



HB Series
Packaged Rooftop Units &
Outdoor Air Handlers
Engineering Catalog



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Features and Benefits

Energy Efficiency

HB Series packaged DX units have 13 SEER or better performance. With options such as an adjustable speed supply fan, two step compressor and factory installed economizer an HB Series unit can be configured to provide economical and energy efficient heating and cooling.

Flexibility

HB Series units can include options such as chilled water coil cooling, two stage R-410A DX cooling, two stage gas heating, 3 stage electric resistance heating and hot water coil heating. In addition, HB Series units are also available with humidity control, hot water preheat, sensible and enthalpy controlled economizers, CO₂ ventilation control, hot gas bypass, smoke detectors and horizontal supply and return connections.

Humidity Control

Modulating hot gas reheat humidity control option provides a dehumidification mode of operation, which can operate independently from the cooling mode. During dehumidification, the modulating reheat valves divert hot refrigerant gas from the condenser coil to the reheat coil, allowing the evaporator coil to cool the air stream to the dew point and the reheat coil to warm the air stream back to room temperature, using the minimum amount of reheat needed. This allows the humidity of the space to be reduced without supply air temperature swings or overcooling of the space.

Reliability

Cabinet construction consists of 1 inch foam panels, which provide an insulation R-value of 7, and are rigid and resistant to damage. The construction also protects the insulation from moisture damage and provides the unit with increased sound dampening. Corrosion resistant exterior paint exceeds a 2,500 hour salt spray test - over 5 times the industry standard of 500 hours. Direct drive backward curved plenum fan provides improved energy efficiency and eliminates belt maintenance. 5 year non-prorated compressor warranty and 15 year non-prorated gas heat exchanger warranty.

Compact Construction

Foam panel construction and compact condenser coil design allow the HB Series units to meet the weight and size requirements of almost any job. Continuous fin bent condenser coil design is compact while still being easily cleanable.

Serviceability

Quarter turn hinged access door with stainless steel piano hinges provide service access to the unit filters, economizer, heater, compressor and controls.



Fig. B1 - HB Series Air Handling Unit

HB Base Model Description

Model Number																		
<u>H</u>	<u>B</u>	-	<u>0</u>	<u>0</u>	<u>3</u>	-	<u>3</u>	-	<u>V</u>	-	<u>B</u>	<u>A</u>	<u>0</u>	<u>2</u>	-	<u>2</u>	<u>1</u>	<u>2</u>
1	2		3	4	5		6		7		8	9	10	11		12	13	14

BASE MODEL

Digit 1, 2: GENERATION

HB

Digit 3, 4, 5: UNIT SIZE

002 = 2 Nominal Tons

003 = 3 Nominal Tons

004 = 4 Nominal Tons

005 = 5 Nominal Tons

Digit 6: VOLTAGE

A = 208-230V/1Φ/60Hz

B = 208-230V/3Φ/60Hz

3 = 460V/3Φ/60Hz

Digit 7: DISCHARGE LOCATION

V = Standard (Vertical Discharge - Vertical Return)

H = Horizontal (Horizontal Discharge - Horizontal Return)

Model Option A: COOLING

Digit 8: COOLING STYLE

0 = Air Handling Unit

A = R-410A

B = R-410A 2-Step

Digit 9: COOLING CONFIGURATION

0 = No Cooling

A = Air-Cooled Cond w/ Std Evap Coil

Q = Air-Cooled Cond w/ Std Evap Coil w/ RA bypass

U = Chilled Water 4R Coil

W = Chilled Water 4R Coil w/ RA bypass

Y = Chilled Water 3R Coil w/ 1R Preheat

Z = Chilled Water 3R Coil w/ RA bypass w/ 1R Preheat

2 = Non-Comp w/ Std DX Evap Coil

3 = Non-Comp w/ Std DX Evap Coil w/ RA bypass

Digit 10: COOLING COATING

0 = Standard

1 = Polymer E-Coated (Evap and Cond Coil)

8 = Polymer E-Coated Condenser Coil

9 = Polymer E-Coated Cooling Coil

Digit 11: COOLING STAGING

0 = No Cooling

1 = 1 Stage

2 = 2 Stage

M = Quarter Serp, 10 FPI (CHW)

N = Half Serp, 10 FPI (CHW)

Model Option B: HEATING

Digit 12: HEATING STYLE

0 = No Heat

1 = Electric Heat

2 = Natural Gas Aluminized

E = Hot Water, Std

F = Hot Water, Polymer E-Coat

Digit 13: Heating Designation

0 = No Heat

1 = Heat 1

2 = Heat 2

3 = Heat 3

4 = Heat 4

5 = Heat 5

J = 2 Row Coil

Digit 14: Heating Staging

0 = No Heat

1 = 1 Stage

2 = 2 Stage

3 = 3 Stage

M = Single Serp, 12 FPI (HW)

N = Half Serp, 12 FPI (HW)

HB Features Description

Feature Number															
<u>A</u>	<u>0</u>	<u>0</u>	<u>A</u>	-	<u>0</u>	<u>0</u>	-	<u>0</u>	<u>0</u>	<u>A</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>B</u>
31	32	33	34		35	36		37	38	39	40	41	42	43	45

Feature 10: POWER OPTIONS

Digit 31:

0 = Standard
A = Power Switch (60 Amps)
B = Power Switch (100 Amps)

Feature 11: SAFETY OPTIONS

Digit 32:

0 = Standard
B = RA Smoke Detector
D = RA and SA Smoke Detector
H = Remote Smoke Detector Terminals

Feature 12: CONTROLS

Digit 33:

0 = Standard

Feature 13: SPECIAL CONTROLS

Digit 34:

0 = Base Board (T-Stat Interface)
A = Expanded Board (T-Stat Interface + DDC Interface)
E = Expanded Board + Network Module (Space Temp Sensor & Prism Software)

Feature 14: PREHEAT

Digit 35: PREHEAT CONFIGURATION

0 = No Preheat
A = 1 Row Hot Water Preheat

Digit 36: PREHEAT SIZING

0 = No Preheat
A = Half Serpentine, 10 FPI

Feature 15: BLANK

Digit 37:

0 = Standard

Feature 16: INTERIOR CABINET OPTIONS

Digit 38:

0 = Standard

Feature 17: EXTERIOR CABINET OPTIONS

Digit 39:

0 = Standard
A = Standard with Condenser Coil Guards

Feature 18: CUSTOMER CODE

Digit 40:

0 = None

Feature 19: CODE OPTIONS

Digit 41:

0 = Standard ETL USA Listing
A = MEA, New York
B = Chicago Cool and Gas
C = Chicago Cool and Electric
D = Chicago Cool Only
E = Chicago Gas Only
F = Chicago Electric Only
G = Chicago No Cool No Heat
H = ETL USA + Canada Listing

Feature 20: CRATING

Digit 42:

0 = Standard
A = Export Crating
B = Export Crating, No Condenser Section

Feature 21: BLANK

Digit 43:

0 = Standard

Feature 22: BLANK

Digit 44:

0 = Standard

Feature 23: TYPE

Digit 45:

B = Standard Paint
U = Special Pricing Authorization with Special Paint
X = Special Pricing Authorization with Standard Paint

Model Number

Unit Size

Example: HB-**003**-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

The first number of the model string designates nominal tons cooling at ARI conditions for air-cooled condenser units. Actual capacities will vary with conditions. Refer to the Performance Data section or the AAONECat32™ software for performance and cooling capacities at design conditions.

Table M1 - Unit Sizes

Model (Tons)	SEER @ ARI Conditions	Dimensions (in.)					
		Air Handling Unit			Packaged DX Unit		
		Length	Width	Height	Length	Width	Height
HB- 002	13.5	44	42	38	74	42	38
HB- 003	13.2						
HB- 004	13.3						
HB- 005	13.0						

Model Number

Voltage

Example: HB-003-**3**-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

All units have single point power blocks with grounding lugs and 24 VAC control circuits.

A = 208-230V/1Φ/60Hz

B = 208-230V/3Φ/60Hz

3 = 460V/3Φ/60Hz

Model Number Discharge Location

Example: HB-003-3-**V**-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

V = *Standard (Vertical Discharge - Vertical Return)* - Selects bottom of the unit opening locations for supply and return air.

H = *Horizontal (Horizontal Discharge - Horizontal Return)* - Selects horizontal supply and return air openings.

Note: Units are not field convertible and must be ordered with as either vertical or horizontal discharge.

Model Number Model Option A1 - Cooling Style

Example: HB-003-3-V-**B**A02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *Air Handling Unit* - No compressor. Also includes heating only or chilled water cooling unit.

A = *R-410A* - Compressorized DX cooling with R-410A refrigerant.

B = *R-410A 2-Step* - Same as option A but with a 2-step scroll compressor. Not available on 2 ton units with three phase line voltage.

Model Number Model Option A2 – Cooling Configuration

Example: HB-003-3-V-BA**A**02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *No Cooling* - Heating only or air handler unit

A = *Air-Cooled Cond w/ Std Evap Coil* - Air-cooled condenser with standard DX evaporator coil.

Q = *Air-Cooled Cond w/ Std Evap Coil w/ RA bypass* - Air-cooled condenser with a bypass damper mounted beneath the evaporator coil and separate return air damper section that allows a bypass of up to 50% return air. The damper section routes all outside air across the evaporator coil and the return air through or around the evaporator coil. Used as a single coil humidity control in units with both outside and return air.

***U** = *Chilled Water 4R Coil* - 4 row chilled water coil mounted before the fan.

Model Option A2 - Cooling Configuration Continued

***W** = *Chilled Water 4R Coil w/ RA Bypass* - 4 row chilled water coil mounted before the fan with a bypass damper mounted beneath the coil and separate return air damper section that allows a bypass of up to 50% return air. The damper section routes all outside air across the coil and the return air through or around the coil. Used as a single coil humidity control in units with both outside and return air.

***Y** = *Chilled Water 3R Coil w/ 1R Preheat* - 3 row chilled water coil mounted before the fan, with a 1 row integrated hot water preheat coil.

***Z** = *Chilled Water 3R Coil w/ RA Bypass w/ 1R Preheat* - 3 row chilled water coil mounted before the fan, with a 1 row integrated hot water preheat coil, with a bypass damper mounted beneath the coil and separate return air damper section that allows a bypass of up to 50% return air. The damper section routes all outside air across the coil and the return air through or around the coil. Used as a single coil humidity control in units with both outside and return air.

2 = *Non-Compressorized w/ Std DX Evap Coil* - Air handler with a standard evaporator coil but no compressors or condenser coils. Used with a remote condensing unit.

3 = *Non-Compressorized w/ Std DX Evap Coil w/ RA Bypass* - Same as option 2 but with a bypass damper mounted beneath the coil and separate return air damper section that allows a bypass of up to 50% return air. The damper section routes all outside air across the coil and the return air through or around the coil. Used as a single coil humidity control in units with both outside and return air.

* For cooling performance, refer to the AAONEcat32™ software. No valves or controls are included with these options.

Model Number

Model Option A3 – Cooling Coating

Example: HB-003-3-V-BA**0**2-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard* - No coating

1 = *Polymer E-Coated (Evap and Cond Coil)* - Polymer e-coating applied to both the condenser and evaporator coils. Coating exceeds a 6000 hour salt spray test per ASTM B 117-90 requirements, yet is only 0.8-1.2 mils thick and has excellent flexibility. Option is intended for use in coastal saltwater conditions under the stress of heat, salt, sand, and wind and is applicable to all corrosive environments where a polymer e-coating is acceptable.

8 = *Polymer E-Coated Condenser Coil* - Polymer e-coating applied only to the condenser coil.

9 = *Polymer E-Coated Cooling Coil* - Polymer e-coating applied only to the cooling coil.

Model Number

Model Option A4 – Cooling Staging

Example: HB-003-3-V-BA0**2**-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *No Cooling* - Heating only or air handling unit

1 = *1 stage* - Single stage unit

2 = *2 stage* - Two stage unit with each stage a step of the 2-step scroll compressor. Not available on 2 ton units with three phase line voltage.

***M** = *Quarter Serpentine 10 FPI (CHW)* - Chilled water coil, 10 fins per inch, single piping inlet/outlet

***N** = *Half Serpentine 10 FPI (CHW)* - Chilled water coil, 12 fins per inch, single piping inlet/outlet

*For cooling performance, refer to the AAONEcat32™ software. No valves or controls are included with these options.

