Product Data

Aquazone™ Indoor Packaged Water Source Heat Pump Units

1/2 to 6 Nominal Tons



50WC Vertical and Horizontal Compact Water Source Heat Pump Units with Puron Advance™ Refrigerant (R-454B) Sizes 007-070

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Overview

Carrier's Aquazone™ indoor packaged water source heat pump (WSHP) is an efficient, compact solution great for both new construction and retrofit applications.

The Carrier AquaZone™ 50WC water source heat pumps utilize Puron Advance™ low GWP refrigerant (R-454B), with a GWP of 465, ensuring compliance with U.S. EPA (Environmental Protection Agency) and other regulatory agency limits of 700, and offer:

- a compact, cost optimized design in both a vertical and horizontal packaged configuration
- enhanced serviceability features, a wide variety of factory-installed options, and flexible configurations suitable for boiler tower, geothermal, and hybrid water loop systems
- optional integrated Carrier TruVu™ controls allowing for advanced equipment control and monitoring and seamless integration to the i-Vu® building automation system

Cabinet construction and insulation

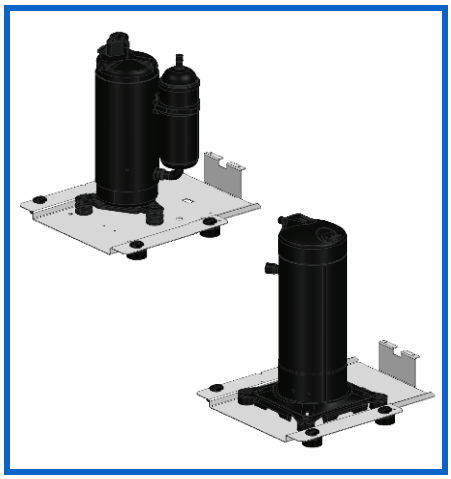
Heavy gauge galvanized sheet metal cabinet construction designed with large access panels for easy maintenance and service. Cabinet interior surfaces are lined with 1/2 in. thick, 1-1/2 lb fiberglass insulation or closed cell foam insulation. Sheet metal surfaces are treated for maximum corrosion protection to provide resilience for long term vitality. Compact cabinet dimensions fit tight space limitations in both horizontal and vertical configurations.

Cabinets are fully insulated to reduce noise transmission, low speed blowers are used for quiet operation through reduced outlet air velocities, and air to refrigerant coils are designed for lower airflow coil face velocities.

Compressor

Compact Aquazone™ units include a rotary compressor in sizes 007-030 and a scroll compressor in size 024-070 units. Compressors are mounted on a double isolated system (i.e., from the cabinet) that maximizes vibration isolation and minimizes transmission to the unit structure.

All 50WC units have a unique floating basepan; the compressor is mounted on a heavy steel plate which rests on a high density rubber pad on the base of the unit. In addition, compressors are mounted on rubber grommets. This double isolation is standard in all 50WC units preventing vibration and noise transmission from the compressor to the unit structure, resulting in exceptionally quiet operation.



Refrigerant circuit

All units contain sealed refrigerant (R-454B) circuit including features like:

- Thermal expansion valve — Units are equipped with a thermostatic expansion valve (TXV) metering device to ensure reliable operation across a wide range of entering air and water temperatures.
- Reversing valve (4-way valve) — Units are equipped with a refrigerant reversing valve. This valve's operation is specifically controlled to switch modes, ensuring heightened reliability in functionality.
- Pressure ports — All units are provided with high and low pressure ports integral to the refrigeration circuit for ease service.
- Filter drier — Standard on units with scroll compressor 2 tons and up, the refrigerant circuit filter drier enhances system performance by efficiently filtering and removing contaminants for improved longevity and efficiency.

Refrigerant to air heat exchanger

All units come standard with a copper tube, aluminum-fin air coil. These air coils employ lanced fin and rifled tubing for maximum heat transfer. Large face areas result in lower face velocity reducing sound while ensuring high latent heat removal for maximum dehumidification in cooling mode. Additional air coil coating protection option is available for units.

Refrigerant to water heat exchanger

50WC units are offered with a Copper coaxial (tube-in-tube) refrigerant to water heat exchanger. Optional Cupronickel coaxial heat exchanger is available for higher corrosion protection. Additionally, heat exchanger is insulated to prevent condensation, and therefore potential dripping problems, in applications where the entering water temperature is less than 50°F.



Table of contents

	Page
Overview	2
Features/Benefits	5
Model Number Nomenclature	7
AHRI Ratings and Capacities	8
Physical Data	9
Options and Accessories	11
Dimensions	24
Performance Data	30
Electrical Data	37
Application Data	42
Selection Procedure	53
Guide Specifications	56

Overview (cont)

Blower motor and housing

All units come equipped with a direct drive blower and motor assembly, which includes large blower wheels that enable the unit to operate at lower speeds, resulting in quieter operation. These units offer three optional motor choices: Permanent split capacitor (PSC), Constant Torque ECM, Constant Airflow ECM.

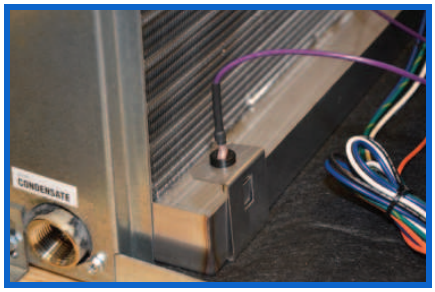
To minimize noise and vibration transmission to the unit and airstream, the motors are mounted on the fan housing using rubber grommets. The standard configuration includes a 1-inch supply air duct-flange connection, facilitating easy duct installation on the unit.

Stainless steel drain pan with condensate switch

Protection against corrosion is a feature in the 50WC series. A stainless steel drain pan is designed to last the lifetime of the unit and resist corrosion and cracking that may occur with steel or plastic materials.

Condensate overflow sensor

Factory-installed sensor is an 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 30 continuous seconds of overflow as a fault condition.



Unit controls

All Carrier WSHPs are equipped with a 24-v low voltage control circuit. Units are selectable to be provided with no controls for control via a field installed thermostat or third party DDC or to be provided with a factory-installed Carrier i-Vu® TruVu™ DDC for advanced equipment control and monitoring. Regardless of the selection all units will be equipped with a unit protection module, which regulates unit operation, features integrated safeties, and simplifies unit troubleshooting.

Electrical protection

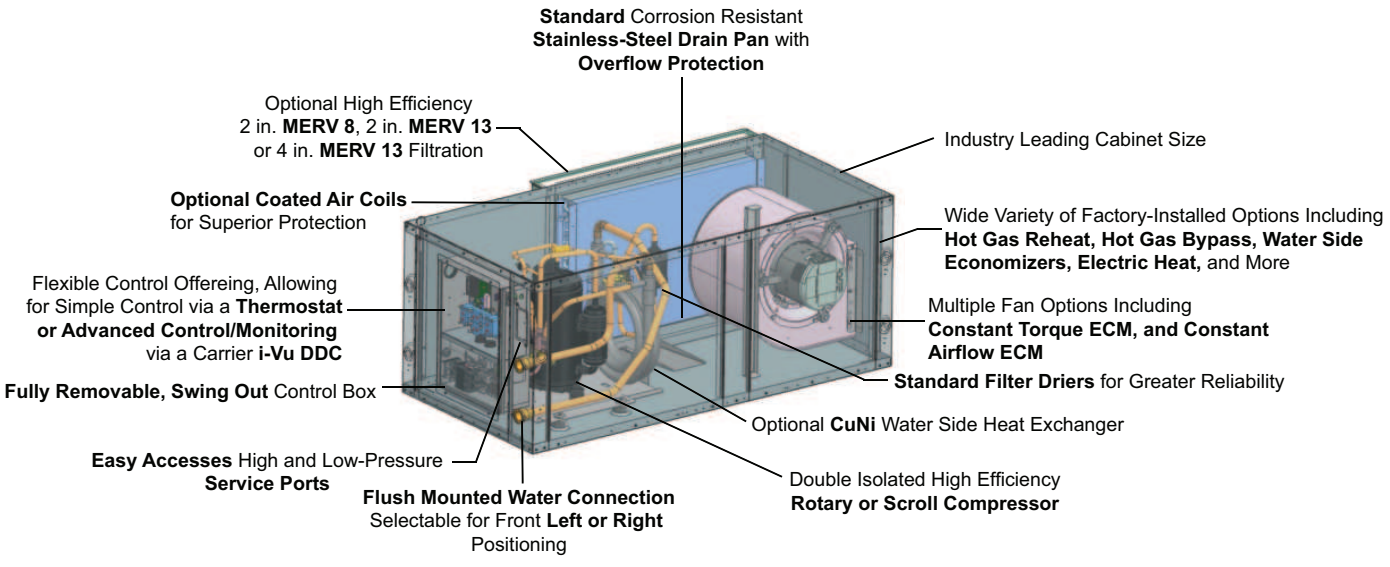
Units are offered with standard 5 kA SCCR (Short-Circuit Current Rating) or optional for enhanced protection with a 65 kA SCCR. Optional factory-installed disconnects are available for units with 5 kA SCCR.

Hanging brackets

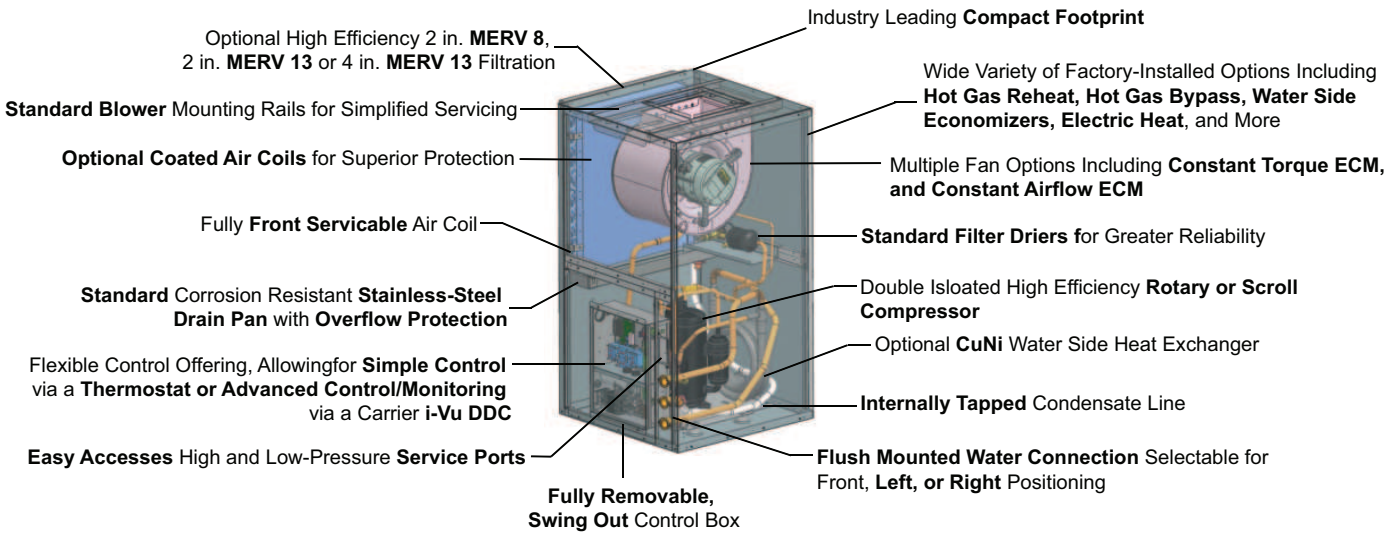
All horizontal units come standard with hanging bracket kits for suspending the unit from field-supplied hanger rods. These kits include heavy duty steel brackets and rubber grommets for sound and vibration isolation from the building structure.

Operating efficiencies

All efficiencies stated are in accordance with the latest edition of ISO/AHRI/ ASHRAE/ISO 13256-1 and provide competitive high ratings cooling EERs (energy efficiency ratios) and heating COPs (coefficients of performance) in the industry. All Aquazone™ units have AHRI (Air-Conditioning, Heating, and Refrigeration Institute)/ ISO, NRTL (Nationally Recognized Testing Lab), or CSA (Canadian Standards Association) labels and are factory tested under normal operating conditions at nominal water flow rates. Quality assurance is provided via testing report cards shipped with each unit to indicate specific unit performance under cooling and heating modes.



Overview (cont)



Features/Benefits

Safe, reliable operation

Equipment standard safety features include high and low refrigerant pressure protection, voltage protection, air and water coil freeze protection, condensate overflow shutdown, and optional refrigerant leak detector. All safety features are tested and run at the factory to assure proper operation of all components and safety switches. All components are carefully designed and selected for endurance, durability, and carefree day-to-day operation. The Aquazone™ unit is shipped to provide internal and external equipment protection. Shipping supports are placed under the blower housing. In addition, horizontal and vertical units are both mounted on oversized pallets with lag bolts for sturdiness and maximum protection during transit.

Quiet operation

In addition to standard cabinet and component insulation, such as rubber pads and grommets aimed at minimizing noise and vibration transmission, we provide sound attenuation packages tailored for applications demanding exceptionally low noise levels. This option encompasses closed-cell foam and a compressor blanket. Additionally, automatic 3-speed fan control logic is accessible through TruVu™ DDC, enabling the unit to operate at its lowest speed when necessary, thus further enhancing noise reduction capabilities.

Simple maintenance and serviceability

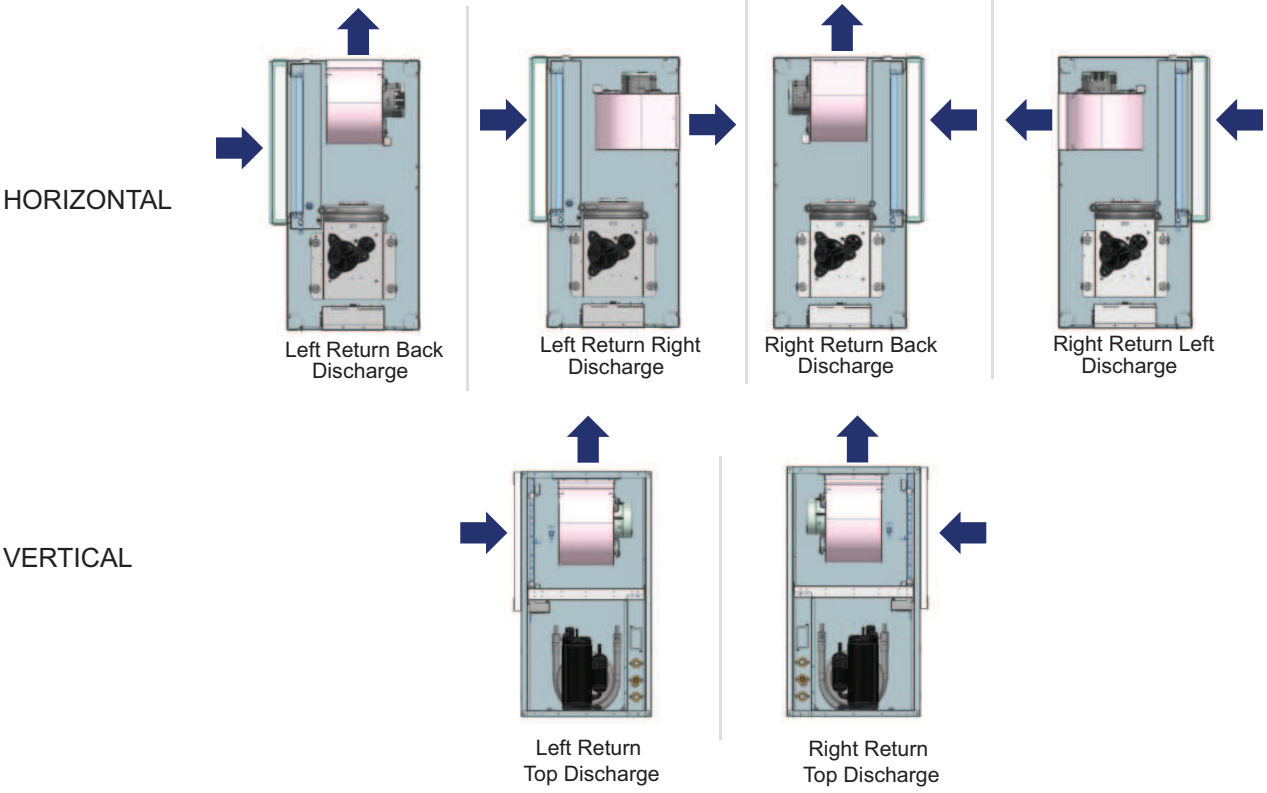
The Aquazone™ WSHP units are constructed to provide easy maintenance. All units allow easy access to the compressor section from 2 sides with large removable panels. Additional panels allow access to the blower and control box sections. The blower housing assembly can be serviced without disconnecting ductwork from the dedicated blower access panel. Blower units come with permanently lubricated bearings for worry-free performance. Blower inlet rings allow blower wheel removal without having to remove the housing or ductwork connections. Electrical disconnection of the blower motor and control box is easily accomplished via quick disconnects on each component. Easy removal of the control box from the unit provides access to all refrigeration components. The refrigeration circuit is easily tested and serviced through high and low pressure ports integral to the refrigeration circuit.

Ease of installation

The Aquazone™ unit is packaged for simple low cost handling and requires minimal installation. All units are pre-wired and factory charged with refrigerant. Horizontal units include factory-installed hanger isolation brackets. Water connections (FPT) and condensate drains (FPT) are anchored securely to the unit cabinet.

Airflow Configuration — Horizontal and Vertical Units

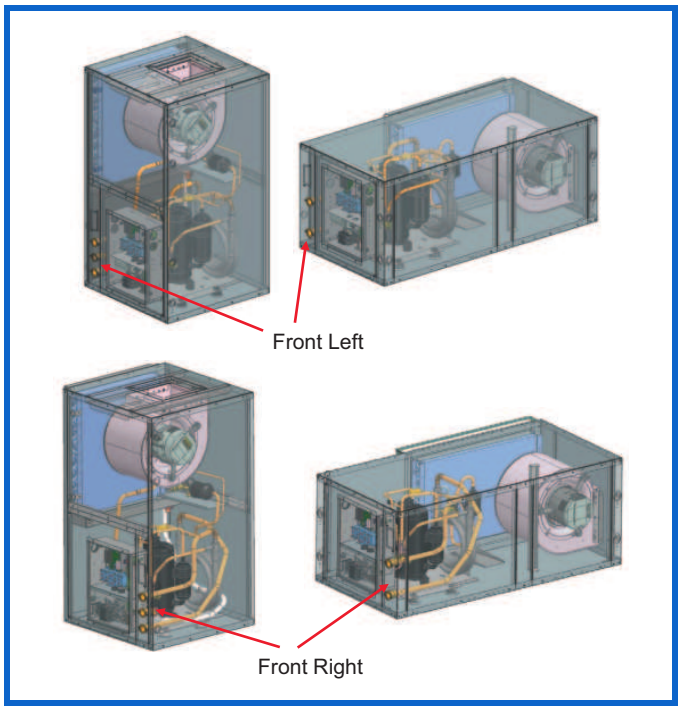
Airflow configurations for horizontal units are available in patterns including left or right return with straight through or end discharge. Horizontal units are field convertible between straight through (left or right) discharge and back discharge. Vertical units are available in left or right return with top discharge.



Features/Benefits (cont)

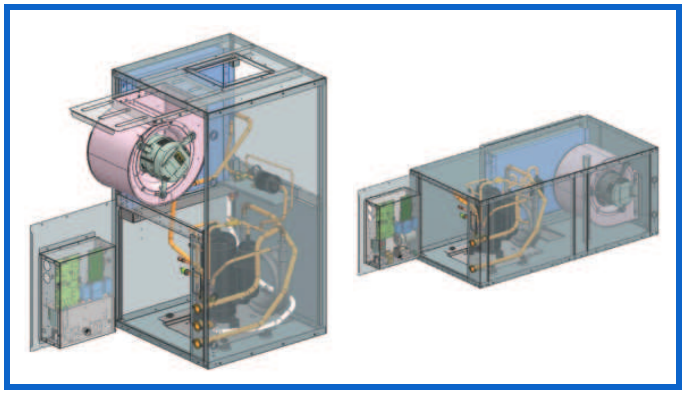
Water connections

All units are offered with choice of water connection side for flexible All water connections are heavy duty bronze FPT fittings securely fastened to the unit corner post. This allows connecting to a flexible hose kit without the use of a backup wrench making for easier, faster installation.



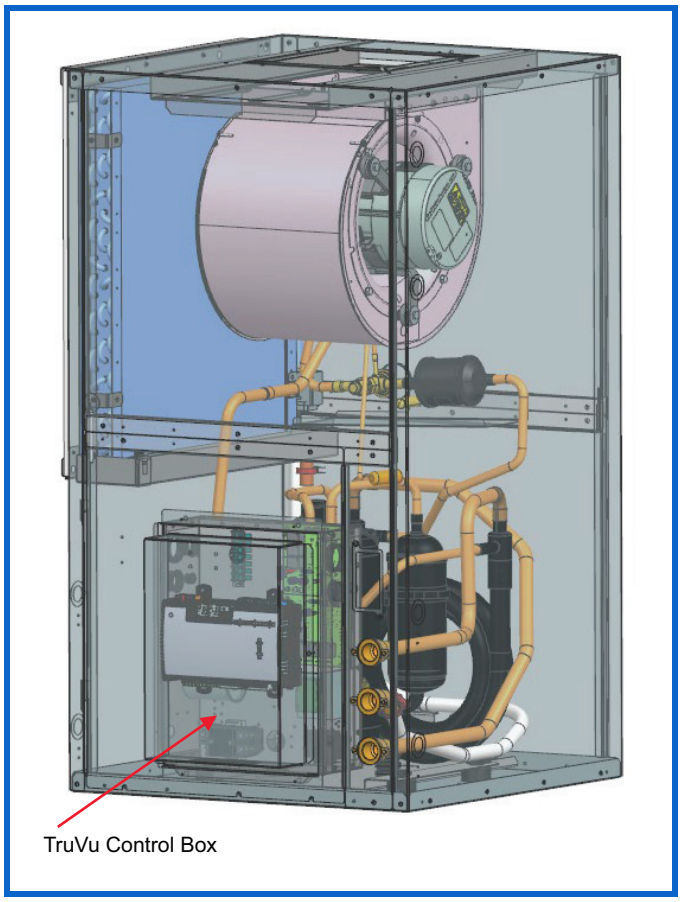
Swing out control box and slide out motor

Designed for optimal convenience, the unit combines a user-friendly control box that effortlessly swings out for easy access, along with a fan assembly that smoothly slides out (vertical units only) for simplified maintenance.



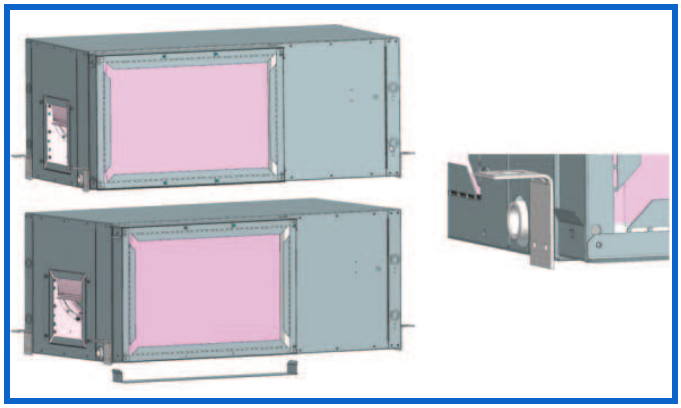
TruVu™ DDC control box

For added controller protection, an additional enclosure box is included and factory installed with the selected TruVu™ DDC control option. This feature increases the unit's depth by 3 inches.



Bottom filter access

Bottom filter access is offered optionally for horizontal units (sizes 007-060) equipped with MERV 8 or MERV 13 filters, providing convenient accessibility in situations where side access to the filters is restricted.



