SB Series

Vertical Self-Contained Units

Engineering Catalog

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V14200 · Rev. B · 190802
(ACP 31226)

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SB Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	SIZE	VLT	CONFIG	A1	A2	A3	A4	B1	B2	B3	1A	1B	1C	1D	2	3	4	5A	5B	5C	6A	6B	6C	7	8	9	10	11	12	13	14A	14B
SB	- 007	- 3	- 0	- E	7	0	A	- 0	0	0	: 0	0	0	0	-	0	0	0	-	A	B	C	- 0	A	0	-	0	0	0	0	0	0	Y	- E	0
																											0	0	0	0	0	0	0	A	B
																											15	16	17	18	19	20	21	22	23

MODEL OPTIONS

Series and Generation
SB

Unit Size
003 = 3 ton Capacity
004 = 4 ton Capacity
005 = 5 ton Capacity
006 = 6 ton Capacity
007 = 7 ton Capacity
009 = 9 ton Capacity
010 =10 ton Capacity
014 =14 ton Capacity
016 = 16 ton Capacity
018 = 18 ton Capacity

Voltage
1 = 230V/1Φ/60Hz
2 = 230V/3Φ/60Hz
3 = 460V/3Φ/60Hz
4 = 575V/3Φ/60Hz
8 = 208V/3Φ/60Hz
9 = 208V/1Φ/60Hz

Configuration
0 = Right Hand Unit + Top Vertical Discharge
A = Left Hand Unit + Top Vertical Discharge

A1: Refrigerant Style
E = R-410A Variable Capacity Scroll Compressor

A2: Unit Configuration
0 = Water-Cooled Condenser - Condensing Unit Only
7 = Water-Source/Geothermal Heat Pump + Std Evap. Coil - Coaxial Heat Exchanger
8 = Water-Source/Geothermal Heat Pump + 6 Row Evap. Coil - Coaxial Heat Exchanger
9 = Water-Source/Geothermal Heat Pump - Condensing Unit Only

A3: Coil Coating
0 = Standard - None
1 = Polymer E-coated Cooling and Reheat Coils
5 = Copper Finned Coils + Stainless Steel Coil Casing

A4: Cooling / Heat Pump Staging
A = Modulating - Variable Capacity Compressor

B1: Heating Type
0 = No Heating
3 = Electric Heat
C = Steam Distributing Standard Coil
D = Steam Distributing Polymer E-Coated Coil
E = Hot Water Standard Coil
F = Hot Water Polymer E-Coated Coil

B2: Heating Designation
0 = No Heating
1 = 1 Row Coil
2 = 2 Row Coil
A = 7 kW (5.3 kW @ 208V)
B = 14 kW (10.5 kW @ 208V)
C = 21 kW (15.8 kW @ 208V)
D = 28 kW (21.0 kW @ 208V)
E = 35 kW (26.3 kW @ 208V)
F = 42 kW (31.5 kW @ 208V)
G = 49 kW (37.0 kW @ 208V)
H = 56 kW (42.0 kW @ 208V)
J = 63 kW (47.3 kW @ 208V)
K = 70 kW (52.5 kW @ 208V)

B3: Heating Staging
0 = No Heating
1 = 1 Stage
2 = 2 Stage
3 = 3 Stage
4 = 4 Stage
9 = Modulating/SCR Electric - Potentiometer Control
A = Modulating/SCR Electric - 0-10VDC Control Signal
H = Single Serpentine 8 fpi
J = Half Serpentine 8 fpi
K = Single Serpentine 10 fpi
L = Half Serpentine 10 fpi
M = Single Serpentine 12 fpi
N = Half Serpentine 12 fpi

SB Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	SIZE	VLT	CONFIG	A1	A2	A3	A4	B1	B2	B3	1A	1B	1C	1D	2	3	4	5A	5B	5C	6A	6B	6C	7	8	9	10	11	12	13		14A	14B
SB	- 007	- 3	- 0	- E	7	0	A	- 0	0	0	: **0**	**0**	**0**	**0**	**-**	**0**	**0**	**0**	**-**	**A**	**B**	C	- 0	A	0	- 0	0	0	0	0	0	0	Y	-	E	0
																											0	0	0	0	0	0	0	A	B	
																								15	16	17	18	19	20	21	22	23				

UNIT FEATURE OPTIONS

1A: Return / Outside Air Section
0 = Standard
2 = Mixing Box - Top and Front Openings

