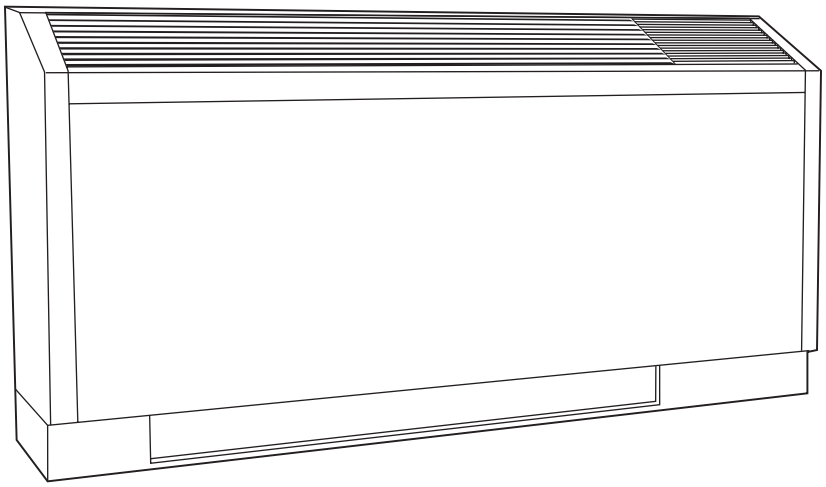
Carrier®

Product Data

Aquazone™
50KQE07-19
Water Source Heat Pumps
Console Unit
50 Hz, CE Mark
R-407C

1.8 to 3.8 Nominal kW (Cooling)
2.4 to 4.6 Nominal kW (Heating)

AQUAZONE™



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

- Environmentally-friendly HFC-407C refrigerant.
- Wide application use with operating temperature range from –6.7 C to 43.3 C
- 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 (models without cabinet are available)
- 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 high COP (Coefficient of Performance) ratings: Up to 3.4 cooling COP and up to 4.3 heating COP.

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 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 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 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 in accordance with ISO 13256-1 performance standard, and have CE Mark conformity.

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-407C 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 is available as a factory-installed option.

A $^{5}/_{8}$ in. ID vinyl condensate connection is provided for connection to the field-installed condensate line.

Compact cabinet design dimensions are 305 mm deep, 1219 mm wide and 610 mm. tall (with 76 mm 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.

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.

Table of contents

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.

Model number nomenclature

5 0 K Q E 0 7 S R E C 7 0 3 A A

Aquazone Water Source Heat Pump
50KQ – Console Unit

Refrigerant Type
E – R-407C

Size – Nominal Capacity (kW)

	Cooling	Heating
07 –	1.82	2.35
09 –	2.45	2.74
12 –	2.99	3.32
15 –	3.48	4.27
19 –	3.84	4.61

Water Circuit Options

Connection Type	Valve Option
A – Sweat	Water Control Valve
B – Sweat	Autoflow Regulator, 0.040 L/s per kW
C – Sweat	Autoflow Regulator, 0.054 L/s per kW
D – Sweat	Water Control Valve with Autoflow Regulator, 0.040 L/s per kW
E – Sweat	Water Control Valve with Autoflow Regulator, 0.054 L/s per kW
F – FPT	None
G – FPT	Water Control Valve
H – FPT	Autoflow Regulator, 0.040 L/s per kW
J – FPT	Autoflow Regulator, 0.054 L/s per kW
K – FPT	Water Control Valve with Autoflow Regulator, 0.040 L/s per kW
L – FPT	Water Control Valve with Autoflow Regulator, 0.054 L/s per kW
M – MPT	None
N – MPT	Water Control Valve
P – MPT	Autoflow Regulator, 0.040 L/s per kW
Q – MPT	Autoflow Regulator, 0.054 L/s per kW
R – MPT	Water Control Valve with Autoflow Regulator, 0.040 L/s per kW
S – Sweat	None
T – MPT	Water Control Valve with Autoflow Regulator, 0.054 L/s per kW

Water Supply Orientation*
R – Right Hand
L – Left Hand

Control Options
E – Manual Changeover with Complete C (CE Mark)†
F – Auto Changeover with Complete C (CE Mark)†
G – Remote Thermostat with Deluxe D (CE Mark)
J – Manual Changeover with Deluxe D (CE Mark)
K – Auto Changeover with Deluxe D (CE Mark)
Q – Remote Thermostat with Complete C (CE Mark)†

Power Termination
A – Hard Wired
D – Disconnect switch, 15A fuse
F – Disconnect switch, non-fused

Packaging
3 – Export

Revision Code
0 – Current revision

Power Supply
7 – 220/240-1-50

Heat Exchanger and Operating Range
C – Copper heat exchanger, standard range (15.6 to 35 C)
E – Copper heat exchanger, extended range (-6.7 to 43.3 C)
F – Cupronickel heat exchanger, extended range (-6.7 to 43.3 C)
N – Cupronickel heat exchanger, standard range (15.6 to 35 C)

Cabinet, Subbase and Mute Package Options

Std	Mute	Cabinet	Subbase
A	**T**	Bottom return	76mm Subbase
B	**U**	Bottom return	76mm Subbase with Motorized Damper
C	**V**	Bottom return	127mm Subbase with Motorized Damper
D	**W**	Bottom return	NO BASE
E	**Y**	Bottom return Locking control door	76mm Subbase
F	**Z**	Bottom return Locking control door	76mm Subbase with Motorized Damper
G	**1**	Bottom return Locking control door	127mm 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	76mm Subbase
M	**6**	NO CABINET	76mm Subbase with Motorized Damper
N	**7**	NO CABINET	127mm Subbase with Motorized Damper
P	**8**	NO CABINET	NO BASE
Q	**9**	NO CABINET	127mm Subbase
R	**0**	Bottom return	127mm Subbase
S	**O**	Bottom return Locking control door	127mm Subbase

* Right and left hand orientation is determined by looking at front of unit.
† For these options, unit must be hard wired (digit 15 must be “A”).

ISO* 13256-1 capacity ratings

UNIT 50KQE	COOLING					HEATING				AIRFLOW (l/s)	WATER FLOW (l/s)	PRESSURE DROP (kPa)
	TC	SC	THR	Input Power (kW)	COP	TC	THA	Input Power (kW)	COP			
07	1.82	1.35	2.4	0.606	3.0	2.35	1.8	0.588	4.0	90	0.114	16.4
09	2.45	2.03	3.1	0.742	3.3	2.74	2.0	0.668	4.1	118	0.133	6.8
12	2.99	2.21	4.0	0.879	3.4	3.32	2.6	0.790	4.2	137	0.145	8.4
15	3.48	2.64	4.5	1.055	3.3	4.27	3.2	0.993	4.3	163	0.196	20.8
19	3.84	3.11	5.0	1.198	3.2	4.61	3.4	1.181	3.9	179	0.208	24.0

LEGEND

COP — Coefficient of Performance
db — Dry Bulb Temperature
TC — Total Capacity (kW)
THA — Total Heat of Absorption (kW)
THR — Total Heat of Rejection (kW)
SC — Sensible Capacity (kW)
wb — Wet Bulb Temperature

*International Organization for Standardization.

NOTES:
1. Ratings are in accordance with ISO Standard 13256-1.
2. Cooling Standard: 27 C db, 19 C wb indoor entering air temperature, 30 C entering water temperature.
3. Heating Standard: 20 C db indoor entering air temperature, and 20 C entering water temperature.

Physical data

BASE UNIT 50KQE	07	09	12	15	19
NOMINAL COOLING CAPACITY (kW)	1.82	2.45	2.99	3.48	3.84
COMPRESSOR	Rotary				
BLOWER					
Motor Horsepower (W)	1/20 (37)	1/15 (50)	1/15 (50)	1/6 (124)	1/6 (124)
Wheel Size D x W (mm) 2 each	133 x 159	133 x 159	133 x 159	133 x 159	133 x 159
FILTER SIZE (mm) Bottom Return	203 x 749 x 9.5	203 x 749 x 9.5	203 x 749 x 9.5	203 x 749 x 9.5	203 x 749 x 9.5
FILTER SIZE (mm) Front Return	178 x 749 x 3.2	178 x 749 x 3.2	178 x 749 x 3.2	178 x 749 x 3.2	178 x 749 x 3.2
UNIT WEIGHT (kg)					
Shipping	72	74	78	81	83
Operating	68	70	74	77	79
REF. TO AIR HEAT EXCHANGER					
Face Area (m^2)	.130	.130	.130	.167	.167
No. of Rows Deep	2	2	3	3	3
Copper Tube Size OD (in.) [mm]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	5/16 [7.9]
Distance Between Fins (mm)	1.95	1.95	1.95	1.95	2.12
REFRIG. CHARGE (R-407C)/CKT (kg)	0.340	0.369	0.510	0.567	0.539
No. of Circuits	1	1	1	1	1
UNIT CABINET WITH STANDARD SUBBASE W x H x D (in.)	1219 x 610 x 305	1219 x 610 x 305	1219 x 610 x 305	1219 x 610 x 305	1219 x 610 x 305
WATER IN/OUT SIZE OD SWEAT (in.) [mm]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]
CONDENSATE SIZE ID VINYL (in.) [mm]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]	5/8 [15.9]

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 Q and G 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 15.6 C).

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 76 or 127 mm 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 0.040 or 0.054 L/s per kw 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 3.5 and MOPD of 138 kPa.

Mute package includes high density noise suppression material on front, right, and left sides of compressor compartment and 12.5 mm ($^1/_2$-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 10 C. When return air temperature is raised above 12.8 C 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.

50KQE CONTROL OPTIONS TABLE

OPTION	CONTROLLER	THERMOSTAT	FUNCTIONS	TRANSFORMER
E	Complete C	MCO	—	50 VA
F	Complete C	ACO	—	50 VA
G	Deluxe D	REMOTE	NIGHT LOW LIMIT2-HR OVERRIDE	75 VA
J	Deluxe D	MCO	NIGHT LOW LIMIT 2-HR OVERRIDE	75 VA
K	Deluxe D	ACO	NIGHT LOW LIMIT 2-HR OVERRIDE	75 VA
Q	Complete C	REMOTE	—	50 VA

LEGEND

ACO — Auto Changeover
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.

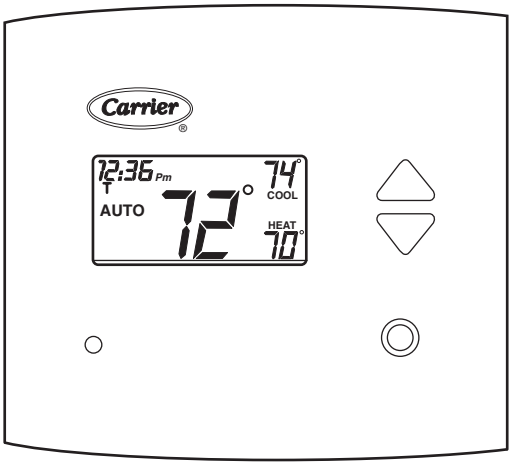
Aquazone system control panel includes a pre-programmed, easy to use, Carrier Comfort Controller set up for a WSHP system.

- Coordinates, monitors, and controls all WSHP units and ancillary equipment including cooling towers, boilers, and system pumps.
- 50RLP 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.

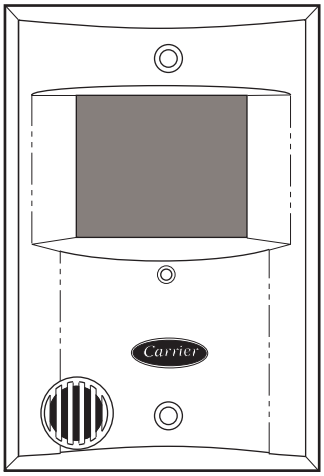
Remote sensors are available for Aquazone flush mount thermostats. Sensors are available for wall (wired and wireless) or duct mounted applications.