Model Number

Model Option B1 – Heating Type

Example: HB-003-3-V-BA0**2**-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *No Heat*

1 = *Electric Heat* - Electric heater with multiple elements.

***2** = *Natural Gas Aluminized* - Natural gas heater with aluminized steel heat exchanger with a 15 year non-prorated warrant. The maximum temperature rise across the heat exchanger is 70 degrees. The maximum outlet temperature is 180°F.

E = *Hot Water Std* - Hot water coil with no coating. No valves or controls are included with these options.

F = *Hot Water Polymer E-Coated* - Hot water coil with a polymer e-coating. No valves or controls are included with these options

* Single stage LP field conversion kits, high altitude field conversion kits, and pressure regulator field installation kits are available.

Model Number

Model Option B2 – Heating Designation

Example: HB-003-3-V-BA02-2**1**2:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = No Heat

Table M2 - Electric and Gas Heating Capacities

	Gas Heat Input Capacity	Gas Heat Output Capacity	Electric Heat Capacity	
	MBH	MBH	kW 208V	kW 230 or 460V
1 = Heat 1	45	36	7.5	10
2 = Heat 2	60	48	15	20
3 = Heat 3	75	60	22.5	30
4 = Heat 4	100	80	NA	
5 = Heat 5	125	100		

***J** = 2 Row Coil - Two row hot water coil

*For heating performance, refer to the AAONEcat32™ software. No valves or controls are included with this option.

Note: AAONEcat32™ will calculate the heating designation for gas or electric heat and choose the correct heat code, based on the desired leaving air and entering air temperature conditions.

Model Number

Model Option B3 – Heating Staging

Example: HB-003-3-V-BA02-2**1**2:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = No Heat

1 = 1 stage - Single stage heat control. Available on all gas and electric heat units.

2 = 2 stage - Two stage heat control. Available on all gas heat units and 20 and 30 kW electric heat units.

3 = 3 stage - Three stage heat control. Available on 30kW electric heat units only.

***M** = Single Serpentine 12 FPI (HW) - Hot water coil, 12 fins per inch, single piping inlet/outlet.

Model Option B3 - Heating Staging Continued

*N = *Half Serpentine 12 FPI (HW)* - Hot water coil, 12 fins per inch, single piping inlet/outlet.

*For heating performance, refer to the AAONEcat32™ software. No valves or controls are included with these options.

Feature 1A Return/Outside Air Section

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard - No Outside Air* - No outside air opening. Return air opening only.

A = *Economizer* - Economizer damper assembly with controls. Choose the control options in Feature 2.

B = *Manual Outside Air* - 0-25% manual outside air opening. The unit will have a return air opening.

C = *Motorized Outside Air Dampers with Return Air* - Selects extruded aluminum, low leakage, gear-driven airfoil damper to control the outside air intake. The unit will have a return air opening. Dampers will open on a call for the supply fan.

Feature 1B Return/Outside Air Blower Configuration

Example: HB-003-3-V-BA02-212:A**0**00-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard* - None

Feature 1C Return/Outside Air Blower

Example: HB-003-3-V-BA02-212:A0**0**0-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard* - None

Feature 1D

Return/Outside Air Motor

Example: HB-003-3-V-BA02-212:A00**0**-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard* - None

Feature 2

Outside Air Control

Example: HB-003-3-V-BA02-212:A00**0**-D00-0BG-00A-000A00A-00-00A00000B

0 = *Standard (No Actuator)* - No actuator

C = *Full Mod Actuator w/ Sensible Limit and Dual Min Pos Option* - Fully modulating actuator with 3 positions. Position one is the closed position. Position two is the minimum outside air position for stage 1 cooling, which is activated when there is a call for fan operation. Position three is the minimum outside air position for stage 2 cooling. During economizer mode actuator modulates between minimum outside air position and fully open to maintain a discharge temperature of 55°F. The range for the economizer changeover control is 45°F to 95°F and responds to sensible temperature only. For motorized outside air option, only fully closed and fully open positions are used. The actuator is spring return closed.

D = *Full Mod Actuator w/ Enthalpy Limit and Dual Min Pos Option* - Same as option C but the economizer changeover control responds to sensible and latent heat of the ambient air. See Figure 1, Enthalpy Changeover Dial, and Table 3, Enthalpy Changeover Adjustment.

E = *DDC Actuator* - Economizer actuator with terminal strip (EC1 and EC2) in the controls compartment for a field supplied outside air control signal. Actuator is factory configured for a 4-20mA control signal, but can be configured for a 0-10VDC control signal by removing the resistor between the terminals, EC1 and EC2. Use this option where customer supplied controls are employed for economizer/outside air functions. All economizer functions will be by others. AAON supplies the damper assembly and actuator only.

P = *CO₂ Override + Full Mod Actuator w/ Sensible Limit and Dual Min Pos Option* - Option C + CO₂ ventilation controller that senses the return air stream through a pitot tube. Used for demand controlled ventilation applications, where outside air ventilation is based on actual not assumed demand, for energy savings. The sensor is self-calibrating with a 14-day log that will automatically correct for sensor drift and has onboard push buttons with LCD display for specifying CO₂ setpoint. This option works best with air velocities in the 600 to 1200 fpm range.

Feature 2 - Outside Air Control Continued

Q = CO₂ Override + Full Mod Actuator w/ Enthalpy Limit and Dual Min Pos Option - Option D + CO₂ sensor

R = CO₂ Override + DDC Actuator - Option E + CO₂ sensor

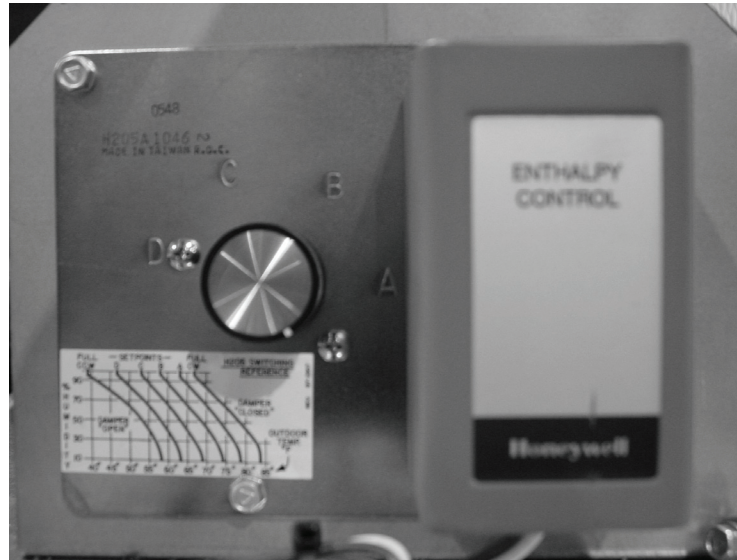


Fig. M1 - Enthalpy Changeover Dial

Table M3 - Enthalpy Changeover Adjustment

Dial Setting	20% RH		50% RH		80% RH	
	°F	°C	°F	°C	°F	°C
A (Max)	78	26	73	23	68	20
B	73	23	68	20	63	17
C	68	20	63	17	59	15
D (Min)	62	17	58	14	53	12

Feature 3 Gas Options

Example: HB-003-3-V-BA02-212:A000-D**00**-0BG-00A-000A00A-00-00A00000B

***0** = Standard (None - Field Kits for LP and Pressure Regulators Available Separately)

* Single stage LP field conversion kits, high altitude field conversion kits, and pressure regulator field installation kits are available.

Feature 4

Maintenance Options

Example: HB-003-3-V-BA02-212:A000-D0**0**-0BG-00A-000A00A-00-00A00000B

0 = *Standard*

A = *115V Convenience Outlet, Field Wired* - Field wired 2x4 electrical box with ground fault interrupter receptacle, located inside the unit controls cabinet. Receptacle is rated for 20 amps. The outlet must be field wired to a 115VAC power supply.

Feature 5A

Supply Air Blower Configuration

Example: HB-003-3-V-BA02-212:A000-D00-**0**BG-00A-000A00A-00-00A00000B

0 = *1 Blower*

AAONEcat32™ will select the correct option for Feature 5A based on unit conditions and the input from the fan selection program. When all of the other features have been selected, you will be prompted to select a supply fan and motor under the “Fan Selection” window. In the “Fan Selection” window you will be able to choose the motor hp and an adjustable or multi-tap (non-adjustable) two speed motor and view fan curves.

Feature 5B

Supply Air Blower

Example: HB-003-3-V-BA02-212:A000-D00-0**B**G-00A-000A00A-00-00A00000B

B = *Blower B (BC 16.5”)*

AAONEcat32™ will select the correct option for Feature 5B based on unit conditions and the input from the fan selection program. When all of the other features have been selected, you will be prompted to select a supply fan and motor under the “Fan Selection” window. In the “Fan Selection” window you will be able to choose the motor hp and an adjustable or multi-tap (non-adjustable) two speed motor and view fan curves.

Feature 5C

Supply Air Motor

Example: HB-003-3-V-BA02-212:A000-D00-0B**G**-00A-000A00A-00-00A00000B

***A** = 0.167 hp - Multi-Tap

***B** = 0.25 hp - Multi-Tap

***C** = 0.75 hp - Multi-Tap

E = 0.167 hp - Adjustable 2 Speed

F = 0.25 hp - Adjustable 2 Speed

G = 0.75 hp - Adjustable 2 Speed

*Motor has three fixed speeds (High, Med, Low). AAON factory wires controller to two of these motor speeds (High and Low). Motor can be field rewired from one of these two speeds to the unused speed.

AAONEcat32™ will select the correct option for Feature 5C based on unit conditions and the input from the fan selection program. When all of the other features have been selected, you will be prompted to select a supply fan and motor under the “Fan Selection” window. In the “Fan Selection” window you will be able to choose the motor hp and an adjustable or multi-tap two speed motor and view fan curves.

Feature 6A

Pre Filter Type

Example: HB-003-3-V-BA02-212:A000-D00-0BG-**0**0A-000A00A-00-00A00000B

0 = Standard (None)

Feature 6B

Unit Filter Type

Example: HB-003-3-V-BA02-212:A000-D00-0BG-**00**A-000A00A-00-00A00000B

00 = Standard 2” Pleated 30% Eff - 2” pleated, 30% efficient, MERV 8 filters mounted next to and upstream of the evaporator coil and downstream of the return air opening.

Feature 6C

Filter Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00**A**-000A00A-00-00A00000B

0 = *Standard* - No CFS

***A** = *Clogged Filter Switch (CFS)* - Adjustable differential pressure switch sensing pressure drop across the filter bank. The range of adjustment is 0.17" to 5.0" W.C. with contact closure on rise. The switch is mounted in the filter compartment with terminal connections in the low voltage control section. Normally open dry contacts (C1 and C2) are provided for clogged filter indication.

* A Special Pricing Authorization (SPA) is required if the CFS is to be used to respond to the pressure drop across the coil.

Feature 7

Refrigeration Control

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-**0**00A00A-00-00A00000B

0 = *Std (5 min (On-Off) times, Fan Cycling and Adj. Compressor Lockout)* - The HB controllers have the following refrigeration control setpoints that can be adjusted with the optional HB Service Tool. See Controls Section for more information.

Table M4 - HB Refrigeration Settings

Setpoint	Minimum	Default	Maximum
Minimum Off Time	180 sec.	180 sec.	900 sec.
Minimum On Time	300 sec.	300 sec.	900 sec.
Auto Staging Up Delay	180 sec.	600 sec.	900 sec.
Cooling Lockout Temperature	32°F	40°F	80°F

Feature 8

Refrigeration Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-00**0**A00A-00-00A00000B

0 = *Standard* - Manual reset high pressure cutouts, automatic reset low pressure cutouts, internal overload protection on compressors, thermal expansion valves.

A = *Hot Gas Bypass (HGB)* - Field adjustable pressure activated bypass valve on the cooling circuit factory setup to divert hot compressor discharge gas to the evaporator coil if pressure on the evaporator side of the valve drops below 105 psi (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low airflow or cold entering coil conditions. This option is used for refrigerant system protection only and cannot be used for cooling capacity modulation.