Model number nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5	0	W	C	A	0	2	4	A	A	A	1	A	A	–	A

Model Series (1-2)
50 = Packaged WSHP Unit

Tier (3-4)
WC = 1-Stage (Compact)

Cabinet Configuration (5)

ORIENTATION	FILTER ACCESS	WATER CONNECTION	
		Front Left	Front Right
Horizontal	Side Filter Access	A	B
	Bottom Filter Access	C	D
Vertical	Side Filter Access	E	F

Nominal Capacity MBH (Tons) (6-8)
007 = 7 (1/2)
009 = 9 (3/4)
012 = 12 (1)
015 = 15 (1-1/4)
018 = 18 (1-1/2)
024 = 24 (2)
030 = 30 (2-1/2)
036 = 36 (3)
042 = 42 (3-1/2)
048 = 48 (4)
060 = 60 (5)
070 = 70 (6)

Airflow Configuration (9)

ORIENTATION	RETURN	DISCHARGE	MOTOR		
			PSC	CT ECM	CA ECM
Horizontal	Right	Back	A	G	N
	Right	Left	B	H	P
	Left	Back	C	J	Q
	Left	Right	D	K	R
Vertical	Right	Top	E	L	S
	Left	Top	F	M	T

Controls — Option/Transformer (10)
A = UPM/50 VA
B = UPM/75 VA
C = UPM + BE/50 VA[a]
D = UPM + BE/75 VA[a]
E = UPM + TV DDC/100 VA
G = UPM + SR/50 VA
H = UPM + SR/75 VA
J = UPM + PR/50 VA
K = UPM + PR/75 VA
L = UPM + EMS/50 VA
M = UPM + EMS/75 VA
N = UPM + BE + PR/50 VA[a]
P = UPM + BE + PR/75 VA[a]
Q = UPM + BE + SR/50 VA[a]
R = UPM + BE + SR/75 VA[a]
S = UPM + BE + SR + PR/50 VA[a]
T = UPM + BE + SR + PR/75 VA[a]
U = UPM + SR + PR/50 VA
V = UPM + SR + PR/75 VA
W = UPM + EMS+ SR/50 VA
X = UPM + EMS + SR/75 VA
Z = UPM + EMS + PR/75 VA
1 = UPM + EMS + SR+ PR/50 VA
2 = UPM + EMS + SR+ PR/75 VA
3 = UPM + EMS + BE/50VA[a]
4 = UPM + EMS + BE/75VA[a]
5 = UPM + EMS + BE + SR/50 VA[a]
6 = UPM + EMS + BE + SR/75 VA[a]
7 = UPM + EMS + BE + PR/50 VA[a]
8 = UPM + EMS + BE + PR/75 VA[a]

LEGEND
BE — Boilerless Electric Heat
CA ECM — Constant Airflow ECM
CB — Compressor Blanket
CCF — Closed Cell Foam Insulation
CO — Cooling Only
CT ECM — Constant Torque ECM
DP — Differential Pressure Flow Switch
ECM — Electronically Commutated Motor
EMS — Energy Management Switch
HGBP — Hot Gas Bypass
HGRH — Hot Gas Reheat
PR — Pump Relay
PSC — Permanent Split Capacitor
REG — Auto Flow Regulator
SCCR — Short Circuit Current Rating
SR — Compressor Status Relay
Std — Standard
TV DDC — TruVu Direct Digital Controller
ULL — Ultra Low Leak Cabinet
UPM — Unit Protection Module
VLV — 2-Way Solenoid Valve
WSE — Water Side Economizer
WSHP — Water Source Heat Pump

Design Revision (16)
A = Initial Release

Miscellaneous Options (15)
– = None
A = Waterside Economizer (WSE)[a]
B = A2L Leak Detection (LD)
C = WSE + LD[a]

Hydronic Options (14)

OPTION	WATER COIL	
	Copper	Cupro-Nickel
None	A	J
2-Way Valve (VLV)	B	K
Auto-Flow Reg. (REG)	C	L
Flow Proving Switch (DP)	D	M
VLV + REG	E	N
VLV + DP	F	P
VLV + REG + DP	G	Q
REG + DP	H	R

Sound, and IAQ Options (13)
A = None (Std insulation)
B = Closed Cell Foam Insulation (CCF)
D = Ultra Low Leak Cabinet (ULL) + 2 in. MERV 8, CCF[b]
F = 2 in. MERV8 Filter, Std Insulation
G = 2 in. MERV8 Filter, CCF
H = 2 in. MERV13 Filter, Std Insulation
J = 2 in. MERV13 Filter, CCF
K = 4 in. MERV13 Filter, Std Insulation
L = 4 in. MERV13 Filter, CCF
M = ULL + 2 in. MERV 13, CCF[b]
P = ULL + 4 in. MERV 13, CCF[b]
U = Compressor Blanket (CB), Std Insulation
V = Compressor Blanket (CB), CCF
W = CB + 2 in. MERV 8, Std Insulation
X = CB + 2 in. MERV 8, CCF
Y = CB + 2 in. MERV 13, Std Insulaton
Z = CB + 2 in. MERV 13, CCF
Y = CB + 2 in. MERV 13, Std Insulation
Z = CB + 2 in. MERV 13, CCF
1 = CB + 4 in. MERV 13, Std Insulation
2 = CB + 4 in. MERV 13, CCF
3 = ULL + CB + 2 in. MERV 8, CCF[b]
4 = ULL + CB + 2 in. MERV 13, CCF[b]
5 = ULL + CB + 4 in. MERV 13, CCF[b]

Electrical Options (12)
1 = 575/3/60
3 = 208-230/1/60
4 = 265/1/60
5 = 208-230/3/60
6 = 460/3/60
B = 208-230/1/60 with Disc.
C = 265/1/60 w/ Disc.
D = 208-230/3/60 with Disc.
E = 460/3/60 with Disc.
F = 575/3/60 with Disc.
G = 208-230/1/60, 65 kA SCCR
J = 265/1/60, 65 kA SCCR
K = 208-230/1/60, 5 kW E-Heat
L = 208-230/1/60, 7.5 kW E-Heat
M = 208-230/1/60,10 kW E-Heat
Z = 460/3/60, 65 kA SCCR

Refrigerant Circuit Options (11)

OPTION	NON-COATED AIR COIL	COATED AIR COIL
None	A	B
Hot Gas Reheat (HGRH)[a]	C	D
Cooling Only (CO)	E	F
Hot Gas Bypass (HGBP)	G	H
HGRH + HGBP[a]	N	P

NOTE(S):
a. Option card board is provided with selection of HGRH/WSE/BE options and without TruVu DDC.
b. ULL represents < 2% air leakage option.

AHRI ratings and capacities

50WC Series Water Source Heat Pump Ratings[a,b,c,d,e,f,g]

MOTOR OPTION	MODEL NUMBER	WATER LOOP HEAT PUMP				GROUND WATER HEAT PUMP				GROUND LOOP HEAT PUMP				CFM	GPM
		Cooling 86°F		Heating 68°F		Cooling 59°F		Heating 50°F		Cooling 77°F		Heating 32°F			
		Capacity BTU/h	EER BTU/ W-h	Capacity BTU/h	COP	Capacity BTU/h	EER BTU/ W-h	Capacity BTU/h	COP	Capacity BTU/h	EER BTU/ W-h	Capacity BTU/h	COP		
PSC	007	6,100	13.20	8,900	4.60	6,750	18.5	7,100	4.20	6,350	14.80	5,600	3.30	300	2.00
	009	8,200	12.40	10500	4.60	9,100	18.0	8,400	4.00	8,450	14.50	6,700	3.20	300	2.25
	012	10,900	12.20	14,000	4.50	12,100	18.0	11,200	4.00	11,350	14.50	9,000	3.20	400	3.00
	015	14,200	12.80	17,000	4.70	15,750	18.0	13,600	4.30	14,800	14.80	11,000	3.50	500	3.50
	018	18,000	13.80	22,000	4.60	20,000	19.0	17,600	4.50	18,350	14.60	14,000	3.60	600	4.50
	024	24,200	14.00	28,300	4.70	26,850	19.5	22,650	4.40	24,550	14.70	18,500	3.60	800	6.00
	030	27,700	13.90	34,600	4.50	30,750	19.5	27,700	4.20	28,000	14.80	23,000	3.50	950	7.50
	036	37,700	13.60	40,000	4.60	41,850	19.0	32,000	4.10	39,000	14.80	27,000	3.50	1,200	9.00
	042 VT	39,300	14.10	47,400	4.60	43,600	19.5	37,900	4.30	40,100	14.70	31,000	3.50	1,400	10.50
	042 HZ	39,300	14.00	47,400	4.60	43,600	19.5	37,900	4.30	40,100	14.70	31,000	3.50	1,400	10.50
	048	46,900	14.00	54,000	4.70	52,050	19.5	43,200	4.30	47,400	14.90	36,500	3.60	1,600	12.00
	060	59,500	13.60	74,000	4.60	66,050	19.0	59,200	4.30	60,400	14.60	48,500	3.50	1,900	15.00
	070	64,000	13.30	73,500	4.50	71,050	18.5	58,800	4.10	65,000	14.50	50,000	3.50	2,030	16.00
ECM	007	6,200	13.50	8,800	4.60	6,900	18.9	7,000	4.20	6,450	14.90	5,500	3.30	300	2.00
	009	8,300	12.60	10,400	4.60	9,200	18.3	8,400	4.00	8,550	14.70	6,700	3.20	350	2.25
	012	11,000	12.50	13,900	4.60	12,150	18.4	11,100	4.10	11,400	14.80	8,900	3.30	400	3.00
	015 VT	14,400	13.70	16,700	4.80	16,000	19.3	13,250	4.60	15,000	15.60	10,700	3.70	550	4.00
	015 HZ	14,400	13.70	16,700	4.80	16,000	19.3	13,250	4.60	15,000	15.60	10,700	3.70	500	4.00
	018	18,200	14.50	21,800	4.70	20,150	20.0	17,350	4.70	18,500	15.30	13,800	3.70	600	5.00
	024	24,500	14.80	28,000	4.70	27,200	20.5	22,250	4.50	24,850	15.40	18,200	3.70	800	6.00
	030	28,000	14.50	34,000	4.70	31,100	20.3	27,200	4.50	28,300	15.20	22,600	3.70	950	7.00
	036	37,900	13.90	39,800	4.60	42,050	19.5	31,750	4.30	39,000	14.90	26,800	3.60	1,200	9.00
	042	40,100	15.60	46,500	4.90	44,500	21.5	36,800	4.60	40,900	16.20	30,100	3.80	1,400	10.00
	048	47,400	14.70	53,300	4.70	52,600	20.5	42,640	4.40	47,900	15.30	35,800	3.70	1,600	12.00
	060	59,900	14.00	73,300	4.70	66,500	19.5	58,640	4.50	60,800	15.00	47,800	3.70	2,000	15.00
	070	64,900	14.20	72,600	4.70	72,100	19.0	58,150	4.50	65,900	15.60	49,100	3.70	2,100	16.00

NOTE(S):

a. Ratings based upon AHRI/ANSI 13256-1 with 1 in. disposable MERV 5 filter.
b. ECM motor option = Constant Airflow (CA), and Constant Torque (CT) motors.
c. These ratings are for Vertical and Horizontal airflow.
d. For specific configuration ratings, refer to WSHP Builder in the Carrier NG ECA.
e. Certified in accordance with ANSI/AHRI/ASHRAE/ISO 13256-1.
f. Cooling rated capacities based on EAT = 80.6°F/66.2°F (db/wb).
g. Heating rated capacities based on EAT = 68°F (db).

LEGEND

AHRI — Air-Conditioning, Heating and Refrigeration Institute
BTU/h — British Thermal Units per Hour
BTU/W-h — British Thermal Units per Watt-Hour
CA — Constant Airflow
Cfm — Cubic Feet Per Meter
COP — Coefficient Performance
CT — Constant Torque
ECM — Electronically Commutated Motor
EER — Energy Efficiency Ratio
Gpm — Gallons Per Minute
HZ — Horizontal
PSC — Permanent Split Capacitor
VT — Vertical

Physical data

Physical Data — 50WC (007-024) Units

UNIT SIZE	007	009	012	015	018	024
Compressor Type (Qty 1)	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll (208/230-v 3 Phase,460-v) Rotary (208/230-v 1 Phase, 265-v)
Max Water Working Pressure (psig/kPa)[a]	400	400	400	400	400	400
FAN MOTOR AND BLOWER						
PSC Fan Motor (hp)	0.10	0.10	0.10	1/6	1/6	0.25
Constant Torque Fan Motor (hp)	0.25	0.25	0.25	0.33	0.33	0.33 (vertical 208/230-v, 265-v) 0.5 (vertical 460-v; horizontal)
Constant Airflow Fan Motor (hp)	—	—	—	—	0.33	0.33 (vertical) 0.50 (horizontal)
Blower Wheel Size (Dia. x W)	5.5 x 4.5	5.5 x 4.5	5.5 x 4.5	9 x 7	9 x 7	9 x 7
WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	0.75	0.75	0.75
Coaxial Coil Volume (gal)	0.07	0.07	0.07	0.07	0.10	0.18
ECONOMIZER OPTION WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	0.75	0.75	0.75
VERTICAL CABINET						
Refrigeration Charge (oz)	17	20	18.5	19	23	30 Scroll (208/230-v 3 Phase, 460-v) 29 Rotary (208/230-v 1 Phase, 265-v)
Air Coil Dimensions (H x W)	10 x 14	10 x 14	10 x 14	15 x 16.5	15 x 16.5	20 x 16.5
Standard Filter - 1" MERV 5 Throwaway (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Optional Filter - 2" MERV 8 or 13 (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Optional Filter - 4" MERV 13 (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Weight - Operating (lb)	106	112	117	146	170	191
Weight - Shipping (lb)	134	139	144	174	195	218
HORIZONTAL CABINET						
Refrigeration Charge (oz)	18	18.5	18.5	21	24	28 Scroll (208/230-v 3 Phase, 460-v) 30 Rotary (208/230-v 1 Phase, 265-v)
Air Coil Dimensions (H x W)	10 x 14	10 x 14	10 x 14	14 x 20	14 x 20	15 x 22
Standard Filter - 1" Throwaway (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Optional Filter - 2" MERV 8 or 13 (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Optional Filter - 4" MERV 13 (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Weight - Operating (lb)	98	106	114	147	155	183
Weight - Shipping (lb)	130	135	143	169	189	214

NOTE(S):

a. 300 psig when unit is built with the factory installed 2-way solenoid valve option.

LEGEND

FPT — Female Pipe Thread
PSC — Permanent Split Capacitor

Physical data (cont)

Physical Data — 50WC (030-070) Units

UNIT SIZE	030	036	042	048	060	070
Compressor Type (Qty 1)	Scroll (208-230-v 3 Phase, 460-v) Rotary (208-230-v 1 Phase, 265-v)	Scroll	Scroll	Scroll	Scroll	Scroll
Max Water Working Pressure (psig/kPa)[a]	400	400	400	400	400	400
FAN MOTOR AND BLOWER						
PSC Fan Motor (hp)	0.25 (vertical) 0.50 (horizontal)	0.75 (vertical 208/230-v, 460-v) 0.50 (vertical 265-v; horizontal)	0.75	0.75	0.75	0.75
Constant Torque Fan Motor (hp)	0.33 (vertical 208/230-v, 265-v) 0.50 (vertical 460-v; horizontal)	0.75	0.75	0.75	1.00	1.00
Constant Airflow Fan Motor (hp)	0.33 (vertical) 0.5 (horizontal)	0.75	0.75	0.75	1.00	1.00
Blower Wheel Size (Dia. x W)	9 x 7	10 x 8	10 x 8	10 x 8	11 x 9	11 x 9
WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	1.00	1.00	1.00
Coaxial Coil Volume (gal)	0.32	0.32	0.32	0.37	0.49	0.49
Economizer Option Water Connection Size (FPT) (in.)	0.75	0.75	0.75	1.00	1.00	1.00
VERTICAL CABINET						
Refrigeration Charge (oz)	28 Scroll (208/230-v 3 Phase, 460-v) 35 Rotary (208/230-v 1 Phase, 265-v)	34	38	44	48	57
Air Coil Dimensions (H x W)	20 x 16.5	24 x 16.5	28 x 21	28 x 21	28 x 21	40 x 27
Standard Filter - 1" MERV 5 Throwaway (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x3 0	20 x 27 (2)
Optional Filter - 2" MERV 8 or 13 (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x 30	20 x 27 (2)
Optional Filter - 4" MERV 13 (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x 30	20 x 27 (2)
Weight - Operating (lb)	191	215	228	228	275	338
Weight - Shipping (lb)	218	241	254	253	299	362
HORIZONTAL CABINET						
Refrigeration Charge (oz)	31 Scroll (208/230-v 3 Phase, 460-v) 29 Rotary (208/230-v 1 Phase, 265-v)	32	37	44	50	55
Air Coil Dimensions (H x W)	15 x 22	16 x 27.5	16 x27.5	18 x 31	18 x 31	18 x 42
Standard Filter - 1" Throwaway (L x H)	17 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Optional Filter - 2" MERV 8 or 13 (L x H)	17 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Optional Filter - 4" MERV 13 (L x H)	1 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Weight - Operating (lb)	187	205	213	267	285	296
Weight - Shipping (lb)	221	250	247	292	315	345

NOTE(S):

a. 300 psig when unit is built with the factory installed 2-way solenoid valve option.

LEGEND

FPT — Female Pipe Thread
PSC — Permanent Split Capacitor

Options and accessories

ITEM	FACTORY-INSTALLED OPTION	FIELD-INSTALLED ACCESSORY
Coated Air Coil	X	
Cupronickel Water Heat Exchanger	X	
Permanent Split Capacitor (PSC)	X	
Constant Torque ECM (CT ECM)	X	
Constant Airflow ECM (CA ECM)	X	
Hot Gas Reheat (HGRH)	X	
Hot Gas Bypass (HGBP)	X	
Water Side Economizer (WSE)	X	
Cooling Only (CO)	X	
Disconnect Switch	X	
Electric Heater	X	X
Air Filter (MERV 5, MERV 8, MERV 13)	X	
Closed Cell Foam Insulation (CCF)	X	
Compressor Blanket (CB)	X	
Ultra Low Leak Cabinet (ULL)	X	
A2L Leak Detection (LD)	X	
Two-Position Motorized Isolation Valve (2-way solenoid valve)	X	X
Autoflow Regulator	X	X
Differential Pressure Switch / Flow Proving Switch	X	
Supply and Return Water Hose Kits		X
Ball Valves		X
Y-Strainers		X
Thermostat		X
Non-Communicating Sensors		X
TruVu™ DDC Controller	X	
User Interfaces		X
ZS Sensors		X

Factory-installed options

Coated air coil

Additional air coil Protection option is available for units. This option offers tin electro-plated copper tubing with high tech polymer coated aluminum fins will protect the air coil from all forms of corrosive elements in the airstream. Air coil protection is required for primary residence applications to protect against formicary corrosion. Protected coils exceed 1000 hours of ASTM B117 salt spray testing.

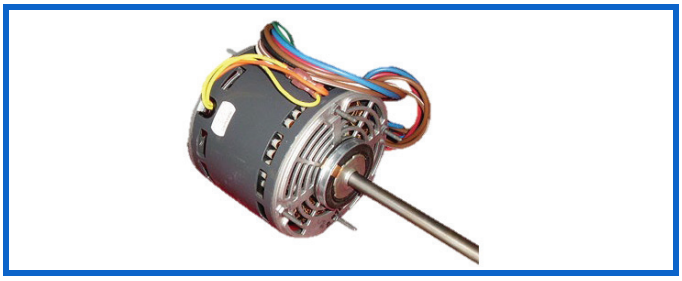
Cupronickel water heat exchanger

Option is 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.

Fan motor options

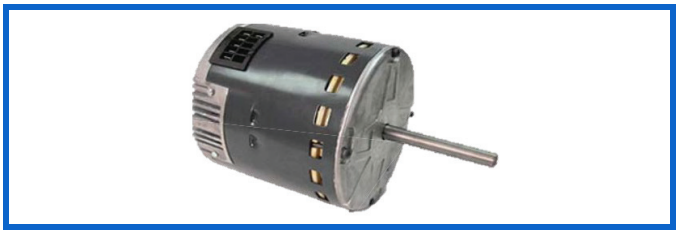
Permanent Split Capacitor

Permanent split capacitor (PSC) motors are available as a standard option for all unit sizes. The provided motor features three-speed taps that can be adjusted in the field. With the exception of the 575-volt motor, it has a single speed tap.



Constant Torque ECM

Constant Torque ECMs (CT ECM) are available as a standard option across all unit sizes. Constant torque ECMs have 3 available speed taps for unit sizes from 007 to 012, and 5-speed taps for unit sizes from 015 to 060 and it will maintain a constant motor torque as external static pressure in the system increases.



Constant Airflow ECM

Constant Airflow ECMs (CA ECM) are available as a standard option for units from 015 to 070 size. It will maintain constant unit airflow as the static pressure in the system increases. Constant airflow ECMs provide 3 available speed settings.

NOTE: 460-v units with Constant Airflow ECM blower motors require a neutral wire (4 wires).



Options and accessories (cont)

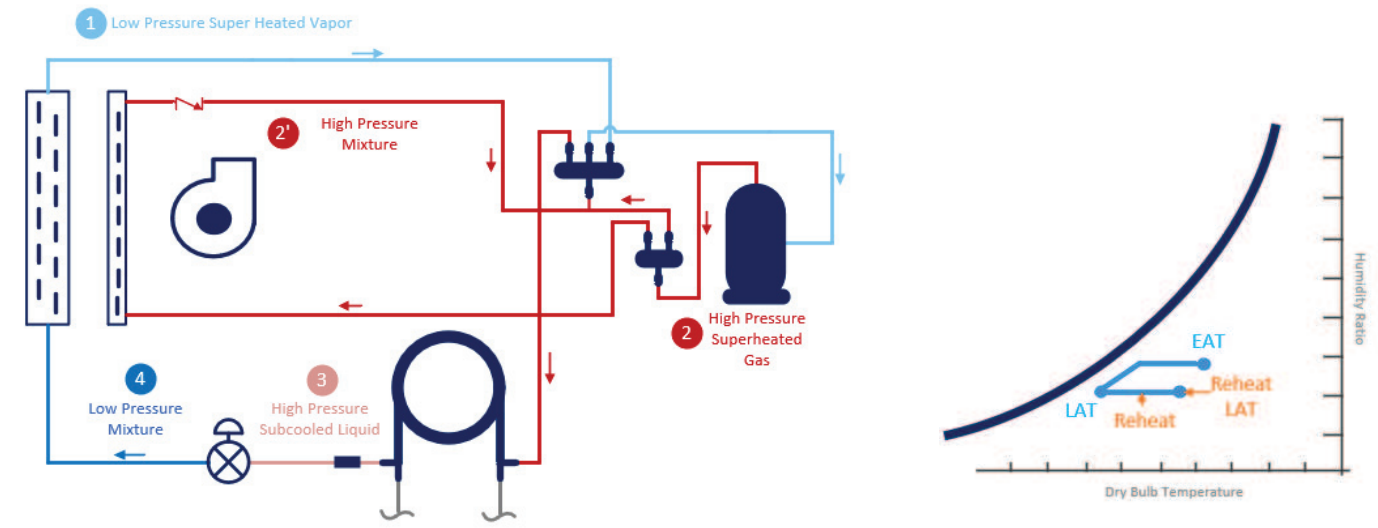
Hot gas reheat (HGRH)

HGRH is an efficient and effective method of providing space humidity control. HGRH allows the unit to dehumidify the space when there is no demand for space cooling without the need for additional energy consuming devices.

The HGRH package is factory-installed and includes a HGRH coil (installed behind the indoor air coil), a on/off HGRH control valve, and additional refrigerant piping. The HGRH coil is factory sized to maximize performance.

When the space temperature is satisfied but the space humidity is above the desired set point, a call for dehumidification is initiated and the unit fan, reversing valve, HGRH valve, and compressor are enabled. The fan draws in warm humid air through the indoor air coil where is it cooled and dehumidified. The cool, dehumidified air then passes through the reheat coil where it is heated to a neutral temperature (typically 68 to 78°F). The neutral, dry air is then delivered to the space and reduces space humidity levels without cooling the space. See NG eCAT unit report for HGRH performance. This option requires a thermostat with dehumidification output, humidistat, or DDC controller with space relative humidity sensor and binary/digital output.

Hot Gas Reheat (HGRH)



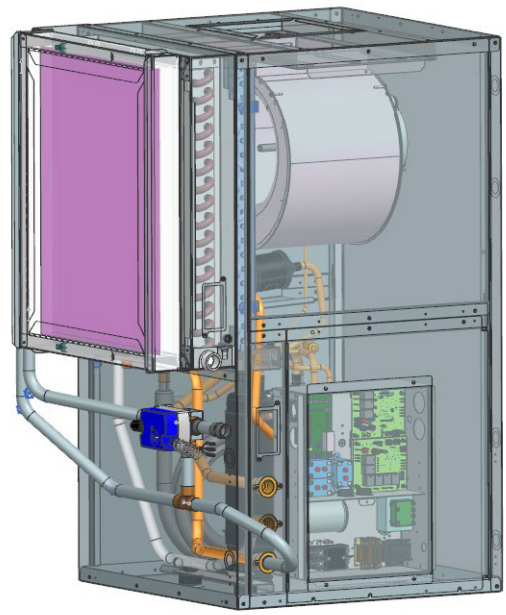
Options and accessories (cont)

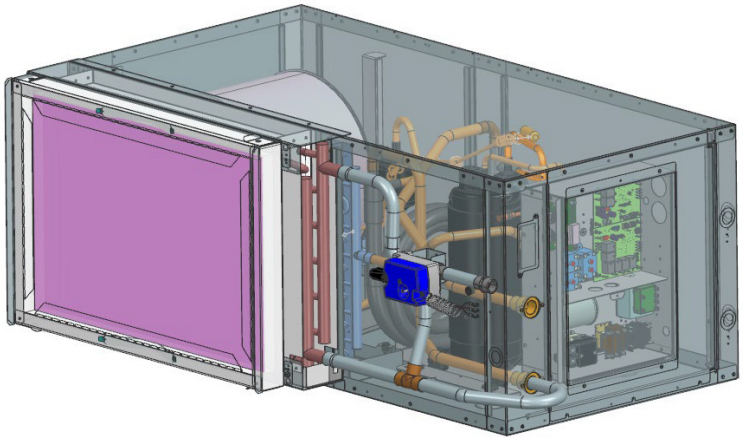
Water side economizer

A Water side economizer (WSE) is available as a factory-installed option and allows for free cooling for applications where the water loop temperature is able to reach temperatures between 40 and 65°F. When the loop is cold enough, the waterside economizer acts as a chilled water coil, providing free cooling limiting fully or partially the usage of the compressor (mechanical cooling). The water leaving the economizer coil is then directed to the unit coaxial coil, which can allow compressor operation in integrated economizer cooling applications. The factory installed waterside economizer coil is mounted external to the air coil and piped as shown in the following image. The waterside economizer includes insulated factory mounted piping, 2 position 3 way valve with actuator, EWT sensor, drain with condensate overflow switch, and Option Card for controls (if unit is ordered without TruVu DDC).

See NG ECAT unit report for WSE performance.

NOTE: WSE heating is available with TruVu DDC controller. Refer to the WSE sequence of operation with TruVu controller.



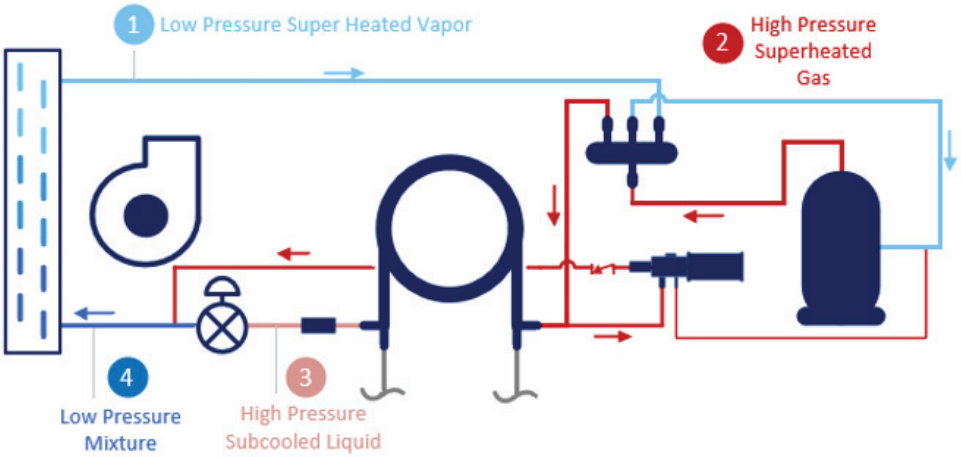


Options and accessories (cont)

Hot gas bypass (HGBP)

HGBP helps to reduce unit cycling and prevents icing of the air coil when the unit is operating at low cooling load conditions. The hot gas bypass valve located in the compressor discharge line diverts hot gas to the inlet of the air coil. The valve is factory set to open when the evaporating pressure falls to 105 psig and will modulate to prevent the pressure falling any lower. This setting is field adjustable (95 to 115 psig), and this set point may be adjusted as required.

