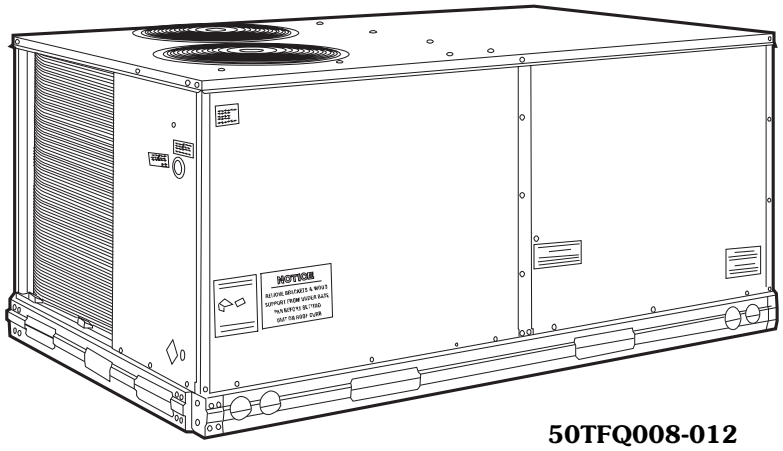
Carrier®

Product Data

50TFQ008-012 Single-Package Standard Efficiency Rooftop Heat Pump Units 50 Hz

Nominal Capacities: 26.4 to 35.2 kW
(7 1/2 to 10 Nominal Tons)



50TFQ008-012

Single-package standard efficiency rooftop heat pumps with:

- State-of-the-art defrost system
- Dependable 4-way valve operation
- Refrigerant filter strainer and accumulator
- Field-installed electric heaters available
- Advanced hermetic compressors mounted on vibration isolators
- Factory-installed Apollo communicating controls, non-fused disconnect switch available

Features/Benefits

The 50TFQ standard efficiency rooftop product line combines advanced technology with serviceability, performance, and flexibility.

State-of-the-art defrost system uses time and temperature to keep the outdoor coil frost-free for economical, dependable operation.

Dependable 4-way valve operation safely and efficiently accomplishes cycle reversals, defrost, and normal operation.

Refrigerant filter strainer and accumulator ensure performance dependability and circuit protection.

Field-installed electric heaters available in a wide range of capacities. Single-point wiring kit makes installation simple.

NOTE: Some electric heater applications not available for use with factory-installed disconnect switch.

Easy conversion from vertical to horizontal discharge to make retrofit and add-on jobs easier. To convert from vertical to horizontal discharge, simply interchange 2 panels. The same basic unit can be used for a variety of applications and can be quickly modified at the jobsite. All units are factory shipped in the vertical discharge configuration for fit-up to standard roof curbs. The contractor can order and install the roof curbs early in the construction stage, before decisions on exact size requirements have been made.

Prepainted galvanized steel cabinet with baked enamel finish is capable of withstanding U.S.A. Test Method Standard No. 141 (Method 6061) 500-hour salt spray test. Paint finish is non-chalking type. All internal cabinet panels are primed, allowing the entire unit to have a longer life and a more attractive appearance.

Single continuous top panel eliminates any possibility of leaking at the seams or gaskets, which tend to deteriorate over time and shift during rigging procedures.

Heavy gage roll-formed base rails with forklift and rigging holes are integral to the unit and provide easier maneuvering and installation. Forklift slots are on 3 sides of the unit. Stretch-wrap packaging protects the unit during shipment and storage.

Exclusive tool-less removal for the filter access panel allows the replacement of filters without the need for any tools.

Fifty-one mm (2-in.) return-air filters are the standard throwaway type, easily accessed and replaced through the filter access panel located directly above the air intake hood.

Thru-the-bottom electrical connection capability allows power and control wiring to be routed through the unit basepan, thereby minimizing roof penetrations.

Color-coded electrical wiring permits easy tracing and diagnostics.

Advanced hermetic compressors mounted on vibration isolators for additional sound integrity and structural support.

Enhanced copper tube, aluminum plate fin coils are thoroughly leak and pressure tested at the factory. Outdoor coils have louvered, aluminum lanced fins to provide maximum heat transfer for optimum efficiency and easy cleaning.

Acutrol™ refrigerant metering system precisely controls refrigerant flow, preventing slugging and flood-back, while maintaining optimum unit performance.

Corrosion-resistant sloped condensate pan reduces possibility of biological growth and is in conformance of ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 62 to meet many Indoor-Air Quality (IAQ) specifications. The condensate drain pan offers both bottom and end drain capability to minimize roof penetrations. The bottom drain can be used in conjunction with the thru-the-bottom connections. An external trap must be field supplied.

Commercial duty motors with permanently lubricated bearings provide additional dependability.

Standard low ambient cooling operation to –4 C (25 F). Optional head pressure control kit available for outdoor ambient conditions to –17 C (0° F).

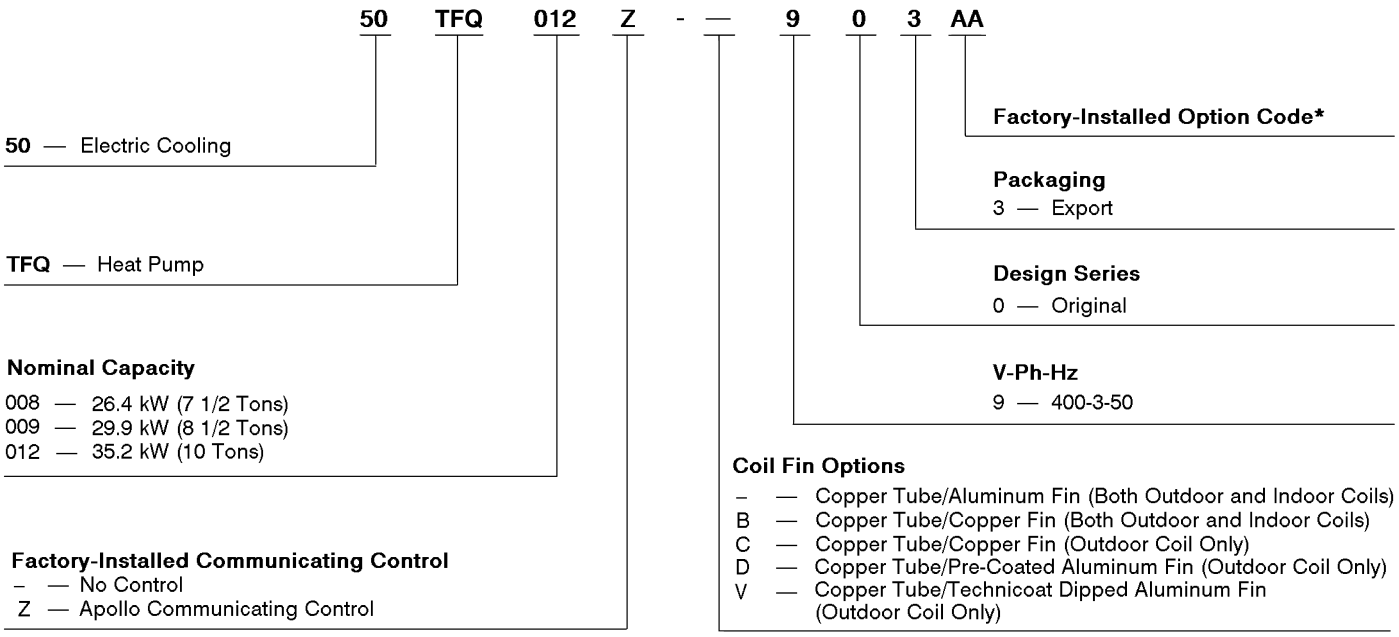
Factory run test printout included with each unit, providing certification of the unit's status at the time of manufacture. Printout includes test pressures, amperages, dates, and inspectors. Every unit is thoroughly run tested at the factory in each operating mode and evacuated prior to final charging. Every coil is then leak-tested with helium. Automated run testing allows accurate, undisputed tests and measurements which are second to none in the industry.

Ease of serviceability on all refrigerant access ports allow for quick and accurate measurements to take place. Single-side utility connections provide easy access to perform necessary service. Indoor motors are accessible through a single access door to facilitate servicing and adjustments after installation. Compressors are easily accessible for troubleshooting and system analysis.

Factory-installed Apollo communicating control (available as an option), designed exclusively by Carrier, actively monitors all modes of operation as well as indoor fan status, filter status, indoor-air quality, supply-air temperature, and outdoor-air temperature. The Apollo control board is installed in the rooftop unit control box and comes equipped with built-in diagnostic capabilities. Light-emitting diodes (LEDs) simplify troubleshooting by indicating thermostat commands for both stages of heating and cooling, indoor (evaporator) fan operation, and economizer operation. The Apollo communicating control is designed to work specifically with Carrier TEMP and VVT® thermostats.

Table of contents

Model number nomenclature



LEGEND

Al — Aluminum
Cu — Copper

*Refer to 50TFQ Product Ordering Data or contact your local Carrier representative for 50TFQ Factory-Installed Option code table.

Quality Assurance

Carrier Corporation UL REGISTERED FIRM ISO 9001:2000 #A2325

Ratings summary

UNIT 50TFQ	NOMINAL kW	NOMINAL TONS	AIRFLOW QUANTITIES (Nominal)		NET CAPACITIES					
					Cooling		Heating			
			L/s	Cfm	kW	MBtuh	High		Low	
							kW	MBtuh	kW	MBtuh
008	26.4	7.5	1200	2600	21.3	73.0	19.3	66.0	8.7	30.0
009	29.9	8.5	1415	3000	23.4	80.0	21.6	74.0	10.8	37.0
012	35.2	10	1600	3400	26.9	92.0	24.3	83.0	12.8	44.0

LEGEND

db — dry bulb
MBtuh — Btuh x 1000
wb — wet bulb

NOTE: Ratings are net values adjusted for the effects of indoor-fan motor heat. Ratings are based on:

Cooling Standard: 27 C (80 F) db, 19 C (67 F) wb indoor entering-air temperature and 35 C (95 F) db outdoor entering-air temperature.

High-Temp Heating Standard: 21 C (70 F) db indoor entering-air temperature and 8 C (47 F) db, 6 C (43 F) wb outdoor entering-air temperature.

Low-Temp Heating Standard: 21 C (70 F) db indoor entering-air temperature and –8 C (17 F) db, –9 C (15 F) wb outdoor entering-air temperature.

Physical data (SI)

UNIT SIZE 50TFQ	008	009	012
NOMINAL CAPACITY (kW)	26.4	29.9	35.2
OPERATING WEIGHT (kg)			
Unit			
Al/Al*	426	438	460
Durablade Economizer	20	20	20
Roof Curb†	65	65	65
COMPRESSOR		Hermetic	
Quantity	2	2	2
Oil (ml)	1331 ea	1597 ea	1597 ea
REFRIGERANT TYPE		R-22	
Operating Charge (kg)			
Circuit 1	2.67	3.60	3.45
Circuit 2	2.72	3.70	3.45
OUTDOOR COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Acutrol™ Metering Device	
Rows...Fins/m	1...669	2...669	2...669
Total Face Area (sq m)	1.90	1.67	1.70
OUTDOOR FAN		Propeller Type	
Nominal L/s	2880	2880	2880
Quantity...Diameter (mm)	2...559	2...559	2...559
Motor BkW...r/s	.19...15.5	.19...15.5	.19...15.5
Watts Input (Total)	500	500	500
INDOOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol Metering Device	
Rows...Fins/m	3...590	3...590	3...590
Total Face Area (sq m)	0.74	0.74	1.03
INDOOR FAN		Centrifugal Type	
Quantity...Size (mm x mm)	1...381 x 381	1...381 x 381	1...381 x 381
Type Drive	Belt	Belt	Belt
Nominal L/s	1200	1415	1600
Motor kW	1.12	1.12	1.50
Maximum Continuous BkW	1.79	1.79	2.16
Motor Frame Size	56	56	56
Fan r/s Range	10.33-14.67	10.33-14.67	11.50-15.00
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable r/s	26.7	26.7	26.7
Motor Pulley Pitch Diameter Min/Max (mm)	61/86	61/86	86/112
Nominal Motor Shaft Diameter (mm)	16	16	16
Fan Pulley Pitch Diameter (mm)	140	140	178
Nominal Fan Shaft Diameter (mm)	25	25	25
Belt, Quantity...Type...Length (mm)	1...A...1219	1...A...1219	1...A...1295
Pulley Center Line Distance (mm)	406	406	495
Speed Change per Full Turn of Moveable Pulley Flange (r/s)	.83	.83	.67
Moveable Pulley Maximum Full Turns From Closed Position	5	5	5
Factory Setting	5	5	5
Factory Speed Setting (r/s)	10.33	10.33	11.50
Fan Shaft Diameter at Pulley (mm)	25	25	25
HIGH-PRESSURE SWITCH (kPa)			
Standard Compressor Internal Relief (Differential)		3103 ± 345	
Cutout		2951	
Reset (Auto.)		2206	
LOSS-OF-CHARGE (LOW-PRESSURE) SWITCH (kPa)			
Cutout		48 ± 21	
Reset (Auto.)		152 ± 48	
FREEZE PROTECTION THERMOSTAT (C)			
Opens		–1 ± 3	
Closes		7 ± 3	
OUTDOOR-AIR INLET SCREENS		Cleanable	
Quantity...Size (mm)		1...508 x 635 x 25 1...406 x 635 x 25	
RETURN-AIR FILTERS		Throwaway	
Quantity...Size (mm)	4...406 x 558 x 51	4...406 x 508 x 51	4...508 x 508 x 51

LEGEND

Al — Aluminum

*Indoor coil fin material/outdoor coil fin material.
†Weight of 356 mm roof curb.

NOTE: The 50TFQ units have a loss-of-charge/low-pressure switch located in the liquid line.

Physical data (English)

UNIT SIZE 50TFQ	008	009	012
NOMINAL CAPACITY (tons)	7 1/2	8 1/2	10
OPERATING WEIGHT (lb)			
Unit			
Al/Al*	940	965	1015
Durablade Economizer	44	44	44
Roof Curb†	143	143	143
COMPRESSOR		Hermetic	
Quantity	2	2	2
Oil (oz)	45 ea	54 ea	54 ea
REFRIGERANT TYPE		R-22	
Operating Charge (lb-oz)			
Circuit 1	5-14	7-6	7-10
Circuit 2	6- 0	8-3	7-10
OUTDOOR COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Acutrol™ Metering Device	
Rows...Fins/in.	1...17	2...17	2...17
Total Face Area (sq ft)	20.50	18.00	18.30
OUTDOOR FAN		Propeller Type	
Nominal Cfm	6500	6500	6500
Quantity...Diameter (in.)	2...22	2...22	2...22
Motor Hp...Rpm	1/4...1100	1/4...1100	1/4...1100
Watts Input (Total)	500	500	500
INDOOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol Metering Device	
Rows...Fins/in.	3...15	3...15	3...15
Total Face Area (sq ft)	8.0	8.0	11.1
INDOOR FAN		Centrifugal Type	
Quantity...Size (in.)	1...15 x 15	1...15 x 15	1...15 x 15
Type Drive	Belt	Belt	Belt
Nominal Cfm	2600	3000	3400
Motor Hp	1 1/2	1 1/2	2
Maximum Continuous Bhp	2.40	2.40	2.90
Motor Frame Size	56	56	56
Fan Rpm Range	620-880	620-880	690-900
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable Rpm	1600	1600	1600
Motor Pulley Pitch Diameter Min/Max (in.)	2.4/3.4	2.4/3.4	3.4/4.4
Nominal Motor Shaft Diameter (in.)	5/8	5/8	5/8
Fan Pulley Pitch Diameter (in.)	5.5	5.5	7.0
Nominal Fan Shaft Diameter (in.)	1.0	1.0	1.0
Belt, Quantity...Type...Length (in.)	1...A...48	1...A...48	1...A...51
Pulley Center Line Distance (in.)	16	16	19.5
Speed Change per Full Turn of Moveable Pulley Flange (rpm)	50	50	41
Moveable Pulley Maximum Full Turns From Closed Position	5	5	5
Factory Setting	5	5	5
Factory Speed Setting (rpm)	620	620	690
Fan Shaft Diameter at Pulley (in.)	1	1	1
HIGH-PRESSURE SWITCH (psig)			
Standard Compressor Internal Relief (Differential)		450 ± 50	
Cutout		428	
Reset (Auto.)		320	
LOSS-OF-CHARGE (LOW-PRESSURE) SWITCH (psig)			
Cutout		7 ± 3	
Reset (Auto.)		22 ± 5	
FREEZE PROTECTION THERMOSTAT (F)			
Opens		30 ± 5	
Closes		45 ± 5	
OUTDOOR-AIR INLET SCREENS		Cleanable	
Quantity...Size (in.)		1...20 x 25 x 1 1...16 x 25 x 1	
RETURN-AIR FILTERS		Throwaway	
Quantity...Size (in.)	4...16 x 20 x 2	4...16 x 20 x 2	4...20 x 20 x 2

LEGEND

Al — Aluminum
Bhp — Brake Horsepower

*Indoor coil fin material/outdoor coil fin material.

†Weight of 14-in. roof curb.

NOTE: The 50TFQ units have a loss-of-charge/low-pressure switch located in the liquid line.

Options and accessories

ITEM	OPTION*	ACCESSORY†
Apollo Communicating Controls	X	
Non-Fused Disconnect Switch	X	
Durablade Integrated Economizer	X	X
Electric Heat**		X
Manual Outdoor-Air Damper (25% Open)		X
Manual Outdoor-Air Damper (50% Open)		X
Outdoor Coil Grille		X
25% Open Two-Position Damper		X
100% Open Two-Position Damper		X
Roof Curbs (Vertical and Horizontal Discharge)		X
Thermostats and Subbases		X
Emergency Heat Package		X
Motormaster® II Head Pressure Control		X
Logo Kit		X
Time Guard® II Control Circuit		X
Thru-the-Bottom Service Connections		X
Electronic Programmable Thermostat		X
Accusensor™ II Enthaply Control		X
Accusensor III Enthalpy Sensor		X
Outdoor Coil Hail Guard Assembly		X
Fan/Filter Status		X
Salt Spray Protection Grille		X
Pre-Coated Aluminum Fin Coils	X	
Copper-Fin Coils	X	

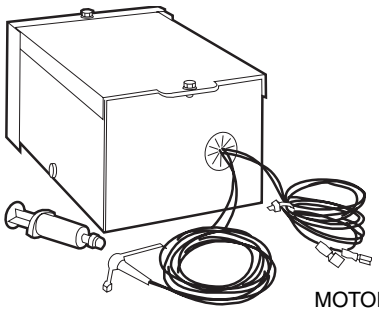
*Factory installed.
†Field installed.
**Accessory single-point kit is required for size 008-012 units using electric heat.

TIME GUARD II CONTROL

Time Guard II Control automatically prevents compressor from restarting for at least 5 minutes after a shutdown. Accessory prevents short cycling of compressor if thermostat is rapidly changed. Time Guard II device mounts in the control compartment of unit.

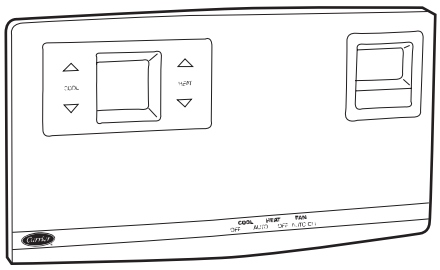
HEAD PRESSURE CONTROL

The 50TFQ standard units are designed to operate in cooling at outdoor temperatures down to –4 C (25 F). With accessory Motormaster II control (outdoor-fan speed), units can operate at outdoor temperatures down to –17 C (0° F). The head pressure control, which mounts in the outdoor section, cycles the outdoor-fan motor to maintain correct condensing temperature.



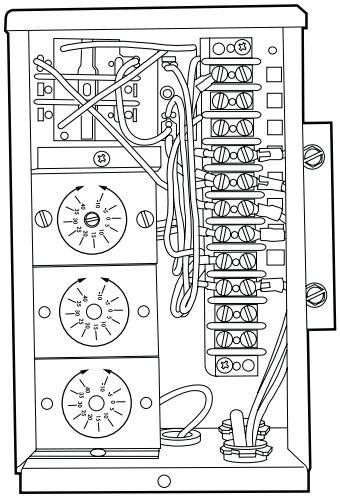
MOTORMASTER II

ELECTRONIC PROGRAMMABLE THERMOSTAT



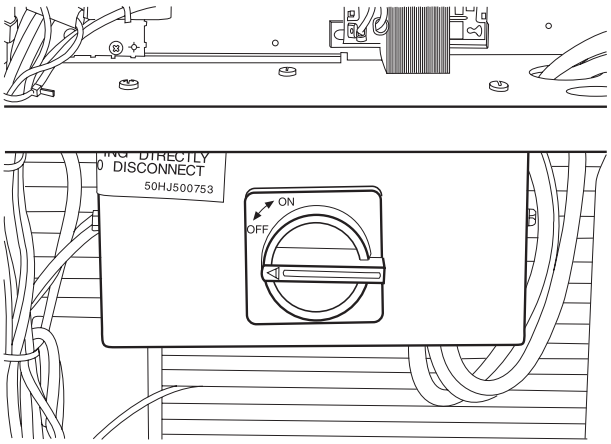
Carrier's electronic programmable thermostat provides efficient temperature control by allowing you to program heating and cooling setbacks and set ups with provisions for weekends and holidays. Accessory remote sensing package is also available to provide tamperproof control in high traffic spaces. Used in conjunction with factory-installed Apollo control, this thermostat provides a 5-minute recycle timer between modes of operation for short-cycle protection.

