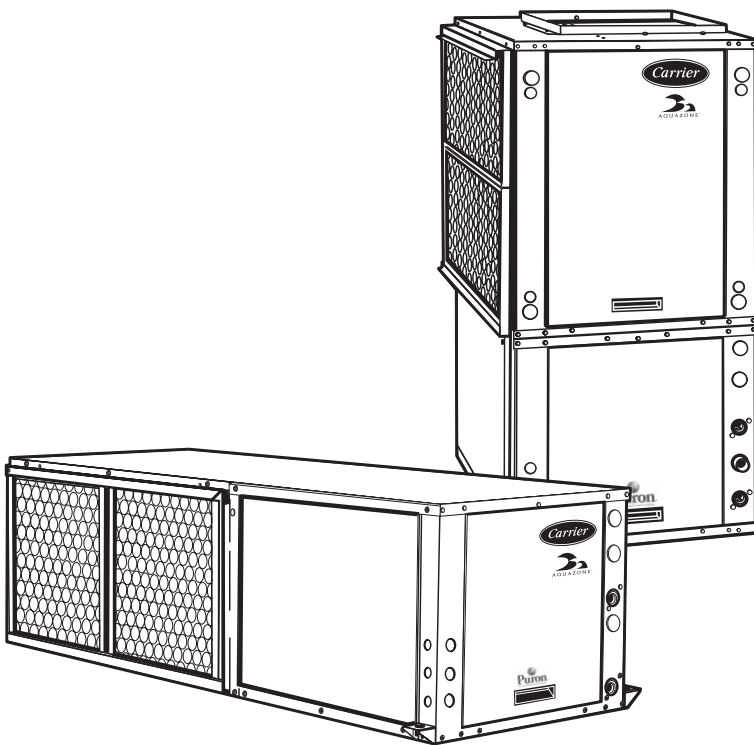




Product Data

AQUAZONE™ 50PSH, PSV, PSD006-070 Single-Stage Water Source Heat Pumps with PURON® Refrigerant (R-410A)

1/2 to 6 Nominal Tons



Single-package horizontally and vertically mounted water source heat pumps with electronic controls offer:

- Non-ozone depleting Puron refrigerant (R-410A)
- State-of-the-art electronically commutated motor (ECM) variable speed blower motor option
- Stainless steel drain pan
- E-coated air coil available
- Mute package for quieter operation available
- Versatility: apply to commercial boiler/cooling tower or geothermal applications (select extended range option for use in geothermal applications)
- Performance certified to ARI/ISO 13256-1:1998
- Flexible and reliable multiple protocol WSHP Open controller can use BACnet™, Modbus®, N2, and LON (with a separate card) protocols for integrating energy efficiency and precise unit control
- Modulating hot water reheat (HWR) available for dehumidification capability

Features/Benefits

The Aquazone single-stage water source heat pump with Puron refrigerant (R-410A) is a high quality, efficient solution for all boiler/tower and geothermal applications.

Operating efficiency

Carrier water source heat pumps (WSHPs) are designed for quality and high performance over a lifetime of operation. Single-stage WSHP models with Puron refrigerant (R-410A) offer cooling EERs (Energy Efficiency Ratios) to 27.4 and heating COPs (Coefficient of Performance) to 5.9.

**ASHRAE
90.1
COMPLIANT**

**Well exceeds
ASHRAE 90.1 and
Energy Star Standards.**


Puron®
the environmentally sound refrigerant

Features/Benefits (cont)



All efficiencies stated are in accordance with standard conditions under ISO (International Organization for Standardization) Standard 13256-1:1998 and provide among the highest ratings in the industry, exceeding ASHRAE (American Society of Heating, Refrigerant and Air Conditioning Engineers) 90.1 Energy Standards.

High quality construction and testing

All units are manufactured to meet extensive quality control protocol from start to finish through an automated control system, which provides continuous monitoring of each unit and performs quality control checks as equipment progresses through the production process. Standard construction features of the Aquazone™ units include:

Cabinet — Standard unit fabrication consists of heavy gage galvanized sheet metal cabinet construction designed for part standardization (i.e., minimal number of parts) and modular design. Compressor section interior surfaces are lined with 1/2 in. thick, dual density, 1 3/4 lb per cubic ft acoustic type fiberglass insulation. Air-handling section interior surfaces are lined with 1/2 in. thick, single density, 1 3/4 lb per cubic ft foil-backed fiber insulation for ease of cleaning. Insulation placement is designed to eliminate any exposed edges to prevent the introduction of glass fibers into the airstream.

Horizontal and vertical water source heat pumps are fabricated from heavy gage G90 galvanized steel with a powder coat paint finish. Compact cabinet

dimensions are designed to fit tight space limitations in both horizontal and vertical configurations.

Compressor — Aquazone 50PS single-stage units include a rotary compressor in sizes 006-012 and a scroll compressor in sizes 018-070. Single-stage models with Puron® refrigerant (R-410A) offer a dual level vibration isolation system. The compressor is mounted on computer selected vibration isolation springs to a large heavy gage compressor mounting tray plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. The compressor has thermal overload protection and is located in an insulated compartment away from the airstream to minimize sound transmission.

ARI/ISO labels — Aquazone units have ARI (Air Conditioning & Refrigeration Institute)/ISO, NRTL (Nationally Recognized Testing Lab), or ETL labels and are factory tested under normal operating conditions at nominal water flow rates. Quality assurance is provided via testing report cards shipped with each unit to indicate specific unit performance under cooling and heating modes of operation.

Blower and motor assembly — Aquazone 50PS units are available with permanent split capacitor (PSC), high-static PSC or electronically commutated motors (ECM).

NOTE: The ECM blower motors are not available in 575-v units. The PSC and high-static PSC blower motors, when used with a Thermostat™ device and/or a humidistat and the Deluxe D controls, allow for intelligent

fan speed reduction to provide the IdealHumidity™ system. The ECM blower motor, when used with a Thermostat device and/or a humidistat (and any controller), also allows for intelligent fan speed reduction to provide the IdealHumidity system. The variable-speed blower systems work in concert with the Thermostat and/or humidistat control to remove more moisture than a standard system, making the occupants feel cool and more comfortable.

Refrigeration/water circuit — All units contain sealed Puron refrigerant (R-410A) circuits including a high-efficiency hermetic compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum-lanced fin and rifled copper tube refrigerant-to-air heat exchanger, reversing valve, coaxial (tube-in-tube) refrigerant-to-water heat exchanger, and safety controls including a high-pressure switch, low-pressure switch, water coil low temperature sensor, and air coil low temperature sensor.

Quiet operation

Fan motor insulation and double isolated compressor are provided for sound isolation, cabinets are fully insulated to reduce noise transmission, low speed blowers are utilized for quiet operation through reduced outlet air velocities, and air-to-refrigerant coils are designed for lower airflow coil face velocities. Additional sound mitigation can be attained with the mute package option.

Puron® refrigerant (R410-A)

Puron refrigerant (R-410A) is a non-chlorine based refrigerant. Puron refrigerant characteristics, compared to R-22, have:

- Binary and near azeotropic mixture of 50% R-32 and 50% R-125.
- Higher efficiencies (50 to 60% higher operating pressures).
- Non-ozone depleting potential and low global warming potential.
- Virtually no glide. Unlike other alternative refrigerants, the two components in Puron refrigerant have virtually the same leak rates. Therefore, refrigerant can be added if necessary without recovering the charge.

Table of contents

	Page
Features/Benefits	1-4
Model Number Nomenclature	5
ARI/ISO Capacity Ratings	6
Physical Data	7
Options and Accessories	8-11
Dimensions	12-14
Selection Procedure	15
Performance Data	16-40
Electrical Data	41-43
Typical Piping and Wiring	44
Typical Control Wiring Schematics	45-52
Application Data	53-58
Controls	59-62
Guide Specifications	63-68

E-coated (electro-coated) air coils

The 50PSH, PSV, PSD units are available with an optional e-coated air coil. This electro-coating process will provide years of protection against corrosion from airborne chemicals. Modern building materials, such as countertops, floor coverings, paints and other materials, can “outgas” chemicals into the indoor air. Some of these chemicals are suspected of contributing to corrosion in the air coils found in both traditional and geothermal heating and cooling equipment. Corrosion often results in refrigerant leaks and eventual failure of the air coil, costing hundreds of dollars to replace. Studies have also shown that these air coil coatings improve moisture shedding and therefore, improve a unit's moisture removal capability resulting in a more comfortable indoor environment. The 50PSH, PSV, PSD units assure both maximum air coil life and comfort.

Design flexibility

Airflow configurations for horizontal units are available in four patterns including left or right return, and left, right, or back discharge. Horizontal and downflow units are field convertible from left or right discharge to back discharge. Vertical units are available in three airflow patterns including top discharge with right or left return. Standard entering water temperature is between 60 and 95 F. Extended entering water temperature range between 20 and 120 F offers maximum design flexibility for all applications. Water flow rates as low as 1.5 gpm per ton assist with selection from a various range of circulating pumps. Factory-installed options are offered to meet specific design requirements.

Safe, reliable operation

Standard safety features for the refrigerant circuit include high-pressure switch, low-pressure sensor to detect loss of refrigerant, and low air temperature sensor to safeguard against freezing. Equipment safety features include water loop temperature monitoring, voltage protection, water coil freeze protection, and standard electronic condensate overflow shutdown. All safety features are tested and run at the factory to assure proper operation of all components and safety switches.

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

The Aquazone™ unit is shipped to provide internal and external equipment protection. Shipping supports are placed under the blower housing and compressor feet. In addition, horizontal and vertical units are both mounted on oversized pallets with lag bolts for sturdiness and maximum protection during transit.

Ease of installation

The Aquazone unit is packaged for simple low cost handling, with minimal time required for installation. All units are pre-wired and factory charged with refrigerant. Horizontal units are provided with factory-installed hangar isolation brackets. Vertical units are provided with an internally trapped condensate drain to reduce labor associated with installing an external trap for each unit. Water connections (FPT) and condensate drains (FPT) are anchored securely to the unit cabinet, eliminating the need for backup wrenches.

Simple maintenance and serviceability

The Aquazone water source heat pump (WSHP) units are constructed to provide ease of maintenance. Units allow access to the compressor section from 3 sides and have large removable panels for easy access. Additional panels are provided to access the blower and control box sections.

The blower housing assembly can be serviced without disconnecting ductwork from the dedicated blower access panel. Blower units are provided with permanently lubricated bearings for worry-free performance. Blower inlet rings allow removal of the blower wheel without having to remove the housing or ductwork connections.

Electrical disconnection of the blower motor and control box is easily accomplished from quick disconnects on each component.

Easy removal of the control box from the unit provides access to all refrigeration components.

The refrigeration circuit is easily tested and serviced through the use of high and low pressure ports integral to the refrigeration circuit.

Maximum control flexibility

Aquazone water source heat pumps provide reliable control operation using a standard microprocessor board with flexible alternatives for many direct digital controls (DDC) applications including the Carrier Comfort Network® (CCN) controls and open protocol systems.

The Aquazone standard unit solid-state control system, the Complete C, provides control of the unit compressor, reversing valve, fan, safety features, and troubleshooting fault indication features. The Complete C control system is one of the most user friendly, low cost, and advanced control boards found in the WSHP industry. Many features are field selectable to provide the ultimate in field installation flexibility. The overall features of this standard control system include:

50-va transformer — The transformer assists in accommodating accessory loads.

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

Random start relay — The random start relay ensures a random delay in energizing each different WSHP unit. This option minimizes peak electrical demand during start-up from different operating modes or after building power outages.

High and low pressure refrigerant protection — This protection safeguards against unreliable unit operation and provides a warning for refrigerant leaking.

Condensate overflow sensor — The electronic sensor is mounted to the drain pan. When condensate pan liquid reaches an unacceptable level, unit is automatically deactivated and placed in a lockout condition. Thirty continuous seconds of overflow is recognized as a fault by the sensor.

High and low voltage protection — Safety protection for excessive or low voltage conditions is included.

Automatic intelligent reset — The unit will automatically restart 5 minutes after shutdown if the fault has cleared. Should a fault occur 3 times sequentially, lockout will occur.

Features/Benefits (cont)



Accessory output — A 24-v output is provided to cycle a motorized water valve or damper actuator with compressor in applications such as variable speed pumping arrangements.

Performance Monitor (PM) — This unique feature monitors water temperatures to warn when the heat pump is operating inefficiently or beyond typical operating range. Field selectable switch initiates a warning code on the unit display.

Water coil freeze protection (selectable for water or antifreeze) — The field selectable switch for water and water/glycol solution systems initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.

Air coil freeze protection (check filter operation) — The field selectable switch for assessing excessive filter pressure drop initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.

Alarm relay setting — A selectable 24-v or pilot duty dry contact provides activation of a remote alarm.

Electric heat option — The output provided on the controller operates two stages of emergency electric heat.

Service Test mode with diagnostic LED (light-emitting diode) — The Service Test mode allows service personnel to check the operation of the WSHP and control system efficiently. Upon entering Service Test mode, time delays are sped up, and the Status LED will flash a code to indicate the last fault experienced for easy diagnosis. Based on the fault code flashed by the status LED, system diagnostics are assisted through the use of Carrier provided troubleshooting tables for easy reference to typical problems.

LED visual output — An LED panel indicates high pressure, low pressure, low voltage, high voltage, air/water freeze protection, condensate overflow, and control status.

WSHP Open multiple protocol controller — Carrier's state of the art water source heat pump multiple protocol controller is capable of communicating BACnet™, Modbus*, N2 and LON (with a separate card) protocols. The controller is designed specifically for Carrier's WSHPs in order to bring more features and benefits to the units such as waterside economizer control, *Registered trademark of Schneider Electric.

auxiliary heat, dehumidification, etc., in addition to independent compressor and fan operation. The WSHP Open controller can be used to actively monitor and control all modes of operation as well as monitor the following diagnostics and features: unit number, zone temperature, zone set point, zone humidity set point, discharge air temperatures, fan status, stages of heating, stages of cooling, outdoor-air temperature, leaving-air temperature, leaving water temperature, alarm status, and alarm lockout condition.

The controller also provides a proactive approach to maintenance and service enabling the unit to recognize and correct operating conditions outside of recommended operating conditions avoiding the need to manually restart equipment. From a system standpoint WSHP Open controller can accept both water and airside linkage.

Condenser water linkage provides optimized water loop operation using the UC (universal controller) Open XP loop controller. Loop pump operation is automatically controlled by WSHP equipment occupancy schedules, unoccupied demand and tenant override conditions. Positive pump status feedback prevents nuisance fault trips.

Airside linkage enables the WSHP equipment to be completely integrated with the Carrier's VVT® application as a system. The WSHP Open controller responds to individual zone demands rather than average temperature conditions to provide individual temperature control in each zone.

This controller has a 38.4 kilobaud communications capability and is compatible with i-Vu® Open building automation system controls and CCN controls. The addition of the Carrier CO₂ sensor in the conditioned space provides ASHRAE 62-99 compliance and demand controlled ventilation (DCV). A DCV control strategy is especially beneficial for a water source heat pump system to minimize the energy utilized to condition ventilation air. In combination with energy efficient Aquazone units, DCV may be the most energy efficient approach ever developed for a water source heat pump system.

The WSHP Open multiple protocol controller is designed specifically for constant volume (CV) and variable volume and temperature (VVT®) applications. This comprehensive controls system allows water source heat pumps

to be linked together to create a fully functional HVAC (heating, ventilation, and air conditioning) automation system.

PremierLink™ controller adds reliability, efficiency, and simplification

The PremierLink direct digital controller can be ordered as a factory-installed option. Designed and manufactured exclusively by Carrier, the controller can be used to actively monitor and control all modes of operation as well as monitor the following diagnostics and features: unit number, zone temperature, zone set point, zone humidity set point, discharge air temperatures, fan status, stages of heating, stages of cooling, outdoor-air temperature, leaving-air temperature, leaving water temperature, alarm status, and alarm lockout condition.

This controller has a 38.4 kilobaud communications capability and is compatible with i-Vu Open building automation system controls and CCN controls. The addition of the Carrier CO₂ sensor in the conditioned space provides ASHRAE 62-99 compliance and demand controlled ventilation (DCV). A DCV control strategy is especially beneficial for a water source heat pump system to minimize the energy utilized to condition ventilation air. In combination with energy efficient Aquazone units, DCV may be the most energy efficient approach ever developed for a water source heat pump system.

The PremierLink peer-to-peer, Internet ready communicating control is designed specifically for constant volume (CV) and variable volume and temperature (VVT®) applications. This comprehensive controls system allows water source heat pumps to be linked together to create a fully functional HVAC (heating, ventilation, and air conditioning) automation system.

LON protocol for diverse control — The LON controller option is ideal when building automation requires interoperability across diverse control platforms. This LONMark® compliant offering can operate as standalone or as a part of Local Operating Network (LON) via the LonWorks® FTT-10 Free Topology communication network. Factory completed pre-engineered applications specific to Aquazone water source heat pumps and digital wall sensors communicating over



Sensor Link (S-Link) communication protocol completes a system of networked control.

Humidity control — Aquazone 50PSH, PSV, PSD units provide very good latent capacity and are an excellent choice for controlling humidity

within a zone in many applications. The latent capacity of the units can be increased based on zone conditions with either the use of fan speed control and a humidistat or with the modulating WSHP Open controller hot water reheat option. The Deluxe D controls

option provides fan speed control based on relative humidity and is an effective, low-cost means of controlling humidity. For certain applications in which a significant amount of latent capacity is required, the modulating hot water reheat option is a good solution.

Model number nomenclature

50PSH,PSV,PSD PREMIUM EFFICIENCY

50PSV 024 J C C 3 0 1 3 0

Aquazone™ Single Stage Water Source Heat Pump with Puron® Refrigerant (R-410A)

50PSD – Vertical Downflow Configuration
50PSH – Horizontal Configuration
50PSV – Vertical Upflow Configuration

Size – Nominal Tons

006* – 1/2 024 – 2 048 – 4
009* – 3/4 030 – 2-1/2 060 – 5
012* – 1 036 – 3 070 – 6
018 – 1-1/2 042 – 3-1/2

Airflow Configuration†

50PSH Units

Option	Return	Discharge	Blower Motor
A	Right	Left	PSC HS
B	Right	Back	PSC
C	Right	Back	PSC HS
D	Left	Right	PSC HS
E	Left	Back	PSC
F	Left	Back	PSC HS
N	Right	Left	ECM
P	Right	Back	ECM
S	Left	Right	PSC
W	Left	Right	ECM
Y	Left	Back	ECM
Z	Right	Left	PSC

50PSV Units

Option	Return	Discharge	Blower Motor
G	Right	Top	PSC HS
J	Left	Top	ECM
K	Right	Top	ECM
L	Left	Top	PSC
M	Left	Top	PSC HS
R	Right	Top	PSC

50PSD Units

Option	Return	Discharge	Blower Motor
G	Right	Bottom	PSC HS
J	Left	Bottom	ECM
K	Right	Bottom	ECM
L	Left	Bottom	PSC
M	Left	Bottom	PSC HS
R	Right	Bottom	PSC

Control

C – Complete C Microprocessor Control
D – Deluxe D Microprocessor Control
L – Complete C with LON
M – Deluxe D with LON
P – Complete C with PremierLink™ Control
W – Complete C with WSHP Open Multiple Protocol Communicating Control
Y – Deluxe D with WSHP Open Multiple Protocol Communicating Control

LEGEND

ECM — Electronically Commutated Motor
EWT — Entering Water Temperature
HS — High Static
HWG — Hot Water Generator
HWR — Hot Water Reheat
LON — Local Operating Network
PSC — Permanent Split Capacitor

Water Circuit Options

0 – None
2 – HWG Coil Only
8 – Auto Flow Regulator Sized for 2.5 Gpm/Ton
9 – Auto Flow Regulator Sized for 3.0 Gpm/Ton

Operating Range/Sound Option

1 – Extended EWT Range (20 to 110 F)
2 – Extended EWT Range with Mute Package
3 – Standard EWT Range (60 to 95 F)
4 – Standard EWT Range with Mute Package

Packaging

1 – Single Pack, Domestic

Revision Code

0 – Current Revision

Voltage

1 – 575-3-60
3 – 208/230-1-60
4 – 265-1-60
5 – 208/230-3-60
6 – 460-3-60

Heat Exchanger Options

Valve	Non Coated Air Coil		Coated Air Coil	
	Copper	Cupronickel	Copper	Cupronickel
None	C	N	A	J
Motorized Valve	T	S	U	W
HWR**	E	N/A	D	N/A



*Not available on 50PSD units.

†ECM and PSC HS motors not available for sizes 006-012.

**Must order Deluxe D when selecting HWR option. Units with the HWR option installed in an open loop application require an internal bronze pump. The cupronickel heat exchanger option, which includes a bronze pump, must be used. Failure to select this option could result in premature equipment failure. HWR is not recommended for applications with poor water quality. The copper heat exchanger with cast iron pump (standard modulating reheat option) is designed for closed loop systems.

ARI/ISO capacity ratings



50PS UNIT SIZE	FAN MOTOR	WATER LOOP HEAT PUMP				GROUND WATER HEAT PUMP				GROUND LOOP HEAT PUMP			
		Cooling 86 F		Heating 68 F		Cooling 59 F		Heating 50 F		Cooling 77 F		Heating 32 F	
		Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP
006	PSC	6,300	15.7	8,000	5.4	7,400	25.5	6,300	4.4	6,700	18.5	4,800	3.4
	ECM	6,300	15.7	8,000	5.4	7,400	25.5	6,300	4.4	6,700	18.5	4,800	3.4
009	PSC	9,300	15.3	11,100	4.8	11,100	25.2	9,400	4.3	10,000	18.1	7,100	3.4
	ECM	9,300	15.3	11,100	4.8	11,100	25.2	9,400	4.3	10,000	18.1	7,100	3.4
012	PSC	11,700	15.4	13,800	4.5	13,300	24.6	11,800	4.0	12,300	18.1	9,500	3.5
	ECM	11,700	15.4	13,800	4.5	13,300	24.6	11,800	4.0	12,300	18.1	9,500	3.5
018	PSC	18,600	15.0	23,000	5.2	21,300	24.8	18,800	4.5	19,500	18.4	14,500	3.6
	ECM	19,200	16.5	23,300	5.9	22,100	26.3	18,900	4.9	20,200	19.4	14,500	3.9
024	PSC	25,100	16.2	29,600	4.9	28,600	25.7	25,000	4.3	26,300	19.1	19,000	3.7
	ECM	25,000	17.0	30,000	5.3	28,100	27.4	25,100	4.6	26,000	20.0	19,400	3.8
030	PSC	28,200	15.3	34,900	5.0	31,700	22.9	29,400	4.4	29,400	17.6	23,600	3.8
	ECM	28,600	15.6	35,200	5.3	32,200	23.9	29,400	4.6	29,800	18.0	23,700	3.9
036	PSC	33,000	16.6	39,800	5.5	37,300	25.1	32,900	4.8	34,500	19.2	25,700	3.9
	ECM	33,100	17.6	39,500	5.8	37,300	26.5	32,900	5.1	34,600	20.2	25,800	4.2
042	PSC	37,400	16.0	49,400	5.4	42,900	24.3	40,100	4.6	39,300	18.4	31,600	3.8
	ECM	37,800	17.1	48,600	5.7	44,200	27.1	39,300	4.9	40,000	20.0	30,400	4.0
048	PSC	47,000	15.3	60,000	5.0	53,900	23.3	49,000	4.4	49,900	17.6	39,000	3.7
	ECM	47,600	15.9	59,700	5.2	54,100	24.6	48,700	4.5	50,100	18.5	38,400	3.8
060	PSC	61,000	15.9	70,400	5.0	67,000	23.2	58,700	4.5	63,300	18.2	46,500	3.7
	ECM	61,000	16.4	70,800	5.2	67,200	24.3	59,100	4.6	64,000	19.0	46,700	3.8
070	PSC	67,500	14.4	85,800	5.0	77,100	21.6	69,400	4.3	70,800	16.6	54,000	3.6
	ECM	67,000	15.2	84,900	5.0	77,000	23.5	69,000	4.4	70,000	17.8	53,900	3.6

LEGEND

- COP** — Coefficient of Performance
- db** — Dry Bulb
- EER** — Energy Efficiency Ratio
- ECM** — Electronically Commutated Motor
- PSC** — Permanent Split Capacitor
- wb** — Wet Bulb

NOTES:

1. Cooling capacities based upon 80.6 F db, 66.2 F wb entering air temperature.
2. Heating capacities based upon 68 F db, 59 F wb entering air temperature.
3. All ratings based upon operation at the lower voltage of dual voltage rated models.
4. Certified in accordance with the ARI/ISO Standard 13256-1 Certification Program.



Physical data



50PS UNIT SIZE	006*	009*	012*	018	024	030	036	042	048	060	070
COMPRESSOR (1 Each)	Rotary			Scroll							
FACTORY CHARGE R-410A (oz)	24	32	34	50	56	58	70	80	80	136	144
ECM FAN MOTOR AND BLOWER											
Fan Motor (Hp)	N/A	N/A	N/A	1/2	1/2	1/2	1/2	1/2	1	1	1
Blower Wheel Size (D x W) (in.)	N/A	N/A	N/A	9 x 7	9 x 7	9 x 7	11 x 10	11 x 10	11 x 10	11 x 10	11 x 10
PSC FAN MOTOR AND BLOWER											
(3 Speeds)											
Fan Motor (Hp)	1/25	1/20	1/8	1/6	1/5	1/3	1/2	1/2	3/4	1	1
High Static Fan Motor (Hp)	N/A	N/A	N/A	1/5	1/3	1/2	1/2	3/4	3/4	1	N/A
Blower Wheel Size (D x W) (in.)	6 x 5	6 x 5	6 x 5	9 x 7	9 x 7	9 x 7	10 x 10	10 x 10	10 x 10	11 x 10	11 x 10
Heat Exchanger Water Volume (gal.)	0.56	0.56	0.56	0.56	0.76	0.76	0.92	1.24	1.24	1.56	1.56
COAX VOLUME (gal.)	.17	.29	.45	.56	.76	.76	.92	1.24	1.24	1.56	1.56
WATER CONNECTION SIZE, FPT (in.)	1/2	1/2	1/2	3/4	3/4	3/4	3/4	1	1	1	1
HWG CONNECTION SIZE, FPT (in.)	N/A	N/A	N/A	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
VERTICAL UPFLOW/DOWNFLOW											
Air Coil Dimensions (H x W) (in.)	16 x 16	16 x 16	16 x 16	24 x 20	28 x 20	28 x 20	28 x 25	32 x 25	32 x 25	36 x 25	36 x 25
Throwaway Filter, Standard 1-in., Qty...Size	1... 16 x 20	1... 16 x 20	1... 16 x 20	1... 24 x 24	1... 28 x 24	1... 28 x 24	1... 28 x 30	2... 16 x 30	2... 16 x 30	16 x 30; 1... 20 x 30	16 x 30; 1... 20 x 30
Weight											
Operating (lb)	126	146	150	252	266	268	327	414	416	441	443
Packaged (lb)	136	156	160	262	276	278	337	424	426	451	453
HORIZONTAL											
Air Coil Dimensions (H x W) (in.)	16 x 16	16 x 16	16 x 16	18 x 27	18 x 31	18 x 31	20 x 35	20 x 40	20 x 40	20 x 45	20 x 45
Throwaway Filter, Standard 1-in., Qty...Size	1... 16 x 20	1... 16 x 20	1... 16 x 20	2... 18 x 18	2... 18 x 18	2... 18 x 18	12 x 20; 1... 20 x 25	18 x 20; 1... 20 x 24	18 x 20; 1... 20 x 24	2... 20 x 24	2... 20 x 24
Weight											
Operating (lb)	136	156	160	257	266	268	327	414	416	441	443
Packaged (lb)	146	166	170	267	276	278	337	424	426	451	453
Corner (lb)											
Left Front	45.0	55.0	56.0	74.7	78.8	79.4	104.4	144.3	145.0	182.3	183.1
Left Rear	33.0	36.0	37.0	66.2	69.9	70.4	83.7	97.7	98.1	78.4	78.8
Right Front	30.0	33.0	34.0	63.6	67.2	67.7	74.9	92.1	92.6	72.5	72.8
Right Rear	28.0	32.0	33.0	47.5	50.2	50.5	64.0	79.9	80.3	107.8	108.3

LEGEND

- ECM — Electronically Commutated Motor
- FPT — Female Pipe Thread
- HWG — Hot Water Generator
- PSC — Permanent Split Capacitor
- TXV — Thermostatic Expansion Valve

*Unit sizes 006-012 not available on 50PSD unit.

NOTE: All units have spring compressor mountings, TXV expansion devices, and 1/2-in. and 3/4-in. electrical knockouts.

Options and accessories



ITEM	FACTORY-INSTALLED OPTIONS	FIELD-INSTALLED ACCESSORIES
Aquazone™ System Control Panel		X
2-in. Filter Rack		X
Ball Valves (Brass Body)		X
Blower Motor		
Permanent Split Capacitor, High Static	X	
Electronically Commutated Motor	X	
Cupronickel Heat Exchangers	X	
Deluxe D Control System	X	
Extended Range Units	X	
Fire-Rated Hoses		X
Hose Kit Assemblies		X
Hot Water Generator	X	
PremierLink™ Intelligent Controller	X	
LONMark® Compliant Controller	X	
UC Open XP Loop Controller		X
Non-Programmable Thermostat		X
PremierLink Accessories		X
Programmable 5-Day Thermostat		X
Programmable 7-Day Flush-Mount Thermostat		X
Programmable 7-Day Light-Activated Thermostat		X
Programmable 7-Day Thermostat		X
Remote Sensors (SPT, CO ₂ , Humidity Sensors)		X
Solenoid Water Control Valves (Brass Body)		X
Sound Attenuation (Mute) Package	X	
Two-Way Motorized Control Valve	X	X
Water Circuit Options	X	
Y Strainers (Brass Body)		X
Modulating Hot Water Reheat (HWR)	X	
WSHP Open Multiple Protocol Controller	X	

Factory-installed options

Cupronickel heat exchangers are available for higher corrosion protection for applications such as open tower, geothermal, etc. Consult the water quality guidelines for proper application and selection of this option.

Sound attenuation package (mute package) is available for applications that require especially low noise levels. With this option, a double application of sound attenuating material is applied, access panels are double dampened with 1/2-in. thick density fiberglass insulation, which is applied to the basepan, and a unique application of special dampening material is applied to the curved portion of the blower. The mute package in combination with standard unit noise reduction features (i.e., as mentioned previously) provides sound levels and noise reduction to the highest degree.

Extended range units have an insulated coaxial coil and insulated refrigerant and water piping to prevent condensation, and therefore potential dripping problems, in applications where the entering water temperature is below the normal operating range (less than 60 F). Units are capable of operating with an entering water temperature of 20 to 120 F.

Hot water generator coil and 125 F high temperature switch to generate hot water using the unit. Hot water pumps are not provided with this option.

Water circuit options provide internally mounted 2.5 or 3.0 gpm per ton automatic flow regulating valves for easier installation.

Modulating hot water reheat diverts condenser water through a water-to-air coil that is placed after the evaporator coil. The modulating reheat valve automatically adjusts reheat capacity based upon leaving-air temperature and loop entering-water temperature to provide 100% reheat and neutral supply air to the space.

Two-way motorized control valve can be provided for applications involving open type systems or variable speed pumping. This valve will slowly open and close in conjunction with the compressor operation to shut off or turn on water to the unit.

WSHP Open multiple protocol controller is a proactive controller capable of communicating BACnet™, Modbus®, N2, and LON (with a separate card) protocols. The controller is designed to allow users access and ability to change and configure multiple settings and features including indoor air quality (IAQ), waterside economizer controls, etc.

Deluxe D control system provides the same functions as the Complete C control system while incorporating additional flexibility and functions to include:

Thermostat input capabilities accommodate emergency shutdown mode and night setback with override potential. Night setback from low temperature thermostat with 2-hour override is initiated by a momentary signal from the thermostat.

Compressor relay staging is used with dual stage units (units with 2 compressors and 2 Deluxe D controls) or in master/slave applications.

Boilerless electric heat control system allows automatic changeover to electric heat at low loop water temperature.

Intelligent reversing valve operation minimizes reversing valve operation for extended life and quiet operation.

Thermostat type select (Y, O or Y, W) provides ability to work and select heat pump or heat/cool thermostats (Y, W).

Reversing valve signal select (O or B) provides selection for heat pump O/B thermostats.

The IdealHumidity™ system provides operation of fan control for dehumidification operation (units with ECM motor have input on the ECM board; optional Deluxe D board is not required).

Multiple units on one thermostat/wall sensor provides for communication for up to three heat pumps on one thermostat.

Boilerless changeover temperature provides selection of boilerless changeover temperature set point.

Accessory relays allow configuration for multiple applications including fan and compressor cycling, digital night setback (NSB), mechanical night setback, water valve operation, and outside air damper operation.

PremierLink™ controller is compatible with the Carrier Comfort Network® (CCN) and other building automation systems (BAS). This control is designed to allow users the access and ability to change factory-defined settings thus expanding the function of the standard unit.

*Registered trademark of Schneider Electric.



LONMark® compliant controller contains the factory-loaded Aquazone™ water source heat pump application for an interoperable control solution.

Permanent split capacitor (high static) blower motors enable the 50PS units to increase performance levels in high-static applications.

Electronically commutated motors (ECM) provide soft starting, maintain constant airflow over the motor static operating range and provides airflow adjustment on the motor control board. The fan motor is isolated from the housing by rubber grommets, is permanently lubricated and has thermal overload protection.

Field-installed accessories

Aquazone™ system control panel includes a preprogrammed, easy to use, Carrier Comfort Controller set up for a WSHP system.

- Panel coordinates and monitors loop water temperature and all water side ancillary equipment.
- The 5ORLP model nomenclature is used to customize the control panel options to control all WSHP system requirements.
- Panel can be ordered to include 2, 4, 6, or 8 stages of system heat rejection.
- Panel can be ordered to include 2, 4, 6, or 8 stages of system heat addition.
- Panel can be ordered with unique WSHP zone operation capabilities for stand-alone systems (i.e., noncommunicating) to control 10 or 18 zones of WSHP units.
- Panel can be ordered to control variable frequency cooling tower fan operation.
- System pumping operation can be configured for start/stop, lead/lag, or variable frequency pump operation.
- Direct Digital Controls (DDC) compatible using the Carrier Comfort Network® (CCN) and WSHP units utilizing PremierLink™ CCN controllers.

Carrier's line of Aquazone thermostats are both attractive and multi-functional, accommodating stand-alone water source heat pump installations.

Programmable 7-day thermostat — Thermostat offers 2-stage heat, 2-stage cool, auto changeover, 7-day programmable with copy command, 4 settings per day, fully electronic, 24 vac, backlit LCD, keypad lockout, no batteries required, 5-minute compressor protection, NEVERLOST™ memory, 3 security levels, and temperature display in degrees F or C.

Programmable 7-day light-activated thermostat — Thermostat offers same features as the 7-day programmable thermostat and includes occupied comfort settings with lights on, unoccupied energy savings with lights off.

Programmable 7-day flush-mount thermostat — Thermostat offers same features as the 7-day programmable thermostat and includes locking coverplate with tamper proof screws, flush to wall mount, holiday/vacation programming, set point limiting, dual point with adjustable deadband, O or B terminal, and optional wall or duct-mounted remote sensor.

Programmable 5-day thermostat — Thermostat offers 2-stage heat, 2-stage cool, auto changeover, 5-minute built-in compressor protection, locking cover included,

temperature display in degrees F or C, keypad lockout, backlit display, 5-1-1 programming, O or B terminal, dual set point with adjustable deadband, configurable display, self-prompting program, and 4 settings per day.

Non-programmable thermostat — Thermostat offers 2 heat stages, 2 cool stages, auto changeover, 5-minute built-in compressor protection, locking cover included, temperature display in degrees F or C, keypad lockout, large display, backlit display, O or B terminal, dual set point with adjustable deadband, and backplate with terminals.

UC Open XP loop controller with six stages (2 stages for heating and 4 stages for cooling) includes:

- Loop temperature alarms
- Two pump single loop flow monitoring with the ability to manually select the lead pump
- One common alarm signal and indicating light and one audible alarm
- Loop water temperature sensor test circuit
- Functional test simulation from operator keypad
- Real timeclock, industrial noise ratings
- Loop water temperature control switch

Filter rack (2 in.) is available in place of the standard 1-in. return air filter to enhance the filtration system of the water source heat pump. The 2-in. filter rack does not include filters.

Fire-rated hoses are 2 ft long and have a fixed MPT on one end and a swivel with an adapter on the other end. Hose kits are provided with both a supply and return hose and can be either stainless steel or galvanized. Two sizes are available (3/4 and 1 in.).

Ball valves (brass body) are used for shutoff and balancing water flow and are available with memory, memory stop, and pressure temperature ports. Ball valves consist of UL-listed brass body, ball and stem type with Teflon* seats and seals. Two sizes are available (3/4 and 1 in.).

Y strainers (bronze body) are “Y” type strainers with a brass cap. With a maximum operating pressure rating of 450 psi, the strainer screen is made of stainless steel and is available with blow down valves. Two sizes are available (3/4 and 1 in.).

Solenoid valves (brass body) offer 3.5 watt coil, 24 volt, 50/60 Hz, 740 amps inrush, .312 amps holding. Solenoid valves have slow operation for quiet system application. Two sizes are available (3/4 and 1 in.).

Hose kit assemblies provide all the necessary components to hook up a water-side system. Supply hose includes a ported ball valve with pressure temperature (P/T) plug ports, flexible stainless steel hose with swivel and nipple. Return hose includes a ball valve, preset automatic balancing valve (gpm) with two P/T ports, flexible stainless steel hose with a swivel and nipple, balancing valve, and low-pressure drop water control valve.

Remote sensors are available for Aquazone flush-mount thermostats and for wall (wired and wireless) or duct mounted applications.

SPT Standard offers space temperature sensor with communication port.

*Teflon is a trademark of E. I. du Pont de Nemours and Company.

Options and accessories (cont)



SPT Plus offers space temperature sensor with set point adjust, local override with indicating light and communication port.

SPT Pro offers space temperature sensor with LCD display, set point adjust, local override, alarm icon, outside air, and unit status with heating and cooling set points.

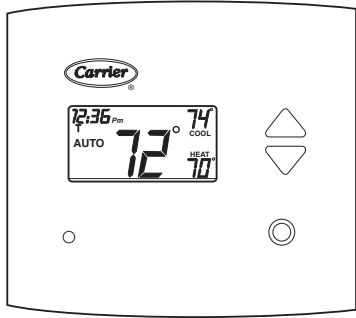
SPT Pro+ offers space temperature sensor with LCD display, set point adjust, local override, alarm icon, outside air, unit status with heating and cooling set points, and fan speed control.

LON wall sensors are available in 3 models: sensor only, sensor with status override indicator, and sensor with set point, status adjustment override, and digital LCD display.

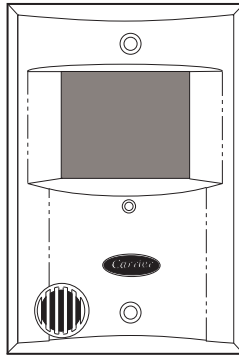
PremierLink™ accessories are available for providing a fully integrated WSHP DDC system. Accessories include supply air temperature sensors (with override and/or set point adjustment), communicating room sensors, CO₂ sensors (for use in demand control ventilation), and linkage thermostats (to control multiple units from one thermostat).

Two-way motorized control valve can be provided for applications involving open type systems or variable speed pumping. This valve will slowly open and close in conjunction with the compressor operation to shut off or turn on water to the unit.

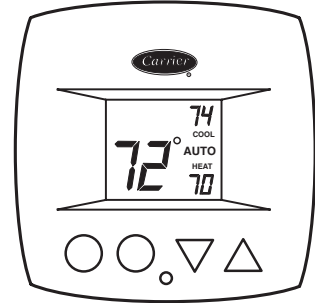
AQUAZONE™ THERMOSTATS



**7-DAY PROGRAMMABLE/
LIGHT-ACTIVATED PROGRAMMABLE**

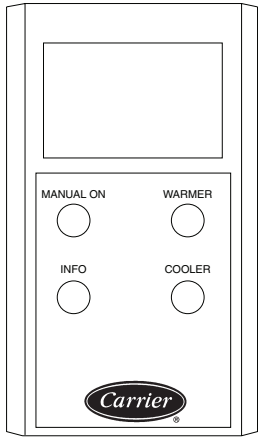


**7-DAY PROGRAMMABLE
FLUSH MOUNT**

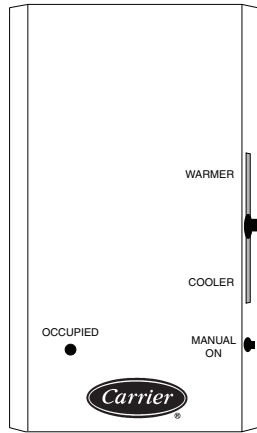


**5-DAY PROGRAMMABLE/
NON-PROGRAMMABLE**

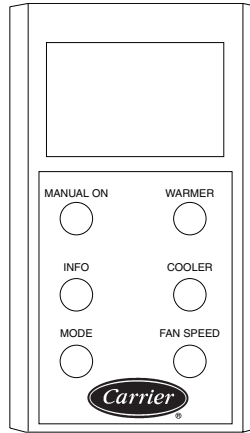
WSHP OPEN SENSORS



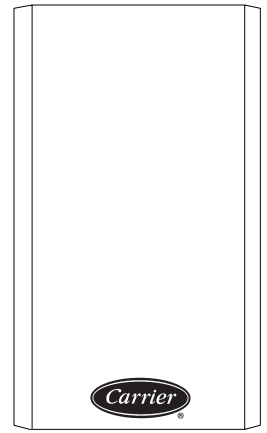
**SPACE TEMPERATURE
SENSOR WITH SET
POINT ADJUSTMENT
AND LOCAL OVERRIDE**



**SPACE TEMPERATURE
SENSOR WITH SLIDE SET
POINT ADJUSTMENT AND
LOCAL OVERRIDE**

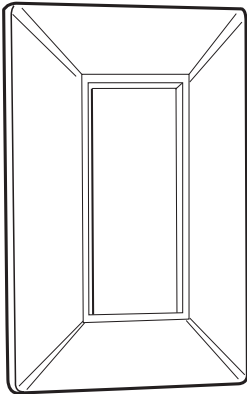


**SPACE TEMPERATURE SENSOR
WITH SET POINT ADJUSTMENT,
FAN SPEED CONTROL, AND
LOCAL OVERRIDE**

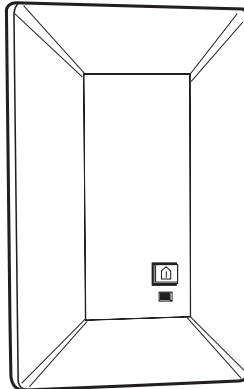


**SPACE TEMPERATURE
SENSOR ONLY**

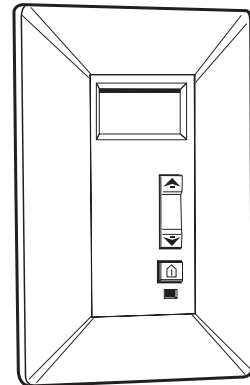
LON WALL SENSORS



SENSOR ONLY



SENSOR WITH OVERRIDE



**SENSOR WITH SET POINT ADJUSTMENT,
OVERRIDE AND DIGITAL LCD**

Dimensions



50PSH006-070 UNITS

50PSH UNIT SIZE	OVERALL CABINET (in.)			WATER CONNECTIONS (in.)						WATER CONNECTIONS (in.) - UNITS WITH HWR			ELECTRICAL KNOCKOUTS (in.)			DISCHARGE CONNECTION (in.) DUCT FLANGE INSTALLED (±0.10 in.)						RETURN CONNECTION (in.) USING RETURN AIR OPENING (±0.10 in.)			
				1	2	3	4	5	Loop Water FPT	HWG FPT	1	2	J 1/2 Cond	K 1/2 Cond	L 3/4 Cond	M (LH rtrn)	N	O Supply Height	P Supply Width	Q (RH rtrn)	R	S Return Depth	T Return Height	U	V
	A Width	B Depth	C Height	D In	E Out	F HWG In	G HWG Out	H Condensate	Loop In D	Loop Out E	Low Voltage	Ext Pump	Power Supply												
006,009,012	22.4	43.1	17.3	3.7	9.7	N/A	N/A	0.8	1/2	N/A	N/A	N/A	3.8	6.3	8.8	5.3	4.1	9.0	9.0	5.3	4.1	17.1	15.3	2.1	1.0
018	22.4	62.2	19.3	2.1	10.0	13.9	16.9	0.6	3/4	1/2	2.1	10.0	3.6	6.1	8.6	3.6	2.0	12.5	15.5	3.6	2.0	28.1	16.2	2.3	1.5
024,030	22.4	62.2	19.3	2.1	10.0	13.9	16.9	0.6	3/4	1/2	5.26	13.13	3.6	6.1	8.6	3.6	2.0	12.5	15.5	3.6	2.0	33.8	16.2	2.3	1.5
036	25.4	71.2	21.3	3.4	10.8	15.6	18.9	0.6	3/4	1/2	5.96	13.13	3.6	6.1	8.6	3.1	1.2	19.0	17.5	3.1	1.0	34.8	18.2	3.1	1.5
042,048	25.4	76.2	21.3	3.4	10.8	15.6	18.9	0.6	1	1/2	5.96	13.13	3.6	6.1	8.6	3.1	1.2	19.0	17.5	3.1	1.0	39.8	18.2	3.1	1.5
060,070	25.4	81.2	21.3	3.4	10.8	15.6	18.9	0.6	1	1/2	5.96	13.13	3.6	6.1	8.6	3.1	1.2	19.0	17.5	3.1	1.0	44.8	18.2	3.1	1.5

NOTES:

1. Condensate is 3/4-in. FPT copper.
2. Horizontal unit shipped with filter bracket only. This bracket should be removed for return duct connection.
3. Discharge flange and hanger kit is factory installed.
4. Shaded areas are recommended service areas, not required.

