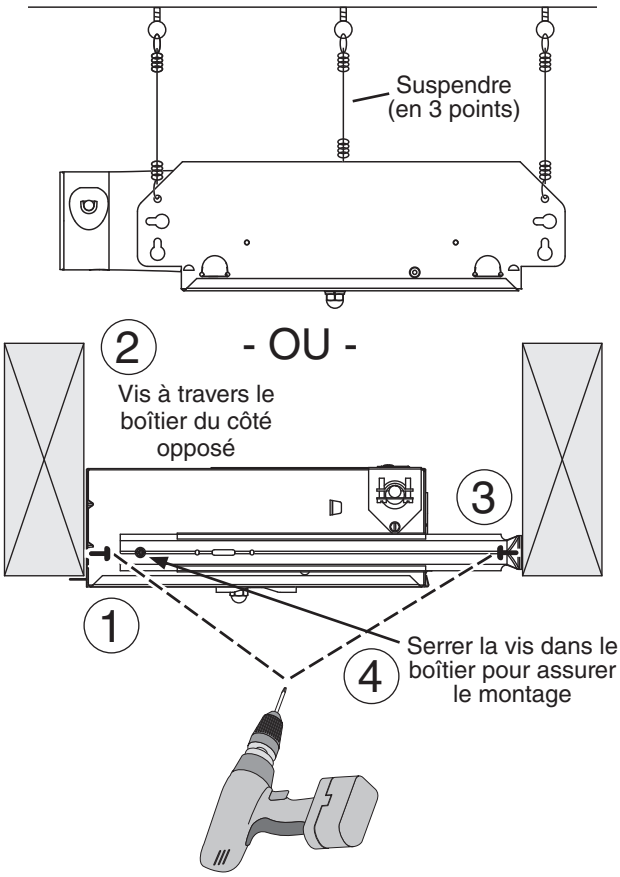


Installation

2 Installer dans le mur ou le plafond

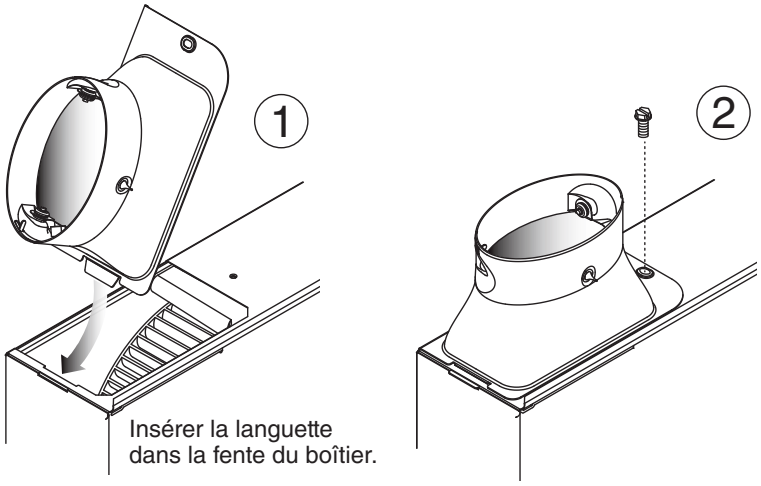


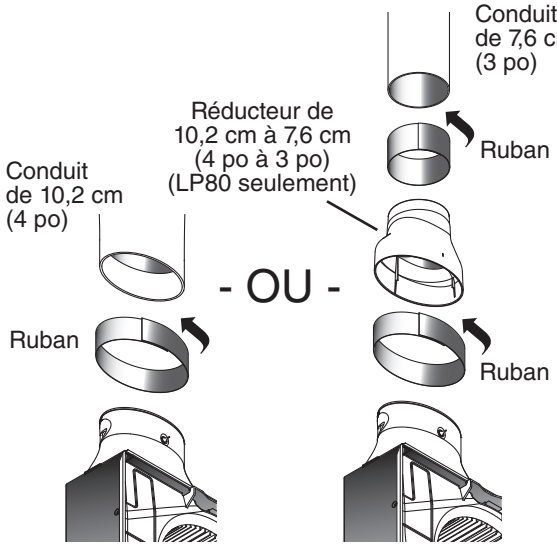
Mur



Plafond

3 Installer le conduit

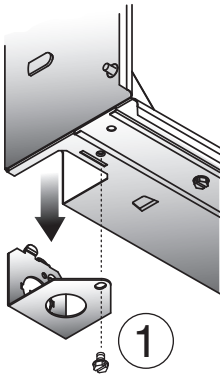


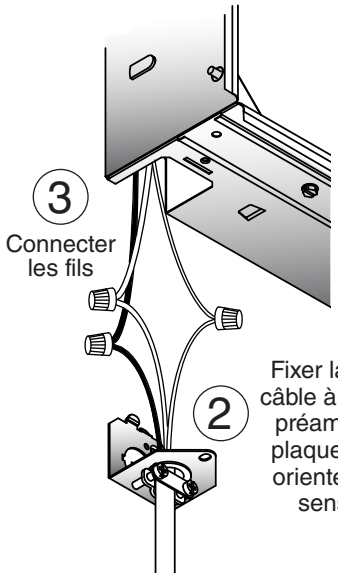


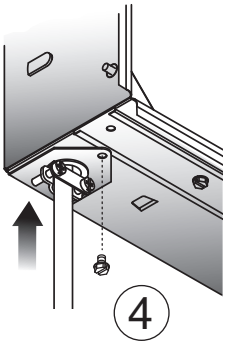
Installation

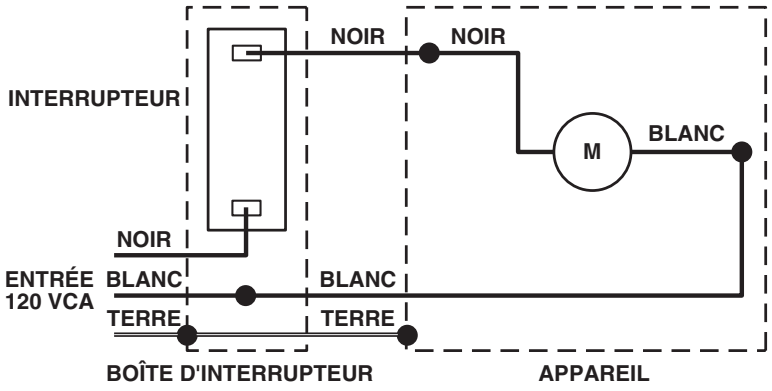
4 Connecter les fils

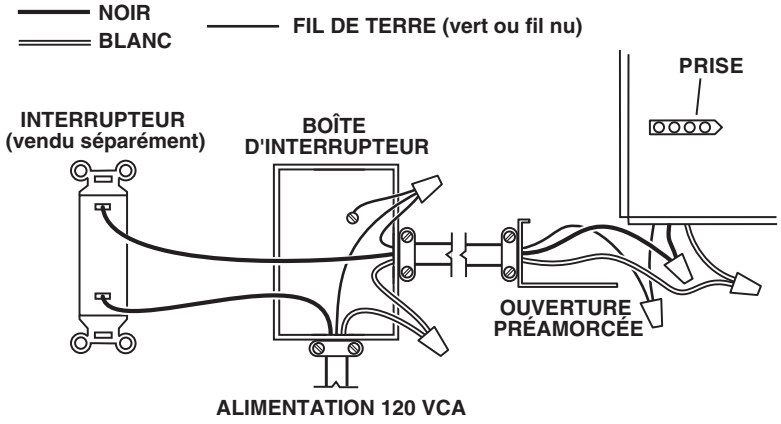
- Acheminer un fil électrique de 120 VCA jusqu'au site d'installation.
- Utiliser les connecteurs homologués UL pour fixer le fil à l'ouverture préamorcée fournie.
- Connecter les fils, tel qu'illustré dans le schéma de câblage.





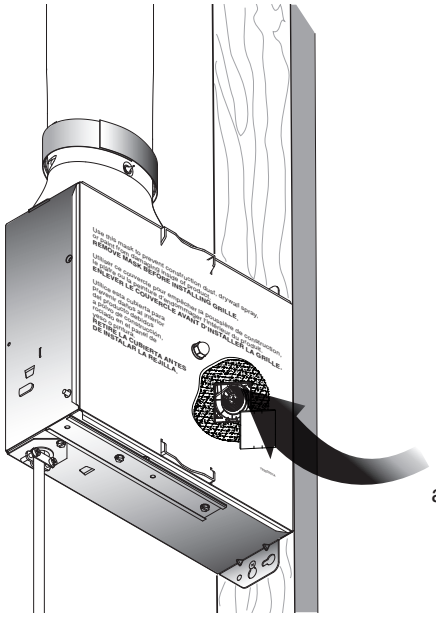






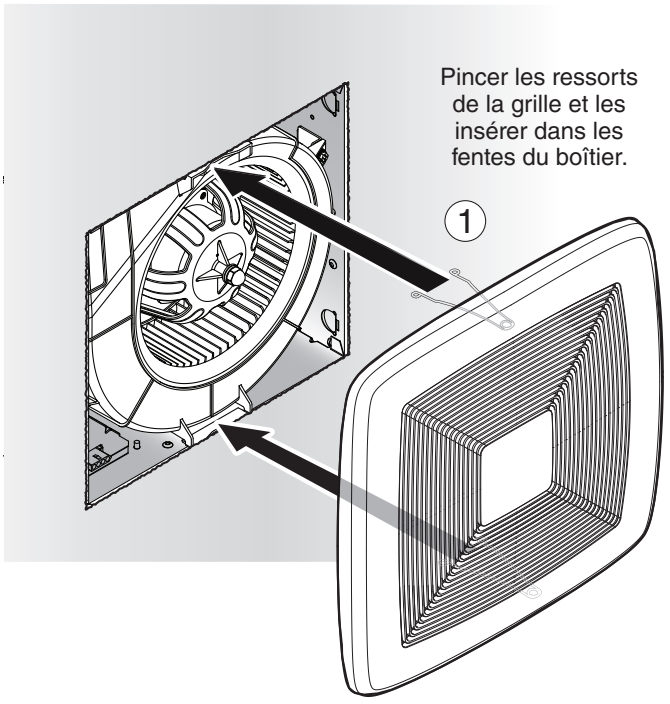
Installation

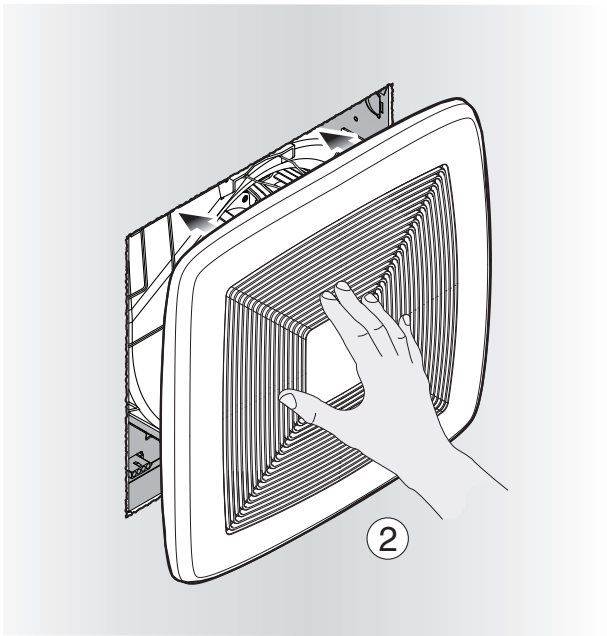
5 Insérer le masque et finir le mur ou le plafond



Ce masque protège l'appareil durant la construction. Le retirer avant d'installer la grille.

6 Installer la grille





Fonctionnement

Pour actionner le ventilateur
Utilisez un interrupteur marche/arrêt ou une commande de vitesse pour actionner le ventilateur.

AVERTISSEMENT **Avant de procéder à l'entretien ou au nettoyage de l'appareil, coupez l'alimentation du panneau électrique et verrouillez l'interrupteur principal afin d'empêcher que le courant ne soit accidentellement rétabli. S'il est impossible de verrouiller l'interrupteur principal, fixez solidement un message d'avertissement, par exemple une étiquette, sur le panneau électrique.**

Nettoyage et entretien

Pour nettoyer
Pour un fonctionnement silencieux et efficace, ainsi qu'une durabilité et une apparence supérieures, enlevez la grille et nettoyez l'intérieur de l'appareil avec un aspirateur muni d'une brosse à épousseter.

Le moteur est lubrifié en permanence et n'a pas besoin d'être huilé. Si les roulements du moteur sont anormalement bruyants, remplacez le moteur.

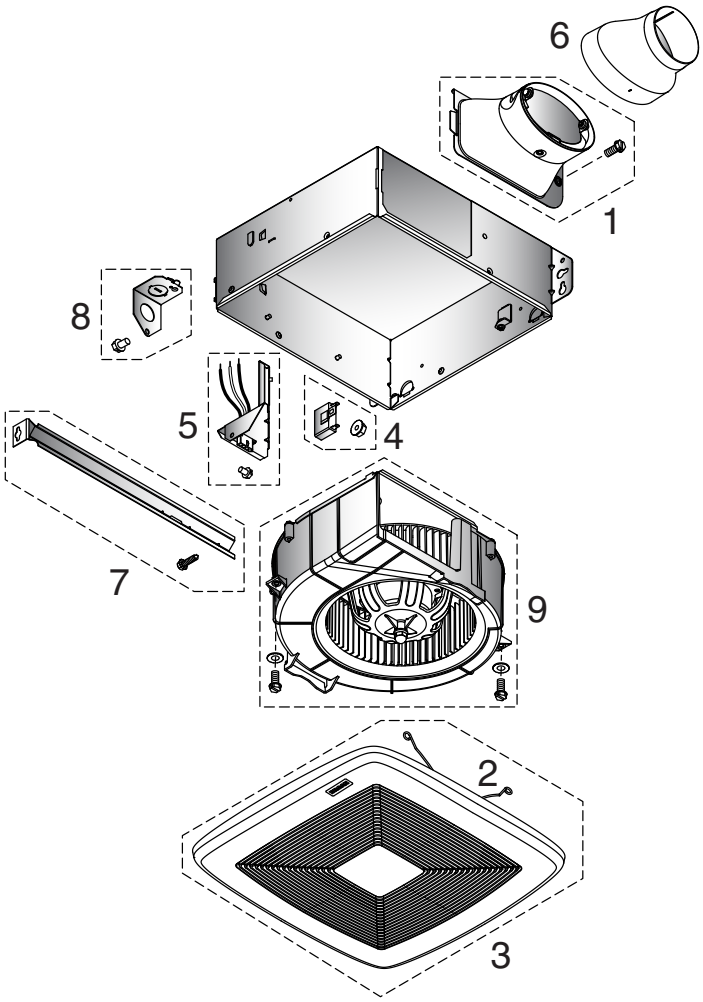
Dépannage

Symptôme : Le ventilateur ne démarre pas.
- Vérifiez que le disjoncteur ou le fusible ne sont pas coupés dans le panneau électrique de l'édifice.
- Vérifiez que la fiche du moteur est bien branchée et fermement appuyée.
- Vérifiez que la roue à ailettes tourne librement.

Symptôme : Le ventilateur tourne de manière inégale.
- Vérifiez que la roue à ailettes est solidement fixée à l'arbre du moteur et que les deux tournent librement.

Symptôme : Le ventilateur semble bruyant.
- Vérifiez que le clapet à l'arrière du raccord de conduit pivote librement. Les vis utilisées pour fixer le conduit au raccord peuvent empêcher le clapet de s'ouvrir correctement.
- Vérifiez que le clapet antirefoulement du capuchon mural ou de toit pivote librement. Ces clapets sont parfois peints par erreur, ce qui les empêche de s'ouvrir, ou obstrués par des débris d'oiseaux ou d'insectes.

Pièces de rechange



N° de repère	N° de pièce	Description
1	77001277	Ensemble de raccord de conduit
2	79140014	Ressort de grille (2 inclus)
3	77001280	Ensemble de grille (comprend 2 ressorts)
4	77001297	Condensateur (LP80)
	1100050	Condensateur (LP110)
5	77001298	Ensemble de panneau de câblage
6	79110158	Réducteur de 10,2 cm à 7,6 cm (4 po à 3 po) (LP80 seulement)
7	77001299	Tige de suspension
8	77001300	Plaque à ouverture préamorcée
9	97020043	Ensemble de ventilateur (LP80)
	1100048	Ensemble de ventilateur (LP110)

Veuillez commander les pièces par N° de pièce et non par N° de repère.

Garantie

GARANTIE LIMITÉE D'UN AN BROAN

Broan garantit à l'acheteur original que les produits vendus en vertu de la présente sont libres de tout vice de matériau ou de fabrication pour une période d'un an à compter de la date d'achat originale. CETTE GARANTIE NE COMPORTE AUCUNE AUTRE GARANTIE, EXPRESSE OU TACITE, Y COMPRIS, MAIS SANS S'Y LIMITER, LES GARANTIES TACITES DE VALEUR MARCHANDE OU D'ADAPTATION À UN USAGE PARTICULIER.

Durant cette période d'un an, Broan réparera ou remplacera gratuitement, à sa discrétion, tout produit ou toute pièce jugés défectueux dans des conditions normales d'utilisation.

CETTE GARANTIE NE S'APPLIQUE PAS AUX TUBES FLUORESCENTS ET AUX DÉMARREURS, NI AUX AMPOULES HALOGÈNES OU INCANDESCENTES, FUSIBLES, FILTRES, CONDUITS, CAPUCHONS DE TOIT, CAPUCHONS MURAUX ET AUTRES ACCESSOIRES POUR CONDUITS. Cette garantie ne couvre pas (a) les frais d'entretien ou de service normaux ni (b) tout produit ou toute pièce soumis à un abus, une négligence, un accident, un entretien ou une réparation inadéquats (autres que ceux effectués par Broan), une mauvaise installation ou une installation contraire aux instructions recommandées.

La durée de toute garantie tacite est limitée à la période d'un an stipulée pour la garantie expresse. Certains territoires ou provinces interdisant de limiter la durée d'une garantie tacite, la limitation ci-dessus peut ne pas s'appliquer à votre situation.

L'OBLIGATION POUR BROAN DE RÉPARER OU DE REMPLACER LE PRODUIT, À SA DISCRÉTION, CONSTITUE LE SEUL RECOURS DE L'ACHETEUR EN VERTU DE LA PRÉSENTE GARANTIE. BROAN NE PEUT ÊTRE TENUE RESPONSABLE DES DOMMAGES INDIRECTS OU CONSÉCUTIFS NI DES DOMMAGES-INTÉRÊTS PARTICULIERS DÉCOULANT DE L'UTILISATION OU DU RENDEMENT DU PRODUIT. Certains territoires ou provinces ne permettant pas la limitation ou l'exclusion des dommages indirects ou consécutifs, la limitation ci-dessus peut ne pas s'appliquer à votre situation.