Options and accessories (cont)

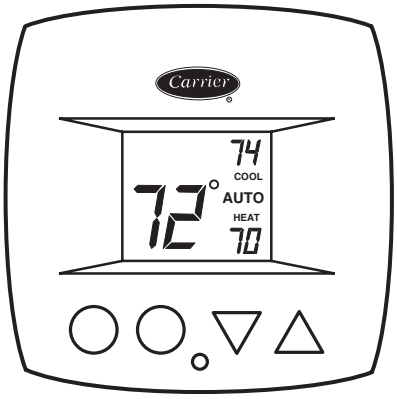
CARRIER AQUAZONE™ THERMOSTATS
(FOR USE WITH REMOTE THERMOSTAT UNITS)



7-DAY PROGRAMMABLE/LIGHT-ACTIVATED PROGRAMMABLE



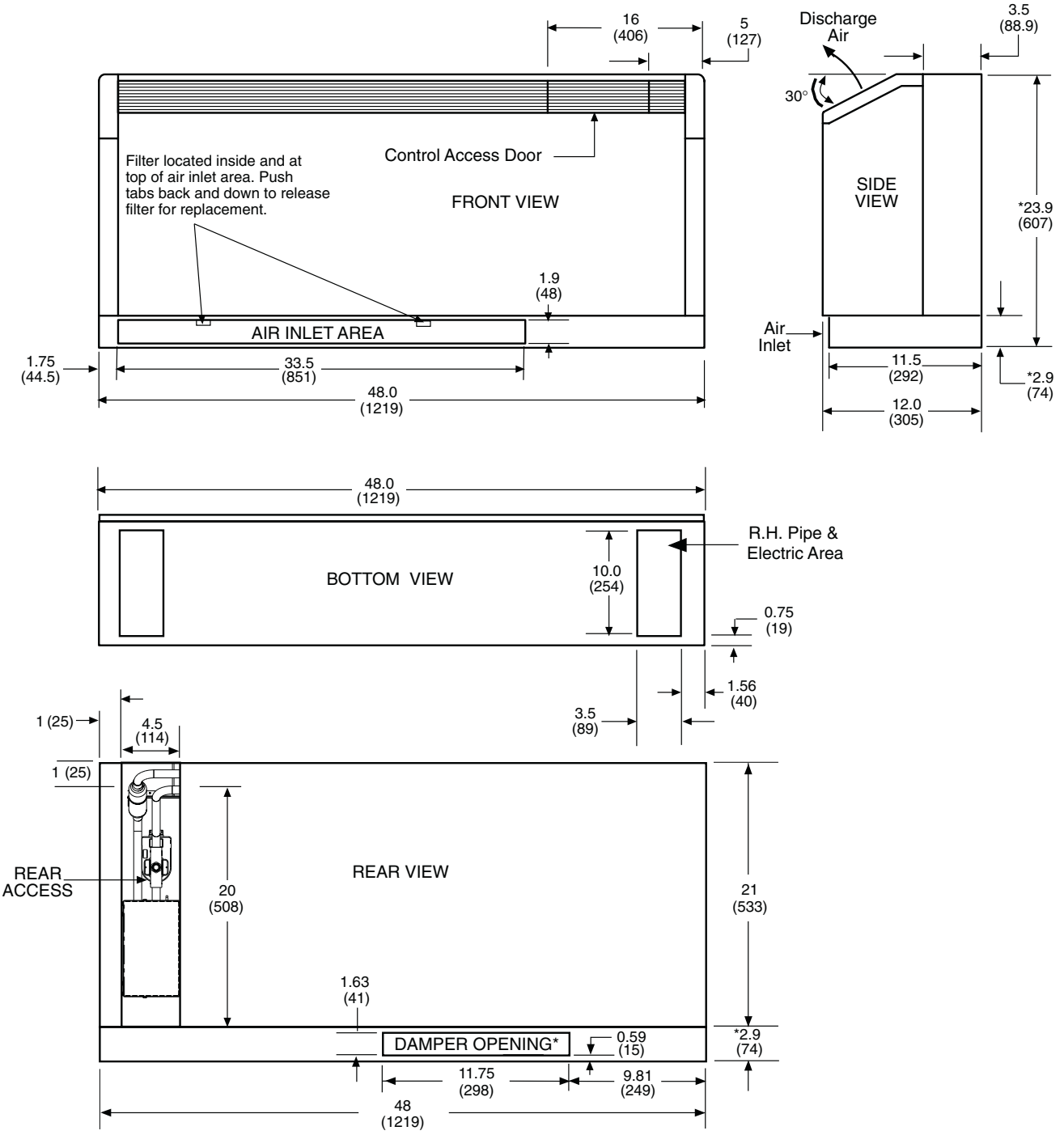
7-DAY PROGRAMMABLE FLUSH MOUNT



5-DAY PROGRAMMABLE/NON-PROGRAMMABLE

Dimensions

50KQE BOTTOM RETURN CABINET DIMENSIONS — RIGHT HAND PIPING

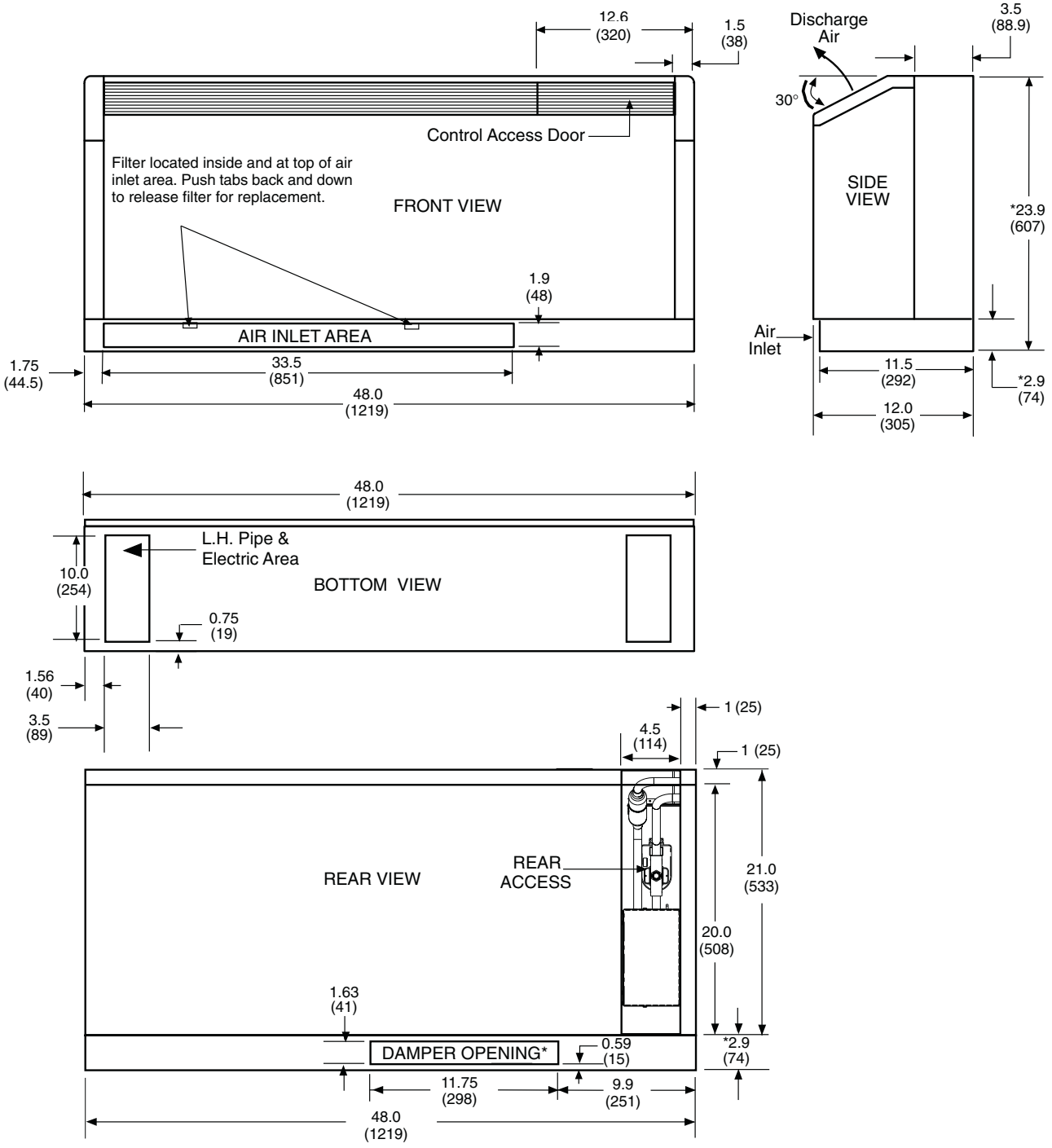


*Dimension shown is with 76 mm subbase. Add 50.8 mm to dimension shown for 127 mm subbase.

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)

50KQE BOTTOM RETURN CABINET DIMENSIONS — LEFT HAND PIPING

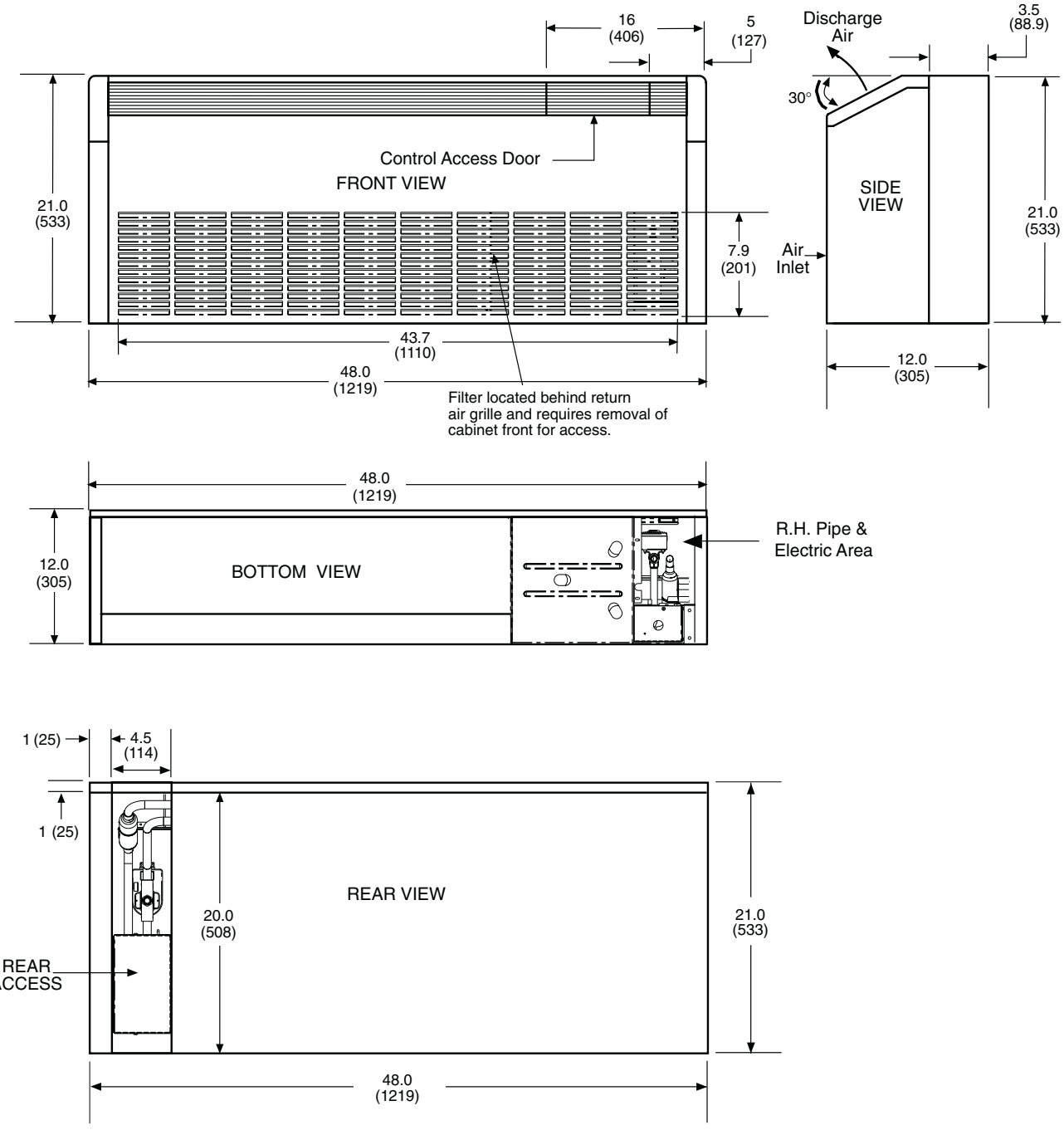


*Dimension shown is with 76 mm subbase. Add 50.8 mm to dimension shown for 127 mm subbase.

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.