D = *Modulating Hot Gas Reheat Coil (MHGR)* - Reheat coil mounted downstream of the evaporator and piped to the lead cooling circuit. A terminal contact (RH1) is included for connecting a humidistat. Upon a dry contact closure signal from the humidistat and no call for cooling from the thermostat, the lead compressor is activated. A call for cooling or heating will deactivate the reheat coil, returning all refrigerant to the condenser coil. A wall mount humidistat is available as an accessory. Receiver tank is standard with this option. This option is used when dehumidification is needed when the cooling setpoint has been satisfied. Option includes modulating condenser control valve, modulating reheat control valve, and supply air temperature sensor to maintain constant supply air temperature during dehumidification.

H = *HGB + MHGR* - Option A + D

Feature 9

Refrigeration Accessories

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-00**0**A00A-00-00A00000B

0 = *Standard* - None

Feature 10

Power Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000**A**00A-00-00A00000B

0 = *Standard Power Block*

A = *Power Switch (60 Amps)*

B = *Power Switch (100 Amps)*

Individual components within the control cabinet are fused. Switch options include molded case, non-fused, disconnect switch inside the unit control cabinet. The switch is accessible from the exterior of the unit. The switch disconnects high voltage service to the unit. To add a switch, choose any switch and after all options have been selected and the fan program is completed AAONEcat32™ will automatically calculate the minimum allowable ampacity and choose the correct size switch.

Feature 11

Safety Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000**A00**A-00-00A00000B

0 = *Standard* - No smoke detectors

B = *R/A Smoke Detector* - Photoelectric type smoke detector is factory mounted in the return air section of the unit. It is wired to shut down the 24V control circuit upon detector activation, thereby shutting off the unit. Relay contacts are provided for interfacing the detector with alarm panels. A test magnet is supplied in the unit control cabinet. Smoke detectors are non-addressable.

D = *R/A and S/A Smoke Detector* - Option B + another smoke detector mounted in the filter/economizer section with sensor mounted to the blower/heating compartment, sensing the supply air downstream of the filters and blower. Smoke detectors are non-addressable.

H = *Remote Smoke Detector Terminals (field detector)* - Adds low voltage terminals labeled BI1 and BI2 for wiring to a field installed smoke detector. When contacts are open the unit 24V control circuit is broken and the unit will not operate. Remove the factory supplied jumper before installing smoke detectors.

Feature 12

Controls

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00**0**A-00-00A00000B

0 = *Standard*

Feature 13

Special Controls

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00**A**-00-00A00000B

0 = *Base Board (T-Stat Interface)* - WattMaster HB Mini Controller with terminal block for wiring to separately purchased thermostat. Outside air temperature sensor is factory mounted and wired. Only multi-tap 2 speed supply fan is available with this option. Option used when only a basic thermostat controlled heating and cooling unit is needed. Default unit settings can be adjusted with the addition of an optional HB Service Tool. Only one HB Service Tool is needed to configure multiple HB units as it connects to the control board via modular cable.

A = *Expanded Board (T-Stat Interface + DDC Interface)* - WattMaster HB Controller with terminal block for wiring to separately purchased thermostat and DDC interface with the addition of an optional HB Service Tool. Outside air temperature sensor is factory mounted and wired. Option used when additional features are needed such as economizer, adjustable 2 speed fan, or modulating hot gas reheat. Default unit settings setpoints can be adjusted with the addition of an optional HB Service Tool. Only one HB Service Tool is needed to configure multiple HB units as it connects to the control board via modular cable.

E = *Expanded Board + Network Module (Space Temp Sensor & Prism Software)* - WattMaster HB Controller with terminal block for wiring to separately purchased thermostat, a DDC interface with the addition of an optional HB Service Tool, and a network module for connecting to other WattMaster HB Controllers. PC, with free Prism software downloaded from www.orioncontrols.com, can be connected to the network loop with the addition of a separately purchased CommLink. When connected the Prism software provides a 7 day, 2 event per day scheduler and a 14 day holiday scheduler. Outside air temperature sensor is factory mounted and wired. Optional space temperature sensor can be used for unit control. Option used when HB networking or space temperature sensor DDC control is needed. Default unit settings and setpoints can be adjusted with the addition of an optional HB Service Tool. Only one HB Service Tool is needed to configure multiple HB units as it connects to the control board via modular cable.

Feature 14A

Preheat Configuration

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-**00**-00A00000B

0 = *Standard (No Preheat)*

A = *1R Preheat* - 1 row of hot water preheat included with Model Option A2 = Y or Z.
No valves or controls are included with these options.

Feature 14B

Preheat Sizing

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-**00**-00A00000B

0 = *Standard (No Preheat)*

A = *Half Serpentine / 10FPI (HW)* - Hot water preheat, 10 fins per inch, single piping inlet/outlet. Included with Model Option A2 = Y or Z. No valves or controls are included with these options.

Feature 15

Blank

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-**00**A00000B

0 = *Standard*

Feature 16

Interior Cabinet Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-**00**A00000B

0 = *Standard (Stainless Steel Drain Pans)* - The drain pan is fabricated of stainless steel and insulated with 1" thick rigid, closed cell polyurethane foam. The HB series standard cabinet construction is 1" thick rigid, closed cell polyurethane foam double wall construction with a thermal break.

Feature 17

Exterior Cabinet Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00**A**00000B

0 = *Standard (1" Double Wall G90 w/ Foam Insulation)* - The HB series standard cabinet construction is 1" thick rigid, closed cell polyurethane foam double wall construction with a thermal break.

A = *Standard with Cond Coil Guards* - Option includes louvered panels fabricated from galvanized steel painted and factory mounted around the condenser coil face. The HB series standard cabinet construction is 1" thick rigid, closed cell polyurethane foam double wall construction with a thermal break.



Fig. M2 - Standard Construction and Standard Construction with Condenser Coil Guards

Feature 18

Customer Code

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00**0**0000B

0 = *Standard*

Used for groups of special features and options for national account customers only.

Feature 19

Code Options

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00**0**000B

0 = *Standard ETL USA Listing* - AAON units are ETL listed and tested in accordance with the latest revision of UL 1995. If a Special Pricing Authorization (SPA) is applied there may be additional costs incurred to secure the ETL label.

A = *MEA (New York)- MEA 348-05-E* - Approval tag attached to the unit exterior, designating AAON units comply with the Material & Equipment Acceptance requirements for the City of New York.

B = *Chicago Cool & Gas* - Chicago code for a unit with cooling and gas heat. Chicago code states that unit wiring to the condenser fan motors must be in flexible conduit and refrigerant pressure relief valves must be supplied.

C = *Chicago Cool & Electric* - Chicago code for a unit with cooling and electric heat.

D = *Chicago Cool Only* - Chicago code for a cooling only unit.

E = *Chicago Gas Only* - Chicago code for a gas heat only unit.

F = *Chicago Electric Only* - Chicago code for an electric heat only unit.

G = *Chicago No Cool No Heat* - Chicago code for a unit with no cooling and no heat.

H = *ETL USA + Canada Listing* - Canadian and USA listings for export. The nameplate, safety labels, drain, and blower warnings will be in English and French.

Feature 20

Crating

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00**0**00B

0 = *Standard* - Standard crating

A = *Export Crating* - Crating for overseas shipping fabricated from blocked, braced and banded dimensional lumber and 3/8 inch plywood. Option is only available on units with condensers.

B = *Export Crating, No Condenser Section* - Same as option A, but for a unit without a condensing section.

Feature 21

Blank

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A0000**0**0B

0 = *Standard*

Feature 22

Blank

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A00000**0**B

0 = *Standard*

Feature 23

Type

Example: HB-003-3-V-BA02-212:A000-D00-0BG-00A-000A00A-00-00A000000**B**

B = *Standard (Gray Paint)* - Cabinet exterior is primer washed then spray coated with a two-part polyurethane, heat-baked coating. Polyurethane coating exceeds 2500 hours when tested under ASTM B 117-95 requirements.

U = *Special Price Authorization & Special Paint* - When a special paint color is specified, a set-up charge and price add per unit is required. Also use this designation if other special paint options are necessary. The Special Pricing Authorization worksheet with comprehensive explanation of requirements must accompany the order documents.

X = *Special Price Authorization & Gray Paint* - The Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.

General Data

Unit Information

Table G1 - HB Series Cooling Information

	Model			
	002	003	004	005
Compressor				
Quantity/Nominal Tons	1/2	1/3	1/4	1/5
Capacity Steps (%)	100 or 100/65			
DX Evaporator Coil - Standard				
Number of Circuits	1			
Quantity/Face Area	1/5.0ft ²		1/5.1ft ²	
Rows/FPI	3/14		4/14	
Chilled Water Coil - 4 Row				
Quantity/Face Area	1/4.2ft ²			
Rows/FPI	4/10 (Half or Quarter Serpentine)			
Standard Coil	Quarter Serpentine with 10 FPI			
Chilled Water Coil - 3 Row with 1 Row Preheat				
Quantity/Face Area	1/4.5ft ²			
Rows/FPI	4/10 (Half Serpentine)			

Table G2 - HB Series Heating Information

	Model			
	002	003	004	005
Electric Heat				
Capacity (kW)	10, 20, 30			
Stages	10 kW - 1 20 kW - 1 or 2 30 kW - 1, 2, or 3			
Natural Gas Heat				
Input (MBH)	45, 60, 75, 100, 125			
Natural Gas Capacity Steps (MBH)	45 MBH: 1 stage - 45, 2 stage - 45/31.5 60 MBH: 1 stage - 60, 2 stage - 60/42 75 MBH: 1 stage - 75, 2 stage - 75/52.5 100 MBH: 1 stage - 100, 2 stage - 100/70 125 MBH: 1 stage - 125, 2 stage - 125/87.5			
Hot Water Coil				
Quantity/Face Area	1/2.13ft ²			
Rows/FPI	2/12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine with 12 FPI			

Table G3 - HB Series Fan Information

	Model			
	002	003	004	005
Supply Fan				
Quantity/Type	1/ Direct Drive Backward Curved Plenum			
Condenser Fan				
Quantity/Type	1/22" Propeller Fan			
hp	0.16		0.33	

Curb Information

Acoustical Solid Bottom Curb

Acoustical solid bottom curbs are lined with 1 inch neoprene coated fiberglass insulation for sound attenuation. Curbs are available in 14 and 24 inch tall sizes. Supply and return air connection openings must field cut on the bottom of the curb for the duct connections.

