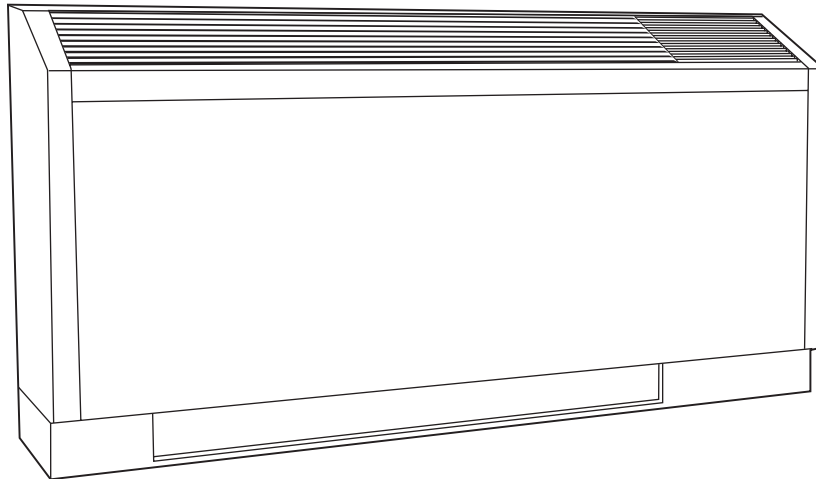




Product Data

AQUAZONE™ 50KQL07-19 Water Source Heat Pumps Console Unit

1/2 to 1 1/2 Nominal Tons



Single-Package Console Water Source Heat Pump with self-contained line voltage thermostats.

- Suitable for either geothermal or boiler/tower applications with operating temperature range from 20 F to 110 F.
- Thermostatic expansion valve (TXV) provides efficient and reliable refrigerant flow
- Rubber grommet mounted compressors for quiet operation
- Sloped top cabinet with powder paint finish
- Right or left hand piping connection
- Multiple unit-mounted and remote thermostat options
- Adaptable cabinet and subbase configurations
- Factory-mounted flow regulators and control valves for easy installation
- Flexible and reliable controls accommodate all systems

Features/Benefits

Carrier's Aquazone console water source heat pumps are a flexible, attractive alternative for all finished interior space, under-window style installations.

Operating efficiency

Carrier Aquazone water source heat pump (WSHP) units are designed for quality and performance excellence over their lifetime. Units offer standard cooling EERs (Energy Efficiency Ratios) up to 12.1 for boiler/tower systems and as high as 19.5 for geothermal applications. Heating COPs (Coefficient of Performance) are as high as 4.9, among the highest in the industry.





Quiet operation

The Carrier Console WSHP provides exceptionally quiet operation for maximum comfort.

Design flexibility

Aquazone™ Console WSHP units are offered in 5 capacity sizes and 3 different voltages to meet individual zone needs efficiently and effectively. Standard and extended operating range units are available to suit a variety of application requirements.

Safe, reliable operation

Standard safety features include: high and low pressure monitoring and field selectable water and air coil freeze protection sensing. All safety controls may be reset at the thermostat. Each unit is tested and run at the factory to ensure 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 water-to-refrigerant heat exchanger has copper inner and steel outer tubing which is painted on the outside to provide corrosion resistance protection. Cupronickel heat exchangers are available and should be used on all open loop applications.

Units are rated and certified in accordance with ARI/ISO/ASHRAE 13256-1 performance standard, and are CSA/NRTL listed.

Installation ease

The unit is packaged for simple, low cost handling, with minimal time required for installation. The console unit

arrives at the jobsite fully assembled to minimize installation time and reduce installation cost. All units are pre-wired and factory charged with R-22 refrigerant.

Water connections are available in a variety of configurations direct from the factory. The standard configuration is 5/8 in. OD Sweat connections for maximum flexibility in the field. Both FPT and MPT are available as factory-installed options to improve installation efficiency. Additionally, factory-installed motorized water shutoff valves are available for use on energy conserving systems employing a variable pumping technique.

The standard electrical connections are made quickly and directly to a power distribution terminal block. To further improve installation efficiency, a fused or unfused disconnect switch as well as a 20 amp plug and cord are available as factory-installed options.

A 5/8 in. ID vinyl condensate connection is provided for connection to the field-installed condensate line.

Compact cabinet design dimensions are 12 in. deep, 48 in. wide and 24 in. tall (with 3 in. subbase). For flexibility, the controls can be mounted on the top right or left side. Additionally, the sloped top design discourages the use of the unit as a shelf or coffee holder, preventing air blockage and any spills from damaging the unit.

No-fuss maintenance and serviceability

Regular maintenance or service to the console WSHP units require little time. Large service access panels enable

quick inspection for problem solving and the control box swings down for easy access to the controls.

Fan motor sleeve bearings are permanently lubricated for worry-free performance. If the unit does require service, an easily removable cabinet and slide out fan section make access simple.

Refrigerant circuit protection is designed to result in fewer service calls. Units are equipped with easily accessible service access ports on both the suction and the discharge refrigerant lines for on-site testing and environmentally correct refrigerant recovery. Filter racks provide easy filter access for cleaning.

Maximum control flexibility

Aquazone water source heat pumps provide reliable control operation using a standard microprocessor board.

Flexible alternatives for many direct digital control (DDC) applications include the Carrier Comfort Network (CCN) and open protocol systems.

Carrier's 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 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 — Assists in accommodating accessory loads.

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As an ENERGY STAR® Partner, Carrier Corporation has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

Features/Benefits (cont)



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

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 — Safeguards against unreliable unit operation and prevents refrigerant from leaking.

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

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

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

Accessory output — In applications such as variable speed pumping, a 24-v output cycles a motorized water valve or damper actuator with compressor.

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

Water coil freeze protection (selectable for water or anti-freeze) — 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) — 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 — Selectable 24-v or pilot duty dry contact provides remote alarm activation.

Electric heat option — Output provided on the controller for operating two stages of emergency electric heat.

Service test mode with diagnostic LED (light-emitting diode) — Test mode allows service personnel to check the operation of the WSHP and control system efficiently. Upon entering Test mode, time delays speed up, and the Status LED flashes a code indicating the last fault. This mode provides easy fault diagnosis; based on the fault code the status LED flashes, Carrier provided troubleshooting tables provide 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.

Carrier 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, cooling stages, outdoor-air temperature, leaving-air temperature, leaving water temperature, alarm status, and alarm lockout condition.

This controller has 38.4K baud communications capability and is compatible with *ComfortLink™* Controls, *CCN* and *ComfortVIEW™* Software. The Scrolling Marquee and Navigator are optional tools used for programming and monitoring the unit for optimal performance. Adding the Carrier CO₂ sensor in the conditioned space provides ASHRAE 62-99 compliance and Demand Control Ventilation (DCV). A DCV control strategy is especially beneficial for a water source heat pump system to minimize the energy used 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 and Variable Volume Temperature applications. This comprehensive controls system allows water source heat pumps to be linked together, creating a fully functional HVAC (heating, ventilation, and air conditioning) automation system.

Model number nomenclature



5 0 K Q L 0 7 S A E C 1 0 1 A A

Aquazone™ High-Efficiency R-22
Water Source Heat Pump
50KQL – Console Unit

Size – Nominal Capacity (Tons)
07 – 1/2
09 – 3/4
12 – 1
15 – 1 1/4
19 – 1 1/2

Water Circuit Options

Connection Type	Valve Option
A – Sweat	2-Way Water Control Valve
B – Sweat	Autoflow Regulator, 2.25 gpm/ton
C – Sweat	Autoflow Regulator, 3.0 gpm/ton
D – Sweat	2-Way Water Control Valve with Autoflow Regulator, 2.25 gpm/ton
E – Sweat	2-Way Water Control Valve with Autoflow Regulator, 3.0 gpm/ton
F – FPT	None
G – FPT	2-Way Water Control Valve
H – FPT	Autoflow Regulator, 2.25 gpm/ton
J – FPT	Autoflow Regulator, 3.0 gpm/ton
K – FPT	2-Way Water Control Valve with Autoflow Regulator, 2.25 gpm/ton
L – FPT	2-Way Water Control Valve with Autoflow Regulator, 3.0 gpm/ton
M – MPT	None
N – MPT	2-Way Water Control Valve
P – MPT	Autoflow Regulator, 2.25 gpm/ton
Q – MPT	Autoflow Regulator, 3.0 gpm/ton
R – MPT	2-Way Water Control Valve with Autoflow Regulator, 2.25 gpm/ton
S – Sweat	None
T – MPT	2-Way Water Control Valve with Autoflow Regulator, 3.0 gpm/ton

Water Supply Orientation*

R – Right Hand
L – Left Hand

Control Options

A – Manual Changeover with Complete C
B – Manual Changeover with Deluxe D
C – Auto Changeover with Complete C
D – Auto Changeover with Deluxe D
P – PremierLink™ DDC Control†
R – Remote Thermostat with Complete C
S – Remote Thermostat with Deluxe D

*Right and left hand orientation is determined by looking at front of unit.

†Available with Complete C only.

**20A plug and cord not available for 265V units.

††Sizes 07,09,12 only.

Power Termination

A – Field-Connected Hard Wired
B – 20A Plug and Cord**
D – Disconnect switch, 15A fuse
F – Disconnect switch, non-fused
H – 20A Plug, Cord, Receptacle, Disconnect Switch, 15A Fuse
K – 20A Plug, Cord, Disconnect Switch, No Fuse

Packaging

1 – Domestic

Revision Code

0 – Current revision

Power Supply

1 – 115V-1 Ph-60 Hz††
3 – 208/230V-1 Ph-60 Hz
4 – 265V-1 Ph-60 Hz**

Heat Exchanger and Operating Range

C – Copper heat exchanger, standard range (60 to 95 F)
E – Copper heat exchanger, extended range (20 to 110 F)
F – Cupronickel heat exchanger, extended range (20 to 110 F)
N – Cupronickel heat exchanger, standard range (60 to 95 F)

Cabinet, Subbase and Mute Package Options

Std	Mute	Cabinet	Subbase
A	T	Bottom return	3 in. Subbase
B	U	Bottom return	3 in. Subbase with Motorized Damper
C	V	Bottom return	5 in. Subbase with Motorized Damper
D	W	Bottom return	NO BASE
E	Y	Bottom return Locking control door	3 in. Subbase
F	Z	Bottom return Locking control door	3 in. Subbase with Motorized Damper
G	1	Bottom return Locking control door	5 in. Subbase with Motorized Damper
H	2	Bottom return Locking control door	NO BASE
J	3	Front return	NO BASE
K	4	Front return Locking control door	NO BASE
L	5	NO CABINET	3 in. Subbase
M	6	NO CABINET	3 in. Subbase with Motorized Damper
N	7	NO CABINET	5 in. Subbase with Motorized Damper
P	8	NO CABINET	NO BASE
Q	9	NO CABINET	5 in. Subbase
R	0	Bottom return	5 in. Subbase
S	O	Bottom return Locking control door	5 in. Subbase

ARI/ISO 13256-1 capacity ratings



UNIT 50KQL	COOLING					HEATING			AIRFLOW (cfm)	WATER FLOW (gpm)	PRESSURE DROP (ft wg)
	TC	SC	THR	Input Power (kW)	EER	TC	Input Power (kW)	COP			
07	7.8	6.6	10.0	0.645	12.1	10.4	0.622	4.9	240	1.9	1.5
09	9.3	7.2	11.9	0.775	12.0	12.0	0.799	4.4	300	2.5	3.1
12	12.3	9.5	15.9	1.060	11.6	15.0	0.999	4.4	350	3.1	3.8
15	13.8	11.2	17.8	1.169	11.8	17.3	1.152	4.4	400	3.6	3.0
19	16.0	11.9	20.6	1.333	12.0	19.3	1.346	4.2	460	4.8	5.0

LEGEND

- ARI — Air Conditioning and Refrigeration Institute
- COP — Coefficient of Performance
- db — Dry Bulb Temperature
- EER — Energy Efficiency Ratio
- ISO — International Organization for Standardization
- TC — Total Capacity (MBtuh)
- THR — Total Heat of Rejection (MBtuh)
- SC — Sensible Capacity (MBtuh)
- wb — Wet Bulb Temperature

NOTES:

1. Ratings are in accordance with and certified to ARI/ISO Standard 13256-1.
2. Cooling Standard: 80.6 F db, 66 F wb indoor entering air temperature, 86 F entering water temperature.
3. Heating Standard: 68 F db indoor entering air temperature, and 68 F entering water temperature.

Physical data

BASE UNIT 50KQL	07	09	12	15	19
NOMINAL COOLING CAPACITY (Btuh)	7,800	9,300	12,300	13,800	16,000
COMPRESSOR	Rotary				
BLOWER Motor Horsepower Wheel Size D x W (in.) 2 each	¹ / ₂₀ 5 ¹ / ₄ x 6 ¹ / ₄	¹ / ₁₅ 5 ¹ / ₄ x 6 ¹ / ₄	¹ / ₁₅ 5 ¹ / ₄ x 6 ¹ / ₄	¹ / ₆ 5 ¹ / ₄ x 6 ¹ / ₄	¹ / ₆ 5 ¹ / ₄ x 6 ¹ / ₄
FILTER SIZE (in.) Bottom Return	8 x 29 ¹ / ₂ x ³ / ₈	8 x 29 ¹ / ₂ x ³ / ₈	8 x 29 ¹ / ₂ x ³ / ₈	8 x 29 ¹ / ₂ x ³ / ₈	8 x 29 ¹ / ₂ x ³ / ₈
FILTER SIZE (in.) Front Return	7 x 29 ¹ / ₂ x ¹ / ₈	7 x 29 ¹ / ₂ x ¹ / ₈	7 x 29 ¹ / ₂ x ¹ / ₈	7 x 29 ¹ / ₂ x ¹ / ₈	7 x 29 ¹ / ₂ x ¹ / ₈
UNIT WEIGHT (lb) Shipping Operating	181 173	185 177	195 187	201 193	206 198
REF. TO AIR HEAT EXCHANGER Face Area (sq ft) No. of Rows Deep Copper Tube Size OD (in.) Fin Spacing (FPI)	1.4 2 ³ / ₈ 13	1.4 2 ³ / ₈ 13	1.4 3 ³ / ₈ 13	1.8 3 ³ / ₈ 13	1.8 3 ³ / ₈ 12
REFRIG. CHARGE (R-22)/CKT (oz) No. of Circuits	16 1	16 1	21 1	27 1	24 1
UNIT CABINET WITH STANDARD SUBBASE W x H x D (in.)	48 x 24 x 12	48 x 24 x 12	48 x 24 x 12	48 x 24 x 12	48 x 24 x 12
WATER IN/OUT SIZE OD SWEAT (in.)	⁵ / ₈	⁵ / ₈	⁵ / ₈	⁵ / ₈	⁵ / ₈
CONDENSATE SIZE ID VINYL (in.)	⁵ / ₈	⁵ / ₈	⁵ / ₈	⁵ / ₈	⁵ / ₈

Options and accessories



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.

Thermostat options include a unit mounted Manual Changeover (MCO) or Auto Changeover (ACO) thermostat. The temperature set point knob and push button switches for fan speed and cool/heat mode (MCO) selection are conveniently located on the top. The thermostat senses the return-air temperature. The thermostat sends the appropriate signal to the controller for cooling or heating mode of operation.

Options R and S allow connection to a remote wall-mounted thermostat. The Complete C controller requires a heat pump thermostat. The Deluxe D controller can be configured for heat pump or heat/cool thermostat.

Extended range is provided to insulate the coaxial coil 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).

Cabinet options include a locking control panel for added security. Bottom or front return with left or right hand configurations are available for ease of installation. Available with 3 or 5 in. subbase, with or without motorized damper.

Motorized fresh air damper with the unit-mounted thermostat. Opens when LOW or HIGH fan speed selections are made from the push button switches. When STOP or FAN ONLY selections are made the spring return on the damper motor closes the damper. With remote thermostat the motorized fresh air damper opens when the fan is running.

Piping connections can be provided on either the right or left hand side of the unit, for easy installation. Orientation is determined by facing the unit from the front side.

Automatic flow regulators include internally mounted 2.25 or 3.0 gpm/ton automatic flow regulating valves for easier installation.

