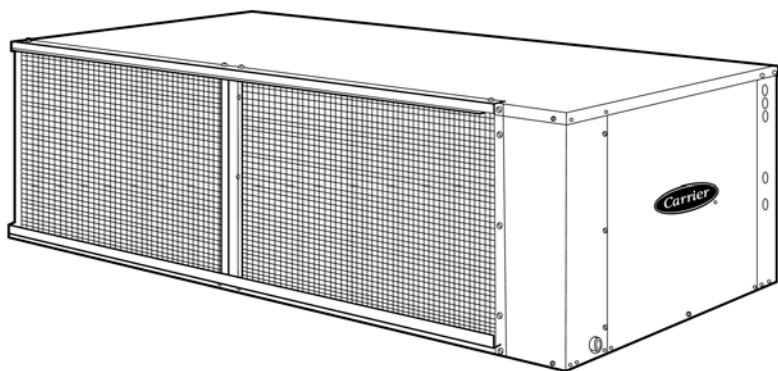
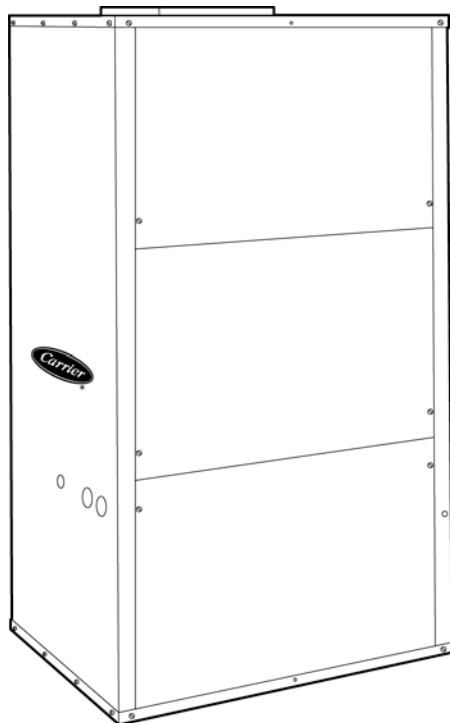




Product Data

50HQA, HQD, VQA, VQD Horizontal and Vertical Standard and Low Temperature Water Source Heat Pumps

Horizontal — 6 to 10 Nominal Tons
Vertical — 6½ to 25 Nominal Tons



Single-Package Horizontally and Vertically Mounted Water Source Heat Pumps with electronic controls.

- system is designed for high-efficiency year-round cooling and heating
- ideal for schools, offices, apartments, hotels/motels, and condominiums
- utilizes decentralized concept, which allows individual tenant metering, low initial cost, and control flexibility
- choices in heat exchangers allow use in closed-loop or open-loop applications

Features/Benefits

Operating efficiency

The Carrier water source heat pumps (WSHP) are designed for quality and performance over their lifetime. Models offer cooling EERs (Energy Efficiency Ratio) to 14, and heating COPs (Coefficient of Performance) to 4.2, which are among the highest in the industry.

Quiet operation

Fan motors and compressors are sound isolated, and the insulated cabinet makes unit operation even quieter.

Design flexibility

The WSHP units are offered in 3 horizontal and 7 vertical sizes and in various voltages to meet individual zone needs efficiently and effectively. Standard range and low temperature cooling units are available to suit a variety of application requirements. Factory-installed options and field options are offered to meet specific design requirements.

Low-temperature units are available with an extended range of 40 to 110 F.



Safe, reliable operation

Standard safety features include: high-pressure switch, freeze protection switches, and loss-of-charge protection, which consists of either a low pressure switch or a high discharge temperature switch. Each unit is tested and run at the factory to assure proper operation of all components and safety switches.

Anti-short cycle timer provides a minimum off-time to prevent the unit from short-cycling. The 5-minute timer energizes when the compressor is deenergized, resulting in a 5-minute delay before the unit can be restarted.

Condensate overflow switch is mounted on the drain pan. When condensate pan liquid reaches an unacceptable level, unit is automatically deactivated and placed in a lockout condition.

All components are carefully designed and selected for endurance, durability, and carefree day-to-day operation.

The water-to-refrigerant heat exchanger has copper inner and steel

outer tubing to provide corrosion resistance protection. Cupronickel heat exchangers are available for open tower applications.

The unit is shipped on a protective wooden skid with rigid corner posts held in place by plastic stretch wrap.

Units are ARI (Air Conditioning & Refrigeration Institute) Standard 320-93 certified and UL (Underwriters' Laboratories) and CSA (Canadian Standards Association) listed (575 v CSA only).

Standard electronic controls provide anti-short cycle protection, random start, remote alarm, and intelligent reset. Self-diagnostic capability includes fault-type indication and memory.

An optional electronic controller offers advanced system control capabilities, such as night setback and emergency shutdown.

Installation ease

The unit is packaged for simple, low-cost handling, with minimal time required for installation. All units are

pre-wired and factory charged with refrigerant.

Water connections (FPT) and condensate drain (FPT) are anchored securely to the unit cabinet.

On horizontal, ceiling-hung units, hanger kits are factory-supplied for field installation. Duct mounting flanges are provided for connection to supply ductwork.

Electrical connections are made quickly and directly to a power distribution terminal block.

No-fuss maintenance and serviceability

When regular maintenance or a service call is required, the WSHP units require little time. Large service access panels enable quick inspection for problem solving.

The blower wheels and fan motors can be removed for testing or repair. There are convenient low- and high-side refrigerant service access ports for on-site testing and refrigerant recovery. The filter tracks permit easy filter replacement.

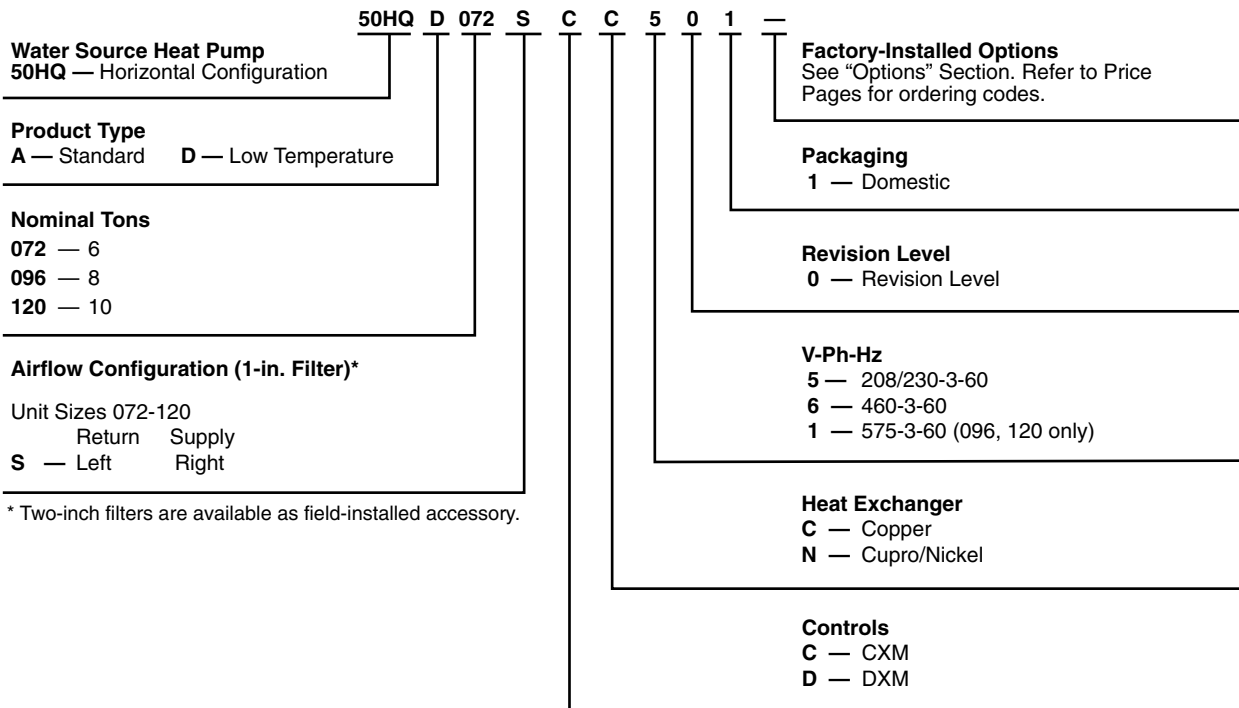
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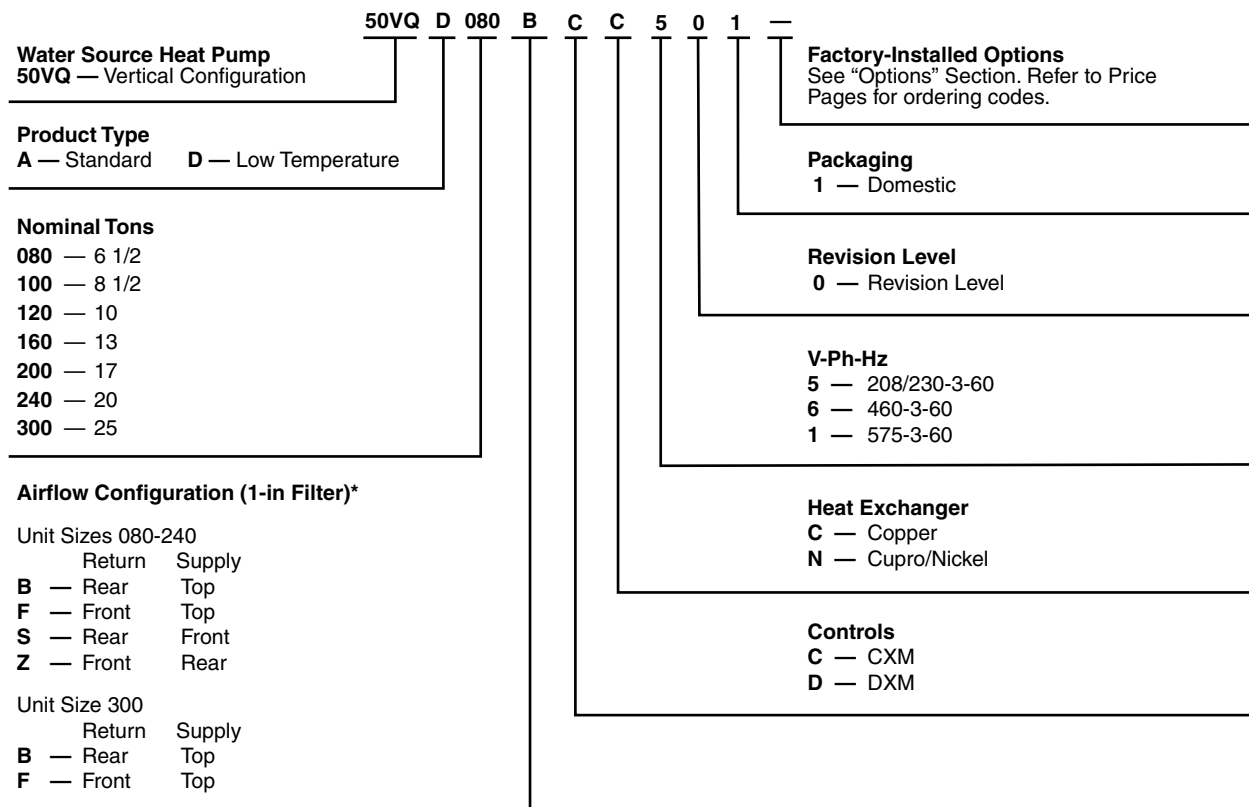
Model number nomenclature



HORIZONTAL UNITS



VERTICAL UNITS



Options (factory-installed)



Return-air configurations (vertical units only) consist of following options:

Sizes 080-240

Return: Rear or Front

Discharge: Rear, Front, or Top

Size 300

Return: Rear or Front

Discharge: Top

Cupronickel heat exchangers are available for open tower applications.

High temperature water switch interrupts the unit operation when the leaving-water temperature reaches 115 F. This option is designed to protect PVC and CPVC piping loop.

75 va transformer (size 072) provides additional 24-v power for accessory devices such as motorized isolation valves or outside-air damper motors.

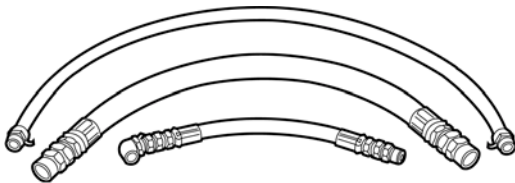
Optional sound attenuation package is available for applications that require especially low noise levels. With this option, the compressor compartment is surrounded by 1/2-in. closed-cell insulation with a 5-lb/cu ft density. For unit size 072, the compressor is spring mounted. The package also includes a heavy dampening material on the compressor shell, and a discharge muffler. All other panels are lined with a special 1/2-in. thick fiberglass, dual density insulation.

Optional (DXM) electronic controller provides system functions such as night setback with override, pump restart, and emergency shutdown, in addition to the standard (CXM) control features.

Warranties (Electronic Controls) consist of 3 options in place of the standard warranty (one year limited product warranty and 2 to 5 year compressor warranty).

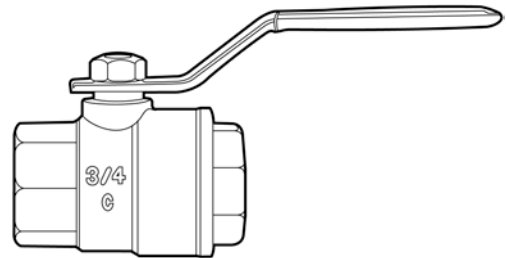
- Option I offers first year labor allowance on refrigerant circuit repairs.
- Option II offers a second through fifth year parts and labor allowance on refrigerant circuit repairs.
- Option III combines both Option I and Option II.

Accessories (field-installed)



Supply/return hose kit — Three diameters available (1/2 in., 3/4 in., or 1 in.). Each 24-in. long EPDM tube with Teflon seal. Maximum working pressure of 300 psig. Fire-rated hose is also available.

Condensate hose kit — 48-in. long clear PVC tube with threaded adapter and clamps. Fire-rated hose is also available.



Ball valves — UL listed brass body, ball and stem type with Teflon seats and seals.

Two-in. filter rack is available for 2-in. cleanable filters in place of standard 1-in. return-air filters.

ARI* capacities

HORIZONTAL UNITS

UNIT 50HQA,HQD	COOLING					HEATING				CFM	ESP	GPM	PD
	TC	TSC	THR	kW	EER	TC	THA	kW	COP				
072	70,000	49,975	91,712	6.36	11.0	91,000	67,676	6.84	4.0	2400	.25	18.3	10.2
096	95,000	69,200	123,876	8.64	11.0	114,000	83,948	8.80	3.8	3400	.25	24.8	19.3
120	124,000	91,000	161,838	11.08	11.2	150,000	110,484	11.58	3.8	4000	.30	32.4	23.6

VERTICAL UNITS

UNIT 50VQA,VQD	COOLING					HEATING				CFM	ESP	GPM	PD
	TC	TSC	THR	kW	EER	TC	THA	kW	COP				
080	74,000	58,500	92,035	5.29	14.0	83,000	64,768	5.79	4.2	2600	.25	18.0	8.2
100	101,000	77,215	130,966	8.78	11.5	109,000	95,025	8.41	3.8	3500	.30	26.0	15.5
120	120,000	91,772	155,916	10.53	11.4	135,000	109,107	10.41	3.8	4200	.30	31.0	20.8
160	148,000	117,000	184,070	10.57	14.0	166,000	129,536	11.58	4.2	5200	.35	36.0	8.2
200	202,000	154,429	261,933	17.56	11.5	218,000	190,050	16.81	3.8	7000	.35	52.0	15.5
240	240,000	183,544	311,832	21.05	11.4	270,000	218,214	20.82	3.8	8400	.40	62.0	20.8
300	300,000	216,612	402,360	30.00	10.0	360,000	248,164	32.83	3.2	9000	.45	80.0	16.2

CFM — Cubic Feet Per Minute
COP — Coefficient of Performance
db — Dry Bulb
EER — Energy Efficiency Ratio
ESP — External Static Pressure (in. wg)
GPM — Gallons Per Minute
kW — Total Power Input (kilowatts)

LEGEND
PD — Pressure Drop (ft wg)
TC — Total Capacity (Btuh)
THA — Total Heat of Absorption (Btuh)
THR — Total Heat of Rejection (Btuh)
TSC — Total Sensible Capacity (Btuh)
wb — Wet Bulb
*Air Conditioning and Refrigeration Institute.

NOTES:
1. Ratings are in accordance with ARI Standard 320-93.
2. Cooling Standard: 80 F db, 67 F wb indoor entering-air temperature, 85 F entering water and 95 F leaving water temperatures.
3. Heating Standard: 70 F db indoor entering-air temperature, and 70 F entering water temperature.