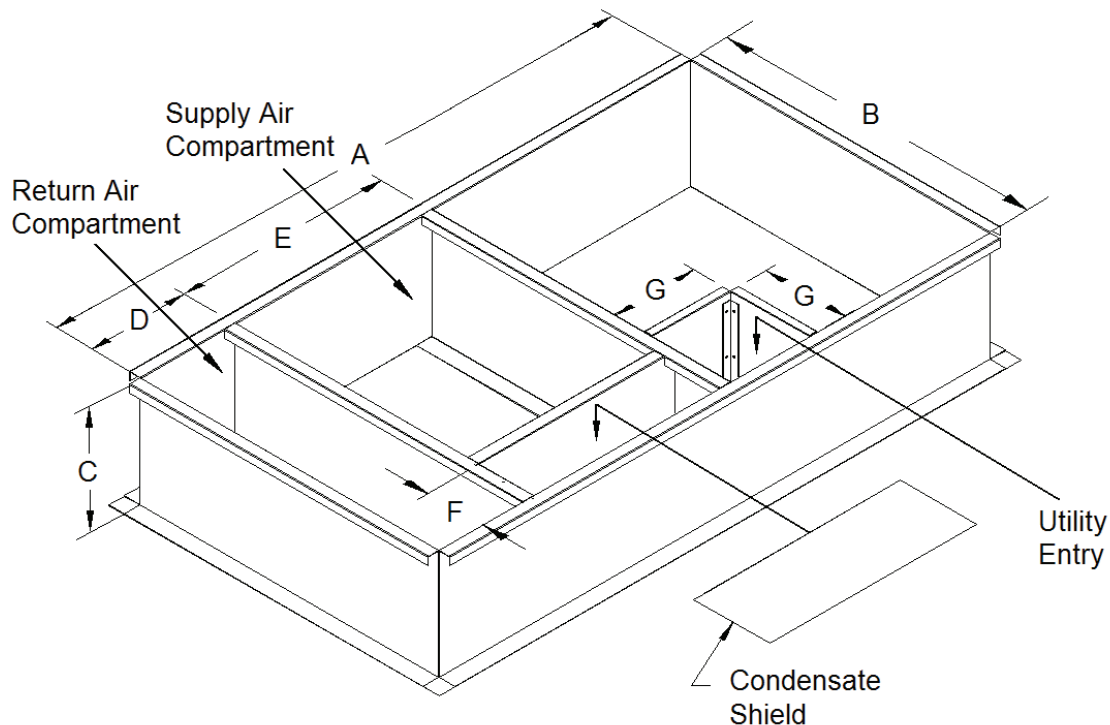


Fig. C1 - HB Series Packaged DX Unit Acoustical Solid Bottom Curb

Dimensions (in.)						
A	B	C	D	E	F	G
70	38	14 or 24	12	25	7	10

Acoustical Solid Bottom Curb Continued

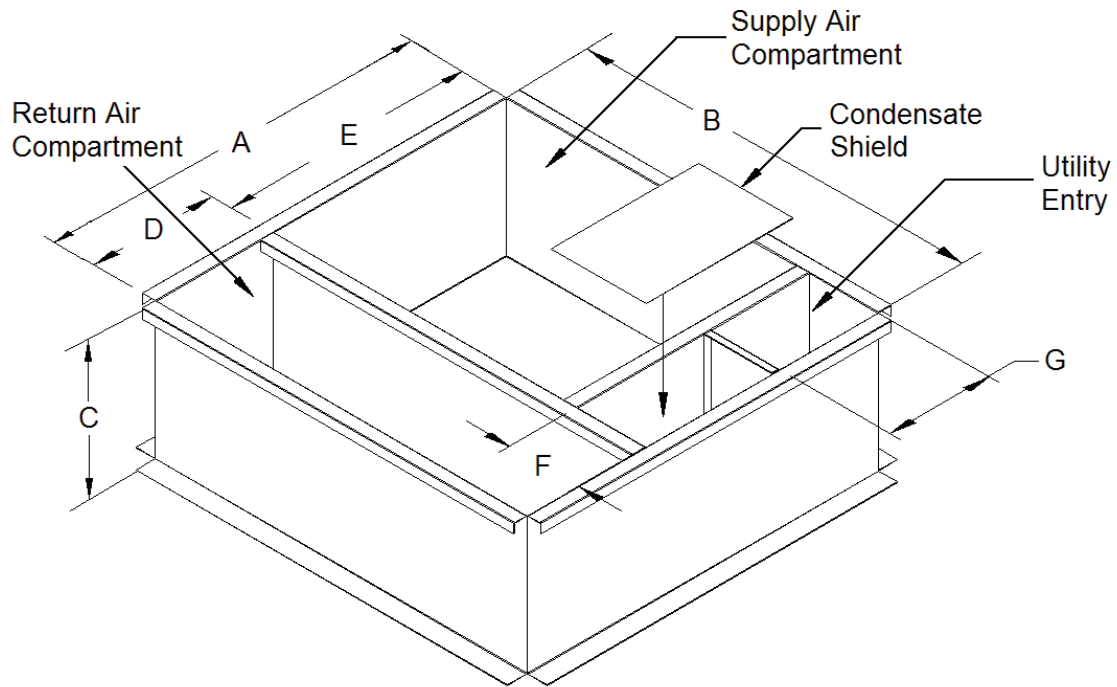


Fig. C2 - HB Series Air Handling Unit Acoustical Solid Bottom Curb

Dimensions (in.)						
A	B	C	D	E	F	G
42	38	14 or 24	12	30	7	10

Knock Down Curb

Knock down curbs are shipped disassembled for field construction. Curbs are available in 14 and 24 inch tall sizes.

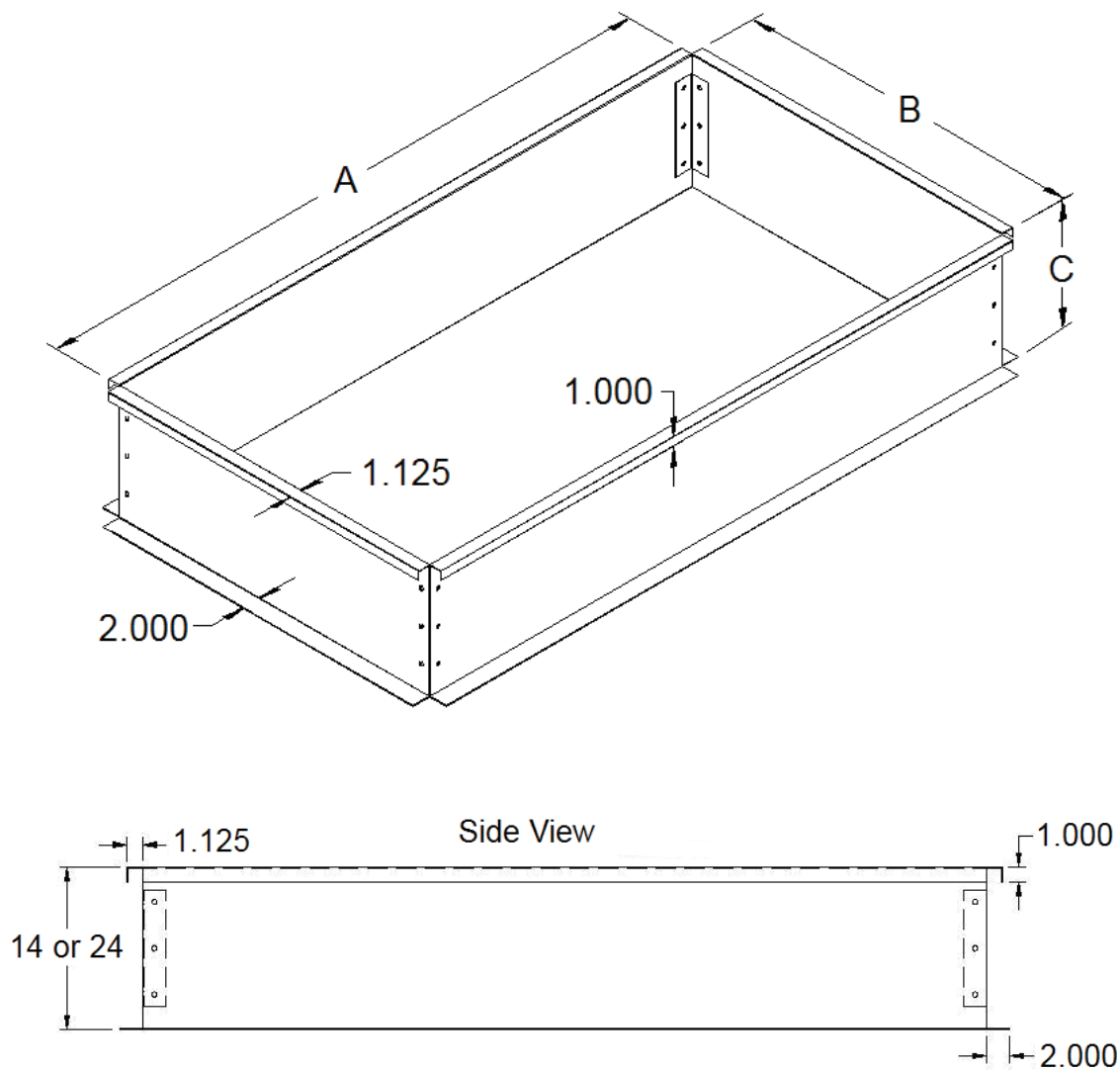


Fig. C3 - HB Series Packaged DX Unit Knock Down Curb

Dimensions (in.)		
A	B	C
70	38	14 or 24

Knock Down Curb Continued

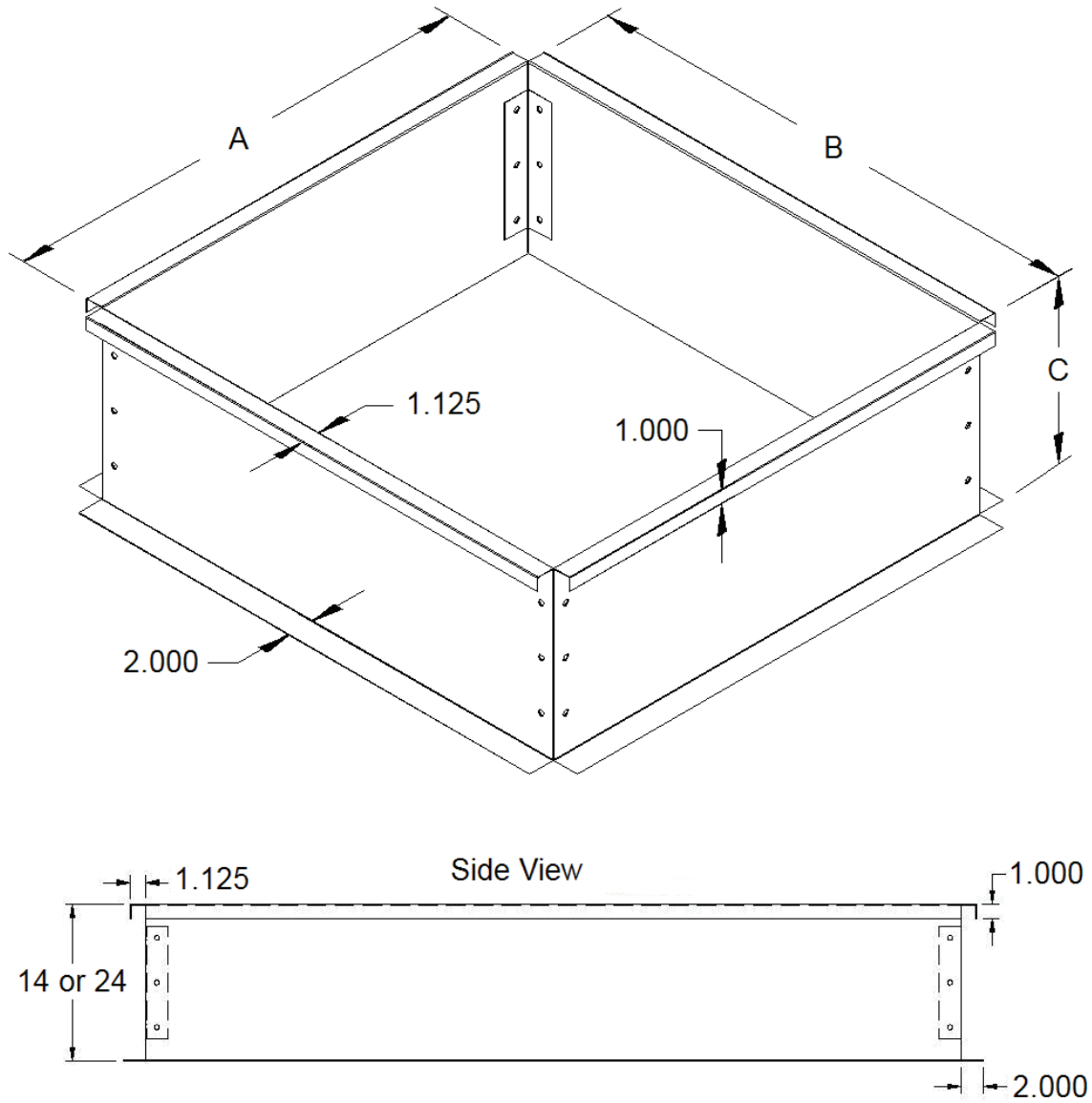


Fig. C4- HB Series Air Handling Unit Knock Down Curb

Dimensions (in.)		
A	B	C
42	38	14 or 24

Optional Knock Down Curb Duct Support Rail Kit

Duct support rails are for knock down curbs only.