Two-way motorized control valve can be provided with a copper or cupronickel heat exchanger 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. Standard two-way valve performance includes Cv of 2.9 and maximum operating pressure differential (MOPD) of 125 psi.

Mute package includes high density noise suppression material on front, right, and left sides of compressor compartment and 1/2-in. fiberglass insulation on all insulated surfaces, for extra-quiet operation in the most critical applications.

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

Thermostat input capabilities — Accommodate emergency shutdown mode and night setback with override (NSB) potential. Night setback from low temperature thermostat

with 2-hour override is initiated by a momentary signal from the thermostat.

Compressor relay staging — 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.

Dehumidistat input — Provides operation of fan control for dehumidification operation.

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.

Night low limit — If the unit operation is turned OFF from either the push button switches, remote thermostat or the energy management system, it is possible that the space temperature could drop uncontrollably. The Night Low Limit feature, with Deluxe D controller, helps maintain the space temperature at a level that is the best compromise between energy consumption and a safe space temperature. A thermostat located near the return air filter activates the blower and compressor operation when the space temperature falls below 50 F. When return air temperature is raised above 55 F the compressor and blower stop.

Override function — An Override function is available for units operating in occupied/unoccupied mode under the control of an external timeclock or an energy management system. A contact closure from the timeclock or energy management system shorts the NSB and C terminal on the Deluxe D controller signaling an unoccupied mode.

For units with the unit-mounted thermostat, pressing override switch (located under control access door) will override the unoccupied mode and allow the occupied mode of operation to continue for a period of two hours.

The units with the remote wall-mounted thermostat require a digital thermostat with the override function. In unoccupied mode an accessory relay is energized on the Deluxe D controller. The NO/NC contacts of the relay can be used as appropriate input to the digital thermostat to signal occupied/unoccupied mode. The thermostat selects cooling/heating set points based on occupied/unoccupied mode.

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.



50KQL CONTROL OPTIONS TABLE

OPTION	CONTROLLER	THERMOSTAT	FUNCTIONS	TRANSFORMER
A	Complete C	MCO	—	50 VA
B	Deluxe D	MCO	NIGHT LOW LIMIT 2-HR OVERRIDE	75 VA
C	Complete C	ACO	—	50 VA
D	Deluxe D	ACO	NIGHT LOW LIMIT 2-HR OVERRIDE	75 VA
P	Complete C with PremierLink™	LINKAGE	DDC SYSTEM	50 VA
R	Complete C	REMOTE	—	50 VA
S	Deluxe D	REMOTE	NIGHT LOW LIMIT 2-HR OVERRIDE	75 VA

LEGEND

ACO — Auto Changeover
 DDC — Direct Digital Controls
 MCO — Manual Changeover

Field-installed accessories

Carrier's line of Aquazone™ thermostats (used with remote thermostat units) are both attractive and multi-functional, accommodating stand-alone water source heat pump installations.

Programmable 7-day 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, temperature display in degrees F or C.

Programmable 7-day light-activated 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 — 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 — 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, 4 settings per day.

Non-programmable 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, back-lit display, O or B terminal, dual set point with adjustable deadband, backplate with terminals.

Aquazone system control panel includes a pre-programmed, easy to use, Carrier Comfort Controller set up for a WSHP system.

- Coordinates, monitors, and controls all WSHP units and ancillary equipment including cooling towers, boilers, and system pumps.
- 50RPL model nomenclature is used to customize the panel 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., non-communicating) 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 Control compatible using the Carrier Comfort Network (CCN) and WSHP units utilizing PremierLink CCN controllers.

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. Five sizes are available (1/2, 3/4, 1, 1 1/4, 1 1/2 in.).

Ball valves (brass body) used for shutoff and balancing water flow. Available with memory, memory stop, and pressure temperature ports. UL-listed brass body, ball and stem type with Teflon seats and seals. Five sizes are available (1/2, 3/4, 1, 1 1/4, 1 1/2 in.).

Y strainers (bronze body) are "Y" type strainers with a brass cap. Maximum operating pressure rating of 450 psi. Strainer screen made of stainless steel. Available with blow down valves. Five sizes are available (1/2, 3/4, 1, 1 1/4, 1 1/2 in.).

Solenoid valves (brass body) offer 3.5 watt coil, 24 volt, 50/60 Hz, 740 amps inrush, .312 amps holding. Slow operation for quiet system application. Five sizes are available (1/2, 3/4, 1, 1 1/4, 1 1/2 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.

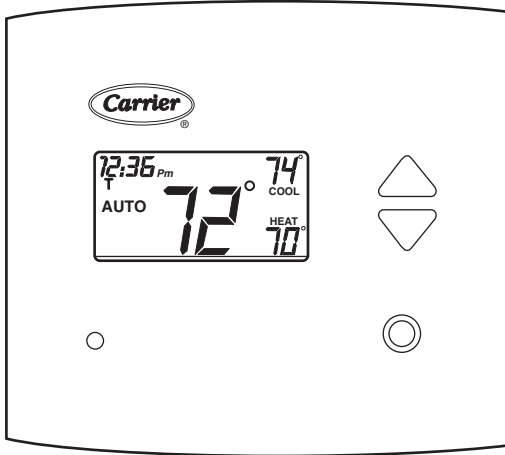
Remote sensors are available for Aquazone flush mount thermostats. Sensors are available for wall (wired and wireless) or duct mounted applications.

PremierLink™ accessories are available to provide 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).

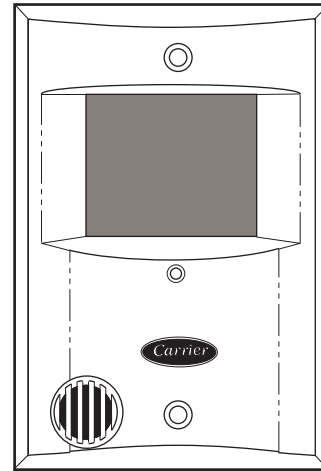
Options and accessories (cont)



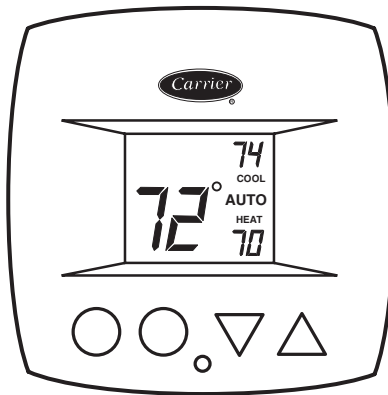
CARRIER AQUAZONE™ THERMOSTATS (FOR USE WITH REMOTE THERMOSTAT UNITS)



7-DAY PROGRAMMABLE/LIGHT-ACTIVATED PROGRAMMABLE

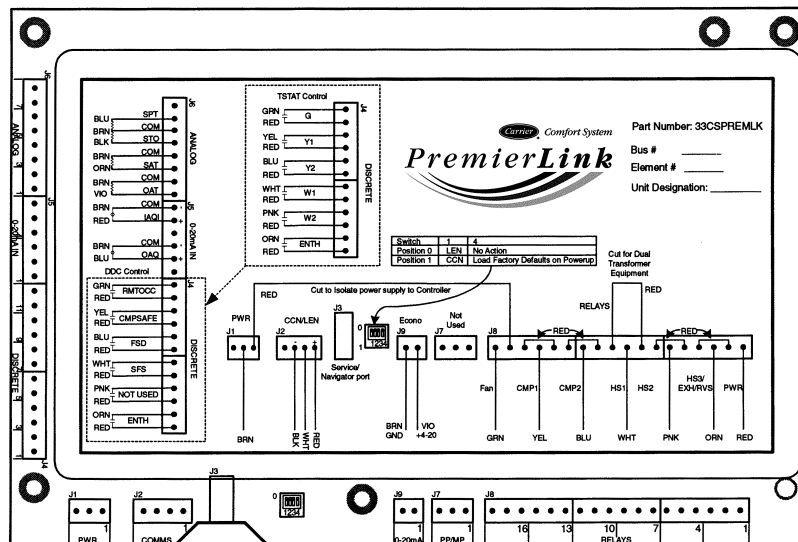


7-DAY PROGRAMMABLE FLUSH MOUNT



5-DAY PROGRAMMABLE/NON-PROGRAMMABLE

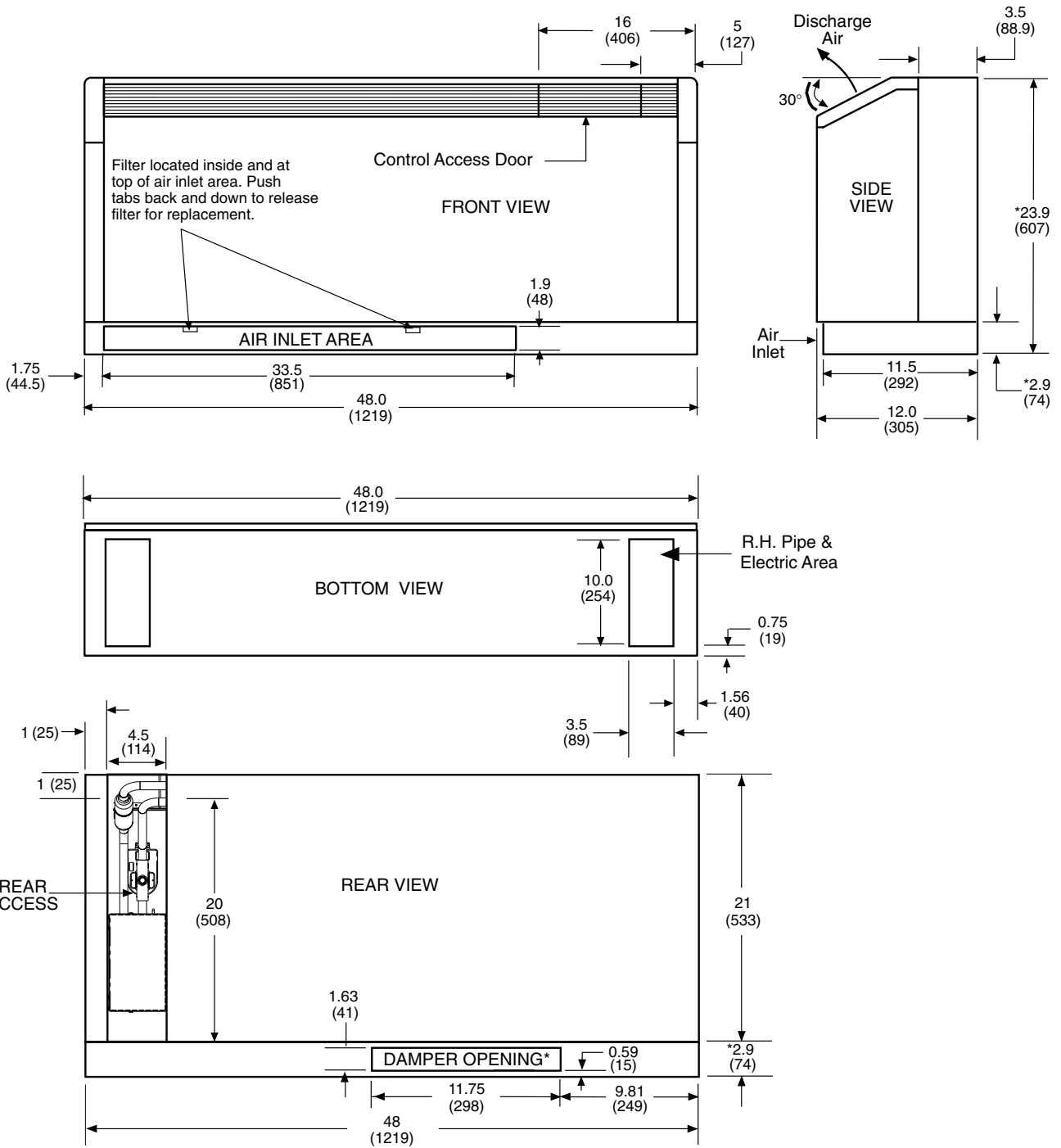
PREMIERLINK™ COMMUNICATING CONTROL



Dimensions



50KQL BOTTOM RETURN CABINET DIMENSIONS — RIGHT HAND PIPING



*Dimension shown is with 3 in. subbase. Add 2 in. to dimension shown for 5 in. subbase.

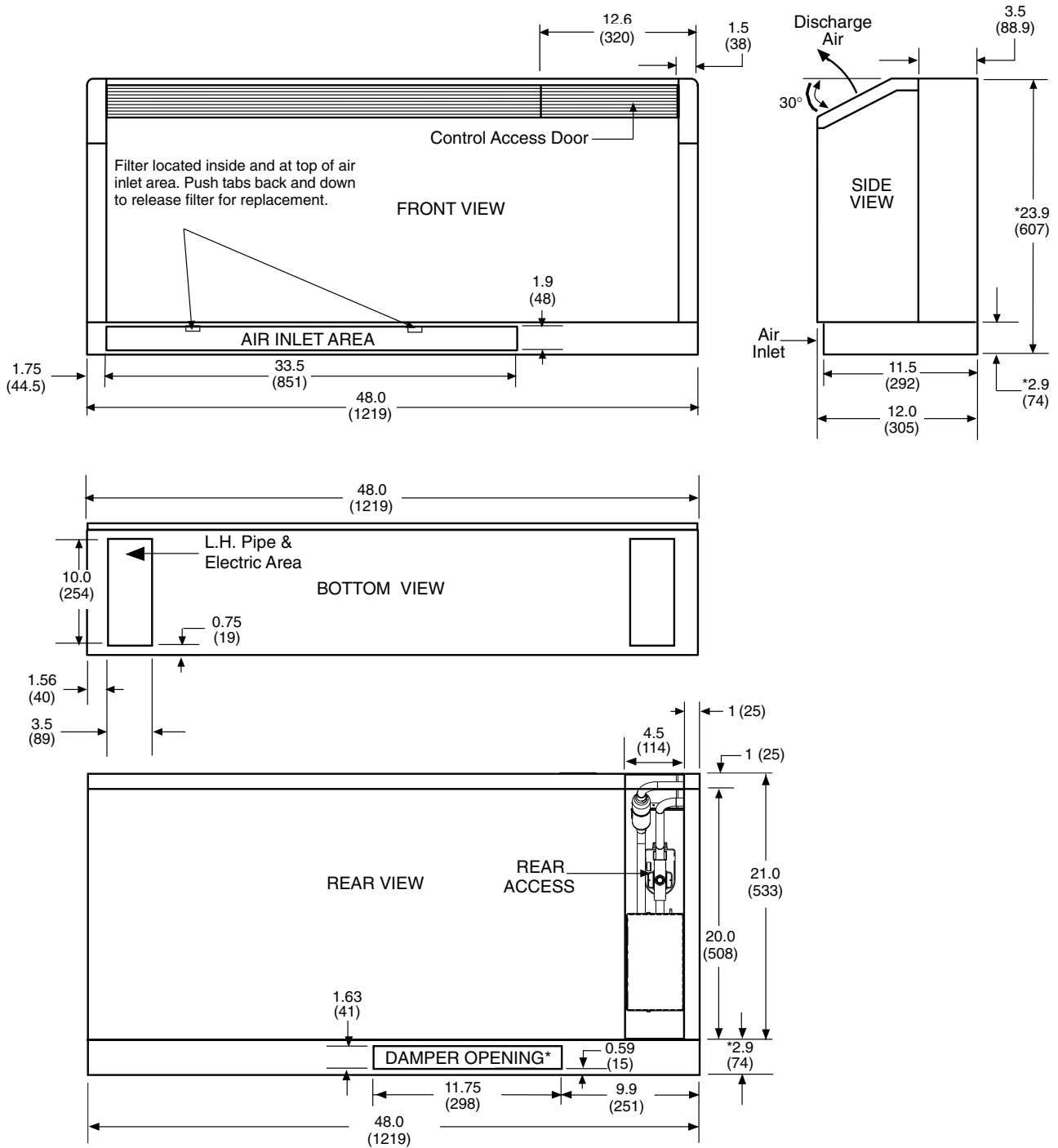
NOTES:

1. Dimensions are shown in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.

Dimensions (cont)