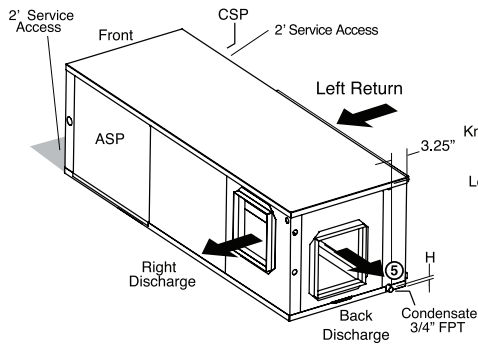
LEGEND

- ASP — Alternate Service Panel
- BSP — Blower Service Panel
- CAP — Control Access Panel
- CSP — Compressor Service Panel
- FPT — Female Pipe Thread
- HWG — Hot Water Generator
- HWR — Hot Water Reheat
- LH — Left Hand
- RH — Right Hand

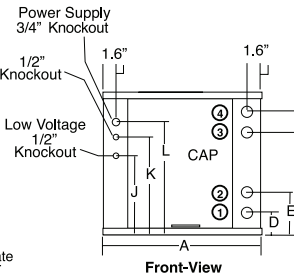
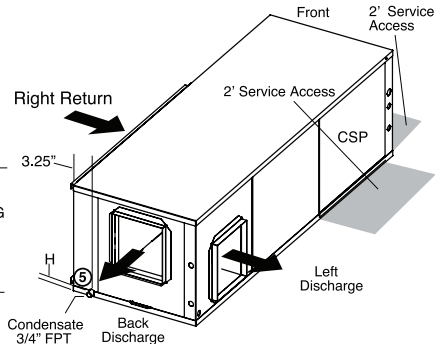
PSC BLOWER AIRFLOW CONFIGURATION

CODE	RETURN	DISCHARGE
E	Left	Back
B	Right	Back
S	Left	Right
Z	Right	Left

LEFT RETURN

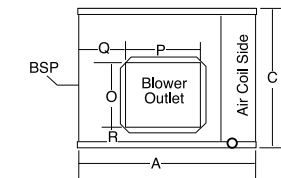


RIGHT RETURN

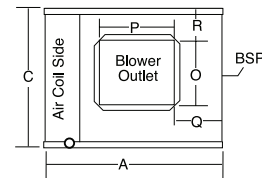


Unit Hanger Detail

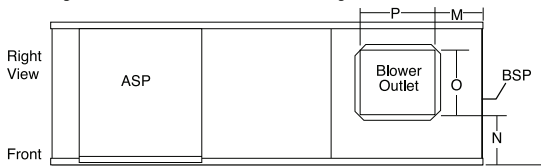
Model	x in.	y in.	z in.
006-012	43.1	24.5	20.3
018-030	62.1	24.5	23.3
036	71.1	27.5	23.3
042-048	76.1	27.5	23.3
060-070	81.1	27.5	23.3



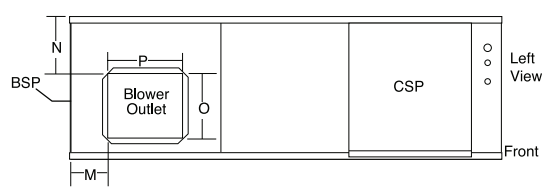
Configuration E - Left Return / Back Discharge



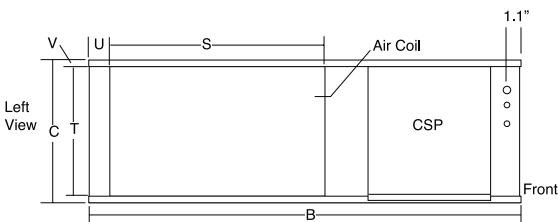
Configuration B - Right Return / Back Discharge



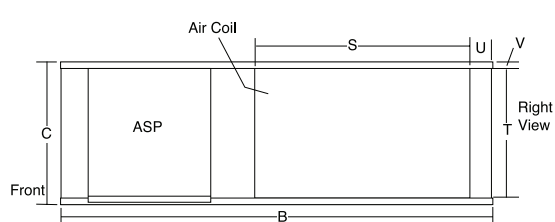
Configuration S - Left Return / Right Discharge - Air Coil Opening



Configuration Z - Right Return / Left Discharge - Air Coil Opening



Configuration S - Left Return / Right Discharge - Air Coil Opening



Configuration Z - Right Return / Left Discharge - Air Coil Opening

50PSV006-070 UNITS

50PSV UNIT SIZE	OVERALL CABINET (in.)			WATER CONNECTIONS (in.)							WATER CONNECTIONS (in.) - UNITS WITH HWR			ELECTRICAL KNOCKOUTS (in.)			DISCHARGE CONNECTION (in.) DUCT FLANGE INSTALLED (±0.10 in.)						RETURN CONNECTION (in.) USING RETURN AIR OPENING (±0.10 in.)		
				1	2	3	4	5	Loop Water FPT	HWG FPT	1	2	J 1/2 Cond	K 1/2 Cond	L 3/4 Cond	M (LH rtrn)	N	O Supply Width	P Supply Depth	Q (RH rtrn)	R	S Return Depth	T Return Height	U	
	A Width	B Depth	C Height	D In	E Out	F HWG In	G HWG Out	H Conden- sate	Loop In D	Loop Out E	Low Voltage	Ext Pump	Power Supply												
006,009, 012	22.4	21.6	34.5	3.7	9.7	N/A	N/A	7.4	1/2	N/A	N/A	N/A	3.8	6.3	8.8	6.7	6.3	9.0	9.0	6.7	2.3	17.1	15.3	1.0	
018	22.4	25.6	44.6	2.1	10.0	13.9	16.9	7.8	3/4	1/2	2.1	10.0	3.6	6.1	8.6	7.2	5.8	14.0	14.0	4.9	2.2	21.1	23.2	1.0	
024, 030	22.4	25.6	48.5	2.1	10.0	13.9	16.9	7.8	3/4	1/2	5.26	13.13	3.6	6.1	8.6	7.2	5.8	14.0	14.0	4.9	2.2	21.1	27.2	1.0	
036	25.4	30.6	50.5	3.4	10.8	15.6	18.9	7.8	3/4	1/2	5.96	13.13	3.6	6.1	8.6	6.4	6.3	18.0	18.0	5.3	2.2	26.1	27.2	1.0	
042, 048	25.4	30.6	54.5	3.4	10.8	15.6	18.9	7.8	1	1/2	5.96	13.13	3.6	6.1	8.6	6.4	6.3	18.0	18.0	5.3	2.2	26.1	31.2	1.0	
060, 070	25.4	30.6	58.5	3.4	10.8	15.6	18.9	7.8	1	1/2	5.96	13.13	3.6	6.1	8.6	6.4	6.3	18.0	18.0	5.3	2.2	26.1	35.2	1.0	

NOTES:

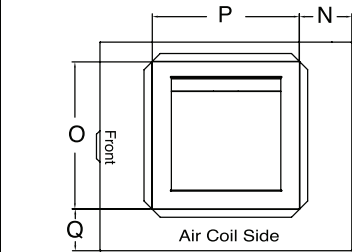
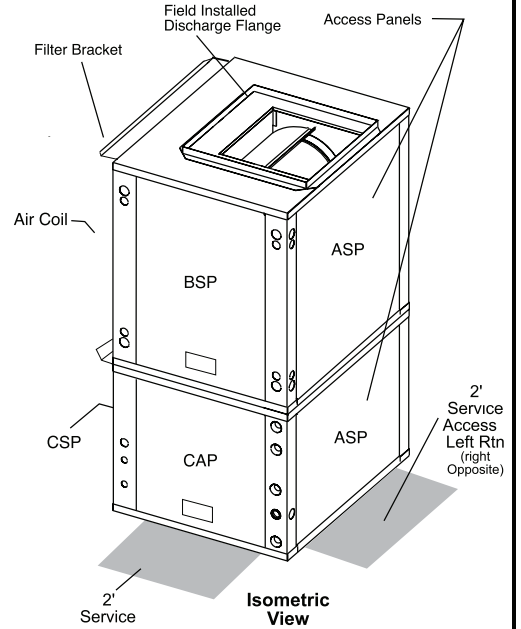
1. Condensate is 3/4-in. FPT copper and is switchable from side to front.
2. Vertical unit shipped with filter bracket only, extending from unit 2.5-in. This bracket should be removed for return duct connection.
3. Discharge flange field installed.
4. Shaded areas are recommended service areas, not required.

LEGEND

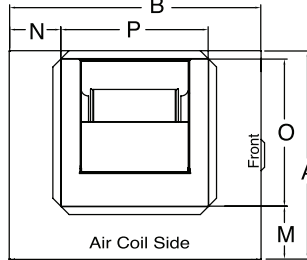
- ASP — Alternate Service Panel
- BSP — Blower Service Panel
- CAP — Control Access Panel
- CSP — Compressor Service Panel
- FPT — Female Pipe Thread
- HWG — Hot Water Generator
- HWR — Hot Water Reheat
- LH — Left Hand
- RH — Right Hand

PSC BLOWER AIRFLOW CONFIGURATION

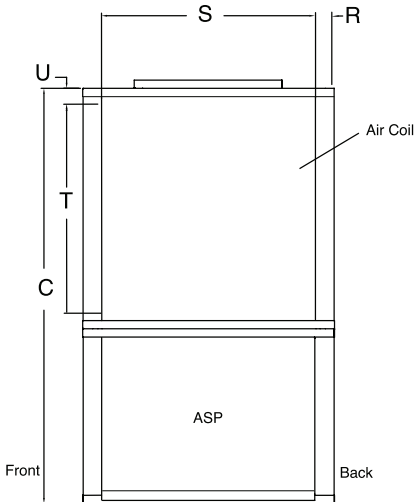
CODE	RETURN	DISCHARGE
L	Left	Top
R	Right	Top



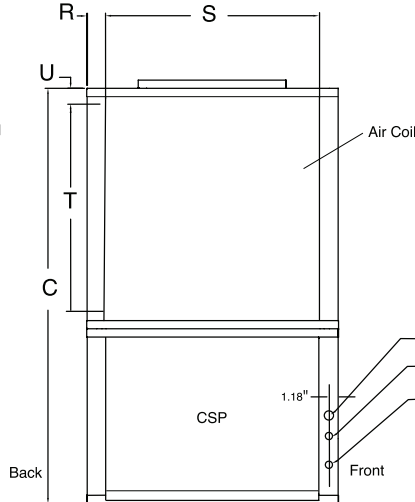
R - Configuration Right Return / Top Discharge - Top View



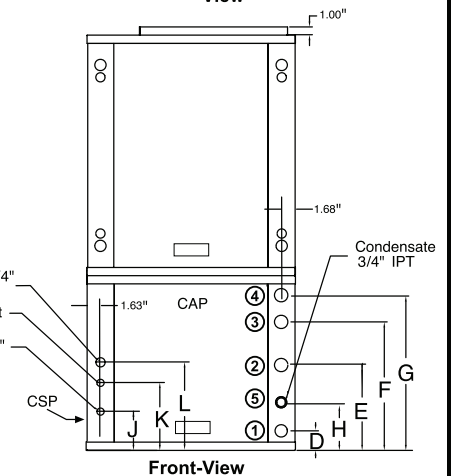
L - Configuration Left Return / Top Discharge - Top View



Right Return - Air Coil Opening - Right Side View



Left Return - Air Coil Opening - Left Side View



Front-View

Dimensions (cont)



50PSD018-070 UNITS

50PSD UNIT SIZE	OVERALL CABINET (in.)			WATER CONNECTIONS (in.)							WATER CONNECTIONS (in.) - UNITS WITH HWR		ELECTRICAL KNOCKOUTS (in.)			DISCHARGE CONNECTION (in.) DUCT FLANGE INSTALLED (±0.10 in.)						RETURN CONNECTION (in.) USING RETURN AIR OPENING (±0.10 in.)		
				1	2	3	4	5	Loop Water FPT	HWG FPT	1	2	J 1/2 Cond	K 1/2 Cond	L 3/4 Cond	M (LH rtn)	N	O Supply Width	P Supply Depth	Q (RH rtn)	R	S Return Depth	T Return Height	U
	A Width	B Depth	C Height	D In	E Out	F HWG In	G HWG Out	H Condensate	Loop In D	Loop Out E	Low Voltage	Ext Pump	Power Supply											
018	22.4	25.6	48.4	2.1	10.0	13.9	16.9	3.6	3/4	1/2	2.1	10.0	3.6	6.1	8.6	6.7	8.4	10.1	9.1	10.8	2.2	21.1	23.2	1.0
024, 030	22.4	25.6	52.5	2.1	10.0	13.9	16.9	3.6	3/4	1/2	5.96	13.13	3.6	6.1	8.6	6.7	8.4	10.1	9.1	10.8	2.2	21.1	27.2	1.0
036	25.4	30.6	54.5	3.4	10.8	15.6	18.9	3.6	3/4	1/2	5.96	13.13	3.6	6.1	8.6	7.2	9.0	13.4	12.9	10.4	2.2	26.1	27.2	1.0
042, 048	25.4	30.6	58.5	3.4	10.8	15.6	18.9	3.6	1	1/2	5.96	13.13	3.6	6.1	8.6	7.2	9.0	13.4	12.9	10.4	2.2	26.1	31.2	1.0
060, 070	25.4	30.6	62.5	3.4	10.8	15.6	18.9	3.6	1	1/2	5.96	13.13	3.6	6.1	8.6	7.2	9.0	13.4	12.9	10.4	2.2	26.1	35.2	1.0

NOTES:

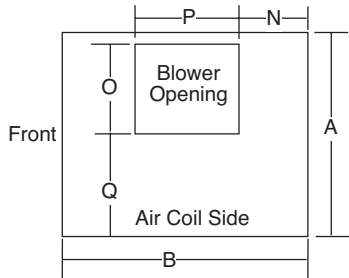
1. Condensate is 3/4-in. FPT copper and is switchable from side to front.
2. Vertical unit shipped with filter bracket only, extending from unit 2.5-in. This bracket should be removed for return duct connection.
3. Downflow unit does not have discharge flange, and is rated for zero clearance installation.
4. Shaded areas are recommended service areas, not required.

LEGEND

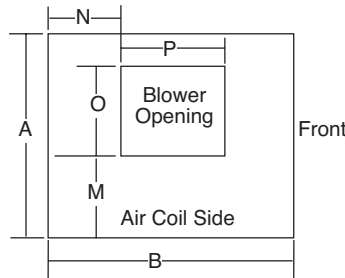
- ASP — Alternate Service Panel
- BSP — Blower Service Panel
- CAP — Control Access Panel
- CSP — Compressor Service Panel
- FPT — Female Pipe Thread
- HWG — Hot Water Generator
- HWR — Hot Water Reheat
- LH — Left Hand
- RH — Right Hand

PSC BLOWER AIRFLOW CONFIGURATION

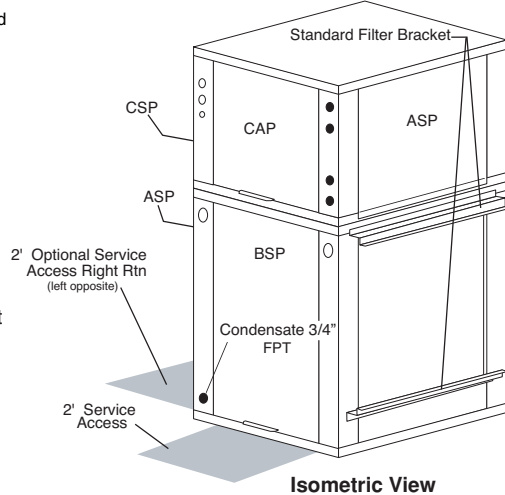
CODE	RETURN	DISCHARGE
L	Left	Bottom
R	Right	Bottom



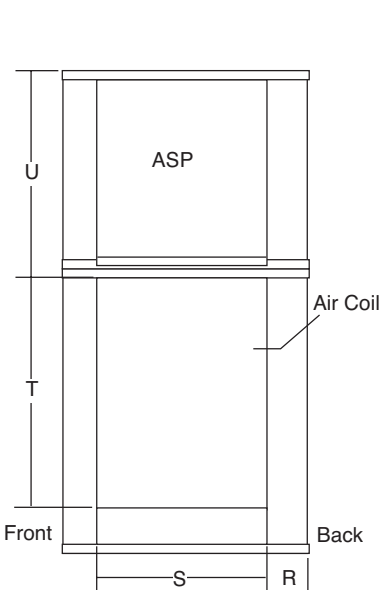
Right Return / Bottom Discharge



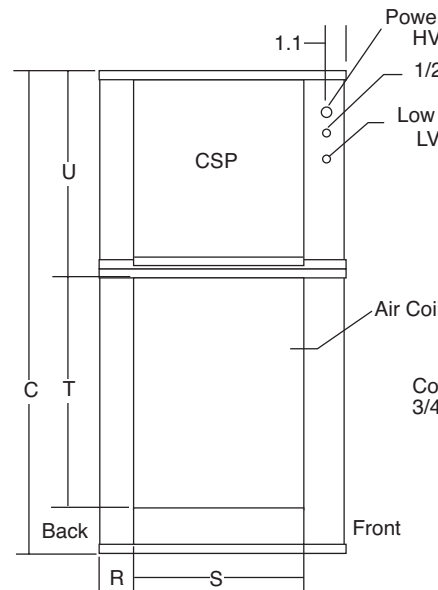
Left Return / Bottom Discharge



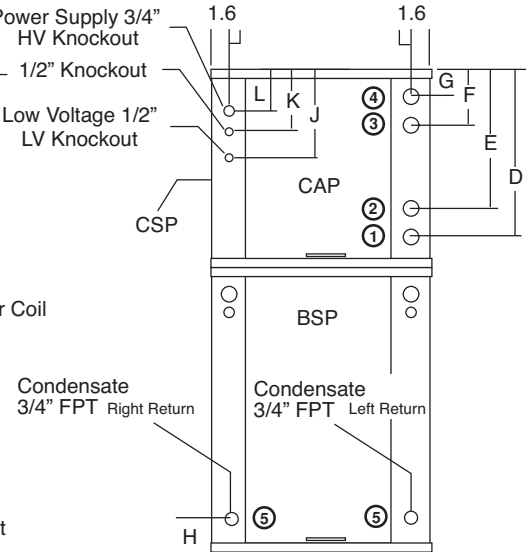
Isometric View



Right Return Right View - Air Coil Opening



Left Return Left View - Air Coil Opening



Front-View

Selection procedure (50PSH024 unit example)



I Determine the actual cooling and heating loads at the desired dry bulb and wet bulb conditions.

Given:

Total Cooling (TC) 24,000 Btuh
 Sensible Cooling (SC) 17,900 Btuh
 Entering-Air Temperature db 80.6 F
 Entering-Air Temperature wb 65 F

II Determine the following design parameters from Performance Data tables.

Determine entering water temperature, water flow rate (gpm), airflow (cfm), water flow pressure drop and design wet and dry bulb temperatures. Airflow cfm should be between 300 and 450 cfm per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. For the 50PSH024 unit example, the given design parameters are as follows:

Given:

Entering Water Temperature 90 F
 Water Flow (Based upon
 12 F rise in temperature) 6.0 gpm
 Airflow 748 cfm

III Select a unit based on total cooling and total sensible cooling conditions. Unit selected should be closest to but not larger than the actual cooling load.

Enter Performance Data tables at the design water flow and water temperature. Read the total and sensible cooling capacities.

NOTE: Interpolation is permissible, extrapolation is not.

For example:

Enter the 50PSH024 (PSC Blower) Performance Table at design water flow and water temperature. Read Total Cooling, Sensible Cooling and Heat of Rejection capacities:

Total Cooling 25,200 Btuh
 Sensible Cooling 18,400 Btuh
 Heat of Rejection 31,100 Btuh

Read the Heat Capacity. If the Heat Capacity exceeds the design criteria specified in the scope, it is acceptable.

NOTE: It is normal for water source heat pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.

IV Determine the correction factors associated with the variable factors of dry bulb and wet bulb using the correction factor tables found in this book.

Use the following formulas to determine the correction factors of total cooling, sensible cooling, and heat of rejection:

- a. Corrected Total Cooling = tabulated total cooling x wet bulb correction x airflow correction.

- b. Corrected Sensible Cooling = tabulated sensible cooling x wet/dry bulb correction x airflow correction.
- c. Corrected Heat of Rejection = tabulated heat of rejection x wet bulb correction x airflow correction.

V Determine entering air and airflow correction using the correction factor tables found in this book.

The nominal airflow for the 50PSH024 is 850 cfm. The design parameter is 748 cfm.

$$748/850 = 87.5\% \text{ of nominal airflow:}$$

Use the 87.5% row in the Airflow Correction Table (PSC Airflow).

The Entering-Air Temperature is 65 F wb. Use the 65 F row in the Entering Air Correction Table.

Using the following formulas to determine the correction factors of entering air and airflow correction:

	Table	Ent Air	Airflow	Corrected
Corrected Total Cooling	=	25,200	x 0.971 x 0.983	= 24,053
Corrected Sensible Cooling	=	18,400	x 1.106 x 0.915	= 18,520
Corrected Heat of Rejection	=	31,100	x 0.976 x 0.983	= 29,838

Compare the corrected capacities to the load requirements established in Step I. If the capacities are within 10% of the load requirements, the equipment is acceptable. It is better to undersize than oversize as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.

VI Calculate and assess the water temperature rise.

Calculate the water temperature rise and assess the selection using the following calculation:

$$\text{Actual Temperature Rise} = \frac{\text{Corrected Heat of Rejection}}{\text{GPM} \times 500}$$

For example, using the Corrected Heat of Rejection from the last step:

$$\text{Actual Temperature Rise} = \frac{29,838}{6.0 \times 500} = 9.9 \text{ F}$$

If the units selected are not within 10% of the load calculations, review what effect changing the GPM, water temperature and/or airflow will have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat Steps I through VI.

Performance data



50PSH,PSV006

240 CFM NOMINAL AIRFLOW COOLING/240 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	2.0	3.2	7.4	Operation Not Recommended							180	3.8	0.48	2.3	89.6	2.3
	2.0	3.2	7.4	Operation Not Recommended							240	3.9	0.44	2.4	85.1	2.6
30	1.0	0.3	0.7	180	6.7	3.9	0.6	0.26	7.6	25.6	180	4.6	0.50	3.0	93.4	2.7
	1.0	0.3	0.7	240	7.0	4.7	0.7	0.27	7.9	25.8	240	4.7	0.45	3.1	88.0	3.0
	1.5	1.6	3.7	180	6.9	3.9	0.6	0.26	7.8	26.9	180	4.8	0.50	3.2	94.5	2.8
	1.5	1.6	3.7	240	7.2	4.7	0.7	0.26	8.1	27.1	240	4.9	0.46	3.3	88.9	3.1
	2.0	3.0	6.9	180	7.0	4.0	0.6	0.25	7.9	27.7	180	4.9	0.50	3.3	95.0	2.8
	2.0	3.0	6.9	240	7.3	4.8	0.7	0.26	8.2	27.9	240	5.0	0.46	3.5	89.3	3.2
40	1.0	0.3	0.7	180	7.0	4.2	0.6	0.28	7.9	24.8	180	5.4	0.51	3.7	97.8	3.1
	1.0	0.3	0.7	240	7.3	5.0	0.7	0.29	8.2	25.0	240	5.6	0.47	4.0	91.4	3.5
	1.5	1.4	3.2	180	7.0	4.2	0.6	0.27	8.0	25.9	180	5.6	0.51	3.9	98.9	3.2
	1.5	1.4	3.2	240	7.3	5.0	0.7	0.28	8.3	26.1	240	5.8	0.47	4.2	92.3	3.6
	2.0	2.6	6.5	180	7.1	4.2	0.6	0.27	8.0	26.7	180	5.7	0.51	4.1	99.5	3.3
	2.0	2.6	6.5	240	7.4	5.0	0.7	0.27	8.3	26.9	240	5.9	0.47	4.3	92.7	3.7
50	1.0	0.3	0.7	180	6.9	4.4	0.6	0.31	8.0	22.2	180	6.1	0.52	4.4	101.6	3.5
	1.0	0.3	0.7	240	7.2	5.2	0.7	0.32	8.3	22.4	240	6.3	0.48	4.7	94.3	3.9
	1.5	1.4	3.2	180	7.0	4.4	0.6	0.29	8.0	23.9	180	6.4	0.52	4.6	102.7	3.6
	1.5	1.4	3.2	240	7.3	5.2	0.7	0.30	8.4	24.0	240	6.5	0.48	4.9	95.2	4.0
	2.0	2.6	6.0	180	7.1	4.4	0.6	0.29	8.1	24.7	180	6.5	0.52	4.7	103.3	3.6
	2.0	2.6	6.0	240	7.4	5.2	0.7	0.30	8.4	24.9	240	6.7	0.48	5.0	95.7	4.1
60	1.0	0.2	0.5	180	6.7	4.4	0.7	0.35	7.9	19.4	180	6.8	0.53	5.0	105.0	3.8
	1.0	0.2	0.5	240	7.0	5.3	0.8	0.36	8.2	19.6	240	7.0	0.48	5.3	96.9	4.2
	1.5	1.3	3.0	180	6.9	4.5	0.6	0.33	8.0	21.1	180	7.0	0.53	5.3	106.2	3.9
	1.5	1.3	3.0	240	7.2	5.3	0.7	0.34	8.3	21.3	240	7.2	0.48	5.6	97.9	4.4
	2.0	2.4	5.5	180	6.9	4.5	0.6	0.32	8.0	21.9	180	7.2	0.53	5.4	106.9	4.0
	2.0	2.4	5.5	240	7.2	5.3	0.7	0.33	8.3	22.1	240	7.4	0.48	5.7	98.4	4.5
70	1.0	0.2	0.5	180	6.4	4.4	0.7	0.39	7.7	16.5	180	7.4	0.53	5.6	108.3	4.1
	1.0	0.2	0.5	240	6.6	5.2	0.8	0.40	8.0	16.6	240	7.6	0.49	6.0	99.5	4.6
	1.5	1.2	2.8	180	6.6	4.4	0.7	0.36	7.8	18.0	180	7.7	0.53	5.9	109.8	4.2
	1.5	1.2	2.8	240	6.8	5.3	0.8	0.38	8.1	18.2	240	7.9	0.49	6.3	100.6	4.8
	2.0	2.2	5.1	180	6.7	4.4	0.7	0.35	7.9	18.9	180	7.9	0.53	6.1	110.6	4.3
	2.0	2.2	5.1	240	6.9	5.3	0.8	0.37	8.2	19.0	240	8.1	0.49	6.4	101.2	4.9
80	1.0	0.2	0.5	180	5.9	4.2	0.7	0.43	7.4	13.7	180	8.1	0.54	6.3	111.8	4.4
	1.0	0.2	0.5	240	6.2	5.0	0.8	0.45	7.7	13.8	240	8.4	0.49	6.7	102.2	5.0
	1.5	1.1	2.5	180	6.1	4.3	0.7	0.41	7.5	15.1	180	8.5	0.54	6.6	113.7	4.6
	1.5	1.1	2.5	240	6.4	5.1	0.8	0.42	7.8	15.2	240	8.7	0.49	7.0	103.6	5.2
	2.0	2.0	4.6	180	6.3	4.3	0.7	0.40	7.6	15.8	180	8.7	0.54	6.8	114.7	4.7
	2.0	2.0	4.6	240	6.5	5.2	0.8	0.41	7.9	16.0	240	8.9	0.49	7.2	104.4	5.3
85	1.0	0.2	0.5	180	5.7	4.1	0.7	0.46	7.2	12.5	180	8.5	0.54	6.7	113.8	4.6
	1.0	0.2	0.5	240	5.9	4.9	0.8	0.47	7.5	12.6	240	8.7	0.49	7.1	103.8	5.2
	1.5	1.05	2.4	180	5.9	4.2	0.7	0.43	7.4	13.8	180	8.9	0.54	7.0	115.9	4.8
	1.5	1.05	2.4	240	6.2	5.0	0.8	0.45	7.7	13.9	240	9.2	0.49	7.5	105.4	5.4
	2.0	1.9	4.4	180	6.0	4.2	0.7	0.42	7.5	14.5	180	9.2	0.54	7.3	117.2	5.0
	2.0	1.9	4.4	240	6.3	5.1	0.8	0.43	7.8	14.6	240	9.4	0.50	7.7	106.3	5.6
90	1.0	0.2	0.5	180	5.4	4.0	0.7	0.48	7.1	11.3	180	8.9	0.54	7.0	115.8	4.8
	1.0	0.2	0.5	240	5.6	4.8	0.8	0.50	7.3	11.4	240	9.1	0.49	7.5	105.3	5.4
	1.5	1.0	2.3	180	5.7	4.1	0.7	0.46	7.2	12.4	180	9.4	0.54	7.5	118.2	5.1
	1.5	1.0	2.3	240	5.9	4.9	0.8	0.47	7.5	12.5	240	9.6	0.50	7.9	107.1	5.7
	2.0	1.8	4.2	180	5.8	4.2	0.7	0.44	7.3	13.1	180	9.7	0.55	7.7	119.6	5.2
	2.0	1.8	4.2	240	6.0	5.0	0.8	0.46	7.6	13.2	240	9.9	0.50	8.2	108.2	5.8
100	1.0	0.1	0.2	180	4.9	3.7	0.8	0.53	6.7	9.2	Operation Not Recommended					
	1.0	0.1	0.2	240	5.1	4.5	0.9	0.55	7.0	9.3						
	1.5	0.8	1.8	180	5.2	3.9	0.8	0.51	6.9	10.2						
	1.5	0.8	1.8	240	5.4	4.6	0.9	0.52	7.2	10.2						
	2.0	1.6	3.7	180	5.3	3.9	0.7	0.49	7.0	10.7						
	2.0	1.6	3.7	240	5.5	4.7	0.9	0.51	7.3	10.8						
110	1.0	0.1	0.2	180	4.4	3.5	0.8	0.59	6.4	7.5						
	1.0	0.1	0.2	240	4.6	4.1	0.9	0.61	6.7	7.6						
	1.5	0.7	1.6	180	4.6	3.6	0.8	0.56	6.6	8.2						
	1.5	0.7	1.6	240	4.8	4.3	0.9	0.58	6.8	8.3						
	2.0	1.4	3.2	180	4.8	3.7	0.8	0.55	6.6	8.6						
	2.0	1.4	3.2	240	5.0	4.4	0.9	0.57	6.9	8.7						
120	1.0	0.1	0.2	180	3.9	3.2	0.8	0.65	6.1	6.1						
	1.0	0.1	0.2	240	4.1	3.8	0.9	0.67	6.4	6.1						
	1.5	0.6	1.4	180	4.1	3.3	0.8	0.62	6.3	6.7						
	1.5	0.6	1.4	240	4.3	3.9	0.9	0.64	6.5	6.7						
	2.0	1.2	2.8	180	4.2	3.4	0.8	0.61	6.3	7.0						
	2.0	1.2	2.8	240	4.4	4.0	0.9	0.63	6.6	7.0						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV009

300 CFM NOMINAL AIRFLOW COOLING/300 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	2.8	2.8	6.5	Operation Not Recommended							225	5.7	0.69	3.5	93.3	2.4
	2.8	2.8	6.5	Operation Not Recommended							300	5.8	0.63	3.7	88.0	2.7
30	1.4	0.8	1.8	225	11.6	6.5	0.6	0.37	12.9	31.4	225	6.6	0.71	4.3	97.0	2.7
	1.4	0.8	1.8	300	12.1	7.8	0.6	0.38	13.4	31.6	300	6.7	0.65	4.6	90.8	3.0
	2.1	1.5	3.5	225	11.9	6.6	0.6	0.34	13.0	34.9	225	6.9	0.72	4.5	98.2	2.8
	2.1	1.5	3.5	300	12.4	7.9	0.6	0.35	13.5	35.2	300	7.0	0.66	4.8	91.7	3.1
	2.8	2.7	6.2	225	12.0	6.7	0.6	0.32	13.1	36.9	225	7.0	0.72	4.7	98.8	2.8
	2.8	2.7	6.2	300	12.5	8.0	0.6	0.33	13.6	37.2	300	7.2	0.66	5.0	92.2	3.2
40	1.4	0.8	1.7	225	11.3	6.3	0.6	0.42	12.7	26.7	225	7.7	0.74	5.3	101.9	3.1
	1.4	0.8	1.7	300	11.7	7.6	0.6	0.44	13.2	26.9	300	8.0	0.67	5.7	94.5	3.5
	2.1	1.5	3.4	225	11.5	6.4	0.6	0.39	12.8	29.6	225	8.1	0.74	5.6	103.2	3.2
	2.1	1.5	3.4	300	12.0	7.7	0.6	0.40	13.3	29.8	300	8.3	0.68	6.0	95.6	3.6
	2.8	2.6	5.9	225	11.6	6.5	0.6	0.37	12.9	31.2	225	8.3	0.75	5.8	104.0	3.2
	2.8	2.6	5.9	300	12.1	7.8	0.6	0.39	13.4	31.5	300	8.5	0.68	6.2	96.2	3.6
50	1.4	0.7	1.6	225	10.8	6.2	0.6	0.48	12.4	22.7	225	8.9	0.76	6.4	106.4	3.4
	1.4	0.7	1.6	300	11.3	7.4	0.7	0.49	12.9	22.9	300	9.1	0.69	6.7	98.0	3.8
	2.1	1.4	3.2	225	11.1	6.3	0.6	0.44	12.6	25.1	225	9.2	0.76	6.7	107.9	3.5
	2.1	1.4	3.2	300	11.6	7.5	0.6	0.46	13.1	25.3	300	9.5	0.70	7.1	99.2	4.0
	2.8	2.4	5.6	225	11.2	6.3	0.6	0.42	12.7	26.5	225	9.4	0.77	6.9	108.8	3.6
	2.8	2.4	5.6	300	11.7	7.6	0.6	0.44	13.2	26.7	300	9.7	0.70	7.3	99.8	4.0
60	1.4	0.7	1.5	225	10.3	6.0	0.6	0.53	12.1	19.3	225	9.9	0.77	7.3	110.7	3.8
	1.4	0.7	1.5	300	10.7	7.2	0.7	0.55	12.6	19.5	300	10.2	0.71	7.8	101.4	4.2
	2.1	1.3	3.0	225	10.6	6.1	0.6	0.50	12.3	21.3	225	10.3	0.78	7.7	112.4	3.9
	2.1	1.3	3.0	300	11.1	7.3	0.7	0.51	12.8	21.5	300	10.6	0.71	8.2	102.7	4.4
	2.8	2.3	5.3	225	10.8	6.1	0.6	0.48	12.4	22.5	225	10.5	0.78	7.9	113.3	3.9
	2.8	2.3	5.3	300	11.2	7.4	0.7	0.50	12.9	22.6	300	10.8	0.71	8.4	103.3	4.4
70	1.4	0.6	1.5	225	9.7	5.8	0.6	0.59	11.8	16.4	225	10.9	0.79	8.2	114.9	4.1
	1.4	0.6	1.5	300	10.1	6.9	0.7	0.61	12.2	16.5	300	11.2	0.72	8.7	104.5	4.6
	2.1	1.2	2.8	225	10.1	5.9	0.6	0.56	12.0	18.1	225	11.3	0.79	8.6	116.7	4.2
	2.1	1.2	2.8	300	10.5	7.1	0.7	0.58	12.5	18.2	300	11.6	0.72	9.2	105.9	4.7
	2.8	2.2	5.0	225	10.3	6.0	0.6	0.54	12.1	19.0	225	11.6	0.80	8.9	117.6	4.3
	2.8	2.2	5.0	300	10.7	7.1	0.7	0.56	12.6	19.2	300	11.9	0.73	9.4	106.7	4.8
80	1.4	0.6	1.4	225	9.1	5.6	0.6	0.66	11.4	13.9	225	11.9	0.80	9.1	118.9	4.3
	1.4	0.6	1.4	300	9.5	6.7	0.7	0.68	11.8	14.0	300	12.2	0.73	9.7	107.6	4.9
	2.1	1.1	2.6	225	9.5	5.7	0.6	0.62	11.6	15.3	225	12.3	0.81	9.6	120.8	4.5
	2.1	1.1	2.6	300	9.9	6.8	0.7	0.64	12.1	15.4	300	12.7	0.74	10.2	109.1	5.0
	2.8	2.0	4.7	225	9.7	5.8	0.6	0.60	11.7	16.1	225	12.6	0.81	9.8	121.9	4.5
	2.8	2.0	4.7	300	10.1	6.9	0.7	0.62	12.2	16.2	300	12.9	0.74	10.4	109.9	5.1
85	1.4	0.6	1.3	225	8.8	5.5	0.6	0.69	11.1	12.8	225	12.3	0.81	9.6	120.8	4.5
	1.4	0.6	1.3	300	9.1	6.6	0.7	0.71	11.6	12.9	300	12.7	0.74	10.2	109.1	5.0
	2.1	1.1	2.5	225	9.2	5.6	0.6	0.65	11.4	14.1	225	12.8	0.82	10.0	122.8	4.6
	2.1	1.1	2.5	300	9.5	6.7	0.7	0.67	11.8	14.2	300	13.2	0.75	10.6	110.7	5.2
	2.8	1.9	4.5	225	9.3	5.7	0.6	0.63	11.5	14.8	225	13.1	0.82	10.3	123.9	4.7
	2.8	1.9	4.5	300	9.7	6.8	0.7	0.65	12.0	14.9	300	13.5	0.75	10.9	111.5	5.2
90	1.4	0.6	1.3	225	8.4	5.4	0.6	0.72	10.9	11.7	225	12.8	0.82	10.0	122.8	4.6
	1.4	0.6	1.3	300	8.8	6.4	0.7	0.75	11.3	11.8	300	13.2	0.75	10.6	110.6	5.2
	2.1	1.1	2.5	225	8.8	5.5	0.6	0.69	11.2	12.9	225	13.3	0.83	10.5	124.9	4.7
	2.1	1.1	2.5	300	9.2	6.6	0.7	0.71	11.6	13.0	300	13.7	0.76	11.1	112.3	5.3
	2.8	1.9	4.3	225	9.0	5.6	0.6	0.67	11.3	13.5	225	13.6	0.83	10.7	126.0	4.8
	2.8	1.9	4.3	300	9.4	6.7	0.7	0.69	11.7	13.6	300	14.0	0.76	11.4	113.1	5.4
100	1.4	0.5	1.2	225	7.7	5.1	0.7	0.79	10.4	9.7	Operation Not Recommended					
	1.4	0.5	1.2	300	8.0	6.2	0.8	0.82	10.8	9.8						
	2.1	1.0	2.3	225	8.1	5.3	0.7	0.75	10.7	10.8						
	2.1	1.0	2.3	300	8.4	6.3	0.7	0.78	11.1	10.8						
	2.8	1.7	4.0	225	8.3	5.3	0.6	0.74	10.8	11.3						
	2.8	1.7	4.0	300	8.7	6.4	0.7	0.76	11.2	11.4						
110	1.4	0.5	1.1	225	6.9	4.9	0.7	0.86	9.9	8.0						
	1.4	0.5	1.1	300	7.2	5.8	0.8	0.89	10.3	8.1						
	2.1	0.9	2.1	225	7.3	5.0	0.7	0.83	10.2	8.9						
	2.1	0.9	2.1	300	7.6	6.0	0.8	0.85	10.6	8.9						
	2.8	1.6	3.7	225	7.5	5.1	0.7	0.81	10.3	9.3						
	2.8	1.6	3.7	300	7.9	6.1	0.8	0.84	10.7	9.4						
120	1.4	0.4	1.0	225	6.1	4.5	0.7	0.94	9.3	6.5						
	1.4	0.4	1.0	300	6.4	5.4	0.8	0.97	9.7	6.6						
	2.1	0.8	1.9	225	6.5	4.7	0.7	0.90	9.6	7.2						
	2.1	0.8	1.9	300	6.8	5.6	0.8	0.93	10.0	7.3						
	2.8	1.5	3.4	225	6.7	4.8	0.7	0.88	9.7	7.6						
	2.8	1.5	3.4	300	7.0	5.7	0.8	0.91	10.1	7.7						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV012

350 CFM NOMINAL AIRFLOW COOLING/350 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	3.5	4.0	9.2	Operation Not Recommended							265	7.7	0.89	4.9	97.1	2.5
	3.5	4.0	9.2	Operation Not Recommended							350	8.0	0.82	5.2	91.0	2.8
30	1.8	0.6	1.4	265	12.1	6.5	0.5	0.50	13.8	24.4	265	8.9	0.92	5.9	101.0	2.8
	1.8	0.6	1.4	350	12.6	7.8	0.6	0.51	14.4	24.6	350	9.1	0.85	6.3	94.1	3.2
	2.6	2.1	4.8	265	12.3	6.6	0.5	0.48	13.9	25.9	265	9.3	0.94	6.2	102.4	2.9
	2.6	2.1	4.8	350	12.8	7.9	0.6	0.49	14.5	26.1	350	9.5	0.86	6.6	95.1	3.3
	3.5	3.8	8.8	265	12.7	6.8	0.5	0.47	14.3	27.3	265	9.5	0.94	6.4	103.1	2.9
	3.5	3.8	8.8	350	13.3	8.1	0.6	0.48	14.9	27.3	350	9.7	0.86	6.8	95.7	3.3
40	1.8	0.6	1.3	265	12.7	6.9	0.5	0.55	14.6	23.3	265	10.3	0.97	7.2	106.0	3.1
	1.8	0.6	1.3	350	13.2	8.2	0.6	0.56	15.2	23.5	350	10.6	0.88	7.6	98.0	3.5
	2.6	2.0	4.6	265	12.8	6.9	0.5	0.52	14.6	24.8	265	10.7	0.98	7.5	107.4	3.2
	2.6	2.0	4.6	350	13.3	8.3	0.6	0.53	15.2	25.0	350	11.0	0.89	8.0	99.1	3.6
	3.5	3.6	8.3	265	12.9	6.9	0.5	0.50	14.6	25.6	265	10.9	0.98	7.7	108.1	3.2
	3.5	3.6	8.3	350	13.5	8.3	0.6	0.52	15.2	25.8	350	11.2	0.90	8.1	96.6	3.6
50	1.8	0.5	1.1	265	12.7	6.9	0.5	0.61	14.8	21.0	265	11.5	1.00	8.2	110.2	3.4
	1.8	0.5	1.1	350	13.2	8.3	0.6	0.63	15.4	21.2	350	11.8	0.92	8.7	101.2	3.8
	2.6	1.9	4.3	265	12.8	7.0	0.5	0.57	14.8	22.6	265	11.9	1.01	8.5	111.5	3.4
	2.6	1.9	4.3	350	13.3	8.3	0.6	0.59	15.4	22.7	350	12.2	0.93	9.0	102.2	3.9
	3.5	3.4	7.9	265	12.9	7.0	0.5	0.55	14.8	23.4	265	12.0	1.02	8.7	112.1	3.5
	3.5	3.4	7.9	350	13.5	8.4	0.6	0.57	15.4	23.5	350	12.4	0.93	9.2	102.7	3.9
60	1.8	0.4	1.0	265	12.5	6.9	0.5	0.67	14.8	18.6	265	12.5	1.03	9.0	113.6	3.5
	1.8	0.4	1.0	350	13.0	8.2	0.6	0.69	15.4	18.8	350	12.8	0.94	9.6	103.9	4.0
	2.6	1.8	4.1	265	12.7	6.9	0.5	0.63	14.9	20.2	265	12.8	1.04	9.3	114.6	3.6
	2.6	1.8	4.1	350	13.3	8.3	0.6	0.65	15.5	20.3	350	13.1	0.95	9.9	104.7	4.0
	3.5	3.2	7.4	265	12.8	7.0	0.5	0.61	14.9	20.9	265	12.9	1.05	9.4	115.1	3.6
	3.5	3.2	7.4	350	13.4	8.4	0.6	0.63	15.5	21.1	350	13.3	0.96	10.0	105.1	4.1
70	1.8	0.4	0.9	265	12.0	6.7	0.6	0.75	14.5	16.1	265	13.2	1.06	9.7	116.1	3.7
	1.8	0.4	0.9	350	12.5	8.0	0.6	0.77	15.1	16.2	350	13.5	0.97	10.3	105.8	4.1
	2.6	1.6	3.8	265	12.3	6.8	0.6	0.70	14.7	17.5	265	13.4	1.06	9.9	116.9	3.7
	2.6	1.6	3.8	350	12.8	8.1	0.6	0.73	15.3	17.7	350	13.8	0.97	10.5	106.4	4.1
	3.5	3.0	6.9	265	12.5	6.9	0.5	0.68	14.8	18.3	265	13.5	1.07	9.9	117.2	3.7
	3.5	3.0	6.9	350	13.0	8.2	0.6	0.70	15.4	18.4	350	13.9	0.98	10.6	106.7	4.2
80	1.8	0.3	0.7	265	11.3	6.5	0.6	0.83	13.8	13.6	265	13.7	1.07	10.2	118.1	3.7
	1.8	0.3	0.7	350	11.7	7.8	0.7	0.85	14.7	13.7	350	14.0	0.98	10.8	107.1	4.2
	2.6	1.5	3.5	265	11.7	6.6	0.6	0.78	14.3	15.0	265	13.8	1.08	10.2	118.2	3.8
	2.6	1.5	3.5	350	12.2	7.9	0.6	0.81	14.9	15.1	350	14.2	0.98	10.9	107.4	4.2
	3.5	2.8	6.5	265	11.9	6.7	0.6	0.76	14.5	15.7	265	13.8	1.08	10.3	118.3	3.8
	3.5	2.8	6.5	350	12.4	8.0	0.6	0.76	15.0	15.8	350	14.2	0.98	10.9	107.6	4.2
85	1.8	0.3	0.7	265	10.9	6.4	0.6	0.87	13.8	12.5	265	13.8	1.08	10.2	118.1	3.8
	1.8	0.3	0.7	350	11.3	7.6	0.7	0.90	14.4	12.6	350	14.1	0.98	10.8	107.4	4.2
	2.6	1.5	3.4	265	11.3	6.5	0.6	0.82	14.1	13.8	265	13.8	1.08	10.2	118.4	3.8
	2.6	1.5	3.4	350	11.8	7.8	0.7	0.85	14.7	13.9	350	14.2	0.98	10.9	107.6	4.2
	3.5	2.7	6.3	265	11.5	6.5	0.6	0.80	14.2	14.5	265	13.9	1.08	10.3	118.5	3.8
	3.5	2.7	6.3	350	12.0	7.8	0.7	0.83	14.8	14.6	350	14.2	0.98	10.9	107.7	4.2
90	1.8	0.3	0.6	265	10.4	6.2	0.6	0.91	13.5	11.4	265	13.9	1.08	10.3	118.5	3.8
	1.8	0.3	0.6	350	10.9	7.5	0.7	0.94	14.1	11.5	350	14.3	0.99	10.9	107.7	4.2
	2.6	1.4	3.3	265	10.9	6.4	0.6	0.87	13.9	12.6	265	13.9	1.08	10.3	118.6	3.8
	2.6	1.4	3.3	350	11.4	7.6	0.7	0.89	14.4	12.7	350	14.3	0.98	10.9	107.7	4.3
	3.5	2.6	6.0	265	11.1	6.4	0.6	0.84	14.0	13.2	265	13.9	1.07	10.3	118.6	3.8
	3.5	2.6	6.0	350	11.6	7.7	0.7	0.87	14.6	13.3	350	14.3	0.98	10.9	107.8	4.3
100	1.8	0.2	0.5	265	9.5	6.0	0.6	1.00	12.9	9.5	Operation Not Recommended					
	1.8	0.2	0.5	350	9.9	7.2	0.7	1.04	13.4	9.5						
	2.6	1.3	3.0	265	10.0	6.1	0.6	0.96	13.3	10.5						
	2.6	1.3	3.0	350	10.4	7.3	0.7	0.99	13.8	10.5						
	3.5	2.4	5.6	265	10.2	6.2	0.6	0.93	13.4	11.0						
	3.5	2.4	5.6	350	10.7	7.4	0.7	0.96	14.0	11.1						
110	1.8	0.1	0.3	265	8.5	5.7	0.7	1.10	12.3	7.7						
	1.8	0.1	0.3	350	8.9	6.9	0.8	1.14	12.8	7.8						
	2.6	1.2	2.7	265	9.0	5.9	0.7	1.05	12.6	8.6						
	2.6	1.2	2.7	350	9.4	7.0	0.7	1.09	13.1	8.6						
	3.5	2.2	5.1	265	9.3	5.9	0.6	1.03	12.8	9.0						
	3.5	2.2	5.1	350	9.6	7.1	0.7	1.06	13.3	9.1						
120	1.8	0.1	0.2	265	7.5	5.5	0.7	1.20	11.6	6.2						
	1.8	0.1	0.2	350	7.8	6.6	0.8	1.24	12.0	6.3						
	2.6	1.1	2.5	265	8.0	5.6	0.7	1.15	11.9	6.9						
	2.6	1.1	2.5	350	8.3	6.7	0.8	1.19	12.4	7.0						
	3.5	2.0	4.6	265	8.2	5.7	0.7	1.13	12.1	7.3						
	3.5	2.0	4.6	350	8.6	6.8	0.8	1.16	12.5	7.3						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD018