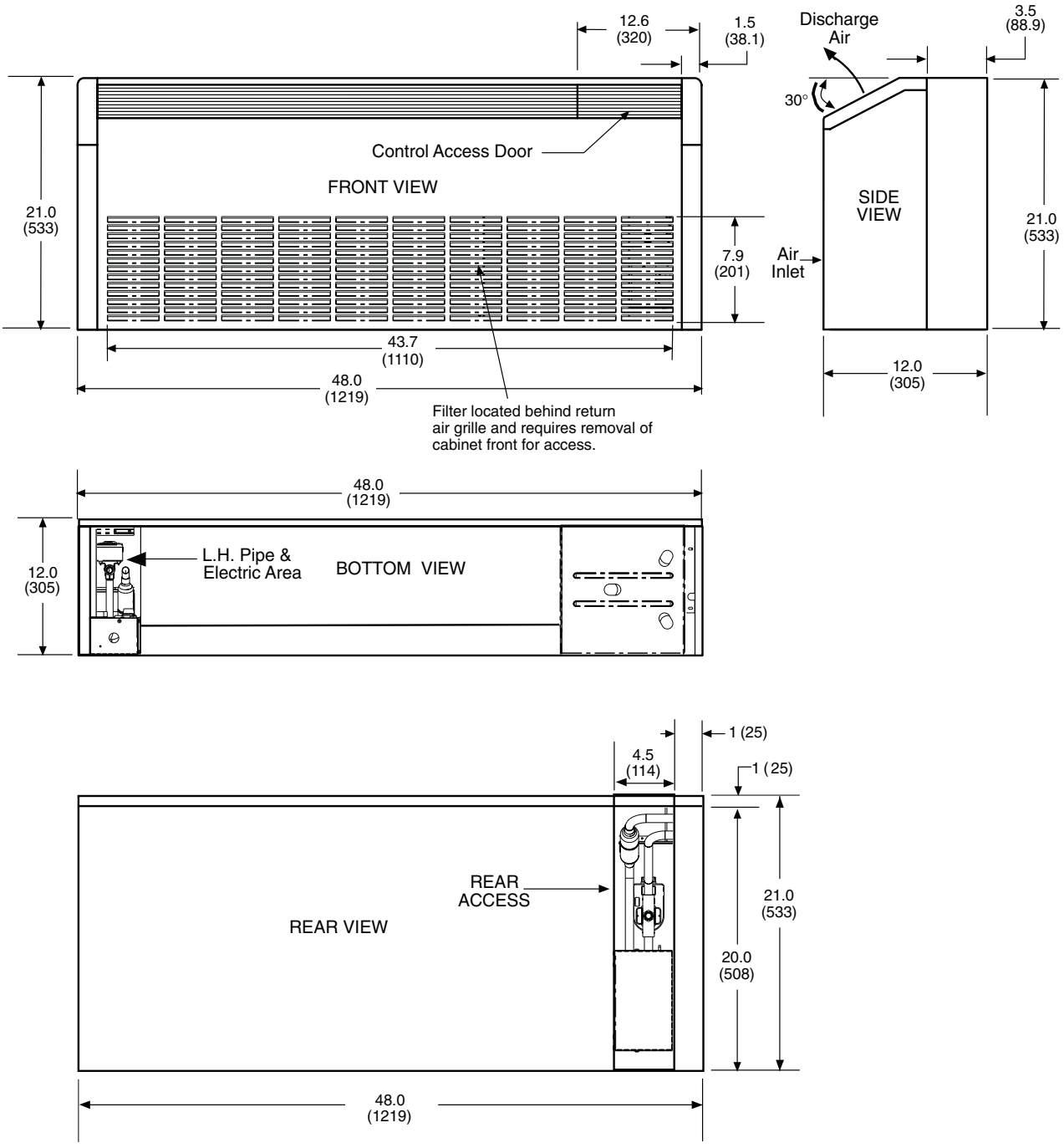
50KQE FRONT RETURN CABINET DIMENSIONS — RIGHT HAND PIPING



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.

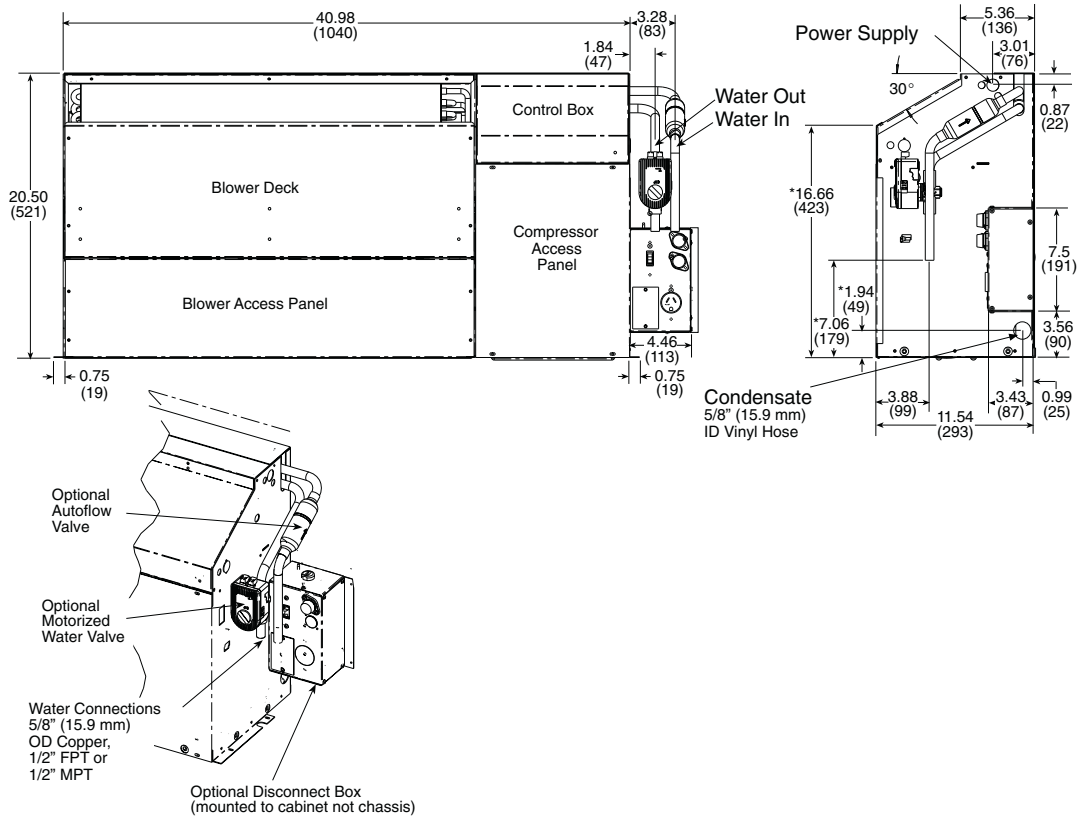
Dimensions (cont)

50KQE FRONT RETURN CABINET DIMENSIONS — LEFT HAND PIPING

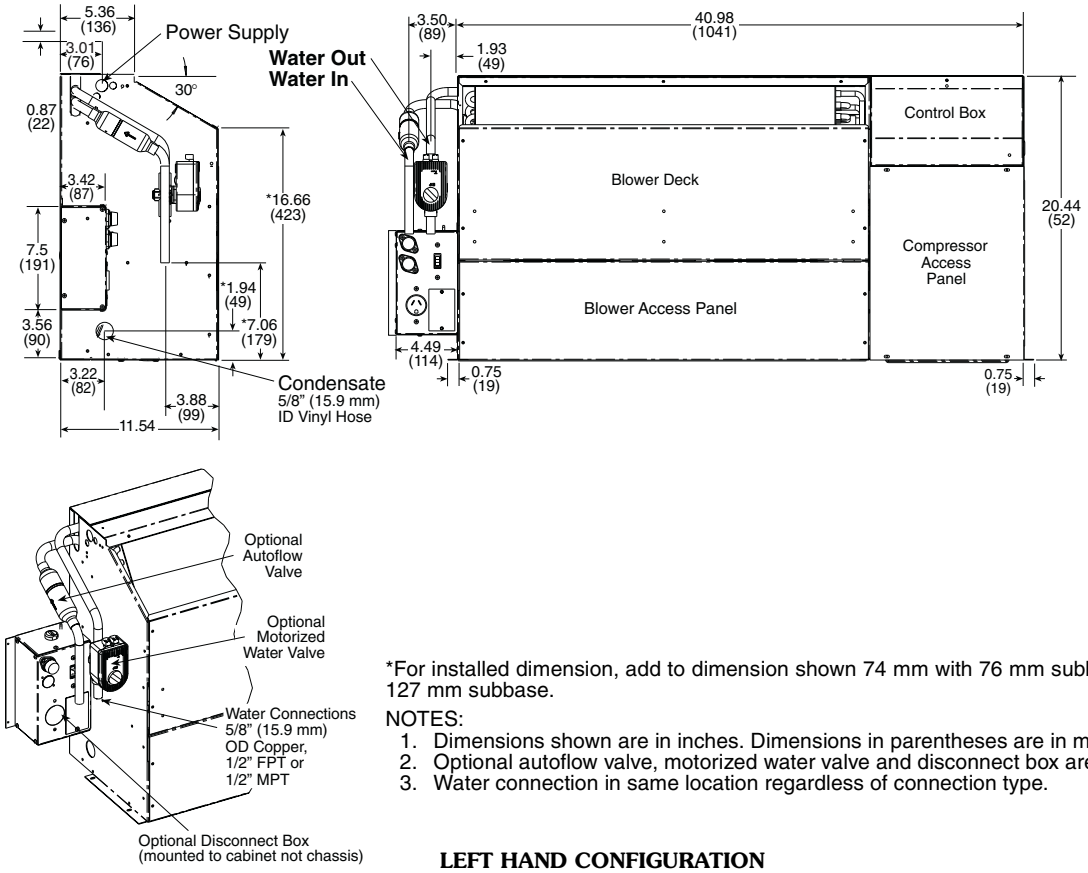


NOTES:
1. All dimensions are shown in inches. Dimensions in parentheses are in millimeters.
2. Optional autoflow valve, motorized water valve and disconnect box are shown.

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



RIGHT HAND CONFIGURATION



*For installed dimension, add to dimension shown 74 mm with 76 mm subbase and 124 mm for 127 mm 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.

LEFT HAND CONFIGURATION

Selection procedure (with 50KQE12 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 27 C and wet bulb 17 C conditions are as follows:

Given:

Total Cooling (TC). . . . . .2.71 kW

Sensible Cooling (SC) . . . . . .2.54 kW

Entering-Air Temperature db . . . . . 27 C

Entering-Air Temperature wb . . . . . 17 C

II Determine the following design parameters.

Determine entering water temperature, water flow rate (L/s), airflow (L/s), water flow pressure drop and design wet and dry bulb temperatures. Airflow should be between 40 and 60 L/s per kW cooling. For applications using multiple units, the unit water pressure drop should be kept as close as possible across units to make water balancing easier. Enter the 50KQE12 Performance Data tables and find the proper indicated water flow and water temperature.

For example:

Entering Water Temp . . . . . 30 C

Water Flow (Based upon 6.7 C rise in temp) . . . . . 0.107 L/s

Airflow. . . . . 121 L/s

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 50KQE12 Performance Table at design water flow and water temperature. Read Total Cooling, Sensible Cooling and Heat of Rejection capacities:

Total Cooling . . . . . .2.97 kW

Sensible Cooling . . . . . .2.23 kW

Heat of Rejection . . . . . .3.9 kW

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 50KQE12 is 137 L/s. The design parameter is 121 L/s.