50KQL BOTTOM RETURN CABINET DIMENSIONS — LEFT HAND PIPING

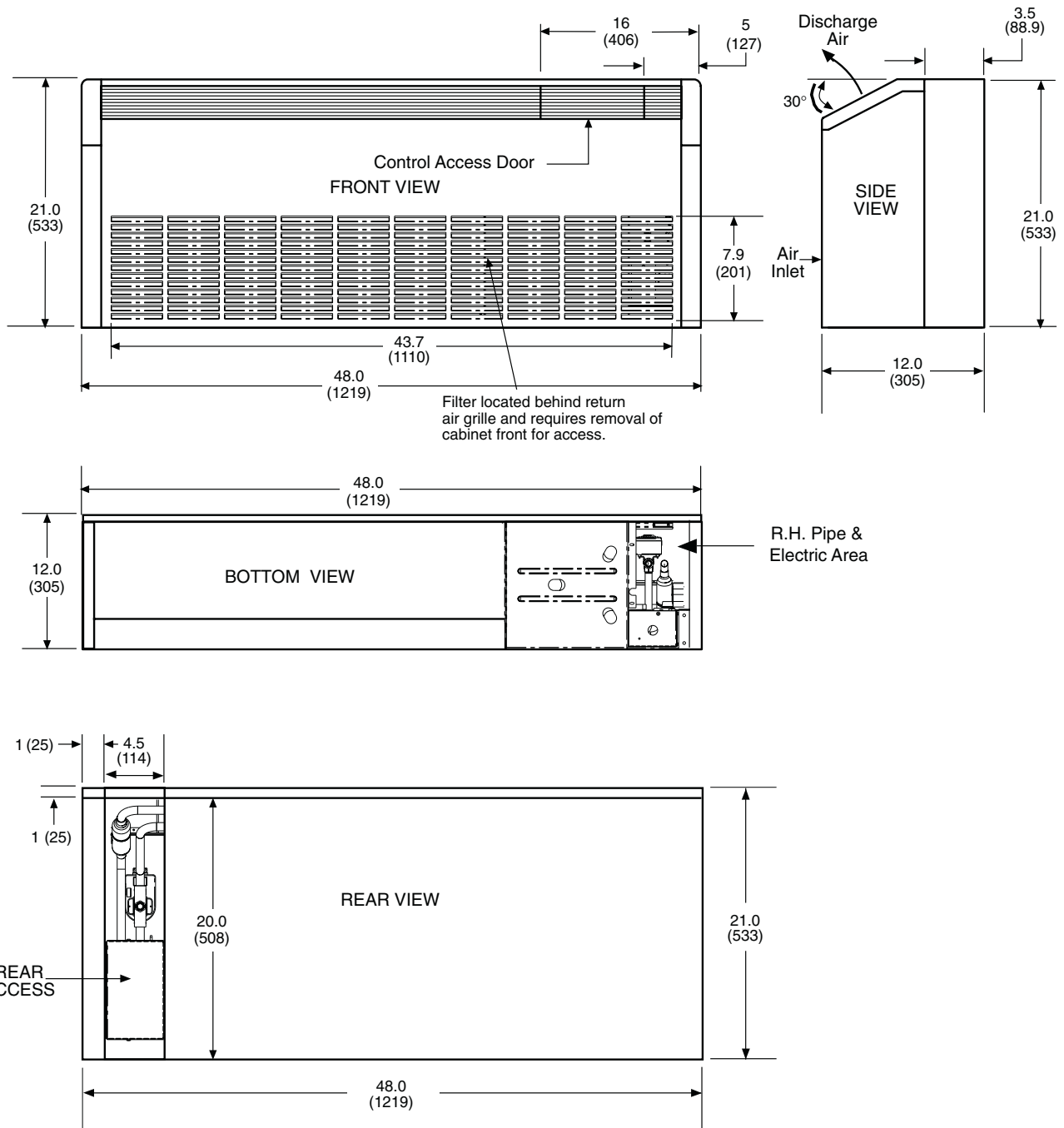


*Dimension shown is with 3 in. subbase. Add 2 in. to dimension shown for 5 in. subbase.

NOTES:

1. Dimensions are shown in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.

50KQL FRONT RETURN CABINET DIMENSIONS — RIGHT HAND PIPING



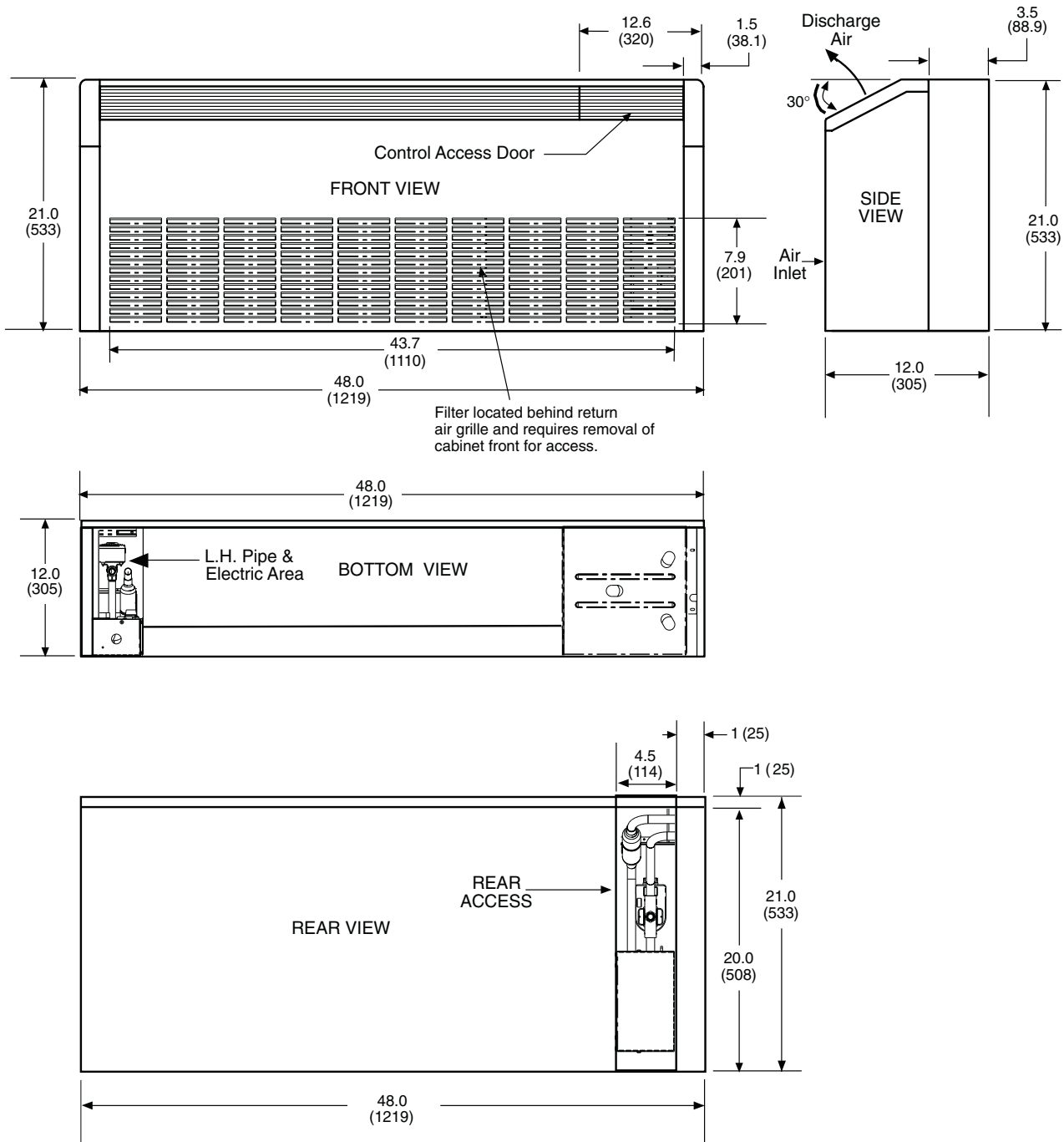
NOTES:

1. All dimensions are shown in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.

Dimensions (cont)



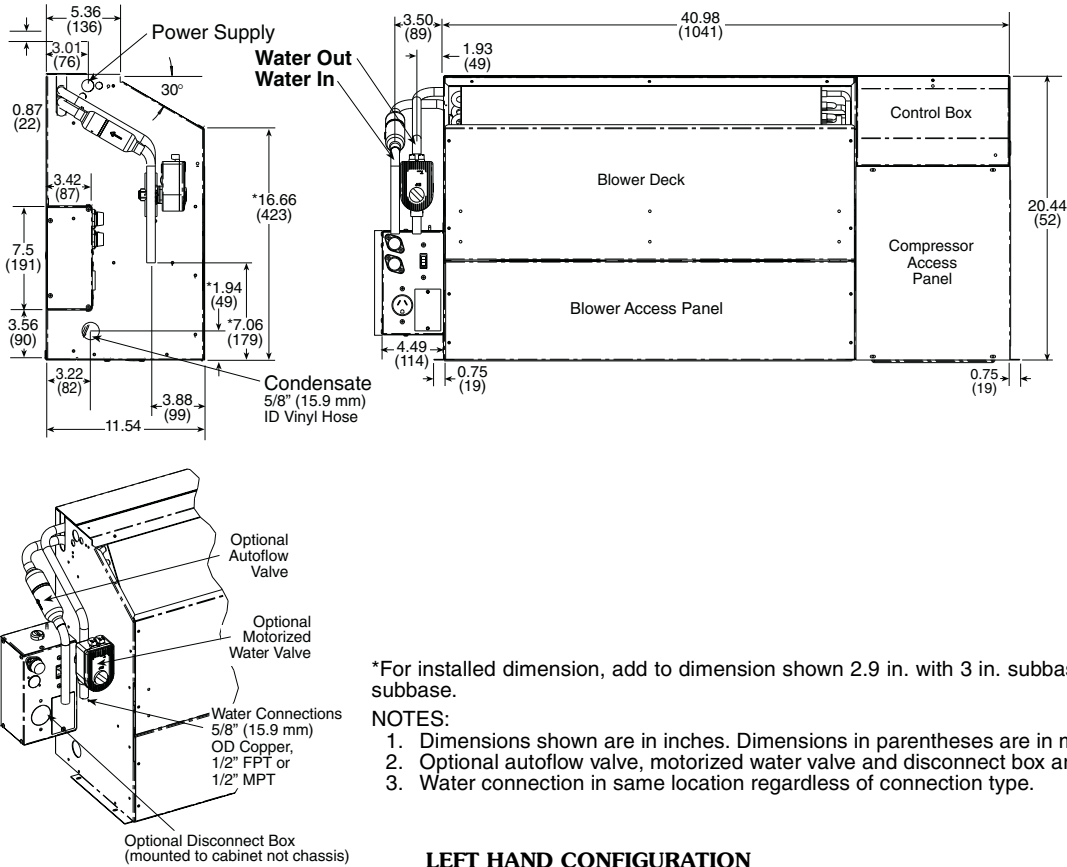
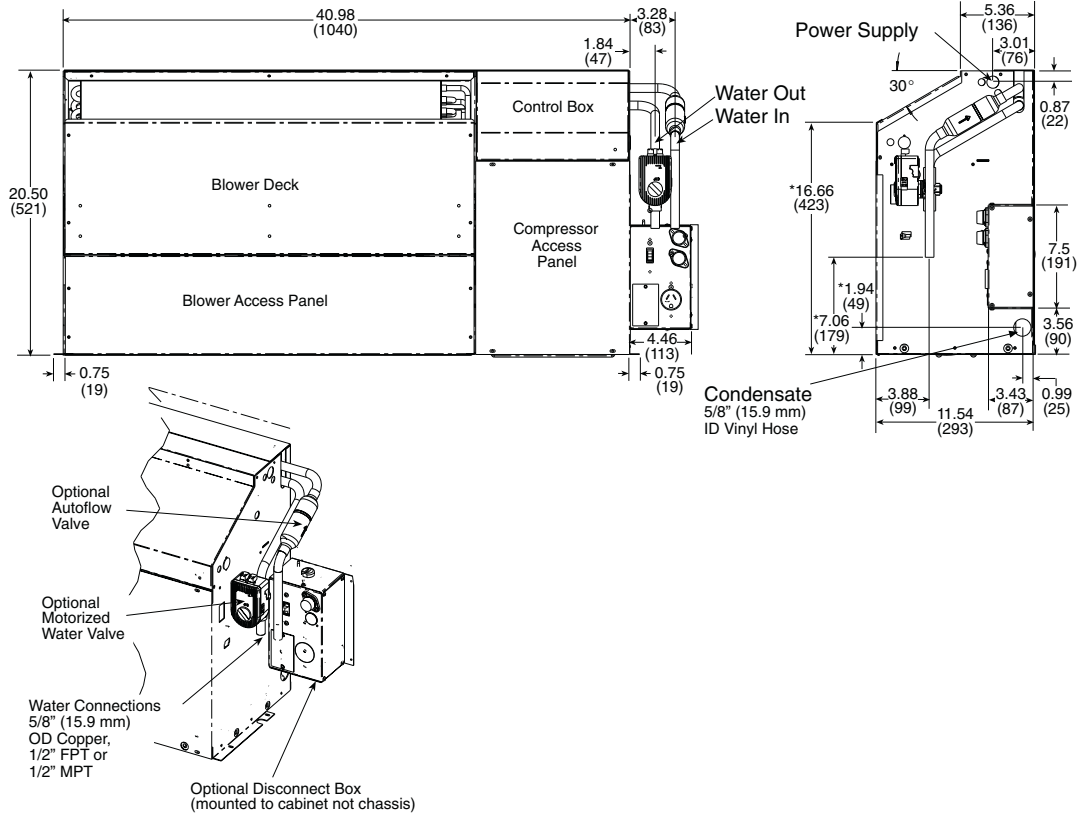
50KQL FRONT RETURN CABINET DIMENSIONS — LEFT HAND PIPING



NOTES:

1. All dimensions are shown in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.

50KQL CHASSIS DIMENSIONS — SIZE 07, 09, 12, 15, 19



*For installed dimension, add to dimension shown 2.9 in. with 3 in. subbase and 4.9 in. for 5 in. subbase.

NOTES:

1. Dimensions shown are in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.
3. Water connection in same location regardless of connection type.

Selection procedure (with 50KQL12 example)



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

Assume cooling load at desired dry bulb 80 F and wet bulb 66 F conditions are as follows:

Given:

- Total Cooling (TC) 11,750 Btuh
- Sensible Cooling (SC) 8,650 Btuh
- Entering-Air Temperature db 80 F
- Entering-Air Temperature wb 66 F

II Determine the following design parameters.

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. For applications using multiple units, the water pressure drop should be kept as close as possible across units to make water balancing easier. Enter the 50KQL12 Performance Data tables and find the proper indicated water flow and water temperature.

For example:

- Entering Water Temp 90 F
- Water Flow (Based upon
10 F rise in temp) 3.1 gpm
- Airflow Cfm 308 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 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 50KQL12 Performance Table at design water flow and water temperature. Read Total Cooling, Sensible Cooling and Heat of Rejection capacities:

- Total Cooling 12,200 Btuh
- Sensible Cooling 8,900 Btuh
- Heat of Rejection 15,900 Btuh

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

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

Using the following formulas to determine the correction factors of dry bulb and wet bulb:

- 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

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

The nominal airflow for 50KQL12 is 350 cfm. The design parameter is 325 cfm.

$$308/350 = 88\% \text{ of nominal airflow}$$

Use the 88% row in the Nominal Cfm Correction table.

The Entering Air Temperature wb is 66 F. Use the 66.2 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	=	12,200	x 0.983 x 0.979	= 11,741
Corrected Sensible Cooling	=	8,900	x 1.036 x 0.936	= 8,630
Corrected Heat of Rejection	=	15,900	x 0.985 x 0.979	= 15,333

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 Water temperature rise calculation and assessment.

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

$$\text{Actual Temperature Rise} = \frac{\text{Correction of Heat Rejection}}{\text{gpm} \times 500}$$

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

$$\text{Actual Temperature Rise} = \frac{15,333}{3.1 \times 500} = 9.9 \text{ F}$$

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.

VII ARI/ISO 13256-1 Conversion

Performance standard ARI/ISO 13256-1 became effective on January 1, 2000 and replaced the existing ARI Standards 320 Water-Loop Heat Pumps (WLHP), 325 Ground-Water Heat Pumps (GWHP), and 330 Ground-Loop Heat Pumps (GLHP).

