Product Data

Omnizone™ Water Source Cooling Only and Heat Pump Units

30 to 60 Nominal Tons

50BVT,V,W034-064
Modular Omnizone Unit

Omnizone 50BV034-064 Indoor Cooling Only and Cooling/Heating Water Source Heat Pumps with Puron Advance™ Refrigerant (R-454B), High-Efficiency Scroll Compressors, and Optional Constant or Variable Air Volume

Overview

Carrier's Omnizone 50BV units are packaged, indoor cooling only and cooling/ heating water source heat pumps.

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

- High-boy modular units that break down to fit through a standard 36 in. doorway
- Either two or four high-efficiency scroll compressors for efficient part-load control, quiet operation, and system redundancy
- Optional constant volume (CV) or variable air volume (VAV) configurations
- Optional integrated Carrier SCU Open controller for Variable Air Volume (VAV) applications:
  - All units are ETL listed for compliance with UL 60335-2-40.
  - All units are backed by a standard one-year parts warranty with options for extended parts and labor warranties for up to five years.
  - Single point electrical connections and piping connections.

Cabinet construction and insulation

Heavy gauge galvanized sheet metal cabinet construction designed with large access panels for easy maintenance and service. Cabinet interior surfaces are lined with 1/2-in. thick, 1-1/2 lb fiberglass insulation or closed-cell foam insulation. Sheet metal surfaces are treated for maximum corrosion protection to provide resilience for long term vitality. Vertical cabinets have an insulated divider panel between the blower compartment and the compressor section to minimize the transmission of compressor noise, and to permit operational service testing without air bypass.

Modular construction

All 50BVT,V,W units are designed to allow for installation flexibility without breaking refrigerant piping and are available in two styles: high boy and low boy.

High boy units are tall and ship as two (size 034) or four (size 044-064) modules. High boy units can have the filter/economizer field removed to allow every piece of the unit to fit through a standard 36 in. door for easy installation. See 50BV high boy field and shipping splits in "Dimensions" on page 12 for details. Low boy units are short and ship as one (size 034) or two (size 044-064) pieces. The filter/economizer section can be field removed to allow the unit to fit though a 50 in. opening. See 50BV low boy field and shipping splits in "Dimensions" on page 12 for details.

Compressor

Large capacity Omnizone units include dual, high capacity scroll compressors. Compressors are mounted on sturdy channels attached to the cabinet of the unit, ensuring robust support and stability. In addition, compressors are mounted on rubber grommets effectively minimizing vibration and noise transmission to the unit structure.

Refrigerant circuit

Unit size 034 comes with dual independent refrigerant circuits. Units sizes 044-064 come with 4 independent refrigerant circuits. All circuits contain sealed Puron Advance™ refrigerant (R-454B). Refrigerant circuits which include features, such as:

Thermal expansion valve (TXV)

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)

50BVV (heat pump) 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 in all units, the refrigerant circuit filter drier enhances system performance by efficiently filtering and removing contaminants for improved longevity and efficiency.

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. All 50BV units include a factory-installed A2L leak detection system.

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. Coils are either three or four rows deep depending on unit model and mounted above stainless steel condensate drain pans, which help resist corrosion.

Refrigerant to water heat exchanger

50BV units are offered with a Copper coaxial (tube-in-tube) refrigerant to water heat exchanger. Optional

Table of contents

Overview (cont)

Cupronickel coaxial heat exchanger 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. 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. All condensers are rated at 600 psig operating refrigerant pressures and 450 psig waterside pressure.

Refrigerant to Water Heat Exchanger

Blower motor and housing

All units come equipped with adjustable Belt-drive centrifugal blowers. These blowers, you can easily tweak pulley to balance air flow rate in the field. Fans offer cost-effective serviceability with easily replaceable components like bearings, reducing overall maintenance costs. The belt-driven design ensures quieter operation and less wear, providing a reliable and efficient solution. Units also offer Staged Air Volume (SAV) as a special order (ETO), or Variable Air Volume (VAV) operation with Variable Frequency Drive (VFD) compatibility, providing precise fan control for heating and cooling, ensuring code compliance and energy savings.

Optional Reverse Blower

Stainless steel drain pan with condensate switch

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

Condensate overflow sensor

Factory-installed sensor is an electronic sensor mounted to the drain pan. When condensate pan liquid reaches an unacceptable level, the unit is automatically deactivated and placed in a lockout condition. The sensor recognizes 30 continuous seconds of overflow as a fault condition.

Unit controls

CV units include a terminal strip for use with field-provided and installed Carrier or third-party thermostat or with a field provided and installed Carrier Open or third-party DDC control.

All VAV units include a factory-installed, programmed, and run-tested SCU Open DDC controller configured for multi-zone VAV operation or can be configured as a single-zone unit for space temperature control. VAV units can operate standalone or integrated in a Building Automation System using open protocols BACnet®[1]. Local interface to the DDC control for start-up, commissioning, or troubleshooting is accomplished through Carrier's i-Vu® user interface Equipment Touch™ or System Touch™ interface, or the Field Assistant technician tool.

Flexible, efficient, and economical

Units are available for constant volume (CV) or variable air volume (VAV) applications (with the exception of heat pumps). Modular units are factory piped and charged, and ship partially disassembled for easy field installation.

Units include a direct expansion refrigerant to air coil, coaxial refrigerant to water coil, compressors, belt drive supply fan, and reversing valve (heat pump units only). VAV units also include VFD (variable frequency drive) driven supply fan, a factory-installed and configured VAV DDC control, factory-installed hot gas bypass (HGBP) for low load control, and a modulating hot gas reheat (HGRH) coil for supply air temperature control.

These WSHP (water source heat pump) units are built and designed for comfort cooling and heating duty in commercial buildings, such as offices, retail, and schools. The 50BV units are not intended for industrial or process applications.

Safe, reliable operation

Equipment standard safety features include high and low refrigerant pressure protection, voltage protection, air and water coil freeze protection, condensate overflow shut-down, 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 Omnizone unit is shipped to provide internal and external equipment protection. Shipping supports are placed under the blower housing. In addition, units are mounted on oversized pallets with lag bolts for sturdiness and maximum protection during transit.

Ease of installation

The Omnizone™ unit is packaged for simple low cost handling and requires minimal installation. All units are prewired and factory charged with refrigerant. Water connections (FPT) and condensate drains (FPT) are anchored securely to the unit cabinet. High and low voltage knockouts are provided on all units. Modular construction option allows facilitating effortless setup in tight spaces by splitting the unit into several sections depending on size and configuration (low or high boy).

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

Features/Benefits (cont)

Simple maintenance and serviceability

The Omnizone units are constructed to provide ease of maintenance. Units have large removable panels for easy access. Additional panels are provided to access the blower and control box sections. The blower housing assembly can be serviced without disconnecting ductwork from the dedicated blower access panel. Blower units are provided with permanently lubricated bearings for worry-free performance. Electrical disconnection of the blower motor and control box is easily accomplished from quick disconnects on each component. Easy removal of the control box from the unit provides access to all refrigeration components. The refrigeration circuit is easily tested and serviced through the use of high and low-pressure ports integral to the refrigeration circuit.

Constant Volume (CV) Control

50BVT,V constant volume units are a great fit for single-zone applications that require simple control. All constant volume units include a thermostatic style input for use with thermostat or field provided DDC controls to provide 2-stage (size 034) or 4-stage (size 044-064) cooling. 50BVV units also provide 2-stage (size 034) or 4-stage (size 044-064) heat pump heating. An ETO (engineered to order) is available for staged air volume (SAV™) two speed fan control and for condenser-less units for use with field-provided remote condensers.

Variable Air Volume (VAV) Control

50BVW units are designed for use in multi-zone VAV applications to act as a cooling only VAV air source. All VAV units include a factory-installed and configured DDC controller that is set up for multi-zone VAV control. VAV units include a supply fan VFD that is operated by the DDC controller to maintain duct static pressure using the included duct pressure transducer (field-installed).

The refrigeration circuits of the 50BVW units are also optimality configured to maximize performance in a VAV system with either 2-stage (size 034) or 4-stage (size 044-064) cooling with hot gas bypass (HGBP) on every circuit. All VAV units include a modulating hot gas reheat (HGRH) coil to help prevent low supply air temperatures. The DDC controller operates the unit refrigeration components to maintain supply air temperature using the factory provided, field-installed return air temperature sensors and factory-installed supply air temperature sensor (duct SAT sensor is provided for field installation, installation is required for VAV operation).

Model number nomenclature

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Example:	5	0	B	V	T	0	3	4	–	F	C	6	2	E	–	–

Model Series (Pos 1-4)
50BV – OMNIZONE Modular Indoor Self-Contained Unit

Unit Type (Pos 5)[a]
T – (CV) Cool Only[b]
V – (CV) Heat Pump[b]
W – (VAV) Cool Only[c]

Nominal Capacity (Pos 6-8)
034 – 30 Tons
044 – 40 Tons
054 – 50 Tons
064 – 60 Tons

Economizer and Hot Gas Reheat Options (Pos 9)
- – None
A – Waterside Economizer (WSE) with 3-Way Valve Package and Controls
C – Cycling Hot Gas Reheat Coil
D – Cycling Hot Gas Reheat and WSE with 3-Way Valve Package and Controls
F – Modulating Hot Gas Reheat[d]
G – Modulating Hot Gas Reheat and WSE with Valve Package Controls[d]

Indoor Motor and Drive Options (Pos 10)[h]
F — 7.5 Hp with Standard Drive
G — 10 Hp with Standard Drive
H — 15 Hp with Standard Drive
J — 20 Hp with Standard Drive
R — 7.5 Hp with Medium Drive
S — 10 Hp with Medium Drive
T — 15 Hp with Medium Drive
U — 20 Hp with Medium Drive
5 — 7.5 Hp with High Drive
6 — 10 Hp with High Drive
7 — 15 Hp with High Drive
8 — 20 Hp with High Drive

Airflow Configuration (Pos 11)[f,g]
C – Rear Return, Top Supply
D – Rear Return, Front Supply
E – Rear Return, Rear Supply

Voltage Description (Pos 12)
1 – 575-3-60
5 – 208/230-3-60
6 – 480-3-60

Cabinet Changes (Pos 13)[e]
1 – High Boy Cabinet
2 – Low Boy Cabinet

Revision / Controls (Pos 14)
G – R-454b, CV with Standard Controls (50BVT, 50BVV)[c]
H – R-454b, VAV with SCU Open Controller (50BVW)[a]

Factory-Installed Options (Pos 15-16)
Refer to price pages of unit for details.

NOTE(S):
a. VAV requires factory-installed modulating HGRH.
b. CV units (50BVT and 50BVV) do not receive factory-installed controls and can only have the no controller option (Pos 14 = G).
c. Only VAV units (50BVW) will have the factory-installed controller (Pos 14 = H).
d. F or G is required for VAV units.
e. See dimensional diagrams for physical size difference between High and Low Boy.
f. Low Boy cabinets only available with Top or Front Supply.
g. High Boy cabinets only available with Front or Rear Supply.
h. HP ratings are per motor. Most 50BV units have two indoor-fan motors. See price pages for additional information.

LEGEND
CV — Constant Volume
HGBP — Hot Gas Bypass
HP — Horsepower
Pos — Position
VAV — Variable Air Volume
WSE — Water Economizer

Capacity ratings

Efficiency and Capacity Ratings[a,b]

UNIT	SIZE	WATER FLOW RATE (GPM)	WATER LOOP HEAT PUMP			
			Cooling 86°F		Heating 68°F	
			Capacity BTU/hr	EER	Capacity BTU/hr	COP
50BVT,W	034	90	377,300	10.45	—	—
	044	120	547,900	14.00	—	—
	054	150	625,700	12.65	—	—
	064	180	754,600	10.45	—	—
50BVV	034	90	377,300	10.45	463,100	3.45
	044	120	547,900	14.00	593,300	4.10
	054	150	625,700	12.65	687,200	4.00
	064	180	754,600	10.45	926,200	3.45

NOTE(S):

a. Ratings are at AHRI/ISO 13256-1 water loop conditions.
b. For specific configuration ratings, refer to WSHP Builder in the Carrier NG ECat.

LEGEND

AHRI — Air-conditioning, Heating, and Refrigeration Institute
BTU/hr — British Thermal Unit per Hour
COP — Coefficient Performance
EER — Energy Efficiency Ratio

Physical data

Physical Data — 50BVT, V, W

UNIT 50BVT, V, W	034	044	054	064
Compressor Type	Scroll	Scroll	Scroll	Scroll
Compressor Qty	2	4	4	4
Compressor Size (Hp)	15	10	12.5	15
Refrigeration Charge per Circuit (oz)	264	144	284	264
Total Refrigeration Charge (oz)	528	576	1136	1056
Max Water Working Pressure (psig/kPa)	450/3100	450/3100	450/3100	450/3100
Number of Manifolded Refrigeration Circuits	2	4	4	4
AIR SIDE COILS				
Evaporator Coil Type	Tube-Fin	Tube-Fin	Tube-Fin	Tube-Fin
Evaporator Dimensions (H x L) in. (qty)	26 x 62 (2)	26 x 62 (4)	26 x 62 (4)	26 x 62 (4)
Evaporator Rows	4	3	4	4
Waterside Economizer Coil Dimensions (H x L) in. (qty)	26.2 X 61 (2)	26.2 X 61 (4)	26.2 X 61 (4)	26.2 X 61 (4)
Waterside Economizer Coil Rows	3	3	3	3
Hot Gas Reheat Coil Dimensions (H x L) in. (qty)	26.2 X 62.5 (2)	26.2 X 62.5 (4)	26.2 X 62.5 (4)	26.2 X 62.5 (4)
Hot Gas Reheat Coil Rows	1	1	1	1
MOTOR AND BLOWER				
Fan Motor Type	Belt Drive	Belt Drive	Belt Drive	Belt Drive
Available Fan Motors (hp)	7.5, 10, 15, 20	7.5, 10, 15, 20	7.5, 10, 15, 20	7.5, 10, 15, 20
Blower Wheel Size (in.) (Dia. x W x Qty)	18 x 18 x 1	18 x 18 x 2	18 x 18 x 2	18 x 18 x 2
Nominal CFM	12,200	16,000	20,000	24,000
WATER COIL				
Connection Type	FPT	FPT	FPT	FPT
Size	2-1/2"	2-1/2"	3"	3"
Water Coil Type (qty)	Coaxial (2)	Coaxial (4)	Coaxial (4)	Coaxial (4)
Coil; Volume Each (gal.)	2.69	1.80	2.69	2.69
RETURN AIR FILTERS				
Nominal Size of 4" Standard Filter - (H x L) in. (qty)	17 x 27 (8)	17 x 27 (16)	17 x 27 (16)	17 x 27 (16)
Weight - Operating (lb)	2,650	4,750	5,500	5,550
Weight - Shipping (lb)	2,866	4,846	5,700	5,732

Physical data (cont)

Modulating Operating Weights

	HIGH BOY DESIGN				LOW BOY DESIGN			
	034	**044**	**054**	**064**	**034**	**044**	**054**	**064**
Main Air Conditioning Section								
Number of Sections	1	2	2	2	1	2	2	2
Main Section (ea) (lb)	1450	1175	1550	1575	2100	1825	2200	2225
Hot Gas Reheat Coil Option (ea) (lb)	40	40	40	40	40	40	40	40
Filter / Economizer Sections								
Number of Sections	1	2	2	2	1	2	2	2
Filter Section (ea) (lb)	310	310	310	310	310	310	310	310
Waterside Economizer Option (ea) (lb)	200	200	200	200	200	200	200	200
Blower Section								
Number of Sections	1	2	2	2	Included in Main Air Conditioning Section			
Fan Section with Max Motor Size (lb)	650	650	650	650				
Total Unit								
Number of Sections	3	6	6	6	2	4	4	4
Total Weight of the Unit with Options (lb)	2650	4750	5500	5550	2650	4750	5500	5550

Options and accessories

Factory-installed options

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.

Hot gas reheat (HGRH)

HGRH is an efficient and effective method of providing space humidity control. HGRH allows the unit to dehumidify the space when there is no demand for space cooling without the need for additional energy consuming devices. The HGRH package is factory installed and includes a HGRH coil (installed behind the indoor air coil, 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 is it cooled and dehumidified. The cool, dehumidified air then passes through the reheat coil where it is heated to a neutral temperature (typically 68 to 78°F). The neutral, dry air is then delivered to the space and reduces space humidity levels without cooling the space. See NG ECAT unit report for HGRH performance. This option requires a thermostat with dehumidification output, humidistat, or DDC controller with space relative humidity sensor and binary/digital output.