1B: Exhaust Fan
0 = Standard
A = 250 mm Exhaust Fan, 800 W EC Motor
B = 310 mm Exhaust Fan, 1.0 kW EC Motor
C = 310 mm Exhaust Fan, 1.7 kW EC Motor
D = 355 mm Exhaust Fan, 1.7 kW EC Motor
E = 450 mm Exhaust Fan, 3.0 kW EC Motor
F = 450 mm Exhaust Fan, 6.0 kW EC Motor
G = Dual 310 mm Exhaust Fan, 1.0 kW EC Motor
H = Dual 310 mm Exhaust Fan, 1.7 kW EC Motor
J = Dual 355 mm Exhaust Fan, 1.7 kW EC Motor
K = Dual 450 mm Exhaust Fan, 3.0 kW EC Motor
L = Dual 450 mm Exhaust Fan, 6.0 kW EC Motor

1C: Filter Location
0 = Standard

1D: Mixing Box Damper Control
0 = Standard - None
A = 2 Position Actuators (24V)
B = Fully Modulating Actuators (DDC)
C = Fixed Position Dampers

2: Waterside Economizer
0 = Standard - None

3: Energy Recovery Type
0 = Standard
A = Energy Recovery Wheel – Total + High CFM, Polymer
C = Energy Recovery Wheel – Total + High CFM, 1% Purge, Polymer
E = Energy Recovery Wheel – Sensible + High CFM, Polymer
G = Energy Recovery Wheel – Sensible + High CFM, 1% Purge, Polymer
J = Energy Recovery Wheel - Total + High CFM, Aluminum
L = Energy Recovery Wheel - Total + High CFM, 1% Purge, Aluminum
N = Energy Recovery Wheel - Sensible + High CFM, Aluminum
Q = 1 % Purge High cfm Sensible ERW, Aluminum

4: Maintenance Options
0 = Standard
A = Blower Aux. Contact - Low Voltage Terminal Block
B = Remote Start/Stop Terminals - Low Voltage Terminal Block
C = Options A + B

5A: Supply Air Blower Configuration
0 = No Airside - Condensing Unit Only
A = 1 Blower + High Efficiency EC Motor
B = 2 Blowers + High Efficiency EC Motors

5B: Supply Air Blower
0 = No Airside - Condensing Unit Only
A = 310 mm (14”) Direct Drive Backward Curved Plenum Fan
B = 355 mm (16”) Direct Drive Backward Curved Plenum Fan
C = 450 mm (18”) Direct Drive Backward Curved Plenum Fan
D = 250MM (12") Direct Drive Backward Curved Plenum

SB Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	SIZE	VLT	CONFIG	A1	A2	A3	A4	B1	B2	B3	1A	1B	1C	1D	2	3	4	5A	5B	**5C**	**6A**	**6B**	**6C**	**7**	**8**	**9**	**10**	**11**	**12**	**13**		14A	14B
SB	-	007	-	3	-	0	-	E	7	0	9	-	0	0	0	:	0	0	0	0	-	0	0	0	-	A	B	**C**	**-**	**0**	**A**	**0**	**-**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**Y**	-	E	0
																																	A	B
																								15	16	17	18	19	20	21		22	23

5C: Supply Air Blower Motor
0 = No Airside - Condensing Unit Only
B = 1.0 kW (1.34 HP)
C = 1.7 kW (2.3 hp)
D = 3.0 kW (4.0 hp)
E = 6.0 kW (8.0 hp)
F = 800 W (1.1 HP)

6A: Pre-Filter Type
0 = No Pre Filter
A = 2" Pleated - MERV 8

6B: Unit Filter Type
0 = No Unit Filter
A = 2" Pleated - MERV 8
B = 4" Pleated - MERV 8
C = 4" Pleated - MERV 11
D = 4" Pleated - MERV 13
E = 4" Pleated - MERV 14

6C: Filter Options
0 = Standard
A = Clogged Filter Switch
B = Magnehelic Gauge
C = Options A + B

7: Refrigeration Control
0 = Standard
C = Freeze Stat - Each Circuit

8: Refrigeration Options
0 = Standard
D = Modulating Hot Gas Reheat

9: Refrigeration Accessories
0 = Standard
A = Sight Glass
B = Compressor Isolation Valves
C = Options A + B

10: Power Options
0 = Standard Power Block

11: Safety Options
0 = Standard
C = Supply Air Smoke Detector
H = Remote Safety Shutoff Terminals
L = Options C + H

12: Controls
0 = Standard
A = Low Limit Controls
B = Phase and Brown Out Protection
C = Options A + B
D = Energy Recovery Wheel Rotation Detection
E = Options A+D
F = Options B+D
G = Options A+B+D