La présente garantie vous confère des droits spécifiques reconnus par la loi. D'autres droits pourraient également vous être accordés selon la législation locale en vigueur. La présente garantie remplace toutes les autres garanties précédentes.

Pour vous prévaloir de cette garantie, vous devez (a) aviser Broan à l'adresse ou au numéro de téléphone indiqués ci-dessous, (b) donner le numéro de modèle du produit et le numéro d'identification de la pièce et (c) décrire la nature de la défectuosité du produit ou de la pièce. Lors de votre demande de garantie, vous devez présenter une preuve de la date d'achat originale.

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www.broan.com 800-558-1711

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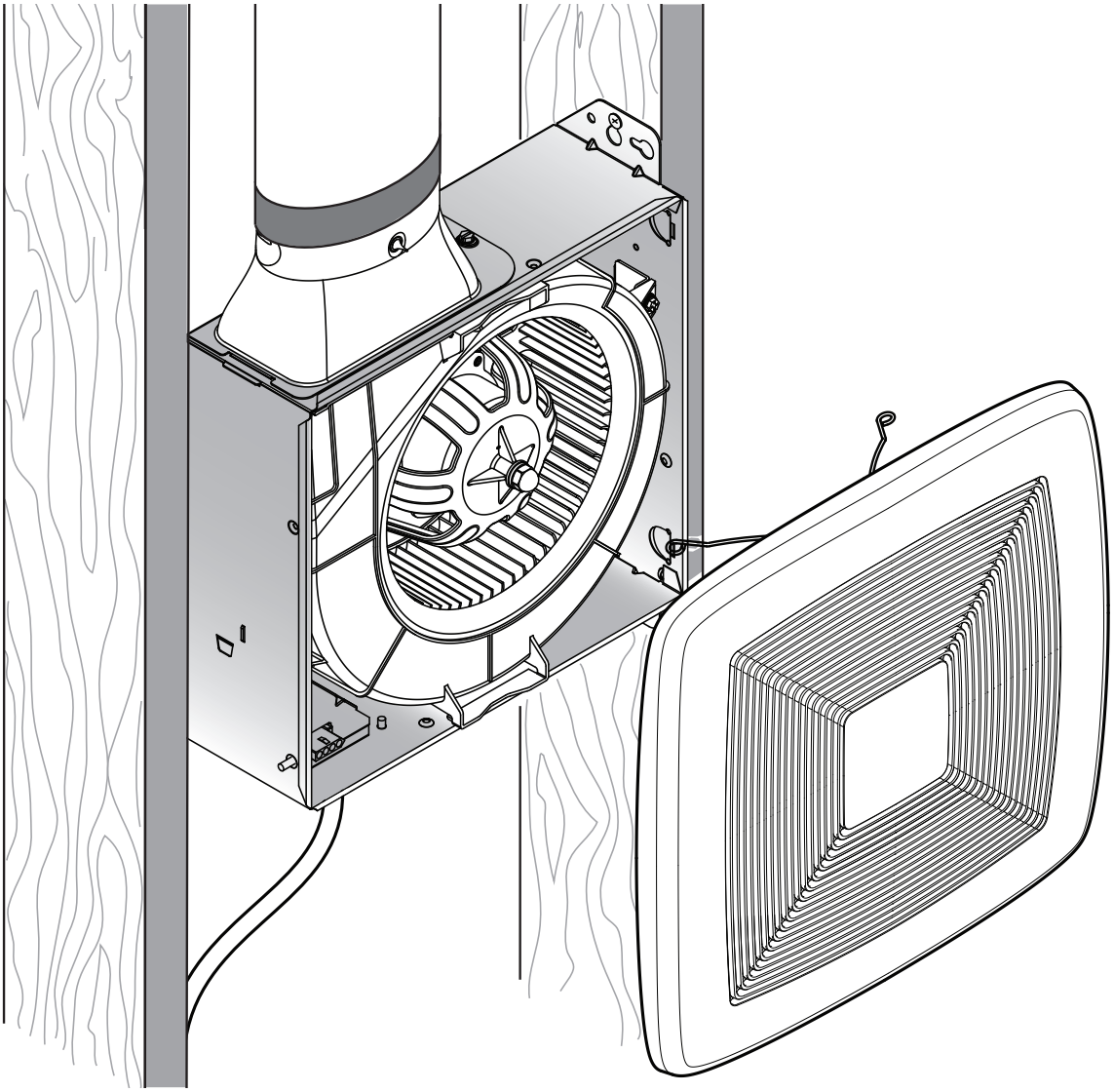
Aviso al instalador: deje esta guía con el dueño de la casa.
Registre su producto en línea en **www.broan.com/register.**

LP80 y LP110
Ventilador de
bajo perfil
GUÍA DE INSTALACIÓN



Instalación sencilla

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ADVERTENCIA

PARA REDUCIR EL RIESGO DE INCENDIOS, DESCARGAS ELÉCTRICAS O LESIONES PERSONALES, SIGA LAS SIGUIENTES PRECAUCIONES:

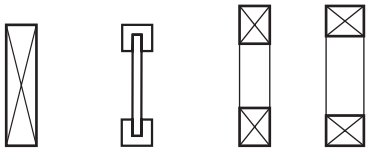
1. Use la unidad sólo de la manera indicada por el fabricante. Si tiene preguntas, comuníquese con el fabricante a la dirección o al número telefónico que se incluye en la garantía.
2. Antes de dar servicio a la unidad o de limpiarla, interrumpa el suministro eléctrico en el panel de servicio y bloquee los medios de desconexión del servicio para evitar que la electricidad se reanude accidentalmente. Cuando no sea posible bloquear los medios de desconexión del servicio, fije firmemente una señal de advertencia (como una etiqueta) en un lugar visible del panel de servicio.
3. Una o más personas calificadas deben realizar el trabajo de instalación y el cableado eléctrico, de acuerdo con todos los códigos y normas correspondientes, incluidos los códigos y las normas de construcción específicos de protección contra incendios.
4. Es necesario suficiente aire para que se lleve a cabo una combustión y una extracción adecuadas de los gases a través del tubo de humos (chimenea) del equipo quemador de combustible, con el fin de evitar el contratiro. Siga las directrices y las normas de seguridad del fabricante del equipo de calefacción, como las publicadas por la Asociación Nacional de Protección contra Incendios (National Fire Protection Association, NFPA), la Sociedad Americana de Ingenieros de Calefacción, Refrigeración y Aire Acondicionado (American Society for Heating, Refrigeration and Air Conditioning Engineers, ASHRAE) y las autoridades normativas locales.
5. Al cortar o perforar a través de la pared o del techo, tenga cuidado de no dañar el cableado eléctrico ni otros servicios ocultos.
6. Los ventiladores en conductos siempre deben ventearse hacia el exterior.
7. Esta unidad puede instalarse sobre una tina o ducha (en el cielo raso solamente) siempre que se conecte a un GFCI (interruptor accionado por pérdida de conexión a tierra) en un circuito de derivación protegido.
8. Esta unidad debe estar conectada a tierra.

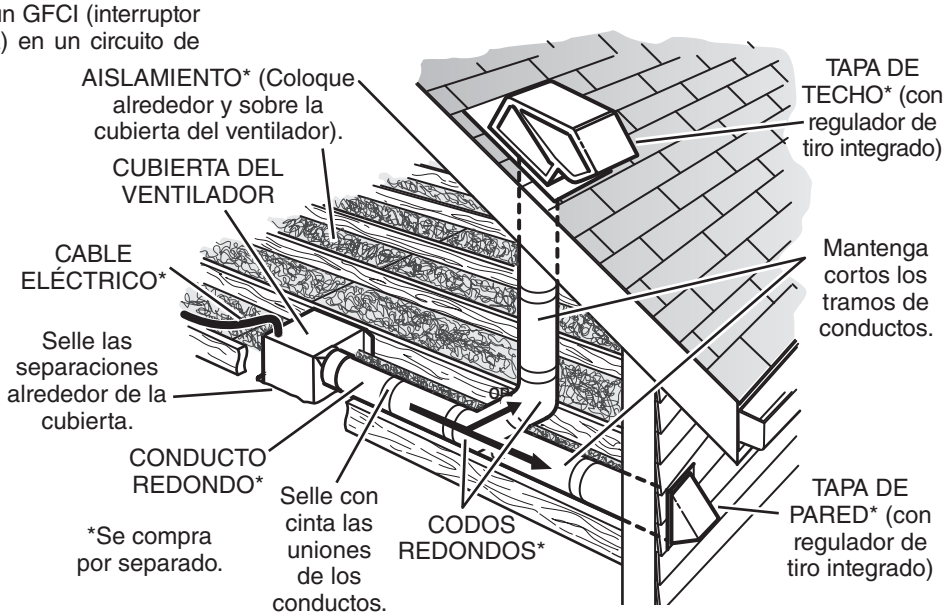
PRECAUCIÓN

1. Sólo para usarse como medio de ventilación general. No debe usarse para la extracción de materiales o vapores peligrosos o explosivos.
2. Cuando se instale en una pared o un cielo raso con pendiente, el conector del conducto debe apuntar hacia arriba.
3. Para evitar daños a los cojinetes del motor y rotores ruidosos o desbalanceados, mantenga la unidad de potencia protegida contra rociados de yeso, polvos de construcción, etc.
4. Lea la etiqueta de especificaciones del producto para ver información y requisitos adicionales.

Instalación típica

- Se fija a vigas 2 x 4 pulg. o a montantes de pared o viguetas de cielo raso de mayor tamaño.





SE MUESTRA LA INSTALACIÓN EN EL CIELO RASO

Los conductos desde este ventilador hacia el exterior del edificio tienen un gran efecto sobre el flujo de aire, el ruido y el uso de energía del ventilador. Utilice el tramo de conductos más corto y recto posible para obtener un desempeño óptimo y evite instalar el ventilador con conductos menores que los recomendados. El aislamiento alrededor de los conductos puede reducir la pérdida de energía e inhibir el desarrollo de moho. Los ventiladores instalados en conductos existentes podrían no obtener el flujo de aire nominal.

Para un mejor desempeño, se recomienda utilizar conductos metálicos redondos y rígidos de 4 pulg. (10 cm).

Instalación

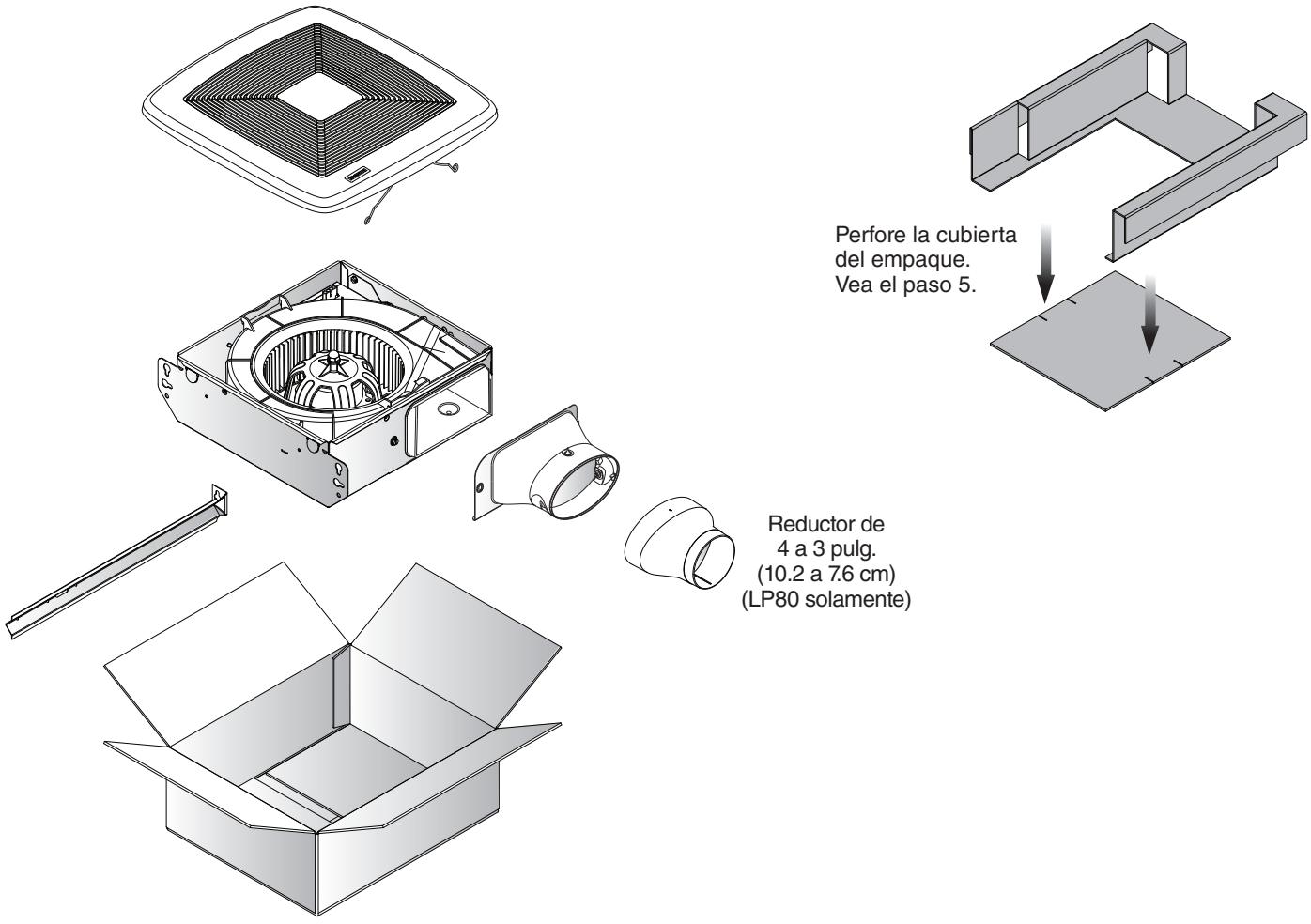
Herramientas necesarias

- Destornillador eléctrico con punta Phillips
- Destornillador Phillips
- Desforrador de aislamiento de cables
- Cortador de cables

Materiales necesarios

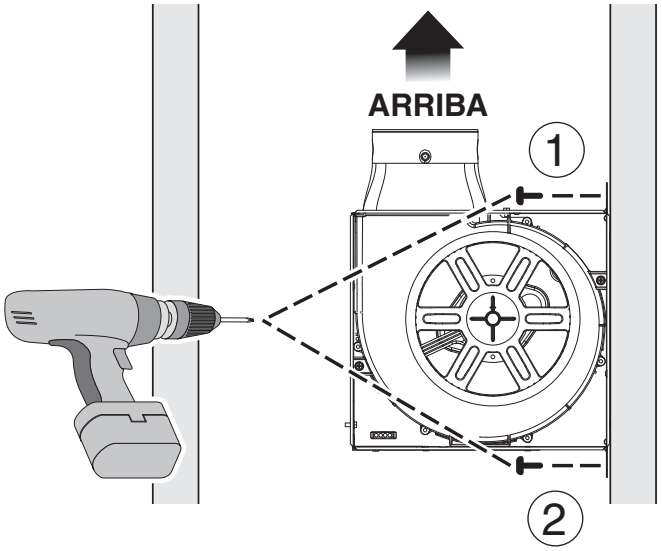
- Se recomienda el conducto metálico redondo de 4 pulg. (10.2 cm) para obtener el mejor desempeño. Es aceptable usar otros conductos, pero se puede afectar el desempeño.
- Tapa de techo o tapa de pared (se recomienda el regulador integrado)
- Cinta para sellar las conexiones de los conductos
- Tornillos para placa de yeso, para chapa metálica o cable
- Cableado eléctrico y suministros de acuerdo con los requisitos del código local