Hot Gas Bypass (HGBP)



Options and accessories (cont)

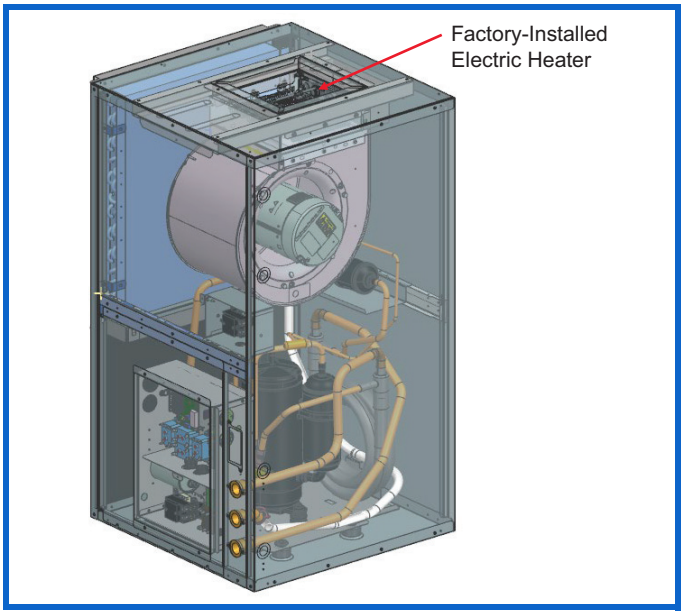
Cooling only

Optional cooling only (CO) modification is available for all sizes. The cooling only option excludes the reversing valve from refrigerant circuit. This modification provides efficient cooling in environments where heating is not a primary need.

Electric heater

Single stage electric heater is a factory-installed option on vertical units with top discharge and with ECM motors. Electric heaters are available in 5 and 10 kW on units with 208/230-v-1Ph power. Electric heaters shall be factory wired and installed internal to the unit on the fan discharge. The output provided on the controller shall be able to control single stage electric heat.

NOTE: Units with a factory-installed electric heater have a feature single-point power connection and can serve as emergency or auxiliary electric heat.



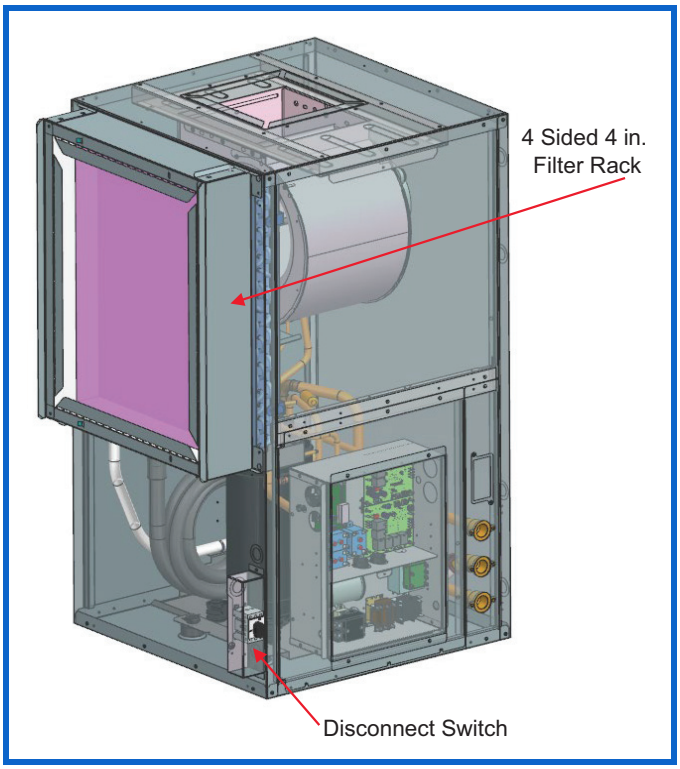
Disconnect switch

Optional unit mounted non-fused disconnect switch is available for units. Conveniently positioned on the corner post of the unit. This switch allows for easy power interruption during field service.

IEQ (indoor environmental quality) options

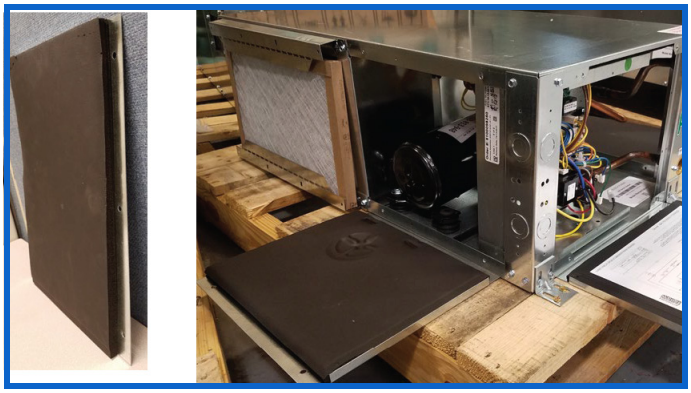
Air Filters

Every unit is equipped with a default 1 in. 2-sided filter rack and 1 in. MERV 5 filter suitable for free return applications. Alternatively, there are optional 4-sided 2 in. or 4 in. MERV 8 or MERV 13 filters for ducted returns. MERV 13 is available for the purpose of obtaining LEED certification points and achieving higher efficiency filtration standards.



Closed cell foam insulation

1/2 in. thick closed cell foam (CCF) Insulation is to help aid indoor air quality (IAQ) and to further attenuate low frequency noise from the compressor compartment. The closed-cell foam insulation option is available in all unit sizes.



Options and accessories (cont)

Compressor blanket

Compressor blanket (CB) is available as factory-installed option on all units to reduce noise transmission of the compressor.



Ultra low leak cabinet

Ultra low leak cabinet (ULL) feature offers enhanced cabinet construction with a leakage rate of less than 2% (includes closed cell foam insulation).

A2L leak detection

Industry safety standard UL 60335-2-40 requires systems charged with over 64 ounces of R-454B to include an integrated A2L leak detection system to ensure safety in the event of a refrigerant leak. If a refrigerant leak occurs the A2L leak detection system activates, shutting down compressor operation and running the blower motor to disperse any leaked refrigerant. Although all 50WC units have a refrigerant charge below 64 ounces; the A2L leak detection feature is optional to meet more stringent local codes or customer requirements.

Hydronic options

Two-position motorized isolation valve (2-way solenoid valve)

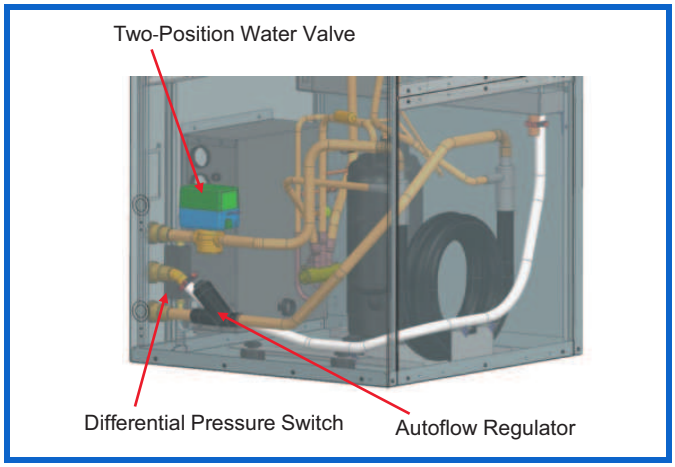
Optional factory-installed 2-way solenoid valve is available on all unit sizes and it is a great energy savings option. The valve opens to allow 100% fluid flow through the coaxial heat exchanger only when there is a call for cooling or heating. Closing off fluid flow to the unit when there is no call for cooling or heating reduces system operating costs, when using variable speed pump.

Autoflow regulator

Factory installed pressure independent auto-flow regulator ensures a constant water flow rate to the unit, it comes with internal cartridge which is set to fixed 3 gpm/ton flowrate. The system installation is much easier with auto-flow regulators compared to manually balanced systems, and the "fluctuation" seen in manually balanced systems is no longer an issue.

Differential pressure switch / Flow proving switch

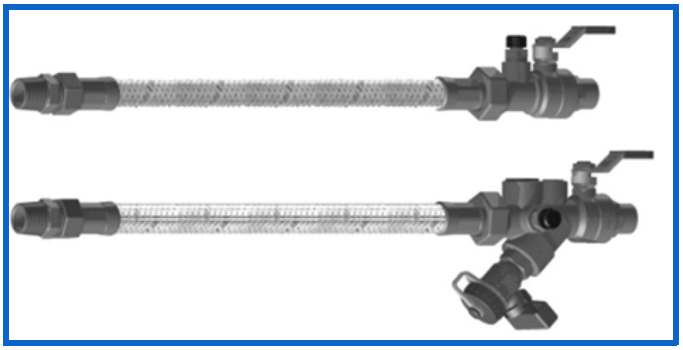
The differential pressure switch, also known as a flow proving switch, is a crucial device for verifying fluid flow in systems. By detecting pressure differences, it ensures accurate flow confirmation, enhancing overall system performance and efficiency across a range of applications.



Field-installed options

Supply and return water hose kits

Hose kits are recommended for connection between the unit and the water loop piping. Hose kits are available in 24 or 36 inches in length. All hose kits come with flexible stainless steel hoses and have options for manual isolation valves with and without autoflow regulators and Y-strainer.



Options and accessories (cont)

Autoflow regulator

Field-installed pressure independent autoflow regulator (automatic balancing valve) is a part of the hose kit and is available with wide range of set flow rate internal cartridges. Factory-installed auto-flow regulator ensures a constant water flow rate to the unit. The system installation is much easier with autoflow regulators compared to manually balanced systems, and the "fluctuation" seen in manually balanced systems is no longer an issue.

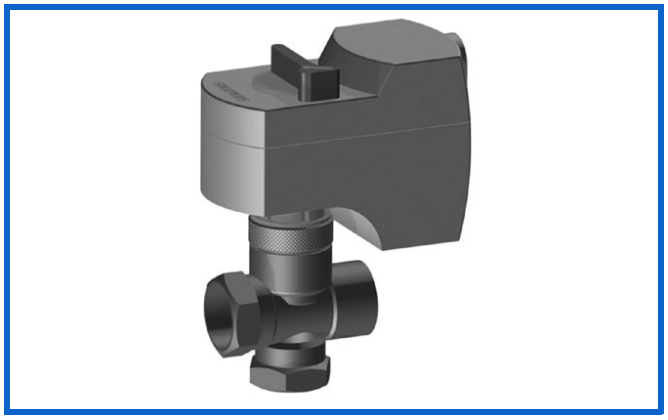
Ball valves

Carrier's ball valves can be field installed between supply and return lines and the WSHP. These valves provide manual stoppage of water flow during maintenance or when service is needed.



Two-position motorized isolation valve (2-way solenoid valve)

Carrier's motorized water valves are normally closed, 2-position water valves field installed on the WSHP return line. The valve opens to allow 100% of the fluid flow through the WSHP when compressor energized and closes to shut off flow to the WSHP when compressor is deenergized. Closing off fluid flow to the unit when there is no call for cooling or heating reduces system operating costs, when using variable speed pump.



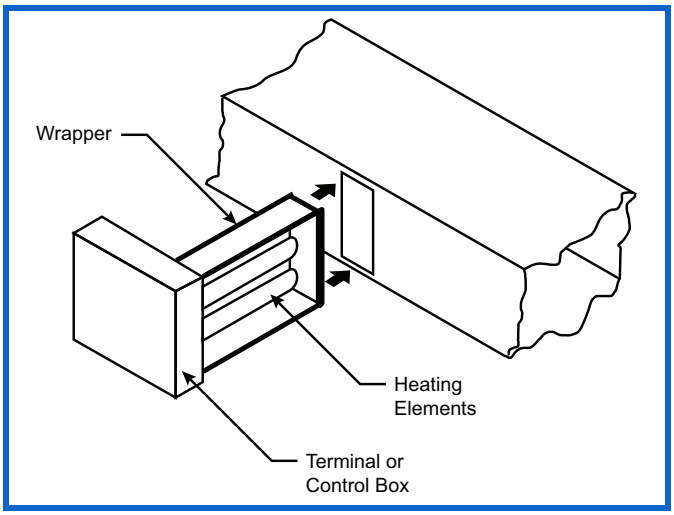
Y-strainers

Carrier's strainers are field installed on the supply line of the WSHP. These strainers are a combination strainer and ball valve and equipped with a union end, blow down port, and two accessory ports. The strainers provide a 20-mesh removable filter screen.



Slip-in electric heater

Field installed duct slip-in electric heaters provide an economical heating source that can be easily integrated into an existing HVAC (Heating, Ventilation and Air-Conditioning) system and new installations. These heaters provide space heating, primary heating, auxiliary heating, and reheating in a wide variety of configurations. The design of the heaters allows for free flow air.



Controls options

Unit protection module (UPM)

All Carrier WSHP units feature an advanced UPM which implements all the critical equipment safeties and allows for continuous safe and reliable operation. It is located in the control box.

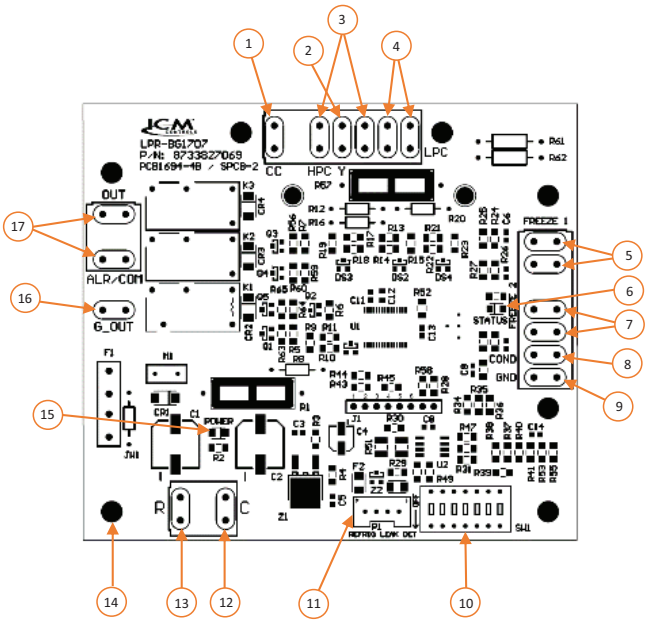
Features of the unit protection module include:

- High and Low Refrigerant Pressure Protection: The unit is equipped with high and low-pressure switches set to disable operation at pressures above 600 psig or below 40 psig.
- Low Pressure Bypass Timer: This bypass helps to eliminate nuisance trips by keeping the compressor on for 120s upon the LPS opening. If the LPS is still open after 2 minutes the unit is shut down and put into soft lockout.
- Air and Water Coil Freeze Protection: Both the cooling and heating refrigerant liquid line temperatures are monitored to prevent freeze up of both the water and air coil. The freeze limit by default is set to 25°F and is configurable via a dip switch on the UPM to 15°F for applications utilizing antifreeze.

Options and accessories (cont)

- High Condensate Level Shutdown: All units are equipped with a condensate overflow sensor in the drain pan set to disable operation in the event of an overflow condition.
- Anti-Short Cycle Time Delay: A 5-minute delay on break timer to prevent compressor short cycling.
- Random Start Time Delay: Each controller has a unique random start delay ranging from 270 to 300 seconds on initial power up to reduce the chance of multiple units simultaneously starting at the same time after powering up or after a power interruption, thus avoiding creating large inrush current.
- Brownout/Surge Protection: The UPM board will disable the compressor if the incoming low voltage power falls below 18 vac.
- Intelligent Alarm Reset: Upon fault, a 5-minute break is initiated, and the unit will automatically restart after this time period has expired.
- Hard Lockout Reset: A hard lockout can be reset by turning the unit thermostat off and then back on when the RESET DIP switch is set to "Y" or by shutting off unit power at the circuit breaker when the RESET DIP switch is set to "R".
- Alarm Output: The alarm output is normally open (NO) dry contact. The output is configurable via a dip switch on the UPM to be constant, as a general alarm, or pulsed, to be interpreted for the specific alarm by a remote device.
- Refrigerant Leak Detection: On units equipped with an A2L refrigerant leak detection sensor the controller will take mitigation action in the event of a leak. The leak detection sensor is standard option and included with the unit when required by the product safety standard UL60335-2-40. The leak detection sensor is optional feature in cases where it is required by safety standards other than UL60335-2-40 standard with more stringent requirements.
- Test Mode: The UPM features a test mode for ease of service which shortens the anti-short cycle and random start delays and requires manual reset for both soft and hard lockouts.

UPM Control Board



1 — Compressor Contact Output
2 — Compressor Y1 Call
3 — High Pressure Switch
4 — Low Pressure Switch
5 — Water Coil Freeze 1
6 — LED Status Diagnostic
7 — Air Coil Freeze 2
8 — Condensate Overflow
9 — Ground
10 — UPM Settings Dip Switch
11 — A2L Sensor
12 — 24 Vac Power Common
13 — 24 Vac Power Input
14 — UPM Standoff
15 — Power LED
16 — Fan
17 — Dry Contact

Options and accessories (cont)

Thermostat control

The Carrier 50WC series water source heat pumps utilizes 24-v non-communicating controls and are suitable for control via most 24-v non-communicating single stage heat pump thermostats. Carrier has several 24-v non communicating thermostats that are well suited for pairing with water source heat pumps. See "Thermostats" below. for a summary of the available carrier thermostats and the general functionality/capability of each.

Thermostats

								
TYPE	**NON-COMMUNICATING THERMOSTATS**		**BACNET®[a] THERMOSTAT WITH WI-FI**				**BACNET® THERMOSTAT**	
Feature	**Comfort Pro Programmable Thermostat**	**Edge Pro Programmable Thermostat**	**Connect 43FX Thermostat**	**Connect BACnet® Wi-Fi Thermostat**	**Non-Branded 43FX Thermostat**	**Non-Branded BACnet® Wi-Fi Thermostat**	**ComfortVu BACnet® Standard Thermostat**	**ComforVu BACnet® Plus Thermostat**
	33CSCPACHP-01	**33CS2PP2S-03/ 33CS2PPRH-03**	**33TCSPL-4**	**33TCSP-4**	**33TWSPL-4**	**33TWSP-4**	**TB-24-C/ TB24-HM-C**	**TBPL-24-H-C**
Power	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac
Power Requirements	3 Va	3 Va	6 Va	6 Va	6 Va	6 Va	4 Va Unit, 76 Va Full Load	4 Va Unit, 76 Va Full Load
Interface	Backlit Display	Backlit Display	4.3" LCD Touchscreen	4.3" LCD Color Touchscreen	4.3" LCD Touchscreen	4.3" LCD Color Touchscreen	LCD Push Button	LCD Touchscreen
Onboard Sensors	Temperature	Temperature& Humidity (optional)	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity
Scheduling	√	√	√	√	√	√	√	√
Occupancy (motion)	—	—	—	—	—	—	√	√
Compressor Stages	1-2	1-2	1-3	1-3	1-3	1-3	1-2	1-2
Auxiliary Heat Stages	1	1	1-2	1-2	1-2	1-2	1-3	1-3
Fan Control	1-Speed	1-Speed	1-Speed	1-Speed	1-Speed	1-Speed	1 to 3-Speed	1 to 3-Speed
Dehumidification Output for HGRH	—	√	√	√	√	√	—	√
Humidification Output	—	√	√	√	√	√	√	√
Remote Sensors	OAT / RSS / SAT / RAT	OAT / RSS	RH + OAT / RSS / SAT	OAT / RSS / SAT	RH + OAT / RSS / SAT	OAT / RSS / SAT	ECON / RSS / DEICE	ECON / RSS / DEICE
Dry Contact	—	Dehum or Economizer	OCC / ECFL / FLTR	OCC / ECFL	OCC / ECFL / FLTR	OCC / ECFL	Window / Door / Keytag	Window / Door / Keytag
BACnet® MS/TP	—	—	√	√	√	√	√	√
Wi-Fi	—	—	√	√	√	√	—	—
Accessories	OAT Sensor: 33ZCSENOAT Remote Temperature with Averaging: 33ZCT55SPT Remote Supply/Return Temp Sensing: 33ZCSENSAT							

NOTE(S):

a. Third-party trademarks and logos are the property of their respective owners.

Options and accessories (cont)

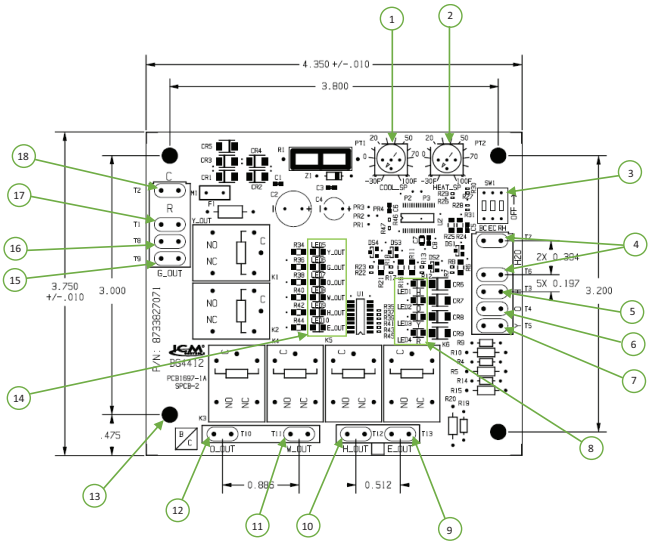
Control options to supplement thermostat

50WC units have a number of control options available to supplement the control of a thermostat allowing for control of various auxiliary components that thermostats are not typically capable of controlling. These options include:

Option Card

Units ordered with the water side economizer or hot gas reheat factory installed options and no factory-installed DDC controller will include the UPM expander as standard. The card supplements the primary thermostat control by controlling auxiliary devices that a thermostat is not typically capable of controlling.

Option Card Detail



1 — Cool Set Point Potentiometer
2 — Heat Set Point Potentiometer
3 — Operating Mode Dip Switch
4 — Entering Water Temperature
5 — H Signal Input
6 — O Signal Input
7 — Y Call Input
8 — LED Input Status
9 — Economizer output “E_OUT”
10 — Hot Gas Reheat Output “H_OUT”
11 — Boilerless Control “W_OUT”
12 — Reversing Valve Output “O_OUT”
13 — Option Card Standoff
14 — LED Output Status
15 — FAN Output “G_OUT”
16 — Y Call Output “Y_OUT”
17 — 24 Vac Power Input
18 — 24 Vac Power Common

The card has three primary functions:

- “Boilerless” Electric Heat Control: Boilerless heat control is a means to control an auxiliary electric heater on units that are connected to a water loop without a reliable heat injection source. The card features a potentiometer to configure a water loop heat setpoint (HEAT_SP). When the water loop drops below this setpoint and there is a call for heating the compressor will be disabled and the card generates a 24-v output to enable the electric heater. Units equipped with the boilerless electric heat option include an entering water temperature sensor.
- On/Off Hot Gas Reheat Control: Hot gas reheat control is an active means of dehumidification control. HGRH is enabled when the space temperature is satisfied but the space humidity is above the desired setpoint. The expansion card energizes the fan, reversing valve, HGRH valve and compressor.
- Water Side Economizer Control: Water side economizer control allows for cooling directly with the source water when the source water temperature is below a configurable setpoint. The expansion card features a potentiometer to configure a water loop cool setpoint (COOL_SP). When the water loop drops below this setpoint and there is a call for cooling the WSE diverting valve will divert water through the water side economizer coil. If a cooling call remains for a period of > 10 min the compressor will be enabled to assist the WSE in meeting the cooling demand.

Energy Management Switch (EMS) Relay

An optional relay providing a normally open set of contacts for remotely enabling and disabling the unit via an external 24 vac signal.

Pump Relay

An optional relay providing a signal to energize a pump when the compressor is command to run.

Compressor Status Relay

Optional relay providing compressor status via a normally open set of dry contacts.

Carrier i-Vu® WSHP TruVu™ DDC

Carrier’s WSHP TruVu™ controller is an integrated component of a Carrier water source heat pump. The WSHP TruVu™ controller continuously monitors and regulates water source heat pump operation with reliability and precision. This advanced controller features a sophisticated, factory-engineered control program that provides optimum performance and energy efficiency. It also features plug and play connectivity to the Carrier i-Vu® Building Automation System. For added flexibility, the controller is capable of stand-alone operation, or it can be integrated with any other building automation system utilizing BACnet®[1] IP.



1. Third-party trademarks and logos are the property of their respective owners.

Options and accessories (cont)

Application Features

- Provides space temperature control with up to 2 stages of mechanical cooling and heating.
- Integrated 2-position or modulating waterside economizer control for optimized mechanical cooling (ASHRAE 90.1).
- Controls modulating or 2-position outside air damper to meet ASHRAE 62 ventilation requirements.
- Automatic 3-speed fan control for efficient WSHP operation. Using the space temperature input, the TruVu™ controller automatically operate the fan at the optimal speed to maintain space temperature while providing increased latent heat removal, reduced sound and the lowest fan energy consumption (exception units with PSC motor, only 1-speed is available).
- Auxiliary Heat — Provides control over auxiliary heating, allowing for the management of a 2-position or modulating water/steam valve, or a two-stage electric heater. The auxiliary heat functionality can be configured in two modes: Boilerless (alternative) or Auxiliary Heat (supplemental), providing flexibility and adaptability to different system designs.
- Dehumidification — Provides occupied and unoccupied dehumidification, allowing configure setpoints for both occupancy types. The controller offers the choice of cycling on/off HGRH control or modulating control with Modulating HGRH for precise dehumidification.
- Equipment Performance Monitoring/Statuses — Compressor Status, Fan Status, Water flow switch, Secondary Condensate Overflow, EWT, LWT, SAT, RAT.
- Scheduling — Adaptable scheduling for occupied and unoccupied periods with ability for internal/local occupancy configuration or remote occupancy configuration via external dry contact, local user interfaces, i-Vu® network, or BAS network. Additionally, flexible intermittent fan operation is available during both occupied and unoccupied periods for energy savings.
- Learning adaptive optimal start. Transitions the WSHP from unoccupied set points to occupied set points in the most efficient means possible. Over time, the WSHP will learn and determine the best adjustment rates of the set points to provide the most efficient means of shifting the WSHP to an occupied mode.
- Space temperature input via communicating ZS sensor, or non-communication zone sensor (10K thermistor), or over the network.
- Shutdown Inputs — Fire/Smoke Detector Shutdown and Network Shutdown to safely shutdown the unit in a controlled fashion with ability to monitor the unit.
- Alarm Status — Alarms status is accessible through equipment user interfaces or network. (see TruVu™ Alarms Table).