EMERGENCY HEAT CONTROL PACKAGE



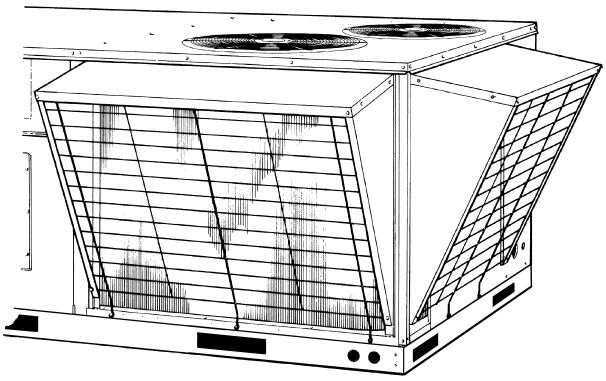
Emergency heat control package allows emergency operation of electric heat and fans by bypassing compressor circuits and outdoor thermostats.

UNIT-MOUNTED DISCONNECT



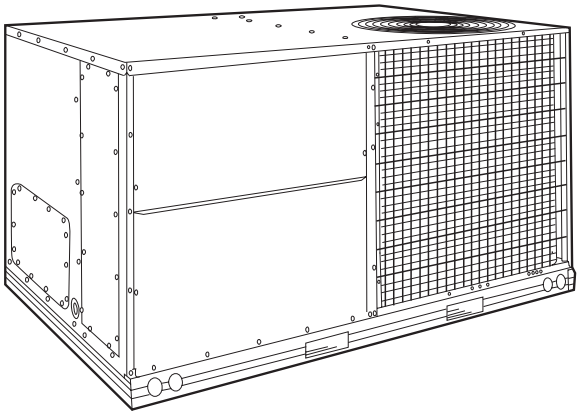
Factory-installed, internally mounted, NEC (U.S.A. Standard) and UL (Underwriters' Laboratories) approved non-fused switch provides unit power shutoff. May not be used with certain electric heat sizes.

HAIL GUARD, OUTDOOR COIL SALT SPRAY PROTECTION



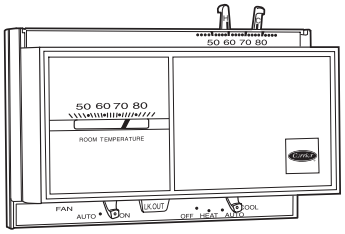
Hail guard accessory protects coils against damage from hail and other flying debris (field installed). Coil guard accessory (field installed) protects coils from salt spray induced corrosion in coastal areas. Utilizes a replaceable filter.

COIL GRILLE



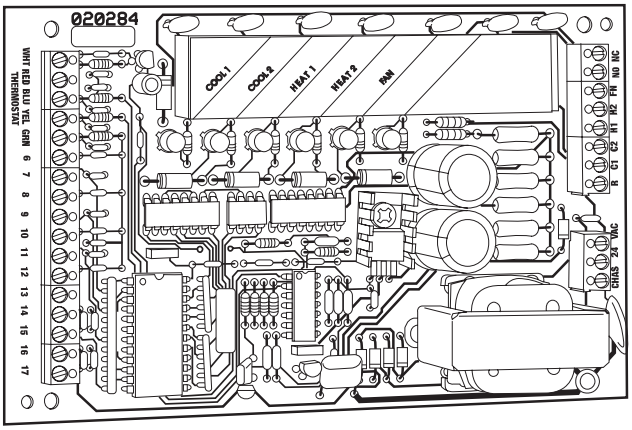
Coil Grille protects coils against large objects and vandalism.

THERMOSTAT



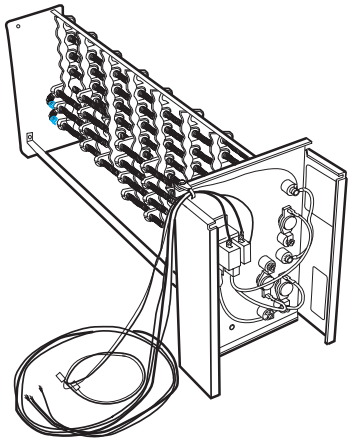
Zone thermostat (24 v) provides one- or 2-stage cooling for control of unit. Matching subbases are available with or without tamperproof switches and automatic changeover.

FACTORY-INSTALLED APOLLO COMMUNICATING CONTROLS



The Apollo direct digital controls are designed exclusively by Carrier, and are used to actively monitor and control all modes of operation as well as to monitor evaporator-fan status, filter status, supply-air temperature, outdoor-air temperature, and indoor-air quality. They are designed to work in conjunction with Carrier TEMP and VVT® system thermostats.

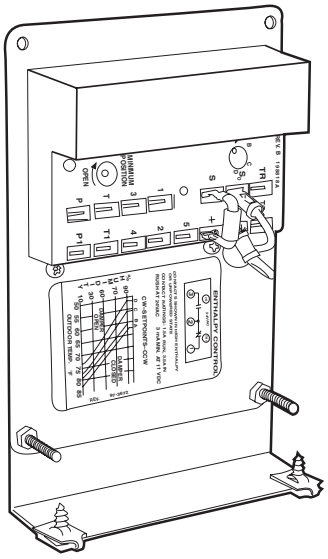
ELECTRIC HEATER



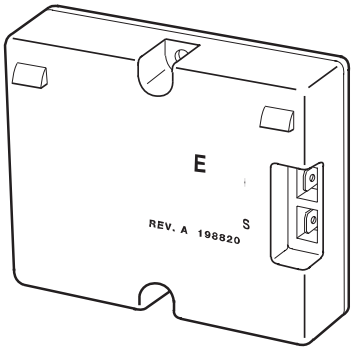
Electric heaters are available in a wide range of capacities for field installation.

Options and accessories (cont)

ACCUSENSOR™ II

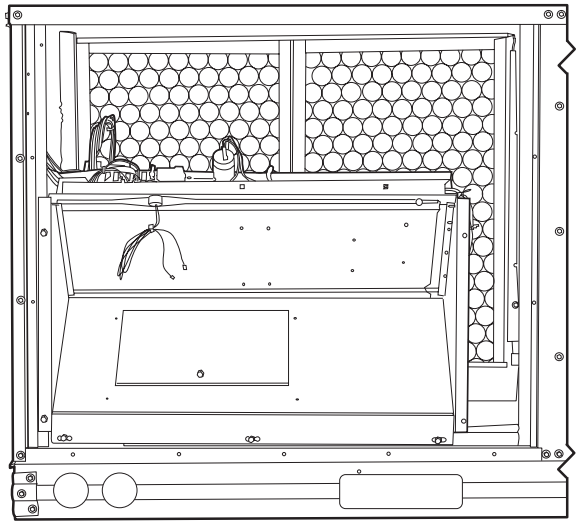


ACCUSENSOR III



Accusensor economizer controls help provide efficient, economical economizer operation. The Accusensor I dry-bulb sensor measures outdoor temperature and is standard with the Durablade economizer. The accessory Accusensor II solid-state enthalpy control senses both dry and wet bulb of the outdoor air to provide an accurate enthalpy reading. Accusensor II is available as a field-installed accessory for the Durablade economizer. The accessory Accusensor III differential enthalpy control compares outdoor temperature and humidity to return-air temperature and humidity and determines the most economical mixture of air. Accusensor III is available as a field-installed accessory for the Durablade economizer.

DURABLADE ECONOMIZER



Exclusive Durablade economizer damper design saves energy while providing economical and reliable cooling. A sliding plate on the face of the economizer controls the amount of outdoor air entering the system. Closed, it provides a leakproof seal which prevents ambient air from seeping in or conditioned air from seeping out. It can be easily adjusted for 100% outdoor air or any proportions of mixed air. Like the base unit, the economizer is easily converted for horizontal discharge applications.

Base unit dimensions

UNIT 50TFQ	STANDARD UNIT WEIGHT		ECONOMIZER WEIGHT (DURABLADE)		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
008	940	426	44	20	207	94	178	81	254	115	301	136	2- $0^{7}/_{8}$	632	3-$5^{5}/_{16}$	1050	2-$9^{11}/_{16}$	856
009	965	438	44	20	212	96	183	83	261	119	309	140	2- $0^{7}/_{8}$	632	3-$5^{5}/_{16}$	1050	2-$9^{11}/_{16}$	856
012	1015	460	44	20	223	101	193	88	274	124	325	147	2-$10^{7}/_{8}$	885	4-$1^{5}/_{16}$	1253	3-$0^{3}/_{8}$	924

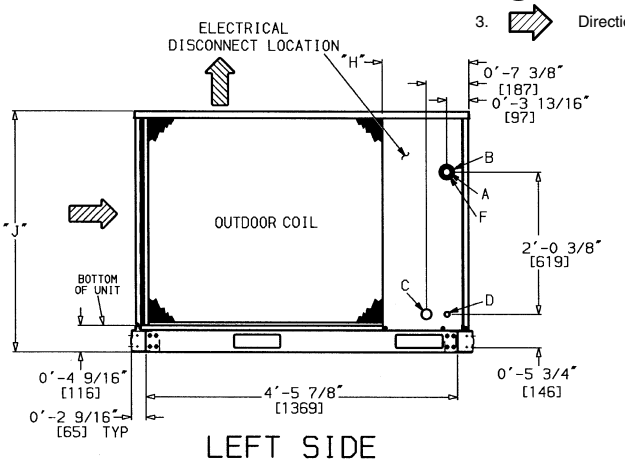
NOTES:
1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Direction of airflow.
4. Ductwork to be attached to accessory roof curb only.
5. Minimum clearance (local codes or jurisdiction may prevail):
   a. Bottom to combustible surfaces (when not using curb) 0 in. [0], on horizontal discharge units with electric heat 1 in. [25] clearance to ductwork for 1 ft. [.3 m]
   b. Outdoor coil, for proper airflow, 36 in. [914] one side, 12 in. [305] the other. The side getting the greater clearance is optional.
   c. Overhead, 60 in. [1524] to assure proper outdoor fan operation.
   d. Between units, control box side, 42 in. [1067] per NEC (National Electrical Code).
   e. Between unit and ungrounded surfaces, control box side, 36 in. [914] per NEC.
   f. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. [1067] per NEC.
   g. Horizontal supply and return end, 0 inches.
6. With the exception of the clearance for the outdoor coil and combustibles as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
7. Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.
8. The vertical center of gravity is 1′-$7^{1}/_{2}$″ [495] for 008 and 009, 2′-0″ [610] for 012 up from the bottom of the base rail.

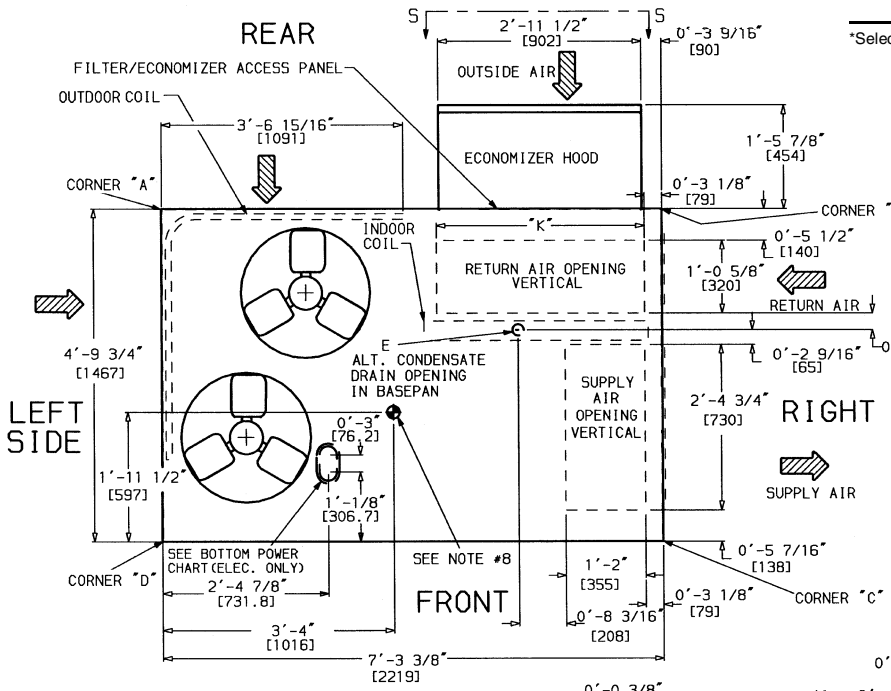
BOTTOM POWER CHART, THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGES — CRBTMPWR001A00 ($^{1}/_{2}$″, $^{3}/_{4}$″) OR CRBTMPWR002A00 ($^{1}/_{2}$″, $1^{1}/_{4}$″)

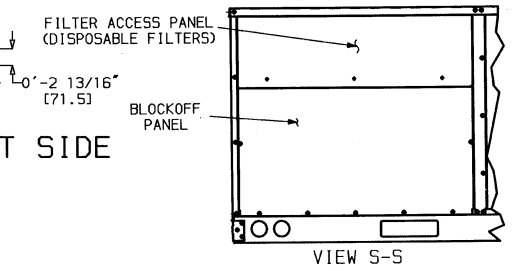
THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (Max.)
$^{1}/_{2}$″	24 V	$^{7}/_{8}$″ [22.2]
$^{3}/_{4}$″	Power*	$1^{1}/_{8}$″ [28.4]
$1^{1}/_{4}$″	Power*	$1^{3}/_{4}$″ [44.4]

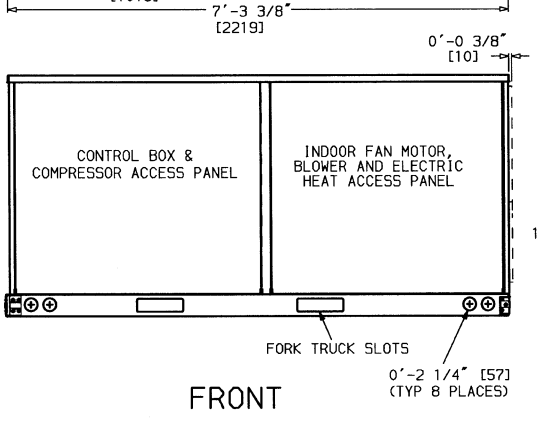
*Select either $^{3}/_{4}$″ or $1^{1}/_{4}$″ for power, depending on wire size.

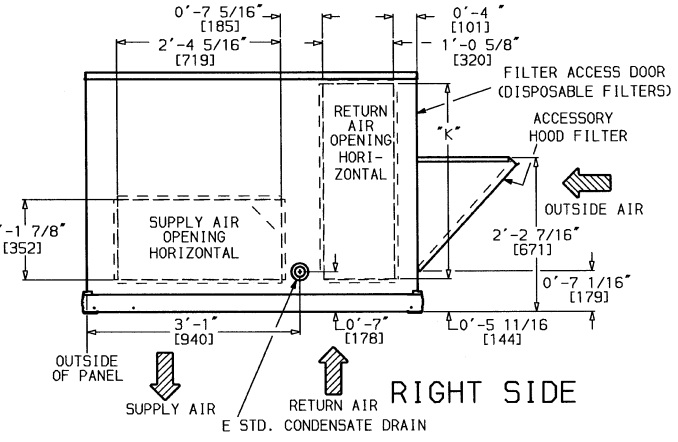
	CONNECTION SIZES
A	$1^{3}/_{8}$″ Dia. [35] Field Power Supply Hole
B	$2^{1}/_{2}$″ Dia. [64] Power Supply Knockout
C	$1^{3}/_{4}$″ Dia. [44] Charging Port Hole
D	$^{7}/_{8}$″ Dia. [22] Field Control Wiring Hole
E	$^{3}/_{4}$″ — 14 NPT Condensate Drain
F	2″ Dia. [51] Power Supply Knockout











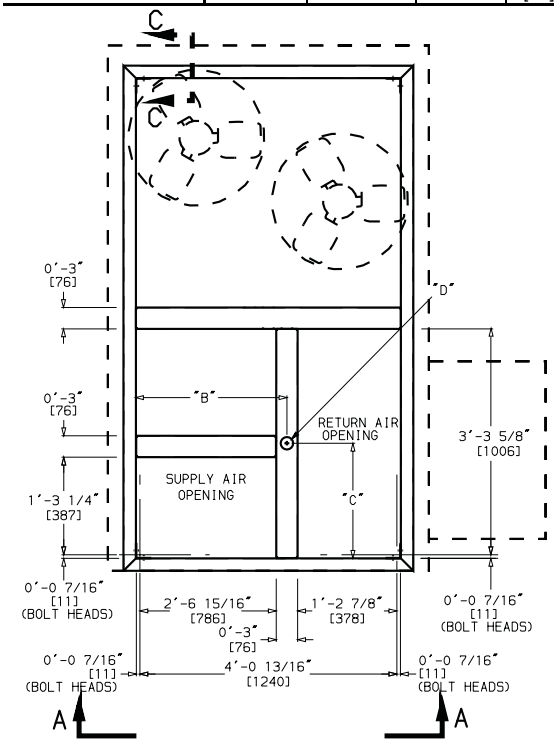
Accessory dimensions

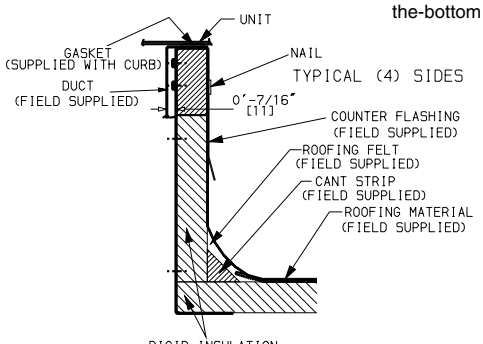
ROOF CURB 50TFQ008-012

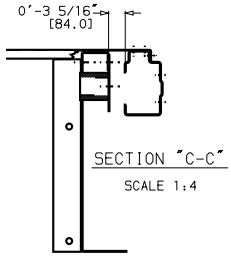
CONNECTOR PKG. ACCY.	B	C	D ALT DRAIN HOLE	GAS	POWER	CONTROL
CRBTMPWR001A00	2′-8 7/16″ [827]	1′-10 15/16″ [583]	1 3/4″ [44.5]	3/4″ [19] NPT	3/4″ [19] NPT)	1/2″ [12.7]
CRBTMPWR002A00					1 1/4″ [31.7]	
CRBTMPWR003A00				1/2″ [12.7] NPT	3/4″ [19] NPT	1/2″ [12.7]
CRBTMPWR004A00				3/4″ [19] NPT	1 1/4″ [31.7]	

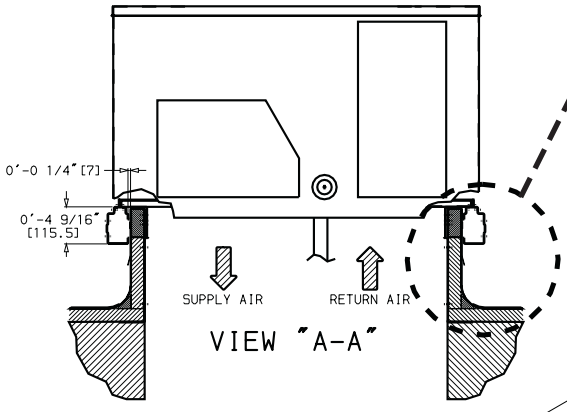
ROOF CURB ACCESSORY	"A"	UNIT SIZE 50TFQ
CRRFCURB003A00	1′-2″ [356]	008-012
CRRFCURB004A00	2′-0″ [610]	

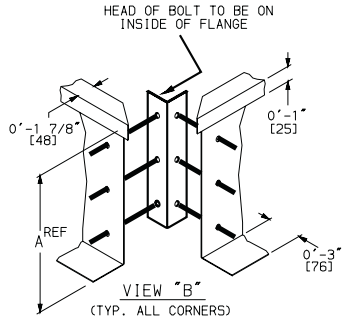
NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 25.4 mm (1-in.) thick polyurethane foam, 0.5 kg (1 3/4 lb) density.
3. Dimensions in [ ] are in millimeters.
4. Roof curb: 16-gage steel.
5. Attach ductwork to curb (flanges of duct rest on curb).
6. Service clearance 1219.2 mm (4 ft) on each side.
7. Direction of airflow.
8. Connector packages CRBTMPWR001A00 and 2A00 are for thru-the-curb gas type. Packages CRBTMPWR003A00 and 4A00 are for thru-the-bottom type gas connections.