121/137 = 88% of nominal airflow

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

The Entering Air Temperature wb is 17 C. Use the 17 C 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	=	2.97	x	0.946	x	0.979	=	2.75
Corrected Sensible Cooling	=	2.23	x	1.204	x	0.936	=	2.51
Corrected Heat of Rejection	=	3.9	x	0.954	x	0.979	=	3.64

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:

$$\text{Actual Temperature Rise} = \frac{\text{Correction of Heat Rejection (kW)}}{\text{Water Flow (L/s) x 4.16}}$$

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

$$\text{Actual Temperature Rise} = \frac{3.64}{0.107 \times 4.16} = 8.2 \text{ C}$$

If the units selected are not within 10% of the load calculations, review what effect changing the water flow, 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

50KQE07 — RATED AIRFLOW 90 L/S

EWT (C)	WATER FLOW L/s	WATER PRESSURE DROP (kPa)	COOLING — EAT 27 C DB/19 C WB					HEATING — EAT 20 C DB		
			TC (kW)	SC (kW)	SHR	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
–5	0.063	16.5	Operation Not Recommended					Operation Not Recommended		
	0.088	21.0								
	0.114	28.0								
	0.145	33.0						1.46	0.51	1.0
0	0.063	12.1	2.26	1.55	0.68	0.39	2.7	1.48	0.51	1.0
	0.088	16.8	2.30	1.55	0.67	0.37	2.7	1.52	0.51	1.0
	0.114	23.2	2.30	1.55	0.67	0.35	2.6	1.54	0.51	1.0
	0.145	31.0	2.30	1.55	0.68	0.35	2.6	1.57	0.51	1.1
5	0.063	7.8	2.21	1.52	0.69	0.42	2.6	1.67	0.53	1.1
	0.088	13.4	2.27	1.52	0.67	0.40	2.7	1.73	0.53	1.2
	0.114	19.1	2.27	1.52	0.67	0.39	2.7	1.76	0.53	1.2
	0.145	27.1	2.27	1.55	0.68	0.38	2.7	1.79	0.54	1.2
10	0.063	7.8	2.16	1.49	0.69	0.46	2.6	1.88	0.54	1.3
	0.088	12.6	2.19	1.49	0.68	0.44	2.6	1.94	0.55	1.4
	0.114	18.5	2.22	1.52	0.69	0.43	2.6	1.97	0.55	1.4
	0.145	26.3	2.25	1.52	0.68	0.42	2.7	2.00	0.55	1.4
15	0.063	7.2	2.06	1.46	0.71	0.50	2.6	2.06	0.56	1.5
	0.088	12.0	2.11	1.46	0.69	0.47	2.6	2.12	0.56	1.6
	0.114	18.0	2.14	1.49	0.70	0.46	2.6	2.18	0.57	1.6
	0.145	26.3	2.17	1.49	0.69	0.45	2.6	2.21	0.57	1.6
20	0.063	6.5	1.95	1.41	0.72	0.54	2.5	2.27	0.57	1.7
	0.088	11.5	2.01	1.43	0.71	0.52	2.5	2.33	0.57	1.8
	0.114	17.9	2.04	1.44	0.71	0.51	2.5	2.39	0.58	1.8
	0.145	25.8	2.07	1.46	0.71	0.50	2.6	2.42	0.58	1.8
25	0.063	6.3	1.85	1.37	0.74	0.58	2.4	2.46	0.58	1.9
	0.088	11.4	1.91	1.38	0.73	0.56	2.5	2.54	0.59	2.0
	0.114	17.3	1.94	1.41	0.73	0.55	2.5	2.60	0.59	2.0
	0.145	25.3	1.96	1.42	0.72	0.54	2.5	2.63	0.59	2.0
30	0.063	5.7	1.72	1.33	0.77	0.63	2.3	2.67	0.60	2.1
	0.088	10.5	1.80	1.36	0.76	0.60	2.4	2.75	0.60	2.2
	0.114	16.4	1.83	1.36	0.74	0.59	2.4	2.81	0.61	2.2
	0.145	25.0	1.86	1.37	0.74	0.58	2.4	2.84	0.61	2.2
35	0.063	5.7	1.60	1.29	0.81	0.68	2.3	Operation Not Recommended		
	0.088	10.2	1.67	1.32	0.79	0.66	2.3			
	0.114	16.1	1.71	1.32	0.77	0.64	2.4			
	0.145	24.1	1.73	1.33	0.77	0.63	2.4			
40	0.063	5.7	1.57	1.26	0.81	0.74	2.3			
	0.088	9.9	1.56	1.28	0.82	0.71	2.3			
	0.114	15.8	1.58	1.29	0.81	0.69	2.3			
	0.145	23.4	1.61	1.29	0.80	0.68	2.3			
45	0.063	4.0	Operation Not Recommended							
	0.088	8.4	1.53	1.26	0.82	0.78	2.3			
	0.114	14.8	1.57	1.27	0.81	0.76	2.3			
	0.145	22.4	1.60	1.28	0.80	0.75	2.3			

LEGEND

EWT — Entering Water Temperature (C)
SC — Sensible Capacity
SHR — Sensible Heat Ratio
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

NOTES:

1. Interpolation is permissible, extrapolation is not.
2. All entering air conditions are 27 C db (dry bulb) and 19 C wb (wet bulb) in cooling and 20 C db in heating.
3. All performance data is based upon the lower voltage of dual voltage rated units.
4. See Correction Factor tables for operating conditions other than those listed above.
5. Operation below 15 C EWT requires extended range option.
6. Operation below 5 C EWT is based on 15% antifreeze solution.
7. Table does not reflect fan or pump power ISO corrections.
8. ISO 13256-1 nominal conditions are 30 C EWT, 27 C db and 19 C wb in cooling and 20 C EWT, 20 C db and 15 C wb in heating.

Performance data (cont)

50KQE09 — RATED AIRFLOW 118 L/S

EWT (C)	WATER FLOW L/s	WATER PRESSURE DROP (kPa)	COOLING — EAT 27 C DB/19 C WB					HEATING — EAT 20 C DB		
			TC (kW)	SC (kW)	SHR	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
–5	0.069	5.6	Operation Not Recommended					Operation Not Recommended		
	0.101	7.1								
	0.133	10.7						1.52	0.57	1.0
0	0.069	4.5	3.17	2.32	0.73	0.45	3.6	1.46	0.57	0.9
	0.101	6.1	3.24	2.35	0.73	0.41	3.6	1.54	0.57	1.0
	0.133	9.7	3.27	2.33	0.71	0.39	3.7	1.57	0.58	1.0
5	0.069	3.3	3.04	2.29	0.75	0.50	3.5	1.79	0.59	1.2
	0.101	5.4	3.15	2.32	0.74	0.46	3.6	1.88	0.60	1.3
	0.133	8.9	3.18	2.32	0.73	0.44	3.6	1.91	0.60	1.3
10	0.069	3.3	2.88	2.23	0.78	0.56	3.4	2.09	0.62	1.5
	0.101	5.4	3.00	2.30	0.77	0.52	3.5	2.17	0.63	1.5
	0.133	8.4	3.05	2.30	0.75	0.49	3.5	2.23	0.63	1.6
15	0.069	2.8	2.73	2.18	0.80	0.61	3.3	2.35	0.64	1.7
	0.101	5.1	2.84	2.21	0.78	0.57	3.4	2.44	0.65	1.8
	0.133	8.1	2.92	2.24	0.77	0.55	3.5	2.50	0.65	1.9
20	0.069	2.7	2.57	2.10	0.82	0.66	3.2	2.57	0.65	1.9
	0.101	5.1	2.69	2.15	0.80	0.62	3.3	2.68	0.66	2.0
	0.133	7.4	2.75	2.19	0.79	0.60	3.4	2.71	0.66	2.0
25	0.069	2.7	2.39	2.01	0.84	0.73	3.1	2.78	0.67	2.1
	0.101	4.9	2.51	2.08	0.83	0.69	3.2	2.90	0.68	2.2
	0.133	7.0	2.59	2.11	0.81	0.67	3.3	2.92	0.68	2.2
30	0.069	2.7	2.26	1.92	0.85	0.79	3.1	2.99	0.69	2.3
	0.101	4.8	2.35	1.98	0.84	0.75	3.1	3.08	0.70	2.4
	0.133	6.8	2.40	2.01	0.83	0.72	3.1	3.14	0.70	2.4
35	0.069	2.5	2.12	1.86	0.88	0.87	3.0	Operation Not Recommended		
	0.101	4.6	2.20	1.91	0.87	0.82	3.0			
	0.133	6.1	2.25	1.92	0.86	0.80	3.0			
40	0.069	2.4	2.01	1.82	0.90	0.96	3.0			
	0.101	4.5	2.07	1.84	0.89	0.89	3.0			
	0.133	5.9	2.10	1.86	0.88	0.87	3.0			
45	0.069	1.9	Operation Not Recommended							
	0.101	4.2	1.98	1.80	0.91	1.00	3.0			
	0.133	5.5	2.03	1.84	0.91	0.98	3.0			

LEGEND

EWT — Entering Water Temperature (C)
SC — Sensible Capacity
SHR — Sensible Heat Ratio
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

NOTES:

1. Interpolation is permissible, extrapolation is not.
2. All entering air conditions are 27 C db (dry bulb) and 19 C wb (wet bulb) in cooling and 20 C db in heating.
3. All performance data is based upon the lower voltage of dual voltage rated units.
4. See Correction Factor tables for operating conditions other than those listed above.
5. Operation below 15 C EWT requires extended range option.
6. Operation below 5 C EWT is based on 15% antifreeze solution.
7. Table does not reflect fan or pump power ISO corrections.
8. ISO 13256-1 nominal conditions are 30 C EWT, 27 C db and 19 C wb in cooling and 20 C EWT, 20 C db and 15 C wb in heating.

50KQE12 — RATED AIRFLOW 137 L/S

EWT (C)	WATER FLOW L/s	WATER PRESSURE DROP (kPa)	COOLING — EAT 27 C DB/19 C WB					HEATING — EAT 20 C DB		
			TC (kW)	SC (kW)	SHR	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
–5	0.076	6.2	Operation Not Recommended					Operation Not Recommended		
	0.107	8.5								
	0.145	12.3						1.97	0.69	1.3
0	0.076	5.1	3.80	2.69	0.71	0.62	4.4	1.96	0.71	1.2
	0.107	7.2	3.90	2.72	0.70	0.57	4.5	2.05	0.71	1.3
	0.145	11.5	3.93	2.73	0.69	0.54	4.5	2.11	0.71	1.4
5	0.076	3.9	3.67	2.63	0.71	0.67	4.3	2.30	0.72	1.6
	0.107	6.0	3.79	2.66	0.70	0.62	4.4	2.41	0.73	1.7
	0.145	10.7	3.85	2.69	0.70	0.59	4.4	2.48	0.73	1.7
10	0.076	3.9	3.54	2.51	0.71	0.74	4.3	2.61	0.75	1.9
	0.107	5.7	3.66	2.61	0.71	0.69	4.3	2.73	0.75	2.0
	0.145	10.2	3.72	2.64	0.71	0.66	4.4	2.82	0.76	2.1
15	0.076	3.3	3.39	2.43	0.72	0.80	4.2	2.93	0.77	2.2
	0.107	5.7	3.50	2.50	0.71	0.75	4.3	3.05	0.77	2.3
	0.145	9.6	3.59	2.55	0.71	0.72	4.3	3.14	0.78	2.4
20	0.076	3.3	3.21	2.35	0.73	0.86	4.1	3.22	0.79	2.4
	0.107	5.7	3.35	2.41	0.72	0.81	4.2	3.37	0.80	2.6
	0.145	9.1	3.43	2.47	0.72	0.78	4.2	3.45	0.81	2.6
25	0.076	3.3	3.03	2.26	0.75	0.93	4.0	3.52	0.82	2.7
	0.107	5.5	3.17	2.32	0.73	0.88	4.1	3.68	0.83	2.9
	0.145	8.8	3.26	2.37	0.73	0.84	4.1	3.79	0.83	3.0
30	0.076	3.0	2.83	2.17	0.77	0.99	3.8	3.82	0.84	3.0
	0.107	5.4	2.97	2.23	0.75	0.94	3.9	4.04	0.85	3.2
	0.145	8.4	3.06	2.26	0.74	0.91	4.0	4.16	0.85	3.3
35	0.076	2.8	2.62	2.11	0.81	1.06	3.7	Operation Not Recommended		
	0.107	5.2	2.77	2.16	0.78	1.01	3.8			
	0.145	8.1	2.85	2.19	0.77	0.99	3.8			
40	0.076	2.7	2.55	2.03	0.80	1.17	3.7			
	0.107	5.1	2.71	2.09	0.77	1.12	3.8			
	0.145	7.5	2.80	2.14	0.76	1.09	3.9			
45	0.076	2.4	Operation Not Recommended							
	0.107	4.8								
	0.145	7.2	2.68	2.07	0.77	1.19	3.9			

LEGEND

EWT — Entering Water Temperature (C)
SC — Sensible Capacity
SHR — Sensible Heat Ratio
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

NOTES:

1. Interpolation is permissible, extrapolation is not.
2. All entering air conditions are 27 C db (dry bulb) and 19 C wb (wet bulb) in cooling and 20 C db in heating.
3. All performance data is based upon the lower voltage of dual voltage rated units.
4. See Correction Factor tables for operating conditions other than those listed above.
5. Operation below 15 C EWT requires extended range option.
6. Operation below 5 C EWT is based on 15% antifreeze solution.
7. Table does not reflect fan or pump power ISO corrections.
8. ISO 13256-1 nominal conditions are 30 C EWT, 27 C db and 19 C wb in cooling and 20 C EWT, 20 C db and 15 C wb in heating.