600 CFM NOMINAL AIRFLOW COOLING/600 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	5.5	3.9	9.0	Operation Not Recommended							450	12.2	1.36	7.8	95.0	2.6
	5.5	3.9	9.0	Operation Not Recommended							600	12.5	1.24	8.3	89.3	2.9
30	2.8	0.7	1.6	450	10.7	16.8	0.81	0.78	23.3	26.6	450	13.7	1.40	9.2	98.1	2.9
	2.8	0.7	1.6	600	21.5	14.0	0.65	0.80	24.3	26.8	600	14.0	1.28	9.7	91.7	3.2
	4.1	2.1	4.9	450	21.0	16.8	0.80	0.74	23.5	28.4	450	14.2	1.41	9.6	99.3	2.9
	4.1	2.1	4.9	600	21.8	14.1	0.64	0.76	24.4	28.6	600	14.6	1.29	10.2	92.5	3.3
	5.5	3.5	8.1	450	21.2	16.8	0.80	0.72	23.6	29.3	450	14.5	1.42	9.9	99.9	3.0
	5.5	3.5	8.1	600	22.0	14.1	0.64	0.75	24.6	29.6	600	14.9	1.30	10.5	93.0	3.4
40	2.8	0.6	1.4	450	20.8	17.2	0.83	0.85	23.7	24.5	450	15.8	1.44	11.1	102.6	3.2
	2.8	0.6	1.4	600	21.7	14.4	0.66	0.88	24.6	24.7	600	16.3	1.32	11.8	95.1	3.6
	4.1	2.0	4.6	450	21.0	17.2	0.82	0.81	23.7	26.0	450	16.5	1.45	11.7	103.9	3.3
	4.1	2.0	4.6	600	21.8	14.4	0.66	0.83	24.7	26.2	600	16.9	1.33	12.4	96.1	3.7
	5.5	3.2	7.4	450	21.2	17.3	0.82	0.79	23.9	26.9	450	16.8	1.46	12.0	104.7	3.4
	5.5	3.2	7.4	600	22.9	14.5	0.66	0.81	24.8	27.1	600	17.3	1.33	12.8	96.7	3.8
50	2.8	0.5	1.2	450	20.6	17.3	0.84	0.95	23.9	21.8	450	18.0	1.47	13.1	107.0	3.6
	2.8	0.5	1.2	600	21.5	14.5	0.67	0.98	24.8	22.0	600	18.5	1.35	13.9	92.5	4.0
	4.1	1.7	3.9	450	21.0	17.5	0.83	0.89	24.0	23.5	450	18.7	1.48	13.8	108.6	3.7
	4.1	1.7	3.9	600	21.8	14.6	0.67	0.92	25.0	23.7	600	19.2	1.35	14.6	99.7	4.2
	5.5	2.8	6.5	450	21.2	17.5	0.83	0.86	24.0	24.4	450	19.2	1.49	14.2	109.4	3.8
	5.5	2.8	6.5	600	22.1	14.6	0.67	0.89	25.0	24.6	600	19.7	1.36	15.1	100.4	4.2
60	2.8	0.3	0.7	450	19.9	16.8	0.85	1.05	23.5	18.9	450	20.1	1.50	15.1	111.4	3.9
	2.8	0.3	0.7	600	20.7	14.1	0.68	1.09	24.4	19.1	600	20.7	1.37	16.0	101.9	4.4
	4.1	1.5	3.5	450	20.4	17.2	0.84	0.99	23.7	20.6	450	21.0	1.51	15.9	113.3	4.1
	4.1	1.5	3.5	600	21.2	14.3	0.68	1.02	24.7	20.8	600	21.6	1.38	16.9	103.3	4.6
	5.5	2.6	6.0	450	20.6	17.3	0.84	0.96	23.8	21.5	450	21.5	1.52	16.4	114.3	4.1
	5.5	2.6	6.0	600	21.4	14.4	0.67	0.99	24.8	21.7	600	22.1	1.39	17.4	104.1	4.7
70	2.8	0.3	0.7	450	18.9	16.2	0.86	1.17	22.9	16.1	450	22.3	1.54	17.1	115.9	4.3
	2.8	0.3	0.7	600	19.7	13.5	0.69	1.21	23.8	16.2	600	22.9	1.40	18.1	105.4	4.8
	4.1	1.4	3.2	450	19.5	16.6	0.85	1.10	23.2	17.7	450	23.4	1.56	18.0	118.1	4.4
	4.1	1.4	3.2	600	20.3	13.8	0.68	1.10	24.2	17.9	600	24.0	1.43	19.1	107.0	4.9
	5.5	2.4	5.5	450	19.8	16.8	0.85	1.07	23.4	18.6	450	23.9	1.57	18.5	119.3	4.5
	5.5	2.4	5.5	600	20.6	14.0	0.68	1.10	24.3	18.7	600	24.6	1.44	19.7	107.9	5.0
80	2.8	0.2	0.5	450	17.7	15.0	0.88	1.31	22.2	13.6	450	24.6	1.59	19.1	120.6	4.5
	2.8	0.2	0.5	600	18.5	12.6	0.70	1.35	23.8	13.7	600	25.2	1.46	20.3	108.9	5.1
	4.1	1.2	2.8	450	18.4	15.5	0.87	1.23	23.2	15.0	450	25.8	1.63	20.2	123.1	4.6
	4.1	1.2	2.8	600	19.2	12.9	0.70	1.27	24.1	15.1	600	26.5	1.49	21.4	110.9	5.2
	5.5	2.2	5.1	450	18.7	15.7	0.86	1.19	23.4	15.7	450	26.5	1.66	20.7	124.5	4.7
	5.5	2.2	5.1	600	19.5	13.1	0.69	1.23	24.3	15.9	600	27.2	1.52	22.0	111.9	5.3
85	2.8	0.2	0.5	450	17.1	15.0	0.88	1.39	21.9	12.4	450	25.8	1.63	20.1	123.0	4.6
	2.8	0.2	0.5	600	17.1	12.6	0.70	1.43	22.7	12.5	600	26.4	1.49	21.3	110.8	5.2
	4.1	1.2	2.7	450	17.8	15.5	0.87	1.30	22.2	13.7	450	27.1	1.69	21.2	125.7	4.7
	4.1	1.2	2.7	600	18.5	12.9	0.70	1.35	23.1	13.8	600	27.8	1.54	22.5	117.9	5.3
	5.5	2.1	4.9	450	18.1	15.7	0.86	1.26	22.4	14.4	450	27.8	1.72	21.8	127.2	4.7
	5.5	2.1	4.9	600	18.9	13.8	0.69	1.30	23.0	14.6	600	28.6	1.58	23.2	114.1	5.3
90	2.8	0.2	0.5	450	16.5	14.7	0.89	1.46	21.5	11.3	450	26.9	1.68	21.1	125.4	4.7
	2.8	0.2	0.5	600	17.2	12.3	0.71	1.51	22.4	11.4	600	27.7	1.53	22.4	112.7	5.3
	4.1	1.1	2.5	450	17.2	15.1	0.88	1.38	21.9	12.5	450	28.4	1.74	22.3	128.3	4.8
	4.1	1.1	2.5	600	17.9	12.6	0.70	1.42	22.8	12.6	600	29.1	1.60	23.6	114.9	5.3
	5.5	2.0	4.6	450	17.5	15.3	0.87	1.33	22.1	13.1	450	29.1	1.79	22.9	130.0	4.8
	5.5	2.0	4.6	600	18.3	12.8	0.70	1.38	23.0	13.2	600	29.9	1.63	24.3	116.2	5.4
100	2.8	0.2	0.5	450	15.2	14.0	0.92	1.64	20.8	9.3	Operation Not Recommended					
	2.8	0.2	0.5	600	15.9	11.7	0.74	1.69	21.7	9.4						
	4.1	1.1	2.5	450	15.9	14.3	0.90	1.54	21.2	10.3						
	4.1	1.1	2.5	600	16.0	12.0	0.72	1.59	22.0	10.4						
	5.5	1.9	4.4	450	16.3	14.5	0.89	1.50	21.4	10.9						
	5.5	1.9	4.4	600	16.9	12.1	0.72	1.55	22.2	10.9						
110	2.8	0.1	0.2	450	14.0	18.4	0.46	1.84	20.3	7.6						
	2.8	0.1	0.2	600	14.6	11.2	0.77	1.90	21.1	7.7						
	4.1	0.9	2.1	450	14.6	13.7	0.94	1.73	20.5	8.4						
	4.1	0.9	2.1	600	15.2	11.4	0.75	1.79	21.4	8.5						
	5.5	1.7	3.9	450	15.0	13.8	0.93	1.68	20.7	8.9						
	5.5	1.7	3.9	600	15.6	11.6	0.74	1.74	21.5	9.0						
120	2.8	0.1	0.2	450	12.9	13.1	1.02	2.06	19.9	6.2						
	2.8	0.1	0.2	600	13.4	10.9	0.82	2.13	20.7	6.3						
	4.1	0.8	1.8	450	13.4	13.2	0.99	1.94	20.1	6.9						
	4.1	0.8	1.8	600	14.0	11.0	0.79	2.01	20.8	7.0						
	5.5	1.6	3.7	450	13.7	13.3	0.97	1.89	20.2	7.3						
	5.5	1.6	3.7	600	14.3	11.1	0.78	1.95	21.0	7.3						

- LEGEND**
- ARI** — Air Conditioning and Refrigeration Institute
 - COP** — Coefficient of Performance
 - db** — Dry Bulb
 - EER** — Energy Efficiency Ratio
 - EWT** — Entering Water Temperature
 - GPM** — Gallons Per Minute
 - HE** — Heat of Extraction (MBtuh)
 - ISO** — International Organization for Standardization
 - LAT** — Leaving Air Temperature (F)
 - MBtuh** — Btuh in Thousands
 - TC** — Total Capacity (MBtuh)
 - THC** — Total Heating Capacity (MBtuh)
 - THR** — Total Heat Rejection (MBtuh)
 - TSC** — Total Sensible Capacity (MBtuh)
 - wb** — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD024

850 CFM NOMINAL AIRFLOW COOLING/850 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	8.0	5.6	12.9	Operation Not Recommended							640	16.3	1.80	10.6	94	2.66
	8.0	5.6	12.9	Operation Not Recommended							850	16.8	1.65	11.2	88	2.99
30	4.0	1.5	3.5	640	27.9	15.6	0.56	0.94	31.1	29.8	640	18.5	1.83	12.5	97	2.95
	4.0	1.5	3.5	850	29.1	18.7	0.64	0.97	32.4	30.0	850	19.0	1.68	13.3	91	3.32
	6.0	3.1	7.2	640	28.0	15.6	0.56	0.90	31.1	31.1	640	19.2	1.84	13.2	98	3.05
	6.0	3.1	7.2	850	29.2	18.7	0.64	0.93	32.4	31.3	850	19.7	1.68	14.0	91	3.42
	8.0	5.1	11.8	640	28.1	15.7	0.56	0.88	31.1	31.8	640	19.5	1.85	13.5	98	3.10
	8.0	5.1	11.8	850	29.3	18.8	0.64	0.91	32.4	32.1	850	20.0	1.69	14.3	92	3.48
40	4.0	1.3	3.0	640	27.8	15.8	0.57	1.04	31.3	26.9	640	21.4	1.87	15.2	101	3.34
	4.0	1.3	3.0	850	29.0	18.9	0.65	1.07	32.6	27.1	850	22.0	1.71	16.1	94	3.75
	6.0	2.8	6.5	640	28.0	15.8	0.56	0.99	31.4	28.5	640	22.2	1.89	16.0	102	3.45
	6.0	2.8	6.5	850	29.2	18.9	0.65	1.02	32.6	28.7	850	22.8	1.72	17.0	95	3.87
	8.0	4.5	10.4	640	28.2	15.8	0.56	0.96	31.4	29.3	640	22.6	1.89	16.4	103	3.51
	8.0	4.5	10.4	850	29.3	18.9	0.65	0.99	32.7	29.5	850	23.3	1.73	17.4	95	3.94
50	4.0	1.3	3.0	640	27.6	15.9	0.58	1.15	31.5	24.1	640	24.2	1.92	17.8	105	3.71
	4.0	1.3	3.0	850	28.7	19.0	0.66	1.18	32.7	24.3	850	24.9	1.75	18.9	97	4.16
	6.0	2.6	6.0	640	27.8	15.9	0.57	1.08	31.5	25.7	640	25.2	1.93	18.7	106	3.82
	6.0	2.6	6.0	850	29.0	19.1	0.66	1.12	32.8	25.9	850	25.9	1.76	19.9	98	4.29
	8.0	4.3	9.9	640	27.9	15.9	0.57	1.06	31.5	26.5	640	25.7	1.94	19.2	107	3.89
	8.0	4.3	9.9	850	29.1	19.1	0.66	1.09	32.8	26.7	850	26.4	1.77	20.3	99	4.36
60	4.0	1.2	2.8	640	26.9	15.9	0.59	1.27	31.2	21.1	640	27.0	1.96	20.4	109	4.05
	4.0	1.2	2.8	850	28.0	19.1	0.68	1.32	32.5	21.3	850	27.7	1.79	21.7	100	4.54
	6.0	2.5	5.8	640	27.3	15.9	0.58	1.20	31.4	22.7	640	28.1	1.97	21.4	111	4.17
	6.0	2.5	5.8	850	28.4	19.1	0.67	1.24	32.6	22.9	850	28.8	1.80	22.7	101	4.68
	8.0	4.0	9.2	640	27.5	15.9	0.58	1.17	31.4	23.5	640	28.6	1.98	21.9	111	4.23
	8.0	4.0	9.2	850	28.6	19.1	0.67	1.21	32.7	23.7	850	29.4	1.81	23.2	102	4.75
70	4.0	1.1	2.5	640	26.0	15.8	0.61	1.42	30.8	18.2	640	29.7	2.00	22.9	113	4.36
	4.0	1.1	2.5	850	27.0	18.9	0.70	1.47	32.0	18.4	850	30.5	1.83	24.3	103	4.89
	6.0	2.3	5.3	640	26.5	15.9	0.60	1.34	31.1	19.8	640	30.8	2.02	23.9	115	4.48
	6.0	2.3	5.3	850	27.6	19.0	0.69	1.39	32.3	19.9	850	31.7	1.84	25.4	104	5.04
	8.0	3.8	8.8	640	26.7	15.9	0.60	1.30	31.2	20.5	640	31.4	2.02	24.5	115	4.55
	8.0	3.8	8.8	850	27.8	19.0	0.68	1.35	32.4	20.7	850	32.3	1.85	25.9	105	5.11
80	4.0	1.0	2.3	640	24.8	15.6	0.63	1.59	30.2	15.6	640	32.3	2.04	25.3	117	4.65
	4.0	1.0	2.3	850	25.8	18.6	0.72	1.65	31.5	15.7	850	33.2	1.86	26.8	106	5.22
	6.0	2.2	5.1	640	25.4	15.7	0.62	1.50	30.6	16.9	640	33.5	2.06	26.3	118	4.77
	6.0	2.2	5.1	850	26.5	18.8	0.71	1.55	31.8	17.1	850	34.4	1.88	27.9	107	5.36
	8.0	3.5	8.1	640	25.7	15.8	0.61	1.46	30.7	17.7	640	34.1	2.07	26.9	119	4.83
	8.0	3.5	8.1	850	26.8	18.9	0.70	1.51	31.9	17.8	850	35.0	1.89	28.5	108	5.43
85	4.0	1.0	2.3	640	24.1	15.4	0.64	1.69	29.9	14.3	640	33.5	2.06	26.4	119	4.78
	4.0	1.0	2.3	850	25.1	18.4	0.73	1.75	31.1	14.4	850	34.4	1.88	28.0	108	5.36
	6.0	2.2	5.0	640	24.8	15.5	0.63	1.59	30.2	15.6	640	34.7	2.08	27.5	120	4.90
	6.0	2.2	5.0	850	25.8	18.6	0.72	1.65	31.5	15.7	850	35.7	1.90	29.2	109	5.50
	8.0	3.5	8.0	640	25.1	15.6	0.62	1.55	30.4	16.2	640	35.4	2.09	28.0	121	4.96
	8.0	3.5	8.0	850	26.2	18.7	0.71	1.60	31.6	16.4	850	36.3	1.91	29.8	110	5.57
90	4.0	1.0	2.3	640	23.5	15.2	0.65	1.79	29.6	13.1	640	34.8	2.08	27.5	120	4.90
	4.0	1.0	2.3	850	24.4	18.2	0.74	1.85	30.8	13.2	850	35.7	1.90	29.2	109	5.51
	6.0	2.1	4.9	640	24.2	15.4	0.64	1.69	29.9	14.3	640	36.0	2.10	28.6	122	5.03
	6.0	2.1	4.9	850	25.2	18.4	0.73	1.74	31.1	14.4	850	37.0	1.92	30.4	110	5.64
	8.0	3.4	7.9	640	24.5	15.5	0.63	1.64	30.1	15.0	640	36.6	2.11	29.2	123	5.09
	8.0	3.4	7.9	850	25.5	18.5	0.73	1.69	31.3	15.1	850	37.6	1.93	31.0	111	5.71
100	4.0	1.0	2.3	640	21.9	14.7	0.67	2.02	28.8	10.9	Operation Not Recommended					
	4.0	1.0	2.3	850	22.8	17.6	0.77	2.08	30.0	11.0						
	6.0	2.0	4.6	640	22.7	14.9	0.66	1.90	29.2	12.0						
	6.0	2.0	4.6	850	23.7	17.9	0.76	1.96	30.4	12.0						
	8.0	3.2	7.4	640	23.1	15.1	0.65	1.84	29.4	12.5						
	8.0	3.2	7.4	850	24.1	18.1	0.75	1.91	30.6	12.6						
110	4.0	0.9	2.1	640	20.2	14.0	0.69	2.27	28.0	8.9						
	4.0	0.9	2.1	850	21.1	16.8	0.80	2.34	29.1	9.0						
	6.0	1.9	4.4	640	21.1	14.4	0.68	2.14	28.4	9.8						
	6.0	1.9	4.4	850	22.0	17.2	0.78	2.21	29.5	9.9						
	8.0	3.1	7.2	640	21.5	14.5	0.67	2.08	28.6	10.3						
	8.0	3.1	7.2	850	22.4	17.4	0.78	2.15	29.7	10.4						
120	4.0	0.9	2.1	640	18.4	13.2	0.72	2.55	27.1	7.2						
	4.0	0.9	2.1	850	19.2	15.8	0.82	2.64	28.2	7.3						
	6.0	1.8	4.2	640	19.3	13.6	0.70	2.41	27.5	8.0						
	6.0	1.8	4.2	850	20.1	16.3	0.81	2.49	28.6	8.1						
	8.0	3.0	6.9	640	19.7	13.8	0.70	2.35	27.8	8.4						
	8.0	3.0	6.9	850	20.6	16.5	0.80	2.42	28.9	8.5						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD030

950 CFM NOMINAL AIRFLOW COOLING/950 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

Table with columns: EWT (F), GPM, PRESSURE DROP (PSI, ft wg), COOLING (Airflow CFM, TC, TSC, Sens/Tot Ratio, kW, THR, EER), HEATING (Airflow CFM, THC, kW, HE, LAT, COP). Rows represent different EWT and GPM combinations.

LEGEND
ARI — Air Conditioning and Refrigeration Institute
COP — Coefficient of Performance
db — Dry Bulb
EER — Energy Efficiency Ratio
EWT — Entering Water Temperature
GPM — Gallons Per Minute
HE — Heat of Extraction (MBtuh)
ISO — International Organization for Standardization
LAT — Leaving Air Temperature (F)
MBtuh — Btuh in Thousands
TC — Total Capacity (MBtuh)
THC — Total Heating Capacity (MBtuh)
THR — Total Heat Rejection (MBtuh)
TSC — Total Sensible Capacity (MBtuh)
wb — Wet Bulb

NOTES:
1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD036

1,250 CFM NOMINAL AIRFLOW COOLING/1,250 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	9.0	5.9	13.6	Operation Not Recommended							940	21.7	2.41	14.0	91	2.64
	9.0	5.9	13.6	Operation Not Recommended							1250	22.3	2.21	14.9	87	2.96
30	4.5	1.7	3.9	940	32.8	18.6	0.57	1.49	37.9	22.0	940	24.0	2.44	16.1	94	2.88
	4.5	1.7	3.9	1250	34.1	22.3	0.65	1.54	39.4	22.2	1250	24.6	2.23	17.1	88	3.23
	6.8	3.3	7.6	940	33.1	18.6	0.56	1.43	38.0	23.2	940	24.9	2.45	16.9	94	2.97
	6.8	3.3	7.6	1250	34.5	22.3	0.65	1.48	39.5	23.4	1250	25.5	2.24	18.0	89	3.34
	9.0	5.7	13.2	940	33.3	18.7	0.56	1.40	38.1	23.8	940	25.4	2.46	17.4	95	3.02
	9.0	5.7	13.2	1250	34.7	22.4	0.65	1.45	39.6	24.0	1250	26.0	2.25	18.4	89	3.40
40	4.5	1.5	3.5	940	35.5	21.0	0.59	1.57	40.8	22.6	940	27.3	2.48	19.2	97	3.23
	4.5	1.5	3.5	1250	36.9	25.1	0.68	1.62	42.4	22.8	1250	28.1	2.27	20.4	91	3.62
	6.8	3.2	7.4	940	35.6	21.0	0.59	1.54	40.9	23.1	940	28.4	2.50	20.2	98	3.33
	6.8	3.2	7.4	1250	37.1	25.2	0.68	1.60	42.5	23.3	1250	29.2	2.29	21.5	92	3.74
	9.0	5.4	12.5	940	35.9	21.3	0.59	1.51	41.1	23.8	940	29.0	2.51	20.8	99	3.39
	9.0	5.4	12.5	1250	37.4	25.5	0.68	1.56	42.7	24.0	1250	29.8	2.29	22.0	92	3.81
50	4.5	1.3	3.0	940	35.9	21.7	0.60	1.75	41.8	20.5	940	30.8	2.53	22.4	100	3.56
	4.5	1.3	3.0	1250	37.3	26.0	0.70	1.81	43.5	20.6	1250	31.6	2.32	23.7	93	4.00
	6.8	3.1	7.2	940	36.2	21.8	0.60	1.67	41.9	21.7	940	32.1	2.56	23.6	102	3.68
	6.8	3.1	7.2	1250	37.7	26.1	0.69	1.72	43.5	21.9	1250	33.0	2.34	25.0	94	4.13
	9.0	5.2	12.0	940	36.9	22.1	0.60	1.63	42.5	22.7	940	32.8	2.57	24.2	102	3.75
	9.0	5.2	12.0	1250	38.5	26.4	0.69	1.68	44.2	22.8	1250	33.7	2.35	25.7	95	4.21
60	4.5	1.2	2.8	940	34.6	21.6	0.63	1.90	41.1	18.2	940	34.3	2.59	25.6	104	3.88
	4.5	1.2	2.8	1250	36.0	25.9	0.72	1.96	42.7	18.4	1250	35.2	2.37	27.2	96	4.36
	6.8	2.9	6.7	940	35.5	21.9	0.62	1.80	41.6	19.7	940	35.8	2.62	27.0	105	4.01
	6.8	2.9	6.7	1250	37.0	26.2	0.71	1.86	43.3	19.8	1250	36.8	2.39	28.6	97	4.51
	9.0	5.0	11.6	940	35.8	21.9	0.61	1.76	41.8	20.4	940	36.7	2.63	27.8	106	4.09
	9.0	5.0	11.6	1250	37.3	26.3	0.70	1.82	43.5	20.5	1250	37.6	2.40	29.5	98	4.59
70	4.5	1.1	2.5	940	32.8	21.0	0.64	2.06	39.9	15.9	940	37.9	2.65	28.9	107	4.19
	4.5	1.1	2.5	1250	34.2	25.1	0.73	2.13	41.4	16.0	1250	38.9	2.42	30.6	99	4.70
	6.8	2.9	6.7	940	34.0	21.4	0.63	1.96	40.7	17.4	940	39.7	2.68	30.5	109	4.33
	6.8	2.9	6.7	1250	35.4	25.6	0.72	2.02	42.3	17.5	1250	40.7	2.45	32.3	100	4.87
	9.0	4.8	11.1	940	34.5	21.6	0.63	1.91	41.0	18.1	940	40.6	2.70	31.4	110	4.41
	9.0	4.8	11.1	1250	35.9	25.9	0.72	1.97	42.7	18.2	1250	41.7	2.47	33.3	101	4.95
80	4.5	1.0	2.3	940	30.8	20.2	0.65	2.25	38.5	13.7	940	41.6	2.72	32.2	111	4.48
	4.5	1.0	2.3	1250	32.1	24.1	0.75	2.32	40.0	13.8	1250	42.7	2.48	34.2	102	5.04
	6.8	2.8	6.5	940	32.0	20.6	0.64	2.13	39.3	15.0	940	43.6	2.75	34.1	113	4.64
	6.8	2.8	6.5	1250	33.4	24.7	0.74	2.21	40.9	15.1	1250	44.8	2.52	36.1	103	5.21
	9.0	4.5	10.4	940	32.6	20.9	0.64	2.08	39.7	15.7	940	44.7	2.77	35.1	114	4.72
	9.0	4.5	10.4	1250	34.0	25.0	0.74	2.15	41.3	15.8	1250	45.9	2.54	37.2	104	5.30
85	4.5	1.0	2.2	940	29.8	19.8	0.66	2.36	37.9	12.7	940	43.4	2.75	33.9	113	4.63
	4.5	1.0	2.2	1250	31.1	23.7	0.76	2.44	39.4	12.8	1250	44.6	2.52	36.0	103	5.20
	6.8	2.7	6.2	940	31.0	20.2	0.65	2.24	38.6	13.9	940	45.6	2.79	35.9	115	4.79
	6.8	2.7	6.2	1250	32.3	24.2	0.75	2.31	40.2	14.0	1250	46.8	2.55	38.1	105	5.38
	9.0	4.5	10.3	940	31.6	20.5	0.65	2.18	39.0	14.5	940	46.8	2.82	37.0	116	4.87
	9.0	4.5	10.3	1250	32.9	24.5	0.74	2.25	40.6	14.6	1250	48.1	2.57	39.2	106	5.47
90	4.5	0.9	2.1	940	28.9	19.4	0.67	2.47	37.3	11.7	940	45.3	2.79	35.6	115	4.77
	4.5	0.9	2.1	1250	30.1	23.3	0.77	2.55	38.8	11.8	1250	46.5	2.55	37.8	104	5.35
	6.8	2.6	6.0	940	30.0	19.8	0.66	2.34	38.0	12.8	940	47.6	2.83	37.7	117	4.93
	6.8	2.6	6.0	1250	31.2	23.7	0.76	2.42	39.5	12.9	1250	48.9	2.59	40.0	106	5.54
	9.0	4.4	10.2	940	30.6	20.1	0.66	2.27	38.3	13.4	940	48.9	2.86	38.9	118	5.02
	9.0	4.4	10.2	1250	31.8	24.0	0.75	2.35	39.9	13.5	1250	50.2	2.61	41.3	107	5.64
100	4.5	0.8	1.8	940	27.3	19.0	0.70	2.72	36.6	10.0	Operation Not Recommended					
	4.5	0.8	1.8	1250	28.5	22.8	0.80	2.81	38.1	10.1						
	6.8	2.6	6.0	940	28.1	19.2	0.68	2.57	36.9	10.9						
	6.8	2.6	6.0	1250	29.3	23.0	0.78	2.66	38.4	11.0						
	9.0	4.2	9.7	940	28.6	19.3	0.68	2.50	37.2	11.4						
9.0	4.2	9.7	1250	29.8	23.2	0.78	2.59	38.6	11.5							
110	4.5	0.8	1.8	940	26.4	18.9	0.71	2.99	36.6	8.8						
	4.5	0.8	1.8	1250	27.5	22.6	0.82	3.09	38.1	8.9						
	6.8	2.5	5.8	940	26.9	19.0	0.71	2.85	36.6	9.4						
	6.8	2.5	5.8	1250	28.0	22.8	0.81	2.95	38.1	9.5						
	9.0	4.0	9.2	940	27.2	19.1	0.70	2.77	36.7	9.8						
9.0	4.0	9.2	1250	28.3	22.8	0.81	2.86	38.1	9.9							
120	4.5	0.7	1.6	940	25.8	19.3	0.75	3.33	37.2	7.7						
	4.5	0.7	1.6	1250	26.9	23.1	0.86	3.44	38.7	7.8						
	6.8	2.5	5.8	940	26.4	19.6	0.74	3.18	37.2	8.3						
	6.8	2.5	5.8	1250	27.5	23.5	0.86	3.29	38.7	8.4						
	9.0	3.8	8.8	940	26.9	19.7	0.73	3.09	37.4	8.7						
9.0	3.8	8.8	1250	28.0	23.6	0.84	3.19	38.9	8.8							

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD042
1,400 CFM NOMINAL AIRFLOW COOLING/1,400 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING						
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP	
20	11.0	4.0	9.2	Operation Not Recommended							1050	27.1	2.94	17.7	94	2.70	
	11.0	4.0	9.2	Operation Not Recommended							1400	27.8	2.69	18.8	88	3.03	
30	5.5	1.1	2.5	1050	38.8	23.0	0.59	1.53	44.0	25.4	1050	29.6	2.96	20.0	96	2.93	
	5.5	1.1	2.5	1400	40.4	27.6	0.68	1.58	45.7	25.6	1400	30.4	2.71	21.2	90	3.28	
	8.3	2.2	5.1	1050	39.4	23.0	0.58	1.51	44.5	26.1	1050	30.7	2.97	21.0	97	3.02	
	8.3	2.2	5.1	1400	41.0	27.6	0.67	1.56	46.3	26.3	1400	31.5	2.72	22.3	91	3.40	
	11.0	3.9	9.0	1050	39.8	23.1	0.58	1.46	44.8	27.4	1050	31.3	2.98	21.6	98	3.08	
	11.0	3.9	9.0	1400	41.5	27.6	0.67	1.50	46.6	27.6	1400	32.1	2.73	22.9	91	3.46	
40	5.5	1.0	2.3	1050	42.0	25.7	0.61	1.77	48.1	23.8	1050	33.8	3.01	23.9	100	3.29	
	5.5	1.0	2.3	1400	43.8	30.8	0.70	1.83	50.0	24.0	1400	34.7	2.75	25.4	93	3.69	
	8.3	2.1	4.9	1050	42.5	25.7	0.60	1.70	48.3	25.0	1050	35.2	3.03	25.3	101	3.41	
	8.3	2.1	4.9	1400	44.3	30.7	0.69	1.76	50.3	25.2	1400	36.2	2.77	26.8	94	3.83	
	11.0	3.7	8.5	1050	43.3	25.9	0.60	1.66	48.9	26.1	1050	36.0	3.04	26.0	102	3.48	
	11.0	3.7	8.5	1400	45.1	31.0	0.69	1.72	50.9	26.3	1400	37.0	2.78	27.6	94	3.90	
50	5.5	0.9	2.1	1050	42.5	26.6	0.63	1.99	49.3	21.3	1050	38.3	3.07	28.1	104	3.66	
	5.5	0.9	2.1	1400	44.3	31.9	0.72	2.06	51.2	21.5	1400	39.3	2.81	29.8	96	4.10	
	8.3	2.1	4.9	1050	43.1	26.6	0.62	1.88	49.5	22.9	1050	40.1	3.10	29.7	105	3.79	
	8.3	2.1	4.9	1400	44.8	31.9	0.71	1.94	51.4	23.1	1400	41.2	2.83	31.5	97	4.26	
	11.0	3.6	8.3	1050	43.6	26.7	0.61	1.83	49.8	23.8	1050	41.1	3.11	30.6	106	3.87	
	11.0	3.6	8.3	1400	45.4	32.0	0.71	1.89	51.8	24.0	1400	42.2	2.85	32.5	98	4.34	
60	5.5	0.9	2.1	1050	40.6	26.0	0.64	2.17	48.0	18.7	1050	43.0	3.15	32.3	108	4.00	
	5.5	0.9	2.1	1400	42.3	31.1	0.73	2.24	49.9	18.9	1400	44.1	2.88	34.3	99	4.49	
	8.3	2.0	4.6	1050	41.9	26.4	0.63	2.06	48.9	20.3	1050	45.1	3.19	34.2	110	4.14	
	8.3	2.0	4.6	1400	43.6	31.7	0.73	2.13	50.9	20.5	1400	46.3	2.91	36.3	101	4.65	
	11.0	3.5	8.1	1050	42.5	26.6	0.63	1.99	49.3	21.4	1050	45.7	3.20	34.8	110	4.18	
	11.0	3.5	8.1	1400	44.3	31.9	0.72	2.05	51.3	21.6	1400	46.9	2.93	36.9	101	4.70	
70	5.5	0.8	1.8	1050	38.0	24.8	0.65	2.37	46.1	16.1	1050	47.6	3.24	36.6	112	4.31	
	5.5	0.8	1.8	1400	39.6	29.7	0.75	2.45	48.0	16.2	1400	48.9	2.96	38.8	102	4.84	
	8.3	2.0	4.6	1050	39.6	25.5	0.64	2.25	47.3	17.6	1050	49.9	3.29	38.6	114	4.44	
	8.3	2.0	4.6	1400	41.3	30.6	0.74	2.33	49.2	17.8	1400	51.2	3.01	41.0	104	4.99	
	11.0	3.2	7.4	1050	40.4	25.9	0.64	2.19	47.9	18.4	1050	51.1	3.33	39.7	115	4.51	
	11.0	3.2	7.4	1400	42.1	31.0	0.74	2.26	49.8	18.6	1400	52.5	3.04	42.1	105	5.06	
80	5.5	0.7	1.6	1050	35.1	23.4	0.67	2.59	44.0	13.6	1050	52.1	3.35	40.5	116	4.56	
	5.5	0.7	1.6	1400	36.6	28.0	0.77	2.68	45.7	13.7	1400	53.5	3.07	43.0	105	5.12	
	8.3	1.9	4.4	1050	36.8	24.2	0.66	2.46	45.2	14.9	1050	54.5	3.42	42.6	118	4.66	
	8.3	1.9	4.4	1400	38.3	29.0	0.76	2.54	47.0	15.1	1400	55.9	3.13	45.2	107	5.24	
	11.0	3.2	7.4	1050	37.6	24.6	0.65	2.40	45.8	15.7	1050	55.7	3.46	43.7	119	4.71	
	11.0	3.2	7.4	1400	39.2	29.5	0.75	2.48	47.6	15.8	1400	57.2	3.17	46.3	108	5.29	
85	5.5	0.7	1.6	1050	33.7	22.7	0.67	2.70	42.9	12.5	1050	54.2	3.42	42.4	118	4.65	
	5.5	0.7	1.6	1400	35.1	27.2	0.77	2.79	44.7	12.6	1400	55.6	3.12	44.9	107	5.22	
	8.3	1.9	4.3	1050	35.3	23.5	0.66	2.57	44.1	13.8	1050	56.5	3.50	44.3	120	4.73	
	8.3	1.9	4.3	1400	36.8	28.1	0.76	2.65	45.8	13.9	1400	58.0	3.20	47.0	108	5.32	
	11.0	3.2	7.3	1050	36.1	23.9	0.66	2.50	44.7	14.5	1050	57.6	3.54	45.3	121	4.77	
	11.0	3.2	7.3	1400	37.6	28.6	0.76	2.58	46.4	14.6	1400	59.2	3.24	48.1	109	5.35	
90	5.5	0.7	1.6	1050	32.3	22.0	0.68	2.81	41.9	11.5	1050	56.3	3.48	44.2	120	4.73	
	5.5	0.7	1.6	1400	33.6	26.4	0.78	2.91	43.6	11.6	1400	57.8	3.18	46.9	108	5.32	
	8.3	1.8	4.2	1050	33.8	22.7	0.67	2.67	42.9	12.7	1050	58.5	3.57	46.0	122	4.80	
	8.3	1.8	4.2	1400	35.2	27.2	0.77	2.76	44.6	12.8	1400	60.0	3.26	48.9	110	5.39	
	11.0	3.1	7.2	1050	34.6	23.1	0.67	2.60	43.5	13.3	1050	59.6	3.62	46.9	123	4.82	
	11.0	3.1	7.2	1400	36.0	27.7	0.77	2.69	45.2	13.4	1400	61.1	3.31	49.8	110	5.41	
100	5.5	0.6	1.4	1050	29.9	21.0	0.70	3.05	40.3	9.8	Operation Not Recommended						
	5.5	0.6	1.4	1400	31.1	25.1	0.81	3.15	41.9	9.9							
	8.3	1.8	4.2	1050	31.0	21.5	0.69	2.90	40.9	10.7							
	8.3	1.8	4.2	1400	32.3	25.7	0.80	3.00	42.6	10.8							
	11.0	2.9	6.7	1050	31.7	21.8	0.69	2.81	41.3	11.3							
	11.0	2.9	6.7	1400	33.0	26.1	0.79	2.90	43.0	11.4							
110	5.5	0.6	1.4	1050	28.4	20.6	0.73	3.21	39.4	8.8							
	5.5	0.6	1.4	1400	29.6	24.7	0.84	3.32	40.9	8.9							
	8.3	1.7	3.9	1050	29.0	20.7	0.71	3.12	39.6	9.3							
	8.3	1.7	3.9	1400	30.2	24.8	0.82	3.22	41.2	9.4							
	11.0	2.9	6.7	1050	29.4	20.8	0.71	3.06	39.9	9.6							
	11.0	2.9	6.7	1400	30.6	24.9	0.81	3.16	41.5	9.7							
120	5.5	0.6	1.4	1050	28.0	20.9	0.75	3.33	39.4	8.4							
	5.5	0.6	1.4	1400	29.1	25.0	0.86	3.44	40.9	8.5							
	8.3	1.6	3.7	1050	28.2	20.9	0.74	3.27	39.3	8.6							
	8.3	1.6	3.7	1400	29.3	25.0	0.85	3.38	40.9	8.7							
	11.0	2.7	6.2	1050	28.4	20.9	0.74	3.25	39.5	8.8							
	11.0	2.7	6.2	1400	29.6	25.1	0.85	3.35	41.1	8.8							

- LEGEND**
- ARI — Air Conditioning and Refrigeration Institute
 - COP — Coefficient of Performance
 - db — Dry Bulb
 - EER — Energy Efficiency Ratio
 - EWT — Entering Water Temperature
 - GPM — Gallons Per Minute
 - HE — Heat of Extraction (MBtuh)
 - ISO — International Organization for Standardization
 - LAT — Leaving Air Temperature (F)
 - MBtuh — Btuh in Thousands
 - TC — Total Capacity (MBtuh)
 - THC — Total Heating Capacity (MBtuh)
 - THR — Total Heat Rejection (MBtuh)
 - TSC — Total Sensible Capacity (MBtuh)
 - wb — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD048

1,600 CFM NOMINAL AIRFLOW COOLING/1,600 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	12.0	4.8	11.1	Operation Not Recommended							1200	34.4	3.80	22.2	97	2.65
	12.0	4.8	11.1	Operation Not Recommended							1600	35.3	3.47	23.6	90	2.98
30	6.0	1.3	3.0	1200	52.0	29.3	0.56	2.14	59.3	24.3	1200	37.1	3.84	24.7	99	2.83
	6.0	1.3	3.0	1600	54.2	35.1	0.65	2.22	61.7	24.4	1600	38.0	3.51	26.2	92	3.18
	9.0	2.6	6.0	1200	52.3	29.3	0.56	2.06	59.4	25.4	1200	38.5	3.86	26.0	100	2.92
	9.0	2.6	6.0	1600	54.5	35.1	0.64	2.13	61.7	25.6	1600	39.5	3.53	27.6	93	3.28
	12.0	4.5	10.4	1200	52.5	29.4	0.56	2.03	59.4	25.9	1200	39.3	3.87	26.8	100	2.98
	12.0	4.5	10.4	1600	54.7	35.2	0.64	2.09	61.8	26.1	1600	40.4	3.54	28.4	93	3.34
40	6.0	1.2	2.8	1200	53.2	30.3	0.57	2.32	61.1	22.9	1200	41.9	3.92	29.1	102	3.14
	6.0	1.2	2.8	1600	55.4	36.3	0.66	2.40	63.5	23.1	1600	43.0	3.58	30.9	95	3.52
	9.0	2.6	6.0	1200	53.4	30.4	0.57	2.24	61.1	23.9	1200	43.8	3.95	30.9	104	3.25
	9.0	2.6	6.0	1600	55.7	36.4	0.65	2.31	63.5	24.1	1600	45.0	3.61	32.8	96	3.65
	12.0	4.4	10.2	1200	53.7	30.4	0.57	2.18	61.1	24.6	1200	44.9	3.97	31.8	105	3.31
	12.0	4.4	10.2	1600	55.9	36.4	0.65	2.26	63.6	24.8	1600	46.1	3.63	33.8	97	3.72
50	6.0	1.1	2.5	1200	52.6	30.7	0.58	2.60	61.5	20.2	1200	47.2	4.01	33.9	106	3.45
	6.0	1.1	2.5	1600	54.8	36.8	0.67	2.69	63.9	20.4	1600	48.5	3.67	36.0	98	3.87
	9.0	2.5	5.8	1200	53.5	30.9	0.58	2.44	61.8	21.9	1200	49.6	4.06	36.1	108	3.58
	9.0	2.5	5.8	1600	55.7	37.0	0.66	2.52	64.3	22.1	1600	50.9	3.71	38.3	99	4.02
	12.0	4.2	9.7	1200	53.8	30.9	0.57	2.37	61.9	22.7	1200	50.9	4.08	37.3	109	3.65
	12.0	4.2	9.7	1600	56.0	37.0	0.66	2.45	64.3	22.9	1600	52.2	3.73	39.6	100	4.10
60	6.0	1.0	2.3	1200	50.7	30.2	0.60	2.85	60.4	17.8	1200	52.8	4.12	39.0	111	3.75
	6.0	1.0	2.3	1600	52.8	36.2	0.68	2.94	62.8	17.9	1600	54.2	3.77	41.4	101	4.22
	9.0	2.4	5.5	1200	52.1	30.6	0.59	2.67	61.2	19.5	1200	55.6	4.18	41.6	113	3.90
	9.0	2.4	5.5	1600	54.3	36.6	0.68	2.76	63.7	19.7	1600	57.1	3.82	44.1	103	4.38
	12.0	4.0	9.2	1200	52.7	30.7	0.58	2.59	61.5	20.4	1200	57.2	4.21	43.0	114	3.98
	12.0	4.0	9.2	1600	54.9	36.8	0.67	2.67	64.0	20.5	1600	58.8	3.85	45.6	104	4.47
70	6.0	1.0	2.3	1200	48.3	29.5	0.61	3.13	59.0	15.4	1200	58.6	4.24	44.2	115	4.05
	6.0	1.0	2.3	1600	50.3	35.3	0.70	3.24	61.3	15.5	1600	60.2	3.88	46.9	105	4.54
	9.0	2.3	5.3	1200	50.0	30.0	0.60	2.93	60.0	17.0	1200	61.9	4.32	47.2	118	4.20
	9.0	2.3	5.3	1600	52.1	35.9	0.69	3.03	62.4	17.2	1600	63.6	3.95	50.1	107	4.72
	12.0	3.8	8.8	1200	50.8	30.2	0.59	2.84	60.5	17.9	1200	63.8	4.36	48.9	119	4.29
	12.0	3.8	8.8	1600	52.9	36.2	0.68	2.93	62.9	18.0	1600	65.5	3.99	51.9	108	4.81
80	6.0	0.9	2.1	1200	45.7	28.7	0.63	3.45	57.5	13.2	1200	64.6	4.38	49.6	120	4.32
	6.0	0.9	2.1	1600	47.6	34.4	0.72	3.57	59.8	13.3	1600	66.3	4.01	52.6	108	4.85
	9.0	2.3	5.3	1200	47.5	29.2	0.62	3.23	58.5	14.7	1200	68.4	4.47	53.0	123	4.48
	9.0	2.3	5.3	1600	49.4	35.0	0.71	3.34	60.8	14.8	1600	70.2	4.09	56.2	111	5.03
	12.0	3.6	8.3	1200	48.3	29.5	0.61	3.13	59.0	15.5	1200	70.5	4.53	54.9	124	4.56
	12.0	3.6	8.3	1600	50.3	35.3	0.70	3.23	61.4	15.6	1600	72.4	4.14	58.3	112	5.12
85	6.0	0.9	2.1	1200	44.4	28.4	0.64	3.64	56.8	12.2	1200	67.6	4.46	52.3	122	4.45
	6.0	0.9	2.1	1600	46.2	34.0	0.74	3.76	59.1	12.3	1600	69.4	4.07	55.5	110	4.99
	9.0	2.3	5.2	1200	46.1	28.8	0.63	3.40	57.7	13.5	1200	71.7	4.56	55.9	125	4.60
	9.0	2.3	5.2	1600	48.0	34.5	0.72	3.52	60.0	13.6	1600	73.6	4.17	59.3	113	5.17
	12.0	3.6	8.2	1200	47.0	29.1	0.62	3.29	58.2	14.3	1200	73.9	4.62	57.9	127	4.69
	12.0	3.6	8.2	1600	48.9	34.8	0.71	3.40	60.6	14.4	1600	75.9	4.23	61.4	114	5.26
90	6.0	0.9	2.1	1200	43.1	28.1	0.65	3.82	56.1	11.3	1200	70.6	4.53	55.0	125	4.57
	6.0	0.9	2.1	1600	44.9	33.6	0.75	3.95	58.4	11.4	1600	72.5	4.14	58.4	112	5.13
	9.0	2.2	5.1	1200	44.8	28.4	0.64	3.57	57.0	12.5	1200	74.9	4.65	58.8	128	4.72
	9.0	2.2	5.1	1600	46.6	34.1	0.73	3.69	59.2	12.6	1600	76.9	4.25	62.4	115	5.30
	12.0	3.5	8.1	1200	45.6	28.7	0.63	3.46	57.4	13.2	1200	77.3	4.72	60.9	130	4.80
	12.0	3.5	8.1	1600	47.5	34.3	0.72	3.57	59.7	13.3	1600	79.3	4.31	64.6	116	5.39
100	6.0	0.8	1.8	1200	40.8	27.8	0.68	4.24	55.3	9.6	Operation Not Recommended					
	6.0	0.8	1.8	1600	42.5	33.3	0.78	4.39	57.5	9.7						
	9.0	2.1	4.9	1200	42.2	27.9	0.66	3.97	55.8	10.6						
	9.0	2.1	4.9	1600	44.0	33.4	0.76	4.10	58.0	10.7						
	12.0	3.3	7.6	1200	43.0	28.1	0.65	3.83	56.1	11.2						
12.0	3.3	7.6	1600	44.8	33.6	0.75	3.96	58.3	11.3							
110	6.0	0.8	1.8	1200	39.2	27.8	0.71	4.68	55.2	8.4						
	6.0	0.8	1.8	1600	40.8	33.3	0.82	4.84	57.4	8.4						
	9.0	2.0	4.6	1200	40.1	27.9	0.69	4.42	55.2	9.1						
	9.0	2.0	4.6	1600	41.8	33.4	0.80	4.57	57.4	9.2						
	12.0	3.2	7.4	1200	40.7	27.9	0.69	4.27	55.3	9.5						
12.0	3.2	7.4	1600	42.4	33.5	0.79	4.41	57.5	9.6							
120	6.0	0.7	1.6	1200	38.1	28.7	0.75	5.25	56.1	7.3						
	6.0	0.7	1.6	1600	39.7	34.4	0.87	5.42	58.3	7.3						
	9.0	1.9	4.4	1200	39.2	28.8	0.74	4.97	56.2	7.9						
	9.0	1.9	4.4	1600	40.8	34.5	0.85	5.14	58.4	7.9						
	12.0	3.0	6.9	1200	39.8	28.9	0.73	4.82	56.2	8.3						
12.0	3.0	6.9	1600	41.4	34.6	0.84	4.98	58.5	8.3							