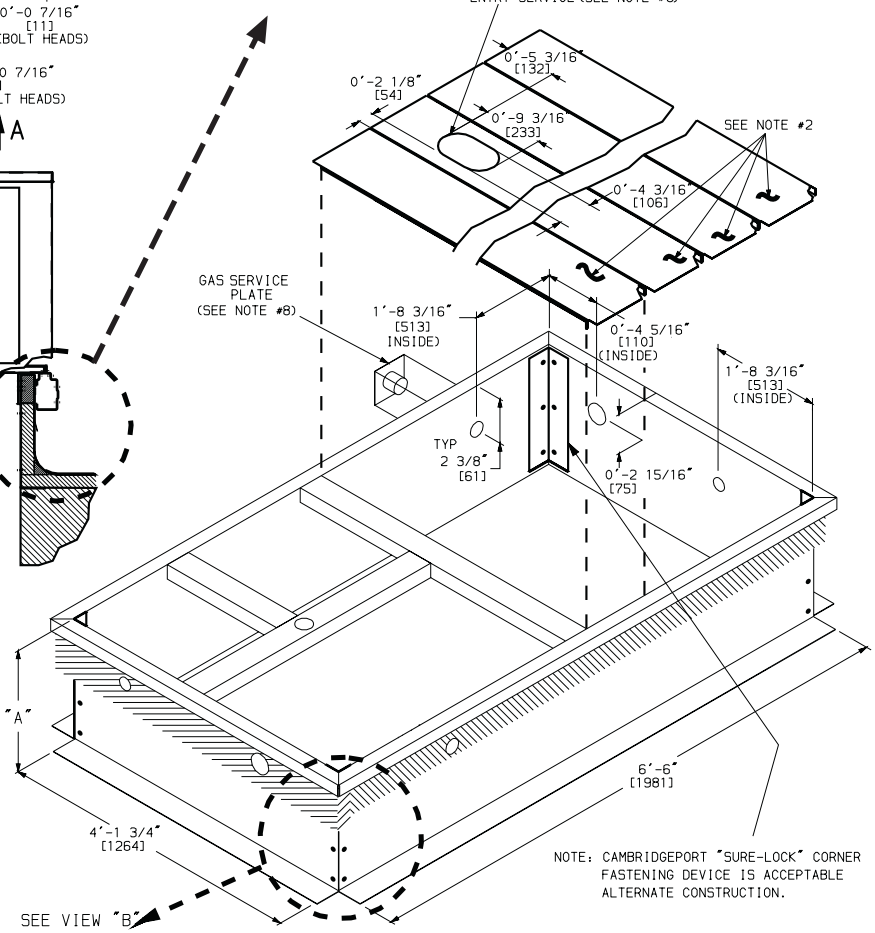












Selection procedure (with 50TFQ008 example) — SI

I Determine cooling and heating requirements at design conditions.

Given:

Required Cooling Capacity (TC)	23 kW
Sensible Heat Capacity (SHC)	14 kW
Required Heating Capacity	21 kW
Outdoor Entering-Air Temperature	32 C
Outdoor-Air Winter Design Temperature	–12 C
Indoor-Air Winter Design Temperature	21 C
Indoor Entering-Air Temperature	26.7 C, edb 20 C, ewb
Indoor-Air Quantity	1200 L/s
External Static Pressure	185 Pa
Electrical Characteristics (V-Ph-Hz)	380-3-50

II Select unit based on required cooling capacity.

Enter Cooling Capacities table at outdoor entering temperature of 32 C, indoor air entering at 1200 L/s and 20 C ewb. The 50TFQ008 unit will provide a total cooling capacity of 25.6 kW and a sensible heat capacity of 15.7 kW.

For indoor-air temperature other than 26.7 C edb, calculate sensible heat capacity correction, as required, using the formula found in Note 3 following the cooling capacities tables.

NOTE: Unit ratings are gross capacities and do not include the effect of indoor-fan motor heat. To calculate net capacities, see Step V.

III Select electric heat.

Enter the Instantaneous and Integrated Heating Ratings table at 1200 L/s. At 21 C return indoor air and –12 C air entering outdoor coil, the integrated heating capacity is 9.5 kW. (Select integrated heating capacity value since deductions for outdoor-coil frost and defrosting have already been made. No correction is required.)

The required heating capacity is 21 kW. Therefore, 11.5 kW (21 – 9.5) additional electric heat is required.

Enter the Electric Heating Capacities table for 50TFQ008 at 400-3-50, 3 phase. The 11.5 kW heater at 400 v most closely satisfies the heating required. To calculate kW at 380 v, use the Multiplication Factors table.

11.5 kW x .902 = 10.4 kW

Total unit heating capacity is 19.9 kW (9.5 + 10.4).

IV Determine fan speed and power requirements at design conditions.

Before entering Fan Performance tables, calculate the total static pressure required based on unit components. From the given and the Pressure Drop tables on page 28, find:

External static pressure	185 Pa
Economizer	6 Pa
Electric heat	8 Pa
Total static pressure	199 Pa

Enter the Fan Performance table for 50TFQ008 vertical discharge. Find fan R/s and BkW at 199 Pa and 1200 L/s. Note that the fan speed is 12.6 R/s and power required is 1.05 BkW. The standard 1.12 kW motor is satisfactory.

To determine the input power to the motor, use the Indoor-Fan Motor Efficiency table on page 28.

$$\text{IFM Watts} = \frac{1.05}{.80}$$

$$= 1.9 \text{ kW}$$

V Determine net capacities.

Capacities are gross and do not include the effect of indoor-fan motor (IFM) heat.

Determine net cooling capacity as follows:

Net capacity = Total capacity – IFM heat

= 25.6 kW – (1.9 kW)

= 23.7 kW

Net sensible capacity = 15.7 kW – 1.9 kW

= 14.1 kW

Determine net heating capacity as follows:

Net capacity = Total capacity + IFM heat

= 19.9 kW + 1.9 kW

= 21.8 kW

Selection procedure (with 50TFQ008 example) — English

I Determine cooling and heating requirements at design conditions.

Given:

Required Cooling Capacity (TC) . . . . .78,000 Btuh
Sensible Heat Capacity (SHC) . . . . . .51,000 Btuh
Required Heating Capacity . . . . . .72,000 Btuh
Outdoor Entering-Air Temperature . . . . . .95 F
Outdoor-Air Winter Design Temperature . . . . .10 F
Indoor-Air Winter Design Temperature . . . . . .70 F
Indoor Entering-Air Temperature . . . . . 80 F, edb
67 F, ewb
Indoor-Air Quantity . . . . . 2600 cfm
External Static Pressure . . . . . 70 in. wg
Electrical Characteristics (V-Ph-Hz) 380-3-50

II Select unit based on required cooling capacity.

Enter Cooling Capacities table at outdoor entering temperature of 95 F, indoor air entering at 2600 cfm and 67 F ewb. The 50TFQ008 unit will provide a total cooling capacity of 83,400 Btuh and a sensible heat capacity of 56,200 Btuh.

For indoor-air temperature other than 80 F edb, calculate sensible heat capacity correction, as required, using the formula found in Note 3 following the cooling capacities tables.

NOTE: Unit ratings are gross capacities and do not include the effect of indoor-fan motor heat. To calculate net capacities, see Step V.

III Select electric heat.

Enter the Instantaneous and Integrated Heating Ratings table at 2600 cfm. At 70 F return indoor air and 10 F air entering outdoor coil, the integrated heating capacity is 32,200 Btuh. (Select integrated heating capacity value since deductions for outdoor-coil frost and defrosting have already been made. No correction is required.)

The required heating capacity is 72,000 Btuh. Therefore, 39,800 Btuh (72,000 – 32,200) additional electric heat is required.

Determine additional electric heat capacity in kW.

$$\frac{39{,}800 \text{ Btuh}}{3413 \text{ Btuh/kW}} = 11.7 \text{ kW of heat required.}$$

Enter the Electric Heating Capacities table for 50TFQ008 at 400-3-50. The 11.5 kW heater at 400 v most closely satisfies the heating required. To calculate kW at 380 v, use the Multiplication Factors table.

11.5 kW x .902 = 10.4 kW
11.5 kW x .902 x 3413 = 35,403 Btuh

Total unit heating capacity is 67,603 Btuh (32,200 + 35,403).

IV Determine fan speed and power requirements at design conditions.

Before entering Fan Performance tables, calculate the total static pressure required based on unit components. From the given and the Pressure Drop tables on page 28, find:

External static pressure	.70 in. wg
Economizer	.02 in. wg
Electric heat	.03 in. wg
Total static pressure	.75 in. wg

Enter the Fan Performance table for 50TFQ008 vertical discharge. Find fan R/s and BkW at 0.75 in. wg and 2600 cfm. Note that the fan speed is 747 rpm and power required is 1.40 Bhp (interpolation not shown). The standard 1.5 hp motor is satisfactory.

NOTE: Convert bhp to Watts using the formula found in the note following the Indoor-Fan Motor Efficiency table found on page 28.

For this example:

$$\text{Watts} = \frac{746 \times \text{Bhp}}{\text{Motor Efficiency}}$$

$$\text{Watts} = \frac{746 \times 1.40}{.80}$$

Watts = 1306

V Determine net capacities.

Capacities are gross and do not include the effect of indoor-fan motor (IFM) heat.

Determine net cooling capacity as follows:

Net capacity = Gross capacity – IFM heat
= 83,400 Btuh – (1306 watts x 3.413 Btuh/Watts)
= 83,400 Btuh – 4457 Btuh
= 78,943 Btuh

Net sensible capacity = 56,200 Btuh – 4457 Btuh
= 51,743 Btuh

Determine net heating capacity as follows:

Net capacity = Gross capacity + IFM heat
= 67,603 Btuh + 4457 Btuh
= 72,060 Btuh

Performance data

COOLING CAPACITIES

50TFQ008

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF														
		850/0.09					1150/0.23					1200/0.25				
		Indoor Air — Ewb (C)														
		14	16	18	20	22	14	16	18	20	22	14	16	18	20	22
20	TC	22.2	23.6	25.2	26.8	28.2	24.6	25.4	26.6	28.2	29.8	25.0	25.6	26.8	28.4	30.0
	SHC	20.2	18.4	16.3	14.0	11.6	22.4	21.4	18.9	15.9	12.9	22.8	21.8	19.3	16.2	13.2
	kW	4.64	4.76	4.88	4.98	5.08	4.84	4.88	4.98	5.10	5.22	4.86	4.90	5.00	5.12	5.24
24	TC	21.6	22.8	24.2	26.0	27.8	24.0	24.4	25.8	27.6	29.0	24.2	24.8	26.0	27.6	29.2
	SHC	19.5	17.9	15.8	13.7	11.4	21.8	21.0	18.7	15.8	12.7	22.2	21.4	19.1	16.1	13.0
	kW	4.91	5.04	5.16	5.30	5.46	5.16	5.20	5.32	5.46	5.56	5.18	5.22	5.34	5.46	5.58
28	TC	20.8	21.8	23.4	25.0	26.3	23.2	23.6	24.8	26.6	28.2	23.4	23.8	25.0	26.8	28.4
	SHC	18.9	17.5	15.6	13.4	11.2	21.2	20.4	18.4	15.6	12.6	21.4	21.0	18.1	15.9	12.8
	kW	5.24	5.34	5.48	5.64	5.80	5.46	5.50	5.62	5.78	5.94	5.50	5.54	5.64	5.80	5.96
32	TC	20.2	21.0	22.4	24.2	25.8	22.4	22.6	23.8	25.6	27.2	22.6	22.8	24.0	25.6	27.4
	SHC	18.3	17.1	15.3	13.1	10.9	20.4	20.0	18.0	15.3	12.3	20.8	20.4	18.4	15.7	12.6
	kW	5.52	5.62	5.78	5.96	6.14	5.78	5.80	5.94	6.12	6.28	5.82	5.84	5.96	6.12	6.30
36	TC	19.3	20.0	21.4	23.2	24.8	21.6	21.6	22.8	24.4	26.2	21.8	22.0	23.0	24.6	26.4
	SHC	17.6	16.7	14.5	12.8	10.6	19.6	19.5	17.7	15.0	12.0	19.9	19.8	18.0	15.3	12.3
	kW	5.82	5.90	6.06	6.26	6.46	6.10	6.12	6.24	6.42	6.62	6.14	6.14	6.26	6.44	6.64
40	TC	18.6	19.1	20.4	22.0	23.8	20.6	20.6	21.8	23.2	25.0	21.0	21.0	22.0	23.4	25.2
	SHC	16.9	16.2	14.6	12.5	10.3	18.9	18.8	17.2	14.7	11.8	19.1	19.1	17.6	15.0	12.1
	kW	6.10	6.18	6.36	6.56	6.78	6.40	6.40	6.54	6.74	6.96	6.44	6.44	6.56	6.76	6.90
44	TC	17.7	18.1	19.2	21.0	22.6	19.7	19.7	20.6	22.0	23.8	20.0	20.0	20.8	22.2	24.0
	SHC	16.2	15.7	14.2	12.1	10.0	18.0	18.0	16.6	14.3	11.5	18.3	18.3	17.0	14.7	11.8
	kW	6.40	6.46	6.62	6.86	7.10	6.70	6.70	6.84	7.04	7.26	6.76	6.76	6.86	7.06	7.28
48	TC	16.8	17.0	18.1	19.7	21.4	18.8	18.8	19.5	20.8	22.6	19.0	19.0	19.7	21.0	22.8
	SHC	15.4	15.2	13.8	11.8	9.7	17.2	17.2	16.0	14.0	11.2	17.4	17.4	16.3	14.3	11.5
	kW	6.70	6.72	6.88	7.14	7.40	7.02	7.02	7.12	7.32	7.58	7.06	7.06	7.16	7.34	7.60
52	TC	15.9	15.9	16.9	18.5	20.2	17.8	17.8	18.3	19.5	21.2	18.0	18.0	18.5	19.6	21.4
	SHC	14.6	14.6	13.3	11.4	9.3	16.3	16.3	15.4	13.6	10.9	16.5	16.5	15.7	14.0	11.1
	kW	7.00	7.00	7.16	7.40	7.68	7.32	7.32	7.40	7.58	7.86	7.36	7.36	7.44	7.60	7.90

50TFQ008 (cont)

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF				
		1450/0.34				
		Indoor Air — Ewb (C)				
		14	16	18	20	22
20	TC	26.4	26.6	27.6	29.2	39.6
	SHC	24.0	23.6	21.2	17.7	14.1
	kW	4.96	4.98	5.06	5.18	5.30
24	TC	25.8	25.8	26.8	28.4	30.2
	SHC	23.4	23.4	21.2	17.7	14.1
	kW	5.30	5.32	5.40	5.54	5.68
28	TC	25.0	25.0	26.0	27.4	29.2
	SHC	22.8	22.6	20.8	17.5	13.9
	kW	5.64	5.66	5.74	5.88	6.02
32	TC	24.0	24.0	25.0	26.4	28.0
	SHC	22.0	22.0	20.2	17.3	13.6
	kW	5.98	5.98	6.06	6.22	6.36
36	TC	23.2	23.2	24.0	25.2	27.0
	SHC	21.2	21.2	19.6	17.0	13.4
	kW	6.28	6.30	6.38	6.54	6.72
40	TC	22.2	22.2	22.8	24.0	25.8
	SHC	20.4	20.4	19.0	16.7	13.2
	kW	6.62	6.62	6.70	6.84	7.06
44	TC	21.2	21.2	21.8	22.8	24.6
	SHC	19.4	19.4	18.4	16.4	12.9
	kW	6.94	6.94	7.00	7.14	7.38
48	TC	20.2	20.2	20.6	21.4	23.2
	SHC	18.5	18.5	17.8	16.8	12.6
	kW	7.24	7.24	7.30	7.42	7.68
52	TC	19.1	19.1	19.4	20.2	22.0
	SHC	17.5	17.5	17.1	15.6	12.4
	kW	7.54	7.54	7.58	7.70	7.98

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb Temperature (C)
kW — Compressor Input (kW)
SHC — Sensible Heat Capacity (kW)
TC — Total Capacity (kW)

NOTES:
1. Ratings are gross, and do not account for the effects of the indoor-fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 26.7 C db temperature of air entering the unit. At any other temperature, correct the SHC read from the table of cooling capacities as follows:

   Corrected SHC_{kW}

   $= SHC + [1.23 \times 10^{-3} \times (1 - BF) \times (C_{db} - 26.7) \times L/s]$

   Observe the rule of signs. Above 26.7 C, SHC correction will be positive; add it to SHC. Below 26.7 C, SHC correction will be negative; subtract it from SHC.
4. Formulas:

$$C_{ldb} = C_{edb} - \frac{SHC_{kW} \times 1000}{1.23 \times L/s}$$

Leaving wet bulb = wet bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{TC_{kW} \times 100}{1.20 \times L/s}$$

Where h_{ewb} is enthalpy of air entering indoor coil (kJ/kg).

Performance data (cont)

COOLING CAPACITIES (SI) (cont)

50TFQ009

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF														
		950/0.10					1250/0.24					1400/0.30				
		Indoor Air — Ewb (C)														
		14	16	18	20	22	14	16	18	20	22	14	16	18	20	22
20	TC	23.8	25.2	26.8	28.4	29.6	26.2	27.0	28.0	29.2	30.4	27.0	27.6	28.6	29.6	30.8
	SHC	22.2	20.2	18.0	15.5	12.9	24.6	23.2	20.4	17.0	13.8	25.2	24.4	21.6	17.9	14.4
	kW	5.16	5.28	5.42	5.54	5.64	5.38	5.42	5.50	5.60	5.70	5.44	5.48	5.56	5.64	5.76
24	TC	23.2	24.4	26.0	27.8	29.4	25.6	26.2	27.4	28.8	30.0	26.4	26.8	27.8	29.2	30.6
	SHC	21.6	19.9	17.8	15.4	12.8	24.0	23.0	20.4	17.0	13.8	24.8	24.2	21.6	18.0	14.4
	kW	5.52	5.62	5.76	5.92	6.06	5.74	5.80	5.88	6.00	6.10	5.82	5.86	5.94	6.04	6.18
28	TC	22.4	23.6	25.2	27.0	28.6	24.8	25.2	26.6	28.2	29.4	25.8	26.0	27.2	28.6	30.0
	SHC	21.0	19.4	17.4	15.1	12.6	23.2	22.6	20.2	17.1	13.7	24.0	23.6	21.4	18.0	14.4
	kW	5.84	5.96	6.12	6.28	6.44	6.10	6.14	6.26	6.42	6.52	6.18	6.22	6.32	6.46	6.58
32	TC	21.8	22.6	24.2	26.0	27.8	24.0	24.4	25.6	27.4	28.8	25.0	25.0	26.2	27.8	29.2
	SHC	20.4	19.0	17.1	14.8	12.3	22.6	22.0	19.9	16.9	13.6	23.4	23.2	21.0	17.9	14.3
	kW	6.18	6.30	6.46	6.66	6.82	6.46	6.50	6.64	6.80	6.96	6.56	6.58	6.70	6.86	7.00
36	TC	21.0	21.8	23.2	25.0	26.8	23.2	23.4	24.6	26.6	28.0	24.0	24.2	25.2	26.8	28.4
	SHC	19.7	18.6	16.7	14.4	12.1	21.8	21.6	19.5	16.6	13.5	22.6	22.4	20.6	17.7	14.2
	kW	6.52	6.62	6.82	7.04	7.22	6.84	6.86	7.00	7.18	7.38	6.94	6.96	7.06	7.24	7.42
40	TC	20.4	21.0	22.4	24.0	25.8	22.4	22.6	23.6	25.4	27.0	23.2	23.2	24.2	25.8	27.6
	SHC	19.0	18.2	16.4	14.1	11.7	21.0	21.0	19.1	16.4	13.3	21.8	21.8	20.2	17.4	14.0
	kW	6.86	6.96	7.16	7.40	7.60	7.20	7.22	7.36	7.58	7.78	7.32	7.32	7.44	7.62	7.84
44	TC	19.6	20.2	21.4	23.0	24.8	21.6	21.8	22.6	24.2	26.0	22.4	22.4	23.2	24.6	26.4
	SHC	18.4	17.7	16.0	13.8	11.5	20.4	20.2	18.6	16.0	12.9	21.0	21.0	19.6	17.1	13.7
	kW	7.24	7.30	7.50	7.76	8.00	7.58	7.58	7.74	7.94	8.16	7.70	7.70	7.82	8.00	8.22
48	TC	18.9	19.2	20.4	22.0	23.8	20.8	20.8	21.8	23.2	24.8	21.6	21.6	22.2	23.4	25.2
	SHC	17.7	17.2	15.7	13.5	11.2	19.5	19.5	18.1	15.7	12.7	20.2	20.2	19.0	16.7	13.4
	kW	7.60	7.66	7.86	8.14	8.40	7.96	7.96	8.10	8.32	8.56	8.08	8.08	8.20	8.38	8.60
52	TC	18.1	18.2	19.3	21.0	22.8	19.9	20.0	20.8	22.0	23.8	20.6	20.6	21.2	22.4	24.0
	SHC	17.0	16.7	15.3	13.1	10.8	18.7	18.7	17.5	15.4	12.4	19.4	19.4	18.4	16.4	13.1
	kW	7.98	8.02	8.22	8.50	8.78	8.34	8.34	8.43	8.70	8.98	8.48	8.48	8.58	8.76	9.02

50TFQ009 (cont)

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF				
		1600/0.36				
		Indoor Air — Ewb (C)				
		14	16	18	20	22
20	TC	27.8	28.2	29.0	30.2	31.4
	SHC	26.0	25.8	22.8	18.9	15.0
	kW	5.50	5.54	5.62	5.70	5.82
24	TC	27.4	27.6	28.4	29.8	31.2
	SHC	25.8	25.4	22.8	19.1	15.3
	kW	5.90	5.92	6.00	6.12	6.26
28	TC	26.6	26.6	27.8	29.2	30.6
	SHC	25.0	24.2	22.6	19.2	15.2
	kW	6.28	6.28	6.38	6.54	6.66
32	TC	25.8	25.8	26.8	28.4	29.8
	SHC	24.2	24.2	22.4	19.1	15.0
	kW	5.98	6.68	6.68	6.92	7.06
36	TC	25.0	25.0	25.8	27.2	28.8
	SHC	23.4	23.4	21.8	18.8	14.9
	kW	7.06	7.06	7.14	7.30	7.48
40	TC	24.2	24.2	24.8	26.2	28.0
	SHC	22.6	22.6	21.2	18.5	14.8
	kW	7.44	7.44	7.52	7.66	7.90
44	TC	23.2	23.2	23.8	25.0	26.8
	SHC	21.8	21.8	20.6	18.2	14.5
	kW	7.84	7.84	7.92	8.06	8.28
48	TC	22.4	22.4	22.8	23.8	25.6
	SHC	21.0	21.0	20.0	17.5	14.1
	kW	8.22	8.22	8.30	8.44	8.66
52	TC	21.4	21.4	21.8	22.6	24.4
	SHC	20.2	20.2	19.4	17.6	13.8
	kW	8.62	8.62	8.68	8.82	9.04

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb Temperature (C)
kW — Compressor Input (kW)
SHC — Sensible Heat Capacity (kW)
TC — Total Capacity (kW)

NOTES:
1. Ratings are gross, and do not account for the effects of the indoor-fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 26.7 C db temperature of air entering the unit. At any other temperature, correct the SHC read from the table of cooling capacities as follows:

   Corrected SHC_{kW}

   $= SHC + [1.23 \times 10^{-3} \times (1 - BF) \times (C_{db} - 26.7) \times L/s]$

   Observe the rule of signs. Above 26.7 C, SHC correction will be positive; add it to SHC. Below 26.7 C, SHC correction will be negative; subtract it from SHC.
4. Formulas:

$$C_{ldb} = C_{edb} - \frac{SHC_{kW} \times 1000}{1.23 \times L/s}$$

Leaving wet bulb = wet bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{TC_{kW} \times 100}{1.20 \times L/s}$$

Where h_{ewb} is enthalpy of air entering indoor coil (kJ/kg).

