



## Product Data

# Aquazone™ Indoor Packaged Water Source Heat Pump Units

2 to 6 Nominal Tons



50WT Vertical and Horizontal Two-Stage High Efficiency Water Source Heat Pump Units with Puron Advance™ Refrigerant (R-454B)

## 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 50WT water source heat pumps utilize Puron Advance™ low global warming potential (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:

- 2-stage high efficiency units with cost optimized design in both 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

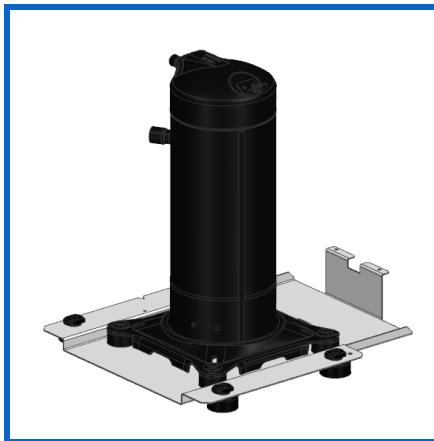
Cabinets are of heavy gauge galvanized sheet metal cabinet construction designed with large access panels for easy maintenance and service. Cabinet interior surfaces are lined with 1/2 in. thick, 1-1/2 lb fiberglass insulation or closed cell foam insulation. Sheet metal surfaces are treated for maximum 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

The 50WT Aquazone units include a scroll compressor for all unit sizes. 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 50WT 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 50WT units preventing vibration and noise transmission from the compressor to the unit structure, resulting in exceptionally quiet operation.



## Refrigerant circuit

All units contain a 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

All 50WT 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.



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# 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. Units are offered with a constant airflow ECM motor, allowing the user to select the correct speed to deliver the specified airflow and the design system static pressure.

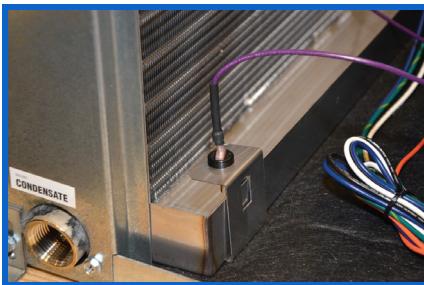
To minimize noise and vibration transmission to the unit and airstream, the motors are mounted on the fan housing using rubber grommets. The standard configuration includes a 1-inch supply air duct flange connection, facilitating easy duct installation on the unit.

## Stainless steel drain pan with condensate switch

Protection against corrosion is a feature in the 50WT 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

The 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.

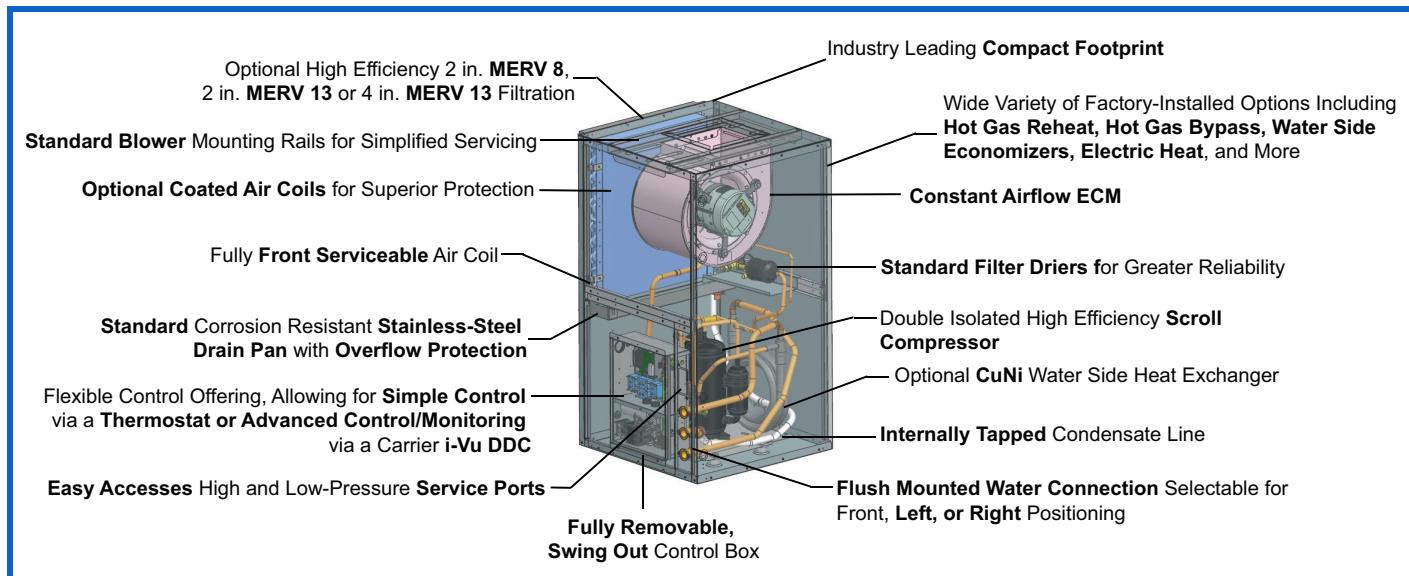
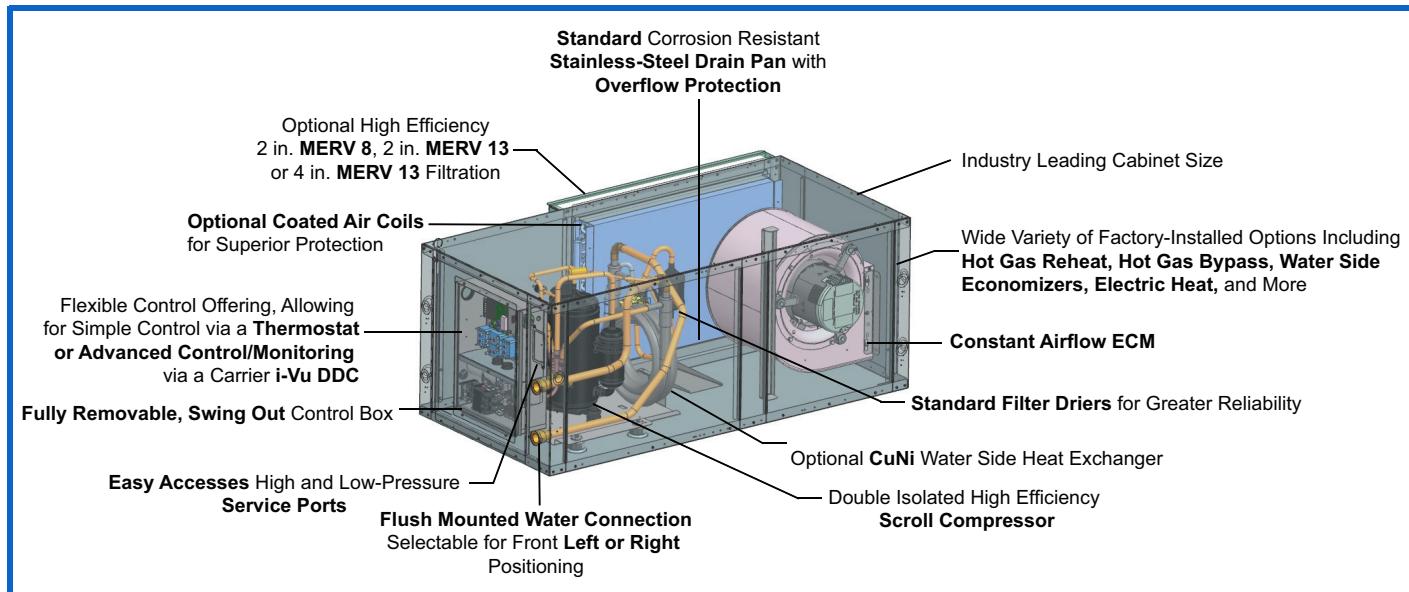
## Hanging brackets

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 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, Carrier provides sound attenuation packages tailored for applications demanding exceptionally low noise levels. These options encompass a closed-cell foam insulation, compressor blanket or extra quiet package. 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

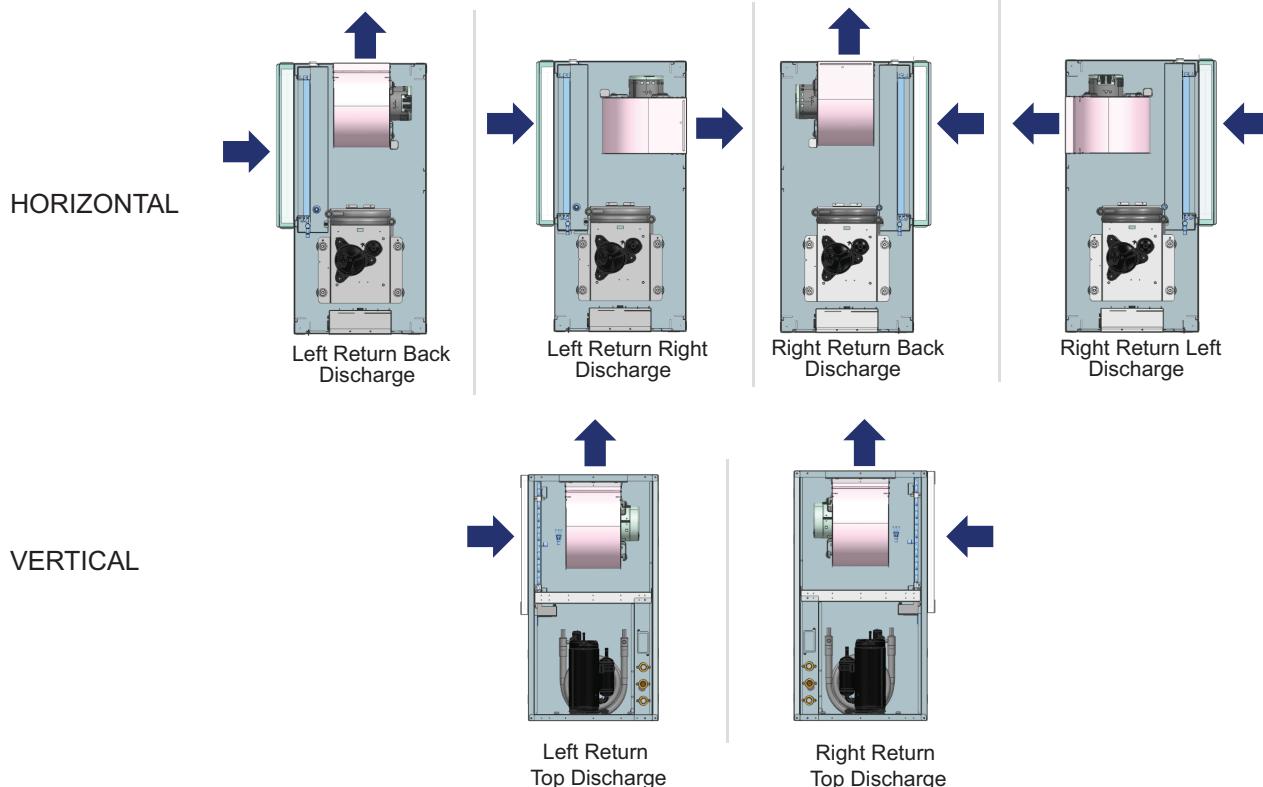
The Aquazone WSHP units are constructed to provide easy maintenance. All units allow easy access to the compressor section from 2 sides with large removable panels. Additional panels allow access to the blower and control box sections. The blower housing assembly can be serviced without disconnecting 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 (female pipe thread) 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 end discharge. Vertical units are available in left or right return with top discharge.

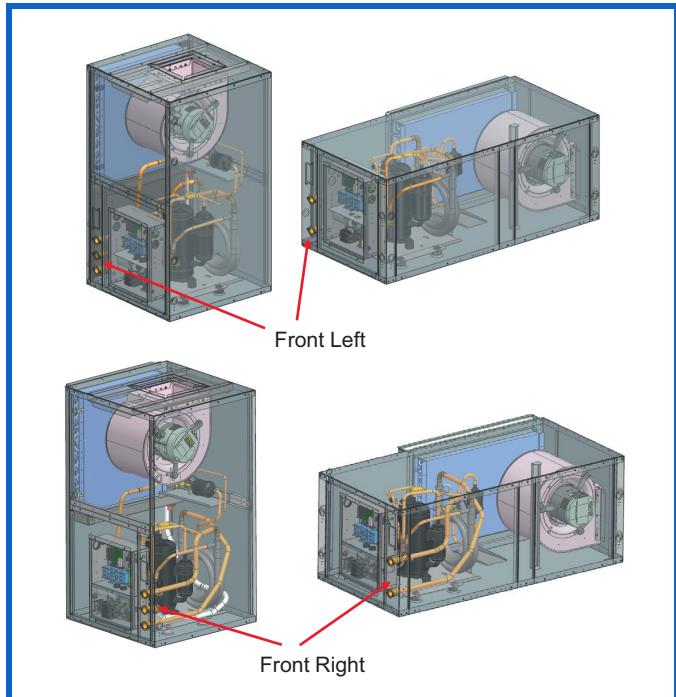


# Features/Benefits (cont)



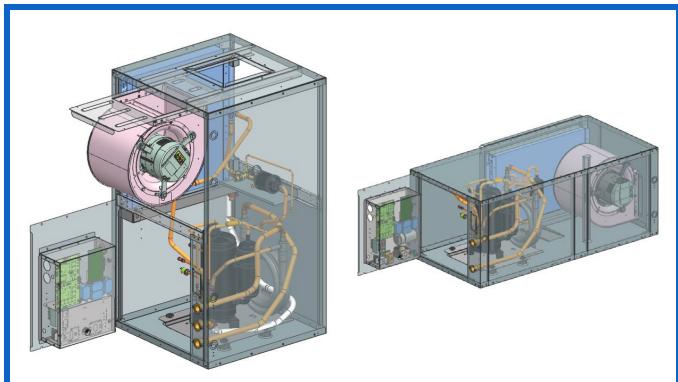
## Water connections

All units are offered with choice of water connection side for flexibility. All water connections are heavy duty bronze PFT 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.



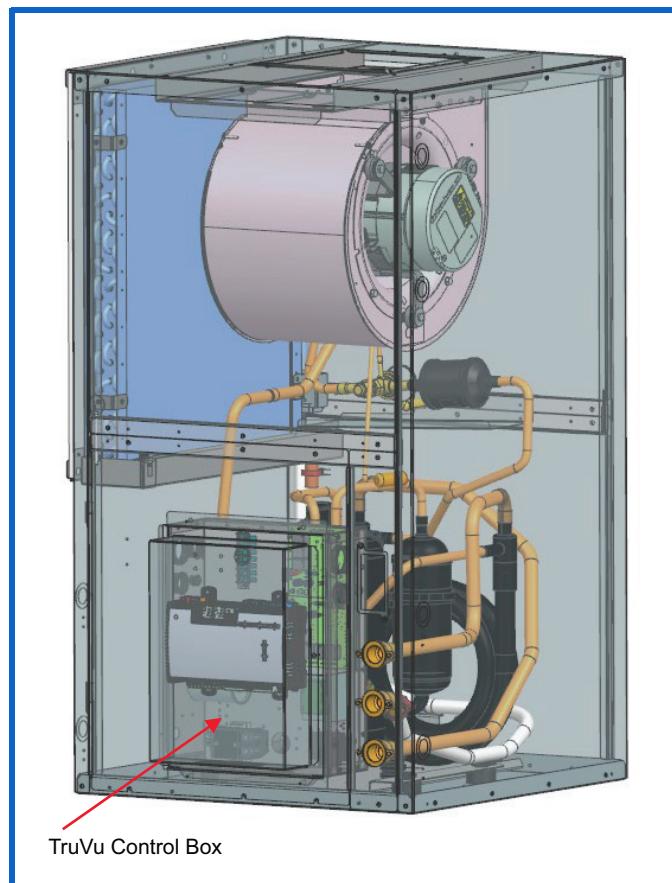
## Swing out control box and slide out motor

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.