Hardware Features

- USB port for service/commissioning/troubleshooting, hard-wired via laptop/smartphone/TruVu™ ET Display, or wireless service connections via USB-WiFi kit
- dual 10/100 Mbps, BACnet® IP and IP addressing
- supports home run, daisy chain and ring IP network topologies
- capacitor-backed real-time clock keeps time in the event of power failure or network interruption for at least three days
- LED indicators for power, status of network and controller, and 1 programmable LED indicator
- supports Rnet devices like ZS sensors, Equipment touch, and TruVu™ ET Display
- supports Act Net devices (Smart actuators)

System Features

- integrated Carrier waterside linkage algorithm for plug-and-play integration with the Carrier WSHP System
- fully plug-and-play with the Carrier i-Vu® Building Automation System
- supports demand limiting for maximum energy savings
- compatible with i-Vu® Tenant Billing for tracking tenant's after-hours energy usage
- built-in network diagnostic capture functionality for troubleshooting
- network statistics that can be viewed numerically or as trend graphs

Options and accessories (cont)

TruVu™ Alarms

ALARM	DESCRIPTION
Fire/Smoke Detector Alarm	Immediate shutdown of equipment (fan, compressor, aux heat, and damper) after alarm is generated.
Space Temperature Alarms	Generates an alarm whenever the space temperature exceeds configurable alarm set points for occupied and unoccupied periods.
Source Water Temperature Alarm	Four configurable alarm limits for leaving condenser water temperature.
Supply Air Temperature Alarm	Two configurable alarm limits for supply air temperature.
High Condensate/ Overflow Alarm	Disables the compressor and fan outputs when alarm is generated.
Fan Status Alarm	Monitors the fan output and alarm is generated after 30 seconds and no fan status (all speeds).
Compressor Status Alarm	Monitors the compressor output and alarm is generated after 6 minutes of energizing compressor and no status.
Filter Status Alarm	Generates an alarm after the number of fan run hours exceeds a configurable filter alarm timer limit.
Indoor Air Quality Alarm	Generates an alarm during occupied periods whenever the CO_2 sensor value exceeds the user adjustable limit.
Relative Humidity Alarm	Generates an alarm whenever the space relative humidity exceeds configurable alarm set point.
Source Water Linkage Failure Alarm	Generates an alarm after linkage fail with Water loop controller for > 6 min.
Airside Linkage Failure Alarm	Generates an alarm once linkage fails for > 6 min.

TruVu™ Alarms (cont)

ALARM	DESCRIPTION
OAT Sensor Alarm	Generates an alarm if the value of OAT fails to be updated through the network.
SPT (space temperature) Sensor Alarm	Generates an alarm if the SPT sensor fails to communicate with the control for > 5 minutes.
ZS Sensor Alarm	Generates an alarm if the ZS sensor fail to communicate with the control for > 5 minutes.
Return Air Temperature Alarm	Configurable alarm limits for return air temperature.
Entering Water Temperature Alarm	Configurable alarm limits for entering condenser water temperature.
Water Side Delta T Alarm	Configurable alarm limits for waterside Delta T.
Air Side Delta T Alarm	Configurable alarm limits for airside Delta T.
Low Water Flow Alarm	Monitors the differential pressure switch, generates alarm if unit has no flow.
UPM Alarm - Hard Lockout Status	Generates alarm if hard lockout conditions occurred on UPM board. Soft lockout alarm history can be viewed.
Source Water Valve Alarm	Monitors communicating source water valve (ACT net), alarm is generated if valve fails to communicate.

Field-installed TruVu™ DDC accessories

ZS Sensors

ZS sensors are the preferred method of monitoring space temperature, humidity and CO_2 levels when using the TruVu™ controller.

TruVu™ DDC Accessories

	ZS Standard	ZS Plus	ZS Pro	ZS Pro-M	ZS Pro-F
Model Number	**ZS-CAR**	**ZSPL-CAR**	**ZSP-CAR**	**ZS P-M-CAR**	**ZSPF-CAR**
Temp CO_2 Humidity Options	X	X	X	X	X
VOC Options	X	X	X		X
Neutral Color	X	X	X	X	X
Motion-Sensing Option				X	
Addressable / Supports Daisy-Chain	X	X	X	X	X
Hidden Communication Port	X	X	X	X	X
Mounts on a Standard 2 x 4 in. Electrical Box	X	X	X	X	X
Occupancy Status Indicator		X	X	X	X
Push Button Occupancy Override		X	X	X	X
Setpoint Adjust		X	X	X	X
Large Easy-to-Read LCD			X	X	X
Alarm Indicator			X	X	X
Fan Speed Control					X
Cooling / Heating/ Fan Only - Mode Control					X
°F to °C Conversion Button					X

Options and accessories (cont)

User interfaces

Interfaces are used for start up, commissioning, access information, read sensor values, set or adjust setpoints and schedules, view trends, and monitor alarms.

TruVu™ ET Display

Carrier's TruVu™ equipment touch (ET) displays are an integrated component of the i-Vu® building automation system. They feature illuminated color pixel touchscreens in two different sizes and connect to a single i-Vu® controller. Designed for panel or wall mounting, they provide building occupants, facility managers, and technicians a powerful user interface for managing HVAC equipment in a building. It can view or change its property values, schedule equipment, view trends and alarms, and more, without having to access the system's server. For more details about the TruVu™ equipment touch devices, see either the TruVu™ ET Display Installation and Setup Guide.



Field Assistant

Field assistant is a standalone tool you can install on computer or laptop to access a single TruVu™ controller, several controllers, or a network of i-Vu® TruVu™ controllers (up to 750 controllers). It can communicate with the devices using USB port on the TruVu™ controller or over an IP network. For more details about the Field Assistant tool, see Field assistant tool Help manual.

Field provided non-communicating sensors

In addition to supplement thermostat or DDC controller, a variety of non-communicating sensors are available to fulfill specific requirements of your application.

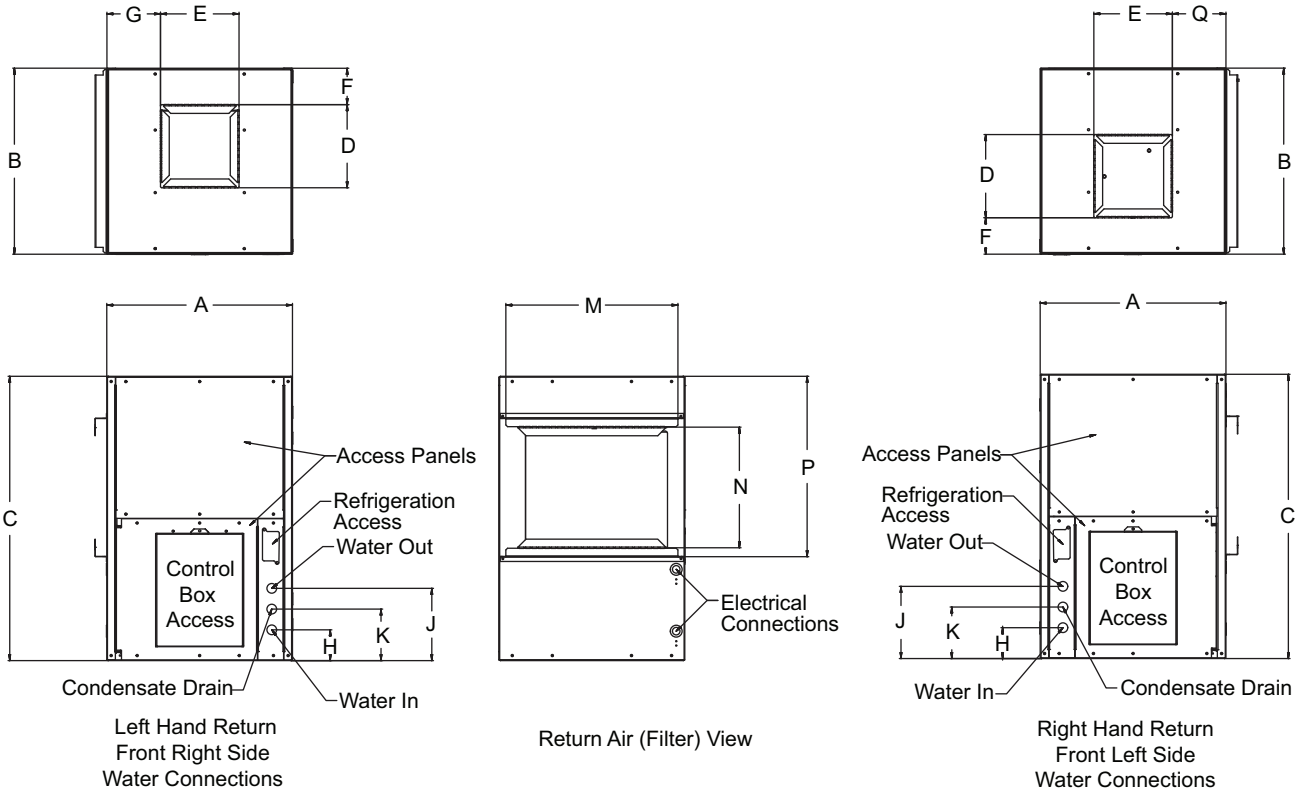
Non-Communicating Sensors

PART NUMBER	DESCRIPTION
33ZCSENSRH-02	Space Wall Mounted Relative Humidity Sensor
33ZCSPTCO2-01	CO_2/Space Temp. Sensor without LCD Display and No Override
33ZCT55CO2-02	Space Temp and CO_2 Room Sensor with Override
33ZCSPTCO2LCD-01	CO_2/Space Temp. Sensor with LCD Display and No Override
33ZCT55CO2-02	Space Temp. and CO_2 Room Sensor with Override
33ZCT56CO2-02	Space Temp. and CO_2 Room Sensor with Override and Set Point Adjustment
33ZCT55SPT	Space Temperature Sensor with Override
33ZCT56SPT	Space Temperature Sensor with Override and Set Point Adjustment
33ZCT59SPT	Space Temperature Sensor with Override and Set Point Adjustment and Digital Display

NOTE: Check capability/inputs of the controlling device (thermostat or DDC controller) to accept non-communicating sensor.

Dimensions

50WC Vertical Units



Left Hand Return
Front Right Side
Water Connections

Return Air (Filter) View

Right Hand Return
Front Left Side
Water Connections

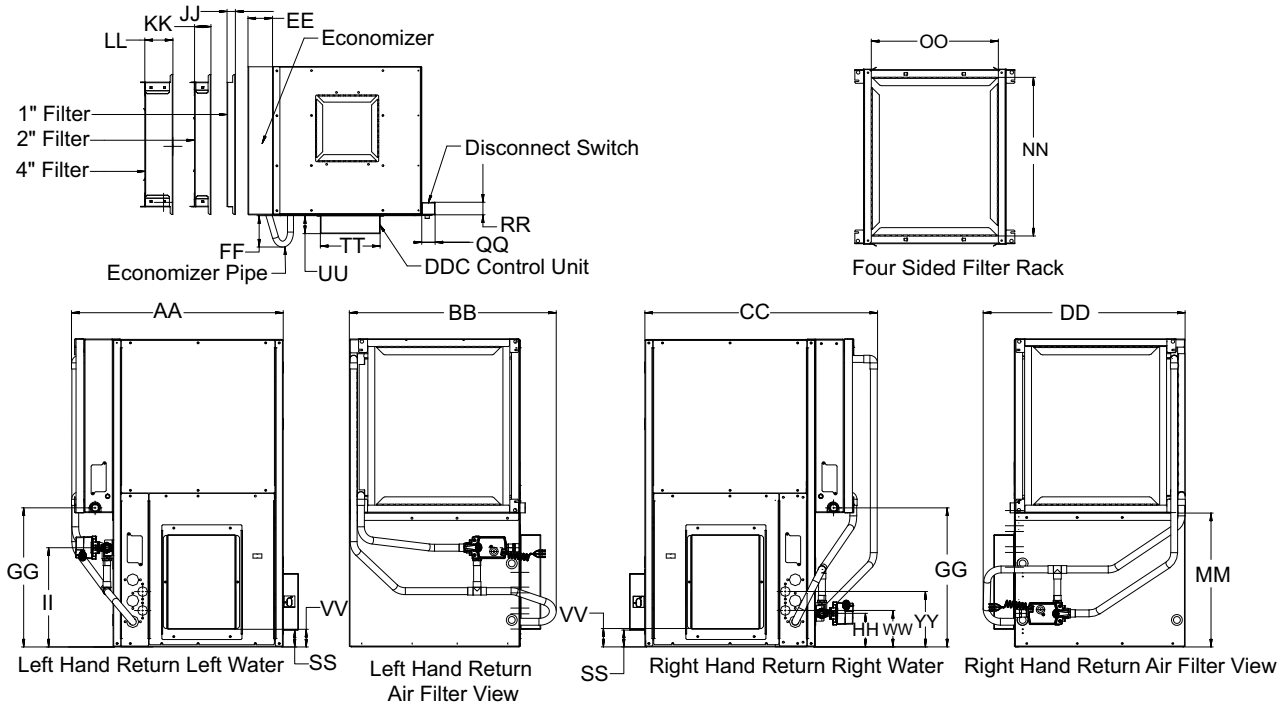
50WC UNIT SIZE [a,b,c,d]	VERTICAL DIMENSIONS (in.)[e,f,g]																	
				Discharge					Water									
	Width	Depth	Hight	Depth	Width	Cabinet Edge to Discharge (Left Hand Return)	Cabinet Edge to Discharge (Right Hand Return)	Cabinet Edge to Discharge (Left Hand Return)	Inlet	Outlet	Condensate Drain	R/A Duct Width	R/A Duct Flange Height	Filter Rack Height[h,i,j]	Cabinet Edge To Discharge (Right Hand Return)	Condenser Water Connections (in.)	Recommended Replacement Nom. Filter (Qty)	Condensate Drain Connections (in.)
	A	B	C	D	E	F	F	G	H	J	K	M	N	P	Q			
007	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
009	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
012	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
015	21.5	21.5	33.0	9.75	9.00	4.25	4.25	6.25	3.00	8.5	6.00	17.50	15.25	17.25	6.25	3/4 FPT	17 x 19	3/4 FPT
018	21.5	21.5	33.0	9.75	9.00	4.25	4.25	6.25	3.00	8.5	6.00	17.50	15.25	17.25	6.25	3/4 FPT	17 x 19	3/4 FPT
024	21.5	21.5	39.0	9.75	9.00	4.25	4.25	6.25	3.25	8.5	5.75	18.00	20.00	22.25	6.25	3/4 FPT	28 x 22	3/4 FPT
030	21.5	21.5	39.0	9.75	9.00	4.25	4.25	6.25	3.25	8.5	5.75	18.00	20.00	22.25	6.25	3/4 FPT	28 x 22	3/4 FPT
036	21.5	21.5	39.0	11.50	10.50	2.25	2.25	6.50	3.25	8.5	5.75	18.25	25.00	27.00	6.50	3/4 FPT	19 x 27	3/4 FPT
042	21.5	26.0	44.0	11.25	10.50	5.75	5.75	5.50	3.25	8.5	5.75	24.00	28.25	30.75	5.50	3/4 FPT	24 x 30	3/4 FPT
048	24.0	26.0	44.0	11.25	10.50	5.00	5.00	6.75	3.00	8.5	5.75	24.00	28.25	30.00	6.75	1 FPT	24 x 30	3/4 FPT
060	24.0	26.0	44.0	12.50	11.75	4.25	4.25	6.25	3.25	8.0	5.75	24.00	28.25	30.00	6.00	1 FPT	24 x 30	3/4 FPT
070	24.0	33.0	58.0	12.50	11.75	9.00	9.00	6.25	3.00	8.5	5.75	24.25	38.25	32.00	6.00	1 FPT	20 x 27 (2)	3/4 FPT

NOTE(S):

a. Front of the unit is determined by the location of the control box panel.
b. When DDC controller is installed, control box panel extends 3.0 in. beyond the front of the unit.
c. When disconnect switch is installed, increase width by 2.0 in. beyond side of unit.
d. The local electric codes may require 36 in. or more clearance at the electrical control box.
e. Specifications subject to change without notice.
f. Overall unit dimensions do not include filter rack or duct flanges.
g. All dimensions within ± 0.125 in. Dimensions in inches.
h. The 1 in. filter rack extends 1.25 in. beyond the side of the unit (not including flange).
i. The 2 in. filter rack extends 3.0 in. beyond the side of the unit (not including flange). This filter rack is 4-sided with a filter access door on both ends (front/back) and can accept either a 1 in. or 2 in. filter.
j. The 4 in. filter rack extends 4.75 in. beyond the side of the unit (not including flange). This filter rack is 4-sided with a filter access door on both ends (front/back) and can accept either a 2 in. or 4 in. filter.

Dimensions (cont)

50WC Vertical Units — FIOP



50WC UNIT[a,b,c,d,e]	ECONOMIZER									FILTER RACK OPTIONS						DISCONNECT SWITCH			TruVu DDC		
	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	LL	MM	NN	OO	QQ	RR	SS	TT	UU	VV
	Cabinet + Economizer Width (Left Hand Return)	Cabinet + Economizer Depth (Left Hand Return)	Cabinet + Economizer Width (Right Hand Return)	Cabinet + Economizer Depth (Right Hand Return)	Economizer	Economizer Pipe	Economizer Drain	Economizer Valve (Right Hand Return)	Economizer Valve (Left Hand Return)	1" Filter Rack	2" Filter Rack	4" Filter Rack	Filter Rack Height	R/A Duct Flange Height	R/A Duct Flange Width	Disconnect Switch Width	Disconnect Switch Depth	Disconnect Switch Height	DDC Panel Width	DDC Panel Depth	DDC Panel Height
007	24.75	23.25	24.75	22.00	4	3.50	11.50	1.50	6.50	1.25	3	4.75	11.00	10.00	14.25	2	2	2.00	9	3	2.25
009	24.75	23.25	24.75	22.00	4	3.50	11.50	1.50	6.50	1.25	3	4.75	11.00	10.00	14.25	2	2	2.00	9	3	2.25
012	23.75	23.25	24.75	25.75	4	3.50	11.50	1.50	6.50	1.25	3	4.75	11.00	10.00	14.25	2	2	2.00	9	3	2.25
015	28.00	24.25	28.75	25.50	4	5.00	16.75	3.50	9.25	1.25	3	4.75	16.00	15.00	17.00	2	2	2.00	9	3	2.25
018	29.00	26.50	28.75	25.50	4	5.00	16.75	3.50	9.25	1.25	3	4.75	16.00	15.00	17.00	2	2	2.00	9	3	2.25
024	26.00	26.25	29.50	25.50	4	4.75	17.50	3.50	9.00	1.25	3	4.75	17.25	20.00	16.00	2	2	2.00	9	3	2.25
030	26.00	26.25	29.50	25.50	4	4.75	17.50	3.50	9.00	1.25	3	4.75	17.25	20.00	16.00	2	2	2.00	9	3	2.25
036	30.00	25.00	30.00	25.50	4	4.00	13.50	3.50	9.00	1.25	3	4.75	12.00	25.00	17.00	2	2	2.00	9	3	2.25
042	29.25	28.00	30.00	30.50	4	4.00	14.75	3.50	8.75	1.25	3	4.75	13.75	28.00	22.25	2	2	2.00	9	3	2.25
048	32.50	30.25	32.50	30.50	4	4.00	14.75	3.50	8.75	1.25	3	4.75	13.75	28.00	22.25	2	2	2.00	9	3	2.25
060	32.75	30.75	34.00	30.75	4	4.50	14.50	3.50	8.75	1.25	3	4.75	13.50	28.00	22.25	2	2	2.00	9	3	3.00
070	34.00	37.75	34.50	38.00	4	4.25	16.75	3.50	8.75	1.25	3	4.75	16.75	38.25	25.00	2	2	2.75	9	3	3.00

NOTE(S):

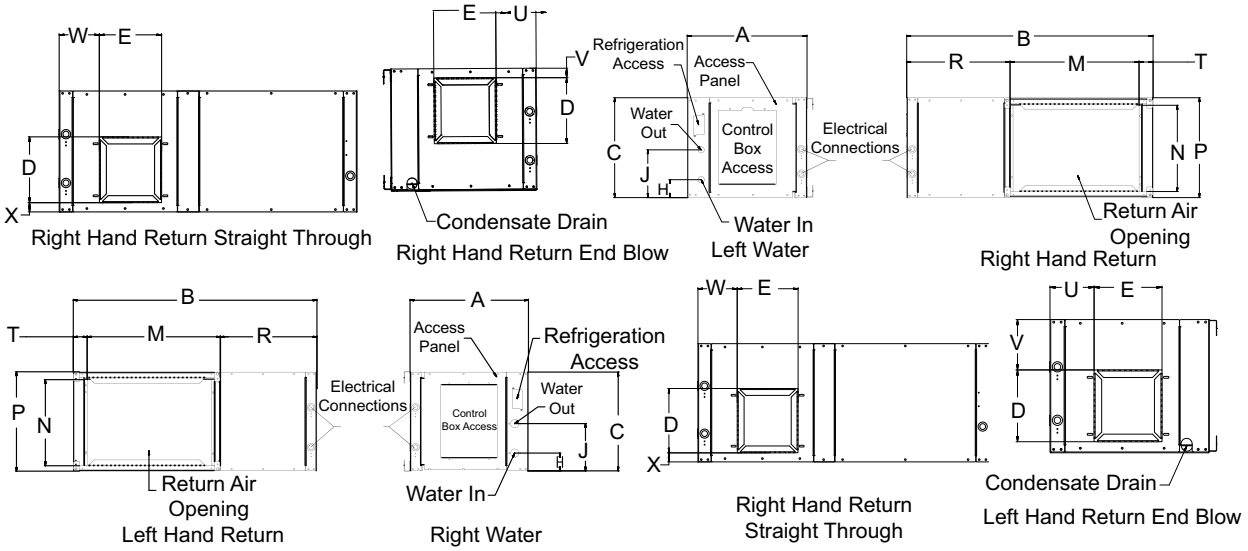
a. Specifications subject to change without notice.
b. All dimensions within +/– 0.25".
c. Filter rack dimensions does not include 1" duct flange.
d. 2" filter racks can accept either a 1" or 2" filter
e. 4" filter racks can accept either a 2" or 4" filter.

LEGEND

DDC — Direct Digital Controller

Dimensions (cont)

50WC Horizontal Units



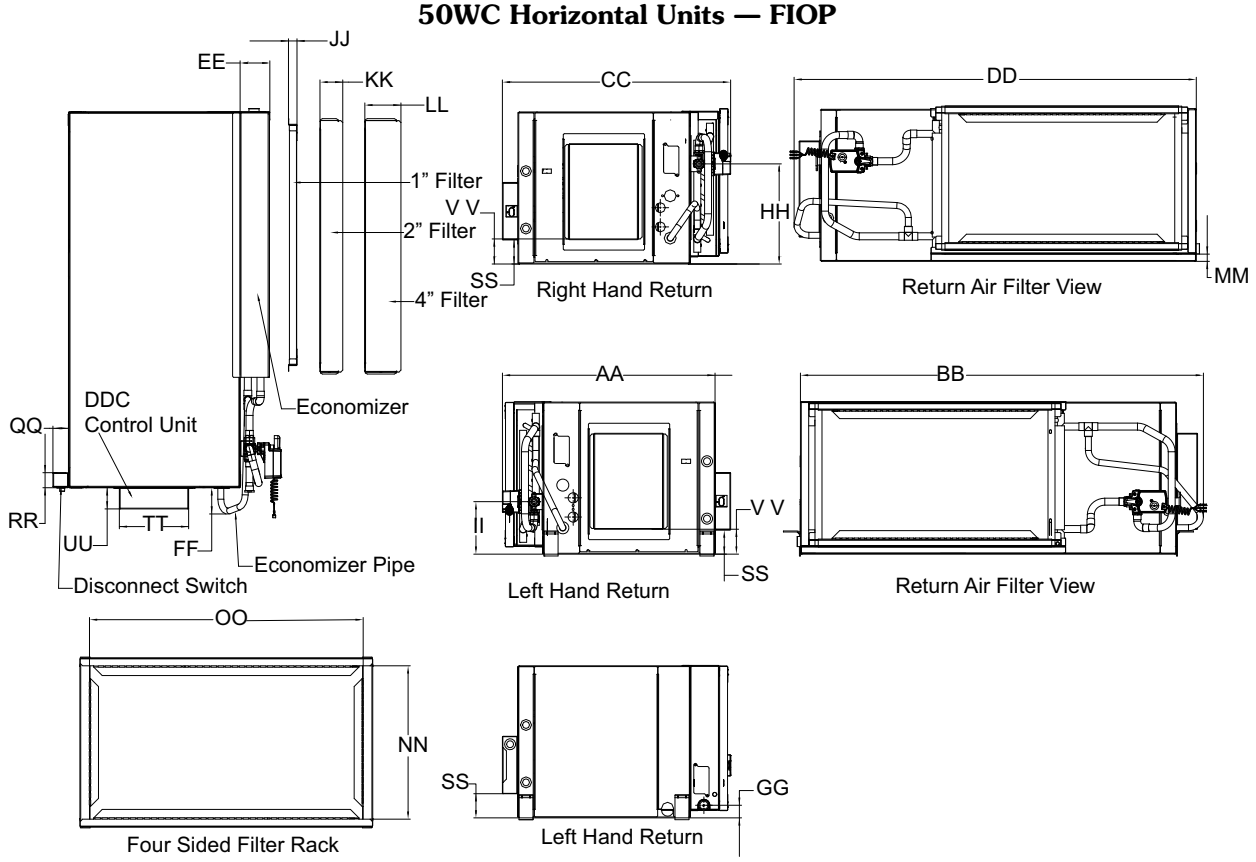
50WC UNIT[a,b,c,d]	A	B	C	D	E	H	J	M	N	P	R	T	U		V		W		X		CONDENSER WATER CONNECTIONS	RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE	CONDENSATE DRAIN CONNECTION
	Width	Depth	Height	Discharge Height	Discharge Width	Water Inlet	Water Outlet	R/A Duct Width	R/A Duct Flange Height	Filter Rack Height	Cabinet Front to Filter Rack	Cabinet End to Filter Rack	Side to Discharge (Left Return End Blow)	Side to Discharge (Right Return End Blow)	Top to Discharge (Left Return End Blow)	Top to Discharge (Right Return End Blow)	End to Discharge (Left Straight Through)	End to Discharge (Right Straight Through)	Bottom to Discharge (Left Straight Through)	Bottom to Discharge (Right Straight Through)			
007	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
009	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
012	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
015	21.5	44	17.0	9.75	9.25	3.25	8.5	23.25	14.00	16.00	18.50	0.10	6.00	6.00	5.75	1.50	6.00	6.00	5.75	1.50	3/4" FPT	16 x 24	3/4" FPT
018	21.5	44	17.0	9.75	9.25	3.25	8.5	23.25	14.00	16.00	18.50	0.10	6.00	6.00	5.75	1.50	6.00	6.00	5.75	1.50	3/4" FPT	16 x 24	3/4" FPT
024	21.5	44	18.0	9.75	9.25	3.25	8.5	24.25	15.25	17.00	17.25	0.10	6.00	6.00	6.75	1.50	6.00	6.00	6.75	1.50	3/4" FPT	17 x 25	3/4" FPT
030	21.5	44	18.0	9.75	9.25	3.25	8.5	24.25	15.25	17.00	17.25	0.10	6.00	6.00	6.75	1.50	6.00	6.00	6.75	1.50	3/4" FPT	17 x 25	3/4" FPT
036	21.5	47	19.0	11.25	10.50	3.25	8.5	29.25	16.00	18.25	14.50	1.00	5.75	5.75	6.00	1.75	5.75	5.75	6.00	1.75	3/4" FPT	18 x 30	3/4" FPT
042	21.5	47	19.0	11.25	10.50	3.25	8.5	29.25	16.00	18.25	14.50	1.00	5.75	5.75	6.00	1.75	5.75	5.75	6.00	1.75	3/4" FPT	18 x 30	3/4" FPT
048	24.0	54	21.0	11.25	10.50	3.25	8.0	33.25	18.00	20.00	18.00	1.00	5.25	5.25	7.75	1.50	5.25	5.25	7.75	1.50	1" FPT	20 x 34	3/4" FPT
060	24.0	54	21.0	12.50	11.75	3.25	8.0	33.25	18.00	20.00	18.00	1.00	5.25	5.25	7.75	1.50	5.25	5.25	7.75	1.50	1" FPT	20 x 34	3/4" FPT
070	24.0	62	21.0	12.50	11.75	3.25	8.5	43.50	18.00	20.00	15.00	1.00	5.50	5.50	7.00	1.50	5.50	5.50	7.00	1.50	1" FPT	20 x 22 (Qty 2)	3/4" FPT

NOTE(S):

a. Specifications subject to change without notice.
b. All dimensions within +/– 0.25".
c. Overall unit dimensions do not in 50WC filter rack or duct flanges.
d. Unit sizes 015-070 can be field converted between end blow and straight through supply air configurations.