Performance data (cont)

50KQE15 — RATED AIRFLOW 163 L/S

EWT (C)	WATER FLOW L/s	WATER PRESSURE DROP (kPa)	COOLING — EAT 27 C DB/19 C WB					HEATING — EAT 20 C DB		
			TC (kW)	SC (kW)	SHR	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
–5	0.101	12.1	Operation Not Recommended					Operation Not Recommended		
	0.145	17.7								
	0.196	28.7								
	0.240	43.4						2.61	0.84	1.8
0	0.101	10.8	4.46	3.06	0.69	0.69	5.2	2.55	0.83	1.7
	0.145	16.1	4.55	3.10	0.68	0.65	5.2	2.65	0.85	1.8
	0.196	26.8	4.59	3.10	0.68	0.62	5.2	2.71	0.85	1.9
	0.240	40.8	4.59	3.10	0.68	0.61	5.2	2.76	0.86	1.9
5	0.101	9.4	4.30	3.00	0.70	0.75	5.1	2.95	0.87	2.1
	0.145	14.5	4.42	3.06	0.69	0.70	5.1	3.07	0.89	2.2
	0.196	24.9	4.48	3.09	0.69	0.68	5.2	3.12	0.89	2.2
	0.240	37.7	4.51	3.09	0.69	0.66	5.2	3.16	0.90	2.3
10	0.101	7.8	4.09	2.89	0.71	0.82	4.9	3.29	0.91	2.4
	0.145	12.9	4.24	2.95	0.70	0.77	5.0	3.44	0.92	2.5
	0.196	23.0	4.32	3.01	0.70	0.75	5.1	3.49	0.93	2.6
	0.240	35.3	4.38	3.01	0.69	0.73	5.1	3.55	0.93	2.6
15	0.101	7.8	3.86	2.77	0.72	0.89	4.7	3.63	0.93	2.7
	0.145	12.9	4.03	2.84	0.70	0.84	4.9	3.78	0.94	2.8
	0.196	22.5	4.11	2.90	0.70	0.81	4.9	3.86	0.95	2.9
	0.240	34.7	4.17	2.93	0.70	0.80	5.0	3.92	0.95	3.0
20	0.101	7.8	3.65	2.66	0.73	0.97	4.6	3.98	0.95	3.0
	0.145	12.9	3.80	2.73	0.72	0.91	4.7	4.12	0.96	3.2
	0.196	21.9	3.88	2.79	0.72	0.88	4.8	4.21	0.97	3.2
	0.240	34.2	3.94	2.82	0.72	0.87	4.8	4.27	0.97	3.3
25	0.101	7.1	3.44	2.59	0.75	1.05	4.5	4.30	0.98	3.3
	0.145	12.6	3.56	2.64	0.74	0.99	4.6	4.45	0.99	3.5
	0.196	21.2	3.65	2.68	0.73	0.96	4.6	4.53	0.99	3.5
	0.240	33.0	3.71	2.71	0.73	0.94	4.6	4.59	1.00	3.6
30	0.101	6.9	3.24	2.55	0.79	1.13	4.4	4.59	1.00	3.6
	0.145	12.6	3.35	2.57	0.77	1.07	4.4	4.76	1.01	3.7
	0.196	20.8	3.43	2.60	0.76	1.04	4.5	4.85	1.02	3.8
	0.240	31.8	3.49	2.60	0.74	1.02	4.5	4.91	1.03	3.9
35	0.101	6.9	3.10	2.56	0.83	1.22	4.3	Operation Not Recommended		
	0.145	12.6	3.20	2.55	0.80	1.16	4.4			
	0.196	20.3	3.24	2.56	0.79	1.12	4.4			
	0.240	30.8	3.28	2.56	0.78	1.11	4.4			
40	0.101	6.9	2.93	2.42	0.83	1.33	4.3			
	0.145	12.3	3.05	2.43	0.80	1.27	4.3			
	0.196	20.1	3.12	2.46	0.79	1.23	4.4			
	0.240	30.3	3.18	2.48	0.78	1.22	4.4			
45	0.101	5.4	Operation Not Recommended							
	0.145	10.8								
	0.196	18.8								
	0.240	28.2	3.03	2.40	0.79	1.33	4.4			

LEGEND

EWT — Entering Water Temperature (C)
SC — Sensible Capacity
SHR — Sensible Heat Ratio
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

NOTES:

1. Interpolation is permissible, extrapolation is not.
2. All entering air conditions are 27 C db (dry bulb) and 19 C wb (wet bulb) in cooling and 20 C db in heating.
3. All performance data is based upon the lower voltage of dual voltage rated units.
4. See Correction Factor tables for operating conditions other than those listed above.
5. Operation below 15 C EWT requires extended range option.
6. Operation below 5 C EWT is based on 15% antifreeze solution.
7. Table does not reflect fan or pump power ISO corrections.
8. ISO 13256-1 nominal conditions are 30 C EWT, 27 C db and 19 C wb in cooling and 20 C EWT, 20 C db and 15 C wb in heating.

50KQE19 — RATED AIRFLOW 179 L/S

EWT (C)	WATER FLOW L/s	WATER PRESSURE DROP (kPa)	COOLING — EAT 27 C DB/19 C WB					HEATING — EAT 20 C DB		
			TC (kW)	SC (kW)	SHR	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
–5	0.107	12.8	Operation Not Recommended					Operation Not Recommended		
	0.158	19.7								
	0.208	36.1								
	0.271	52.8						2.75	0.96	1.8
0	0.107	11.1	5.12	3.66	0.71	0.82	5.9	2.58	0.95	1.6
	0.158	17.9	5.15	3.64	0.71	0.77	5.9	2.74	0.96	1.8
	0.208	34.4	5.11	3.59	0.70	0.75	5.9	2.80	0.97	1.8
	0.271	49.8	5.05	3.54	0.70	0.74	5.8	2.85	0.98	1.9
5	0.107	9.7	4.95	3.62	0.73	0.89	5.8	3.11	1.00	2.1
	0.158	16.6	5.11	3.66	0.72	0.83	5.9	3.28	1.01	2.3
	0.208	30.7	5.14	3.66	0.71	0.80	5.9	3.34	1.02	2.3
	0.271	46.6	5.17	3.66	0.71	0.78	6.0	3.40	1.03	2.4
10	0.107	8.7	4.67	3.51	0.75	0.97	5.6	3.58	1.05	2.5
	0.158	15.5	4.93	3.60	0.73	0.90	5.8	3.73	1.07	2.7
	0.208	27.5	5.01	3.63	0.72	0.87	5.9	3.82	1.08	2.7
	0.271	43.4	5.07	3.66	0.72	0.85	5.9	3.88	1.09	2.8
15	0.107	8.7	4.36	3.34	0.77	1.04	5.4	3.95	1.10	2.9
	0.158	15.0	4.62	3.46	0.75	0.98	5.6	4.10	1.12	3.0
	0.208	26.4	4.75	3.52	0.74	0.95	5.7	4.19	1.13	3.1
	0.271	42.3	4.84	3.55	0.73	0.92	5.8	4.25	1.14	3.1
20	0.107	8.0	4.04	3.20	0.79	1.12	5.2	4.30	1.15	3.2
	0.158	15.0	4.28	3.32	0.78	1.06	5.3	4.45	1.17	3.3
	0.208	25.1	4.43	3.38	0.76	1.03	5.5	4.53	1.18	3.4
	0.271	41.7	4.53	3.41	0.75	1.00	5.5	4.59	1.18	3.4
25	0.107	7.8	3.75	3.06	0.81	1.23	5.0	4.62	1.18	3.4
	0.158	14.3	3.96	3.16	0.80	1.15	5.1	4.79	1.20	3.6
	0.208	24.6	4.09	3.22	0.79	1.11	5.2	4.88	1.21	3.7
	0.271	40.5	4.18	3.25	0.78	1.09	5.3	4.94	1.21	3.7
30	0.107	7.8	3.50	2.97	0.85	1.34	4.8	4.94	1.21	3.7
	0.158	14.1	3.66	3.03	0.83	1.26	4.9	5.12	1.23	3.9
	0.208	24.0	3.77	3.06	0.81	1.22	5.0	5.24	1.23	4.0
	0.271	39.3	3.85	3.12	0.81	1.19	5.0	5.30	1.23	4.1
35	0.107	7.8	3.43	3.01	0.88	1.47	4.9	Operation Not Recommended		
	0.158	14.1	3.49	2.98	0.85	1.38	4.9			
	0.208	23.0	3.53	2.98	0.84	1.33	4.9			
	0.271	38.3	3.59	3.00	0.84	1.30	4.9			
40	0.107	7.8	3.15	2.83	0.90	1.49	4.6			
	0.158	13.8	3.31	2.88	0.87	1.49	4.8			
	0.208	22.1	3.43	2.93	0.86	1.44	4.9			
	0.271	37.4	3.53	2.99	0.84	1.40	4.9			
45	0.107	6.2	Operation Not Recommended							
	0.158	12.3								
	0.208	20.4								
	0.271	34.7	3.35	2.90	0.87	1.52	4.9			

LEGEND

EWT — Entering Water Temperature (C)
SC — Sensible Capacity
SHR — Sensible Heat Ratio
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

NOTES:

1. Interpolation is permissible, extrapolation is not.
2. All entering air conditions are 27 C db (dry bulb) and 19 C wb (wet bulb) in cooling and 20 C db in heating.
3. All performance data is based upon the lower voltage of dual voltage rated units.
4. See Correction Factor tables for operating conditions other than those listed above.
5. Operation below 15 C EWT requires extended range option.
6. Operation below 5 C EWT is based on 15% antifreeze solution.
7. Table does not reflect fan or pump power ISO corrections.
8. ISO 13256-1 nominal conditions are 30 C EWT, 27 C db and 19 C wb in cooling and 20 C EWT, 20 C db and 15 C wb in heating.

Performance data (cont)

CORRECTION FACTORS — ENTERING AIR

HEATING				COOLING										
EAT DB (C)	TC (kW)	Input Power (kW)	THA (kW)	EAT WB (C)	TC (kW)	Sensible Capacity Entering Dry Bulb (C)							Power Input (kW)	THR (kW)
						21	23	25	27	29.5	32	35		
15	1.009	0.988	1.015	**15**	0.896	1.237	1.260	1.510	1.416	*	*	*	0.964	0.912
17	1.005	0.995	1.009	**17**	0.946	0.778	0.868	1.204	1.204	*	*	*	0.981	0.954
20	**1.000**	**1.000**	**1.000**	**19**	**1.000**	0.630	0.733	0.866	**1.000**	1.272	*	*	**1.000**	**1.000**
22	0.997	1.005	0.994	**21**	1.064	—	0.456	0.727	0.860	1.090	1.614	1.897	1.020	1.054
24	0.994	1.010	0.988	**23**	1.115	—	—	0.563	0.721	0.885	1.056	1.240	1.035	1.096
26	0.990	1.018	0.981	**25**	1.182	—	—	—	0.609	0.939	1.119	1.315	1.056	1.152

*Sensible Capacity equals total capacity.

CORRECTION FACTORS — AIRFLOW

% OF NOMINAL AIRFLOW	COOLING CORRECTIONS				HEATING CORRECTIONS		
	TC (kW)	SC (kW)	Input Power (kW)	THR (kW)	TC (kW)	Input Power (kW)	THA (kW)
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 (C)
SC — Sensible Capacity
TC — Total Capacity
THA — Total Heat of Absorption
THR — Total Heat of Rejection

50KQE CONSOLE BLOWER PERFORMANCE 60 Hz

50KQE	RATED AIRFLOW (L/s)	AIRFLOW (L/S)	
		Low Speed	High Speed
07	90	76	90
09	118	99	118
12	137	116	137
15	163	137	163
19	179	151	179

NOTES:
1. Fan speed is field adjustable.
2. All airflow is rated at lowest voltage if unit is dual voltage rated, i.e., 220 v for 220/240 v units.
3. All units 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

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 0.040 and 0.054 l/s per kW 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 15.6 C and 35 C. 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 reduces the need to create heat and conserves energy.

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 applications.
- Ventilation methods and system design including energy recovery.
- Acoustical considerations for different product types.
- Addressing 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.
- WSHP Efficiency/Operational Cost Comparison chart.
- System variations such as a system without a boiler, variable pumping, and variable air volume 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 15.6 C. 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 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 1 to 2 meters below the ground surface, and then backfilled. 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 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.