13: Special Controls
D = VAV Unit Controller - VAV Cool + CV Heat
Y = Single Zone VAV Heat Pump Unit Controller - VAV Cool + VAV Heat
Z = Constant Volume Heat Pump Unit Controller - CV Cool + CV Heat
1 = Make Up Air Heat Pump Unit Controller - CV Cool + CV Heat
5 = Field Installed DDC Controls by Others with Isolation Relays
6 = Factory Installed DDC Controls Furnished by Others with Isolation Relays

SB Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	SIZE	VLT	CONFIG	A1	A2	A3	A4	B1	B2	B3		1A	1B	1C	1D		2	3	4		5A	5B	5C		6A	6B	6C		7	8	9	10	11	12	13		**14A**	**14B**
SB	-	007	- 3 -	0	-	E	7	0	A	-	0	0	0	:	0	0	0	0	-	0	0	0	-	A	B	C	-	0	A	0	-	0	0	0	0	0	0	Y	-	**E**	**0**
																																				0	**0**	**0**	**0**	**0**	**0**	**A**	**B**
																																				15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**

14A: Water-Cooled Condenser
B = Water Flow Switch
E = Balancing Valves + Option B
H = Motorized Shut-Off Valve + Option B
J = Two Way Head Pressure Control + Option B
L= Balancing Valves + Option H
M = Balancing Valves + Option J
T = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option B
W = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option E
1 = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option H
2 = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option J
4 = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option L
5 = CuNi Corrosion Resistant Coaxial Heat Exchanger + Option M

14B: Waterside Economizer Piping
0 = Standard - None

15: Glycol Percentage
0 = Standard - None
A = Minimum 20% Propylene Glycol
B = Minimum 40% Propylene Glycol

16: Interior Cabinet Options
0 = Standard - Double Wall Construction + R-6.5 Foam Insulation + Stainless Steel Drain Pan
A = Overflow Switch
B = Compressor Sound Blanket
C = Options A + B

17: Exterior Cabinet Options
0 = Standard
A = AAON Gray Exterior Paint
B = Special Paint
C = Interior Corrosion Protection
D = Options A + C

18: Energy Recovery Cabinet
0 = Standard – None
A = Top RA + Back EA + Back OA Connections
G = OA + EA Dampers – Top RA + Back EA + Back OA Connections
N = OA + Economizer Dampers – Top RA + Back EA + Back Connections
U = OA + EA + Economizer Dampers – Top RA + Back EA + Back OA Connections

19: Code Options
0 = Standard - ETL U.S.A. Listing
H = ETL U.S.A. + Canada Listing

20: Crating
0 = Standard
A = Export Crating
B = Forkliftable Base - 5” Base
D = Options A + B
E = Shipping Shrink Wrap
F = Options B + E
G = Options A + B + E

21: Unit Splits
0 = Standard - One Piece Unit
A = 1 Shipping Split (2 pallets)
B = 2 Shipping Splits (3 pallets)
C = 3 Shipping Splits (4 pallets)
D = 4 Shipping Splits (5 pallets)
H = Special Shipping Split

22: Control Vendors
0 = Standard
A = AAON Orion Controls System
H = AAON Touchscreen Controller

23: Type
B = Standard
X = Special Pricing Authorization

Model Number

Unit Size

Example: SB-**007**-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

The first number of the model string designates the nominal tons of cooling for SB Series self-contained units with coaxial refrigerant-to-water heat exchangers. Actual capacities will vary with conditions. Refer to the AAON ECat selection software for performance and cooling capacities at design conditions.

Table 1 - Unit Sizes

Model (Nominal tons)	Cabinet	Discharge	Compressors/ Circuits	RA Location	SA Location	OA Location	EA Location
SB-**003**	B	Top Vertical	1/1	Back - Standard Top - ERW	Top	Back - ERW	Back - ERW
SB-**004**							
SB-**005**							
SB-**006**	C						
SB-**007**							
SB-**009**							
SB-**010**							
SB-**014**	D						
SB-**016**							
SB-**018**							