Dimensions (cont)

50WC Horizontal Units — FIOP



50WC UNIT[a,b,c,d,e]	ECONOMIZER									FILTER RACK OPTIONS						DISCONNECT SWITCH			TRUVU DDC		
	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	LL	MM	NN	OO	QQ	RR	SS	TT	UU	VV
	Cabinet + Economizer Width (Left Hand Return)	Cabinet + Economizer Depth (Left Hand Return)	Cabinet + Economizer Width (Right Hand Return)	Cabinet + Economizer Depth (Right Hand Return)	Economizer	Economizer Pipe	Economizer Drain	Economizer Valve (Right Hand Return)	Economizer Valve (Left Hand Return)	1" Filter Rack	2" Filter Rack	4" Filter Rack	Filter Rack Height	R/A Duct Flange Height	R/A Duct Flange Width	Disconnect Switch Width	Disconnect Switch Depth	Disconnect Switch Height	DDC Panel Width	DDC Panel Depth	DDC Panel Height
007	24.00	36.00	24.00	36.00	4.00	3.75	1.00	2.75	9.50	1.25	2.25	4.25	0.75	8	14	2.00	2.00	2.00	9.00	3.00	3.00
009	24.00	36.00	24.00	36.00	4.00	3.75	1.00	2.75	9.50	1.25	2.25	4.25	0.75	8	14.00	2.00	2.00	2.00	9.00	3.00	3.00
012	24.00	36.00	24.00	36.00	4.00	3.75	1.00	2.75	9.50	1.25	2.25	4.25	0.75	8	14.00	2.00	2.00	2.00	9.00	3.00	3.00
015	26.75	47.50	26.50	48.50	4.00	3.50	1.50	3.00	14.75	1.25	2.25	4.25	1.00	14	22.00	2.00	2.00	2.00	9.00	3.00	3.00
018	26.00	47.50	26.00	48.50	4.00	3.50	1.50	3.00	14.75	1.25	2.25	4.25	1.00	14	22.00	2.00	2.00	2.00	9.00	3.00	3.00
024	26.75	48.50	26.50	47.50	4.00	4.50	1.75	3.00	15.75	1.25	2.25	4.25	1.00	15	23.00	2.00	2.00	3.00	9.00	3.00	3.00
030	26.50	48.50	26.50	47.50	4.00	4.50	1.75	3.00	15.75	1.25	2.25	4.25	1.00	15	23.00	2.00	2.00	3.00	9.00	3.00	3.00
036	26.50	50.50	26.50	50.25	4.00	3.75	1.50	3.25	16.00	1.25	2.25	4.25	1.00	16	28.00	2.00	2.00	3.00	9.00	3.00	3.00
042	26.50	50.50	26.50	50.25	4.00	3.75	1.50	3.25	16.00	1.25	2.25	4.25	1.00	16	28.00	2.00	2.00	3.00	9.00	3.00	3.00
048	29.00	57.00	29.00	57.25	4.00	4.50	1.75	3.00	18.75	1.25	2.25	4.25	1.00	18	32.00	2.00	2.00	2.00	9.00	3.00	3.00
060	29.00	59.75	29.00	56.50	4.00	5.75	1.75	3.00	18.75	1.25	2.25	4.25	1.00	18	32.00	2.00	2.00	2.00	9.00	3.00	3.00
070	29.00	67.50	29.00	67.00	4.00	4.75	1.50	3.00	18.75	1.25	2.25	4.25	0.75	18	42.00	2.00	2.00	2.00	9.00	3.00	3.00

NOTE(S):

a. Specifications subject to change without notice.
b. All dimensions within ± 0.25 inches. Dimensions are in inches.
c. Filter rack dimensions does not include 1 in. duct flange.
d. 2 in. filter rack can accept either a 1 in or 2 in. filter.
e. 4 in. filter rack can accept either a 2 in. or 4 in. filter.

LEGEND

DDC — Direct Digital Controller

Dimensions (cont)

50WC Horizontal Unit Corner Weights

UNIT SIZE	UNITS	TOTAL WEIGHT	LEFT HAND EVAPORATOR				RIGHT HAND EVAPORATOR			
			Left Front[a]	Right Front[a]	Left Back	Right Back	Left Front[a]	Right Front[a]	Left Back	Right Back
007	lb	98.0	30.8	21.0	20.0	26.2	21.0	30.8	26.2	20.0
	kg	44.5	14.0	9.5	9.1	11.9	9.5	14.0	11.9	9.1
009	lb	106.0	32.8	23.0	22.0	28.2	23.0	32.8	28.2	22.0
	kg	48.1	14.9	10.4	10.0	12.8	10.4	14.9	12.8	10.0
012	lb	114.0	34.8	25.0	24.0	30.2	25.0	34.8	30.2	24.0
	kg	51.7	15.8	11.3	10.9	13.7	11.3	15.8	13.7	10.9
015	lb	146.8	40.2	38.6	31.4	36.6	38.6	40.2	36.6	31.4
	kg	66.6	18.2	17.5	14.2	16.6	17.5	18.2	16.6	14.2
018	lb	154.8	42.2	40.6	33.4	38.6	40.6	42.2	38.6	33.4
	kg	70.2	19.1	18.4	15.1	17.5	18.4	19.1	17.5	15.1
024	lb	183.2	45.8	58.2	42.2	37.0	58.2	45.8	37.0	42.2
	kg	83.1	20.8	26.4	19.1	16.8	26.4	20.8	16.8	19.1
030	lb	187.4	58.2	50.2	36.8	42.2	50.2	58.2	42.2	36.8
	kg	85.0	26.4	22.8	16.7	19.1	22.8	26.4	19.1	16.7
036	lb	205.2	61.6	46.6	40.6	56.4	46.6	61.6	56.4	40.6
	kg	93.1	27.9	21.1	18.4	25.6	21.1	27.9	25.6	18.4
042	lb	213.2	63.6	48.6	42.6	58.4	48.6	63.6	58.4	42.6
	kg	96.7	28.8	22.0	19.3	26.5	22.0	28.8	26.5	19.3
048	lb	266.6	77.0	74.4	52.6	62.6	74.4	77.0	62.6	52.6
	kg	120.9	34.9	33.7	23.9	28.4	33.7	34.9	28.4	23.9
060	lb	285.2	77.2	82.2	73.4	52.4	82.2	77.2	52.4	73.4
	kg	129.4	35.0	37.3	33.3	23.8	37.3	35.0	23.8	33.3
070	lb	296.2	85.0	90.6	60.2	60.4	90.6	85.0	60.4	60.2
	kg	134.4	38.6	41.1	27.3	27.4	41.1	38.6	27.4	27.3

NOTE(S):

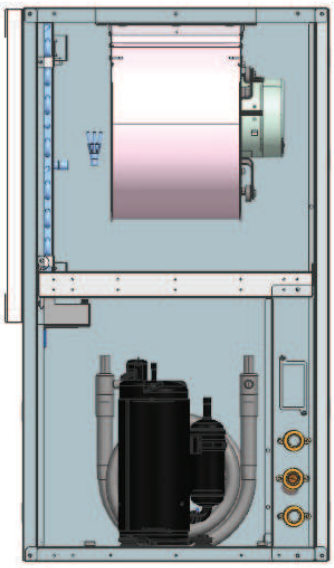
a. Front is the control box end.

Dimensions (cont)

50WC Service Clearance

Vertical Unit

Left Return, Top Discharge

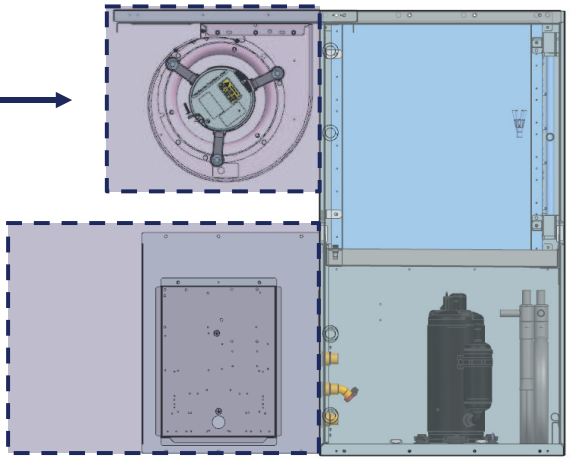


Front View

Left Return, Top Discharge

Blower Front Access
18 in. Minimum
24 in. Optimum

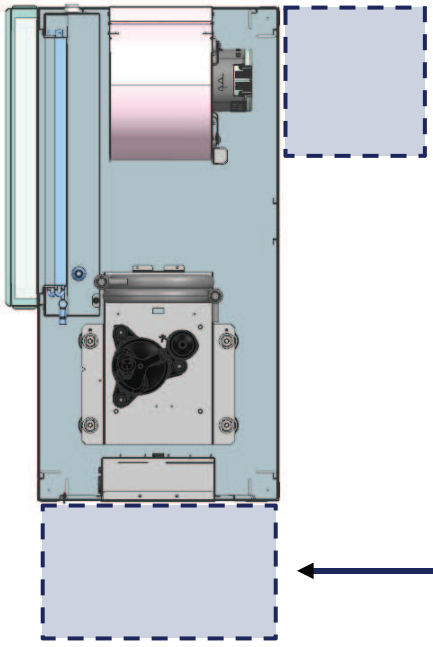
Compressor and Electrical Front Access
24 in. Minimum
36 in. Optimum



Side View

Horizontal Unit

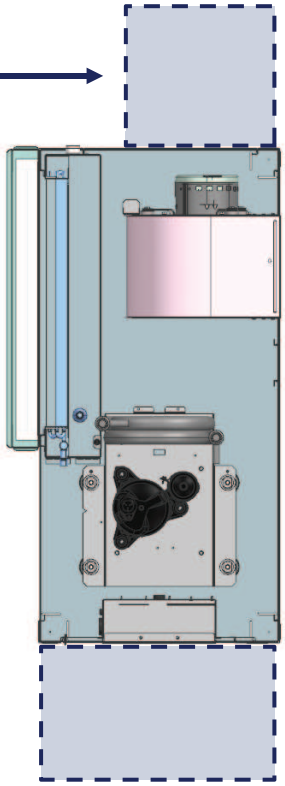
Left Return, Back Discharge



Top View

Blower Access
18 in. Minimum
24 in. Optimum

Left Return, Right Discharge



Top View

Compressor and Electrical Front Access
24 in. Minimum
36 in. Optimum

50WC Series WSHP Operating Limits[a]

FLUID TYPE	LIMIT		COOLING	HEATING
Air	Minimum Ambient (°F)		50	40
	Maximum Ambient (°F)		100	85
	Rated Ambient (°F)		80	68
	Minimum Entering (°F db/wb)		65 / 57	45
	Maximum Entering (°F db/wb)		95 / 85	80
	Rated Entering (°F)		80 / 67	68 / 57
Liquid	Minimum Entering (°F)		45	20
	Max Entering (°F)		110	80
	Rated Entering (°F)	Water Loop	86	68
		Ground Loop	77	32
		Ground Water	59	50
	Anti-Freeze Requirement (LWT / EWT °F)		<40 / <50	
	Maximum Operating Water Pressure (PSI / kPa)		400 psi/2,758 kPa (standard unit) 300 psi/2,068 kPa (with factory-installed 2-way valve option)	
	Minimum Operating Flow Rate (gpm/ton)		1.5	

NOTE(S):

a. Units with water side economizer options can operate with EWT <45°F, the LWT from WSE should be within the stated above conditions.

LEGEND

db — Dry Bulb
EWT — Entering Water Temperature
Gpm — Gallons per Minute
LWT — Leaving Water Temperature
wb — Wet Bulb
WSE — Water Side Economizer
WSHP — Water Source Heat Pump

Performance data (cont)

50WC Vertical Units (PSC Motor Performance)[a,b]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low		289	267	244	213	—	—	—	—	—	—	—	—
	Med	X	335	309	283	251	215	—	—	—	—	—	—	—
	High		347	320	294	262	225	185	—	—	—	—	—	—
50WC009	Low		294	281	267	248	—	—	—	—	—	—	—	—
	Med	X	379	360	340	316	289	—	—	—	—	—	—	—
	High		414	391	369	343	314	284	—	—	—	—	—	—
50WC012	Low		294	281	267	248	—	—	—	—	—	—	—	—
	Med		379	360	340	316	289	—	—	—	—	—	—	—
	High	X	414	391	369	343	314	284	—	—	—	—	—	—
50WC015	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC018	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC024	Low		730	723	703	679	637	544	493	—	—	—	—	—
	Med		821	808	787	757	720	667	535	479	—	—	—	—
	High	X	1019	972	943	890	840	779	696	535	473	—	—	—
50WC030	Low		730	723	703	679	637	544	493	412	—	—	—	—
	Med		821	808	787	757	720	667	535	479	—	—	—	—
	High	X	1019	972	943	890	840	779	696	535	473	—	—	—
50WC036 208/230, 460-v	Low		1178	1139	1097	1052	998	935	863	—	—	—	—	—
	Med		1250	1204	1158	1108	1052	987	912	826	—	—	—	—
	High	X	1289	1240	1194	1142	1082	1017	945	857	—	—	—	—
50WC036 265-v	Low		1022	1013	988	953	884	805	750	684	—	—	—	—
	Med		1221	1193	1156	1118	1059	964	837	772	—	—	—	—
	High	X	1353	1304	1261	1206	1147	1062	887	808	—	—	—	—
50WC042	Low		963	999	1016	1013	996	995	860	—	—	—	—	—
	Med		1237	1243	1263	1260	1243	1215	1103	—	—	—	—	—
	High	X	1561	1559	1547	1520	1480	1426	1357	1165	—	—	—	—
50WC048	Low		1424	1422	1410	1393	1364	1327	1273	1210	1124	—	—	—
	Med		1677	1662	1633	1590	1538	1481	1407	1324	1229	—	—	—
	High	X	1953	1896	1847	1778	1704	1609	1515	1422	1319	1167	—	—
50WC060	Low		1646	1636	1627	1592	1573	1540	1505	1462	1415	1397	—	—
	Med		1832	1819	1806	1793	1746	1711	1659	1619	1553	1501	1417	—
	High	X	2081	2076	2029	2008	1976	1934	1876	1812	1740	1659	1575	—
50WC070	Low		1593	1586	1587	1576	1572	1561	1563	1550	1534	1504	1456	1411
	Med		1776	1777	1774	1778	1776	1756	1749	1733	1728	1684	1659	1606
	High	X	2028	2033	2029	2029	2030	2029	2024	1991	1969	1943	1906	1852

NOTE(S):

a. 575-v models employ 1-speed motors (high only).
b. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Performance data (cont)

50WC Horizontal Units (PSC Motor Performance)[a,b]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low		296	285	271	254	235	—	—	—	—	—	—	—
	Med	X	410	391	373	349	321	—	—	—	—	—	—	—
	High		465	442	420	393	360	—	—	—	—	—	—	—
50WC009	Low		296	281	266	244	—	—	—	—	—	—	—	—
	Med	X	393	373	347	323	293	255	223	—	—	—	—	—
	High		424	401	373	345	314	279	238	196	—	—	—	—
50WC012	Low		296	281	266	244	—	—	—	—	—	—	—	—
	Med		393	373	347	323	293	255	223	—	—	—	—	—
	High	X	424	401	373	345	314	279	238	196	—	—	—	—
50WC015	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC018	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC024	Low		1010	965	923	878	811	625	—	—	—	—	—	—
	Med	X	1079	1016	967	912	851	721	568	—	—	—	—	—
	High		1118	1060	1000	949	888	795	586	561	—	—	—	—
50WC030	Low		1010	965	923	878	811	625	—	—	—	—	—	—
	Med		1079	1016	967	912	851	721	568	—	—	—	—	—
	High	X	1118	1060	1000	949	888	795	586	561	—	—	—	—
50WC036	Low		1027	1029	1024	1010	930	922	912	857	786	689	—	—
	Med		1282	1272	1245	1217	1168	1026	1001	971	904	796	—	—
	High	X	1535	1497	1444	1384	1315	1250	1034	1026	979	887	—	—
50WC042	Low		1279	1248	1212	1161	1087	992	853	801	744	675	—	—
	Med		1465	1414	1365	1301	1240	1097	917	846	774	702	—	—
	High	X	1569	1509	1418	1358	1298	1189	995	869	816	741	—	—
50WC048	Low		1399	1388	1377	1359	1327	1284	1245	1173	1106	883	—	—
	Med		1651	1605	1562	1525	1481	1420	1362	1293	1209	1101	—	—
	High	X	1816	1764	1712	1660	1590	1519	1446	1367	1284	1198	—	—
50WC060	Low		1639	1620	1597	1565	1529	1482	1424	1358	1276	1194	1100	994
	Med		1812	1789	1737	1698	1653	1600	1539	1472	1388	1287	1187	1076
	High	X	2022	1976	1937	1887	1833	1771	1704	1628	1543	1443	1309	1193
50WC070	Low		1636	1626	1611	1607	1591	1571	1540	1506	—	—	—	—
	Med		1822	1822	1814	1793	1777	1756	1724	1675	1626	1562	—	—
	High	X	2092	2082	2068	2045	2020	1968	1932	1878	1815	1730	1640	1525

NOTE(S):

a. 575-v models employ 1-speed motors (high only).
b. Airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Performance data (cont)

50WC Vertical Units (Constant Torque Motor Performance)[a,b]

MODEL	TAP NO.	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low	X	335	322	309	298	—	—	—	—	—	—	—	—
	Medium		413	403	392	375	351	—	—	—	—	—	—	—
	High		456	436	415	393	368	345	—	—	—	—	—	—
50WC009	Low		335	322	309	298	—	—	—	—	—	—	—	—
	Medium	X	413	403	392	375	351	—	—	—	—	—	—	—
	High		456	436	415	393	368	345	—	—	—	—	—	—
50WC012	Low		335	322	309	298	—	—	—	—	—	—	—	—
	Medium		413	403	392	375	351	—	—	—	—	—	—	—
	High	X	456	436	415	393	368	345	—	—	—	—	—	—
50WC015	1		577	540	494	458	436	408	372	351	—	—	—	—
	2	X	647	621	564	537	504	468	440	398	—	—	—	—
	3		829	799	777	739	619	572	527	417	295	—	—	—
	4		947	895	838	782	646	594	528	436	316	—	—	—
	5		945	907	860	799	694	605	532	469	—	—	—	—
50WC018	1		577	540	494	458	436	408	372	—	—	—	—	—
	2		647	621	564	537	504	468	440	398	—	—	—	—
	3	X	829	799	777	739	619	572	527	417	—	—	—	—
	4		947	895	838	782	646	594	528	436	—	—	—	—
	5		945	907	860	799	694	605	532	469	—	—	—	—
50WC024	1		600	578	538	498	448	418	—	—	—	—	—	—
	2		669	649	616	588	528	487	467	423	—	—	—	—
	3		861	833	812	787	757	732	645	562	—	—	—	—
	4	X	1034	1005	967	923	867	803	726	583	—	—	—	—
	5		1071	1027	988	939	888	827	738	590	—	—	—	—
50WC030	1		600	578	538	498	448	418	—	—	—	—	—	—
	2		669	649	616	588	528	487	467	423	—	—	—	—
	3		861	833	812	787	757	732	645	562	—	—	—	—
	4		1034	1005	967	923	867	803	726	583	—	—	—	—
	5	X	1071	1027	988	939	888	827	738	590	—	—	—	—
50WC036	1		885	864	832	808	—	—	—	—	—	—	—	—
	2		1028	999	978	951	940	908	872	—	—	—	—	—
	3		1199	1175	1152	1114	1063	1005	929	811	—	—	—	—
	4		1270	1227	1177	1127	1075	996	928	804	—	—	—	—
	5	X	1288	1246	1188	1136	1072	1008	927	809	—	—	—	—
50WC042	1		1202	1175	1150	1128	1108	1080	1021	971	935	903	—	—
	2		1295	1269	1244	1230	1203	1183	1154	1093	1025	940	—	—
	3		1399	1377	1352	1333	1302	1284	1260	1236	1051	963	—	—
	4	X	1500	1475	1452	1425	1400	1377	1364	1321	1251	966	—	—
	5		1607	1580	1558	1532	1509	1492	1420	1351	1264	977	—	—
50WC048	1		1412	1383	1359	1331	—	—	—	—	—	—	—	—
	2		1606	1579	1556	1529	1501	1471	1421	—	—	—	—	—
	3	X	1728	1701	1675	1651	1622	1588	1472	—	—	—	—	—
	4		1827	1801	1780	1751	1680	1593	1468	—	—	—	—	—
	5		1897	1873	1848	1797	1722	1628	1482	1376	—	—	—	—
50WC060	1		1899	1873	1847	1822	1780	1760	—	—	—	—	—	—
	2		2032	2004	1970	1942	1903	1876	—	—	—	—	—	—
	3	X	2152	2116	2091	2057	2015	1984	1953	1927	1888	—	—	—
	4		2252	2224	2194	2165	2132	2099	2066	2021	1948	1866	—	—
	5		2380	2355	2332	2292	2256	2219	2161	2096	2017	1925	1832	1723
50WC070	1		2055	2027	1991	1965	1939	1911	1874	1845	1816	1779	—	—
	2		2149	2122	2096	2060	2034	2008	1979	1945	1916	1887	—	—
	3	X	2225	2198	2172	2140	2111	2087	2057	2029	1995	1968	—	—
	4		2388	2361	2330	2300	2272	2246	2220	2190	2155	2124	2094	2062
	5		2436	2408	2380	2351	2322	2294	2267	2240	2210	2179	2145	2111

NOTE(S):

a. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.
b. Off delay = 30 seconds = After receiving an off command motor will continue running for 30 seconds.