Application data (cont)

Trapping — Condensate trapping is essential 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 25.4 mm for every 249 Pa 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 6.4 mm per 30 cm 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 blowout 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.

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 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	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 350 ppm.		
Iron Oxides	Less than 1 ppm.		
Iron Bacteria	No level allowable.		
Corrosion*		Max Allowable Level	Coaxial Metal
	Ammonia, Ammonium Hydroxide	0.5 ppm	Cu
	Ammonium Chloride, Ammonium Nitrate	0.5 ppm	Cu
	Ammonium Sulfate	0.5 ppm	Cu
	Chlorine/Chlorides	0.5 ppm	CuNi
	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: Hardness in mg/l is equivalent to ppm.

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. Noise Criteria (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 (Lw). 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

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 ± 10% of nameplate utilization voltage is acceptable.

Starting conditions

The 50KQE unit will start and operate in an ambient temperature of 10 C, with entering air temperature at 10 C, with entering water temperature at 16 C, with both air and water at the flow rates used in the 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.

AIR LIMITS

	50KQE	
	Cooling	Heating
Min. Ambient Air	10 C	10 C
Rated Ambient Air	27 C	19 C
Max. Ambient Air	38 C	30 C
Min. Entering Air	10 C	10 C
Rated Entering Air, db/wb	27/19 C	20 C
Max. Entering Air, db/wb	38/28 C	27 C

WATER LIMITS

	50KQE	
	Cooling	Heating
Min. Entering Water	–1 C*	–6 C*
Normal Entering Water	30 C	21 C
Max. Entering Water	43 C	32 C

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 ISO 13256-1 flow rates.
2. The 50KQE units may have up 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 (0° C) 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.

Electrical data

50KQE	VOLTS-PHASE (50 Hz)	VOLTAGE MIN/MAX	COMPRESSOR		FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	MAX FUSE/ HACR
			RLA	LRA				
07	220/240-1	198/264	3.2	14.0	0.35	3.6	4.4	15
09	220/240-1	198/264	3.7	17.2	0.50	4.2	5.1	15
12	220/240-1	198/264	4.2	21.3	0.50	4.7	5.8	15
15	220/240-1	198/264	5.1	28.0	1.00	6.1	7.4	15
19	220/240-1	198/264	5.9	34.0	1.00	6.9	8.4	15

LEGEND

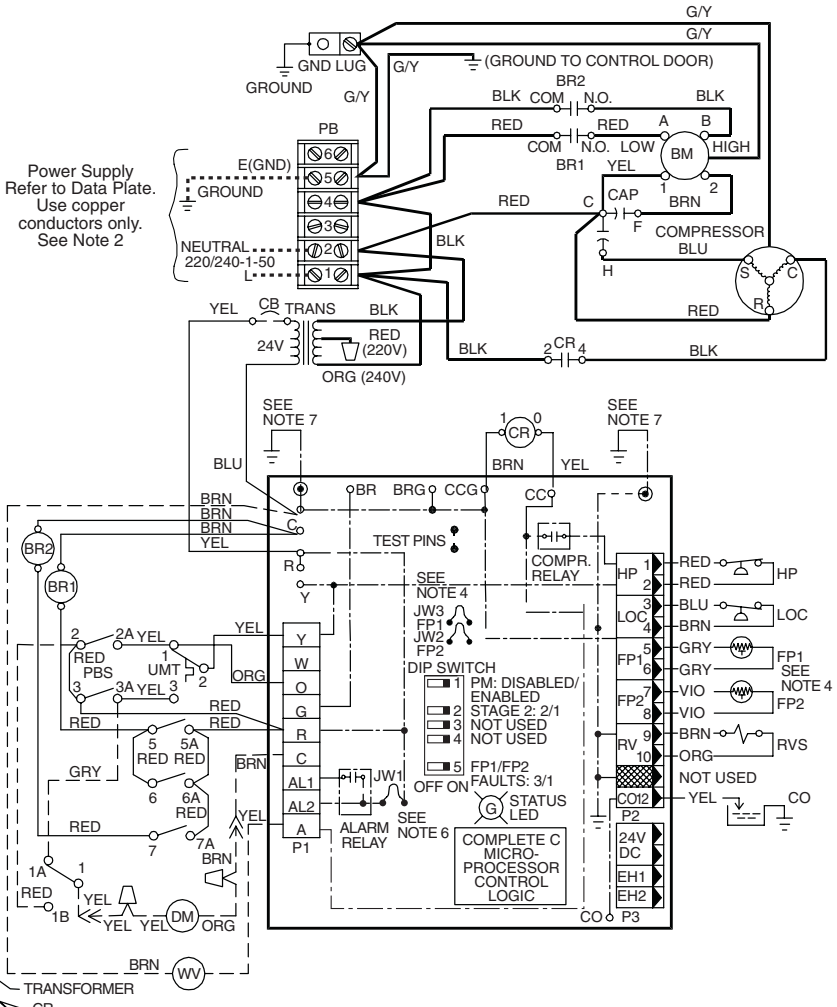
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
RLA — Rated Load Amps

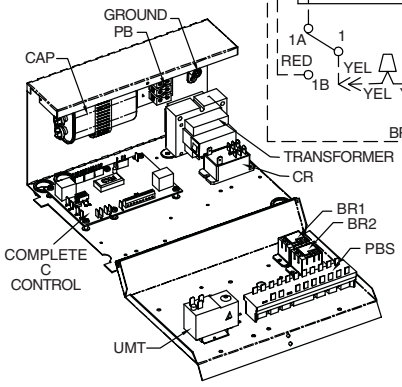
Typical wiring schematics

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	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

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





LEGEND

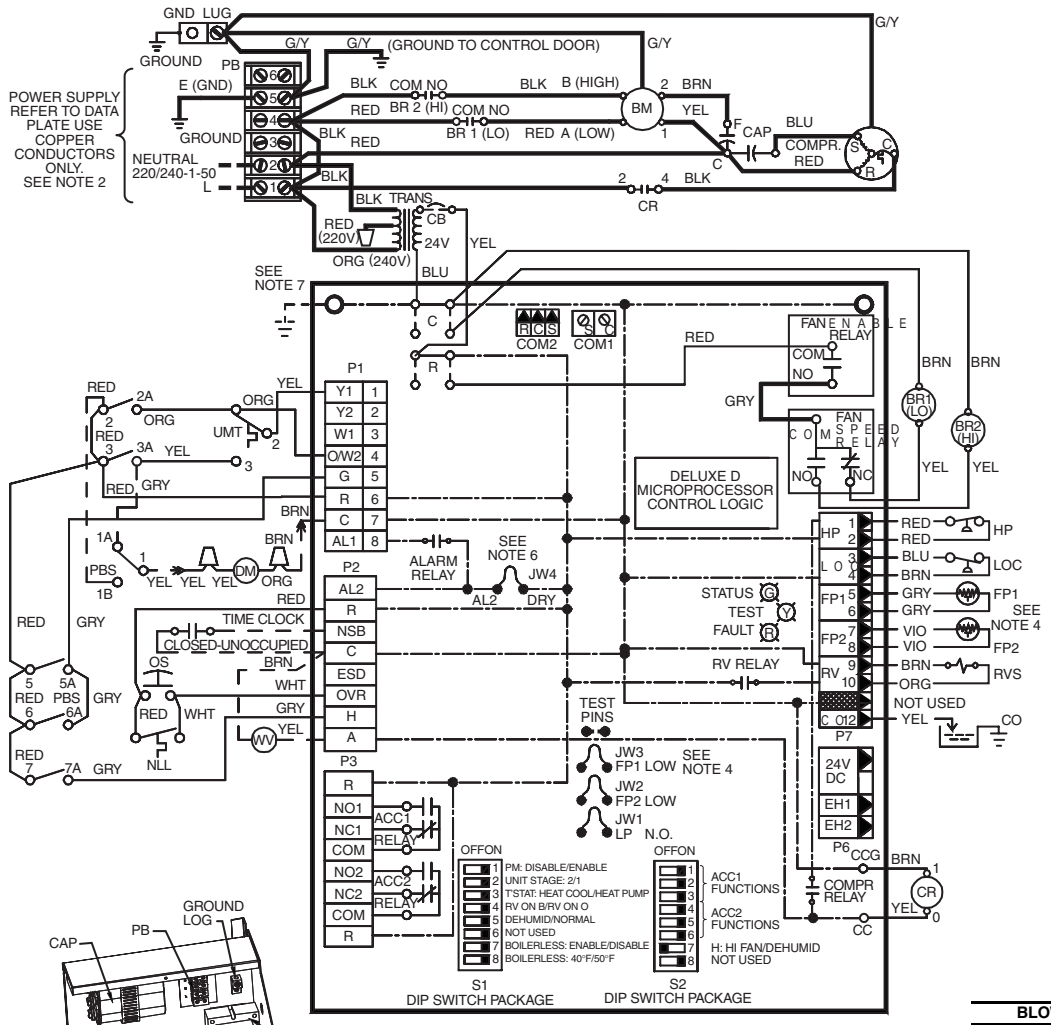
AL	—	Alarm Relay Contacts
BM	—	Blower Motor
BR	—	Blower Relay
CAP	—	Capacitor
CB	—	Circuit Breaker
CO	—	Sensor, Condensate Overflow
CR	—	Compressor Relay
DM	—	Damper Motor
FP1	—	Sensor, Water Coil Freeze Protection
FP2	—	Sensor, Air Coil Freeze Protection
HP	—	High-Pressure Switch
JW1	—	Jumper Wire for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

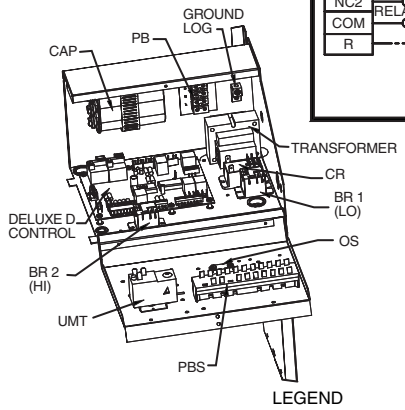
	Option Low Voltage Wiring
	Relay/Contactor Coil
	Solenoid Coil
	Thermistor
	Circuit Breaker
	Relay Contacts-N.O.
	Switch-Temperature
	Switch-High Pressure
	Switch-Low Pressure
	Ground
	Wire Nut
	Mate-N-Lock

*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 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG 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 unit-mounted thermostat wiring shown.
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.)

MANUAL CHANGEOVER WITH DELUXE D CONTROLLER





LEGEND

AL	—	Alarm Relay Contacts
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BR	—	Blower Relay
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CB	—	Circuit Breaker
CO	—	Sensor, Condensate Overflow
CR	—	Compressor Relay
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FP2	—	Sensor, Air Coil Freeze Protection
HP	—	High-Pressure Switch
JW1	—	Jumper Wire for Alarm
LOC	—	Loss of Charge Pressure Switch
NLL	—	Night Low Limit Switch
OS	—	Override Switch
PB	—	Power Terminal Block
PBS	—	Push Button Switch
PM	—	Performance Monitor
RVS	—	Reversing Valve Solenoid
TRANS	—	Transformer
UMT	—	Unit Mounted Thermostat
WV	—	Water Valve
----------		Field Line Voltage Wiring
– – – –		Field Low-Voltage Wiring
— — —		Printed Circuit Trace
— — —		Option Low Voltage Wiring
		Relay/Contactor Coil
		Solenoid Coil
		Thermistor
		Circuit Breaker
		Relay Contacts-N.O.
		Switch-Temperature
		Switch-High Pressure
		Switch-Low Pressure
		Ground
		Wire Nut
		Mate-N-Lock