Modulating hot gas reheat (MHGRH)

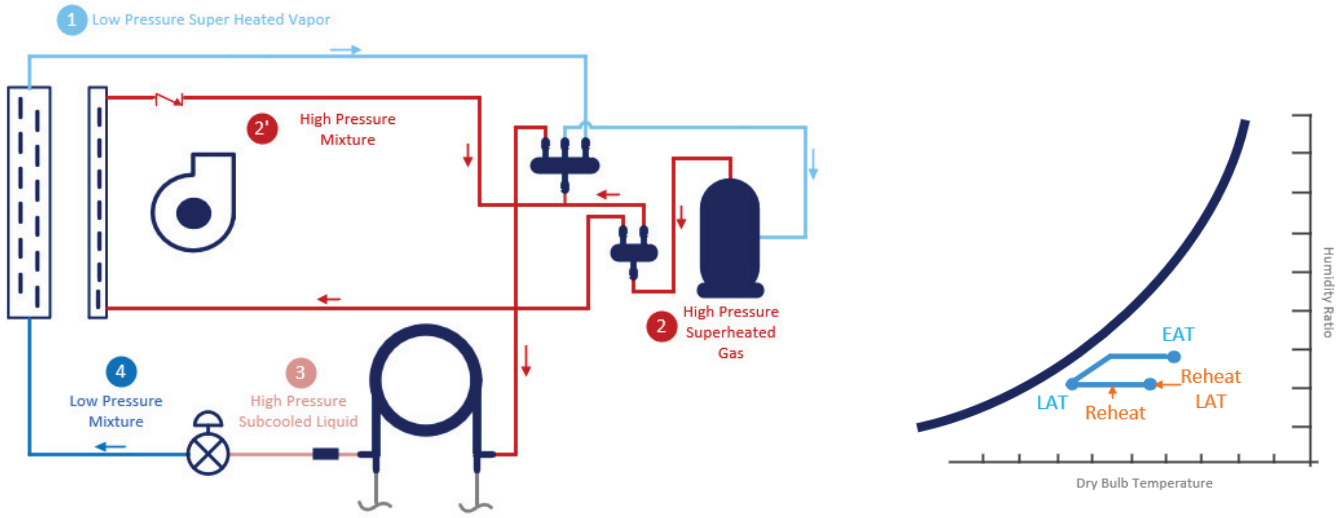
MHGRH is an effective method of providing supply air temperature control for Variable Air Volume (VAV) applications. It provides steady supply air temperature by modulating HGRH during compressor cycles, preventing temperature fluctuations. This ensures precise and efficient temperature regulation. The MHGRH package is factory installed and includes a HGRH coil (installed behind the indoor air coil, a modulating HGRH control valve, and additional refrigerant piping. 50BVW Omnizone VAV units are standard with modulating HGRH for supply air temperature control. If the air leaving the indoor air coil is colder than the unit supply air temperature set point, the modulating HGRH coil is enabled to reheat the air back up to the supply air temperature set point. The modulating HGRH system is controlled by the unit DDC control for supply air temperature control only and will not operate for dehumidification purposes.

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 120 psig and will modulate to prevent the pressure falling any lower. This setting is field adjustable for 75-150 psig and this set point may be adjusted as required.

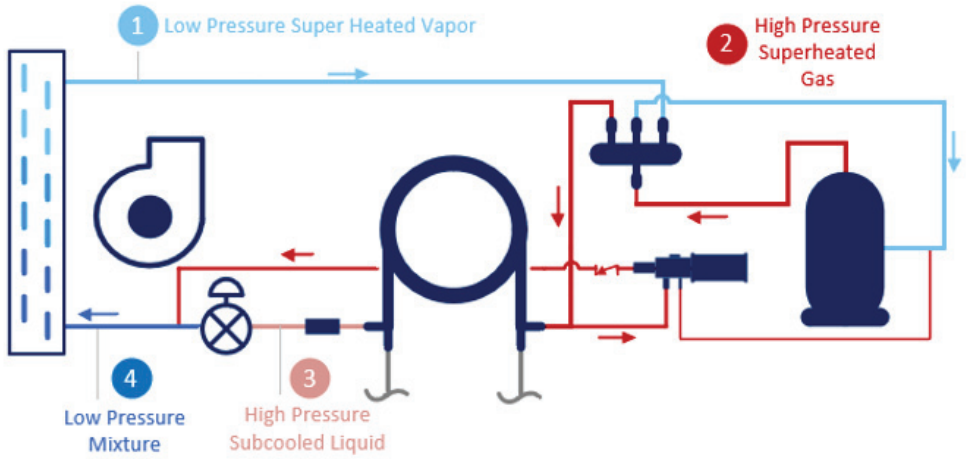
NOTE: HGBP is standard with VAV units.

Hot Gas Reheat (HGRH)



Options and accessories (cont)

Hot Gas Bypass (HGBP)



Waterside economizer

A waterside economizer 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 below. See dimensional drawings on pages 14-23 for details.

Hot water coil

A factory-installed hot water coil is available in the filter/economizer section of modular CV and VAV units (50BVT,V,W). The hot water coil is intended to have a separate water supply and provides pre-heat operation (upstream of the evaporator coil and supply fan). The hot water coil package includes a factory-installed 1 or 2-row hot water coil and pipe connections on the side of the unit. See dimensional drawings on pages 14-23 for details. 50BVW units only, the provided SCU Open controller with VAV units includes modulating hot water heat functionality.

NOTE: The hot water coil requires a separate pipe connection, field provided and installed control valves and strainer, and field provided and installed control system with freeze protection.

Extended range option

This option includes insulation on the coaxial heat exchanger and water piping to prevent condensation during low entering water temperature conditions. Extended range option is recommended for application with EWT < 50°F.

IEQ options

Every unit is equipped with a default four-inch, 4-sided filter rack and 4 in. MERV 8 filter suitable for ducted return applications.

Options and accessories (cont)

Controls options

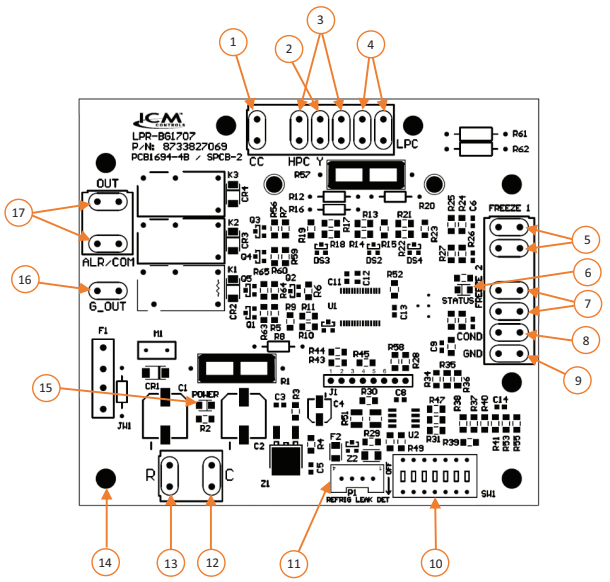
Unit Protection Module (UPM)

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:

- Hi and Low Refrigerant Pressure Protection: The unit is equipped with high and low-pressure switches set to disable operation at pressures above 600 psig or below 40 psig.
- Low Pressure Bypass Timer: This bypass helps to eliminate nuisance trips by keeping the compressor on for 120s upon the LPS opening. If the LPS is still open after 2 minutes the unit is shut down and put into soft lockout.
- Air and Water Coil Freeze Protection: Both the cooling and heating refrigerant liquid line temperatures are monitored to prevent freeze up of both the water and air coil. The freeze limit by default is set to 25°F and is configurable via a dip switch on the UPM to 15°F for applications utilizing antifreeze.
- High Condensate Level Shutdown: All units are equipped with a condensate overflow sensor in the drain pan set to disable operation in the event of an overflow condition.
- Anti-Short Cycle Time Delay: A 5-minute delay on break timer to prevent compressor short cycling.
- Random Start Time Delay: Each controller has a unique random start delay ranging from 270 to 300 seconds on initial power up to reduce the chance of multiple units simultaneously starting at the same time after powering up or after a power interruption, thus avoiding creating large inrush current.
- Brownout/Surge Protection: The UPM board will disable the compressor if the incoming low voltage power falls below 18 vac.
- Intelligent Alarm Reset: Upon fault, a 5-minute break is initiated, and the unit will automatically restart after this time period has expired.
- Hard Lockout Reset: A hard lockout can be reset by turning the unit thermostat off and then back on when the RESET DIP switch is set to “Y” or by shutting off unit power at the circuit breaker when the RESET DIP switch is set to “R”.
- Alarm Output: The alarm output is normally open (NO) dry contact. The output is configurable via a dip switch on the UPM to be constant, as a general alarm, or pulsed, to be interpreted for the specific alarm by a remote device.
- Refrigerant Leak Detection: On units equipped with an A2L refrigerant leak detection sensor the controller will take mitigation action in the event of a leak. The leak detection sensor is standard option and included with the unit when required by the product safety standard UL60335-2-40. The leak detection sensor is optional feature in cases where it is required by safety standards other than UL60335-2-40 standard with more stringent requirements.
- Test Mode: the UPM features a test mode for ease of service which shortens the anti-short cycle and random start delays and requires manual reset for both soft and hard lockouts.

UPM Control Board



LEGEND

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

Options and accessories (cont)

Thermostat control

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

Consider applying a thermostat or DDC controller that matches the unit staging capability for maximum performance. Otherwise, field wiring may be needed to match a higher number of available cooling or heating stages to a thermostat or DDC controller with a lower amount of cooling or heating stages.

Thermostats

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

NOTE(S):

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

Options and accessories (cont)

Control options to supplement thermostat

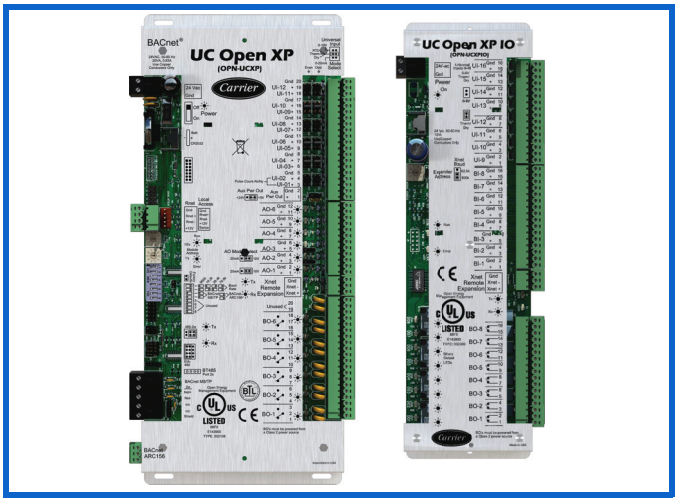
50BVT/V units have a number of control options available to supplement the control of a thermostat allowing for control of various auxiliary components that thermostats are not typically capable of controlling. These options include:

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.

Carrier i-Vu SCU Open DDC for VAV units

All VAV units include a factory-installed, programmed, and run-tested SCU Open DDC controller configured for multi-zone VAV operation or can be configured as a single-zone unit for space temperature control. VAV units can operate standalone or integrated in a Building Automation System using open protocols BACnet (ARCnet and MS/TP). Local interface to the DDC control for start-up, commissioning, or troubleshooting is accomplished through Carrier's i-Vu user interface Equipment Touch™ or System Touch™ interface, or the Field Assistant technician tool.



Multi-zone VAV Application Features

- Provides Multi-zone supply air temperature control with up to 2 stages of mechanical cooling and modulating hot water valve control. Additionally, controller provides modulating fan control to maintain duct static pressure.
- Controls modulating or 2-position outside air damper to meet ASHRAE 62 ventilation requirements.
- Integrated 2-position waterside economizer control for optimized mechanical cooling (ASHRAE 90.1).
- Scheduling. Adaptable scheduling for occupied and unoccupied periods with ability for internal/local occupancy configuration or remote occupancy configuration via external dry contact, local user interfaces, i-Vu network, or BAS network. Additionally, flexible intermittent fan operation is available during both occupied and unoccupied periods for energy savings.
- Equipment Performance Monitoring: EWT, LWT, SAT, RAT.
- Optional Discrete inputs for: Compressor Status, Fan Status, Condenser water valve Status, Filter Status, Water flow switch (DPS), Supply duct high static pressure.
- 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.
- Shutdown Inputs. Fire/Smoke Detector Shutdown and Network Shutdown to safely shutdown the unit in a controlled fashion with ability to monitor the unit.
- Alarm Status. Alarms status is accessible through equipment user interfaces or network. Refer to Controls, Start-Up, Operation and Troubleshooting Guide for full list of alarms.

Hardware Features

- Native BACnet MS/TP or ARCnet communications

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.

Equipment Touch Display

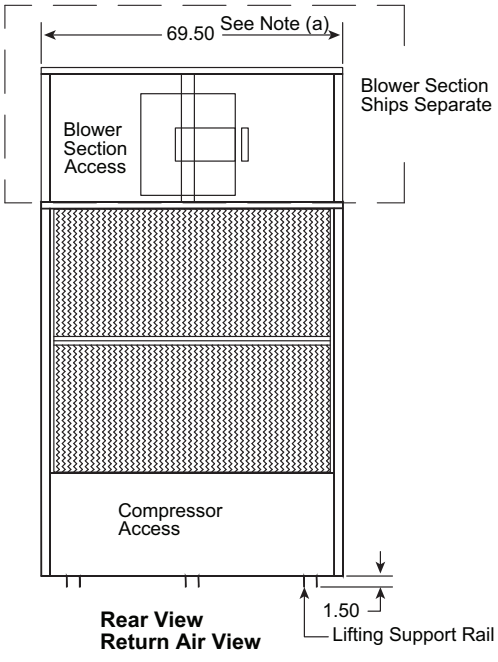
Carrier's Equipment Touch (ET) displays are an integrated component of the i-Vu building automation system. They feature illuminated color pixel touchscreens in two different sizes and connect to a single i-Vu controller. Designed for panel or wall mounting, they provide building occupants, facility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

Field Assistant

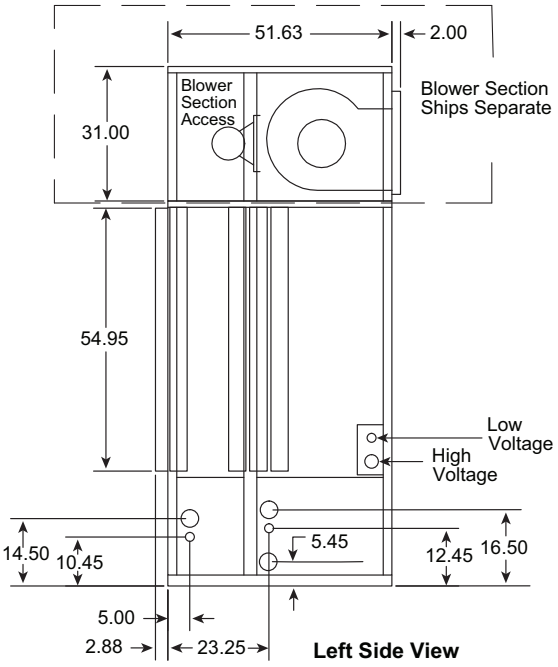
Field Assistant is a standalone tool you can install on computer or laptop to access a single SCU Open™ controller, several controllers, or a network of i-Vu SCU Open controllers (up to 750 controllers). It can communicate with the devices using USB kit. For more details about the Field Assistant tool,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

Dimensions

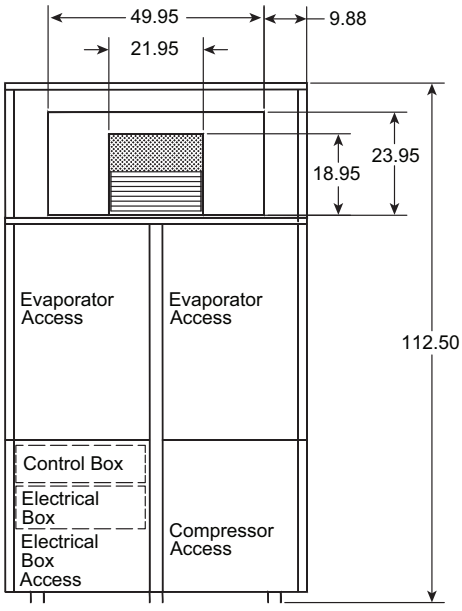
50BVT,V,W 034 (High Boy) Rear Return, Front Supply with or without Waterside Economizer or Hot Water Coil



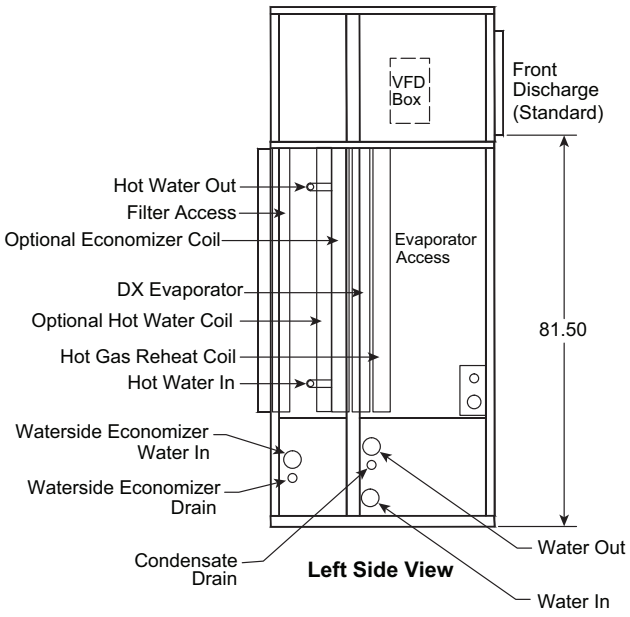
Rear View Return Air View



Left Side View



Front View



Left Side View

NOTES:
a. Optional hot water coil connections may add up to 3 in. on both the left and right side of the unit, increasing the unit width an additional 6 in.
b. Dimensions in inches.
c. Recommended minimum service clearances are as follows:
   1. Front and rear: 36 in.
   2. Left of right side: 65 in. for coil removal
   3. Side opposite coil removal: 36 in.
d. For all other airflow configuration drawings see *SCU*Builder program.
e. Dimensions Include Base Rail Height (1.5 in.).

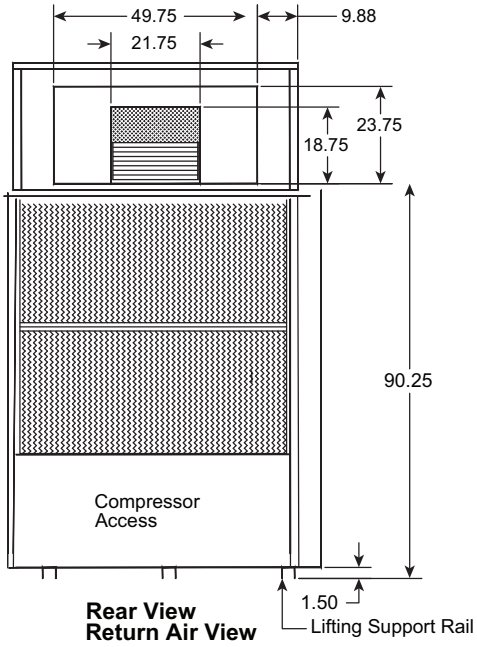
WATER CONNECTIONS	
H_2O In[a]	2.5
H_2O Out[a]	2.5
Condensate[a]	0.75
Economizer Condensate	1.25
HW In/Out Sweat Connection	1.38

NOTE(S):
a. FTP Type Connection.