Physical data (horizontal units)



BASE UNIT 50HQA, HQD	072	096	120
NOMINAL CAPACITY (tons)	6	8	10
SHIPPING WEIGHT (lb)	635	665	675
OPERATING WEIGHT (lb)	615	645	655
REFRIGERANT-TO-AIR HEAT EXCHANGER	Aluminum Fins, Copper Tubes		
Face Area (sq ft)	6.66	8.33	8.33
No. of Rows	2	2	3
Copper Tube Size (OD in.)	3/8	3/8	3/8
No. of Fins/in.	14	14	14
REFRIGERANT CHARGE R-22/Ckt (oz)	HQA	38	46
	HQD	36	42
NO. OF CIRCUITS	2	2	3
HIGH-VOLTAGE BUSHING (in.)	1 3/8	1 3/8	1 3/8
FAN			
Diameter (in.)	12.0	10.0	11.0
Width (in.)	11.0	10.0	10.0
Motor (hp)	1.5	1.5	2.0
Range (rpm)	760-1014	1065-1319	1065-1319
WATER-TO-REFRIGERANT HEAT EXCHANGER	Steel-Copper or Steel-Cupronickel Tube-in-Tube		
Water Connection (FPT) (in. ...TPI)	1 1/4...1 1/2	1 1/4...1 1/2	1 1/4...1 1/2
CONDENSATE DRAIN CONNECTION (FPT) (in. ...TPI)	3/4...1 1/4	3/4...1 1/4	3/4...1 1/4
FILTER	1-in. Throwaway*		
Size (Height x Width) (in.) ...Qty	20x26 1/2...2	16x20...4	16x20...4

Physical data (vertical units)

BASE UNIT 50VQA, VQD	080	100	120	160	200	240	300
NOMINAL CAPACITY (tons)	6 1/2	8 1/2	10	13	17	20	25
SHIPPING WEIGHT (lb)	610	695	745	1145	1275	1375	1475
OPERATING WEIGHT (lb)	595	685	735	1120	1265	1350	1465
REFRIGERANT-TO-AIR HEAT EXCHANGER	Aluminum Fins, Copper Tubes						
Face Area (sq ft)	9.00	8.75	9.38	18.00	17.50	18.75	18.75
No. of Rows	2	2	3	2	2	3	4
Copper Tube Size (OD in.)	3/8	1/2	1/2	3/8	1/2	1/2	1/2
No. of Fins/in.	14	15	15	14	15	15	15
REFRIGERANT CHARGE R-22/Ckt (oz)	110	118	144	110	118	144	175
NO. OF CIRCUITS	1	1	1	2	2	2	2
HIGH-VOLTAGE BUSHING (in.)	1 3/8-1 3/4						2
FAN							
Diameter (in.)	12.0	15.0	15.0	12.0	15.0	15.0	15.0
Width (in.)	9.0	15.0	15.0	9.0	15.0	15.0	15.0
Motor (hp)	1.5	1.5	2.0	3.0	1.5	2.0	3.0
Range (rpm)	768-982	724-925	768-982	768-982	724-925	768-982	896-1110
WATER-TO-REFRIGERANT HEAT EXCHANGER	Steel-Copper or Steel-Cupronickel Tube-in-Tube						
Water Connection (FPT) (in. ...TPI)	1 1/4...1 1/2	1 1/4...1 1/2	1 1/4...1 1/2	1 1/2...1 1/2	1 1/2...1 1/2	1 1/2...1 1/2	1 1/2...1 1/2
CONDENSATE DRAIN CONNECTION (FPT) (in. ...TPI)	1...1 1/2						
FILTER	1-in. Throwaway*						
Size (Height x Width) (in.) ...Qty	20x25...2			20x25...4			

LEGEND

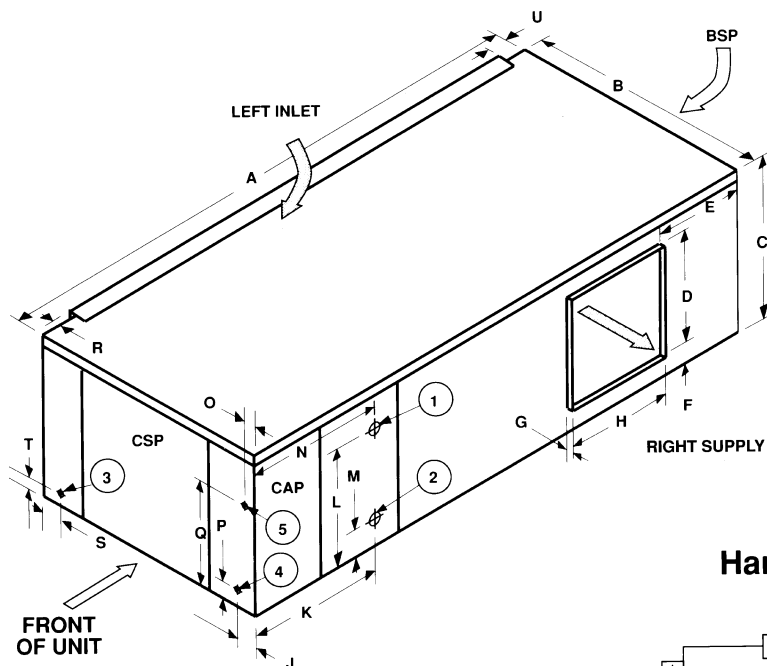
TPI — Threads per inch

* Two-in. filter available as field-installed accessory.

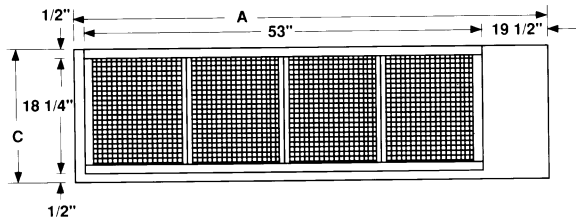
Base unit dimensions



50HQA, HQD072



FLANGED FILTER RACK
VIEW AT INLET



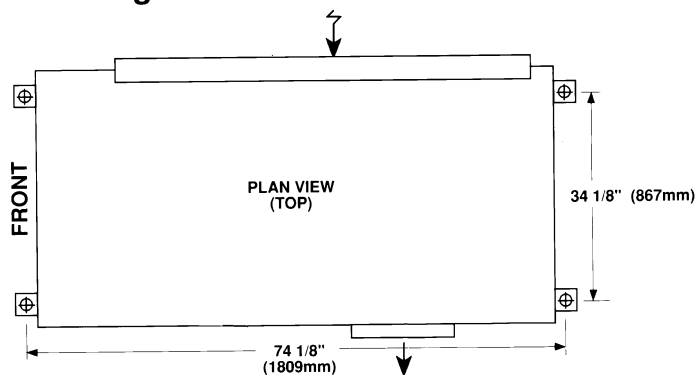
NOTES:

1. Available only in left return, right supply as shown.
2. All side panels are removable.
3. Return Air Duct Size: 18 1/4" High x 53" Wide (464 mm High x 1346 mm Wide).
4. Nominal Filter Size: 20" x 26 1/2" x 1" (508 mm x 673 mm x 25 mm) two required.
5. Clearances are 2'-6" on the compressor, control box, and return air sides of the unit.
6. Leave one end of the duct collar open for filter removal.

- LEGEND**
- BSP** — Blower Service Panel
CAP — Control Access Panel
CSP — Compressor Service Panel
K.O. — Knockout

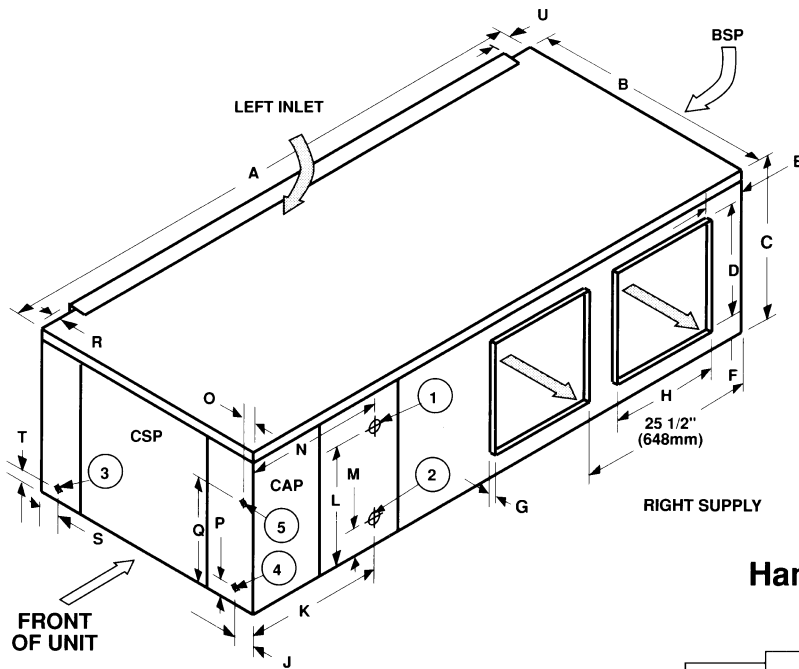
- CONNECTIONS**
- ① Water Outlet 1 1/4" FPT
 ② Water Inlet 1 1/4" FPT
 ③ Condensate Drain 3/4" FPT
 ④ High Voltage Access 1 3/8" K.O. (35 mm)
 ⑤ Low Voltage Access 1/2" DIA. (13 mm)

Hangar Bracket Dimensions



UNIT 50HQA,HQD		DIMENSIONS																			
		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U
072	in.	72¼	36	21	16	14½	3	1	16	17⅞	19¾	16½	3¼	21¼	½	2½	13½	1	4¼	1⅜	¾
	mm	1835	914	533	406	368	76	25	406	48	502	419	83	540	13	64	343	25	108	35	19

50HQA, HQD096, 120



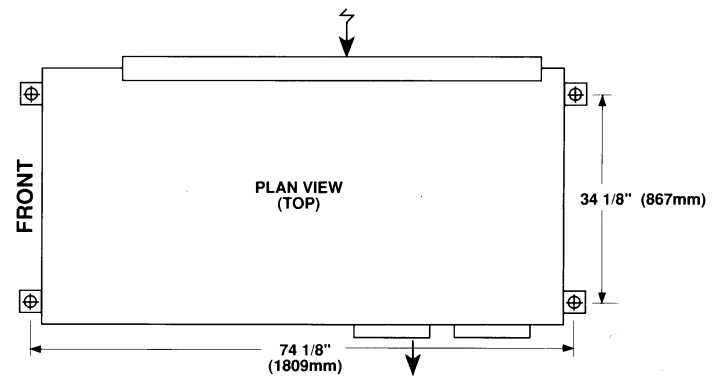
LEGEND

BSP — Blower Service Panel
CAP — Control Access Panel
CSP — Compressor Service Panel
K.O. — Knockout

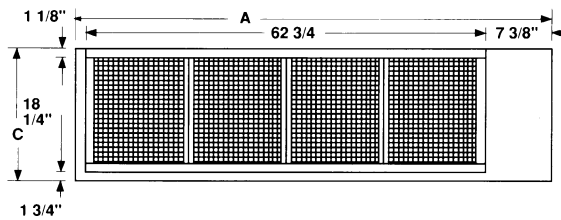
CONNECTIONS

- | | |
|-----------------------|---------------------|
| ① Water Outlet | 1/4" FPT |
| ② Water Inlet | 1/4" FPT |
| ③ Condensate Drain | 3/4" FPT |
| ④ High Voltage Access | 1 3/8" K.O. (35 mm) |
| ⑤ Low Voltage Access | 1/2" DIA. (13 mm) |

Hanger Bracket Dimensions



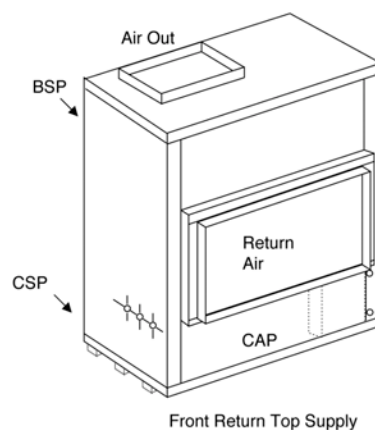
FLANGED FILTER RACK VIEW AT INLET



NOTES:

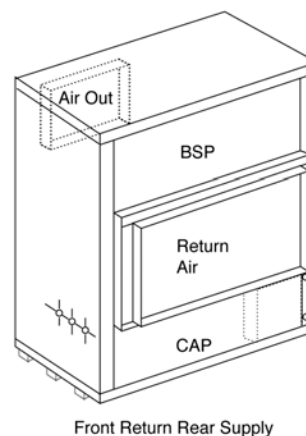
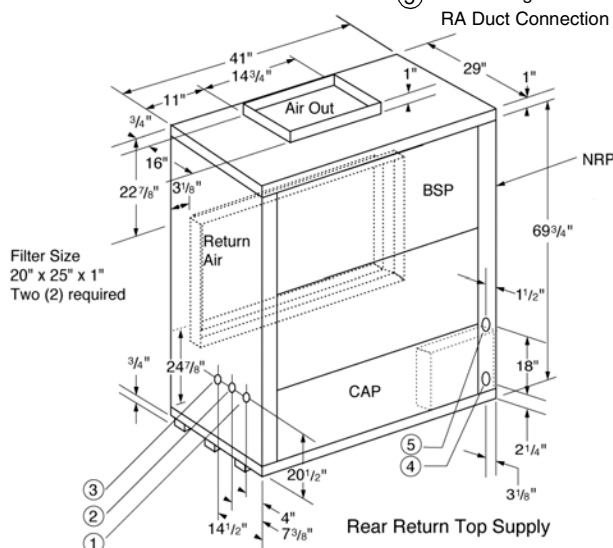
1. Available only in left return, right supply as shown.
2. All side panels are removable.
3. Return Air Duct Size: 18 1/4" High x 62 3/4" Wide (464 mm High x 1594 mm Wide).
4. Nominal Filter Size: 16" x 20" x 1" (406 mm x 508 mm x 25 mm) 4 required.
5. Clearances are 2'-6" on the compressor, control box, and return air sides of the unit.
6. Leave one end of the duct collar open for filter removal.

UNIT 50HQA,HQD		DIMENSIONS																			
		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U
096	in.	72¼	36¼	21	15⅞	3¼	3¼	1	1⅞	1⅞	18¼	17	3¼	20	½	2½	13½	1	4⅞	1¼	1⅞
	mm	1835	921	533	384	83	83	25	384	48	464	432	83	508	13	64	343	25	105	32	48
120	in.	72¼	36¼	21	15⅞	2⅝	4¼	1	15⅞	1⅞	18¼	18⅝	3¼	22¼	½	2½	13½	1	4⅞	1¼	1⅞
	mm	1835	921	533	384	67	108	25	384	48	464	473	83	565	13	64	343	25	105	32	48

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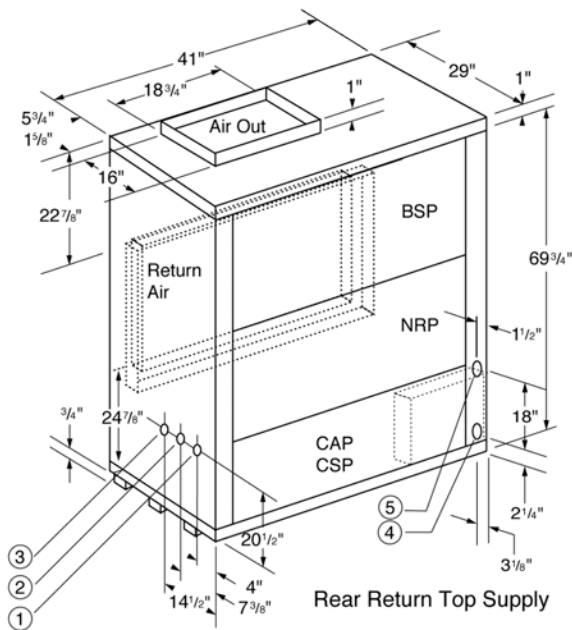
BSP — Blower Service Panel
CAP — Control Access Panel
CSP — Compressor Service Panel
K.O. — Knockout
NRP — Non-Removable Panel
RA — Return Air

- ① Water Inlet 1¼" FPT
- ② Water Outlet.....1¼" FPT
- ③ Condensate Drain 1" FPT
- ④ High Voltage Access..... 1⅜"– 1¾" K.O.
- ⑤ Low Voltage Access..... ½" Dia.
RA Duct Connection 23" x 34¼"

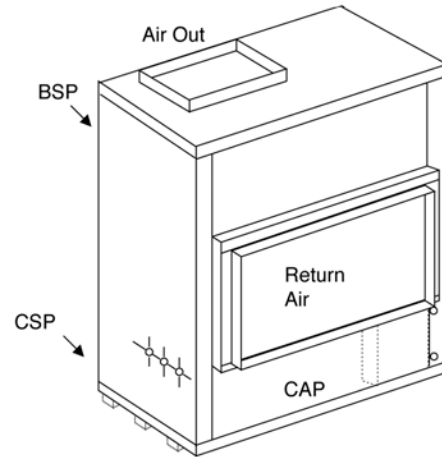


1. All side panels are removable except those identified by NRP (Non-Removable Panel).
2. Units require 3" clearance for water connections, CAP, CSP, and BSP service access.

50VQA, VQD100, 120



Rear Return Top Supply



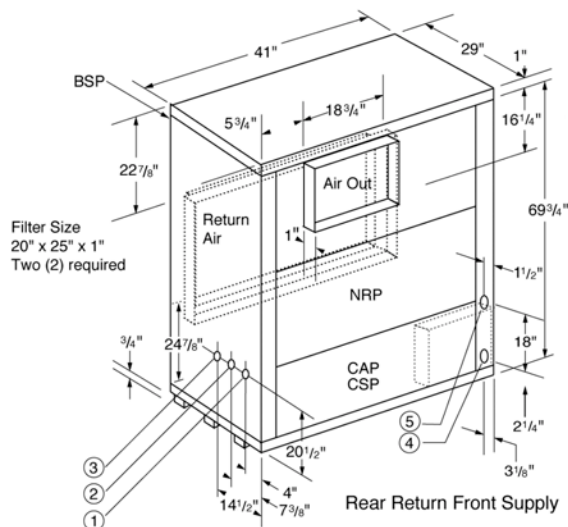
Front Return Top Supply

LEGEND

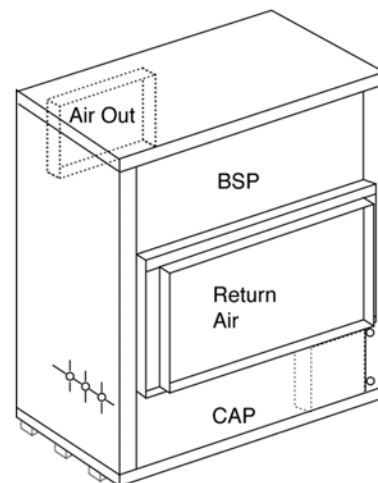
- BSP** — Blower Service Panel
- CAP** — Control Access Panel
- CSP** — Compressor Service Panel
- K.O.** — Knockout
- NRP** — Non-Removable Panel
- RA** — Return Air

CONNECTIONS

- ① Water Inlet..... 1 1/4" FPT
- ② Water Outlet..... 1 1/4" FPT
- ③ Condensate Drain..... 1" FPT
- ④ High Voltage Access..... 1 3/8" - 1 3/4" K.O.
- ⑤ Low Voltage Access..... 1/2" Dia.
- RA Duct Connection..... 23" x 34 3/4"



Rear Return Front Supply



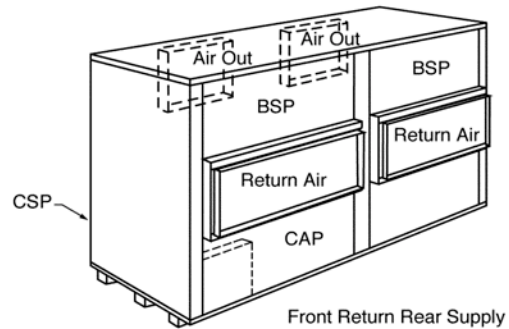
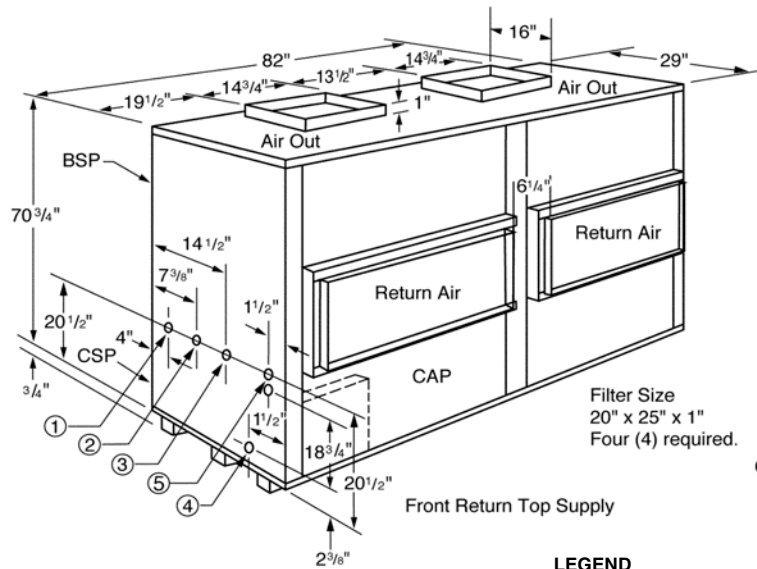
Front Return Rear Supply

NOTE: All side panels are removable except those identified by NRP (Non-Removable Panel).