The ARI/ISO Standard incorporates a consistent rating methodology for including fan and pump energy for calculating cooling capacity, heating capacity, and energy efficiency ratios (EER). This simplifies the use of rating data for heat pump performance modeling in seasonal energy analysis calculations, and allows for direct rating comparisons across applications.

a) ISO Capacity and Efficiency Equations

The following equations are used to calculate and correct cooling capacity, heating capacity, and respective EER:

ISO Cooling Capacity = (Cooling Capacity in Btuh) + (Fan Power Correction in Watts x 3.412)

ISO Cooling EER = (ISO Cooling Capacity in Btuh/3.412)/(Power Input in watts - fan power correction in watts + pump power correction in watts) = Watts/Watts

NOTE: Do not divide ISO Cooling Capacity by 3.412 to obtain Btuh/Watts.

ISO Heating Capacity = (Heating Capacity in Btuh) - (Fan Power Correction in Watts x 3.412)

ISO Heating EER = (ISO Heating Capacity in Btuh/3.412)/(Power Input in watts - fan power correction in watts + pump power correction in watts) = Watts/Watts

NOTE: Do not divide ISO Heating Capacity by 3.412 to obtain Btuh/Watts.

b) Identify the design conditions corrected for air and water conditions.

Airflow Cfm = 308 Cfm

Water Flow

(Based upon 10 F rise in temp) = 3.1 GPM

External Static Pressure = 0.0 in. wg (non-ducted application)

Water Pressure Drop = 3.7 ft of head

Power input = 1,067 watts

Cooling Capacity = 11,741 Btuh

c) Perform Fan Power Correction Adjustment

Use the following formula to calculate Fan Power Correction:

Fan Power

$$\begin{aligned} \text{Correction} &= (\text{Cfm} \times 0.472) \times (\text{External Static Pressure} \times 249) / 300 = \text{Watts} \\ &= (308 \times 0.472) \times (0 \times 249) / 300 \\ &= 0 \text{ Watts} \end{aligned}$$

d) Perform Pump Power Correction Adjustment

Use the following formula to calculate Pump Power Correction:

Pump Power

$$\begin{aligned} \text{Correction} &= (\text{GPM} \times 0.0631) \times (\text{Pressure Drop} \times 2,990) / 300 \\ &= \text{Watts} \\ &= (3.1 \times 0.0631) \times \\ &\quad (3.7 \times 2,990) / 300 \\ &= 7.2 \text{ Watts} \end{aligned}$$

e) Perform capacity and EER calculations

Use the following formula to calculate capacity and EER:

ISO Cooling

$$\begin{aligned} \text{Capacity} &= (\text{Cooling Capacity}) + (\text{Fan Power Correction} \times 3.412) \\ &= 11,741 + (0 \times 3.412) \\ &= 11,741 \text{ Btuh} \end{aligned}$$

f) Perform Corrections by using the ISO Equations

$$\begin{aligned} \text{ISO EER} &= (\text{ISO Cooling Capacity} / 3.412) / \\ &\quad (\text{Power Input} - \text{Fan Power Correction} + \text{Pump Power Correction}) \\ &= \text{Watts/Watts} \end{aligned}$$

NOTE: Do not divide ISO Cooling Capacity by 3.412 to obtain Btuh/Watts.

$$\begin{aligned} &= (11,741 / 3.412) / (1,067 - 0 + 7.2) \\ &= 3.20 \text{ Watts/Watt} \\ &= 10.93 \text{ Btuh/Watt} \end{aligned}$$

Performance data



50KQL07 — NOMINAL AIRFLOW 240 CFM

EWT (F)	GPM	WATER PRESSURE DROP (ft wg)		COOLING — EAT 80 F DB/67 F WB					HEATING — EAT 70 F		
		Without Motorized Valve	With Cv = 2.9 MOPD = 125 psi	TC	SC	SHR	Input Power	THR	TC	Input Power	THA
20	1.0	1.6	1.8	Operation not recommended					Operation not recommended		
	1.4	2.5	2.7								
	1.9	3.7	4.2								
30	1.0	1.4	1.6	9.7	6.9	0.71	0.36	10.9	6.0	0.51	4.3
	1.4	2.2	2.4	9.8	6.9	0.70	0.33	10.9	6.3	0.52	4.5
	1.9	3.3	3.7	9.9	6.9	0.70	0.31	10.9	6.4	0.52	4.7
40	1.0	0.9	1.0	9.4	6.8	0.72	0.41	10.8	6.9	0.53	5.1
	1.4	1.4	1.7	9.6	6.9	0.71	0.37	10.9	7.2	0.54	5.4
	1.9	2.1	2.5	9.7	6.9	0.71	0.36	10.9	7.4	0.55	5.6
50	1.0	0.9	1.0	9.0	6.7	0.74	0.46	10.6	7.8	0.56	5.9
	1.4	1.4	1.6	9.3	6.8	0.73	0.42	10.8	8.2	0.57	6.3
	1.9	2.0	2.5	9.5	6.8	0.72	0.40	10.8	8.4	0.57	6.5
60	1.0	0.8	0.9	8.6	6.5	0.76	0.52	10.4	8.7	0.58	6.7
	1.4	1.3	1.5	8.9	6.6	0.74	0.48	10.5	9.2	0.59	7.2
	1.9	1.9	2.4	9.1	6.7	0.74	0.46	10.6	9.4	0.60	7.4
70*	1.0	0.7	0.9	8.1	6.3	0.78	0.58	10.1	9.6	0.61	7.6
	1.4	1.2	1.4	8.5	6.5	0.76	0.53	10.3	10.2	0.62	8.1
	1.9	1.8	2.2	8.6	6.5	0.76	0.51	10.4	10.5	0.63	8.3
80	1.0	0.7	0.8	7.6	6.1	0.79	0.65	9.8	10.6	0.63	8.4
	1.4	1.1	1.3	8.0	6.2	0.78	0.60	10.0	11.1	0.64	9.0
	1.9	1.6	2.0	8.1	6.3	0.78	0.57	10.1	11.5	0.65	9.3
85*	1.0	0.6	0.7	7.4	5.9	0.80	0.68	9.7	11.0	0.64	8.9
	1.4	1.0	1.3	7.7	6.1	0.79	0.63	9.9	11.6	0.65	9.4
	1.9	1.5	1.9	7.9	6.2	0.78	0.61	10.0	12.0	0.66	9.7
90	1.0	0.6	0.7	7.2	5.8	0.81	0.72	9.6	11.5	0.65	9.3
	1.4	1.0	1.2	7.5	6.0	0.80	0.67	9.8	12.1	0.66	9.9
	1.9	1.4	1.9	7.6	6.1	0.79	0.64	9.8	12.5	0.67	10.2
100	1.0	0.6	0.7	6.7	5.5	0.81	0.81	9.5	Operation Not Recommended		
	1.4	0.9	1.1	7.0	5.7	0.81	0.75	9.6			
	1.9	1.3	1.7	7.2	5.8	0.81	0.72	9.6			
110	1.0	0.5	0.7	6.4	5.2	0.81	0.91	9.5			
	1.4	0.9	1.1	6.6	5.4	0.81	0.84	9.5			
	1.9	1.3	1.7	6.7	5.5	0.81	0.81	9.5			

LEGEND

- DB — Dry Bulb
- EAT — Entering Air Temperature (F)
- EWT — Entering Water Temperature (F)
- GPM — Gallons per Minute
- MBtuh — Btuh in Thousands
- SC — Sensible Capacity (MBtuh)
- SHR — Sensible Heat Ratio
- TC — Total Capacity
- THA — Total Heat of Absorption (MBtuh)
- THR — Total Heat of Rejection (MBtuh)
- WB — Wet Bulb
- WLHP — Water Loop Heat Pump

NOTES:

1. MOPD = Maximum Operating Pressure Differential (water pressure differential at unit cannot exceed MOPD or water valve cannot close)
2. Interpolation is permissible, extrapolation is not.
3. All entering air conditions are 80 F db and 67 F wb in cooling and 70 F db in heating.
4. All performance data is based upon the lower voltage of dual voltage rated units. See Performance Correction Tables on page 21 for operating conditions other than those listed above.
5. ARI/ISO 13256-1 (WLHP application) certified conditions are 86 F EWT, 80.6 db and 66.2 F wb in cooling and 68 F EWT, 68 F db and 59 F wb in heating.

*ARI 320 points (bold printing) are shown for comparison purposes only. These are not certified data points.



50KQL09 — NOMINAL AIRFLOW 300 CFM

EWT (F)	GPM	WATER PRESSURE DROP (ft wg)		COOLING — EAT 80 F DB/67 F WB					HEATING — EAT 70 F		
		Without Motorized Valve	With Cv = 2.9 MOPD = 125 psi	TC	SC	SHR	Input Power	THR	TC	Input Power	THA
20	1.3	2.2	2.4	Operation not recommended					Operation not recommended		
	1.9	3.9	4.4								
	2.5	6.2	7.0								
30	1.3	1.8	2.0	11.3	7.6	0.67	0.48	13.0	7.5	0.66	5.2
	1.9	3.2	3.6	11.7	7.7	0.66	0.44	13.2	7.6	0.67	5.4
	2.5	5.0	5.8	11.9	7.8	0.66	0.42	13.3	7.7	0.67	5.4
40	1.3	1.3	1.5	10.9	7.4	0.68	0.54	12.8	8.1	0.69	5.8
	1.9	2.6	3.0	11.2	7.5	0.67	0.49	12.9	8.4	0.70	6.0
	2.5	4.0	4.7	11.3	7.6	0.67	0.47	13.0	8.6	0.71	6.2
50	1.3	1.3	1.5	10.6	7.2	0.68	0.60	12.6	9.1	0.72	6.6
	1.9	2.5	2.9	10.8	7.3	0.68	0.56	12.7	9.4	0.73	6.9
	2.5	3.9	4.6	10.9	7.4	0.67	0.53	12.8	9.7	0.74	7.1
60	1.3	1.2	1.4	10.2	7.1	0.69	0.67	12.5	10.1	0.75	7.6
	1.9	2.4	2.8	10.4	7.2	0.69	0.62	12.6	10.6	0.77	8.0
	2.5	3.7	4.4	10.6	7.2	0.68	0.60	12.6	10.9	0.77	8.2
70	1.3	1.2	1.3	9.8	6.9	0.71	0.75	12.4	11.3	0.79	8.6
	1.9	2.2	2.7	10.1	7.0	0.70	0.70	12.5	11.9	0.80	9.1
	2.5	3.5	4.2	10.2	7.1	0.69	0.67	12.5	12.2	0.81	9.4
80	1.3	1.1	1.3	9.3	6.8	0.73	0.83	12.1	12.5	0.82	9.7
	1.9	2.1	2.5	9.6	6.9	0.71	0.78	12.3	13.1	0.83	10.3
	2.5	3.2	4.0	9.8	6.9	0.71	0.75	12.4	13.5	0.84	10.6
85	1.3	1.1	1.2	9.0	6.7	0.74	0.87	12.0	13.1	0.83	10.2
	1.9	2.0	2.4	9.4	6.8	0.72	0.82	12.2	13.7	0.85	10.8
	2.5	3.1	3.9	9.6	6.9	0.72	0.79	12.3	14.1	0.86	11.2
90	1.3	1.0	1.2	8.7	6.5	0.75	0.92	11.8	13.7	0.85	10.8
	1.9	2.0	2.4	9.1	6.7	0.74	0.86	12.0	14.3	0.87	11.4
	2.5	3.0	3.8	9.3	6.8	0.73	0.83	12.1	14.7	0.88	11.7
100	1.3	1.0	1.2	7.9	6.2	0.79	1.01	11.3	Operation Not Recommended		
	1.9	1.9	2.3	8.4	6.4	0.77	0.95	11.6			
	2.5	3.0	3.7	8.6	6.5	0.76	0.92	11.8			
110	1.3	1.0	1.2	6.9	5.7	0.83	1.10	10.7			
	1.9	2.0	2.4	7.5	6.0	0.80	1.04	11.1			
	2.5	3.1	3.8	7.8	6.2	0.79	1.02	11.3			

LEGEND

- DB — Dry Bulb
- EAT — Entering Air Temperature (F)
- EWT — Entering Water Temperature (F)
- GPM — Gallons per Minute
- MBtuh — Btuh in Thousands
- SC — Sensible Capacity (MBtuh)
- SHR — Sensible Heat Ratio
- TC — Total Capacity
- THA — Total Heat of Absorption (MBtuh)
- THR — Total Heat of Rejection (MBtuh)
- WB — Wet Bulb
- WLHP — Water Loop Heat Pump

NOTES:

1. MOPD = Maximum Operating Pressure Differential (water pressure differential at unit cannot exceed MOPD or water valve cannot close)
2. Interpolation is permissible, extrapolation is not.
3. All entering air conditions are 80 F db and 67 F wb in cooling and 70 F db in heating.
4. All performance data is based upon the lower voltage of dual voltage rated units. See Performance Correction Tables on page 21 for operating conditions other than those listed above.
5. ARI/ISO 13256-1 (WLHP application) certified conditions are 86 F EWT, 80.6 db and 66.2 F wb in cooling and 68 F EWT, 68 F db and 59 F wb in heating.

*ARI 320 points (bold printing) are shown for comparison purposes only. These are not certified data points.

Performance data (cont)



50KQL12 — NOMINAL AIRFLOW 350 CFM

EWT (F)	GPM	WATER PRESSURE DROP (ft wg)		COOLING — EAT 80 F DB/67 F WB					HEATING — EAT 70 F		
		Without Motorized Valve	With Cv = 2.9 MOPD = 125 psi	TC	SC	SHR	Input Power	THR	TC	Input Power	THA
20	1.6	2.1	6.5	Operation not recommended					Operation not recommended		
	2.3	3.8	11.4								
	3.1	6.1	19.6								
30	1.6	1.8	6.5	14.8	9.8	0.66	0.60	16.8	9.4	0.81	6.6
	2.3	3.3	11.4	14.9	9.9	0.66	0.55	16.8	9.7	0.83	6.9
	3.1	5.3	19.6	15.0	9.9	0.66	0.53	16.8	9.9	0.83	7.1
40	1.6	1.6	6.5	14.4	9.6	0.67	0.68	16.7	10.6	0.86	7.7
	2.3	3.1	11.4	14.7	9.7	0.66	0.62	16.8	11.0	0.87	8.0
	3.1	4.8	19.6	14.8	9.8	0.66	0.59	16.8	11.2	0.88	8.3
50	1.6	1.6	6.5	14.0	9.5	0.68	0.76	16.6	11.8	0.89	8.8
	2.3	2.9	11.4	14.3	9.6	0.67	0.70	16.7	12.3	0.91	9.2
	3.1	4.5	19.6	14.5	9.6	0.67	0.67	16.7	12.6	0.92	9.5
60	1.6	1.5	6.5	13.5	9.3	0.69	0.86	16.4	13.1	0.93	9.9
	2.3	2.7	11.4	13.8	9.4	0.68	0.79	16.5	13.6	0.94	10.4
	3.1	4.3	19.6	14.0	9.5	0.68	0.76	16.6	13.9	0.95	10.7
70	1.6	1.4	6.5	12.9	9.1	0.71	0.97	16.2	14.3	0.96	11.0
	2.3	2.6	11.4	13.3	9.2	0.69	0.90	16.3	14.9	0.97	11.6
	3.1	4.1	19.6	13.5	9.3	0.69	0.86	16.4	15.2	0.98	11.9
80	1.6	1.3	6.5	12.2	8.9	0.73	1.10	15.9	15.5	0.98	12.1
	2.3	2.5	11.4	12.7	9.0	0.71	1.01	16.1	16.0	0.99	12.7
	3.1	3.9	19.6	12.9	9.1	0.71	0.97	16.2	16.3	1.00	12.9
85	1.6	1.3	6.5	11.8	8.8	0.74	1.16	15.8	16.0	0.99	12.6
	2.3	2.4	11.4	12.3	8.9	0.72	1.07	16.0	16.6	1.00	13.2
	3.1	3.8	19.6	12.6	9.0	0.72	1.03	16.1	16.9	1.01	13.4
90	1.6	1.3	6.5	11.5	8.6	0.75	1.23	15.7	16.5	1.00	13.1
	2.3	2.3	11.4	12.0	8.8	0.73	1.14	15.8	17.1	1.01	13.6
	3.1	3.7	19.6	12.2	8.9	0.73	1.09	15.9	17.3	1.01	13.9
100	1.6	1.2	6.5	10.7	8.4	0.78	1.37	15.4	Operation Not Recommended		
	2.3	2.2	11.4	11.2	8.6	0.76	1.27	15.6			
	3.1	3.4	19.6	11.5	8.6	0.75	1.23	15.7			
110	1.6	1.1	6.5	9.9	8.1	0.82	1.52	15.1			
	2.3	2.0	11.4	10.4	8.3	0.79	1.42	15.3			
	3.1	3.2	19.6	10.7	8.4	0.78	1.37	15.4			

LEGEND

DB	— Dry Bulb
EAT	— Entering Air Temperature (F)
EWT	— Entering Water Temperature (F)
GPM	— Gallons per Minute
MBtuh	— Btuh in Thousands
SC	— Sensible Capacity (MBtuh)
SHR	— Sensible Heat Ratio
TC	— Total Capacity
THA	— Total Heat of Absorption (MBtuh)
THR	— Total Heat of Rejection (MBtuh)
WB	— Wet Bulb
WLHP	— Water Loop Heat Pump

NOTES:

1. MOPD = Maximum Operating Pressure Differential (water pressure differential at unit cannot exceed MOPD or water valve cannot close)
2. Interpolation is permissible, extrapolation is not.
3. All entering air conditions are 80 F db and 67 F wb in cooling and 70 F db in heating.
4. All performance data is based upon the lower voltage of dual voltage rated units. See Performance Correction Tables on page 21 for operating conditions other than those listed above.
5. ARI/ISO 13256-1 (WLHP application) certified conditions are 86 F EWT, 80.6 db and 66.2 F wb in cooling and 68 F EWT, 68 F db and 59 F wb in heating.