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

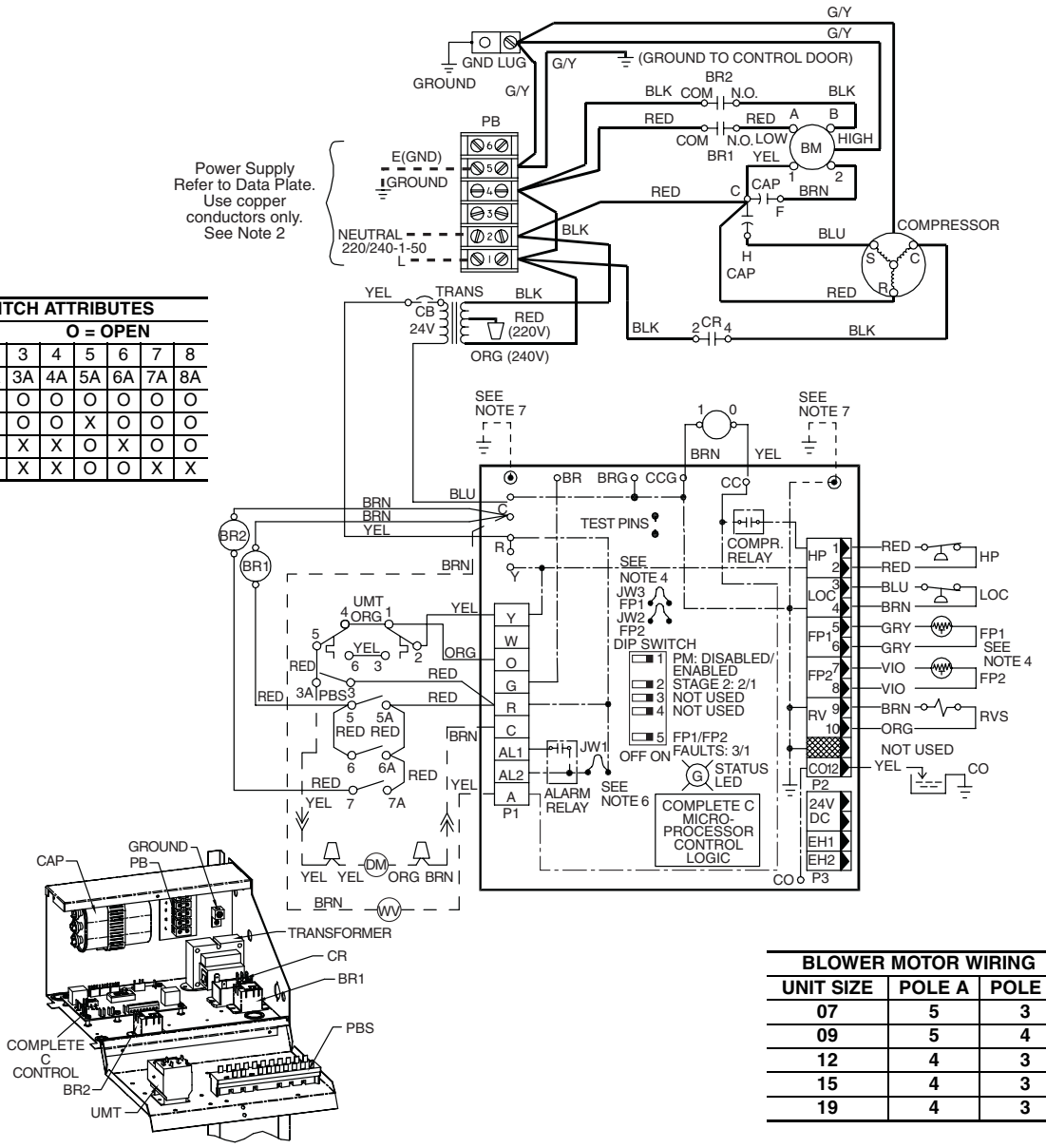
PUSH BUTTON SWITCH ATTRIBUTES									
X = CLOSED						O = OPEN			
TERMINALS	1		2	3	4	5	6	7	8
	1A	1B	2A	3A	4A	5A	6A	7A	8A
STOP	X	O	O	O	O	O	O	O	O
FAN ONLY	X	O	O	O	O	X	O	O	O
LOW COOL	O	X	X	O	O	O	X	O	O
HIGH COOL	O	X	X	O	O	O	O	X	O
LOW HEAT	X	O	O	X	X	O	X	O	O
HIGH HEAT	X	O	O	X	X	O	O	X	X

*Optional wiring.

NOTES:
1. Compressor and blower motor thermally protected internally.
2. All wiring to the unit must comply with local codes.
3. Transformer is wired to 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG 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 unit-mounted thermostat wiring shown.
6. 24-V alarm signal shown. For dry alarm contact, cut AL2 DRY (JW4) jumper and 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.)

Typical wiring schematics (cont)

AUTOMATIC 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	O
FAN ONLY	X	O	O	O	O	X	O	O	O
LOW FAN	X	O	O	X	X	O	X	O	O
HIGH FAN	X	O	O	X	X	O	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

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
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
UMT	—	Unit Mounted Thermostat
WV	—	Water Valve
----------		Field Line Voltage Wiring
– – – –		Field Low-Voltage Wiring

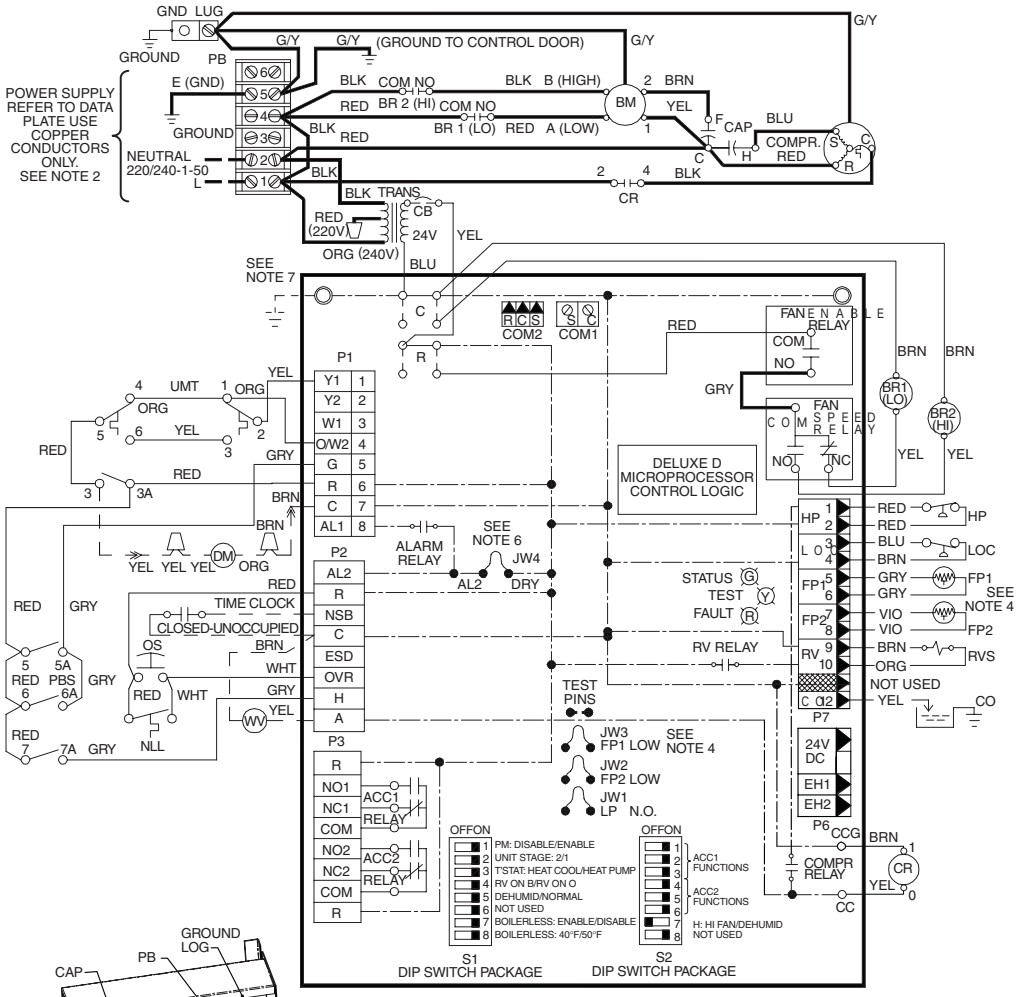
— — —	Printed Circuit Trace
▬ ▬ ▬	Option Low Voltage Wiring
	Relay/Contactor Coil
	Solenoid Coil
	Thermistor
	Circuit Breaker
	Relay Contacts-N.O.
	Switch-Temperature
	Switch-High Pressure
	Switch-Low Pressure
	Ground
	Wire Nut
	Mate-N-Lock

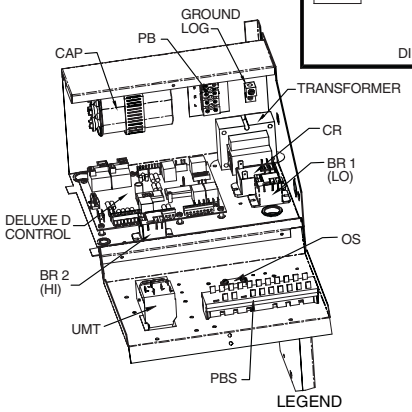
*Optional wiring.

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 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG lead. Transformer is energy limiting or may have circuit breaker.
4. FP1 thermistor provides freeze protection for WATER. When using ANTI-FREEZE solutions, cut JW1 jumper.
5. Typical unit-mounted thermostat wiring shown.
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.)

AUTOMATIC CHANGEOVER WITH DELUXE D 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	O
FAN ONLY	X	O	O	O	O	X	O	O	O
LOW FAN	X	O	O	X	X	O	X	O	O
HIGH FAN	X	O	O	X	X	O	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

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
HP	—	High-Pressure Switch
JW1	—	Jumper Wire for Alarm
LOC	—	Loss of Charge Pressure Switch
NLL	—	Night Low Limit Switch
OS	—	Override Switch
PB	—	Power Terminal Block
PBS	—	Push Button Switch
PM	—	Performance Monitor
RVS	—	Reversing Valve Solenoid
TRANS	—	Transformer
UMT	—	Unit Mounted Thermostat
WV	—	Water Valve
----------		Field Line Voltage Wiring
— — — —		Field Low-Voltage Wiring

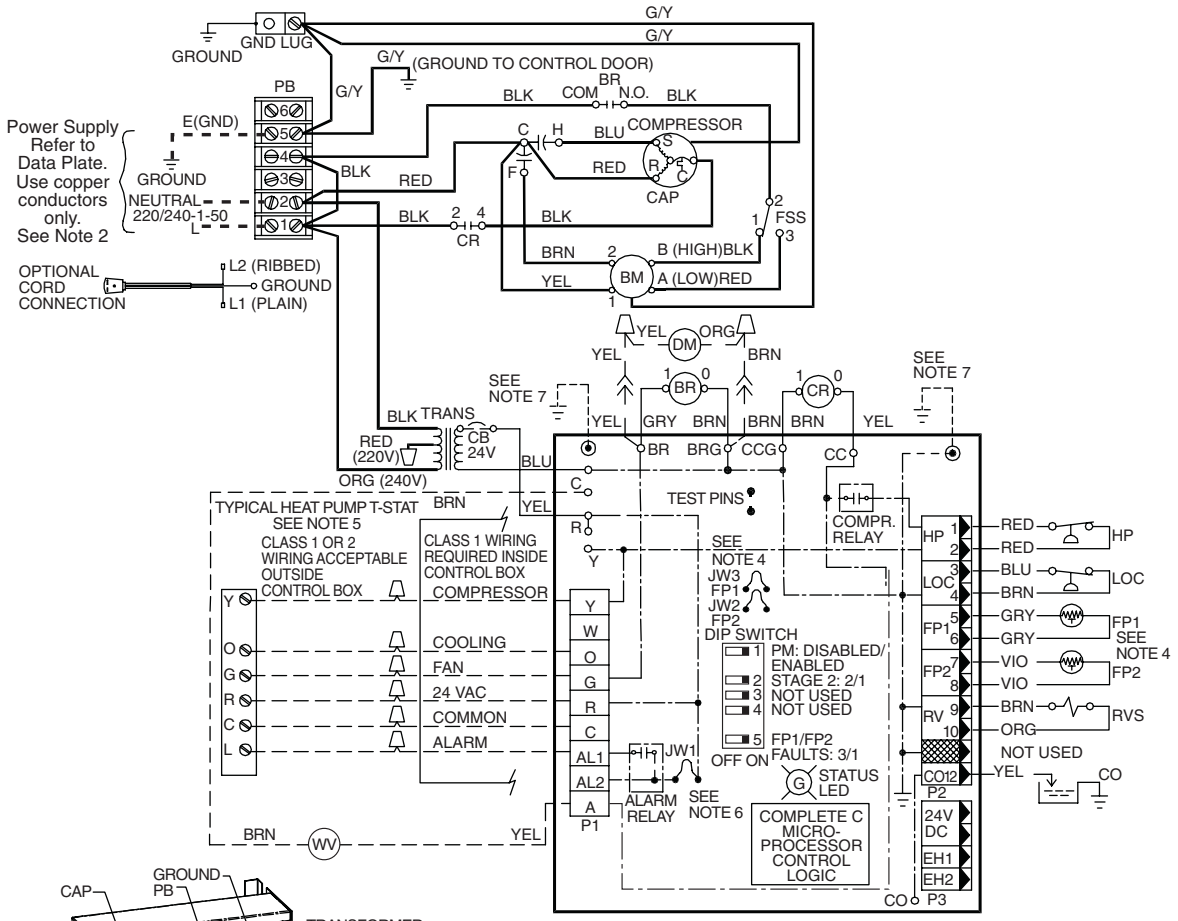
Printed Circuit Trace
Option Low Voltage Wiring
Relay/Contactor Coil
Solenoid Coil
Thermistor
Circuit Breaker
Relay Contacts-N.O.
Switch-Temperature
Switch-High Pressure
Switch-Low Pressure
Ground
Wire Nut
Mate-N-Lock

*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 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG 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 unit-mounted thermostat wiring shown.
6. 24-V alarm signal shown. For dry alarm contact, cut AL2 DRY (JW4) jumper and 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.)