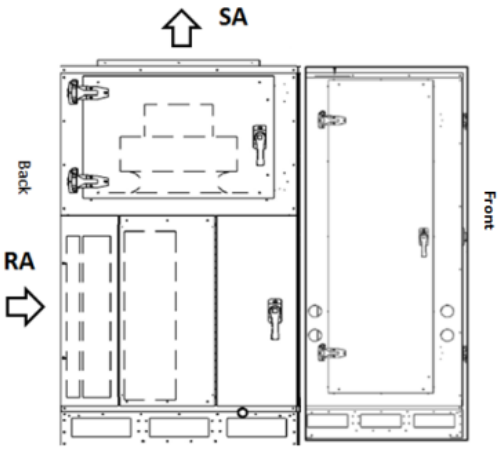

Figure 2 - SB Series Side View

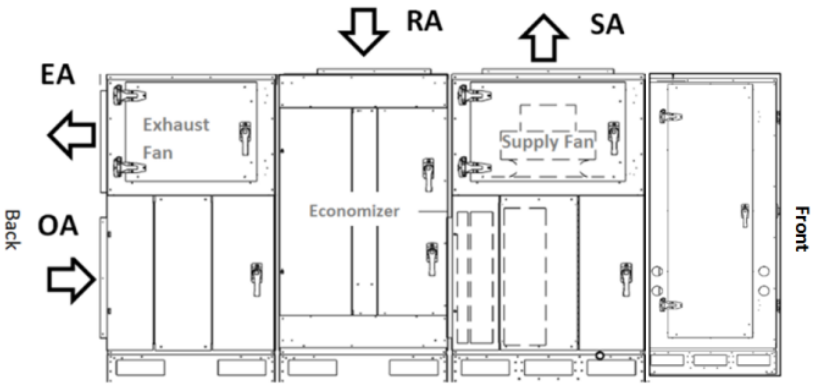

Figure 1 - SB Series Energy Recovery Side

Model Number
Voltage

Example: SB-007-**3**-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

All units have single point power connections with grounding lugs and 24 VAC control circuits. Single phase options are only available on 3-5 ton units.

1 = 230V/1Φ/60Hz
2 = 230V/3Φ/60Hz
3 = 460V/3Φ/60Hz
4 = 575V/3Φ/60Hz
8 = 208V/3Φ/60Hz
9 = 208V/1Φ/60Hz

Model Number
Configuration

Example: SB-007-3-**0**-E70A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *Right Hand Unit with Top Vertical Discharge* - Piping stub outs and unit access doors are located on the right hand side of the unit. Condensate drain pan is fabricated of 18 gauge 304 stainless steel with connection located on the right side of the unit. Discharge connection is located on the top of the unit. Interior of the unit is lined with galvanized G90 steel.
A = *Left Hand Unit with Top Vertical Discharge* - Piping stub outs and unit access doors are located on the left hand side of the unit. Condensate drain pan is fabricated of 18 gauge 304 stainless steel with connection located on left hand side of the unit. Discharge connection is located on the top of the unit. Interior of the unit is lined with galvanized G90 steel.