1 Retire del empaque

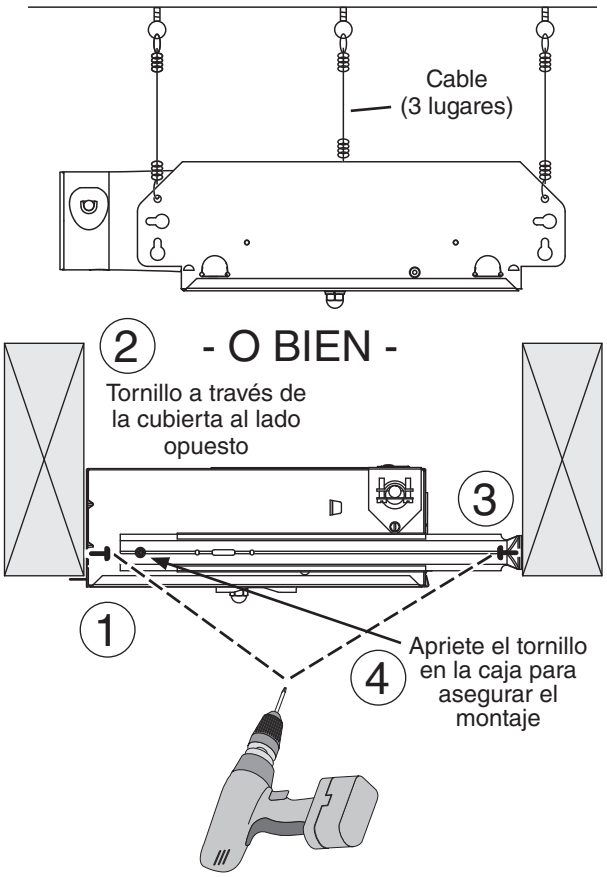


Instalación

2 Instale en la pared o el cielo raso

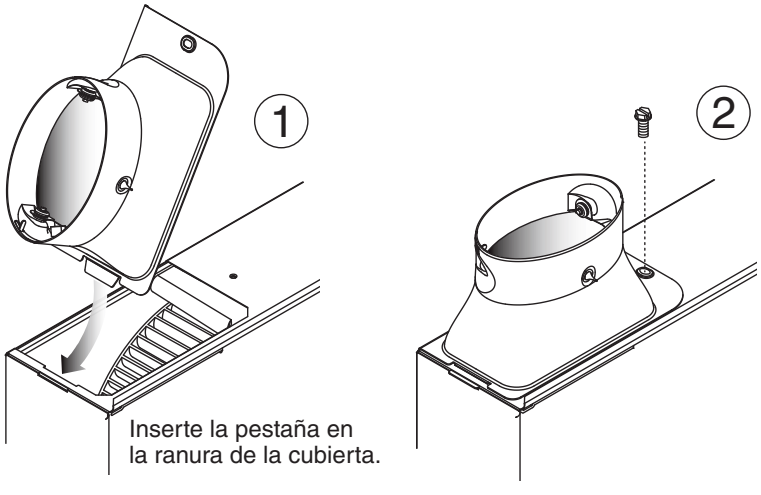


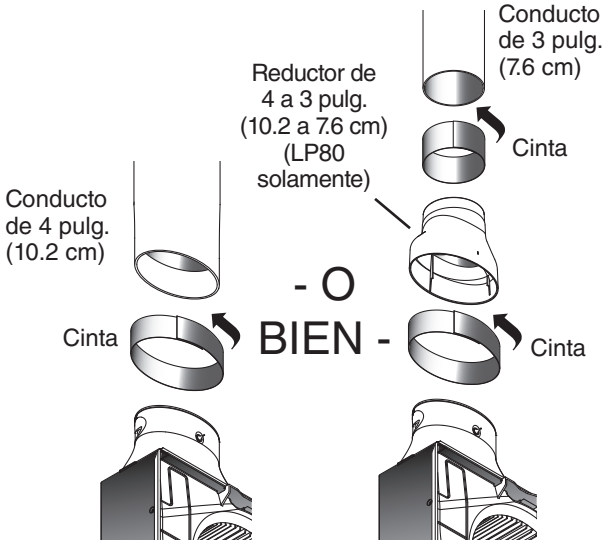
Pared



Cielo raso

3 Instale los conductos

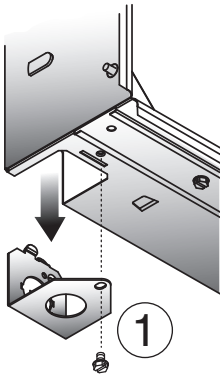


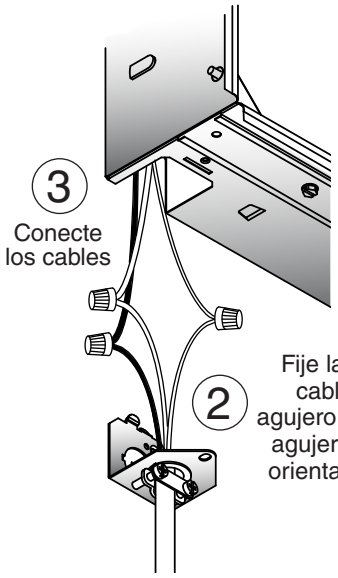


Instalación

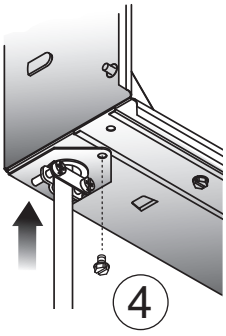
4 Conecte los cables

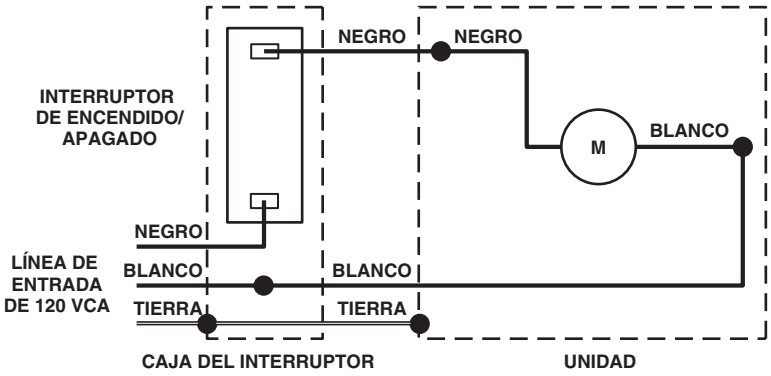
- Coloque el cable eléctrico de 120 VCA hasta el lugar de la instalación.
- Use conectores adecuados y aprobados por UL para asegurar el cableado a la placa de agujero ciego.
- Conecte los cables tal como se ilustra en el diagrama de cableado.

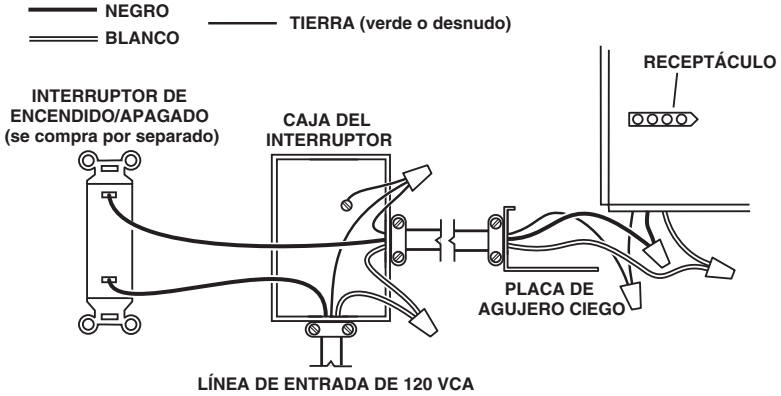




Fije la abrazadera del cable a la placa de agujero ciego. La placa de agujero ciego se puede orientar como se desee.

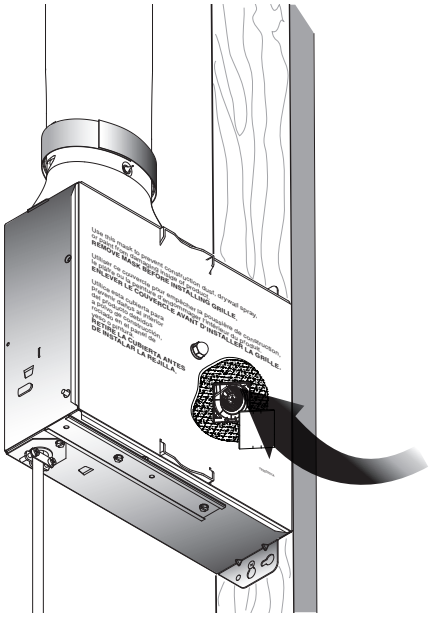






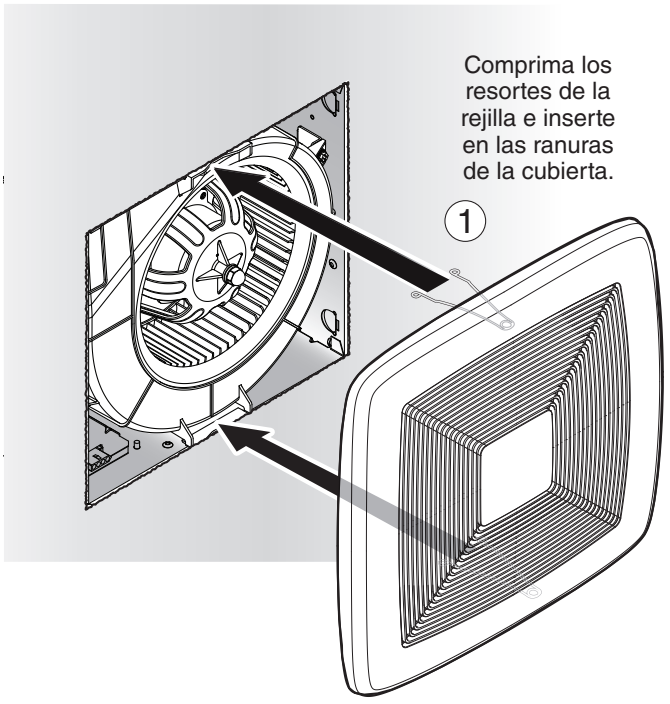
Instalación

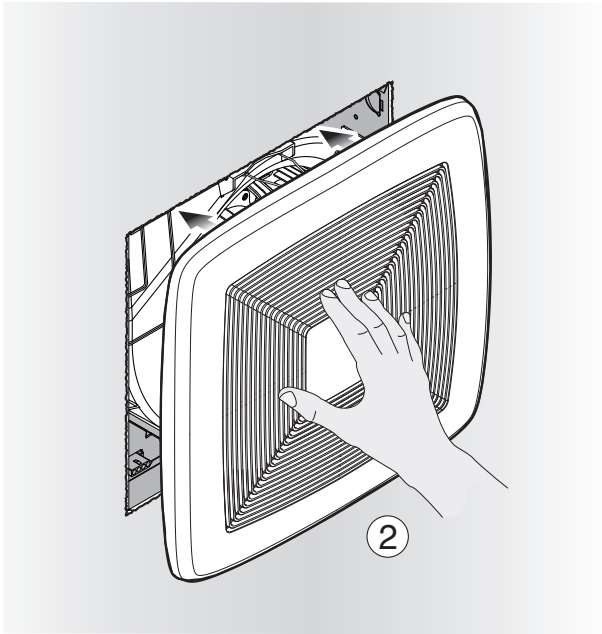
5 Inserte la cubierta protectora y dé acabado a la pared o al cielo raso



La cubierta protectora protege la unidad durante la construcción. Quítela antes de instalar la rejilla.

6 Instale la rejilla





Funcionamiento

Para accionar el ventilador
Para accionar este ventilador, utilice el interruptor de encendido/apagado o el control de velocidad.

ADVERTENCIA **Antes de realizar el servicio o de limpiar la unidad, corte el suministro eléctrico en el panel de servicio y bloquee el servicio desconectando los medios que evitan que se conecte la energía en forma accidental. Cuando no se puedan bloquear los medios que desconectan el servicio, coloque un dispositivo de alarma importante, como por ejemplo una etiqueta, en el panel de servicio.**

Limpieza y mantenimiento

Para limpiar
Para lograr un funcionamiento silencioso y eficiente, larga vida y una apariencia atractiva, retire la rejilla y aspire el interior de la unidad con el accesorio del cepillo para sacudir polvo.

El motor está permanentemente lubricado y nunca necesitará ponerle aceite. Si los cojinetes del motor hacen ruidos excesivos o inusuales, reemplace el motor.

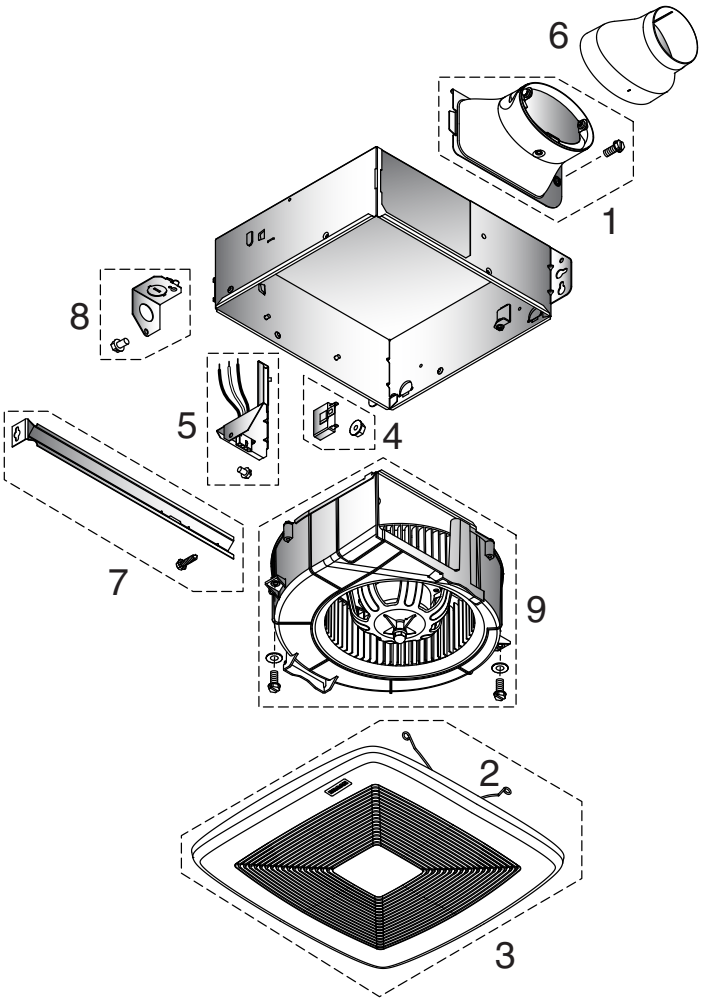
Resolución de problemas

Síntoma: el ventilador no funciona.
- Compruebe si hay un fusible o interruptor de circuitos abierto en el panel de servicio del edificio.
- Compruebe que la conexión enchufable del motor esté firmemente asentada en su lugar.
- Compruebe que la rueda del ventilador gira libremente.

Síntoma: el ventilador funciona erráticamente.
- Compruebe que la rueda del ventilador esté firmemente acoplada al eje del motor y que ambas giren libremente.

Síntoma: el ventilador parece ruidoso.
- Compruebe que el regulador de contratiro en el conector de conductos del ventilador pivotee libremente. Los tornillos empleados para fijar el conducto al conector podrían impedir que se abra el regulador.
- Compruebe que el regulador de contratiro en la pared o tapa de techo pivotee libremente. A veces a estos reguladores se les tapa con pintura por error, o están obstruidos por desechos de aves e insectos.

Piezas de servicio



Clave N.º	Pieza N.º	Descripción
1	77001277	Conjunto del conector de conductos
2	79140014	Resorte de la rejilla (se incluyen 2)
3	77001280	Conjunto de la rejilla (incluye 2 resortes de la rejilla)
4	77001297	Capacitor (LP80)
	1100050	Capacitor (LP110)
5	77001298	Conjunto del panel de cableado
6	79110158	Reductor de 4 a 3 pulg. (10.2 a 7.6 cm) (LP80 solamente)
7	77001299	Barra de suspensión
8	77001300	Placa de agujero ciego
9	97020043	Conjunto del ventilador (LP80)
	1100048	Conjunto del ventilador (LP110)

Pida las piezas por número de pieza, no por número de clave.

Garantía

GARANTÍA LIMITADA DE UN AÑO DE BROAN

Broan garantiza al consumidor comprador original de sus productos que dichos productos estarán libres de defectos en materiales o mano de obra durante un período de un año a partir de la fecha de compra original. NO EXISTEN OTRAS GARANTÍAS, EXPLÍCITAS O IMPLÍCITAS, INCLUYENDO, ENTRE OTRAS, GARANTÍAS IMPLÍCITAS DE COMERCIALIZACIÓN O APTITUD PARA UN PROPÓSITO PARTICULAR.

Durante este período de un año, Broan, a su criterio, reparará o reemplazará sin cargo alguno cualquier pieza o producto que se encuentre defectuoso bajo condiciones normales de uso y servicio.

LA PRESENTE GARANTÍA NO CUBRE TUBOS O ARRANCADORES DE LÁMPARAS FLUORESCENTES, BOMBILLAS HALÓGENAS E INCANDESCENTES, FUSIBLES, FILTROS, CONDUCTOS, TAPAS DE TECHO O DE PARED Y DEMÁS ACCESORIOS DE CANALIZACIÓN. Esta garantía no cubre (a) mantenimiento y servicio normales, ni (b) ningún producto o piezas que se hayan sometido a uso inadecuado, negligencia, accidente, mantenimiento o reparación inadecuada (no hecha por Broan), instalación incorrecta o instalación en contra de las instrucciones de instalación recomendadas.

La duración de cualquier garantía implícita se limita a un período de un año, como se especifica en la garantía expresa. Algunos estados no permiten limitaciones en cuanto al tiempo de vencimiento de una garantía implícita, por lo que la limitación antes mencionada podría no aplicarse a usted.

LA OBLIGACIÓN DE BROAN DE REPARAR O REEMPLAZAR, A CRITERIO DE BROAN, SERÁ EL ÚNICO Y EXCLUSIVO RECURSO DEL COMPRADOR BAJO ESTA GARANTÍA. BROAN NO SERÁ RESPONSABLE POR DAÑOS INCIDENTALES, RESULTANTES O ESPECIALES QUE SURJAN DEL USO O DESEMPEÑO DEL PRODUCTO O EN RELACIÓN CON ESTE. Algunos estados no permiten la exclusión o limitación de daños incidentales o resultantes, por lo que la limitación antes mencionada podría no aplicarse a usted.

Esta garantía le otorga derechos legales específicos, y usted podría tener otros derechos que varían de un estado a otro. Esta garantía sustituye todas las garantías anteriores.

Para tener derecho al servicio de la garantía, usted debe (a) notificar a Broan NuTone a la dirección y número de teléfono que aparecen abajo, (b) proporcionar el número de modelo y la identificación de la pieza y (c) describir la naturaleza de cualquier defecto en el producto o pieza. En el momento de solicitar el servicio cubierto por la garantía, debe presentar un comprobante de la fecha original de compra.

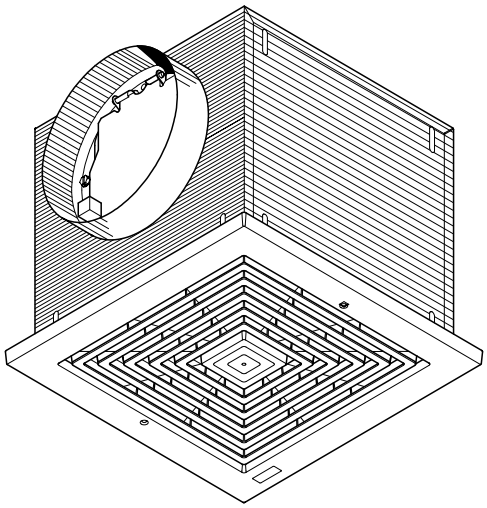
Broan
926 W. State Street, Hartford, Wisconsin 53027
www.broan.com 800-558-1711

BROAN®

USER AND INSTALLER MANUAL

LIGHT COMMERCIAL
ENERGY STAR® CERTIFIED VENTILATORS
CEILING/WALL MOUNT

MODELS L100E - L150E - L200E - L250E - L300E



CAN BE USED TO COMPLY WITH ASHRAE 90.1 2019

CAN BE USED TO COMPLY WITH IECC-C 2021

CAN BE USED TO COMPLY WITH IMC 2021

ENERGY STAR

amca CERTIFIED RATINGS SOUND AND AIR PERFORMANCE AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

® 2100 HVI CERTIFIED

INSTALLER: READ THESE INSTRUCTIONS
SAVE THEM FOR USER

RESIDENTIAL AND LIGHT COMMERCIAL USE ONLY

1108065B

Please take note that this manual uses the following symbols to emphasize particular information:

⚠ WARNING
Identifies an instruction which, if not followed, might cause serious personal injuries including possibility of death.

CAUTION
Denotes an instruction which, if not followed, may severely damage the unit and/or its components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

LIMITATION

For residential (domestic) and light commercial installation only.