COOLING CAPACITIES (SI) (cont)

50TFQ012

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF														
		1100/0.15					1450/0.29					1600/0.34				
		Indoor Air — Ewb (C)														
		14	16	18	20	22	14	16	18	20	22	14	16	18	20	22
20	TC	26.2	27.6	29.2	31.0	32.6	28.6	29.1	30.8	32.4	34.0	29.4	30.0	31.2	32.8	34.2
	SHC	25.4	23.4	21.0	18.3	15.6	28.0	26.6	23.8	20.2	16.9	28.8	27.8	24.8	21.0	17.4
	kW	5.80	5.90	6.02	6.16	6.28	5.98	6.04	6.14	6.26	6.40	6.04	6.10	6.18	6.30	6.42
24	TC	25.6	27.0	28.6	30.4	32.0	28.0	28.6	30.2	31.8	33.4	28.8	29.2	30.6	32.2	33.6
	SHC	25.0	23.2	20.8	18.1	15.4	27.4	26.2	23.6	20.2	16.7	28.2	27.4	24.8	21.2	17.2
	kW	6.24	6.38	6.50	6.64	6.76	6.44	6.50	6.62	6.76	6.88	6.50	6.54	6.66	6.80	6.92
28	TC	25.0	26.2	27.8	29.6	31.2	27.4	28.0	29.4	31.2	32.8	28.2	28.6	29.8	31.6	33.2
	SHC	24.4	22.8	20.4	17.8	15.1	26.8	26.0	23.4	20.2	16.6	27.6	27.0	24.6	21.0	17.2
	kW	6.76	6.88	7.00	7.14	7.28	7.00	7.04	7.16	7.30	7.44	7.06	7.10	7.20	7.36	7.48
32	TC	24.4	25.6	27.0	28.8	30.6	26.8	27.2	28.6	30.2	32.0	27.6	27.8	29.0	30.8	32.4
	SHC	23.8	22.4	20.2	17.5	14.9	26.2	25.6	23.2	19.8	16.5	27.0	26.6	24.2	20.8	17.0
	kW	7.30	7.40	7.56	7.70	7.86	7.56	7.60	7.70	7.86	8.02	7.62	7.64	7.76	7.90	8.06
36	TC	23.8	24.8	26.2	28.0	29.8	26.0	26.4	27.6	29.4	31.2	26.8	27.0	28.0	29.8	31.6
	SHC	23.2	21.8	19.7	17.2	14.6	25.6	25.0	22.8	19.5	16.2	26.2	26.0	23.8	20.4	16.8
	kW	7.86	7.88	8.12	8.30	8.48	8.14	8.16	8.28	8.44	8.62	8.20	8.22	8.32	8.48	8.66
40	TC	23.2	24.0	25.4	27.2	28.8	25.4	25.6	26.8	28.4	30.2	26.0	26.2	27.2	28.8	30.6
	SHC	22.6	21.4	19.4	16.9	14.3	24.8	24.6	22.4	19.2	16.0	25.6	25.4	23.4	20.2	16.5
	kW	8.43	8.58	8.74	8.94	9.08	8.76	8.78	8.88	9.56	9.26	8.84	8.86	8.94	9.10	9.30
44	TC	22.4	23.0	24.4	26.2	28.0	21.6	24.6	25.8	27.4	29.2	25.2	25.2	26.2	27.8	29.6
	SHC	21.8	21.0	19.0	16.5	13.9	24.0	23.8	22.0	18.9	15.6	28.8	24.8	22.8	19.8	16.2
	kW	9.12	9.20	9.38	9.60	9.76	9.42	9.42	9.56	9.74	9.94	9.52	9.52	9.62	9.78	9.98
48	TC	21.6	22.2	23.4	25.2	27.0	23.8	23.8	24.8	26.4	28.2	24.4	24.4	25.4	26.8	28.6
	SHC	21.2	20.4	18.6	16.2	13.6	23.2	23.2	21.4	18.6	15.3	24.0	24.0	22.4	19.5	15.9
	kW	9.80	9.86	10.06	10.28	10.48	10.10	10.10	10.24	10.44	10.62	10.20	10.20	10.32	10.48	10.68
52	TC	20.8	21.2	22.4	24.2	26.0	22.8	22.8	23.8	25.2	27.0	23.6	23.6	24.2	25.6	27.4
	SHC	20.4	19.8	18.1	15.8	13.5	22.4	22.4	20.8	18.2	14.0	23.0	23.0	21.6	19.2	15.5
	kW	10.50	10.56	10.71	10.96	11.22	10.82	10.82	10.96	11.14	11.34	10.92	10.92	11.02	11.20	11.38

50TFQ012 (cont)

Temp (C) Outdoor Entering Air (Edb)		Indoor Air — L/s / BF				
		1800/0.40				
		Indoor Air — Ewb (C)				
		14	16	18	20	22
20	TC	30.2	30.6	31.8	33.4	34.6
	SHC	29.6	29.0	26.2	22.2	17.9
	kW	6.10	6.14	6.24	6.36	6.41
24	TC	29.6	29.8	31.2	32.8	34.0
	SHC	29.0	28.6	26.0	22.2	17.8
	kW	6.56	6.60	6.72	6.86	6.94
28	TC	29.0	29.2	30.4	32.0	33.6
	SHC	28.4	28.2	25.8	22.2	17.9
	kW	7.12	7.14	7.34	7.40	7.52
32	TC	28.4	28.4	29.6	31.2	32.8
	SHC	27.8	27.6	25.4	22.0	17.7
	kW	7.68	7.68	7.80	7.96	8.10
36	TC	27.6	27.6	28.6	30.2	31.8
	SHC	27.2	27.0	25.0	21.8	17.5
	kW	8.28	8.28	8.38	8.54	8.68
40	TC	27.0	27.0	27.8	29.2	30.0
	SHC	26.4	26.4	24.6	21.4	17.1
	kW	8.94	8.94	9.02	9.14	9.28
44	TC	26.2	26.2	27.0	28.2	36.0
	SHC	25.6	25.6	24.0	21.0	17.0
	kW	9.68	9.64	9.70	9.82	10.02
48	TC	25.2	25.2	26.0	27.2	29.0
	SHC	24.8	24.8	23.4	20.8	16.8
	kW	10.34	10.34	10.40	10.52	10.74
52	TC	24.4	24.4	24.8	26.0	27.0
	SHC	23.8	23.8	22.8	20.4	16.4
	kW	11.06	11.06	11.12	11.26	11.41

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb Temperature (C)
kW — Compressor Input (kW)
SHC — Sensible Heat Capacity (kW)
TC — Total Capacity (kW)

NOTES:
1. Ratings are gross, and do not account for the effects of the indoor-fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 26.7 C db temperature of air entering the unit. At any other temperature, correct the SHC read from the table of cooling capacities as follows:

   Corrected SHC_{kW}

   $= SHC + [1.23 \times 10^{-3} \times (1 - BF) \times (C_{db} - 26.7) \times L/s]$

   Observe the rule of signs. Above 26.7 C, SHC correction will be positive; add it to SHC. Below 26.7 C, SHC correction will be negative; subtract it from SHC.
4. Formulas:

$$C_{ldb} = C_{edb} - \frac{SHC_{kW} \times 1000}{1.23 \times L/s}$$

Leaving wet bulb = wet bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{TC_{kW} \times 100}{1.20 \times L/s}$$

Where h_{ewb} is enthalpy of air entering indoor coil (kJ/kg).

Performance data (cont)

COOLING CAPACITIES (ENGLISH)

50TFQ008

Temp (F) Outdoor Entering Air (Edb)		Indoor Air — Cfm/BF											
		1850/0.03			2450/0.05			2600/0.06			3050/0.10		
		Indoor Air — Ewb (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
75	TC	95.4	87.2	79.0	99.4	92.6	84.2	100.6	93.4	85.4	103.6	95.6	88.4
	SHC	38.4	49.0	59.6	42.4	57.0	70.4	43.6	58.8	73.0	46.8	64.0	79.6
	kW	5.46	5.26	5.06	5.56	5.42	5.20	5.60	5.44	5.24	5.68	5.48	5.32
85	TC	90.8	82.8	74.6	96.0	87.8	79.6	96.8	88.8	80.8	98.6	91.0	84.0
	SHC	37.0	47.8	58.0	41.6	55.8	68.8	42.8	57.8	71.0	45.8	63.2	76.6
	kW	5.94	5.72	5.48	6.08	5.86	5.62	6.10	5.90	5.66	6.16	5.96	5.76
95	TC	86.4	78.0	70.2	90.8	82.6	74.8	91.6	83.4	76.2	93.4	85.6	79.8
	SHC	35.8	46.2	56.2	40.4	54.2	66.8	41.6	56.2	68.6	44.6	61.8	72.8
	kW	6.42	6.14	5.86	6.56	6.30	6.04	6.58	6.32	6.08	6.64	6.40	6.20
105	TC	8.12	73.0	65.4	85.6	77.2	70.2	86.4	78.0	71.6	88.4	79.8	75.4
	SHC	34.2	44.6	54.4	39.2	52.8	64.0	40.4	54.8	65.4	43.8	60.4	69.0
	kW	6.84	6.56	6.24	7.02	6.72	6.46	7.06	6.76	6.50	7.14	6.82	6.66
115	TC	75.8	67.6	60.2	80.0	71.6	65.8	80.6	72.2	67.2	82.2	73.8	70.8
	SHC	32.8	43.0	52.4	37.8	51.0	60.2	39.0	53.2	61.4	42.4	58.8	64.6
	kW	7.28	6.94	6.60	7.46	7.12	6.86	7.48	7.14	6.94	7.56	7.24	7.10
125	TC	70.0	61.8	54.8	73.6	65.2	61.0	74.2	65.8	62.4	76.0	67.6	65.8
	SHC	31.2	41.2	50.0	36.2	49.2	55.8	37.6	51.4	57.0	41.2	56.8	60.2
	kW	7.68	7.30	6.96	7.88	7.48	7.28	7.90	7.52	7.36	8.00	7.60	7.52

50TFQ009

Temp (F) Outdoor Entering Air (Edb)		Indoor Air — Cfm/BF											
		2000/0.05			2700/0.07			3000/0.10			3350/0.13		
		Indoor Air — Ewb (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
75	TC	100.6	93.6	85.0	102.8	97.0	90.4	105.0	98.6	92.4	107.4	100.4	94.2
	SHC	43.0	55.0	66.0	46.2	61.4	77.6	48.4	65.0	82.2	50.8	68.8	86.6
	kW	6.06	5.88	5.64	6.12	5.94	5.82	6.18	6.00	5.86	6.26	6.06	5.90
85	TC	92.0	89.2	80.6	100.2	94.4	85.8	102.0	96.2	88.0	103.8	97.6	90.2
	SHC	41.8	53.4	64.4	45.6	61.8	75.8	47.8	65.8	80.2	50.2	69.6	84.2
	kW	6.58	6.36	6.12	6.68	6.54	6.28	6.74	6.60	6.36	6.82	6.64	6.42
95	TC	93.2	84.6	76.2	97.4	89.4	81.0	98.8	91.0	83.4	99.8	92.6	86.0
	SHC	40.6	52.0	62.6	45.4	60.4	74.0	47.6	64.4	77.4	49.6	68.4	80.6
	kW	7.16	6.90	6.58	7.30	7.04	6.78	7.34	7.10	6.88	7.38	7.16	6.96
105	TC	88.2	79.8	71.8	92.8	84.2	76.6	94.2	85.8	79.2	95.8	87.0	81.8
	SHC	39.2	50.4	61.0	44.2	59.0	71.2	46.6	62.8	74.2	49.2	66.6	76.8
	kW	7.66	7.40	7.04	7.86	7.58	7.28	7.94	7.62	7.38	8.00	7.66	7.50
115	TC	83.6	75.2	67.6	87.2	79.0	72.8	88.6	80.4	75.2	89.8	81.6	77.8
	SHC	37.8	48.8	59.2	42.6	57.4	68.0	45.0	61.4	70.6	47.4	65.4	73.0
	kW	8.26	7.88	7.52	8.38	8.08	7.78	8.44	8.16	7.92	8.50	8.20	8.04
125	TC	78.6	70.2	62.8	82.2	73.8	68.6	83.2	75.0	71.0	84.0	76.2	73.4
	SHC	36.4	47.2	57.0	41.6	55.8	64.4	43.8	59.8	66.8	46.0	63.8	69.0
	kW	8.78	8.38	8.00	8.98	8.60	8.32	9.00	8.66	8.46	9.04	8.72	8.58

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb Temperature (F)
kW — Compressor Input (kW)
SHC — Sensible Heat Capacity (kW)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Ratings are gross, and do not account for the effects of the indoor-fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 80 F db temperature of air entering the unit. At any other temperature, correct the SHC read from the table of cooling capacities as follows:

   Corrected SHC_{Btuh}

   $= SHC + [1.10 \times (1 - BF) \times (F_{db} - 80) \times cfm]$

   Observe the rule of signs. Above 80 F, SHC correction will be positive; add it to SHC. Below 80 F, SHC correction will be negative; subtract it from SHC.
4. Formulas:

$$C_{ldb} = C_{edb} - \frac{SHC_{Btuh}}{1.10 \times cfm}$$

Leaving wet bulb = wet bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{TC_{Btuh}}{4.50 \times cfm}$$

Where h_{ewb} is enthalpy of air entering indoor coil (Btu/lb).

COOLING CAPACITIES (ENGLISH) (cont)

50TFQ012

Temp (F) Outdoor Entering Air (Edb)		Indoor Air — Cfm/BF											
		2350/0.09			3100/0.14			3400/0.16			3900/0.20		
		Indoor Air — Ewb (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
75	TC	110.4	102.4	94.0	114.6	107.6	99.0	115.4	109.0	100.4	116.8	111.0	102.4
	SHC	52.0	64.8	77.6	56.2	73.2	89.2	57.4	76.0	92.4	59.6	80.8	98.0
	kW	6.78	6.60	6.40	6.88	6.72	6.52	6.92	6.76	6.56	6.94	6.82	6.62
85	TC	106.6	98.6	90.4	112.0	104.0	95.4	113.2	105.2	96.8	114.6	107.2	99.0
	SHC	50.6	63.2	75.8	55.8	72.4	88.2	57.4	75.2	91.2	60.0	80.2	96.0
	kW	7.50	7.30	7.10	7.66	7.48	7.26	7.70	7.50	7.30	7.74	7.56	7.34
95	TC	103.4	95.0	86.6	108.0	99.6	91.2	109.0	100.8	92.8	110.4	102.8	95.4
	SHC	49.6	62.0	74.2	54.8	70.8	85.8	56.2	73.8	88.8	58.8	79.2	93.2
	kW	8.36	8.12	7.88	8.48	8.24	8.04	8.50	8.28	8.08	8.56	8.36	8.12
105	TC	99.0	91.0	82.4	103.8	95.2	87.2	104.6	96.2	89.0	105.2	98.0	92.2
	SHC	48.0	60.6	72.4	53.6	69.0	83.8	55.0	72.0	86.4	56.8	77.4	90.2
	kW	9.20	9.00	8.70	9.40	9.08	8.88	9.40	9.12	8.94	9.38	9.20	9.06
115	TC	94.6	86.4	78.8	99.0	90.6	83.0	100.0	91.6	84.8	101.8	93.0	88.2
	SHC	46.4	59.0	70.4	52.0	68.2	80.8	53.8	71.0	83.2	57.0	75.6	86.4
	kW	10.14	9.92	9.58	10.32	10.08	9.78	10.36	10.10	9.86	10.44	10.12	10.02
125	TC	89.8	81.2	73.2	93.4	85.2	78.6	94.4	86.0	80.6	96.0	87.4	83.6
	SHC	44.8	57.0	68.0	50.0	66.2	77.0	52.0	69.2	79.0	55.2	74.4	82.2
	kW	11.18	10.88	10.52	11.30	11.04	10.78	11.34	11.08	10.86	11.42	11.14	11.02

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb Temperature (F)
kW — Compressor Input (kW)
SHC — Sensible Heat Capacity (kW)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Ratings are gross, and do not account for the effects of the indoor-fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. SHC is based on 80 F db temperature of air entering the unit. At any other temperature, correct the SHC read from the table of cooling capacities as follows:

   Corrected SHC_{Btuh}

   $= SHC + [1.10 \times (1 - BF) \times (F_{db} - 80) \times cfm]$

   Observe the rule of signs. Above 80 F, SHC correction will be positive; add it to SHC. Below 80 F, SHC correction will be negative; subtract it from SHC.

4. Formulas:

$$C_{ldb} = C_{edb} - \frac{SHC_{Btuh}}{1.10 \times cfm}$$

Leaving wet bulb = wet bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{TC_{Btuh}}{4.50 \times cfm}$$

Where h_{ewb} is enthalpy of air entering indoor coil (Btu/lb).

Performance data (cont)

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (SI)