Base unit dimensions (cont)



50VQA, VQD160

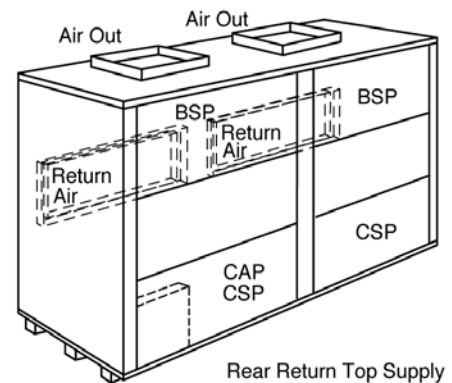
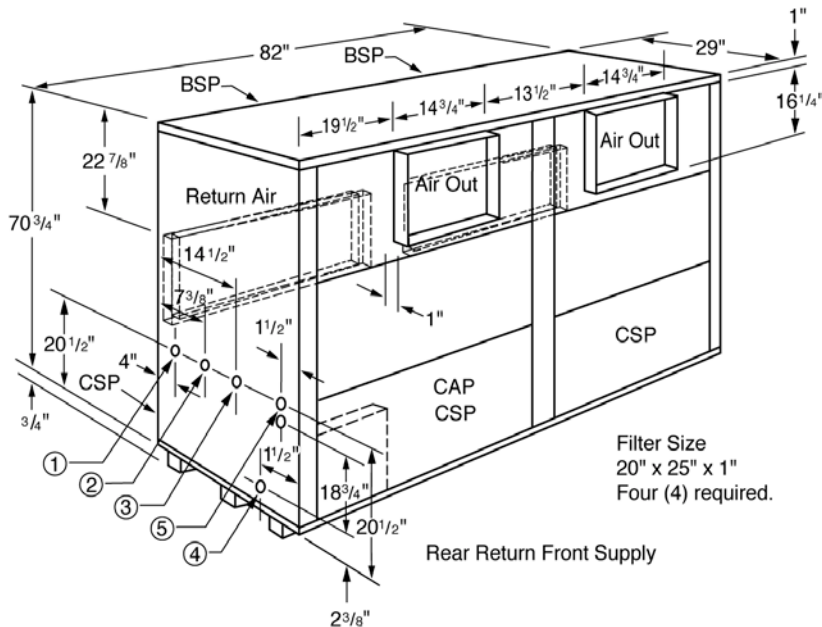


LEGEND

- BSP** — Blower Service Panel
- CAP** — Control Access Panel
- CSP** — Compressor Service Panel
- K.O.** — Knockout
- NRP** — Non-Removable Panel
- RA** — Return Air

CONNECTIONS

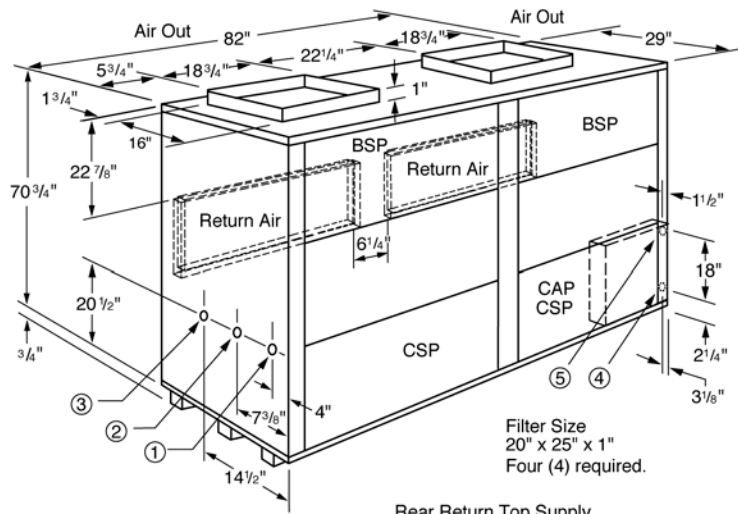
- ① Water Inlet..... 1/4" FPT
- ② Water Outlet..... 1/4" FPT
- ③ Condensate Drain..... 1" FPT
- ④ High Voltage Access 1 3/8"– 1 3/4" K.O.
- ⑤ Low Voltage Access 1/2" Dia.
- RA Duct Connection..... 23" x 34 3/4"



NOTES:

1. All side panels are removable except those identified by NRP (Non-Removable Panel).
2. Units require 3" clearance for water connections, CAP, CSP, and BSP service access.

50VQA, VQD200, 240



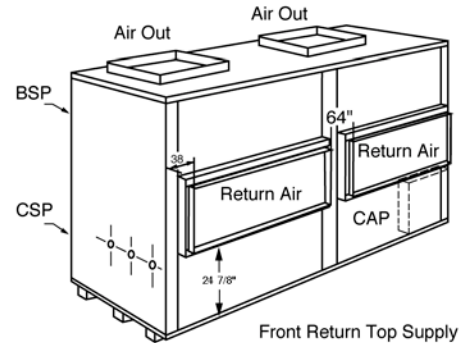
Rear Return Top Supply

LEGEND

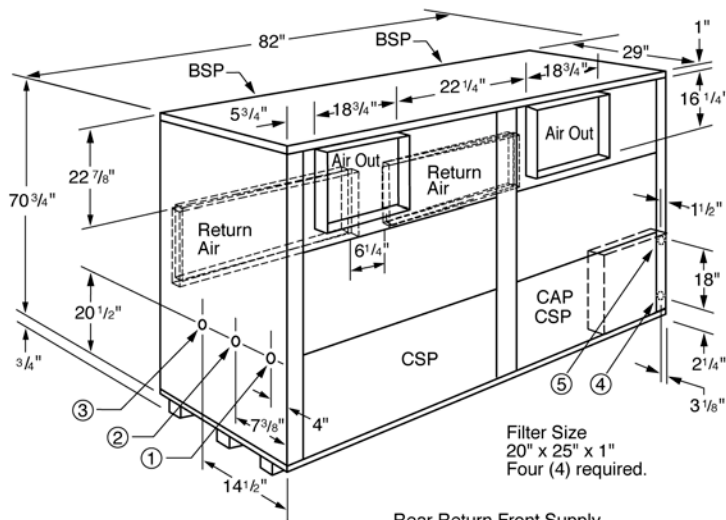
- BSP** — Blower Service Panel
- CAP** — Control Access Panel
- CSP** — Compressor Service Panel
- K.O.** — Knockout
- NRP** — Non-Removable Panel
- RA** — Return Air

CONNECTIONS

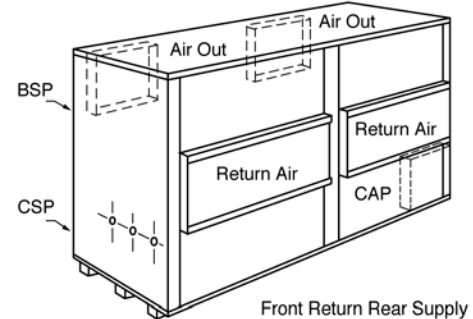
- ① Water Inlet..... 1 1/4" FPT
- ② Water Outlet..... 1 1/4" FPT
- ③ Condensate Drain..... 1" FPT
- ④ High Voltage Access 1 3/8"– 1 3/4" K.O.
- ⑤ Low Voltage Access 1/2" Dia.
RA Duct Connection..... 23" x 34 3/4"



Front Return Top Supply



Rear Return Front Supply



Front Return Rear Supply

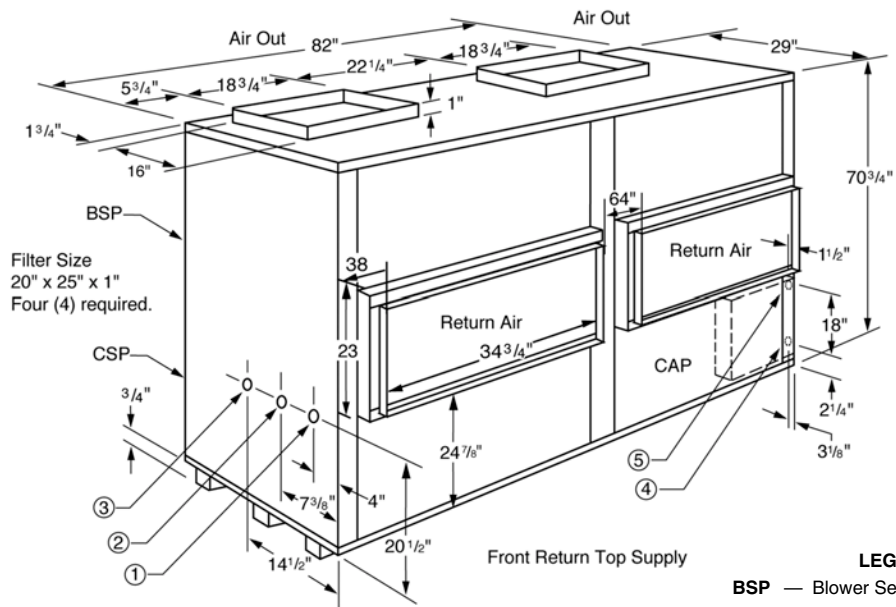
NOTES:

1. All side panels are removable except those identified by NRP (Non-Removable Panel).
2. Units require 3" clearance for water connections, CAP, CSP, and BSP service access.

Base unit dimensions (cont)



50VQA, VQD300

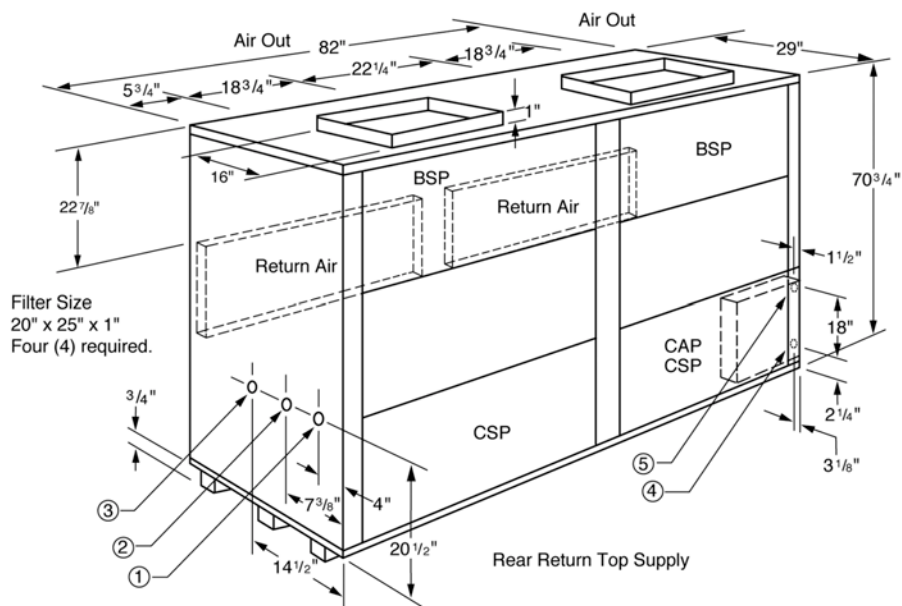


LEGEND

- BSP** — Blower Service Panel
- CAP** — Control Access Panel
- CSP** — Compressor Service Panel
- K.O.** — Knockout
- NRP** — Non-Removable Panel
- RA** — Return Air

CONNECTIONS

- ① Water Inlet..... 1/4" FPT
- ② Water Outlet..... 1/4" FPT
- ③ Condensate Drain..... 1" FPT
- ④ High Voltage Access..... 1 3/8" - 1 3/4" K.O.
- ⑤ Low Voltage Access 1/2" Dia.
- RA Duct Connection 23" x 34 3/4"



DO NOT USE HIGH EFFICIENCY FILTERS

NOTES:

1. All side panels are removable except those identified by NRP (Non-Removable Panel).
2. Units require 3" clearance for water connections, CAP, CSP, and BSP service access.

Performance data



50HQA,HQD072 (6 TONS)

RATED AIRFLOW 2400 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)	
9.9	40	83,246	54,960	99,768	4842	OPERATION NOT RECOMMENDED			3.5
14.4	40	84,322	55,537	100,247	4667				7.1
18.3	40	85,255	56,037	100,663	4516				10.2
23.4	40	86,475	56,691	101,206	4317				14.3
9.9	50	79,849	53,709	97,814	5265	71,917	51,017	6126	3.5
14.4	50	80,925	54,286	98,294	5090	73,835	52,749	6180	7.1
18.3	50	81,858	54,786	98,709	4939	75,497	54,250	6227	10.2
23.4	50	83,078	55,440	99,252	4740	77,671	56,213	6289	14.3
9.9	60	76,787	52,600	96,050	5644	77,000	55,334	6350	3.5
14.4	60	77,528	53,035	96,340	5513	80,596	58,530	6467	7.1
18.3	60	78,461	53,535	96,755	5362	82,258	60,032	6514	10.2
23.4	60	78,500	54,400	96,181	5182	84,000	61,549	6580	14.3
9.9	60	75,251	51,548	94,129	5531	79,310	56,994	6541	3.5
14.4	60	75,977	51,974	94,413	5403	83,014	60,286	6661	7.1
18.3	60	76,892	52,464	94,820	5255	84,726	61,833	6709	10.2
23.4	60	76,930	53,312	94,257	5078	86,520	63,395	6777	14.3
9.9	70	73,055	51,207	93,907	6111	85,700	62,703	6740	3.5
14.4	70	74,131	51,784	94,050	5836	87,357	64,312	6754	7.1
18.3	70	74,900	51,900	94,340	5696	91,000	67,676	6836	10.2
23.4	70	76,284	52,938	95,344	5586	91,193	67,776	6863	14.3
9.9	85	67,400	49,500	90,458	6758	95,581	71,253	7130	3.5
14.4	85	69,036	49,908	91,456	6571	97,498	72,985	7185	7.1
18.3	85	70,000	49,975	91,712	6363	101,000	76,297	7240	10.2
23.4	85	71,000	51,100	92,335	6253	101,334	76,449	7293	14.3
9.9	90	66,261	48,705	90,000	6957	OPERATION NOT RECOMMENDED			3.5
14.4	90	67,337	49,282	90,479	6782				7.1
18.3	90	69,400	49,760	91,010	6432				10.2
23.4	90	69,490	50,436	91,437	6332				14.3
9.9	95	63,400	48,099	87,888	7177				3.5
14.4	95	65,639	48,657	89,502	6994				7.1
18.3	95	66,572	49,157	89,917	6842				10.2
23.4	95	68,531	50,100	91,460	6720				14.3
9.9	100	62,864	47,454	88,046	7380				3.5
14.4	100	63,940	48,031	88,525	7205				7.1
18.3	100	64,873	48,531	88,940	7054				10.2
23.4	100	66,093	49,185	89,483	6855				14.3
9.9	110	OPERATION NOT RECOMMENDED							3.5
14.4	110								7.1
18.3	110								10.2
23.4	110								14.3

CORRECTION FACTORS — ENTERING AIR — 50HQA, HQD072

COOLING							HEATING				
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
61	0.910	0.871	1.072	1.243	*	*	0.956	60	1.035	1.052	0.948
64	0.955	0.702	0.919	1.136	*	*	0.978	65	1.018	1.026	0.974
67	1.000	0.532	0.766	1.000	1.221	*	1.000	70	1.000	1.000	1.000
70	1.045	—	0.611	0.864	1.101	1.334	1.021	75	0.984	0.982	1.030
73	1.090	—	0.455	0.727	0.981	1.234	1.043	80	0.969	0.965	1.061

CORRECTION FACTORS — NOMINAL CFM — 50HQA, HQD072

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
1800	0.936	0.940	0.948	0.978	0.935	0.928	1.022
2100	0.968	0.970	0.974	0.991	0.967	0.963	1.011
2250	0.984	0.985	0.987	0.998	0.984	0.982	1.006
2400	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2700	1.033	1.030	1.026	1.018	1.034	1.038	0.989
3000	1.065	1.060	1.050	1.032	1.070	1.077	0.979

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.
- Boldface values show ARI conditions.