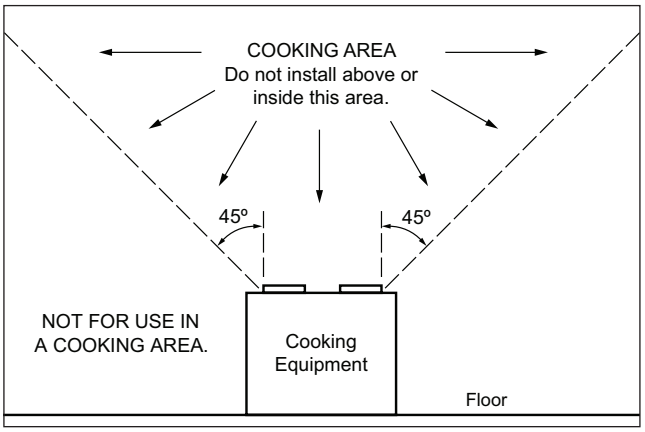
⚠WARNING

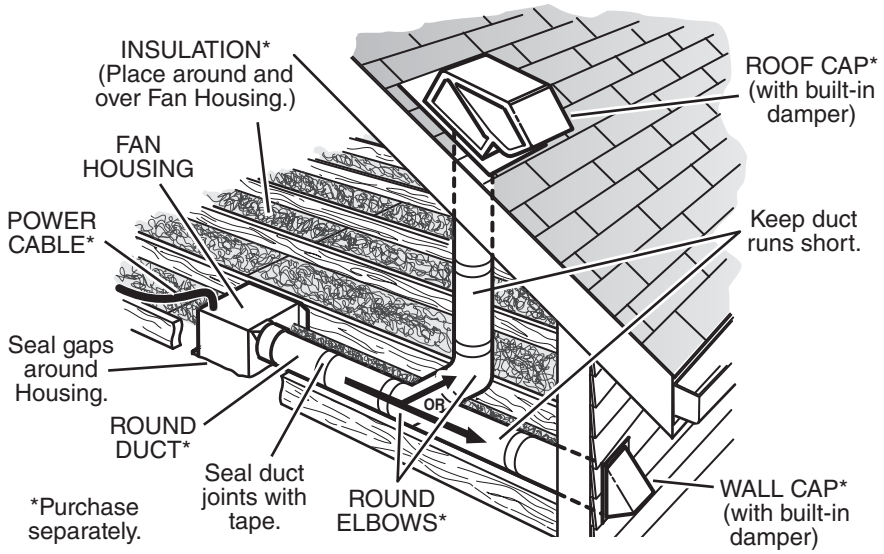
TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSON(S) OBSERVE THE FOLLOWING:

1. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer at the address or telephone number listed in the warranty.
2. Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
3. Installation work and electrical wiring must be done by a qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction codes and standards.
4. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
5. When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.
6. Ducted fans must always be vented to the outdoors.
7. To reduce the risk of fire, use only metal ductwork.
8. Models L100E, L150E, L200E, L250E and L300E only:
   If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Interrupter) - protected branch circuit.
9. Never place a switch where it can be reached from a tub or shower.
10. This unit must be grounded.
11. The wearing of safety glasses and gloves is recommended when installing, maintaining or cleaning the unit to reduce the risk of injury that could be caused by the presence of thin metal and/or moving parts.
12. If the fan makes excessive noise or if there is unusual noise or smells of smoke, disconnect power supply and contact customer service.

CAUTION

1. For general ventilating use only. Do not use to exhaust hazardous or explosive materials and vapors.
2. To avoid motor bearing damage and noisy and/or unbalanced impellers, keep drywall spray, construction dust, etc. off power unit.
3. Please read specification label on product for further information and requirements.





Ducting has a strong effect on the air flow, noise and energy use of the fan. Use the shortest, straighest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

8-inch round rigid metal duct is recommended for best performance.

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1. WARRANTY

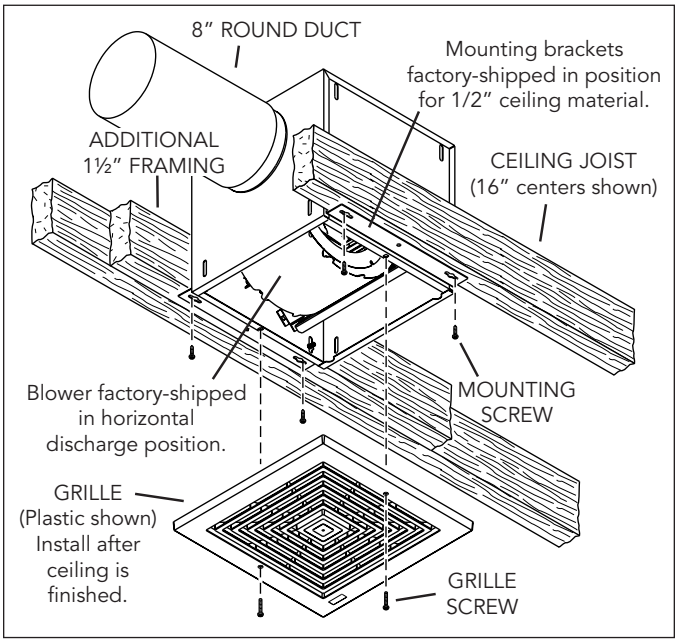
Broan-NuTone warrants to the original consumer purchaser of its products that such products will be free from defects in materials or workmanship for a period of one year from the date of original purchase. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
During this one-year period, Broan-NuTone will, at its option, repair or replace, without charge, any product or part which is found to be defective under normal use and service.
THIS WARRANTY DOES NOT EXTEND TO FLUORESCENT LAMP STARTERS AND TUBES. This warranty does not cover (a) normal maintenance and service or (b) any products or parts which have been subject to misuse, negligence, accident, improper maintenance or repair (other than by Broan-NuTone), faulty installation or installation contrary to recommended installation instructions.
The duration of an implied warranty is limited to the one-year period as specified for the express warranty. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.
BROAN-NUTONE'S OBLIGATION TO REPAIR OR REPLACE, AT BROAN-NUTONE'S OPTION, SHALL BE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. BROAN-NUTONE SHALL NOT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH PRODUCT USE OR PERFORMANCE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.
This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty supersedes all prior warranties.
To qualify for warranty service, you must (a) notify Broan-NuTone at the address or phone number stated below (b) give the model number and part identification and (c) describe the nature of any defect in the product or part. At the time of requesting warranty service, you must present evidence of the original purchase date.
Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 1 800-558-1711 www.broan-nutone.com
Venmar Ventilation ULC, 550 Lemire Blvd., Drummondville, Québec Canada J2C 7W9 1 800-567-3855 www.broan-nutone.ca

2. TYPICAL INSTALLATION

⚠ WARNING

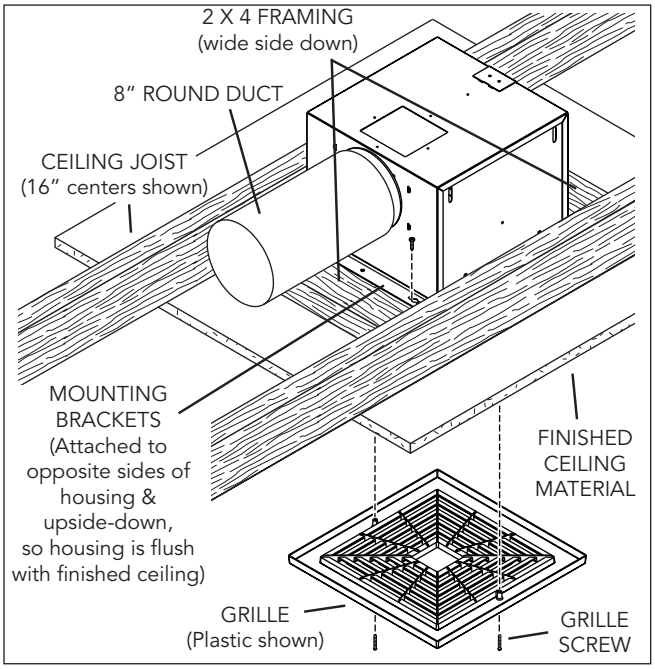
The wearing of safety glasses and gloves is recommended when installing, maintaining or cleaning the unit to reduce the risk of injury that could be caused by the presence of thin metal and/or moving parts.

2.1 Mounting (New Frame Construction)



Factory-shipped unit installed in new construction.

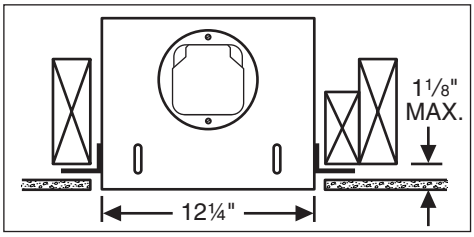
2.2 Mounting (Existing Frame Construction)



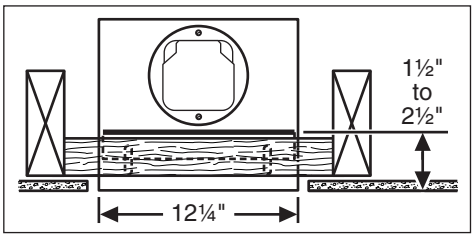
Factory-shipped unit installed in existing construction.

3. MOUNTING OPTIONS

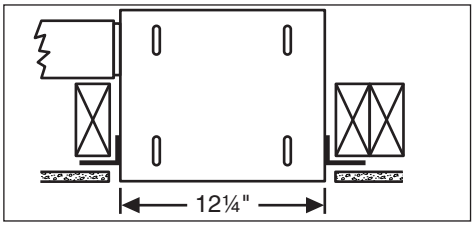
Use 1/4-20 hex. nuts to secure mounting brackets to housing. Loosen and re-tighten or remove and replace nuts as necessary for desired mounting bracket position.



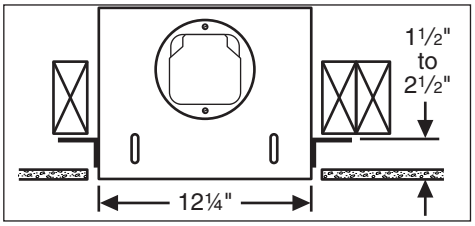
Mounting brackets in factory-shipped position.
(Outlet parallel to joists.) (New construction)



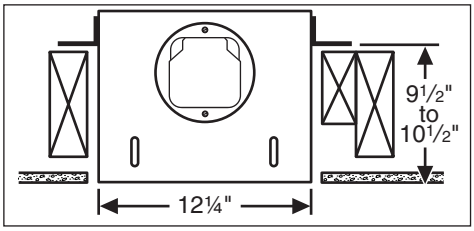
Mounting brackets flipped over and mounted to outlet sides of housing.
(Outlet parallel to joists.) (Existing construction)



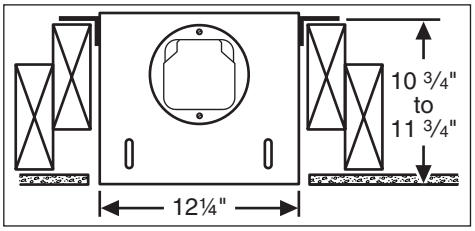
Mounting brackets mounted to outlet sides of housing.
(Outlet perpendicular to joists.)
(New construction)



Mounting brackets flipped over to give approx. 1" more clearance.
(Outlet parallel to joists.)
(New construction)



Mounting brackets mounted to top of sides of housing.
(Outlet parallel to joists.)
(New or existing construction)

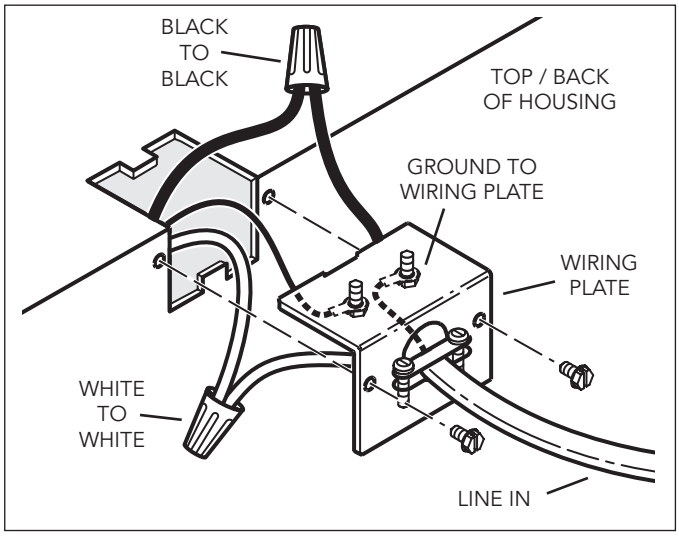


Mounting brackets flipped over and mounted to top of sides of housing.
(Outlet parallel to joists.)
(New or existing construction)

4. WIRING

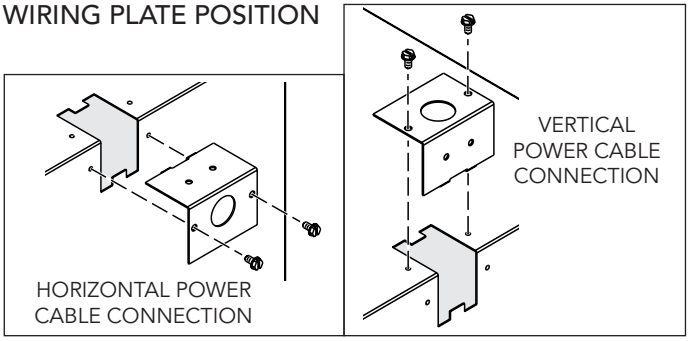
⚠ WARNING

Electrical wiring must be done by a qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction codes and standards.



Ventilator can be wired from outside of housing.
Use UL approved connectors to wire per local codes.

WIRING PLATE POSITION



Wiring plate mounts to side or top of housing.

5. DUCTING

CAUTION

Remove shipping tape from damper.

Remove the shipping tape from the damper flap and make sure that damper flap opens and closes freely inside the ductwork. Use duct tape to make ductwork connections secure and air-tight.

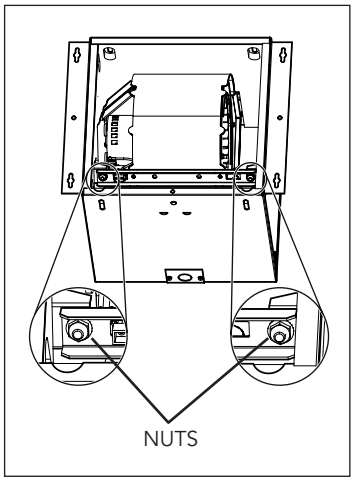
CAUTION

Remove shipping ring from blower inlet.

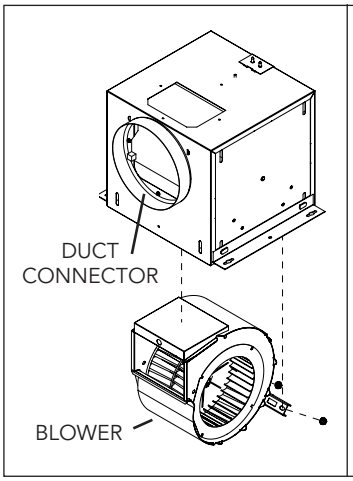
Remove the shipping ring from the blower inlet before operating the ventilator.

5. DUCTING (CONT'D)

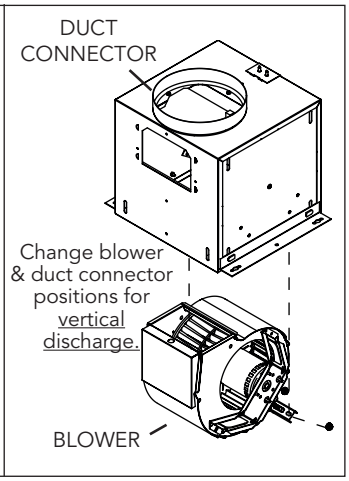
5.1 Blower Discharge Positions



To remove blower: unplug blower and remove 2 blower retaining nuts

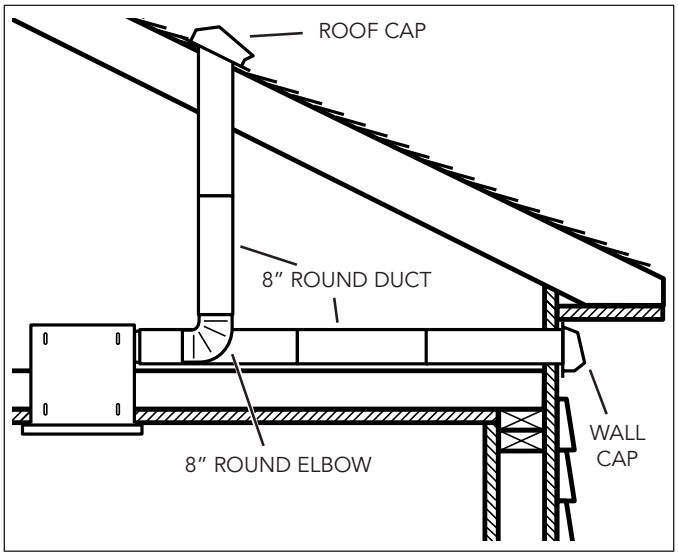


Blower and duct connector in horizontal discharge position. (Factory shipped)



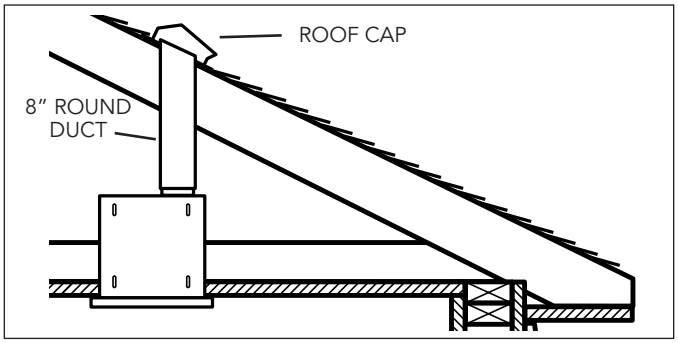
Blower and duct connector in vertical discharge position.

5.2 Horizontal Blower Discharge



Two ways to connect ductwork to a factory-shipped unit.

5.3 Vertical Blower Discharge



Typical ductwork connection to a ventilator converted to vertical discharge.

6. USE AND CARE

Ventilator is designed for continuous operation. If desired, it may be controlled using an on/off switch or a solid-state, variable speed control. Follow wiring instructions packed with control, and adhere to all local and state codes, and the National Electrical Code.