50TFQ008

Return Air (C db)	L/s (Standard Air)		Air Temperature Entering Outdoor Coil (C)									
			–20	–16	–12	–8	–4	0	4	8	12	16
12	800	Cap.	8.1 | 6.9	9.5 | 8.1	11.0 | 10.1	12.4 | 11.3	14.1 | 12.5	15.8 | 14.3	17.5 | 17.3	19.2 | 19.2	21.2 | 21.2	23.2 | 23.2
		kW	4.24	4.50	4.74	4.93	5.26	5.54	5.84	6.18	6.54	6.92
	1050	Cap.	8.4 | 7.1	9.8 | 8.3	11.2 | 10.3	12.3 | 11.7	14.5 | 12.9	16.2 | 14.7	18.0 | 17.8	19.8 | 19.8	21.8 | 21.8	23.8 | 23.8
		kW	4.22	4.42	4.64	4.36	5.12	5.36	5.62	5.92	6.20	6.43
	1200	Cap.	8.4 | 7.2	9.9 | 8.4	11.3 | 10.4	13.0 | 11.8	14.7 | 13.0	16.4 | 14.8	18.2 | 18.0	20.0 | 20.0	21.8 | 21.8	23.4 | 23.4
		kW	4.20	4.40	4.60	4.82	5.06	5.30	5.54	5.80	6.04	6.22
	1300	Cap.	8.4 | 7.3	10.0 | 8.5	11.4 | 10.5	13.0 | 11.9	14.8 | 13.1	16.5 | 14.9	18.3 | 18.2	20.2 | 20.2	21.8 | 21.8	23.0 | 23.0
		kW	4.20	4.38	4.58	4.80	5.02	5.24	5.48	5.74	5.94	6.08
15	800	Cap.	7.7 | 6.5	9.1 | 7.7	10.6 | 9.7	12.1 | 11.0	13.7 | 12.2	15.4 | 13.9	17.1 | 16.9	18.9 | 18.9	20.8 | 20.8	22.8 | 22.8
		kW	4.30	4.56	4.82	5.06	5.36	5.66	5.96	6.32	6.70	7.10
	1050	Cap.	7.9 | 6.7	9.4 | 8.0	10.9 | 10.0	12.4 | 11.3	14.2 | 12.6	15.9 | 14.4	17.6 | 17.5	19.5 | 19.5	21.4 | 21.4	23.4 | 23.4
		kW	4.26	4.50	4.72	4.96	5.22	5.48	5.76	6.06	6.38	6.63
	1200	Cap.	8.0 | 6.8	9.5 | 8.1	11.0 | 10.1	12.6 | 11.4	14.3 | 12.7	16.1 | 14.5	17.8 | 17.7	19.7 | 19.7	21.6 | 21.6	23.2 | 23.2
		kW	4.26	4.48	4.70	4.92	5.16	5.42	5.68	6.96	6.22	6.46
	1300	Cap.	8.1 | 6.9	9.6 | 8.2	11.1 | 10.1	12.7 | 11.5	14.4 | 12.8	16.2 | 14.6	17.9 | 17.8	19.8 | 19.9	21.6 | 21.6	23.2 | 23.2
		kW	4.24	4.46	4.68	4.90	5.14	5.38	5.62	5.90	6.14	6.32
18	800	Cap.	7.2 | 6.1	8.7 | 7.4	10.2 | 9.3	11.7 | 10.6	13.4 | 11.9	15.0 | 13.6	16.7 | 16.6	18.5 | 18.5	20.4 | 20.4	22.4 | 22.4
		kW	4.36	4.62	4.88	5.16	5.46	5.78	6.10	6.46	6.86	7.28
	1050	Cap.	7.5 | 6.4	9.0 | 7.8	10.5 | 9.6	12.0 | 10.9	13.8 | 12.2	15.5 | 14.0	17.3 | 17.1	19.1 | 19.1	21.2 | 21.2	23.2 | 23.2
		kW	4.32	4.56	4.82	5.06	5.34	5.62	5.90	6.22	6.56	6.88
	1200	Cap.	7.6 | 6.5	9.1 | 7.8	10.6 | 9.8	12.2 | 11.1	13.9 | 12.4	15.7 | 14.2	17.5 | 17.3	19.3 | 19.3	21.4 | 21.4	23.2 | 23.2
		kW	4.32	4.54	4.78	5.02	5.28	5.54	5.82	6.12	6.42	6.70
	1300	Cap.	7.7 | 6.5	9.2 | 7.8	10.7 | 9.8	12.3 | 11.2	14.1 | 12.5	15.8 | 14.3	17.6 | 17.5	19.5 | 19.5	21.4 | 21.4	23.2 | 23.2
		kW	4.30	4.54	4.76	5.00	5.24	5.50	5.76	6.06	6.34	6.58
21	800	Cap.	6.8 | 5.8	8.3 | 7.0	9.8 | 9.0	11.3 | 10.3	13.0 | 11.5	14.6 | 13.2	16.3 | 16.2	18.1 | 18.1	20.2 | 20.2	22.2 | 22.2
		kW	4.40	4.68	4.96	5.26	5.58	5.88	6.22	6.60	7.02	7.48
	1050	Cap.	7.1 | 6.0	8.6 | 7.3	10.2 | 9.3	11.6 | 10.6	13.4 | 11.9	15.2 | 13.7	16.9 | 16.8	18.8 | 18.8	20.8 | 20.8	22.8 | 22.8
		kW	4.38	4.64	4.90	5.16	5.44	5.74	6.04	6.36	6.72	7.08
	1200	Cap.	7.2 | 6.1	8.7 | 7.4	10.3 | 9.5	11.8 | 10.7	13.6 | 12.1	15.4 | 13.9	17.1 | 17.0	19.0 | 19.0	21.0 | 21.0	23.0 | 23.0
		kW	4.36	4.62	4.88	5.12	5.40	5.68	5.96	6.28	6.60	6.92
	1300	Cap.	7.2 | 6.1	8.8 | 7.5	10.4 | 9.5	11.9 | 10.8	13.7 | 12.2	15.5 | 14.0	17.3 | 17.1	19.1 | 19.1	21.2 | 21.2	23.2 | 23.2
		kW	4.36	4.62	4.86	5.10	5.36	5.64	6.90	6.22	6.52	6.82
24	800	Cap.	6.3 | 5.3	7.8 | 6.6	9.3 | 8.6	10.9 | 9.9	12.5 | 11.1	14.2 | 12.8	15.9 | 15.7	17.7 | 17.7	19.7 | 19.7	21.8 | 21.8
		kW	4.44	4.74	5.04	5.34	5.66	6.00	6.34	6.72	7.16	7.64
	1050	Cap.	6.6 | 5.6	8.1 | 6.9	9.7 | 8.9	11.3 | 10.2	13.0 | 11.5	14.7 | 13.3	16.5 | 16.4	18.4 | 18.4	20.4 | 20.4	22.6 | 22.6
		kW	4.42	4.70	4.98	5.26	5.54	5.86	6.16	6.50	6.90	7.28
	1200	Cap.	6.7 | 6.7	8.3 | 7.0	9.9 | 9.0	11.4 | 10.4	13.2 | 11.7	14.9 | 13.5	16.7 | 16.6	18.6 | 18.6	20.6 | 20.6	22.8 | 22.8
		kW	4.42	4.68	4.96	5.22	5.50	5.80	6.08	6.42	6.76	7.12
	1300	Cap.	6.7 | 5.7	8.3 | 7.1	9.9 | 9.1	11.5 | 10.5	13.3 | 11.8	15.1 | 13.0	16.9 | 16.7	18.8 | 18.8	20.8 | 20.8	22.8 | 22.8
		kW	4.42	4.68	4.94	5.20	5.48	5.76	6.04	6.36	6.70	7.02

LEGEND

Cap. — Heating Capacity (kW) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. Shaded cells indicate integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (SI) (cont)

50TFQ009

Return Air (C db)	L/s (Standard Air)		Air Temperature Entering Outdoor Coil (C)									
			–20	–16	–12	–8	–4	0	4	8	12	16
12	900	Cap.	9.4 | 8.0	11.0 | 9.4	12.7 | 11.6	14.6 | 13.3	16.6 | 14.7	18.6 | 16.8	20.8 | 20.6	22.8 | 22.8	25.2 | 25.2	27.8 | 27.8
		kW	4.94	5.20	5.46	5.78	6.10	6.44	6.80	7.18	7.64	8.12
	1150	Cap.	9.7 | 8.2	11.3 | 9.6	13.0 | 11.9	14.9 | 13.6	17.0 | 15.1	19.1 | 17.2	21.2 | 21.0	23.4 | 23.4	26.0 | 26.0	28.6 | 28.6
		kW	4.90	5.14	5.38	5.66	5.96	6.26	6.56	6.90	7.30	7.72
	1400	Cap.	9.8 | 8.4	11.5 | 9.8	13.2 | 12.1	15.2 | 13.8	17.3 | 15.3	19.3 | 17.5	21.6 | 21.4	23.8 | 23.8	26.4 | 26.4	29.0 | 29.0
		kW	4.86	5.08	5.32	5.58	5.86	6.12	6.42	6.72	7.08	7.46
	1500	Cap.	9.9 | 8.4	11.5 | 9.8	13.2 | 12.1	15.3 | 13.9	17.3 | 15.3	19.4 | 17.5	21.6 | 21.4	23.8 | 23.8	26.4 | 26.4	29.0 | 29.0
		kW	4.86	5.08	5.30	5.58	5.84	6.12	6.42	6.68	7.04	7.42
15	900	Cap.	8.9 | 7.6	10.6 | 9.0	12.3 | 11.2	14.1 | 12.8	16.1 | 14.3	18.2 | 16.5	20.2 | 20.0	22.4 | 22.4	24.8 | 24.8	27.4 | 27.4
		kW	5.02	5.30	5.58	5.90	6.26	6.60	6.96	7.38	7.34	8.34
	1150	Cap.	9.2 | 7.8	10.9 | 9.2	12.6 | 11.5	14.5 | 13.2	16.6 | 14.7	18.6 | 16.8	20.8 | 20.6	23.0 | 23.0	25.6 | 25.6	28.2 | 28.2
		kW	4.93	5.24	5.50	5.78	6.10	6.42	6.74	7.10	7.52	7.94
	1400	Cap.	9.3 | 7.9	11.1 | 9.4	12.8 | 11.7	14.8 | 13.4	16.8 | 15.0	18.9 | 17.1	21.2 | 21.0	23.4 | 23.4	26.0 | 26.0	28.6 | 28.6
		kW	4.94	5.20	5.44	5.72	6.00	6.30	6.60	6.92	7.28	7.68
	1500	Cap.	9.4 | 8.0	11.1 | 9.4	12.8 | 11.8	14.8 | 13.5	16.9 | 15.0	19.0 | 17.2	21.2 | 21.0	23.4 | 23.4	26.0 | 26.0	26.8 | 28.8
		kW	4.94	5.18	5.42	5.70	5.93	6.28	6.56	6.88	7.26	7.64
18	900	Cap.	8.4 | 7.2	10.1 | 8.6	11.8 | 10.9	13.7 | 12.4	15.7 | 13.9	17.7 | 16.0	19.7 | 19.6	22.0 | 22.0	24.4 | 24.4	26.2 | 26.2
		kW	5.10	5.40	5.70	6.02	6.40	6.76	7.14	7.56	8.06	8.56
	1150	Cap.	8.7 | 7.4	10.4 | 8.8	12.2 | 11.2	14.1 | 12.8	16.1 | 14.3	18.2 | 16.5	20.4 | 20.2	22.6 | 22.6	25.0 | 25.0	27.6 | 27.6
		kW	5.06	5.34	5.62	5.92	6.24	6.58	6.92	7.30	7.72	8.18
	1400	Cap.	8.8 | 7.5	10.6 | 9.0	12.4 | 11.4	14.3 | 13.0	16.4 | 14.6	18.5 | 16.8	20.8 | 20.6	23.0 | 23.0	25.6 | 25.6	28.2 | 28.2
		kW	5.04	5.30	5.56	5.84	6.16	6.46	6.78	7.10	7.30	7.92
	1500	Cap.	8.9 | 7.5	10.6 | 9.0	12.4 | 11.4	14.4 | 13.1	16.5 | 14.6	18.6 | 16.3	20.8 | 20.6	23.0 | 23.0	25.6 | 25.6	28.2 | 28.2
		kW	5.04	5.30	5.56	5.84	6.14	6.44	6.74	7.08	7.46	7.86
21	900	Cap.	7.9 | 6.7	9.7 | 8.2	11.4 | 10.5	13.2 | 12.0	15.2 | 13.5	17.3 | 15.6	19.2 | 19.1	21.6 | 21.6	24.0 | 24.0	26.4 | 26.4
		kW	5.18	5.50	5.82	6.16	6.54	6.92	7.30	7.76	8.26	8.30
	1150	Cap.	8.2 | 6.9	10.0 | 8.5	11.3 | 10.8	13.6 | 12.4	15.7 | 14.0	17.8 | 16.1	19.9 | 19.7	22.2 | 22.2	24.6 | 24.6	27.2 | 27.2
		kW	5.14	5.44	5.74	6.06	6.40	6.74	7.10	7.48	7.94	8.40
	1400	Cap.	8.3 | 7.1	10.2 | 8.6	12.0 | 11.0	13.9 | 12.6	15.0 | 14.2	18.1 | 16.4	20.4 | 20.2	22.6 | 22.6	25.2 | 25.2	27.8 | 27.8
		kW	5.12	5.40	5.70	5.98	6.30	6.62	6.92	7.30	7.72	8.14
	1500	Cap.	8.4 | 7.1	10.2 | 8.7	12.0 | 11.0	13.9 | 12.7	16.1 | 14.3	18.2 | 16.4	20.4 | 20.2	22.6 | 22.6	25.2 | 25.2	27.8 | 27.8
		kW	5.12	5.40	5.68	5.98	6.28	6.60	6.92	7.28	7.68	8.10
24	900	Cap.	7.3 | 6.2	9.1 | 7.7	10.9 | 10.6	12.8 | 11.6	14.7 | 13.1	16.7 | 15.1	18.7 | 18.6	21.0 | 21.0	23.4 | 23.4	26.0 | 26.0
		kW	5.24	5.58	5.94	6.30	6.68	7.08	7.48	7.94	8.43	9.02
	1150	Cap.	7.6 | 6.4	9.4 | 8.0	11.3 | 10.3	13.2 | 12.0	15.2 | 13.5	17.3 | 15.6	19.4 | 19.2	21.8 | 21.8	24.2 | 24.2	26.8 | 26.8
		kW	5.22	5.54	5.86	6.20	6.54	6.90	7.28	7.63	8.14	8.64
	1400	Cap.	7.7 | 6.6	9.6 | 8.2	11.5 | 10.5	13.4 | 12.2	15.5 | 13.8	17.6 | 15.9	19.8 | 19.6	22.2 | 22.2	24.6 | 24.6	27.2 | 27.2
		kW	5.20	5.50	5.80	6.12	6.46	6.78	7.12	7.50	7.94	8.38
	1500	Cap.	7.8 | 6.6	9.6 | 8.2	11.5 | 10.6	13.5 | 12.3	15.6 | 13.8	17.7 | 16.0	19.8 | 19.7	22.2 | 22.2	24.8 | 24.8	27.4 | 27.4
		kW	5.20	5.50	5.80	6.10	6.44	6.76	7.10	7.48	7.90	8.34

LEGEND

Cap. — Heating Capacity (kW) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. [ ] indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (SI) (cont)

50TFQ012

Return Air (C db)	L/s (Standard Air)		Air Temperature Entering Outdoor Coil (C)									
			–20	–16	–12	–8	–4	0	4	8	12	16
12	1000	Cap.	11.5 | 9.8	13.2 | 11.2	14.9 | 13.7	16.8 | 15.3	18.9 | 16.8	21.0 | 19.0	23.2 | 23.0	25.4 | 25.4	28.0 | 28.0	30.6 | 30.6
		kW	5.80	6.02	6.24	6.48	6.76	7.04	7.34	7.68	8.10	8.56
	1300	Cap.	11.5 | 9.7	13.3 | 11.3	15.1 | 13.9	17.1 | 15.5	19.2 | 17.0	21.4 | 19.2	23.4 | 23.2	25.8 | 25.8	28.4 | 28.4	31.0 | 31.0
		kW	5.64	5.82	6.00	6.20	6.44	6.66	6.92	7.22	7.56	7.94
	1600	Cap.	11.5 | 9.8	13.4 | 11.4	15.3 | 14.0	17.2 | 15.6	19.3 | 17.2	21.4 | 19.4	23.6 | 23.4	25.3 | 25.3	28.6 | 28.6	31.2 | 31.2
		kW	5.54	5.70	5.86	6.04	6.24	6.44	6.66	6.92	7.22	7.54
15	1000	Cap.	11.2 | 9.5	12.9 | 10.9	14.6 | 13.4	16.5 | 15.0	18.6 | 16.5	20.8 | 18.7	23.0 | 22.8	25.2 | 25.2	27.8 | 27.8	30.4 | 30.4
		kW	6.06	6.28	6.52	6.78	7.06	7.36	7.68	8.04	8.48	8.96
	1300	Cap.	11.2 | 9.6	13.0 | 11.1	14.8 | 13.6	16.8 | 15.3	18.9 | 16.8	21.0 | 19.0	23.2 | 23.0	25.4 | 25.4	28.0 | 28.0	30.8 | 30.8
		kW	5.90	6.08	6.28	6.50	6.74	6.98	7.24	7.54	7.90	8.30
	1600	Cap.	11.4 | 9.6	13.1 | 11.2	14.9 | 13.7	16.9 | 15.4	19.1 | 16.9	21.2 | 19.2	23.4 | 23.2	25.6 | 25.6	28.4 | 28.4	31.0 | 31.0
		kW	5.80	5.96	6.12	6.32	6.52	6.74	6.96	7.22	7.54	7.88
18	1000	Cap.	10.8 | 9.2	12.6 | 10.7	14.3 | 13.1	16.2 | 14.7	18.3 | 16.3	20.4 | 18.5	22.6 | 22.4	24.8 | 24.8	27.4 | 27.4	30.2 | 30.2
		kW	6.30	6.54	6.80	7.06	7.38	7.70	8.04	8.40	8.86	9.36
	1300	Cap.	11.0 | 9.4	12.8 | 10.8	14.5 | 13.3	16.5 | 15.0	18.6 | 16.6	20.8 | 18.8	23.0 | 22.8	25.2 | 25.2	27.8 | 27.8	30.6 | 30.6
		kW	6.16	6.34	6.54	6.78	7.04	7.30	7.56	7.88	8.26	8.66
	1600	Cap.	11.2 | 9.5	12.9 | 10.9	14.6 | 13.4	16.7 | 15.2	18.8 | 16.7	21.0 | 19.0	23.2 | 23.0	25.4 | 25.4	28.2 | 28.2	30.8 | 30.8
		kW	6.06	6.22	6.40	6.60	6.82	7.04	7.28	7.54	7.86	8.22
21	1000	Cap.	10.5 | 8.9	12.3 | 10.4	14.0 | 12.9	15.9 | 14.4	18.0 | 16.0	20.2 | 18.2	22.4 | 22.2	24.6 | 24.6	27.2 | 27.2	29.8 | 29.8
		kW	6.56	6.32	7.08	7.36	7.68	8.02	8.38	8.76	9.24	9.74
	1300	Cap.	10.8 | 9.2	12.5 | 10.6	14.2 | 13.0	16.2 | 14.8	18.4 | 16.3	20.6 | 18.6	22.8 | 22.6	25.0 | 25.0	27.6 | 27.6	30.4 | 30.4
		kW	6.42	6.62	6.82	7.06	7.34	7.60	7.90	8.20	8.60	9.02
	1600	Cap.	11.0 | 9.3	12.6 | 10.7	14.3 | 13.1	16.4 | 14.9	18.6 | 18.5	20.8 | 18.8	23.0 | 22.8	25.2 | 25.2	27.8 | 27.8	30.6 | 30.6
		kW	6.30	6.48	6.66	6.88	7.10	7.34	7.58	7.86	8.20	8.56
24	1000	Cap.	10.1 | 8.6	11.9 | 10.1	13.7 | 12.6	15.5 | 14.1	17.6 | 15.7	19.8 | 17.9	22.0 | 21.8	24.2 | 24.2	26.8 | 26.8	29.6 | 29.6
		kW	6.82	7.10	7.38	7.66	8.02	8.38	8.74	9.16	9.66	10.11
	1300	Cap.	10.4 | 8.8	12.1 | 10.3	13.9 | 12.7	15.8 | 14.4	18.0 | 16.0	20.2 | 18.3	22.4 | 22.2	24.8 | 24.8	27.4 | 27.4	30.0 | 30.0
		kW	6.66	6.90	7.12	7.36	7.66	7.96	8.26	8.58	8.98	9.42
	1600	Cap.	10.5 | 9.0	12.3 | 10.4	14.0 | 12.9	16.0 | 14.6	18.3 | 16.2	20.6 | 18.5	22.8 | 22.6	25.0 | 25.0	27.6 | 27.6	30.4 | 30.4
		kW	6.56	6.76	6.96	7.18	7.42	7.68	7.94	8.22	8.56	8.94

LEGEND

Cap. — Heating Capacity (kW) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. [ ] indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (ENGLISH)

50TFQ008

Return Air (F db)	Cfm (Standard Air)		Air Temperature Entering Outdoor Coil (F)															
			0		10		17		30		40		47		50		60	
55	1650	Cap.	30.2	25.6	37.0	34.0	41.8	38.0	52.0	45.6	60.0	60.0	66.0	66.0	68.8	68.8	78.0	78.0
		kW	4.40		4.74		4.98		5.48		5.90		6.24		6.40		6.92	
	2200	Cap.	31.0	26.4	37.8	34.8	43.0	39.2	53.6	47.0	61.8	61.8	68.0	68.0	70.8	70.8	79.8	79.8
		kW	4.34		4.64		4.88		5.32		5.70		5.98		6.10		6.50	
	2600	Cap.	31.4	26.8	38.2	35.2	43.6	39.8	54.2	47.6	62.6	62.6	68.8	68.8	71.8	71.8	78.8	78.8
		kW	4.32		4.60		4.82		5.24		5.58		5.84		5.98		6.22	
	2750	Cap.	31.6	26.8	38.4	35.2	43.8	40.0	54.4	47.8	62.8	62.8	69.2	69.2	72.2	72.2	78.4	78.4
		kW	4.32		4.60		4.80		5.22		5.54		5.80		5.92		6.12	
70	1650	Cap.	26.0	22.2	33.2	30.4	38.4	35.0	48.4	42.4	56.4	56.4	62.4	62.4	65.2	65.2	74.6	74.6
		kW	4.56		4.96		5.24		5.80		6.26		6.64		6.80		7.42	
	2200	Cap.	27.2	23.0	34.4	31.6	39.4	35.8	50.2	44.0	58.6	58.6	64.6	64.6	67.4	67.4	77.0	77.0
		kW	4.52		4.90		5.14		5.66		6.08		6.40		6.56		7.06	
	2600	Cap.	27.6	23.4	35.0	32.2	40.0	36.4	51.0	44.6	59.4	59.4	65.6	65.6	68.4	68.4	78.0	78.0
		kW	4.50		4.86		5.10		5.58		5.98		6.28		6.42		6.86	
	2750	Cap.	27.8	23.6	35.2	32.4	40.2	36.6	51.2	44.8	59.8	59.8	66.0	66.0	68.8	68.8	78.4	78.4
		kW	4.50		4.86		5.08		5.56		5.94		6.24		6.38		6.80	
80	1650	Cap.	23.0	19.6	30.4	27.8	35.6	32.4	45.4	39.8	53.4	53.4	59.6	59.6	62.4	62.4	72.0	72.0
		kW	4.66		5.08		5.38		6.00		6.48		6.88		7.06		7.72	
	2200	Cap.	24.0	20.4	31.6	29.0	37.0	33.8	47.4	41.4	55.8	55.8	62.2	62.2	65.0	65.0	75.0	75.0
		kW	4.62		5.02		5.32		5.86		6.32		6.66		6.82		7.40	
	2600	Cap.	24.4	20.8	32.2	29.6	37.6	34.4	48.2	45.2	56.8	56.8	63.2	63.2	66.0	66.0	75.8	75.8
		kW	4.62		5.00		5.28		5.80		6.22		6.56		6.72		7.22	
	2750	Cap.	24.6	21.0	32.4	29.8	37.8	34.6	48.6	42.6	57.2	57.2	63.6	63.6	66.4	66.4	76.2	76.2
		kW	4.60		5.00		5.26		5.78		6.20		6.52		6.66		7.16	

LEGEND

Cap. — Heating Capacity (1000 Btuh) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. [ ] indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (ENGLISH) (cont)