Model Number - Configuration Continued

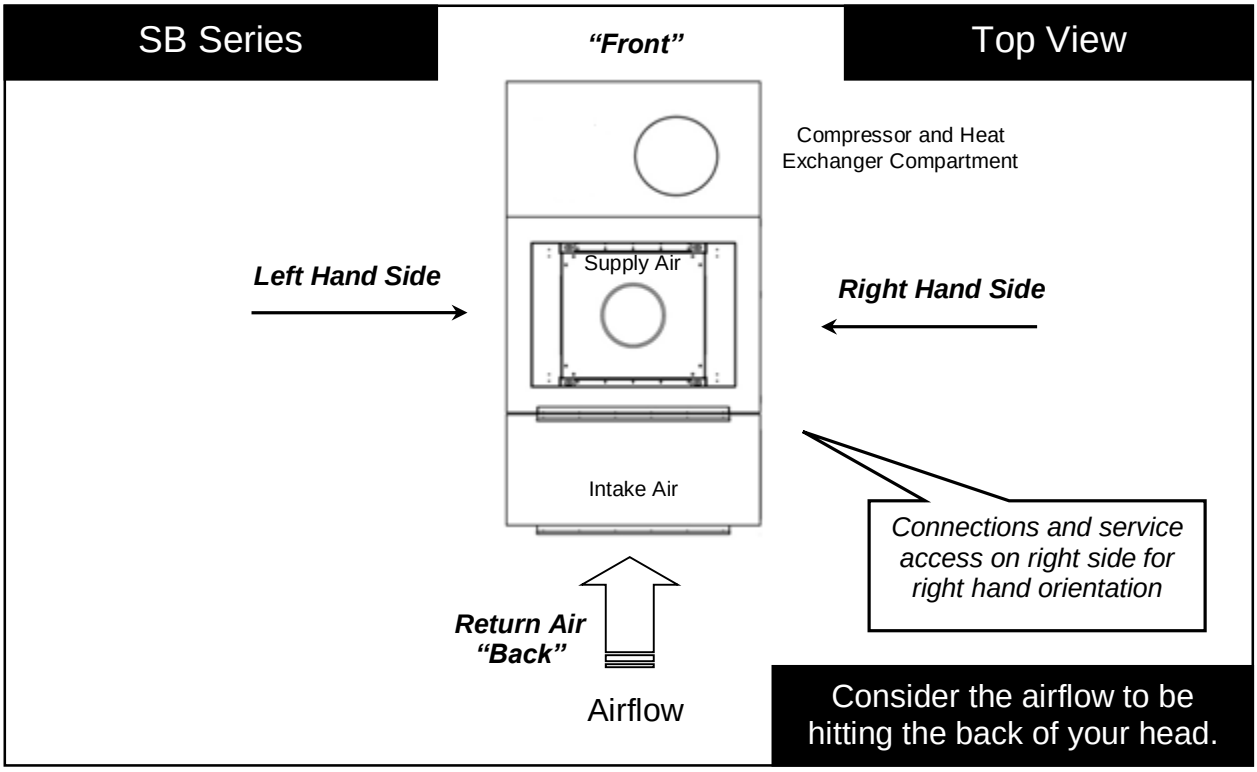

Figure 3 - SB Series Unit Orientation

Model Number

Model Option A1 - Refrigerant Style

Example: SB-007-3-0-**E**70A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

E = *R-410A Variable Capacity Scroll Compressor (VCC)* - R-410A DX cooling with a 10-100% variable capacity scroll compressor. Option provides the unit with precise temperature control, improved humidity control, and energy savings at part load conditions. A suction pressure sensor is provided per variable capacity scroll compressor. With customer provided controls, one analog control signal is required per variable capacity compressor (Feature 13).

Model Number
Model Option A2 - Unit Configuration

Example: SB-007-3-0-E**7**0A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *Water-Cooled Condenser - Condensing Unit Only* - Compressor section of the self-contained unit with coaxial refrigerant-to-water heat exchanger and variable capacity compressor. Unit includes a single circuit to match with a single circuited air handling unit.
7 = *Coaxial Water-Source/Geothermal Heat Pump with Standard Evaporator Coil* - Self-contained unit with coaxial refrigerant-to-water heat exchangers and a standard heat pump air coil.
8 = *Coaxial Water-Source/Geothermal Heat Pump with 6 Row Evaporator Coil* - Self-contained unit with coaxial refrigerant-to-water heat exchangers and a 6 row high capacity heat pump air coil. High capacity air coils improve unit's energy efficiency and dehumidification capability during the cooling mode of operation.
9 = *Water-Source/Geothermal Heat Pump - Condensing Unit Only* - Compressor section of the self-contained unit with coaxial refrigerant-to-water heat exchanger and variable capacity compressor. Unit includes a single circuit to match with a single circuited heat pump air handling unit.

Model Number
Model Option A3 - Coil Coating

Example: SB-007-3-0-E7**0**A-000:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *Standard* - No cooling coil coating.
1 = *Polymer E-Coated Cooling and Reheat Coil* - Polymer e-coating is applied to the cooling and reheat coil.. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117-90, 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. Coating includes a 5 year warranty, from the date of original equipment shipment from the factory. Instructions coil cleaning, maintenance, and recording keeping must be followed. Refer to the unit Installation, Operation and Maintenance Manual.This feature applies to the cooling coil and reheat coil (if reheat feature is selected).
5 = *Copper Finned Coils + Stainless Steel Coil Casing* - Coil is constructed of copper tubes with copper fins mechanically bonded to the tubes and stainless steel end casings. This feature applies to the cooling coil and reheat coil (if reheat feature is selected).

Model Number
Model Option A4 - Cooling/Heat Pump Staging

Example: SB-007-3-0-E70**A**-000:0000-000-ABC-0A0-000000D-E0-0000000AB

A = *Modulating - Variable Capacity Compressor* - Modulating DX cooling and modulating heat pump heating unit without auxiliary heat. 3-18 ton units include a single 10-100% variable capacity scroll compressor.