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD060

1,950 CFM NOMINAL AIRFLOW COOLING/1,950 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	15.0	5.0	11.6	Operation Not Recommended							1465	40.8	4.43	26.6	96	2.70
	15.0	5.0	11.6	Operation Not Recommended							1950	41.9	4.05	28.2	90	3.03
30	7.5	0.6	1.4	1465	61.8	36.2	0.59	2.64	70.8	23.4	1465	44.1	4.50	29.6	98	2.88
	7.5	0.6	1.4	1950	64.3	43.4	0.67	2.73	73.6	23.6	1950	45.3	4.11	31.4	92	3.23
	11.3	2.3	5.3	1465	63.0	36.5	0.58	2.63	72.0	23.9	1465	45.8	4.53	31.1	99	2.96
	11.3	2.3	5.3	1950	65.6	43.7	0.67	2.72	74.9	24.1	1950	47.0	4.14	33.0	92	3.33
	15.0	4.8	11.1	1465	64.9	37.4	0.58	2.60	73.8	24.9	1465	46.7	4.55	32.0	100	3.01
	15.0	4.8	11.1	1950	67.6	44.8	0.66	2.69	76.7	25.1	1950	48.0	4.16	33.9	93	3.38
40	7.5	0.5	1.2	1465	64.9	38.6	0.59	2.86	74.6	22.7	1465	50.0	4.61	34.9	102	3.18
	7.5	0.5	1.2	1950	67.5	46.2	0.68	2.96	77.6	22.9	1950	51.3	4.22	37.0	94	3.57
	11.3	2.2	5.1	1465	65.4	38.7	0.59	2.76	74.9	23.7	1465	52.1	4.65	36.8	103	3.28
	11.3	2.2	5.1	1950	68.2	46.3	0.68	2.85	77.8	23.9	1950	53.5	4.25	39.1	95	3.69
	15.0	4.5	10.4	1465	66.0	38.8	0.59	2.72	75.3	24.3	1465	53.3	4.67	37.9	104	3.34
	15.0	4.5	10.4	1950	68.8	46.4	0.67	2.81	78.3	24.5	1950	54.7	4.27	40.2	96	3.75
50	7.5	0.4	0.9	1465	65.4	39.8	0.61	3.15	76.2	20.8	1465	56.1	4.73	40.5	105	3.48
	7.5	0.4	0.9	1950	68.1	47.6	0.70	3.26	79.2	20.9	1950	57.6	4.32	43.0	97	3.91
	11.3	2.1	4.9	1465	66.1	39.8	0.60	2.97	76.2	22.2	1465	58.7	4.77	42.9	107	3.60
	11.3	2.1	4.9	1950	68.8	47.6	0.69	3.07	79.2	22.4	1950	60.3	4.37	45.5	99	4.05
	15.0	4.3	9.9	1465	66.4	39.8	0.60	2.91	76.3	22.9	1465	60.1	4.80	44.1	108	3.67
	15.0	4.3	9.9	1950	69.2	47.6	0.69	3.00	79.4	23.0	1950	61.7	4.39	46.8	99	4.12
60	7.5	0.3	0.7	1465	64.0	39.9	0.62	3.50	76.0	18.3	1465	62.5	4.84	46.3	109	3.78
	7.5	0.3	0.7	1950	66.7	47.8	0.72	3.62	79.0	18.4	1950	64.2	4.43	49.1	100	4.24
	11.3	2.1	4.9	1465	65.3	40.1	0.61	3.26	76.4	20.0	1465	65.5	4.90	49.0	111	3.92
	11.3	2.1	4.9	1950	68.0	48.0	0.71	3.37	79.4	20.2	1950	67.2	4.48	52.0	102	4.40
	15.0	4.1	9.5	1465	65.7	40.1	0.61	3.17	76.5	20.7	1465	67.1	4.93	50.5	112	3.99
	15.0	4.1	9.5	1950	68.4	48.0	0.70	3.27	79.5	20.9	1950	68.9	4.51	53.5	103	4.48
70	7.5	0.3	0.7	1465	61.6	39.2	0.64	3.84	74.7	16.0	1465	68.9	4.97	52.0	114	4.06
	7.5	0.3	0.7	1950	64.2	46.9	0.73	3.97	77.7	16.2	1950	70.7	4.54	55.2	104	4.56
	11.3	2.0	4.6	1465	63.4	39.7	0.63	3.61	75.7	17.6	1465	72.2	5.03	55.0	116	4.20
	11.3	2.0	4.6	1950	66.0	47.6	0.72	3.73	78.7	17.7	1950	74.1	4.60	58.4	105	4.72
	15.0	3.9	9.0	1465	64.1	39.9	0.62	3.49	76.1	18.4	1465	73.9	5.07	56.6	117	4.28
	15.0	3.9	9.0	1950	66.8	47.8	0.72	3.61	79.1	18.5	1950	75.9	4.63	60.1	106	4.80
80	7.5	0.2	0.5	1465	58.6	38.1	0.65	4.23	73.1	13.9	1465	75.1	5.09	57.7	117	4.32
	7.5	0.2	0.5	1950	61.1	45.6	0.75	4.37	76.0	14.0	1950	77.1	4.65	61.2	107	4.85
	11.3	1.9	4.4	1465	60.7	38.9	0.64	3.96	74.2	15.3	1465	78.6	5.16	60.8	120	4.46
	11.3	1.9	4.4	1950	63.2	46.6	0.74	4.09	77.2	15.4	1950	80.7	4.72	64.5	108	5.01
	15.0	3.6	8.3	1465	61.7	39.2	0.64	3.83	74.8	16.1	1465	80.4	5.21	62.5	121	4.53
	15.0	3.6	8.3	1950	64.3	47.0	0.73	3.96	77.8	16.2	1950	82.6	4.76	66.3	109	5.08
85	7.5	0.2	0.5	1465	56.9	37.4	0.66	4.44	72.1	12.8	1465	78.1	5.15	60.4	119	4.44
	7.5	0.2	0.5	1950	59.3	44.8	0.76	4.59	75.0	12.9	1950	80.1	4.71	64.0	108	4.98
	11.3	1.9	4.3	1465	59.1	38.3	0.65	4.16	73.3	14.2	1465	81.6	5.23	63.5	122	4.57
	11.3	1.9	4.3	1950	61.6	45.8	0.74	4.30	76.3	14.3	1950	83.7	4.79	67.4	110	5.13
	15.0	3.6	8.2	1465	60.2	38.7	0.64	4.03	73.9	14.9	1465	83.4	5.28	65.1	123	4.63
	15.0	3.6	8.2	1950	62.7	46.3	0.74	4.17	76.9	15.0	1950	85.6	4.83	69.1	111	5.20
90	7.5	0.2	0.5	1465	55.2	36.8	0.67	4.66	71.2	11.9	1465	81.0	5.22	63.0	121	4.55
	7.5	0.2	0.5	1950	57.5	44.0	0.77	4.82	74.0	11.9	1950	83.2	4.77	66.9	109	5.11
	11.3	1.8	4.2	1465	57.5	37.7	0.66	4.37	72.4	13.2	1465	84.5	5.30	66.2	123	4.67
	11.3	1.8	4.2	1950	59.9	45.1	0.75	4.51	75.3	13.3	1950	86.8	4.85	70.2	111	5.25
	15.0	3.5	8.1	1465	58.6	38.1	0.65	4.23	73.1	13.9	1465	86.3	5.35	67.7	125	4.73
	15.0	3.5	8.1	1950	61.1	45.6	0.75	4.37	76.0	14.0	1950	88.6	4.89	71.9	112	5.31
100	7.5	0.1	0.2	1465	51.7	35.3	0.68	5.15	69.3	10.0	Operation Not Recommended					
	7.5	0.1	0.2	1950	53.9	42.3	0.78	5.32	72.1	10.1						
	11.3	1.8	4.2	1465	54.0	36.3	0.67	4.83	70.5	11.2						
	11.3	1.8	4.2	1950	56.2	43.4	0.77	4.99	73.3	11.3						
	15.0	3.3	7.6	1465	55.2	36.7	0.67	4.67	71.1	11.8						
	15.0	3.3	7.6	1950	57.5	44.0	0.77	4.83	74.0	11.9						
110	7.5	0.1	0.2	1465	48.2	33.8	0.70	5.70	67.7	8.5						
	7.5	0.1	0.2	1950	50.2	40.5	0.81	5.89	70.4	8.5						
	11.3	1.7	3.9	1465	50.4	34.8	0.69	5.35	68.7	9.4						
	11.3	1.7	3.9	1950	52.5	41.6	0.79	5.53	71.4	9.5						
	15.0	3.1	7.2	1465	51.5	35.2	0.68	5.18	69.2	10.0						
	15.0	3.1	7.2	1950	53.7	42.2	0.79	5.35	72.0	10.0						
120	7.5	0.0	0.0	1465	45.0	32.5	0.72	6.32	66.6	7.1						
	7.5	0.0	0.0	1950	46.9	39.0	0.83	6.53	69.2	7.2						
	11.3	1.7	3.9	1465	46.9	33.3	0.71	5.93	67.2	7.9						
	11.3	1.7	3.9	1950	48.9	39.9	0.82	6.13	69.9	8.0						
	15.0	2.9	6.7	1465	48.0	33.7	0.70	5.74	67.6	8.4						
	15.0	2.9	6.7	1950	50.0	40.4	0.81	5.94	70.3	8.4						

- LEGEND**
- ARI — Air Conditioning and Refrigeration Institute
 - COP — Coefficient of Performance
 - db — Dry Bulb
 - EER — Energy Efficiency Ratio
 - EWT — Entering Water Temperature
 - GPM — Gallons Per Minute
 - HE — Heat of Extraction (MBtuh)
 - ISO — International Organization for Standardization
 - LAT — Leaving Air Temperature (F)
 - MBtuh — Btuh in Thousands
 - TC — Total Capacity (MBtuh)
 - THC — Total Heating Capacity (MBtuh)
 - THR — Total Heat Rejection (MBtuh)
 - TSC — Total Sensible Capacity (MBtuh)
 - wb — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD070

2,100 CFM NOMINAL AIRFLOW COOLING/2,100 CFM NOMINAL AIRFLOW HEATING — PSC BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	16.5	9.1	21.0	Operation Not Recommended							1575	47.0	5.12	30.6	98	2.69
	16.5	9.1	21.0								2100	48.3	4.68	32.5	91	3.02
30	8.3	2.4	5.5	1575	70.1	40.6	0.58	3.14	80.8	22.3	1575	50.7	5.21	33.9	100	2.85
	8.3	2.4	5.5	2100	73.0	48.7	0.67	3.24	84.0	22.5	2100	52.1	4.77	36.0	93	3.20
	12.4	5.2	12.0	1575	71.0	40.9	0.58	3.01	81.2	23.6	1575	52.8	5.26	35.8	101	2.94
	12.4	5.2	12.0	2100	73.9	49.0	0.66	3.11	84.5	23.7	2100	54.2	4.81	37.9	94	3.30
	16.5	8.0	18.5	1575	71.5	41.1	0.57	2.96	81.6	24.2	1575	53.9	5.28	36.8	102	2.99
	16.5	8.0	18.5	2100	74.5	49.2	0.66	3.05	84.9	24.4	2100	55.4	4.83	39.0	94	3.36
40	8.3	2.2	5.1	1575	75.2	44.0	0.59	3.37	86.7	22.3	1575	57.6	5.36	40.1	104	3.15
	8.3	2.2	5.1	2100	78.3	52.7	0.67	3.48	90.2	22.5	2100	59.2	4.91	42.6	96	3.53
	12.4	4.9	11.3	1575	75.7	44.1	0.58	3.23	86.7	23.5	1575	60.4	5.42	42.6	105	3.26
	12.4	4.9	11.3	2100	78.9	52.9	0.67	3.33	90.2	23.7	2100	62.0	4.96	45.2	97	3.66
	16.5	7.5	17.3	1575	76.0	44.2	0.58	3.15	86.7	24.1	1575	61.9	5.46	44.0	106	3.33
	16.5	7.5	17.3	2100	79.2	52.9	0.67	3.26	90.2	24.3	2100	63.6	4.99	46.7	98	3.74
50	8.3	2.0	4.6	1575	76.2	45.4	0.60	3.72	88.9	20.5	1575	65.2	5.52	47.0	108	3.46
	8.3	2.0	4.6	2100	79.4	54.4	0.68	3.85	92.5	20.6	2100	67.0	5.05	49.9	100	3.89
	12.4	4.5	10.4	1575	77.0	45.4	0.59	3.50	89.0	22.0	1575	68.7	5.60	50.1	110	3.60
	12.4	4.5	10.4	2100	80.2	54.4	0.68	3.62	92.5	22.2	2100	70.5	5.12	53.2	101	4.04
	16.5	7.0	16.2	1575	77.4	45.5	0.59	3.40	89.0	22.8	1575	70.6	5.64	51.8	112	3.67
	16.5	7.0	16.2	2100	80.6	54.5	0.68	3.51	92.5	22.9	2100	72.5	5.15	55.0	102	4.12
60	8.3	1.7	3.9	1575	73.6	44.9	0.61	4.09	87.5	18.0	1575	73.3	5.69	54.2	113	3.77
	8.3	1.7	3.9	2100	76.6	53.8	0.70	4.22	91.0	18.1	2100	75.2	5.21	57.5	103	4.24
	12.4	4.0	9.2	1575	75.7	45.5	0.60	3.82	88.7	19.8	1575	77.4	5.78	57.9	115	3.92
	12.4	4.0	9.2	2100	78.8	54.5	0.69	3.95	92.2	20.0	2100	79.4	5.29	61.5	105	4.40
	16.5	6.4	14.8	1575	76.4	45.7	0.60	3.70	89.1	20.7	1575	79.7	5.83	60.0	117	4.00
	16.5	6.4	14.8	2100	79.6	54.7	0.69	3.82	92.6	20.8	2100	81.8	5.33	63.6	106	4.50
70	8.3	1.7	3.9	1575	69.9	43.6	0.62	4.50	85.3	15.5	1575	81.5	5.87	61.6	118	4.07
	8.3	1.7	3.9	2100	72.8	52.3	0.72	4.65	88.7	15.7	2100	83.6	5.37	65.3	107	4.57
	12.4	4.0	9.2	1575	72.6	44.6	0.61	4.19	87.0	17.3	1575	86.1	5.98	65.8	121	4.22
	12.4	4.0	9.2	2100	75.7	53.4	0.71	4.34	90.4	17.5	2100	88.4	5.47	69.8	109	4.74
	16.5	6.3	14.6	1575	73.9	45.0	0.61	4.05	87.7	18.2	1575	88.7	6.04	68.0	122	4.30
	16.5	6.3	14.6	2100	76.9	53.9	0.70	4.19	91.2	18.4	2100	91.0	5.52	72.2	110	4.83
80	8.3	1.6	3.7	1575	65.7	42.0	0.64	4.97	82.7	13.2	1575	89.6	6.06	68.9	123	4.33
	8.3	1.6	3.7	2100	68.4	50.3	0.73	5.14	86.0	13.3	2100	92.0	5.54	73.1	111	4.87
	12.4	3.8	8.8	1575	68.7	43.2	0.63	4.63	84.5	14.8	1575	94.6	6.19	73.3	126	4.48
	12.4	3.8	8.8	2100	71.6	51.7	0.72	4.79	87.9	15.0	2100	97.2	5.66	77.8	113	5.03
	16.5	6.1	14.1	1575	70.2	43.7	0.62	4.47	85.4	15.7	1575	97.3	6.26	75.7	127	4.56
	16.5	6.1	14.1	2100	73.1	52.4	0.72	4.62	88.8	15.8	2100	99.9	5.72	80.3	114	5.12
85	8.3	1.6	3.7	1575	63.5	41.1	0.65	5.24	81.4	12.1	1575	93.5	6.16	72.3	125	4.45
	8.3	1.6	3.7	2100	66.2	49.2	0.74	5.42	84.7	12.2	2100	96.0	5.63	76.8	112	4.99
	12.4	3.8	8.7	1575	66.5	42.3	0.64	4.88	83.2	13.6	1575	98.6	6.30	76.8	128	4.59
	12.4	3.8	8.7	2100	69.3	50.6	0.73	5.05	86.5	13.7	2100	101.2	5.76	81.5	115	5.15
	16.5	6.0	13.9	1575	68.0	42.9	0.63	4.71	84.1	14.4	1575	101.3	6.38	79.2	130	4.65
	16.5	6.0	13.9	2100	70.9	51.4	0.72	4.87	87.5	14.5	2100	104.0	5.83	84.0	116	5.22
90	8.3	1.6	3.7	1575	61.3	40.2	0.65	5.52	80.2	11.1	1575	97.4	6.26	75.8	127	4.56
	8.3	1.6	3.7	2100	63.9	48.1	0.75	5.70	83.4	11.2	2100	100.0	5.73	80.4	114	5.12
	12.4	3.7	8.5	1575	64.3	41.4	0.64	5.14	81.9	12.5	1575	102.6	6.42	80.3	130	4.69
	12.4	3.7	8.5	2100	67.0	49.6	0.74	5.31	85.1	12.6	2100	105.3	5.87	85.2	116	5.26
	16.5	5.9	13.6	1575	65.9	42.0	0.64	4.95	82.8	13.3	1575	105.2	6.50	82.6	132	4.74
	16.5	5.9	13.6	2100	68.6	50.3	0.73	5.12	86.1	13.4	2100	108.0	5.94	87.7	118	5.33
100	8.3	1.5	3.5	1575	57.1	38.4	0.67	6.15	78.1	9.3	Operation Not Recommended					
	8.3	1.5	3.5	2100	59.5	46.0	0.77	6.36	81.3	9.4						
	12.4	3.5	8.1	1575	59.9	39.5	0.66	5.72	79.4	10.5						
	12.4	3.5	8.1	2100	62.3	47.4	0.76	5.91	82.6	10.5						
	16.5	5.6	12.9	1575	61.3	40.2	0.65	5.52	80.2	11.1						
	16.5	5.6	12.9	2100	63.9	48.1	0.75	5.70	83.4	11.2						
110	8.3	1.4	3.2	1575	53.5	37.1	0.69	6.89	77.1	7.8	Operation Not Recommended					
	8.3	1.4	3.2	2100	55.8	44.4	0.80	7.12	80.2	7.8						
	12.4	3.3	7.6	1575	55.8	37.9	0.68	6.40	77.6	8.7						
	12.4	3.3	7.6	2100	58.1	45.4	0.78	6.61	80.7	8.8						
	16.5	5.3	12.2	1575	57.0	38.4	0.67	6.17	78.1	9.2						
	16.5	5.3	12.2	2100	59.4	46.0	0.77	6.38	81.2	9.3						
120	8.3	1.3	3.0	1575	51.1	36.5	0.71	7.75	77.6	6.6	Operation Not Recommended					
	8.3	1.3	3.0	2100	53.2	43.7	0.82	8.01	80.7	6.6						
	12.4	3.2	7.4	1575	52.5	36.7	0.70	7.18	77.0	7.3						
	12.4	3.2	7.4	2100	54.7	44.0	0.80	7.42	80.1	7.4						
	16.5	5.1	11.8	1575	53.4	37.0	0.69	6.92	77.1	7.7						
	16.5	5.1	11.8	2100	55.6	44.3	0.80	7.15	80.1	7.8						

LEGEND

- ARI** — Air Conditioning and Refrigeration Institute
- COP** — Coefficient of Performance
- db** — Dry Bulb
- EER** — Energy Efficiency Ratio
- EWT** — Entering Water Temperature
- GPM** — Gallons Per Minute
- HE** — Heat of Extraction (MBtuh)
- ISO** — International Organization for Standardization
- LAT** — Leaving Air Temperature (F)
- MBtuh** — Btuh in Thousands
- TC** — Total Capacity (MBtuh)
- THC** — Total Heating Capacity (MBtuh)
- THR** — Total Heat Rejection (MBtuh)
- TSC** — Total Sensible Capacity (MBtuh)
- wb** — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD018

700 CFM NOMINAL AIRFLOW COOLING/700 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	5.5	3.9	9.0	Operation Not Recommended							550	11.9	1.25	7.9	90.0	2.8
	5.5	3.9	9.0	Operation Not Recommended							750	12.3	1.16	8.4	85.1	3.1
30	2.8	0.7	1.6	550	20.3	12.4	0.61	0.75	22.8	27.3	550	13.2	1.29	9.0	92.3	3.0
	2.8	0.7	1.6	750	21.1	14.5	0.68	0.79	23.8	26.8	750	13.6	1.20	9.6	86.8	3.3
	4.1	2.1	4.9	550	20.7	12.6	0.61	0.71	23.1	29.1	550	13.7	1.31	9.5	93.1	3.1
	4.1	2.1	4.9	750	21.5	14.7	0.68	0.75	24.1	28.6	750	14.1	1.21	10.1	87.5	3.4
	5.5	3.5	8.1	550	21.3	12.9	0.61	0.70	23.6	30.5	550	14.0	1.31	9.7	93.6	3.1
	5.5	3.5	8.1	750	22.1	15.0	0.68	0.74	24.6	30.0	750	14.4	1.21	10.3	87.8	3.5
40	2.8	0.6	1.4	550	20.8	12.9	0.62	0.81	23.5	25.5	550	15.3	1.33	10.9	95.8	3.4
	2.8	0.6	1.4	750	21.6	15.0	0.70	0.86	24.5	25.0	750	15.8	1.23	11.6	89.5	3.8
	4.1	2.0	4.6	550	21.3	13.1	0.61	0.97	23.9	27.6	550	16.0	1.34	11.5	96.9	3.5
	4.1	2.0	4.6	750	22.1	15.2	0.69	0.81	24.9	27.2	750	16.5	1.24	12.3	90.3	3.9
	5.5	3.2	7.4	550	21.5	13.2	0.61	0.75	24.0	28.6	550	16.3	1.34	11.9	97.5	3.6
	5.5	3.2	7.4	750	22.4	15.3	0.69	0.79	25.0	28.1	750	16.8	1.24	12.6	90.8	4.0
50	2.8	0.5	1.2	550	21.3	13.5	0.63	0.90	24.3	23.7	550	17.5	1.35	13.0	99.5	3.8
	2.8	0.5	1.2	750	22.1	15.7	0.71	0.95	25.3	23.3	750	18.1	1.25	13.8	92.3	4.2
	4.1	1.7	3.9	550	21.5	13.5	0.63	0.84	24.3	25.5	550	18.4	1.36	13.8	100.9	4.0
	4.1	1.7	3.9	750	22.3	15.7	0.70	0.89	25.4	25.1	750	18.9	1.26	14.6	93.4	4.4
	5.5	2.8	6.5	550	21.6	13.5	0.62	0.82	24.4	26.4	550	18.8	1.36	14.2	101.7	4.0
	5.5	2.8	6.5	750	22.5	15.7	0.70	0.87	25.4	26.0	750	19.4	1.26	15.1	93.9	4.5
60	2.8	0.3	0.7	550	20.6	13.4	0.68	0.99	24.0	23.7	550	19.8	1.37	15.2	103.4	4.2
	2.8	0.3	0.7	750	21.5	15.6	0.76	1.05	25.0	23.3	750	20.4	1.27	16.1	95.2	4.7
	4.1	1.5	3.5	550	21.1	13.5	0.67	0.93	24.3	25.5	550	20.8	1.38	16.1	105.0	4.4
	4.1	1.5	3.5	750	22.2	15.7	0.75	0.99	25.3	25.3	750	21.4	1.28	17.1	96.5	4.9
	5.5	2.6	6.0	550	21.3	13.6	0.66	0.90	24.4	26.4	550	21.3	1.39	16.6	105.9	4.5
	5.5	2.6	6.0	750	21.4	15.8	0.74	0.96	25.4	26.0	750	22.0	1.28	17.6	97.1	5.0
70	2.8	0.3	0.7	550	19.6	13.4	0.68	1.11	23.4	17.7	550	22.1	1.40	17.3	107.2	4.6
	2.8	0.3	0.7	750	20.4	15.6	0.76	1.17	24.4	17.4	750	22.8	1.29	18.4	98.2	5.2
	4.1	1.4	3.2	550	20.3	13.5	0.67	1.04	23.8	19.5	550	23.2	1.42	18.3	109.0	4.8
	4.1	1.4	3.2	750	21.1	15.7	0.75	1.10	24.8	19.2	750	23.9	1.31	19.4	99.5	5.3
	5.5	2.4	5.5	550	20.6	13.6	0.66	1.00	24.0	20.5	550	23.8	1.43	18.8	110.0	4.9
	5.5	2.4	5.5	750	21.4	15.8	0.74	1.06	25.0	20.1	750	24.5	1.32	20.0	100.2	5.4
80	2.8	0.2	0.5	550	18.4	13.1	0.71	1.24	22.7	14.8	550	24.3	1.45	19.3	111.0	4.9
	2.8	0.2	0.5	750	19.2	15.2	0.79	1.31	23.6	14.6	750	25.1	1.34	20.5	101.0	5.5
	4.1	1.2	2.8	550	19.1	13.3	0.69	1.16	23.1	16.5	550	25.5	1.49	20.3	112.9	5.0
	4.1	1.2	2.8	750	19.9	15.4	0.78	1.23	24.1	16.2	750	26.3	1.38	21.5	102.4	5.6
	5.5	2.2	5.1	550	19.5	13.4	0.69	1.12	23.3	17.3	550	26.0	1.52	20.7	113.8	5.0
	5.5	2.2	5.1	750	20.3	15.5	0.77	1.19	24.3	17.0	750	26.8	1.40	22.0	103.1	5.6
85	2.8	0.2	0.5	550	17.8	12.9	0.72	1.32	22.3	13.5	550	25.4	1.49	20.2	112.7	5.0
	2.8	0.2	0.5	750	18.5	15.0	0.81	1.40	23.3	13.3	750	26.2	1.38	21.4	102.3	5.6
	4.1	1.15	2.7	550	18.5	13.1	0.71	1.24	22.7	15.1	550	26.5	1.55	21.1	114.6	5.0
	4.1	1.15	2.7	750	19.2	15.2	0.79	1.31	23.7	14.8	750	27.3	1.43	22.4	103.7	5.6
	5.5	2.1	4.9	550	18.9	13.2	0.70	1.20	22.9	15.9	550	27.0	1.59	21.5	115.5	5.0
	5.5	2.1	4.9	750	19.6	15.3	0.78	1.26	23.9	15.6	750	27.9	1.47	22.8	104.4	5.6
90	2.8	0.2	0.5	550	17.2	12.7	0.74	1.40	21.9	12.3	550	26.4	1.54	21.0	114.5	5.0
	2.8	0.2	0.5	750	17.8	14.8	0.83	1.48	22.9	12.1	750	27.2	1.42	22.4	103.6	5.6
	4.1	1.1	2.5	550	17.9	12.9	0.72	1.31	22.3	13.7	550	27.5	1.61	21.9	116.3	5.0
	4.1	1.1	2.5	750	18.6	15.0	0.81	1.38	23.3	13.4	750	28.4	1.49	23.2	105.0	5.6
	5.5	2.0	4.6	550	18.2	13.0	0.71	1.27	22.6	14.4	550	28.0	1.66	22.3	117.2	5.0
	5.5	2.0	4.6	750	19.0	15.2	0.80	1.54	23.5	14.2	750	28.9	1.53	23.6	105.7	5.5
100	2.8	0.2	0.5	550	15.9	12.3	0.77	1.58	21.3	10.1	Operation Not Recommended					
	2.8	0.2	0.5	750	16.5	14.3	0.87	1.67	22.2	9.9						
	4.1	1.1	2.5	550	16.6	12.5	0.76	1.48	21.6	11.2						
	4.1	1.1	2.5	750	17.2	14.6	0.85	1.56	22.6	11.0						
	5.5	1.9	4.4	550	16.9	12.6	0.75	1.43	21.8	11.8						
	5.5	1.9	4.4	750	17.6	14.7	0.84	1.51	22.8	11.6						
110	2.8	0.1	0.2	550	14.7	12.0	0.81	1.79	20.9	8.3						
	2.8	0.1	0.2	750	15.3	13.9	0.91	1.89	21.8	8.1						
	4.1	0.9	2.1	550	15.3	12.1	0.79	1.67	21.1	9.2						
	4.1	0.9	2.1	750	15.9	14.1	0.89	1.77	22.0	9.0						
	5.5	1.7	3.9	550	15.6	12.2	0.78	1.62	21.2	9.7						
	5.5	1.7	3.9	750	16.3	14.2	0.88	1.71	22.1	9.5						
120	2.8	0.1	0.2	550	13.8	11.5	0.83	2.03	20.8	6.9						
	2.8	0.1	0.2	750	14.4	13.4	0.93	2.14	21.7	6.7						
	4.1	0.8	1.8	550	14.3	11.8	0.83	1.90	20.8	7.5						
	4.1	0.8	1.8	750	14.8	13.7	0.92	2.01	21.7	7.4						
	5.5	1.6	3.7	550	14.5	11.9	0.82	1.83	20.8	7.9						
	5.5	1.6	3.7	750	15.1	13.9	0.92	1.94	21.7	7.8						

- LEGEND**
- ARI** — Air Conditioning and Refrigeration Institute
 - COP** — Coefficient of Performance
 - db** — Dry Bulb
 - EER** — Energy Efficiency Ratio
 - EWT** — Entering Water Temperature
 - GPM** — Gallons Per Minute
 - HE** — Heat of Extraction (MBtuh)
 - ISO** — International Organization for Standardization
 - LAT** — Leaving Air Temperature (F)
 - MBtuh** — Btuh in Thousands
 - TC** — Total Capacity (MBtuh)
 - THC** — Total Heating Capacity (MBtuh)
 - THR** — Total Heat Rejection (MBtuh)
 - TSC** — Total Sensible Capacity (MBtuh)
 - wb** — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD024

850 CFM NOMINAL AIRFLOW COOLING/950 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	8.0	5.6	12.9	Operation Not Recommended							690	16.0	1.70	10.6	92	2.76
	8.0	5.6	12.9	Operation Not Recommended							950	16.5	1.57	11.2	86	3.08
30	4.0	1.5	3.5	610	28.1	16.1	0.57	0.78	30.6	35.9	690	18.1	1.73	12.5	94	3.07
	4.0	1.5	3.5	850	29.2	18.7	0.64	0.83	31.9	35.3	950	18.7	1.60	13.3	88	3.43
	6.0	3.1	7.2	610	28.1	16.1	0.57	0.76	30.6	37.1	690	18.8	1.74	13.2	95	3.17
	6.0	3.1	7.2	850	29.3	18.7	0.64	0.80	31.9	36.5	950	19.4	1.61	14.0	89	3.54
	8.0	5.1	11.8	610	28.2	16.1	0.57	0.74	30.7	38.1	690	19.2	1.74	13.5	96	3.23
	8.0	5.1	11.8	850	29.3	18.8	0.64	0.78	32.0	37.5	950	19.8	1.61	14.3	89	3.60
40	4.0	1.3	3.0	610	28.4	16.6	0.58	0.89	31.3	31.9	690	21.0	1.77	15.2	98	3.48
	4.0	1.3	3.0	850	29.5	19.3	0.65	0.94	32.7	31.3	950	21.7	1.64	16.1	91	3.89
	6.0	2.8	6.5	610	28.6	16.6	0.58	0.84	31.4	34.1	690	21.9	1.78	16.0	99	3.60
	6.0	2.8	6.5	850	29.7	19.3	0.65	0.89	32.7	33.5	950	22.5	1.65	17.0	92	4.01
	8.0	4.5	10.4	610	28.7	16.6	0.58	0.82	31.4	35.2	690	22.3	1.79	16.4	100	3.65
	8.0	4.5	10.4	850	29.9	19.3	0.65	0.86	32.8	34.6	950	23.0	1.65	17.4	92	4.08
50	4.0	1.3	3.0	610	28.2	16.7	0.59	1.00	31.5	28.1	690	23.9	1.81	17.8	102	3.86
	4.0	1.3	3.0	850	29.3	19.4	0.66	1.06	32.9	27.7	950	24.6	1.67	18.9	94	4.31
	6.0	2.6	6.0	610	28.5	16.8	0.59	0.94	31.6	30.4	690	24.8	1.83	18.7	103	3.99
	6.0	2.6	6.0	850	29.7	19.5	0.66	0.99	33.0	29.8	950	25.6	1.69	19.9	95	4.45
	8.0	4.3	9.9	610	28.6	16.8	0.59	0.91	31.7	31.5	690	25.3	1.83	19.1	104	4.05
	8.0	4.3	9.9	850	29.8	19.5	0.66	0.96	33.0	30.9	950	26.1	1.69	20.3	95	4.52
60	4.0	1.2	2.8	610	27.3	16.4	0.60	1.13	31.1	24.1	690	26.7	1.85	20.4	106	4.22
	4.0	1.2	2.8	850	28.4	19.1	0.67	1.20	32.5	23.7	950	27.5	1.71	21.7	97	4.71
	6.0	2.5	5.8	610	27.8	16.6	0.60	1.06	31.4	26.3	690	27.7	1.87	21.3	107	4.35
	6.0	2.5	5.8	850	28.9	19.3	0.67	1.12	32.7	25.8	950	28.6	1.73	22.7	98	4.85
	8.0	4.0	9.2	610	28.1	16.7	0.59	1.02	31.5	27.4	690	28.3	1.88	21.8	108	4.41
	8.0	4.0	9.2	850	29.2	19.4	0.67	1.08	32.8	26.9	950	29.1	1.73	23.2	98	4.92
70	4.0	1.1	2.5	610	26.1	16.0	0.61	1.28	30.5	20.4	690	29.4	1.89	22.8	109	4.54
	4.0	1.1	2.5	850	27.2	18.7	0.69	1.36	31.8	20.0	950	30.3	1.75	24.3	99	5.07
	6.0	2.3	5.3	610	26.8	16.3	0.61	1.20	30.8	22.3	690	30.5	1.91	23.9	111	4.67
	6.0	2.3	5.3	850	27.9	18.9	0.68	1.27	32.2	22.0	950	31.4	1.77	25.4	101	5.21
	8.0	3.8	8.8	610	27.1	16.4	0.60	1.16	31.0	23.4	690	31.1	1.92	24.4	112	4.74
	8.0	3.8	8.8	850	28.2	19.1	0.68	1.23	32.3	23.0	950	32.0	1.77	25.9	101	5.29
80	4.0	1.0	2.3	610	24.8	15.6	0.63	1.45	29.7	17.1	690	31.9	1.93	25.2	113	4.84
	4.0	1.0	2.3	850	25.8	18.1	0.70	1.54	31.0	16.8	950	32.9	1.79	26.8	102	5.40
	6.0	2.2	5.1	610	25.5	15.8	0.62	1.36	30.1	18.7	690	33.1	1.95	26.3	114	4.97
	6.0	2.2	5.1	850	26.5	18.4	0.69	1.44	31.4	18.4	950	34.1	1.80	27.9	103	5.54
	8.0	3.5	8.1	610	25.9	15.9	0.62	1.32	30.3	19.6	690	33.7	1.96	26.9	115	5.04
	8.0	3.5	8.1	850	26.9	18.6	0.69	1.39	31.6	19.3	950	34.8	1.81	28.5	104	5.62
85	4.0	1.0	2.3	610	24.0	15.3	0.64	1.55	29.3	15.5	690	33.2	1.95	26.3	114	4.98
	4.0	1.0	2.3	850	25.0	17.8	0.71	1.64	30.6	15.2	950	34.2	1.80	28.0	103	5.55
	6.0	2.2	5.0	610	24.8	15.6	0.63	1.45	29.7	17.0	690	34.3	1.97	27.4	116	5.10
	6.0	2.2	5.0	850	25.8	18.1	0.70	1.54	31.0	16.8	950	35.4	1.82	29.2	105	5.69
	8.0	3.5	8.0	610	25.1	15.7	0.62	1.41	29.9	17.9	690	35.0	1.98	28.0	117	5.17
	8.0	3.5	8.0	850	26.1	18.3	0.70	1.49	31.2	17.6	950	36.0	1.83	29.8	105	5.77
90	4.0	1.0	2.3	610	23.3	15.0	0.65	1.65	28.9	14.1	690	34.4	1.97	27.5	116	5.11
	4.0	1.0	2.3	850	24.2	17.5	0.72	1.74	30.2	13.9	950	35.5	1.82	29.2	105	5.70
	6.0	2.1	4.9	610	24.0	15.3	0.64	1.55	29.3	15.6	690	35.6	1.99	28.6	118	5.23
	6.0	2.1	4.9	850	25.0	17.8	0.71	1.63	30.6	15.3	950	36.7	1.84	30.4	106	5.84
	8.0	3.4	7.9	610	24.4	15.4	0.63	1.50	29.5	16.3	690	36.2	2.00	29.1	119	5.30
	8.0	3.4	7.9	850	25.4	18.0	0.71	1.58	30.8	16.0	950	37.3	1.85	31.0	106	5.91
100	4.0	1.0	2.3	610	21.8	14.5	0.67	1.86	28.2	11.7	Operation Not Recommended					
	4.0	1.0	2.3	850	22.6	16.9	0.75	1.97	29.4	11.5						
	6.0	2.0	4.6	610	22.5	14.8	0.66	1.75	28.5	12.8						
	6.0	2.0	4.6	850	23.4	17.2	0.73	1.86	29.7	12.6						
	8.0	3.2	7.4	610	22.9	14.9	0.65	1.70	28.7	13.5						
	8.0	3.2	7.4	850	23.8	17.3	0.73	1.80	29.9	13.2						
110	4.0	0.9	2.1	610	20.3	14.1	0.69	2.11	27.5	9.6						
	4.0	0.9	2.1	850	21.1	16.4	0.78	2.23	28.7	9.4						
	6.0	1.9	4.4	610	21.0	14.3	0.68	1.99	27.8	10.5						
	6.0	1.9	4.4	850	21.8	16.6	0.76	2.10	29.0	10.4						
	8.0	3.1	7.2	610	21.3	14.4	0.67	1.93	28.0	11.1						
	8.0	3.1	7.2	850	22.2	16.7	0.75	2.04	29.2	10.9						
120	4.0	0.9	2.1	610	18.9	13.7	0.73	2.39	27.1	7.9						
	4.0	0.9	2.1	850	19.7	16.0	0.81	2.52	28.3	7.8						
	6.0	1.8	4.2	610	19.5	13.9	0.71	2.25	27.3	8.7						
	6.0	1.8	4.2	850	20.3	16.2	0.80	2.38	28.5	8.5						
	8.0	3.0	6.9	610	19.9	14.0	0.70	2.19	27.4	9.1						
	8.0	3.0	6.9	850	20.6	16.3	0.79	2.31	28.6	8.9						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD030

1,000 CFM NOMINAL AIRFLOW COOLING/1,100 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	8.0	5.6	12.9	Operation Not Recommended							820	19.8	2.03	13.3	92	2.86
	8.0	5.6	12.9	Operation Not Recommended							1100	20.4	1.88	14.1	87	3.19
30	4.0	1.5	3.5	730	29.1	17.0	0.58	1.13	32.9	25.8	820	21.8	2.05	15.1	95	3.12
	4.0	1.5	3.5	1000	30.2	19.8	0.65	1.19	34.3	25.3	1100	22.5	1.89	16.1	89	3.48
	6.0	3.1	7.2	730	29.3	17.0	0.58	1.07	32.9	27.3	820	22.7	2.06	16.0	96	3.23
	6.0	3.1	7.2	1000	30.5	19.8	0.65	1.14	34.3	26.8	1100	23.4	1.90	17.0	90	3.60
	8.0	5.1	11.8	730	29.6	17.2	0.58	1.05	33.1	28.3	820	23.2	2.07	16.4	96	3.29
	8.0	5.1	11.8	1000	30.7	20.0	0.65	1.11	34.5	27.8	1100	23.9	1.91	17.4	90	3.67
40	4.0	1.3	3.0	730	32.2	19.1	0.59	1.26	36.4	25.6	820	24.9	2.09	18.0	98	3.49
	4.0	1.3	3.0	1000	33.5	22.2	0.66	1.33	38.0	25.1	1100	25.6	1.93	19.1	92	3.90
	6.0	2.8	6.5	730	32.6	19.2	0.59	1.19	36.6	27.5	820	25.9	2.10	18.9	99	3.61
	6.0	2.8	6.5	1000	33.9	22.3	0.66	1.26	38.2	27.0	1100	26.7	1.94	20.1	92	4.03
	8.0	4.5	10.4	730	33.1	19.4	0.59	1.16	37.0	28.7	820	26.4	2.11	19.4	100	3.67
	8.0	4.5	10.4	1000	34.4	22.6	0.66	1.22	38.6	28.2	1100	27.2	1.95	20.6	93	4.10
50	4.0	1.3	3.0	730	32.3	19.3	0.60	1.39	36.9	23.2	820	27.8	2.13	20.7	101	3.83
	4.0	1.3	3.0	1000	33.5	22.4	0.67	1.47	38.5	22.8	1100	28.7	1.97	22.0	94	4.27
	6.0	2.6	6.0	730	32.7	19.4	0.59	1.31	37.1	25.0	820	29.0	2.15	21.8	103	3.96
	6.0	2.6	6.0	1000	34.0	22.6	0.67	1.38	38.7	24.6	1100	29.9	1.99	23.1	95	4.41
	8.0	4.3	9.9	730	33.1	19.6	0.59	1.27	37.4	26.1	820	29.6	2.16	22.3	103	4.02
	8.0	4.3	9.9	1000	34.5	22.9	0.66	1.34	39.0	25.7	1100	30.5	2.00	23.7	96	4.49
60	4.0	1.2	2.8	730	31.9	19.5	0.61	1.53	37.1	20.8	820	30.8	2.18	23.4	105	4.14
	4.0	1.2	2.8	1000	33.1	22.7	0.68	1.62	38.7	20.4	1100	31.8	2.01	24.9	97	4.62
	6.0	2.5	5.8	730	32.6	19.7	0.60	1.44	37.5	22.7	820	32.1	2.20	24.6	106	4.27
	6.0	2.5	5.8	1000	33.9	22.9	0.68	1.52	39.1	22.3	1100	33.1	2.04	26.2	98	4.77
	8.0	4.0	9.2	730	32.9	19.8	0.60	1.40	37.6	23.6	820	32.8	2.22	25.3	107	4.34
	8.0	4.0	9.2	1000	34.2	23.0	0.67	1.48	39.2	23.2	1100	33.8	2.05	26.8	98	4.84
70	4.0	1.1	2.5	730	30.3	18.9	0.62	1.69	36.0	17.9	820	33.8	2.23	26.1	108	4.43
	4.0	1.1	2.5	1000	31.5	22.0	0.70	1.79	37.6	17.6	1100	34.8	2.06	27.8	99	4.94
	6.0	2.3	5.3	730	31.3	19.3	0.62	1.59	36.7	19.7	820	35.2	2.26	27.5	110	4.57
	6.0	2.3	5.3	1000	32.6	22.4	0.69	1.68	38.3	19.4	1100	36.3	2.09	29.2	101	5.10
	8.0	3.8	8.8	730	31.8	19.5	0.61	1.54	37.0	20.7	820	36.0	2.28	28.2	111	4.64
	8.0	3.8	8.8	1000	33.1	22.6	0.68	1.63	38.6	20.3	1100	37.1	2.10	30.0	101	5.18
80	4.0	1.0	2.3	730	28.4	18.1	0.64	1.87	34.8	15.2	820	36.8	2.29	28.9	112	4.71
	4.0	1.0	2.3	1000	29.6	21.1	0.71	1.98	36.3	15.0	1100	37.9	2.12	30.7	102	5.25
	6.0	2.2	5.1	730	29.6	18.6	0.63	1.76	35.6	16.9	820	38.4	2.32	30.4	113	4.85
	6.0	2.2	5.1	1000	30.8	21.7	0.70	1.86	37.1	16.6	1100	39.6	2.14	32.3	103	5.41
	8.0	3.5	8.1	730	30.2	18.8	0.62	1.70	36.0	17.7	820	39.3	2.34	31.2	114	4.93
	8.0	3.5	8.1	1000	31.4	21.9	0.70	1.80	37.5	17.4	1100	40.5	2.16	33.1	104	5.50
85	4.0	1.0	2.3	730	27.5	17.8	0.65	1.97	34.2	13.9	820	38.3	2.32	30.3	113	4.84
	4.0	1.0	2.3	1000	28.6	20.7	0.72	2.08	35.7	13.7	1100	39.5	2.14	32.1	103	5.40
	6.0	2.2	5.0	730	28.6	18.2	0.64	1.85	34.9	15.4	820	40.1	2.35	31.9	115	5.00
	6.0	2.2	5.0	1000	29.8	21.2	0.71	1.96	36.4	15.2	1100	41.3	2.17	33.9	105	5.58
	8.0	3.5	8.0	730	29.2	18.5	0.63	1.80	35.3	16.3	820	41.0	2.37	32.7	116	5.08
	8.0	3.5	8.0	1000	30.4	21.5	0.71	1.90	36.8	16.0	1100	42.3	2.19	34.8	106	5.67
90	4.0	1.0	2.3	730	26.5	17.4	0.66	2.07	33.6	12.8	820	39.8	2.35	31.6	115	4.98
	4.0	1.0	2.3	1000	27.5	20.2	0.73	2.19	35.0	12.6	1100	41.1	2.17	33.6	105	5.55
	6.0	2.1	4.9	730	27.6	17.8	0.65	1.95	34.3	14.2	820	41.7	2.38	33.4	117	5.14
	6.0	2.1	4.9	1000	28.7	20.7	0.72	2.06	35.8	13.9	1100	43.0	2.20	35.5	106	5.73
	8.0	3.4	7.9	730	28.2	18.1	0.64	1.89	34.7	14.9	820	42.7	2.40	34.3	118	5.23
	8.0	3.4	7.9	1000	29.4	21.0	0.72	2.00	36.2	14.7	1100	44.1	2.21	36.5	107	5.83
100	4.0	1.0	2.3	730	24.7	16.7	0.68	2.31	32.6	10.7	Operation Not Recommended					
	4.0	1.0	2.3	1000	25.7	19.5	0.76	2.44	34.0	10.5						
	6.0	2.0	4.6	730	25.7	17.1	0.67	2.17	33.1	11.8						
	6.0	2.0	4.6	1000	26.7	19.9	0.74	2.30	34.6	11.6						
	8.0	3.2	7.4	730	26.2	17.3	0.66	2.10	33.4	12.5						
8.0	3.2	7.4	1000	27.3	20.1	0.74	2.23	34.9	12.3							
110	4.0	0.9	2.1	730	23.2	16.4	0.70	2.59	32.1	9.0						
	4.0	0.9	2.1	1000	24.1	19.0	0.79	2.74	33.5	8.8						
	6.0	1.9	4.4	730	24.0	16.5	0.69	2.43	32.3	9.9						
	6.0	1.9	4.4	1000	24.9	19.2	0.77	2.57	33.7	9.7						
	8.0	3.1	7.2	730	24.4	16.6	0.68	2.35	32.5	10.4						
8.0	3.1	7.2	1000	25.4	19.4	0.76	2.49	33.9	10.2							
120	4.0	0.9	2.1	730	22.0	16.1	0.73	2.87	31.9	7.7						
	4.0	0.9	2.1	1000	22.8	18.7	0.82	3.04	33.2	7.5						
	6.0	1.8	4.2	730	22.5	16.1	0.72	2.74	31.9	8.2						
	6.0	1.8	4.2	1000	23.4	18.8	0.80	2.90	33.3	8.1						
	8.0	3.0	6.9	730	22.7	16.2	0.71	2.67	31.9	8.5						
8.0	3.0	6.9	1000	23.6	18.9	0.80	2.82	33.3	8.4							

- LEGEND**
- ARI — Air Conditioning and Refrigeration Institute
 - COP — Coefficient of Performance
 - db — Dry Bulb
 - EER — Energy Efficiency Ratio
 - EWT — Entering Water Temperature
 - GPM — Gallons Per Minute
 - HE — Heat of Extraction (MBtuh)
 - ISO — International Organization for Standardization
 - LAT — Leaving Air Temperature (F)
 - MBtuh — Btuh in Thousands
 - TC — Total Capacity (MBtuh)
 - THC — Total Heating Capacity (MBtuh)
 - THR — Total Heat Rejection (MBtuh)
 - TSC — Total Sensible Capacity (MBtuh)
 - wb — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD036