Performance data (cont)



50HQA,HQD096 (8 TONS)

RATED AIRFLOW 3400 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)	
11.9	40	111,168	73,721	134,700	6,890	OPERATION NOT RECOMMENDED			4.4
17.4	40	111,905	75,070	134,900	6,760				9.5
24.8	40	113,017	75,897	153,100	6,477				19.3
31.7	40	113,660	76,962	135,380	6,366				31.5
						74,133	46,124	8,184	
11.9	50	107,164	72,788	133,750	7,790	77,286	49,504	8,144	4.4
17.4	50	108,633	74,439	134,190	7,590	83,804	55,245	8,366	9.5
24.8	50	109,741	75,578	134,240	7,180	89,182	58,652	8,931	19.3
31.7	50	110,385	76,318	134,390	7,034	91,359	60,706	9,001	31.5
11.9	60	105,492	71,232	133,150	8,110	93,525	63,903	8,687	4.4
17.4	60	105,688	73,178	133,290	8,089	101,048	69,861	9,141	9.5
24.8	60	107,121	74,621	133,400	7,719	107,202	73,656	9,826	19.3
31.7	60	108,747	75,674	134,050	7,416	112,891	75,605	10,910	31.5
11.9	60	103,200	75,200	128,520	7,418	90,000	66,878	6,787	4.4
17.4	60	107,200	78,100	130,413	6,817	95,900	71,340	7,211	9.5
24.8	60	109,700	80,000	131,564	6,419	99,800	74,152	7,519	19.3
31.7	60	111,000	80,900	132,189	6,213	101,800	75,605	7,688	31.5
11.9	70	97,500	71,100	125,723	8,284	103,800	76,696	7,950	4.4
17.4	70	101,400	73,900	127,629	7,697	109,900	81,084	8,447	9.5
24.8	70	103,900	75,700	127,968	7,308	114,000	83,948	8,801	19.3
31.7	70	105,200	76,700	128,702	7,106	116,200	85,432	8,993	31.5
11.9	85	88,800	64,700	120,368	9,583	124,500	91,511	9,692	4.4
17.4	85	92,600	67,500	122,235	9,015	131,000	95,874	10,298	9.5
24.8	85	95,000	69,200	123,876	8,640	135,300	98,704	10,724	19.3
31.7	85	96,300	70,200	124,581	8,444	137,500	100,172	10,952	31.5
11.9	90	85,900	62,600	119,446	10,016	OPERATION NOT RECOMMENDED			4.4
17.4	90	89,700	65,400	121,365	9,455				9.5
24.8	90	92,100	67,100	122,760	9,084				19.3
31.7	90	93,400	68,100	123,472	8,891				31.5
11.9	95	83,000	60,500	118,583	10,448				4.4
17.4	95	86,800	63,300	120,495	9,895				9.5
24.8	95	89,200	65,000	121,644	9,528				19.3
31.7	95	90,500	66,000	122,362	9,337				31.5
11.9	105	77,200	56,300	115,787	11,314				4.4
17.4	105	80,900	59,000	117,624	10,774				9.5
24.8	105	83,400	60,800	118,916	10,417				19.3
31.7	105	84,600	61,700	119,509	10,230				31.5
11.9	110	OPERATION NOT RECOMMENDED							4.4
17.4	110								9.5
24.8	110								19.3
31.7	110								31.5
		78,293	57,545	115,193	10,738				
		78,612	58,619	115,479	10,749				

CORRECTION FACTORS — ENTERING AIR — 50HQA, HQD096

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	0.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.000
70	1.045	—	0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090	—	0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

CORRECTION FACTORS — NOMINAL CFM — 50HQA, HQD096

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
3000	0.984	0.981	0.986	0.964	0.984	0.986	1.019
3100	0.988	0.986	0.992	0.973	0.988	0.989	1.014
3250	0.994	0.993	1.001	0.986	0.994	0.995	1.007
3400	1.000	1.000	1.010	1.000	1.000	1.000	1.000
3800	1.016	1.019	1.034	1.036	1.016	1.014	0.981
4200	1.033	1.038	1.057	1.073	1.033	1.028	0.962

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.
- Boldface values show ARI conditions.

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

50HQA,HQD120 (10 TONS)
RATED AIRFLOW 4000 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)			
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)				
15.5	40	142,400	96,965	174,500	9,410	OPERATION NOT RECOMMENDED			5.4			
22.7	40	144,984	98,648	174,780	8,729				11.6			
32.4	40	147,517	99,806	175,600	8,230				23.6			
41.3	40	148,360	101,082	175,970	8,090				38.4			
15.5	50	136,199	95,738	170,810	10,053	97,532	60,711	10,771	5.4			
22.7	50	139,716	97,819	172,250	9,532	101,558	65,023	10,707	11.6			
32.4	50	143,241	99,387	174,400	9,130	110,224	72,640	11,010	23.6			
41.3	50	144,085	100,236	174,670	8,963	117,327	77,274	11,740	38.4			
15.5	60	132,686	93,692	165,300	9,556	120,195	79,709	11,846	5.4			
22.7	60	135,874	96,161	167,700	9,351	122,898	83,933	11,422	11.6			
32.4	60	139,821	98,129	169,700	8,754	132,906	91,822	12,030	23.6			
41.3	60	141,947	99,390	171,700	8,738	141,034	96,876	12,916	38.4			
15.5	60	134,600	98,800	167,400	9,509	148,524	99,533	14,360	5.4			
22.7	60	139,700	102,500	170,136	8,738	118,200	87,808	8,922	11.6			
32.4	60	142,900	104,900	171,882	8,227	126,000	93,751	9,486	23.6			
41.3	60	144,600	106,100	172,221	7,966	131,200	97,524	9,896	38.4			
15.5	70	127,100	93,300	163,758	10,619	133,900	99,327	10,116	5.4			
22.7	70	132,300	97,000	166,504	9,866	136,300	100,673	10,450	11.6			
32.4	70	135,400	99,400	167,184	9,366	144,600	106,690	11,109	23.6			
41.3	70	137,000	100,500	167,678	9,112	150,000	110,484	11,582	38.4			
15.5	85	119,000	85,100	156,782	12,286	152,800	112,336	11,834	5.4			
22.7	85	120,800	88,700	159,468	11,557	163,600	120,203	12,739	11.6			
32.4	85	124,000	91,000	161,838	11,076	172,300	126,099	13,545	23.6			
41.3	85	125,700	92,200	162,309	10,830	178,000	129,924	14,112	38.4			
15.5	90	113,700	82,350	155,620	12,841	OPERATION NOT RECOMMENDED			5.4			
22.7	90	117,050	85,900	158,333	12,122				11.6			
32.4	90	120,200	88,200	160,380	11,646				23.6			
41.3	90	121,900	89,450	160,864	11,403				38.4			
15.5	95	108,400	79,600	154,457	13,396				5.4			
22.7	95	113,300	83,100	157,197	12,686				11.6			
32.4	95	116,400	85,400	158,922	12,215				23.6			
41.3	95	118,100	86,700	159,418	11,975				38.4			
15.5	105	101,000	74,100	150,815	14,508				5.4			
22.7	105	105,800	77,600	153,452	13,814				11.6			
32.4	105	108,900	79,900	155,358	13,355				23.6			
41.3	105	110,500	81,100	155,701	13,120				38.4			
15.5	110	OPERATION NOT RECOMMENDED							5.4			
22.7	110								11.6			
32.4	110								23.6			
41.3	110								38.4			

CORRECTION FACTORS — ENTERING AIR — 50HQA, HQD120

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	0.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045	—	0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090	—	0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

CORRECTION FACTORS — NOMINAL CFM — 50HQA, HQD120

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
3200	0.972	0.968	0.970	0.938	0.972	0.976	1.032
3600	0.986	0.984	0.990	0.969	0.986	0.988	1.016
3800	0.993	0.992	1.000	0.985	0.993	0.994	1.008
4000	1.000	1.000	1.010	1.000	1.000	1.000	1.000
4200	1.007	1.008	1.020	1.016	1.007	1.006	0.992
4400	1.014	1.016	1.030	1.031	1.014	1.012	0.984

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.
- Boldface values show ARI conditions.

Performance data (cont)



50VQA,VQD080 (6¹/₂ TONS) RATED AIRFLOW 2600 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)			
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)				
9	40	80,722	58,822	93,790	3830	OPERATION NOT RECOMMENDED			3.7			
13.5	40	81,696	59,159	94,157	3652				61,058	42,951	5307	5.2
18	40	82,200	59,217	94,364	3565							8.2
23	40	82,410	59,566	94,488	3540							61,685
9	50	79,292	58,928	93,578	4187	65,436	46,953	5417	3.7			
13.5	50	80,320	59,278	93,985	4005	67,517	48,867	5466	5.2			
18	50	80,852	59,413	94,248	3926	68,615	49,876	5492	8.2			
23	50	81,168	59,548	94,400	3878	69,364	50,564	5510	12.6			
9	60	77,741	59,042	93,307	4562	72,873	53,759	5602	3.7			
13.5	60	78,853	59,421	93,777	4374	75,153	55,844	5659	5.2			
18	60	79,467	59,581	94,111	4292	76,382	56,961	5692	8.2			
23	60	79,832	59,691	94,289	4237	77,227	57,727	5715	12.6			
9	70	75,616	58,775	92,509	4951	80,665	60,841	5810	3.7			
13.5	70	76,780	59,154	92,987	4750	83,305	63,352	5848	5.2			
18	70	77,440	59,328	93,354	4664	84,851	64,768	5886	8.2			
23	70	77,812	59,479	93,538	4609	85,887	65,712	5913	12.6			
9	80	73,329	58,072	91,665	5374	88,670	68,089	6032	3.7			
13.5	80	74,443	58,616	92,052	5161	92,032	71,140	6123	5.2			
18	80	75,124	58,788	92,419	5069	93,916	72,871	6168	8.2			
23	80	75,495	58,936	92,589	5010	94,976	73,791	6209	12.6			
9	90	71,735	58,559	91,811	5884	OPERATION NOT RECOMMENDED			3.7			
13.5	90	72,214	57,878	91,407	5625				5.2			
18	90	72,822	58,212	91,697	5532				8.2			
23	90	73,178	58,346	91,842	5470				12.6			
9	100	68,996	57,420	90,942	6432				OPERATION NOT RECOMMENDED	3.7		
13.5	100	70,186	57,904	91,218	6164					5.2		
18	100	70,876	58,160	91,539	6056					8.2		
23	100	71,221	58,316	91,642	5985					12.6		
9	110	OPERATION NOT RECOMMENDED							OPERATION NOT RECOMMENDED			3.7
13.5	110											5.2
18	110	67,954	57,113	90,617	6642	8.2						
23	110	68,318	57,275	90,694	6558	12.6						

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD080

EAT. Wb (F)	TC	COOLING					HEATING			
		Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA
		70	75	80	85	90				
57	0.982	1.017	*	*	*	*	0.985	55	1.018	1.063
61	0.983	0.825	1.061	*	*	*	0.985	60	1.012	1.043
64	0.980	0.686	0.912	1.145	*	*	0.983	65	1.006	1.022
67	1.000	0.549	0.771	1.000	1.230	*	1.000	70	1.000	1.000
70	1.045	0.417	0.631	0.856	1.104	1.315	1.038	75	0.991	0.974

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD080

Cfm	COOLING				HEATING		
	TC	TSC	THR	kW	TC	THA	kW
2300	0.987	0.937	0.951	0.980	0.989	0.989	0.991
2500	0.995	0.976	0.975	0.991	0.995	0.997	0.989
2600	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2700	1.002	1.011	1.002	1.002	1.002	1.004	0.995
2900	1.019	1.067	1.037	1.022	1.009	1.010	1.006
3100	1.022	1.096	1.071	1.032	1.016	1.014	1.023
3300	1.023	1.123	1.110	1.040	1.024	1.018	1.045

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.



**50VQA,VQD100 (8¹/₂ TONS)
RATED AIRFLOW 3500 CFM**

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)			
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)				
13	40	112,510	79,307	135,435	6719	OPERATION NOT RECOMMENDED			5.0			
19	40	114,044	79,912	136,109	6467				9.0			
26	40	114,951	80,259	136,542	6328				15.5			
33	40	115,377	80,553	136,695	6248				23.1			
13	50	110,921	79,479	135,757	7279	85,933	59,599	7,718	5.0			
19	50	112,634	80,129	136,607	7026	92,859	65,300	8,077	9.0			
26	50	113,674	80,509	137,169	6886	96,440	68,236	8,266	15.5			
33	50	114,287	80,782	137,506	6805	97,933	69,306	8,390	23.1			
13	60	107,916	79,182	134,659	7838	101,678	72,935	8,424	5.0			
19	60	109,777	79,838	135,671	7589	106,253	76,343	8,766	9.0			
26	60	110,938	80,225	136,354	7449	110,586	79,868	9,003	15.5			
33	60	111,595	80,495	136,738	7369	113,454	82,282	9,136	23.1			
13	70	104,361	78,074	132,868	8355	115,367	83,902	9,222	5.0			
19	70	106,308	78,760	134,013	8120	120,154	87,791	9,485	9.0			
26	70	107,340	79,328	134,616	7994	125,464	92,136	9,768	15.5			
33	70	108,019	79,598	135,032	7917	128,930	95,025	9,937	23.1			
13	80	100,084	76,763	130,307	8858	130,817	96,533	10,048	5.0			
19	80	101,874	77,656	131,381	8648	134,872	99,950	10,235	9.0			
26	80	103,343	77,864	132,389	8513	141,443	105,245	10,609	15.5			
33	80	104,029	78,132	132,833	8442	145,332	108,397	10,825	23.1			
13	90	95,447	75,747	127,400	9365	147,681	110,299	10,956	5.0			
19	90	97,483	76,383	128,740	9161	OPERATION NOT RECOMMENDED			9.0			
26	90	98,930	76,565	129,764	9037				15.5			
33	90	99,414	77,034	130,067	8984				23.1			
13	100	90,207	74,118	123,740	9828				5.0			
19	100	92,255	74,671	125,136	9637				9.0			
26	100	93,528	75,030	126,048	9531				15.5			
33	100	94,195	75,273	126,520	9474				23.1			
13	110	OPERATION NOT RECOMMENDED							OPERATION NOT RECOMMENDED			5.0
19	110											9.0
26	110	88,243	73,183	122,346	9995							15.5
33	110	88,842	73,542	122,785	9948	23.1						

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD100

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
57	0.994	1.017	*	*	*	*	0.995	55	1.048	1.091	0.928
61	0.995	0.820	1.055	*	*	*	0.995	60	1.033	1.061	0.953
64	0.975	0.683	0.915	1.143	*	*	0.978	65	1.018	1.032	0.978
67	1.000	0.548	0.776	1.000	1.235	*	1.000	70	1.000	1.000	1.000
70	1.048	0.426	0.633	0.857	1.087	1.331	1.042	75	0.986	0.973	1.022

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD100

Cfm	COOLING				HEATING		
	TC	TSC	THR	kW	TC	THA	kW
3000	0.978	0.930	0.971	0.949	0.986	0.984	0.993
3200	0.989	0.955	0.984	0.968	0.994	0.994	0.996
3400	0.995	0.984	0.994	0.989	1.001	1.002	1.000
3500	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3600	1.005	1.010	1.005	1.005	1.008	1.009	1.006
3800	1.011	1.037	1.016	1.034	1.015	1.015	1.015
4000	1.015	1.068	1.025	1.061	1.022	1.021	1.026
4200	1.019	1.088	1.034	1.085	1.027	1.022	1.039

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.

Performance data (cont)



50VQA,VQD120 (10 TONS)

RATED AIRFLOW 4200 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)						
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)							
16	40	134,875	94,734	162,823	8,191	OPERATION NOT RECOMMENDED			6.8						
23.5	40	136,536	95,620	163,498	7,902				98,467	67,916	8,954	13.1			
31	40	137,636	95,938	164,052	7,742							99,697	68,948	9,012	20.8
39	40	138,472	96,396	164,676	7,680										30.7
16	50	132,539	94,806	162,725	8,847	108,216	75,904	9,470	6.8						
23.5	50	134,595	95,609	163,805	8,561	112,099	79,146	96,58	13.1						
31	50	135,769	96,033	164,481	8,415	113,936	80,649	9,756	20.8						
39	50	136,517	96,368	164,908	8,321	115,810	82,308	9,819	30.7						
16	60	128,865	94,109	161,166	9,467	123,170	88,351	10,205	6.8						
23.5	60	131,074	94,941	162,447	9,195	127,917	92,330	10,430	13.1						
31	60	132,352	95,393	163,248	9,055	130,554	94,568	10,547	20.8						
39	60	133,135	95,730	163,727	8,966	132,333	96,053	10,633	30.7						
16	70	124,158	92,810	158,445	10,049	139,080	101,623	10,978	6.8						
23.5	70	126,466	93,649	159,880	9,793	144,668	106,263	11,256	13.1						
31	70	127,817	94,114	160,784	9,662	147,973	109,107	11,391	20.8						
39	70	128,620	94,447	161,300	9,578	149,708	110,446	11,507	30.7						
16	80	118,686	91,460	154,915	10,618	155,767	115,587	11,776	6.8						
23.5	80	121,264	91,980	156,633	10,366	162,571	121,173	12,133	13.1						
31	80	122,653	92,441	157,606	10,244	166,138	124,129	12,312	20.8						
39	80	123,464	92,766	158,150	10,166	168,733	126,329	12,428	30.7						
16	90	113,267	89,850	151,379	11,170	OPERATION NOT RECOMMENDED			6.8						
23.5	90	115,890	90,302	153,190	10,932				13.1						
31	90	117,055	91,103	154,021	10,834					20.8					
39	90	117,885	91,374	154,602	10,761						30.7				
16	100	107,709	88,140	147,732	11,730							6.8			
23.5	100	110,061	89,039	149,350	11,515				13.1						
31	100	111,438	89,549	150,359	11,407					20.8					
39	100	112,213	89,875	150,902	11,339						30.7				
16	110	OPERATION NOT RECOMMENDED							6.8						
23.5	110									104,884		87,126	145,709	11,965	13.1
31	110	20.8													
39	110		30.7												

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD120

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
57	0.974	1.010	*	*	*	*	0.978	55	1.046	1.088	0.927
61	0.975	0.823	1.055	*	*	*	0.977	60	1.033	1.062	0.951
64	0.965	0.690	0.915	1.143	*	*	0.973	65	1.015	1.028	0.978
67	1.000	0.556	0.776	1.000	1.235	*	1.005	70	1.000	1.000	1.000
70	1.049	0.431	0.633	0.857	1.092	1.322	1.042	75	0.984	0.970	1.024

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD120

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
3500	0.978	0.925	0.935	0.968	0.977	0.975	0.983
3700	0.986	0.949	0.953	0.978	0.982	0.980	0.986
3900	0.994	0.969	0.971	0.989	0.990	0.990	0.989
4100	0.999	0.991	0.991	0.997	0.996	0.997	0.996
4200	1.000	1.000	1.000	1.000	1.000	1.000	1.000
4300	1.002	1.016	1.012	1.004	1.001	1.000	1.004
4500	1.005	1.037	1.034	1.011	1.006	1.003	1.013
4700	1.013	1.065	1.059	1.023	1.014	1.010	1.024

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.