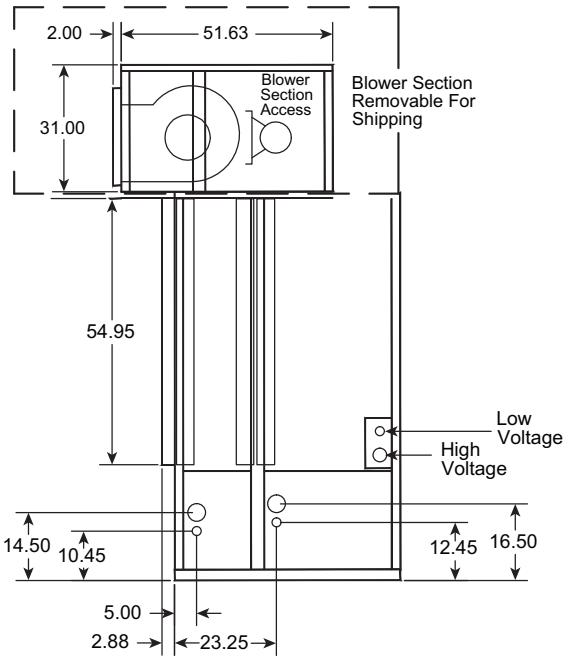
FILTERS	
NOMINAL	**QUANTITY**
17 x 27 x 4	8

Dimensions (cont)

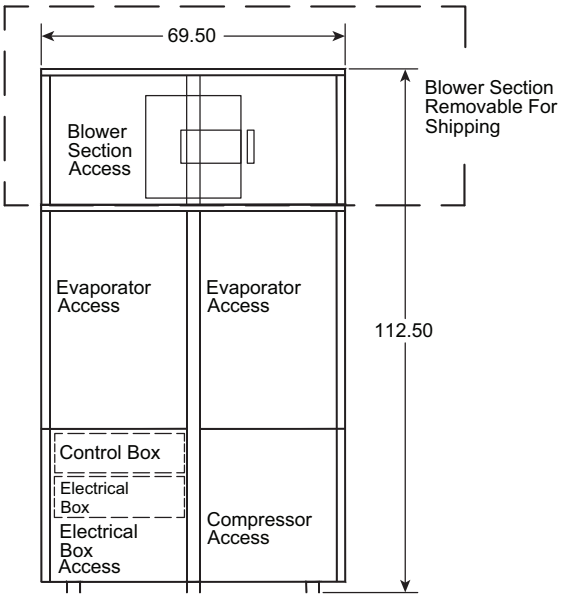
50BVT,V,W 034 (High Boy) Rear Return, Rear Supply with or without Waterside Economizer or Hot Water Coil



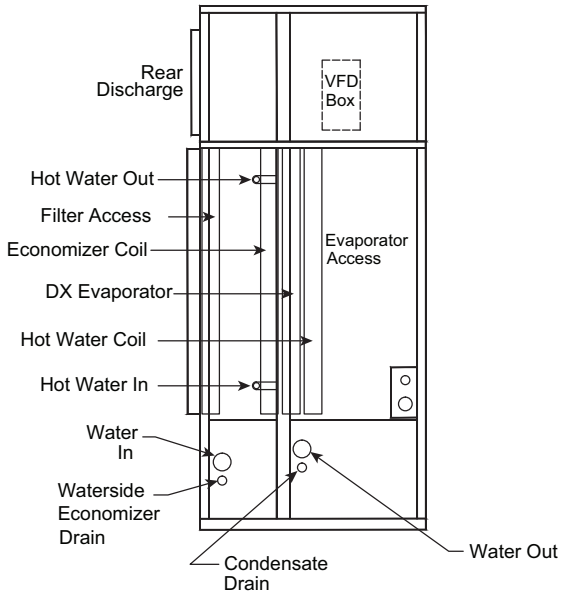
Rear View Return Air View



Left Side View



Front View



Left Side View

WATER CONNECTIONS	
H_2O In[a]	2.5
H_2O Out[a]	2.5
Condensate	0.75
Economizer Condensate	1.25
HW In/Out	1.38

NOTE(S):

a. FTP Type Connection.

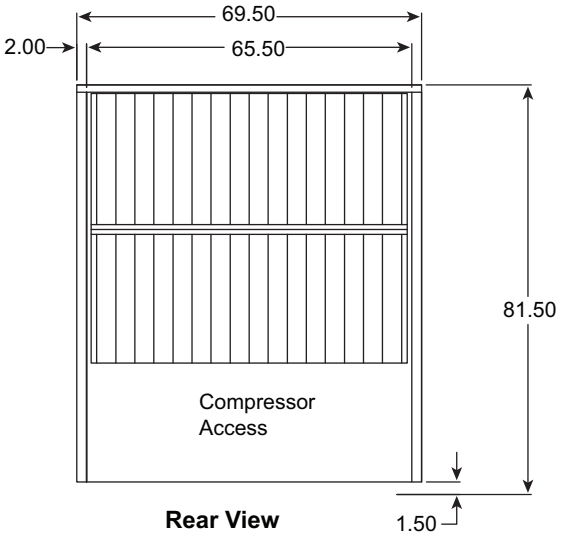
FILTERS	
NOMINAL	**QUANTITY**
17 x 27 x 4	8

NOTES:

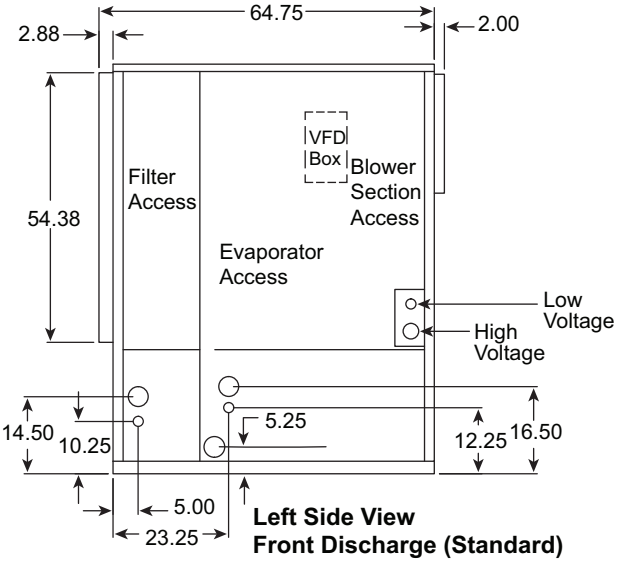
a. Optional hot water coil connections may add up to 3 in. on both the left and right side of the unit, increasing the unit width an additional 6 in.
b. Dimensions in inches.
c. Recommended minimum service clearances are as follows:
   1. Front and rear — 36 in.
   2. Left of right side — 65 in. for coil removal
   3. Side opposite coil removal —36 in.
d. For all other airflow configuration drawings see *SCU*Builder program.
e. Dimensions Include Base Rail Height (1.5 in.).

Dimensions (cont)

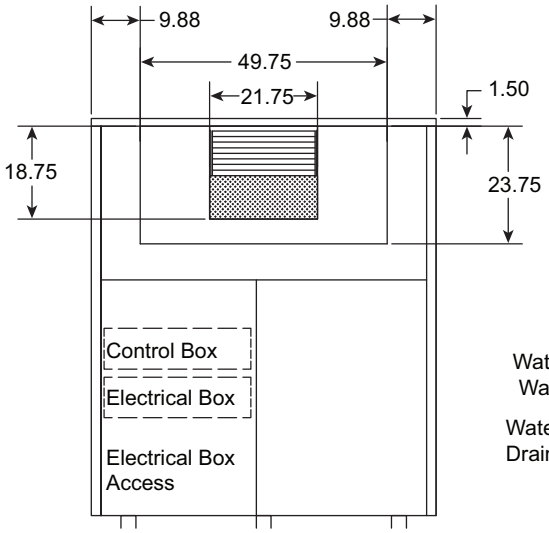
50BVT,V,W 034 (Low Boy) Rear Return, Front Supply with or without Waterside Economizer or Hot Water Coil



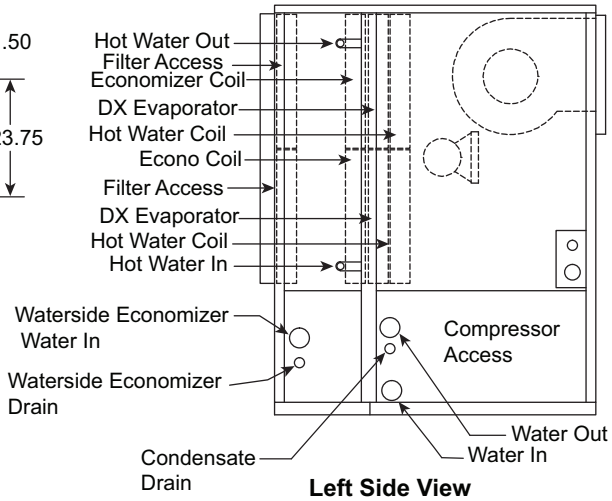
Rear View
Return Air View



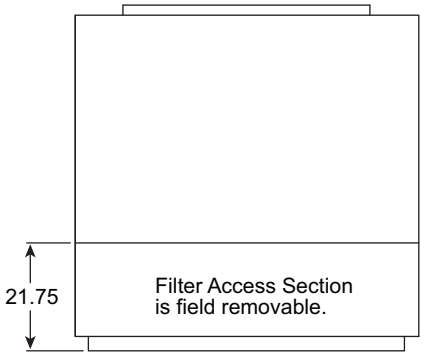
Left Side View
Front Discharge (Standard)



Front View



Left Side View
Front Discharge



Top View

WATER CONNECTIONS	
H_2O In[a]	2.5
H_2O Out[a]	2.5
Condensate[a]	0.75
Economizer Condensate	1.25
HW In/Out Sweat Connection	1.38

NOTE(S):
a. FPT Type Connection.

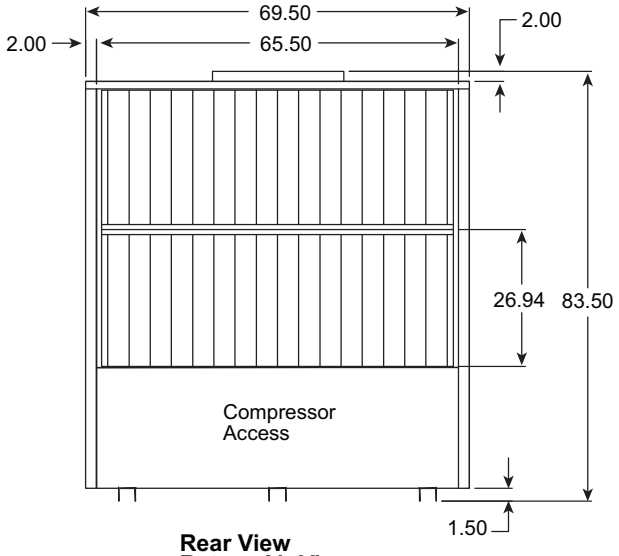
FILTERS[a]		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27 x 4	16.5 x 26.50	8

NOTE(S):
a. 4 in. thick.

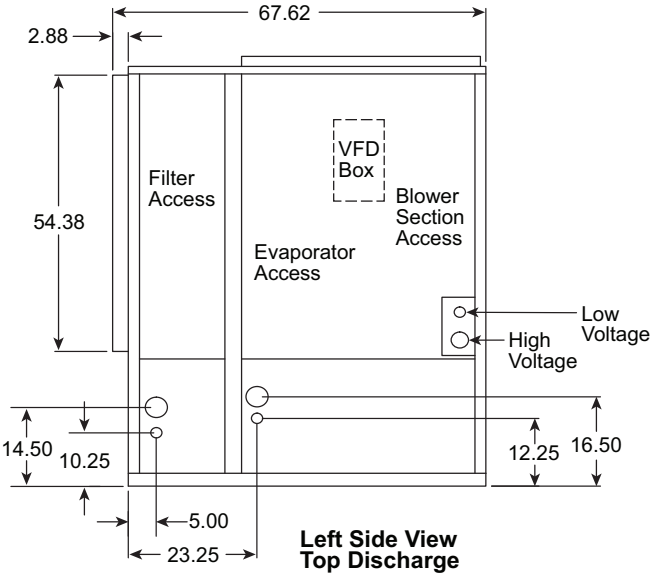
NOTES:
a. Dimensions in inches.
b. Recommended minimum service clearances are as follows:
1. Front and rear — 36 in.
2. Left and right side — 65 in. for coil removal
3. Side opposite coil removal — 36 in.
c. For all other airflow configuration drawings see *SCU*Builder program.
d. Dimensions include base rail height (1.5 in.).

Dimensions (cont)

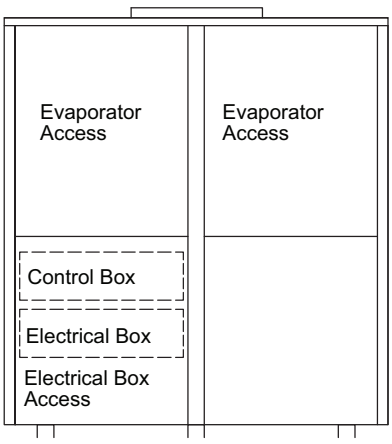
50BVT,V,W 034 (Low Boy) Rear Return, Top Supply with or without Waterside Economizer or Hot Water Coil



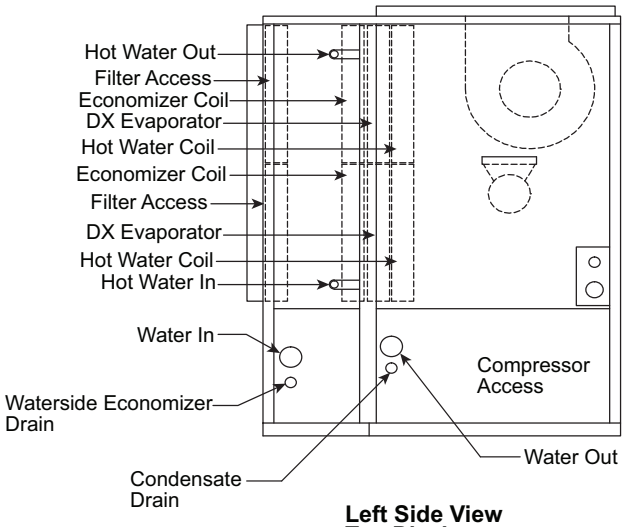
Rear View
Return Air View



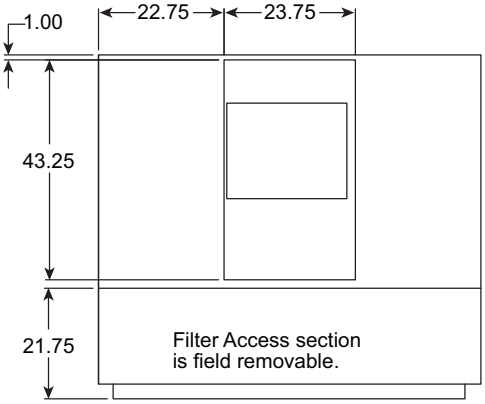
Left Side View
Top Discharge



Front View



Left Side View
Top Discharge



Top View
Top Discharge

WATER CONNECTIONS	
H_2O In[a]	2.5
H_2O Out[a]	2.5
Condensate[a]	0.75
Economizer Condensate	1.25
HW In/Out Sweat Connection	1.38

NOTE(S):

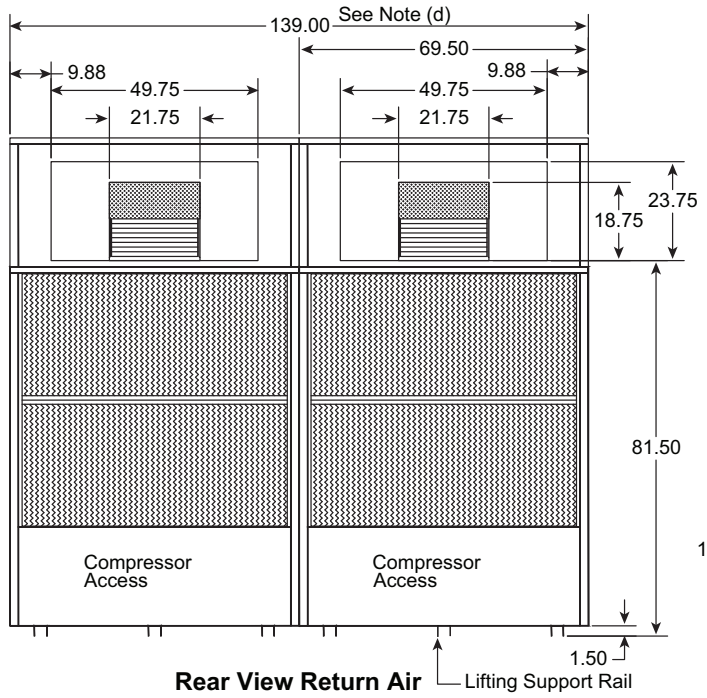
a. FPT Type Connection.