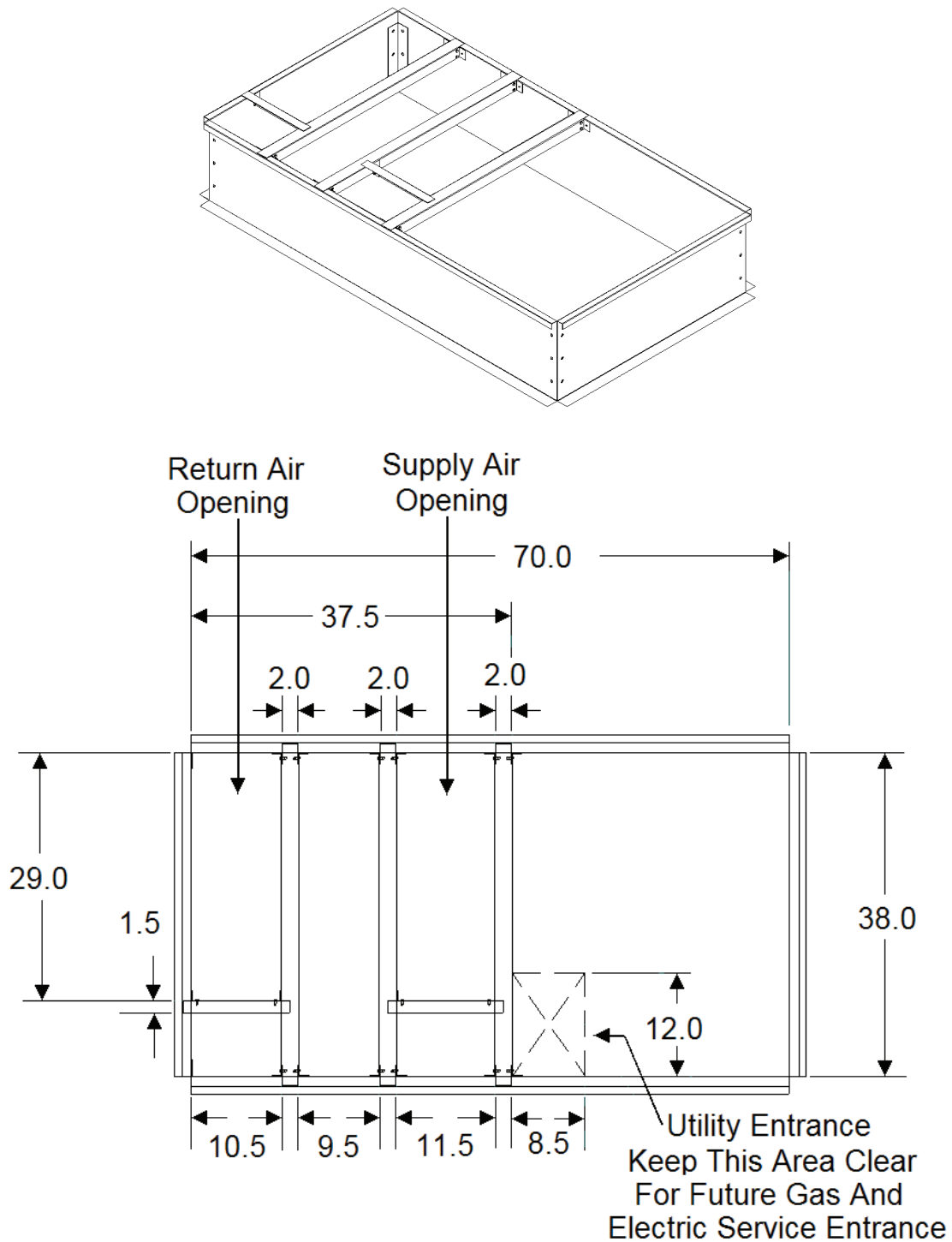


Fig. C5 - HB Series Packaged DX Unit Knock Down Curb with Duct Support Rail Kit

Optional Knock Down Curb Duct Support Rail Kits Continued

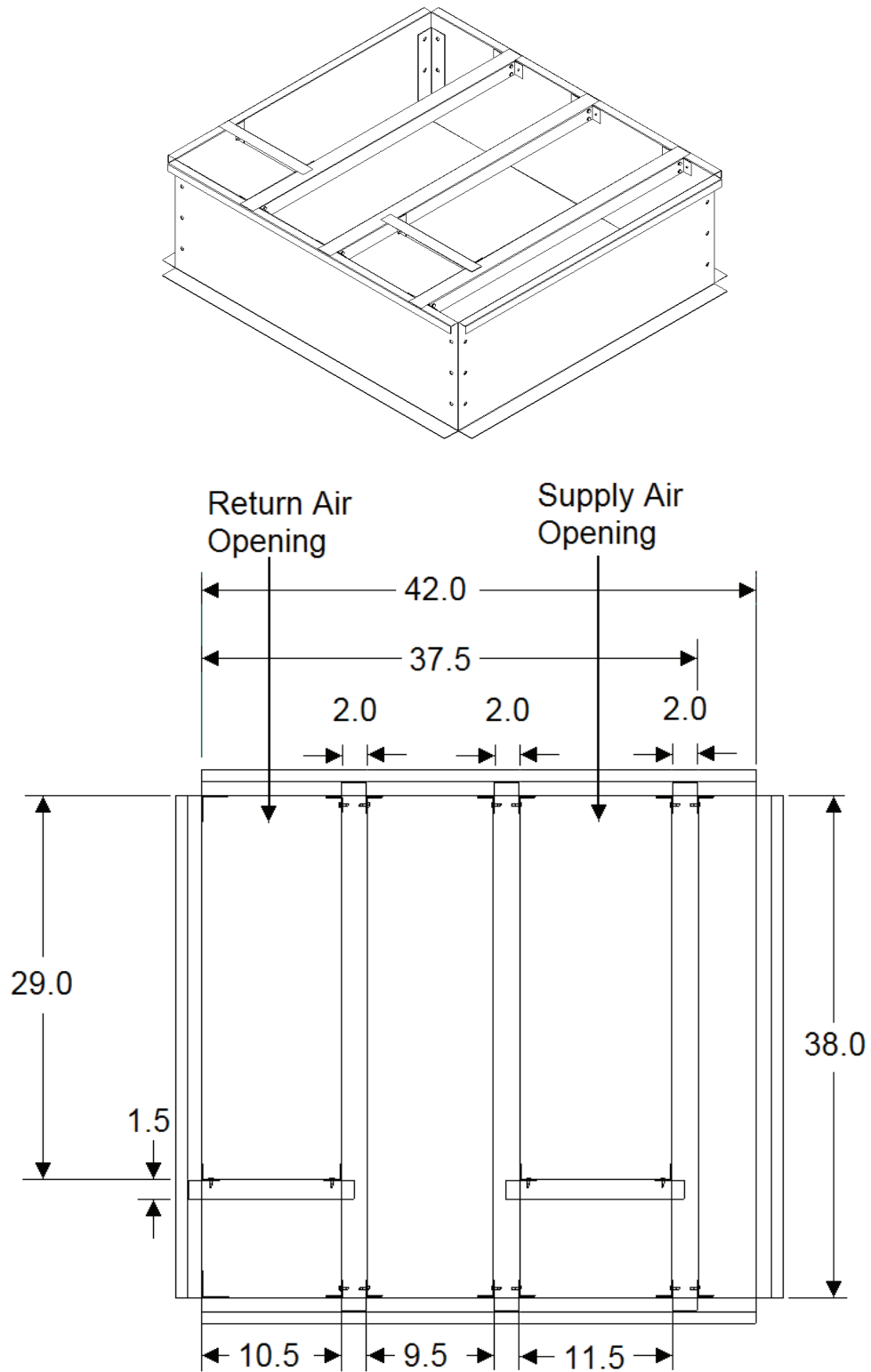


Fig. C6 - HB Series Air Handling Unit Knock Down Curb with Duct Support Rail Kit

Filter Information

Table F1 - HB Series Filters

Option	Quantity	Size	Type
Standard	2	20" x 25" x 2"	2" Pleated 30% eff

Performance Data

Unit Cooling Capacities

2 Ton, Single Stage Cooling Unit Cooling Capacities

Table C1 - Standard Evaporator Coil (3 Row)

EDB (°F)	EWB (°F)	Air Flow (CFM)	Ambient Air Temperature (°F)			
			95		120	
			Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	700	24.57	18.33	20.68	16.71
		1350	27.59	26.23	24.18	24.18
		2000	28.27	28.27	23.05	23.05
	67	700	26.98	14.78	22.69	13.15
		1350	30.03	19.76	24.90	18.01
		2000	31.40	23.37	25.84	21.46
	72	700	29.44	11.15	24.78	9.55
		1350	32.58	13.25	26.85	11.48
		2000	34.09	14.78	27.61	12.83
80	62	700	24.51	21.71	20.64	20.05
		1350	26.86	26.86	22.98	22.98
		2000	28.81	28.81	24.40	24.40
	67	700	26.89	18.16	22.64	16.54
		1350	29.99	25.94	24.82	24.10
		2000	31.30	31.30	28.21	28.21
	72	700	29.37	14.55	24.73	12.93
		1350	32.54	19.45	26.83	17.68
		2000	34.05	23.05	27.59	21.06
90	62	700	24.70	24.07	21.61	21.61
		1350	29.65	29.65	25.56	25.56
		2000	32.01	32.01	27.37	27.37
	67	700	26.76	24.75	22.69	22.69
		1350	29.68	29.68	25.58	25.58
		2000	32.04	32.04	27.40	27.40
	72	700	29.22	21.16	24.62	19.60
		1350	32.45	31.54	26.56	26.56
		2000	33.32	33.32	27.41	27.41

2 Ton, Two Stage Cooling Unit Cooling Capacities

Table C2 -Standard Evaporator Coil (3 Row)

EDB (°F)	EWB (°F)	Stage	Air Flow (CFM)	Ambient Air Temperature (°F)			
				95		120	
				Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	1	900	18.44	18.05	16.13	16.13
		2	1350	25.99	25.61	19.97	19.97
		1	1300	18.78	18.78	16.24	16.24
		2	2000	24.36	24.36	21.12	21.12
	67	1	900	20.44	13.66	17.35	12.60
		2	1350	26.54	18.56	22.46	17.18
		1	1300	21.46	16.56	17.94	15.36
		2	2000	27.46	21.97	22.94	20.53
	72	1	900	22.58	9.21	19.03	8.12
		2	1350	28.79	12.08	24.63	10.81
		1	1300	23.82	10.46	19.72	9.23
		2	2000	29.90	13.52	24.91	11.96
80	62	1	900	18.54	18.54	16.04	16.04
		2	1350	24.26	24.26	21.12	21.12
		1	1300	20.09	20.09	17.39	17.39
		2	2000	25.73	25.73	22.29	22.29
	67	1	900	20.51	18.02	17.30	16.89
		2	1350	26.47	24.70	24.94	24.13
		1	1300	23.71	23.28	17.40	17.40
		2	2000	30.35	30.35	22.45	22.45
	72	1	900	22.54	13.56	19.25	12.54
		2	1350	28.75	18.28	24.59	16.94
		1	1300	23.77	16.41	19.68	15.21
		2	2000	29.86	21.72	24.89	20.27
90	62	1	900	20.81	20.81	18.24	18.24
		2	1350	26.74	26.74	23.47	23.47
		1	1300	22.58	22.58	19.75	19.75
		2	2000	28.62	28.62	24.94	24.94
	67	1	900	20.81	20.81	18.24	18.24
		2	1350	26.76	26.76	23.49	23.49
		1	1300	22.60	22.60	19.76	19.76
		2	2000	28.64	28.64	24.96	24.96
	72	1	900	22.45	22.02	18.76	18.76
		2	1350	28.27	27.27	23.53	23.53
		1	1300	22.66	22.66	19.69	19.69
		2	2000	28.59	28.59	24.99	24.99

3 Ton, Single Stage Cooling Unit Cooling Capacities

Table C3 -Standard Evaporator Coil (3 Row)

EDB (°F)	EWB (°F)	Air Flow (CFM)	Ambient Air Temperature (°F)			
			95		120	
			Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	700	28.44	20.06	23.76	17.99
		1500	32.91	29.67	27.11	27.11
		2300	34.19	34.19	27.48	27.48
	67	700	31.24	16.51	26.32	14.53
		1500	36.15	22.70	30.04	20.58
		2300	38.04	26.77	31.44	24.54
	72	700	34.33	12.91	29.24	11.08
		1500	39.66	15.75	32.79	13.59
		2300	41.44	17.43	34.03	15.17
80	62	700	28.21	23.32	23.70	21.32
		1500	33.23	33.23	29.96	29.96
		2300	34.09	34.09	29.12	29.12
	67	700	31.15	19.85	26.25	17.91
		1500	36.09	29.42	30.05	27.26
		2300	38.00	35.73	35.22	34.78
	72	700	34.23	16.30	29.17	14.48
		1500	39.60	22.48	32.74	20.32
		2300	41.39	26.44	33.99	24.11
90	62	700	27.60	27.60	24.12	24.12
		1500	34.86	34.86	30.29	30.29
		2300	38.03	38.03	32.68	32.68
	67	700	31.02	26.47	26.11	24.50
		1500	34.89	34.89	30.31	30.31
		2300	38.06	38.06	32.71	32.71
	72	700	34.03	22.93	29.03	21.10
		1500	39.48	35.64	32.64	32.64
		2300	40.69	40.69	32.40	32.40