50VQA,VQD160 (13 TONS)
RATED AIRFLOW 5200 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)			
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)				
18	40	161,444	117,644	187,580	7,660	OPERATION NOT RECOMMENDED			3.69			
27	40	163,392	118,318	188,313	7,304				122,117 123,369	85,902 87,052	10,614 10,644	5.23
36	40	164,400	118,434	188,728	7,130							8.23
46	40	164,820	119,132	188,977	7,080							12.59
18	50	158,584	117,856	187,156	8,374	130,872	93,906	10,834	3.69			
27	50	160,640	118,556	187,970	8,010	135,034	97,734	10,932	5.23			
36	50	161,704	118,826	188,495	7,852	137,229	99,752	10,984	8.23			
46	50	162,336	119,096	188,799	7,756	138,728	101,128	11,020	12.59			
18	60	155,482	118,084	186,613	9,124	145,746	107,518	11,204	3.69			
27	60	157,706	118,842	187,554	8,748	150,305	111,688	11,318	5.23			
36	60	158,934	119,162	188,223	8,584	152,764	113,922	11,384	8.23			
46	60	159,664	119,382	188,577	8,474	154,453	115,454	11,430	12.59			
18	70	151,232	117,550	185,018	9,902	161,329	121,682	11,620	3.69			
27	70	153,560	118,308	185,974	9,500	166,611	126,704	11,696	5.23			
36	70	154,880	118,656	186,707	9,328	169,702	129,536	11,772	8.23			
46	70	155,624	118,958	187,076	9,218	171,774	131,424	11,826	12.59			
18	80	146,658	116,144	183,330	10,748	177,340	136,178	12,064	3.69			
27	80	148,886	117,232	184,105	10,322	184,063	142,280	12,246	5.23			
36	80	150,248	117,576	184,839	10,138	187,832	145,742	12,336	8.23			
46	80	150,990	117,872	185,178	10,020	189,952	147,582	12,418	12.59			
18	90	143,470	117,118	183,622	11,768	OPERATION NOT RECOMMENDED			3.69			
27	90	144,428	115,756	182,813	11,250				5.23			
36	90	145,644	116,424	183,394	11,064				8.23			
46	90	146,356	116,692	183,683	10,940				12.59			
18	100	137,992	114,840	181,884	12,864				OPERATION NOT RECOMMENDED	3.69		
27	100	140,372	115,808	182,435	12,328					5.23		
36	100	141,752	116,320	183,078	12,112					8.23		
46	100	142,442	116,632	183,284	11,970					12.59		
18	110	OPERATION NOT RECOMMENDED							OPERATION NOT RECOMMENDED	3.69		
27	110									5.23		
36	110	135,908	114,226	181,233	13,284					8.23		
46	110	136,636	114,550	181,388	13,116					12.59		

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD160

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
57	0.982	1.017	*	*	*	*	0.985	55	1.018	1.063	0.872
61	0.983	0.825	1.061	*	*	*	0.985	60	1.012	1.043	0.911
64	0.980	0.686	0.912	1.145	*	*	0.983	65	1.006	1.022	0.954
67	1.000	0.549	0.771	1.000	1.230	*	1.000	70	1.000	1.000	1.000
70	1.045	0.417	0.631	0.856	1.104	1.315	1.038	75	0.991	0.974	1.046

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD160

Cfm	COOLING				HEATING		
	TC	TSC	THR	kW	TC	THA	kW
4600	0.987	0.937	0.951	0.980	0.989	0.989	0.991
5000	0.995	0.976	0.975	0.991	0.995	0.997	0.989
5200	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5400	1.002	1.011	1.002	1.002	1.002	1.004	0.995
5800	1.019	1.067	1.037	1.022	1.009	1.010	1.006
6200	1.022	1.096	1.071	1.032	1.016	1.014	1.023
6600	1.023	1.123	1.110	1.040	1.024	1.018	1.045

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.

Performance data (cont)



50VQA,VQD200 (17 TONS)

RATED AIRFLOW 7000 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)	
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)		
26	40	225,020	158,614	270,870	13,438	OPERATION NOT RECOMMENDED			5.0	
38	40	228,088	159,824	272,219	12,934				9.0	
52	40	229,902	160,518	273,084	12,656				15.5	
66	40	230,754	161,106	273,390	12,496				23.1	
26	50	221,842	158,958	271,514	14,558	185,717	130,600	16,154	5.0	
38	50	225,268	160,258	273,213	14,052	192,879	136,472	16,532	9.0	
52	50	227,348	161,018	274,338	13,772	195,865	138,612	16,780	15.5	
66	50	228,574	161,564	275,011	13,610	203,355	145,870	16,848	23.1	
26	60	215,832	158,364	269,319	15,676	212,505	152,686	17,532	5.0	
38	60	219,554	159,676	271,341	15,178	221,172	159,736	18,006	9.0	
52	60	221,876	160,450	272,708	14,898	226,908	164,564	18,272	15.5	
66	60	223,190	160,990	273,476	14,738	230,735	167,804	18,444	23.1	
26	70	208,722	156,148	265,737	16,710	240,308	175,582	18,970	5.0	
38	70	212,616	157,520	268,027	16,240	250,929	184,272	19,536	9.0	
52	70	214,680	158,656	269,231	15,988	257,860	190,050	19,874	15.5	
66	70	216,038	159,196	270,064	15,834	261,634	193,066	20,096	23.1	
26	80	200,168	153,526	260,615	17,716	269,744	199,900	20,470	5.0	
38	80	203,748	155,312	262,762	17,296	282,886	210,490	21,218	9.0	
52	80	206,686	155,728	264,779	17,026	290,664	216,794	21,650	15.5	
66	80	208,058	156,264	265,666	16,884	295,362	220,598	21,912	23.1	
26	90	190,894	151,494	254,801	18,730	OPERATION NOT RECOMMENDED			5.0	
38	90	194,966	152,766	257,481	18,322				9.0	
52	90	197,860	153,130	259,528	18,074				15.5	
66	90	198,828	154,068	260,135	17,968				23.1	
26	100	180,414	148,236	247,480	19,656				5.0	
38	100	184,510	149,342	250,273	19,274				9.0	
52	100	187,056	150,060	252,096	19,062				15.5	
66	100	188,390	150,546	253,041	18,948				23.1	
26	110	OPERATION NOT RECOMMENDED								5.0
38	110									9.0
52	110	176,486	146,366	244,692	19,990					15.5
66	110	177,684	147,084	245,569	19,896					23.1

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD200

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
57	0.994	1.017	*	*	*	*	0.995	55	1.048	1.091	0.928
61	0.995	0.820	1.068	*	*	*	0.995	60	1.033	1.061	0.953
64	0.975	0.683	0.910	1.154	*	*	0.978	65	1.018	1.032	0.978
67	1.000	0.548	0.770	1.000	1.243	*	1.000	70	1.000	1.000	1.000
70	1.048	0.426	0.633	0.857	1.087	1.331	1.042	75	0.986	0.973	1.022

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD200

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
6000	0.977	0.929	0.951	0.971	0.987	0.984	0.995
6400	0.989	0.955	0.968	0.984	0.994	0.994	0.996
6800	0.995	0.984	0.989	0.994	1.001	1.002	1.000
7000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7200	1.004	1.008	1.008	1.005	0.737	1.009	1.005
7600	1.007	1.037	1.031	1.012	1.015	1.015	1.013
8000	1.011	1.061	1.054	1.021	1.021	1.021	1.023
8400	1.013	1.085	1.078	1.028	1.025	1.022	1.034

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.



50VQA,VQD240 (20 TONS)
RATED AIRFLOW 8400 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)	
32	40	269,750	189,468	325,645	16,382	OPERATION NOT RECOMMENDED			6.8
47	40	273,072	191,240	326,995	15,804				13.1
62	40	275,272	191,876	328,103	15,484				20.8
78	40	276,944	192,792	329,352	15,360				30.7
32	50	265,078	189,612	325,450	17,694	216,431	151,808	18,940	6.8
47	50	269,190	191,218	327,610	17,122	224,198	158,292	19,316	13.1
62	50	271,538	192,066	328,962	16,830	227,873	161,298	19,512	20.8
78	50	273,034	192,736	329,817	16,642	231,621	164,616	19,638	30.7
32	60	257,730	188,218	322,333	18,934	246,341	176,702	20,410	6.8
47	60	262,148	189,882	324,895	18,390	255,834	184,660	20,860	13.1
62	60	264,704	190,786	326,495	18,110	261,109	189,136	21,094	20.8
78	60	266,270	191,460	327,454	17,932	264,666	192,106	21,266	30.7
32	70	248,316	185,620	316,890	20,098	278,160	203,246	21,956	6.8
47	70	252,932	187,298	319,759	19,586	289,337	212,526	22,512	13.1
62	70	255,634	188,228	321,567	19,324	295,946	218,214	22,782	20.8
78	70	257,240	188,894	322,600	19,156	299,416	220,892	23,014	30.7
32	80	237,372	182,920	309,829	21,236	311,533	231,174	23,552	6.8
47	80	242,528	183,960	313,266	20,732	325,142	242,346	24,266	13.1
62	80	245,306	184,882	315,211	20,488	332,275	248,258	24,624	20.8
78	80	246,928	185,532	316,301	20,332	337,467	252,658	24,856	30.7
32	90	226,534	179,700	302,758	22,340	OPERATION NOT RECOMMENDED			6.8
47	90	231,780	180,604	306,380	21,864				13.1
62	90	234,110	182,206	308,041	21,668				20.8
78	90	235,770	182,748	309,203	21,522				30.7
32	100	215,418	176,280	295,464	23,460	OPERATION NOT RECOMMENDED			6.8
47	100	220,122	178,078	298,700	23,030				13.1
62	100	222,876	179,098	300,717	228,14				20.8
78	100	224,426	179,750	301,803	22,678				30.7
32	110	OPERATION NOT RECOMMENDED				OPERATION NOT RECOMMENDED			6.8
47	110								13.1
62	110	209,768	174,252	291,417	23,930				20.8
78	110	211,326	174,892	292,538	23,802				30.7

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD240

COOLING								HEATING			
EAT. Wb (F)	TC	Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA	kW
		70	75	80	85	90					
57	0.974	1.010	*	*	*	*	0.978	55	1.046	1.088	0.927
61	0.975	0.823	1.055	*	*	*	0.977	60	1.033	1.062	0.951
64	0.965	0.690	0.915	1.143	*	*	0.973	65	1.015	1.028	0.978
67	1.000	0.556	0.776	1.000	1.235	*	1.005	70	1.000	1.000	1.000
70	1.049	0.431	0.633	0.857	1.092	1.322	1.042	75	0.984	0.970	1.024

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD240

COOLING					HEATING		
Cfm	TC	TSC	THR	kW	TC	THA	kW
7000	0.978	0.924	0.937	0.968	0.977	0.975	0.984
7400	0.985	0.948	0.955	0.978	0.982	0.980	0.988
7800	0.994	0.968	0.972	0.989	0.991	0.990	0.991
8200	0.999	0.991	0.991	0.997	0.996	0.997	0.996
8400	1.000	1.000	1.000	1.000	1.000	1.000	1.000
8600	1.002	1.016	1.012	1.004	1.001	1.000	1.003
9000	1.005	1.038	1.033	1.011	1.006	1.003	1.013
9400	1.013	1.065	1.057	1.023	1.014	1.010	1.023

LEGEND	
ARI	— Air Conditioning and Refrigeration Institute
Cfm	— Cubic Feet Per Minute
Db	— Dry Bulb
EAT.	— Entering-Air Temperature (F)
EWT	— Entering Water Temperature (F)
Gpm	— Gallons Per Minute
kW	— Total Power Input (kilowatts)
TC	— Total Capacity (Btuh)
THA	— Total Heat of Absorption (Btuh)
THR	— Total Heat of Rejection (Btuh)
TSC	— Total Sensible Capacity (Btuh)
Wb	— Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.

Performance data (cont)



50VQA,VQD300 (25 TONS) RATED AIRFLOW 9000 CFM

GPM	EWT (F)	COOLING CAPACITIES				HEATING CAPACITIES			PRESSURE DROP (in. wg)	
		TC	TSC	THR	Total Power Input (Watts)	TC	THA	Total Power Input (Watts)		
40	40	344,094	233,156	427,169	24,348	OPERATION NOT RECOMMENDED			5.1	
60	40	348,878	235,058	429,367	23,590				9.9	
80	40	351,452	236,178	430,720	23,232				16.2	
100	40	352,516	238,782	431,743	23,220				23.5	
40	50	333,454	228,686	421,299	25,746	275,817	181,502	27,642	5.1	
60	50	342,214	237,548	427,999	25,142	284,168	188,134	28,146	9.9	
80	50	344,532	238,730	429,034	24,766	288,515	191,614	28,400	16.2	
100	50	346,080	239,618	429,947	24,580	291,344	193,870	28,568	23.5	
40	60	322,286	224,422	415,236	27,242	308,451	207,258	29,658	5.1	
60	60	327,544	226,596	417,962	26,500	318,428	215,140	30,272	9.9	
80	60	330,466	227,708	419,649	26,138	323,463	219,138	30,576	16.2	
100	60	331,560	228,938	420,149	25,964	326,634	221,572	30,792	23.5	
40	70	310,102	219,830	408,217	28,756	341,627	233,398	31,720	5.1	
60	70	315,606	222,048	411,238	28,028	353,969	243,134	32,484	9.9	
80	70	318,692	223,234	413,102	27,670	360,255	248,164	32,852	16.2	
100	70	320,386	223,978	414,100	27,466	364,176	251,212	33,108	23.5	
40	80	296,306	215,642	399,778	30,326	374,790	259,178	33,884	5.1	
60	80	302,578	217,160	403,491	29,576	389,475	270,860	34,764	9.9	
80	80	305,852	218,394	405,557	29,222	396,775	276,632	35,212	16.2	
100	80	307,600	219,150	406,623	29,022	401,688	280,494	35,520	23.5	
40	90	284,618	210,794	393,277	31,846	OPERATION NOT RECOMMENDED			5.1	
60	90	290,034	213,668	396,502	31,204				9.9	
80	90	293,354	214,830	398,676	30,868				16.2	
100	90	295,088	215,544	399,775	30,682				23.5	
40	100	271,612	206,156	385,580	33,402				5.1	
60	100	277,406	208,562	389,176	32,758				9.9	
80	100	278,988	209,408	389,571	32,410				16.2	
100	100	280,724	210,066	390,706	32,234				23.5	
40	110	OPERATION NOT RECOMMENDED							OPERATION NOT RECOMMENDED	5.1
60	110									9.9
80	110	265,652	203,988	381,721	34,018	16.2				
100	110	267,356	204,744	382,859	33,852	23.5				

CORRECTION FACTORS — ENTERING AIR — 50VQA, VQD300

EAT. Wb (F)	TC	COOLING					HEATING			
		Sensible Capacity Entering Dry Bulb (F)					THR	EAT. Db (F)	TC	THA
		70	75	80	85	90				
57	0.953	1.012	*	*	*	*	0.959	55	1.033	1.078
61	0.939	0.839	1.055	1.277	*	*	0.948	60	1.022	1.053
64	0.961	0.708	0.919	1.138	1.359	*	0.967	65	1.010	1.025
67	1.000	0.583	0.787	1.000	1.221	1.441	1.000	70	1.000	1.000
70	1.045	0.462	0.659	0.871	1.085	1.303	1.040	75	0.986	0.970

CORRECTION FACTORS — NOMINAL CFM — 50VQA, VQD300

Cfm	COOLING				HEATING		
	TC	TSC	THR	kW	TC	THA	kW
8,000	0.980	0.951	0.956	0.974	0.985	0.982	0.992
8,500	0.990	0.973	0.976	0.987	0.992	0.991	0.995
9,000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9,500	1.001	1.023	1.023	1.006	1.008	1.008	1.009
10,000	1.006	1.041	1.046	1.016	1.016	1.014	1.019
10,500	1.012	1.071	1.076	1.028	1.341	1.481	1.031
11,000	1.016	1.087	1.102	1.038	1.029	1.022	1.045

LEGEND

ARI	—	Air Conditioning and Refrigeration Institute
Cfm	—	Cubic Feet Per Minute
Db	—	Dry Bulb
EAT.	—	Entering-Air Temperature (F)
EWT	—	Entering Water Temperature (F)
Gpm	—	Gallons Per Minute
kW	—	Total Power Input (kilowatts)
TC	—	Total Capacity (Btuh)
THA	—	Total Heat of Absorption (Btuh)
THR	—	Total Heat of Rejection (Btuh)
TSC	—	Total Sensible Capacity (Btuh)
Wb	—	Wet Bulb

* Sensible equals total.

NOTES:

- Capacities based on 80 F db, 67 F wb at ARI rated cfm. For alternate cfm and entering-air temperatures, use appropriate correction factors.
- Interpolation within table is permissible. Do not extrapolate.
- Shaded values are applicable to low-temperature units only.

FAN PERFORMANCE — BELT DRIVE UNITS

50HQA, HQD072 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	540	0.23	540	0.27	594	0.31	643	0.35	690	0.39	735	0.40	780	0.49
2000	500	0.27	554	0.32	607	0.37	650	0.41	691	0.46	735	0.51	780	0.56
2200	552	0.38	600	0.43	644	0.47	681	0.52	724	0.57	768	0.62	808	0.67
2400	600	0.48	630	0.54	681	0.59	722	0.64	724	0.69	800	0.75	830	0.80
2600	642	0.61	681	0.68	722	0.73	759	0.79	769	0.84	832	0.89	864	0.96
2800	684	0.75	716	0.80	747	0.87	793	0.93	828	1.00	856	1.05	890	1.11
3000	717	0.88	754	0.95	792	1.02	820	1.09	852	1.16	883	1.22	917	1.28

50HQA, HQD072 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	826	0.54	865	0.60	904	0.64	948	0.70	1024	0.74	1024	0.81	1064	0.87
2000	823	0.61	862	0.67	900	0.72	941	0.78	977	0.83	1014	0.90	1051	0.95
2200	843	0.73	878	0.78	917	0.84	956	0.90	992	0.96	1028	1.02	1058	1.08
2400	868	0.86	906	0.92	941	0.98	975	1.04	1011	1.11	1044	1.17	1071	1.23
2600	893	1.01	930	1.08	960	1.14	1000	1.19	1026	1.27	1061	1.32	1090	1.41
2800	918	1.17	954	1.24	989	1.31	1016	1.38	1044	1.44	1075	1.51	1105	1.57
3000	940	1.34	976	1.40	—	—	1036	1.55	1061	1.61	1091	1.69	1120	1.77

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 1.5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 760 to 1014 rpm. All other rpms require field-supplied drive.