⚠ WARNING

To reduce the risk of electric shock, disconnect from power supply before servicing.

To clean grille: Use vacuum soft brush attachment or remove grille and clean with a soft cloth and mild soap or detergent. Dry grille thoroughly before reinstalling.

To clean blower assembly: Remove grille, unplug blower from housing, remove blower mounting nuts, and carefully remove blower from housing. Vacuum blower and interior of unit with the dusting brush attachment.

Motor is permanently lubricated. Do not oil or disassemble motor.

If the product is making excessive or unusual noises, replace the blower assembly.

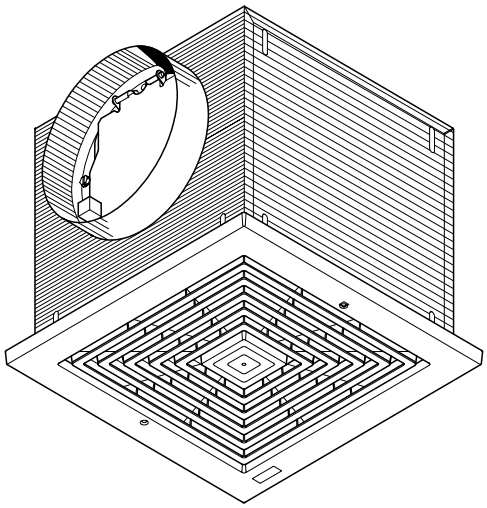
BROAN®

GUIDE D'INSTALLATION ET D'UTILISATION

VENTILATEUR DE TYPE COMMERCIAL LÉGER CERTIFIÉS ENERGY STAR®

MONTAGE AU PLAFOND OU AU MUR

MODÈLES L100E - L150E - L200E - L250E - L300E



CAN BE USED TO COMPLY WITH ASHRAE 90.1 2019

CAN BE USED TO COMPLY WITH IECC-C 2021

CAN BE USED TO COMPLY WITH IMC 2021

ENERGY STAR

amca CERTIFIED RATINGS SOUND AND AIR PERFORMANCE AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

® 2100 HVI CERTIFIED

INSTALLATEUR : LIRE CES INSTRUCTIONS ET LES CONSERVER POUR L'UTILISATEUR

USAGE RÉSIDENTIEL ET COMMERCIAL LÉGER SEULEMENT

1108065B

Veuillez noter que dans ce guide, les symboles suivants sont utilisés afin d'accentuer certaines informations particulières :

⚠ AVERTISSEMENT
Identifie une directive qui, si elle n'est pas suivie, peut causer de graves blessures corporelles ou la mort.

ATTENTION
Identifie une directive qui, si elle n'est pas suivie, peut gravement endommager l'appareil ou ses pièces.

NOTE : Indique une information supplémentaire afin de réaliser complètement une directive.

LIMITATION

Pour installation résidentielle (domestique) et commercial léger seulement.

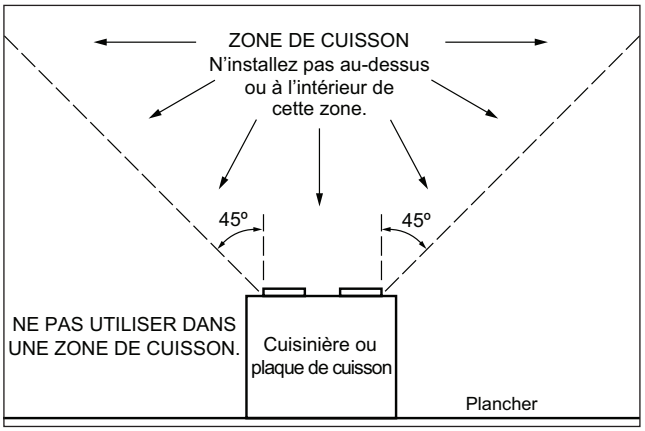
⚠AVERTISSEMENT

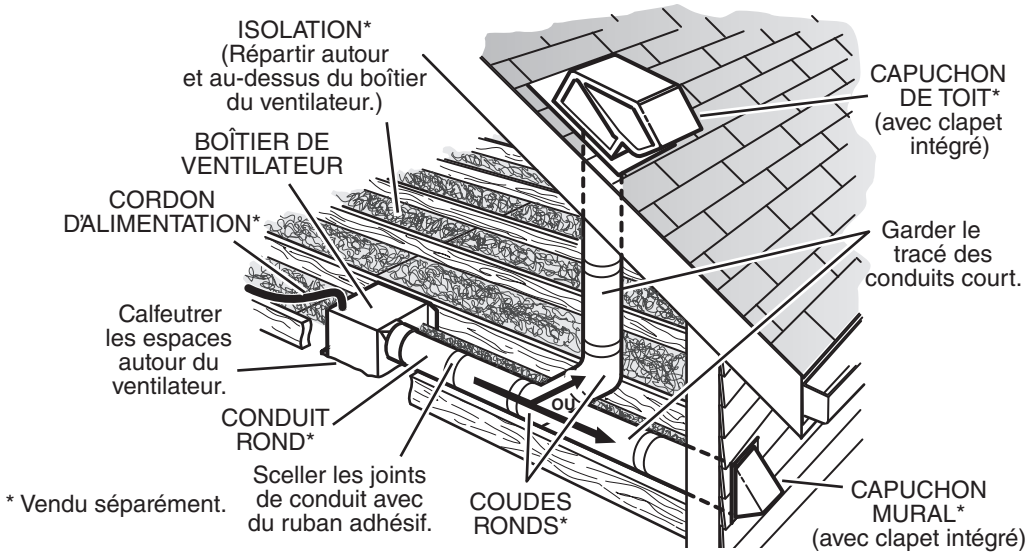
AFIN DE DIMINUER LES RISQUES D'INCENDIE, D'ÉLECTROCUTION OU DE BLESSURES CORPORELLES, SUIVEZ LES DIRECTIVES SUIVANTES :

1. N'utiliser cet appareil que de la façon prévue par le fabricant. Pour toute question, contactez le fabricant à l´adresse ou au numéro de téléphone qui se trouve dans la garantie.
2. Avant d'effectuer une réparation ou un entretien sur cet appareil, coupez le courant au tableau d'alimentation et verrouillez celui-ci pour empêcher que la tension soit remise accidentellement. Lorsque le verrouillage de la déconnexion n'est pas possible, mettez bien en vue un signal d'avertissement telle qu'une étiquette, sur le panneau d'alimentation.
3. L´installation et la pose des fils électriques doivent être effectuées par une ou des personnes qualifiées conformément à tous les codes et normes applicables, incluant les normes de construction relatives à la prévention des incendies.
4. Une quantité d'air adéquate est requise afin d'assurer une bonne combustion et l'évacuation des gaz par la cheminée dans le cas des équipements alimentés au gaz afin de prévenir les retours de cheminée. Suivez les instructions du fabricant de l´équipement de chauffage et les normes de sécurité telles que celles publiées par la *National Fire Protection Association* (NFPA) et l´*American Society for Heating, Refrigeration and Air Conditioning Engineers* (ASHRAE) et des responsables des codes locaux.
5. Lorsque vous coupez ou perforez un mur ou un plafond, ne pas endommager les fils électriques ou autres équipements qui pourraient y être dissimulés.
6. Les ventilateurs avec conduits doivent toujours évacuer l'air à l'extérieur.
7. Afin de réduire les risques d'incendie, n'utilisez que des conduits de métal.
8. Modèles L100E, L150E, L200E, L250E et L300E seulement :
   Si cet appareil doit être installé au-dessus d'une baignoire ou d'une douche, il doit être marqué comme étant approprié pour l'application et être connecté à un disjoncteur de fuite à la terre (DDFT).
9. Ne placez jamais un interrupteur dans un endroit où il peut être rejoint d'une baignoire ou d'une douche.
10. Cet appareil doit être mis à la terre.
11. Il est recommandé de porter des lunettes et des gants de sécurité lors de l'installation, de l'entretien ou du nettoyage de cet appareil afin de réduire le risque de blessure causée par la présence d'arête vive et/ou de pièces mobiles.
12. Si le ventilateur produit un bruit excessif ou s'il y a un bruit, une odeur ou de la fumée inhabituels, débrancher la source d'alimentation et contacter le service à la clientèle.

ATTENTION

1. Pour ventilation générale seulement. Ne pas utiliser pour évacuer des vapeurs ou des matières dangereuses ou explosives.
2. Afind'éviter tout dommage aux roulements du moteur et le déséquilibre de la turbine, ou de la rendre bruyante, garder l'appareil à l'abri des poussières de gypse et de construction/rénovation, etc.
3. Veuillez lire l´étiquette de spécifications sur le produit pour d´autres renseignements et exigences.





Les conduits ont une grande influence sur le débit d'air, le bruit du ventilateur et sa consommation d'énergie. Pour obtenir le meilleur rendement, utilisez les conduits les plus courts et les plus droits que possible et évitez d'utiliser des conduits plus petits que ceux recommandés. L'isolation des conduits peut contribuer à réduire les pertes d'énergie et éviter la prolifération de moisissures. Les ventilateurs installés sur d'anciens conduits pourraient ne pas produire leur débit d'air nominal.

Pour un rendement optimal, il est recommandé d'utiliser des conduits métalliques ronds de 20,3 cm (8 po) de diamètre.

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5.3 ÉVACUATION VERTICALE DU VENTILATEUR 8

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1. GARANTIE

Broan-NuTone garantit à l'acheteur consommateur original, de ses produits qu'ils sont exempts de défauts dans les matières premières ou la main-d'oeuvre pour une période de un an à compter de la date d'achat original. IL N'Y A PAS D'AUTRES GARANTIES, EXPRIMÉES OU IMPLICITES, INCLUANT MAIS NON PAS LIMITÉ AUX GARANTIES IMPLICITES POUR FIN DE COMMERCIALISATION ET DE CONVENANCE DANS UN BUT PARTICULIER.

Pendant cette période d'un an, Broan-NuTone, à son choix, réparera ou remplacera, gratuitement, tout produit ou pièce qui s'avère défectueux sous utilisation et service normaux.

CETTE GARANTIE NE COUVRE PAS LES DÉMARREURS DE LAMPES FLUORESCENTES ET LES TUBES. Cette garantie ne couvre pas (a) l'entretien et le service normal ou (b) tout produit ou pièce endommagé par suite de mauvais usage, négligence, accident, entretien inapproprié ou réparation (autre que par Broan-NuTone), mauvaise installation ou installation contraire au mode d'installation recommandé. La durée de toute garantie implicite est limitée à une période de un an tel que spécifié pour la garantie exprimée.

L'ENGAGEMENT DE BROAN-NUTONE DE RÉPARER OU DE REMPLACER, AU CHOIX DE BROAN-NUTONE, SERA LA SEULE OBLIGATION EXCLUSIVE SOUS CETTE GARANTIE. BROAN-NUTONE NE SE TIENDRA PAS RESPONSABLE DES DOMMAGES DIRECTS, INDIRECTS OU SPÉCIAUX SURVENANT À CAUSE DE OU EN RAPPORT À L'UTILISATION OU LA PERFORMANCE DE SES PRODUITS. Cette garantie vous donne des droits légaux spécifiques et il se peut que vous ayez d'autres droits. Cette garantie annule toutes les garanties précédentes.

Pour le service sous garantie, vous devez (a) aviser Broan-NuTone á l'adresse ou numéro de téléphone mentionnée ci-dessous, (b) donner le numéro du modèle et l'identification de la pièce et (c) décrire la nature de tout défaut dans le produit ou la pièce. Au temps de demander le service sous garantie, vous devez présenter une preuve de la date d'achat original.

Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 1 800 558-1711 www.broan-nutone.com

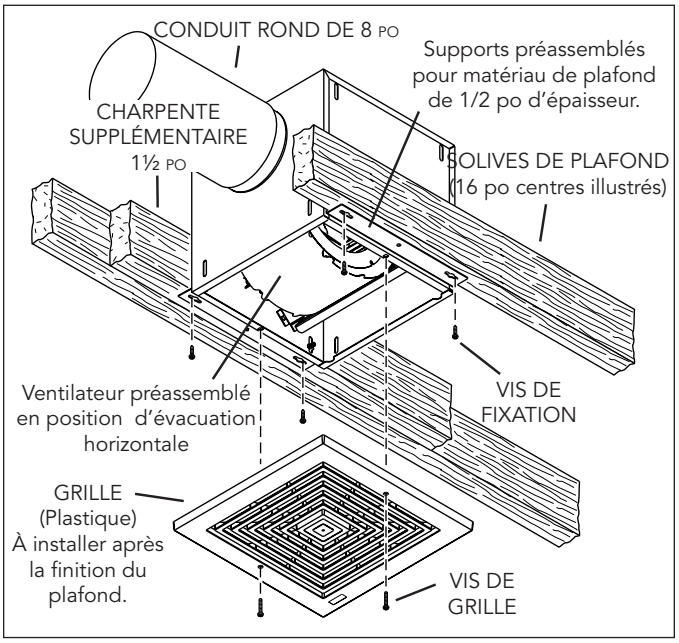
Venmar Ventilation ULC, 550 boul. Lemire, Drummondville, Québec Canada J2C 7W9 1 800 567-3855 www.broan-nutone.ca

2. INSTALLATION TYPE

⚠ AVERTISSEMENT

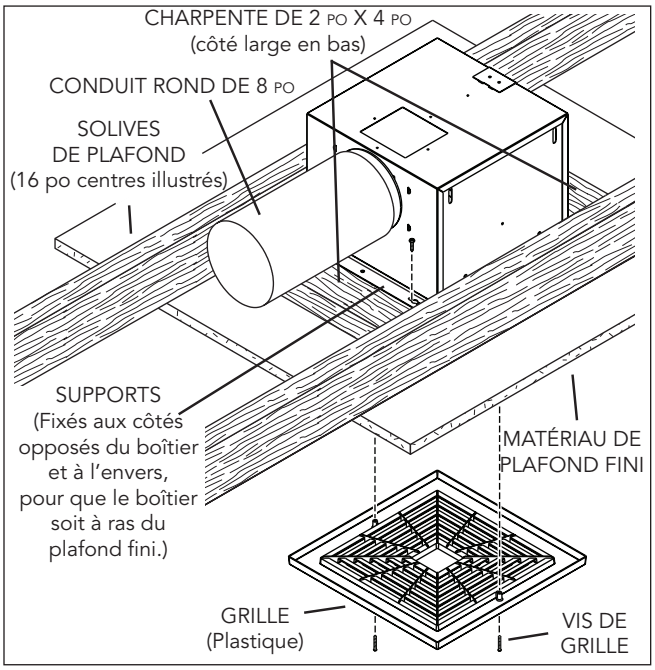
Il est recommandé de porter des lunettes et des gants de sécurité lors de l'installation, de l'entretien ou du nettoyage de cet appareil afin de réduire le risque de blessure causée par la présence d'arête vive et/ou de pièces mobiles.

2.1 Montage (Construction en cours)



Appareil installé dans un bâtiment en cours de construction.

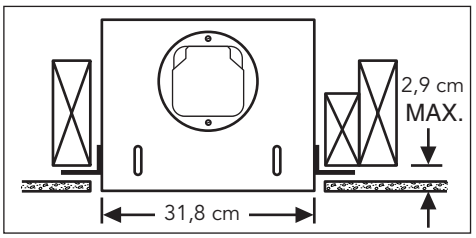
2.2 Montage (Construction existante)



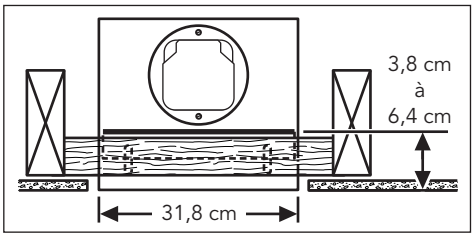
Appareil installé dans un bâtiment déjà construit.

3. OPTIONS DE MONTAGE

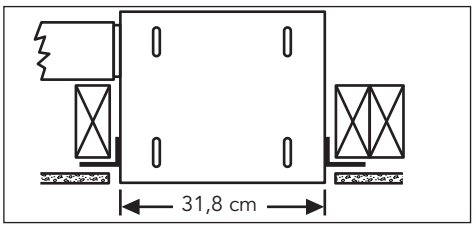
Des écrous à six pans 1/4-20 fixent les supports au boîtier. Desserrer et resserrer ou retirer et replacer les écrous si nécessaire, selon la position désirée pour le support.



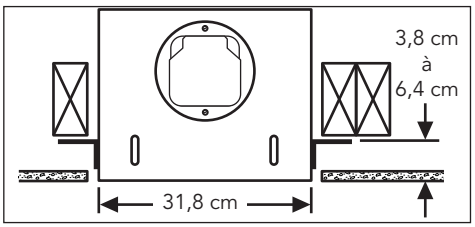
Supports en position préassemblée.
(Sortie parallèle aux solives.)
(Bâtiment en cours de construction)



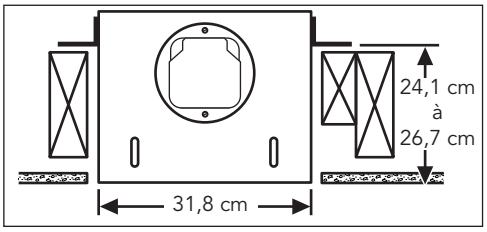
Supports retournés et fixés de part et d'autre de la sortie du boîtier.
(Sortie parallèle aux solives.) (Bâtiment déjà construit)



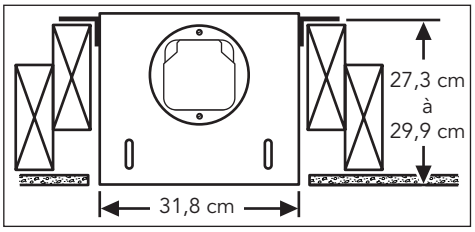
Supports fixés de part et d'autre de la sortie du boîtier.
(Sortie perpendiculaire aux solives.)
(Bâtiment en cours de construction)



Supports retournés pour donner environ 1 po de dégagement supplémentaire.
(Sortie parallèle aux solives.)
(Bâtiment en cours de construction)



Supports fixés sur le dessus, de part et d'autre du boîtier.
(Sortie parallèle aux solives.)
(Bâtiment en cours de construction ou déjà construit)

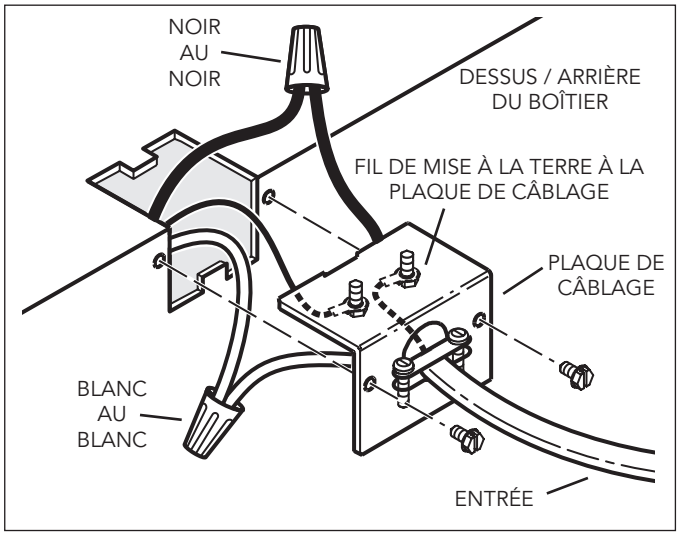


Supports retournés et fixés sur le dessus, de part et d'autre du boîtier.
(Sortie parallèle aux solives.)
(Bâtiment en cours de construction ou déjà construit)

4. CÂBLAGE

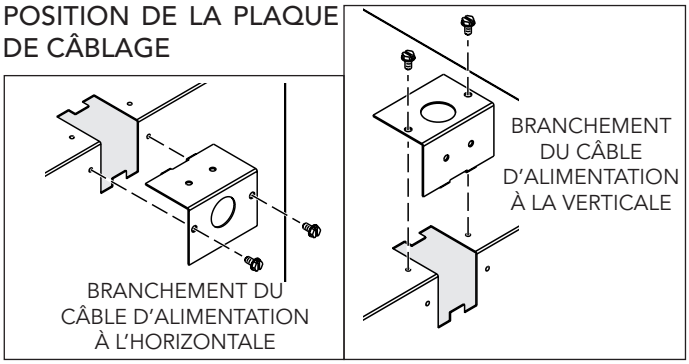
⚠ AVERTISSEMENT

Le câblage électrique doit être effectué par du personnel qualifié conformément à tous les codes et normes applicables, incluant les normes de construction relatives à la prévention des incendies.