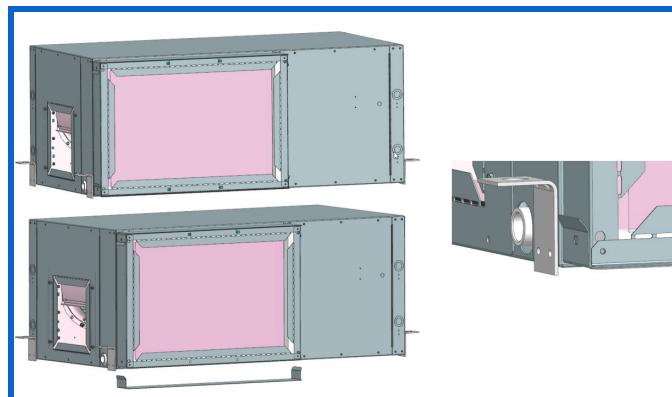
## TruVu™ DDC control box

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 007-036) 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	T	A	0	2	4	N	B	A	3	A	A	-	A

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

Tier (3-4)  
WT = 2-Stage Size 24-70

## 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)

024 = 24 (2)  
036 = 36 (3)  
048 = 48 (4)  
060 = 60 (5)  
070 = 70 (6)

## Airflow Configuration (9)

ORIENTATION	RETURN	DISCHARGE	MOTOR
			CA ECM
Horizontal	Right	Back	N
	Right	Left	P
	Left	Back	Q
	Left	Right	R
Vertical	Right	Top	S
	Left	Top	T

## Controls — Option/Transformer (10)

B = UPM/75VA  
D = UPM + BE/75VA<sup>a</sup>  
E = UPM + TV DDC/100VA  
H = UPM + SR/75VA  
K = UPM + PR/75VA  
M = UPM + ER/75VA  
P = UPM + BE + PR/75VA<sup>a</sup>  
R = UPM + BE + SR/75VA<sup>a</sup>  
T = UPM + BE + SR + PR/75VA<sup>a</sup>  
V = UPM + SR + PR/75VA  
X = UPM + EMS + SR/75VA  
Z = UPM + EMS + PR/75VA

## LEGEND

BE	Boilerless Electric Heat	MHGRH	Modulating Hot Gas Reheat
CA ECM	Constant Airflow ECM	PR	Pump Relay
CB	Compressor Blanket	REG	Auto Flow Regulator
CCF	Closed Cell Foam Insulation	SCCR	Short Circuit Current Rating
CO	Cooling Only	SR	Compressor Status Relay
DP	Differential Pressure Flow Switch	STD	Standard
ECM	Electronically Commutated Motor	TV DDC	TruVu Direct Digital Controller
EMS	Energy Management Switch	ULL	Ultra Low Leak Cabinet
EQP	Extra Quiet Package	UPM	Unit Protection Module
ER	EMS Relay	VLV	2-Way Solenoid Valve
HGBP	Hot Gas Bypass	WSE	Water Side Economizer
HGRH	Hot Gas Reheat	WSHP	Water Source Heat Pump
HWG	Hot Water Generator		
LD	Leak Detection		

## NOTE(S):

- Option card board is provided with selection of HGRH/WSE/BE options and without TruVu DDC.
- ULL represents < 2% air leakage option.

## Design Revision (16)

A = Initial Release

## Miscellaneous Options (15)

— = None  
A = Waterside Economizer (WSE)<sup>a</sup>  
B = A2L Leak Detection (LD)  
C = WSE + LD<sup>a</sup>

## 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)  
C = Extra Quiet Package (EQP)  
D = Ultra-Low-Leak Cabinet (ULL), CCF + 2 in. MERV 8<sup>b</sup>  
E = EQP, ULL, 2 in. MERV 8<sup>b</sup>  
F = 2 in. MERV 8 Filter, Std Insulation  
G = 2 in. MERV 8 Filter, CCF  
H = 2 in. MERV 13 Filter, Std Insulation  
J = 2 in. MERV 13 Filter, CCF  
K = 4 in. MERV 13 Filter, Std Insulation  
L = 4 in. MERV 13 Filter, CCF  
M = ULL, CCF + 2 in. MERV 13<sup>b</sup>  
N = EQP, ULL, 2 in. MERV 13<sup>b</sup>  
P = ULL, CCF + 4 in. MERV 13<sup>b</sup>  
Q = EQP, ULL, 4 in. MERV 13<sup>b</sup>  
R = EQP, 2 in. MERV 8  
S = EQP, 2 in. MERV 13  
T = EQP, 4 in. MERV 13  
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 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, CCF + CB + 2 in. MERV 8<sup>b</sup>  
4 = ULL, CCF + CB + 2 in. MERV 13<sup>b</sup>  
5 = ULL, CCF + CB + 4 in. MERV 13<sup>b</sup>

## Electrical Options (12)

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 with Disc.  
D = 208-230/3/60 with Disc.  
E = 460/3/60 with Disc.

G = 208-230/1/60, 65 kA SCCR  
H = 208-230/3/60, 65 kA SCCR  
J = 265/1/60, 65 kA SCCR  
N = 208-230/1/60, 15 kW E-heat (dual-point power)  
P = 208-230/1/60, 20 kW E-heat (dual-point power)  
Q = 208-230/1/60, 5 kW E-heat (dual-point power)  
S = 208-230/1/60, 10 kW E-heat (dual-point power)

## Refrigerant Circuit Options (11)

OPTION	NON-COATED AIR COIL	COATED AIR COIL
None	A	B
Hot Gas Reheat (HGRH) <sup>a</sup>	C	D
Cooling Only (CO)	E	F
Hot Gas Bypass (HGBP)	G	H
HGRH + HGBP <sup>a</sup>	N	P
Hot Water Generator (HWG)	S	T
Modulating Hot Gas Reheat (MHGRH)	1	2

# AHRI ratings and capacities



## 50WT Series Water Source Heat Pump Ratings<sup>a,b,c,d,e,f,g</sup>

50WT UNIT SIZE	WATER LOOP HEAT PUMP				GROUND WATER HEAT PUMP				FL COOLING 77°F		FL HEATING 32°F		CFM	GPM		
	Cooling 86°F		Heating 68°F		Cooling 59°F		Heating 50°F		PL Cooling 68°F		PL Heating 41°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				
024-VT Full Load	25,000	16.50	28,500	5.60	27,000	24.00	23,000	4.80	25,500	18.50	18,000	4.00	800	6.0		
024-VT Part Load	18,000	18.50	20,000	6.20	20,000	31.50	16,000	5.00	19,500	27.00	14,000	4.40	650	6.0		
024-HZ Full Load	25,000	16.50	28,500	5.60	27,000	24.00	23,000	4.80	25,500	18.50	18,000	4.00	950	6.5		
024-HZ Part Load	18,000	18.50	20,000	6.20	20,000	31.50	16,000	5.00	19,500	27.00	14,000	4.40	800	6.5		
036 Full Load	37,500	16.00	44,000	5.60	40,500	24.00	37,000	5.00	39,000	18.50	28,000	4.00	1,300	10.0		
036 Part Load	27,000	18.00	31,500	6.20	29,000	30.00	26,000	5.20	29,000	25.50	22,000	4.40	975	10.0		
048 Full Load	49,500	16.00	58,000	5.60	53,500	23.00	48,000	5.00	51,000	18.00	38,000	4.00	1,700	12.0		
048 Part Load	36,000	18.00	41,000	6.20	39,000	29.50	33,500	5.20	38,000	25.00	29,500	4.40	1,300	12.0		
060 Full Load	61,500	16.00	75,000	5.60	67,500	23.50	62,000	5.00	63,000	18.00	48,000	4.00	2,000	15.0		
060 Part Load	45,000	18.50	53,000	6.20	49,500	31.00	43,000	5.20	48,500	26.00	37,500	4.40	1,600	15.0		
070-VT Full Load	68,000	15.00	86,000	5.10	75,000	22.00	71,000	4.50	70,000	17.00	55,000	3.80	2,150	18.0		
070-VT Part Load	51,000	16.50	64,000	5.60	57,000	27.00	52,000	4.70	56,000	23.00	45,000	4.20	1,800	18.0		
070-HZ Full Load	68,000	15.00	86,000	5.10	75,000	22.00	71,000	4.50	70,000	17.00	55,000	3.80	2,100	18.0		
070-HZ Part Load	51,000	16.50	64,000	5.60	57,000	27.00	52,000	4.70	56,000	23.00	45,000	4.20	1,700	18.0		

### NOTE(S):

- Ratings based upon AHRI/ANSI 13256-1 with 1 in. disposable MERV 5 filter and ECM motor.
- ECM motor option = Constant Airflow (CA).
- These ratings are for vertical and horizontal airflow.
- For specific configuration ratings, refer to WSHP Builder in the Carrier NG eCAT.
- Certified in accordance with ANSI/AHRI/ASHRAE/ISO 13256-1.
- Cooling rated capacities based on EAT = 80.6°F/66.2°F (db/wb).
- 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
ECM	— Electronically Commutated Motor
EER	— Energy Efficiency Ratio
FL	— Full Load
Gpm	— Gallons per Minute
Hz	— Horizontal
PL	— Part Load
VT	— Vertical

# Physical data



## Physical Data — 50WT (024-070) Units

UNIT SIZE	024	036	048	060	070
Compressor Type (Qty 1)	Scroll	Scroll	Scroll	Scroll	Scroll
Max Water Working Pressure (psig) <sup>a</sup>	400	400	400	400	400
ECM FAN MOTOR and BLOWER					
Fan Motor Type	Constant Airflow	Constant Airflow	Constant Airflow	Constant Airflow	Constant Airflow
Fan Motor (hp)	VT: 0.33 HZ: 0.50	0.75	0.75	1.00	1.00
Blower Wheel Size (Dia. x W) (in.)	10 x 8	11 x 9	11 x 9	VT: 12 x 12 HZ: 11 x 9	VT: 12 x 12 HZ: 11 x 9
WATER CONNECTION SIZE (INCLUDES ECONOMIZER OPTION)					
FPT (in.)	0.75	1.00	1.00	1.00	1.00
Coaxial Coil Volume (gal)	0.28	0.46	0.46	1.09	1.09
VERTICAL CABINET					
Refrigeration Charge (oz)	34	45	57	89	89
Air Coil Dimensions (H x W) (in.)	24 x 16.5	28 x 21	36 x 27	42 x 27	42 x 27
Standard Filter - 1" Throwaway (L x H)	19 x 27	24 x 30	18 x 30	24 x 30 and 18 x 30	24 x 30 and 18 x 30
Optional Filter - 2" MERV 8 or 13 (L x H)	19 x 27	24 x 30	18 x 30	24 x 30 and 18 x 30	24 x 30 and 18 x 30
Optional Filter - 4" MERV 13 (L x H)	19 x 27	24 x 30	18 x 30	24 x 30 and 18 x 30	24 x 30 and 18 x 30
Weight - Operating (lb)	219	255	324	397	401
Weight - Shipping (lb)	243	280	350	424	428
HORIZONTAL CABINET					
Refrigeration Charge (oz)	31	43	52	91	91
Air Coil Dimensions (H x W) (in.)	16 x 27.5	18 x 31	18 x 42	20 x 50	20 x 50
Standard Filter - 1" Throwaway (L x H)	18 x 30	20 x 34	20 x 20 and 20 x 24	20 x 25 (Qty 2)	20 x 25 (Qty 2)
Optional Filter - 2" MERV 8 or 13 (L x H)	18 x 30	20 x 34	20 x 20 and 20 x 24	20 x 25 (Qty 2)	20 x 25 (Qty 2)
Optional Filter - 4" MERV 13 (L x H)	18 x 30	20 x 34	20 x 20 and 20 x 24	20 x 25 (Qty 2)	20 x 25 (Qty 2)
Weight - Operating (lb)	213	263	319	366	414
Weight - Shipping (lb)	237	288	345	393	441

### NOTE(S):

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

### LEGEND

FPT — Female Pipe Thread

# Options and accessories



ITEM	FACTORY-INSTALLED OPTION	FIELD-INSTALLED ACCESSORY
Coated Air Coil	X	
Cupronickel Water Heat Exchanger	X	
Constant Airflow ECM (CA ECM)	X	
Hot Gas Reheat (HGRH)	X	
Modulating Hot Gas Reheat (MHGRH)	X	
Hot Gas Bypass (HGBP)	X	
Water Side Economizer (WSE)	X	
Cooling Only (CO)	X	
Hot Water Generator (HWG)	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 to 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.

### Constant airflow ECM

Constant airflow ECMs (CA ECM) are available as a standard option for all unit sizes. The option 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).



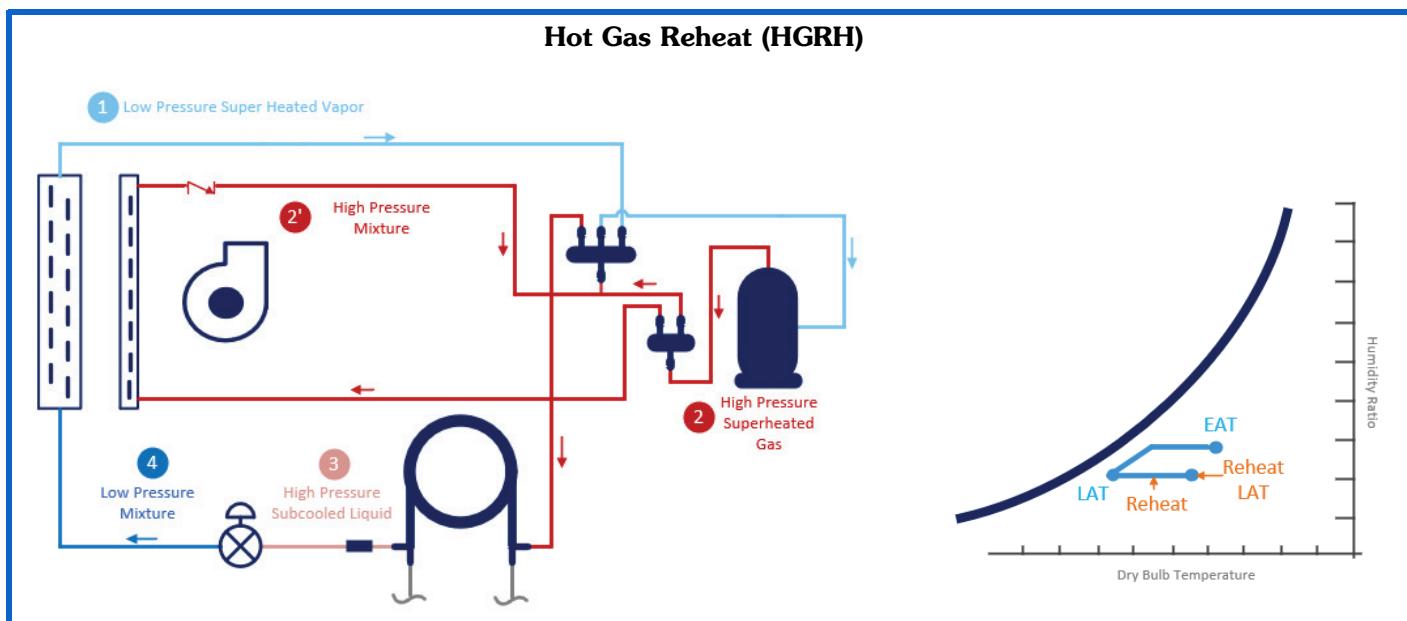
# Options and accessories (cont)



## 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 an HGRH coil, installed behind the indoor air coil, an 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 it is 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.