50HQA, HQD096 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	980	0.80	1023	0.87	1064	0.94	1105	1.06	1144	1.09	1183	1.16	1220	1.23
3200	1034	0.94	1074	1.01	1114	1.08	1153	1.21	1191	1.23	1228	1.30	1264	1.37
3400	1094	1.09	1133	1.16	1172	1.23	1209	1.29	1246	1.36	1282	1.43	1317	1.49
3600	1143	1.27	1180	1.34	1216	1.41	1252	1.55	1287	1.55	1322	1.62	1356	1.69
3800	1198	1.46	1234	1.53	1268	1.60	1303	1.75	1337	1.74	1370	1.80	1403	1.87
4000	1254	1.68	1288	1.74	1321	1.81	1354	1.96	1387	1.94	—	—	—	—
4200	1310	1.91	1342	1.97	—	—	—	—	—	—	—	—	—	—

50HQA, HQD096 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	1256	1.30	1292	1.37	1327	1.45	1362	1.52	1365	1.42	1399	1.49	1433	1.56
3200	1299	1.44	1340	1.51	1368	1.59	1402	1.66	1403	1.67	1437	1.56	1470	1.63
3400	1351	1.56	1386	1.63	1419	1.70	1452	1.77	1484	1.83	1516	1.90	1548	1.97
3600	1389	1.76	1422	1.83	1454	1.91	1486	1.98	—	—	—	—	—	—
3800	1435	1.94	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 1.5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 1065 to 1319 rpm. All other rpms require field-supplied drive.

Performance data (cont)



FAN PERFORMANCE — BELT DRIVE UNITS (cont)

50HQA, HQD120 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3200	978	0.80	1009	0.86	1040	0.91	1070	0.96	1098	1.01	1126	1.06	1153	1.11
3400	1031	0.94	1061	0.99	1090	1.05	1119	1.10	1146	1.15	1173	1.20	1199	1.24
3600	1085	1.10	1113	1.15	1141	1.20	1168	1.25	1195	1.30	1221	1.35	1246	1.39
3800	1139	1.27	1166	1.32	1193	1.37	1219	1.42	1244	1.47	1269	1.52	1293	1.56
4000	1193	1.46	1219	1.51	1245	1.56	1270	1.61	1294	1.65	1318	1.70	1341	1.74
4200	1248	1.67	1272	1.72	1297	1.76	1321	1.81	1344	1.86	1368	1.90	1390	1.94
4400	1303	1.90	1326	1.94	1350	1.99	—	—	—	—	—	—	—	—

50HQA, HQD120 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3200	1180	1.16	1207	1.21	1232	1.26	1258	1.30	1282	1.36	1306	1.41	1329	1.46
3400	1225	1.29	1250	1.35	1275	1.40	1300	1.44	1323	1.49	1347	1.54	1369	1.59
3600	1270	1.45	1295	1.50	1319	1.55	1343	1.59	1366	1.64	1388	1.69	1410	1.74
3800	1317	1.61	1341	1.66	1364	1.71	1387	1.75	1409	1.80	1431	1.85	1452	1.90
4000	1364	1.79	1387	1.84	1410	1.89	1432	1.93	1453	1.97	—	—	—	—
4200	1412	1.98	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 5.)
- Maximum brake horsepower is 2.0. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 1065 to 1319 rpm. All other rpms require field-supplied drive.

50VQA, VQD080 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2300	618	0.44	657	0.48	694	0.52	730	0.56	765	0.60	799	0.65	833	0.69
2500	657	0.54	693	0.59	728	0.63	762	0.67	795	0.72	827	0.77	859	0.81
2700	697	0.67	730	0.71	763	0.76	795	0.81	826	0.86	857	0.91	887	0.96
2900	737	0.81	768	0.86	799	0.91	829	0.96	859	1.01	888	1.06	916	1.11
3100	778	0.97	807	1.02	836	1.07	865	1.13	893	1.18	920	1.24	948	1.29
3300	819	1.15	846	1.21	874	1.26	901	1.32	928	1.38	954	1.43	980	1.49
3500	860	1.35	886	1.41	912	1.47	938	1.53	963	1.59	989	1.65	1013	1.71

50VQA, VQD080 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2300	866	0.74	898	0.79	929	0.83	960	0.88	990	0.93	1020	0.99	1049	1.04
2500	890	0.86	920	0.91	950	0.96	980	1.02	1009	1.07	1037	1.12	1065	1.18
2700	916	1.01	945	1.06	974	1.11	1002	1.17	1030	1.22	1057	1.28	1084	1.33
2900	945	1.17	972	1.22	999	1.28	1026	1.34	1053	1.39	1079	1.45	1105	1.51
3100	974	1.35	1001	1.41	1027	1.47	1052	1.52	1078	1.58	1103	1.64	1127	1.71
3300	1005	1.55	1031	1.61	1056	1.67	1080	1.73	1104	1.80	1128	1.86	1152	1.92
3500	1038	1.78	1062	1.84	1086	1.90	1109	1.97	1133	2.03	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 1.5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 768 to 982 rpm. All other rpms require field-supplied drive.

FAN PERFORMANCE — BELT DRIVE UNITS (cont)

50VQA, VQD100 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	534	0.52	571	0.58	607	0.65	641	0.71	675	0.78	708	0.85	740	0.92
3200	558	0.61	593	0.68	627	0.74	660	0.81	692	0.88	724	0.95	754	1.03
3400	582	0.71	615	0.78	647	0.85	679	0.92	710	0.99	740	1.07	770	1.15
3600	606	0.82	638	0.89	669	0.97	699	1.04	729	1.12	758	1.20	786	1.28
3800	630	0.95	661	1.02	690	1.10	719	1.17	748	1.25	776	1.33	803	1.42
4000	655	1.08	684	1.16	713	1.24	740	1.32	768	1.40	795	1.48	821	1.57
4200	680	1.23	708	1.31	735	1.39	762	1.48	788	1.56	814	1.65	840	1.74

50VQA, VQD100 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	771	1.00	802	1.07	832	1.15	861	1.24	890	1.32	918	1.41	946	1.50
3200	784	1.11	814	1.19	843	1.27	871	1.35	899	1.44	926	1.53	953	1.62
3400	799	1.23	827	1.31	855	1.39	883	1.48	910	1.57	936	1.66	962	1.75
3600	814	1.36	842	1.44	868	1.53	895	1.62	921	1.71	947	1.80	972	1.89
3800	830	1.50	857	1.59	883	1.68	908	1.77	934	1.86	959	1.95	—	—
4000	847	1.66	873	1.75	898	1.84	923	1.93	—	—	—	—	—	—
4200	865	1.83	890	1.92	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 1.5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 724 to 925 rpm. All other rpms require field-supplied drive

50VQA, VQD120 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	619	0.82	651	0.89	682	0.96	713	1.04	742	1.11	772	1.19	800	1.27
3700	645	0.95	675	1.02	705	1.10	734	1.17	763	1.25	791	1.33	818	1.42
3900	671	1.09	700	1.16	729	1.24	757	1.32	784	1.40	811	1.49	837	1.57
4100	697	1.24	725	1.32	752	1.40	779	1.48	806	1.57	832	1.66	857	1.74
4300	724	1.40	750	1.49	776	1.57	802	1.66	828	1.75	853	1.84	877	1.93
4500	750	1.59	776	1.67	801	1.76	826	1.85	850	1.94	874	2.04	—	—
4700	777	1.78	801	1.87	825	1.96	—	—	—	—	—	—	—	—

50VQA, VQD120 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	828	1.36	856	1.44	883	1.53	910	1.62	936	1.71	961	1.80	987	1.90
3700	845	1.50	872	1.59	898	1.68	924	1.77	949	1.86	974	1.96	—	—
3900	863	1.66	889	1.75	914	1.84	939	1.94	964	2.03	—	—	—	—
4100	882	1.84	907	1.93	937	2.02	—	—	—	—	—	—	—	—
4300	902	2.02	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 2.0. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 768 to 982 rpm. All other rpms require field-supplied drive.

Performance data (cont)



FAN PERFORMANCE — BELT DRIVE UNITS (cont)

50VQA, VQD160 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4600	618	0.87	657	0.95	694	1.04	730	1.12	765	1.21	799	1.29	833	1.38
5000	657	1.09	693	1.17	728	1.35	762	1.35	795	1.44	827	1.53	859	1.63
5400	697	1.33	730	1.42	763	1.52	795	1.61	826	1.71	857	1.81	887	1.91
5800	737	1.62	768	1.71	799	1.81	829	1.91	859	2.02	888	2.12	916	2.23
6200	778	1.94	807	2.04	836	2.15	865	2.26	893	2.36	920	2.47	948	2.59
6600	819	2.30	846	2.41	874	2.52	901	2.64	928	2.75	954	2.87	980	2.99
7000	860	2.71	886	2.82	912	2.94	—	—	—	—	—	—	—	—

50VQA, VQD160 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4600	866	1.48	898	1.57	929	1.67	960	1.77	990	1.87	1020	1.97	1049	2.08
5000	890	1.73	920	1.83	950	1.93	980	2.03	1009	2.14	1027	2.24	1065	2.35
5400	916	2.01	945	2.12	974	2.22	1002	2.33	1030	2.44	1057	2.55	1084	2.67
5800	945	2.34	972	2.46	999	2.56	1026	2.67	1053	2.78	1079	2.90	—	—
6200	974	2.70	1001	2.81	1027	2.93	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

1. **Boldface** indicates a field-supplied drive is required. (See Note 5.)
2. Maximum brake horsepower is 3.0. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
3. Values include losses for filters, unit casing, and wet coils.
4. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Motor drive range: 768 to 982 rpm. All other rpms require field-supplied drive.

50VQA, VQD200 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	534	0.52	571	0.58	607	0.65	641	0.71	675	0.78	708	0.85	740	0.92
6400	558	0.61	593	0.68	627	0.74	660	0.81	692	0.88	724	0.95	754	1.03
6800	582	0.71	615	0.78	647	0.85	679	0.92	710	0.99	740	1.07	770	1.15
7200	606	0.82	638	0.89	669	0.97	699	1.04	729	1.12	758	1.20	786	1.28
7600	630	0.95	661	1.02	690	1.10	719	1.17	748	1.25	776	1.33	803	1.42
8000	655	1.08	684	1.16	713	1.24	740	1.32	768	1.40	795	1.48	821	1.57
8400	680	1.23	708	1.31	735	1.39	762	1.48	788	1.56	814	1.65	840	1.74

50VQA, VQD200 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	771	1.00	802	1.07	832	1.15	861	1.24	890	1.32	918	1.41	946	1.50
6400	784	1.11	814	1.19	843	1.27	871	1.35	899	1.44	926	1.53	953	1.62
6800	799	1.23	827	1.31	855	1.39	883	1.48	910	1.57	936	1.66	962	1.75
7200	814	1.36	842	1.44	868	1.53	895	1.62	921	1.71	947	1.80	972	1.89
7600	830	1.50	857	1.59	883	1.68	908	1.77	934	1.86	959	1.95	—	—
8000	847	1.66	873	1.75	898	1.84	923	1.93	—	—	—	—	—	—
8400	865	1.83	890	1.92	—	—	—	—	—	—	—	—	—	—

NOTES:

1. **Boldface** indicates a field-supplied drive is required. (See Note 6.)
2. **Field-supplied** indicates field-supplied motor and drive are required.
3. Maximum brake horsepower is 1.5. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Motor drive range: 724 to 925 rpm. All other rpms require field-supplied drive.

FAN PERFORMANCE — BELT DRIVE UNITS (cont)

50VQA, VQD240 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	619	0.82	651	0.89	682	0.96	713	1.04	742	1.11	772	1.19	800	1.27
7400	645	0.95	675	1.02	705	1.10	734	1.17	763	1.25	791	1.33	818	1.42
7800	671	1.09	700	1.16	729	1.24	757	1.32	784	1.40	811	1.49	837	1.57
8200	697	1.24	725	1.32	752	1.40	779	1.48	806	1.57	832	1.66	857	1.74
8600	724	1.40	750	1.49	776	1.57	802	1.66	828	1.75	853	1.84	877	1.93
9000	750	1.59	776	1.67	801	1.76	826	1.85	850	1.94	874	2.04	—	—
9400	777	1.78	801	1.87	825	1.96	—	—	—	—	—	—	—	—

50VQA, VQD240 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	828	1.36	856	1.44	883	1.53	910	1.62	936	1.71	961	1.80	987	1.90
7400	845	1.50	872	1.59	898	1.68	924	1.77	949	1.86	974	1.96	—	—
7800	863	1.66	889	1.75	914	1.84	939	1.94	964	2.03	—	—	—	—
8200	882	1.84	907	1.93	931	2.02	—	—	—	—	—	—	—	—
8600	902	2.02	—	—	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9400	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 2.0. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 768 to 982 rpm. All other rpms require field-supplied drive.

50VQA, VQD300 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8,000	713	1.24	740	1.32	768	1.40	795	1.48	821	1.57	847	1.66	873	1.75
8,500	747	1.45	773	1.54	799	1.62	825	1.71	850	1.80	875	1.89	900	1.99
9,000	782	1.69	807	1.78	831	1.87	856	1.96	880	2.06	904	2.15	927	2.25
9,500	816	1.96	840	2.05	864	2.15	887	2.24	910	2.34	933	2.44	955	2.54
10,000	851	2.25	874	2.35	897	2.45	919	2.55	941	2.64	963	2.75	984	2.85
10,500	886	2.57	908	2.67	930	2.77	951	2.88	972	2.98	—	—	—	—
11,000	921	2.92	942	3.02	—	—	—	—	—	—	—	—	—	—

50VQA, VQD300 — STANDARD FACTORY-INSTALLED MOTOR AND DRIVE (BELT) (cont)

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.3		1.4		1.5	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8,000	898	1.84	923	1.93	947	2.03	971	2.12	995	2.22	1019	2.32	1042	2.42
8,500	924	2.08	947	2.18	971	2.28	994	2.38	1017	2.48	1040	2.58	1062	2.69
9,000	950	2.35	973	2.45	996	2.55	1018	2.65	1040	2.76	1062	2.86	1083	2.97
9,500	978	2.64	999	2.74	1021	2.85	1043	2.96	—	—	—	—	—	—
10,000	1006	2.96	—	—	—	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES:

- Boldface** indicates a field-supplied drive is required. (See Note 6.)
- indicates field-supplied motor and drive are required.
- Maximum brake horsepower is 3.0. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Values include losses for filters, unit casing, and wet coils.
- Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
- Motor drive range: 896 to 1110 rpm. All other rpms require field-supplied drive.

Application data



Operating limits

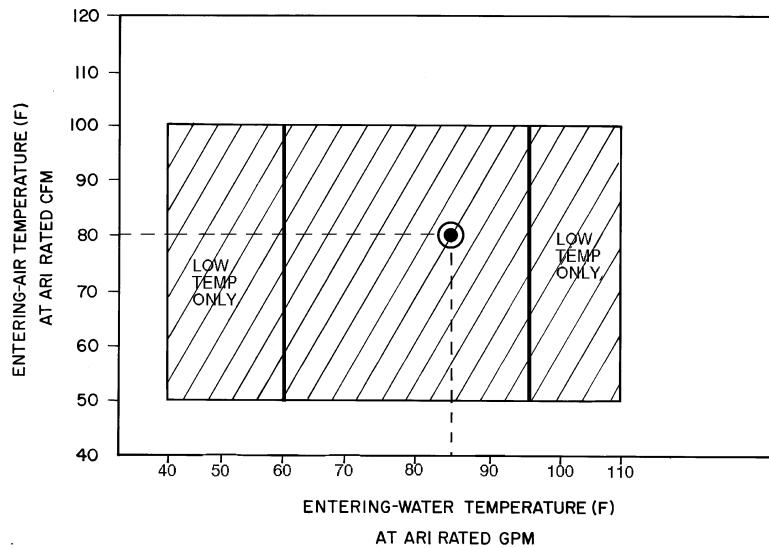
Environment — This equipment is designed for indoor installation **ONLY**. Installation in unconditioned spaces should be avoided to protect against extreme conditions.

Power supply — A voltage variation of ± 10 percent of nameplate utilization voltage is acceptable. Three-phase system imbalance should not exceed 2 percent.