FILTERS		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27 x 4	16.5 x 26.50	8

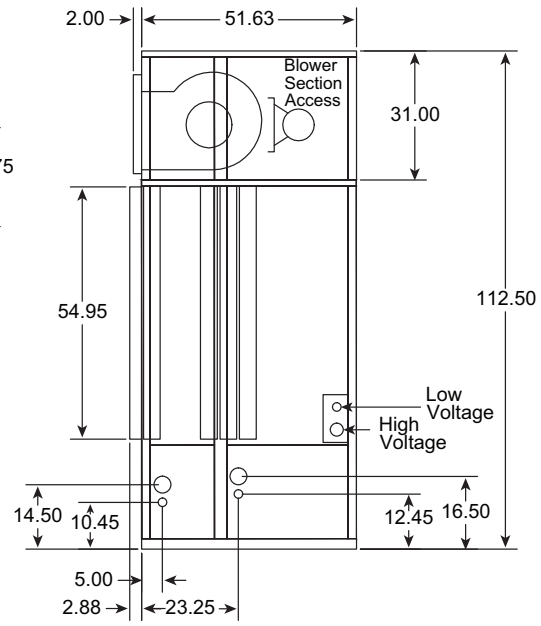
NOTES:
a. Dimensions in inches.
b. Recommended minimum service clearances are as follows:
1. Front and rear — 36 in.
2. Left and right side — 65 in. for coil removal
3. Side opposite coil removal — 36 in.
c. For all other airflow configuration drawings see *SCU*Builder program.
d. Dimensions include base rail height (1.5 in.).

Dimensions (cont)

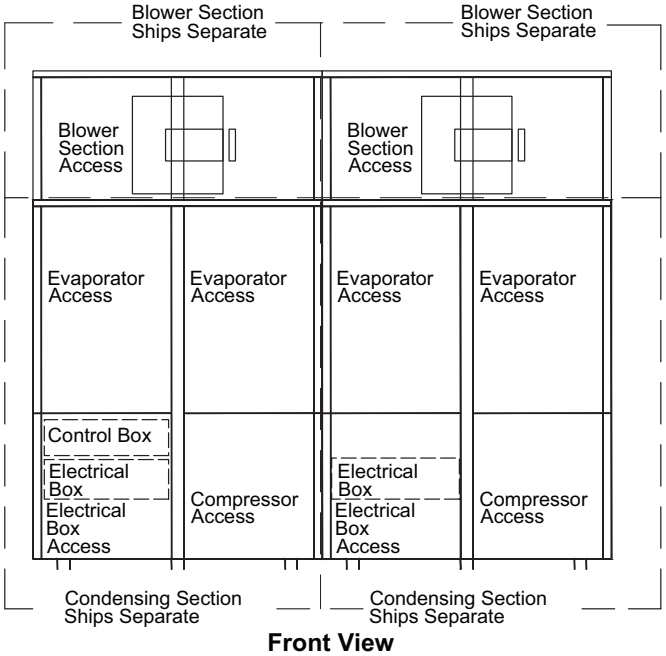
50BVT,V,W 044-064 (High Boy) Rear Return, Rear Supply with or without Waterside Economizer and Hot Water Coil



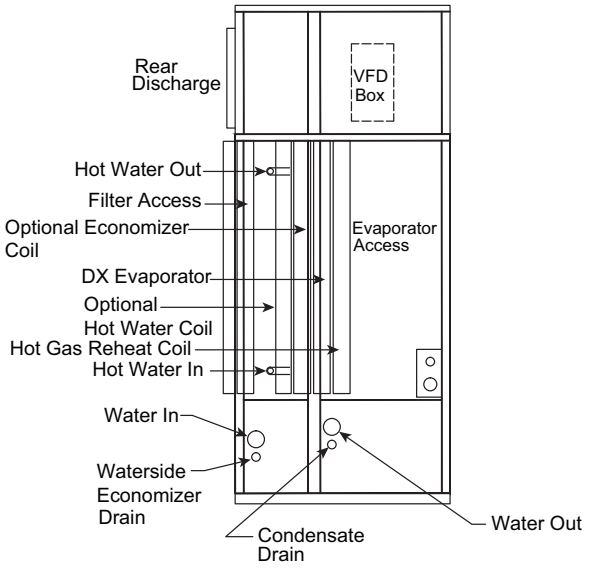
Rear View Return Air



Left Side View



Front View



NOTES:
a. Dimensions in inches.
b. Recommended minimum service clearances are as follows:
   1. Front and rear — 36 in.
   2. Left and right side — 65 in. for coil removal
c. For all other airflow configuration drawings see *SCU*Builder program.
d. Dimensions include base rail height (1.5 in.).

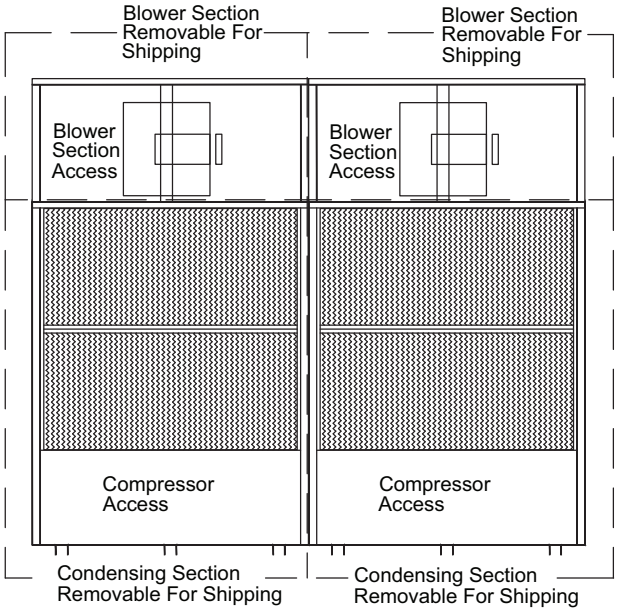
WATER CONNECTIONS			
Model	**44**	**54**	**64**
H_2O In[a]	2.5	3.0	3.0
H_2O Out[a]	2.5	3.0	3.0
Condensate[a]	0.75	0.75	0.75
Economizer Condensate	1.25	1.25	1.25
HW In/Out Sweat Connection	1.38	1.38	1.38

NOTE(S):
a. FPT Type Connection.

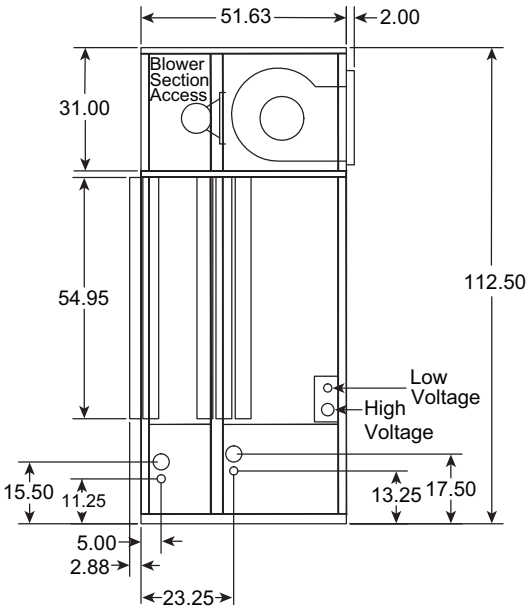
FILTERS		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27 x 4	16.5 x 29.75 x 4	16

Dimensions (cont)

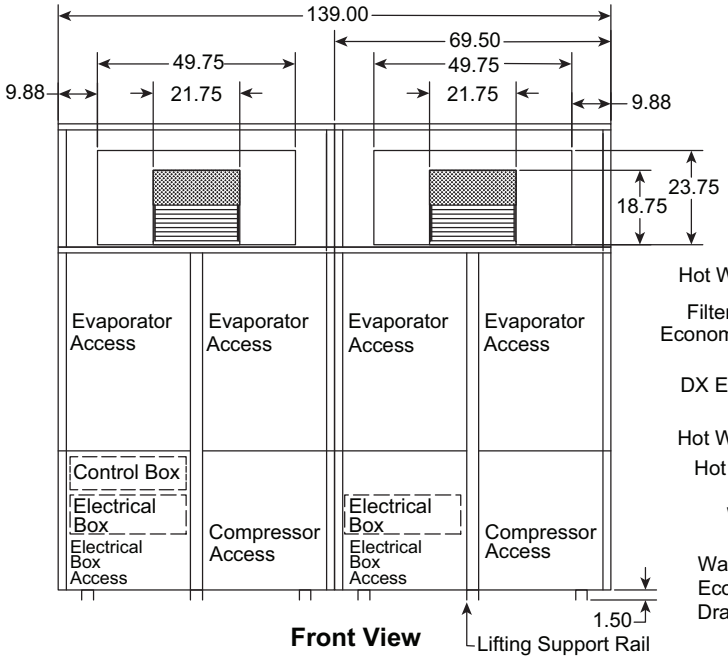
50BVT,V,W 044-064 (High Boy) Rear Return, Front Supply with or without Waterside Economizer or Hot Water Coil



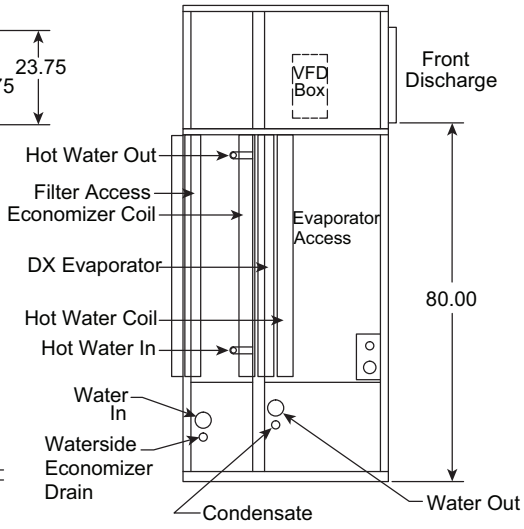
Rear View Return Air



Left Side View



Front View



WATER CONNECTIONS	
H_2O In[a]	2.5
H_2O Out[a]	2.5
Condensate[a]	1.25
Economizer Condensate	1.25
HW In/Out	1.38

NOTE(S):

a. FPT Type Connection.

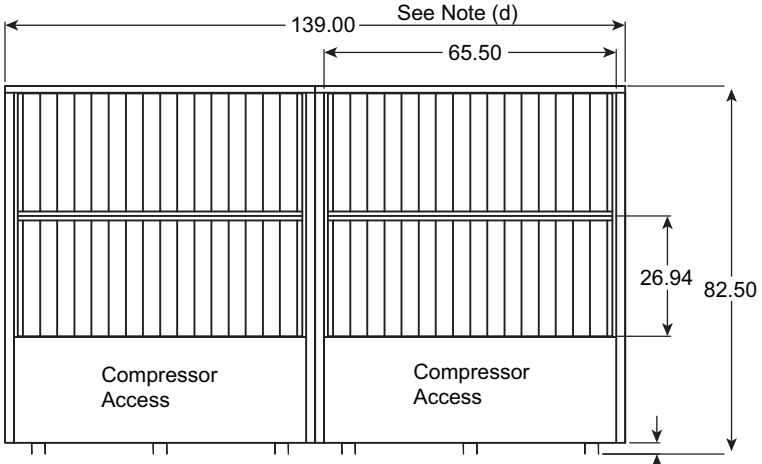
FILTERS		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27 x 4	16.5 x 29.75 x 4	16

NOTES:

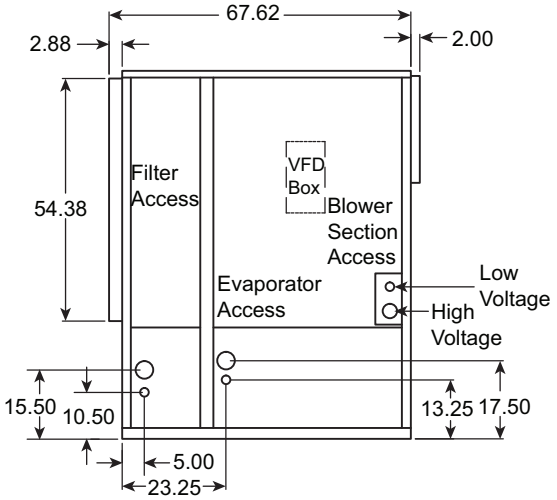
a. Dimensions in inches.
b. Recommended minimum service clearances are as follows:
   1. Front and rear — 36 in.
   2. Left and right side — 65 in. for coil removal
c. For all other airflow configuration drawings see *SCU*Builder program.
d. Dimensions include base rail height (1.5 in.).

Dimensions (cont)

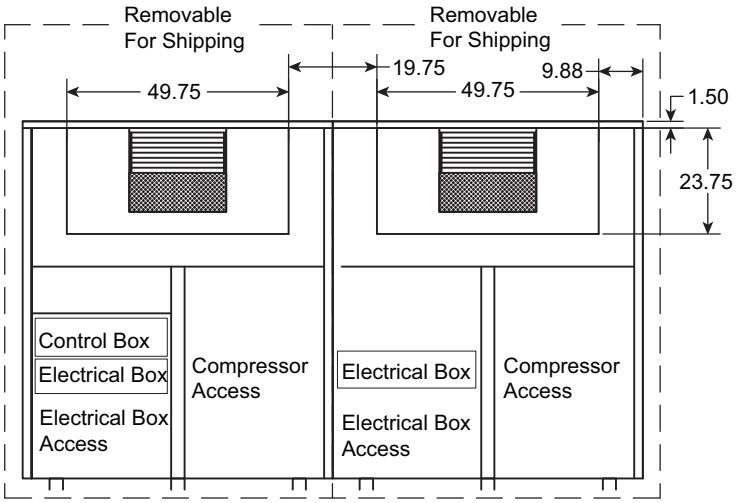
50BVT,V,W 044-064 (Low Boy) Rear Return, Front Supply with or without Waterside Economizer and Hot Water Coil



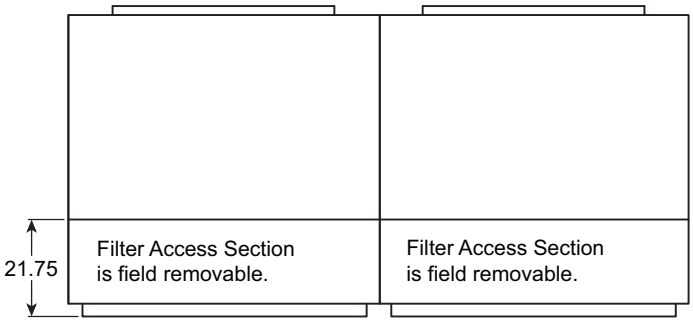
Rear View Return Air



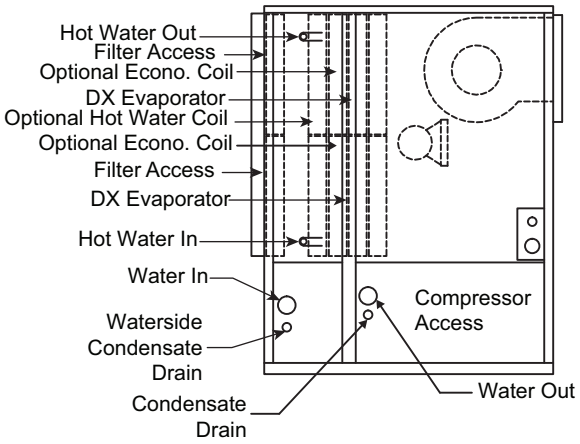
Left Side View Top Discharge



Front View



Top View



Left Side View Top Discharge

NOTES:
a. Dimensions in inches.
b. Recommended minimum service clearances are as follows:
1. Front and rear — 30 in.
2. Left and right side — 65 in. for coil removal
c. For all other airflow configuration drawings see *SCU*Builder program.
d. Dimensions include base rail height (1.5 in.).

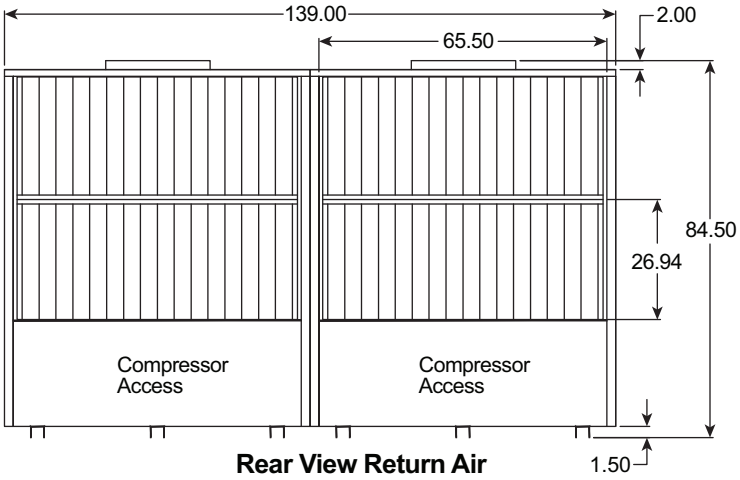
WATER CONNECTIONS			
Model	**44**	**54**	**64**
H_2O In[a]	2.5	3.0	3.0
H_2O Out[a]	2.5	3.0	3.0
Condensate[a]	1.25	1.25	1.25
Economizer Condensate[a]	1.25	1.25	1.25
HW In/Out Sweat Connection	1.38	1.38	1.38

NOTE(S):
a. FPT Type Connection.