# Options and accessories (cont)



## Modulating hot gas reheat (MHGRH)

Optional modulating HGRH is offered for precise humidity control.

The MHGRH package is factory installed and includes an HGRH coil (installed behind the indoor air coil), a modulating HGRH control valve, and additional refrigerant piping.

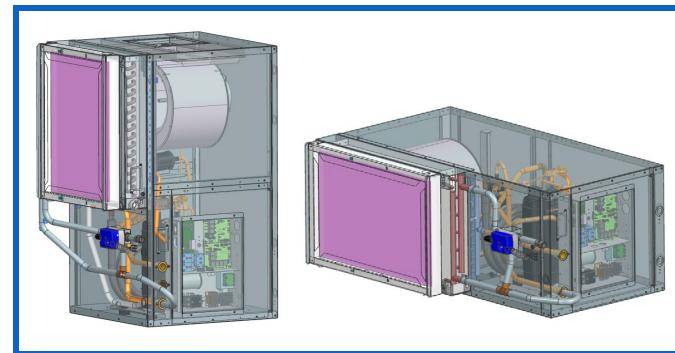
This option is offered with TruVu™ DDC controller only and it requires space relative humidity sensor input via ZS sensor, or network input point System Space RH.

## 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).

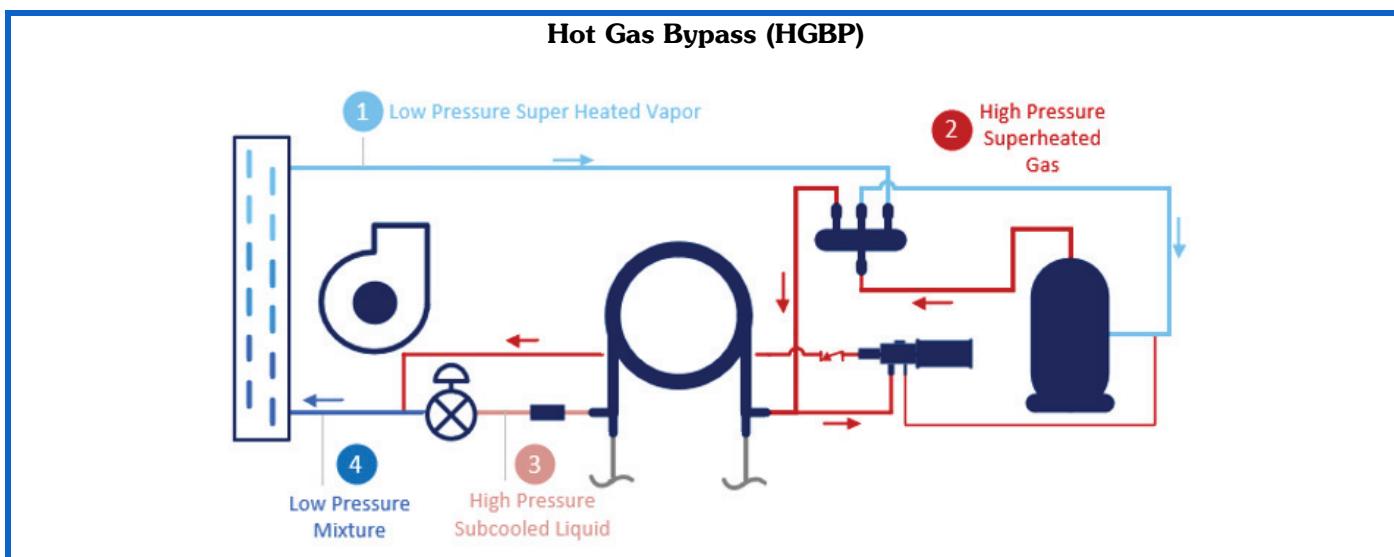
See NG eCAT unit report for WSE performance.

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



## 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.

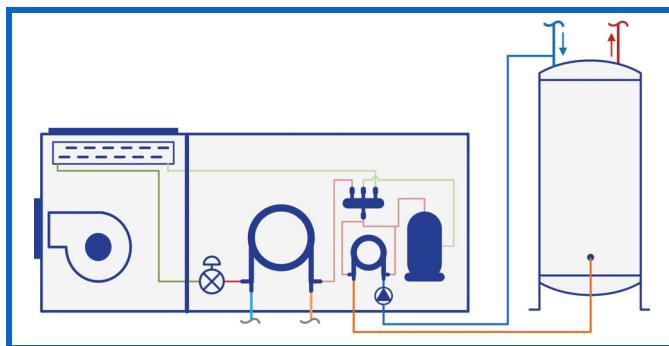


# Options and accessories (cont)



## Hot water generator (heat recovery package/desuperheater)

The hot water generator (HWG) coil is available to generate hot water in the range of 110 to 120°F. Coil is installed off of the discharge line from the compressor to provide heat for a domestic water supply. The coil is a vented, double wall coil, and also includes a circulating pump, high water temperature limit switch (set at 120°F), discharge gas temperature limit switch and an ON/OFF with built in circuit breaker. The HWG is not factory wired to the unit controller.



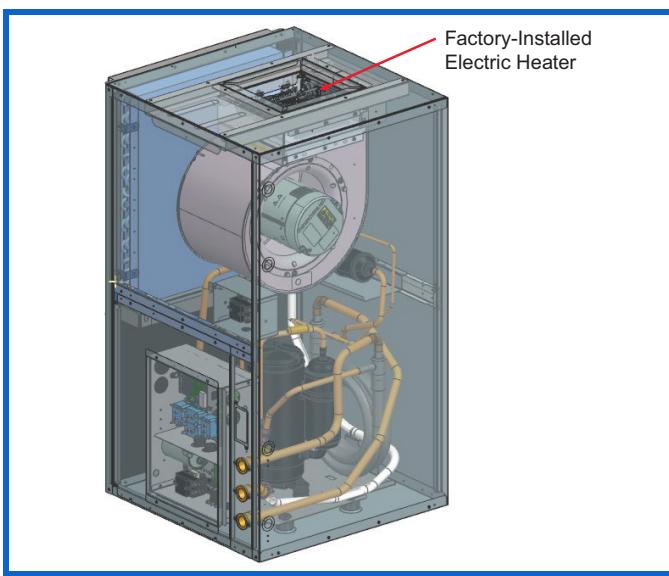
## Cooling only

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

An electric heater is a factory-installed option on vertical units with top discharge and horizontal with back discharge. Electric heaters are available in 5, 10, 15, 20 kW on units with 208/230v-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 furnished with the factory-installed electric heater will be configured with a dual-point power connection. Specifically, one power leg will supply power to both the fan motor and the electric heater, while the second power leg will be dedicated to the compressor.



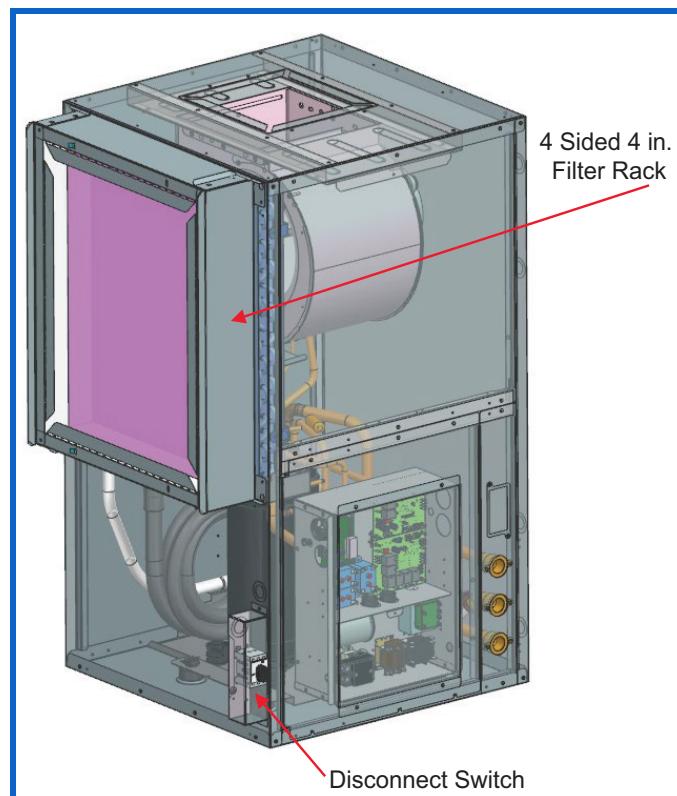
## Disconnect switch

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 options

### Air Filters

Every unit is equipped with a default 2 in. 2-sided filter rack and 2 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

The optional 1/2 in. thick closed cell foam (CCF) insulation helps aid indoor air quality (IAQ) and further attenuates 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.



## Extra quiet package

Sound attenuation packages are available for applications that require especially low noise levels. This option includes 1 in. thick fiberglass insulation to help aid indoor air quality (IAQ) and to further attenuate low frequency noise from the compressor compartment. Compressor blanket is installed on all units with scroll compressors.

## Ultra low leak cabinet

Ultra low leak (ULL) cabinet 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. The 50WT standard units sizes from 060 to 070 are equipped with factory-installed A2L leak detection system. Unit sizes 007-048 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)

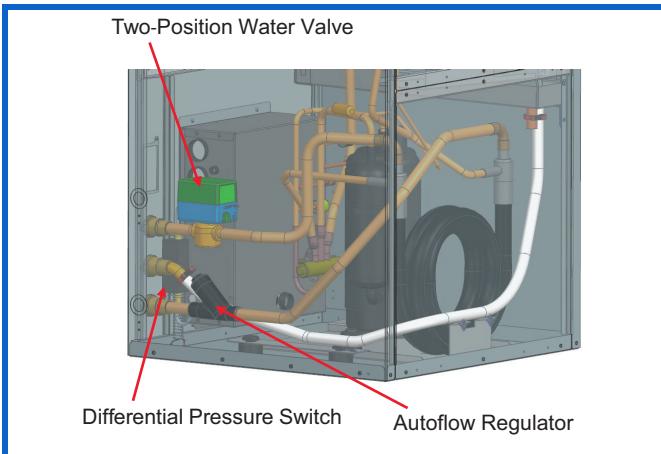
Optional factory installed 2-way solenoid valve is available on all unit sizes and it is a great energy savings option. The valve opens to allow 100% fluid flow through the coaxial heat exchanger only when there is a call for cooling or heating. Closing off fluid flow to the unit when there is no call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

### Autoflow regulator

Factory installed pressure independent autoflow regulator ensures a constant water flow rate to the unit. It comes with an internal cartridge which is set to fixed 3 gpm/ton flowrate. 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.

## Differential pressure switch / Flow proving switch

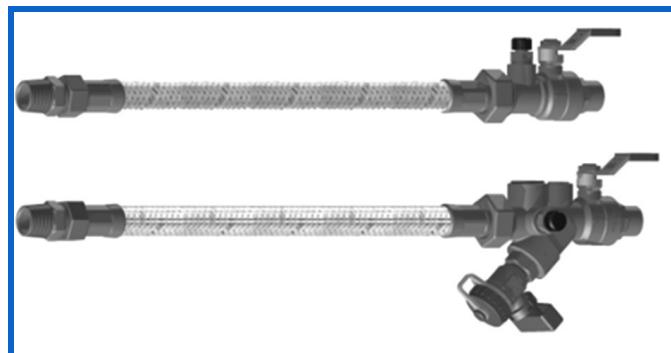
The differential pressure switch, also known as a flow proving switch, is a crucial device for verifying fluid flow in systems. By detecting pressure differences, it ensures accurate flow confirmation, enhancing overall system performance and efficiency across a range of applications.



## Field-installed accessories

### 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.



### 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. Field-installed autoflow 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.

# Options and accessories (cont)



## 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.



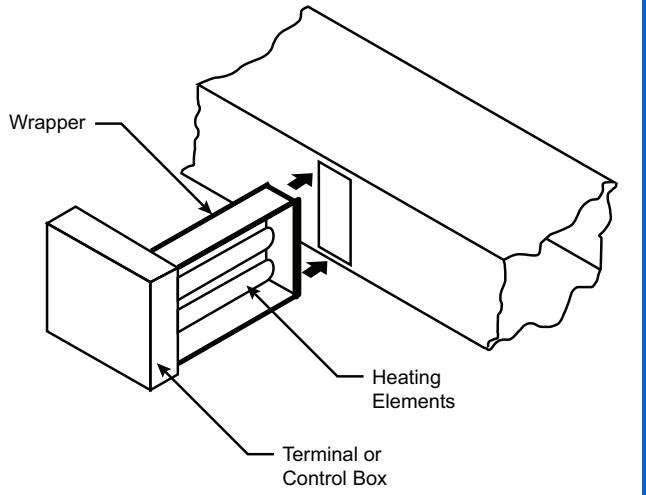
## Y-strainers

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.

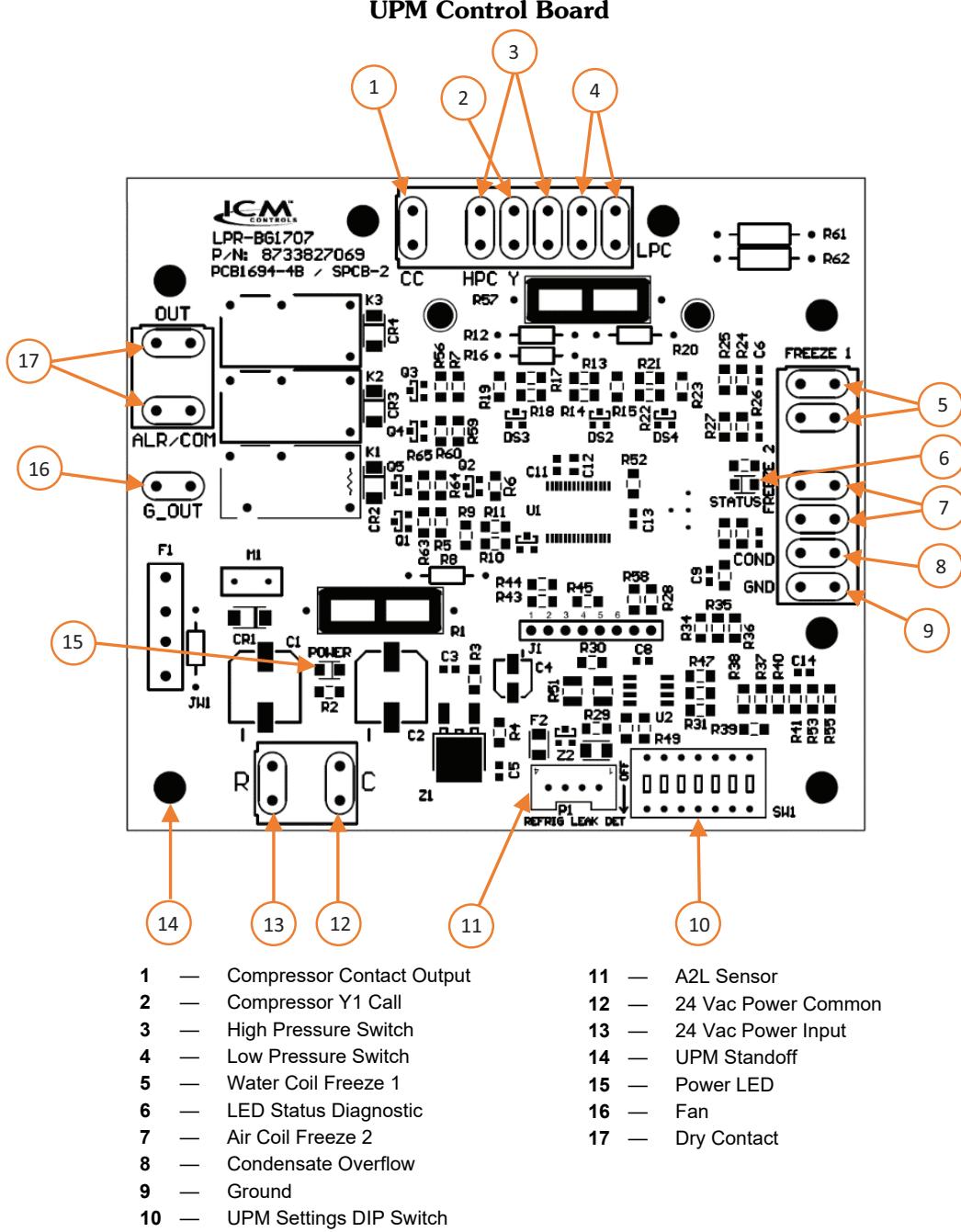
Features of the unit protection module include:

- **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 120 seconds upon the LPS (lower-pressure switch) 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.
- **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.