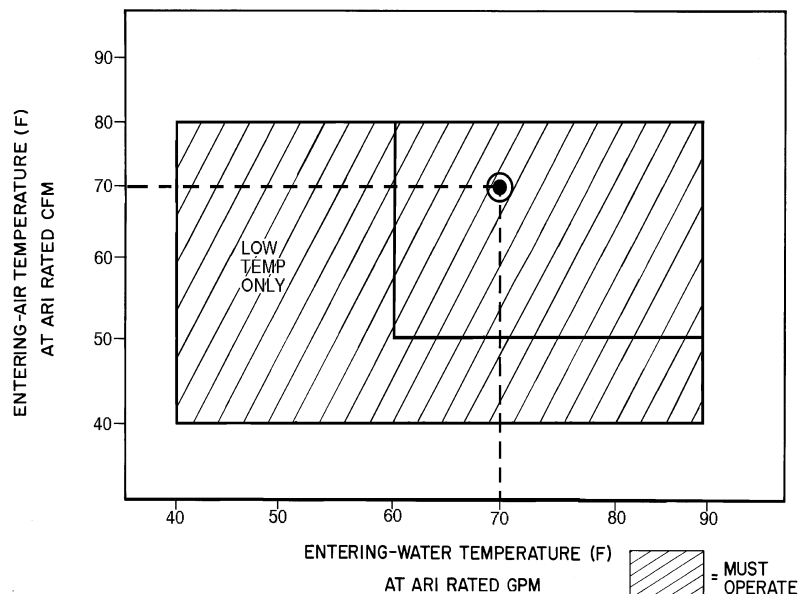
Winter start-up conditions — Units will start and operate in an ambient of 40 F, with entering water at 40 F, with both air and water at the flow rates used in the ARI Standard 320-93 rating test, for initial start-up in winter. These are not normal or continuous operating conditions. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

OPERATING ENVELOPES

COOLING ENVELOPE



HEATING ENVELOPE



LEGEND

ARI — Air Conditioning & Refrigeration Institute
CFM — Cubic Feet Per Minute
GPM — Gallons Per Minute
db — dry bulb
wb — wet bulb

● ARI rating conditions

AIR AND WATER LIMITS

LIMITS	LOW TEMPERATURE UNITS		STANDARD TEMPERATURE UNITS	
AIR	Heating (F)	Cooling (F)	Heating (F)	Cooling (F)
Min. Ambient Air	40	50	50	50
Rated Ambient Air	70	80	70	80
Max. Ambient Air	85	100	80	100
Min. Entering Air	40	50	50	50
Rated Entering Air, db/wb	70 db	80/67	70 db	80/67
Max. Entering Air, db/wb	80 db	100/83	80 db	100/83
WATER	Heating (F)	Cooling (F)	Heating (F)	Cooling (F)
Min. Entering Water	40*	40	60*	60
Normal Entering Water	70	85	70	85
Max. Entering Water	85	110*	85	95*

*At maximum water flow conditions only. Refer to performance data for specific water flow requirements at these entering water temperatures.

NOTES:

1. Minimum air and water conditions can only be used at ARI (Air Conditioning & Refrigeration Institute) flow rates.
2. Standard units must have all other temperature limits at normal conditions when one limit is at minimum or maximum value. Low temperature units may have 2 limits at minimum or maximum values when other limits are at normal values.

WATER FLOW LIMITATIONS (Horizontal Units)

UNIT (50HQA, HQD)	MAX/MIN GPM
072	23.4/ 9.9
096	31.7/11.9
120	41.3/15.5

NOTE: Water flow must be sufficient to obtain a maximum 10° F temperature rise across the water-to-refrigerant heat exchanger when operating in the Cooling mode. Water flow rates greater than 4.0 gpm per nominal ton of water velocities of 10 ft/sec or more may cause erosion damage to the water-to-refrigerant heat exchanger.

WATER FLOW LIMITATIONS (Vertical Units)

UNIT (50VQA, VQD)	MAX/MIN GPM
080	26.0/10.0
100	34.0/13.0
120	40.0/15.0
160	51.0/19.0
200	67.0/25.0
240	79.0/30.0
300	99.0/37.0

NOTE: Water flow must be sufficient to obtain a maximum 10° F temperature rise across the water-to-refrigerant heat exchanger when operating in the Cooling mode. Water flow rates greater than 4.0 gpm per nominal ton or water velocities of 10 ft/sec or more may cause erosion damage to the water-to-refrigerant heat exchanger.

Water quality limitations — In all applications, the quality of the water circulated through the heat exchanger must fall within the ranges listed in the Water Quality Limitation tables. Consult a local water treatment firm, independent testing facility, or local water authority for specific recommendations to maintain water quality within the published limits.

WATER QUALITY LIMITATIONS

WATER CHARACTERISTIC	WATER-TO-REFRIGERANT HEAT EXCHANGER TYPE	
	Standard Steel-Copper	Optional Steel-Cupronickel
SCALING		
Calcium and Magnesium Salts (hardness)	Less than 350 ppm (25 grain/gallon)	More than 350 ppm (up to sea water)
Iron Oxide	Low	High (check with local chemical company)
CORROSION*		
pH	7 to 9	5 to 7 and 9 to 10
Hydrogen Sulfide†	Less than 10 ppm	10 to 50 ppm
Carbon Dioxide**	Less than 50 ppm	50 to 75 ppm
Dissolved Oxygen††	1.0 ppm, max (with pressurized water tank)	1.0 ppm, max (All systems)
Chloride	Less than 300 ppm	300 to 600 ppm
Total Dissolved Solids	Less than 1000 ppm	1000 to 1500 ppm
BIOLOGICAL GROWTH		
Iron bacteria	Low	High (check with chemical company)
SUSPENDED SOLIDS	200 ppm, max	200 ppm, max
WATER VELOCITY	10 fps, max	10 fps, max

* If the concentration of these corrosives exceeds the maximum tabulated in the Cupronickel column, then the potential for serious corrosion problems exists.

** Dissolved carbon dioxide can either be calculated from the pH and total alkalinity values, shown below, or measured on the site using a test kit.
Dissolved Carbon Dioxide, PPM = $TA \times 2^{[(6.3 - pH)/0.3]}$
where TA = Total Alkalinity, PPM as CaCO₃

† Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water contains a pH of 7.0.

†† Closed systems (not exposed to air).

IMPORTANT: Failure to comply with the above required water quality and quantity limitations and the closed-system application design requirements may cause damage to the tube-in-tube heat exchanger and will void manufacturer's warranty.

50HQA,HQD

UNIT SIZE	VOLTS-PHASE (60 Hz)	VOLTAGE RANGE		COMPRESSOR		FAN MOTOR		TOTAL FLA	MCA	MOCP*
		Min	Max	RLA (ea)	LRA (ea)	Hp	FLA			
072	208/230-3	187	253	10.6 (2)	59.5 (2)	1-1/2	5.7	26.9	29.6	40
	460-3	414	506	4.6 (2)	30.7 (2)	1-1/2	2.6	11.8	13.0	15
096	208/230-3	187	253	13.9 (2)	82.0 (2)	1-1/2	5.7	33.3	36.8	50
	460-3	414	506	6.9 (2)	41.0 (2)	1-1/2	2.6	16.4	18.6	25
	575-3	518	633	51.2 (2)	36.0 (2)	1-1/2	1.9	12.1	13.4	15
120	208/230-3	187	253	16.1 (2)	90.0 (2)	2	7.5	39.7	43.7	60
	460-3	414	506	7.7 (2)	45.0 (2)	2	3.4	18.8	20.7	25
	575-3	518	633	6.4 (2)	36.0 (2)	2	2.5	15.3	16.9	20

50VQA,VQD

UNIT SIZE	VOLTS-PHASE (60 Hz)	VOLTAGE RANGE		COMPRESSOR		FAN MOTOR		TOTAL FLA	MCA	MOCP*
		Min	Max	RLA (ea)	LRA (ea)	Hp	FLA			
080	208/230-3	187	253	20.7	156.0	1-1/2	6.1	26.8	32.0	50
	460-3	414	506	10.0	70.0	1-1/2	3.3	13.0	15.5	25
	575-3	518	633	8.2	54.0	1-1/2	2.4	10.6	12.7	20
100	208/230-3	187	253	28.4	183.0	1-1/2	6.0	34.3	41.5	60
	460-3	414	506	14.2	91.1	1-1/2	3.3	17.5	21.1	30
	575-3	518	633	11.4	73.3	1-1/2	2.4	13.8	16.7	25
120	208/230-3	187	253	31.8	193.0	2	7.2	39.0	50.3	80
	460-3	414	506	15.9	96.5	2	3.6	19.5	25.2	40
	575-3	518	633	13.3	77.2	2	2.8	16.1	19.4	30
160	208/230-3	187	253	20.7 (2)	156.0 (2)	3	9.5	50.9	56.1	70
	460-3	414	506	10.0 (2)	70.0 (2)	3	4.8	24.8	27.3	35
	575-3	518	633	8.2 (2)	54.0 (2)	3	3.9	20.3	22.4	30
200	208/230-3	187	253	28.4 (2)	183.0 (2)	1-1/2	6.0	68.8	75.9	100
	460-3	414	506	14.2 (2)	91.1 (2)	1-1/2	3.3	35.0	38.6	50
	575-3	518	633	11.4 (2)	73.3 (2)	1-1/2	2.4	27.6	30.5	40
240	208/230-3	187	253	31.8 (2)	193.0 (2)	2	7.2	78.0	92.0	125
	460-3	414	506	15.9 (2)	96.5 (2)	2	3.6	39.0	46.1	60
	575-3	518	633	13.3 (2)	77.2 (2)	2	2.8	32.2	35.5	45
300	208/230-3	187	253	42.0 (2)	267.0 (2)	3	9.5	103.0	113.5	150
	460-3	414	506	27.5 (2)	135.0 (2)	3	4.8	64.6	71.5	90
	575-3	518	633	22.0 (2)	108.0 (2)	3	3.9	51.8	57.3	70

LEGEND

FLA	—	Full Load Amps
HACR	—	Heating, Air Conditioning, and Refrigeration
LRA	—	Locked Rotor Amps
MCA	—	Minimum Circuit Amps
MOCP	—	Maximum Over Current Protection
RLA	—	Rated Load Amps

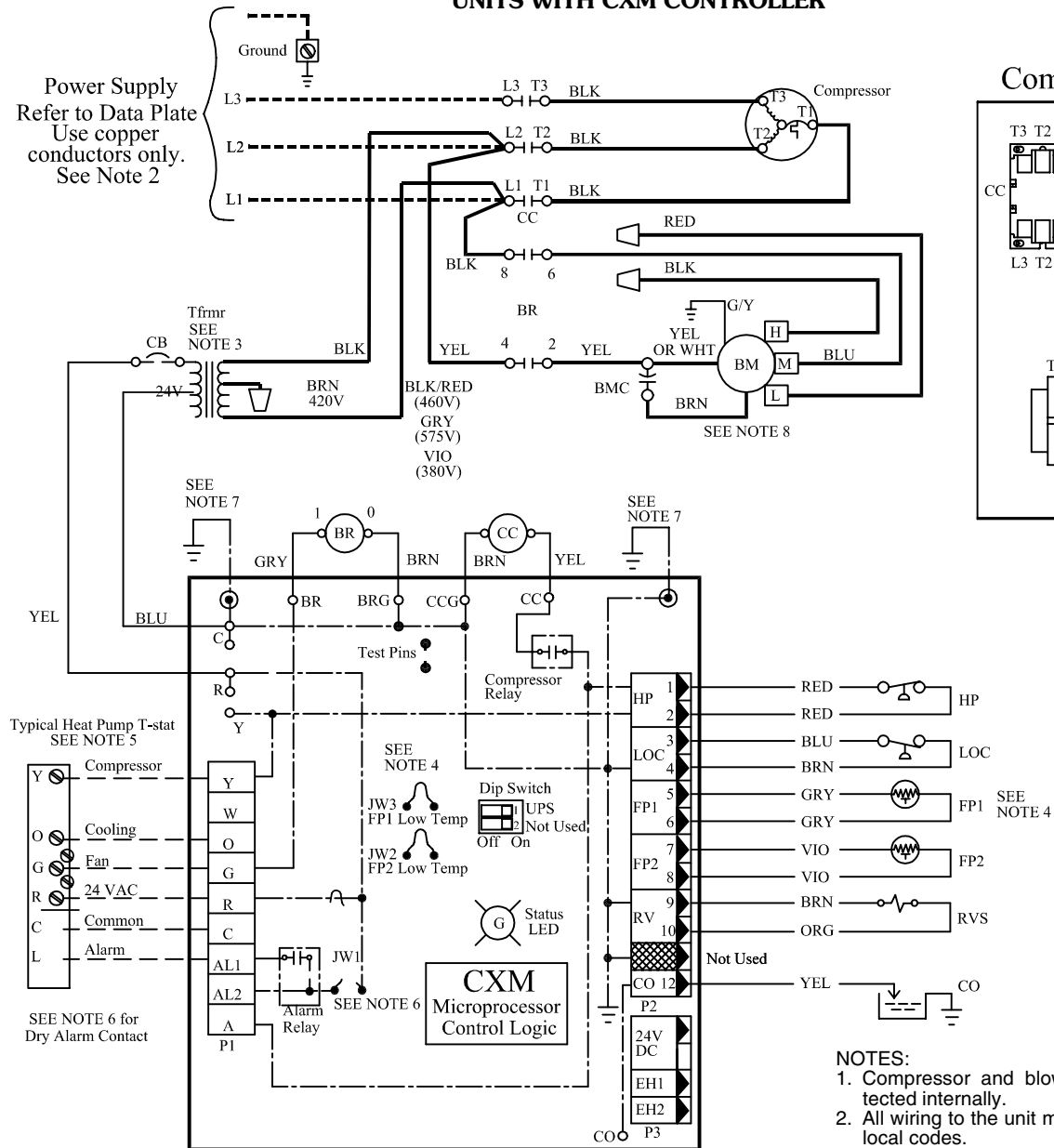


* Time-delay fuse or HACR circuit breaker.

Typical wiring schematics



**TYPICAL WIRING DIAGRAM,
THREE-PHASE WIRING DIAGRAM,
UNITS WITH CXM CONTROLLER**



NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. Transformer is wired to 460V (BLK/RED) Lead for 460/3/60 units, 575V (GRY) Lead for 575/3/60, or 380V (VIO) Lead for 380/3/50. For 420/3/50 switch VIO & BRN Leads at L1 and insulate VIO Lead. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides freeze protection for WATER. When using ANTIFREEZE solution, cut JW3 jumper.
5. Typical heat pump thermostat wiring shown. Refer to thermostat installation instructions for wiring to the unit. T-stat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
6. 24-v Alarm Signal shown. For Dry Alarm Contact, cut JW1 jumper, and Dry Contact will be available between AL1 and AL2.
7. Transformer secondary ground via CXM board standoffs & screws to Control Box. (Ground available from top two standoffs as shown.)
8. For Hi or Low speed remove BLU wire from BR 'NO' and replace with BLK or RED wire respectively. Tape off unused terminal.

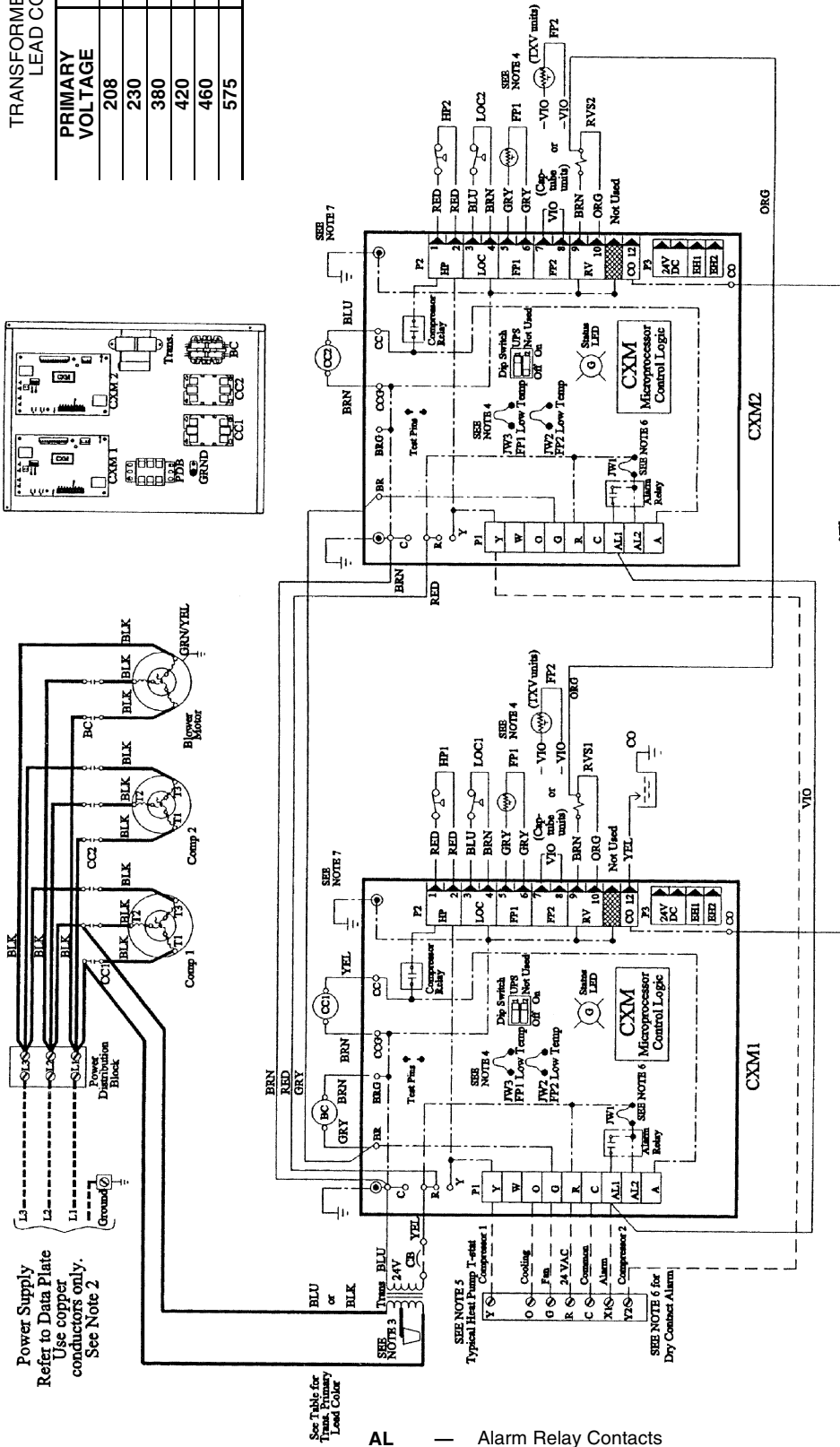
Typical wiring schematics (cont)