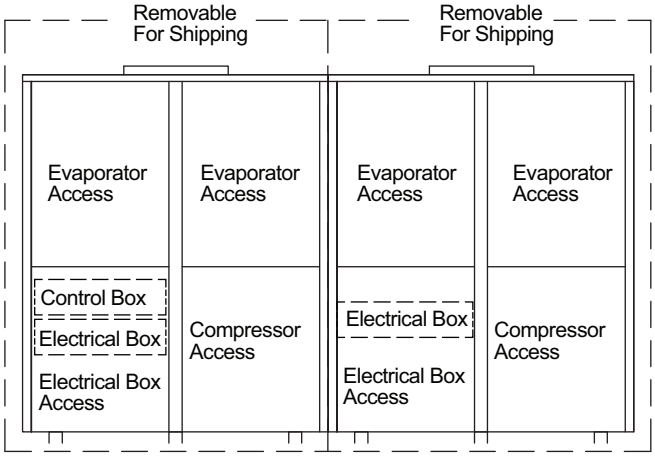
FILTERS		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27 x 4	16.5 x 29.75 x 4	16

Dimensions (cont)

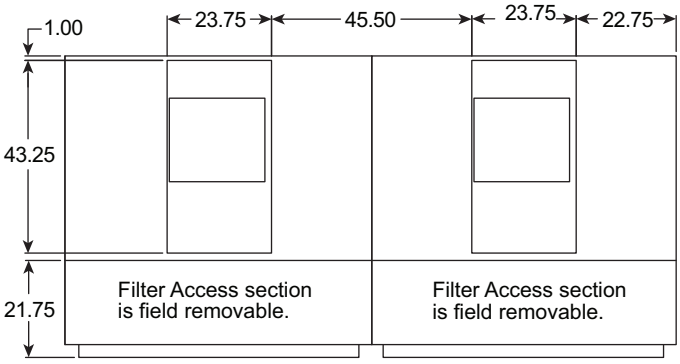
50BVT,V,W 044-064 (Low Boy) Rear Return, Top Supply with or without Waterside Economizer and Hot Water Coil

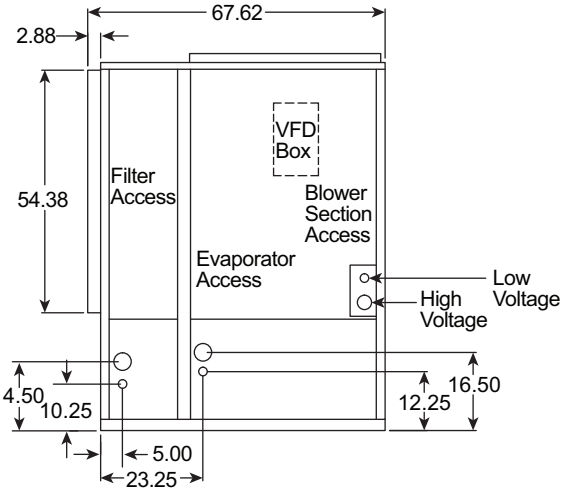


Rear View Return Air

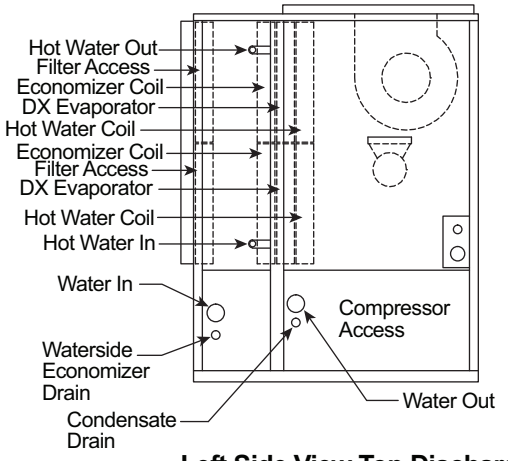


Front View





Left Side View Top Discharge



Left Side View Top Discharge

WATER CONNECTIONS			
Model	**44**	**54**	**64**
H_2O In[a]	2.5	3.0	3.0
H_2O Out[a]	2.5	3.0	3.0
Condensate[a]	0.75	0.75	0.75
Economizer Condensate	1.25	1.25	1.25
HW In/Out Sweat Connection	1.38	1.38	1.38

NOTE(S):

a. FPT Type Connection.

FILTERS		
NOMINAL	**ACTUAL**	**QUANTITY**
17 x 27	16.5 x 29.75	16

NOTES:

a. Dimensions in inches.

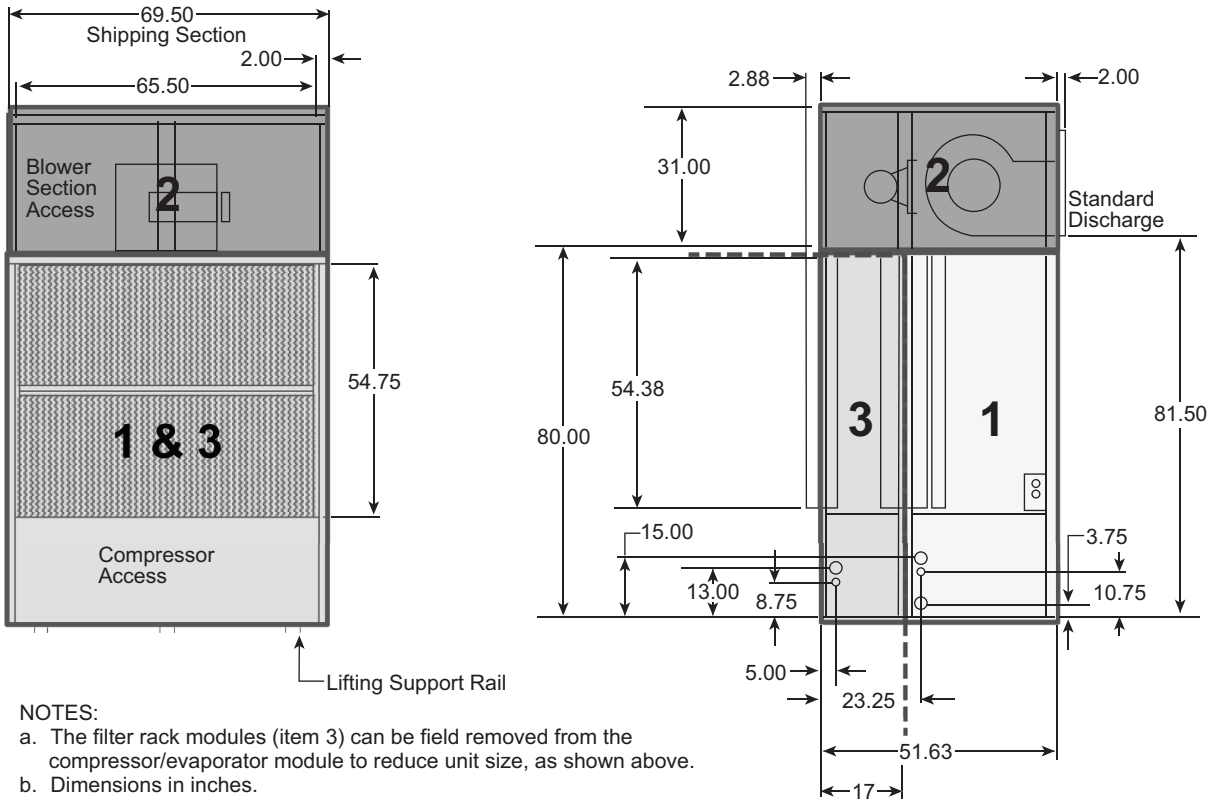
b. Recommended minimum service clearances are as follows:
   1. Front and rear — 36 in.
   2. Left and right side — 65 in. for coil removal
   3. Side opposite coil removal — 36 in.

c. For all other airflow configuration drawings see *SCU*Builder program.

d. Dimensions include base rail height (1.5 in.).

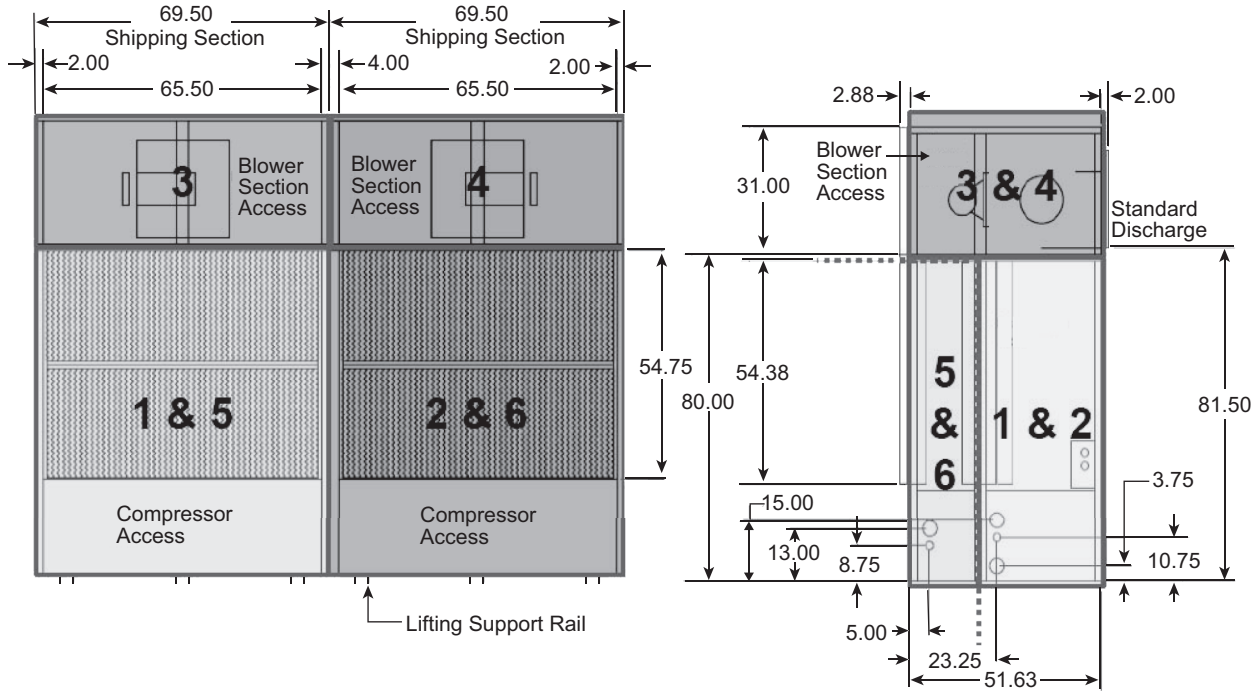
Dimensions (cont)

50BVT,V,W 034 High Boy Field Split (30 Ton)



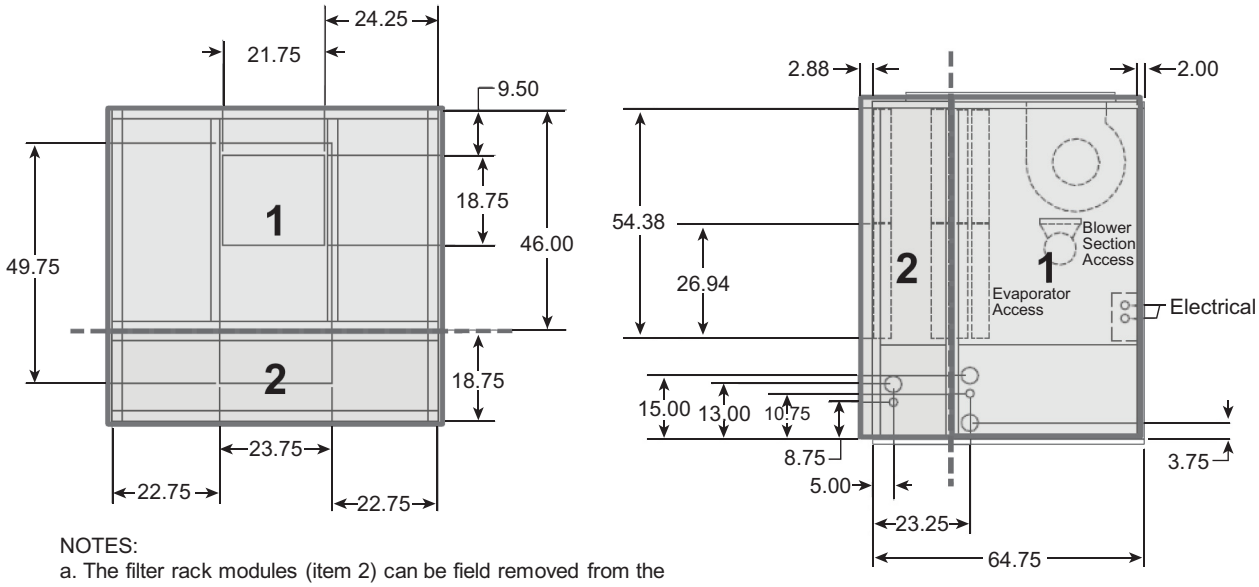
NOTES:
a. The filter rack modules (item 3) can be field removed from the compressor/evaporator module to reduce unit size, as shown above.
b. Dimensions in inches.

50BVT,V,W 044-64 High Boy Field Split (40-60 Ton)



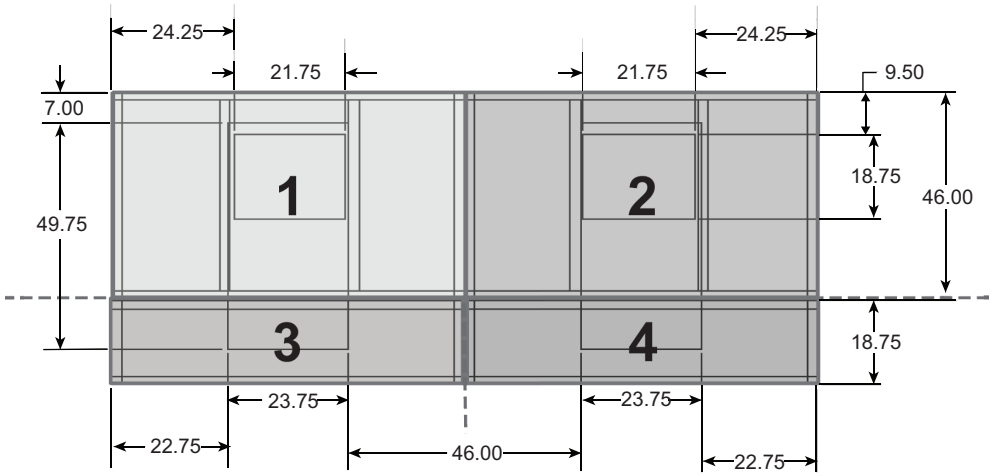
Dimensions (cont)

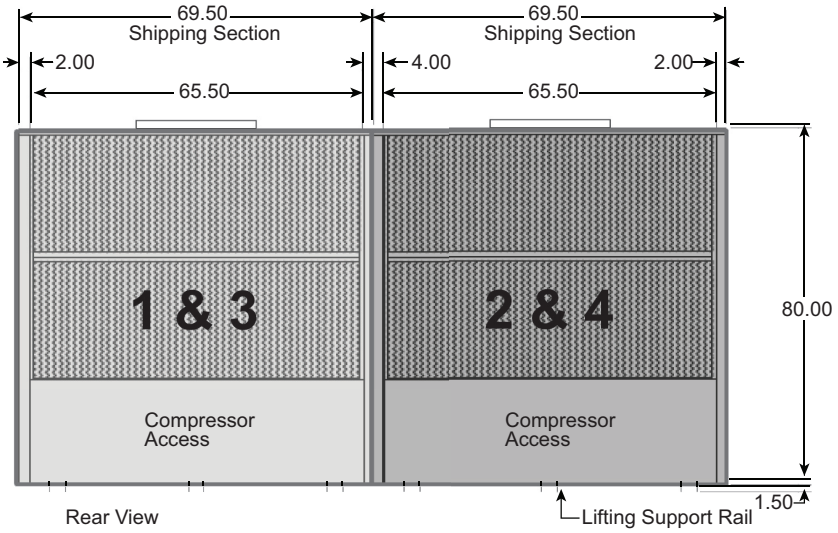
50BVT,V,W 034 Low Boy Field Split (30 Ton)



NOTES:
a. The filter rack modules (item 2) can be field removed from the compressor/evaporator module to reduce unit size, as shown above.
b. Dimensions in inches.