## Options and accessories (cont)



- 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 an 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.



# Options and accessories (cont)



## Thermostat control

The Carrier 50WT series water source heat pumps utilize 24-v non-communicating controls and are suitable for control via most 24-v non-communicating single stage for unit sizes 007-018 and two stages for unit sizes 024-070 heat

pump thermostats. Carrier has several 24-v non-communicating thermostats that are well suited for pairing with water source heat pumps. See Thermostats table for a summary of the available carrier thermostats and the general functionality/capability of each.

## Thermostats

<b>TYPE</b>	<b>NON-COMMUNICATING THERMOSTATS</b>		<b>BACNET® THERMOSTAT WITH WI-FI</b>					
<b>Feature</b>	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	ComfortVU BACnet Plus Thermostat
	33CSCPACHP-01	33CS2PP2S-03/ 33CS2PPRH-03	33CONNECTSTAT43FX	33CONNECTSTAT43	33WIFISTAT43FX	33WIFISTAT43	TB-24-C/ TB24-HM-C	TBPL-24-H-C
<b>Power</b>	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac
<b>Power Requirements</b>	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
<b>Interface</b>	Backlit Display	Backlit Display	4.3" LCD Touchscreen	4.3" LCD Color Touchscreen	4.3" LCD Touchscreen	4.3" LCD Color Touchscreen	LCD Pushbutton	LCD Touchscreen
<b>Onboard Sensors</b>	Temperature	Temperature & Humidity (optional)	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity	Temperature & Humidity
<b>Scheduling</b>	√	√	√	√	√	√	√	√
<b>Occupancy (motion)</b>	—	—	—	—	—	—	√	√
<b>Compressor Stages</b>	1-2	1-2	1-3	1-3	1-3	1-3	1-2	1-2
<b>Auxiliary Heat Stages</b>	1	1	1-2	1-2	1-2	1-2	1-3	1-3
<b>Fan Control</b>	1-Speed	1-Speed	1-Speed	1-Speed	1-Speed	1-Speed	1 to 3-Speed	1 to 3-Speed
<b>Dehumidification Output for HGRH</b>	—	√	√	√	√	√	—	√
<b>Humidification Output</b>	—	√	√	√	√	√	√	√
<b>Remote Sensors</b>	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
<b>Dry Contact</b>	—	Dehum or Economizer	OCC / ECFL / FLTR	OCC / ECFL	OCC / ECFL / FLTR	OCC / ECFL	Window / Door / Key Tag	Window / Door / Key Tag
<b>BACnet® MS/TP</b>	—	—	√	√	√	√	√	√
<b>Wi-Fi</b>	—	—	√	√	√	√	—	—
<b>Accessories</b>	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.

### LEGEND

ECFL	—	Economizer Fault
ECON	—	Economizer
FLTR	—	Filter Reminder
OAT	—	Outside Air Temperature
OCC	—	Occupied and Unoccupied Setpoints
RAT	—	Return Air Temperature
RH	—	Relative Humidity
RSS	—	Remote Space Sensor
SAT	—	Supply Air Temperature

# Options and accessories (cont)



## Control options to supplement thermostat

The 50WT units offer a number of options to supplement thermostats, allowing for control of various auxiliary components that fall outside of typical thermostat capabilities. 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 by controlling auxiliary devices that a thermostat is not typically capable of controlling. 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.

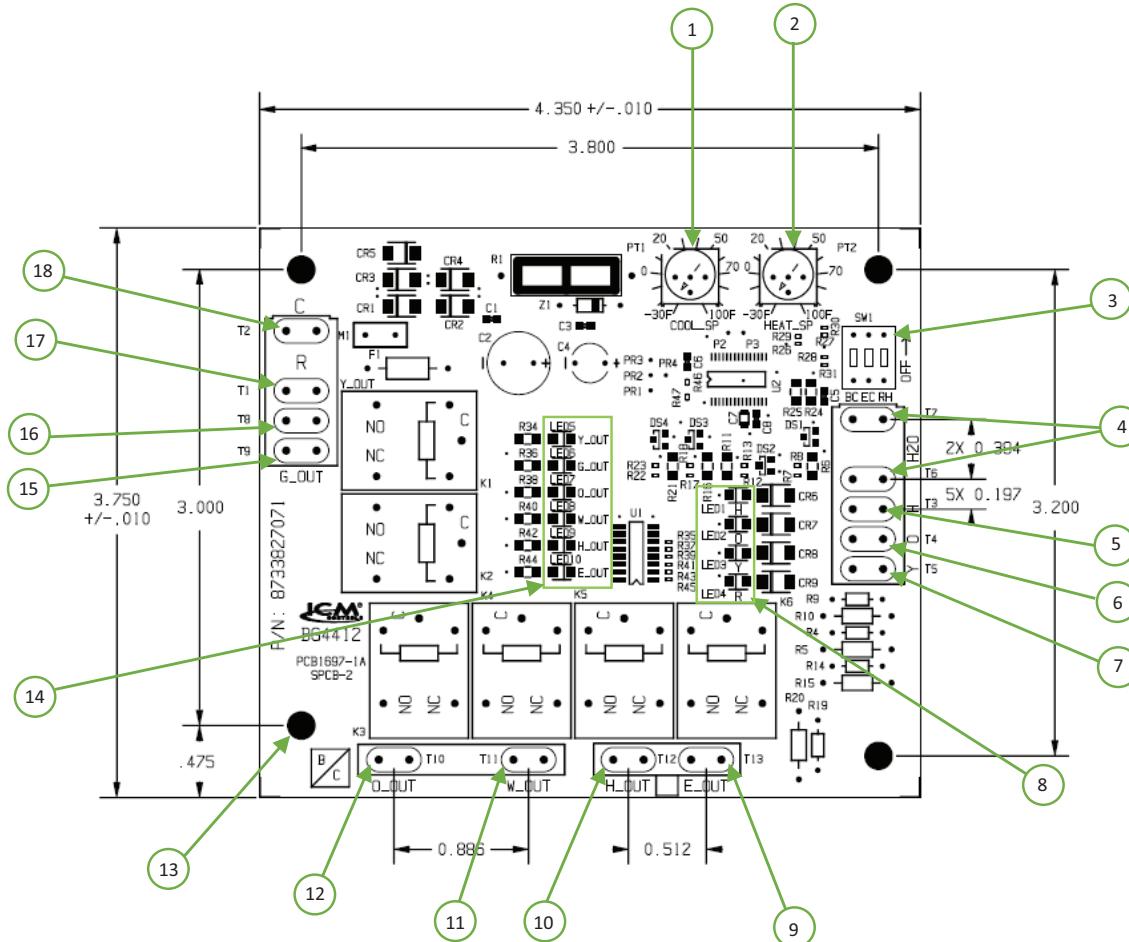
### *Compressor Status Relay*

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

# Options and accessories (cont)



## Option Card Detail



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

# Options and accessories (cont)



## 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®<sup>1</sup> IP.



### Application features

- Provides space temperature control with up to 2 stages of mechanical cooling and heating.
- Offers 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.
- Provides automatic 3-speed fan control for efficient WSHP operation. Using the space temperature input, the TruVu™ controller automatically operates the fan at the optimal speed to maintain space temperature while providing increased latent heat removal, reduced sound and the lowest fan energy consumption.
- 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 building automation system (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 shut down 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™ Alarm 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

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

# Options and accessories (cont)



## TruVu™ Alarms

ALARM	DESCRIPTION
<b>Fire/Smoke Detector Alarm</b>	Immediate shutdown of equipment (fan, compressor, aux heat, and damper) after alarm is generated.
<b>SPT (space temperature) Alarms</b>	Generates an alarm whenever the space temperature exceeds configurable alarm set points for occupied and unoccupied periods.
<b>Source Water Temperature Alarm</b>	Four configurable alarm limits for leaving condenser water temperature.
<b>Supply Air Temperature Alarm</b>	Two configurable alarm limits for supply air temperature.
<b>High Condensate / Overflow Alarm</b>	Disables the compressor and fan outputs when alarm is generated.
<b>Fan Status Alarm</b>	Monitors the fan output and alarm is generated after 30 seconds and no fan status (all speeds).
<b>Compressor Status Alarm</b>	Monitors the compressor output and alarm is generated after 6 minutes of energizing compressor and no status.
<b>Filter Status Alarm</b>	Generates an alarm after the number of fan run hours exceeds a configurable filter alarm timer limit.
<b>Indoor Air Quality Alarm</b>	Generates an alarm during occupied periods whenever the CO <sub>2</sub> sensor value exceeds the user adjustable limit.
<b>Relative Humidity Alarm</b>	Generates an alarm whenever the space relative humidity exceeds configurable alarm set point.
<b>Source Water Linkage Failure Alarm</b>	Generates an alarm after linkage fail with water loop controller for > 6 min.
<b>Airside Linkage Failure Alarm</b>	Generates an alarm once linkage fails for > 6 min.
<b>OAT Sensor Alarm</b>	Generates an alarm if the value of OAT fails to be updated through the network.
<b>SPT Sensor Alarm</b>	Generates an alarm if the SPT sensor fails to communicate with the control for > 5 minutes.
<b>ZS Sensor Alarm</b>	Generates an alarm if the ZS sensor fail to communicate with the control for > 5 minutes.
<b>Return Air Temperature Alarm</b>	Configurable alarm limits for return air temperature.
<b>Entering Water Temperature Alarm</b>	Configurable alarm limits for entering condenser water temperature.
<b>Water Side Delta T Alarm</b>	Configurable alarm limits for waterside delta T.
<b>Air Side Delta T Alarm</b>	Configurable alarm limits for airside delta T.
<b>Low Water Flow Alarm</b>	Monitors the differential pressure switch, generates alarm if unit has no flow.
<b>UPM Alarm - Hard Lockout Status</b>	Generates alarm if hard lockout conditions occurred on UPM board. Soft lockout alarm history can be viewed.
<b>Source Water Valve Alarm</b>	Monitors communicating source water valve (ACT net), alarm is generated if valve fails to communicate.

# Options and accessories (cont)



## Field-installed TruVu™ DDC accessories

### ZS sensors

ZS sensors are the preferred method of monitoring space temperature, humidity and CO<sub>2</sub> levels when using the TruVu™ controller.

### 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. TruVu equipment touch can view or change unit's 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 the TruVu™ ET Display Installation or Setup Guide.



### Field Assistant

Field assistant is a standalone tool customers 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 the Field Assistant Tool Help Manual.

### Field provided non-communicating sensors

To supplement thermostat or DDC controller, a variety of non-communicating sensors are available to fulfill specific requirements of customer applications.

### Non-Communicating Sensors

PART NUMBER	DESCRIPTION
33ZCSENSRH-02	Space Wall Mounted Relative Humidity Sensor
33ZCSPTCO2-01	CO <sub>2</sub> / Space Temp. Sensor Without LCD Display and No Override
33ZCT55CO2-02	Space Temp and CO <sub>2</sub> Room Sensor with Override
33ZCSPTCO2LCD-01	CO <sub>2</sub> /Space Temp. Sensor with LCD Display and No Override
33ZCT55CO2-02	Space Temp. and CO <sub>2</sub> Room Sensor with Override
33ZCT56CO2-02	Space Temp. and CO <sub>2</sub> 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.

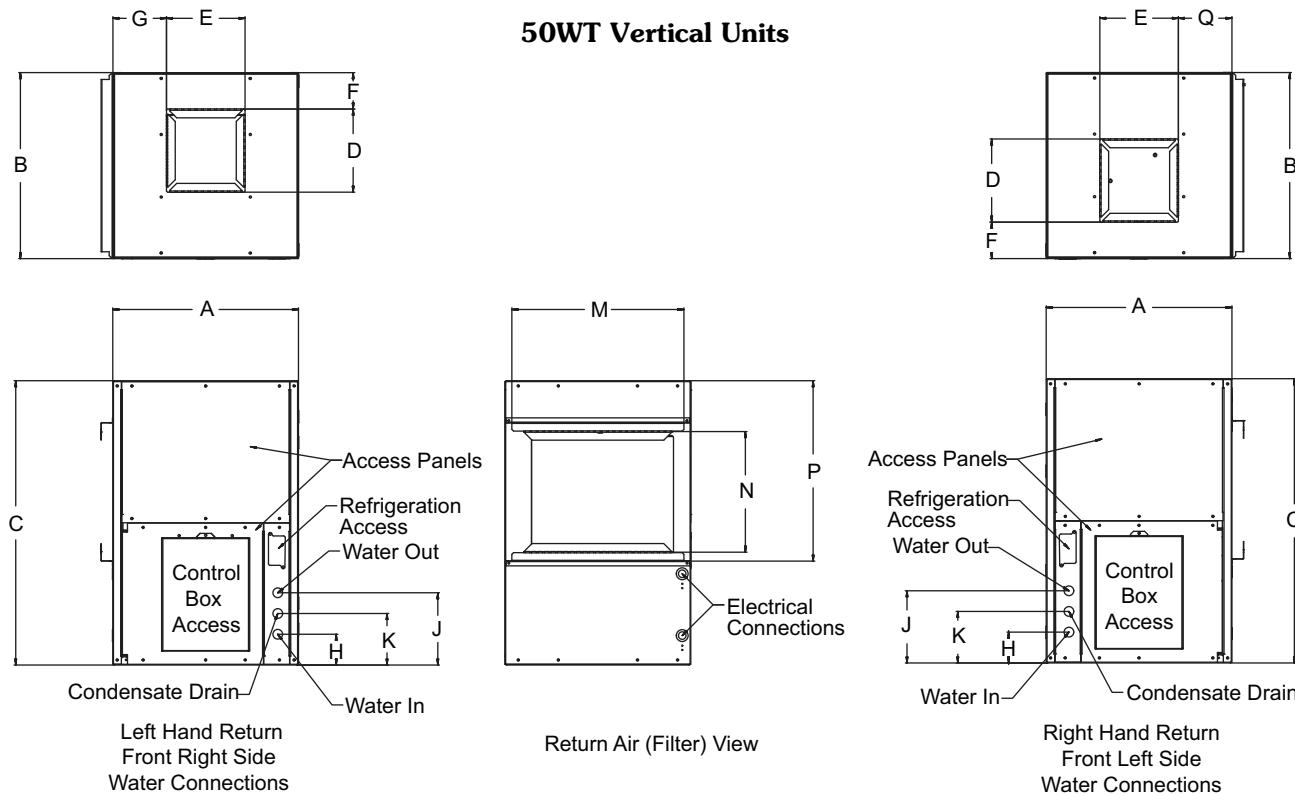
### TruVu™ DDC Accessories

Model Number	ZS Standard	ZS Plus	ZS Pro	ZS Pro-M	ZS Pro-F
Temp CO <sub>2</sub> 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