Le ventilateur peut être branché depuis l'extérieur du boîtier. Utiliser des connecteurs homologués UL pour les branchements, conformément aux codes locaux en vigueur.

POSITION DE LA PLAQUE DE CÂBLAGE



La plaque de câblage se fixe sur le côté ou sur le dessus du boîtier.

5. INSTALLATION DES CONDUITS

ATTENTION

Retirer le ruban adhésif d'expédition du volet.

Veiller à retirer le ruban adhésif d'expédition du volet du registre et s'assurer que ce dernier s'ouvre et se ferme librement à l'intérieur du conduit. Utiliser du ruban adhésif pour assurer et étancher les raccords des conduits.

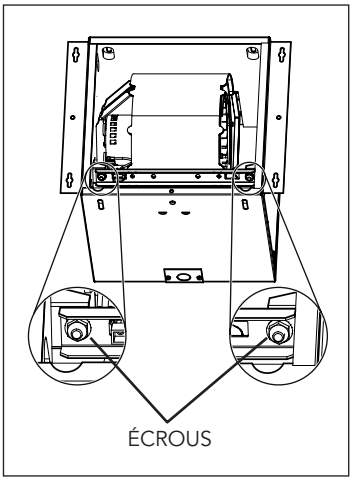
ATTENTION

Retirer l'anneau d'expédition de la prise d'air du ventilateur.

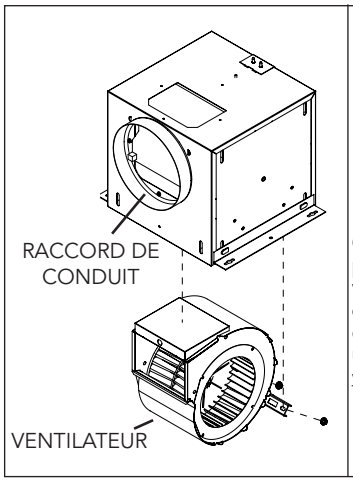
Retirez l'anneau d'expédition de la prise d'air du ventilateur avant de faire fonctionner le ventilateur.

5. INSTALLATION DES CONDUITS (SUITE)

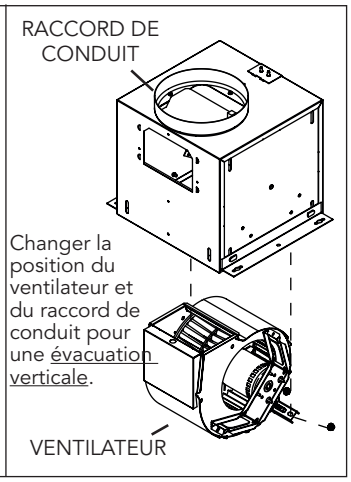
5.1 Positions d'évacuation du ventilateur



Pour retirer le ventilateur : débrancher le ventilateur et retirer ses 2 écrous de retenue

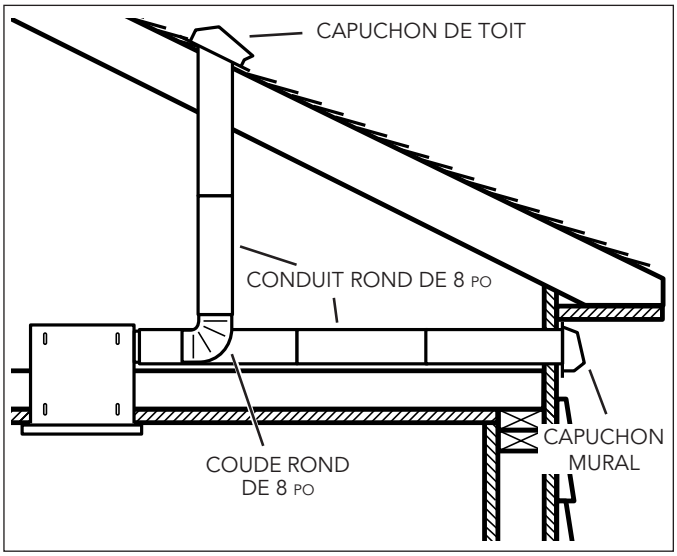


Ventilateur et raccord de conduit en position d'évacuation horizontale (Préassemblés)



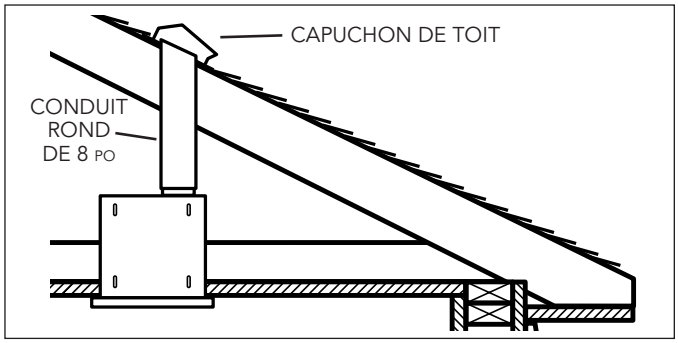
Ventilateur et raccord de conduit en position d'évacuation verticale

5.2 Évacuation horizontale du ventilateur



Deux manières de raccorder les conduits à un appareil prémonté.

5.3 Évacuation verticale du ventilateur



Raccordement de conduit typique à un ventilateur converti en décharge verticale.

6. UTILISATION ET ENTRETIEN

Le ventilateur a été conçu pour une utilisation en continu. Si désiré, il peut être commandé à l'aide d'un interrupteur marche/arrêt ou d'un régulateur de vitesse à semi-conducteurs. Suivre les instructions de câblage fournies avec le régulateur et respecter tous les codes locaux et provinciaux en vigueur, de même que le Code national de l'électricité.

⚠ AVERTISSEMENT

Pour réduire les risques de décharge électrique, débrancher la source d'alimentation avant toute opération d'entretien.

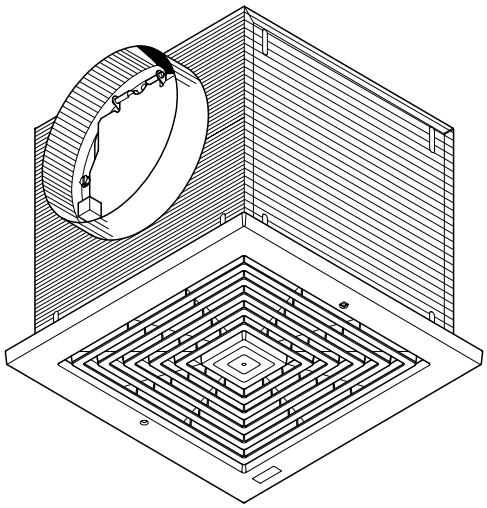
Pour nettoyer la grille : Utiliser l'aspirateur muni d'une brosse à épousseter ou retirer la grille et la nettoyer à l'aide d'un chiffon doux et de savon ou de détergent doux. Bien essuyer la grille avant de la réinstaller.
Pour nettoyer le ventilateur : Retirer la grille, débrancher le ventilateur du boîtier, retirer les écrous de fixation du ventilateur et le retirer délicatement du boîtier. Nettoyez le ventilateur et l'intérieur de l'appareil avec un aspirateur muni d'une brosse à épousseter.
Le moteur est lubrifié en permanence. Ne pas lubrifier ou démonter le moteur.
Si les roulements du moteur sont anormalement bruyants, remplacez l'ensemble de ventilateur.

BROAN®

MANUAL DEL USUARIO Y DEL INSTALADOR

VENTILADORES COMERCIALES LIGEROS CERTIFICADOS ENERGY STAR®
PARA MONTAJE EN CIELO RASO/PARED

MODELOS L100E - L150E - L200E - L250E - L300E



CAN BE USED TO COMPLY WITH ASHRAE 90.1 2019

CAN BE USED TO COMPLY WITH IECC-C 2021

CAN BE USED TO COMPLY WITH IMC 2021

ENERGY STAR

amca CERTIFIED RATINGS SOUND AND AIR PERFORMANCE AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

® 2100 HVI CERTIFIED

INSTALADOR: LEA ESTAS INSTRUCCIONES
GUÁRDELAS PARA EL USUARIO

PARA USO RESIDENCIAL Y
COMERCIAL LIGERO ÚNICAMENTE

1108065B

Este manual utiliza los siguientes símbolos para hacer hincapié en determinada información:

⚠ ADVERTENCIA
Se refiere a una instrucción que, si no se sigue, puede provocar lesiones personales graves, incluso causar la muerte.

PRECAUCIÓN
Denota una instrucción que, si no se sigue, puede dañar gravemente el aparato y/o sus componentes.

NOTA: Indica la información complementaria necesaria para completar una instrucción.

LIMITACIÓN

Para instalación residencial (doméstica) y comercial ligero solamente.

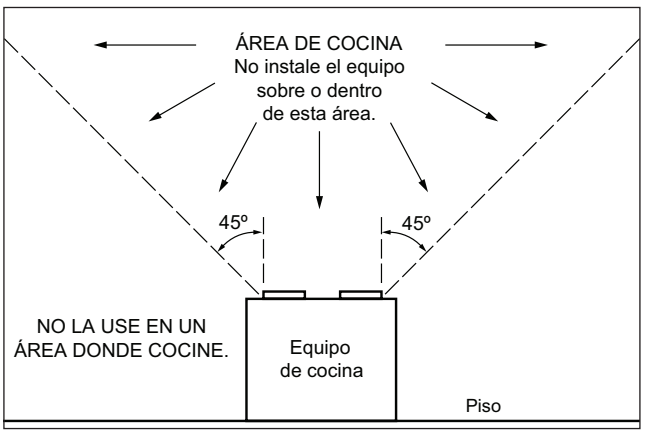
⚠ADVERTENCIA

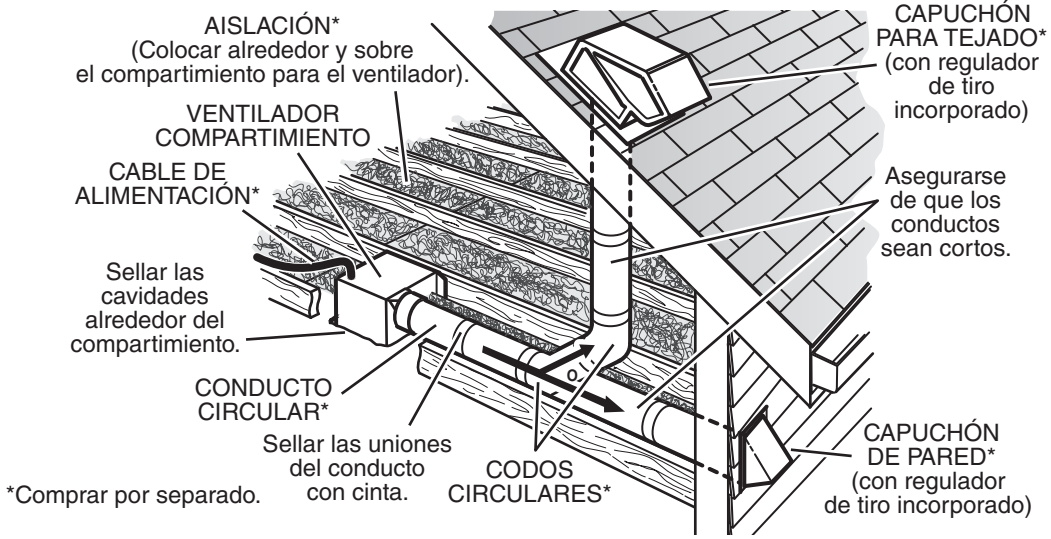
PARA REDUCIR EL RIESGO DE FUEGO, CHOQUE ELÉCTRICO O HERIDAS CORPORALES, SIGA LAS INDICACIONES SIGUIENTES:

1. Utilice este aparato sólo en la forma prevista por el fabricante. Si tiene preguntas, póngase en contacto con el fabricante a la dirección o teléfono que aparecen en la garantía.
2. Antes de limpiar o de poner en servicio la unidad, apague el interruptor en el panel de servicio, y asegure el panel de servicio para evitar que se encienda accidentalmente. Cuando el dispositivo para desconectar el servicio eléctrico no puede ser cerrado con algún tipo de traba, sujete fuertemente al panel de servicio, una etiqueta de advertencia prominente.
3. El trabajo de instalación y cableado eléctrico deben estar hechos por personal capacitado de acuerdo con todos los códigos y estándares aplicables, incluyendo códigos y estándares de construcción a prueba de incendios.
4. Se necesita suficiente aire para la combustión y extracción de gases por la chimenea del equipo que quema combustible para evitar la retrogresión de las llamas. Siga las directrices del fabricante y estándares de seguridad como los publicados por la Asociación Nacional de Protección Contra Incendios (o por sus siglas en inglés NFPA), y la Sociedad Americana de Ingenieros de Calefacción, Refrigeración, y Aire Acondicionado (o por sus sigles en inglés ASHRAE), y los códigos de las autoridades locales.
5. Cuando corte o taladre en una pared o cielo raso, no dañe cableado eléctrico o instalaciones no visibles.
6. Ventiladores con conductos siempre deben extraer hacia el exterior.
7. Para reducir el riesgo de incendio, use sólo ductos de metal.
8. Modelos L100E, L150E, L200E, L250E y L300E solamente:
   Si esta unidad va a instalarse sobre una bañera o ducha, debe marcársela como correcta para dicha aplicación y debe conectarse a un protegido GFCI (Cortacicuito Accidental a Tierra).
9. Nunca instale un interruptor donde se pueda alcanzar desde una bañera o ducha.
10. Esta unidad se debe conectar a tierra.
11. Se aconseja llevar guantes y gafas de protección durante la instalación, el mantenimiento o la limpieza del aparato para reducir el riesgo de lesiones causadas por la presencia de metal delgado y/o de piezas móviles.
12. Si se observan sonidos, olores y humo anormales en su ventilador o si algunos aparecen, apagar el ventilador inmediatamente y póngase en contacto con el servicio al cliente.

PRECAUCIÓN

1. Para uso de ventilación general solamente. No lo use para extraer materiales o vapores peligrosos o explosivos.
2. Para evitar daño a los cojinetes del motor y hélices ruidosas y/o desequilibradas, mantenga la unidad de potencia lejos de rocíos de yeso, polvo de construcción, etc.
3. Para más información y requisitos favor leer la etiqueta de especificaciones del producto.





Los conductos tienen un gran efecto sobre el flujo de aire, el ruido y el uso de energía del ventilador. Utilice el tramo de conductos más corto y recto posible para obtener un desempeño óptimo y evite instalar el ventilador con conductos menores que los recomendados. El aislamiento alrededor de los conductos puede reducir la pérdida de energía e inhibir el desarrollo de moho. Los ventiladores instalados en conductos existentes podrían no obtener el flujo de aire nominal.

Para un mejor desempeño, se recomienda utilizar conductos metálicos redondos y rígidos de 8 pulg. (20,3 cm).

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1. GARANTÍA

Broan-NuTone le garantiza al consumidor comprador original de sus productos que tales productos estarán libres de defectos en materiales o mano de obra por un período de un año a partir de la fecha de compra original. NO HAY OTRAS GARANTIAS EXPLICITAS O IMPLICITAS, INCLUYENDO, PERO NO LIMITADAS A GARANTIAS IMPLICITAS DE COMERCIALIZACION O APTITUD PARA UN PROPOSITO PARTICULAR.

Durante este período de un año, Broan-NuTone reparará o cambiará, a su opción y sin cobro, cualquier producto o pieza que se encuentre defectuosa bajo uso y servicio normal.

ESTA GARANTIA NO SE EXTIENDE A ARRANCADORES DE LAMPARAS FLUORESCENTES Y TUBOS. Esta garantía no cubre (a) mantenimiento y servicio normales o (b) cualquier producto o pieza que hayan sido sometidos a uso equivocado, negligencia, accidente, mantenimiento o reparación indebida (excepto por Broan-NuTone), instalación defectuosa o instalación contraria a las instrucciones de instalación.

La duración de cualquier garantía implícita se limita a un período de un año según se especifica en la garantía explícita. Algunos estados no permiten limitación a la duración de una garantía implícita, por lo que esta limitación tal vez no se aplica al caso suyo.

LA OBLIGACION DE BROAN-NUTONE DE REPARAR O CAMBIAR, A OPCION DE BROAN-NUTONE, SERA EL UNICO Y EXCLUSIVO REMEDIO AL COMPRADOR BAJO ESTA GARANTIA. BROAN-NUTONE NO SERA RESPONSABLE POR DAÑOS INCIDENTALES, CONSECUENTES, O ESPECIALES QUE SURJAN DE O EN RELACION A EL USO O DESEMPEÑO DEL PRODUCTO. Algunos estados no permiten la exlusión o limitación de daños incidentales o consecuentes, por lo que esta limitación o exclusión tal vez no se aplica en su caso.