Model Number
Model Option B1 - Heating Type

Example: SB-007-3-0-E70A-**0**00:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *No Heating* - Self-contained unit without auxiliary heating.
3 = *Electric Heat* - Electric heater with multiple elements located downstream of the cooling coil and supply fan.
C = *Steam Distributing Standard Coil* - Steam distributing heating coil located in the preheat position upstream of the cooling coil. The maximum steam operating pressure is 25 psi. No valves or valve controls are included with this option.
D = *Steam Distributing Polymer E-Coated Coil* - Steam distributing heating coil located in the preheat position upstream of the cooling coil. The maximum steam operating pressure is 25 psi. Polymer e-coating is applied only to the steam distributing heating coils. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117-90, 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. Coating includes a 5 year warranty, from the date of original equipment shipment from the factory. Instructions coil cleaning, maintenance, and recording keeping must be followed. Refer to the unit Installation, Operation and Maintenance Manual.
E = *Hot Water Standard Coil* - Hot water heating coil located in the preheat position upstream of the cooling coil. No valves or valve controls are included with this option.
F = *Hot Water Polymer E-Coated Coil* - Hot water heating coil located in the preheat position upstream of the cooling coil. Polymer e-coating is applied only to the hot water heating coils. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117-90, 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. Coating includes a 5 year warranty, from the date of original equipment shipment from the factory. Instructions coil cleaning, maintenance, and recording keeping must be followed. Refer to the unit Installation, Operation and Maintenance Manual.

Model Number
Model Option B2 - Heating Designation

Example: SB-007-3-0-E70A-0**0**0:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *No Heating* - Self-contained unit without auxiliary heating.
1 = *1 Row Coil* - Single row hot water or steam heating coil. No valves or valve controls are included with this option.
2 = *2 Row Coil* - Two row hot water or steam heating coil. No valves or valve controls are included with this option.

Table 2 - Electric Heating Capacities

	Electric Heat Capacity	
	kW (230V, 460V, 575V)	kW (208V)
A = *Heat A*	7.0	5.3
B = *Heat B*	14.0	10.5
C = *Heat C*	21.0	15.8
D = *Heat D*	28.0	21.0
E = *Heat E*	35.0	26.3
F = *Heat F*	42.0	31.5
G = *Heat G*	49.0	37.0
H = *Heat H*	56.0	42.0
J = *Heat J*	63.0	47.3
K = *Heat K*	70.0	52.5

Note: AAON ECat will select the correct heating designation option for electric heat based on the desired leaving air and entering air temperature conditions. For heat pump units this is the emergency or backup heat capacity, which is the capacity of the secondary heater available when heat pump heating is not in use. See General Data section for model specific heating information.

Model Number
Model Option B3 - Heating Staging

Example: SB-007-3-0-E70A-00**0**:0000-000-ABC-0A0-000000D-E0-0000000AB

0 = *No Heating* - Self-contained unit without auxiliary heating.
1 = *1 stage* - Single stage heat control.
2 = *2 stage* - Two stage heat control.
3 = *3 stage* - Three stage heat control.
4 = *4 stage* - Four stage heat control.

Model Option B3 - Heating Staging Continued

9 = *Modulating/SCR Electric - Potentiometer Control* - Fully modulating electric heating, controlled by a Silicon Controlled Rectifier (SCR) and DDC controller. Includes a factory wired supply air temperature sensor, which is field installed in the supply ductwork. The factory wired supply air temperature setpoint adjustment potentiometer is factory mounted. Potentiometer dial uses variable resistance to provide simple setpoint control.
A = *Modulating/SCR Electric - 0-10VDC Control Signal* - Fully modulating electric heating, controlled by an SCR and DDC controller. With Customer Provided Controls (Feature 13), input terminals, labeled [1] and [2], are provided to connect a 0-10 VDC control signal. Heating elements line voltage is modulated linearly with respect to the control signal.
H = *Single Serpentine 8 fpi* - Steam heating coil with single serpentine circuitry and 8 fins per inch. No valves or valve controls are included with this option.
J = *Half Serpentine 8 fpi* - Hot water heating coil with half serpentine circuitry and 8 fins per inch. No valves or valve controls are included with this option.
K = *Single Serpentine 10 fpi* - Steam heating coil with single serpentine circuitry and 10 fins per inch. No valves or valve controls are included with this option. Standard steam coil option and standard hot water coil option.
L = *Half Serpentine 10 fpi* - Hot water heating coil with half serpentine circuitry and 10 fins per inch. No valves or valve controls are included with this option.
M = *Single Serpentine 12 fpi* - Steam heating coil with single serpentine circuitry and 12 fins per inch. No valves or valve controls are included with this option.
N = *Half Serpentine 12 fpi* - Hot water heating coil with half serpentine circuitry and 12 fins per inch. No valves or valve controls are included with this option.

Note: For heat pump units this is the number of emergency or backup heat stages, which is the number of stages of the secondary heater available when heat pump heating is not in use. See General Data section for model specific heating information.