50TFQ009

Return Air (F db)	Cfm (Standard Air)		Air Temperature Entering Outdoor Coil (F)															
			0		10		17		30		40		47		50		60	
55	1850	Cap.	35.0	29.8	42.6	39.2	49.0	44.6	61.2	53.6	71.2	71.2	78.2	78.2	81.6	81.6	93.4	93.4
		kW	5.12		5.48		5.78		6.38		6.88		7.26		7.44		8.12	
	2500	Cap.	35.8	30.4	43.6	40.0	50.0	45.6	62.8	55.0	72.8	72.8	80.2	80.2	83.6	83.6	96.0	96.0
		kW	5.06		5.40		5.66		6.20		6.64		6.98		7.14		7.72	
	3000	Cap.	36.4	31.0	44.4	40.8	51.2	46.6	63.8	55.8	74.0	74.0	81.4	81.4	85.0	85.0	98.0	98.0
		kW	5.00		5.32		5.60		6.08		6.48		6.78		6.94		7.46	
	3200	Cap.	36.6	31.0	44.6	40.8	51.2	46.8	64.0	56.0	74.2	74.2	81.6	81.6	85.2	85.2	98.2	98.2
		kW	5.00		5.32		5.58		6.06		6.46		6.76		6.90		7.42	
70	1850	Cap.	30.4	25.8	38.8	35.6	44.6	40.6	57.2	50.0	66.4	66.4	74.2	74.2	77.6	77.6	89.2	89.2
		kW	5.36		5.82		6.12		6.82		7.36		7.80		8.00		8.74	
	2500	Cap.	31.4	26.6	39.8	36.6	46.0	42.0	58.8	51.6	68.8	68.8	76.2	76.2	79.6	79.6	91.8	91.8
		kW	5.32		5.74		6.02		6.66		7.14		7.52		7.70		8.36	
	3000	Cap.	32.0	27.2	40.6	37.4	47.0	42.8	60.0	52.6	70.2	70.2	77.8	77.8	81.2	81.2	93.6	93.6
		kW	5.28		5.68		5.96		6.54		6.98		7.34		7.50		8.10	
	3200	Cap.	32.2	27.2	40.8	37.4	42.0	42.8	60.2	52.6	70.4	70.4	77.8	77.8	81.4	81.4	93.8	93.8
		kW	5.28		5.66		5.94		6.52		6.98		7.30		7.48		8.06	
80	1850	Cap.	26.6	22.6	35.4	32.6	41.8	38.0	53.6	47.0	63.4	63.4	70.6	70.6	74.4	74.4	86.2	86.2
		kW	5.50		6.00		6.38		7.10		7.68		8.14		8.40		9.16	
	2500	Cap.	27.6	23.6	36.6	33.6	43.2	39.4	55.4	48.6	65.4	65.4	73.2	73.2	76.8	76.8	88.8	88.8
		kW	5.46		5.94		6.28		6.94		7.46		7.90		8.10		8.78	
	3000	Cap.	28.4	24.2	37.4	34.4	44.0	40.2	56.8	49.8	67.0	67.0	75.0	75.0	78.4	78.4	90.8	90.8
		kW	5.44		5.88		6.22		6.82		7.32		7.70		7.88		8.52	
	3200	Cap.	28.4	24.2	37.6	34.4	44.2	40.2	57.0	49.8	67.2	67.2	75.2	75.2	78.6	78.6	91.0	91.0
		kW	5.44		5.88		6.20		6.82		7.30		7.68		7.86		8.48	

LEGEND

Cap. — Heating Capacity (1000 Btuh) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. ▭ indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

INSTANTANEOUS AND INTEGRATED HEATING RATINGS (ENGLISH) (cont)

50TFQ012

Return Air (F db)	Cfm (Standard Air)		Air Temperature Entering Outdoor Coil (F)															
			0		10		17		30		40		47		50		60	
55	2100	Cap.	42.2	36.0	50.4	46.2	56.8	51.8	69.6	61.0	79.8	79.8	87.2	87.2	90.6	90.6	103.2	103.2
		kW	6.00		6.30		6.54		7.04		7.46		7.80		7.98		8.62	
	2800	Cap.	42.6	36.2	51.2	47.0	57.6	52.4	70.4	61.8	80.8	80.8	88.2	88.2	91.8	91.8	104.6	104.6
		kW	5.80		6.06		6.26		6.68		7.04		7.32		7.46		7.98	
	3400	Cap.	42.8	36.4	51.6	47.4	58.0	52.8	71.0	62.2	81.4	81.4	88.8	88.8	92.4	92.4	105.4	105.4
		kW	5.68		5.92		6.08		6.44		6.76		7.02		7.14		7.58	
	3600	Cap.	43.0	36.6	51.6	47.4	58.0	53.0	71.2	62.4	81.6	81.6	89.0	89.0	92.6	92.6	105.8	105.8
		kW	5.66		5.88		6.04		6.40		6.70		6.94		7.06		7.50	
70	2100	Cap.	39.2	33.4	47.6	43.6	53.6	48.8	66.8	58.6	77.0	77.0	84.6	84.6	88.0	88.0	100.8	100.8
		kW	6.72		7.06		7.34		7.94		8.42		8.82		9.00		9.70	
	2800	Cap.	40.2	34.2	48.0	44.0	54.8	50.0	68.0	59.6	78.4	78.4	86.0	86.0	89.6	89.6	102.6	102.6
		kW	6.54		6.82		7.06		7.54		7.94		8.26		8.40		9.00	
	3400	Cap.	40.6	34.6	48.6	44.6	55.6	50.6	68.8	60.4	79.2	79.2	86.8	86.8	90.6	90.6	103.4	103.4
		kW	6.42		6.66		6.86		7.28		7.62		7.88		8.02		8.52	
	3600	Cap.	40.6	34.4	48.8	44.8	55.6	50.8	69.0	60.4	79.4	79.4	87.0	87.0	90.6	90.6	103.6	103.6
		kW	6.38		6.62		6.82		7.22		7.54		7.80		7.94		8.42	
80	2100	Cap.	36.6	31.2	45.4	41.8	51.0	46.4	64.6	56.6	74.8	74.8	82.4	82.4	86.2	86.2	98.6	98.6
		kW	7.20		7.62		7.90		8.58		9.12		9.56		9.76		10.50	
	2800	Cap.	37.6	32.0	46.2	42.4	52.2	47.6	66.0	57.8	76.4	76.4	84.0	84.0	87.8	87.8	100.6	100.6
		kW	7.04		7.38		7.62		8.18		8.60		8.96		9.12		9.72	
	3400	Cap.	38.2	32.6	46.8	43.0	53.2	48.4	67.0	58.8	77.4	77.4	85.2	85.2	88.8	88.8	101.8	101.8
		kW	6.92		7.20		7.42		7.90		8.26		8.56		8.70		9.22	
	3600	Cap.	38.4	32.6	47.0	43.0	53.4	48.6	67.2	58.8	77.8	77.8	85.4	85.4	89.0	89.0	102.0	102.0
		kW	6.88		7.16		7.38		7.84		8.20		8.48		8.60		9.12	

LEGEND

Cap. — Heating Capacity (1000 Btuh) (includes indoor-fan motor heat)
kW — Total Power Input (includes compressor motor power input, outdoor-fan motor input and indoor-fan motor input)

NOTES:

1. [ ] indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

FAN PERFORMANCE (SI) — VERTICAL DISCHARGE UNITS

50TFQ008,009 (26.4 AND 29.9 kW)

Airflow (L/s)	External Static Pressure (Pa)																			
	50		100		150		200		250		300		350		400		450		500	
	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW
1100	**8.7**	**0.42**	**10.1**	**0.59**	11.1	0.75	12.2	0.93	13.1	1.12	14.0	1.30	**14.8**	**1.51**	**15.7**	**1.77**	16.4	2.02	17.2	2.35
1200	**9.3**	**0.52**	10.5	0.69	11.6	0.87	12.6	1.05	13.5	1.26	14.3	1.46	**15.1**	**1.66**	15.9	1.88	16.7	2.14	17.4	2.44
1300	**9.8**	**0.54**	11.0	0.81	12.1	1.01	13.0	1.20	13.9	1.41	**14.7**	**1.63**	15.5	1.84	16.2	1.98	16.9	2.29	17.6	2.56
1400	10.4	0.77	11.5	0.94	12.6	1.16	13.5	1.37	14.3	1.58	15.1	1.80	15.9	2.04	16.6	2.27	17.3	2.51	—	—
1500	11.0	0.92	12.0	1.10	13.0	1.33	13.9	1.56	**14.7**	**1.78**	15.5	2.00	16.3	2.25	17.0	2.50	—	—	—	—
1600	11.6	1.08	12.6	1.28	13.5	1.50	14.4	1.76	15.2	2.00	16.0	2.23	16.7	2.47	—	—	—	—	—	—
1700	12.2	1.26	13.1	1.48	14.0	1.70	14.9	1.97	15.7	2.23	16.4	2.48	—	—	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
R/s — Fan Wheel Speed, Revolutions per Second

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. ▭ indicates field-supplied motor and drive required.
3. Maximum usable output power (BkW) is 1.79 with standard 1.12 kW motor. Extensive motor and electrical testing on these units ensures that the full brakepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 10.33 to 14.67 r/s. All other r/s's will require a field-supplied drive.

50TFQ012 (35.2 kW)

Airflow (L/s)	External Static Pressure (Pa)																			
	50		100		150		200		250		300		350		400		450		500	
	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW
1300	**8.4**	**0.37**	**9.6**	**0.51**	**10.8**	**0.61**	11.7	0.69	12.6	0.81	13.3	0.90	14.3	1.05	**15.1**	**1.27**	**15.9**	**1.48**	**16.7**	**1.67**
1400	**8.8**	**0.46**	**10.0**	**0.59**	**11.1**	**0.71**	12.0	0.82	12.9	0.93	13.7	1.04	14.5	1.17	**15.4**	**1.35**	**16.2**	**1.56**	**16.8**	**1.75**
1500	**9.2**	**0.55**	**10.4**	**0.68**	11.5	0.81	12.4	0.94	13.2	1.06	14.0	1.19	14.8	1.26	**15.6**	**1.44**	**16.4**	**1.62**	**17.1**	**1.83**
1600	**9.7**	**0.65**	**10.8**	**0.79**	11.8	0.93	12.8	1.07	13.6	1.19	14.4	1.33	**15.1**	**1.46**	**15.8**	**1.59**	**16.5**	**1.72**	**17.3**	**1.91**
1700	**10.2**	**0.75**	**11.2**	**0.91**	12.2	1.06	13.1	1.20	13.9	1.34	14.7	1.48	**15.4**	**1.63**	**16.1**	**1.76**	**16.7**	**1.89**	**17.4**	**2.04**
1800	**10.6**	**0.87**	11.7	1.05	12.6	1.20	13.5	1.35	14.3	1.51	15.0	1.65	**15.7**	**1.80**	**16.4**	**1.95**	**17.1**	**2.10**	17.7	2.24
1900	**11.1**	**1.01**	12.1	1.19	13.0	1.35	13.9	1.52	14.7	1.68	**15.4**	**1.84**	**16.1**	**1.99**	**16.8**	**2.14**	17.4	2.31	18.0	2.46
2000	11.6	1.16	12.5	1.35	13.4	1.52	14.3	1.69	15.0	1.86	**15.8**	**2.04**	16.5	2.21	17.1	2.36	17.7	2.53	—	—
2100	12.0	1.32	13.0	1.53	13.8	1.70	14.6	1.88	**15.4**	**2.07**	16.1	2.25	16.8	2.43	—	—	—	—	—	—
2200	12.5	1.50	13.4	1.71	14.3	1.91	**15.1**	**2.09**	15.8	2.29	16.5	2.48	—	—	—	—	—	—	—	—
2300	13.0	1.70	13.9	1.91	14.7	2.13	15.5	2.31	16.2	2.52	—	—	—	—	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
R/s — Fan Wheel Speed, Revolutions per Second

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. ▭ indicates field-supplied motor and drive required.
3. Maximum usable output power (BkW) is 2.16 with standard 1.50 kW motor. Extensive motor and electrical testing on these units ensures that the full brakepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 11.50 to 15.00 r/s. All other r/s's will require a field-supplied drive.

FAN PERFORMANCE (SI) — HORIZONTAL DISCHARGE UNITS

50TFQ008,009 (26.4 AND 29.9 kW)

Airflow (L/s)	External Static Pressure (Pa)																			
	50		100		150		200		250		300		350		400		450		500	
	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW
1100	**7.9**	**0.35**	**9.4**	**0.50**	10.6	0.68	11.7	0.85	12.7	1.03	13.6	1.25	14.4	1.46	**14.9**	**1.69**	15.1	1.92	15.0	2.15
1200	**8.3**	**0.42**	**9.8**	**0.59**	11.0	0.78	12.0	0.95	13.0	1.15	13.9	1.36	**14.8**	**1.58**	15.5	1.82	16.0	2.06	16.4	2.31
1300	**8.8**	**0.51**	**10.2**	**0.69**	11.3	0.88	12.4	1.08	13.3	1.28	14.2	1.49	**15.0**	**1.72**	15.8	1.96	16.5	2.21	17.1	2.47
1400	**9.2**	**0.60**	10.6	0.80	11.7	0.99	12.7	1.22	13.7	1.42	14.5	1.63	15.3	1.87	16.1	2.12	16.9	2.38	—	—
1500	**9.7**	**0.71**	11.0	0.91	12.1	1.12	13.0	1.35	14.0	1.59	14.8	1.81	15.6	2.04	16.4	2.30	—	—	—	—
1600	**10.1**	**0.82**	11.3	1.04	12.5	1.28	13.4	1.49	14.3	1.75	15.2	2.00	15.9	2.24	—	—	—	—	—	—
1700	10.6	0.93	11.8	1.20	12.9	1.44	13.8	1.67	14.7	1.92	15.5	2.20	—	—	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
R/s — Fan Wheel Speed, Revolutions per Second

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. [ ] indicates field-supplied motor and drive required.
3. Maximum usable output power (BkW) is 1.79 with standard 1.12 kW motor. Extensive motor and electrical testing on these units ensures that the full brakepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 10.33 to 14.67 r/s. All other r/s's will require a field-supplied drive.

50TFQ012 (35.2 kW)

Airflow (L/s)	External Static Pressure (Pa)																			
	50		100		150		200		250		300		350		400		450		500	
	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW	R/s	BkW
1300	**7.6**	**0.30**	**8.9**	**0.41**	**10.2**	**0.56**	**11.1**	**0.64**	12.1	0.77	13.1	0.92	13.9	0.93	14.0	0.52	15.0	1.13	**15.6**	**1.32**
1400	**8.0**	**0.40**	**9.3**	**0.51**	**10.5**	**0.64**	**11.4**	**0.75**	12.4	0.88	13.3	1.01	14.1	1.11	14.6	0.96	**15.4**	**1.32**	**16.0**	**1.42**
1500	**8.4**	**0.48**	**9.6**	**0.60**	**10.7**	**0.72**	11.8	0.86	12.7	0.99	13.5	1.12	14.3	1.26	**15.1**	**1.35**	**15.7**	**1.49**	**16.4**	**1.54**
1600	**8.8**	**0.58**	**10.0**	**0.69**	**11.1**	**0.82**	12.1	0.96	12.9	1.10	13.8	1.24	14.5	1.38	**15.3**	**1.54**	**16.0**	**1.64**	**16.7**	**1.72**
1700	**9.1**	**0.69**	**10.3**	**0.78**	**11.3**	**0.93**	12.3	1.07	13.2	1.22	14.0	1.37	14.8	1.52	**15.5**	**1.66**	**16.3**	**1.84**	**17.0**	**1.95**
1800	**9.5**	**0.81**	**10.7**	**0.90**	11.7	1.05	12.6	1.20	13.5	1.36	14.3	1.52	15.0	1.67	**15.8**	**1.83**	**16.4**	**1.99**	17.2	2.17
1900	**9.9**	**0.95**	**11.0**	**1.02**	12.0	1.18	12.9	1.34	13.8	1.50	14.6	1.68	**15.3**	**1.83**	**16.0**	**2.00**	**16.7**	**2.16**	17.3	2.33
2000	**10.3**	**1.11**	**11.4**	**1.17**	12.3	1.32	13.2	1.48	14.1	1.66	14.9	1.83	**15.6**	**2.01**	16.3	2.18	17.0	2.36	17.6	2.53
2100	**10.7**	**1.29**	11.8	1.33	12.7	1.47	13.5	1.65	14.4	1.84	**15.1**	**2.00**	15.9	2.20	16.6	2.38	—	—	—	—
2200	**11.2**	**1.48**	12.1	1.51	13.1	1.64	13.9	1.83	14.6	2.01	15.4	2.20	16.2	2.38	—	—	—	—	—	—
2300	11.6	1.70	12.5	1.71	13.4	1.83	14.2	2.01	15.0	2.20	15.7	2.41	—	—	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
R/s — Fan Wheel Speed, Revolutions per Second

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. [ ] indicates field-supplied motor and drive required.
3. Maximum usable output power (BkW) is 2.16 with standard 1.50 kW motor. Extensive motor and electrical testing on these units ensures that the full brakepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 11.50 to 15.00 r/s. All other r/s's will require a field-supplied drive.

Performance data (cont)

FAN PERFORMANCE (ENGLISH) — VERTICAL DISCHARGE UNITS

50TFQ008,009 (7 1/2 AND 8 1/2 TONS)

Airflow (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	**503**	**0.50**	**585**	**0.71**	653	0.92	716	1.15	772	1.38	824	1.63	**884**	**1.95**	**934**	**2.30**	916	2.64	1019	3.09
2400	**534**	**0.61**	**613**	**0.84**	677	1.06	738	1.30	794	1.55	844	1.81	**892**	**2.08**	**944**	**2.40**	987	2.76	1039	3.20
2600	**565**	**0.74**	639	0.97	703	1.20	761	1.46	816	1.74	866	2.01	**913**	**2.29**	957	2.58	1004	2.91	1050	3.31
2800	**597**	**0.89**	665	1.12	731	1.40	786	1.66	839	1.93	**889**	**2.23**	935	2.52	978	2.62	1019	3.13	1061	3.47
3000	629	1.06	694	1.29	759	1.59	812	1.88	862	2.15	911	2.46	957	2.78	1000	3.09	1040	3.41	—	—
3200	662	1.25	724	1.50	785	1.80	840	2.11	887	2.41	934	2.71	980	3.04	1022	3.38	—	—	—	—
3400	696	1.46	756	1.73	811	2.02	868	2.37	914	2.69	959	3.00	1003	3.32	—	—	—	—	—	—
3600	729	1.69	787	1.98	839	2.27	894	2.64	942	2.99	984	3.32	—	—	—	—	—	—	—	—
3800	763	1.95	819	2.27	869	2.56	920	2.92	970	3.31	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Rpm — Fan Wheel Speed, Revolutions per Minute

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. Shaded cells indicate field-supplied motor and drive required.
3. Maximum usable bhp is 2.40 with standard 1.5-hp motor. Extensive motor and electrical testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 620 to 880 rpm. All other rpm's will require a field-supplied drive.

50TFQ012 (10 TONS)

Airflow (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	**532**	**0.64**	**605**	**0.81**	**670**	**0.97**	725	1.12	778	1.28	825	1.43	874	1.60	**926**	**1.82**	**974**	**2.11**	**1012**	**2.36**
3200	**557**	**0.75**	**628**	**0.93**	690	1.10	746	1.28	796	1.44	844	1.61	888	1.70	**934**	**1.94**	**988**	**2.18**	**1025**	**2.47**
3400	**583**	**0.88**	**651**	**1.06**	711	1.25	767	1.44	815	1.61	863	1.79	**907**	**1.97**	**947**	**2.14**	**991**	**2.32**	**1038**	**2.57**
3600	**609**	**1.01**	**674**	**1.22**	732	1.42	787	1.61	836	1.80	880	1.98	**926**	**2.18**	**966**	**2.36**	**1004**	**2.54**	**1045**	**2.74**
3800	**535**	**1.16**	698	1.39	755	1.59	808	1.80	857	2.01	**901**	**2.20**	**943**	**2.39**	**985**	**2.60**	**1023**	**2.79**	1059	2.98
4000	**662**	**1.33**	722	1.57	778	1.78	829	2.01	878	2.22	**922**	**2.44**	**962**	**2.63**	**1003**	**2.84**	1042	3.06	1078	3.26
4200	**689**	**1.52**	746	1.77	801	1.99	851	2.23	898	2.45	**943**	**2.69**	983	2.91	1021	3.11	1060	3.34	—	—
4400	715	1.72	772	1.99	825	2.22	873	2.46	**919**	**2.71**	963	2.94	1004	3.19	1042	3.41	—	—	—	—
4600	742	1.94	797	2.22	848	2.48	896	2.72	940	2.98	984	3.22	1025	3.48	—	—	—	—	—	—
4800	770	2.18	823	2.46	872	2.75	919	3.00	963	3.27	—	—	—	—	—	—	—	—	—	—
5000	797	2.44	849	2.73	897	3.04	943	3.30	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Rpm — Fan Wheel Speed, Revolutions per Minute

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. Shaded cells indicate field-supplied motor and drive required.
3. Maximum usable bhp is 2.90 with standard 2.0-hp motor. Extensive motor and electrical testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 690 to 900 rpm. All other rpm's will require a field-supplied drive.