*ARI 320 points (bold printing) are shown for comparison purposes only. These are not certified data points.



50KQL15 — NOMINAL AIRFLOW 400 CFM

EWT (F)	GPM	WATER PRESSURE DROP (ft wg)		COOLING — EAT 80 F DB/67 F WB					HEATING — EAT 70 F		
		Without Motorized Valve	With Cv = 2.9 MOPD = 125 psi	TC	SC	SHR	Input Power	THR	TC	Input Power	THA
20	1.8	1.4	1.8	Operation not recommended					Operation not recommended		
	2.7	3.0	3.9								
	3.6	4.9	6.5								
30	1.8	1.2	1.6	16.5	11.2	0.67	0.68	18.8	10.4	0.95	7.2
	2.7	2.6	3.4	16.6	11.1	0.67	0.62	18.7	10.7	0.96	7.4
	3.6	4.2	5.7	16.6	11.0	0.67	0.60	18.6	10.9	0.97	7.6
40	1.8	1.3	1.6	16.3	11.1	0.68	0.76	18.9	11.6	0.99	8.2
	2.7	2.3	3.1	16.5	11.2	0.68	0.70	18.9	12.1	1.00	8.7
	3.6	3.6	5.1	16.5	11.2	0.67	0.67	18.8	12.3	1.01	8.9
50	1.8	1.2	1.6	15.8	11.0	0.70	0.85	18.7	13.1	1.03	9.6
	2.7	2.2	3.1	16.2	11.1	0.69	0.78	18.8	13.7	1.05	10.1
	3.6	3.5	5.0	16.3	11.1	0.68	0.75	18.9	14.0	1.05	10.4
60	1.8	1.2	1.6	15.2	10.8	0.71	0.94	18.4	14.7	1.07	11.1
	2.7	2.1	3.0	15.6	10.9	0.70	0.87	18.6	15.4	1.09	11.7
	3.6	3.4	4.9	15.8	11.0	0.69	0.84	18.7	15.8	1.09	12.1
70	1.8	1.1	1.5	14.3	10.5	0.73	1.04	17.9	16.4	1.10	12.6
	2.7	2.0	2.9	14.9	10.7	0.72	0.97	18.2	17.2	1.12	13.4
	3.6	3.2	4.8	15.2	10.8	0.71	0.94	18.4	17.6	1.13	13.8
80	1.8	1.1	1.5	13.4	10.2	0.76	1.16	17.3	18.0	1.13	14.1
	2.7	2.0	2.8	14.0	10.4	0.74	1.08	17.7	18.8	1.15	14.9
	3.6	3.1	4.6	14.3	10.5	0.73	1.05	17.9	19.3	1.15	15.3
85	1.8	1.1	1.5	12.9	10.0	0.78	1.21	17.0	18.8	1.14	14.8
	2.7	1.9	2.8	13.5	10.3	0.76	1.14	17.4	19.6	1.15	15.6
	3.6	3.0	4.6	13.9	10.4	0.75	1.10	17.6	20.0	1.16	16.0
90	1.8	1.0	1.4	12.3	9.9	0.80	1.27	16.7	19.5	1.15	15.5
	2.7	1.9	2.7	13.0	10.1	0.78	1.20	17.1	20.2	1.16	16.3
	3.6	3.0	4.5	13.4	10.2	0.76	1.16	17.3	20.6	1.16	16.6
100	1.8	1.0	1.4	11.1	9.4	0.85	1.40	15.9	Operation Not Recommended		
	2.7	1.8	2.7	11.9	9.7	0.82	1.32	16.4			
	3.6	2.9	4.4	12.2	9.8	0.80	1.28	16.6			
110	1.8	1.0	1.4	9.8	8.9	0.91	1.53	15.0			
	2.7	1.8	2.7	10.6	9.2	0.87	1.45	15.5			
	3.6	2.9	4.4	11.0	9.4	0.85	1.41	15.8			

LEGEND

- DB — Dry Bulb
- EAT — Entering Air Temperature (F)
- EWT — Entering Water Temperature (F)
- GPM — Gallons per Minute
- MBtuh — Btuh in Thousands
- SC — Sensible Capacity (MBtuh)
- SHR — Sensible Heat Ratio
- TC — Total Capacity
- THA — Total Heat of Absorption (MBtuh)
- THR — Total Heat of Rejection (MBtuh)
- WB — Wet Bulb
- WLHP — Water Loop Heat Pump

NOTES:

1. MOPD = Maximum Operating Pressure Differential (water pressure differential at unit cannot exceed MOPD or water valve cannot close)
2. Interpolation is permissible, extrapolation is not.
3. All entering air conditions are 80 F db and 67 F wb in cooling and 70 F db in heating.
4. All performance data is based upon the lower voltage of dual voltage rated units. See Performance Correction Tables on page 21 for operating conditions other than those listed above.
5. ARI/ISO 13256-1 (WLHP application) certified conditions are 86 F EWT, 80.6 db and 66.2 F wb in cooling and 68 F EWT, 68 F db and 59 F wb in heating.

*ARI 320 points (bold printing) are shown for comparison purposes only. These are not certified data points.

Performance data (cont)



50KQL19 — NOMINAL AIRFLOW 460 CFM

EWT (F)	GPM	WATER PRESSURE DROP (ft wg)		COOLING — EAT 80 F DB/67 F WB					HEATING — EAT 70 F		
		Without Motorized Valve	With Cv = 2.9 MOPD = 125 psi	TC	SC	SHR	Input Power	THR	TC	Input Power	THA
20	2.4	3.0	3.7	Operation not recommended					Operation not recommended		
	3.6	6.0	7.5								
	4.8	9.7	12.5								
30	2.4	2.1	2.8	20.1	13.2	0.66	0.81	22.8	12.2	1.09	8.5
	3.6	4.2	5.8	20.5	13.4	0.66	0.76	23.1	12.6	1.10	8.9
	4.8	6.8	9.6	20.7	13.5	0.65	0.74	23.2	12.8	1.11	9.0
40	2.4	2.0	2.7	19.4	12.9	0.66	0.90	22.5	13.8	1.14	9.9
	3.6	3.8	5.4	19.8	13.1	0.66	0.84	22.7	14.3	1.16	10.3
	4.8	6.2	9.0	20.0	13.2	0.66	0.82	22.8	14.5	1.17	10.6
50	2.4	2.0	2.6	18.7	12.5	0.67	1.00	22.1	15.5	1.21	11.4
	3.6	3.7	5.2	19.2	12.7	0.66	0.94	22.4	16.0	1.23	11.9
	4.8	6.0	8.8	19.4	12.8	0.66	0.91	22.5	16.3	1.24	12.1
60	2.4	1.9	2.5	18.0	12.1	0.67	1.11	21.8	17.2	1.27	12.8
	3.6	3.5	5.1	18.5	12.4	0.67	1.04	22.0	17.8	1.30	13.4
	4.8	5.8	8.5	18.7	12.5	0.67	1.01	22.1	18.1	1.31	13.6
70	2.4	1.8	2.4	17.2	11.8	0.68	1.23	21.4	18.8	1.34	14.2
	3.6	3.3	4.9	17.7	12.0	0.68	1.16	21.6	19.4	1.36	14.8
	4.8	5.5	8.2	17.9	12.1	0.67	1.12	21.8	19.8	1.37	15.1
80	2.4	1.7	2.4	16.3	11.4	0.70	1.36	20.9	20.3	1.40	15.6
	3.6	3.2	4.7	16.8	11.6	0.69	1.28	21.2	20.9	1.42	16.1
	4.8	5.2	7.9	17.1	11.7	0.69	1.24	21.3	21.3	1.43	16.4
85	2.4	1.6	2.3	15.8	11.2	0.71	1.43	20.7	21.0	1.42	16.2
	3.6	3.1	4.6	16.4	11.4	0.70	1.35	21.0	21.6	1.44	16.7
	4.8	5.0	7.8	16.7	11.5	0.69	1.31	21.1	21.9	1.46	16.9
90	2.4	1.6	2.3	15.3	11.0	0.72	1.50	20.4	21.7	1.45	16.7
	3.6	3.0	4.6	15.9	11.2	0.71	1.42	20.7	22.2	1.47	17.2
	4.8	4.9	7.7	16.2	11.3	0.70	1.38	20.9	22.5	1.48	17.4
100	2.4	1.6	2.2	14.1	10.5	0.75	1.65	19.8	Operation Not Recommended		
	3.6	2.9	4.5	14.8	10.8	0.73	1.56	20.1			
	4.8	4.8	7.5	15.1	10.9	0.72	1.52	20.3			
110	2.4	1.6	2.3	12.8	10.0	0.78	1.81	19.0			
	3.6	3.0	4.5	13.6	10.3	0.76	1.72	19.4			
	4.8	4.9	7.6	13.9	10.5	0.75	1.68	19.6			

LEGEND

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NOTES:

1. MOPD = Maximum Operating Pressure Differential (water pressure differential at unit cannot exceed MOPD or water valve cannot close)
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5. ARI/ISO 13256-1 (WLHP application) certified conditions are 86 F EWT, 80.6 db and 66.2 F wb in cooling and 68 F EWT, 68 F db and 59 F wb in heating.

*ARI 320 points (bold printing) are shown for comparison purposes only. These are not certified data points.



CORRECTION FACTORS — ENTERING AIR

HEATING				COOLING										
EAT DB (F)	TC	Input Power	THA	EAT WB (F)	TC	Sensible Capacity Entering Dry Bulb (F)						Power Input	THR	
						70	75	80	80.6	85	90			95
60	1.011	0.989	1.007	60	0.893	0.889	1.087	*	*	*	*	*	0.964	0.902
65	1.004	0.994	1.004	65	0.964	0.692	0.884	1.085	1.108	*	*	*	0.988	0.967
68	1.002	0.997	1.002	66.2	0.983	0.645	0.838	1.036	1.059	1.231	*	*	0.995	0.985
70	1.000	1.000	1.000	67	1.000	0.613	0.806	1.000	1.027	1.199	*	*	1.000	1.000
75	0.996	1.007	0.995	70	1.049	—	0.683	0.879	0.902	1.077	1.274	1.415	1.016	1.046
80	0.991	1.018	0.990	75	1.118	—	—	0.676	0.698	0.866	1.068	1.266	1.037	1.106

*Sensible Capacity equals total capacity.

CORRECTION FACTORS — AIRFLOW

% OF NOMINAL AIRFLOW	COOLING CORRECTIONS				HEATING CORRECTIONS		
	TC	SC	Input Power	THR	TC	Input Power	THA
75%	0.951	0.860	0.963	0.952	0.990	1.054	0.966
81%	0.964	0.894	0.973	0.965	0.993	1.035	0.977
88%	0.979	0.936	0.984	0.979	0.996	1.019	0.987
94%	0.990	0.969	0.992	0.990	0.998	1.008	0.994
100%	1.000	1.000	1.000	1.000	1.000	1.000	1.000
106%	1.010	1.033	1.008	1.010	1.002	0.994	1.005
113%	1.019	1.069	1.016	1.019	1.003	0.988	1.011

LEGEND

- DB** — Dry Bulb
- EAT** — Entering Air Temperature (F)
- SC** — Sensible Capacity
- TC** — Total Capacity
- THA** — Total Heat of Absorption
- THR** — Total Heat of Rejection

50KQL CONSOLE BLOWER PERFORMANCE 60 Hz

50KQL	RATED AIRFLOW (cfm)	AIRFLOW (cfm)	
		Low Speed	High Speed
07	240	190	240
09	300	240	300
12	350	300	350
15	400	340	400
19	460	400	460

NOTES:

1. Fan speed is field adjustable.
2. All airflow is rated at lowest voltage if unit is dual voltage rated, i.e., 208 v for 208-230 v units.
3. All units are ARI/ISO 13256-1 rated on high fan speed.
4. All units are designed and rated for zero external static pressure (non-ducted) application.

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. Use 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
50RHC,RVC Horizontal/Vertical	Standard Efficiency 1/2-5	Efficient, compact, low cost alternative for retrofit or new boiler/tower systems.
50RHR,RVR Horizontal/Vertical	High Efficiency 1/2-5	Efficient, adaptable unit for new boiler/tower, ground water, or ground loop systems.
50RHS,RVS Horizontal/Vertical	Premium Efficiency 1 1/4-6	Premium, ultra efficient unit for new boiler/tower, ground water, or ground loop systems
50HQ,VQ Horizontal/Vertical	Large Capacity 6 1/2-25	Designed to handle large zoned areas for all applications.
50KQ	Console 1/2-1 1/2	Attractive design for finished interior, under-window installations.
50RTG	Rooftop 3-20	Economical solution for IAQ problems and tempering ventilation air.
50RWS	Water-to-Water 3-30	Used to pre-heat or cool air and can be used as a stand-alone or supplemental boiler/chiller in most hydronic heating applications. Also conditions process fluids, lubricants and refrigerants.

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, design this system 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 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 designing water loop systems. The guide includes a practical approach for the latest and most current design recommendations including:

- Horizontal, vertical, console, rooftop and water-to-water product applications.
- Ventilation methods and system design including energy recovery.
- Acoustical considerations for different product types.
- Addressing IAQ issues such as condensate removal, 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 stand alone, DDC, DCV, and VVT®.
- WSHP efficiency/operational cost comparison chart.
- System variations such as a system without a boiler, variable pumping, and VAV for interior use.

Ground water systems

To use Aquazone units in ground water applications, you should specify extended range. This will provide factory-installed coaxial coil insulation 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 — Use this system 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 piping and excavation.

Aquazone units include a standard TXV and are rated to extremely low temperatures to self-adjust the refrigeration circuit. Therefore, open loop systems do not require water regulating valves. Use a slow opening/closing solenoid valve to conserve water.

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. This system only requires piping to get the water from the source to the unit.

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

Horizontal ground loop — Use this system when adequate space is available and trenching can be easily accomplished. A series of parallel pipes are laid out in trenches 3 to 6 feet below the ground surface, and then back-filled. Often, multiple pipes are used to maximize each trench's heat transfer capability. Ground conditions, heating and cooling requirements, and system design determine piping requirements and ground loop field size.

Vertical ground loop — Use this system in vertical borehole applications. This design is well suited for retrofit applications when space is limited or where landscaping is already complete and minimum site disruption 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



WATER QUALITY GUIDELINES

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

Connect the console unit condensate drain to the building condensate drain with a flexible, non-pressure rate plastic hose. Be sure to avoid kinks in this hose to ensure an unobstructed flow of condensate from the unit to the drain. The condensate hose's horizontal run is usually too short to pose any drainage problems, however, make sure this line is pitched at least 1 inch for every 10 feet of run (in the direction of the flow.) Avoid low points and unpitched piping since dirt collects in these areas and may cause stoppage and overflow.