1,250 CFM NOMINAL AIRFLOW COOLING/1,250 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	9.0	5.9	13.6	Operation Not Recommended							900	21.5	2.06	14.8	92	3.06
	9.0	5.9	13.6	Operation Not Recommended							1250	22.1	1.90	15.7	86	3.42
30	4.5	1.7	3.9	900	33.0	19.5	0.59	1.16	36.9	28.5	900	23.7	2.09	16.9	94	3.33
	4.5	1.7	3.9	1250	34.3	22.7	0.66	1.22	38.4	28.0	1250	24.5	1.93	17.9	88	3.72
	6.8	3.3	7.6	900	33.1	19.5	0.59	1.13	36.9	29.4	900	24.7	2.10	17.8	95	3.45
	6.8	3.3	7.6	1250	34.4	22.7	0.66	1.19	38.4	28.9	1250	25.5	1.94	18.9	89	3.84
	9.0	5.7	13.2	900	33.3	19.6	0.59	1.10	36.9	30.3	900	25.3	2.11	18.3	96	3.51
	9.0	5.7	13.2	1250	34.6	22.8	0.66	1.16	38.5	29.8	1250	26.1	1.95	19.4	89	3.91
40	4.5	1.5	3.5	900	36.1	22.4	0.62	1.29	40.4	28.1	900	27.3	2.14	20.1	98	3.73
	4.5	1.5	3.5	1250	37.5	26.1	0.69	1.36	42.2	27.6	1250	28.1	1.98	21.4	91	4.17
	6.8	3.2	7.4	900	36.3	22.4	0.62	1.24	40.5	29.2	900	28.5	2.16	21.3	99	3.87
	6.8	3.2	7.4	1250	37.7	26.1	0.69	1.32	42.2	28.7	1250	29.4	2.00	22.6	92	4.32
	9.0	5.4	12.5	900	36.7	22.5	0.61	1.21	40.7	30.3	900	29.2	2.17	21.9	100	3.94
	9.0	5.4	12.5	1250	38.1	26.2	0.69	1.28	42.4	29.8	1250	30.1	2.01	23.3	92	4.40
50	4.5	1.3	3.0	900	37.1	23.9	0.64	1.42	41.9	26.1	900	30.9	2.20	23.5	102	4.12
	4.5	1.3	3.0	1250	38.6	27.9	0.72	1.51	43.7	25.6	1250	31.9	2.03	25.0	94	4.60
	6.8	3.1	7.2	900	37.4	23.8	0.64	1.37	42.0	27.3	900	32.4	2.22	24.8	103	4.27
	6.8	3.1	7.2	1250	38.9	27.7	0.71	1.45	43.8	26.9	1250	33.4	2.05	26.4	95	4.77
	9.0	5.2	12.0	900	37.6	23.8	0.63	1.33	42.1	28.3	900	33.2	2.23	25.6	104	4.35
	9.0	5.2	12.0	1250	39.1	27.6	0.71	1.41	43.9	27.8	1250	34.2	2.06	27.2	95	4.85
60	4.5	1.2	2.8	900	36.3	23.8	0.66	1.60	41.7	22.7	900	34.6	2.26	26.9	106	4.49
	4.5	1.2	2.8	1250	37.8	27.7	0.73	1.69	43.5	22.4	1250	35.7	2.09	28.6	96	5.01
	6.8	2.9	6.7	900	37.1	24.1	0.65	1.50	42.1	24.7	900	36.3	2.29	28.4	107	4.65
	6.8	2.9	6.7	1250	38.5	28.0	0.73	1.59	43.9	24.2	1250	37.4	2.11	30.2	98	5.19
	9.0	5.0	11.6	900	37.3	24.1	0.65	1.46	42.2	25.6	900	37.2	2.30	29.3	108	4.74
	9.0	5.0	11.6	1250	38.8	28.0	0.72	1.54	44.0	25.1	1250	38.4	2.13	31.1	98	5.29
70	4.5	1.1	2.5	900	34.6	23.1	0.67	1.76	40.6	19.7	900	38.3	2.32	30.3	109	4.84
	4.5	1.1	2.5	1250	36.0	26.9	0.75	1.86	42.3	19.4	1250	39.5	2.15	32.2	99	5.40
	6.8	2.9	6.7	900	35.8	23.6	0.66	1.65	41.4	21.6	900	40.2	2.35	32.0	111	5.01
	6.8	2.9	6.7	1250	37.2	27.5	0.74	1.75	43.1	21.3	1250	41.5	2.18	34.0	101	5.58
	9.0	4.8	11.1	900	36.3	23.8	0.66	1.60	41.7	22.6	900	41.2	2.37	32.9	112	5.09
	9.0	4.8	11.1	1250	37.7	27.7	0.73	1.70	43.5	22.2	1250	42.5	2.19	35.0	101	5.68
80	4.5	1.0	2.3	900	32.5	22.1	0.68	1.94	39.1	16.8	900	42.0	2.39	33.6	113	5.16
	4.5	1.0	2.3	1250	33.8	25.7	0.76	2.05	40.8	16.5	1250	43.3	2.21	35.8	102	5.75
	6.8	2.8	6.5	900	33.9	22.7	0.67	1.82	40.0	18.6	900	44.1	2.43	35.5	115	5.33
	6.8	2.8	6.5	1250	35.2	26.4	0.75	1.93	41.8	18.2	1250	45.5	2.24	37.8	104	5.94
	9.0	4.5	10.4	900	34.5	23.0	0.67	1.77	40.5	19.5	900	45.2	2.45	36.5	117	5.41
	9.0	4.5	10.4	1250	35.9	26.8	0.75	1.87	42.2	19.2	1250	46.6	2.26	38.8	105	6.04
85	4.5	1.0	2.2	900	31.4	21.5	0.69	2.04	38.4	15.4	900	43.9	2.42	35.3	115	5.30
	4.5	1.0	2.2	1250	32.7	25.1	0.77	2.16	40.0	15.1	1250	45.2	2.24	37.5	103	5.92
	6.8	2.7	6.2	900	32.7	22.2	0.68	1.92	39.3	17.0	900	46.0	2.47	37.3	117	5.47
	6.8	2.7	6.2	1250	34.0	25.8	0.76	2.03	41.0	16.7	1250	47.4	2.28	39.6	105	6.10
	9.0	4.5	10.3	900	33.4	22.5	0.67	1.86	39.7	17.9	900	47.2	2.49	38.3	119	5.55
	9.0	4.5	10.3	1250	34.7	26.2	0.75	1.97	41.4	17.6	1250	48.6	2.30	40.7	106	6.20
90	4.5	0.9	2.1	900	30.3	21.0	0.69	2.14	37.6	14.1	900	45.7	2.46	37.0	117	5.45
	4.5	0.9	2.1	1250	31.5	24.4	0.78	2.27	39.2	13.9	1250	47.1	2.27	39.3	105	6.08
	6.8	2.6	6.0	900	31.6	21.6	0.68	2.02	38.5	15.7	900	47.9	2.50	39.0	119	5.61
	6.8	2.6	6.0	1250	32.9	25.2	0.77	2.14	40.2	15.4	1250	49.4	2.31	41.4	107	6.26
	9.0	4.4	10.2	900	32.3	22.0	0.68	1.96	39.0	16.5	900	49.1	2.53	40.1	121	5.69
	9.0	4.4	10.2	1250	33.6	25.5	0.76	2.07	40.7	16.2	1250	50.6	2.34	42.6	108	6.35
100	4.5	0.8	1.8	900	28.2	20.1	0.71	2.38	36.3	11.8	Operation Not Recommended					
	4.5	0.8	1.8	1250	29.3	23.4	0.80	2.52	37.9	11.6						
	6.8	2.6	6.0	900	29.3	20.6	0.70	2.24	37.0	13.1						
	6.8	2.6	6.0	1250	30.5	23.9	0.78	2.37	38.6	12.9						
	9.0	4.2	9.7	900	30.0	20.9	0.70	2.18	37.4	13.8						
	9.0	4.2	9.7	1250	31.2	24.3	0.78	2.30	39.0	13.5						
110	4.5	0.8	1.8	900	26.4	19.6	0.74	2.66	35.5	9.9						
	4.5	0.8	1.8	1250	27.4	22.8	0.83	2.82	37.1	9.7						
	6.8	2.5	5.8	900	27.3	19.8	0.72	2.50	35.9	10.9						
	6.8	2.5	5.8	1250	28.4	23.0	0.81	2.65	37.4	10.7						
	9.0	4.0	9.2	900	27.8	20.0	0.72	2.43	36.1	11.5						
	9.0	4.0	9.2	1250	28.9	23.2	0.80	2.57	37.7	11.3						
120	4.5	0.7	1.6	900	25.1	19.3	0.77	2.98	35.3	8.4						
	4.5	0.7	1.6	1250	26.1	22.5	0.86	3.15	36.8	8.3						
	6.8	2.5	5.8	900	25.8	19.5	0.76	2.81	35.4	9.2						
	6.8	2.5	5.8	1250	26.8	22.7	0.85	2.97	36.9	9.0						
	9.0	3.8	8.8	900	26.1	19.5	0.75	2.72	35.5	9.6						
	9.0	3.8	8.8	1250	27.1	22.7	0.84	2.88	37.0	9.4						

- LEGEND**
- ARI — Air Conditioning and Refrigeration Institute
 - COP — Coefficient of Performance
 - db — Dry Bulb
 - EER — Energy Efficiency Ratio
 - EWT — Entering Water Temperature
 - GPM — Gallons Per Minute
 - HE — Heat of Extraction (MBtuh)
 - ISO — International Organization for Standardization
 - LAT — Leaving Air Temperature (F)
 - MBtuh — Btuh in Thousands
 - TC — Total Capacity (MBtuh)
 - THC — Total Heating Capacity (MBtuh)
 - THR — Total Heat Rejection (MBtuh)
 - TSC — Total Sensible Capacity (MBtuh)
 - wb — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD042

1,400 CFM NOMINAL AIRFLOW COOLING/1,400 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING																	
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP												
20	11.0	4.0	9.2	Operation Not Recommended							1050	25.8	2.53	17.6	93	2.98												
	11.0	4.0	9.2	Operation Not Recommended							1400	26.6	2.34	18.7	88	3.33												
30	5.5	1.1	2.5	1050	42.9	27.1	0.63	1.40	47.6	30.6	1050	28.0	2.57	19.6	95	3.19												
	5.5	1.1	2.5	1400	44.6	31.5	0.71	1.48	49.6	30.1	1400	28.8	2.38	20.8	89	3.55												
	8.3	2.2	5.1	1050	43.2	27.1	0.63	1.33	47.6	32.4	1050	29.0	2.59	20.5	96	3.28												
	8.3	2.2	5.1	1400	44.9	31.6	0.70	1.41	49.7	31.8	1400	29.9	2.39	21.8	90	3.66												
	11.0	3.9	9.0	1050	43.7	27.2	0.62	1.30	48.0	33.6	1050	29.6	2.60	21.0	96	3.33												
	11.0	3.9	9.0	1400	45.4	31.6	0.70	1.38	50.1	33.0	1400	30.5	2.40	22.3	90	3.72												
40	5.5	1.0	2.3	1050	44.0	28.9	0.66	1.51	49.0	29.1	1050	32.1	2.64	23.3	98	3.56												
	5.5	1.0	2.3	1400	45.7	33.6	0.73	1.60	51.1	28.6	1400	33.1	2.44	24.8	92	3.97												
	8.3	2.1	4.9	1050	44.3	29.0	0.65	1.46	49.2	30.4	1050	33.5	2.66	24.7	100	3.69												
	8.3	2.1	4.9	1400	46.1	33.8	0.73	1.54	51.3	29.9	1400	34.6	2.46	26.2	93	4.12												
	11.0	3.7	8.5	1050	44.6	29.1	0.65	1.42	49.3	31.4	1050	34.4	2.68	25.4	100	3.76												
	11.0	3.7	8.5	1400	46.3	33.9	0.73	1.50	51.4	30.9	1400	35.4	2.47	27.0	93	4.20												
50	5.5	0.9	2.1	1050	43.3	29.5	0.68	1.69	49.0	25.7	1050	36.8	2.71	27.7	102	3.97												
	5.5	0.9	2.1	1400	45.1	34.3	0.76	1.78	51.1	25.2	1400	37.9	2.51	29.4	95	4.43												
	8.3	2.1	4.9	1050	44.0	29.6	0.67	1.59	49.4	27.6	1050	38.7	2.74	29.4	104	4.13												
	8.3	2.1	4.9	1400	45.8	34.4	0.75	1.69	51.5	27.2	1400	39.9	2.53	31.2	96	4.61												
	11.0	3.6	8.3	1050	44.3	29.6	0.67	1.55	49.4	28.6	1050	39.7	2.76	30.4	105	4.22												
	11.0	3.6	8.3	1400	46.0	34.5	0.75	1.64	51.5	28.1	1400	41.0	2.55	32.3	97	4.71												
60	5.5	0.9	2.1	1050	41.6	28.7	0.69	1.86	47.9	22.4	1050	41.8	2.79	32.2	107	4.39												
	5.5	0.9	2.1	1400	43.3	33.4	0.77	1.96	49.9	22.0	1400	43.1	2.58	34.3	98	4.89												
	8.3	2.0	4.6	1050	42.7	29.2	0.68	1.75	48.6	24.4	1050	44.0	2.83	34.3	109	4.56												
	8.3	2.0	4.6	1400	44.4	34.0	0.77	1.85	50.7	24.0	1400	45.4	2.62	36.5	100	5.09												
	11.0	3.5	8.1	1050	43.2	29.4	0.68	1.70	48.9	25.4	1050	45.3	2.85	35.4	110	4.65												
	11.0	3.5	8.1	1400	44.9	34.2	0.76	1.80	51.0	25.0	1400	46.7	2.63	37.7	101	5.19												
70	5.5	0.8	1.8	1050	39.4	27.6	0.70	2.05	46.3	19.2	1050	46.8	2.88	36.8	111	4.77												
	5.5	0.8	1.8	1400	40.9	32.1	0.78	2.17	48.3	18.9	1400	48.3	2.66	39.2	102	5.32												
	8.3	2.0	4.6	1050	40.7	28.3	0.69	1.93	47.3	21.1	1050	49.3	2.93	39.1	113	4.94												
	8.3	2.0	4.6	1400	42.4	32.9	0.78	2.04	49.3	20.7	1400	50.8	2.70	41.6	104	5.51												
	11.0	3.2	7.4	1050	41.4	28.6	0.69	1.87	47.7	22.1	1050	50.6	2.95	40.3	115	5.02												
	11.0	3.2	7.4	1400	43.0	33.3	0.77	1.98	49.8	21.7	1400	52.2	2.73	42.8	105	5.60												
80	5.5	0.7	1.6	1050	36.9	26.3	0.71	2.27	44.7	16.2	1050	51.6	2.97	41.2	115	5.08												
	5.5	0.7	1.6	1400	38.4	30.6	0.80	2.40	46.6	16.0	1400	53.2	2.75	43.8	105	5.67												
	8.3	1.9	4.4	1050	38.3	27.0	0.70	2.14	45.6	17.9	1050	54.1	3.03	43.4	118	5.23												
	8.3	1.9	4.4	1400	39.9	31.5	0.79	2.26	47.6	17.6	1400	55.8	2.80	46.1	107	5.83												
	11.0	3.2	7.4	1050	39.1	27.4	0.70	2.08	46.1	18.8	1050	55.3	3.07	44.5	119	5.29												
	11.0	3.2	7.4	1400	40.6	31.9	0.79	2.20	48.1	18.5	1400	57.0	2.83	47.3	108	5.90												
85	5.5	0.7	1.6	1050	35.7	25.7	0.72	2.40	43.9	14.8	1050	53.7	3.03	43.1	117	5.20												
	5.5	0.7	1.6	1400	37.1	29.9	0.81	2.54	45.8	14.6	1400	55.4	2.80	45.8	107	5.80												
	8.3	1.9	4.3	1050	37.1	26.4	0.71	2.26	44.8	16.4	1050	56.0	3.09	45.1	119	5.31												
	8.3	1.9	4.3	1400	38.5	30.7	0.80	2.39	46.7	16.1	1400	57.8	2.86	47.9	108	5.93												
	11.0	3.2	7.3	1050	37.8	26.8	0.71	2.20	45.2	17.2	1050	57.1	3.13	46.1	120	5.35												
	11.0	3.2	7.3	1400	39.3	31.1	0.79	2.32	47.2	16.9	1400	58.9	2.89	49.0	109	5.97												
90	5.5	0.7	1.6	1050	34.4	25.1	0.73	2.53	43.1	13.6	1050	55.8	3.08	45.0	119	5.31												
	5.5	0.7	1.6	1400	35.8	29.2	0.82	2.68	45.0	13.4	1400	57.6	2.85	47.8	108	5.93												
	8.3	1.8	4.2	1050	35.8	25.7	0.72	2.39	43.9	15.0	1050	58.0	3.15	46.8	121	5.39												
	8.3	1.8	4.2	1400	37.2	30.0	0.81	2.52	45.8	14.7	1400	59.8	2.91	49.8	110	6.02												
	11.0	3.1	7.2	1050	36.5	26.1	0.71	2.31	44.4	15.8	1050	58.9	3.19	47.6	122	5.42												
	11.0	3.1	7.2	1400	38.0	30.4	0.80	2.45	46.3	15.5	1400	60.8	2.95	50.6	110	6.04												
100	5.5	0.6	1.4	1050	32.2	24.2	0.75	2.84	41.9	11.3	Operation Not Recommended																	
	5.5	0.6	1.4	1400	33.4	28.2	0.84	3.01	43.7	11.1																		
	8.3	1.8	4.2	1050	33.3	24.6	0.74	2.67	42.5	12.5																		
	8.3	1.8	4.2	1400	34.6	28.7	0.83	2.83	44.3	12.3																		
	11.0	2.9	6.7	1050	34.0	24.9	0.73	2.59	42.8	13.1																		
	11.0	2.9	6.7	1400	35.3	29.0	0.82	2.74	44.7	12.9																		
110	5.5	0.6	1.4	1050	30.3	23.9	0.79	3.20	41.4	9.5							Operation Not Recommended											
	5.5	0.6	1.4	1400	31.5	27.8	0.88	3.39	43.1	9.3																		
	8.3	1.7	3.9	1050	31.2	24.0	0.77	3.01	41.5	10.4																		
	8.3	1.7	3.9	1400	32.4	27.9	0.86	3.18	43.3	10.2																		
	11.0	2.9	6.7	1050	31.7	24.1	0.76	2.91	41.7	10.9																		
	11.0	2.9	6.7	1400	33.0	28.0	0.85	3.08	43.5	10.7																		
120	5.5	0.6	1.4	1050	28.9	23.5	0.81	3.62	41.4	8.0													Operation Not Recommended					
	5.5	0.6	1.4	1400	30.1	27.4	0.91	3.83	43.2	7.9																		
	8.3	1.6	3.7	1050	29.7	23.9	0.80	3.40	41.4	8.7																		
	8.3	1.6	3.7	1400	30.9	27.8	0.90	3.60	43.2	8.6																		
	11.0	2.7	6.2	1050	30.1	24.0	0.80	3.30	41.5	9.1																		
	11.0	2.7	6.2	1400	31.3	28.0	0.89	3.49	43.3	9.0																		

- LEGEND**
- ARI — Air Conditioning and Refrigeration Institute
 - COP — Coefficient of Performance
 - db — Dry Bulb
 - EER — Energy Efficiency Ratio
 - EWT — Entering Water Temperature
 - GPM — Gallons Per Minute
 - HE — Heat of Extraction (MBtuh)
 - ISO — International Organization for Standardization
 - LAT — Leaving Air Temperature (F)
 - MBtuh — Btuh in Thousands
 - TC — Total Capacity (MBtuh)
 - THC — Total Heating Capacity (MBtuh)
 - THR — Total Heat Rejection (MBtuh)
 - TSC — Total Sensible Capacity (MBtuh)
 - wb — Wet Bulb

- NOTES:**
1. Interpolation is permissible; extrapolation is not.
 2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
 3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
 4. All performance is based upon the lower voltage of dual voltage rated units.
 5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
 6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
 7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD048

1,550 CFM NOMINAL AIRFLOW COOLING/1,650 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	12.0	4.8	11.1	Operation Not Recommended							1200	32.9	3.41	21.9	95	2.82
	12.0	4.8	11.1	Operation Not Recommended							1650	33.9	3.15	23.2	89	3.15
30	6.0	1.3	3.0	1120	53.5	31.9	0.60	1.91	59.9	28.0	1200	35.4	3.47	24.2	97	2.99
	6.0	1.3	3.0	1550	55.6	37.1	0.67	2.02	62.5	27.5	1650	36.5	3.21	25.7	91	3.34
	9.0	2.6	6.0	1120	54.1	31.9	0.59	1.81	60.1	29.9	1200	36.8	3.51	25.4	98	3.08
	9.0	2.6	6.0	1550	56.2	37.1	0.66	1.91	62.7	29.4	1650	38.0	3.24	27.0	91	3.44
	12.0	4.5	10.4	1120	54.8	32.1	0.59	1.76	60.6	31.1	1200	37.6	3.52	26.2	99	3.13
	12.0	4.5	10.4	1550	56.9	37.4	0.66	1.86	63.2	30.5	1650	38.8	3.26	27.8	92	3.49
40	6.0	1.2	2.8	1120	54.3	32.8	0.60	2.09	61.3	26.0	1200	40.3	3.58	28.6	101	3.30
	6.0	1.2	2.8	1550	56.5	38.2	0.68	2.21	64.0	25.6	1650	41.6	3.31	30.4	93	3.68
	9.0	2.6	6.0	1120	54.8	32.8	0.60	1.97	61.4	27.9	1200	42.2	3.62	30.3	103	3.42
	9.0	2.6	6.0	1550	57.0	38.2	0.67	2.08	64.1	27.4	1650	43.6	3.34	32.2	94	3.82
	12.0	4.4	10.2	1120	55.1	32.8	0.60	1.91	61.4	28.8	1200	43.3	3.64	31.3	103	3.49
	12.0	4.4	10.2	1550	57.3	38.2	0.67	2.02	64.1	28.3	1650	44.7	3.36	33.3	95	3.89
50	6.0	1.1	2.5	1120	53.5	32.9	0.62	2.31	61.3	23.2	1200	45.8	3.69	33.5	105	3.64
	6.0	1.1	2.5	1550	55.6	38.3	0.69	2.44	63.9	22.8	1650	47.2	3.41	35.6	96	4.06
	9.0	2.5	5.8	1120	54.4	33.1	0.61	2.16	61.6	25.2	1200	48.2	3.74	35.7	107	3.78
	9.0	2.5	5.8	1550	56.5	38.5	0.68	2.28	64.3	24.8	1650	49.7	3.45	37.9	98	4.22
	12.0	4.2	9.7	1120	54.7	33.1	0.61	2.09	61.7	26.2	1200	49.5	3.76	36.9	108	3.86
	12.0	4.2	9.7	1550	56.8	38.5	0.68	2.21	64.3	25.7	1650	51.1	3.48	39.3	99	4.30
60	6.0	1.0	2.3	1120	51.7	32.4	0.63	2.55	60.3	20.2	1200	51.5	3.80	38.7	110	3.97
	6.0	1.0	2.3	1550	53.7	37.7	0.70	2.70	62.9	19.9	1650	53.1	3.52	41.1	100	4.43
	9.0	2.4	5.5	1120	53.0	32.8	0.62	2.38	61.0	22.3	1200	54.4	3.86	41.3	112	4.13
	9.0	2.4	5.5	1550	55.1	38.2	0.69	2.52	63.7	21.9	1650	56.1	3.57	43.9	101	4.60
	12.0	4.0	9.2	1120	53.6	32.9	0.61	2.30	61.3	23.3	1200	56.0	3.89	42.8	113	4.21
	12.0	4.0	9.2	1550	55.7	38.3	0.69	2.43	64.0	22.9	1650	57.7	3.60	45.4	102	4.70
70	6.0	1.0	2.3	1120	49.3	31.6	0.64	2.83	58.9	17.4	1200	57.3	3.92	44.0	114	4.28
	6.0	1.0	2.3	1550	51.3	36.7	0.72	3.00	61.5	17.1	1650	59.1	3.63	46.7	103	4.78
	9.0	2.3	5.3	1120	51.0	32.2	0.63	2.64	59.9	19.3	1200	60.6	3.99	46.9	117	4.45
	9.0	2.3	5.3	1550	53.0	37.4	0.71	2.79	62.5	19.0	1650	62.4	3.69	49.8	105	4.96
	12.0	3.8	8.8	1120	51.8	32.4	0.63	2.54	60.4	20.3	1200	62.3	4.03	48.5	118	4.53
	12.0	3.8	8.8	1550	53.8	37.7	0.70	2.69	63.0	20.0	1650	64.2	3.73	51.5	106	5.05
80	6.0	0.9	2.1	1120	46.6	30.6	0.66	3.15	57.3	14.8	1200	63.0	4.05	49.1	119	4.56
	6.0	0.9	2.1	1550	48.4	35.6	0.73	3.33	59.8	14.5	1650	65.0	3.74	52.2	106	5.09
	9.0	2.3	5.3	1120	48.4	31.3	0.65	2.93	58.4	16.5	1200	66.4	4.13	52.2	121	4.71
	9.0	2.3	5.3	1550	50.4	36.4	0.72	3.10	60.9	16.2	1650	68.5	3.82	55.4	108	5.26
	12.0	3.6	8.3	1120	49.3	31.6	0.64	2.83	58.9	17.4	1200	68.2	4.18	53.7	123	4.79
	12.0	3.6	8.3	1550	51.3	36.8	0.72	2.99	61.5	17.1	1650	70.3	3.86	57.1	109	5.34
85	6.0	0.9	2.1	1120	45.1	30.1	0.67	3.33	56.5	13.5	1200	65.7	4.12	51.5	121	4.68
	6.0	0.9	2.1	1550	46.9	35.0	0.75	3.52	59.0	13.3	1650	67.8	3.80	54.7	108	5.22
	9.0	2.3	5.2	1120	47.0	30.7	0.65	3.10	57.6	15.2	1200	69.1	4.20	54.5	123	4.81
	9.0	2.3	5.2	1550	48.9	35.8	0.73	3.28	60.1	14.9	1650	71.2	3.89	57.9	110	5.37
	12.0	3.6	8.2	1120	48.0	31.1	0.65	2.99	58.1	16.0	1200	70.8	4.25	56.0	125	4.88
	12.0	3.6	8.2	1550	49.8	36.2	0.73	3.17	60.6	15.7	1650	73.0	3.93	59.5	111	5.44
90	6.0	0.9	2.1	1120	43.7	29.5	0.68	3.51	55.7	12.4	1200	68.4	4.18	53.9	123	4.79
	6.0	0.9	2.1	1550	45.4	34.4	0.76	3.72	58.1	12.2	1650	70.5	3.86	57.3	110	5.35
	9.0	2.2	5.1	1120	45.6	30.2	0.66	3.27	56.8	13.9	1200	71.7	4.28	56.8	125	4.91
	9.0	2.2	5.1	1550	47.4	35.2	0.74	3.46	59.2	13.7	1650	73.9	3.95	60.4	111	5.48
	12.0	3.5	8.1	1120	46.6	30.6	0.66	3.16	57.3	14.8	1200	73.3	4.33	58.2	127	4.96
	12.0	3.5	8.1	1550	48.4	35.6	0.74	3.34	59.8	14.5	1650	75.6	4.00	61.9	112	5.54
100	6.0	0.8	1.8	1120	40.8	28.5	0.70	3.92	54.3	10.4	Operation Not Recommended					
	6.0	0.8	1.8	1550	42.4	33.2	0.78	4.15	56.6	10.2						
	9.0	2.1	4.9	1120	42.6	29.2	0.68	3.66	55.2	11.7						
	9.0	2.1	4.9	1550	44.3	33.9	0.77	3.87	57.5	11.5						
	12.0	3.3	7.6	1120	43.6	29.5	0.68	3.53	55.7	12.3						
	12.0	3.3	7.6	1550	45.3	34.3	0.76	3.73	58.1	12.1						
110	6.0	0.8	1.8	1120	38.0	27.7	0.73	4.39	53.1	8.6						
	6.0	0.8	1.8	1550	39.5	32.2	0.82	4.65	55.4	8.5						
	9.0	2.0	4.6	1120	39.7	28.2	0.71	4.10	53.8	9.7						
	9.0	2.0	4.6	1550	41.3	32.8	0.80	4.33	56.1	9.5						
	12.0	3.2	7.4	1120	40.6	28.5	0.70	3.95	54.2	10.3						
	12.0	3.2	7.4	1550	42.2	33.1	0.79	4.18	56.5	10.1						
120	6.0	0.7	1.6	1120	35.5	27.1	0.76	4.93	52.5	7.2						
	6.0	0.7	1.6	1550	36.9	31.6	0.85	5.21	54.8	7.1						
	9.0	1.9	4.4	1120	37.0	27.4	0.74	4.59	52.8	8.0						
	9.0	1.9	4.4	1550	38.4	31.9	0.83	4.86	55.1	7.9						
	12.0	3.0	6.9	1120	37.8	27.6	0.73	4.44	53.0	8.5						
	12.0	3.0	6.9	1550	39.3	32.1	0.82	4.69	55.3	8.4						

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb
- EER — Energy Efficiency Ratio
- EWT — Entering Water Temperature
- GPM — Gallons Per Minute
- HE — Heat of Extraction (MBtuh)
- ISO — International Organization for Standardization
- LAT — Leaving Air Temperature (F)
- MBtuh — Btuh in Thousands
- TC — Total Capacity (MBtuh)
- THC — Total Heating Capacity (MBtuh)
- THR — Total Heat Rejection (MBtuh)
- TSC — Total Sensible Capacity (MBtuh)
- wb — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



50PSH,PSV,PSD060

1,825 CFM NOMINAL AIRFLOW COOLING/2,050 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	15.0	5.0	11.6	Operation Not Recommended							1470	39.6	4.02	26.6	95	2.89
	15.0	5.0	11.6								2050	40.9	3.72	28.3	88	3.22
30	7.5	0.6	1.4	1320	62.0	37.7	0.61	2.30	69.7	26.9	1470	42.9	4.09	29.5	97	3.07
	7.5	0.6	1.4	1825	64.4	43.9	0.68	2.44	72.7	26.5	2050	44.2	3.78	31.4	90	3.42
	11.3	2.3	5.3	1320	63.4	38.5	0.61	2.32	71.2	27.4	1470	44.5	4.13	31.0	98	3.16
	11.3	2.3	5.3	1825	65.9	44.8	0.68	2.45	74.2	26.9	2050	45.9	3.82	33.0	91	3.52
	15.0	4.8	11.1	1320	65.6	39.8	0.61	2.27	73.2	28.9	1470	45.4	4.15	31.8	99	3.21
	15.0	4.8	11.1	1825	68.2	46.3	0.68	2.40	76.4	28.4	2050	46.8	3.83	33.8	91	3.58
40	7.5	0.5	1.2	1320	65.6	40.3	0.61	2.57	74.2	25.5	1470	48.6	4.21	34.7	101	3.38
	7.5	0.5	1.2	1825	68.2	46.9	0.69	2.72	77.4	25.1	2050	50.1	3.89	36.9	93	3.77
	11.3	2.2	5.1	1320	66.3	40.5	0.61	2.49	74.7	26.6	1470	50.7	4.25	36.6	102	3.49
	11.3	2.2	5.1	1825	69.0	47.1	0.68	2.64	77.9	26.1	2050	52.2	3.93	38.9	94	3.90
	15.0	4.5	10.4	1320	67.1	40.9	0.61	2.45	75.3	27.4	1470	51.8	4.27	37.7	103	3.55
	15.0	4.5	10.4	1825	69.8	47.6	0.68	2.59	78.6	26.9	2050	53.4	3.95	40.0	94	3.96
50	7.5	0.4	0.9	1320	66.5	41.3	0.62	2.84	76.0	23.4	1470	54.7	4.33	40.3	104	3.70
	7.5	0.4	0.9	1825	69.1	48.1	0.70	3.00	79.3	23.0	2050	56.4	4.00	42.8	95	4.13
	11.3	2.1	4.9	1320	67.2	41.4	0.62	2.69	76.2	25.0	1470	57.2	4.38	42.6	106	3.83
	11.3	2.1	4.9	1825	69.9	48.2	0.69	2.85	79.5	24.5	2050	59.0	4.04	45.3	97	4.28
	15.0	4.3	9.9	1320	68.1	41.9	0.61	2.62	76.9	26.0	1470	58.7	4.40	43.9	107	3.90
	15.0	4.3	9.9	1825	70.8	48.7	0.69	2.77	80.2	25.5	2050	60.5	4.07	46.6	97	4.36
60	7.5	0.3	0.7	1320	65.3	41.3	0.63	3.11	75.8	21.0	1470	61.0	4.45	46.0	108	4.02
	7.5	0.3	0.7	1825	67.9	48.0	0.71	3.29	79.1	20.6	2050	62.9	4.11	48.9	98	4.49
	11.3	2.1	4.9	1320	66.5	41.6	0.62	2.93	76.4	22.7	1470	64.0	4.50	48.7	110	4.16
	11.3	2.1	4.9	1825	69.1	48.4	0.70	3.09	79.7	22.3	2050	66.0	4.16	51.8	100	4.65
	15.0	4.1	9.5	1320	66.9	41.6	0.62	2.84	76.5	23.6	1470	65.6	4.54	50.2	111	4.24
	15.0	4.1	9.5	1825	69.6	48.4	0.70	3.00	79.8	23.2	2050	67.6	4.19	53.3	101	4.73
70	7.5	0.3	0.7	1320	63.4	40.7	0.64	3.35	74.7	18.9	1470	66.1	4.55	50.7	112	4.26
	7.5	0.3	0.7	1825	65.9	47.4	0.72	3.54	77.9	18.6	2050	68.2	4.20	53.8	101	4.76
	11.3	2.0	4.6	1320	64.6	41.1	0.64	3.20	75.4	20.2	1470	70.7	4.64	54.8	115	4.47
	11.3	2.0	4.6	1825	67.2	47.8	0.71	3.38	78.7	19.9	2050	72.9	4.28	58.2	103	4.98
	15.0	3.9	9.0	1320	65.4	41.3	0.63	3.10	75.9	21.1	1470	72.4	4.67	56.4	116	4.54
	15.0	3.9	9.0	1825	68.0	48.1	0.71	3.28	79.1	20.8	2050	74.7	4.32	59.9	104	5.07
80	7.5	0.2	0.5	1320	59.7	39.5	0.66	3.76	72.5	15.9	1470	73.6	4.70	57.4	116	4.59
	7.5	0.2	0.5	1825	62.1	46.0	0.74	3.98	75.6	15.6	2050	75.9	4.34	61.0	104	5.12
	11.3	1.9	4.4	1320	61.9	40.2	0.65	3.52	73.8	17.6	1470	77.0	4.77	60.5	119	4.73
	11.3	1.9	4.4	1825	64.3	46.8	0.73	3.72	77.0	17.3	2050	79.4	4.41	64.3	106	5.28
	15.0	3.6	8.3	1320	62.9	40.6	0.64	3.40	74.4	18.5	1470	78.8	4.81	62.1	120	4.80
	15.0	3.6	8.3	1825	65.4	47.2	0.72	3.60	77.6	18.2	2050	81.3	4.45	66.0	107	5.36
85	7.5	0.2	0.5	1320	57.9	38.9	0.67	3.96	71.4	14.6	1470	76.5	4.76	60.1	118	4.71
	7.5	0.2	0.5	1825	60.2	45.3	0.75	4.19	74.5	14.4	2050	78.9	4.40	63.8	106	5.25
	11.3	1.9	4.3	1320	60.2	39.7	0.66	3.70	72.8	16.3	1470	79.9	4.84	63.1	120	4.84
	11.3	1.9	4.3	1825	62.6	46.2	0.74	3.92	75.9	16.0	2050	82.4	4.47	67.1	107	5.40
	15.0	3.6	8.2	1320	61.3	40.0	0.65	3.58	73.5	17.1	1470	81.7	4.89	64.7	121	4.90
	15.0	3.6	8.2	1825	63.7	46.6	0.73	3.79	76.6	16.8	2050	84.2	4.51	68.7	108	5.47
90	7.5	0.2	0.5	1320	56.2	38.3	0.68	4.17	70.4	13.5	1470	79.4	4.83	62.7	120	4.82
	7.5	0.2	0.5	1825	58.4	44.5	0.76	4.41	73.4	13.2	2050	81.9	4.46	66.6	107	5.38
	11.3	1.8	4.2	1320	58.5	39.1	0.67	3.89	71.8	15.0	1470	82.8	4.91	65.7	122	4.94
	11.3	1.8	4.2	1825	60.8	45.5	0.75	4.12	74.9	14.8	2050	85.4	4.54	69.8	109	5.51
	15.0	3.5	8.1	1320	59.7	39.5	0.66	3.76	72.5	15.9	1470	84.5	4.96	67.2	123	5.00
	15.0	3.5	8.1	1825	62.1	46.0	0.74	3.98	75.6	15.6	2050	87.1	4.58	71.4	109	5.57
100	7.5	0.1	0.2	1320	52.4	37.0	0.71	4.64	68.3	11.3	Operation Not Recommended					
	7.5	0.1	0.2	1825	54.5	43.1	0.79	4.91	71.3	11.1						
	11.3	1.8	4.2	1320	54.8	37.8	0.69	4.33	69.6	12.7						
	11.3	1.8	4.2	1825	57.0	44.0	0.77	4.58	72.6	12.4						
	15.0	3.3	7.6	1320	56.0	38.2	0.68	4.18	70.3	13.4						
	15.0	3.3	7.6	1825	58.3	44.5	0.76	4.42	73.4	13.2						
110	7.5	0.1	0.2	1320	48.6	35.8	0.74	5.20	66.5	9.3	Operation Not Recommended					
	7.5	0.1	0.2	1825	50.5	41.6	0.82	5.50	69.4	9.2						
	11.3	1.7	3.9	1320	50.9	36.5	0.72	4.85	67.6	10.5						
	11.3	1.7	3.9	1825	53.0	42.5	0.80	5.13	70.5	10.3						
	15.0	3.1	7.2	1320	52.2	36.9	0.71	4.68	68.2	11.2						
	15.0	3.1	7.2	1825	54.2	43.0	0.79	4.95	71.1	11.0						
120	7.5	0.0	0.0	1320	45.1	34.8	0.77	5.85	65.3	7.7	Operation Not Recommended					
	7.5	0.0	0.0	1825	46.9	40.5	0.86	6.19	68.1	7.6						
	11.3	1.7	3.9	1320	47.2	35.4	0.75	5.45	65.9	8.7						
	11.3	1.7	3.9	1825	49.1	41.1	0.84	5.76	68.8	8.5						
	15.0	2.9	6.7	1320	48.3	35.7	0.74	5.25	66.4	9.2						
	15.0	2.9	6.7	1825	50.2	41.5	0.83	5.56	69.2	9.0						

LEGEND
ARI — Air Conditioning and Refrigeration Institute
COP — Coefficient of Performance
db — Dry Bulb
EER — Energy Efficiency Ratio
EWT — Entering Water Temperature
GPM — Gallons Per Minute
HE — Heat of Extraction (MBtuh)
ISO — International Organization for Standardization
LAT — Leaving Air Temperature (F)
MBtuh — Btuh in Thousands
TC — Total Capacity (MBtuh)
THC — Total Heating Capacity (MBtuh)
THR — Total Heat Rejection (MBtuh)
TSC — Total Sensible Capacity (MBtuh)
wb — Wet Bulb

NOTES:
1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.

Performance data (cont)



50PSH,PSV,PSD070

1,950 CFM NOMINAL AIRFLOW COOLING/2,100 CFM NOMINAL AIRFLOW HEATING — ECM BLOWER

EWT (F)	GPM	PRESSURE DROP		COOLING							HEATING					
		PSI	ft wg	Airflow CFM	TC	TSC	Sens/Tot Ratio	kW	THR	EER	Airflow CFM	THC	kW	HE	LAT	COP
20	16.5	9.1	21.0	Operation Not Recommended							1520	46.2	4.80	30.7	98	2.82
	16.5	9.1	21.0								2100	47.6	4.44	32.6	91	3.14
30	8.3	2.4	5.5	1450	73.1	42.8	0.59	2.74	82.3	26.7	1520	49.9	4.89	34.0	100	2.99
	8.3	2.4	5.5	1950	76.0	49.8	0.66	2.90	85.8	26.2	2100	51.4	4.52	36.1	93	3.33
	12.4	5.2	12.0	1450	73.5	42.9	0.58	2.65	82.3	27.7	1520	52.0	4.94	35.9	102	3.08
	12.4	5.2	12.0	1950	76.4	49.9	0.65	2.80	85.9	27.2	2100	53.6	4.57	38.1	94	3.44
	16.5	8.0	18.5	1450	73.8	43.0	0.58	2.59	82.4	28.5	1520	53.1	4.97	36.9	102	3.13
	16.5	8.0	18.5	1950	76.7	50.0	0.65	2.74	86.0	28.0	2100	54.8	4.59	39.2	94	3.50
40	8.3	2.2	5.1	1450	77.1	45.3	0.59	2.94	87.0	26.3	1520	56.8	5.05	40.2	105	3.30
	8.3	2.2	5.1	1950	80.2	52.7	0.66	3.11	90.7	25.8	2100	58.6	4.67	42.8	96	3.68
	12.4	4.9	11.3	1450	77.4	45.3	0.59	2.87	87.0	27.0	1520	59.6	5.11	42.7	106	3.42
	12.4	4.9	11.3	1950	80.5	52.7	0.65	3.03	90.7	26.5	2100	61.4	4.72	45.4	97	3.81
	16.5	7.5	17.3	1450	77.6	45.3	0.58	2.80	87.0	27.7	1520	61.1	5.14	44.1	107	3.48
	16.5	7.5	17.3	1950	80.7	52.7	0.65	2.97	90.7	27.2	2100	63.0	4.75	46.9	98	3.89
50	8.3	2.0	4.6	1450	77.2	45.8	0.59	3.37	88.5	22.9	1520	64.4	5.21	47.1	109	3.62
	8.3	2.0	4.6	1950	80.2	53.3	0.66	3.56	92.3	22.5	2100	66.4	4.82	50.0	99	4.04
	12.4	4.5	10.4	1450	78.2	45.9	0.59	3.14	88.7	24.9	1520	67.8	5.29	50.2	111	3.76
	12.4	4.5	10.4	1950	81.3	53.5	0.66	3.32	92.5	24.5	2100	69.9	4.88	53.3	101	4.20
	16.5	7.0	16.2	1450	78.6	46.1	0.59	3.04	88.8	25.8	1520	69.8	5.33	51.9	112	3.84
	16.5	7.0	16.2	1950	81.7	53.6	0.66	3.22	92.6	25.4	2100	71.9	4.92	55.2	102	4.28
60	8.3	1.7	3.9	1450	74.4	45.1	0.61	3.71	86.9	20.1	1520	72.4	5.38	54.3	114	3.94
	8.3	1.7	3.9	1950	77.3	52.5	0.68	3.92	90.7	19.7	2100	74.6	4.97	57.7	103	4.40
	12.4	4.0	9.2	1450	76.6	45.7	0.60	3.45	88.2	22.2	1520	76.4	5.47	57.9	117	4.09
	12.4	4.0	9.2	1950	79.6	53.1	0.67	3.65	92.0	21.8	2100	78.8	5.06	61.6	105	4.57
	16.5	6.4	14.8	1450	77.4	45.9	0.59	3.33	88.6	23.2	1520	78.7	5.52	60.0	118	4.18
	16.5	6.4	14.8	1950	80.5	53.4	0.66	3.52	92.4	22.8	2100	81.1	5.10	63.7	106	4.66
70	8.3	1.7	3.9	1450	70.7	44.0	0.62	4.10	84.7	17.2	1520	80.4	5.56	61.5	119	4.24
	8.3	1.7	3.9	1950	73.5	51.2	0.70	4.34	88.3	16.9	2100	82.9	5.14	65.4	107	4.73
	12.4	4.0	9.2	1450	73.5	44.8	0.61	3.81	86.4	19.3	1520	85.0	5.67	65.7	122	4.39
	12.4	4.0	9.2	1950	76.4	52.1	0.68	4.03	90.1	18.9	2100	87.7	5.24	69.8	109	4.90
	16.5	6.3	14.6	1450	74.7	45.2	0.60	3.68	87.1	20.3	1520	87.5	5.73	67.9	123	4.47
	16.5	6.3	14.6	1950	77.7	52.6	0.68	3.89	90.9	20.0	2100	90.2	5.30	72.1	110	4.99
80	8.3	1.6	3.7	1450	66.6	42.5	0.64	4.56	82.1	14.6	1520	88.4	5.76	68.7	124	4.50
	8.3	1.6	3.7	1950	69.2	49.5	0.71	4.82	85.7	14.3	2100	91.2	5.32	73.0	110	5.02
	12.4	3.8	8.8	1450	69.5	43.6	0.63	4.23	83.9	16.4	1520	93.3	5.89	73.0	127	4.65
	12.4	3.8	8.8	1950	72.3	50.7	0.70	4.48	87.5	16.1	2100	96.2	5.44	77.6	112	5.18
	16.5	6.1	14.1	1450	71.0	44.0	0.62	4.08	84.8	17.4	1520	96.0	5.97	75.3	128	4.71
	16.5	6.1	14.1	1950	73.8	51.2	0.69	4.31	88.5	17.1	2100	98.9	5.51	80.1	114	5.26
85	8.3	1.6	3.7	1450	64.4	41.7	0.65	4.82	80.9	13.4	1520	92.3	5.86	72.1	126	4.61
	8.3	1.6	3.7	1950	67.0	48.5	0.72	5.10	84.4	13.1	2100	95.1	5.42	76.6	112	5.15
	12.4	3.8	8.7	1450	67.4	42.8	0.63	4.48	82.6	15.0	1520	97.2	6.01	76.4	129	4.74
	12.4	3.8	8.7	1950	70.0	49.8	0.71	4.74	86.2	14.8	2100	100.2	5.55	81.2	114	5.29
	16.5	6.0	13.9	1450	68.8	43.3	0.63	4.31	83.5	16.0	1520	99.8	6.09	78.6	131	4.80
	16.5	6.0	13.9	1950	71.6	50.4	0.70	4.56	87.1	15.7	2100	102.9	5.63	83.6	115	5.35
90	8.3	1.6	3.7	1450	62.3	40.8	0.65	5.09	79.7	12.2	1520	96.1	5.97	75.5	129	4.72
	8.3	1.6	3.7	1950	64.8	47.5	0.73	5.38	83.2	12.0	2100	99.1	5.52	80.2	114	5.26
	12.4	3.7	8.5	1450	65.2	42.0	0.64	4.72	81.3	13.8	1520	101.1	6.13	79.8	132	4.83
	12.4	3.7	8.5	1950	67.8	48.8	0.72	4.99	84.8	13.6	2100	104.2	5.66	84.8	116	5.39
	16.5	5.9	13.6	1450	66.7	42.5	0.64	4.55	82.2	14.7	1520	103.6	6.22	82.0	133	4.88
	16.5	5.9	13.6	1950	69.3	49.5	0.71	4.81	85.8	14.4	2100	106.8	5.75	87.1	117	5.45
100	8.3	1.5	3.5	1450	58.3	39.0	0.67	5.70	77.9	10.2	Operation Not Recommended					
	8.3	1.5	3.5	1950	60.6	45.4	0.75	6.03	81.2	10.0						
	12.4	3.5	8.1	1450	60.9	40.2	0.66	5.29	79.0	11.5						
	12.4	3.5	8.1	1950	63.3	46.8	0.74	5.59	82.4	11.3						
	16.5	5.6	12.9	1450	62.3	40.8	0.65	5.09	79.7	12.2						
	16.5	5.6	12.9	1950	64.8	47.5	0.73	5.38	83.2	12.0						
110	8.3	1.4	3.2	1450	54.9	37.4	0.68	6.42	77.0	8.6	Operation Not Recommended					
	8.3	1.4	3.2	1950	57.1	43.5	0.76	6.79	80.4	8.4						
	12.4	3.3	7.6	1450	57.0	38.4	0.67	5.94	77.4	9.6						
	12.4	3.3	7.6	1950	59.2	44.7	0.75	6.29	80.8	9.4						
	16.5	5.3	12.2	1450	58.2	39.0	0.67	5.72	77.8	10.2						
	16.5	5.3	12.2	1950	60.5	45.4	0.75	6.05	81.2	10.0						
120	8.3	1.3	3.0	1450	52.8	36.2	0.69	7.02	77.0	7.5	Operation Not Recommended					
	8.3	1.3	3.0	1950	54.9	42.1	0.77	7.42	80.3	7.4						
	12.4	3.2	7.4	1450	54.0	36.9	0.68	6.71	77.1	8.0						
	12.4	3.2	7.4	1950	56.1	42.9	0.77	7.09	80.4	7.9						
	16.5	5.1	11.8	1450	54.8	37.3	0.68	6.49	77.2	8.5						
	16.5	5.1	11.8	1950	57.0	43.5	0.76	6.86	80.5	8.3						

LEGEND

- ARI** — Air Conditioning and Refrigeration Institute
- COP** — Coefficient of Performance
- db** — Dry Bulb
- EER** — Energy Efficiency Ratio
- EWT** — Entering Water Temperature
- GPM** — Gallons Per Minute
- HE** — Heat of Extraction (MBtuh)
- ISO** — International Organization for Standardization
- LAT** — Leaving Air Temperature (F)
- MBtuh** — Btuh in Thousands
- TC** — Total Capacity (MBtuh)
- THC** — Total Heating Capacity (MBtuh)
- THR** — Total Heat Rejection (MBtuh)
- TSC** — Total Sensible Capacity (MBtuh)
- wb** — Wet Bulb

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. All entering air conditions are 80 F db and 67 F wb in cooling, and 70 F db in heating. ARI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for ARI/ISO conditions.
4. All performance is based upon the lower voltage of dual voltage rated units.
5. Operation below 40 F EWT is based upon a 15% antifreeze solution.
6. Operation below 60 F EWT requires optional insulated water/refrigerant circuit.
7. See performance correction tables for operating conditions other than those listed above.