Feature 1A
Return/Outside Air Section

Example: SB-007-3-0-E70A-000:**0**000-000-ABC-0A0-000000D-E0-0000000AB

0 = *Standard* - Unit with a standard air intake on the back of the unit and no mixing box.
2 = *Mixing Box - Top and Front Openings* - Factory installed mixing box with a damper on the top of the mixing box and a damper on the front of the mixing box. Additional filter options are available with a mixing box.

Feature 1B
Exhaust Fan

Example: SB-007-3-0-E70A-000:0**0**00-000-ABC-0A0-000000D-E0-0000000AB

0 = *Standard* - None
A = *250 mm Exhaust Fan, 800 W EC Motor*
B = *310 mm Exhaust Fan, 1.0 kW EC Motor*
C = *310 mm Exhaust Fan, 1.7 kW EC Motor*
D = *355 mm Exhaust Fan, 1.7 kW EC Motor*
E = *450 mm Exhaust Fan, 3.0 kW EC Motor*
F = *450 mm Exhaust Fan, 6.0 kW EC Motor*
G = *Dual 310 mm Exhaust Fan, 1.0 kW EC Motor*
H = *Dual 310 mm Exhaust Fan, 1.7 kW EC Motor*
J = *Dual 355 mm Exhaust Fan, 1.7 kW EC Motor*
K = *Dual 450 mm Exhaust Fan, 3.0 kW EC Motor*
L = *Dual 450 mm Exhaust Fan, 6.0 kW EC Motor*

AAON ECat will select the correct available options for Feature 1B 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 exhaust fans under the "Fan Selection" window. In the "Fan Selection" window you will be able to choose the motor based on RPM, efficiency, or sound information. Fan curves will be available for viewing in the "Fan Curve" tab.

Feature 1C
Filter Location

Example: SB-007-3-0-E70A-000:00**0**0-000-ABC-0A0-000000D-E0-0000000AB

0 = *Standard* - Filters are located within the air handling unit section of the self-contained unit.

Feature 1D
Mixing Box Damper Control

Example: SB-007-3-0-E70A-000:000**0**-000-ABC-0A0-000000D-E0-0000000AB

0 = *Standard - None*
A = *2 Position Actuators (24V)* - Two position actuators each of the mixing box dampers. Position one is the closed position. Position two is the fully open position, which is activated when there is a call for supply fan operation. The actuators are spring return closed.
B = *Fully Modulating Actuators (DDC)* - Fully modulating actuators on each of the mixing box dampers. With factory provided controls, position one is the closed position and position two is the minimum outside air position, which is activated when there is a call for supply fan operation. With factory provided controls, during the economizer mode the outside air actuator modulates between minimum position and having the outside air dampers fully open to maintain a discharge temperature of 55°F. The minimum outside air position can be field adjusted for the desired amount of outside air. The actuators are spring return closed.
C = *Fixed Position Dampers* - Manually adjustable fixed position return air and outside air mixing box dampers.

Feature 2
Waterside Economizer

Example: SB-007-3-0-E70A-000:0000-**0**00-ABC-0A0-000000D-E0-0000000AB

0 = *Standard*

Feature 3
Energy Recovery Type

Example: SB-007-3-0-E70A-000:0000-0**0**0-ABC-0A0-000000DE-E0-0000000AB

0 = *Standard* - No Energy Recovery Wheel
A = *Energy Recovery Wheel - Total + High CFM, Polymer* - Factory installed total energy recovery wheel. The wheel's polymer heat transfer material is coated with silica gel desiccant for sensible and latent recovery. The energy recovery wheel is designed for 100% outside air applications.