Esta garantía le da derechos legales específicos, y usted puede tener otros derechos que varían de estado a estado. Esta garantía reemplaza todas las garantías anteriores.

Para calificar para servicio bajo esta garantía, usted debe (a) notificar a Broan-NuTone en la dirección o al teléfono que aparece abajo (b) dar el número de modelo y la identificación de pieza y (c) describir el defecto en el producto o pieza. Al solicitar servicio bajo la garantía, usted debe presentar evidencia de la fecha de compra original.

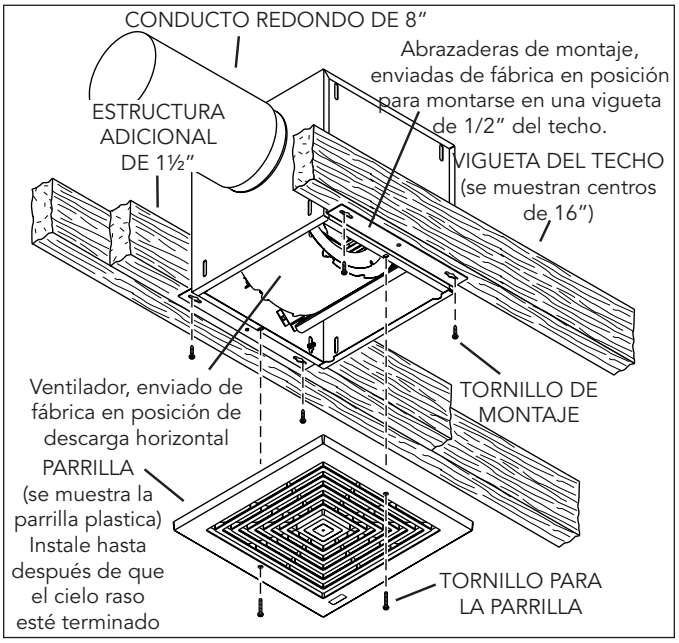
Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 1 800-558-1711 www.broan-nutone.com
Venmar Ventilation ULC, 550 boul. Lemire, Drummondville, Québec Canada J2C 7W9 1 800-567-3855 www.broan-nutone.ca

2. INSTALATIÓN TÍPICA

⚠ ADVERTENCIA

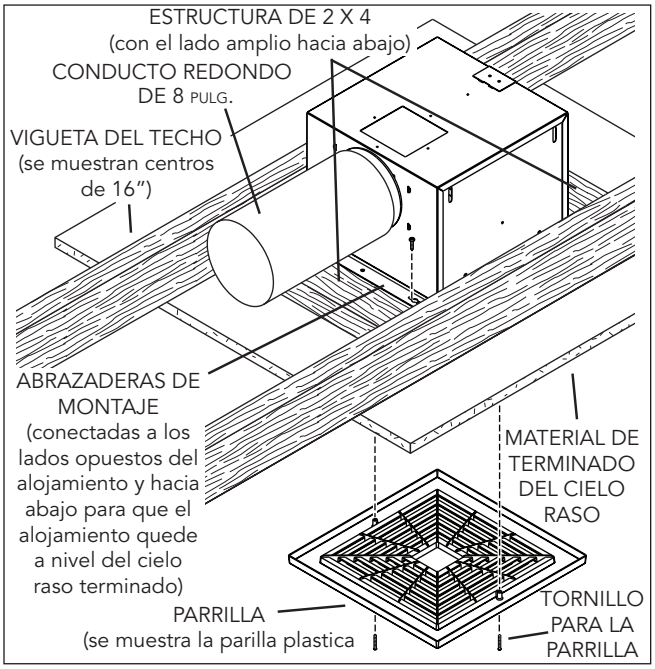
Se aconseja llevar guantes y gafas de protección durante la instalación, el mantenimiento o la limpieza del aparato para reducir el riesgo de lesiones causadas por la presencia de metal delgado y/o de piezas móviles.

2.1 Montaje (Estructura nueva)



Unidad enviada de fábrica instalada en una estructura nueva.

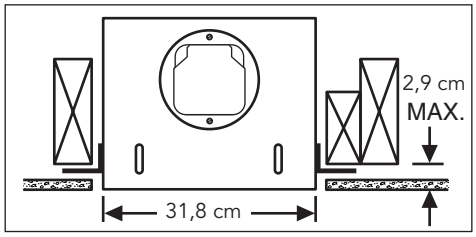
2.2 Montaje (Estructura existente)



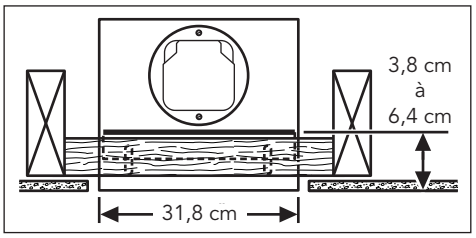
Unidad enviada de fábrica instalada en una estructura existente.

3. OPTIONES DE MONTAJE

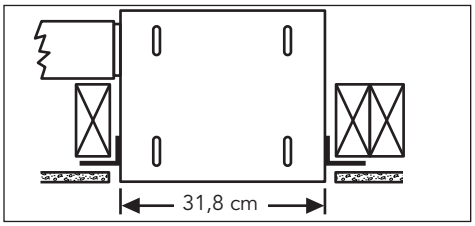
Las tuercas hexagonales de 1/4 x 20 aseguran las abrazaderas de montaje en el alojamiento. Afloje y vuelva a apretar o quite y reemplace las tuercas según sea necesario para colocar las abrazaderas de montaje en la posición deseada.



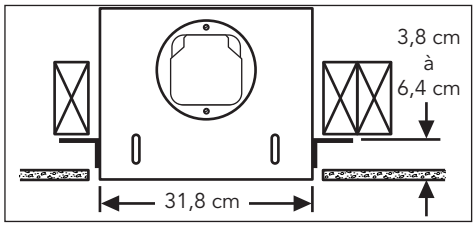
Abrazaderas de montaje en la posición ajustada en fábrica.
(La salida queda paralela a la viguetas)
(Estructura nueva)



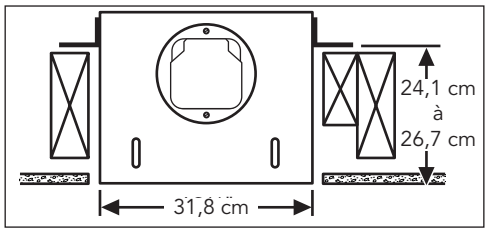
Abrazaderas de montaje volteadas y montadas a los lados de la salidad del alojamiento.
(La salida queda perpendicular a las viguetas)
(Estructura existente)



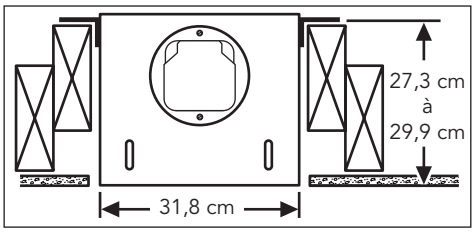
Abrazaderas de montaje montadas en los lados de la salida del alojamiento.
(La salida queda perpendicular a las viguetas)
(Estructura nueva)



Abrazaderas de montaje volteadas para permitir un espacio adicional de aprox. 1".
(La salida queda paralela a las viguetas)
(Estructura nueva)



Abrazaderas de montaje montadas en la parte superior de los lados del alojamiento.
(La salida queda paralela a las viguetas)
(Estructura nueva o existente)

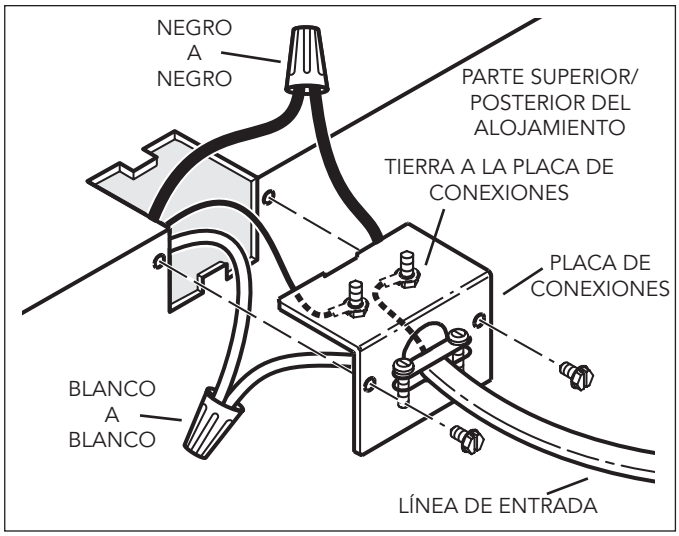


Abrazaderas de montaje volteadas y montadas en la parte superior de los lados del alojamiento.
(La salida queda paralela a las viguetas)
(Estructura nueva o existente)

4. CONEXIÓN ELÉCTRICA

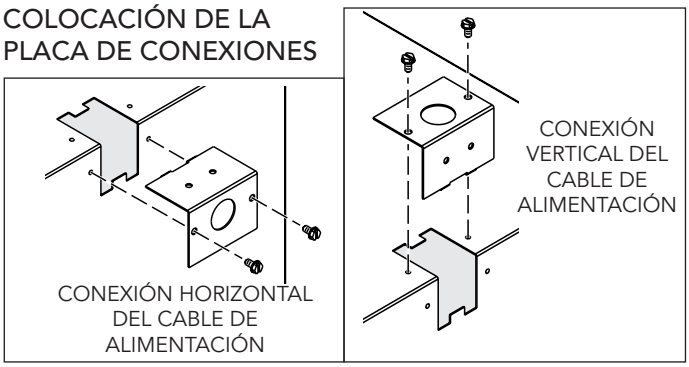
⚠ ADVERTENCIA

El trabajo de cableado eléctrico deben estar hechos por personal capacitado de acuerdo con todos los códigos y estándares aplicables, incluyendo códigos y estándares de construcción a prueba de incendios.



El ventilador se puede conectar desde el exterior del alojamiento. Use conectores aprobados por UL en la conexión en cumplimiento con los códigos locales.

COLOCACIÓN DE LA PLACA DE CONEXIONES



La placa de conexiones se monta a los lados o en la parte superior del alojamiento.

5. COLOCACIÓN DE LOS CONDUCTOS

PRECAUCIÓN

Quite la cinta dela pestaña del regulador.

Asegúrese de quitar la cinta que fija la pestaña del regulador durante la transportación, y de que esta pestaña abra y cierre libremente dentro del conducto. Utilice cinta de conductos para asegurar y hermetizar las conexiones de los conductos.

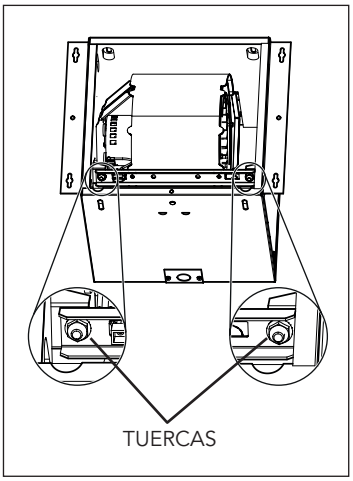
PRECAUCIÓN

Quite el anillo del envío de la entrada del ventilador.

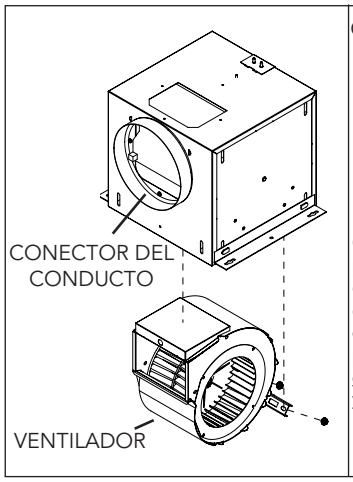
Quite el anillo del envío de la entrada del ventilador antes de funcionar el ventilador.

5. COLOCACIÓN DE LOS CONDUCTOS (CONTINUACIÓN)

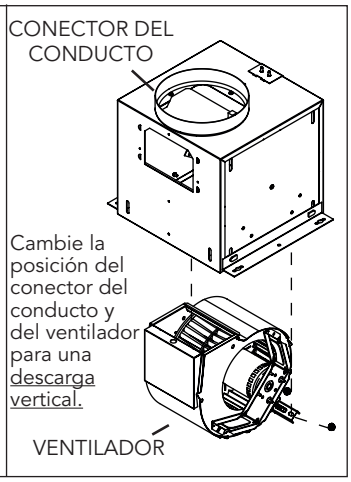
5.1 Posiciones de la descarga del ventilador



Para quitar el ventilador: desenchufar el ventilador y quitar las dos tuercas de retención del ventilador

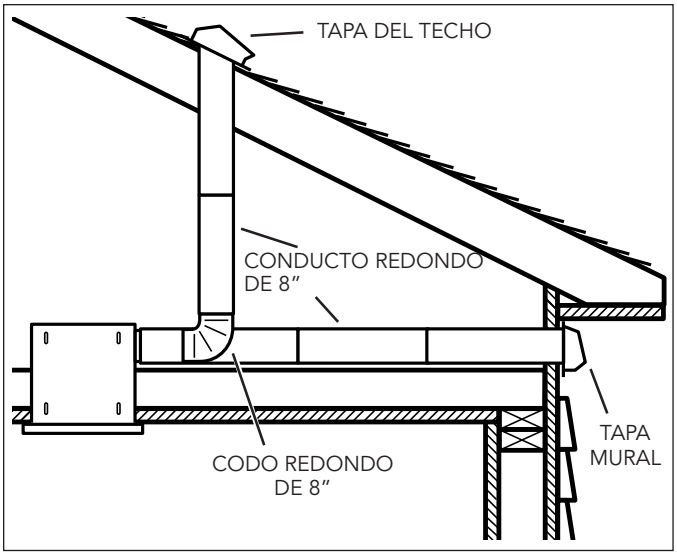


Ventilador y conector del conducto en posición de descarga horizontal (ajuste de fábrica)



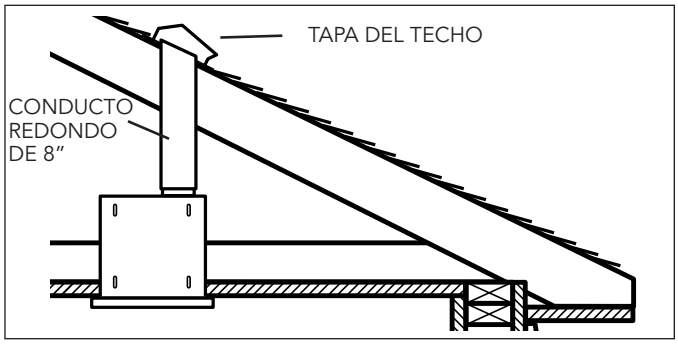
Ventilador y conector del conducto en posición de descarga vertical

5.2 Descarga horizontal del ventilador



Dos formas de conectar los conductos a una unidad enviada de fábrica.

5.3 Descarga vertical del ventilador



Conexión típica de los conductos al ventilador cambiado a descarga vertical.

6. USO Y CUIDADO

El ventilador está diseñado para operar continuamente. Si se desea, se puede controlar usando un interruptor de encendido/apagado o un control de estado sólido de velocidad variable. Siga las instrucciones para las conexiones eléctricas que vienen empacadas con el control, y observe todos los códigos locales y estatales y el Código Eléctrico Nacional.

⚠ ADVERTENCIA

Para reducir el riesgo de sufrir una descarga eléctrica, antes de dar servicio al ventilador desconéctelo del suministro eléctrico.

Para limpiar la parrilla: Use el accesorio del cepillo para polvo de la aspiradora o quite la parrilla y límpiela con un paño suave y jabón o detergente suave. Seque la parrilla completamente antes de volverla a instalar.

Para limpiar el conjunto del ventilador: Quite la parrilla, desconecte el ventilador del alojamiento, quite las tuercas de montaje del ventilador y cuidadosamente saque el ventilador del alojamiento. Aspire el interior de la unidad y el ventilador con el accesorio del cepillo para polvo.

El motor está permanentemente lubricado. No lubrique ni desmonte el motor.

Si el producto hace un ruido excesivo o anormal, sustituir el conjunto del ventilador.

(ENGINEERS)

OPERATION/MAINTENANCE INSTRUCTIONS

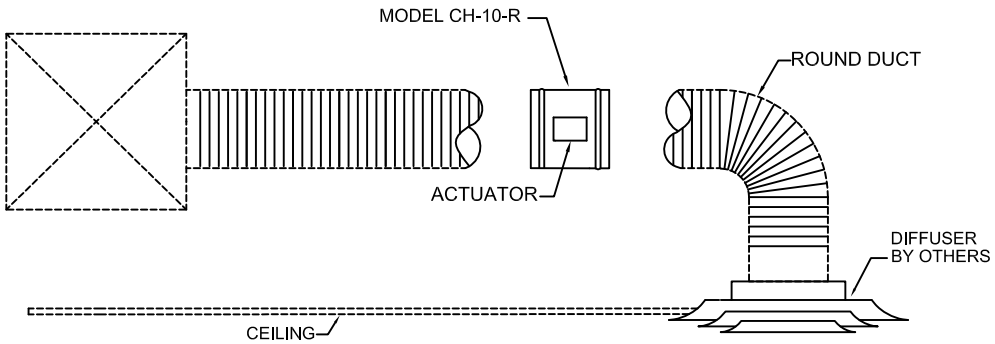
CH-10 & CH-10-R

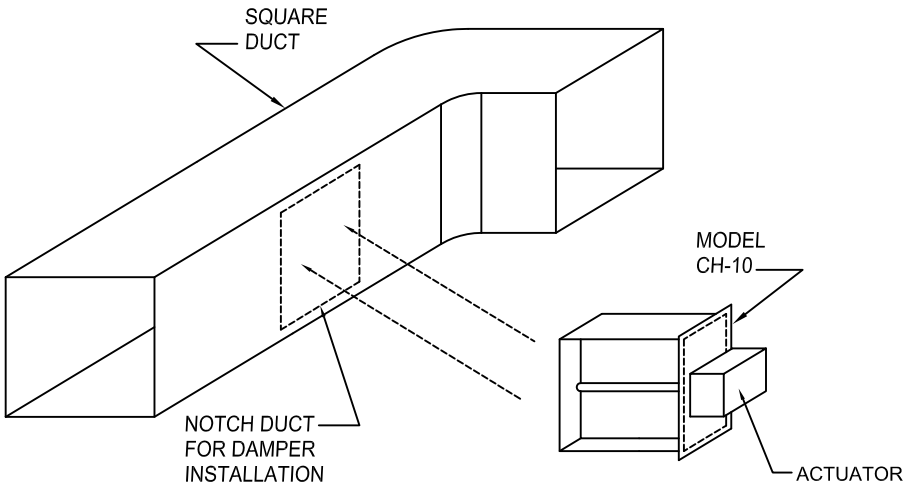
Exhaust, O.A. Dampers

Operation & Maintenance Instructions

All components recieved must be checked against packing slip within one week after receipt of goods

1. Verify that the actuator wiring is disconnected. PO/SC or PC/SO will determine damper position.
2. Check that motor cover is installed. Please consult factory if missing or damaged.
3. Keep damper motor away from any direct contact of moisture or debris.
4. Do not lubricate any components of the damper. All oilite bushings are permanently lubricated.
5. Clean damper if attached ductwork is cleaned.