Installing a trap or drain in the field is not required unless specified by local codes. The 50KQL units are designated in a blow-thru configuration. The condensate drain pan is located on the outlet side of the blower so that the pressure in the drain pan is higher than the atmospheric pressure.

Water conditioning

In some applications, maintaining proper water quality may require 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 important when considering any WSHP application. Water typically includes impurities and hardness that must be removed. The required treatment depends on the water quality as well as system type. 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, Aqua-zone™ WSHP units use copper water-to-refrigerant heat exchanger. Units can also be equipped with a Cupronickel heat exchanger for applications where water is outside the copper heat exchanger's standard contaminant limits.

CONDITION	ACCEPTABLE LEVEL		
pH	7 to 9 range for copper. Cupronickel may be used in the 5 to 9 range.		
Total Hardness	Calcium and magnesium carbonate should not exceed 20 grains per gallon (350 ppm).		
Iron Oxides	Less than 1 ppm.		
Iron Bacteria	No level allowable.		
Corrosion*	Ammonia,	Max Allowable Level	Coaxial Metal
	Ammonium Hydroxide	0.5 ppm	Cu
	Ammonium Chloride,	0.5 ppm	Cu
	Ammonium Nitrate	0.5 ppm	Cu
	Ammonium Sulfate	0.5 ppm	CuNi
Chlorine/Chlorides	0.5 ppm	—	
Hydrogen Sulfide†	None Allowable	—	
Brackish	Use Cupronickel heat exchanger when concentrations of calcium or sodium chloride are greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)		

*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 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.

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

Acoustical design

Sound power levels represent the sound that the source, the WSHP unit, produces with no regard to attenuation between the source and the space. Acoustical design goals are necessary to provide criteria for occupied spaces. These goals help ensure that 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. Noise Criteria (NC) curve levels represent a peak over a full frequency spectrum. 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 the unit ratings from sound power (Lw) to sound pressure (Lp). This conversion depends on the specifics of the installation's acoustical environment. Assessing an area's acoustical design requires that you compare the sound pressure (Lp) with the NC curve for the selected area.

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

Application data (cont)



OCTAVE BAND SOUND PRESSURE LEVEL (Lp) ASSOCIATED WITH NC CURVES

NOISE CRITERIA CURVES	OCTAVE BAND SOUND PRESSURE LEVEL (Lp)							
	Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
NC-15	49	36	26	17	17	14	12	11
NC-20	52	41	33	27	22	19	17	16
NC-25	54	45	38	31	27	24	22	21
NC-30	58	49	41	36	31	29	28	27
NC-35	61	53	45	40	36	34	33	32
NC-40	64	57	50	45	41	39	38	37
NC-45	67	61	54	49	46	44	43	42
NC-50	71	64	58	54	51	49	48	47
NC-55	74	68	63	58	56	54	53	52
NC-60	77	71	67	63	61	59	58	57
NC-65	80	75	71	68	66	64	63	62

WSHP sound control

Analyzing the projected sound level in the conditioned space caused by a WSHP unit is quite involved. The key is to have good sound power ratings (Lw) in dB on the equipment to determine the ductwork, ceiling and room sound attenuation effect.

Console units

With console units, the fan and compressor are located within the space, and only the casing design attenuates the transmission of sound sources into the space. The designer should carefully review the manufacturer's acoustical data when selecting console units and use lower fan speeds to minimize space noise.

Operating limits

Environment

This equipment is designed for indoor installation ONLY.

Power supply

A voltage variation of $\pm 10\%$ of nameplate utilization voltage is acceptable.

Starting conditions

The 50KQL unit will start and operate in an ambient temperature of 50 F, with entering air temperature at 50 F, with entering water temperature at 60 F, with both air and water at the flow rates used in the ARI/ISO Standard 13256-1 rating test, for initial start-up in winter.

NOTE: These are not normal or continuous operating conditions. Such a start-up should be used to bring the building space up to occupancy temperature.

Electrical data

50KQL	VOLTS-PHASE (60 Hz)	VOLTAGE		COMPRESSOR		FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR
		Min	Max	RLA	LRA				
07	115-1	104	127	7.1	46.5	0.50	7.6	9.3	15
	208/230-1	187	253	3.7	19.0	0.33	4.0	5.0	15
	265-1	239	291	2.8	16.0	0.35	3.1	3.8	15
09	115-1	104	127	9.0	46.5	1.30	10.3	12.5	20
	208/230-1	187	253	4.7	23.0	0.50	5.2	6.3	15
	265-1	239	291	3.8	16.0	0.50	4.3	5.3	15
12	115-1	104	127	10.6	63.0	1.30	11.9	14.6	25
	208/230-1	187	253	6.1	29.0	0.50	6.6	8.1	15
	265-1	239	291	4.8	21.6	0.50	5.3	6.5	15
15	208/230-1	187	253	7.0	33.2	1.10	8.1	9.8	15
	265-1	239	291	5.4	29.0	1.00	6.4	7.8	15
	208/230-1	187	253	7.7	38.0	1.10	8.8	10.7	15
19	265-1	239	291	5.8	29.0	1.00	6.8	8.2	15

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
RLA — Rated Load Amps

AIR LIMITS

	50KQL	
	Cooling	Heating
Min. Ambient Air	50 F	50 F
Rated Ambient Air	80 F	66 F
Max. Ambient Air	100 F	86 F
Min. Entering Air	50 F	50 F
Rated Entering Air, db/wb	80/66 F	68 F
Max. Entering Air, db/wb	100/82 F	80 F

WATER LIMITS

	50KQL	
	Cooling	Heating
Min. Entering Water	30 F*	21 F*
Normal Entering Water	86 F	70 F
Max. Entering Water	110 F	90 F

LEGEND

db — Dry Bulb
wb — Wet Bulb

*Requires optional extended range insulation package when operating below the dew point.

NOTES:

1. Minimum Air and Water conditions can only be used at ARI/ISO 13256-1 flow rates.
2. The 50KQL units may have up to two values at maximum or minimum with all other parameters at normal conditions.

Solenoid valves

In applications using variable flow pumping, solenoid valves can be factory 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. Use design care when selecting both the type and concentrations of glycol due to the following:

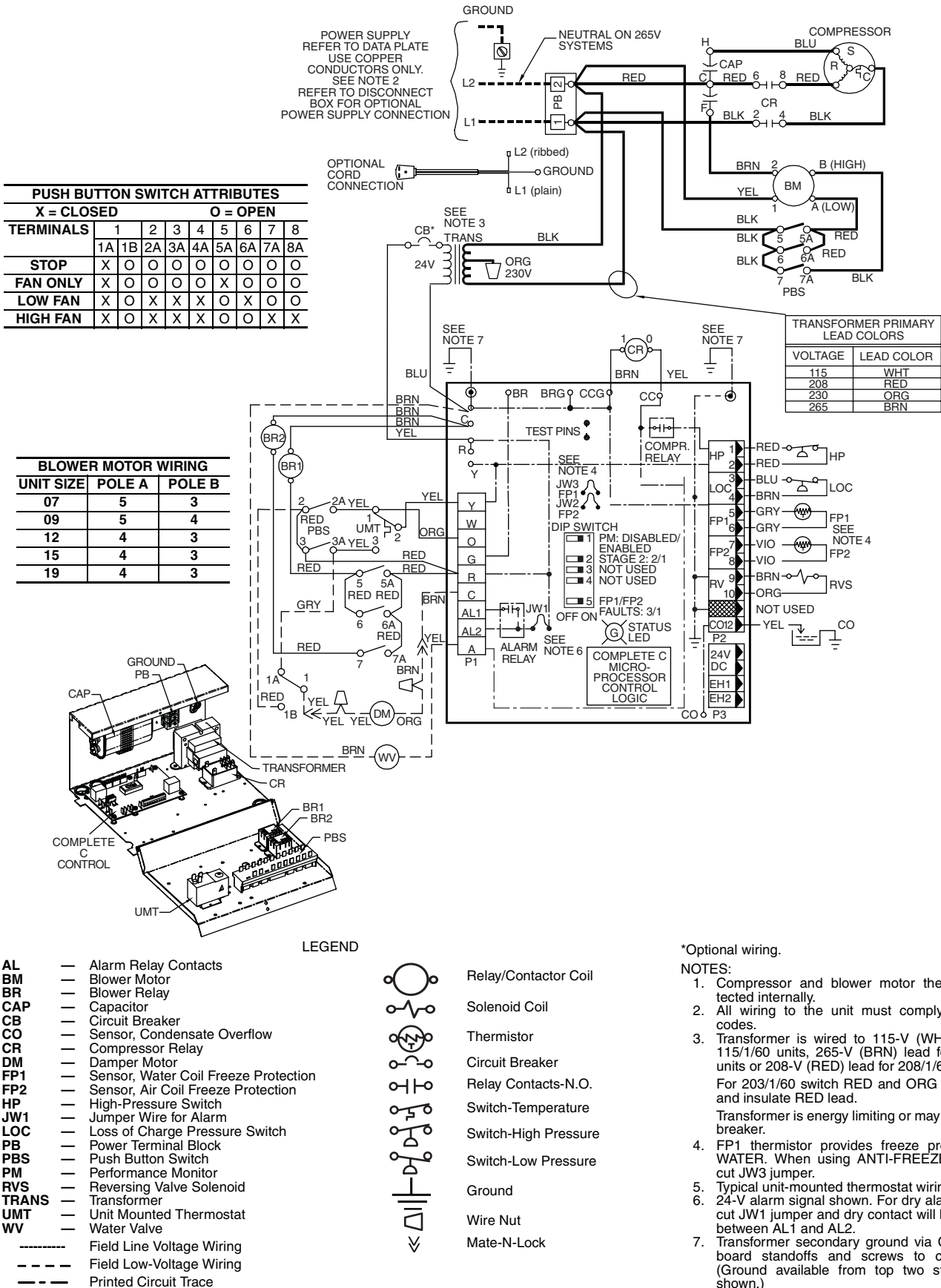
- Equipment and performance may suffer with high concentrations of glycol and other antifreeze solutions
- Loss of piping pressure may increase greatly, resulting in higher pumping costs
- Higher mixture viscosity may cause excess corrosion and wear on the entire system
- The water's acidity may be greatly increased, promoting corrosion

Glycol promotes galvanic corrosion in systems of dissimilar metals. The result is corrosion of one metal by the other, causing leaks.

Typical wiring schematics

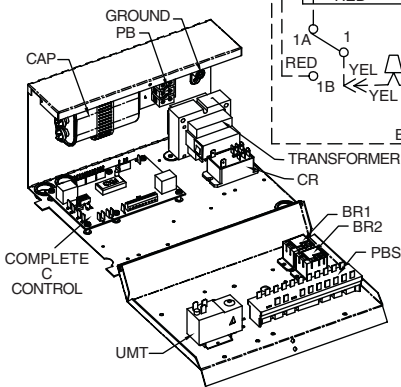


MANUAL CHANGEOVER WITH COMPLETE C CONTROLLER



PUSH BUTTON SWITCH ATTRIBUTES								
X = CLOSED				O = OPEN				
TERMINALS	1	2	3	4	5	6	7	8
1A	1B	2A	3A	4A	5A	6A	7A	8A
STOP	X	O	O	O	O	O	O	O
FAN ONLY	X	O	O	O	O	X	O	O
LOW FAN	X	O	X	X	X	O	X	O
HIGH FAN	X	O	X	X	X	O	X	X

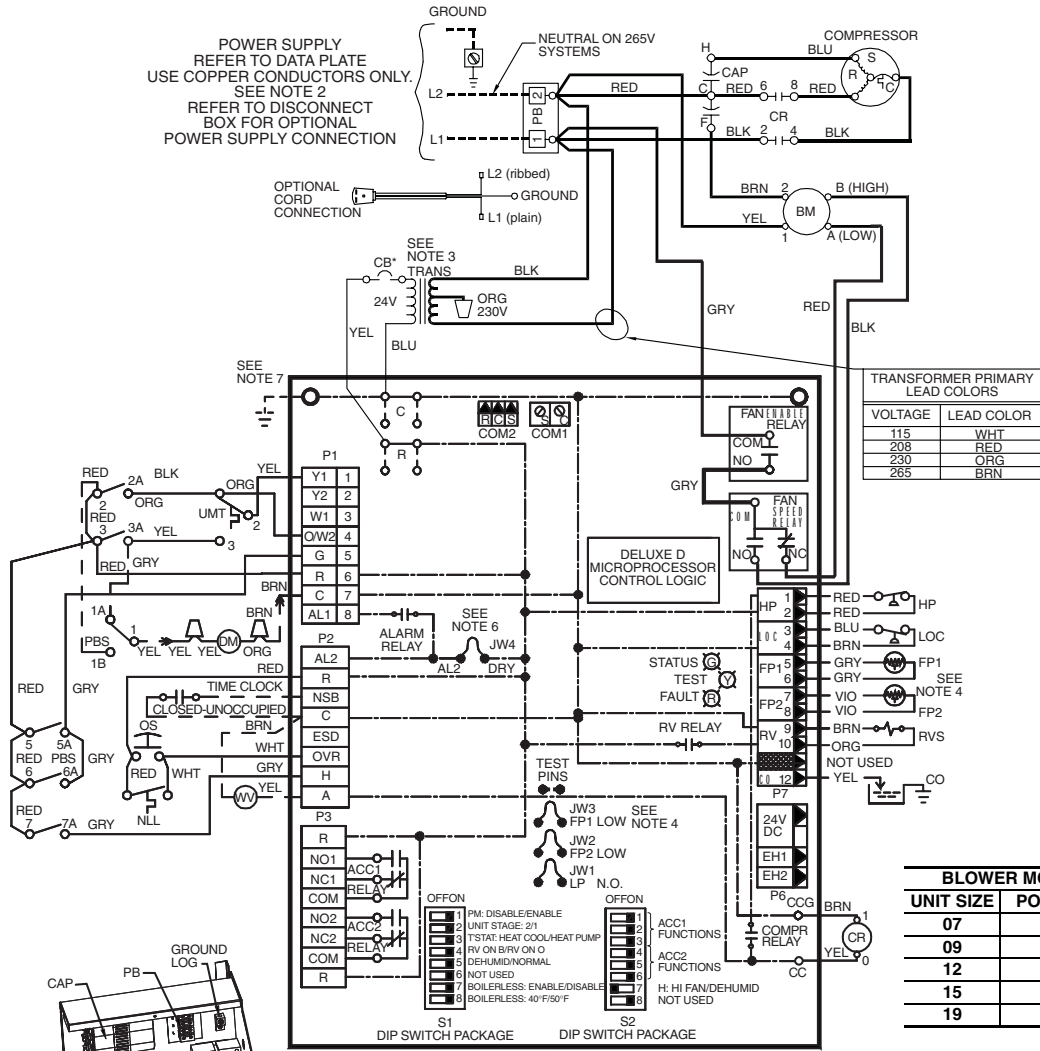
BLOWER MOTOR WIRING		
UNIT SIZE	POLE A	POLE B
07	5	3
09	5	4
12	4	3
15	4	3
19	4	3



Typical wiring schematics (cont)