# Dimensions



## 50WT Vertical Units



50WT UNIT <sup>a,b,c,d</sup>	VERTICAL UNIT DIMENSIONS (in.) <sup>e,f,g</sup>																
	A	B	C	D	E	F	G	H	J	K	M	N	P	Q	CONDENSER WATER CONNECTIONS	RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE	CONDENSATE DRAIN CONNECTION
24	21.50	26.00	44.00	11.25	10.50	5.75	5.50	3.25	8.50	5.75	18.25	18.25	27.25	5.50	3/4" FPT	19 x 27	3/4" FPT
36	24.00	26.00	44.00	11.25	10.50	5.00	6.75	3.25	8.50	5.75	24.00	24.00	30.00	6.75	3/4" FPT	24 x 30	3/4" FPT
48	24.00	33.00	51.00	13.50	12.00	8.50	6.00	3.00	8.25	5.50	30.00	30.00	37.25	6.00	3/4" FPT	18 x 30	3/4" FPT
60	25.00	33.00	58.00	13.50	14.75	9.00	6.00	3.00	8.25	5.50	30.00	30.00	42.25	6.00	1" FPT	24 x 30 and 18 x 30	3/4" FPT
70	25.00	33.00	58.00	13.50	14.75	9.00	6.00	3.00	8.25	5.50	30.00	30.00	42.75	6.00	1" FPT	24 x 30 and 18 x 30	3/4" FPT

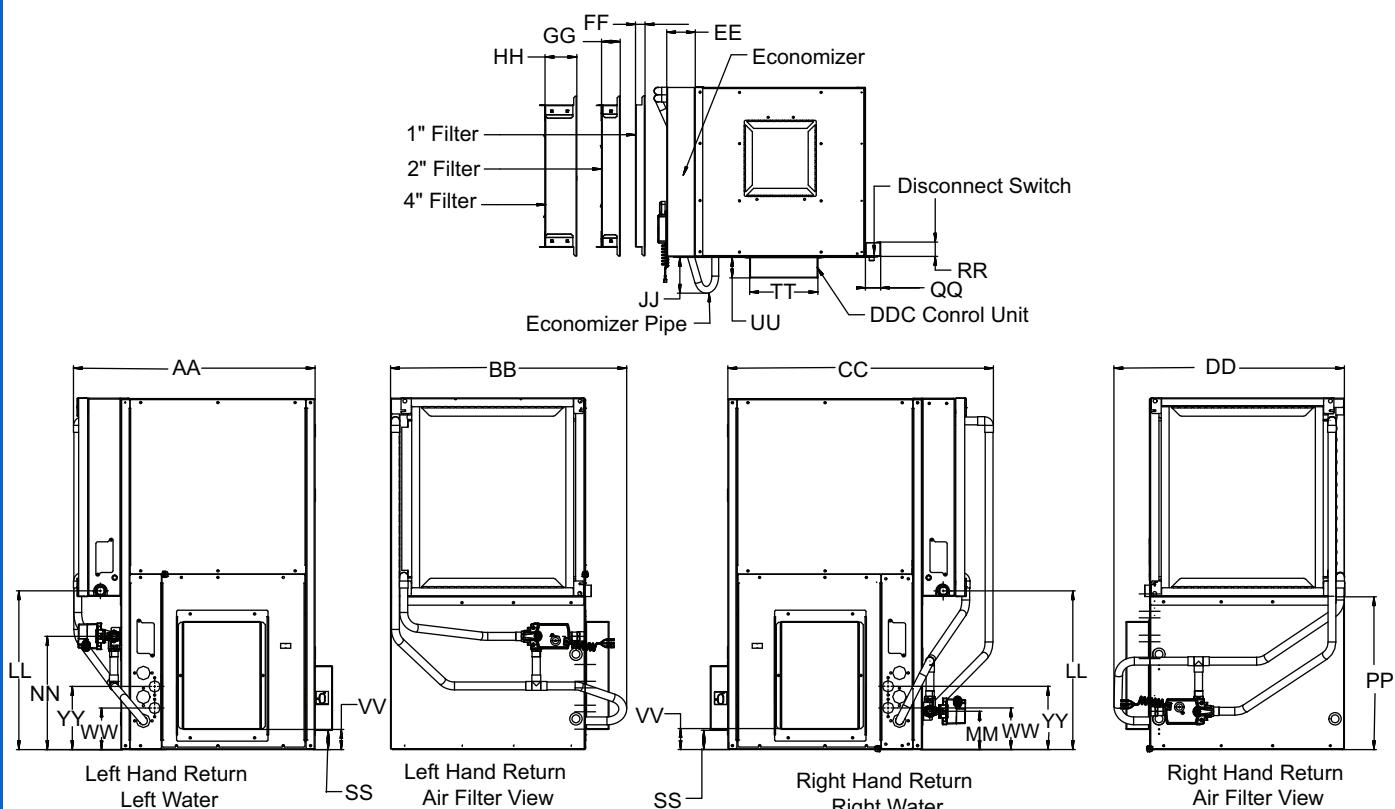
### NOTE(S):

- 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  $\pm 0.125$  in. Dimensions in inches.
- h. Water In connection is via 3 way valve for units with selected Waterside economizer option.
- i. The 1 in. filter rack extends 1.25 in. beyond the side of the unit (not including flange).
- j. 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.
- k. 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)



## 50WT Vertical Units — FIOP



50WT UNIT <sup>a,b,c,d</sup>	WSE								FILTER RACKS				DISCONNECT SWITCH			DDC CONTROL BOX			HWG <sup>e</sup>		
	AA	BB	CC	DD	EE	JJ	LL	MM	NN	FF	GG	HH	PP	QQ	RR	SS	TT	UU	VV	WW	YY
24	30.00	29.50	30.00	29.50	3.50	3.50	18.75	9.25	15.00	1.25	2.25	4.25	16.75	2.00	2.00	2.00	9.00	3.00	2.00	4.50	7.00
36	32.50	30.25	32.50	30.50	3.75	4.25	14.75	7.25	11.00	1.25	2.25	4.25	14.00	2.00	2.00	2.00	9.00	3.00	2.00	4.50	7.00
48	32.00	38.75	33.50	37.25	3.75	5.75	13.25	4.00	9.50	1.25	2.25	4.25	13.75	2.00	2.00	2.50	9.00	3.00	3.00	4.50	7.00
60	33.00	39.25	33.00	36.50	3.75	3.25	14.00	7.25	9.50	1.25	2.25	4.25	15.25	2.00	2.00	2.50	9.00	3.00	2.25	4.50	7.00
70	33.00	39.25	33.00	36.50	3.75	3.25	14.00	7.25	9.50	1.25	2.25	4.25	15.25	2.00	2.00	2.50	9.00	3.00	2.25	4.50	7.00

NOTE(S):

- a. Specifications subject to change without notice.
- b. All dimensions within  $\pm 0.25$  in. Dimensions in inches.
- c. Filter rack dimensions does not include 1 in. duct flange.
- d. 4 in. filter rack can accept either a 2 in. or 4 in. filter.
- e. HWG connection sizes are 1/2" FPT.
- f. Waterside Economizer condensate drain connection size is 3/4" FPT.
- g. WSE drain connection size is 3/4" FPT.

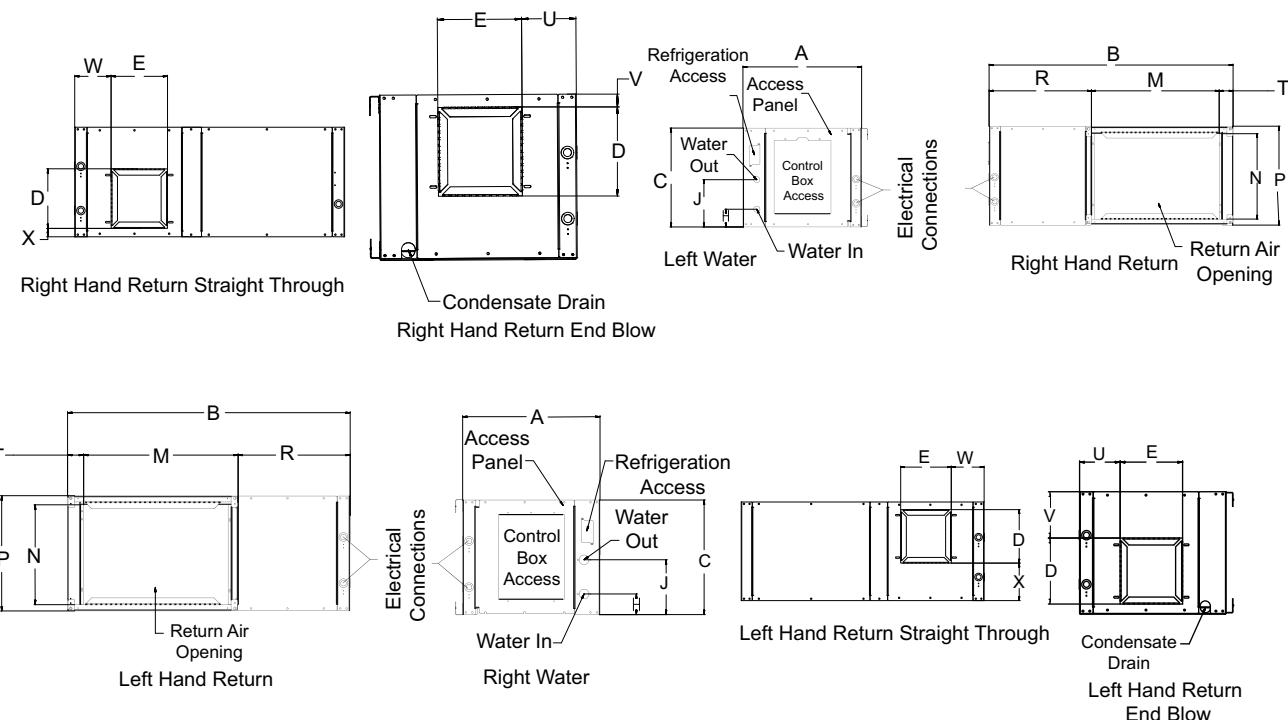
### LEGEND

**DDC** — Direct Digital Controller  
**HWG** — Hot Water Generator  
**WSE** — Waterside Economizer

# Dimensions (cont)



## 50WT Horizontal Units



HORIZONTAL DIMENSIONS (in.)<sup>a,b,c</sup>

50WT UNIT <sup>d,e,f,g</sup>																			RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE	CONDENSATE DRAIN CONNECTION		
A	B	C	D	E	H	J	M	N	P	R	T	U	V	W	X							
Width	Depth	Height	Discharge Height	Discharge Width	Water Inlet	Water Outlet	R/A Duct Width	R/A Duct Flange Height	Filter Rack Height <sup>h,i,j,k</sup>	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)			
24	21.5	47.00	19	11.25	10.50	3.25	8.75	29.25	16	18.00	15.5	2.25	5.75	5.75	6	1.75	5.75	5.75	6	1.75	3/4" FPT	18x30 3/4" FPT
36	24.0	54.00	21	12.50	11.75	3.25	8.50	33.25	18	20.00	19.5	1.25	5.50	5.50	7	1.50	5.50	5.50	7	1.50	3/4" FPT	20x34 3/4" FPT
48	24.0	65.00	21	12.50	11.75	3.00	8.25	43.50	18	20.50	16.0	5.25	5.50	5.50	7	1.50	5.50	5.50	7	1.50	1" FPT	20 x 20 and 20 x 24 3/4" FPT
60	24.0	75.25	21	12.50	11.75	3.00	8.25	49.50	18	20.25	22.5	3.00	5.50	5.50	7	1.50	4.75	4.75	7	1.50	1" FPT	20x25 (2) 3/4" FPT
70	24.0	75.25	21	12.50	11.75	3.00	8.25	49.50	18	20.25	22.5	3.00	5.50	5.50	7	1.50	4.75	4.75	7	1.50	1" FPT	20x25 (2) 3/4" FPT

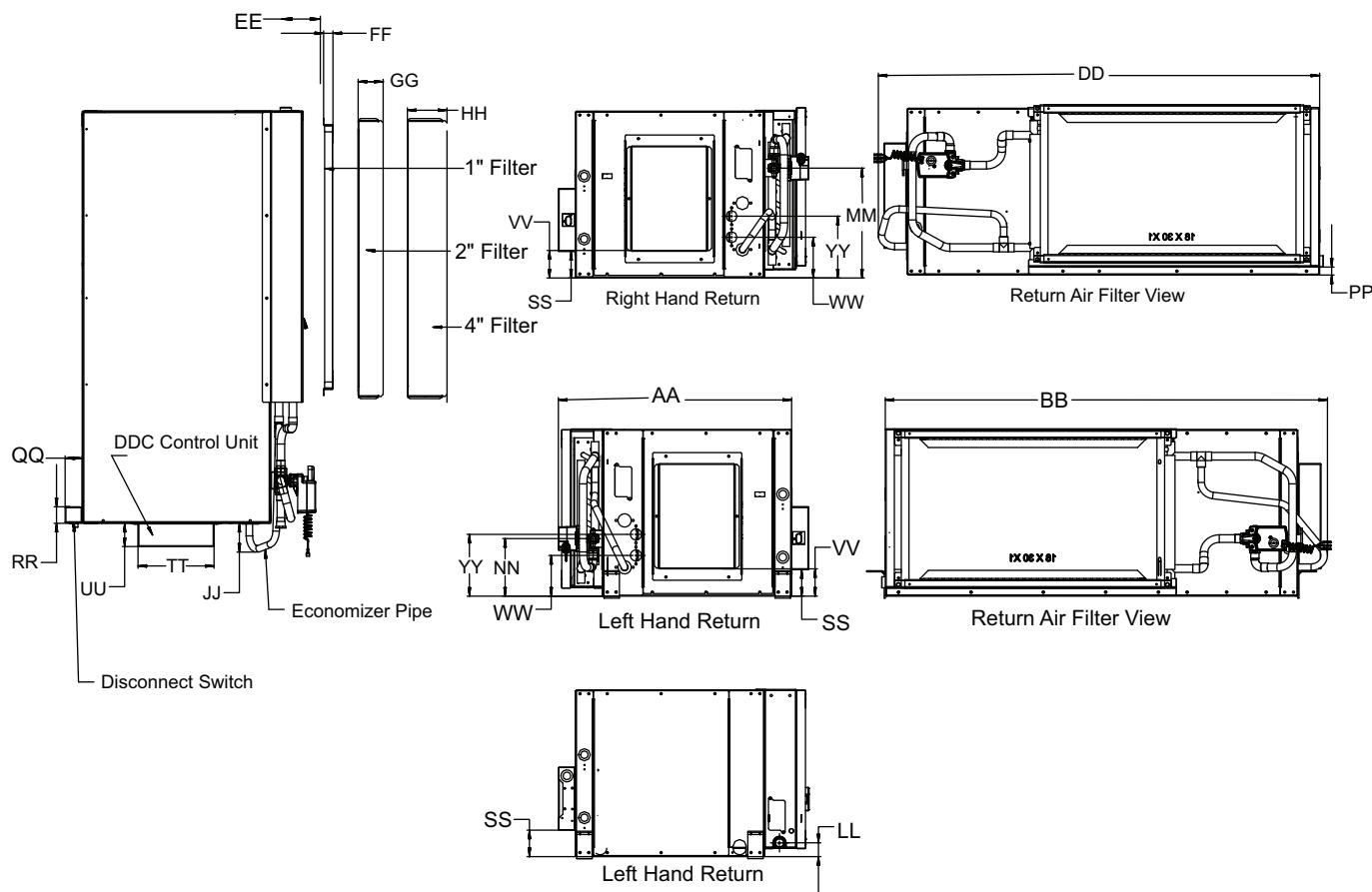
NOTE(S):