FAN PERFORMANCE (ENGLISH) — HORIZONTAL DISCHARGE UNITS

50TFQ008,009 (7 1/2 AND 8 1/2 TONS)

AIRFLOW (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	**459**	**0.42**	**549**	**0.62**	625	0.83	691	1.06	753	1.31	805	1.58	842	1.87	857	2.16	851	2.45	823	2.70
2400	**482**	**0.50**	**569**	**0.71**	645	0.95	708	1.18	768	1.40	824	1.72	872	2.01	**909**	**2.32**	931	2.64	935	2.96
2600	**507**	**0.59**	**592**	**0.82**	663	1.08	727	1.32	784	1.58	839	1.87	**891**	**2.17**	936	2.49	973	2.82	999	3.16
2800	**533**	**0.71**	**615**	**0.95**	683	1.20	747	1.49	802	1.75	855	2.04	**906**	**2.35**	954	2.67	997	3.01	1034	3.36
3000	**559**	**0.83**	637	1.09	704	1.35	765	1.66	823	1.94	872	2.22	921	2.54	969	2.88	1014	3.22	—	—
3200	**585**	**0.96**	660	1.24	727	1.52	785	1.83	841	2.15	892	2.45	939	2.76	984	3.10	—	—	—	—
3400	**610**	**1.10**	682	1.41	750	1.72	806	2.01	860	2.36	912	2.69	958	3.01	1002	3.34	—	—	—	—
3600	636	1.25	707	1.60	772	1.93	828	2.23	880	2.57	930	2.95	978	3.29	—	—	—	—	—	—
3800	661	1.41	733	1.82	795	2.15	852	2.48	901	2.80	949	3.20	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Rpm — Fan Wheel Speed, Revolutions per Minute

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. Shaded cells indicate field-supplied motor and drive required.
3. Maximum usable bhp is 2.40 with standard 1.5-hp motor. Extensive motor and electrical testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 620 to 880 rpm. All other rpm's will require a field-supplied drive.

50TFQ012 (10 TONS)

Airflow (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	**484**	**0.55**	**560**	**0.70**	**631**	**0.87**	690	1.03	747	1.20	800	1.38	850	1.52	879	1.38	**925**	**1.81**	**964**	**1.92**
3200	**505**	**0.66**	**579**	**0.81**	**646**	**0.98**	708	1.16	761	1.34	812	1.51	862	1.71	**908**	**1.85**	**944**	**2.01**	**984**	**2.09**
3400	**527**	**0.78**	**599**	**0.93**	**664**	**1.11**	724	1.30	775	1.48	827	1.67	873	1.85	**920**	**2.07**	**963**	**2.21**	**1001**	**2.31**
3600	**548**	**0.92**	**619**	**1.05**	**680**	**1.24**	738	1.43	794	1.64	840	1.83	888	2.04	**931**	**2.23**	**976**	**2.47**	**1017**	**2.62**
3800	**571**	**1.08**	**639**	**1.19**	698	1.39	756	1.60	810	1.81	856	2.02	**901**	**2.23**	**945**	**2.44**	**986**	**2.65**	**1029**	**2.89**
4000	**593**	**1.25**	**659**	**1.35**	717	1.56	773	1.78	823	1.98	875	2.22	**915**	**2.42**	**960**	**2.65**	**1000**	**2.87**	1039	3.10
4200	**616**	**1.45**	**680**	**1.53**	737	1.74	789	1.95	841	2.18	889	2.41	**934**	**2.65**	**972**	**2.87**	1015	3.12	1053	3.34
4400	**639**	**1.67**	701	1.73	757	1.92	807	2.16	858	2.41	**903**	**2.62**	**951**	**2.89**	990	3.12	1028	3.36	—	—
4600	**662**	**1.91**	722	1.95	777	2.13	827	2.38	874	2.62	**921**	**2.87**	965	3.11	1008	3.39	—	—	—	—
4800	**686**	**2.17**	744	2.20	797	2.36	846	2.62	891	2.85	938	3.14	980	3.37	—	—	—	—	—	—
5000	710	2.45	766	2.47	816	2.61	866	2.86	910	3.12	934	3.39	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Rpm — Fan Wheel Speed, Revolutions per Minute

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. Shaded cells indicate field-supplied motor and drive required.
3. Maximum usable bhp is 2.90 with standard 2.0-hp motor. Extensive motor and electrical testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the brakepower ratings shown will not result in nuisance tripping or premature motor failure.
4. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
5. Values include losses for filters, unit casing, and wet coils.
6. Motor drive range is 690 to 900 rpm. All other rpm's will require a field-supplied drive.

Performance data (cont)

ACCESSORY STATIC PRESSURE DROP (Pa)
50TFQ008-012

COMPONENT	L/s												
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
1 Heater Module	6	8	10	12	14	16	18	19	21	23	25	27	29
2 Heater Modules	10	12	15	17	20	22	25	27	29	32	34	37	39
Economizer	5	6	7	8	9	10	11	12	13	14	15	16	17

ACCESSORY STATIC PRESSURE DROP (in. wg)
50TFQ008-012

COMPONENT	CFM								
	2200	2500	3000	3500	4000	4500	5000	5500	6000
1 Heater Module	.02	.03	.05	.07	.08	.10	.12	.14	.16
2 Heater Modules	.03	.05	.07	.09	.12	.14	.16	.19	.21
Economizer	.02	.02	.03	.04	.05	.06	.07	.08	.09

FAN R/S AT MOTOR PULLEY SETTINGS (SI)

UNIT 50TFQ	MOTOR PULLEY TURNS OPEN										
	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
008,009	14.67	14.25	13.83	13.33	12.92	12.50	12.08	11.67	11.25	10.83	10.33
012	15.00	14.58	14.25	13.92	13.58	13.25	12.92	12.58	12.25	11.92	11.50

FAN RPM AT MOTOR PULLEY SETTINGS (ENGLISH)

UNIT 50TFQ	MOTOR PULLEY TURNS OPEN										
	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
008,009	880	855	830	800	775	750	725	700	675	650	620
012	900	875	855	835	815	795	775	755	735	715	690

OUTDOOR SOUND DATA
(Total Unit)

UNIT 50TFQ	SOUND RATING (Bels)	A-WEIGHTED (dB)	SOUND POWER (dB) OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
008	8.2	80.3	56.6	68.4	70.4	73.4	75.3	71.3	71.6	65.8
009	8.2	81.9	60.5	69.1	73.3	75.3	76.6	74.8	69.7	64.0
012	8.2	80.0	59.8	67.6	69.5	73.9	75.5	72.3	68.0	63.0

ELECTRIC HEATING CAPACITIES

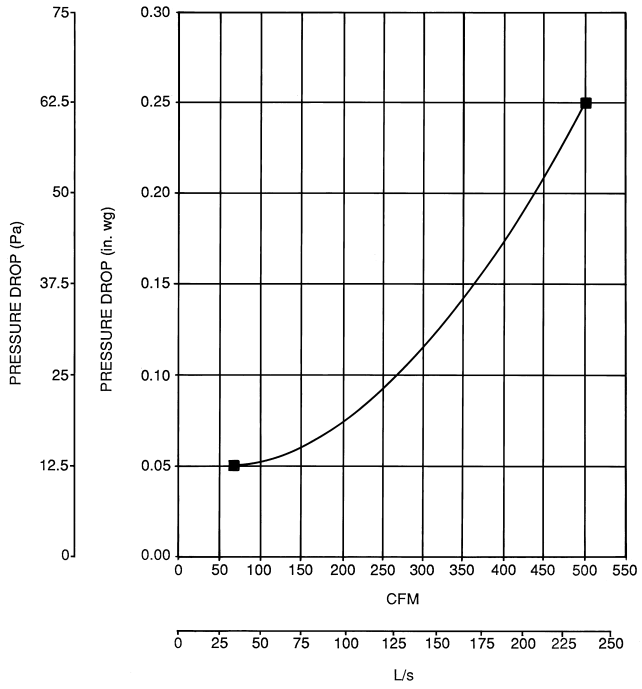
UNIT 50TFQ	ELECTRICAL CHARACTERISTICS	ACCESSORY kW
008,009	400-3-50	9.6 11.5 19.3 22.9 28.9*
012	400-3-50	11.5 19.3 22.9 28.9 34.7*

*Two heater packages are required to provide kW indicated.

INDOOR-FAN MOTOR EFFICIENCY

UNIT 50TFQ	MOTOR EFFICIENCY (%)
008-012	80

DURABLADE ECONOMIZER BAROMETRIC RELIEF DAMPER CHARACTERISTICS 50TFQ008-012



INDOOR-FAN MOTOR PERFORMANCE

UNIT 50TFQ	INDOOR-FAN MOTOR	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BkW*	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW
008	Standard	400	1.79	2.40	2120	2.7
009	Standard	400	1.79	2.40	2120	2.7
012	Standard	400	2.16	2.90	2615	3.6

LEGEND

Bhp — Brake Horsepower
BkW — Fan Input Watts x Motor Efficiency

*Extensive motor and electrical testing on these units ensures that the full BkW (or brake horsepower) range of the motors can be utilized with confidence. Using your fan motors up to the BkW (or brake horsepower) ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

MULTIPLICATION FACTORS

HEATER kW RATING (Nominal V)	VOLTAGE DISTRIBUTION V-3-50	MULTIPLICATION FACTOR FOR CAPACITY	MULTIPLICATION FACTOR FOR FULL LOAD AMPS
400	380	0.902	0.949
	415	1.076	1.037

Electrical data

UNIT 50TFQ	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR (each)		OFM FLA	IFM FLA	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE†	
			Min	Max	RLA	LRA			Nominal kW**	FLA	MCA	MOCP	FLA	LRA
008	400-3-50	STD	360	440	6.7	42.0	0.6	2.6	—	—	18.9	20††	20	108
									9.6	13.9	36.3	40††	36	122
									11.5	16.6	39.6	40††	39	125
									19.3	27.9	53.8	60††	52	136
									22.9	33.1	60.3	70	58	141
									28.9	41.7	71.0	80	68	150
009	400-3-50	STD	360	440	7.3	69.0	0.6	2.6	—	—	20.2	25††	21	162
									9.6	13.9	37.6	40††	37	176
									11.5	16.6	41.0	45††	40	179
									19.3	27.9	55.1	60††	53	190
									22.9	33.1	61.6	70	59	195
									28.9	41.7	72.4	80	69	204
012	400-3-50	STD	360	440	9.2	59.6	0.6	3.4	—	—	25.3	30††	26	152
									11.5	16.6	46.1	50††	46	169
									19.3	27.9	60.2	70	59	180
									22.9	33.1	66.7	70	65	186
									28.9	41.7	77.4	80	74	194
									34.7	50.1	87.9	90	84	203

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor-Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code (U.S.A. Standard)
OFM — Outdoor-Fan Motor
RLA — Rated Load Amps

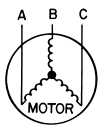
*Heaters are field installed only.
†Used to determine minimum disconnect per NEC (U.S.A. Standard).
**Heater capacity (kW) is based on heater voltage of 400 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
††Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

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

Example: Supply voltage is 400-3-50.



AB = 393 v
BC = 403 v
AC = 396 v

$$\text{Average Voltage} = \frac{393 + 403 + 396}{3}$$

$$= \frac{1192}{3}$$

$$= 397$$

Determine maximum deviation from average voltage.
(AB) 397 – 393 = 4 v
(BC) 403 – 397 = 6 v
(AC) 397 – 396 = 1 v

Maximum deviation is 6 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{6}{397}$$

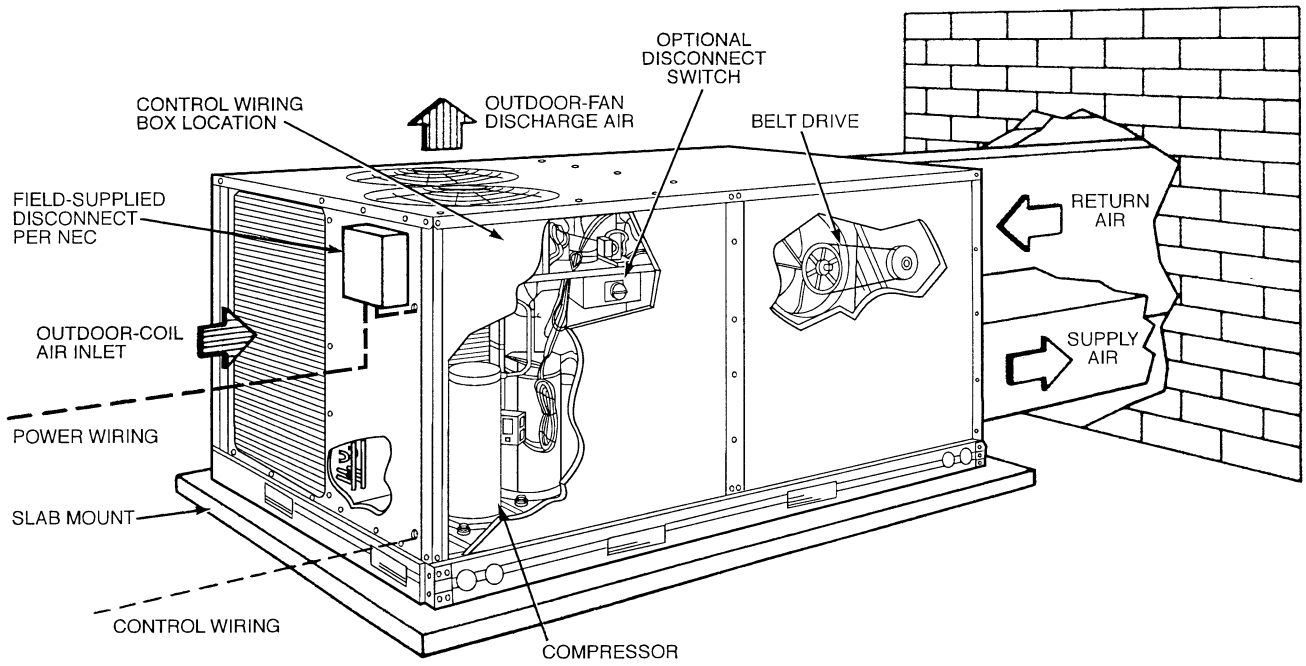
$$= 1.5\%$$

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

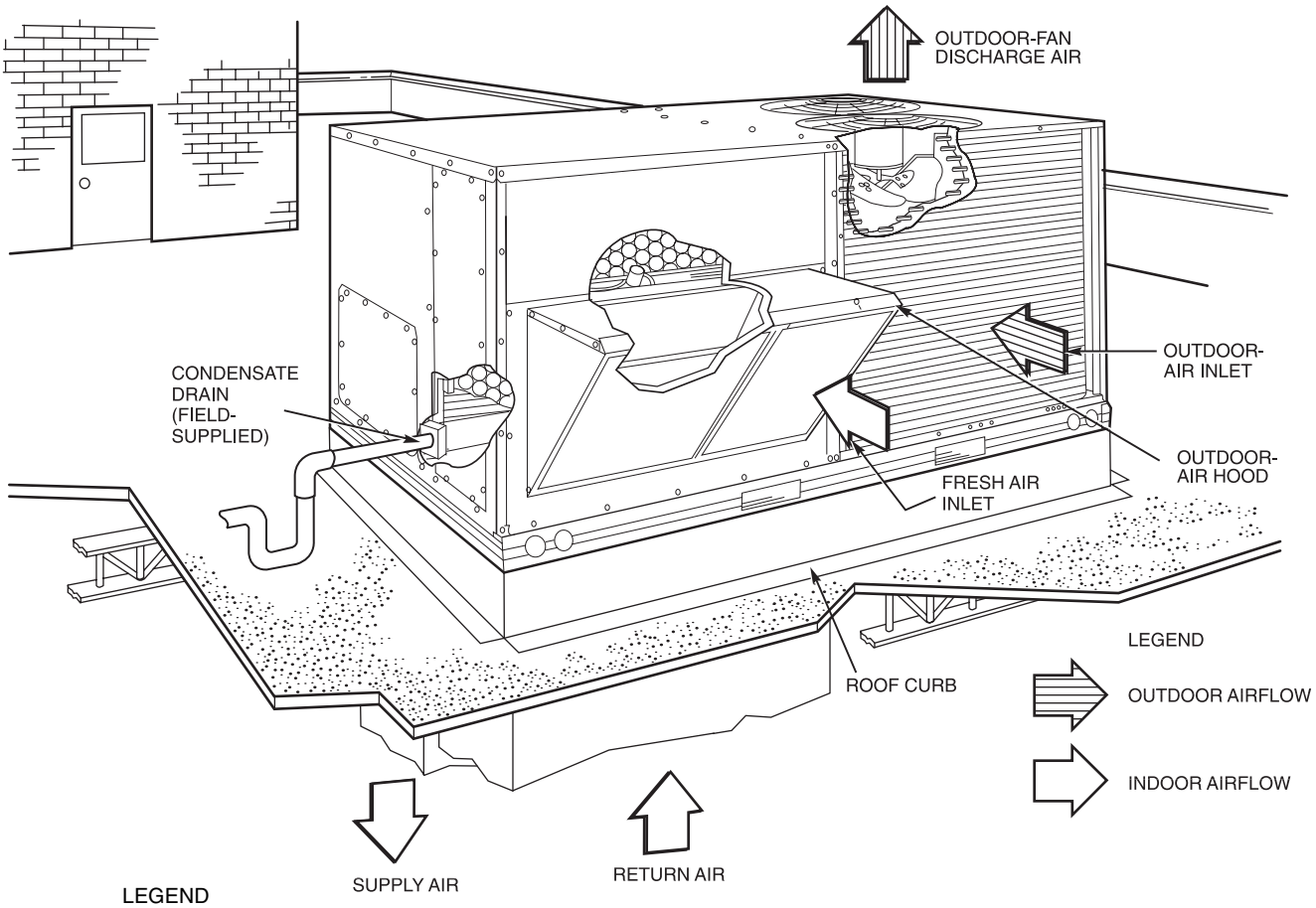
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Typical piping and wiring

HORIZONTAL DISCHARGE DUCTING



VERTICAL DISCHARGE DUCTING



LEGEND

NEC — National Electrical Code (U.S.A.)

Operating sequence

Cooling, units without economizer — When the thermostat calls for cooling, terminals G and Y1 are energized. The indoor-fan contactor (IFC), RVS1 (reversing valve solenoid), compressor contactor no. 1 (C1), and outdoor-fan contactor (OFC) are energized and the indoor-fan motor, compressor no. 1, and outdoor fans start. The outdoor-fan motors run continuously while unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) and RVS2 are energized and compressor no. 2 starts.

Heating, units without economizer — Upon a request for heating from the space thermostat, terminal W1 will be energized with 24 v. The IFC, OFC, C1, and C2 will be energized. The reversing valves switch position and the indoor fan, outdoor fan, compressor no. 1, and compressor no. 2 are energized.

If the space temperature continues to fall while W1 is energized, W2 will be energized with 24 v, and the heater contactor(s) (HC) will be energized, which will energize the electric heater(s).

When the space thermostat is satisfied, W2 will be deenergized first, and the electric heater(s) will be deenergized.

Upon a further rise in space temperature, W1 will be deenergized, and the reversing valve solenoids (RVS1 and RVS2) will be energized.

Cooling, units with Durablade economizer — When the outdoor-air temperature is above the OAT setting and the room thermostat calls for cooling, the compressor contactor no. 1 is energized to start compressor no. 1 and outdoor-fan motors. RVS1 (reversing valve solenoid) is energized). The indoor-fan motor (IFM) is energized and the economizer damper moves to the minimum position. Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2. RVS2 is energized. After the thermostat is satisfied and the IFM is deenergized, the damper moves to the fully closed position.

When the outdoor air temperature is below the OAT setting and the thermostat calls for Y1 and G, the economizer damper moves to the minimum position when the indoor fan starts. The first stage of cooling is provided by the economizer. If the supply-air temperature is above 14 C (57 F), a switch on the supply-air thermostat is closed between the T2 terminal and the 24 vac terminal. This causes the damper to continue to modulate open until the supply-air temperature falls below 13 C (55 F) or the damper reaches the fully open position.

When the supply-air temperature is between 13 C (55 F) and 11 C (52 F), the supply-air thermostat has open switches between the T2 and 24 vac terminals and between the T1 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the supply-air temperature falls below 11 C (52 F), a switch on the supply-air thermostat is closed between the T1 terminal and the 24 vac terminal. This causes the damper to modulate closed until the supply-air temperature rises above 13 C (55 F) or the damper reaches the minimum position.

When the supply-air temperature is between 13 C (55 F) and 14 C (57 F), the supply-air thermostat has open switches between the T2 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second stage cooling. Compressor no. 1 and outdoor fans will be energized, and the position of the economizer damper will be determined by the supply-air temperature. Compressor no. 2 is locked out.

When the second stage of cooling is satisfied, the compressor, RVS2, and outdoor fan motors will be deenergized. The damper position will be determined by the supply-air temperature.

When the first stage of cooling is satisfied, the damper will move to fully closed position.

**Cooling, units with EconoMi$er —** When the OAT is above the ECON SP set point and the room thermostat calls for Stage 1 cooling (R to G + Y1), the indoor-fan motor (IFM) is energized and the EconoMi$er damper modulates to minimum position. The compressor contactor and OFC are energized to start the compressor, outdoor-fan motors (OFM), and RVS1 (reversing valve solenoid). After the thermostat is satisfied, the damper modulates to the fully closed position when the IFM is deenergized.

When the OAT is below the ECON SP setting and the room thermostat calls for Stage 1 cooling (R to G + Y1), the EconoMi$er modulates to the minimum position when the IFM is energized. The EconoMi$er provides Stage 1 of cooling by modulating the return and outdoor-air dampers to maintain a 13 C (55 F) supply air set point. If the supply-air temperature (SAT) is greater than 14 C (57 F), the EconoMi$er modulates open, allowing a greater amount of outdoor air to enter the unit. If the SAT drops below 12 C (53 F), the outdoor air damper modulates closed to reduce the amount of outdoor air. When the SAT is between 12 C and 14 C (53 and 57 F), the EconoMi$er maintains its position.

If outdoor air alone cannot satisfy the cooling requirements of the conditioned space, and the OAT is above the MECH CLG LOCKOUT set point, the EconoMi$er integrates free cooling with mechanical cooling. This is accomplished by the strategies below.

NOTE: Compressor has a two-minute Minimum On, Minimum Off, and interstage delay timer.