Typical wiring schematics (cont)

REMOTE-MOUNTED THERMOSTAT WITH COMPLETE C CONTROLLER



BLOWER MOTOR WIRING		
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

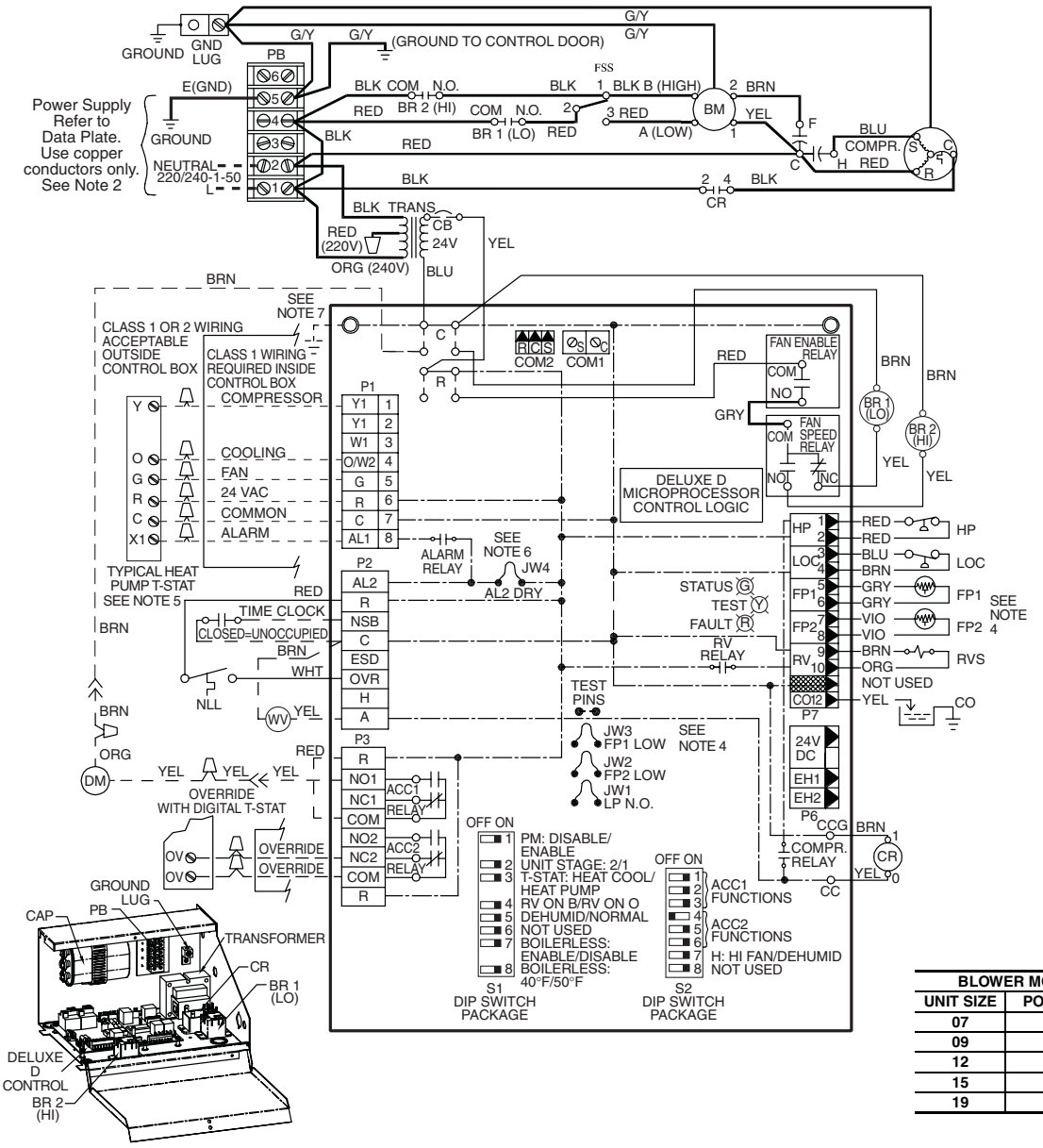
	Printed Circuit Trace
	Option Low Voltage Wiring
	Relay/Contactor Coil
	Solenoid Coil
	Thermistor
	Circuit Breaker
	Relay Contacts-N.O.
	Switch-High Pressure
	Switch-Low Pressure
	Ground
	Wire Nut
	Mate-N-Lock

*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 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG 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.)

REMOTE-MOUNTED THERMOSTAT WITH DELUXE D CONTROLLER



BLOWER MOTOR WIRING		
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
BR	—	Blower Relay
CAP	—	Capacitor
CB	—	Circuit Breaker
CO	—	Sensor, Condensate Overflow
CR	—	Compressor Relay
DM	—	Damper Motor
FP1	—	Sensor, Water Coil Freeze Protection
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LOC	—	Loss of Charge Pressure Switch
NLL	—	Night Low Limit
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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
▬▬▬		Option Low Voltage Wiring
		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 240-V (ORG) lead for 240/1/50. For 220/1/50 switch RED and ORG leads at PB(1) and insulate ORG lead. Transformer is energy limiting or may have circuit breaker.
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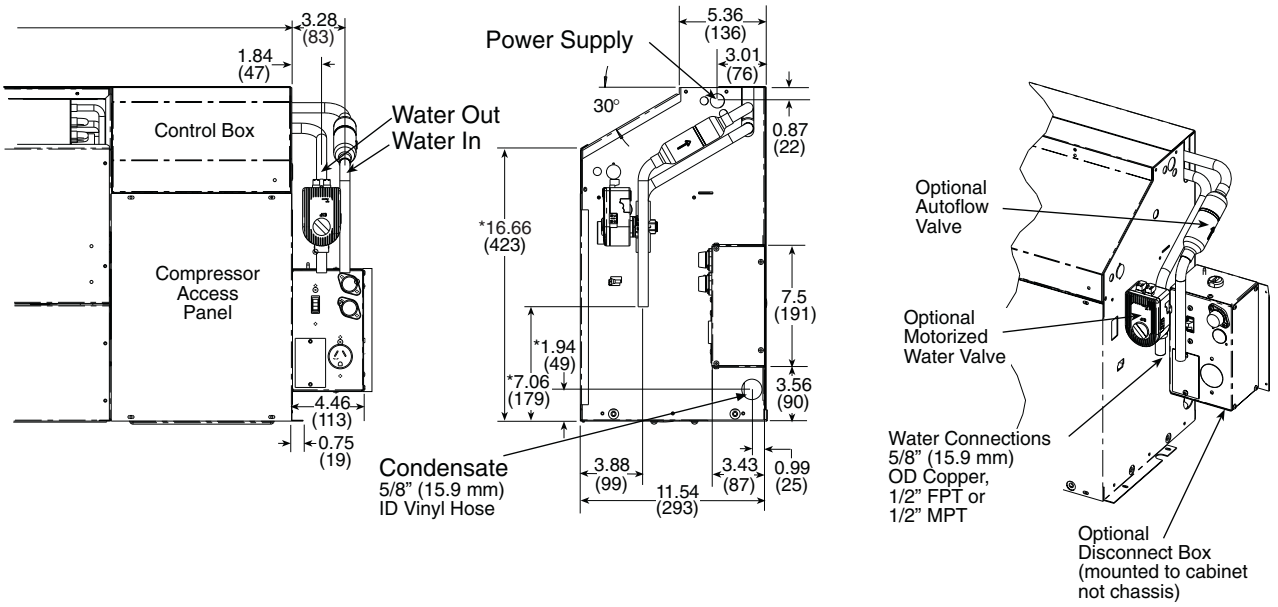
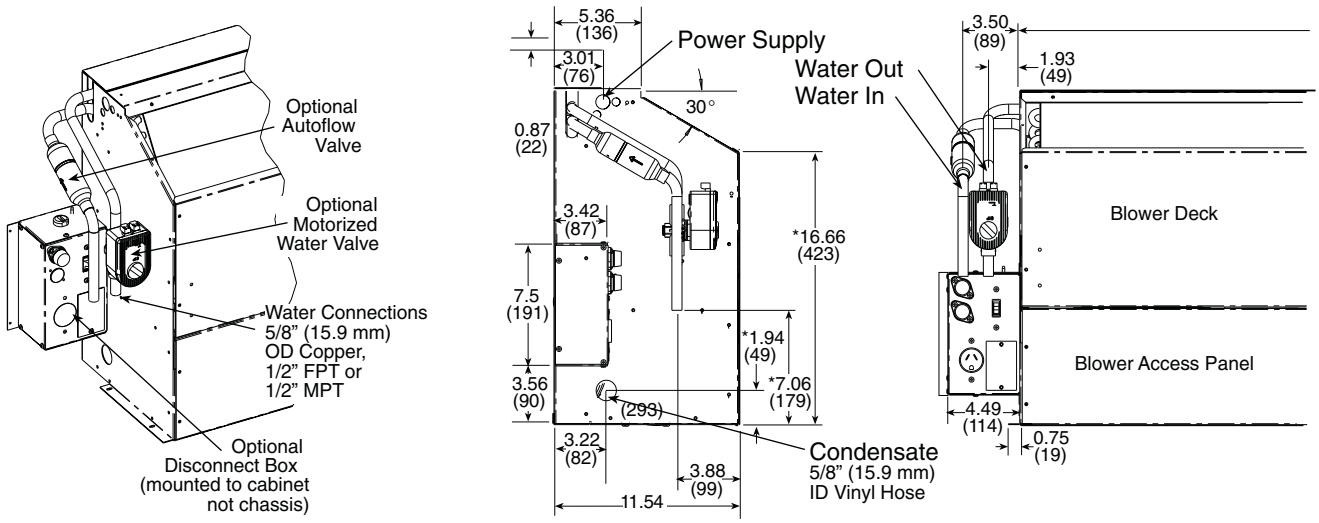
5. Typical heat pump thermostat wiring shown. Refer to thermostat Installation Instructions for wiring to the unit.
6. 24-V alarm signal shown. For dry alarm contact, cut AL2 DRY (JW4) jumper and dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via Deluxe D board standoffs and screws to control box. (Ground available from top two standoffs as shown.)

Typical piping and wiring

50KQE PIPING DETAIL



RIGHT HAND CONFIGURATION



LEFT HAND CONFIGURATION

*For installed dimension, add to dimension shown 74 mm with 76 mm subbase and 124 mm for 127 mm 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 R-407C, 50 Hz, CE Mark

HVAC Guide Specifications

Size Range: **1.82 to 3.84 kW Cooling Capacity**
2.35 to 4.61 kW Heating Capacity

Carrier Model Number: **50KQE**

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 50KQE.

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 rated in accordance with ISO Standard 13256-1. The units shall have CE Mark conformity.

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 15.6 to 35 C 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 HFC R-407C, 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 (1219 mm L x 305 mm D x 610 mm 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 76 or 127 mm 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 12.7 mm (1/2 in.) noise dampening insulation for all surfaces that normally have 6 mm (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 (freezestat) 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 2930 kPa 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 3103 kPa 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 –6.7 to 43.3 C.

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 $^5/_8$-in. (15.9 mm) 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 $^1/_2$-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. 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 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. Remote Sensors:

   Sensors for Aquazone flush-mount thermostats shall be available.

Carrier Corporation • Syracuse, New York 13221 2-04

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Book 1 4 Catalog No. 005-00041 Printed in U.S.A. Form 50KQE-C1PD
Tab 5a 5a Replaces: New