ENTERING AIR CORRECTION TABLE

HEATING CORRECTIONS			
Ent Air DB (F)	Heating Capacity	Power	Heat of Ext
45	1.0514	0.7749	1.1240
50	1.0426	0.8113	1.1032
55	1.0329	0.8525	1.0802
60	1.0224	0.8980	1.0551
65	1.0114	0.9473	1.0282
68	1.0046	0.9786	1.0115
70	1.0000	1.0000	1.0000
75	0.9883	1.0556	0.9706
80	0.9764	1.1135	0.9404

FULL LOAD COOLING CORRECTIONS 400 CFM PER TON														
Ent Air WB (F)	Total Cooling Capacity	Sensible Cooling Capacity Multipliers — Entering DB (F)										kW	THR	
		60	65	70	75	80	80.6	85	90	95	100			
50	0.7432	0.9111	*	*	*	*	*	*	*	*	*	*	0.9866	0.7901
55	0.8202	0.7709	0.8820	1.0192	*	*	*	*	*	*	*	*	0.9887	0.8527
60	0.8960		0.6702	0.8540	1.0473	*	*	*	*	*	*	*	0.9924	0.9146
65	0.9705			0.6491	0.8657	1.0809	1.1066	*	*	*	*	*	0.9975	0.9757
66.2	0.9882			0.5939	0.8152	1.0333	1.0592	1.2481	*	*	*	*	0.9990	0.9903
67	1.0000			0.5559	0.7801	1.0000	1.0261	1.2158	*	*	*	*	1.0000	1.0000
70	1.0438				0.6377	0.8645	0.8913	1.0847	1.2983	*	*	*	1.0042	1.0362
75	1.1159						0.6008	0.6289	0.8323	1.0578	1.2773	*	1.0123	1.0959

LEGEND

*Sensible capacity equals total capacity.

Ent — Entering THR — Total Heat of Rejection
 Ext — Extraction WB — Wet Bulb
 DB — Dry Bulb

AIRFLOW CORRECTION TABLE
ECM AIRFLOW

% OF RATED	HEATING			COOLING				
	Heating Capacity	Power	Heat of Ext	Total Capacity	Sensible Capacity	Sensible Capacity Ratio*	kW	THR
68.75	—	—	—	0.9470	0.8265	0.8727	0.9363	0.9449
75.00	0.9700	1.0822	0.9410	0.9619	0.8593	0.8933	0.9455	0.9587
81.25	0.9775	1.0536	0.9579	0.9747	0.8943	0.9175	0.9564	0.9711
87.50	0.9851	1.0304	0.9733	0.9853	0.9302	0.9441	0.9691	0.9821
93.75	0.9925	1.0125	0.9874	0.9938	0.9659	0.9719	0.9837	0.9918
100.00	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
106.25	1.0074	0.9928	1.0112	1.0041	1.0313	1.0271	1.0181	1.0069
112.50	1.0148	0.9909	1.0210	1.0060	1.0584	1.0522	1.0381	1.0123
118.75	1.0222	0.9622	1.0377	1.0070	1.0815	1.0740	1.0598	1.0174
125.00	1.0295	0.8681	1.0712	1.0076	1.0998	1.0916	1.0834	1.0225
130.00	1.0354	0.8456	1.0844	1.0083	1.1110	1.1018	1.1035	1.0271

LEGEND

Ext — Extraction
 THR — Total Heat of Rejection

*Sensible Capacity Ratio = Sensible Capacity/Total Capacity.

PSC AIRFLOW

% OF RATED	HEATING			COOLING				
	Heating Capacity	Power	Heat of Ext	Total Capacity	Sensible Capacity	Sensible Capacity Ratio*	kW	THR
68.75	—	—	—	0.9465	0.8019	0.8472	0.9614	0.9496
75.00	0.9740	1.0936	0.9425	0.9602	0.8350	0.8696	0.9675	0.9617
81.25	0.9810	1.0635	0.9592	0.9724	0.8733	0.8981	0.9744	0.9728
87.50	0.9876	1.0379	0.9744	0.9831	0.9149	0.9306	0.9821	0.9829
93.75	0.9940	1.0167	0.9880	0.9923	0.9578	0.9653	0.9906	0.9920
100.00	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
106.25	1.0057	0.9878	1.0105	1.0062	1.0392	1.0328	1.0102	1.0070
112.50	1.0112	0.9800	1.0194	1.0109	1.0733	1.0617	1.0211	1.0130
118.75	1.0163	0.9705	1.0284	1.0141	1.1001	1.0848	1.0329	1.0180
125.00	1.0211	0.9614	1.0368	1.0159	1.1174	1.0999	1.0455	1.0220
130.00	1.0247	0.9554	1.0430	1.0161	1.1229	1.1050	1.0562	1.0244

LEGEND

Ext — Extraction
 THR — Total Heat of Rejection

*Sensible Capacity Ratio = Sensible Capacity/Total Capacity.

Performance data (cont)



PSC BLOWER MOTOR PERFORMANCE DATA

50PS UNIT SIZE	RATED AIRFLOW (cfm)	MIN CFM	FAN SPEED	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)																
				0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.00	
006	240	150	HI	317	310	305	295	285	279	271	261	250	241	230	203	168				
			MED	260	253	245	238	230	222	214	202	190	180	167						
			LO	216	206	201	196	189	177	156										
009	300	225	HI	393	386	378	371	364	355	346	337	325	283	253						
			MED	366	360	353	347	341	334	326	318	310	262	230						
			LO	326	321	316	309	303	297	290	283	274	236							
012	350	300	HI	520	510	500	488	479	466	453	441	403	375	347	312					
			MED	459	453	447	437	428	420	411	400	368	344	317						
			LO	371	370	368	363	358	353	345	340	315								
018	600	450	HI	704	708	711	702	693	692	690	683	675	658	640	598	515				
			MED	602	601	599	590	581	583	585	579	573	560	547	492					
			LO	531	529	527	522	517	512	506	501	495	479	462						
			HS HI	894	886	877	859	841	827	812	786	760	744	728	659					
			HS MED	765	760	755	747	738	725	711	690	668	654	640	602					
			HS LO	683	672	661	649	636	616	596	584	571	560	549						
024	850	600	HI	965	960	954	943	931	923	914	898	882	862	842	794	725	635			
			MED	841	833	825	817	809	800	790	777	763	747	731	686	623				
			LO	723	715	707	703	698	689	680	668	656	642	627						
			HS HI	1271	1250	1229	1207	1185	1164	1143	1118	1093	1061	1029	953	875	753			
			HS MED	1048	1037	1025	1016	1007	994	981	962	943	915	886	822	731	626			
			HS LO	890	887	884	879	874	865	855	842	829	809	789	726	660				
030	950	750	HI	1271	1250	1229	1207	1185	1164	1143	1118	1093	1061	1029	953	875	753			
			MED	1048	1037	1025	1016	1007	994	981	962	943	915	886	822					
			LO	890	887	884	879	874	865	855	842	829	809	789						
			HS HI	1439	1411	1383	1355	1327	1297	1266	1232	1198	1160	1122	1041	943	830			
			HS MED	1186	1174	1162	1151	1140	1126	1112	1089	1065	1039	1013	946	870	762			
			HS LO	1039	1038	1036	1036	1028	1020	1009	997	983	968	946	866	798				
036	1250	900	HI	1411	1407	1402	1390	1378	1370	1361	1326	1290	1248	1205	1083	942				
			MED	1171	1164	1156	1145	1133	1113	1092	1064	1035	997	958						
			LO	983	967	950	943	936	936											
			HS HI	1648	1633	1617	1597	1576	1557	1537	1493	1448	1397	1345	1207	1051	957			
			HS MED	1344	1335	1325	1312	1299	1276	1253	1220	1186	1143	1099	1007	903				
			HS LO	1141	1128	1115	1106	1097	1077	1057	1031	1005	966	926						
042	1400	1050	HI	1634	1626	1618	1606	1594	1583	1571	1539	1507	1464	1420	1265	1078				
			MED	1332	1323	1314	1298	1282	1263	1243	1206	1169	1115	1060						
			LO	1130	1109	1088	1086	1084	1066	1048	1052	1055								
			HS HI	1798	1781	1764	1738	1711	1688	1665	1630	1595	1555	1514	1420	1239				
			HS MED	1384	1382	1379	1375	1371	1356	1341	1318	1294	1261	1227						
			HS LO	1091	1088	1084	1081	1078	1069	1060										
048	1600	1200	HI	1798	1781	1764	1738	1711	1688	1665	1630	1595	1555	1514	1420	1239				
			MED	1384	1382	1379	1375	1371	1356	1341	1318	1294	1261	1227						
			LO																	
			HS HI	2011	1977	1942	1923	1903	1841	1778	1755	1732	1689	1645	1520	1431	1307	1211		
			HS MED	1881	1858	1834	1807	1780	1746	1711	1676	1640	1604	1567	1469	1378	1286			
			HS LO	1738	1716	1694	1673	1651	1634	1617	1584	1551	1508	1465	1390	1321	1228			
060	1950	1500	HI	2311	2306	2300	2290	2279	2268	2257	2233	2209	2175	2140	2088	1990	1901	1856	1752	
			MED	2058	2049	2039	2028	2016	2000	1983	1966	1949	1935	1920	1874	1807	1750	1670	1582	
			LO	1868	1863	1858	1858	1858	1848	1838	1822	1806	1799	1792	1749	1699	1636	1570		
			HS HI	2510	2498	2486	2471	2455	2440	2424	2401	2377	2348	2318	2247	2161	2078	1986	1855	
			HS MED	2171	2167	2162	2162	2162	2158	2153	2135	2117	2101	2085	2024	1971	1891	1823	1691	
			HS LO	2010	2008	2006	2006	2006	2006	2006	2006	1992	1977	1962	1947	1892	1851	1782	1705	1600
070	2100	1800	HI	2510	2498	2486	2471	2455	2440	2424	2401	2377	2348	2318	2247	2161	2078	1986	1855	
			MED	2171	2167	2162	2162	2162	2158	2153	2135	2117	2101	2085	2024	1971	1891	1823		
			LO	2010	2008	2006	2006	2006	2006	2006	2006	1992	1977	1962	1947	1892	1851			

LEGEND

ESP — External Static Pressure
 HS — High Static

NOTES:

1. Shaded areas denote ESP where operation is not recommended.
2. Units factory shipped on medium speed. Other speeds require field selection.
3. All airflow is rated and shown above at the lower voltage if unit is dual voltage rated, e.g., 208 v for 208/230 v units.
4. Only two-speed fan (high and medium) available on 575 v units.



PSC BLOWER MOTOR PERFORMANCE DATA FOR 50PS UNITS WITH HWR*

COIL FACE VELOCITY FPM	REHEAT ESP LOSS PER UNIT SIZE				
	018 (in. wg)	024,030 (in. wg)	036 (in. wg)	042,048 (in. wg)	060,070 (in. wg)
200	0.037	0.033	0.031	0.028	0.026
250	0.052	0.046	0.042	0.038	0.034
300	0.077	0.066	0.059	0.051	0.044
350	0.113	0.096	0.085	0.073	0.061
400	0.181	0.160	0.145	0.131	0.117
450	0.242	0.226	0.215	0.205	0.194
500	0.360	0.345	0.335	0.326	0.316

LEGEND

ESP — External Static Pressure
HWR — Hot Water Reheat

*HWR not available on 50PS006-012 units.

NOTE: For units with HWR coil applications, calculate face velocity of the entering air. From the data table, find ESP for reheat application. The loss includes wet coil loss.

ECM BLOWER MOTOR PERFORMANCE DATA

50PS UNIT SIZE	MAX ESP (in. wg)	FAN MOTOR (hp)	TAP SETTING	COOLING MODE (cfm)			DEHUMIDIFICATION MODE (cfm)			HEATING MODE (cfm)		
				Stage 1	Stage 2	Fan	Stage 1	Stage 2	Fan	Stage 1	Stage 2	Fan
018	0.50	1/2	4	640	800	400	500	620	400	640	700	400
			3	600	750	375	470	590	375	600	750	375
			2	525	650	330	400	500	330	520	650	330
			1	450	550	280	—	—	—	450	550	280
024	0.50	1/2	4	780	850	470	610	740	470	870	1060	470
			3	700	850	420	540	660	420	780	950	420
			2	630	770	360	490	600	360	670	820	360
			1	550	670	300	—	—	—	570	690	300
030	0.50	1/2	4	920	1130	560	720	880	560	1000	1230	560
			3	820	1000	500	640	780	500	900	1100	500
			2	740	900	450	580	700	450	800	980	450
			1	660	800	400	—	—	—	700	850	400
036	0.50	1/2	4	1150	1400	700	900	1090	700	1150	1400	700
			3	1020	1250	630	800	980	630	1020	1250	630
			2	890	1080	540	690	840	540	890	1080	540
			1	740	900	450	—	—	—	750	920	450
042	0.50	1/2	4	1290	1580	790	1010	1230	790	1290	1580	790
			3	1150	1400	700	900	1090	700	1150	1400	700
			2	1050	1280	640	820	1000	640	1020	1240	640
			1	920	1120	560	—	—	—	900	1080	560
048	0.75	1	4	1420	1730	870	1110	1350	870	1520	1850	865
			3	1270	1550	780	990	1210	780	1350	1650	775
			2	1180	1440	720	920	1120	720	1190	1450	720
			1	1050	1280	640	—	—	—	1020	1250	640
060	0.75	1	4	1680	2050	1030	1310	1600	1030	1870	2280	1030
			3	1500	1830	910	1170	1420	910	1680	2050	910
			2	1400	1700	850	1090	1330	850	1480	1800	850
			1	1300	1580	790	—	—	—	1270	1550	790
070	0.75	1	4	1830	2230	1100	1420	1740	1100	1830	2230	1100
			3	1600	1950	980	1250	1520	980	1720	2100	980
			2	1440	1750	880	1120	1360	880	1670	1950	880
			1	1200	1580	790	—	—	—	1460	1780	790

LEGEND

ESP — External Static Pressure

NOTES:

- See ECM control section in the Base Unit Installation Instructions for details on setting taps.
- Factory setting is Tap Setting 2.
- Airflow is controlled within 5% up to the Max ESP shown with wet coil.
- Do not select Dehumidification mode if Tap Setting is on Setting 1.
- All units ARI/ISO 13256-1 rated Tap Setting 3.
- Airflow in cfm with wet coil and clean air filter.
- Units have an ECM fan motor as a standard feature. The small additional pressure drop of the reheat coil causes the ECM motor to slightly increase rpm to overcome the added pressure drop and maintain selected cfm up to maximum ESP.

Performance data (cont)



SOUND DATA — DUCTED DISCHARGE WITH STANDARD CONSTRUCTION

50PS UNIT	MODE	DUCTED DISCHARGE OCTAVE BAND FREQUENCY, Hz						
		125	250	500	1000	2000	4000	8000
018	Fan Only: Low Speed	48	51	49	46	42	42	33
	Fan Only: High Speed	52	56	62	54	51	52	45
	Cooling: Low Speed	49	50	45	45	43	42	32
	Cooling: High Speed	51	55	61	53	50	50	42
	Heating: Low Speed	50	50	51	46	43	42	33
	Heating: High Speed	51	57	61	54	50	51	44
024	Fan Only: Low Speed	52	55	56	52	48	48	40
	Fan Only: High Speed	57	61	65	60	56	57	51
	Cooling: Low Speed	52	54	55	51	48	48	39
	Cooling: High Speed	56	60	65	59	56	56	50
	Heating: Low Speed	54	55	57	52	48	48	40
	Heating: High Speed	56	61	65	60	56	56	50
030	Fan Only: Low Speed	57	59	63	57	54	54	47
	Fan Only: High Speed	62	66	69	66	62	62	57
	Cooling: Low Speed	56	58	64	56	53	53	46
	Cooling: High Speed	61	66	69	65	62	62	57
	Heating: Low Speed	59	59	63	57	54	53	47
	Heating: High Speed	61	66	68	65	61	61	56
036	Fan Only: Low Speed	57	55	57	53	48	46	37
	Fan Only: High Speed	71	69	68	68	63	62	54
	Cooling: Low Speed	59	55	56	53	49	47	38
	Cooling: High Speed	70	69	68	67	63	63	56
	Heating: Low Speed	59	56	57	53	49	46	40
	Heating: High Speed	70	69	68	67	62	60	53
042	Fan Only: Low Speed	60	57	59	55	50	49	40
	Fan Only: High Speed	71	70	69	69	64	64	57
	Cooling: Low Speed	61	57	68	54	51	50	41
	Cooling: High Speed	70	70	69	68	64	64	58
	Heating: Low Speed	61	58	58	55	50	48	41
	Heating: High Speed	70	70	69	68	60	62	55
048	Fan Only: Low Speed	64	60	61	57	53	52	44
	Fan Only: High Speed	72	72	71	70	65	66	60
	Cooling: Low Speed	62	59	60	56	53	53	45
	Cooling: High Speed	71	71	70	69	65	66	60
	Heating: Low Speed	63	60	59	56	52	51	42
	Heating: High Speed	71	71	70	69	64	64	58
060	Fan Only: Low Speed	70	73	68	67	62	62	56
	Fan Only: High Speed	74	72	70	72	68	68	63
	Cooling: Low Speed	69	74	68	66	61	62	56
	Cooling: High Speed	74	72	70	71	67	68	63
	Heating: Low Speed	71	70	67	67	61	60	54
	Heating: High Speed	72	72	69	71	67	67	61
070	Fan Only: Low Speed	71	74	69	68	63	64	58
	Fan Only: High Speed	74	73	70	72	68	69	64
	Cooling: Low Speed	72	77	65	69	64	66	60
	Cooling: High Speed	76	74	72	74	70	71	66
	Heating: Low Speed	74	73	70	70	64	64	57
	Heating: High Speed	74	75	72	74	72	70	65

NOTE: All performance is Sound Power Level in dB referenced to 1 picroWatt.



SOUND DATA — CASE RADIATED WITH STANDARD CONSTRUCTION

50PS UNIT	MODE	FREE AIR INLET COMBINED WITH CASING (CABINET) RADIATED OCTAVE BAND FREQUENCY, Hz						
		125	250	500	1000	2000	4000	8000
018	Fan Only: Low Speed	53	51	51	41	40	38	30
	Fan Only: High Speed	60	58	56	50	49	47	40
	Cooling: Low Speed	60	53	52	48	45	41	34
	Cooling: High Speed	62	58	58	54	53	48	42
	Heating: Low Speed	67	55	52	48	48	42	36
	Heating: High Speed	67	59	58	54	53	49	42
024	Fan Only: Low Speed	58	55	55	46	44	43	35
	Fan Only: High Speed	63	61	59	54	52	51	45
	Cooling: Low Speed	61	56	55	50	47	44	38
	Cooling: High Speed	64	61	60	56	54	51	46
	Heating: Low Speed	67	57	56	50	47	45	39
	Heating: High Speed	68	61	60	56	54	52	46
030	Fan Only: Low Speed	62	58	58	51	49	47	41
	Fan Only: High Speed	66	64	62	59	56	55	50
	Cooling: Low Speed	62	58	57	51	48	47	41
	Cooling: High Speed	66	63	61	58	56	54	49
	Heating: Low Speed	67	60	60	52	49	48	43
	Heating: High Speed	68	64	62	58	56	55	50
036	Fan Only: Low Speed	59	55	49	43	41	39	33
	Fan Only: High Speed	72	69	59	56	55	54	48
	Cooling: Low Speed	60	55	50	47	42	40	35
	Cooling: High Speed	72	69	58	56	55	54	48
	Heating: Low Speed	64	56	52	47	43	41	40
	Heating: High Speed	72	68	58	55	54	53	47
042	Fan Only: Low Speed	61	57	51	44	43	41	35
	Fan Only: High Speed	72	70	60	57	55	55	50
	Cooling: Low Speed	65	59	54	49	45	43	39
	Cooling: High Speed	72	69	59	57	55	55	49
	Heating: Low Speed	67	59	54	48	45	44	42
	Heating: High Speed	72	69	59	56	55	54	49
048	Fan Only: Low Speed	63	60	53	46	45	44	38
	Fan Only: High Speed	72	70	61	57	56	56	51
	Cooling: Low Speed	71	63	58	52	48	46	44
	Cooling: High Speed	72	69	61	58	56	56	51
	Heating: Low Speed	70	62	57	50	47	46	45
	Heating: High Speed	72	69	61	56	55	55	51
060	Fan Only: Low Speed	70	73	62	61	56	56	49
	Fan Only: High Speed	74	72	64	63	61	61	55
	Cooling: Low Speed	69	72	63	60	55	55	48
	Cooling: High Speed	73	70	64	63	61	61	54
	Heating: Low Speed	72	71	63	61	56	56	50
	Heating: High Speed	73	70	64	62	60	60	54
070	Fan Only: Low Speed	71	74	63	61	56	57	50
	Fan Only: High Speed	74	72	65	63	61	62	55
	Cooling: Low Speed	75	77	67	63	58	59	53
	Cooling: High Speed	75	72	67	66	63	63	57
	Heating: Low Speed	76	75	67	64	59	60	54
	Heating: High Speed	75	72	67	64	62	63	57

NOTE: All performance is Sound Power Level in dB referenced to 1 picoWatt.

Performance data (cont)



SOUND DATA — CASE RADIATED WITH MUTE CONSTRUCTION

50PS UNIT	MODE	FREE AIR INLET COMBINED WITH CASING (CABINET) RADIATED OCTAVE BAND FREQUENCY, Hz						
		125	250	500	1000	2000	4000	8000
018	Fan Only: Low Speed	52	51	49	40	37	36	30
	Fan Only: High Speed	59	56	53	46	44	42	37
	Cooling: Low Speed	59	50	51	46	42	37	29
	Cooling: High Speed	60	56	57	51	49	45	38
	Heating: Low Speed	66	52	50	46	45	38	31
	Heating: High Speed	65	56	56	51	49	45	41
024	Fan Only: Low Speed	57	55	53	44	41	40	35
	Fan Only: High Speed	62	59	56	50	48	46	42
	Cooling: Low Speed	60	53	53	47	44	40	33
	Cooling: High Speed	62	58	58	53	51	48	41
	Heating: Low Speed	66	54	54	48	44	41	34
	Heating: High Speed	66	59	58	53	51	48	45
030	Fan Only: Low Speed	61	58	56	49	46	45	41
	Fan Only: High Speed	65	62	59	55	51	50	47
	Cooling: Low Speed	61	55	56	49	45	43	36
	Cooling: High Speed	64	61	60	55	52	51	45
	Heating: Low Speed	66	57	58	50	46	44	38
	Heating: High Speed	66	61	60	55	52	51	49
036	Fan Only: Low Speed	58	55	47	41	38	36	33
	Fan Only: High Speed	71	67	56	52	50	49	45
	Cooling: Low Speed	59	52	48	44	39	36	30
	Cooling: High Speed	70	66	57	53	51	50	43
	Heating: Low Speed	63	53	50	44	40	37	35
	Heating: High Speed	70	66	56	52	51	50	46
042	Fan Only: Low Speed	60	57	49	43	40	39	35
	Fan Only: High Speed	71	68	57	53	51	50	47
	Cooling: Low Speed	64	56	52	47	42	39	34
	Cooling: High Speed	70	66	58	54	52	51	45
	Heating: Low Speed	66	56	53	46	42	40	37
	Heating: High Speed	70	66	58	53	51	50	47
048	Fan Only: Low Speed	62	60	51	44	42	41	38
	Fan Only: High Speed	71	68	59	53	52	51	48
	Cooling: Low Speed	69	60	57	49	45	42	39
	Cooling: High Speed	70	66	59	55	53	53	47
	Heating: Low Speed	69	59	56	48	44	42	40
	Heating: High Speed	70	67	59	53	52	51	49
060	Fan Only: Low Speed	69	73	60	59	53	53	49
	Fan Only: High Speed	73	70	62	59	57	56	52
	Cooling: Low Speed	68	69	61	57	52	51	43
	Cooling: High Speed	71	67	63	60	57	57	50
	Heating: Low Speed	70	68	62	58	53	52	45
	Heating: High Speed	71	68	62	59	57	57	52
070	Fan Only: Low Speed	70	75	61	60	53	54	50
	Fan Only: High Speed	73	70	62	59	57	57	52
	Cooling: Low Speed	73	74	66	61	55	55	48
	Cooling: High Speed	73	69	66	63	60	60	53
	Heating: Low Speed	74	72	65	61	56	56	49
	Heating: High Speed	73	70	65	61	59	59	55

NOTE: All performance is Sound Power Level in dB referenced to 1 picoWatt.

Electrical data



50PSH, PSV, PSD STANDARD PSC MOTOR ELECTRICAL DATA

50PS UNIT SIZE	RATED VOLTAGE V-Ph-Hz	VOLTAGE MIN/MAX	COMPRESSOR			FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR	UNITS WITH PSC MOTOR AND HWR			
			RLA	LRA	Qty					REHEAT PUMP FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE / HACR
006	208/230-1-60	197/254	3.1	17.7	1	0.4	3.5	4.3	15	0.43	3.9	4.7	15
009	208/230-1-60	197/254	3.9	21.0	1	0.4	4.3	5.3	15	0.43	4.8	5.7	15
012	208/230-1-60	197/254	5.0	25.0	1	0.4	5.7	7.0	15	0.43	6.1	7.4	15
018	208/230-1-60	197/254	9.0	48.0	1	1.0	10.0	12.3	20	0.43	10.4	12.7	20
	265-1-60	239/292	8.4	40.0	1	0.9	9.3	11.4	15	N/A	N/A	N/A	N/A
024	208/230-1-60	197/254	12.8	60.0	1	1.1	13.9	17.1	25	0.43	14.3	17.5	30
	208/230-3-60	197/254	8.0	55.0	1	1.1	9.1	11.1	15	0.43	9.5	11.5	15
	460-3-60	414/506	4.0	22.4	1	0.6	4.6	5.6	15	N/A	N/A	N/A	N/A
030	208/230-1-60	197/254	13.5	61.0	1	1.4	14.9	18.3	30	0.80	15.7	19.1	30
	265-1-60	239/292	10.9	58.0	1	1.6	12.5	15.2	25	0.70	13.2	15.9	25
	208/230-3-60	197/254	8.3	63.0	1	1.4	9.7	11.8	20	0.80	10.5	12.6	20
	460-3-60	414/506	4.5	27.0	1	0.9	5.4	6.5	15	0.70	6.1	7.2	15
036	208/230-1-60	197/254	14.7	72.5	1	2.1	16.8	20.5	35	0.80	17.6	21.3	35
	265-1-60	239/292	12.5	61.0	1	2.2	14.7	17.8	30	0.70	15.4	18.5	30
	208/230-3-60	197/254	10.4	63.0	1	2.1	12.5	15.1	25	0.80	13.3	15.9	25
	460-3-60	414/506	4.5	32.0	1	1.3	5.8	6.9	15	0.70	6.5	7.6	15
042	208/230-1-60	197/254	15.4	83.0	1	2.1	17.5	21.4	35	0.80	18.3	22.2	35
	208/230-3-60	197/254	11.5	77.0	1	2.1	13.6	16.5	25	0.80	14.4	17.3	25
	460-3-60	414/506	5.1	35.0	1	1.0	6.1	7.4	15	0.70	6.8	8.1	15
	575-3-60	518/633	4.3	31.0	1	0.8	5.1	6.2	15	N/A	N/A	N/A	N/A
048	208/230-1-60	197/254	20.5	109.0	1	3.0	23.5	28.6	45	0.80	24.3	29.4	45
	208/230-3-60	197/254	14.6	91.0	1	3.0	17.6	21.3	35	0.80	18.4	22.1	35
	460-3-60	414/506	7.1	46.0	1	1.7	8.8	10.6	15	0.70	9.5	11.3	15
	575-3-60	518/633	5.1	34.1	1	1.4	6.5	7.8	15	N/A	N/A	N/A	N/A
060	208/230-1-60	197/254	26.9	145.0	1	4.9	31.8	38.5	60	1.07	32.9	39.6	60
	208/230-3-60	197/254	17.6	123.0	1	4.9	22.5	26.9	40	1.07	23.6	28.0	45
	460-3-60	414/506	9.6	64.0	1	2.5	12.1	14.5	20	1.07	13.2	15.6	25
	575-3-60	518/633	6.1	40.0	1	1.9	8.0	9.5	15	N/A	N/A	N/A	N/A
070	208/230-1-60	197/254	30.1	158.0	1	5.8	35.9	43.4	70	1.07	37.0	44.5	70
	208/230-3-60	197/254	20.5	155.0	1	5.8	26.3	31.4	50	1.07	27.4	32.5	50
	460-3-60	414/506	9.6	75.0	1	2.6	12.2	14.6	20	1.07	13.3	15.7	25
	575-3-60	518/633	7.6	54.0	1	2.3	9.9	11.8	15	N/A	N/A	N/A	N/A

LEGEND

- FLA — Full Load Amps
- HACR — Heating, Air Conditioning and Refrigeration
- HWR — Hot Water Reheat
- LRA — Locked Rotor Amps
- RLA — Rated Load Amps

Electrical data (cont)



50PSH, PSV, PSD HIGH-STATIC PSC MOTOR ELECTRICAL DATA

50PS UNIT SIZE	RATED VOLTAGE V-Ph-Hz	VOLTAGE MIN/MAX	COMPRESSOR			FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR	UNITS WITH HIGH-STATIC PSC MOTOR AND HWR			
			RLA	LRA	Qty					REHEAT PUMP FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE / HACR
018	208/230-1-60	197/254	9.0	48.0	1	1.10	7.9	12.4	20	0.80	10.9	13.2	20
	265-1-60	239/292	8.4	40.0	1	0.90	7.1	11.4	15	0.70	10.0	12.1	20
024	208/230-1-60	197/254	12.8	60.0	1	1.40	14.2	17.4	30	0.80	15.0	18.2	30
	208/230-3-60	197/254	8.0	55.0	1	1.40	9.4	11.4	15	0.80	10.2	12.2	20
	460-3-60	414/506	4.0	22.4	1	0.90	4.9	5.9	15	0.70	5.6	6.6	15
030	208/230-1-60	197/254	13.5	61.0	1	1.80	15.3	18.7	30	0.80	16.1	19.5	30
	265-1-60	239/292	10.9	58.0	1	2.00	12.9	15.6	25	0.70	13.6	16.3	25
	208/230-3-60	197/254	8.3	63.0	1	1.80	10.1	12.2	20	0.80	10.9	13.0	20
	460-3-60	414/506	4.5	27.0	1	1.24	5.7	6.9	15	0.70	6.4	7.6	15
036	208/230-1-60	197/254	14.7	72.5	1	2.00	16.7	20.4	35	0.80	17.5	21.2	35
	265-1-60	239/292	12.5	61.0	1	1.66	14.2	17.3	25	0.70	14.9	18.0	30
	208/230-3-60	197/254	10.4	63.0	1	2.00	12.4	15.0	25	0.80	13.2	15.8	25
	460-3-60	414/506	4.5	32.0	1	1.00	5.5	6.6	15	0.70	6.2	7.3	15
042	208/230-1-60	197/254	15.4	83.0	1	3.00	18.4	22.3	35	0.80	19.2	23.1	35
	208/230-3-60	197/254	11.5	77.0	1	3.00	14.5	17.4	25	0.80	15.3	18.2	25
	460-3-60	414/506	5.1	35.0	1	1.70	6.8	8.1	15	0.70	7.5	8.8	15
	575-3-60	518/633	4.3	31.0	1	1.40	5.7	6.8	15	N/A	N/A	N/A	N/A
048	208/230-1-60	197/254	20.5	109.0	1	3.40	23.9	29.0	45	1.07	25.0	30.1	50
	208/230-3-60	197/254	14.6	91.0	1	3.40	18.0	21.7	35	1.07	19.1	22.7	35
	460-3-60	414/506	7.1	46.0	1	1.80	8.9	10.7	15	1.07	10.0	11.7	15
	575-3-60	518/633	5.1	34.1	1	1.40	6.5	7.8	15	N/A	N/A	N/A	N/A
060	208/230-1-60	197/254	26.9	145.0	1	5.80	32.7	39.4	60	1.07	33.8	40.5	60
	208/230-3-60	197/254	17.6	123.0	1	5.80	23.4	27.8	45	1.07	24.5	28.9	45
	460-3-60	414/506	9.6	64.0	1	2.60	12.2	14.6	20	1.07	13.3	15.7	25
	575-3-60	518/633	6.1	40.0	1	2.30	8.4	9.9	15	N/A	N/A	N/A	N/A

LEGEND

- FLA** — Full Load Amps
- HACR** — Heating, Air Conditioning and Refrigeration
- HWR** — Hot Water Reheat
- LRA** — Locked Rotor Amps
- RLA** — Rated Load Amps



50PSH, PSV, PSD ECM MOTOR ELECTRICAL DATA

50PS UNIT SIZE	RATED VOLTAGE V-Ph-Hz	VOLTAGE MIN/MAX	COMPRESSOR			FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR	UNITS WITH ECM MOTOR AND HWR			
			RLA	LRA	Qty					REHEAT PUMP FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR
018	208/230-1-60	197/254	9.0	48.0	1	4.3	13.3	15.6	20	0.8	14.1	16.4	25
	265-1-60	239/292	8.4	40.0	1	4.1	12.5	14.6	20	0.7	13.2	15.3	20
024	208/230-1-60	197/254	12.8	60.0	1	4.3	17.1	20.3	30	0.8	17.9	21.1	30
	208/230-3-60	197/254	8.0	55.0	1	4.3	12.3	14.3	20	0.8	13.1	15.1	20
	460-3-60	414/506	4.0	22.4	1	4.1	8.1	9.1	15	0.7	8.8	9.8	15
030	208/230-1-60	197/254	13.5	61.0	1	4.3	17.8	21.2	30	0.8	18.6	22.0	35
	265-1-60	239/292	10.9	58.0	1	4.1	15.0	17.7	25	0.7	15.7	18.4	25
	208/230-3-60	197/254	8.3	63.0	1	4.3	12.6	14.7	20	0.8	13.4	15.5	20
	460-3-60	414/506	4.5	27.0	1	4.1	8.6	9.7	15	0.7	9.3	10.4	15
036	208/230-1-60	197/254	14.7	72.5	1	4.3	19.0	22.7	35	0.8	19.8	23.5	35
	265-1-60	239/292	12.5	61.0	1	4.1	16.6	19.7	30	0.7	17.3	20.4	30
	208/230-3-60	197/254	10.4	63.0	1	4.3	14.7	17.3	25	0.8	15.5	18.1	25
	460-3-60	414/506	4.5	32.0	1	4.1	8.6	9.7	15	0.7	9.3	10.4	15
042	208/230-1-60	197/254	15.4	83.0	1	4.3	19.7	23.6	35	0.8	20.5	24.4	35
	208/230-3-60	197/254	11.5	77.0	1	4.3	15.8	18.7	30	0.8	16.6	19.5	30
	460-3-60	414/506	5.1	35.0	1	4.1	9.2	10.5	15	0.7	9.9	11.2	15
048	208/230-1-60	197/254	20.5	109.0	1	7.0	27.5	32.6	50	1.07	28.6	33.7	50
	208/230-3-60	197/254	14.6	91.0	1	7.0	21.6	25.3	35	1.07	22.7	26.3	40
	460-3-60	414/506	7.1	46.0	1	6.9	14.0	15.8	20	1.07	15.1	16.8	20
060	208/230-1-60	197/254	26.9	145.0	1	7.0	33.9	40.6	60	1.07	35.0	41.7	60
	208/230-3-60	197/254	17.6	123.0	1	7.0	24.6	29.0	45	1.07	25.7	30.1	45
	460-3-60	414/506	9.6	64.0	1	6.9	16.5	18.9	25	1.07	17.6	20.0	25
070	208/230-1-60	197/254	30.1	158.0	1	7.0	37.1	44.6	70	1.07	38.2	45.7	70
	208/230-3-60	197/254	20.5	155.0	1	7.0	27.5	32.6	50	1.07	28.6	33.7	50
	460-3-60	414/506	9.6	75.0	1	6.9	16.5	18.9	25	1.07	17.6	20.0	25

LEGEND

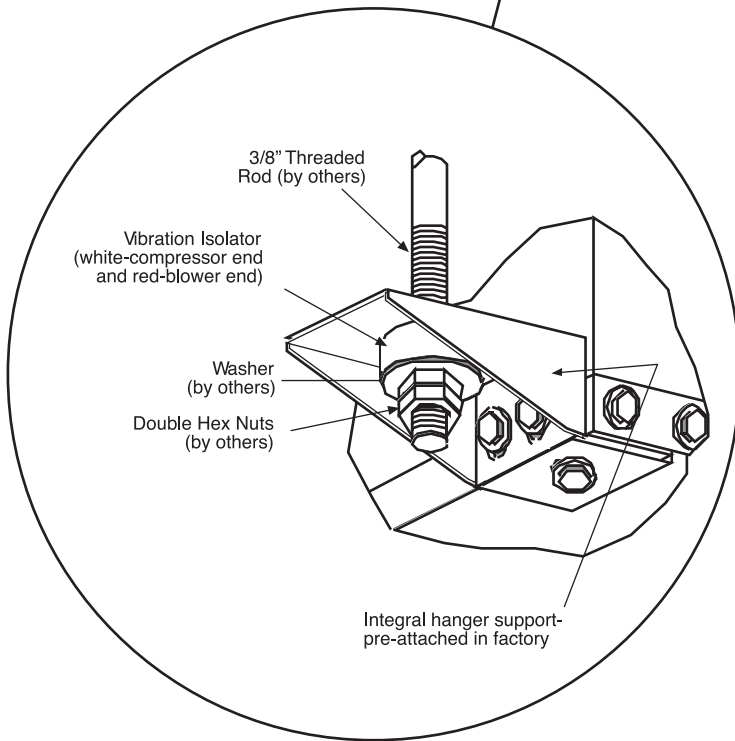
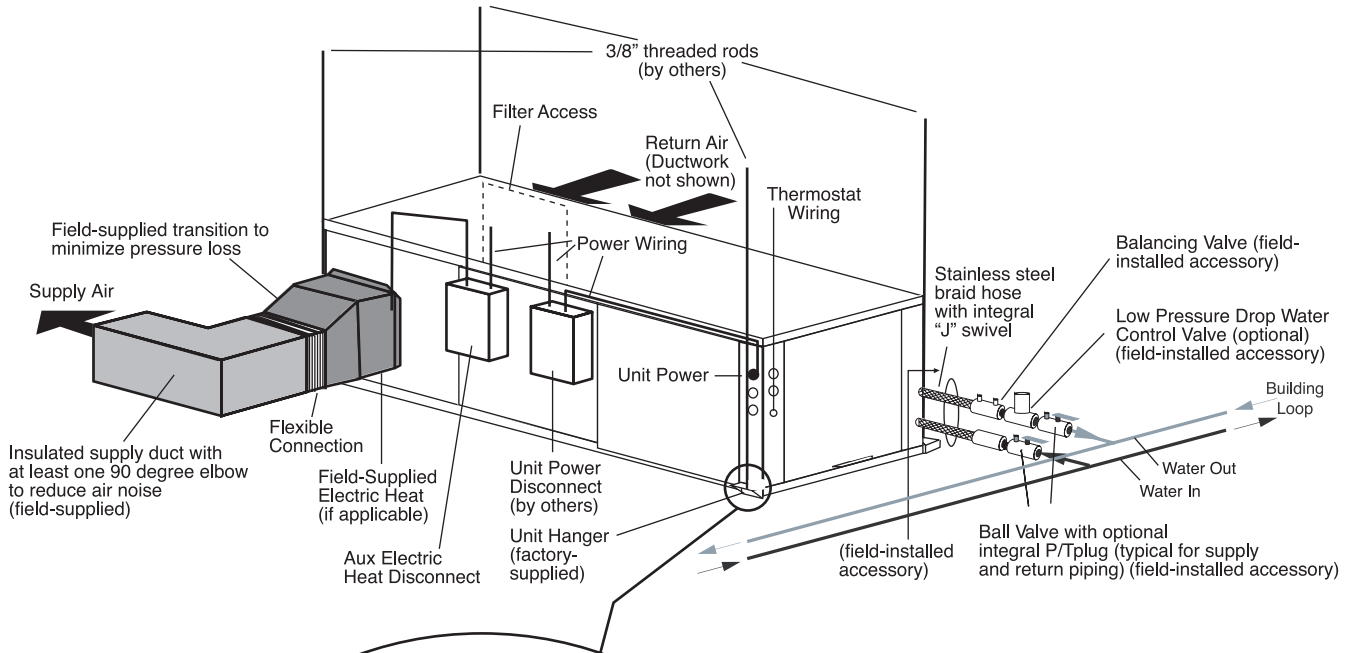
- FLA** — Full Load Amps
- HACR** — Heating, Air Conditioning and Refrigeration
- HWR** — Hot Water Reheat
- LRA** — Locked Rotor Amps
- RLA** — Rated Load Amps

NOTE: 460V with ECM motor requires a neutral wire.

Typical piping and wiring



TYPICAL PIPING AND WIRING INSTALLATION

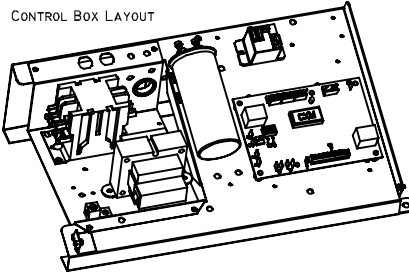
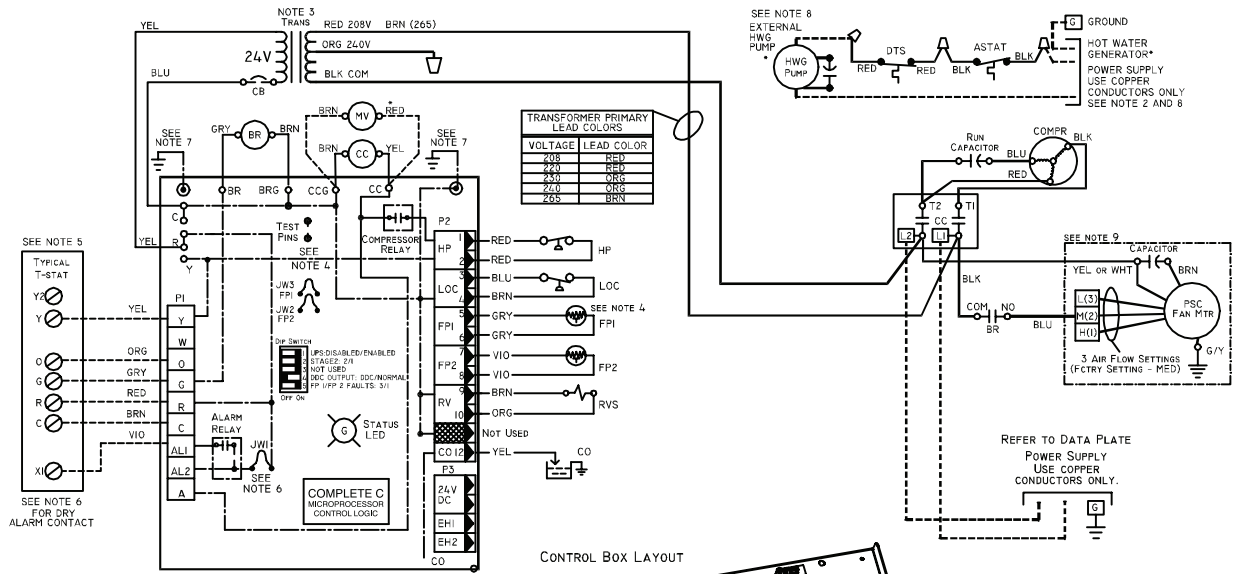


UNIT HANGER ISOLATION DETAIL

Typical control wiring schematics



UNITS WITH COMPLETE C CONTROLLER, SINGLE-PHASE



LEGEND

- AL** — Alarm Relay Contacts
- ASTAT** — Aquastat
- BR** — Blower Relay
- CB** — Circuit Breaker
- CC** — Compressor Contactor
- CO** — Condensate Overflow Sensor
- COMPR** — Compressor
- DTS** — Discharge Temp Switch
- FP1** — Water Coil Freeze Protection Sensor
- FP2** — Air Coil Freeze Protection Sensor
- HP** — High-Pressure Switch
- HWG** — Hot Water Generator
- JW** — Jumper Wire
- LOC** — Loss of Charge Pressure Switch
- MV** — Motorized Valve
- NEC** — National Electrical Code
- PSC** — Permanent Split Capacitor
- P1** — Field Wiring Terminal Block
- RVS** — Reversing Valve Solenoid

- TRANS** — Transformer
- UPS** — Unit Performance Sentinel
- Factory Low Voltage Wiring
- Factory Line Voltage Wiring
- Field Low Voltage Wiring
- Field Line Voltage Wiring
- Printed Circuit Trace
- Optional Wiring
- — Relay/Contactor Coil
- ⊞ — Thermistor
- ⊞ — Condensate Pan
- ⊞ — Circuit Breaker

- ⊞ — Solenoid Coil
- ⊞ — Relay Contacts - N.C.
- ⊞ — Relay Contacts - N.O.
- ⊞ — Capacitor
- ⊞ — Temperature Switch
- ⊞ — Low Pressure Switch
- ⊞ — High Pressure Switch
- ⊞ — Wire Nut
- ⊞ — Splice Cap
- ⊞ — LED

*Optional.

NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. 208/230 v transformer will be connected for 208 v operation. For 230 v operation, disconnect RED lead at L1 and attach ORANGE lead to L1. Insulate open end of RED lead. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides freeze protection for water. When using anti-freeze solutions, cut JW3 jumper.
5. Check installation wiring information for specific thermostat hookup. Refer to thermostat installation instructions for wiring to the unit. Thermostat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
6. 24-v alarm signal shown. For dry alarm contact, cut JW1 jumper and dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via Complete C board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
8. Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltage up to 277 v.
9. Fan motors factory wired for medium speed. For high and low speed remove BLU wire from fan motor speed tap 'M' and connect to 'H' for high or 'L' for low.