3 Ton, Two Stage Cooling Unit Cooling Capacities

Table C4 -Standard Evaporator Coil (3 Row)

EDB (°F)	EWB (°F)	Stage	Air Flow (CFM)	Ambient Air Temperature (°F)			
				95		120	
				Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	1	1000	23.39	21.12	20.92	20.14
		2	1500	32.65	29.57	27.75	27.65
		1	1400	26.31	26.21	19.81	19.81
		2	2300	33.69	33.69	27.89	27.89
	67	1	1000	25.82	16.19	21.64	14.74
		2	1500	35.47	22.46	29.95	20.54
		1	1400	26.95	18.98	22.47	17.47
		2	2300	36.90	26.38	31.28	24.49
	72	1	1000	28.56	11.31	24.15	9.92
		2	1500	38.41	15.35	32.54	13.51
		1	1400	29.97	12.54	25.21	11.08
		2	2300	39.78	16.92	33.44	14.99
80	62	1	1000	22.70	22.70	19.68	19.68
		2	1500	31.51	31.51	27.44	27.44
		1	1400	24.61	24.61	21.17	21.17
		2	2300	33.85	33.85	29.40	29.40
	67	1	1000	25.77	20.96	21.59	19.46
		2	1500	35.42	29.18	30.16	27.29
		1	1400	27.09	25.37	25.17	24.71
		2	2300	36.87	35.36	35.03	34.73
	72	1	1000	28.50	16.10	24.10	14.71
		2	1500	38.36	22.09	32.50	20.25
		1	1400	29.92	18.91	25.16	17.40
		2	2300	39.73	25.93	33.40	23.94
90	62	1	1000	25.29	25.29	22.13	22.13
		2	1500	34.49	34.49	30.30	30.30
		1	1400	27.40	27.40	23.83	23.83
		2	2300	37.17	37.17	32.49	32.49
	67	1	1000	25.31	25.31	22.14	22.14
		2	1500	34.53	34.53	30.32	30.32
		1	1400	27.42	27.42	23.85	23.85
		2	2300	37.19	37.19	32.52	32.52
	72	1	1000	28.38	25.41	24.10	24.09
		2	1500	38.26	35.26	32.52	32.52
		1	1400	29.28	29.28	23.93	23.93
		2	2300	39.22	39.22	32.34	32.34

4 Ton, Single Stage Cooling Unit Cooling Capacities

Table C5 -Standard Evaporator Coil (4 Row)

EDB (°F)	EWB (°F)	Air Flow (CFM)	Ambient Air Temperature (°F)			
			95		120	
			Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	800	37.93	25.47	32.93	23.16
		1550	44.29	36.41	37.74	33.75
		2300	46.77	45.82	39.11	39.11
	67	800	41.54	21.34	36.23	19.11
		1550	48.49	28.49	41.27	25.79
		2300	51.19	34.43	43.36	31.76
	72	800	46.67	17.23	39.73	14.94
		1550	52.98	20.52	45.27	17.93
		2300	55.80	22.91	47.30	20.30
80	62	800	37.83	29.33	32.84	26.98
		1550	44.33	43.87	36.98	36.98
		2300	45.32	45.32	39.47	39.47
	67	800	41.41	25.21	36.13	22.94
		1550	48.27	35.89	41.20	33.35
		2300	51.11	45.32	43.38	42.73
	72	800	45.53	21.13	39.62	18.84
		1550	52.88	28.01	45.19	25.52
		2300	55.71	33.96	47.23	31.34
90	62	800	37.55	36.79	32.31	32.31
		1550	45.51	45.51	40.14	40.14
		2300	49.96	49.96	43.69	43.69
	67	800	41.16	32.72	35.93	30.53
		1550	46.92	46.92	40.17	40.17
		2300	50.00	50.00	43.72	43.72
	72	800	45.24	28.67	39.41	26.46
		1550	52.66	42.81	45.00	40.26
		2300	55.54	55.54	46.44	46.44

4 Ton, Two Stage Cooling Unit Cooling Capacities

Table C6 -Standard Evaporator Coil (4 Row)

EDB (°F)	EWB (°F)	Stage	Air Flow (CFM)	Ambient Air Temperature (°F)			
				95		120	
				Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	1	1000	31.52	24.74	26.92	22.82
		2	1550	43.85	36.14	37.92	33.81
		1	1400	33.53	30.29	28.52	28.29
		2	2300	46.24	45.67	39.19	39.19
	67	1	1000	35.03	19.81	30.08	17.96
		2	1550	47.80	28.24	41.41	25.84
		1	1400	37.19	23.28	31.73	21.38
		2	2300	50.20	34.09	43.14	31.69
	72	1	1000	38.62	14.74	33.19	12.87
		2	1550	52.33	20.22	44.92	17.82
		1	1400	40.91	16.21	34.97	14.34
		2	2300	55.04	22.68	47.34	20.31
80	62	1	1000	31.44	29.56	27.43	27.43
		2	1550	43.92	43.68	38.57	38.57
		1	1400	32.57	32.57	28.54	28.54
		2	2300	44.96	44.96	39.57	39.57
	67	1	1000	34.95	24.67	30.01	2.79
		2	1550	47.72	35.69	41.34	33.40
		1	1400	37.12	30.12	31.68	28.15
		2	2300	50.14	45.00	43.35	42.72
	72	1	1000	38.53	19.63	33.12	17.77
		2	1550	52.24	27.80	45.25	25.54
		1	1400	40.83	23.07	34.90	21.20
		2	2300	54.96	33.72	47.27	31.36
90	62	1	1000	32.70	32.70	29.06	29.06
		2	1550	45.13	45.13	40.13	40.13
		1	1400	36.29	36.29	32.08	32.08
		2	2300	49.32	49.32	43.77	43.77
	67	1	1000	34.79	34.13	29.07	29.07
		2	1550	46.43	46.43	40.16	40.16
		1	1400	36.31	36.31	32.10	32.10
		2	2300	49.36	49.36	43.81	43.81
	72	1	1000	38.34	29.14	32.97	27.34
		2	1550	52.03	42.60	45.07	40.28
		1	1400	40.68	36.41	34.99	34.63
		2	2300	54.79	54.79	46.48	46.48

5 Ton, Single Stage Cooling Unit Cooling Capacities

Table C7 -Standard Evaporator Coil (4 Row)

EDB (°F)	EWB (°F)	Air Flow (CFM)	Ambient Air Temperature (°F)			
			95		120	
			Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	1000	47.38	31.82	40.89	28.83
		1600	53.29	40.70	45.26	37.29
		2200	56.15	48.45	47.66	45.08
	67	1000	51.72	26.58	44.75	23.67
		1600	57.79	32.30	49.82	29.32
		2200	61.03	37.34	52.18	34.11
	72	1000	56.74	21.40	49.33	18.54
		1600	63.63	24.21	54.28	21.04
		2200	66.80	26.19	56.50	22.91
80	62	1000	47.06	36.55	40.82	33.62
		1600	52.94	48.25	45.02	45.02
		2200	56.03	56.03	45.59	45.59
	67	1000	47.94	28.12	41.84	25.40
		1600	57.68	40.06	49.74	37.00
		2200	60.93	47.78	52.08	44.66
	72	1000	56.58	26.28	49.16	23.41
		1600	63.49	32.01	54.19	28.78
		2200	67.18	36.95	56.42	33.52
90	62	1000	46.91	45.98	39.85	39.85
		1600	52.81	52.81	46.56	46.56
		2200	57.32	57.32	50.82	50.82
	67	1000	51.28	40.82	44.65	38.05
		1600	57.67	55.18	47.98	47.98
		2200	59.18	59.18	50.89	50.89
	72	1000	56.26	35.73	48.82	32.91
		1600	63.21	47.15	54.00	44.05
		2200	66.94	57.66	56.26	54.22

5 Ton, Two Stage Cooling Unit Cooling Capacities

Table C8 -Standard Evaporator Coil (4 Row)

EDB (°F)	EWB (°F)	Stage	Air Flow (CFM)	Ambient Air Temperature (°F)			
				95		120	
				Total MBH	Sensible MBH	Total MBH	Sensible MBH
75	62	1	1000	36.17	26.70	31.39	24.69
		2	1600	51.57	39.98	44.40	36.95
		1	1400	38.82	32.36	33.30	30.20
		2	2200	54.48	47.80	46.40	44.63
	67	1	1000	39.77	21.63	34.58	19.64
		2	1600	56.24	31.71	48.32	28.76
		1	1400	42.48	25.27	36.54	23.06
		2	2200	59.31	36.61	50.62	33.57
	72	1	1000	43.59	16.48	37.94	14.51
		2	1600	61.88	23.61	52.94	20.51
		1	1400	46.65	18.07	40.24	16.00
		2	2200	64.49	25.45	55.06	22.46
80	62	1	1000	36.08	31.55	31.32	29.51
		2	1600	51.55	47.68	44.12	44.12
		1	1400	38.75	38.75	32.43	32.43
		2	2200	52.86	52.86	44.85	44.85
	67	1	1000	39.68	26.49	34.50	24.50
		2	1600	56.13	39.47	48.23	36.45
		1	1400	42.40	32.01	36.48	29.90
		2	2200	59.42	47.25	50.51	44.12
	72	1	1000	43.41	21.34	37.86	19.41
		2	1600	61.74	31.40	52.85	28.34
		1	1400	46.57	24.93	40.09	22.83
		2	2200	64.40	36.05	54.98	33.07
90	62	1	1000	36.35	36.35	32.47	32.47
		2	1600	51.74	51.74	45.68	45.68
		1	1400	40.45	40.45	35.84	35.84
		2	2200	55.82	55.82	49.58	49.58
	67	1	1000	39.42	35.91	34.35	33.93
		2	1600	56.11	54.63	46.97	46.97
		1	1400	41.37	41.37	35.86	35.86
		2	2200	58.76	58.76	49.63	49.63
	72	1	1000	43.20	30.87	37.69	28.92
		2	1600	61.48	46.56	52.67	43.62
		1	1400	46.39	38.32	37.69	28.92
		2	2200	64.21	56.68	52.67	43.62

Component Static Pressure Drops

Table S1 - HB Series Cooling Static Pressure Drops
*95°F Ambient, 80°F EDB, 67°F EWB

Tonnage	CFM	Standard Coil (in. w.g.)
2	700	0.05
	1350	0.12
	2000	0.19
3	700	0.05
	1500	0.15
	2300	0.27
4	800	0.09
	1550	0.21
	2300	0.37
5	1000	0.13
	1600	0.25
	2200	0.39

*Default outside air and entering air conditions, refer to the AAONEcat32™ software for static pressure drops across the evaporator coil at specific unit conditions.