50BVT,V,W 044-064 Low Boy Field Split (40-60 Ton)





Operating Limits[a]

FLUID TYPE	LIMIT		COOLING	HEATING
Air	Minimum Ambient (°F)		50°F	40°F
	Maximum Ambient (°F)		100°F	85°F
	Rated Ambient (°F)		80°F	68°F
	Minimum Entering (°F db/wb)		65/57°F	45°F
	Maximum Entering (°F db/wb)		95/85°F	80°F
	Rated Entering (°F)		80/67°F	68/59°F
Liquid	Anti-Freeze Requirement (LWT / EWT °F)		<40 / <50	
	Minimum Entering (°F)		45°F	EXT 20°F
				STD 50°F
	Max Entering (°F)		110°F	80°F
	Rated Water Coil Entering Fluid	Water Loop	86°F	68°F
		Ground Loop	77°F	32°F
		Ground Water	59°F	50°F
	Maximum Operating Water Pressure (psi/kPa)		450psi/3,100 kPA	
	Minimum operating Flow Rate (gpm/ton)		1.5	

NOTE(S):

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

LEGEND

db — Dry Bulb
EWT — Entering Water Temperature
EXT — Extended Range Option
GPM — Gallons per Minute
LWT — Leaving Water Temperature
STD — Standard Range Option
wb — Wet Bulb
WSE — Waterside Economizer

Performance data (cont)

Blower Performance[a,b]

SIZE	NOMINAL AIRFLOW	AIRFLOW	TOTAL STATIC PRESSURE (in. wg, WET COIL AND FILTER ARE NOT INCLUDED)											
			2.00		2.50		3.00		3.50		4.00		4.50	
			rpm	hp	rpm	hp	rpm	hp	rpm	hp	rpm	hp	rpm	hp
034	12,200	9,500	813	7.5	871	15.0	949	10.0	1034	15.0	1111	15	1172	15
		10,000	813	7.5	916	10.0	949	10.0	1034	15.0	1111	15	1172	15
		10,500	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		11,000	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		11,500	871	15.0	916	15.0	982	15.0	1034	15.0	1111	15	1172	20
		12,000	871	15.0	949	15.0	982	15.0	1072	15.0	1111	20	1172	20
		12,500	871	15.0	949	15.0	1034	15.0	1072	20.0	1111	20	1172	20
		13,500	916	15.0	982	20.0	1034	20.0	1072	20.0	1149	20	—	—
044	16,000	13,000	794	7.5	916	7.5	982	7.5	1111	7.5	1200	10	1256	10
		14,000	794	7.5	871	7.5	982	7.5	1072	10.0	1172	10	1256	10
		15,000	794	7.5	871	7.5	982	7.5	1072	10.0	1172	10	1256	15
		16,000	794	7.5	871	7.5	982	7.5	1034	10.0	1149	10	1256	15
		17,000	794	7.5	871	7.5	982	7.5	1034	10.0	1111	15	1214	15
		18,000	813	7.5	871	7.5	949	10.0	1034	10.0	1111	15	1172	15
		19,000	813	7.5	871	15.0	949	10.0	1034	15.0	1111	15	1172	15
054	20,000	16,000	794	7.5	871	7.5	982	7.5	1034	10.0	1149	10	1256	15
		17,000	794	7.5	871	7.5	982	7.5	1034	10.0	1111	15	1214	15
		18,000	813	7.5	871	8.0	949	10.0	1034	10.0	1111	15	1172	15
		19,000	813	7.5	871	15.0	949	10.0	1034	15.0	1111	15	1172	15
		20,000	813	7.5	916	10.0	949	10.0	1034	15.0	1111	15	1172	15
		21,000	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		22,000	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		23,000	871	15.0	916	15.0	982	15.0	1034	15.0	1111	15	1172	20
		24,000	871	15.0	949	15.0	982	15.0	1072	15.0	1111	20	1172	20
064	24,000	19,000	813	7.5	871	15.0	949	10.0	1034	15.0	1111	15	1172	15
		20,000	813	7.5	916	10.0	949	10.0	1034	15.0	1111	15	1172	15
		21,000	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		22,000	842	10.0	916	10.0	982	15.0	1034	15.0	1111	15	1172	15
		23,000	871	15.0	916	15.0	982	15.0	1034	15.0	1111	15	1172	20
		24,000	871	15.0	949	15.0	982	15.0	1072	15.0	1111	20	1172	20
		25,000	871	15.0	949	15.0	1034	15.0	1072	20.0	1111	20	1172	20

NOTE(S):

a. Horse power (HP) values are per motor. Refer to the physical data table for quantity of blowers and motors to confirm.
b. Blower performance tables are based on Total Static pressure, and don't include Wet Coil and Standard Filter (4" MERV 5). Use NG builder report for External static pressure.

Electrical data

Electrical Data — with Belt Drive Motor, Inverter Duty (50BVV,W,T)[a]

UNIT SIZE	RATED VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR			TOTAL UNIT W/ BELT DRIVE MOTOR		
			Qty	RLA (each)	LRA (each)	Hp (each)	Qty	FLA (each)	Total Unit FLA	MCA	MOCP
034	208-230/3/60	197/253	2	54.6	386.3	7.5	1	21.2	130.4	144.1	175
	208-230/3/60	197/253	2	54.6	386.3	10.0	1	27.7	136.9	150.6	200
	208-230/3/60	197/253	2	54.6	386.3	15.0	1	40.5	149.7	163.4	200
	208-230/3/60	197/253	2	54.6	386.3	20.0	1	53.0	162.2	175.9	225
	460/3/60	414/506	2	26.7	182.0	7.5	1	9.9	63.3	70.0	90
	460/3/60	414/506	2	26.7	182.0	10.0	1	12.7	66.1	72.8	90
	460/3/60	414/506	2	26.7	182.0	15.0	1	18.8	72.2	78.9	100
	460/3/60	414/506	2	26.7	182.0	2.0	1	24.3	77.7	84.4	110
	575/3/60	518/632	2	21.4	131.0	7.5	1	7.9	50.7	56.1	70
	575/3/60	518/632	2	21.4	131.0	10.0	1	10.3	53.1	58.5	70
	575/3/60	518/632	2	21.4	131.0	15.0	1	15.1	57.9	63.3	80
	575/3/60	518/632	2	21.4	131.0	20.0	1	19.5	62.3	67.7	80
044	208-230/3/60	197/253	4	37.1	255.0	7.5	2	21.2	190.8	200.1	225
	208-230/3/60	197/253	4	37.1	255.0	10.0	2	27.7	203.8	213.1	250
	208-230/3/60	197/253	4	37.1	255.0	15.0	2	40.5	229.4	239.5	250
	208-230/3/60	197/253	4	37.1	255.0	20.0	2	53.0	254.4	267.7	300
	460/3/60	414/506	4	17.1	140.0	7.5	2	9.9	88.2	92.5	100
	460/3/60	414/506	4	17.1	140.0	10.0	2	12.7	93.8	98.1	110
	460/3/60	414/506	4	17.1	140.0	15.0	2	18.8	106	110.7	125
	460/3/60	414/506	4	17.1	140.0	20.0	2	24.3	117	123.1	125
	575/3/60	518/632	4	14.4	107.6	7.5	2	7.9	73.4	77.0	90
	575/3/60	518/632	4	14.4	107.6	10.0	2	10.3	78.2	81.8	90
	575/3/60	518/632	4	14.4	107.6	15.0	2	15.1	87.8	91.6	100
	575/3/60	518/632	4	14.4	107.6	20.0	2	19.5	96.6	101.5	110
054	208-230/3/60	197/253	4	45.4	270.0	7.5	2	21.2	224	235.4	250
	208-230/3/60	197/253	4	45.4	270.0	10.0	2	27.7	237	248.4	250
	208-230/3/60	197/253	4	45.4	270.0	15.0	2	40.5	262.6	274.0	300
	208-230/3/60	197/253	4	45.4	270.0	20.0	2	53.0	287.6	300.9	350
	460/3/60	414/506	4	21.6	147.0	7.5	2	9.9	106.2	111.6	125
	460/3/60	414/506	4	21.6	147.0	10.0	2	12.7	111.8	117.2	125
	460/3/60	414/506	4	21.6	147.0	15.0	2	18.8	124	129.4	150
	460/3/60	414/506	4	21.6	147.0	20.0	2	24.3	135	141.1	150
	575/3/60	518/632	4	15.3	109.0	7.5	2	7.9	77	80.8	90
	575/3/60	518/632	4	15.3	109.0	10.0	2	10.3	81.8	85.6	100
	575/3/60	518/632	4	15.3	109.0	15.0	2	15.1	91.4	95.2	110
	575/3/60	518/632	4	15.3	109.0	20.0	2	19.5	100.2	105.1	110

Electrical data (cont)

Electrical Data — with Belt Drive Motor, Inverter Duty (50BVV,W,T)[a]

UNIT SIZE	RATED VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR			TOTAL UNIT W/ BELT DRIVE MOTOR		
			Qty	RLA (each)	LRA (each)	Hp (each)	Qty	FLA (each)	Total Unit FLA	MCA	MOCP
064	208-230/3/60	197/253	4	54.6	386.3	7.5	2	21.2	260.8	274.5	300
	208-230/3/60	197/253	4	54.6	386.3	10.0	2	27.7	273.8	287.5	300
	208-230/3/60	197/253	4	54.6	386.3	15.0	2	40.5	299.4	313.1	350
	208-230/3/60	197/253	4	54.6	386.3	20.0	2	53.0	324.4	338.1	350
	460/3/60	414/506	4	26.7	182.0	7.5	2	9.9	126.6	133.3	150
	460/3/60	414/506	4	26.7	182.0	10.0	2	12.7	132.2	138.9	150
	460/3/60	414/506	4	26.7	182.0	15.0	2	18.8	144.4	151.1	175
	460/3/60	414/506	4	26.7	182.0	20.0	2	24.3	155.4	162.1	175
	575/3/60	518/632	4	21.4	131.0	7.5	2	7.9	101.4	106.8	125
	575/3/60	518/632	4	21.4	131.0	10.0	2	10.3	106.2	111.6	125
	575/3/60	518/632	4	21.4	131.0	15.0	2	15.1	115.8	121.2	125
	575/3/60	518/632	4	21.4	131.0	20.0	2	19.5	124.6	130.0	150

NOTE(S):

a. The presence of an inverter duty motor does not guarantee that the unit will be provided with a VFD; only 50BVW (VAV) units are provided with a VFD as standard.

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

Application data

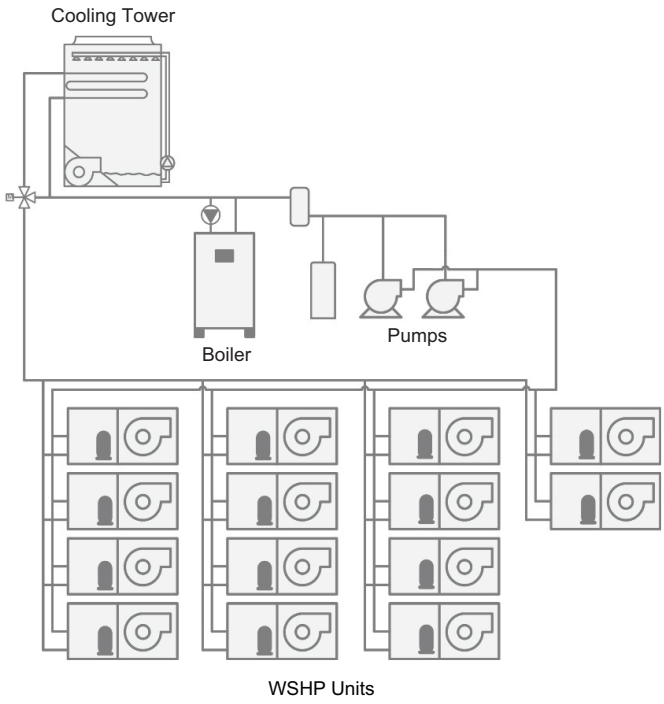
Aquazone™ water source heat pumps are available in a flexible, efficient array of models and sizes, which can be used for extensive variety of commercial building types that has several temperature control zones, some of which need to be heated while others need to be cooled. The WSHP system is an especially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

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

Water loop system

Water loop (or boiler/tower) system applications typically include a number of units plumbed to a common piping system. For optimal performance, this system should be designed between 1.5 and 4 gpm per ton of cooling capacity. The system is comprised of highly efficient packaged reverse cycle heat pump units interconnected by a water loop. The water circuit serves as both a sink and source for heat absorption and rejection and is designed for entering water temperatures between 50 and 80°F. Within this temperature range units can heat or cool as required from the same water source. Transferring heat from warm to cold spaces in the building, whenever they coexist, conserves energy rather than creating new heat.

Typical Water Loop (Boiler/Cooling Tower) Application



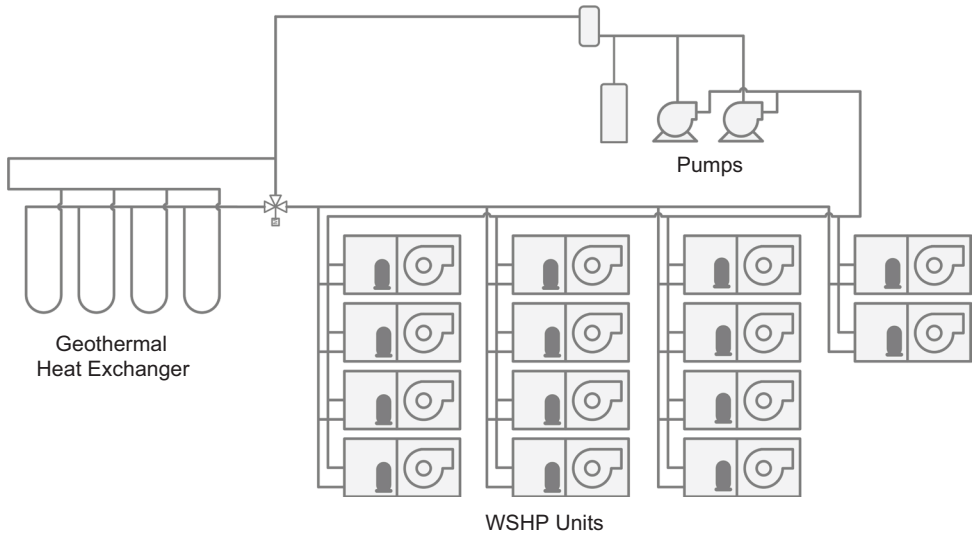
Application data (cont)

Ground loop systems

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

- Horizontal ground loop. This system is used when adequate space is available, and trenching can be easily accomplished. A series of parallel pipes are laid out in trenches 3 to 6 ft below the ground surface, and then back-filled. Often, multiple pipes are used to maximize the heat transfer capability of each trench. The amount of pipe and the size of the ground loop field are based on ground conditions, heating, and cooling requirements of the application and system design.
- Vertical ground loop. This system is used in vertical borehole applications. This design is well suited for retrofit applications when space is limited or where landscaping is already complete and minimum disruption of the site is desired. The vertical ground loop system contains a single loop of pipe inserted into a hole. The hole is back-filled and grouted after the pipe is inserted. The completed loop is concealed below ground. The number of loops required depends on ground conditions, heating and cooling requirements, and the depth of each hole.

Typical Ground Loop / Geothermal Application

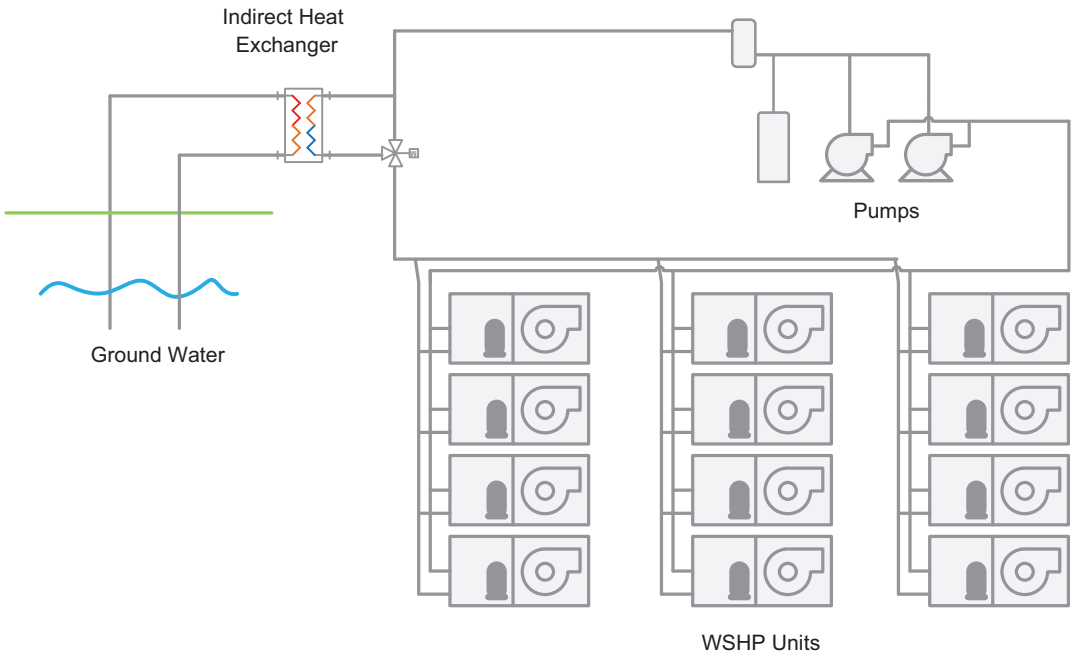


Application data (cont)

Ground water systems

This system is used where ground water is plentiful. In this application, ground water is pumped through supply piping from the well to the building. The water is then pumped back into the ground through a discharge well as it leaves the building. An additional heat exchanger is usually installed between the building water piping system and the ground water piping system to isolate WSHP units from contamination. This design limits the amount of piping and excavation required. Aquazone units come with an extended range coil (20 to 110°F) for open or closed loop systems. To conserve water on this type of system, a slow opening/closing solenoid valve is recommended. Depending on loop water temperatures, a water regulating valve may be needed.

Ground Water Application

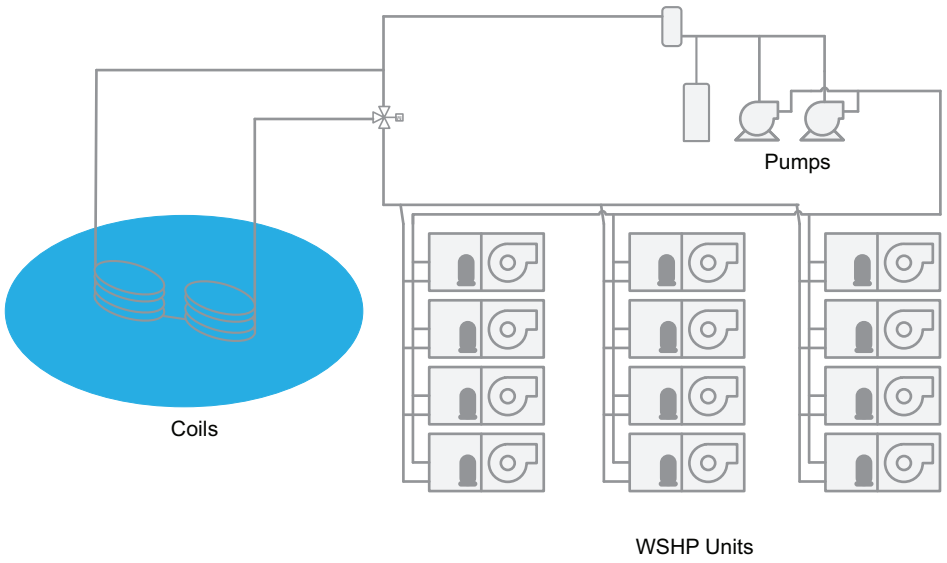


Application data (cont)

Surface water system

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

Surface Water Application

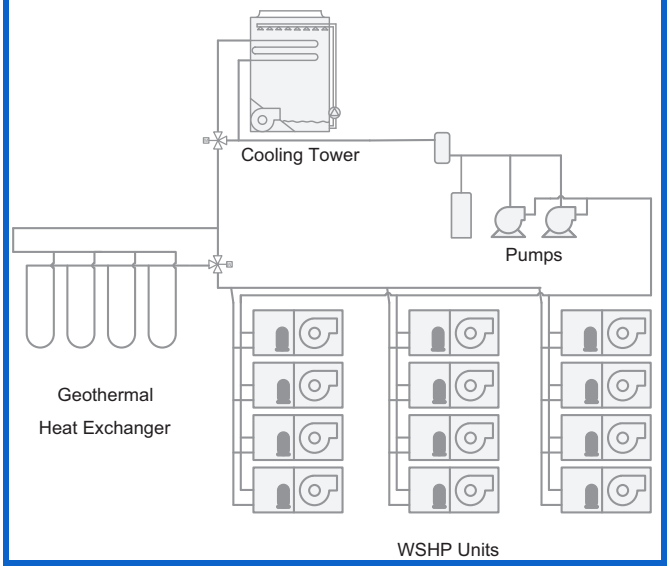


Application data (cont)

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.