- a. Specifications subject to change without notice.
- b. Overall unit dimensions do not include filter rack or duct flanges.
- c. All dimensions within  $\pm 0.125$  in. Dimensions in inches.
- d. Front of the unit is determined by the location of the control box panel.
- e. When DDC controller is installed, control box panel extends 3.0 in. beyond the front of the unit.
- f. When disconnect switch is installed, increase width by 2.0 in. beyond side of unit.
- g. The local electric codes may require 36 in. or more clearance at the electrical control box.
- 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.
- k. 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)



## 50WT Horizontal Units — FIOP



50WT UNIT <sup>a,b,c,d</sup>	DISCONNECT SWITCH			DDC CONTROL BOX			WSE							FILTER RACK OPTIONS				HWG <sup>e</sup>		
	QQ	RR	SS	TT	UU	VV	EE	JJ	AA	DD	BB	LL	MM	NN	FF	GG	HH	PP	WW	YY
	Disconnect Switch Width	Disconnect Switch Depth	Disconnect Switch Height	DDC Panel Width	DDC Panel Height	DDC Height	Depth	WSE Pipe	Cabinet and WSE Width	Cabinet Depth and WSE (right hand return)	Cabinet Depth and WSE (left hand return)	WSE Drain <sup>f,g</sup>	WSE Valve (right hand return)	WSE Valve (left hand return)	1" Filter Rack	2" Filter Rack	4" Filter Rack	Filter Rack Height	Inlet	Outlet
24	2.00	2.00	3.00	9.00	3.00	3.00	3.75	3.50	26.50	50.25	50.50	1.50	12.50	6.50	1.25	2.25	4.25	1.00	4.50	7.00
36	2.00	2.00	2.00	9.00	3.00	2.00	4.00	8.00	29.00	58.25	62.00	1.75	9.50	11.50	1.25	2.25	4.25	1.00	4.75	7.00
48	2.00	2.00	2.00	9.00	3.00	2.00	4.00	4.75	29.00	69.75	70.00	1.50	10.25	11.25	1.25	2.25	4.25	0.75	4.50	6.75
60	2.00	2.00	2.00	9.00	3.00	2.00	4.00	5.25	29.00	77.50	80.25	1.25	13.00	9.00	1.25	2.25	4.25	0.75	4.50	6.75
70	2.00	2.00	2.00	9.00	3.00	2.00	4.00	5.25	29.00	77.50	80.25	1.25	13.00	9.00	1.25	2.25	4.25	0.75	4.50	6.75

### NOTE(S):

- a. Specifications subject to change without notice.
- b. All dimensions within  $\pm 0.25$  in. Dimensions in inches.
- c. Filter rack dimensions does not include 1 in. duct flange.
- d. 4 in. filter rack can accept either a 2 in. or 4 in. filter.
- e. HWG connection sizes are 1/2" FPT.
- f. Waterside Economizer condensate drain connection size is 3/4" FPT.
- g. WSE drain connection size is 3/4" FPT.

### LEGEND

**DDC** — Direct Digital Controller  
**HWG** — Hot Water Generator  
**WSE** — Waterside Economizer

# Dimensions (cont)



## 50WT Horizontal Unit Corner Weights

UNIT SIZE	UNITS	TOTAL WEIGHT	LEFT HAND EVAPORATOR				RIGHT HAND EVAPORATOR			
			Left Front <sup>a</sup>	Right Front <sup>a</sup>	Left Back	Right Back	Left Front <sup>a</sup>	Right Front <sup>a</sup>	Left Back	Right Back
24	lb	213.4	63.0	63.0	35.8	51.6	63.0	63.0	51.6	35.8
	kg	96.8	28.6	28.6	16.2	23.4	28.6	28.6	23.4	16.2
36	lb	262.6	68.8	68.8	69.0	56.0	68.8	68.8	56.0	69.0
	kg	119.1	31.2	31.2	31.3	25.4	31.2	31.2	25.4	31.3
48	lb	319.0	94.8	94.8	58.0	71.4	94.8	94.8	71.4	58.0
	kg	144.7	43.0	43.0	26.3	32.4	43.0	43.0	32.4	26.3
60	lb	366.2	104.8	104.8	86.2	70.4	104.8	104.8	70.4	86.2
	kg	166.1	47.5	47.5	39.1	31.9	47.5	47.5	31.9	39.1
70	lb	414.2	126.4	126.4	69.6	91.8	126.4	126.4	91.8	69.6
	kg	187.9	57.3	57.3	31.6	41.6	57.3	57.3	41.6	31.6

NOTE(S):

a. Front is control box end.

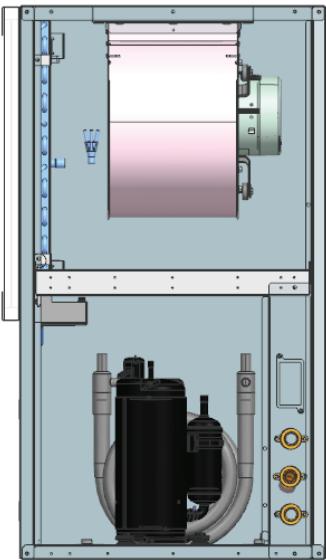
# Dimensions (cont)



## 50WT Service Clearance

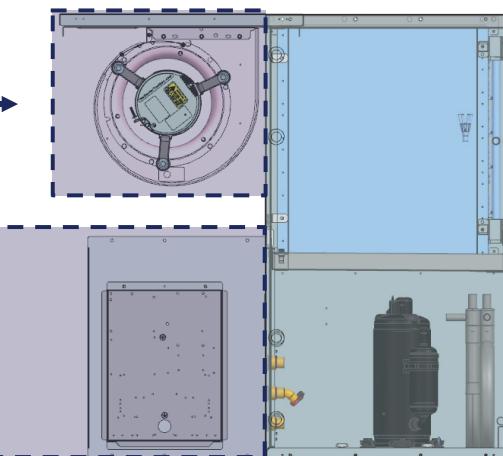
### Vertical Unit

Left Return, Top Discharge



Front View

Left Return, Top Discharge



Side View

#### Blower Front Access

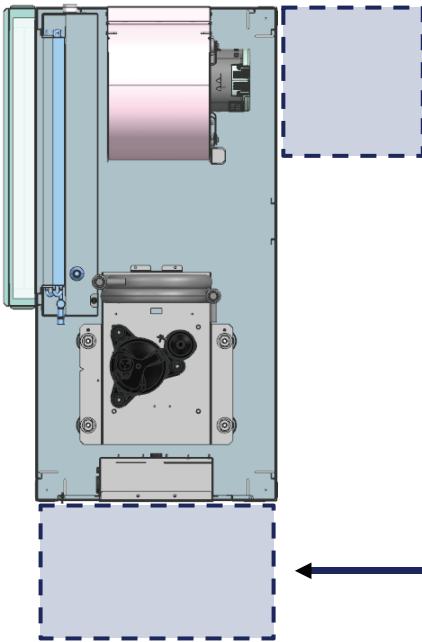
18 in. Minimum  
24 in. Optimum

#### Compressor and Electrical Front Access

24 in. Minimum  
36 in. Optimum

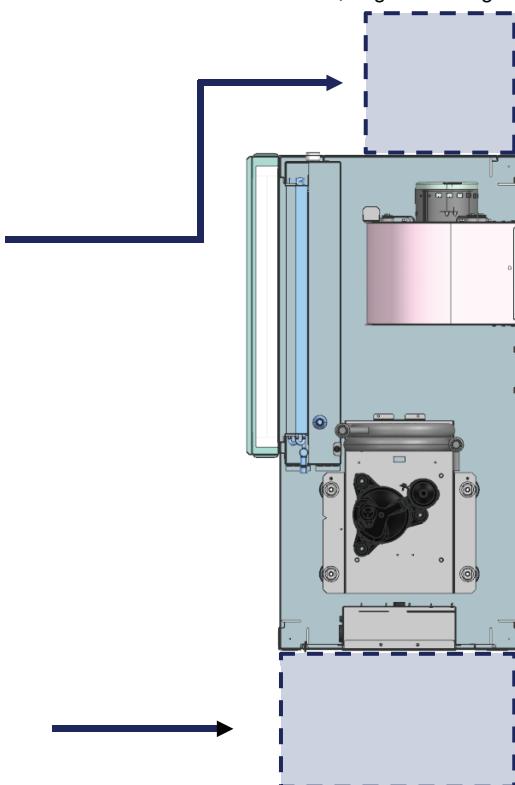
### Horizontal Unit

Left Return, Back Discharge



Top View

Left Return, Right Discharge



Top View

#### Blower Access

18 in. Minimum  
24 in. Optimum

#### Compressor and Electrical Front Access

24 in. Minimum  
36 in. Optimum

# Performance data



## 50WT Series WSHP Operating Limits<sup>a,b</sup>

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
		Ground Loop	77
		Ground Water	59
	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.
- b. Maximum and minimum operating limits may not be combined. If one value is at either maximum or minimum, the other value(s) must be within normal operating range.

### 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)



## 50WT Vertical Units — Constant Airflow Motor Performance<sup>a,b,c</sup>

UNIT SIZE	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
024 Full Load	A -		680	680	680	680	680	680	680	680	—	—	—	—
	A Norm (Full)	X	800	800	800	800	800	800	800	800	—	—	—	—
	A +		920	920	920	920	920	920	920	920	—	—	—	—
024 Part Load	A -		553	553	553	553	553	553	553	553	—	—	—	—
	A Norm (Part)	X	650	650	650	650	650	650	650	650	—	—	—	—
	A +		748	748	748	748	748	748	748	748	—	—	—	—
036 Full Load	A -		1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	—	—
	A Norm (Full)	X	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	—	—
	A +		1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	—	—
036 Part Load	A -		829	829	829	829	829	829	829	829	829	829	—	—
	A Norm (Part)	X	975	975	975	975	975	975	975	975	975	975	—	—
	A +		1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	—	—
048 Full Load	A -		1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	—	—
	A Norm (Full)	X	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	—	—
	A +		1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	—	—
048 Part Load	A -		1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	—	—
	A Norm (Part)	X	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	—	—
	A +		1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	—	—
060 Full Load	A -		1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
	A Norm (Full)	X	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	A +		2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
060 Part Load	A -		1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360
	A Norm (Part)	X	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	A +		1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840
070 Full Load	A -		1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828
	A Norm (Full)	X	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150
	A +		2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473
070 Part Load	A -		1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530
	A Norm (Part)	X	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	A +		2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070

### 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)



## 50WT Horizontal Units — Constant Airflow Motor Performance<sup>a,b,c</sup>

UNIT SIZE	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
024 Full Load	A -		808	808	808	808	808	808	808	808	—	—	—	—
	A Norm (Full)	X	950	950	950	950	950	950	950	950	—	—	—	—
	A +		1,093	1,093	1,093	1,093	1,093	1,093	1,093	1,093	—	—	—	—
024 Part Load	A -		680	680	680	680	680	680	680	680	—	—	—	—
	A Norm (Part)	X	800	800	800	800	800	800	800	800	—	—	—	—
	A +		920	920	920	920	920	920	920	920	—	—	—	—
036 Full Load	A -		1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	—
	A Norm (Full)	X	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	—
	A +		1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	—
036 Part Load	A -		829	829	829	829	829	829	829	829	829	829	829	—
	A Norm (Part)	X	975	975	975	975	975	975	975	975	975	975	975	—
	A +		1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	—
048 Full Load	A -		1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	—
	A Norm (Full)	X	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	—
	A +		1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	1,955	—
048 Part Load	A -		1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	—
	A Norm (Part)	X	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	—
	A +		1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	1,495	—
060 Full Load	A -		1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
	A Norm (Full)	X	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	A +		2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
060 Part Load	A -		1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360
	A Norm (Part)	X	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	A +		1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840
070 Full Load	A -		1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828
	A Norm (Full)	X	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150	2,150
	A +		2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473	2,473
070 Part Load	A -		1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530
	A Norm (Part)	X	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	A +		2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070	2,070

### 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.

## 50WT without Electric Heat — Constant Airflow ECM Blower Motor Electrical Data

UNIT SIZE	VOLTAGE/PHASE/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOP
			Quantity	RLA	LRA	FLA	HP			
024 VT	208-230/1/60	197 / 253	1	10.3	62.0	4.4	0.3	14.7	17.3	25.0
	265/1/60	238 / 292	1	7.8	52.0	4.7	0.3	12.5	14.5	20.0
	208-230/3/60	197 / 253	1	6.3	56.0	4.4	0.3	10.7	12.3	15.0
	460/3/60	414 / 506	1	3.8	29.0	4.7	0.3	8.5	9.7	15.0
024 HZ	208-230/1/60	197 / 253	1	10.3	62.0	5.0	0.5	15.3	17.9	25.0
	265/1/60	238 / 292	1	7.8	52.0	5.0	0.5	12.8	14.8	20.0
	208-230/3/60	197 / 253	1	6.3	56.0	5.0	0.5	11.3	12.9	15.0
	460/3/60	414 / 506	1	3.8	29.0	5.0	0.5	8.8	10.1	15.0
036	208-230/1/60	197 / 253	1	14.6	14.6	90.0	0.8	23.0	26.6	40.0
	265/1/60	238 / 292	1	12.6	12.5	79.0	0.8	20.0	23.2	35.0
	208-230/3/60	197 / 253	1	9.9	9.9	82.0	0.8	18.3	20.7	30.0
	460/3/60	414 / 506	1	4.8	4.8	44.3	0.8	12.3	14.2	20.0
048	208-230/1/60	197 / 253	1	18.3	18.3	138.0	0.8	26.7	31.3	45.0
	208-230/3/60	197 / 253	1	11.9	11.9	112.0	0.8	20.3	23.3	35.0
	460/3/60	414 / 506	1	6.8	6.8	61.8	0.8	14.3	16.2	20.0
060	208-230/1/60	197 / 253	1	25.2	25.2	147.3	1.0	34.3	40.6	60.0
	208-230/3/60	197 / 253	1	13.8	13.8	150.0	1.0	22.9	26.3	40.0
	460/3/60	414 / 506	1	6.9	6.9	58.0	1.0	16.0	18.2	25.0
070	208-230/1/60	197 / 253	1	28.0	28.0	166.0	1.0	37.1	44.1	70.0
	208-230/3/60	197 / 253	1	18.9	19.2	162.3	1.0	28.3	32.7	50.0
	460/3/60	414 / 506	1	9.1	9.1	70.8	1.0	18.2	20.5	25.0

### LEGEND

<b>FLA</b>	— Full Load Amps
<b>Hp</b>	— Horsepower
<b>Hz</b>	— Horizontal
<b>LRA</b>	— Locked Rotor Amp
<b>RLA</b>	— Rated Load Amps
<b>MCA</b>	— Minimum Circuit Amp
<b>MOP</b>	— Maximum Overcurrent Protection
<b>VT</b>	— Vertical

# Electrical data (cont)



## First Data Plate for Units with Electric Heater (EH) Option — Compressor Power Connection

50WT UNIT SIZE	VOLTAGE/ PHASE/Hz	VOLTAGE MIN/MAX	COMPRESSOR			FLA	MCA	MOP
			Quantity	RLA	LRA			
024 VT/HZ	208-230/1/60	197 / 253	1	10.3	62.0	10.3	12.9	20.0
036	208-230/1/60	197 / 253	1	14.6	90.0	14.6	18.3	30.0
048	208-230/1/60	197 / 253	1	18.3	138.0	18.3	22.9	40.0
060	208-230/1/60	197 / 253	1	25.2	147.3	25.2	31.5	50.0
070	208-230/1/60	197 / 253	1	28.0	166.0	28.0	35.0	60.0