Table S2 - HB Series Heating Static Pressure Drops

Tonnage	CFM	Reheat Coil (in. w.g.)	Electric Heat [kW] (in. w.g.)			Gas Heat [MBh] (in. w.g.)				
			10	20	30	45	60	75	100	125
2	700	0.01	0.03	0.04	0.05	0.07	0.04	NA	NA	NA
	1350	0.03	0.06	0.08	0.09	0.14	0.07	0.05	0.03	
	2000	0.08	0.08	0.11	0.14	NA	0.10	0.07	0.05	
3	700	0.01	0.04	0.05	0.06	0.07	0.04	NA	NA	NA
	1500	0.04	0.06	0.08	0.10	0.15	0.08	0.05	0.04	
	2300	0.10	0.09	0.13	0.16	NA	NA	NA	NA	
4	800	0.01	0.04	0.05	0.06	0.09	0.05	0.03	NA	
	1550	0.04	0.06	0.09	0.11	0.16	0.08	0.05	0.04	
	2300	0.09	0.09	0.13	0.16	NA	NA	NA	NA	
5	1000	0.02	0.04	0.06	0.07	0.10	0.05	0.03	NA	
	1600	0.05	0.07	0.09	0.11	0.16	0.08	0.05	0.04	
	2200	0.09	0.09	0.12	0.15	NA	NA	NA	NA	

Table S3 -HB Series Economizer and Filter Static Pressure Drops

Tonnage	CFM	Economizer	2" Pleated (in. w.g.)
2	700	0.02	0.06
	1350	0.04	0.06
	2000	0.07	0.08
3	700	0.04	0.06
	1500	0.04	0.07
	2300	0.08	0.09
4	800	0.05	0.06
	1550	0.05	0.07
	2300	0.08	0.09
5	1000	0.07	0.06
	1600	0.07	0.07
	2200	0.07	0.09

Controls

Control Options

Base Board (Thermostat Interface)

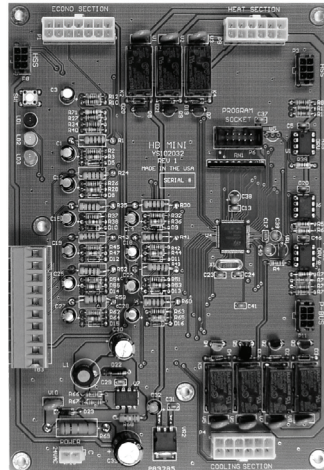


Fig. T1 - WattMaster HB Mini Controller

Operation

WattMaster HB Mini Controller is used to control constant volume mechanical heating and/or mechanical cooling units or air handling units. Controller is to be used with a 24 VAC thermostat, field wired to a factory installed terminal block. Two stage cooling units use the low speed of the supply fan for stage one cooling and the high speed of the supply fan for stage two cooling to maximize dehumidification. Single stage cooling units use only the high speed of the supply fan. All heating stages use the high speed of the supply fan.

Required Features

Feature 5 - Multi-Tap 2 Speed Supply Fan

Feature 13 - Base Board (T-Stat Interface)

Standard Supplied Sensor

Outside Air Temperature

Recommend Options

HB Service Tool - Tool should be purchased if viewing of unit status and adjustment of unit settings and setpoints is needed. Only one HB Service Tool is needed to configure multiple HB series units as it connects to the control board via modular cable.

Model Option A1 - 2-Step Compressor

Expanded Board (Thermostat Interface + DDC Interface)

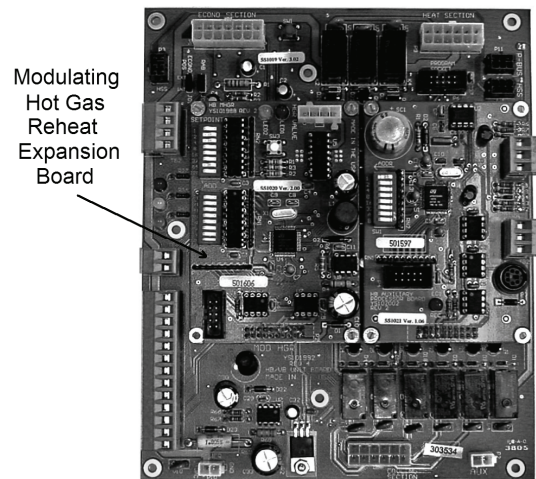


Fig. T2 - WattMaster HB Controller with MHGR Expansion Board

Operation

WattMaster HB Controller is used to control constant volume heating, cooling, and air handling units. Controller is to be used with a 24 VAC thermostat, field wired to a factory installed terminal block or with HB Service Tool DDC interface. Two stage cooling units use the low speed of the supply fan for stage one cooling and the high speed of the supply fan for stage two cooling to maximize dehumidification. Single stage cooling units use only the high speed of the supply fan. All heating stages use the high speed of the supply fan. Economizer, Return Air Bypass, and Modulating Hot Gas Reheat are available with this controller.

Required Features

Feature 13 - Expanded Board (T-Stat Interface + DDC Interface)

Standard Supplied Sensor

Outside Air Temperature

Recommend Options

HB Service Tool - Tool should be purchased if viewing of unit status and adjustment of unit setpoints is needed. Only one HB Service Tool is needed to configure multiple HB series units as it connects to the control board via modular cable.

Model Option A1 - 2-Step Compressor

Model Option A2 - Return Air Bypass

Feature 1A - Economizer

Feature 5C - Adjustable 2 Speed Fan (HB Service Tool required for speed adjustment.)

Feature 8 - Modulating Hot Gas Reheat Coil

Expanded Board + Network Module (Space Temp Sensor and Prism Software)

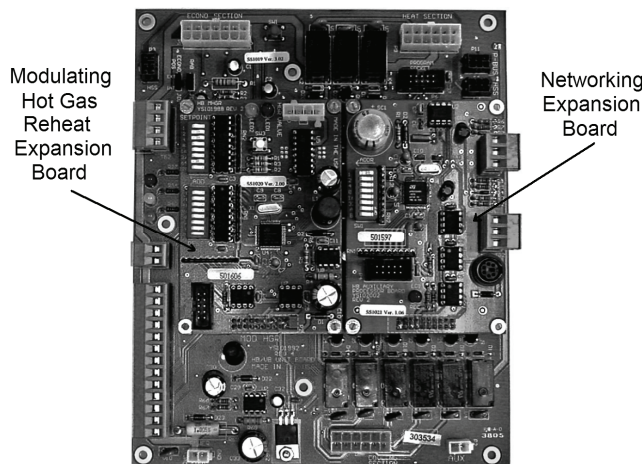


Fig. T3 - WattMaster HB Controller with MHGR and Networking Expansion Boards

Operation

WattMaster HB Controller is used to control constant volume heating, cooling, and air handling units. Controller is to be used with a 24 VAC thermostat, field wired to a factory installed terminal block or with HB Service Tool DDC interface. Two stage cooling units use the low speed of the supply fan for stage one cooling and the high speed of the supply fan for stage two cooling to maximize dehumidification. Single stage cooling units use only the high speed of the supply fan. All heating stages use the high speed of the supply fan. Economizer, Return Air Bypass, and Modulating Hot Gas Reheat are available with this controller. Space temperature sensor DDC control and networking with up to 60 HB controllers are available with this controller.

With the Prism software, available for free download at www.orioncontrols.com, and separately purchased Commlink the unit(s) will have a 7 day, 2 events pre day scheduler and a 14 day holiday scheduler available.

Required Features

Feature 13 - Expanded Board (Space Temp Sensor & Prism Software)

Standard Supplied Sensor

Outside Air Temperature

Recommend Options

HB Service Tool - Tool should be purchased if viewing of unit status and adjustment of unit setpoints is needed. Only one HB Service Tool is needed to configure multiple HB series units as it connects to the control board via modular cable.

Model Option A1 - 2-Step Compressor

Model Option A2 - Return Air Bypass

Feature 1A - Economizer

Feature 5C - Adjustable 2 Speed Fan (HB Service Tool required for speed adjustment.)

Feature 8 - Modulating Hot Gas Reheat Coil

Electrical Service Sizing Data

Use the following equations to correctly size the electrical service wiring and disconnect switch for the unit.

To correctly calculate the Minimum Circuit Ampacity (MCA) and Maximum Overcurrent Protection (MOP), the number of motors and other current drawing devices must be known for each mode of operation. For example, in heating mode the compressor and condenser fan do not operate, while the supply fan does operate. In cooling mode, however, the compressor, condenser fan, and supply fan all operate. Once it is determined what current drawing devices are operating during each mode of operation use the following equations to calculate the MCA and MOP.

To calculate the correct MCA and MOP values for units **without electric heating** use the *Cooling Mode* and *Heating Mode without Electric Heat* equations. To calculate the correct MCA and MOP values for units **with electric heating** calculate the MCA and MOP with the *Cooling Mode* equations and with the *Heating Mode with Electric Heat* equations. The larger of MCA and MOP values calculated are the correct values.

Load 1 = Current of the largest motor/compressor

Load 2 = Sum of the currents of the remaining motors/compressors

Load 3 = Current of electric heaters

Use Rated Load Amps (RLA) for compressors and Full Load Amps (FLA) for all other motors and electric heaters.

The electrical data for a given unit configuration can be found with the AAONEcat32™ software. For further assistance in determining the electrical ratings, contact the Applications Department, or consult U.L. 1995

Electric Heat FLA Calculation

Single Phase

Three Phase

$$FLA = \frac{(Heating\ Element\ kW) \times 1000}{Rated\ Voltage}$$

$$FLA = \frac{(Heating\ Element\ kW) \times 1000}{(Rated\ Voltage) \times \sqrt{3}}$$

Cooling Mode / Heating Mode without Electric Heat

$$MCA = 1.25(Load\ 1) + Load\ 2$$

$$MOP = 2.25(Load\ 1) + Load\ 2$$

Electrical Service Sizing Data Continued

Heating Mode with Electric Heat

$$\text{MCA} = 1.25(\text{Load 1} + \text{Load 2} + \text{Load 3})$$

$$\text{MOP} = 2.25(\text{Load 1}) + \text{Load 2} + \text{Load 3}$$

Select a fuse rating equal to the MOP value. If the MOP does not equal a standard fuse rating select the next lower standard fuse rating. If the MOP is less than the MCA then select the fuse rating equal to or greater than the MCA.

Standard Ampere Ratings for Fuses (From NEC Handbook, 240-6)

The standard ratings for fuses shall be considered 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800 and 1000 amperes.

Disconnect (Power) Switch Size

$$\text{DSS} = \text{MOP}$$

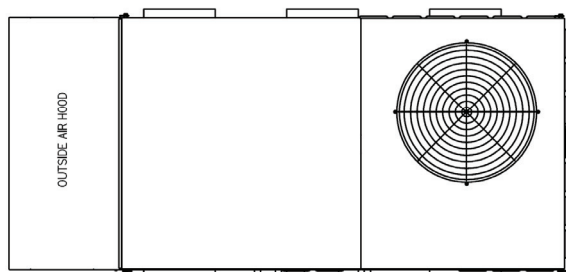
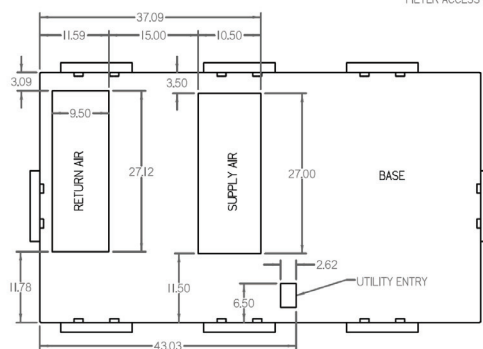
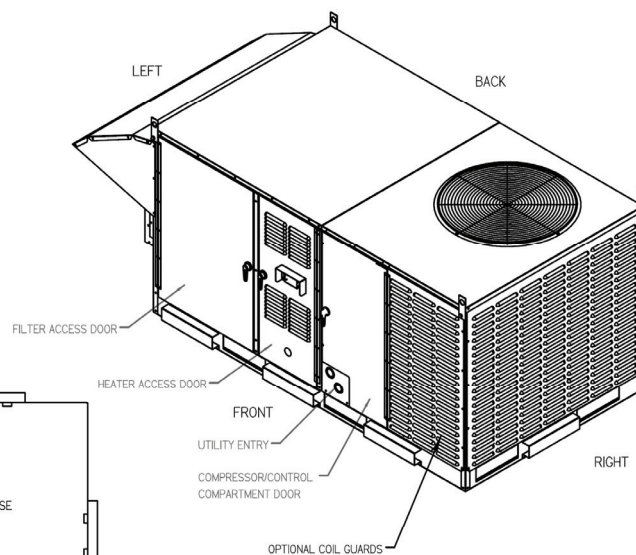
Select the standard switch size equal to the calculated Disconnect Switch Size value. If this value is not a standard size, select the next LARGER size.