Hybrid System (Geothermal Loop/Cooling Tower) Application



Freeze protection

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

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

Water quality

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

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

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

Application data (cont)

Water Quality Guidelines

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

NOTE(S):

a. Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.
b. Closed recirculating system is identified by a closed pressurized piping system.
c. Recirculating open wells should observe the open recirculating design considerations.
d. If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.
Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water registers a pH of 7.0.
To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

LEGEND

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

Application data (cont)

Condensate drainage

Venting

Properly vent condensate lines to prevent fan pressure from causing water to hang up in the piping. Condensate lines should be pitched to assure full drainage of condensate under all load conditions. Use chemical treatment to remove algae in the condensate pans and drains in geographical areas that are conducive to algae growth.

Trapping

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

Ductwork

The supply duct should be properly supported and the aspect ratio as close to square as possible. The duct should be sized for a maximum of 2000 ft/min. velocity in areas outside the equipment room. The duct should be lined with acoustical insulation for a minimum of 10 ft beyond the equipment room. A flexible duct connection should be used on the connection to the unit to prevent transmission of any unit vibrations into the duct. Refer to the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Standards for recommended duct connection to unit with 2 fans.

NOTE: All 2 fan units require a “pair of pants” duct connection to ensure proper air distribution and prevent undue stress on the fan assembly. A return duct may be attached to the unit, but is not necessary. The return to the unit should prevent line of sight visibility to the space. Insulated return duct is also recommended. The maximum velocity should not exceed 1000 ft/min. over occupied spaces. An adequate return area is essential for proper unit operation.

Water piping connections

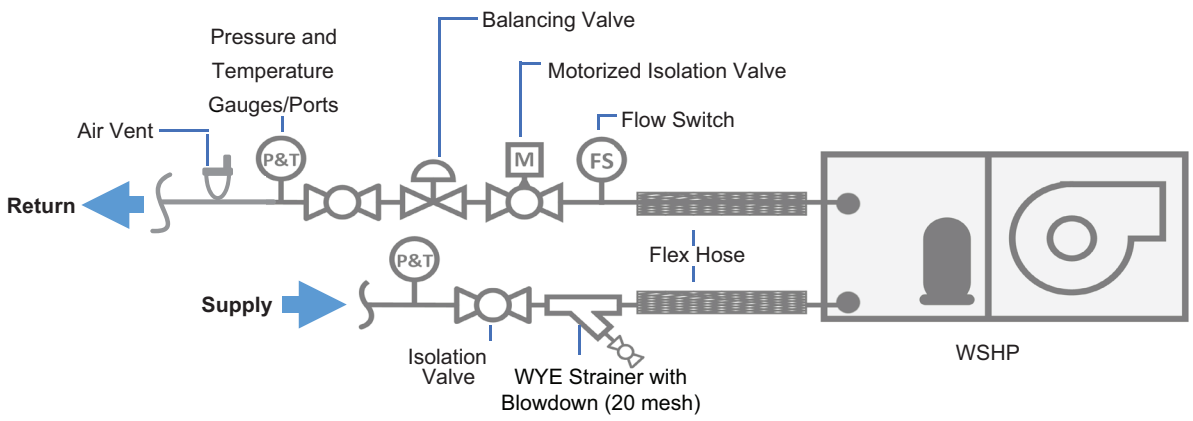
Recommended system piping configuration includes a reverse return system to minimize balancing. A strainer is recommended at the inlet to each unit to prevent sediments from plugging the condensers. Pressure gauges are also recommended before the strainer and at the unit outlet to check any potential condenser fouling. Gate type isolation valves are also recommended at each unit to allow service without the need to drain the entire system.

Flow balancing

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

Application data (cont)

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

General recommendations:

- Utilize flexible – not rigid – electrical connections to the WSHP unit.
- Utilize flexible loop water and condensate piping connections to the WSHP unit.
- Use a canvas duct connector to connect the WSHP discharge to the downstream duct system. This reduces vibration-induced noise.
- Provide acoustic interior lining for the first 20 feet of discharge duct, or until the first elbow is reached. The elbow prevents line-of-site sound transmission in the discharge duct.
- Provide "turning" vanes in ductwork elbows and tees to reduce air turbulence.
- Size the sheet metal supply duct with velocities no greater than 1000 fpm.
- Make ductwork as stiff as possible.
- Use round duct whenever possible – it is less noisy.
- Allow at least 3 equivalent duct diameters of straight duct upstream and downstream of the unit before allowing any fittings, transitions, etc.
- Seal all penetrations around duct entering the space.
- Provide a four-foot runout duct made of flexible material to connect a diffuser to the supply trunk duct. The flex duct provides an "attenuating end-effect" and reduces duct transmitted sound before it reaches the space. Typically a 6db sound reduction can be accomplished with the use of flex duct.
- Locate the runout duct balancing damper as far away from the outlet diffuser as possible. Locating the balancing damper at the trunk duct exit is best.
- If return air is drawn through a ceiling plenum, provide an acoustically lined return duct elbow or "L" shaped boot at the WSHP to eliminate line-of-site noise into the ceiling cavity and possible through ceiling return air grilles. Face the elbow or boot away from the nearest adjacent WSHP unit to prevent additive noise.
- Do not hang the suspended ceiling from the ductwork.
- 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.
- Unit compressors are internally isolated and the compressor compartment is lined with acoustical insulation. If additional vibration isolation is desired, rubber shear pads are recommended under the four corners of the unit. Spring isolation is not recommended.
- Since the units return air flows through a grille mounted in a closet door, provide a sound barrier or some other modification of the closet to prevent line-of-site noise into the space.
- Follow good duct design practice in sizing and locating the connection of the WSHP discharge to the supply duct system. Use an elbow with turning vanes and bent in the direction of the fan rotation to minimize turbulence. Make any duct transitions as smooth and as gradual as possible to again minimize turbulence and loss of fan static pressure.

Hot gas reheat

Hot gas reheat (HGRH) allows a WSHP to dehumidify the space when the space temperature is satisfied but the space humidity is high. High humidity can promote mold and bacteria growth, poor indoor air quality (IAQ), and cause occupant discomfort. Possible causes of excess humidity could be a byproduct of the unit having to operate under a widely varying load, an oversized unit that is short cycling, a high percentage of unconditioned outside air being introduced into the space, a high latent load in the space or any location where humidity infiltration is a problem. A properly sized WSHP unit operating in cooling mode will dehumidify the air as it cools. Once the space temperature is satisfied and cooling mode is disabled, the unit no longer dehumidifies. Operating the unit in cooling mode for the sole purpose of dehumidifying will cause the space to become cold and uncomfortable. HGRH allows the unit to continue dehumidifying the space without over cooling the space. Dehumidification with HGRH requires a control system with dehumidification capabilities, such as a thermostat with dehumidification output, a thermostat with separate humidistat, or a DDC controller with humidity sensor and dehumidification output. Once the space temperature is satisfied but the space humidity is above the desired set point, the control system sends a dehumidification command (H input) to the WSHP. The WSHP is now in dehumidification mode. In dehumidification mode, the fan, reversing valve, HGRH valve, and compressor are all enabled. The reversing valve directs cold refrigerant liquid to the indoor air coil and the HGRH valve directs warm refrigerant vapor to the HGRH coil. As the fan draws warm, humid air into the unit, the air passes through the indoor air cool where it is cooled and dehumidified, due to the cold liquid refrigerant flowing in the coil. The cooled and dehumidified air then passes through the HGRH coil

where it is reheated to a neutral temperature (68°F to 78°F typical), due to the warm refrigerant vapor flowing in the coil. The air exits the unit at a neutral temperature and low humidity (dry). The unit will remain in dehumidification mode until the space humidity is reduced below the set point or there is a call for space cooling, which is prioritized over dehumidification mode. The moisture removal capacity of a WSHP in a specific application will depend on multiple factors including the WSHP sizing, the nominal latent capacity, the application airflow, the application temperatures and humidity, and the application fluid flow and fluid temperature.

WSHP Builder can be utilized to simulate the performance of WSHP units with HGRH under the desired application conditions and will specify the unit leaving air dry bulb temperature and wet bulb temperature, which can be used to determine the leaving air relative and absolute humidity levels. The target leaving air dry bulb temperature for unit with HGRH in dehumidification mode is between 68°F and 78°F. The target leaving air wet bulb temperature should result in a relative humidity is between 40 and 60%, based on the dry bulb temperature. If the relative humidity is too high, reduce the fan speed or increase the unit size until the desired conditions are met.

Alternate methods of dehumidification with WSHPs include fan speed control and condenser water reheat. Fan speed control is one of the simplest and most efficient methods of dehumidification, but only provides dehumidification when the unit is in cooling mode. Condenser water reheat can be an effective method of dehumidification in boiler/tower applications, but is not very efficient. Condenser water reheat requires hot loop temperatures (which reduces cooling efficiency) to achieve a neutral discharge air temperature and requires an extra pump which adds to the unit power consumption. Condenser water reheat coils often have a higher airside pressure drop than HGRH coils, which results in higher fan energy consumption.

NOTE: Modulating HGRH is provided as standard with VAV units, and used for SAT control.

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.

Multiple independent circuit operation

CV units have either two (size 034) or four (size 044-064) independent refrigerant circuits. Consider applying a thermostat or DDC controller that matches the unit staging capability for maximum performance. Otherwise, field wiring may be needed to match a higher number of available cooling or heating stages to a thermostat or DDC controller with a lower amount of cooling or heating stages.

Part load limits

VAV units utilize face split air coils and should not be operated below 50% of the rated air flow to prevent coil freezing. 50BVW (30-60 tons) minimum cooling airflow is 200 cfm/ton.

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

Selection inputs

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

Electrical

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

System Parameters

Entering Water Temperature (EWT)

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

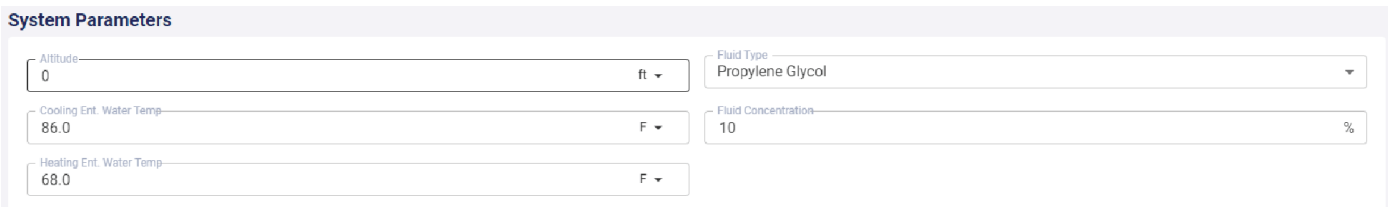
Fluid Type

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

Altitude

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

System Parameters Screen



Design Parameters

Entering Air Temperature (EAT)

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

Airflow Rate

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

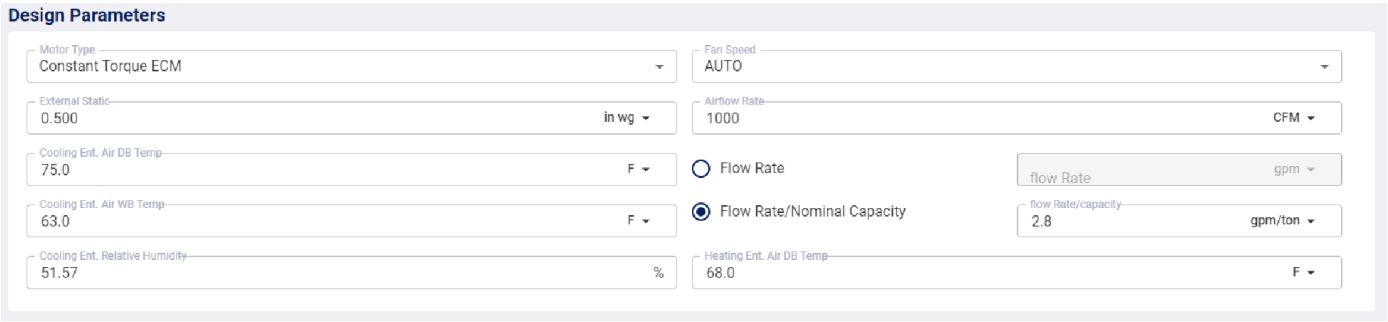
External Static Pressure

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

Water Flow Rate

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

Design Parameters Screen



Selection procedure (cont)

Capacity Requirements

Heating and Cooling Loads

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

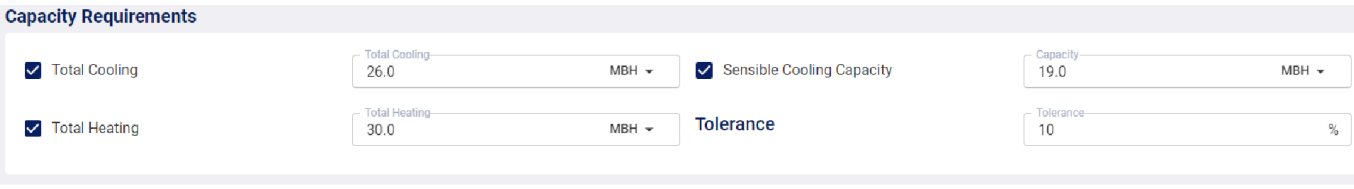
Unit Configuration

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

Accessories/Warranties/Start-Up

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

Capacity Requirements Screen

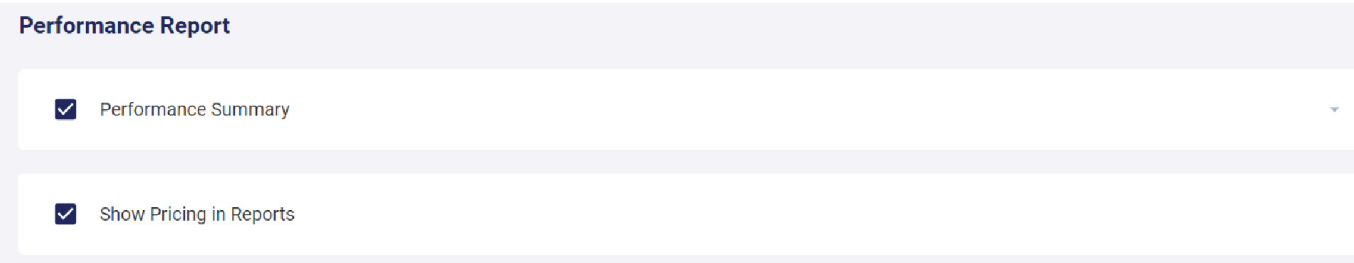


Selection Outputs / Reports

Performance Report

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

Performance Report

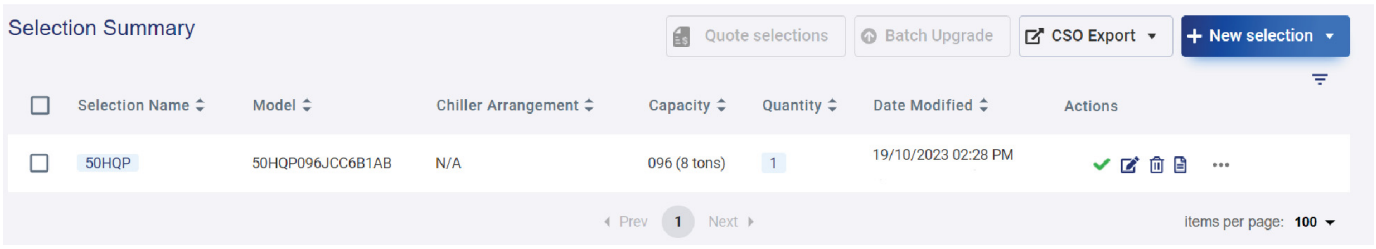


Selection procedure (cont)

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.

Submittal Report



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 — 50BVT, BVV units

Indoor Packaged Unit
Constant Volume Application

HVAC Guide Specifications

Size Range: **30 to 60 Tons**

Carrier Model Number:

50BVT — Water-Cooled Packaged Cooling Unit

50BVV — Water-Cooled Vertical Heat Pump

Part 1 — General

1.01 SYSTEM DESCRIPTION

A. Units shall be water-cooled, cooling only or water cooled heat pump self-contained packaged air-conditioning units. Capacities, models, and unit arrangement shall be as shown on the unit schedule and the contract drawings. Units 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 ETL-US-C labels.

B. Units shall be supplied completely factory built and capable of operation with an entering water temperature range from 50 to 110°F. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuation and accurately charging of system, detailed heating and cooling mode tests, and quality cross checking all operational and test conditions to pass/fail criteria.