If Y1 is energized, and the room thermostat calls for Y2 (2-stage thermostat), the compressor and OFC are energized. The position of the EconoMi$er damper is maintained at its current value.

If Y1 is energized for more than 20 minutes, and Y2 is not energized (whether or not a 2-stage thermostat is used), the compressor and OFCs are energized. The position of the EconoMi$er damper is maintained at its current value.

If Y1 is energized, and the compressor no. 1 is already energized (see Step 2) and the room thermostat calls for Y2, compressor no. 1 continues to operate. If Y2 remains energized for more than 20 minutes, compressor no. 2 is energized.

NOTE: Compressor no. 2 cannot be energized unless there is a signal for Y2 from the space thermostat.

If compressor no. 2 is energized, and the Y2 signal from the thermostat is satisfied, compressors 1 and 2 are deenergized. Re-asserting Y2 will start compressor no. 1 and (after a 20-minute interstage delay) compressor no. 2.

If compressor no. 1 is energized and the thermostat is satisfied, the compressor no. 1, the OFMs, and IFM are deenergized and the EconoMi$er modulates closed.

When the OAT is below the MECH CLG LOCKOUT set point, the compressors remain off.

Heating, units with economizer — Upon a call for heat through W1, the IFC energizes to start the evaporator fan and the economizer damper blade opens to the minimum position. If the accessory two-position damper is used, the outdoor-air damper opens to the minimum position whenever the evaporator fan runs. If unit is equipped with 2 stages of heat, when additional heat is needed a call is made through W2.

As space temperature approaches the heating temperature set point, heating stages cycle off. Economizer or two-position damper returns to fully closed position.

Defrost — When the temperature of the outdoor coil drops below –2 C (28 F) as sensed by the defrost thermostat (DFT2) and the defrost timer is at the end of a timed period (adjustable at 30, 50, or 90 minutes), reversing valve solenoids (RVS1 and RVS2) are energized and the OFC is deenergized. This switches the position of the reversing valves and shuts off the outdoor fans. The electric heaters (if installed) will be energized.

The unit continues to defrost until the coil temperature as measured by the DFT2 reaches 18 C (65 F), or the duration of defrost cycle completes a 10-minute period.

During the Defrost mode, if circuit 1 defrosts first, RVS1 will oscillate between Heating and Cooling modes until the Defrost mode is complete.

At the end of the defrost cycle, the electric heaters (if installed) will be deenergized; the reversing valves switch and the outdoor-fan motors will be energized. The unit will now operate in the Heating mode.

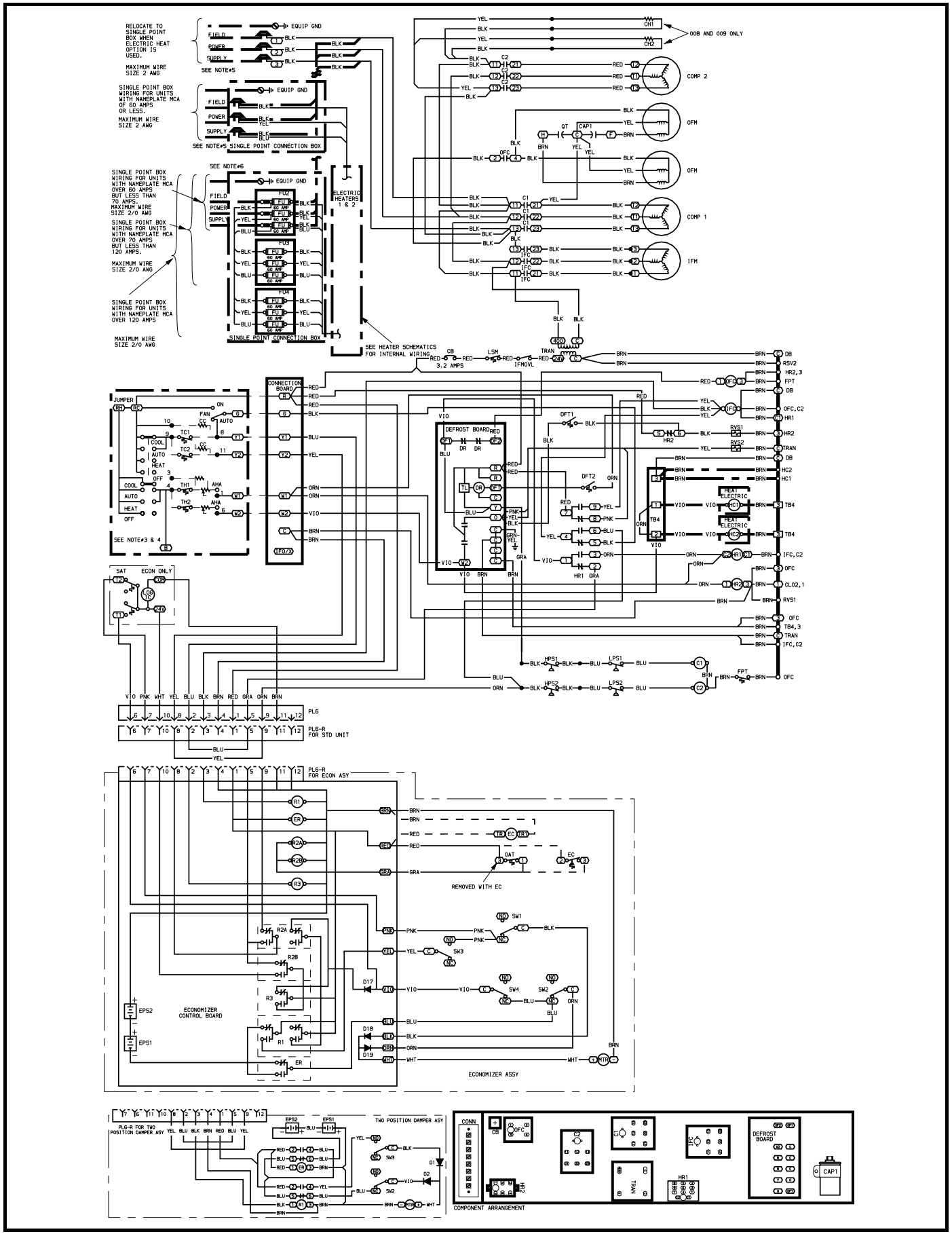
If the space thermostat is satisfied during a defrost cycle, the unit will continue in the Defrost mode until the time or temperature constraints are satisfied.

High-pressure switch — The high-pressure switch contains a Schrader core depressor, and is located on the compressor hot gas line. This switch opens at 2951 kPa (428 psig) and closes at 2206 kPa (320 psig). No adjustments are necessary.

Loss-of-charge switch — The loss-of-charge switch contains a Schrader core depressor, and is located on the compressor liquid line. This switch opens at 48.26 kPa (7 psig) and closes at 151 kPa (22 psig). No adjustments are necessary.

Freeze-stat — The freeze-stat is a bimetal temperature-sensing switch that is located on the "hair-pin" end of the evaporator coil. The switch protects the evaporator coil from freeze-up due to lack of airflow. The switch opens at –1 C (30 F) and closes at 7 C (45 F). No adjustments are necessary.

Typical wiring schematic



LEGEND AND NOTES FOR TYPICAL WIRING SCHEMATIC

LEGEND

AHA — Adjustable Heat Anticipator
AWG — American Wire Gage
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Capacitor
CLO — Compressor Lockout
COMP — Compressor Motor
D — Diode
DB — Defrost Board
DFT — Defrost Thermostat
EC — Enthalpy Control
ECON — Economizer
EPS — Emergency Power Supply (Nine-Volt Battery)
EQUIP — Equipment
ER — Economizer Relay
FPT — Freeze-Up Protection Thermostat
FU — Fuse
GND — Ground
HC — Heater Contactor (Strip Heat)
HPS — High-Pressure Switch
HR — Heater Relay
IFC — Indoor-Fan Contactor
IFM — Indoor-Fan Motor
IFMOVL — Indoor-Fan Motor Overload
LPS — Low-Pressure Switch
LSM — Limit Switch (Manual Reset)
MCA — Minimum Circuit Amps
MTR — Motor
OAT — Outdoor-Air Thermostat
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
P — Plug
PL — Plug Assembly
QT — Quadruple Terminal
R — Relay
RVS — Reversing Valve Solenoid
SAT — Supply-Air Thermostat
SW1 — Switch Fully Open
SW2 — Switch Fully Closed
SW3 — Switch Min Vent Position
SW4 — Switch Max Vent Position
TB — Terminal Block
TC — Thermostat-Cooling
TH — Thermostat-Heating
TRAN — Transformer


Field Splice

Marked Wire

Terminal (Marked)


Terminal (Unmarked)

Terminal Block


Splice


Splice (Marked)

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring


To indicate common potential only. Not to represent wiring.

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostat:
   HH07AT172 and P272-2783
   Subbase:
   HH93AZ176, 178 and P272-1882, 1883
4. Set heat anticipator at 0.8 amp for first stage and 0.3 amp for second stage.
5. Use copper conductors only.
6. Use copper, copper-clad aluminum or aluminum conductors.
7.

VOLTAGE RATING	CB Manufacturer's Part No.	MUST TRIP AMPS
24 V	Potter & Brumfield W28X-1024-3.2	3.2

Application data

Outdoor installation — Units approved for outdoor installation only.

Ductwork — Secure vertical discharge ductwork to roof curb. For horizontal discharge applications, either attach ductwork to unit, or use field-supplied flanges attached to the horizontal discharge openings and attach all ductwork to flanges.

Horizontal discharge — To convert from vertical discharge to horizontal discharge:

1. Remove economizer or two-position damper to gain access to return duct opening.
2. Move the horizontal-discharge duct opening covers to the vertical discharge openings.
3. Rotate economizer or two-position damper 90 degrees.
4. Rotate the barometric relief damper 90 degrees.
5. Install block-off plate over the opening on the access panel.

Thru-the-bottom power connections — For applications requiring thru-the-bottom connections, Carrier accessory thru-the-bottom package must be purchased to ensure proper connections.

Thermostat — Use of 2-stage heating and cooling thermostat is recommended for all units. A 2-stage cooling thermostat is required on units with accessory economizer to provide integrated cooling.

Heating-to-cooling changeover — All units are automatic changeover from heating to cooling when automatic changeover thermostat and subbase are used.

Airflow — Units are draw-thru on cooling and blow-thru on heating.

Maximum airflow — To minimize the possibility of condensate blow-off from evaporator, airflow through units should not exceed 236 L/s per kW (500 cfm/ton).

Minimum airflow — For cooling, minimum airflow is 142 L/s per kW (300 cfm/ton). For 50TFQ units with electric heating, required minimum L/s is 1062 (cfm is 2250) for 50TFQ008; 1203 (2500) for 50TFQ009; and 1416 (3000) for 50TFQ012, with the following exceptions:

UNIT 50TFQ	UNIT VOLTAGE	HEATER kW	UNIT CONFIGURATION	REQUIRED MINIMUM L/s (Cfm)
012	400	34.7	Horizontal or Vertical	1510 (3200)

Minimum ambient cooling operating temperature — The minimum temperature for standard units is –4 C (25 F). With accessory Motormaster® control, units can operate at outdoor temperatures down to –17 C (0° F).

Internal unit design — Due to Carrier's internal unit design (draw-thru over the motor), air path, and specially designed motors, the full kW (maximum continuous BkW) or the full horsepower (maximum continuous bhp) listed in the Physical Data table and the notes following each Fan Performance table can be utilized with confidence.

Using Carrier motors with the values listed in the Physical and Fan Performance Data tables *will not* result in nuisance tripping or premature motor failure. The unit warranty will not be affected.

Apollo direct digital controls — The Apollo direct digital controls must be used with either a Carrier master or monitor thermostat.

Guide specifications

Packaged Rooftop Air-to-Air Heat Pump with Electric Heat Option — Constant Volume Application

HVAC Guide Specifications

Size Range: **26.4 to 35.2 kW (7 1/2 to 10 Tons), Nominal Cooling**

Carrier Model Number: **50TFQ**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor rooftop- or slab-mounted, electrically controlled air-to-air heat pump utilizing a hermetic compressor for heating and cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standards 210/240 and 270 (U.S.A. Standard).

B. Unit shall be designed to conform to ASHRAE 15, latest revision, and in accordance with UL 1995 (U.S.A. Standard).

C. Unit shall be UL tested and certified in accordance with ANSI Z21.47 (U.S.A. Standard) and UL listed and certified under Canadian Standards as a total package for safety requirements.

D. Roof curb shall be designed to conform to NRCA Standards (U.S.A. Standard).

E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation (U.S.A. Standard).

F. Unit casing shall be capable of withstanding U.S.A. Test Method Standard No. 141 (Method 6061) 500-hour salt spray test.

1.03 DELIVERY, STORAGE, AND HANDLING

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

Part 2 — Products

2.01 EQUIPMENT (STANDARD)

A. General:

Factory-assembled, single-piece air-to-air heat pump. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet:

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked enamel finish on all externally exposed surfaces with primer coated internal panels.
2. Indoor fan cabinet interior shall be insulated with a minimum 13-mm (1/2-in.) thick flexible fiberglass insulation coated on the air side.
3. Cabinet panels shall be easily removable for servicing.
4. Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging, and forklift slots shall be provided to facilitate maneuvering.
5. Unit shall have a factory-installed, sloped condensate drain pan made of a non-corrosive material, providing a minimum 19-mm (3/4-in.) connection with both vertical and horizontal drains and shall comply with ASHRAE 62.
6. Unit shall have factory-installed filter access panel to provide filter access with tool-less removal.
7. Unit shall have standard thru-the-bottom power connection capability.

C. Fans:

1. Indoor blower shall be belt-driven, double inlet, forward-curved centrifugal type. Belt drive shall include an adjustable-pitch motor pulley.
2. Indoor blower shall be made from steel with a corrosion-resistant finish and shall be dynamically balanced.
3. Bearings shall be of the sealed, permanently lubricated, ball-bearing type for longer life and lower maintenance.
4. Outdoor fan shall be of the direct-driven propeller type and shall discharge air vertically.
5. Outdoor fan shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

D. Compressor(s):

1. Fully hermetic type, internally protected.
2. Factory rubber shock-mounted and internally spring mounted for vibration isolation.

E. Coils:

1. Outdoor and indoor coils shall have aluminum plate fins mechanically bonded to enhanced copper tubes with all joints brazed.
2. Tube sheet openings shall be belled to prevent tube wear.
3. Indoor coil shall be of the full face active design.

F. Refrigerant Components:

Refrigerant circuit components shall include:

1. Acutrol™ multiple independent circuit feed system.
2. Filter strainer to eliminate any moisture or foreign matter.
3. Service gage connections on suction, discharge, and liquid line to charge, evacuate, and contain refrigerant.
4. Accumulator.
5. Reversing valve.

G. Filter Section:

1. Standard filter section shall consist of factory-installed low-velocity, throwaway 51-mm (2-in.) thick fiberglass filters of commercially available sizes.
2. Filter face velocity shall not exceed 1.52 m/s (300 fpm) at nominal airflows.
3. Filter section shall use only one size filter.

4. Filters shall be accessible through an access panel with ''no-tool'' removal.

H. Controls and Safeties:
1. Unit Controls:
a. Unit shall be complete with self-contained low-voltage control circuit.
b. Unit shall incorporate an outdoor coil defrost system to prevent excessive frost accumulation during heating duty, and shall be controlled as follows:
1) Defrost shall be initiated on the basis of time and coil temperature.
2) A 30/50/90-minute timer shall activate defrost cycle only if coil temperature is low enough to indicate a heavy frost condition.
3) Defrost cycle shall terminate when defrost thermostat is satisfied and shall have a positive termination time of 10 minutes.
2. Refrigerant Controls:
Unit shall contain high-pressure, loss-of-charge/low-pressure, and freeze protection switches.
3. Standard Safeties:
Unit shall incorporate compressor overtemperature and overcurrent safety devices to shut off compressor.

I. Operating Characteristics:
1. Unit shall be capable of starting and running in cooling at 51 C (125 F) ambient outdoor temperature, meeting maximum load criteria of ARI Standard 210/240 at ±10% voltage.
2. Compressor with standard controls shall be capable of cooling operation down to –4 C (25 F) ambient outdoor temperature.
3. Compressor shall be capable of operation in heating duty down to –23 C (–10 F) ambient outdoor-air temperature.
4. Unit shall be capable of simultaneous heating duty and defrost cycle operation when using electric heaters indicated in Section L, Special Features.

J. Electrical Requirements:
All unit power wiring shall enter unit cabinet at a single factory-predrilled location.

K. Motors:
1. Compressor motors shall be cooled by refrigerant passing through motor windings and shall have line break thermal and current overload protection.
2. Indoor blower motor shall have permanently lubricated bearings and inherent automatic-reset thermal overload protection.
3. Totally enclosed outdoor-fan motor shall have permanently lubricated bearings, and inherent automatic-reset thermal overload protection.

L. Special Features:
Certain features are not applicable when the features designated by * are specified. For assistance in amending the specifications, your local Carrier Sales Office should be contacted.
* 1. Direct Digital Controls:
a. Shall be available as a factory-installed option.
b. Shall actively monitor all modes of operation, as well as indoor-fan status, filter status, indoor-air quality, supply-air temperature, and outdoor-air temperature.
c. Shall work with Carrier TEMP and VVT® systems.
d. Shall have built-in diagnostics for thermostat commands for both staged heating and cooling, indoor-fan operation, and economizer operation.
e. Shall be equipped with a 5-minute time delay between modes of operation.
2. Roof Curbs:
a. Formed galvanized steel with wood nailer strip and capable of supporting entire unit weight.
b. Allows for installing and securing ductwork to curb prior to mounting unit on the curb.
* 3. Integrated Economizers:
a. Integrated integral-modulating type capable of simultaneous economizer and compressor operation.
b. Includes all hardware and controls to provide cooling with outdoor air.
c. Equipped with low-leakage dampers not to exceed 3% leakage at 1.868 mm Hg (1 in. wg) pressure differential.
d. Capable of introducing up to 100% outdoor air in both minimum and fully open positions.
e. Equipped with a gravity relief sliding plate damper. Damper shall close upon unit shut-off.
f. Economizer is equipped with 30% of return-air relief.
g. Designed to close damper during loss-of-power situations with emergency power supply.
h. Dry bulb outdoor-air thermostat protection shall be provided as standard.
i. Economizer is a guillotine-style damper design.
* 4. 25% Manual Outdoor-Air Damper:
Manual damper package shall consist of damper, birdscreen, and rainhood which can be preset to admit up to 25% outdoor air for year-round ventilation.
* 5. 50% Manual Outdoor-Air Damper:
Manual damper package shall consist of damper birdscreen, and rainhood which can be

preset to admit up to 50% outdoor air for year-round ventilation.

* 6. 100% Two-Position Damper:
   a. Two-position damper package shall include single blade damper. Admits up to 100% outdoor air.
   b. Damper shall close upon indoor fan shutoff.
   c. Designed to close damper during loss of power situations.
   d. Equipped with barometric relief damper.

* 7. 25% Two-Position Damper:
   a. Two-position damper package shall include single blade damper and motor. Admits up to 25% outdoor air.
   b. Damper shall close upon indoor fan shutoff.
   c. Designed to close damper during loss of power situations.
   d. Equipped with barometric relief damper.

* 8. Solid-State Enthalpy Control:
   a. For use with economizer only.
   b. Capable of sensing outdoor-air enthalpy content (temperature and humidity) and controlling economizer cut-in point to have minimum heat content air passing over the indoor coil for most efficient system operation.

* 9. Differential Enthalpy Sensor:
   a. For use with economizer only.
   b. Capable of comparing enthalpy content (temperature and humidity) of outdoor and indoor air and controlling economizer cut-in point at the most economical level.

*10. Electric Resistance Heaters:
   a. Open wire nichrome elements with all necessary safety operating controls.
   b. UL listed and indicated on basic unit informative plate.
   c. Available in multiples to match heating requirements.
   d. Single point kits available for each heater when required.

*11. Head Pressure Control Packages:
   Consists of solid-state control and outdoor-coil temperature sensor to maintain condensing temperature between 32 C (90 F) and 43 C (110 F) at outdoor ambient temperatures down to –17 C (0° F) by outdoor fan cycling.

*12. Thermostat and Subbase:
   Provides staged cooling and heating automatic (or manual) changeover, fan control, and indicator light.

13. Thru-The-Bottom Service Connections:
   Kit shall provide connectors to permit electrical connections to be brought to the unit through the basepan.

*14. Electronic Programmable Thermostat:
   Capable of using deluxe full-featured electronic thermostat. Shall use built-in compressor cycle delay control for both heating and cooling duty. Capable of working with Carrier direct digital controls.

15. Outdoor Coil Hail Guard Assembly:
   Hail guard shall protect against damage from hail and flying debris.

16. Outdoor Coil Grille:
   The grille protects the outdoor coil from damage by large objects without increasing unit clearances.

17. Compressor Cycle Delay:
   Unit shall be prevented from restarting for a minimum of 5 min. after shutdown.

18. Salt Spray Protection Package:
   Coil guard protects coil from corrosion in coastal areas and in areas with high sulfur emissions.

19. Fan/Filter Status Switch:
   Provides status of evaporator fan (ON/OFF) or filter (CLEAN/DIRTY). Status shall be displayed over communication bus when used with direct digital controls or with an indicator light at the thermostat.

20. Unit Mounted Disconnect Switch:
   Shall be factory-installed. Internally mounted, NEC and UL approved non-fused switch provides unit power shutoff. Shall be accessible from outside the unit.

21. Emergency Heat Package:
   When mechanical heating is locked out, auxiliary heat shall be activated when necessary.

22. Logo Kit:
   Shall be mounted on the outdoor coil grille.