Select the disconnect switch size equal to the calculated MOP value. If this value is not the standard size, select the next larger size

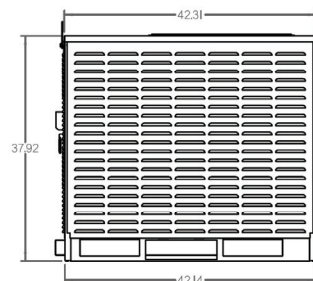
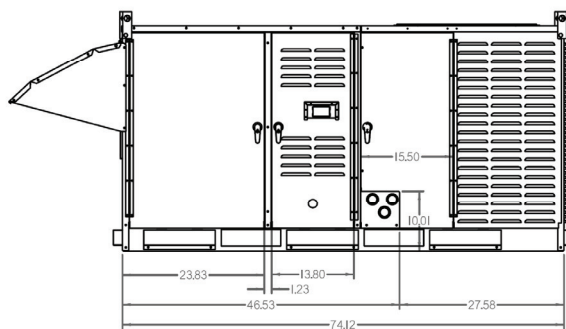
Unit Drawings

HB Series (2-5 Tons) Air-Cooled Condenser Packaged DX Unit Vertical Supply and Return Air Connections

CLEARANCES	
LOCATION	UNIT SIZE 2 - 5 TON
BACK	10
FRONT	36
LEFT SIDE	20
RIGHT SIDE	20
TOP	UNOBSTRUCTED

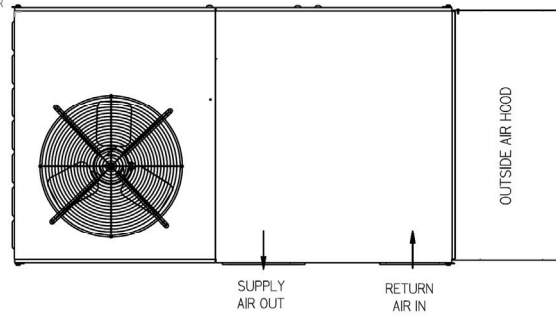
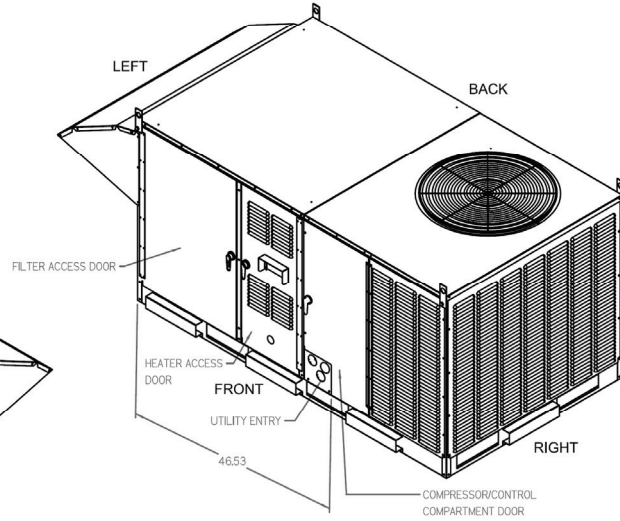
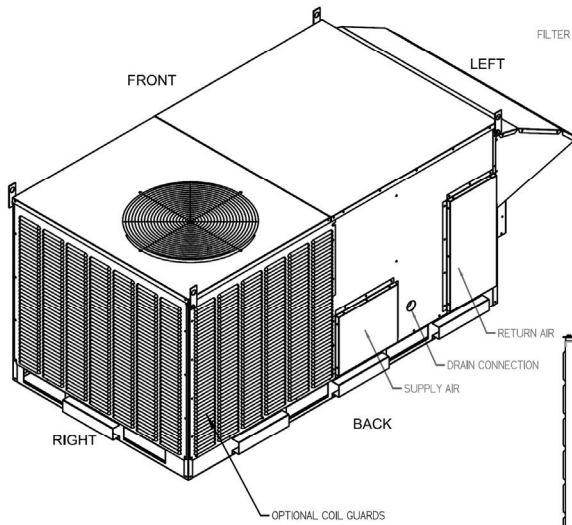


NOTE:
ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE
UNLESS NOTED OTHERWISE.

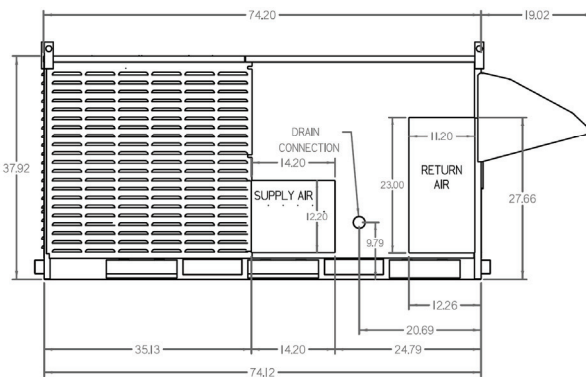
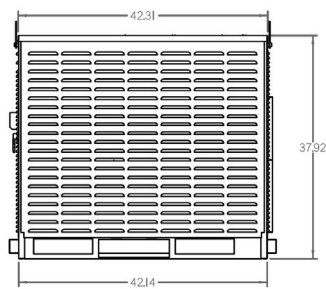


HB Series (2-5 Tons) Air-Cooled Condenser Packaged DX Unit Horizontal Supply and Return Air Connections

CLEARANCES	
LOCATION	UNIT SIZE
	2 - 5 TON
BACK	10
FRONT	36
LEFT SIDE	20
RIGHT SIDE	20
TOP	UNOBSTRUCTED



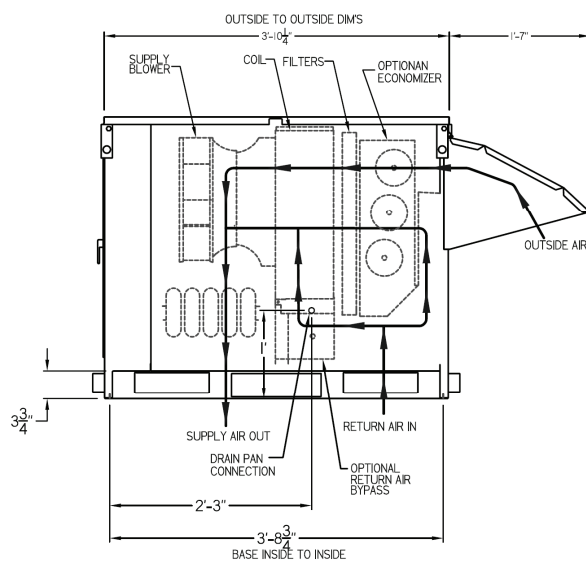
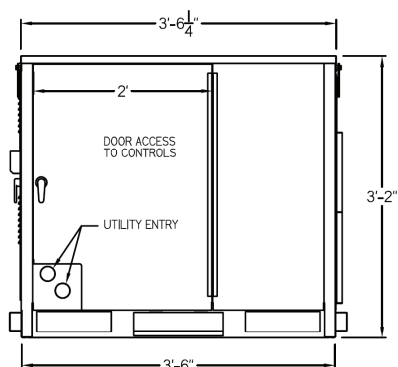
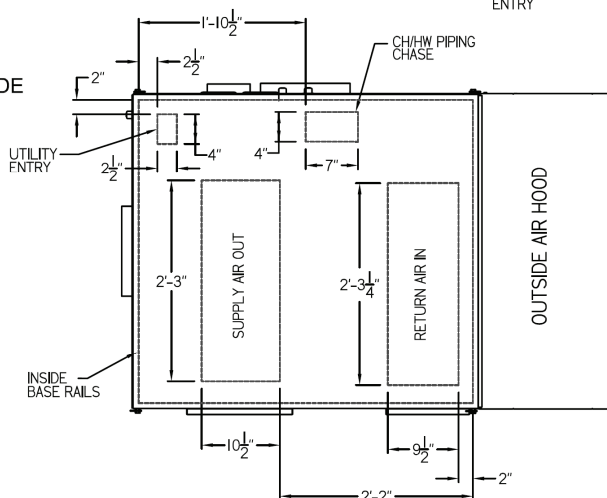
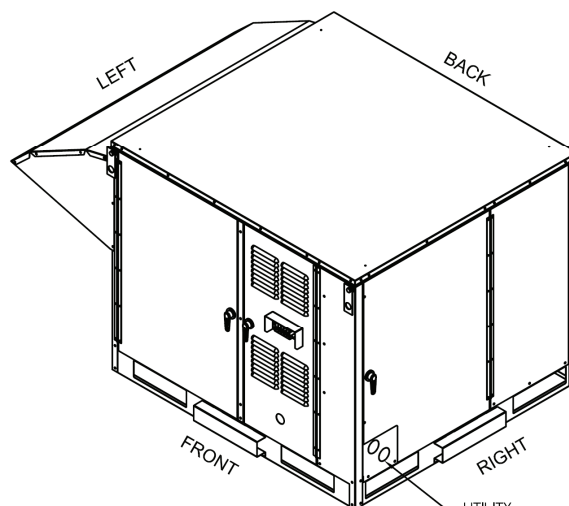
NOTE:
ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE
UNLESS NOTED OTHERWISE.



HB Series (2-5 Tons) Air Handler Vertical Supply and Return Air Connections

CLEARANCES	
LOCATION	UNIT SIZE 2-5 TON
BACK	10
FRONT	36
LEFT SIDE	20
RIGHT SIDE	34
TOP	UNOBSTRUCTED

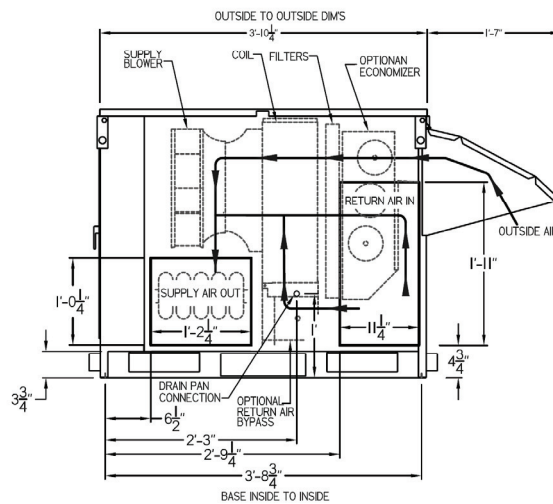
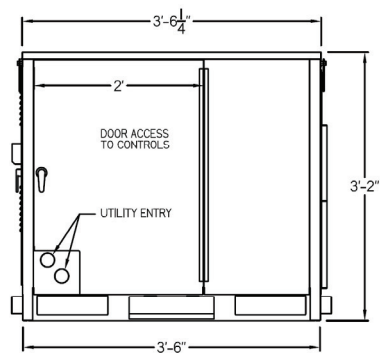
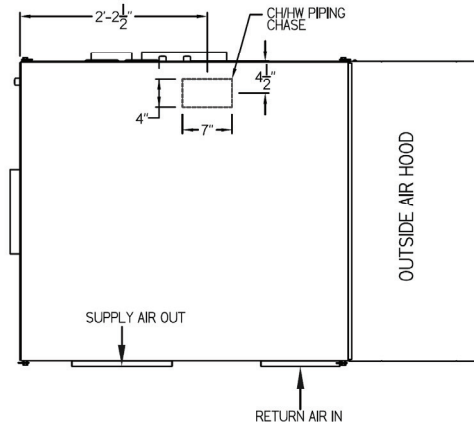
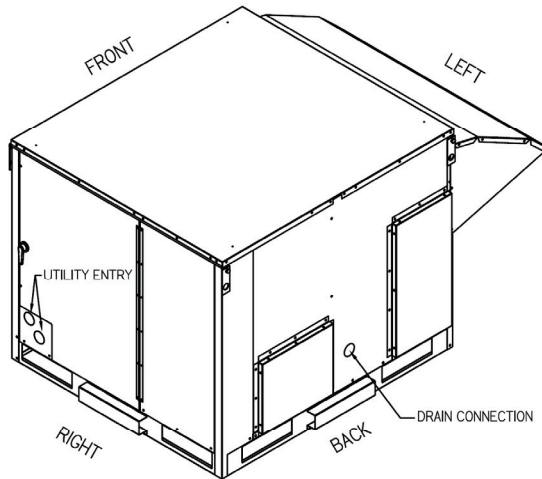
NOTE:
ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE
UNLESS NOTED OTHERWISE.



HB Series (2-5 Tons) Air Handler Horizontal Supply and Return Air Connections

CLEARANCES	
LOCATION	UNIT SIZE
	2-5 TON
BACK	10
FRONT	36
LEFT SIDE	20
RIGHT SIDE	34
TOP	UNOBSTRUCTED

NOTE:
ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE
UNLESS NOTED OTHERWISE.



Literature Change History

June 2007

Update of catalog, adding Unit Drawings Section.

October 2007

Update of catalog, clarifying on page 10 & 14 that only single stage LP field conversion kits are available.

February 2008

Update of catalog, correcting the description of hot gas bypass in Feature 8.



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HB Series Engineering Catalog
R53090 · Rev. B · 081121

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