Performance data (cont)

50WC Horizontal Units (Constant Torque Motor Performance)[a,b]

MODEL	TAP NO.	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low	X	342	331	317	305	293	281	264	—	—	—	—	—
	Medium		426	414	402	381	356	329	300	267	—	—	—	—
	High		467	446	429	405	381	353	320	282	—	—	—	—
50WC009	Low		342	331	317	305	293	281	264	—	—	—	—	—
	Medium	X	426	414	402	381	356	329	300	267	—	—	—	—
	High		467	446	429	405	381	353	320	282	—	—	—	—
50WC012	Low		342	331	317	305	293	281	264	—	—	—	—	—
	Medium		426	414	402	381	356	329	300	267	—	—	—	—
	High	X	467	446	429	405	381	353	320	282	—	—	—	—
50WC015	1		505	434	392	368	327	—	—	—	—	—	—	—
	2		538	491	440	424	384	338	—	—	—	—	—	—
	3	X	669	636	597	533	499	485	447	—		—	—	—
	4		762	733	704	658	605	569	538	488	—	—	—	—
	5		861	838	823	800	771	641	569	511	—	—	—	—
50WC018	1		505	434	392	368	327	—	—	—	—	—	—	—
	2		538	491	440	424	384	338	—	—	—	—	—	—
	3	X	669	636	597	533	499	485	447	—	—	—	—	—
	4		762	733	704	658	605	569	538	488	—	—	—	—
	5		861	838	823	800	771	641	569	511	—	—	—	—
50WC024	1		723	684	651	613	539	475	—	—	—	—	—	—
	2		772	734	704	644	564	514	—	—	—	—	—	—
	3		928	899	837	814	783	728	508	—	—	—	—	—
	4	X	1012	984	960	925	881	817	557	—	—	—	—	—
	5		1083	1060	1032	925	867	769	503	—	—	—	—	—
50WC030	1		723	684	651	613	539	475	—	—	—	—	—	—
	2		772	734	704	644	564	514	—	—	—	—	—	—
	3		928	899	837	814	783	728	508	—	—	—	—	—
	4	X	1012	984	960	925	881	817	557	—	—	—	—	—
	5		1083	1060	1032	925	867	769	503	—	—	—	—	—
50WC036	1		1205	1178	1158	1130	1104	1075	1050	1020	998	967	877	—
	2		1290	1268	1243	1218	1198	1169	1141	1115	1087	1013	918	—
	3	X	1398	1376	1348	1329	1301	1283	1256	1222	1146	1045	921	—
	4		1503	1481	1451	1434	1412	1378	1320	1250	1149	1043	926	—
	5		1752	1696	1645	1585	1529	1451	1376	1294	1198	1087	946	815
50WC042	1		1205	1178	1158	1130	1104	1075	1050	1020	998	967	877	—
	2		1290	1268	1243	1218	1198	1169	1141	1115	1087	1013	918	—
	3		1398	1376	1348	1329	1301	1283	1256	1222	1146	1045	921	—
	4	X	1503	1481	1451	1434	1412	1378	1320	1250	1149	1043	926	—
	5		1752	1696	1645	1585	1529	1451	1376	1294	1198	1087	946	815
50WC048	1		1424	1400	1374	1351	1329	1308	1285	1262	1241	1209	—	—
	2		1636	1615	1595	1571	1551	1526	1502	1455	1381	1304	—	—
	3	X	1700	1677	1655	1637	1611	1581	1526	1463	1385	1293	—	—
	4		1798	1776	1754	1730	1689	1630	1560	1489	1412	1317	—	—
	5		1889	1865	1827	1777	1718	1652	1579	1499	1412	1328	—	—
50WC060	1		1851	1818	1792	1758	1729	1698	1660	1627	1588	1539	—	—
	2		1945	1911	1886	1852	1823	1793	1757	1720	1659	1579	—	—
	3	X	2026	1994	1965	1938	1901	1874	1825	1760	1683	1593	1487	1370
	4		2081	2055	2021	1993	1949	1903	1840	1775	1695	1594	1486	1370
	5		2239	2201	2151	2086	2028	1977	1903	1822	1737	1650	1529	1397
50WC070	1		2020	1988	1958	1932	1895	1866	1836	1801	—	—	—	—
	2		2114	2081	2056	2027	1993	1966	1936	1896	1863	—	—	—
	3	X	2198	2173	2146	2113	2085	2050	2018	1981	1948	1907	—	—
	4		2334	2303	2272	2245	2215	2181	2148	2103	2046	1972	1886	—
	5		2385	2355	2328	2295	2263	2231	2192	2141	2075	1994	1908	1812

NOTE(S):

a. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.
b. Off delay = 30 seconds = After receiving an off command motor will continue running for 30 seconds.

Performance data (cont)

50WC Vertical Units (Constant Airflow Motor Performance)[a,b,c]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC015	D - Low	—	460	460	460	460	460	460	460	440	410	390	—	—
	D - Normal	X	550	550	550	550	550	550	550	550	550	550	—	—
	D - High	—	610	620	640	640	640	640	640	640	620	590	—	—
50WC018	A - Low	—	510	510	510	510	510	510	510	500	480	460	—	—
	A - Normal	X	600	600	600	600	600	600	600	580	540	500	—	—
	A - High	—	685	685	685	685	685	685	640	600	560	520	—	—
50WC024	A - Low	—	680	680	680	680	680	680	680	680	650	620	—	—
	A - Normal	X	800	800	800	800	800	800	800	780	740	680	—	—
	A - High	—	900	900	900	900	900	900	900	870	840	710	—	—
50WC030	C - Low	—	810	830	830	830	830	830	830	830	—	—	—	—
	C - Normal	X	930	950	950	950	950	950	950	900	—	—	—	—
	C - High	—	1040	1040	1040	1040	1040	1020	980	940	—	—	—	—
50WC036	A - Low	—	1020	1040	1040	1040	1040	1040	1040	1040	1020	1000	—	—
	A - Normal	X	1200	1200	1200	1200	1200	1200	1200	1160	1140	1060	—	—
	A - High	—	1160	1200	1280	1300	1300	1340	1380	1380	1380	1380	—	—
50WC042	A - Low	—	1180	1200	1200	1200	1200	1200	1200	1200	1200	1200	—	—
	A - Normal	X	1340	1400	1400	1400	1400	1400	1400	1400	1400	1400	—	—
	A - High	—	1520	1530	1550	1550	1550	1550	1550	1550	1550	1580	—	—
50WC048	B - Low	—	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	—	—
	B - Normal	X	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	—	—
	B - High	—	1750	1750	1750	1750	1750	1750	1780	1800	1800	1800	—	—
50WC060	C - Low	—	1700	1725	1725	1725	1725	1725	1725	1725	1725	1700	—	—
	C - Normal	X	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	C - High	—	2260	2260	2260	2260	2260	2260	2260	2260	2200	2160	2120	2080
50WC070	A - Low	—	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
	A - Normal	X	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
	A - High	—	2375	2375	2375	2375	2375	2375	2375	2375	2375	2375	2300	2270

NOTE(S):

a. During fan only operation air flow is 70% of tabulated value.
b. When passive dehumidification mode is enabled, air flow is 85% of tabulated value.
c. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Performance data (cont)

50WC Horizontal Units (Constant Airflow Motor Performance)[a,b,c]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC015	A - Low	—	440	440	440	440	440	440	440	440	430	420	—	—
	A - Normal	X	500	500	500	500	500	500	500	500	490	480	—	—
	A - High	—	590	590	590	590	590	590	590	590	590	575	—	—
50WC018	D - Low	—	500	500	500	500	500	500	500	500	500	500	—	—
	D - Normal	X	580	600	600	600	600	600	600	600	590	580	—	—
	D - High	—	660	680	700	700	700	700	700	680	650	620	—	—
50WC024	B - Low	—	620	650	650	650	650	650	650	640	630	600	—	—
	B - Normal	X	750	780	800	800	800	800	800	780	700	650	—	—
	B - High	—	880	900	900	900	900	900	900	880	800	700	—	—
50WC030	A - Low	—	780	800	800	800	800	800	800	800	700	650	—	—
	A - Normal	X	920	950	950	950	950	950	950	900	750	700	—	—
	A - High	—	1050	1050	1050	1050	1050	1050	1050	1000	950	900	—	—
50WC036	A - Low	—	960	980	1000	1000	1000	1000	1000	1000	1000	1000	1000	—
	A - Normal	X	1150	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	—
	A - High	—	1310	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	—
50WC042	B - Low	—	1120	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160	—
	B - Normal	X	1340	1350	1400	1400	1400	1400	1400	1400	1400	1400	1380	—
	B - High	—	1530	1550	1550	1550	1550	1550	1550	1550	1550	1530	1480	—
50WC048	A - Low	—	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	—	—
	A - Normal	X	1560	1600	1600	1600	1600	1600	1600	1600	1600	1600	—	—
	A - High	—	1790	1820	1820	1820	1820	1820	1820	1820	1820	1760	—	—
50WC060	A - Low	—	1620	1620	1620	1620	1620	1620	1620	1620	1620	1620	1610	1600
	A - Normal	X	1900	1940	2000	2000	2000	2000	2000	2000	2000	1970	1900	1900
	A - High	—	2150	2150	2150	2150	2150	2150	2150	2150	2100	2050	2000	1950
50WC070	A - Low	—	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
	A - Normal	X	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
	A - High	—	2380	2400	2400	2400	2400	2400	2400	2400	2300	2250	2200	2150

NOTE(S):

a. During fan only operation air flow is 70% of tabulated value.
b. When passive dehumidification mode is enabled, air flow is 85% of tabulated value.
c. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Electrical data

50WC without Electric Heat — PSC (Standard) Blower Motor Heat Electrical Data

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	Hp			
007	Vertical/Horizontal	208-230/1/60	197/253	1	2.9	15.0	1.12	0.10	4.0	4.7	15
		265/1/60	238/292	1	2.2	12.0	1.00	0.10	3.2	3.8	15
009	Vertical/Horizontal	208-230/1/60	197/253	1	3.3	20.0	1.12	0.10	4.4	5.3	15
		265/1/60	238/292	1	2.7	19.0	1.00	0.10	3.7	4.4	15
012	Vertical/Horizontal	208-230/1/60	197/253	1	4.7	27.0	1.12	0.10	5.8	6.9	15
		265/1/60	238/292	1	3.9	23.0	1.00	0.10	4.9	5.9	15
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	1.10	0.17	6.9	8.4	15
		265/1/60	238/292	1	4.7	28.0	0.85	0.17	5.6	6.7	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	1.10	0.17	8.4	10.2	15
		265/1/60	238/292	1	5.8	31.0	0.85	0.17	6.7	8.1	15
024	Vertical/Horizontal	208-230/1/60	197/253	1	9.6	58.0	1.80	0.25	11.4	13.8	20
		265/1/60	238/292	1	7.6	36.0	1.60	0.25	9.2	11.1	15
		208-230/3/60	197/253	1	7.7	59.9	1.80	0.25	9.5	11.4	15
		460/3/60	414/506	1	3.8	32.4	0.90	0.25	4.7	5.7	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	1.80	0.25	10.5	12.6	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	4.40	0.50	13.1	15.2	20
	Vertical	265/1/60	238/292	1	10.9	71.7	1.60	0.25	12.5	15.2	25
	Horizontal	265/1/60	238/292	1	10.9	71.7	3.30	0.50	14.2	16.9	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	1.80	0.25	10.1	12.2	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	4.40	0.50	12.7	14.8	20
	Vertical	460/3/60	414/506	1	5.1	38.1	0.90	0.25	6.0	7.3	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	1.80	0.50	6.9	8.2	15
036	Vertical	208-230/1/60	197/253	1	16.7	93.5	4.40	0.75	21.1	25.2	40
	Horizontal	208-230/1/60	197/253	1	16.7	93.5	4.40	0.50	21.1	25.2	40
	Vertical	265/1/60	238/292	1	13.5	90.8	3.30	0.50	16.8	20.1	30
	Horizontal	265/1/60	238/292	1	13.5	90.8	3.30	0.50	16.8	20.1	30
	Vertical	208-230/3/60	197/253	1	12.2	97.5	4.40	0.75	16.6	19.6	30
	Horizontal	208-230/3/60	197/253	1	12.2	97.5	4.40	0.50	16.6	19.6	30
	Vertical	460/3/60	414/506	1	5.8	44.3	2.80	0.75	8.6	10.0	15
	Horizontal	460/3/60	414/506	1	5.8	44.3	1.80	0.50	7.6	9.0	15
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	4.40	0.75	19.1	22.8	35
		208-230/3/60	197/253	1	12.2	102.8	4.40	0.75	16.6	19.6	30
		460/3/60	414/506	1	5.8	50.0	2.80	0.75	8.6	10.0	15
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	4.40	0.75	21.7	26.0	40
		208-230/3/60	238/292	1	12.2	120.4	4.40	0.75	16.6	19.6	30
		460/3/60	197/253	1	6.4	50.0	2.80	0.75	9.2	10.8	15
		575/3/60	518/632	1	5.1	41.0	2.60	0.75	7.7	9.0	15
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	5.50	0.75	31.1	37.6	60
		208-230/3/60	238/292	1	18.6	155.0	5.50	0.75	24.1	28.7	45
		460/3/60	197/253	1	8.3	58.1	2.80	0.75	11.1	13.1	20
		575/3/60	518/632	1	7.7	47.8	2.60	0.75	10.3	12.2	15
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	5.50	0.75	33.1	40.0	60
		208-230/3/60	238/292	1	19.2	156.5	5.50	0.75	24.7	29.5	45
		460/3/60	197/253	1	9.0	74.8	2.80	0.75	11.8	14.0	20
		575/3/60	518/632	1	7.7	47.8	2.60	0.75	10.3	12.2	15

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Electrical data (cont)

50WC without Electric Heat — Constant Torque ECM Blower Motor Electrical Data

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	Hp			
007	Vertical/Horizontal	208-230/1/60	197/253	1	2.9	15.0	2.3	0.25	5.2	5.9	15
		265/1/60	238/292	1	2.2	12.0	2.3	0.25	4.5	5.1	15
009	Vertical/Horizontal	208-230/1/60	197/253	1	3.3	20.0	2.3	0.25	5.6	6.5	15
		265/1/60	238/292	1	2.7	19.0	2.3	0.25	5.0	5.7	15
012	Vertical/Horizontal	208-230/1/60	197/253	1	4.7	27.0	2.3	0.25	7.0	8.1	15
		265/1/60	238/292	1	3.9	23.0	2.3	0.25	6.2	7.2	15
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	2.8	0.33	8.6	10.1	15
		265/1/60	238/292	1	4.7	28.0	2.6	0.33	7.3	8.5	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	2.8	0.33	10.1	11.9	15
		265/1/60	238/292	1	5.8	31.0	2.6	0.33	8.4	9.9	15
024	Vertical	208-230/1/60	197/253	1	9.6	58.0	2.8	0.33	12.4	14.8	20
	Horizontal	208-230/1/60	197/253	1	9.6	58.0	4.1	0.50	13.7	16.1	25
	Vertical	265/1/60	238/292	1	7.6	36.0	2.6	0.33	10.2	12.1	15
	Horizontal	265/1/60	238/292	1	7.6	36.0	3.6	0.50	11.2	13.1	20
	Vertical	208-230/3/60	197/253	1	7.7	59.9	2.8	0.33	10.5	12.4	20
	Horizontal	208-230/3/60	197/253	1	7.7	59.9	4.1	0.50	11.8	13.7	20
	Vertical	460/3/60	414/506	1	3.8	32.4	2.1	0.50	5.9	6.9	15
	Horizontal	460/3/60	414/506	1	3.8	32.4	2.1	0.50	5.9	6.9	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	2.8	0.33	11.5	13.6	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	4.1	0.50	12.8	14.9	20
	Vertical	265/1/60	238/292	1	10.9	71.7	2.6	0.30	13.5	16.2	20
	Horizontal	265/1/60	238/292	1	10.9	71.7	3.6	0.50	14.5	17.2	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	2.8	0.33	11.1	13.2	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	4.1	0.50	12.4	14.5	20
	Vertical	460/3/60	414/506	1	5.1	38.1	2.1	0.50	7.2	8.5	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	2.1	0.50	7.2	8.5	15
036	Vertical/Horizontal	208-230/1/60	197/253	1	16.7	93.5	6.0	0.75	22.7	26.8	40
		265/1/60	238/292	1	13.5	90.8	4.9	0.75	18.4	21.7	35
		208-230/3/60	197/253	1	12.2	97.5	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	5.8	44.3	3.2	0.75	9.0	10.4	15
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	6.0	0.75	20.7	24.4	35
		208-230/3/60	197/253	1	12.2	102.8	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	5.8	50.0	3.2	0.75	9.0	10.4	15
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	6.0	0.75	23.3	27.6	40
		208-230/3/60	197/253	1	12.2	120.4	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	6.4	50.0	3.2	0.75	9.6	11.2	15
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	7.6	1.00	33.2	39.7	60
		208-230/3/60	197/253	1	18.6	155.0	7.6	1.00	26.2	30.8	45
		460/3/60	414/506	1	8.3	58.1	4.0	1.00	12.3	14.3	20
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	7.6	1.00	35.2	42.1	60
		208-230/3/60	197/253	1	19.2	156.5	7.6	1.00	26.8	31.6	50
		460/3/60	414/506	1	9.0	74.8	4.0	1.00	13.0	15.2	20

LEGEND

Hp — Horsepower
FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Electrical data (cont)

50WC without Electric Heat — Constant Airflow ECM Blower Motor Electrical Data[a]

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	HP			
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	4.4	0.33	10.2	11.7	15
		265/1/60	238/292	1	4.7	28.0	4.7	0.33	9.4	10.6	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	4.4	0.33	11.7	13.5	20
		265/1/60	238/292	1	5.8	31.0	4.7	0.33	10.5	12.0	15
024	Vertical	208-230/1/60	197/253	1	9.6	58.0	4.4	0.33	14.0	16.4	25
	Horizontal	208-230/1/60	197/253	1	9.6	58.0	5.0	0.50	14.6	17.0	25
	Vertical	265/1/60	238/292	1	7.6	36.0	4.7	0.33	12.3	14.2	20
	Horizontal	265/1/60	238/292	1	7.6	36.0	5.0	0.50	12.6	14.5	20
	Vertical	208-230/3/60	197/253	1	7.7	59.9	4.4	0.33	12.1	14.0	20
	Horizontal	208-230/3/60	197/253	1	7.7	59.9	5.0	0.50	12.7	14.6	20
	Vertical	460/3/60	414/506	1	3.8	32.4	4.7	0.33	8.5	9.7	15
	Horizontal	460/3/60	414/506	1	3.8	32.4	5.0	0.50	8.8	10.1	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	4.4	0.33	13.1	15.2	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	5.0	0.50	13.7	15.8	20
	Vertical	265/1/60	238/292	1	10.9	71.7	4.7	0.33	15.6	18.3	25
	Horizontal	265/1/60	238/292	1	10.9	71.7	5.0	0.50	15.9	18.6	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	4.4	0.33	12.7	14.8	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	5.0	0.50	13.3	15.4	20
	Vertical	460/3/60	414/506	1	5.1	38.1	4.7	0.33	9.8	11.1	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	5.0	0.50	10.1	11.4	15
036	Vertical/Horizontal	208-230/1/60	197/253	1	16.7	93.5	8.4	0.75	25.1	29.2	45
		265/1/60	238/292	1	13.5	90.8	7.5	0.75	21.0	24.3	35
		208-230/3/60	197/253	1	12.2	97.5	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	5.8	44.3	7.5	0.75	13.3	15.1	20
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	8.4	0.75	23.1	26.8	40
		208-230/3/60	197/253	1	12.2	102.8	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	5.8	50.0	7.5	0.75	13.3	15.1	20
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	8.4	0.75	25.7	30.0	45
		208-230/3/60	197/253	1	12.2	120.4	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	6.4	50.0	7.5	0.75	13.9	15.8	20
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	9.1	1.00	34.7	41.2	60
		208-230/3/60	197/253	1	18.6	155.0	9.1	1.00	27.7	32.3	50
		460/3/60	414/506	1	8.3	58.1	9.1	1.00	17.4	19.6	25
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	9.1	1.00	36.7	43.6	70
		208-230/3/60	197/253	1	19.2	156.5	9.1	1.00	28.3	33.1	50
		460/3/60	414/506	1	9.0	74.8	9.1	1.00	18.1	20.3	25

NOTE(S):

a. 460-v units with Constant Airflow ECM blower motors require a neutral wire (4 wires).

LEGEND

Hp — Horsepower
FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Electrical data (cont)

50WC with 5 kW Electric Heat — Constant Torque ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	5 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		AMPS		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024	Vertical	3.6 K	4.8 K	17.3	20.0	25.2	28.5	30	30
030	Vertical	3.6 K	4.8 K	17.3	20.0	25.2	28.5	30	30
036	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
042	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
048	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
060	Vertical	3.6 K	4.8 K	17.3	20.0	39.7	39.7	40	40
070	Vertical	3.6 K	4.8 K	17.3	20.0	42.1	42.1	45	45

50WC with 10 kW Electric Heat — Constant Torque ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	10 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
036	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
042	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
048	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
060	Vertical	7.2 K	9.6 K	34.7	40.0	52.8	59.5	60	60
070	Vertical	7.2 K	9.6 K	34.7	40.0	52.8	59.5	60	60

Electrical data (cont)

50WC with 5 kW Electric Heat — Constant Airflow ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	5 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024	Vertical	3.6 K	4.8 K	17.3	20.0	27.2	30.5	30	35
030	Vertical	3.6 K	4.8 K	17.3	20.0	27.2	30.5	35	40
036	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
042	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
048	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
060	Vertical	3.6 K	4.8 K	17.3	20.0	41.2	41.2	45	45
070	Vertical	3.6 K	4.8 K	17.3	20.0	43.6	43.6	45	45

50WC with 10 kW Electric Heat — Constant Airflow ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	10 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
036	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
042	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
048	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
060	Vertical	7.2 K	9.6 K	34.7	40.0	54.7	61.4	60	70
070	Vertical	7.2 K	9.6 K	34.7	40.0	54.7	61.4	60	70

Application data

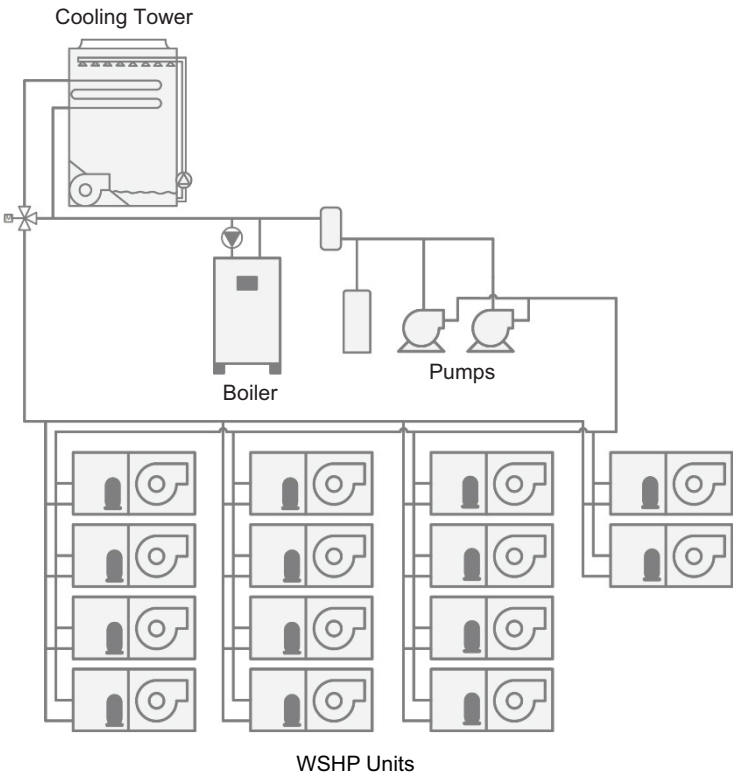
Aquazone™ water source heat pumps are available in a flexible, efficient array of models and sizes, which can be used for extensive variety of commercial building types that has several temperature control zones, some of which need to be heated while others need to be cooled. The WSHP system is an especially good choice for potential energy savings from heat-recovery capabilities to efficiently transfer heat between areas.

The design of WSHP units is adaptable, making them suitable for various water loop, ground water, and ground loop systems. Aquazone™ products provide optimal energy efficient solutions and adapt to the most challenging design requirements.

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 1.5 and 4 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 50 and 80°F. Within this temperature range units can heat or cool as required from the same water source. Transferring heat from warm to cold spaces in the building, whenever they coexist, conserves energy rather than creating new heat.

Typical Water Loop (boiler/cooling tower) Application



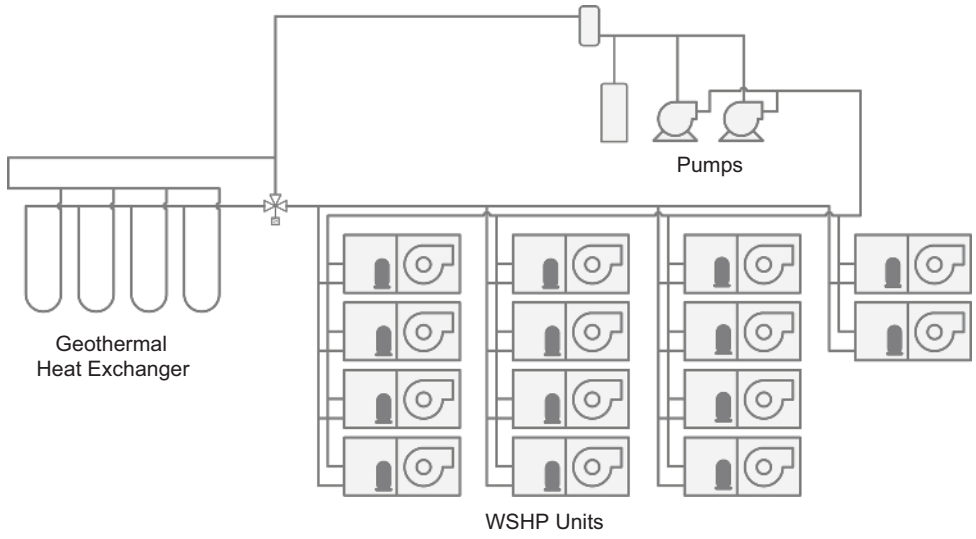
Application data (cont)

Ground loop systems

The benefit of ground source applications lies in utilizing the earth's stable temperatures to maintain appropriate water loop temperatures. There are many commonly specified designs for ground loop applications. Typical designs include vertical and horizontal loops:

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

Typical Ground Loop / Geothermal Application

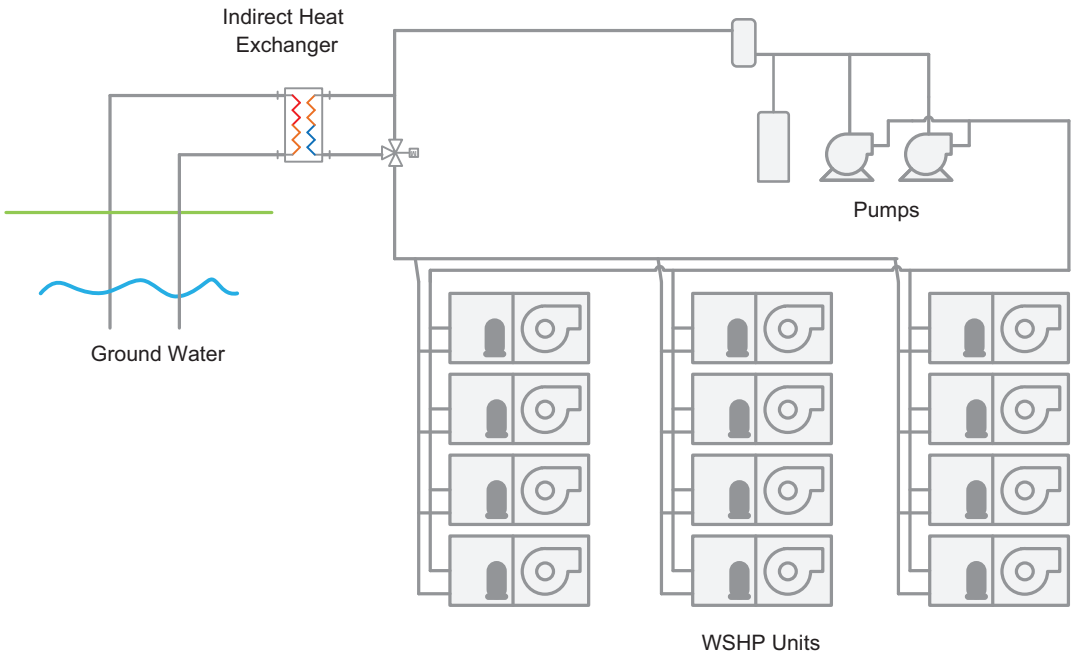


Application data (cont)

Ground water systems

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 to isolate WSHP units from contamination. This design limits the amount of piping and excavation required. Aquazone™ units come with an extended range coil (20 to 110°F) for open or closed loop systems. To conserve water on this type of system, a slow opening/closing solenoid valve is recommended. Depending on loop water temperatures, a water regulating valve may be needed.