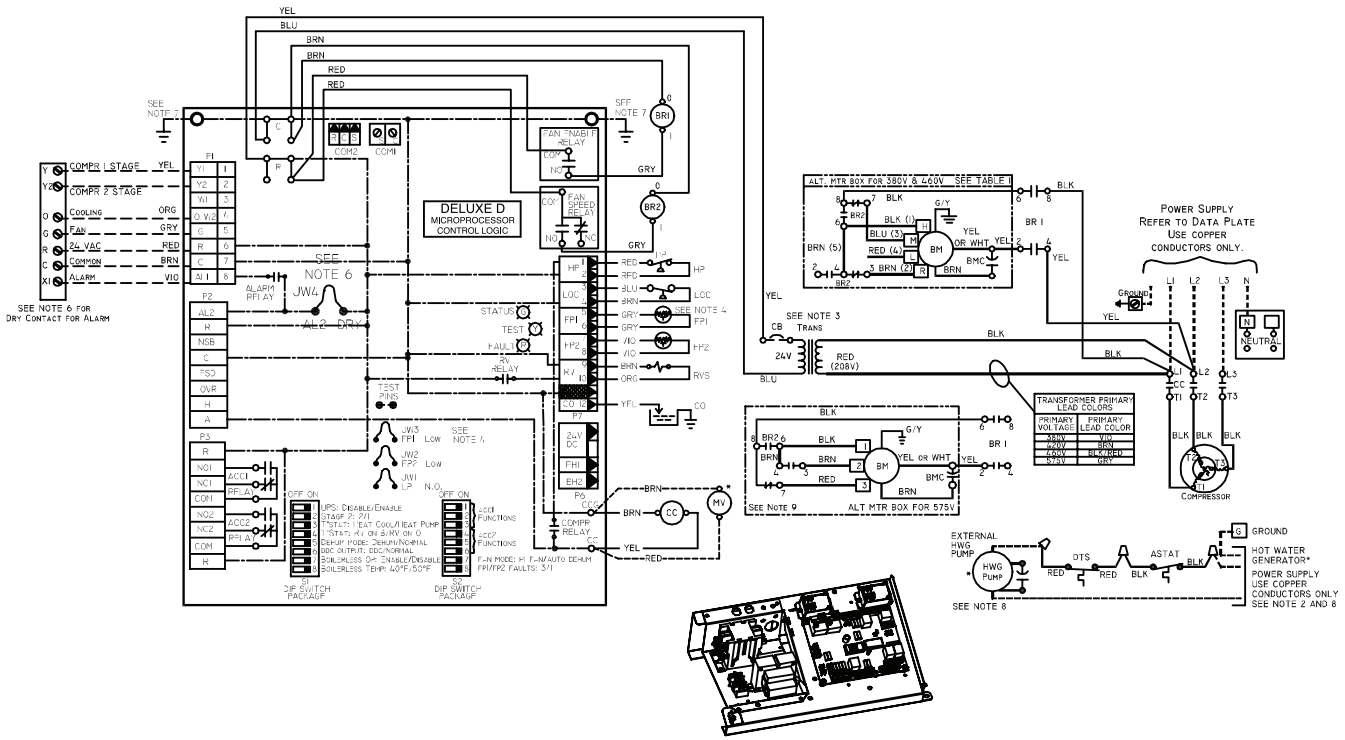
COMPLETE C CONTROLLER FAULT CODES

DESCRIPTION OF OPERATION	LED	ALARM RELAY
Normal Mode	ON	Open
Normal Mode with UPS Warning	ON	Cycle (Closed 5 Sec. Open 25 Sec.)
Complete C is Non-Functional	OFF	Open
Fault Retry	Slow Flash	Open
Lockout	Fast Flash	Closed
Over/Under Voltage Shutdown	Slow Flash	Open (Closed After 15 Min.)
Test Mode-No Fault in Memory	Flashing Code 1	Cycling Code 1
Test Mode-HP Fault in Memory	Flashing Code 2	Cycling Code 2
Test Mode-LP Fault in Memory	Flashing Code 3	Cycling Code 3
Test Mode-FP1 Fault in Memory	Flashing Code 4	Cycling Code 4
Test Mode-FP2 Fault in Memory	Flashing Code 5	Cycling Code 5
Test Mode-CO Fault in Memory	Flashing Code 6	Cycling Code 6
Test Mode-Over/Under Shutdown in Memory	Flashing Code 7	Cycling Code 7
Test Mode-UPS in Memory	Flashing Code 8	Cycling Code 8
Swapped FP1/FP2 Lockout	Flashing Code 9	Cycling Code 9

Typical control wiring schematics (cont)



UNITS WITH DELUXE D CONTROLLER, THREE-PHASE (460/575 V)



CONTROL BOX LAYOUT

LEGEND

- | | | |
|--|---|-----------------------|
| AL — Alarm Relay Contacts | P1 — Field Wiring Terminal Block | Solenoid Coil |
| ASTAT — Aquastat | RVS — Reversing Valve Solenoid | Relay Contacts - N.C. |
| BM — Blower Motor | TRANS — Transformer | Relay Contacts - N.O. |
| BMC — Blower Motor Capacitor | Factory Low Voltage Wiring | Capacitor |
| BR — Blower Relay | Factory Line Voltage Wiring | Temperature Switch |
| CB — Circuit Breaker | Field Low Voltage Wiring | Low Pressure Switch |
| CC — Compressor Contactor | Field Line Voltage Wiring | High Pressure Switch |
| CO — Condensate Overflow Sensor | Printed Circuit Trace | Wire Nut |
| COMPR — Compressor | Optional Wiring | Splice Cap |
| DTS — Discharge Temp Switch | Relay/Contactor Coil | LED |
| FP1 — Water Coil Freeze Protection Sensor | Thermistor | |
| FP2 — Air Coil Freeze Protection Sensor | Condensate Pan | |
| HP — High-Pressure Switch | Circuit Breaker | |
| HWG — Hot Water Generator | Ground | |
| JW — Jumper Wire | | |
| LOC — Loss of Charge Pressure Switch | | |
| MV — Motorized Valve | | |
| NEC — National Electric Code | | |

*Optional.

NOTES:

- Compressor and blower motor thermally protected internally.
- All wiring to the unit must comply with NEC and local codes.
- Transformer is wired to 460 v (BLK/RED) lead for 460/60/3 units. 575 v (GRY) lead for 575/60/3. Transformer is energy limiting or may have circuit breaker.
- FP1 thermistor provides freeze protection for water. When using antifreeze solutions, cut JW3 jumper.
- Check installation wiring information for specific thermostat hookup. Refer to thermostat installation instructions for wiring to the unit. Thermostat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
- 24-v alarm signal shown. For dry alarm contact, cut JW4 jumper and dry contact will be available between AL1 and AL2.
- Transformer secondary ground via Deluxe D board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
- Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltage up to 277 v.
- Blower motor is factory wired for high and low speeds. No other combination is available.
- The 460-v units using an ECM (electronically commutated motor) fan motor, modulating HWG, and/or an internal secondary pump will require a neutral wire from the supply side in order to feed the accessory with 265-v.

DELUXE D CONTROLLER FAULT CODES

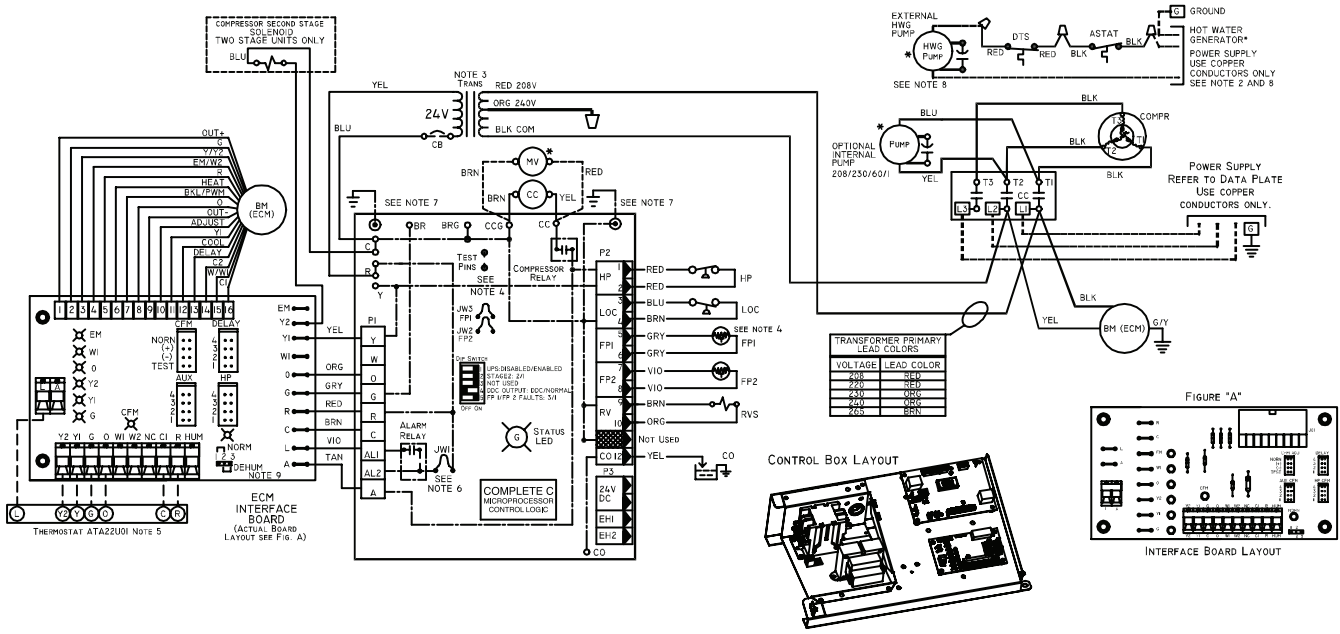
OPERATION	STATUS LED (GREEN)	TEST LED (YELLOW)	FAULT LED (RED)	ALARM RELAY
Normal Mode	ON	OFF	Note 2	Open
Deluxe D is Non-Functional	OFF	OFF	OFF	Open
Test Mode	—	ON	Note 2	Cycle (Note 3)
Night Setback	Flashing Code 2	—	Note 2	—
Emergency Shut Down	Flashing Code 3	—	Note 2	—
Invalid Thermostat Inputs	Flashing Code 4	—	Note 2	—
No Fault in Memory	ON	OFF	Flashing Code 1	Open
HP Fault/(Lockout) Note 1	Slow Flash/(Fast Flash)	OFF	Flashing Code 2	Open/(Closed)
LP Fault/(Lockout) Note 1	Slow Flash/(Fast Flash)	OFF	Flashing Code 3	Open/(Closed)
FP1 Fault/(Lockout) Note 1	Slow Flash/(Fast Flash)	OFF	Flashing Code 4	Open/(Closed)
FP2 Fault/(Lockout) Note 1	Slow Flash/(Fast Flash)	OFF	Flashing Code 5	Open/(Closed)
CC Fault/(Lockout) Note 1	Slow Flash/(Fast Flash)	OFF	Flashing Code 6	Open/(Closed)
Over-Under Voltage	Slow Flash	OFF	Flashing Code 7	Open (Note 4)
Normal Mode with UPS	ON	OFF	Flashing Code 8	Cycle (Note 5)
Swapped FP1/FP2 Lockout	Fast Flash	OFF	Flashing Code 9	Closed

NOTES:

- Status LED (GREEN) Slow Flash - Controller In - Fault Retry Mode. Fast Flash - Controller in Lockout Mode. Slow Flash = 1 Flash per every 2 seconds. Fast Flash = 2 Flashes per every 1 second.
- Fault LED (RED) flashes a code representing last fault in memory. If no fault in memory code 1 is flashed.
- Cycles appropriate code, by cycling alarm relay in the same sequence as fault LED.
- Alarm relay closes after 15 minutes.
- Alarm relay cycles. Closed for 5 seconds and open for 25 seconds.

TABLE 1 WIRE NUMBER					
Blower Speeds	1	2	3	4	5
Factory HI + MED	BM(H) to BR2(6)	BM(R) to BR2(3)	BM(M) to BR2(7)	Not Used	BR2(6) to BR2(4)
HI + LOW	BM(H) to BR2(6)	BM(R) to BR2(3)	Not Used	BM(L) to BR2(7)	BR2(6) to BR2(4)
MED + LOW	BM(H) to BR2(3)	BM(R) to BR2(3)	BM(M) to BR2(6)	BM(L) to BR2(7)	BR2(2) to BR2(4)

UNITS WITH COMPLETE C ECM BLOWER, THREE-PHASE (208/230 V)



- AL** — Alarm Relay Contacts
- ASTAT** — Aquastat
- BM** — Blower Motor
- BR** — Blower Relay
- CB** — Circuit Breaker
- CC** — Compressor Contactor
- CO** — Condensate Overflow Sensor
- COMPR** — Compressor
- DTS** — Discharge Temp Switch
- ECM** — Electronically Commutated Motor
- FP1** — Water Coil Freeze Protection Sensor
- FP2** — Air Coil Freeze Protection Sensor
- HP** — High-Pressure Switch
- HWG** — Hot Water Generator
- JW** — Jumper Wire
- LOC** — Loss of Charge Pressure Switch
- LWT** — Leaving Water Temperature
- MV** — Motorized Valve
- NEC** — National Electric Code
- P1** — Field Wiring Terminal Block

- ### LEGEND
- RVS** — Reversing Valve Solenoid
 - TRANS** — Transformer
 - UPS** — Unit Performance Sentinel
 - — — — — Factory Low Voltage Wiring
 - — — — — Factory Line Voltage Wiring
 - - - - - Field Low Voltage Wiring
 - - - - - Field Line Voltage Wiring
 - · · · · Printed Circuit Trace
 - · — · — · Optional Wiring
 - — Relay/Contactor Coil
 - ⊞ — Thermistor
 - ⊞ — Condensate Pan
 - ⊞ — Circuit Breaker
 - ⊞ — Ground
 - ⊞ — Solenoid Coil
 - ⊞ — Relay Contacts - N.C.
 - ⊞ — Relay Contacts - N.O.
 - ⊞ — Capacitor
 - ⊞ — Temperature Switch
 - ⊞ — Low Pressure Switch
 - ⊞ — High Pressure Switch
 - ⊞ — Wire Nut
 - ⊞ — Splice Cap
 - ⊞ — LED

*Optional.

NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. 208/230 v transformer will be connected for 208 v operation. For 230 v operation, disconnect RED lead at L1 and attach ORANGE lead to L1. Insulate open end of RED lead. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides freeze protection for water. When using anti-freeze solutions, cut JW3 jumper.
5. Check installation wiring information for specific thermostat hookup. Refer to thermostat installation instructions for wiring to the unit. Thermostat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
6. 24-v alarm signal shown. For dry alarm contact, cut JW1 jumper and dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via Complete C board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
8. Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltage up to 277 v.
9. Place jumpers on 2 and 3, integrated control motor (ICM) board, when dehumidification mode is used.

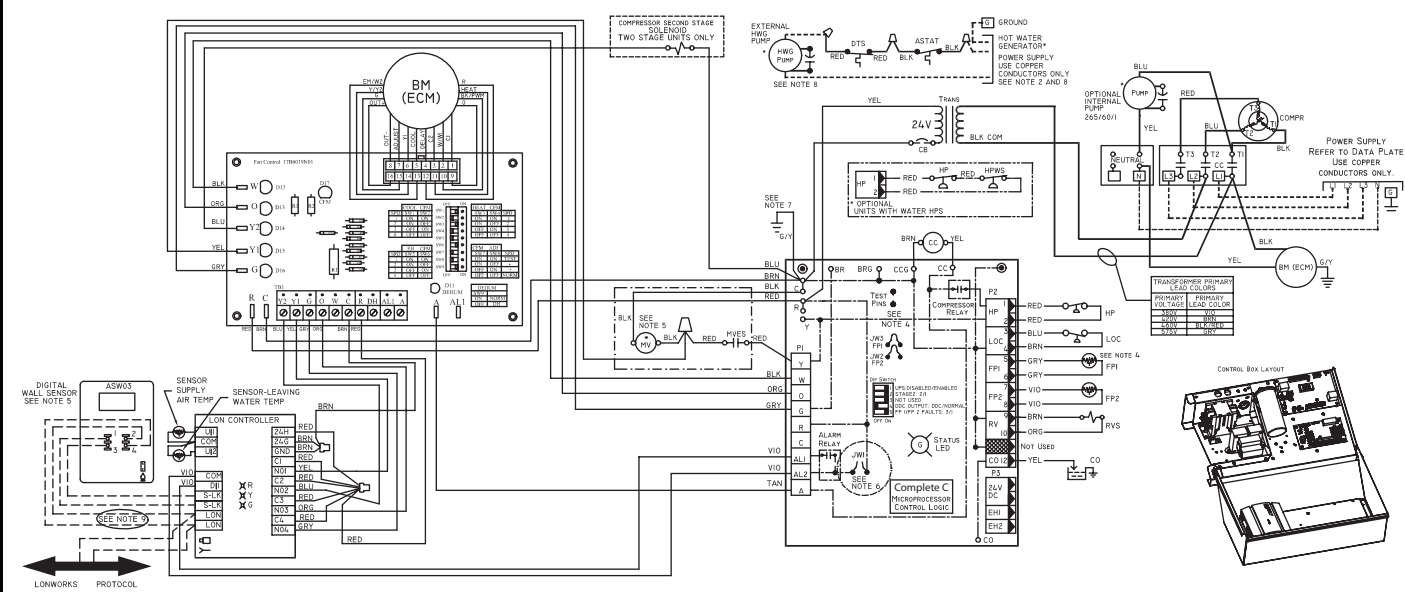
COMPLETE C CONTROLLER FAULT CODES

DESCRIPTION OF OPERATION	LED	ALARM RELAY
Normal Mode	ON	Open
Normal Mode with UPS Warning	ON	Cycle (Closed 5 Sec. Open 25 Sec.)
Complete C is Non-Functional	OFF	Open
Fault Retry	Slow Flash	Open
Lockout	Fast Flash	Closed
Over/Under Voltage Shutdown	Slow Flash	Open (Closed After 15 Min.)
Test Mode-No Fault in Memory	Flashing Code 1	Cycling Code 1
Test Mode-HP Fault in Memory	Flashing Code 2	Cycling Code 2
Test Mode-LP Fault in Memory	Flashing Code 3	Cycling Code 3
Test Mode-FP1 Fault in Memory	Flashing Code 4	Cycling Code 4
Test Mode-FP2 Fault in Memory	Flashing Code 5	Cycling Code 5
Test Mode-CO Fault in Memory	Flashing Code 6	Cycling Code 6
Test Mode-Over/Under Shutdown in Memory	Flashing Code 7	Cycling Code 7
Test Mode-UPS in Memory	Flashing Code 8	Cycling Code 8
Swapped FP1/FP2 Lockout	Flashing Code 9	Cycling Code 9

Typical control wiring schematics (cont)



UNITS WITH ECM, COMPLETE C AND LON CONTROLLER (460 V)



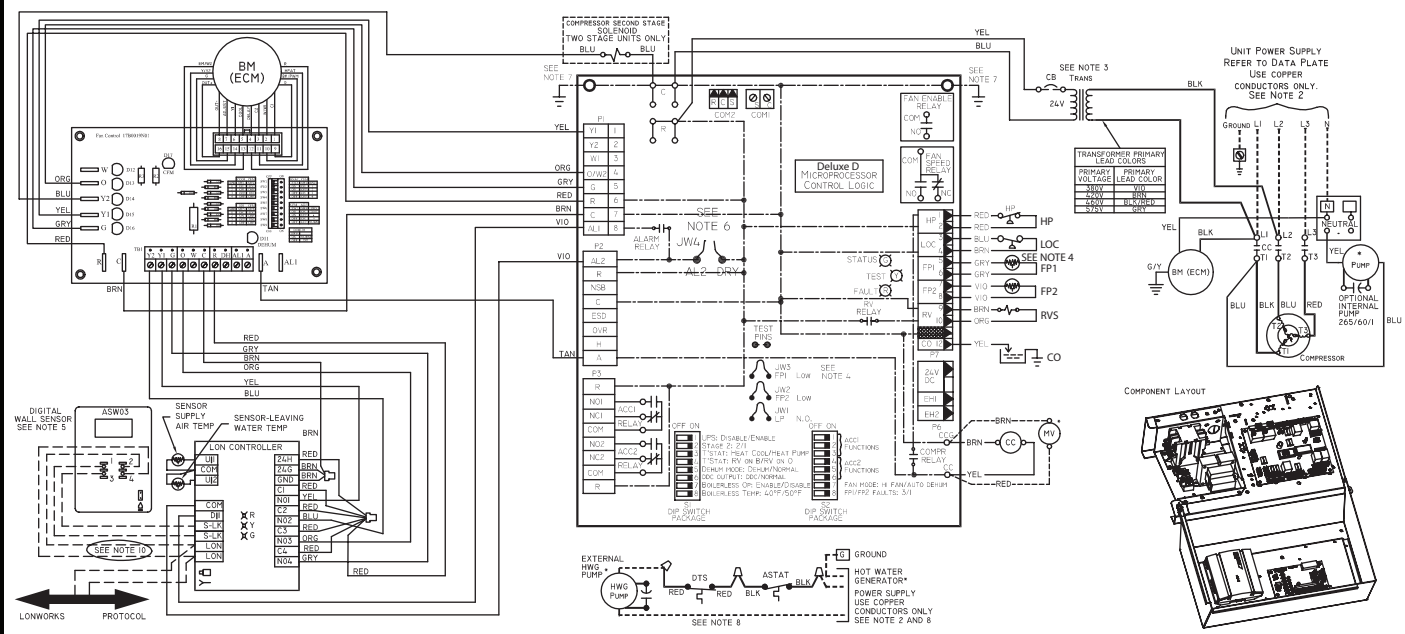
LEGEND

- | | | |
|---|---|-----------------------|
| AL — Alarm Relay Contacts | NEC — National Electrical Code | Wire Nut |
| ASTAT — Aquastat | P1 — Field Wiring Terminal Block | Relay Contacts - N.C. |
| BM — Blower Motor | RVS — Reversing Valve Solenoid | Relay Contacts - N.O. |
| BMC — Blower Motor Capacitor | TRANS — Transformer | Low Pressure Switch |
| BR — Blower Relay | Field Line Voltage Wiring | High Pressure Switch |
| CB — Circuit Breaker | Field Low Voltage Wiring | Splice Cap |
| CC — Compressor Contactor | Printed Circuit Trace | Circuit Breaker |
| CO — Sensor, Condensate Overflow | Optional Wiring | |
| DTS — Discharge Temperature Switch | Relay/Contactor Coil | |
| ECM — Electronically Commutated Motor | Condensate Pan | |
| FP1 — Sensor, Water Coil Freeze Protection | Solenoid Coil | |
| FP2 — Sensor, Air Coil Freeze Protection | Temperature Switch | |
| HP — High-Pressure Switch | Thermistor | |
| HPWS — High-Pressure Water Switch | Ground | |
| HWG — Hot Water Generator | | |
| JW1 — Clippable Field Selection Jumper | | |
| LOC — Loss of Charge Pressure Switch | | |
| LON — Local Operating Network | | |
| MV — Motorized Valve | | |
| MVES — Motorized Valve End Switch | | |
| *Optional Wiring. | | |

NOTES:

- Compressor and blower motor thermally protected internally.
- All wiring to the unit must comply with NEC and local codes.
- Transformer is wired to 460 v (BLK/RED) lead for 460/3/60 units. Transformer is energy limiting or may have circuit breaker.
- FP1 thermistor provides freeze protection for water. When using antifreeze solutions, cut JW3 jumper.
- Typical thermostat wiring shown. Refer to thermostat installation instructions for wiring to the unit. Thermostat wiring must be Class 1 and voltage rating equal to or greater than unit supply voltage.
- Factory cut JW1 jumper. Dry contact will be available between AL1 and AL2.
- Transformer secondary ground via Complete C board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
- Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltages up to 277-v.
- Optional LON wires. Only connect if LON connection is desired at the wall sensor.
- Fan motors are factory wired for medium speed. For high or low speed, remove BLU wire from fan motor speed tap "M" and connect to "H" for high speed or "L" for low speed.
- For low speed, remove BLK wire from BR "6" and replace with RED. Connect BLK and BRN wires together.
- For blower motors with leads. For medium or low speed, disconnect BLK wire from BR "6". Connect BLK and ORG/PUR wire together. Connect RED for low or BLU for medium to BR "6".
- The 460-v units using an ECM (electronically commutated motor) fan motor, modulating HWR, and/or an internal secondary pump will require a neutral wire from the supply side in order to feed the accessory with 265-v.

UNITS WITH ECM, DELUXE D AND LON CONTROLLER (460 V)



LEGEND

- | | | |
|---|---|---|
| <p>AL — Alarm Relay Contacts</p> <p>ASTAT — Aquastat</p> <p>BM — Blower Motor</p> <p>BMC — Blower Motor Capacitor</p> <p>BR — Blower Relay</p> <p>CB — Circuit Breaker</p> <p>CC — Compressor Contactor</p> <p>CO — Sensor, Condensate Overflow</p> <p>DTS — Discharge Temperature Switch</p> <p>ECM — Electronically Commutated Motor</p> <p>FP1 — Sensor, Water Coil Freeze Protection</p> <p>FP2 — Sensor, Air Coil Freeze Protection</p> <p>HP — High-Pressure Switch</p> <p>HPWS — High-Pressure Water Switch</p> <p>HWG — Hot Water Generator</p> <p>JW1 — Clippable Field Selection Jumper</p> <p>LOC — Loss of Charge Pressure Switch</p> <p>LON — Local Operating Network</p> <p>MV — Motorized Valve</p> <p>NEC — National Electrical Code</p> <p>NEC — National Electrical Code</p> <p><i>*Optional Wiring.</i></p> | <p>P1 — Field Wiring Terminal Block</p> <p>RVS — Reversing Valve Solenoid</p> <p>TRANS — Transformer</p> <p>--- Field Line Voltage Wiring</p> <p>--- Field Low Voltage Wiring</p> <p>- - - Printed Circuit Trace</p> <p>... Optional Wiring</p> <p>○ Relay/Contactor Coil</p> <p>□ Condensate Pan</p> <p>⊕ Solenoid Coil</p> <p>⊕ Temperature Switch</p> <p>⊕ Thermistor</p> <p>⊕ Ground</p> | <p>□ Wire Nut</p> <p>⊕ Relay Contacts - N.C.</p> <p>⊕ Relay Contacts - N.O.</p> <p>⊕ Low Pressure Switch</p> <p>⊕ High Pressure Switch</p> <p>⊕ Splice Cap</p> <p>⊕ Circuit Breaker</p> |
|---|---|---|

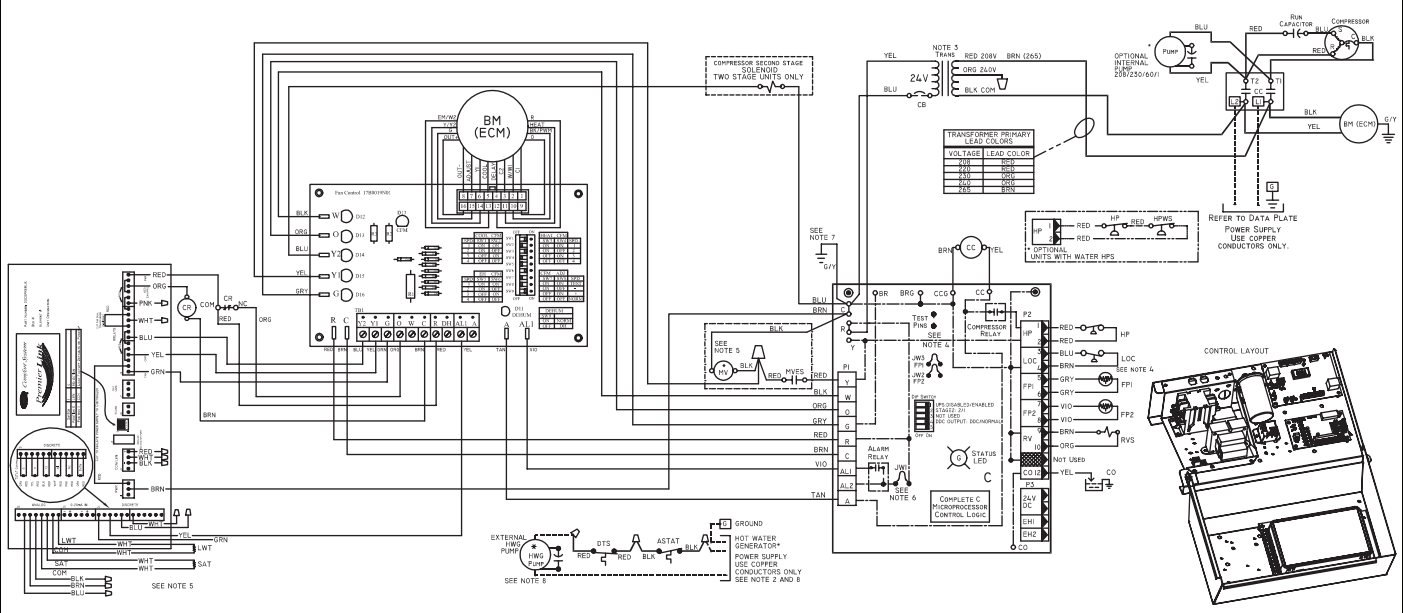
NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. Transformer is wired to 460 v (BLK/RED) lead for 460/3/60 units. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides freeze protection for water. When using antifreeze solutions, cut JW3 jumper.
5. Typical thermostat wiring shown. Refer to thermostat installation instructions for wiring to the unit. Thermostat wiring must be Class 1 and voltage rating equal to or greater than unit supply voltage.
6. Factory cut JW1 jumper. Dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via Deluxe D board standoffs and screws to control box. (Ground available from top two standoffs as shown.)
8. Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltages up to 277-v.
9. Place jumpers on 2 and 3, ICM board, when dehumidification mode is used.
10. Optional LON wires. Only connect if LON connection is desired at the wall sensor.
11. Blower motor is factory wired for medium and high speeds. For any other combination of speeds, at the motor attach the BLK wire to the higher of the two desired speed taps and the BLU wire to the lower of the two desired speed taps.
12. Blower motor is factory wired for high and low speeds. No other combination is available.
13. The 460-v units using an ECM (electronically commutated motor) fan motor, modulating HWR, and/or an internal secondary pump will require a neutral wire from the supply side in order to feed the accessory with 265-v.

Typical control wiring schematics (cont)



UNITS WITH COMPLETE C AND PREMIERLINK™ CONTROLLER, SINGLE-PHASE (208/230 V)



LEGEND

- AL — Alarm Relay Contacts
- ASTAT — Aquastat
- BM — Blower Motor
- BR — Blower Relay
- CB — Circuit Breaker
- CC — Compressor Contactor
- CO — Sensor, Condensate Overflow
- CR — Cooling Relay
- DTS — Discharge Temp Switch
- FP1 — Sensor, Water Coil Freeze Protection
- FP2 — Sensor, Air Coil Freeze Protection
- HP — High Pressure Switch
- HPWS — High Pressure Water Switch
- HWG — Hot Water Generator
- JW — Jumper Wire
- LOC — Loss of Charge Pressure Switch
- LWT — Leaving Water Temperature
- MV — Motorized Valve
- MVES — Motorized Valve End Switch
- P1 — Field Wiring Terminal Block
- RVS — Reversing Valve Solenoid
- SAT — Saturated Air Temperature
- TRANS — Transformer
- UPS — Unit Performance Sentinel

- Field Line Voltage Wiring
- Field Low Voltage Wiring
- Field Line Voltage Wiring
- Field Low Voltage Wiring
- Printed Circuit Trace
- Optional Wiring
- Relay/Contactor Coil
- Condensate Pan
- Solenoid Coil
- Temperature Switch
- Thermistor
- Ground

- Wire Nut
- Relay Contacts - N.C.
- Relay Contacts - N.O.
- Low Pressure Switch
- High Pressure Switch
- Splice Cap
- Circuit Breaker
- Capacitor
- LED

*Optional Wiring.

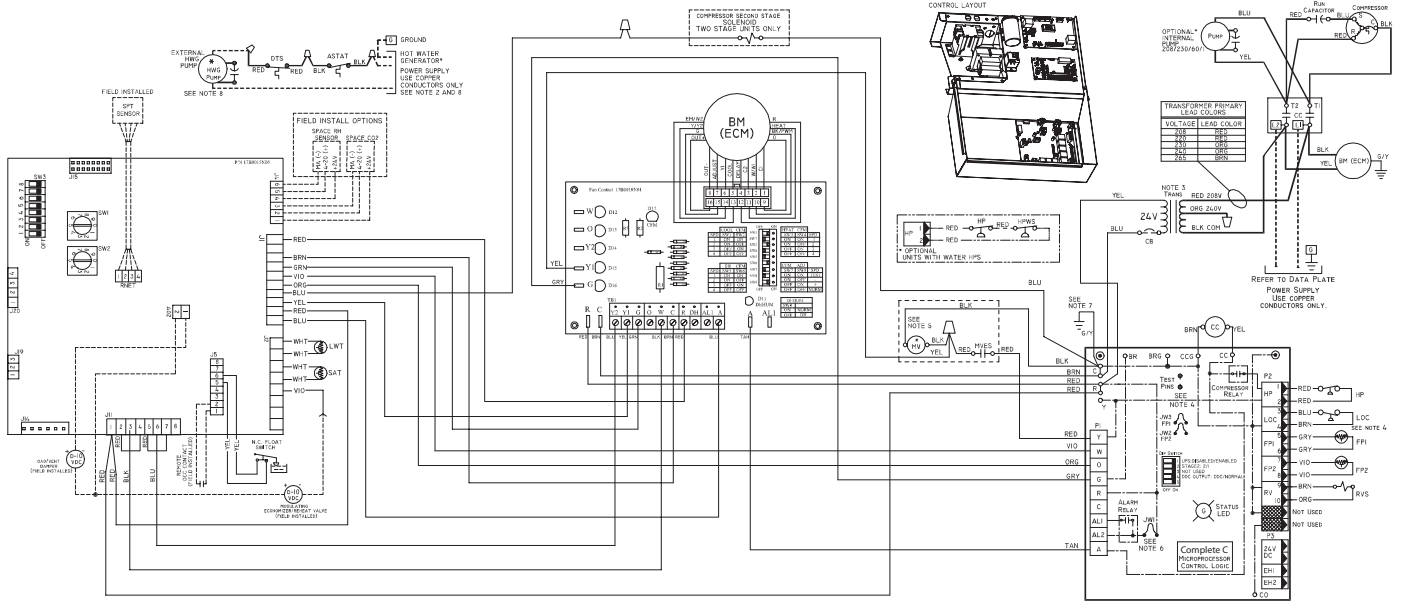
NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. 208-240 60 Hz units are wired for 208v operation. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides low temperature protection for water. When using antifreeze solutions, cut JW3 jumper.
5. Refer to multiple protocol controller (MPC), LON, or TSTAT Installation, Application, and Operation Manual for control wiring to the wire from PremierLink controller to "Y" Complete C when motorized valve is not used. Thermostat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
6. 24v alarm signal shown. For dry contact, cut JW1 jumper and dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via green wire with yellow stripe from "C" terminal to control box.
8. Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltages up to 277v.

COMPLETE C CONTROLLER FAULT CODES

DESCRIPTION OF OPERATION	LED	ALARM RELAY
Normal Mode	ON	Open
Normal Mode with UPS Warning	ON	Cycle (Closed 5 Sec. Open 25 Sec.)
Complete C is Non-Functional	OFF	Open
Fault Retry	Slow Flash	Open
Lockout	Fast Flash	Closed
Over/Under Voltage Shutdown	Slow Flash	Open (Closed After 15 Min.)
Test Mode-No Fault in Memory	Flashing Code 1	Cycling Code 1
Test Mode-HP Fault in Memory	Flashing Code 2	Cycling Code 2
Test Mode-LP Fault in Memory	Flashing Code 3	Cycling Code 3
Test Mode-FP1 Fault in Memory	Flashing Code 4	Cycling Code 4
Test Mode-FP2 Fault in Memory	Flashing Code 5	Cycling Code 5
Test Mode-CO Fault in Memory	Flashing Code 6	Cycling Code 6
Test Mode-Over/Under Shutdown in Memory	Flashing Code 7	Cycling Code 7
Test Mode-UPS in Memory	Flashing Code 8	Cycling Code 8
Swapped FP1/FP2 Lockout	Flashing Code 9	Cycling Code 9

UNITS WITH COMPLETE C AND WSHP OPEN CONTROLS, SINGLE PHASE (208/230 V)



LEGEND

- | | |
|--------------|--|
| AL | — Alarm Relay Contacts |
| ASTAT | — Aquastat |
| BM | — Blower Motor |
| BR | — Blower Relay |
| CB | — Circuit Breaker |
| CC | — Compressor Contactor |
| CO | — Sensor, Condensate Overflow |
| CR | — Cooling Relay |
| DTS | — Discharge Temp Switch |
| FP1 | — Sensor, Water Coil Freeze Protection |
| FP2 | — Sensor, Air Coil Freeze Protection |
| HP | — High Pressure Switch |
| HPWS | — High Pressure Water Switch |
| JW | — Jumper Wire |
| LOC | — Loss of Charge Pressure Switch |
| LWT | — Leaving Water Temperature |
| MV | — Motorized Valve |
| MVES | — Motorized Valve End Switch |
| P1 | — Field Wiring Terminal Block |
| RVS | — Reversing Valve Solenoid |
| TRANS | — Transformer |
- *Optional Wiring.

- | | |
|--|-----------------------------|
| | Factory Line Voltage Wiring |
| | Factory Low Voltage Wiring |
| | Field Line Voltage Wiring |
| | Field Low Voltage Wiring |
| | Printed Circuit Trace |
| | Optional Wiring |
| | Relay/Contactor Coil |
| | Condensate Pan |
| | Solenoid Coil |
| | Temperature Switch |
| | Thermistor |
| | Ground |

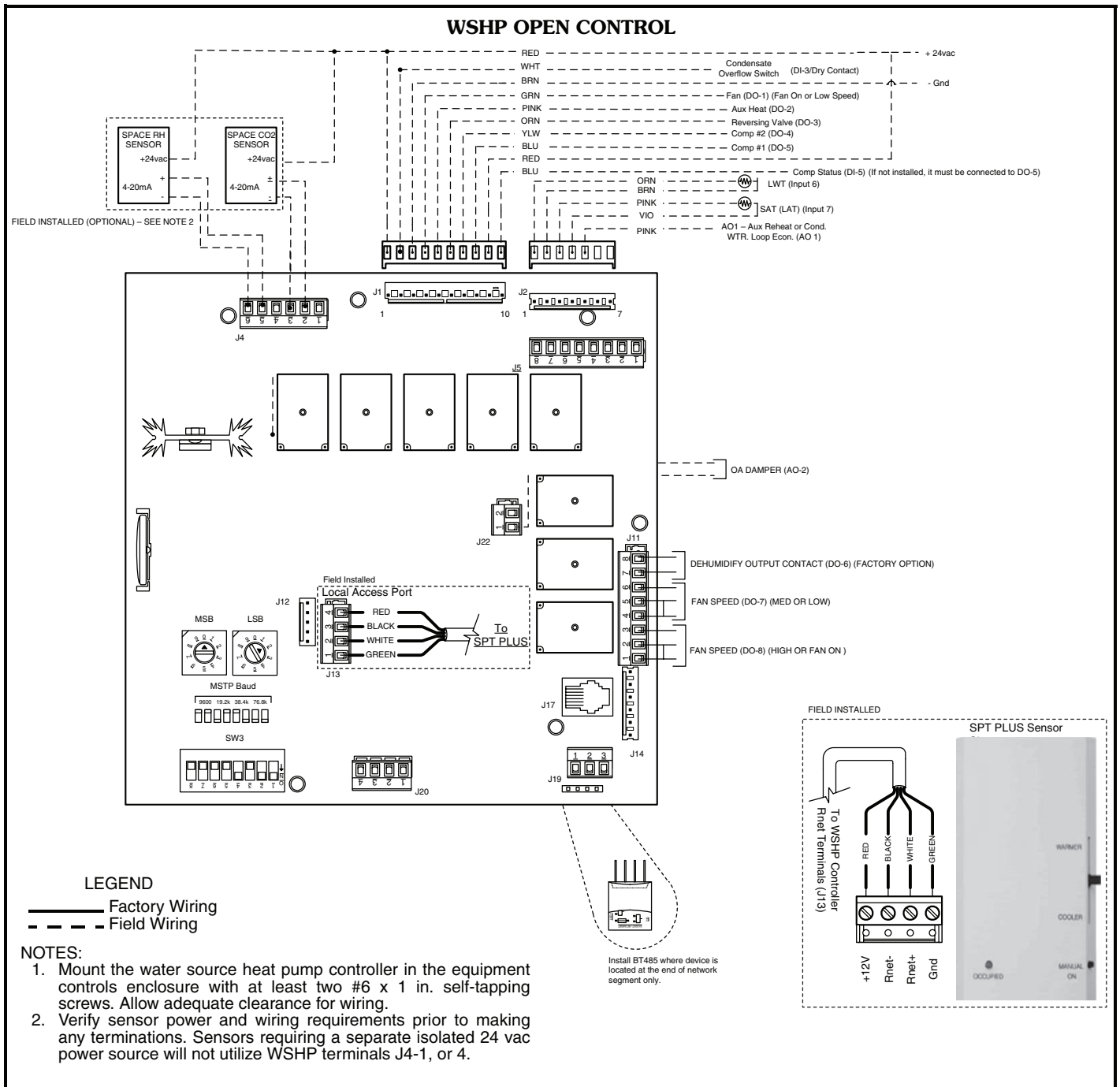
- | | |
|--|-----------------------|
| | Wire Nut |
| | Relay Contacts - N.C. |
| | Relay Contacts - N.O. |
| | Low Pressure Switch |
| | High Pressure Switch |
| | Splice Cap |
| | Circuit Breaker |
| | Capacitor |
| | LED |

NOTES:

- Compressor and blower motor thermally protected internally.
- All wiring to the unit must comply with NEC and local codes.
- 208-240 60 Hz units are wired for 208v operation. Transformer is energy limiting or may have circuit breaker.
- FP1 thermistor provides low temperature protection for water. When using antifreeze solutions, cut JW3 jumper.
- Refer to multiple protocol controller (MPC), LON, or TSTAT Installation, Application, and Operation Manual for control wiring to the wire from PremierLink controller to "Y" Complete C when motorized valve is not used. Thermostat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.

- 24v alarm signal shown. For dry contact, cut JW1 jumper and dry contact will be available between AL1 and AL2.
- Transformer secondary ground via green wire with yellow stripe from "C" terminal to control box.
- Aquastat is supplied with unit and must be wired in series with the hot leg to the pump. Aquastat is rated for voltages up to 277v.

Typical control wiring schematics (cont)



Application data



Aquazone™ water source heat pump products are available in a flexible, efficient array of models, which can be used in all types of water loop, ground water, and ground loop type systems. Utilize Aquazone products to provide optimal energy efficient solutions and adapt to the most challenging design requirements.

AQUAZONE PRODUCT GUIDE

50 SERIES	TYPE SIZE (tons)	APPLICATION
50HQP,VQP	Large Capacity 6-10 (HQP) 6 1/2-25 (VQP)	Environmentally sound unit with Puron® refrigerant (R-410A) designed to handle large zoned areas for all geothermal and boiler/tower applications.
50PC	Compact 1 1/4-5	Compact WSHP with Puron refrigerant (R-410A) for new boiler/tower, or ground loop systems.
50PS	Premium Efficiency 1/2-6	Premium, ultra efficient unit with Puron refrigerant (R-410A) for new boiler/tower, ground water, or ground loop systems
50PEC	High Efficiency Console 3/4-1 1/2	Efficient console unit with Puron refrigerant (R-410A) and attractive design for finished interior, under-window installations.
50PT	Premium Efficiency 2-6	Premium, ultra efficient 2-stage unit with Puron refrigerant (R-410A) for new boiler/tower, ground water, or ground loop systems
50PSW	Water-to-Water 3-28	Efficient unit with Puron refrigerant (R-410A) serves as an alternative to pre-heat or cool air. Unit can be used as a stand-alone or supplemental boiler/chiller in most hydronic heating applications. Also conditions process fluids, lubricants, and refrigerants.
50RTG	Rooftop 3-20	Economical solution for indoor air quality (IAQ) problems and tempering ventilation air.
50VS	Premium Efficiency Vertical Stack Heat Pump 3/4 to 3 Tons	Ultra efficient unit with environmentally sound Puron refrigerant (R-410A) for boiler/tower and geothermal applications (condominiums, hotels, etc.). Stacked design allows for common piping and simplistic design.

Water loop system

Water loop (or boiler/tower) system applications typically include a number of units plumbed to a common piping system. For optimal performance, this system should be designed between 2.25 and 3 gpm per ton of cooling capacity. The system is comprised of highly efficient packaged reverse cycle heat pump units interconnected by a water loop. The water circuit serves as both a sink and source for heat absorption and rejection and is designed for entering water temperatures between 60 F and 90 F. Within this temperature range units can heat or cool as required from the same water source. Transferring heat from warm to cold spaces in the building, whenever they coexist, conserves energy rather than creating new heat.

Refer to the **Carrier Water Source Heat Pump System Design Guide** for assistance with the design of water loop systems. The guide includes a practical approach for the latest and most current design recommendations including:

- product application, including horizontal, vertical, console, rooftop and water-to-water applications
- ventilation methods and system design, including energy recovery
- acoustical considerations for different product types
- addressing indoor air quality (IAQ) issues such as condensate removal and humidity control

- air distribution design including diffuser selection/layout and ductwork design
- hydronic system design including pipe sizing/layout and boiler/tower sizing
- control configurations such as standalone, DDC, DCV, and VVT® controls
- Water Source Heat Pump Efficiency/Operational Cost Comparison chart
- system variations such as a system without a boiler, variable pumping, and variable air volume (VAV) for interior use

Ground water systems

To utilize Aquazone units in ground water applications, extended range should be specified. This will provide factory-installed insulation on the coaxial coil to prevent condensate from dripping when entering water temperatures are below 60 F. In addition, the copper coaxial coil installed on the Aquazone units may not be suitable for all water conditions. Refer to the Water Conditioning section for proper coaxial coil material selection.

Surface water system — This system is typically located near a lake or pond. In this application, the loop can be submerged in a series of coils beneath the water surface. The number of coils required depends on system load and design. This application requires minimum piping and excavation.

Open loop system — This system is used where ground water is plentiful. In this application, ground water is pumped through supply piping from the well to the building. The water is then pumped back into the ground through a discharge well as it leaves the building. An additional heat exchanger is usually installed between the building water piping system and the ground water piping system. This design limits the amount of piping and excavation required.

Aquazone units are provided with a standard thermostatic expansion valve (TXV) and are rated to extremely low temperatures to self-adjust the refrigeration circuit, therefore water regulating valves are not required on open loop systems. To conserve water on this type of system, a slow opening/closing solenoid valve is recommended.

Ground loop systems

There are many commonly specified designs for ground loop applications. Typical designs include vertical loops and horizontal loops. In some applications, water is piped from the ground or lake directly to the water source heat pump. Piping is limited to the amount of pipe required to get the water from the source to the unit.

NOTE: When utilizing Aquazone water source heat pumps in ground loop systems, refer to design considerations in the ground water system section.

Horizontal ground loop — This system is used when adequate space is available and trenching can be easily accomplished. A series of parallel pipes are laid out in trenches 3 to 6 ft below the ground surface, and then back-filled. Often, multiple pipes are used to maximize the heat transfer capability of each trench. The amount of pipe and the size of the ground loop field are based on ground

Application data (cont)



conditions, heating, and cooling requirements of the application and system design.

Vertical ground loop — This system is used in vertical borehole applications. This design is well suited for retrofit applications when space is limited or where landscaping is already complete and minimum disruption of the site is desired. The vertical ground loop system contains a single loop of pipe inserted into a hole. The hole is back-filled and grouted after the pipe is inserted. The completed loop is concealed below ground. The number of loops required depends on ground conditions, heating and cooling requirements, and the depth of each hole.

Hybrid systems — In some applications, it may be beneficial to incorporate a cooling tower into the ground loop system to reduce the overall cost. A hybrid system discards excess heat into the air and increases the cooling performance of the ground loop.

Condensate drainage

Venting — Condensate lines should be properly vented to prevent fan pressure from causing water to hang up in the piping. Condensate lines should be pitched to assure full drainage of condensate under all load conditions. Chemical treatment should be provided to remove algae in the condensate pans and drains in geographical areas that are conducive to algae growth.

Trapping — Condensate trapping is an essential necessity on every water source heat pump unit. A trap is provided to prevent the backflow of moisture from the condensate pan and into the fan intake or downstream into the mechanical system. The water seal or the length of the trap depends on the positive or negative pressure on the drain pan. As a rule of thumb, the water seal should be sized for 1 in. for every 1 in. of negative pressure on the unit. The water seal is the distance from the bottom of the unit condensate piping connection to the bottom of the condensate drain line run-out piping. Therefore, the trap size should be double the water seal dimension.

Horizontal units — Horizontal units should be sloped toward the drain at a $\frac{1}{4}$ in. per foot pitch. If it is not possible to meet the pitch requirement, a condensate pump should be designed and installed at the unit to pump condensate to a building drain. Horizontal units are not internally trapped; therefore an external trap is necessary. Each unit

must be installed with its own individual trap and means to flush or blow out the condensate drain. The design of a common trap or vent for multiple units is not acceptable. The condensate piping system should not be designed with a pipe size smaller than the drain connection pipe size.

Vertical units — Vertical units utilize a condensate hose inside the cabinet that acts as a trapping loop, therefore an external trap is not necessary. Each unit must be installed with its own vent and means to flush or blow out the condensate drain lines. Do not install a common trap or vent on vertical units.