Job Name:	☐ Model CH-10 & CH-10-R		
Location:			
Architect:	DRAWN BY: SRB	DATE: 8-1-07	REV. DATE: 11-8-10
Engineer:			
Contractor:	REV. NO. 3	APPROVED BY: BGT	DWG. NO.: G-3

Limited Warranty

Warranty Period and Exclusions: Broan-NuTone LLC (the "Company") warrants to the original consumer purchaser of its product ("you") that the product (the "Product") will be free from material defects in the Product or its workmanship for the period specified on chart (or, if no period is specified for the Product, then for a period of one (1) year), starting on the date you purchase the Product.

The limited warranty period for any replacement parts provided by the Company and for any Products repaired or replaced under this limited warranty shall be the remainder of the original warranty period.

This warranty does not cover fluorescent lamp starters, tubes, halogen and incandescent bulbs, fuses, filters, ducts, roof caps, wall caps and other accessories for ducting that may be purchased separately and installed with the Product. This warranty also does not cover (a) normal maintenance and service, (b) normal wear and tear, (c) any Products or parts which have been subject to misuse, abuse, abnormal usage, negligence, accident, improper or insufficient maintenance, storage or repair (other than repair by the Company), (d) damage caused by faulty installation, or installation or use contrary to the recommendations or instructions of the Company or its representatives, (e) any Product that has been moved from its original point of installation, (f) damage caused by environmental or natural elements, (g) damage in transit, (h) natural wear of finish, (i) Products in commercial or nonresidential use, (j) damage caused by fire, flood or other act of God, (k) consumable parts, (l) cosmetic damage, including but not limited to scratches or dents, or (m) Products with altered, defaced or removed serial numbers. This warranty covers only Products sold to original consumers in the United States by the Company or its U.S. distributors authorized by the Company.

This warranty supersedes all prior warranties and, subject to applicable law, is not transferable from the original consumer purchaser.

No Other Warranties: To the maximum extent permitted by applicable law, this limited warranty contains the Company's sole obligation and your sole remedy for defective products. The foregoing warranties are exclusive and in lieu of any other warranties and conditions, express or implied. **THE COMPANY DISCLAIMS AND EXCLUDES ALL OTHER EXPRESS WARRANTIES AND CONDITIONS, AND DISCLAIMS AND EXCLUDES ALL WARRANTIES AND CONDITIONS IMPLIED BY LAW, INCLUDING WITHOUT LIMITATION THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.** To the extent that applicable law prohibits the exclusion of implied warranties or conditions, the duration of any applicable implied warranty or condition is limited to the period specified for the express warranty above. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Any oral or written description of the Product is for the sole purpose of identifying it and shall not be construed as an express warranty.

Whenever possible, each provision of this Limited Warranty shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision is held to be prohibited or invalid, such provision shall be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or the other remaining provisions of the Limited Warranty.

Remedy: During the limited warranty period as stated above, the Company will, at its option, provide replacement parts for, or repair or replace, without charge, any Product or part thereof, to the extent the Company finds it to be covered by and in breach of this limited warranty under normal use and service. The Company will ship the repaired or replaced Product or replacement parts to you in the United States at no charge. You are responsible for all costs for removal, reinstallation and shipping, insurance or other freight charges incurred in the shipment of the Product or part to the Company. If you must send the Product or part to the Company, as instructed by the Company, you must properly pack the Product or part—the Company is not responsible for damage in transit. The Company reserves the right to utilize reconditioned, refurbished, repaired or remanufactured Products or parts in the warranty repair or replacement process. Such Products and parts will be comparable in function and performance to an original Product or part and warranted for the remainder of the original warranty period.

The Company reserves the right, in its sole discretion, to refund the money actually paid by you for the Product in lieu of repair or replacement. If the Product or part is no longer available, replacement may be made with a similar product of equal or greater value, at the Company's sole discretion.

Exclusion of Damages: **THE COMPANY'S OBLIGATION TO PROVIDE REPLACEMENT PARTS, OR REPAIR, REPLACE OR REFUND, AT THE COMPANY'S OPTION, SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY UNDER THIS LIMITED WARRANTY AND THE COMPANY'S SOLE AND EXCLUSIVE OBLIGATION. TO THE EXTENT PERMITTED BY THE APPLICABLE LAW, THE COMPANY SHALL NOT BE LIABLE FOR INCIDENTAL, INDIRECT, CONSEQUENTIAL OR SPECIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE PRODUCT, ITS USE OR PERFORMANCE.**

Incidental damages include, but are not limited to such damages as loss of time and loss of use. Consequential damages include, but are not limited to, the cost of repairing or replacing other property which is damaged if the Product does not work properly.

TO THE EXTENT PERMITTED BY THE APPLICABLE LAW, THE COMPANY SHALL NOT BE LIABLE TO YOU, OR TO ANYONE CLAIMING UNDER YOU, FOR ANY OTHER OBLIGATIONS OR LIABILITIES, INCLUDING, BUT NOT LIMITED TO, OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT OR ANY THEORY OF STRICT LIABILITY, WITH RESPECT TO THE PRODUCT OR THE COMPANY'S ACTS OR OMISSIONS OR OTHERWISE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. The disclaimers, exclusions, and limitations of liability under this warranty will not apply to the extent prohibited by applicable law.
This warranty covers only replacement or repair of defective Products or parts thereof at the Company's main facility, or such other facility as Company may designate from time to time, and does not include the cost of field service travel and living expenses, which expenses shall be disclosed to and accepted by you in advance. Any assistance the Company provides to or procures for you outside the terms, limitations or exclusions of this limited warranty will not constitute a waiver of such terms, limitations or exclusions, nor will such assistance extend or revive the warranty.

The Company will not reimburse you for any expenses incurred by you in repairing or replacing any defective Product, except for those incurred with the Company's prior written permission.

How to Obtain Warranty Service: To qualify for warranty service, you must (a) notify the Company at the address or telephone number stated below within seven (7) days of discovering the covered defect, (b) give the model number and part identification, and (c) describe the nature of any defect in the Product or part. At the time of requesting warranty service, you must present evidence of the original purchase date. If you cannot provide a copy of the original written limited warranty, then the terms of the Company's most current written limited warranty for your particular product will control.

Product Category	Warranty Period
Attic Ventilators • 120V Powered Models • Solar Powered Models • Solar Powered Motors (Only)	 One Year Limited Six Year Limited Two Year Limited
Fresh Air Systems / IAQ • Warranty on Parts • Warranty of Core • FAS Controls • FIN-6MD	 2/5 Year Limited 5/10/Lifetime Limited Five Year Limited Five Year Limited
Dehumidifiers	Six Year Limited
Doorbells	One Year Limited
Wall Heaters	One Year Limited
Haven Mosquito Repellent System	Three Year Limited
Overture	One Year Limited
Range Hoods	One Year Limited
Ventilation Fans, Fan/Lights and Heater Fan Lights • EVOLVE Series Ventilation Fans and Fan/Lights • ULTRA™ & QT Series Ventilation Fans and Fan/Lights • InVent™ Series, Flex™ Series, Roomside™ Series Fans and Fan/Lights • InVent™ “B” Series Ventilation Fans; • Other Ventilation Fans/Combo Units and Accessories	 Five Year Limited Three Year Limited Three Year Limited One Year Limited One Year Limited

United Enertech

Standard Terms and Conditions of Sale

1. Applicability

These terms and conditions of sale (these "Terms") are the only terms that govern the sale of goods ("Goods") by United Entertech Corp. ("Seller") to the buyer ("Buyer"). Notwithstanding anything herein to the contrary, if a written contract signed by both parties is in existence covering the sale of the Goods covered hereby, the terms and conditions of said contract shall prevail to the extent they are inconsistent with these Terms. These Terms, together with any purchase order, quotation, or acknowledgment of sale ("Sales Confirmation") provided to Buyer (collectively, this "Agreement") constitute the entire agreement between the parties and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. These Terms prevail over any of Buyer's general terms and conditions of purchase regardless of whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms.

2. Terms of Payment

All discountable invoices are eligible for cash discount if paid by the 10th of the month following billing date. All net invoices are due within 30 days from invoice date. A monthly service charge of the lesser of 1.5% or the maximum penalty by law may be added to all accounts not paid by the net due date, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, attorneys' fees. The foregoing terms are only available on qualified domestic sales. Seller reserves the right to place orders on credit hold and suspend delivery if the Buyer's account is past due. Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy, or otherwise.

3. Terms of Foreign Sales

Payment should be made in favor of United Enertech Corp., Chattanooga, TN., USA, by an acceptable and irrevocable Letter of Credit, payable at sight in U.S.Dollars; confirmed by a major U.S. commercial bank acceptable to Seller. Buyer's instructions to the opening bank should include "Wire Payee Upon Receipt" and "Partial Shipments Allowed". The Letter of Credit shall meet all customary documentary requirements, as determined in Seller's reasonable discretion.

4. Shipments

All shipments are made FOB Seller's location in Chattanooga, TN. Delivery to the initial carrier constitutes delivery and passage of title and risk of loss to the Buyer. Incident to the passage of title, the Buyer assumes all responsibilities of ownership, including but not limited to control and risk of loss or damage, regardless of the time or method of shipping, the form of shipping documents, the consignee, the method of insuring or the terms or method of payment. Broker and shipment arrangements from origin for international sales are the responsibility of the Buyer. Seller may make partial shipments of Goods to Buyer. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

5. **Damage Claims**

Seller is not responsible for any loss, damage or delay to goods in transit. The Buyer must file any damage claims directly with the carrier (title transfers to Buyer at factory regardless of who invoices the freight costs).

6. Delivery

Scheduled shipping dates shown in Seller's Sales Confirmation are approximate and represent the best estimate of shipping date at the time the order is processed. Seller assumes no obligation to ship on the scheduled date or to advise the Buyer that shipment will be delayed. Seller shall have no liability for any liquidated damages or penalty whatsoever because of failure to ship as scheduled unless specifically agreed to in writing.

7. Shortages or Deficiencies

Any shortages or deficiencies to material shipped must be reported within 14 calendar days after receipt to be considered by Seller for adjustment.

8. Warranty

Only Seller's standard "Limited Product Warranty" will apply to sales of Goods.

9. Proposals & Price Quotations

Any quotation from Seller to Buyer will be an invitation for an offer from Buyer subject to these Terms. Such offer will be accepted only if it is in accordance with these Terms. Seller's acceptance of Buyer's order as evidenced by Seller's Sales Confirmation is expressly made conditional on Buyer's agreement to all of these Terms, and Seller agrees to furnish the Goods ordered by the Buyer only upon these Terms.

10. Prices

Product prices are subject to change without notice. Seller will notify Buyer of any price change prior to delivery. Freight quotes are subject to market price adjustments without notice.

11. Compliance with Law

Buyer shall comply with all applicable laws, regulations, and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents, and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Buyer agrees that Goods purchased will not be reshipped or resold to any persons or places prohibited by the laws of the United States of America.

12. Return of Material

Almost all Seller Goods are fabricated to a customer's specific order. Seller does not maintain a stock of Goods. Therefore, return of material for credit cannot be allowed without written authorization from Seller, within terms of our warranty. Any returned material must be accompanied by a Return Material Authorization Form issued by Seller covering the specific transaction. Material must be returned by "Freight Prepaid" unless Return Material Authorization Form specifically authorizes shipping "Freight Collect".

13. Product Changes

Because of a continuous program of Good improvement and uncontrollable factors such as unavailability of certain materials, Seller reserves the right to make reasonable changes in Good design and to supply Goods of revised design against any order without notice.

14. Changes of Order(s)

Orders cancelled before fabrication has begun will be subject to a $50 minimum charge. Orders cancelled or changing in size or quantity after fabrication has begun will be subject to a $75 minimum charge or more depending on stage of production. Charges for all changes will be assessed relative to the expenses involved, including administrative and engineering time spent. Changes after fabrication has begun will result in charges deemed appropriate by Seller to recover the cost of material and labor expended that cannot be utilized because of the change. When shipment of an order is delayed at Buyer's request after material has been ordered or fabrication has begun, partial payment may be required at Seller's option in an amount based on the purchase price and the percentage of work completed at the time. Delay at the request of the Buyer may cause Seller to incur storage or warehousing expense. In this instance, a charge determined appropriate by Seller may be made to the Buyer to offset this storage or warehousing expense.

15. Limited Product Warranty

Seller warrants that Goods manufactured by Seller will be free from defects in materials and workmanship for 60 months after installation or when placed in service, but in no instance shall the warranty extend past 66 months from the date of original shipment by Seller. During the warranty period, Seller will, at its option: (1) provide replacement material or parts necessary to repair the Good; or (2) repair any Good of its manufacture that is proven to Seller's satisfaction to be defective in material or workmanship during this described warranty period. Seller may require material claimed defective to be returned "Freight Prepaid" to Seller's factory that originally shipped the Good. If Seller determines the Good requires service, freight charges relative to replacement material will be paid by Seller (limited to the 48 contiguous United States). The remedies set forth in this Section 15 shall be Buyer's sole and exclusive remedy and Seller's entire liability for any breach of this limited warranty.

This limited warranty does not cover minor imperfections within design specifications, or which do not materially alter functionality. Seller does not warrant and is not responsible

for damages caused by misuse, abuse, accidents, unauthorized service or parts, improper storage prior to installation, or the combination of Seller-branded Goods with other products. This limited warranty does not cover non-Seller-branded Goods. Any warranty applicable to non-Seller-branded Goods is provided by the original manufacturer. To maintain this warranty, uninstalled Goods must be stored in an indoor or protected environment at all times prior to installation.

16. Disclaimer of Warranties

This limited warranty contained herein is the only warranty applicable to the Goods and replaces all other warranties or conditions, express or implied, including, but not limited to, the implied warranties or conditions of merchantability and fitness for a particular purpose. Specifically, except as provided herein, Seller undertakes no responsibility for the quality of the Goods or that the Goods will be fit for any particular purpose for which Buyer may be buying the Goods. Any implied warranty is limited in duration to the warranty period. No oral or written information or advise given by Seller shall create a warranty or in any way increase the scope of this limited warranty.

17. Limitation of Liability

IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY FOR ANY LOSS OF USE, REVENUE OR PROFIT, OR FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGES WERE FORESEEABLE AND WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.

IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS SOLD HEREUNDER.

The limitation of liability set forth in this section shall not apply to (i) liability resulting from Seller's willful misconduct and (ii) death or bodily injury resulting from Seller's acts or omissions.

18. Termination

In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (i) fails to pay any amount when due under this Agreement and such failure continues for 15 days after Buyer's receipt of written notice of nonpayment; (ii) has not otherwise performed or complied with any of these Terms, in whole or in part; or (iii) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

19. Waiver

No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any right, remedy, power, or privilege arising from this Agreement operates or may be construed, as a waiver thereof. No single or partial exercise of any right, remedy, power, or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power, or privilege.

20. Confidential Information

All non-public, confidential or proprietary information of Seller, including but not limited to specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts, or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential" in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section 20. This Section 20 does not apply to information that is: (a) in the public domain; (b) known to Buyer at the time of disclosure; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

21. Force Majeure

No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement (except for any obligations of Buyer to make payments to Seller hereunder), when and to the extent such failure or delay is caused by or results from acts beyond the impacted party's ("Impacted Party") reasonable control, including, without limitation, the following force majeure events ("Force Majeure Event(s)"): (a) acts of God; (b) flood, fire, earthquake, epidemic or explosion; (c) war, invasion, hostilities (whether war is declared or not), terrorist threats or acts, riot or other civil unrest; (d) government order, law, or actions; (e) embargoes or blockades in effect on or after the date of this Agreement; (f) national or regional emergency; (g) strikes, labor stoppages or slowdowns, or other industrial disturbances; (h) shortage of adequate power or transportation facilities; and (i) other events beyond the reasonable control of the Impacted Party. The Impacted Party shall give notice within 5 days of the Force Majeure Event to the other party, stating the period of time the occurrence is expected to continue. The Impacted Party shall use diligent efforts to end the failure or delay and ensure the effects of such Force Majeure Event are minimized. The Impacted Party shall resume the performance of its obligations as soon as reasonably practicable after the removal of the cause. In the event that the Impacted Party's failure or delay remains uncured for a period of 90 consecutive days following written notice given by it under this Section 21, either party may thereafter terminate this Agreement upon 30 days' written notice.

22. Assignment

Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section 22 is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

23. Relationship of the Parties

The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture, or other form of joint enterprise, employment, or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

24. No Third-Party Beneficiaries

This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of these Terms.

25. Governing Law

All matters arising out of or relating to this Agreement are governed by and construed in accordance with the internal laws of the State of Tennessee without giving effect to any choice or conflict of law provision or rule (whether of the State of Tennessee or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than those of the State of Tennessee.

26. Submission to Jurisdiction

Any legal suit, action, or proceeding arising out of or relating to this Agreement shall be instituted in the federal courts of the United States of America or the courts of the State of Tennessee in each case located in the City of Chattanooga and County of Hamilton, and each party irrevocably submits to the exclusive jurisdiction of such courts in any such suit, action, or proceeding.

27. Notices

All notices, requests, consents, claims, demands, waivers, and other communications hereunder (each, a "Notice") shall be in writing and addressed to the parties at the addresses set forth on the face of the Sales Confirmation or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission), or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, and (b) if the party giving the Notice has complied with the requirements of this Section 27.

28. Severability

If any term or provision of this Agreement is invalid, illegal, or unenforceable in any jurisdiction, such invalidity, illegality, or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

29. Survival

Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Agreement including, but not limited to, the following provisions: Compliance with Laws, Confidential Information, Governing Law, Submission to Jurisdiction and Survival.