## Second Data Plate for Units 5 kW Electric Heater (EH) Option and Constant Airflow ECM Motor

50WT UNIT SIZE	VOLTAGE/ PHASE/Hz	VOLTAGE MIN/MAX	BLOWER MOTOR		5 kW ELECTRIC HEATER							
					Heater Element				Unit Data Plate Values			
			FLA	Hp	Watts		Amps		MCA		MOP	
					208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024 VT	208-230/1/60	197 / 253	4.4	0.33	3.6 k	4.8 k	17.3	20	27.1	30.5	30	35
024 HZ	208-230/1/60	197 / 253	4.4	0.33	3.6 k	4.8 k	17.3	20	27.9	31.3	30	35
036	208-230/1/60	197 / 253	8.4	0.75	3.6 k	4.8 k	17.3	20	32.1	35.5	35	40
048	208-230/1/60	197 / 253	8.4	0.75	3.6 k	4.8 k	17.3	20	32.1	35.5	35	40
060	208-230/1/60	197 / 253	9.1	1.00	3.6 k	4.8 k	17.3	20	33.0	36.4	35	40
070	208-230/1/60	197 / 253	9.1	1.00	3.6 k	4.8 k	17.3	20	33.0	36.4	35	40

## Second Data Plate for Units 10 kW Electric Heater (EH) Option and Constant Airflow ECM Motor

50WT UNIT SIZE	VOLTAGE/ PHASE/Hz	VOLTAGE MIN/MAX	BLOWER MOTOR		10 kW ELECTRIC HEATER							
					Heater Element				Unit Data Plate Values			
			FLA	Hp	Watts		Amps		MCA		MOP	
					208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024 VT	208-230/1/60	197 / 253	4.4	0.33	7.2 k	9.6 k	34.7	40	48.9	55.5	50	60
024 HZ	208-230/1/60	197 / 253	4.4	0.33	7.2 k	9.6 k	34.7	40	49.6	56.3	50	60
036	208-230/1/60	197 / 253	8.4	0.75	7.2 k	9.6 k	34.7	40	53.9	60.5	60	70
048	208-230/1/60	197 / 253	8.4	0.75	7.2 k	9.6 k	34.7	40	53.9	60.5	60	70
060	208-230/1/60	197 / 253	9.1	1.00	7.2 k	9.6 k	34.7	40	54.8	61.4	60	70
070	208-230/1/60	197 / 253	9.1	1.00	7.2 k	9.6 k	34.7	40	54.8	61.4	60	70

## Second Data Plate for Units 15 kW Electric Heater (EH) Option and Constant Airflow ECM Motor

50WT UNIT SIZE	VOLTAGE/ PHASE/Hz	VOLTAGE MIN/MAX	BLOWER MOTOR		15 kW ELECTRIC HEATER							
					Heater Element				Unit Data Plate Values			
			FLA	Hp	Watts		Amps		MCA		MOP	
					208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
036	208-230/1/60	197 / 253	8.4	0.75	10.8 k	14.4 k	52.0	60	75.5	85.5	80	90
048	208-230/1/60	197 / 253	8.4	0.75	10.8 k	14.4 k	52.0	60	75.5	85.5	80	90
060	208-230/1/60	197 / 253	9.1	1.00	10.8 k	14.4 k	52.0	60	76.4	86.4	80	90
070	208-230/1/60	197 / 253	9.1	1.00	10.8 k	14.4 k	52.0	60	76.4	86.4	80	90

## Second Data Plate for Units 20 kW Electric Heater (EH) Option and Constant Airflow ECM Motor

50WT UNIT SIZE	VOLTAGE/ PHASE/Hz	VOLTAGE MIN/MAX	BLOWER MOTOR		20 kW ELECTRIC HEATER							
					Heater Element				Unit Data Plate Values			
			FLA	HP	Watts		Amps		MCA		MOP	
					208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
048	208-230/1/60	197 / 253	8.4	0.75	14.4 k	19.2 k	69.3	80	97.1	110.5	100	125
060	208-230/1/60	197 / 253	9.1	1.0	14.4 k	19.2 k	69.3	80	98.0	111.4	100	125
070	208-230/1/60	197 / 253	9.1	1.0	14.4 k	19.2 k	69.3	80	98.0	111.4	100	125

# Application data



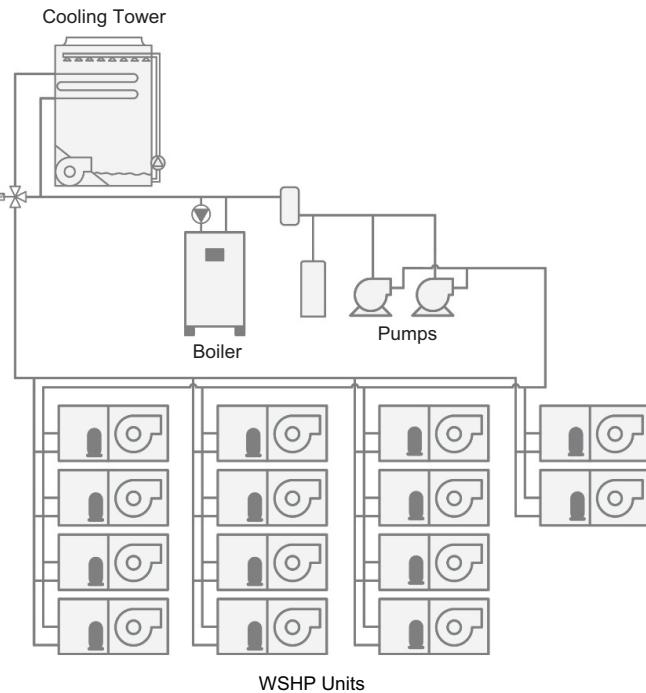
Aquazone™ water source heat pumps are available in a flexible, efficient array of models and sizes, which can be used for an extensive variety of commercial building types with several temperature control zones, some of which need to be heated while others need to be cooled. The WSHP system is an especially 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)



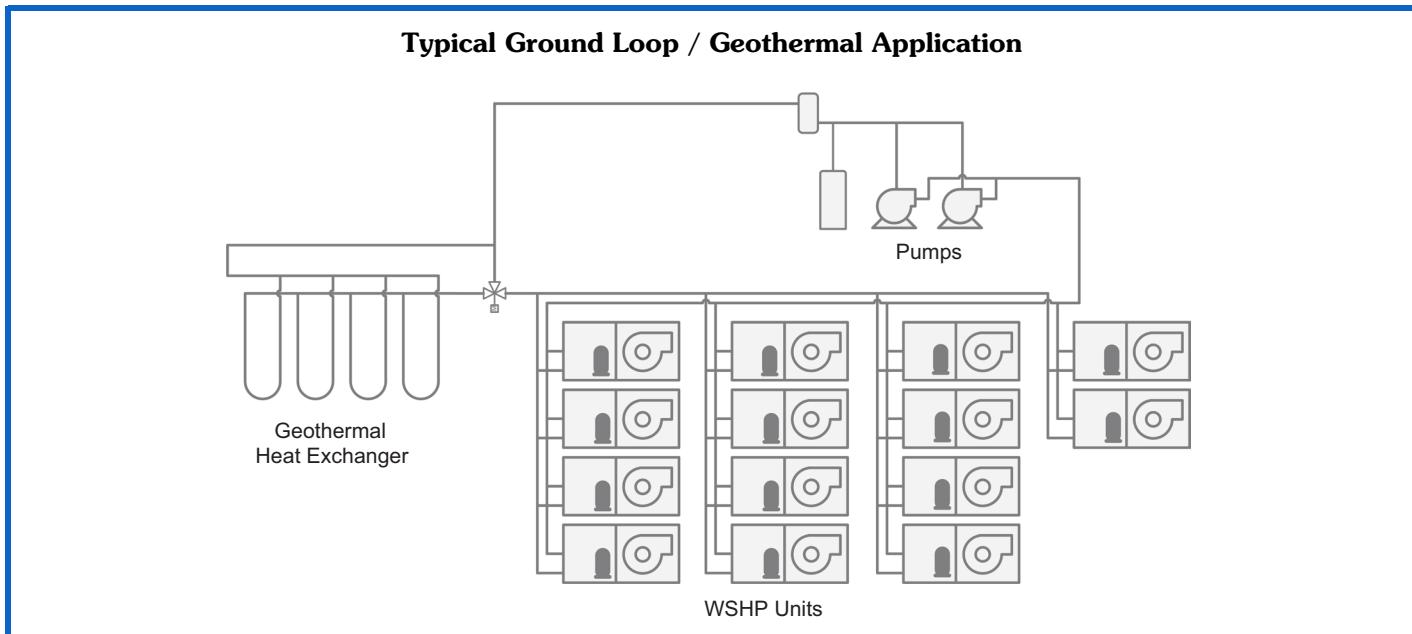
## Ground loop systems

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.



# Application data (cont)

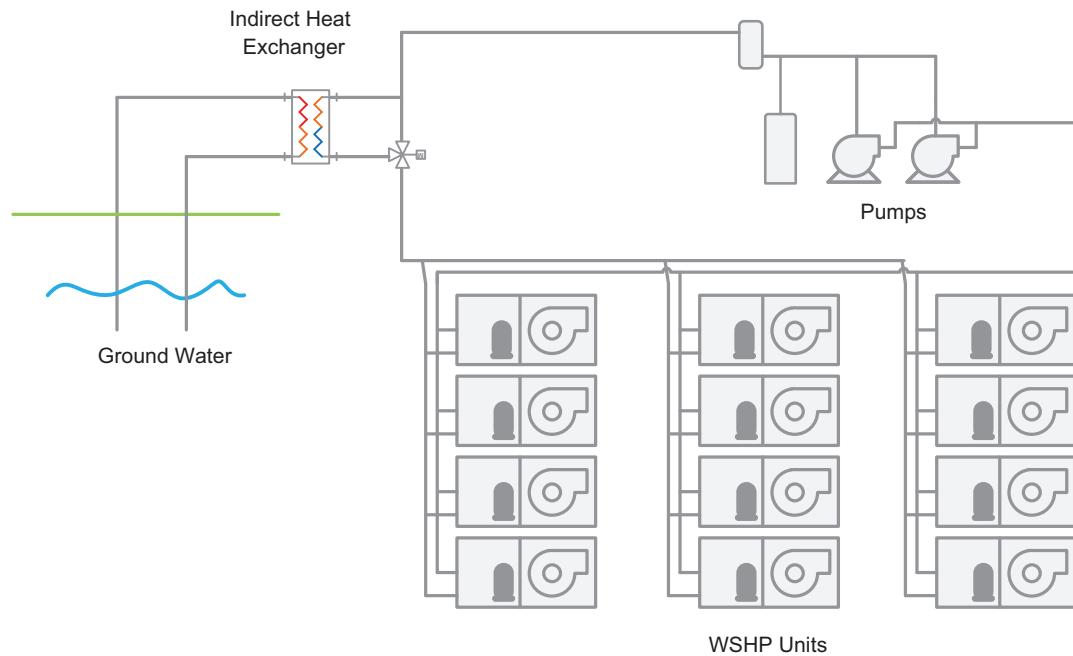


## Ground water systems

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**



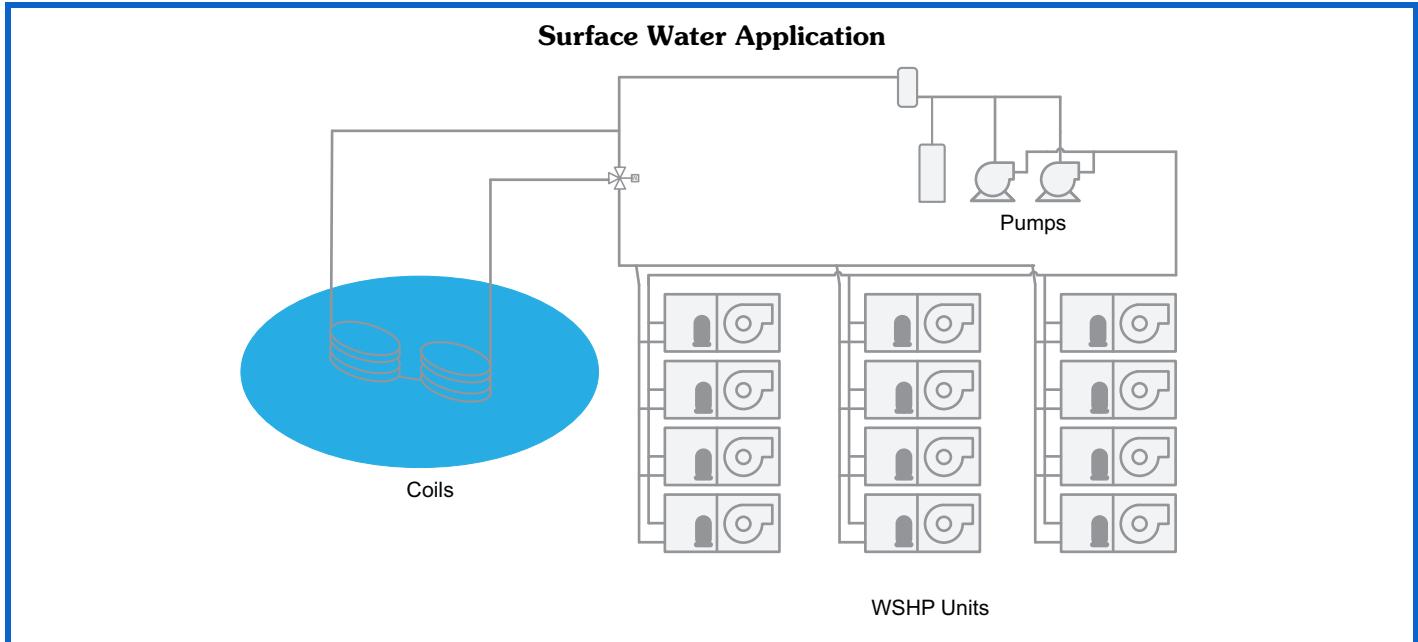
# Application data (cont)



## 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.



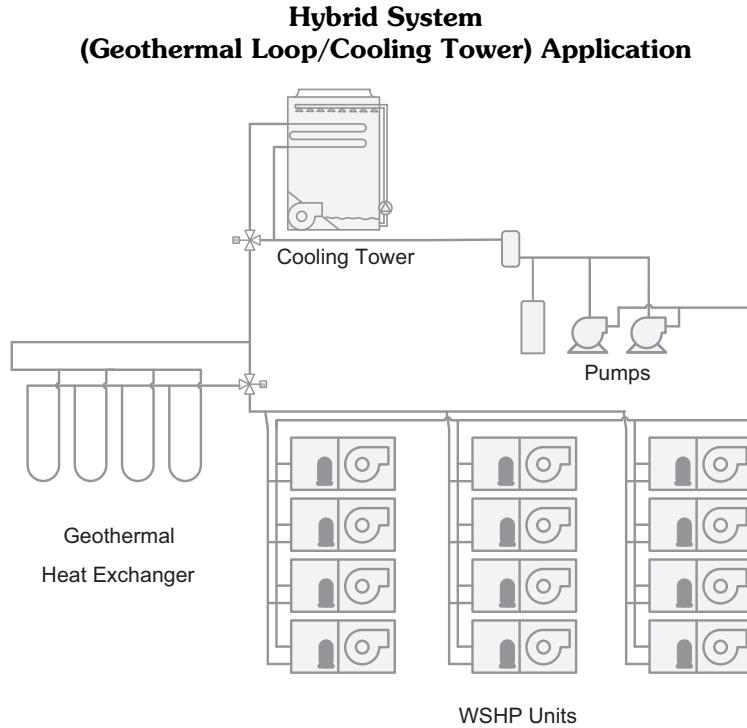
# Application data (cont)