Water conditioning

In some applications, maintaining proper water quality may require the use of higher corrosion protection for the water-to-refrigerant heat exchanger. Water quality varies from location to location and is unique for each job. Water characteristics such as pH value, alkalinity, hardness, and specific conductance are of importance when considering any WSHP application. Water typically includes impurities and hardness that must be removed. The required treatment will depend on the water quality as well as type of system. Water problems fall into three main categories:

1. Scale formation caused by hard water reduces the heat transfer rate and increases the water pressure drop through the heat exchanger. As water is heated, minerals and salts are precipitated from a solution and deposited on the inside surface of the pipe or tube.
2. Corrosion is caused by absorption of gases from the air coupled with water on exposed metal. Corrosion is also common in salt-water areas.
3. Organic growths such as algae can reduce the heat transfer rate by forming an insulating coating on the inside tube surface. Algae can also promote corrosion by pitting.

NOTE: In most commercial water loop applications, Aquazone™ WSHP units use a copper water-to-refrigerant heat exchanger. Units can also be equipped with a cupronickel heat exchanger for applications where water is outside the standard contaminant limits for a copper heat exchanger.



WATER QUALITY GUIDELINES

CONDITION	HX MATERIAL*	CLOSED RECIRCULATING†	OPEN LOOP AND RECIRCULATING WELL**		
Scaling Potential — Primary Measurement					
Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.					
pH/Calcium Hardness Method	All	N/A	pH < 7.5 and Ca Hardness, <100 ppm		
Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)					
Scaling indexes should be calculated at 150 F for direct use and HWG applications, and at 90 F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	N/A	6.0 - 7.5 If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	N/A	-0.5 to +0.5 If <-0.5 minimize steel pipe use. Based upon 150 F HWG and direct well, 85 F indirect well HX.		
Iron Fouling					
Iron Fe ²⁺ (Ferrous) (Bacterial Iron Potential)	All	N/A	<0.2 ppm (Ferrous) If Fe ²⁺ (ferrous) >0.2 ppm with pH 6 - 8, O ₂ <5 ppm check for iron bacteria.		
Iron Fouling	All	N/A	<0.5 ppm of Oxygen Above this level deposition will occur.		
Corrosion Prevention††					
pH	All	6 - 8.5 Monitor/treat as needed.	6 - 8.5 Minimize steel pipe below 7 and no open tanks with pH <8.		
Hydrogen Sulfide (H ₂ S)	All	N/A	<0.5 ppm At H ₂ S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are okay to <0.5 ppm.		
Ammonia Ion as Hydroxide, Chloride, Nitrate and Sulfate Compounds	All	N/A	<0.5 ppm		
Maximum Chloride Levels	Copper Cupronickel 304 SS 316 SS Titanium	N/A N/A N/A N/A N/A	Maximum allowable at maximum water temperature.		
			50 F (10 C)	75 F (24 C)	100 F (38 C)
			<20 ppm	NR	NR
			<150 ppm	NR	NR
<400 ppm	<250 ppm	<150 ppm			
<1000 ppm	<550 ppm	<375 ppm			
>1000 ppm	>550 ppm	>375 ppm			
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		
Brackish	All	N/A	Use cupronickel heat exchanger when concentrations of calcium or sodium chloride are greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)		

LEGEND

- HWG** — Hot Water Generator
- HX** — Heat Exchanger
- N/A** — Design Limits Not Applicable Considering Recirculating Potable Water
- NR** — Application Not Recommended
- SS** — Stainless Steel

*Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.

†Closed recirculating system is identified by a closed pressurized piping system.

**Recirculating open wells should observe the open recirculating design considerations.

††If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.

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

To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

Application data (cont)



COMPLETE C AND DELUXE D ELECTRONIC CONTROL FEATURES COMPARISON

BASIC FEATURES	COMPLETE C	COMPLETE C WITH LON	DELUXE D	DELUXE D WITH LON	COMPLETE C OR DELUXE D WITH WSHP OPEN CONTROLLER
High and Low Refrigerant Pressure Protection	S	S	S	S	S
Water Coil Freeze Protection	S	S	S	S	S
True 24 VA Thermostat Signals	S	S	S	S	S
Thermostat Inputs Compatible with Triacs	S	S	S	S	S
Condensate Overflow Sensor	S	S	S	S	S
Anti-Short-Cycle Time Delay	S	S	S	S	S
Random Start	S	S	S	S	S
Alarm (selectable dry contact or 24 VA)	S	S	S	S	S
Water Valve Relay	S	S	S	S	S
Water Valve Relay with Compressor Delay	N/A	N/A	S	S	S
Emergency Shutdown	N/A	DDC	S	DDC	DDC
Night Setback with Override	N/A	DDC	S	DDC	DDC
Outdoor Air Damper Control	N/A	N/A	S	S	S
ADVANCED FEATURES					
Intelligent Reset	S	S	S	S	S
High and Low Voltage Protection	S	S	S	S	S
Air Coil Freeze Protection	S	S	S	S	S
Freeze Set Point Field Select (water, antifreeze)	S	S	S	S	S
Electric Heat Control Outputs	S	S	S	S	S
Boilerless Electric Heat Control	N/A	N/A	S	S	S
Intelligent Reversing Valve Operation	N/A	DDC	S	S	S
High/Low Fan Speed Outputs	N/A	N/A	S	S	S
Intelligent Fan Speed Control	N/A	N/A	S	S	S
Thermostat Type Select (Y,O or Y,W)	N/A	N/A	S	N/A	N/A
Reversing Valve Signal Select (O or B)	N/A	N/A	S	N/A	N/A
Dehumidistat Input	N/A	N/A	S	S	S
Reheat Dehumidification Control	N/A	N/A	O	O	O
Multiple Units on One Thermostat/Wall Sensor	N/A	DDC	S	DDC	DDC
Condenser Waterside/Airside Linkage	N/A	N/A	N/A	N/A	S
Waterside Economizer	N/A	N/A	N/A	N/A	S
Proactive Diagnostics	N/A	N/A	N/A	N/A	S
CO ₂ Sensor Capable	N/A	N/A	N/A	N/A	S
IAQ Capable	N/A	N/A	N/A	N/A	S
SERVICE AND RELIABILITY FEATURES					
Service Test Mode	S	S	S	S	S
LED Fault and Status Lights	S	S	S	S	S
Fault Memory After Reset	S	S	S	S	S
Unit Performance Sentinel	S	S	S	S	S
Harness-Type Factory Wiring Connections	S	S	S	S	S
Fully Noise-Tested Design	S	S	S	S	S
CE Approval	S	S	S	S	S
Removable Low Voltage Connector	N/A	N/A	S	S	S
DDC/ENERGY MANAGEMENT FEATURES					
LONMark® Compliant	N/A	S	N/A	S	S
BACnet™ Compliant	N/A	N/A	N/A	N/A	S
Johnson N2 Compliant	N/A	N/A	N/A	N/A	S
Modbus Compliant	N/A	N/A	N/A	N/A	S
Leaving Air and Water Temperature Sensor	N/A	S	N/A	S	S
Digital Wall Sensor	N/A	O	N/A	O	O

LEGEND

Complete C — Complete C Control System	LON — LONMark® Controller
DDC — Direct Digital Controls	N/A — Not Available
Deluxe D — Deluxe D Control System	O — Optional
IAQ — Indoor Air Quality	S — Standard

Acoustical design

Sound power levels represent the sound as it is produced by the source, the WSHP unit, with no regard to attenuation between the source and the space. Acoustical design goals are necessary to provide criteria for occupied spaces where people can be comfortable and communicate effectively over the background noise of the air-conditioning system and other background noise sources.

Acoustical design goals are desirable sound pressure levels within a given conditioned space and are represented by noise criteria (NC) curves. The NC curve levels represent a peak over a full spectrum of frequencies. A high value in a low frequency band has the same effect on NC level as a lower value in a high frequency band. It is important that sound levels be balanced over the entire spectrum relative to the NC curve. The lower the NC criteria curve, the more stringent the room acoustical design must be to meet the design goals.

It is important to know how to convert NC levels from the unit ratings in terms of sound power (L_w). This conversion depends on the specifics of the acoustical environment of the installation.

The resulting calculations are compared to the NC curve selected for the area to assess the acoustical design.

Some of the factors that affect conversion of sound power to sound pressure and consequent NC level include:

- type of acoustical ceiling
- use of metal or flex duct
- absorption in the occupied space
- location in the occupied space
- open or closed layout plan
- use of open or ducted returns
- orientation of unit to occupant
- use of lined or unlined duct

WSHP sound control

The analysis of the projected sound level in the conditioned space caused by a WSHP unit located in a ceiling plenum is quite involved. The key is to have good sound power ratings (L_w) in dB on the equipment to determine the sound attenuation effect of the ductwork, ceiling and room. In combination with utilizing standard Aquazone™ equipment attenuating features or the advanced mute package features, suggestions for horizontal and vertical unit sound design are provided to design around the WSHP units.

Horizontal units

Use the following guidelines for layout of Aquazone horizontal units to minimize noise:

1. Obtain sound power ratings in accordance with latest standards from manufacturers to select quietest equipment.
2. Do not locate units over a space with a required NC of 40 or less. Instead, locate units above less sensitive noise areas such as above or in equipment rooms, utility closets, restrooms, storage rooms, or above corridors.
3. Provide at least 10 feet between WSHP units to avoid the additive effect of two noise sources.

4. Provide an acoustical pad underneath the WSHP unit in applications where the unit must be mounted above noise sensitive areas such as private offices or conference rooms. The pad attenuates radiated noise. Be sure the pad has an area at least twice that of the WSHP footprint.
5. Maximize the installed height above the suspended ceiling.
6. Be sure the WSHP unit is located at least 6 feet away from any ceiling return grille to prevent line-of-sight casing noise to reach the space below.
7. Suspend the WSHP unit from the ceiling with hangers that utilize spring or neoprene type isolators to reduce vibration transmission.
8. Utilize flexible electrical connections to the WSHP unit. **DO NOT USE NOT RIGID CONNECTIONS.**
9. Utilize flexible loop water and condensate piping connections to the WSHP unit.
10. Use a canvas duct connector to connect the WSHP discharge to the downstream duct system. This reduces vibration-induced noise.
11. Provide acoustic interior lining for the first 20 feet of discharge duct, or until the first elbow is reached. The elbow prevents line-of-site sound transmission in the discharge duct.
12. Provide turning vanes in ductwork elbows and tees to reduce air turbulence.
13. Size the sheet metal supply duct with velocities no greater than 1000 fpm.
14. Ensure ductwork is rigid.
15. Use round duct whenever possible to further reduce noise.
16. Allow at least 3 equivalent duct diameters of straight duct upstream and downstream of the unit before allowing any fittings, transitions, etc.
17. Seal all penetrations around duct entering the space.
18. Provide a 4-ft run-out duct made of flexible material to connect a diffuser to the supply trunk duct. The flex duct provides an “attenuating end-effect” and reduces duct-transmitted sound before it reaches the space. Typically a 6 dB sound reduction can be accomplished with the use of flex duct.
19. Locate the run-out duct balancing damper as far away from the outlet diffuser as possible. Locating the balancing damper at the trunk duct exit is the best location.
20. If return air is drawn through a ceiling plenum, provide an acoustically lined return duct elbow or “L” shaped boot at the WSHP to eliminate line-of-sight noise into the ceiling cavity and possible through ceiling return air grilles. Face the elbow or boot away from the nearest adjacent WSHP unit to prevent additive noise.
21. Do not hang suspended ceiling from the ductwork.

Application data (cont)



Vertical units

All guidelines established for horizontal units also apply for vertical units. In addition, since vertical units tend to be installed in small equipment rooms or closets, the following additional guidelines apply:

1. Mount the unit on a pad made of high-density sound absorbing material such as rubber or cork. Extend the pad beyond the WSHP unit footprint by at least 6 inches in each direction.
2. Since the unit returns airflow through a grille mounted in a closet door, provide a sound barrier or some other modification of the closet to prevent line-of-sight noise into the space.
3. Follow good duct design practice in sizing and locating the connection of the WSHP discharge to the supply duct system. Use an elbow with turning vanes and bent in the direction of the fan rotation to minimize turbulence. Make any duct transitions as smooth and as gradual as possible to again minimize turbulence and loss of fan static pressure.

Solenoid valves

In applications using variable flow pumping, solenoid valves can be field installed and operated from the control board in the Aquazone™ WSHP unit.

Freeze protection

Applications where systems are exposed to outdoor temperatures below freezing (32 F) must be protected from freezing. The most common method of protecting water systems from freezing is adding glycol concentrations into the water. Design care should be used when selecting both the type and concentrations of glycol utilized due to the following:

- Equipment and performance may suffer with high concentrations of glycol and other antifreeze solutions.
- Loss of piping pressure may increase greatly, resulting in higher pumping costs.
- Higher viscosity of the mixture may cause excess corrosion and wear on the entire system.
- Acidity of the water may be greatly increased, promoting corrosion.
- Glycol promotes galvanic corrosion in systems of dissimilar metals. The result is corrosion of one metal by the other, causing leaks.

Dehumidification

For dehumidification, Carrier has provided a modulating hot water reheat (HWR) function that meets and exceeds those specifications that call for hot gas reheat (HGR). Modulating HWR is a relatively new design that controls dehumidification by providing modulating HWR based on the desired leaving air temperature set point. Unlike the complicated refrigerant circuitry used in HGR, Carrier's HWR utilizes the condenser water and a water-to-air reheat coil, placed after the evaporator coil, to reheat the return air after it is conditioned by the air-to-refrigerant evaporator coil, providing 100% reheat regardless of season and water temperature.

Heat pumps with HWR having a sensible-to-total (S/T) ratio of .72 to .76 dedicate 25% of their total cooling capacity to moisture removal. When selecting a unit for both sensible and latent cooling, it is necessary to pay close attention to the latent cooling of the unit to ensure that the latent cooling load is satisfied by the unit selection. If the latent cooling load is not satisfied, then a larger unit with enough latent cooling is required for that specific application.

Unlike most hot gas reheat options, the HWR option will operate over a wide range of entering-water temperatures (EWTs). Special flow regulation (water regulating valve) is not required for low EWT conditions. However, below 55 F, supply-air temperatures cannot be maintained at 72 F because the cooling capacity exceeds the reheat coil capacity at low water temperatures. Below 55 F, essentially all water is diverted to the reheat coil (no heat of rejection to the building loop). Although the HWR option will work fine with low EWTs, overcooling of the space may result with well water systems or, on rare occasions, with ground loop (geothermal) systems. (NOTE: Extended range units are required for well water and ground loop systems.) Since dehumidification is generally only required in cooling, most ground loop systems will not experience overcooling of the supply-air temperature. If overcooling of the space is a concern (e.g., computer room well water application), auxiliary heating may be required to maintain space temperature when the unit is operating in the dehumidification mode. Water source heat pumps with HWR should not be used as makeup air units. These applications should use equipment specifically designed for makeup air.

WSHP Open sequence of operation

The WSHP Open multi-protocol controller will control mechanical cooling, heating and waterside economizer outputs based on its own space temperature input and set points. An optional CO₂ IAQ (indoor air quality) sensor mounted in the space can maximize the occupant comfort. The WSHP Open controller has its own hardware clock that is automatically set when the heat pump software is downloaded to the board. Occupancy types are described in the scheduling section below. The following sections describe the functionality of the WSHP Open multi-protocol controller. All point objects referred to in this sequence of operation will be referenced to the objects as viewed in the BACview⁶ handheld user interface.

Scheduling — Scheduling is used to start/stop the unit based on a time period to control the space temperature to specified occupied heating and cooling set points. The controller is defaulted to control by occupied set points all the time, until either a time schedule is configured with BACview⁶, Field Assistant, i-Vu[®] Open, or a third party control system to enable/disable the BAS (Building Automation System) on/off point. The local time and date must be set for these functions to operate properly. The occupancy source can be changed to one of the following:

Occupancy schedules — The controller will be occupied 24/7 until a time schedule has been configured using either Field Assistant, i-Vu Open, BACview⁶ or a third party control system to enable/disable the BAS on/off point. The BAS point can be disabled by going to Config, then Unit, then Occupancy Schedules and changing the point from enable to disable then clicking OK.

NOTE: This point must be enabled in order for the i-Vu Open, Field Assistant, or BACview⁶ control system to assign a time schedule to the controller.

Schedule schedule — The unit will operate according to the schedule configured and stored in the unit. The schedule is accessible via the BACview⁶ Handheld tool, i-Vu Open, or Field Assistant control system. The daily schedule consists of a start/stop time (standard or 24-hour mode) and seven days of the week, starting with Monday and ending on Sunday. To enter a daily schedule, navigate to Config, then Sched, then enter BACview⁶ Admin Password (1111), then go to schedule_schedule. From here, enter either a Weekly or Exception schedule for the unit.

Occupancy input contact — The WSHP Open controller has the capability to use an external dry contact closure to determine the occupancy status of the unit. The Occupancy Schedules will need to be disabled in order to utilize the occupancy contact input.

NOTE: Scheduling can only be controlled from one source.

BAS (Building Automation System) on/off — A BAS system that supports network scheduling can control the unit through a network communication and the BAS scheduling function once the Occupancy Schedules have been disabled.

NOTE: Scheduling can either be controlled via the unit or the BAS, but not both.

Indoor fan — The indoor fan will operate in any one of three modes depending on the user configuration selected.

Fan mode can be selected as Auto, Continuous, or Always On. In Auto mode, the fan is in intermittent operation during both occupied and unoccupied periods. Continuous fan mode is intermittent during unoccupied periods and continuous during occupied periods. Always On mode operates the fan continuously during both occupied and unoccupied periods. In the default mode, Continuous, the fan will be turned on whenever any one of the following is true:

- The unit is in occupied mode as determined by its occupancy status.
- There is a demand for cooling or heating in the unoccupied mode.
- There is a call for dehumidification (optional).

When power is reapplied after a power outage, there will be a configured time delay of 5 to 600 seconds before starting the fan. There are also configured fan delays for Fan On and Fan Off. The Fan On delay defines the delay time (0 to 30 seconds; default 10) before the fan begins to operate after heating or cooling is started while the Fan Off delay defines the delay time (0 to 180 seconds; default 45) the fan will continue to operate after heating or cooling is stopped. The fan will continue to run as long as the compressors, heating stages, or the dehumidification relays are on. If the SPT failure alarm or condensate overflow alarm is active; the fan will be shut down immediately regardless of occupancy state or demand.

Automatic fan speed control — The WSHP Open controller is capable of controlling up to three fan speeds using the ECM (electronically commutated motor). The motor will operate at the lowest speed possible to provide quiet and efficient fan operation with the best latent capability. The motor will increase speed if additional cooling or heating is required to obtain the desired space temperature set point. The control increases the motor's speed as the space temperature rises above the cooling or below the heating set point. The amount of space temperature increase above or below the set point required to increase the fan speed is user configurable in the set point. Also, the control will increase the fan speed as the supply air temperature approaches the configured minimum or maximum limits.

Fan speed control (during heating) — Whenever heat is required and active, the control continuously monitors the supply-air temperature to verify it does not rise above the configured maximum heating SAT limit (110 F default). As the SAT approaches this value, the control will increase the fan speed as required to ensure the SAT will remain within the limit. This feature provides the most quiet and efficient operation by operating the fan at the lowest speed possible.

Fan speed control (during cooling) — Whenever mechanical cooling is required and active, the control continuously monitors the supply-air temperature to verify it does not fall below the configured minimum cooling SAT limit (50 F default). As the SAT approaches this value, the control will increase the fan speed as required to ensure the SAT will remain within the limit. The fan will operate at lowest speed to maximize latent capacity during cooling.

Controls (cont)



Cooling — The WSHP Open controller will operate one or two stages of compression to maintain the desired cooling set point. The compressor outputs are controlled by the PI (proportional-integral) cooling loop and cooling stages capacity algorithm. They will be used to calculate the desired number of stages needed to satisfy the space by comparing the space temperature (SPT) to the appropriate cooling set point. The water side economizer, if applicable, will be used for first stage cooling in addition to the compressor(s). The following conditions must be true in order for the cooling algorithm to run:

- Cooling is set to Enable.
- Heating mode is not active and the compressor time guard has expired.
- Condensate overflow input is normal.
- If occupied, the SPT is greater than the occupied cooling set point.
- Space temperature reading is valid.
- If unoccupied, the SPT is greater than the unoccupied cooling set point.
- If economizer cooling is available and active and the economizer alone is insufficient to provide enough cooling.
- OAT (if available) is greater than the cooling lockout temperature.

If all the above conditions are met, the compressors will be energized as required, otherwise they will be deenergized. If cooling is active and should the SAT approach the minimum SAT limit, the fan will be indexed to the next higher speed. Should this be insufficient and if the SAT falls further (equal to the minimum SAT limit), the fan will be indexed to the maximum speed. If the SAT continues to fall 5° F below the minimum SAT limit, all cooling stages will be disabled.

During Cooling mode, the reversing valve output will be held in the cooling position (either B or O type as configured) even after the compressor is stopped. The valve will not switch position until the Heating mode is required.

The configuration screens contain the minimum SAT parameter as well as cooling lockout based on outdoor-air temperature (OAT). Both can be adjusted to meet various specifications.

There is a 5-minute off time for the compressor as well as a 5-minute time delay when staging up to allow the SAT to achieve a stable temperature before energizing a second stage of capacity. Likewise, a 45-second delay is used when staging down.

After a compressor is staged off, it may be restarted again after a normal time-guard period of 5 minutes and if the supply-air temperature has increase above the minimum supply-air temperature limit.

The WSHP Open controller provides a status input to monitor the compressor operation. The status is monitored to determine if the compressor status matches the commanded state. This input is used to determine if a refrigerant safety switch or other safety device has tripped and caused the compressor to stop operating normally. If this should occur, an alarm will be generated to indicate the faulted compressor condition.

Heating — The WSHP Open controller will operate one or two stages of compression to maintain the desired heating set point. The compressor outputs are controlled by the heating PI (proportional-integral) loop and heating stages capacity algorithm. They will be used to calculate the desired number of stages needed to satisfy the space by comparing the space temperature (SPT) to the appropriate heating set point. The following conditions must be true in order for the heating algorithm to run:

- Heating is set to Enable.
- Cooling mode is not active and the compressor time guard has expired.
- Condensate overflow input is normal.
- If occupied, the SPT is less than the occupied heating set point.
- Space temperature reading is valid.
- If unoccupied, the SPT is less than the unoccupied heating set point.
- OAT (if available) is less than the heating lockout temperature.

If all the above conditions are met, the heating outputs will be energized as required, otherwise they will be deenergized. If the heating is active and should the SAT approach the maximum SAT limit, the fan will be indexed to the next higher speed. Should this be insufficient, and the SAT rises further reaching the maximum heating SAT limit, the fan will be indexed to the maximum speed. If the SAT still continues to rise 5° F above the maximum limit, all heating stages will be disabled.

During Heating mode, the reversing valve output will be held in the heating position (either B or O type as configured) even after the compressor is stopped. The valve will not switch position until the Cooling mode is required.

The configuration screens contain the maximum SAT parameter as well as heating lockout based on outdoor-air temperature (OAT); both can be adjusted to meet various specifications.

There is a 5-minute off time for the compressor as well as a 5-minute time delay when staging up to allow the SAT to achieve a stable temperature before energizing a second stage of capacity. Likewise, a 45-second delay is used when staging down.

After a compressor is staged off, it may be restarted again after a normal time-guard period of 5 minutes and if the supply-air temperature has fallen below the maximum supply air temperature limit.

The WSHP Open controller provides a status input to monitor the compressor operation. The status is monitored to determine if the compressor status matches the commanded state. This input is used to determine if a refrigerant safety switch or other safety device has tripped and caused the compressor to stop operating normally. If this should occur, an alarm will be generated to indicate the faulted compressor condition. Also, if auxiliary heat is available (see below), the auxiliary heat will operate to replace the reverse cycle heating and maintain the space temperature as required.

Auxiliary heat — The WSHP Open controller can control a two-position, modulating water, or steam valve

connected to a coil on the discharge side of the unit and supplied by a boiler or a single-stage ducted electric heater in order to maintain the desired heating set point. Should the compressor capacity be insufficient or a compressor failure occurs, the auxiliary heat will be used. Unless the compressor fails, the auxiliary heat will only operate to supplement the heat provided by the compressor if the space temperature falls more than one degree below the desired heating set point (the amount is configurable). The heat will be controlled so the SAT will not exceed the maximum heating SAT limit.

Auxiliary modulating hot water/steam heating reheat —

The control can modulate a hot water or steam valve connected to a coil on the discharge side of the unit and supplied by a boiler in order to maintain the desired heating set point should the compressor capacity be insufficient or a compressor failure occurs. Unless a compressor fault condition exists, the valve will only operate to supplement the heat provided by the compressor if the space temperature falls more than one degree below the desired heating set point. The valve will be controlled so the SAT will not exceed the maximum heating SAT limit.

Two-position hot water/steam heating reheat — The control can operate a two-position, NO or NC, hot water or steam valve connected to a coil on the discharge side of the unit and supplied by a boiler in order to maintain the desired heating set point should the compressor capacity be insufficient or a compressor failure occurs. Unless a compressor fault condition exists, the valve will only open to supplement the heat provided by the compressor if the space temperature falls more than one degree below the desired heating set point. The valve will be controlled so the SAT will not exceed the maximum heating SAT limit. The heat stage will also be subject to a 2-minute minimum OFF time to prevent excessive valve cycling.

Single stage electric auxiliary heat — The control can operate a field-installed single stage of electric heat installed on the discharge side of the unit in order to maintain the desired heating set point should the compressor capacity be insufficient or a compressor failure occurs. Unless a compressor fault condition exists, the heat stage will only operate to supplement the heat provided by the compressor if the space temperature falls more than one degree below the desired heating set point. The heat stage will be controlled so the SAT will not exceed the maximum heating SAT limit. The heat stage will also be subject to a 2-minute minimum OFF time to prevent excessive cycling.

Indoor air quality (IAQ) and demand controlled ventilation (DCV) — If the optional indoor air quality sensor is installed, the WSHP Open controller can maintain indoor air quality via a modulating OA damper providing demand controlled ventilation. The control operates the modulating OA damper during occupied periods. The control monitors the CO₂ level and compares it to the configured set points, adjusting the ventilation rate as required. The control provides proportional ventilation to meet the requirements of ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) specifications by providing a base ventilation rate and then increasing the rate as the CO₂ level increases. The control will begin to

proportionally increase ventilation when the CO₂ level rises above the start ventilation set point and will reach the full ventilation rate when the CO₂ level is at or above the maximum set point. A user-configurable minimum damper position ensures that proper base ventilation is delivered when occupants are not present. The IAQ configurations can be accessed through the configuration screen. The following conditions must be true in order for this algorithm to run:

- Damper control is configured for DCV.
- The unit is in an occupied mode.
- The IAQ sensor reading is greater than the DCV start control set point.

The control has four user adjustable set points: DCV start control set point, DCV maximum control set point, minimum damper position, and DCV maximum damper position.

Two-position OA damper — The control can be configured to operate a ventilation damper in a two-position ventilation mode to provide the minimum ventilation requirements during occupied periods.

Dehumidification — The WSHP Open controller will provide occupied and unoccupied dehumidification only on units that are equipped with the modulating hot water reheat (HWR) option. This function requires an accessory space relative humidity sensor. When using a relative humidity sensor to control dehumidification during occupied or unoccupied times, the dehumidification set points are used accordingly. When the indoor relative humidity becomes greater than the dehumidification set point, a dehumidification demand will be acknowledged. Once acknowledged, the dehumidification output will be energized, bringing on the supply fan (medium speed), mechanical cooling, and the integral hot water reheat coil. The controls will engage Cooling mode and waste heat from the compressor cooling cycle will be returned to the reheat coil simultaneously, meaning that the reversing valve is causing the compressor to operate in the Cooling mode. During Cooling mode, the unit cools, dehumidifies, and disables the HWR coil; however, once the call for cooling has been satisfied and there is still a call for dehumidification, the unit will continue to operate using the reheat mode and HWR coil.

Waterside economizer — The WSHP Open controller has the capability of providing modulating or two-position water economizer operation (for a field-installed economizer coil mounted to the entering air side of the unit and connected to the condenser water loop) in order to provide free cooling (or preheating) when water conditions are optimal. Water economizer settings can be accessed through the equipment status screen. The following conditions must be true for economizer operation:

- SAT reading is available.
- EWT reading is available.
- If occupied, the SPT is greater than the occupied cooling set point or less than the occupied heating set point and the condenser water is suitable.
- Space temperature reading is valid.

Controls (cont)



- If unoccupied, the SPT is greater than the unoccupied cooling set point or less than the unoccupied heating set point and the condenser water is suitable.

Modulating water economizer control — The control has the capability to modulate a water valve to control condenser water flowing through a coil on the entering air side of the unit.

Cooling — The purpose is to provide an economizer cooling function by using the water loop when the entering water loop temperature is suitable (at least 5° F below space temperature). If the water loop conditions are suitable, then the valve will modulate open as required to maintain a supply air temperature that meets the load conditions. Should the economizer coil capacity alone be insufficient for a period greater than 5 minutes, or should a high humidity condition occur, then the compressor will also be started to satisfy the load. Should the SAT approach the minimum cooling SAT limit, the economizer valve will modulate closed during compressor operation.

Heating — Additionally, the control will modulate the water valve should the entering water loop temperature be suitable for heating (at least 5° F above space temperature) and heat is required. The valve will be controlled in a similar manner except to satisfy the heating requirement. Should the economizer coil capacity alone be insufficient to satisfy the space load conditions for more than 5 minutes, then the compressor will be started to satisfy the load. Should the SAT approach the maximum heating SAT limit, the economizer valve will modulate closed during compressor operation.

Two-position water economizer control — The control has the capability to control a NO or NC, two-position water valve to control condenser water flow through a coil on the entering air side of the unit.

Cooling — The purpose is to provide a cooling economizer function directly from the condenser water loop when the entering water loop temperature is suitable (at least 5° F below space temperature). If the optional coil is provided and the water loop conditions are suitable, then the valve will open to provide cooling to the space when required. Should the capacity be insufficient for a period greater than 5 minutes, or should a high humidity condition occur, then the compressor will be started to satisfy the load. Should the SAT reach the minimum cooling SAT limit, the economizer valve will close during compressor operation.

Heating — Additionally, the economizer control will open the water valve should the entering water loop temperature be suitable for heating (at least 5° F above space temperature) and heat is required. The valve will be controlled in a similar manner except to satisfy the heating requirement. Should the coil capacity be insufficient to satisfy the space load for more than 5 minutes, then the compressor will be started to satisfy the load. Should the SAT reach the maximum heating SAT limit, the economizer valve will close during compressor operation.

Demand limit — The WSHP Open controller has the ability to accept three levels of demand limit from the network. In response to a demand limit, the unit will decrease its heating set point and increase its cooling set point to widen the range in order to immediately lower the electrical demand. The amount of temperature adjustment in response is user adjustable for both heating and cooling and for each demand level. The response to a particular demand level may also be set to zero.

Condenser water linkage — The control provides optimized water loop operation using an universal controller (UC) open loop controller. Loop pump operation is automatically controlled by WSHP equipment occupancy schedules, unoccupied demand and tenant override conditions. Positive pump status feedback prevents nuisance fault trips. The condenser water linkage operates when a request for condenser water pump operation is sent from each WSHP to the loop controller. This request is generated whenever any WSHP is scheduled to be occupied, is starting during optimal start (for warm-up or pull down prior to occupancy), there is an unoccupied heating or cooling demand, or a tenant pushbutton override. At each WSHP, the water loop temperature and the loop pump status is given. The WSHP will NOT start a compressor until the loop pumps are running or will shutdown the compressors should the pumps stop. This prevents the WSHP from operating without water flow and thus tripping out on refrigerant pressure, causing a lockout condition. The WSHP Open controller will prevent this from occurring. Also, the loop controller can be configured to start the pumps only after a configurable number of WSHPs are requesting operation (from 1-"N"). This can be used to prevent starting the entire loop operation for only one WSHP. Meanwhile, the WSHPs will not operate if the loop pump status is off and therefore the WSHP compressor will not run.

Guide specifications



Single-Stage Water Source Heat Pumps with Puron® Refrigerant (R-410A)

HVAC Guide Specifications

Size Range: **6,300 to 77,100 Btuh**

Cooling Capacity

4,800 to 85,800 Btuh

Heating Capacity

Carrier Model Number: **50PSH, 50PSV, 50PSD**

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Single package horizontally and vertically mounted water source heat pumps with Puron® refrigerant (R-410A) and electronic controls.
- B. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the guide specifications that follow.

1.02 QUALITY ASSURANCE

- A. All equipment listed in this section must be rated and certified in accordance with ARI/ISO and ETL listed to UL standard 1995. The units shall have ARI/ISO and ETL labels.
- B. All units shall be fully quality tested by factory run testing under normal operating conditions and water flow rates as described herein. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuate and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail data base. A detailed report card will ship with each unit displaying all test performance data.
NOTE: If unit fails on any cross check, system shall not allow unit to ship.
- C. Serial numbers will be recorded by factory and furnished to contractor on report card for ease of unit warranty status. Units tested without water flow are not acceptable. Units shall be prewired and pre-charged in factory.

Part 2 — Product

2.01 EQUIPMENT

A. General:

Units shall be supplied completely factory built for an entering water temperature range from 60 to 95 F as standard. Units may consist of rotary or scroll compressor, PSC (permanent split capacitor) or ECM (electronically controlled motor) fan motor and blower and refrigerant circuit as indicated on the equipment schedule. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing.

B. Unit Cabinets:

1. Horizontal Units:

- a. Horizontal units shall have one of the following airflow arrangements: left inlet/

right discharge; right inlet/left discharge; left inlet/back discharge; or right inlet/back discharge as shown on the plans.

- b. Horizontal units must have the ability to be field convertible from side to back or back to side discharge with no additional parts or unit structure modification. Units will have factory-installed hanger brackets with rubber isolation grommets packaged separately.

2. Vertical Units:

Vertical units shall have one of the following air flow arrangements: left return/top discharge, right return/top discharge, left return/bottom discharge, right return/bottom discharge as shown on the plans.

3. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades.
4. All units (horizontal and vertical) must have a minimum of three access panels for serviceability of compressor compartment. Units having only one access panel to compressor, heat exchangers, expansion device, or refrigerant piping shall not be acceptable.
5. Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. Unit insulation must meet these stringent requirements or unit(s) will not be accepted.
6. Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring.
7. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules.
8. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

C. Compressor:

1. Compressor section interior surfaces shall be lined with 1/2 in. thick, dual density, 1³/₄ lb per cubic ft acoustic type fiberglass insulation. Air-handling section interior surfaces shall be lined with 1/2 in. thick, single density, 1³/₄ lb per cubic ft foil-backed fiber insulation for ease of cleaning.
2. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the airstream. Units without foil-backed insulation in the air-handling section will not be accepted.

Guide specifications (cont)



3. The compressor shall have a dual level vibration isolation system.
4. The compressor will be mounted on computer-selected vibration isolation springs to a large heavy gage compressor mounting tray plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation.
5. Compressor shall be located in an insulated compartment away from airstream to minimize sound transmission.
6. Compressor shall have thermal overload protection.
7. The heat pumps shall be fabricated from heavy gage G90 galvanized steel with powder coat paint finish. Both sides of the steel shall be painted for added protection.
8. All units must have an insulated panel separating the fan compartment from the compressor compartment.
9. Units with the compressor in the airstream are not acceptable.

D. Fan and Motor Assembly:

1. Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing.
2. The fan motor shall be 3-speed, permanently lubricated, PSC (permanent split capacitor) type with internal thermal overload protection.
3. The fan motor shall be isolated from the housing by rubber grommets.
4. The motor shall be permanently lubricated and have thermal overload protection.
5. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode shall be selectable via a jumper on the control board or may be controlled externally from a humidistat.
6. Airflow/static pressure rating of the unit shall be based on a wet coil and a clean filter in place. Ratings based on a dry coil and/or no filter, or on an ESP (external static pressure) less than 0.50 in. wg shall NOT be acceptable.

E. Refrigerant Circuit:

1. All units shall contain a Puron® refrigerant (R-410A) sealed circuit including a high-efficiency Copeland UltraTech™ single-stage compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube-in-tube) refrigerant to water heat exchanger, and safety controls, including a high-pressure switch, low-pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor.

2. Access fittings shall be factory-installed on high and low pressure refrigerant lines to facilitate field service.
3. Refrigerant metering shall be accomplished by thermostatic expansion valve only.

F. Drain Pan:

1. The drain pan shall be constructed of 304 stainless steel to inhibit corrosion. This corrosion protection system shall meet the stringent 1000-hour salt spray test per ASTM B117. If plastic type material is used, it must be HDPE (high-density polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit.
2. Drain pan shall be fully insulated.
3. Drain outlet shall be located at pan as to allow complete and unobstructed drainage of condensate. Drain outlet for horizontal units shall be connected from pan directly to FPT fitting. No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.
4. The unit as standard will be supplied with solid-state electronic condensate overflow protection. A mechanical float switch will be used with the WSHP Open multiple protocol controller option.
5. Vertical units shall be furnished with a PVC slip condensate drain connection and an internal factory-installed condensate trap. If units without an internal trap are used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for the subcontractor to install these provisions.

G. Filter:

1. Units shall have a factory-installed 1 in. wide filter bracket for filter removal from either side. Units shall have a 1 in. thick throwaway type fiberglass filter.
2. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up.
3. Filters shall be standard sizes. If units utilize non-standard filter sizes, then the contractor shall provide 12 spare filters for each unit.

H. Thermostatic Expansion Valve:

1. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering.
2. Units shall be designed and tested for operating ranges of entering water temperatures from 20 to 120 F.
3. Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature



thermostat must be provided to prevent over-cooling an already cold room.

I. Controls and Safeties:

1. Electrical:

- a. A control box shall be located within the unit compressor compartment and shall contain a 50 va transformer, 24-volt activated, 2 or 3-pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation.
- b. Reversing valve and fan motor wiring shall be routed through this electronic controller.
- c. Units shall be name-plated for use with time-delay fuses or HACR circuit breakers. Unit controls shall be 24-volt and provide heating or cooling as required by the remote thermostat/sensor.

2. Unit Controls:

- a. Safety controls including a high-pressure switch, a low-pressure sensor, and a low water and low air temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.
- b. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout shall be reset at the thermostat or at the contractor-supplied disconnect switch.
- c. Units which may be reset only at the disconnect switch only shall not be acceptable.

3. Complete C Controls:

The standard Complete C electronic control system shall interface with a heat pump (Y,O) wall thermostat (mechanical or electronic). The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall have the following features:

- a. 50 va transformer.
- b. Performance Monitor (PM). The PM warns when the heat pump is running inefficiently.
- c. Anti-short cycle time delay on compressor operation time delay shall be 5 minutes minimum.
- d. Random start on power up mode.
- e. Low voltage protection.
- f. High voltage protection.
- g. Unit shutdown on high or low refrigerant pressures.
- h. Unit shutdown on low water temperature.
- i. Water coil freeze protection (selectable for water or antifreeze).
- j. Air coil freeze protection (check filter switch).

k. Condensate overflow shutdown.

l. Option to reset unit at thermostat or disconnect. Fault type shall be retained in memory if reset at thermostat.

m. Automatic intelligent reset. Unit shall automatically reset 5 minutes after trip if the fault has cleared. Should a fault reoccur 3 times sequentially, lockout requiring manual reset will occur.

n. Ability to defeat time delays for servicing.

o. Light-emitting diodes (LED) to indicate high pressure, low pressure, low voltage, high voltage, air/water freeze protection, condensate overflow and control status.

p. The low-pressure switch SHALL NOT be monitored for the first 90 seconds after a compressor start command to prevent nuisance safety trips.

q. Remote fault type indication at thermostat.

r. Selectable 24-v or pilot duty dry contact alarm output.

s. 24-v output to cycle a motorized water valve with compressor contactor.

t. Electric heat output to control two stages of electric heat (emergency heat).

u. Service test mode for troubleshooting and service.

v. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.

Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil freeze, water coil freeze, and condensate overflow protections will not be accepted.

4. Deluxe D Controls:

Optional electronic Deluxe D control shall have all the features of the Complete C control with the following additional features:

- a. 75 va transformer.
- b. A removable thermostat connector.
- c. Random start on return from night setback.
- d. Intelligent reversing valve operation for extended life and quiet operation.
- e. Night setback control from low temperature thermostat, with 2-hour override initiated by a momentary signal from the thermostat.
- f. Dry contact night setback output for digital night setback thermostats.
- g. Ability to work with heat/cool (Y, W) thermostats.
- h. Ability to work with heat pump thermostats using O or B reversing valve control.

Guide specifications (cont)



- i. Single grounded wire to initiate night setback, or emergency shutdown.
- j. Boilerless system control can switch automatically to electric heat at low loop water temperature.
- k. Dehumidistat input providing fan control for dehumidification operation via the Ideal-Humidity™ system.
- l. Multiple units connected to one sensor providing communication for up to 3 water source heat pumps.
- m. Selection of boilerless changeover temperature set point.
- n. Compressor relay staging for dual stage units or in master/slave applications.

Units not having automatic low sensible heat ratio cooling will not be accepted; as an alternate, a hot gas reheat coil may be provided with control system for automatic activation.

5. WSHP Open Multiple Protocol Control:

Units shall have all the features above (either C or D boards) and the state of the art WSHP Open multiple protocol interface board. All point objects will have the ability to be viewed in the BACview⁶ Handheld user interface. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. space temperature
- b. leaving water temperature
- c. discharge air temperature
- d. command of space temperature set point
- e. cooling status
- f. heating status
- g. low temperature sensor alarm
- h. high pressure switch alarm
- i. fan on/off position of space thermostat
- j. unoccupied/occupied command
- k. cooling demand
- l. heating demand
- m. fan "ON/AUTO" command
- n. fault prevention with auto reset
- o. itemized fault code viewed with BACview interface

Additional WSHP Open multiple protocol control features shall include:

- a. two-position OA damper
- b. modulating OA damper with DCV
- c. auxiliary modulating hot water/steam heating
- d. two-position hot water/steam heating
- e. single stage electric auxiliary heat

- f. auto fan speed control (heating/cooling)
- g. power fail restart delay
- h. dehumidification
- i. modulating water economizer control
- j. two-position water economizer control

6. PremierLink™ Controller:

This optional control will function with CCN (Carrier Comfort Network®) and ComfortVIEW™ software. It shall also be compatible with ComfortLink™ controllers. It shall be ASHRAE 62-99 compliant and Internet ready. It shall accept a CO₂ sensor in the conditioned space and be demand controlled ventilation (DCV) ready. The communication rate must be 38.4K or faster. It shall include an integrated economizer controller.

7. LonWorks® Interface System:

Units shall have all features listed above (either Complete C or Deluxe D) and the control board shall be supplied with a LonWorks interface board, which is LONMark® certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. space temperature
- b. leaving-water temperature
- c. discharge-air temperature
- d. command of space temperature set point
- e. cooling status
- f. heating status
- g. low temperature sensor alarm
- h. low pressure sensor alarm
- i. high pressure switch alarm
- j. condensate sensor alarm
- k. high/low voltage alarm
- l. fan "ON/AUTO" position of space thermostat
- m. unoccupied/occupied command
- n. cooling command
- o. heating command
- p. fan "ON/AUTO" command
- q. fault reset command
- r. itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75 va control transformer with load side short circuit and overload protection via a built in circuit breaker.

J. Piping:

- 1. Supply and return water connections shall be copper FPT fittings and shall be securely mounted flush to the cabinet corner post



allowing for connection to a flexible hose without the use of a back-up wrench.

2. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature.

K. Solid-State Permanent Split Capacitor (PSC) Fan Control Board:

1. Airflow selection shall be accomplished via 3 jumper switches on the PSC control board. Actual airflow shall be indicated by the cfm LED with each 100 cfm being represented by one flash of the LED.
2. Airflow shall be automatically maintained ($\pm 5\%$) by the PSC motor regardless of external static pressure up to its maximum output capacity.
3. A jumper shall allow selection of a special dehumidification mode, which reduces airflow in cooling by 25% to increase the latent capacity of the unit. A terminal shall be provided on the control board to allow an external humidistat to activate dehumidification mode.

L. Remote Service Sentinel (Complete C or Deluxe D):

1. Solid-state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown.
2. The remote service sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat.
3. The control board shall provide a signal to the thermostat fault light, indicating a lockout.
4. Upon cycling the G (fan) input 3 times within a 60-second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc.
5. Units that do not provide this remote service sentinel shall not be acceptable.

M. Special Features:

1. Cupronickel coaxial water-to-refrigerant heat exchangers are available for higher corrosion protection.
2. The sound attenuation (mute) package consists of high technology sound attenuating materials strategically applied to the cabinet, in addition to the standard system, to further dampen sound.
3. Extended range is available for units operating with entering water temperatures below dew

point. Extended entering water temperatures range from 20 to 120 F.

4. A two-way motorized water control valve shall operate in conjunction with the compressor to shut off or turn on water to the unit.
5. Water circuit options shall provide internally mounted 2.5 or 3.0 gpm per ton automatic flow regulating valves.
6. The hot water generator coil and high temperature switch shall generate hot water within the unit.
7. The permanent split capacitor (PSC) high-static blower motor shall increase unit capacity through the use of a high-static blower motor.
8. The electronically commutated motor (ECM) shall provide soft starting, maintain constant cfm over its static operating range and provide airflow adjustment on its control board.
9. Modulating hot water reheat (HWR) is composed of a supply air sensor, motorized valve, proportional controller, loop pump, and hydronic coil.
10. Aquazone™ Thermostat Controls:
 - a. Programmable multi-stage thermostat offers 7-day clock, holiday scheduling, large backlit display and remote sensor capability.
 - b. Programmable 7-day light-activated thermostat offers occupied comfort settings with lights on, unoccupied energy savings with lights off.
 - c. Programmable 7-day flush-mount thermostat offers locking coverplate with tamper proof screws, flush to wall mount, dual point with adjustable deadband, O or B terminal, and optional remote sensor.
 - d. Programmable 5-day thermostat offers 2-stage heat/2-stage cool, auto changeover, 5-minute built-in compressor protection, locking cover included.
 - e. Non-programmable thermostat offers 2-stage heat/2-stage cool, auto changeover, 5-minute built-in compressor protection, locking cover included.
11. Loop controller with six stages (2 stages for heating and 4 stages for heat rejection) is available.
12. The filter rack (2 in.) enhances the filtration system of the water source heat pump.
NOTE: Filter rack does not include filters.
13. Fire-rated hose kits include a fixed MPT on one end and a swivel with an adapter on the other end. Hose kits can be either stainless steel or galvanized.
14. Ball valves (brass body) shut off and balance water flow. Valves are available with memory, memory stop, and pressure temperature ports.

Guide specifications (cont)



15. Y strainers (bronze body) are “Y” type configuration with a brass cap and stainless steel strainer screen. Maximum operating pressure rating of strainers is 450 psi.
16. Solenoid valves (brass body) provide slow operation for quiet system application.
17. Hose kit assemblies include a ported ball valve with pressure temperature (P/T) plug ports and flexible stainless steel hose with swivel and nipple. Return hose includes a ball valve, preset measure flow (gpm) with two P/T ports, flexible stainless steel hose with a swivel and nipple.
18. Multiple-protocol WSHP Open controller remote sensors for Aquazone flush-mount thermostats and DDC control options. Only Carrier sensors can be used with the WSHP Open controller. Sensors are available as follows:
 - a. SPT Standard offers space temperature sensor with communication port.
 - b. SPT Plus offers space temperature sensor with set point adjust, local override with indicating light and communication port.
 - c. SPT Pro offers space temperature sensor with LCD display, set point adjust, local override, alarm icon, outside air, and unit status with heating and cooling set points.
 - d. SPT Pro+ offers space temperature sensor with LCD display, set point adjust, local override, alarm icon, outside air, unit status with heating and cooling set points, and fan speed control.
19. PremierLink™ accessories provide a fully integrated DDC system. Accessories include supply air temperature sensors, communicating room sensors, CO₂ sensors, and linkage thermostats.
20. An Aquazone™ system control panel as specified in 50RLP Product Data (525-00040) is available.
21. LON wall sensors are available in 3 models: sensor only, sensor with status override indicator, and sensor with set point, status adjustment override, and digital LCD display.