MANUAL CHANGEOVER WITH DELUXE D CONTROLLER

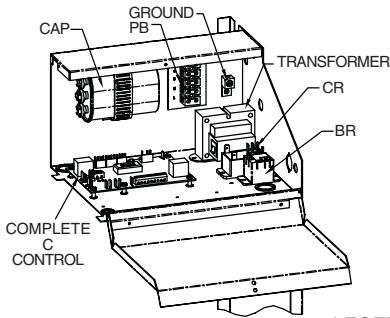
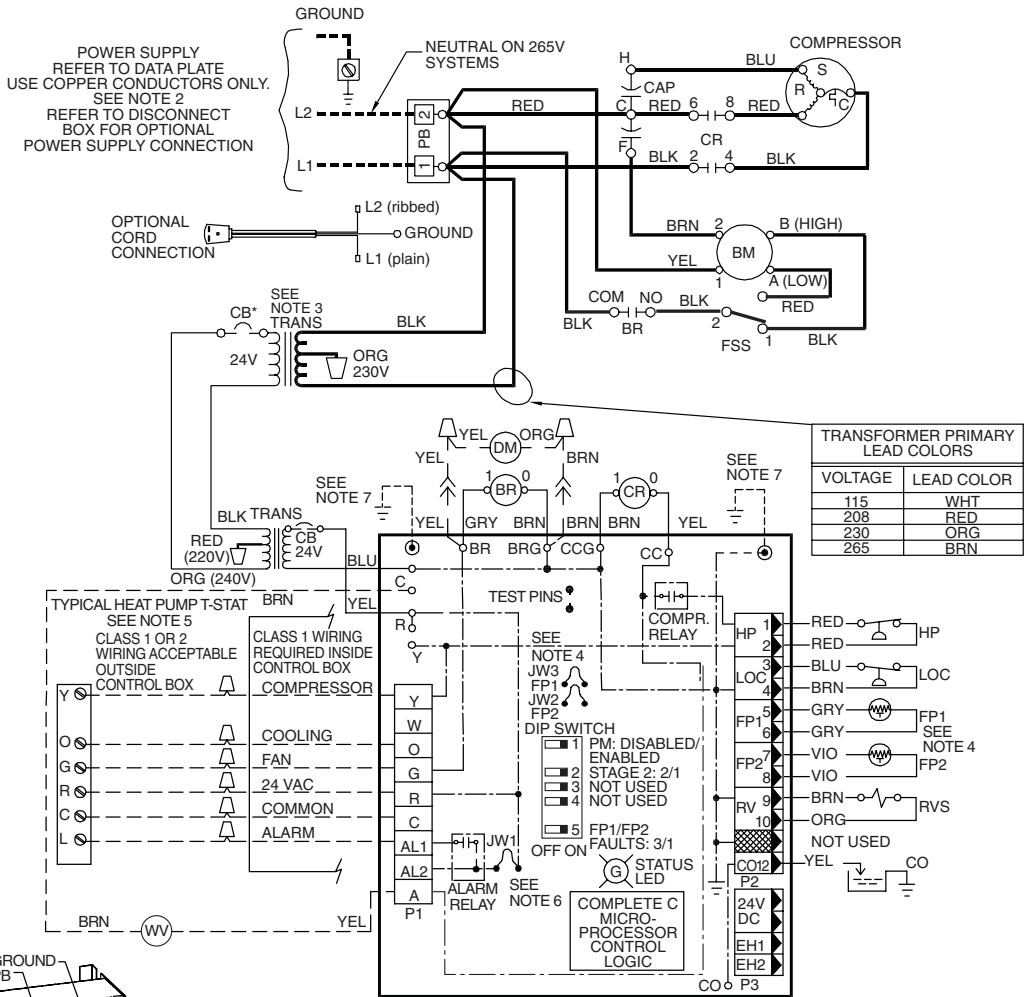


UNIT SIZE	POLE A	POLE B
07	5	3
09	5	4
12	4	3
15	4	3
19	4	3

TERMINALS	X = CLOSED O = OPEN								
	1A	1B	2A	3A	4A	5A	6A	7A	8A
STOP	X	O	O	O	O	O	O	O	O
FAN ONLY	X	O	O	O	O	X	O	O	O
LOW COOL	O	X	X	O	O	O	X	O	O
HIGH COOL	O	X	X	O	O	O	O	X	O
LOW HEAT	X	O	O	X	X	O	X	O	O
HIGH HEAT	X	O	O	X	X	O	O	X	X

- *Optional wiring.
- NOTES:
- Compressor and blower motor thermally protected internally.
 - All wiring to the unit must comply with local codes.
 - Transformer is wired to 115-V (WHT) lead for 115/1/60 units, 265-V (BRN) lead for 265/1/60 units or 208-V (RED) lead for 208/1/60 units. For 203/1/60 switch RED and ORG leads at L1 and insulate RED lead. Transformer is energy limiting or may have circuit breaker.
 - FP1 thermistor provides freeze protection for WATER. When using ANTI-FREEZE solutions, cut JW3 jumper. Typical unit-mounted thermostat wiring shown.
 - 24-V alarm signal shown. For dry alarm contact, cut AL2 DRY (JW4) jumper and dry contact will be available between AL1 and AL2.
 - Transformer secondary ground via Deluxe D board standoffs and screws to control box. (Ground available from top two standoffs as shown.)

REMOTE-MOUNTED THERMOSTAT WITH COMPLETE C CONTROLLER



UNIT SIZE	POLE A	POLE B
07	5	3
09	5	4
12	4	3
15	4	3
19	4	3

- LEGEND**
- AL** — Alarm Relay Contacts
 - BM** — Blower Motor
 - BR** — Blower Relay
 - CAP** — Capacitor
 - CB** — Circuit Breaker
 - CO** — Sensor, Condensate Overflow
 - CR** — Compressor Relay
 - DM** — Damper Motor
 - FP1** — Sensor, Water Coil Freeze Protection
 - FP2** — Sensor, Air Coil Freeze Protection
 - FSS** — Fan Speed Switch
 - HP** — High-Pressure Switch
 - JW1** — Jumper Wire for Alarm
 - LOC** — Loss of Charge Pressure Switch
 - PB** — Power Terminal Block
 - PBS** — Push Button Switch
 - PM** — Performance Monitor
 - RVS** — Reversing Valve Solenoid
 - TRANS** — Transformer
 - WV** — Water Valve
- Field Line Voltage Wiring
 - - - - - Field Low-Voltage Wiring

- Printed Circuit Trace
- Relay/Contactor Coil
- Solenoid Coil
- Thermistor
- Circuit Breaker
- Relay Contacts-N.O.
- Switch-High Pressure
- Switch-Low Pressure
- Ground
- Wire Nut
- Mate-N-Lock

*Optional wiring.

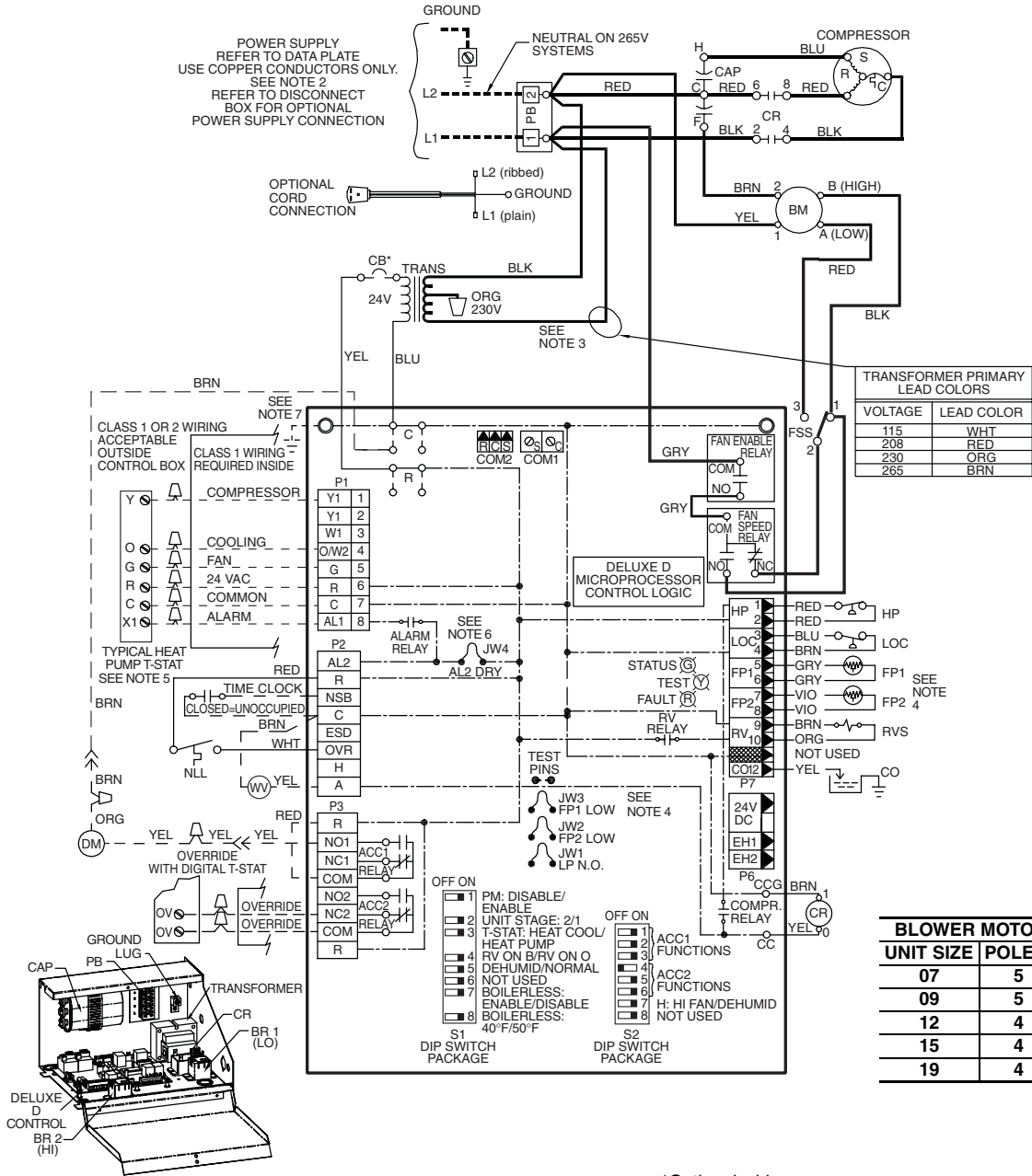
NOTES:

1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with local codes.
3. Transformer is wired to 115-V (WHT) lead for 115/1/60 units, 265-V (BRN) lead for 265/1/60 units or 208-V (RED) lead for 208/1/60 units.
 For 203/1/60 switch RED and ORG leads at L1 and insulate 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. Typical heat pump thermostat wiring shown. Refer to thermostat Installation Instructions for wiring to the unit.
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.)

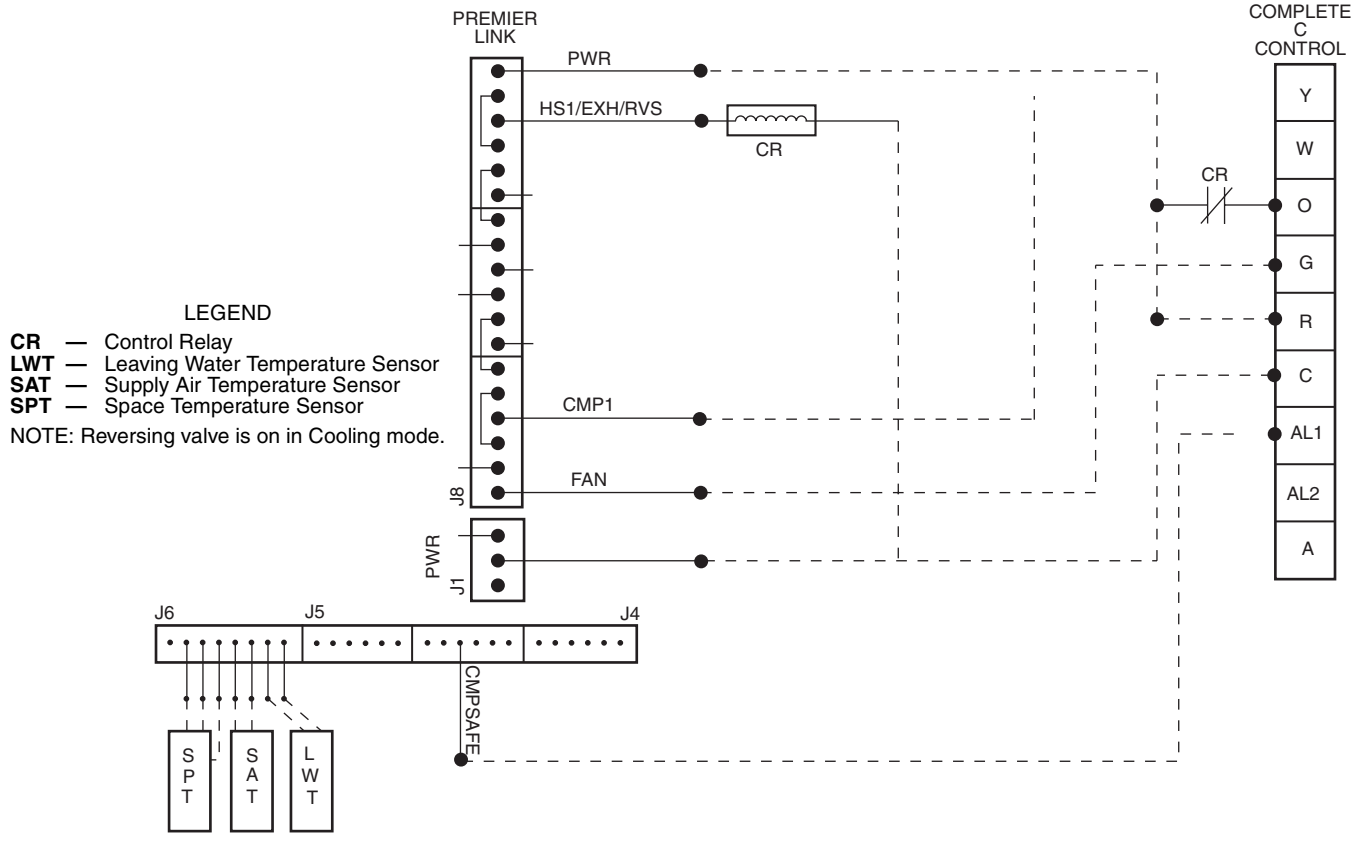
Typical wiring schematics (cont)