C. Units shall be individually packaged on wooden skids with protective corner posts and plastic stretch wrapping for maximum protection.

1.02 QUALITY ASSURANCE

A. Units shall be listed for UL (Underwriters Laboratories) and UL, Canada. Units shall conform to ANSI (American National Standards Institute)/UL standard 1995. Unit shall be accepted for use in the City of New York by the Department of Buildings (MEA).

B. Each unit shall be completely factory assembled, piped, wired, and tested. Units shall be leak tested and charged with a full operating charge of refrigerant.

C. Units shall then be disassembled into their individual modules for shipping and assembly on site.

D. Factory test shall include, but not be limited to: complete run check of all electrical components and safeties, including proper control sequencing; pressure test of refrigerant coils and condensers; leak check of completed refrigerant circuits; leak check of completed water circuit (water-cooled units only); compressor run check.

Part 2 — Products

2.01 EQUIPMENT

A. General:

The unit shall be comprised of two distinct modules: the main air-conditioning section and the filter/pre-cooling coil section. Water-cooled units shall be built for an entering water temperature range from 50°F to 110°F. The unit shall be designed for easy assembly. The refrigeration circuit shall remain intact during disassembly and re-assembly. All high-boy modules shall be able to pass through a 36 in. steel framed door.

B. Cabinet:

1. The frame shall be fabricated of an angle iron framework. Unit exterior panels shall be 18 gauge G90 galvanized steel for corrosion protection.
2. Each section shall incorporate removable access panels. The complete cabinet frame and access panels shall be insulated with 1/2 in., dual density, coated fiberglass insulation.
3. The main air conditioning section and the filter/pre-cooling coil section shall contain a stainless steel drain pan.
4. Low-boy cabinet shall be available on all models. Blower shall be dropped into main coil section, reducing the overall height of the unit. This is for those applications where there is a restriction in the height of the unit.
5. 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.
6. Insulated basepan shall provide additional sound deadening characteristics and corrosion protection in the compressor compartment.

C. Evaporator:

1. The direct expansion coil shall be a minimum of 3 rows and be fabricated from 3/8 in. or 3/4 in. OD seamless copper tubing, mechanically bonded to rippled and corrugated aluminum fins.
2. Each individual evaporator coil shall be removable for replacement without disturbing the remaining refrigerant circuits.
3. Each evaporator coil circuit shall be fed by an adjustable thermostatic expansion valve, with external equalizer, sized to provide efficient operation at full and at part load operating points in the cooling modes.

D. Supply Fan:

1. Supply fans shall be double-width double-inlet (DWDI) forward curved type of Class II construction.
2. All fans shall be statically and dynamically balanced.

3. Fan shafts shall be mounted in heavy-duty 150,000-hour greasable pillow-block bearings. The fan motor shall be open drip-proof (ODP), three-phase, NEMA T-frame E high-efficiency EPACT rated, 1800 rpm, with grease lubricated ball bearings.
4. The drive shall include a fixed pitch blower sheave and variable pitch motor sheave with multiple V belts sized for 110% of the fan brake horsepower.
5. Airflow configurations for Highboy cabinets shall include rear return, front supply; or rear return, rear supply.
6. Airflow configurations for Lowboy cabinets shall include rear return, top supply; or rear return, front supply.

E. Reverse Cycle Operation (Heat Pump Only):

Heat pump units shall be equipped with reversing valves to allow operation in the reverse cycle heating mode.

F. Refrigeration Circuit:

1. Each unit shall contain multiple independent refrigeration circuits.
2. Each circuit shall include a high-efficiency heavy-duty scroll compressor.
3. Each circuit shall have high and low pressure cut-outs.
4. Each circuit shall be dehydrated and factory charged with R-454B refrigerant.
5. Suction and discharge Schrader valves shall be provided for manifold gauge connections to facilitate servicing.
6. [Optional] Hot Gas Bypass: Units shall be supplied with an ETL listed hot gas bypass valve with factory supplied and installed controls to prevent air coils from frost development by taking hot gas and bypassing the water coil and expansion device and reintroducing the hot gas into the refrigeration line prior to the air coil. The hot gas bypass valve shall maintain a minimum refrigerant suction pressure to allow for a light load cooling module or a low entering air temperature cooling mode. The HGBP valve shall be factory set for opening pressure to 120 psig, this set point can be adjusted (75-150 psig) in the field.
7. [Optional] Units shall be equipped with optional hot gas reheat coil. Cycling (on/off) HGRH shall be controlled by a thermostat with dehumidification output, humidistat, or DDC control connected to the unit H terminal and shall start the unit in the reheat mode should the humidity be above the set point once the space temperature is satisfied. Cooling or heating requirements shall take precedent over HGRH.
8. [Optional] Units shall be equipped with modulating hot gas reheat (MHGRH). The MHGRH valve shall be controlled by the field provided DDC controls.
9. A2L refrigerant Leak detection shall be provided with units exceeding refrigerant charge 64 oz. per circuit for the refrigerant leak detection system.

G. Compressors:

1. Each unit shall have multiple high-efficiency scroll compressors with internal or external motor protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.
2. Each compressor shall be on an independent refrigerant circuit.
3. The compressors shall be mounted on rubber isolators.

H. Water Source Condensers:

1. All condensers shall be coaxial tube-in-tube for maximum heat transfer efficiency and performance.
2. Inner water tubes shall be either standard copper or optional cupronickel with large internal diameters for reduced waterside pressure drops.
3. Outer tubes shall be steel, painted for corrosion protection.
4. All condensers shall be rated at 600 psig operating refrigerant pressures and 450 psig waterside pressures.
5. [Optional] Cupronickel coaxial water-to-refrigerant heat exchangers shall be provided, with cupronickel inner water tube construction.
6. [Optional] Extended range units shall provide an insulated water circuit for the coaxial coil and refrigerant circuit to prevent condensation, and therefore potential dripping problems, in applications where the entering water temperature is beyond the normal operating range. Units shall be capable of operation with an entering water temperature range from 20 to 110°F.

I. 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. Economizer coils are 2 or 4 row coils. The unit controller controls all required control logic and changeover. 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] Hot water coil shall be factory-installed on the inlet side of the direct expansion cooling coils with field piping connections on the side of the unit. The hot water control valve is to be provided in the field by other parties.

J. Filter Section:

The unit shall be supplied with 4 in. deep pleated, 30% high-efficiency filters. The filters shall have side access capability through an access panel.

K. Electrical:

1. Each unit shall be wired and tested at the factory prior to shipment.
2. Wiring shall comply with NEC requirements and shall conform with all applicable UL standards.
3. The units shall have a single point power connection. Control power shall be supplied through a factory-installed, low voltage control circuit transformer with an integral resettable circuit breaker.
4. The fan motor starter shall have a magnetic three-line, ambient compensated overload protector with a manual reset.
5. A terminal block shall be provided for the main power connection.
6. Unit shall have a short circuit current rating (SCCR) of 5kA.

L. Controls, Safeties, and Diagnostics:

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, and Unit Protection Module (UPM). The standard transformer shall be rated for a minimum 100 VA. All units shall be name plated for use with time-delay fuses or HACR circuit breakers.
   b. Units shall include a factory provided wiring diagram on the inside of the control access panel.
   c. Each unit shall be wired and tested at the factory prior to shipment.
   d. Wiring shall comply with NEC requirements and shall conform with all applicable UL standards.
   e. The units shall have a single point power connection. Control power shall be supplied through a factory-installed, low voltage control circuit transformer with an integral resettable circuit breaker.
   f. The fan motor starter shall have a magnetic three-line, ambient compensated overload protector with a manual reset.
   g. A terminal block shall be provided for the main power connection.
   h. Unit shall have a short circuit current (SCCR) rating of 5kA.
   i. 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
   j. The UPM shall automatically reset after a safety shutdown. Restart the unit if the cause of the shut-down no longer exists (except for low temperature and high condensate level shutdowns). Should a fault re-occur within 60 minutes after reset, then a “hard” lockout will occur. A light-emitting diode (LED) shall annunciate the following alarms: brownout, high refrigerant pressure, low refrigerant pres-sure, 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:
      1) Lock out reset on thermostat interruption or power reset.
      2) Two or four restart attempts before a hard lockout.
      3) Test mode (reduces all time delays to 5 seconds for diagnostic work).
      4) Air/water coil freeze limit trip.
   k. [Optional] Energy management and alarm 24 vac relay package shall be provided to remotely ena-ble/disable units with constant volume configuration. An additional relay is provided to close when a compressor malfunction is detected, providing remote signaling to a building automation system.

M. Accessories:

Carrier commercial thermostat controls are available for CV 50BVT,V units.

Guide specifications — 50BVW units

Indoor Packaged Unit
Constant Volume Application

HVAC Guide Specifications

Size Range: **30 to 60 Tons**

Carrier Model Number:

50BVW — Water-Cooled Packaged Cooling Unit

Part 1 — General

1.01 SYSTEM DESCRIPTION

A. Units shall be water-cooled, cooling only self contained packaged air conditioning units. Capacities, models, and unit arrangement shall be as shown on the unit schedule and the contract drawings. Units 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 ETL-US-C labels.

B. Units shall be supplied completely factory built and capable of operation with an entering water temperature range from 50 to 110°F. Quality control system shall automatically perform via computer: triple leak check, pres-sure tests, evacuation and accurately charging of system, detailed heating and cooling mode tests, and quality cross checking all operational and test conditions to pass/fail criteria.

C. Units shall be individually packaged on wooden skids with protective corner posts and plastic stretch wrapping for maximum protection.

1.02 QUALITY ASSURANCE

A. Units shall be rated 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. Standard cabinet panel insulation shall meet NFPA (National Fire Protection Association) 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21 and shall meet zero level bacteria growth per ASTM (American Society for Testing and Materials) G22.

B. Each unit shall be completely factory assembled, piped, wired, and tested. Units shall be leak tested and charged with a full operating charge of refrigerant (water-cooled only).

C. Units shall then be disassembled into their individual modules for shipping and assembly on site.

D. Factory test shall include, but not be limited to: complete run check of all electrical components and safeties, including proper control sequencing; pressure test of refrigerant coils and condensers; leak check of completed refrigerant circuits; leak check of completed water circuit (water-cooled units only); compressor run check.

Part 2 — Products

2.01 EQUIPMENT

A. General:

The unit shall be comprised of two distinct modules: the main air-conditioning section and the filter/pre cooling coil section. The unit shall be designed for easy assembly. Water-cooled units shall be built for an entering water temperature range from 50°F to 110°F. The refrigeration circuit shall remain intact during disassembly and reassembly. All high-boy modules shall be able to pass through a 36 in. steel framed door.

B. Cabinet:

1. The frame shall be fabricated of an angle iron framework. Unit exterior panels shall be 18 gauge G90 galvanized steel for corrosion protection.
2. Each section shall incorporate removable access panels. The complete cabinet frame and access panels shall be insulated with 1/2 in., dual density, coated fiberglass insulation.
3. The main air conditioning section and the filter/pre-cooling coil section shall contain a stainless steel drain pan.
4. Low-boy cabinet shall be available on all models. Blower shall be dropped into main coil section reducing the overall height of the unit. This is for those applications where there is a restriction in the height of the unit.
5. 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.
6. Insulated basepan shall provide additional sound deadening characteristics and corrosion protection in the compressor compartment.

C. Evaporator:

1. The direct expansion coil shall be a minimum of 3 rows and be fabricated from 3/8 in. or 3/4 in. OD seamless copper tubing, mechanically bonded to rippled and corrugated aluminum fins.
2. Each individual evaporator coil shall be removable for replacement without disturbing the remaining refrigerant circuits.
3. Each evaporator coil circuit shall be fed by an adjustable thermostatic expansion valve, with external equalizer, sized to provide efficient

operation at full and at part load operating points in the cooling mode.

D. Supply Fan:
   1. Supply fans shall be double-width double-inlet (DWDI) forward curved type of Class II construction.
   2. All fans shall be statically and dynamically balanced.
   3. Fan shafts shall be mounted in heavy-duty 150,000-hour greasable pillow-block bearings.
   4. The fan motor shall be open drip-proof (ODP), 3-phase, NEMA T-frame E high-efficiency EPACT rated, 1800 rpm, with grease lubricated ball bearings. Motor shall be compatible with variable frequency drive (VFD).
   5. Fan shall be belt driven with fixed-pitch motor and fan pulley, with multiple matched belts; drive shall be selected for 110% of motor horsepower and to provide maximum static capability in stable fan operation and when applied with variable frequency drive (VFD).
   6. Airflow configurations for Highboy cabinets shall include rear return, front supply; or rear return, rear supply.
   7. Airflow configurations for Lowboy cabinets shall include rear return, top supply; or rear return, front supply.

E. Supply Fan Capacity Control/Variable Frequency:

   Variable frequency drive (VFD) shall include:
   1. Factory-installed VFD motor control device, provided with a NEMA Type 1 enclosure, and factory-mounted, wired and tested. The VFD shall control motor speed to maintain set point static pressure at the supply duct sensor location.
   2. A duct differential pressure transmitter (DPT) shall be factory supplied (ships in control enclosure) for field installation. Field supplied wiring, pneumatic tubing, and pressure pick up port are required.

F. Refrigeration Circuit:
   1. Each unit shall contain multiple independent refrigeration circuits.
   2. Each circuit shall include a high-efficiency heavy-duty scroll compressor.
   3. Each circuit shall have high and low pressure cut-outs.
   4. Each circuit shall be dehydrated and factory charged with R-454B refrigerant.
   5. Suction and discharge Schrader valves shall be provided for manifold gauge connections to facilitate servicing.
   6. [Optional] Hot Gas Bypass: Units shall be supplied with an ETL listed hot gas bypass valve with factory supplied and installed controls to prevent air coils from frost development by taking hot gas and bypassing the water coil and expansion device and reintroducing the hot gas into the refrigeration line prior to the air coil. The hot gas bypass valve shall maintain a minimum refrigerant suction pressure to allow for a light load cooling module or a low entering air temperature cooling mode. The HGBP valve shall be factory set for opening pressure to 120 psig, this set point can be adjusted (75-150 psig,) in the field.
   7. Modulating Hot Gas Reheat for Variable Air Volume (VAV) units: Units shall be equipped with fully modulating hot gas reheat (MHGRH). The MHGRH valve shall be controlled by the unit DDC controls to help control discharge air conditions.
   8. A2L refrigerant Leak detection shall be provided with units exceeding refrigerant charge 64 oz. per circuit for the refrigerant leak detection system.

G. Compressors:
   1. Each unit shall have multiple high-efficiency scroll compressors with internal or external motor protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.
   2. Each compressor shall be on an independent refrigerant circuit.
   3. The compressors shall be mounted on rubber isolators.

H. Water-Cooled Condensers:
   1. All condensers shall be coaxial tube-in-tube for maximum heat transfer efficiency and performance.
   2. Inner water tubes shall be either standard copper or optional cupronickel with large internal diameters for reduced waterside pressure drops.
   3. Outer tubes shall be painted steel.
   4. All condensers shall be rated at 600 psig operating refrigerant pressures and 450 psig waterside pressures.
   5. [Optional] Cupronickel coaxial water-to-refrigerant heat exchangers shall be provided, with cupronickel inner water tube construction.
   6. [Optional] Extended range units shall provide an insulated water circuit for the coaxial coil and refrigerant circuit to prevent condensation, and therefore potential dripping problems, in applications where the entering water temperature is beyond the normal operating range. Units shall be capable of operation with an entering water temperature range from 20 to 110°F.

I. 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. Economizer coils are 2 or 4 row coils. 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] Hot water coil shall be factory-installed on the inlet side of the direct expansion cooling coils with field piping connections on the side of the unit. The hot water control valve is to be provided in the field by other parties.

J. Filter section:

The unit shall be supplied with 4 in. deep pleated, 30% high-efficiency filters. The filters shall have side access capability through an access panel.

K. Controls, Safeties, and Diagnostics:

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, and Unit Protection Module (UPM). The standard trans-former shall be rated for a minimum 100 VA. All units shall be name plated for use with time-delay fuses or HACR circuit breakers.

b. Units shall include a factory provided wiring diagram on the inside of the control access panel.

c. Each unit shall be wired and tested at the factory prior to shipment.

d. Wiring shall comply with NEC requirements and shall conform with all applicable UL standards.

e. The units shall have a single point power connection. Control power shall be supplied through a factory-installed, low voltage control circuit transformer with an integral reset-table circuit breaker.

f. The fan motor starter shall have a magnetic three-line, ambient compensated g.A terminal block shall be provided for the main power connection.overload protector with a manual reset.

g. A terminal block shall be provided for the main power connection.

h. Unit shall have a short circuit current (SCCR) rating of 5kA.

i. 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

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

The UPM shall feature the following field configurable adjustments:

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

k. Units shall be provided with SCU Open DDC controller with an advanced controls logic and include following features:

1) variable air volume (vav) control
2) high/low static lockout
3) supply fan status
4) UPM alarm
5) filter status
6) fire/smoke detector alarm
7) condenser water temperature alarm
8) static pressure sensor failure alarm
9) high and low supply air temperature alarm

l. DDC controller shall be capable of performing the following functions:

1) Capacity control based on discharge-air temperature (VAV [variable air volume]). Capacity control shall be accomplished through the use of compressor staging and modulating hot gas reheat.
2) Supply fan volume control shall control output from a variable frequency drive to

maintain duct static pressure at user-configured set point.

m. Alerts and Alarms:

Control shall continuously monitor all sensor inputs and control outputs to ensure safe and proper system operation. Alerts shall be generated whenever sensor conditions have gone outside user-configured criteria for acceptability. Alarms shall be initiated when unit control detects that a sensor input value is outside its valid range (indicating a defective device or connection that prevents full unit operation), that an output has not functioned as expected, or that a safety device has tripped.

L. Accessories:

User interfaces for commissioning are available for VAV 50BVW.

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