## 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.



# 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 <sup>a</sup>	CLOSED RECIRCULATING <sup>b</sup>	OPEN LOOP AND RECIRCULATING WELL <sup>c</sup>
<b>Scaling Potential — Primary Measurement</b> 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
<b>Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)</b> 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.
<b>Iron Fouling</b>			
Iron Fe <sup>2+</sup> (Ferrous) (Bacterial Iron Potential)	All	N/A	<0.2 ppm (Ferrous) If Fe <sup>2+</sup> (ferrous) >0.2 ppm with pH 6 to 8, O <sub>2</sub> <5 ppm, check for iron bacteria.
Iron Fouling	All	N/A	<0.5 ppm of Oxygen Above this level deposition will occur.
<b>Corrosion Prevention<sup>d</sup></b>			
pH	All	6 - 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 <sub>2</sub> S)	All	N/A	<0.5 ppm At H <sub>2</sub> S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are acceptable to <0.5 ppm.
Ammonia Ion as Hydroxide, Chloride, Nitrate and Sulfate Compounds	All	N/A	<0.5 ppm
Maximum Chloride Levels	Copper Cupronickel 304 SS 316 SS Titanium	N/A N/A N/A N/A N/A	Maximum allowable at maximum water temperature.
			50°F (10°C)      75°F (24°C)      100°F (38°C)
			<20 ppm      NR      NR
			<150 ppm      NR      NR
			<400 ppm      <250 ppm      <150 ppm
			<1000 ppm      <550 ppm      <375 ppm
			>1000 ppm      >550 ppm      >375 ppm
<b>Erosion and Clogging</b>			
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 greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)

### NOTE(S):

- Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.
- Closed recirculating system is identified by a closed pressurized piping system.
- Recirculating open wells should observe the open recirculating design considerations.
- If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.  
Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity 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 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

All 50WT 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

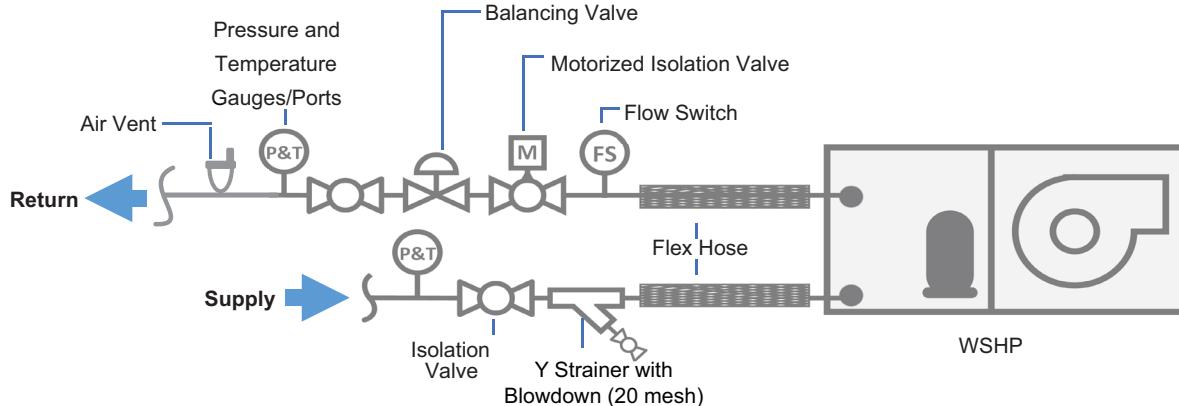
inlets and outlets of the unit. Flexible hoses not only simplify the connection but also play a role in minimizing vibration between the unit and the rigid central piping system. For ease of implementation, typical hose kits can include most hydronic devices like: isolation valves, y-strainer filter, 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 autoflow regulator. An autoflow 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. Autoflow regulators are utilized at each WSHP (each WSHP will have its own autoflow regulator) and the autoflow 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:

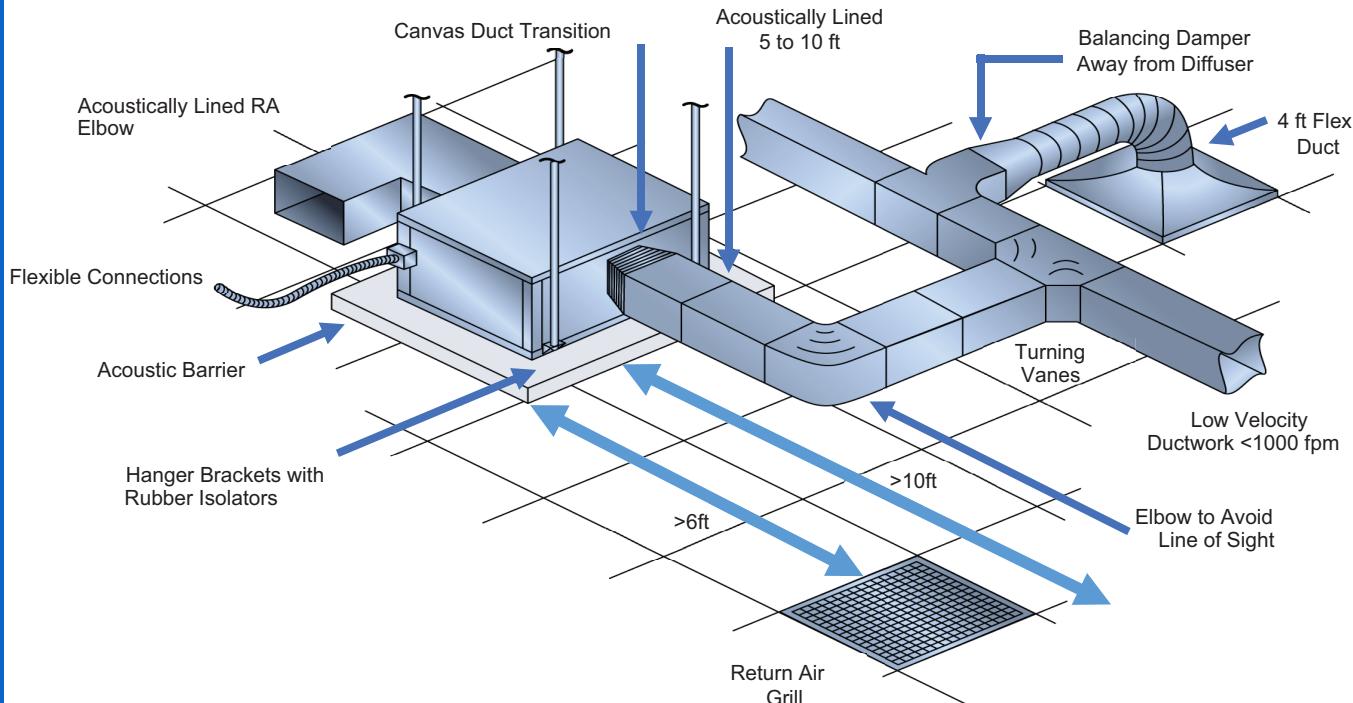
- Maximize the height of the unit above the ceiling.
- Make sure the WSHP unit is located at least 6 feet away from any ceiling return grille to prevent line-of-sight casting noise to reach the space below.

- 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-sight 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-sight noise into the ceiling cavity and possibly 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

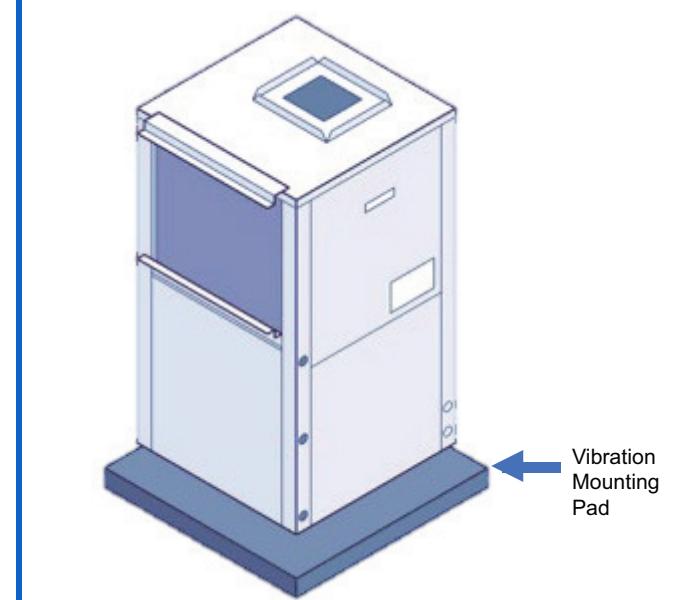


## Vertical units

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-sight 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 that is 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



## 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, contribute to 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 coil 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 and 78°F. The target leaving air wet bulb temperature should result in a relative humidity 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.

## 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.

## Hot water generator

The Hot Water Generator (HWG), also known as a desuperheater, is a great solution for residential and light commercial applications to supplement domestic hot water systems and save energy. The desuperheater generates hot water between 110 and 120°F by utilizing excess heat from the compressor's discharge line, providing a water temperature increase of 5 to 15°F. It heats domestic water when the water source heat pump is in heating or cooling mode. When the WSHP unit is in cooling mode, instead of rejecting the heat to the condenser water loop, it preheats the domestic water. However, the HWG can affect heating performance due to the rejected heat from the discharged refrigerant being used to heat the domestic water. This impact should be considered in the overall system evaluation.

## 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 recommended 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

System Parameters	
Altitude	ft
0	
Cooling Ent. Water Temp	F
86.0	
Heating Ent. Water Temp	F
68.0	
Fluid Type	Propylene Glycol
Fluid Concentration	%
10	

## 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

Design Parameters	
Motor Type	Constant Torque ECM
External Static	in wg
0.500	
Cooling Ent. Air DB Temp	F
75.0	
Cooling Ent. Air WB Temp	F
63.0	
Cooling Ent. Relative Humidity	%
51.57	
Fan Speed	AUTO
Airflow Rate	CFM
1000	
Flow Rate	gpm
Flow Rate/Nominal Capacity	gpm/ton
Heating Ent. Air DB Temp	F
68.0	

# 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

Capacity Requirements			
<input checked="" type="checkbox"/> Total Cooling	Total Cooling 26.0	Capacity 19.0	MBH ▾
<input checked="" type="checkbox"/> Total Heating	Total Heating 30.0	Tolerance 10	MBH ▾ %
<input checked="" type="checkbox"/> Sensible Cooling Capacity			

## 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

Performance Report	
<input checked="" type="checkbox"/> Performance Summary	▼
<input checked="" type="checkbox"/> Show Pricing in Reports	

# Selection procedure (cont)



## 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.

### Summittal Report

Selection Summary

Selection Name	Model	Chiller Arrangement	Capacity	Quantity	Date Modified	Actions
50HQP	50HQP096JCC6B1AB	N/A	096 (8 tons)	1	19/10/2023 02:28 PM	

Items per page: 100

### 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.

# Guide specifications



## Packaged Water Source Heat Pumps

### Engineering Guide Specifications

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

Carrier Model Number: **50WT**

#### 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 accurate 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 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 gauge 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 between the compressor base plate and the unit base pan to prevent transmission of vibration to the structure.

# Guide specifications (cont)



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 knock-outs 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 shall 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 electric heater shall be available for the units. Available only on vertical units with top discharge and horizontal units with back discharge. Units provided with the factory-installed electric heater shall be configured with a dual-point power connection. Specifically, one power leg will supply power to both the fan motor and the electric heater, while the second power leg will be dedicated to the compressor.
15. [Optional] Extra quiet package shall be provided on unit sizes 024-070. This option includes 1 in. thick fiberglass insulation and compressor blanket.

## 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 be 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  $\pm$  15% of nominal design airflow. These motors shall provide feedback to the unit control box to verify motor operating mode and delivered CFM.

2. Blowers shall have inlet rings to allow removal of wheel and motor from one side without removing housing.
3. Units supplied without permanently lubricated motors must provide external oilers for easy service.
4. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule.
5. 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:  
Two stages scroll compressor 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

# Guide specifications (cont)



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] On/Off Hot Gas Reheat (HGRH) shall be available for dehumidification, and 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 is above the set point once the space temperature is satisfied. Cooling or heating requirements shall take precedent over HGRH.
- 10. [Optional] Modulating Hot Gas Reheat (HGRH) shall be available for dehumidification, and controlled by TruVu™ DDC controller and shall start the unit in the reheat mode when the humidity is above the set point once the space temperature is satisfied. Cooling or heating requirements shall take precedent over HGRH.
- 11. [Optional] Hot Gas Bypass (HGBP): 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.
- 12. [Optional] Hot water generator: Unit sizes 024-070 shall be equipped with factory installed internal heat recovery kit for domestic hot water production. This kit shall include an internally protected hot water circulation pump, copper double wall vented coaxial water-to-refrigerant heat exchanger, 120°F hot water temperature limit switch and an on/off switch/circuit breaker.
- 13. A2L refrigerant leak detection system shall be provided for unit sizes 060-070; the refrigerant leak detection system is required by UL-60335-2-40.
- 14. [Optional] A2L refrigerant leak detection system shall be available for units where the refrigerant leak detection system is required by local codes.
- 15. Safety controls shall include both a high pressure and low-pressure switch. Temperature sensors shall not replace these safety switches.
- 16. 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 access panel for the test ports not requiring removal of the primary cabinet panels to access the test ports.
- 17. 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 75 VA, 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.

# Guide specifications (cont)



- 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
  - 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 indicate 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.
- 2) Two-position OA (outdoor air) damper.
- 3) Modulating OA damper with DCV (demand controlled ventilation).
- 4) Hot gas reheat solenoid valve.
- 5) Two-position water economizer control.
- 6) Modulating water economizer control.
- 7) Two stage electric auxiliary heat control.
- 8) Scheduling.
- 9) Adaptive optimal start.
- 10) Equipment performance monitoring.
- 11) Alarm status

TruVu™ controller must be capable of communicating over BACnet®<sup>1</sup> 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] Non-fused electrical disconnect shall be installed on the unit.
- h. [Optional] Units shall have a short circuit current rating (SCCR) of no less than 65 kA.
- i. [Optional] Boilerless control shall activate an electric heater and disable compressor when water temperature drop below set point.
- j. [Optional] Energy management switch to enable remote operation of WSHP (water source heat pump).
- k. [Optional] Pump-valve relay to enable a pump/valve operation when calling for compressor operation.
- l. [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

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# Guide specifications (cont)



and/or auto flow regulators as specified in the schedule.

- b. Two-position motorized isolation valve (2-way solenoid valve)  
Two-position motorized isolation valve (2-way solenoid valve) with end switch shall be available for field installation. The two-way motorized 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. (600WOG 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. (600WOG at 325°F)

2. Controls accessories:

- a. Carrier commercial thermostat controls are available as follows:
  - 1) Edge®1 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 °F or °C.
  - 2) Comfort Pro Programmable Thermostat, 2-stage Heat /2-stage Cool G/E, plus 1-stage auxiliary or emergency heat HP&WSHP, or 2-stage cool/heat only, Touch n Go™ program (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-programmable; 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-programmable; 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®, 24 vac Thermostat offers a large backlit LCD display and intuitive push-button controls for easy operation, BACnet® MS/TP port, 2 universal inputs, 22 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 shall be available as follows, and all sensors below offer monitoring of space temperature only, or space temperature and CO<sub>2</sub>, or space temperature and humidity, or space temperature and CO<sub>2</sub> 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 gauge 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 gauge galvanized steel with multiple knockouts for field wiring. Control cabinet shall have a solid cover also

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# Guide specifications (cont)



of heavy gauge galvanized steel, 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 re-set 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.