Ground Water Application

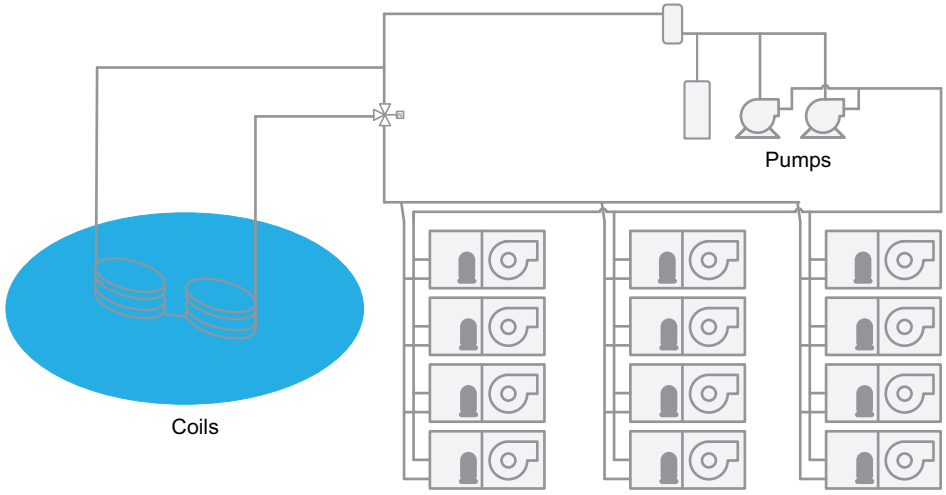


Application data (cont)

Surface water system

This system is typically located near a lake, pond, well, or other water sources to maintain closed loop water temperatures. 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.

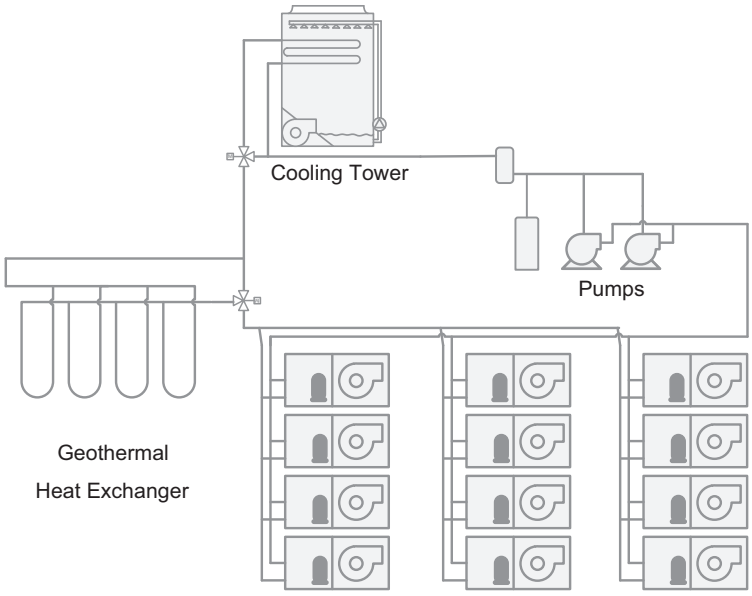
Surface Water Application



Hybrid systems

In some applications, it may be beneficial to incorporate a cooling tower or boiler 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.

Hybrid System
(geothermal loop/cooling tower) Application



Application data (cont)

Freeze protection

Applications where systems are exposed to outdoor temperatures below freezing (32°F) or leaving water temperatures drop below 40°F must be protected from freezing. The most common method of protecting water systems from freezing is adding glycol concentrations into the water. Design care should be used when selecting both the type and concentrations of glycol used due to the following:

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

Water quality

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 will depend on the water quality as well as type of system. Water problems fall into three main categories:

- 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.
- Corrosion is caused by absorption of gases from the air coupled with water on exposed metal. Corrosion is also common in salt-water areas.
- 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 and should be equipped with a cupronickel heat exchanger for applications where water is outside the standard contaminant limits for a copper heat exchanger.

Application data (cont)

Water Quality Guidelines

CONDITION	HX MATERIAL[a]	CLOSED RECIRCULATING[b]	OPEN LOOP AND RECIRCULATING WELL[c]		
Scaling Potential — Primary Measurement **Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.**					
pH/Calcium Hardness Method	All	N/A	pH < 7.5 and Ca Hardness, <100 ppm		
Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)					
Scaling indexes should be calculated at 150°F for direct use and at 90°F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	N/A	6.0 to 7.5 If > 7.5 minimize steel pipe use.		
Langelier Saturation Index	All	N/A	–0.5 to +0.5 If <=0.5 minimize steel pipe use. Based upon 150°F direct well, 85°F indirect well HX.		
Iron Fouling					
Iron Fe^{2+} (Ferrous) (bacterial iron potential)	All	N/A	<0.2 ppm (Ferrous) If Fe^{2+} (ferrous) >0.2 ppm with pH 6 to 8, O_2<5 ppm, check for iron bacteria.		
Iron Fouling	All	N/A	<0.5 ppm of Oxygen Above this level deposition will occur.		
Corrosion Prevention[d]					
pH	All	6 to 8.5 Monitor/treat as needed.	6 to 8.5 Minimize steel pipe below 7 and no open tanks with pH <8.		
Hydrogen Sulfide (H_2S)	All	N/A	<0.5 ppm At H_2S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are acceptable to <0.5 ppm.		
Ammonia Ion as Hydroxide Chloride, Nitrate and Sulfate Compound	All	N/A	<0.5 ppm		
Maximum Chloride Levels			Maximum allowable at maximum water temperature.		
			50°F (10°C)	75°F (24°C)	100°F (38°C)
	Copper	N/A	<20 ppm	NR	NR
	Cupronickel	N/A	<150 ppm	NR	NR
	304 SS	N/A	<400 ppm	<250 ppm	<150 ppm
	316 SS	N/A	<1000 ppm	<550 ppm	<375 ppm
	Titanium	N/A	>1000 ppm	>550 ppm	>375 ppm
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm “sandfree” for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		
Brackish	All	N/A	Use cupronickel heat exchanger when concentrations of calcium or sodium chloride are greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)		

NOTE(S):

a. Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.
b. Closed recirculating system is identified by a closed pressurized piping system.
c. Recirculating open wells should observe the open recirculating design considerations.
d. 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 registers a pH of 7.0.
To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

LEGEND

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

Application data (cont)

Condensate drainage

Venting

Properly vent condensate lines 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. Use chemical treatment to remove algae in the condensate pans and drains in geographical areas that are conducive to algae growth.

Trapping

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

Horizontal Units

Horizontal units should be sloped toward the drain at a 1/4 in. per foot pitch. If it is not possible to meet the pitch requirement, a condensate pump should be designed and installed at the unit to pump condensate to a building drain. Horizontal units are not internally trapped, therefore an external trap is necessary. Each unit must be installed with its own individual trap and means to flush or blow out the condensate drain. It is not acceptable to use a common trap or vent for multiple units. The condensate piping system should not be designed with a pipe size smaller than the drain connection pipe size.

Vertical Units

50WC vertical configuration units are internally trapped from the factory.

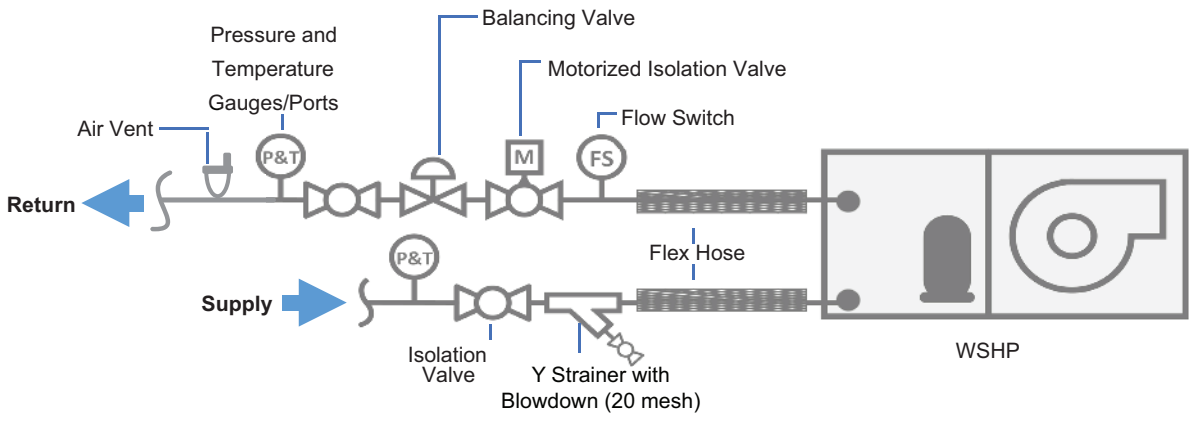
Water Piping Connections

The most basic type of hose kits are used to connect the fixed building water supply and return piping system to the water inlets and outlets of the unit. Flexible hoses not only simplify the connection but also play a role in minimizing vibration between the unit and the rigid central piping system. For ease of implementation, typical hose kits can include most of hydronic devices like: isolation valves, y-strainer filter, balancing valve, pressure/temperature ports.

Flow Balancing

Water source heat pumps are designed and selected to provide a specific amount of cooling and heating capacity at specific operating conditions. While all HVAC equipment is designed around specific return and supply air conditions, WSHPs differentiate themselves by also requiring specific water loop conditions. As a result, it is extremely important that these water loop conditions remain as constant as possible during operation of the WSHP to ensure that both cooling and heating demands are met. One major component of these water loop conditions is the water loop flow rate, often referenced as the gpm or gallons per minute. One method of controlling the gpm is by manually balancing each WSHP, however this is often very time consuming (each WSHP requires manual balancing), and the flow rate through a manually balanced valve tends to fluctuate over time, often requiring frequent re-balancing. A better method to ensure a constant water loop flow rate at each WSHP is to use an automatic flow control device, or an auto-flow regulator. An auto-flow regulator is a pressure independent automatic flow limiting valve, with the main component being an internal flow cartridge that is factory set to a specific flow rate, or gpm. Auto-flow regulators are utilized at each WSHP (each WSHP will have its own auto-flow regulator) and the auto-flow regulator will maintain the designed gpm over a wide water loop pressure differential. Thus, as the water loop pressure changes (which can be common in systems as different WSHPs on the same water loop are turning on/off and their isolation valves open/close as a result), the water loop flow rate to each WSHP remains constant. Additionally, the system installation is much easier with autoflow regulators compared to manually balanced systems, and the "fluctuation" seen in manually balanced systems is no longer an issue.

Typical Hydronic Accessories



Application data (cont)

Acoustical Considerations

Sound power levels represent the sound as it is produced by the source, the WSHP unit, with no regard to attenuation between the source and the space. Acoustical design goals are necessary to provide criteria for occupied spaces where people can be comfortable and communicate effectively over the background noise of the air-conditioning system and other background noise sources. Acoustical design goals are desirable sound pressure levels within a given conditioned space and are represented by noise criteria (NC) curves. The NC curve levels represent a peak over a full spectrum of frequencies. A high value in a low frequency band has the same effect on NC level as a lower value in a high frequency band. It is important that sound levels be balanced over the entire spectrum relative to the NC curve. The lower the NC criteria curve, the more stringent the room acoustical design must be to meet the design goals. It is important to know how to convert NC levels from the unit ratings in terms of sound power (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

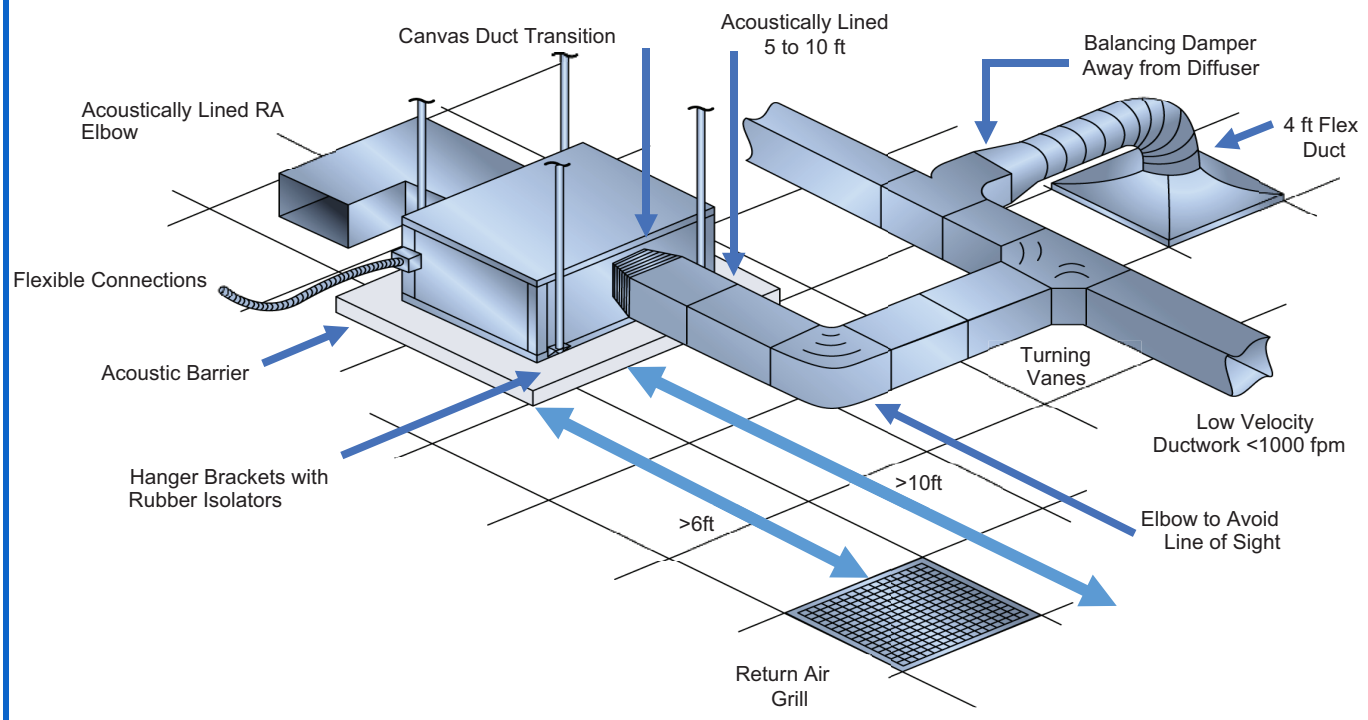
Horizontal units

General Recommendations:

- Maximize the height of the unit above the ceiling.
- Make sure the WSHP unit is located at least 6 feet away from any ceiling return grille to prevent line-of-sight casing noise to reach the space below.
- Suspend the WSHP unit from the ceiling with hangers that utilize spring or neoprene type isolators to reduce vibration transmission.
- Utilize flexible – not rigid – electrical connections to the WSHP unit.
- Utilize flexible loop water and condensate piping connections to the WSHP unit.
- Use a canvas duct connector to connect the WSHP discharge to the downstream duct system. This reduces vibration-induced noise.
- Provide acoustic interior lining for the first 20 feet of discharge duct, or until the first elbow is reached. The elbow prevents line-of-site sound transmission in the discharge duct.
- Provide “turning” vanes in ductwork elbows and tees to reduce air turbulence.
- Size the sheet metal supply duct with velocities no greater than 1000 fpm.
- Make ductwork as stiff as possible.
- Use round duct whenever possible – it is less noisy.
- Allow at least 3 equivalent duct diameters of straight duct upstream and downstream of the unit before allowing any fittings, transitions, etc.
- Seal all penetrations around duct entering the space.
- Provide a four-foot runout duct made of flexible material to connect a diffuser to the supply trunk duct. The flex duct provides an “attenuating end-effect” and reduces duct transmitted sound before it reaches the space. Typically a 6 dB sound reduction can be accomplished with the use of flex duct.
- Locate the runout duct balancing damper as far away from the outlet diffuser as possible. Locating the balancing damper at the trunk duct exit is best.
- If return air is drawn through a ceiling plenum, provide an acoustically lined return duct elbow or “L” shaped boot at the WSHP to eliminate line-of-site noise into the ceiling cavity and possible through ceiling return air grilles. Face the elbow or boot away from the nearest adjacent WSHP unit to prevent additive noise.
- Do not hang the suspended ceiling from the ductwork.

Application data (cont)

Horizontal Units



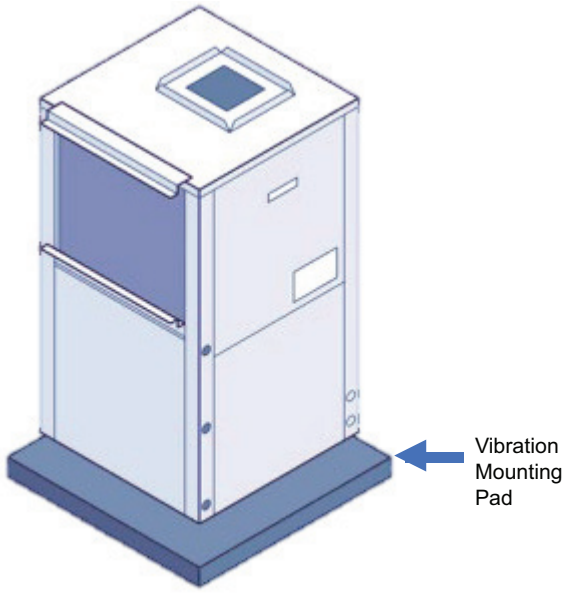
Application data (cont)

Vertical units

All the suggestions made for horizontal units equally apply for vertical units. However, due to the fact that vertical units tend to be installed in small equipment rooms or closets, a few more suggestions apply.

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

Vertical Units



Console units

With console units, the fan and compressor are located within the space, and only the unit casing design attenuates the transmission of these 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. After analysis, it may be best to eliminate the use of console units, and use horizontal or vertical type units instead.

Hot gas reheat

Hot gas reheat (HGRH) allows a WSHP to dehumidify the space when the space temperature is satisfied but the space humidity is high. High humidity can promote mold and bacteria growth, poor indoor air quality (IAQ), and cause occupant discomfort. Possible causes of excess humidity could be a byproduct of the unit having to operate under a widely varying load, an oversized unit that is short cycling, a high percentage of unconditioned outside air being introduced into the space, a high latent load in the space or any location where humidity infiltration is a problem. A properly sized WSHP unit operating in cooling mode will dehumidify the air as it cools. Once the space temperature is satisfied and cooling mode is disabled, the unit no longer dehumidifies. Operating the unit in cooling mode for the sole purpose of dehumidifying will cause the space to become cold and uncomfortable. HGRH allows the unit to continue dehumidifying the space without over cooling the space. Dehumidification with HGRH requires a control system with dehumidification capabilities, such as a thermostat with dehumidification output, a thermostat with separate humidistat, or a DDC controller with humidity sensor and dehumidification output. Once the space temperature is satisfied but the space humidity is above the desired set point, the control system sends a dehumidification command (H input) to the WSHP. The WSHP is now in dehumidification mode. In dehumidification mode, the fan, reversing valve, HGRH valve, and compressor are all enabled. The reversing valve directs cold refrigerant liquid to the indoor air coil and the HGRH valve directs warm refrigerant vapor to the HGRH coil. As the fan draws warm, humid air into the unit, the air passes through the indoor air cool where it is cooled and dehumidified, due to the cold liquid refrigerant flowing in the coil. The cooled and dehumidified air then passes through the HGRH coil where it is reheated to a neutral temperature (68 to 78°F typical), due to the warm refrigerant vapor flowing in the coil. The air exits the unit at a neutral temperature and low humidity (dry). The unit will remain in dehumidification mode until the space humidity is reduced below the set point or there is a call for space cooling, which is prioritized over dehumidification mode. The moisture removal capacity of a WSHP in a specific application will depend on multiple factors including the WSHP sizing, the nominal latent capacity, the application airflow, the application temperatures and humidity, and the application fluid flow and fluid temperature. WSHP Builder can be utilized to simulate the performance of WSHP units with HGRH under the desired application conditions and will specify the unit leaving air dry bulb temperature and wet bulb temperature, which can be used to determine the leaving air relative and absolute humidity levels. The target leaving air dry bulb temperature for unit with HGRH in dehumidification mode is between 68°F and 78°F. The target leaving air wet bulb temperature should result in a relative humidity is between 40 and 60%, based on the dry bulb temperature. If the relative humidity is too high, reduce the fan speed or increase the unit size until the desired conditions are met. Alternate methods of dehumidification with WSHPs include fan speed control and condenser water reheat. Fan speed control is one of the simplest and most efficient methods of dehumidification, but only provides dehumidification when the unit is in cooling mode. Condenser water reheat can be an effective method of dehumidification in boiler/tower applications, but is not very efficient. Condenser water reheat requires hot loop temperatures (which reduces cooling efficiency) to achieve a neutral discharge air temperature and requires an extra pump which adds to the unit power consumption. Condenser water reheat coils often have a higher airside pressure drop than HGRH coils, which results in higher fan energy consumption.

Application data (cont)

Waterside economizer

When considering providing Waterside Economizer with units, several key factors come into play to ensure optimal performance and efficiency. The geographical and climatic conditions of the installation site play a pivotal role, as Waterside Economizers are particularly effective in North/Mild climates and geothermal or hybrid systems where low loop temperatures (40 to 60°F) can be sustained during low ambient conditions. The suitability of the system is heightened in cooling-dominant buildings with a constant cooling demand, maximizing energy savings. It is crucial to weigh the benefits of cooling savings from free cooling against any potential impacts on the airside and waterside pressure drops, as well as heating impact on units. Additionally, compliance with energy codes should guide the selection of the waterside economizer to align with regulatory standards and promote sustainable practices. These considerations collectively contribute to the successful application suitable for the Waterside Economizer, unlocking significant energy savings while advancing environmental sustainability goals.

A2L leak detection considerations

All WSHP units utilizing A2L classified refrigerants must follow UL Standard 60335-2-40. This standard ensures the safe design and use of equipment with A2L refrigerants by limiting refrigerant concentration in a space in the event of a leak. The standard specifies minimum installation area, refrigerant charge limits, minimum circulation airflow and/or ventilation airflow requirements, and restricts the use of ignition sources in ductwork and spaces. Additionally, the standard may require a refrigerant leak detection system provided with the unit. For equipment using R-454B refrigerant with charge amounts of 64 oz. or less per circuit, UL 60335-2-40 does not require an installation area limit, or refrigerant leak detection system, circulation airflow, or ventilation airflow mitigation strategies. However, it is essential to evaluate ignition sources in ductwork. Depending on the application, ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems, may impose more stringent requirements than UL 60335-2-40 and therefore require the above mentioned mitigation measures.

Selection procedure

The electronic catalog (eCAT) selection tool is a web-based selection program recommend for all WSHP equipment selections. The tool provides guided configuration of WSHP units, all associated performance data, and comprehensive and professional equipment reports/submittals.

Selection inputs

The following is a list of the primary information needed to select a water source heat pump unit.

Electrical

WSHP units are available in a variety of electrical configurations. The Voltage / Phase/ Hertz requirements for the project will need to be defined for the WSHP unit.

System parameters

Entering Water Temperature (EWT)

The design entering water temperature will typically be the same for all units within the same source water loop meaning there will be a single set of design cooling and heating source water loop setpoints.

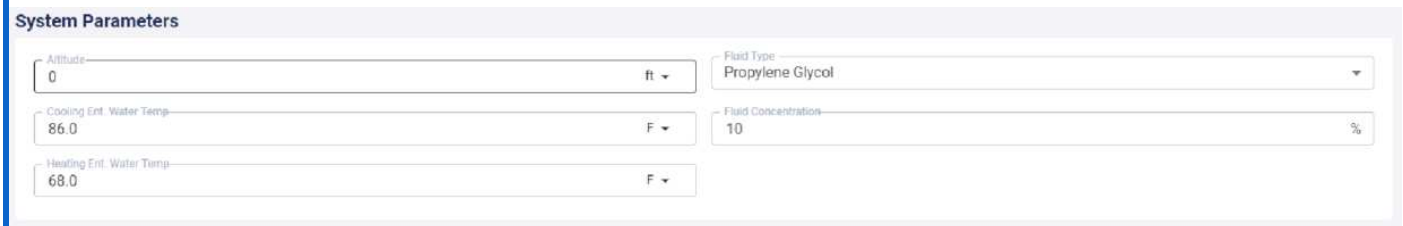
Fluid Type

The fluid type needs to be defined for the source water loop. This will typically be 100% water or a percentage of antifreeze concentration.

Altitude

When the altitude is defined the program will automatically apply any derates to the unit capacity associated with the varying air conditions.

System Parameters Screen



Design parameters

Entering Air Temperature (EAT)

The design entering air temperature for both heating and cooling is required. For cooling this will be both a wet bulb and dry bulb temperature and for heating this will be dry bulb only. If outdoor air is being mixed in with the return air of the unit, the EAT will need to be the mixed air condition.

Airflow Rate

Typically, a single airflow rate will be defined for both heating and cooling operation. In general, these units are constant air volume units meaning they are not varying the airflow as a means of capacity or supply air temperature control. Airflow rates are often selected to maintain around 400 cfm/nominal cooling ton.