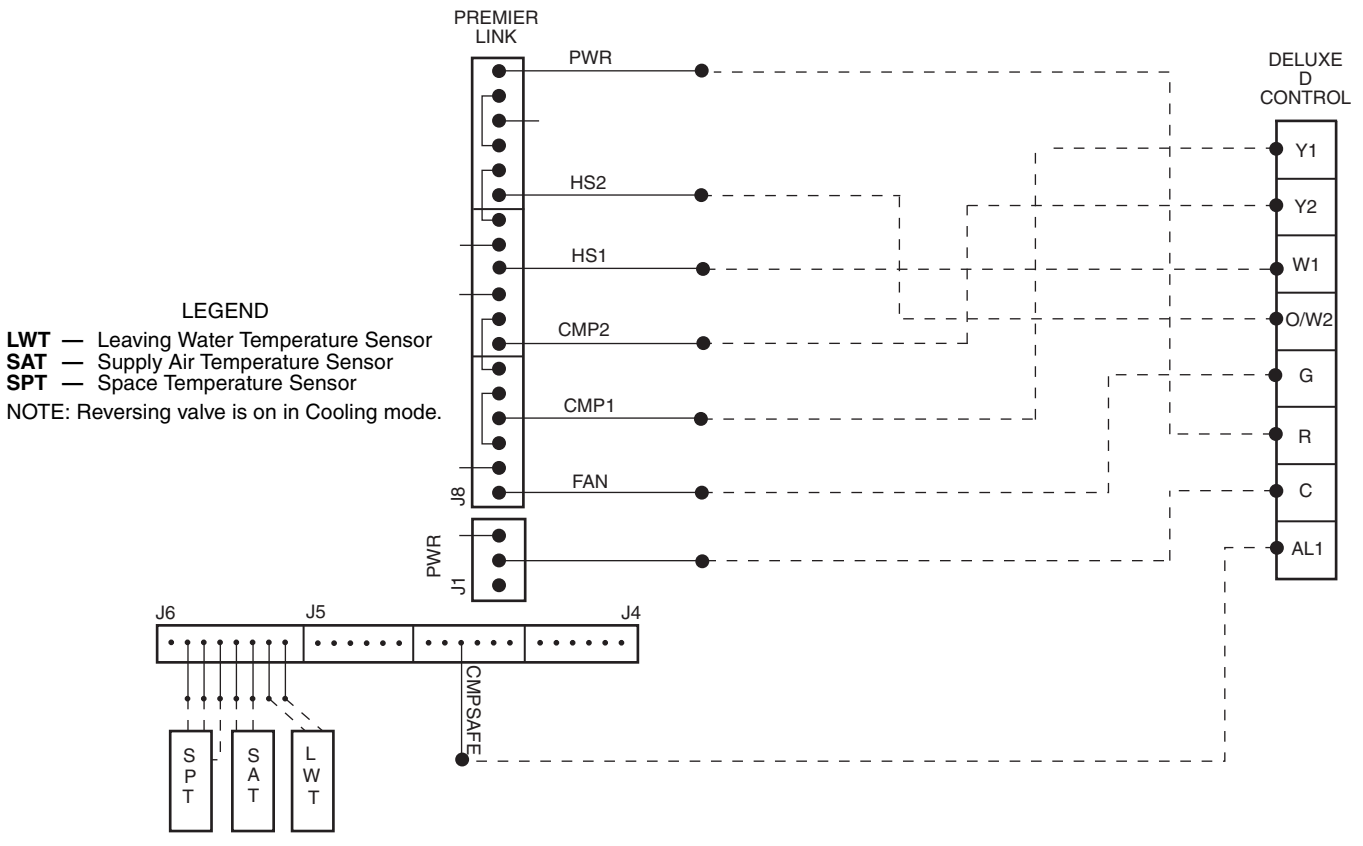
REMOTE-MOUNTED THERMOSTAT WITH DELUXE D CONTROLLER



PREMIERLINK™ CONTROLLER APPLICATIONS WITH COMPLETE C CONTROL



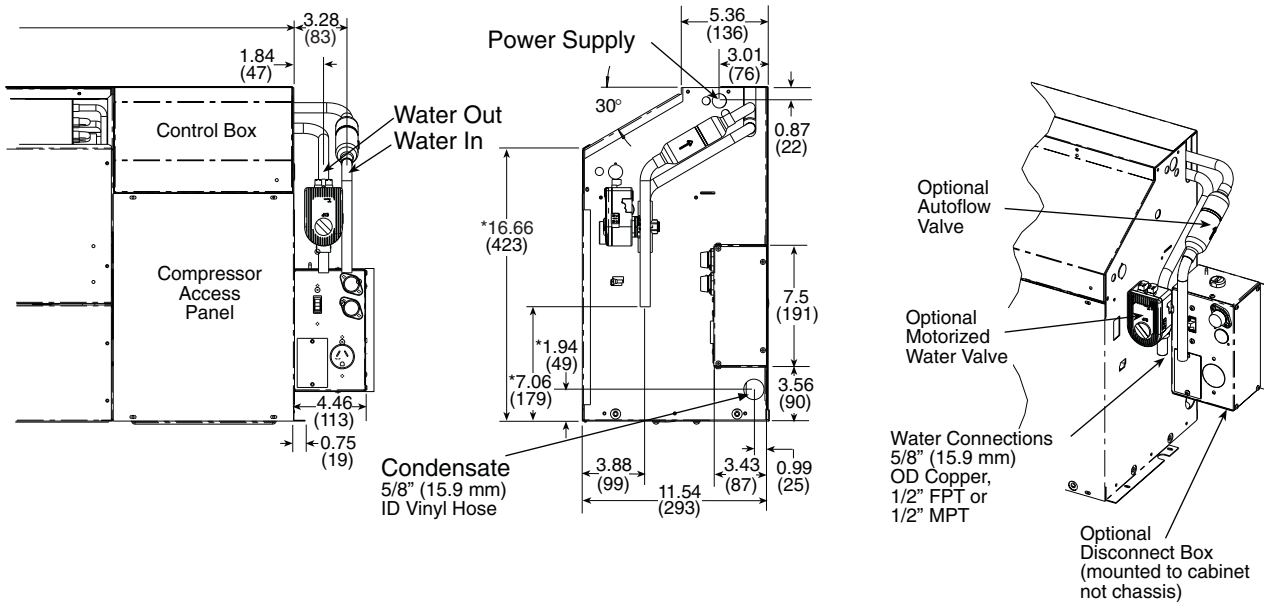
PREMIERLINK CONTROLLER APPLICATIONS WITH DELUXE D CONTROL



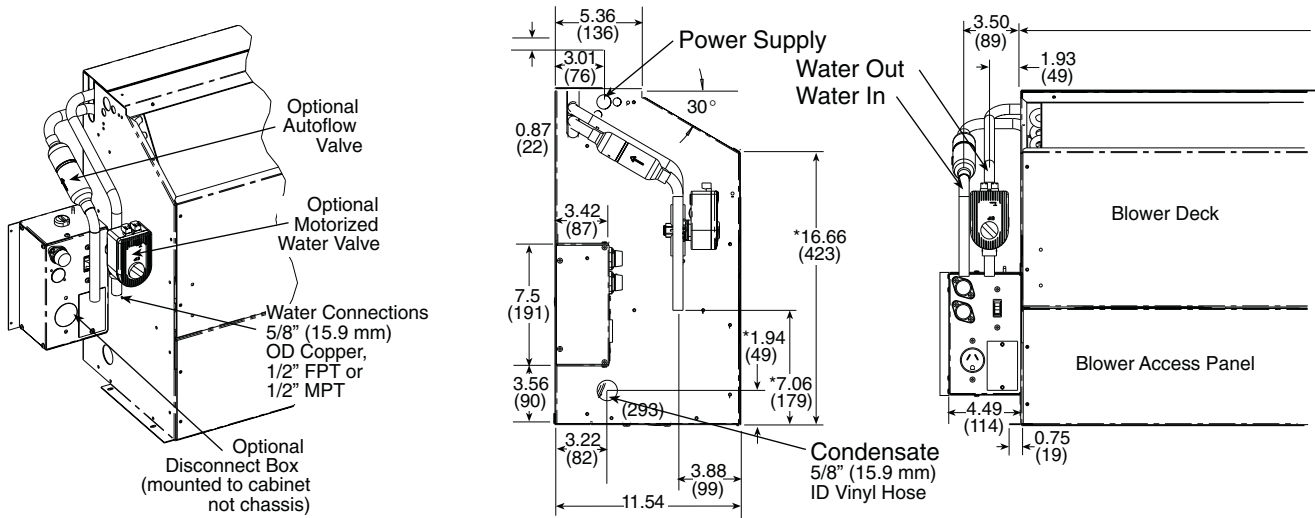
Typical piping



50KQL PIPING DETAIL



RIGHT HAND CONFIGURATION



LEFT HAND CONFIGURATION

*For installed dimension, add to dimension shown 2.9 in. with 3 in. subbase and 4.9 in. for 5 in. subbase.

NOTES:

1. Dimensions shown are in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.
3. Water connection in same location regardless of connection type.

Guide specifications



Console Water Source Heat Pumps

HVAC Guide Specifications

Size Range: **7,800 to 16,000 Btuh**
Cooling Capacity
10,400 to 19,300 Btuh
Heating Capacity

Carrier Model Number: **50KQL**

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Install Water Source Heat Pumps, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow. Units shall be Carrier model 50KQL.
- B. Units shall be individually packaged with wooden skid covered with protective corner posts and plastic stretch wrapping for maximum protection.

1.02 QUALITY ASSURANCE

- A. All equipment listed in this section must be performance rated and certified in accordance with ARI/ISO Standard 13256-1, and safety listed in accordance with NRTL or CSA. All units shall have ARI/ISO and NRTL or CSA labels.
- B. All units shall be factory tested under normal operating conditions at nominal water flow rates. Units which are tested without water flow are not acceptable. Standard operating range is 60 to 95 F entering water temperature.

Part 2 — Product

2.01 EQUIPMENT

A. Heat Pump Assembly:

Factory-tested and assembled single-piece packaged heating and cooling heat pump units shall be factory wired, charged with Non-CFC R-22, contain refrigerant-to-water heat exchanger, air-to-refrigerant heat exchanger, 4-way reversing valve, fan motor assembly, compressor, TXV metering device, and all internal controls and safety devices.

B. Unit Cabinet:

1. The cabinet shall be constructed of heavy gage steel with welded corner bracing. A removable front cabinet allows easy service access to the chassis. The cabinet shall have a 30-degree sloped top with an aluminum rigid bar type discharge grille.
2. An access door shall be provided to cover the swing down control section. For all capacities of the Console Heat Pump, the cabinet shall be one size (48 in. L x 12 in. D x 24 in. H).
3. Options include a locking control panel for added security; a bottom or front return with left or right hand configurations for ease of installation. Available with 3 or 5 in. subbase, with or without motorized damper.
4. The cabinet shall be powder painted.

5. Optional mute package shall consist of additional sound attenuating materials strategically applied to the compressor compartment, and substitution of 1/2 in. noise dampening insulation for all surfaces that normally have 1/4 in. insulation.

C. Fan and Motor Assembly:

The fan motors shall be multi-speed permanently lubricated, PSC (permanent split capacitor) type with thermal overload protection. To facilitate field service all units shall have a slide out fan deck and quick electrical disconnect.

D. Refrigerant Components:

1. Units shall have a sealed refrigerant circuit including a hermetic compressor, a refrigerant metering device, a finned tube refrigerant-to-air heat exchanger, a reversing valve, a coaxial (tube-in-tube) refrigerant-to-water heat exchanger, and safety controls including a high-pressure sensor, a loss-of-charge sensor to protect against loss of refrigerant, and low water temperature (freeze-stat) sensor.
2. Rotary compressors shall have thermal overload protection and shall be located in an insulated compartment to minimize sound transmission. Units shall have the compressor mounted on isolators to reduce noise and vibration transmission.
3. Refrigerant-to-air heat exchangers shall utilize enhanced aluminum fins and rifled copper tube construction rated to withstand 425 psig refrigerant working pressure.
4. Refrigerant-to-water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design rated to withstand 450 psig working refrigerant pressure.
5. Reversing valve shall be four-way solenoid-activated refrigerant valves which shall fail to heating operation. If the unit fails to cooling a low-temperature thermostat must be provided to prevent over-cooling of the room.
6. Optional coaxial water-to-refrigerant heat exchangers shall be cupronickel.
7. Optional Extended Range for units operating with entering water temperatures below dew point. For use in operating range with entering water temperatures from 20 to 110 F.

E. Controls and Safeties:

Units which may be reset at the disconnect switch only shall not be acceptable.

1. Electrical:

A control box shall be located within the unit and shall contain controls for compressor, reversing valve and fan motor operation.

Guide specifications (cont)



2. Piping:
 - a. Copper tubes with a $\frac{5}{8}$ -in. OD dimension shall be provided on the supply and return water connections for the purpose of forming a sweat connection to field-supplied distribution piping.
 - b. Optional threaded connections: A $\frac{1}{2}$ -in. male or female pipe threaded fitting shall be factory mounted on the supply and return water connections.
3. Unit Controls:

Safety devices on all units shall include low-pressure sensor or loss-of-charge switch, high-pressure switch, low water temperature sensor, and condensate overflow switch.
4. The standard Complete C electronic control system shall interface with the unit mounted or remote heat pump (Y,O) wall thermostat (mechanical or electronic). The control system shall have the following features:
 - a. 50 va transformer.
 - b. Anti-short cycle time delay on compressor operation; time delay shall be 5 minutes minimum.
 - c. Random start on power-up.
 - d. Low voltage protection.
 - e. High voltage protection.
 - f. Condensate overflow shutdown.
 - g. Unit shutdown on low refrigerant pressures.
 - h. Unit shutdown on high or low water temperature (selectable for antifreeze solutions).
 - i. Option to reset unit at thermostat or disconnect. Fault type shall be retained in memory if reset at thermostat.
 - j. Automatic intelligent reset. Unit shall automatically restart 5 minutes after shutdown if the fault has cleared. Should a fault occur 3 times sequentially, then lockout will occur.
 - k. Ability to defeat time delays for servicing.
 - l. Light-emitting diode (LED) to indicate high pressure, low pressure, improper voltage, water coil freeze protection, air coil freeze protection, condensate overflow, and control status.
 - m. Unit Performance Monitor to indicate inefficient operating conditions prior to unit lockout.
 - n. Remote fault type indication at thermostat.
 - o. Single harness connection for all safety devices.
 - p. Selectable 24-v or pilot duty dry contact alarm output.
 - q. 24-v output to cycle a motorized water valve with compressor contactor.
 - r. The control box components shall be easily accessible with a swing out control compartment.
 - s. Standard unit-mounted MCO (manual changeover) thermostat operating controls shall consist of temperature setting dial knob, push button switches for Stop, Fan only, Hi Cool, Lo Cool, Hi Heat, Lo Heat. Unit-mounted thermostats shall have a remote sensor for sensing the return-air temperature.
5. The optional Deluxe D electronic 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. Minimized reversing value 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.
 - 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. Control board shall allow up to 3 units to be operated from one thermostat without any auxiliary controls.
 - l. A relay to operate an external damper. The control to be such that the damper will not open until 30 minutes after the unit comes back from Unoccupied mode.
 - m. Fan speed selection at thermostat.
 - n. A relay to restart a central pump or control a 24-v motorized water valve.
 - o. Intelligent fan speed selection based upon thermostat demand and/or dehumidistat signal.
6. Carrier PremierLink™ Controller:

This 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 Control Ventilation (DCV) ready. The communication rate must be 38.4K or faster.

7. Optional Controls:

- a. Unit-mounted ACO (automatic changeover) thermostat operating controls shall consist of temperature setting dial knob, push button switches for Stop, Fan only, Hi fan, Lo fan. Unit-mounted thermostats shall have a remote sensor for sensing the return-air temperature.
- b. Units designed for connection to remote wall mounted thermostat shall be wired such that the operating controls are at the thermostat. The controller shall be provided with a low voltage field wiring terminal block. The control scheme shall accommodate MCO or ACO heat pump thermostats with Y, G, and O outputs. An alternate controller shall be available from the factory to accommodate the Heat/Cool thermostats.
- c. Motorized (2-way) water valves shall be factory installed and wired. The valve shall remain open when there is a cooling or heating demand and the compressor is running. The valve shall close when the compressor stops after satisfying the demand or due to lockout condition.
- d. Fresh air dampers shall be motorized with a spring return. The damper shall open when Cooling or Heating mode selection is made from the unit-mounted switches. With a remote thermostat, the damper shall open any time the fan is in operation.
- e. Night low limit thermostats shall include a unit-mounted thermostat sensing space temperature. Should the space temperature fall below the limit, the night low limit thermostat shall start the fan and compressor operation in Heating mode.
- f. Units with the unit-mounted thermostat shall include a 2-hour override function. The override switch shall be readily accessible. In override mode the unit operation shall be the same as in occupied mode. Override mode shall be terminated automatically at the end of a 2-hour period.

F. Electrical Requirements:

1. A control box shall be located within the unit compressor compartment and shall contain a 50 va transformer, 24-volt activated, 3-pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Electro-mechanical operation WILL NOT be accepted.
2. Units shall be nameplated for use with time-delay fuses or HACR circuit breakers.
3. Unit controls shall be 24-volt and provide heating or cooling as required by the remote thermostat.

G. Special Features:

1. Aquazone™ Thermostat Controls (for use with remote thermostat units):
 - a. Programmable multi-stage thermostat with 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 with 2 heat stages, 2 cool stages, auto changeover, 5-minute built-in compressor protection, locking cover included.
2. Aquazone System Control Panel:

The panel shall coordinate, monitor, and control all WSHP units and ancillary equipment including cooling towers, boilers, and system pumps.
3. Fire-Rated Hose kits:

Hoses shall have a fixed MPT on one end and a swivel with an adapter on the other end. Hose kits shall be either stainless steel or galvanized.
4. Ball Valves (Brass Body):

Ball valves shall be for shutoff and balancing water flow. Valves shall be available with memory, memory stop, and pressure temperature ports.
5. Y Strainers (Bronze Body):

Strainers shall have "Y" type configuration with a brass cap. Strainers shall have a maximum operating pressure rating of 450 psi. Strainer screen shall be made of stainless steel.
6. Solenoid Valves (Brass Body):

Valves shall provide slow operation for quiet system application.
7. Hose Kit Assemblies:

Hose kits shall include 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 measure flow (gpm) with two P/T ports, flexible stainless steel hose with a swivel and nipple.
8. Remote Sensors:

Sensors for Aquazone flush-mount thermostats shall be available.

Guide specifications (cont)



9. PremierLink™ accessories:

PremierLink accessories shall provide a fully integrated DDC system. Accessories include

supply air temperature sensors, communicating room sensors, CO₂ sensors, and linkage thermostats.



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