TRANSFORMER PRIMARY
LEAD COLORS

PRIMARY VOLTAGE	PRIMARY LEAD COLOR
208	RED
230	ORG
380	VIO
420	BRN
460	BLK/RED
575	GRY

THREE-PHASE UNIT WITH CXM CONTROLS, TWO COMPRESSOR SYSTEMS



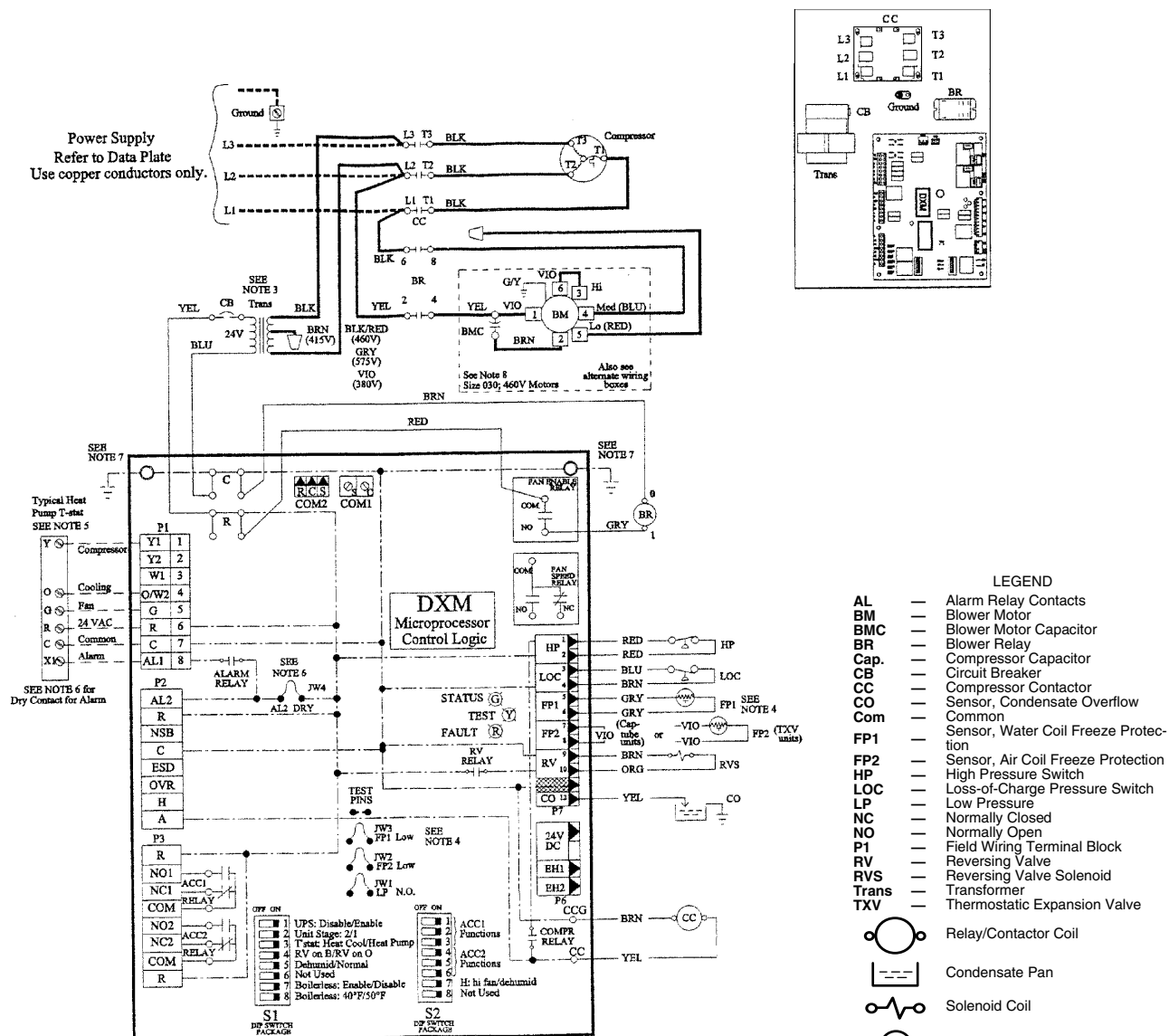
LEGEND

AL	Alarm Relay Contacts
BC	Blower Motor Contactor
BR	Blower Relay
CB	Circuit Breaker
CC	Compressor Contactor
COM	Common
FP1	Sensor, Water Coil Freeze Protection
FP2	Sensor, Air Coil Freeze Protection
HP	High-Pressure Switch
LOC	Loss-of-Charge Pressure Switch
NO	Normally Open
RVS	Reversing Valve Solenoid
Tran	Transformer
TXV	Thermostatic Expansion Valve
	Low-Pressure Switch
	Ground
	Circuit Breaker
	Relay Contactor Coil
	Condensate Pan
	Solenoid Coil
	Thermistor
	Field Line Voltage Wiring
	Field Low-Voltage Wiring
	Printed Circuit Trace

NOTES:

- Compressor and blower motor thermally protected internally.
- All wiring to the unit must comply with NEC and local codes.
- 208-230-v transformers will be connected for 208-v operation. For 230-v operation, disconnect RED lead at L1, and attach ORG lead to L1. Insulate open end of RED lead. 380-420-v transformers will be connected for 380-v operation. For 420-v operation, disconnect VIO lead at L1 and attach BRN lead to L1. Insulate open end of VIO lead.
- FP1 thermistor provides freeze protection for WATER. When using ANTI-FREEZE solution, cut JW3 jumper.
- Typical heat pump thermostat wiring shown. Refer to thermostat installation instructions for wiring to the unit. T-stat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
- 24-v Alarm Signal shown. For Dry Alarm Contact, cut JW1 jumper and Dry Contact will be available between AL1 and AL2.
- Transformer secondary ground via CXM board standoffs and screws to Control Box. (Ground available from top two standoffs as shown.)

THREE-PHASE UNIT WITH DXM CONTROLS



DESCRIPTION OF OPERATION	STATUS LED (GREEN)	TEST LED (YELLOW)	FAULT LED (RED)	ALARM RELAY
Normal Mode	ON	—	OFF	OPEN
DXM is Non-Functional	OFF	OFF	OFF	OPEN
Night Setback	Flashing Code 2	—	—	—
Emergency Shutdown	Flashing Code 3	—	420	BRN
Invalid Tstat Input	Flashing Code 4	—	460	BLK/RED
Lockout	Fast Flash	—	Flashing Fault Code	Closed
Fault Retry	Slow Flash	—	Flashing Fault Code	OPEN
HP Fault	Slow Flash	—	*Flashing Code 3	OPEN
LP Fault	Slow Flash	—	*Flashing Code 3	OPEN
FP1 Fault	Slow Flash	—	*Flashing Code 4	OPEN
FP2 Fault	Slow Flash	—	*Flashing Code 5	OPEN
CO Fault	Slow Flash	—	*Flashing Code 6	OPEN
Over/Under Voltage	Slow Flash	—	*Flashing Code 7	OPEN†
Normal Mode W/UPS	ON	—	*Flashing Code 8	CYCLE**
Test Mode	—	ON	—	—

*Codes displayed with 10 sec. LED OFF Period. Exam.: Code 3 = flash 3 times, off 10 sec, flash 3 times, off 10 sec.

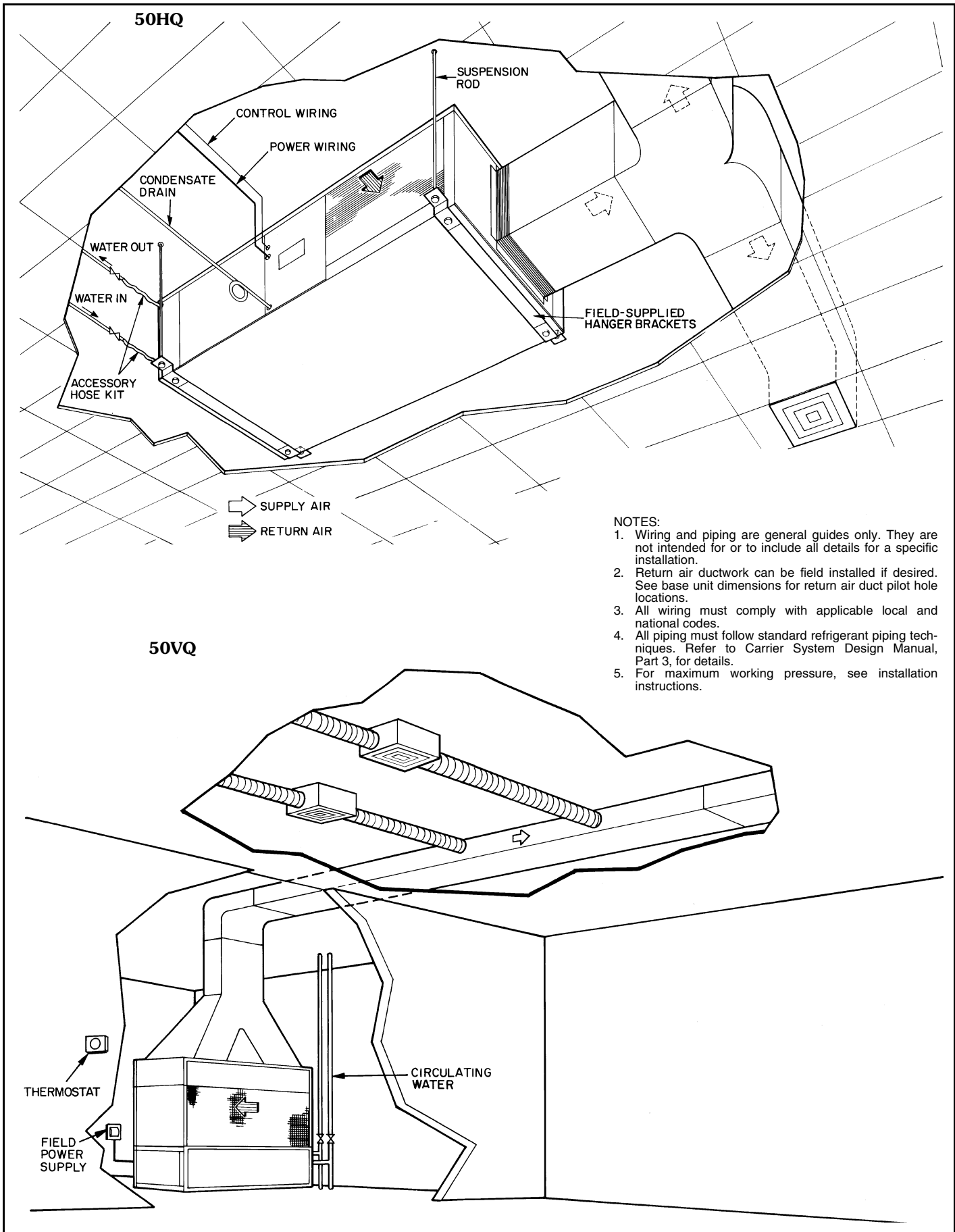
† Closed after 15 minutes.

**Closed 5 sec. open 25 sec.

NOTES:

- Compressor and blower motor thermally protected internally.
- All wiring to the unit must comply with NEC and local codes.
- Transformer is wired to 460-v (BLK/RED) lead for 460/3/60 units. 575-v (GRY) lead for 575/3/60, or 380-v (VIO) lead for 380/3/50. For 415/3/50 switch VIO and BRN leads at L1 and insulate VIO lead. Transformer is energy limiting or may have circuit breaker.
- FP1 thermistor provides freeze protection for WATER. When using ANTIFREEZE solution, cut JW3 jumper.
- Typical heat pump thermostat wiring shown. Refer to thermostat installation instructions for wiring to the unit. T-stat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
- 24-v Alarm Signal shown. For Dry Alarm Contact, cut AL2 DRY (JW4) jumper and dry contact will be available between AL1 and AL2.
- Transformer secondary ground via DXM board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
- For HIGH speed operation, remove VIO wire between blower motor terminals 3 and 6. Relocate BLU wire from terminal 4 to 3. For LOW speed operation, disconnect BLU wire from blower relay and cap (insulate). Connect the RED wire to the blower relay.
- For HIGH speed operation, separate BLK and ORG leads and cap (insulate) the ORG. Disconnect the BLU lead from the blower relay and cap. Connect the BLK lead to the blower relay. For LOW speed operation, disconnect BLU lead from blower relay and cap. Connect the RED lead to the blower relay.
- This is a two speed motor. For LOW speed operation, disconnect the BLK lead from the blower relay

Typical piping and wiring



Guide specifications



Packaged Water-to-Air Heat Pump

HVAC Guide Specifications

Size Range: **70,000 to 300,000 Btuh Cooling Capacity**
83,000 to 360,000 Btuh Heating Capacity

Carrier Model Number: **50HQA, HQD**
50VQA, VQD

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Heat pump units designed to operate with 60 to 95 F water temperature for standard units and 40 to 110 F water temperature for low temperature units. The air discharge may be horizontal or vertical discharge as specified on drawings.
- B. Units shall be individually packaged with wooden skid covered with protective corner posts and plastic stretch wrapping for maximum protection.

1.02 QUALITY ASSURANCE

- A. Basic unit shall be rated in accordance with ARI Standard 320-93.
- B. Units shall have insulation and adhesive which meet NFPA 90A requirements for flame spread and smoke generation, and assembled units shall be UL and CSA certified.
- C. Units shall be factory tested with circulating water solution for a minimum of 5 minutes to assure proper operation of all components and safety devices.

Part 2 — Product

2.01 EQUIPMENT

- A. Heat Pump Assembly:
Factory-tested and assembled single-piece packaged heating and cooling heat pump units shall be factory wired, charged with non-CFC R-22, contain refrigerant-to-water heat exchanger, air-to-refrigerant heat exchanger, 4-way reversing valve, fan motor assembly, compressor, metering device, and all internal controls and safety devices.
- B. Unit Cabinet:
 - 1. Unit shall be constructed of heavy gauge galvanized steel with removable service panels, hanging brackets, and insulated galvanized steel condensate pan of welded construction, with 3/4-in. (size horiz. 072-120) or 1-in. (size 080-300) FPT drain connection.
 - 2. Water connections shall be flush-mounted and rigidly connected to prevent damage to tubing and/or noise generation.
 - 3. Cabinet construction shall permit service testing without air bypass on coil and shall incorporate factory-installed supply ductwork connections. Direct connection to fan housing is not recommended due to sound considerations.
 - 4. Unit shall have separate entrances for high- and low-voltage electrical supplies. High- and low-voltage conduit shall enter unit on the same side.

- 5. One-in. disposable filter and factory-installed sheet metal filter shall be provided on each unit.

C. Fan and Motor Assembly:

Units shall have a belt drive fan assembly. The assembly shall include a forward curved fan wheel, housing, solid steel fan shaft encased in ball bearings, fan pulley, and adjustable motor sheave. The motor shall be a 3-phase, open type with internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension.

D. Compressor(s):

Unit shall have heat pump duty, fully hermetic-type compressor(s), with internal and external isolation.

E. Heat Exchangers:

- 1. Air-to-refrigerant coil shall be aluminum/copper finned-tube construction, and shall be fully degreased at the factory to prevent possible condensate blowoff.
- 2. Water-to-refrigerant heat exchanger shall be steel/copper tube-in-tube type rated for 450 psig refrigerant, 300 psig water-side pressures.
- 3. Optional steel/cupronickel water-to-refrigerant heat exchanger shall be used for open loop applications, or where water quality cannot be maintained as specified by manufacturer.

F. Refrigerant Components:

- 1. Unit shall include metering device, in-line strainers, and high and low side service access Schrader-type option gauge ports.
- 2. Reversing valve shall energize in the Cooling mode and fail-safe in the Heating mode.

G. Controls and Safeties:

- 1. Safety devices on all units shall include low-pressure sensor or loss-of-charge switch, high-pressure switch, low-refrigerant temperature sensor (freezestat), and condensor overflow switch.
- 2. The standard CXM electronic control system shall interface with a heat pump (Y,O) wall thermostat (mechanical or electronic). The control system shall have the following features:
 - a. Anti-short cycle time delay on compressor operation; time delay shall be 5 minutes minimum.
 - b. Random start on power-up.
 - c. Low voltage protection.
 - d. High voltage protection.
 - e. Condensate overflow shutdown.
 - f. Unit shutdown on low refrigerant pressures.
 - g. Unit shutdown on high or low water temperature (selectable for antifreeze solutions).
 - h. Unit shutdown on air coil freeze-up (HQD, VQD).
 - i. Option to reset unit at thermostat or disconnect. Fault type shall be retained in memory if reset at thermostat.
 - j. Automatic intelligent reset. Unit shall automatically restart 5 minutes after shutdown if the fault has cleared. Should a fault occur 3 times sequentially, then lockout will occur.

Guide specifications (cont)



- k. Two-stage electric heat control outputs for matching electric heat assembly.
 - l. Ability to defeat time delays for servicing.
 - m. Light-emitting diode (LED) to indicate high pressure, low pressure, improper voltage, water coil freeze protection, air coil freeze protection, condensate overflow, and control status.
 - n. Unit Performance Sentinel to indicate inefficient operating conditions prior to unit lockout.
 - o. Remote fault type indication at thermostat.
 - p. Single harness connection for all safety devices.
 - q. Selectable 24-v or pilot duty dry contact alarm output.
 - r. 24-v output to cycle a motorized water valve with compressor contactor.
3. The optional DXM electronic control shall have all the features of the CXM control, with the following additional features:
- a. A removable thermostat connector.
 - b. Random start on return from night setback.
 - c. Minimized reversing valve operation for extended life and quiet operation.
 - d. Night setback control from low temperature thermostat, with 2-hour override initiated by a momentary signal from the thermostat.
 - e. Dry contact night setback output for digital night setback thermostats.
 - f. Ability to work with heat/cool (Y, W) thermostats.

- g. Ability to work with heat pump thermostats using O or B reversing valve control.
- h. Single grounded wire to initiate night setback or emergency shutdown.
- i. Boilerless system control can switch automatically to electric heat at low loop water temperature.
- j. Control board shall allow up to 3 units to be operated from one thermostat without any auxiliary controls.
- k. A relay to operate an external damper. The control to be such that the damper will not open until 30 minutes after the unit comes back from Unoccupied mode.
- l. Fan speed selection at thermostat.
- m. A relay to restart a central pump or control a 24-v motorized water valve.
- n. Intelligent fan speed selection based upon thermostat demand and/or dehumidistat signal.

H. Special Features:

- 1. Supply/return hose kit shall be a 1/2-in., 3/4-in., or 1-in. diameter x 24-in. long EPDM tube with Teflon seal on threaded swivel connections on one end. Hose shall have a maximum working pressure of 300 psig. Fire-rated hose kits shall also be available.
- 2. Condensate hose kit shall be 48-in. long, clear PVC tube with threaded adapter and clamps. Fire rated hose shall also be available.
- 3. Ball valves shall be UL-listed, brass body, ball and stem type with Teflon seats and seals.
- 4. Two-in. filter rack shall be provided on each unit.