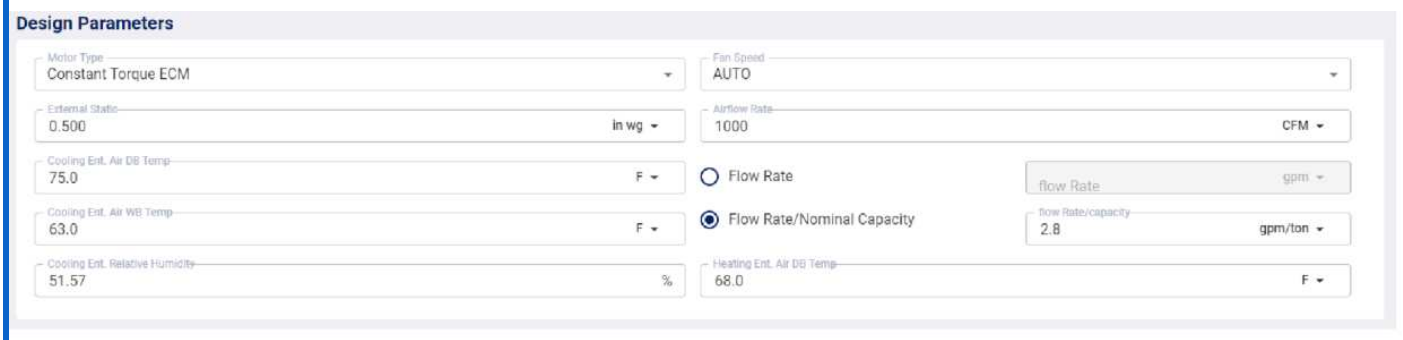
External Static Pressure

The external static pressure at the design airflow rate is required. ECAT will automatically factor in the airside pressure drop of optional airside components when evaluating fan performance.

Water Flow Rate

Water flow rate will vary among each unit in a system and is typically selected to maintain a target temperature difference or gpm/nominal ton for either cooling or heating operation.

Design Parameters Screen



Selection procedure (cont)

Capacity requirements

Heating and Cooling Loads

Although both heating and cooling loads need to be considered when selecting WSHP units, they are often chosen based on cooling capacity, given that heating output is generally higher.

Unit Configuration

WSHP units are highly configurable with a wide variety of factory installed options and air/water flow configurations. The ECAT selection program will present the available options and configurations available to the particular unit of selection.

Accessories/Warranties/Start-Up

The electronic catalog (eCAT) selection tool integrates a range of field-installed accessories to meet the specific needs of each project. The selection of accessories includes hose kits, isolation/balancing valves, strainers, electric duct heaters, sensors, and thermostats. Beyond the unit's configuration and accessories, the selection process extends to warranty choices and equipment start-up options. This ensures a comprehensive and tailored approach to WSHP systems, allowing for customization based on the unique requirements of each project.

Capacity Requirements Screen

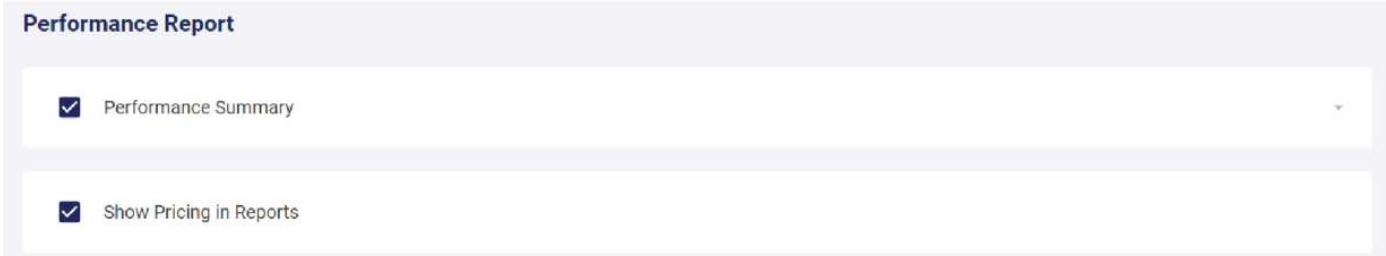


Selection outputs / Reports

Performance Report

Upon completing the selection process, the eCAT tool delivers a concise performance report. This report encompasses key unit parameters such as size, model number, and system conditions. Additionally, it includes crucial electrical data and unit performance metrics based on the specified conditions. The report goes a step further by incorporating the unit's fan curve, offering a visual representation of its airflow characteristics. This concise performance report ensures that users have a clear and easily digestible overview of the chosen WSHP unit, facilitating informed decision-making and streamlined documentation for project evaluation.

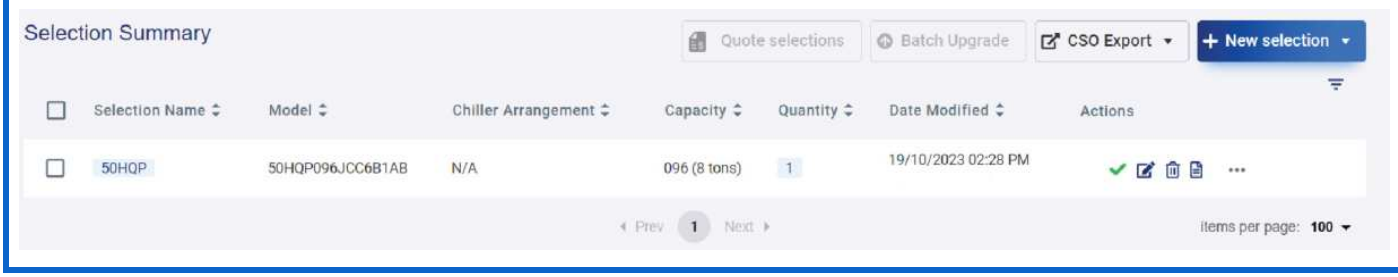
Performance Report



Submittal Report

Within the project overview section of the eCAT, users have the option to generate a tailored submittal report. This customizable report features selectable sections to include essential project documentation.

Sumittal Report



Selection procedure (cont)

Selectable Sections

- Cover Sheet — Includes Project name, Tag name and report's generated Date.
- Unit Report — Offers detailed insights into the selected water source heat pump (WSHP), including size, model number, unit size, overall dimensions, weight, electrical data, selected options and accessories and warranty information.
- Certified Drawings — Provides detailed dimensional information about the unit.
- Detailed Performance Report — Offers a comprehensive overview of the WSHP's electrical and performance data, along with its fan curve.
- Guide Specifications — Outlines key installed options and unit's details.
- Acoustical Report — Provides rated sound data of the unit.

Packaged Water Source Heat Pumps

Engineering Guide Specifications

Size Range: **1/2 to 6 Nominal Tons**

Carrier Model Number: **50WC**

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 horizontal or vertical configurations. All equipment shall be rated and certified in accordance with ANSI/AHRI/ASHRAE/ISO (American National Standard Institute/Air-Conditioning, Heating and Refrigeration Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers/ International Organization for Standardization) 13256-1. All equipment shall be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-60335-2-40 for the United States and CSA C22.2 No. 60335-2-40 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

B. Units shall be supplied completely factory built and capable of operation with an entering water temperature range from 20 to 110°F. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuation and accurately charging of system, detailed heating and cooling mode tests, and quality cross checking all operational and test conditions to pass/fail criteria.

C. Units shall be individually packaged on wooden skids 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 ANSI/AHRI/ASHRAE/ISO 13256-1 performance standard, latest edition. The applicable units shall have an AHRI/ISO label. Standard cabinet panel insulation shall meet NFPA (National Fire Protection Association) 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21 and shall meet zero level bacteria growth per ASTM (American Society for Testing and Materials) G22.

B. All units shall be factory tested in all operating modes and safety switch operation shall be verified.

C. Serial numbers will be recorded by the factory and furnished to the contractor for ease of unit warranty status.

1.03 WARRANTY:

The manufacturer shall warranty the unit's parts for a period of 12 months from start-up or 18 months from shipping (whichever occurs first). The manufacturer shall warranty the compressor (parts only) for a period of up to 5 years from shipping.

[Optional] Units shall have the option for an extended warranty.

Part 2 — Product

2.01 EQUIPMENT

A. General: Units shall be completely assembled, piped, internally wired, and fully charged at the factory.

B. Basic Construction:

1. The cabinet shall be fabricated from heavy gage galvanized steel for superior corrosion protection. All interior surfaces shall be lined with 1/2-in. thick, multi-density, coated, fiberglass insulation. Insulation must be non-combustible, non-hydroscopic and anti-fungal. Insulation must meet NFPA 90A and 90B for fire protection as well as Fire Hazard classification 25/50 (per ASTM E84 and UL 723 and CAN/ULC S102-M88), ASTM C1071, erosion requirements of UL181 and be certified to meet GREENGUARD indoor air quality standards for low emitting products. One blower access panel and two compressor compartment access panels shall be removable with supply and return air ductwork in place.
2. [Optional] Closed Cell Foam (CCF): CCF shall be installed on interior surfaces of water source heat pump and shall meet the density and compression requirements of ASTM D 1056, the water absorption requirements of ASTM D-1667 and the tensile and elongation requirements of ASTM D-412. Closed cell foam shall meet the flammability requirements of FMVSS302, UL94 and ASTM E84.
3. Units shall have the following airflow arrangements available. The contractor shall be responsible for all extra costs incurred as a result of the unavailability of these airflow arrangements.
   a. Horizontal units: Left Return/Right Discharge, Left Return/Back Discharge, Right Return/Left Discharge, Right Return/Back Discharge. Horizontal units shall have a fully field convertible discharge from back to side or side to back. The discharge conversion shall require no additional components.
   b. Vertical units: Left Return/Top Discharge, Right Return/Top Discharge
4. All units shall have a stainless-steel drain pan as standard to comply with this project's IAQ (indoor air quality) requirements. Painted steel or plastic is not acceptable. Drain pan must include a condensate overflow safety switch that will shut the unit down in an overflow event.
5. Unit shall have a floating compressor or pan consisting of a 1/2 in. thick high density elastomeric pad be-tween the compressor base plate and the unit base pan to prevent transmission of vibration to the structure.

6. Units shall have a 1-in., two-sided filter rack with 1-in. thick throwaway type fiberglass filter as standard.
7. [Optional] MERV 8 Filters: Units shall have a gasketed 2 in., four-sided filter rack with a pleated MERV 8 filter. The filter rack shall incorporate a 1-in. duct flange.
8. [Optional] MERV 13 Filters: Units shall have a gasketed 2 in. or 4 in., four-sided filter rack with a pleated MERV 13 filter. The filter rack shall incorporate a 1-in duct flange.
9. Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be brass female pipe thread (FPT) fittings and mounted flush to cabinet exterior. Connections that require a backup wrench or that extrude past the unit corner post are not acceptable. Condensate connection will be stainless steel female pipe thread fittings. Plastic is not acceptable.
10. [Optional] Selectable Water Connections: Units shall be selectable for either front left or front right water connections.
11. Hanging brackets shall be provided for horizontal units and supplied with rubber grommets for field installation.
12. [Optional] Ultra Low Leakage Construction: Unit construction shall allow for cabinet air leakage less than 2% of the nominal unit airflow rate.
13. [Optional] Compressor blanket shall be installed in the unit for additional sound attenuation.
14. [Optional] 208/230-1 phase factory-installed UL listed single stage emergency/alternative electric heater shall be available for the units. Available only on vertical units with top discharge and ECM motors.

C. Fan and Motor Assembly:

1. The fan shall be direct-drive centrifugal forward curved type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low velocity operation. The blower housing shall feature a removable inlet ring to facilitate removal and servicing of the fan motor. The fan motor shall have 3 speed settings (208-v, 230-v, 265-v, or 460-v) or 1 speed setting (575-v), permanently lubricated, PSC (permanent split capacitor) type with thermal overload protection.
2. [Optional] Units shall have an optional constant torque electronically commutated motor for premium fan efficiency. These motors shall feature 3 (unit sizes 007-012) or 5 (unit sizes 015-070) pre-programmed torque settings that can be changed in the field to match design requirements. 460 v-3 ph-60 Hz units with these motors must be able to operate without the need for a neutral wire for the motor.
3. [Optional] Units 15,000 Btu/Hr to 70,000 Btu/Hr shall have an optional Constant Airflow ECM (Electronically Commutated Motor) for premium fan efficiency and constant air delivery over a wide range of external static pressures. These motors shall be field adjustable for ± 15% of nominal design airflow. These motors shall provide feedback to the unit control box to verify motor operating mode and delivered cfm.
4. Blowers shall have inlet rings to allow removal of wheel and motor from one side without removing housing.
5. Units supplied without permanently lubricated motors must provide external oilers for easy service.
6. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule.
7. The airflow/static pressure rating of the unit shall be based on a wet coil and a standard clean filter in place.

D. Refrigerant Components:

1. Units shall use R-454B refrigerant. All units shall have a factory sealed and fully charged refrigerant circuit.
2. Hermetic Compressor:

   Hermetic rotary or scroll compressors shall be specifically designed for R-454B refrigerant and shall be internally sprung, externally isolated and with thermal overload protection.
3. Refrigerant metering shall be accomplished with a thermostatic expansion valve. Units with only capillary tubes are not acceptable.
4. The finned tube heat exchanger shall be constructed of lanced aluminum fins not exceeding sixteen fins per inch bonded to rifled copper tubes in a staggered pattern and will have a 600 psig working refrigerant pressure. The heat exchanger shall have aluminum end sheets.
5. [Optional] The finned tube heat exchanger shall have an optional protective coil coating. This corrosion protection shall consist of tin-plated copper tubing with coated aluminum fins that must pass 1,000 hours of ASTM B117 salt fog testing. Painted, dipped or e-coated heat exchangers are not acceptable.
6. Reversing Valve: Reversing valves shall be four-way solenoid activated refrigerant valves that will fail in the heating operation should the solenoid fail to function. Reversing valves that fail to the cooling operation shall not be allowed.
7. Coaxial (tube in tube) refrigerant-to-water heat exchanger. Refrigerant-to-water heat exchangers shall be of copper inner water tube and steel outer refrigerant tube design rated to withstand 600 psig working refrigerant pressure and 400 psig working water pressure. Shell and

tube style refrigerant to water heat exchangers shall be treated as pressure vessels and shall require refrigerant pressure relief valves piped to the exterior of the building. The contractor supplying the water source heat pumps with shell and tube heat exchangers shall be responsible for any additional installation costs. Brazed plate water-to-refrigerant heat exchangers shall require additional centrifugal separators added to the supply water piping at each unit. Each separator shall have an automated clean out valve piped to a waste line. The contractor supplying water source heat pumps with brazed plate heat exchangers shall be responsible for any additional costs.

8. [Optional] Cupronickel coaxial water-to-refrigerant heat exchangers shall be provided, with cupronickel inner water tube construction.
9. [Optional] Hot Gas Reheat (HGRH): Units with a capacity above 12,000 Btuh shall be equipped with optional hot gas reheat coil. On/Off HGRH shall be controlled by a thermostat with dehumidification output, humidistat, or DDC control connected to the unit H terminal and shall start the unit in the reheat mode when the humidity be above the set point once the space temperature is satisfied. Cooling or heating requirements shall take precedent over HGRH.
10. [Optional] Hot Gas Bypass: Units shall be supplied with an ETL listed hot gas bypass valve with factory supplied and installed controls to prevent air coils from frost development by taking hot gas and bypassing the water coil and expansion device and reintroducing the hot gas into the refrigeration line prior to the air coil. The hot gas bypass valve shall maintain a minimum refrigerant suction pressure to allow for a light load cooling module or a low entering air temperature cooling mode. The HGBP valve shall be factory set for opening pressure to 105 psig, this set point can be adjusted (95 to 115 psig) in the field.
11. [Optional] A2L refrigerant Leak detection shall be available for units where the refrigerant leak detection system is required by local codes.
12. Safety controls shall include both a high pressure and low-pressure switch. Temperature sensors shall not replace these safety switches.
13. Refrigerant pressure test ports shall be factory installed on high- and low-pressure refrigerant lines to facilitate field service. Unit shall be equipped with a dedicated accesses panel for the test ports not requiring removal of the primary cabinet panels to access the test ports.
14. Activation of any safety device shall prevent compressor operation via a lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable.

E. Hydronic Factory Installed Options:
   1. [Optional] Waterside Economizer: Waterside economizer shall be completely installed at the factory, with an additional condensate drain pan, motorized 3-way valve, and all internal electric controls. Waterside economizer assembly shall be rated at minimum 450 psig and UL (Underwriters Laboratories) listed for applications with the heat pump. This option is externally mounted outside the unit.
   2. [Optional] Units shall have a 2-way electrically operated shut-off (solenoid) valve with end switch mounted internally in the unit cabinet. The two-way motorized solenoid valve is rated for a 300 psig working pressure. The valve shall be factory wired to open with compressor operation.
   3. [Optional] Units shall have an optional water flow regulating valve set to 3 gallons per minute of water flow per nominal ton of refrigeration capacity.
   4. [Optional] Flow proving switch (differential pressure switch) shall energize relay and disable unit operation when no water flow to the unit.

F. Controls and Safeties:
   1. Electrical:
      a. Controls and safety devices will be factory wired and mounted within the unit. Controls shall include fan relay, compressor contactor, 24-v transformer, reversing valve coil, and Unit Protection Module (UPM). The standard transformer shall be rated for a minimum 50 va for sizes 007-042, or 75 va for sizes 048-070, or 100 va for units with TruVu™ controller. All units shall be name plated for use with time-delay fuses or HACR circuit breakers. Unit controls shall be 24-v and provide heating or cooling as required by the remote thermostat/sensor.
      b. All units shall have a factory-installed and labeled terminal strip input for field provided thermostat or DDC controller.
      c. Units shall include a factory provided wiring diagram on the inside of the control access panel.
      d. Control box shall be mounted on a hinge and capable of swinging out and full removal.
      e. All units shall have a Unit Protection Module (UPM) printed circuit board which implements following equipment safeties:
         1) anti-short cycle time delay (5-minute delay on break)
         2) random start time delay on initial power
         3) brownout / surge / power interruption protection

4) 120 second low pressure switch bypass timer
5) high refrigerant pressure shutdown
6) low refrigerant pressure shutdown
7) water coil freeze protection shutdown
8) air coil freeze protection shutdown
9) high condensate level shutdown
10) 24 vac alarm output for remote fault indication.
11) refrigerant leak shutdown (presented with the unit only if unit is ordered with A2L leak detection option)
12) Intelligent alarm reset

The UPM shall automatically reset after a safety shutdown. Restart the unit if the cause of the shutdown no longer exists (except for low temperature and high condensate level shutdowns). Should a fault re-occur within 60 minutes after reset, then a "hard" lockout will occur. A light-emitting diode (LED) shall annunciate the following alarms: brownout, high refrigerant pressure, low refrigerant pressure, low water temperature and a high level of condensate in the drain pan, refrigerant leak fault. The LED will display each fault condition as soon as the fault occurs. If a hard lockout occurs, then the fault LED will display the type of fault until the unit is reset.

The UPM shall feature the following field configurable adjustments:

a) lock out reset on thermostat interruption or power reset
b) two or four restart attempts before a hard lockout
c) test mode (reduces all time delays to 5 seconds for diagnostic work)
d) air/water coil freeze limit trip.

f. [Optional] Units shall have all the features above (UPM) and additionally TruVu™ DDC controller shall have an advanced controls logic and include following features:

1) Three-speed fan control. Controller shall automatically, based upon space temperature input, operate the fan at the lowest of 3 selectable speeds to achieve space temperature set point (exception units with PSC motor, or 575-v units):

a) two-position OA (outdoor air) damper
b) modulating OA damper with DCV (demand controlled ventilation)
c) hot gas reheat solenoid valve
d) two-position water economizer control

2) Modulating water economizer control
3) Two stage electric auxiliary heat control
4) Scheduling
5) Adaptive optimal start
6) Equipment performance monitoring
7) Alarm status

TruVu™ controller must be capable of communicating over BACnet®[1] IP, supporting direct connection or daisy chain topologies using BACnet®/IP for seamless integration into building automation systems, and shall have the ability to be viewed in the TruVu™ Equipment Touch (ET), or field assistant user interface.

g. [Optional] A larger transformer rated for at least 75 va shall be available for all unit sizes and have a push button reset circuit breaker on the secondary power. Units with factory installed HGRH or WSE shall be provided with minimum 75 va transformer.
h. [Optional] A larger transformer rated for at least 100 va shall be available for units with factory-installed TruVu™ controller and have a push button reset circuit breaker on the secondary power.
i. [Optional] Non-fused electrical disconnect shall be installed on the unit.
j. [Optional] Units shall have a short circuit current rating (SCCR) of no less than 65 kA.
k. [Optional] Boilerless control shall activate an electric heater and disable compressor when water temperature drop below set point.
l. [Optional] Energy management switch to enable remote operation of WSHP (water source heat pump).
m. [Optional] Pump-valve relay to enable a pump/valve operation when calling for compressor operation.
n. [Optional] Compressor status relay shall be provided to monitor a status of the compressor via normally open set of dry contact.

G. Accessories:

1. Hydronic accessories:

a. Hose Kits

All units shall be connected to main water supply and return headers with hoses. The hoses shall be 2 or 3 feet long, braided stainless steel rated to 400 psig at 265°F. Hoses may contain optional ball valves with P/T ports, Y strainers with blow down valves and/or auto flow regulators as specified in the schedule.

b. Two-position motorized isolation valve (2-way solenoid valve) with end switch is available for field installation. The two-way motorized

1. Third-party trademarks and logos are the property of their respective owners.

solenoid valve is rated for a 125 psig working pressure. The valve shall be field wired to open with compressor operation.

c. Ball Valves (brass body)

Valves shall be available for shutoff and balancing water flow. Available with memory, memory stop, and pressure temperature ports (600 WOG at 325°F).

d. Y Strainers (Bronze Body)

Strainers are "Y" type configuration with a brass cap. Strainer screen shall be made of stainless steel (600 WOG at 325°F).

2. Controls accessories:

a. Carrier commercial thermostat controls are available as follows:

1) Edge® Pro 7-day programmable thermostat offers 2-stage heat, 2-stage cool, remote contact input, remote sensor capability, pre-occupancy purge, soft start, manual/auto changeover, 4 settings per day, 24 vac, backlit LCD, keypad lockout, no batteries required, 5-minute compressor protection, never lost memory, 3 security levels, and temperature display in degrees F or C.

2) Comfort Pro Programmable Thermostat, 2-stage Heat /2-stage Cool G/E, plus 1-stage auxiliary or emergency heat hp and WSHP, or 2- stage cool/heat only, Touch n Go™ prog. (OCC/ UNOCC/ LIMIT), Passcode protection, remote sensor capability with override, random start, Manual/Auto-Changeover, Outdoor/supply/return temp, hospitality mode, option battery powered.

3) Carrier Connect™ Wi-Fi 7-day programmable/non-prog; 4.3 in. touch screen, web enabled (portal), smartphone app, 1-2 stage heat/1-3 stage cool, G/E, hp (with 2-stage aux heat), remote sensor capability, manual/auto-changeover, humidify/dehumidify/Humidi-MiZer®.

4) Non-Branded Wi-Fi 7-day programmable/ non-prog; 4.3 in. touch screen, web enabled (portal), smartphone app, 1-2 stage heat/1-3 stage cool, G/E, hp (with up to 2-stage aux heat), remote sensor capability, manual/auto-changeover, humidify/dehumidify/Humidi-MiZer®.

5) ComfortVu BACnet® Thermostat, 24 vac Thermostat, offers a large backlit LCD display and intuitive push-button controls for easy operation, BACnet® MS/TP port, 2 universal inputs, 2 universal outputs, and 4 relay outputs, it allows control over up to 3 stages of heating and 2 stages of cooling, along with up to 3 fan speeds.

b. ZS sensors for TruVu™ DDC (direct digital controls) control option. Sensors are available as follows, and all sensors below offer monitoring of space temperature only, or space temperature and CO_2, or space temperature and humidity, or space temperature and CO_2 and humidity.

1) ZS Standard sensor with a communication port.

2) ZS Plus sensor with communication port, occupancy status indicator, local occupancy override and set point adjustment.

3) ZS Pro sensor with communication port, occupancy status indicator, local occupancy override, set point adjustment, LCD (liquid crystal diode) display, alarm indicator and fan speed control.

4) ZS Pro-F sensor with communication port, occupancy status indicator, local occupancy override, set point adjustment, LCD display, alarm indicator, fan speed control, cooling/heating/fan only mode control and F to C conversion.

5) TruVu™ Equipment Touch (ET) for unit start-up and commissioning shall be available in 7 and 10 in. touch screen sizes for panel or wall mounting. All point objects will have the ability to be viewed in the TruVu™ ET user interface.

3. Electric Duct Heaters:

a. Duct heater shall be slip-in type and shall be UL approved for zero clearance to combustible surfaces. The heater shall bear a UL/CSA label. Control panel and element housing shall be constructed of heavy gage galvanized steel. All heating elements shall be made of nickel/ chromium resistance wire with ends terminated by means of staking and heliarc welding to machine screws. Heating element support structure shall consist of galvanized steel wire formed and constructed to support ceramic bushings through which the heating element passes. Control cabinet shall be constructed of heavy gage galvanized steel with multiple knockouts for field wiring. Control cabinet shall have a solid cover also of heavy gage galvanized steel and held in place with hinges and tool-release latches.

b. Duct heater shall be supplied with primary over temperature protection by built in disc type automatic reset thermal cutouts and secondary over temperature protection by built in disc type manually resettable thermal cutouts. These devices must function independently of one another and are not acceptable if series connected in the control circuit wiring. A disconnecting magnetic control circuit is required. All duct heaters

will require either a fan interlock circuit or an airflow switch.

c. Over-current protection by means of factory-installed fusing within the control cabinet shall be provided for heaters rated at more than 48 amps. Heating elements shall be subdivided and fused accordingly.

d. All wiring, component sizing, component spacing and protective devices within the control cabinet shall be factory installed and comply with UL standards. All heaters shall function properly with a 60 Hz power supply.

e. A wiring diagram depicting layout and connections of electrical components within the control cabinet shall be affixed to the inside of the control cabinet cover.

f. A rating plate label shall be affixed to the exterior of the control cabinet cover which states model number, serial number, volts, amps, phase, frequency, control volts, volt-amps and minimum airflow requirements.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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