Feature 3 – Energy Recovery Type Continued

C = *Energy Recovery Wheel - Total + High CFM, 1% Purge, Polymer* - Factory installed total energy recovery wheel. The wheel's polymer heat transfer material is coated with silica gel desiccant for sensible and latent recovery. The energy recovery wheel is designed for 100% outside air applications. Option includes an adjustable purge sector, which can reduce carryover to no more than 1%. Used for applications which require limiting cross contamination of the ventilation air with exhaust air.
E = *Energy Recovery Wheel - Sensible + High CFM, Polymer* - Factory installed sensible energy recovery wheel. The wheel's polymer heat transfer material is designed for sensible recovery. The energy recovery wheel is designed for 100% outside air applications.
G = *1 % Purge High cfm Sensible ERW, Polymer* - Factory installed sensible energy recovery wheel. The wheel's polymer heat transfer material is designed for sensible recovery. The energy recovery wheel is designed for 100% outside air applications. Option includes an adjustable purge sector, which can reduce carryover to no more than 1%. Used for applications which require limiting cross contamination of the ventilation air with exhaust air.
J = *Energy Recovery Wheel - Total + High CFM, Aluminum* - Factory installed total energy recovery wheel. Total energy recovery wheels shall be constructed of aluminum media with a honeycomb matrix and desiccant. Segments shall be washable with low temperature steam, hot water, or light detergent without degrading the latent recovery. The energy recovery wheel is designed for 100% outside air applications.
L = *Energy Recovery Wheel - Total + High CFM, 1% Purge, Aluminum* - Factory installed total energy recovery wheel. Total energy recovery wheels shall be constructed of aluminum media with a honeycomb matrix and desiccant. Segments shall be washable with low temperature steam, hot water, or light detergent without degrading the latent recovery. The energy recovery wheel is designed for 100% outside air applications. Option includes an adjustable purge sector, which can reduce carryover to no more than 1%. Used for applications which require limiting cross contamination of the ventilation air with exhaust air.
N = *Energy Recovery Wheel - Sensible + High CFM, Aluminum* - Factory installed sensible energy recovery wheel. Sensible energy recovery wheels shall be constructed of aluminum media with a honeycomb matrix and desiccant. Segments shall be washable with low temperature steam, hot water, or light detergent without degrading the latent recovery. The energy recovery wheel is designed for 100% outside air applications.
Q = *1 % Purge High cfm Sensible ERW, Aluminum* - Factory installed sensible energy recovery wheel. Sensible energy recovery wheels shall be constructed of aluminum media with a honeycomb matrix and desiccant. Segments shall be washable with low temperature steam, hot water, or light detergent without degrading the latent recovery. The energy recovery wheel is designed for 100% outside air applications. Option includes an adjustable purge sector, which can reduce carryover to no more than 1%. Used for applications which require limiting cross contamination of the ventilation air with exhaust air.

Note: If feature 22 = B AAON Orion Controls System, an energy recovery wheel defrost cycle will occur that will disable the energy recovery wheel for 2 minutes when the outdoor air temperature is below the energy recovery defrost setpoint and if 30 minutes have lapsed since the last defrost cycle.

Table 3 - Energy Recovery Wheel Information

SB Cabinet Size	Polymer Energy Recovery Wheel		Aluminum Energy Recovery Wheel	
	Qty/Diameter/Depth	Maximum Air Flow Through the Wheel	Qty/Diameter/Depth	Maximum Air Flow Through the Wheel
B	1/ 34"/ 3"	2000 SCFM	1/ 34"/ 3"	2000 SCFM
C	1/ 40"/ 3"	3900 SCFM	1/ 40"/ 3"	3000 SCFM
D	1/ 50"/ 3"	6000 SCFM	1/ 50"/ 3"	5200 SCFM

Feature 4
Maintenance Options

Example: SB-007-3-0-E70A-000:0000-00**0**-ABC-0A0-000000D-E0-0000000AB

0 = *Standard*
A = *Blower Auxiliary Contacts, Low Voltage Terminal Block* - Normally Open output terminals, labeled [BA1] and [BA2], which close when the supply fan energizes. This option can be used to interface with other devices to indicate unit operation.
B = *Remote Start/Stop Terminals, Low Voltage Terminal Block* - Input terminals, labeled [ST1] and [ST2], which require a field supplied contact closure for unit operation. When contacts are open, the low voltage circuit is broken and the unit will not operate. This option can be used with a remote time clock or space thermostat with occupied/unoccupied capability.
C = *Blower Auxiliary Contacts with Remote Start/Stop Terminals, Low Voltage Terminal Block* - Options A + B.

Feature 5A
Supply Air Blower Configuration

Example: SB-007-3-0-E70A-000:0000-000-**A**BC-0A0-000000D-E0-0000000AB

0 = *No Airside - Condensing Unit Only*
A = *1 Blower with High Efficiency Electronically Commutated Motor (ECM)*
***B** = 2 Blowers with High Efficiency Electronically Commutated Motors*

*Available on 14-18 ton units

AAON ECat will select the correct available options 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 supply fans and motors under the "Fan Selection" window. In the "Fan Selection" window you will be able to choose the number of fans and motor efficiency. General fan information, fan sound information, and fan curves will be available for viewing in the "Fan Selection" window.

Note: With customer provided controls (Feature 13 = 4, 5, 6) a factory installed speed control potentiometer will be provided.

Feature 5B
Supply Air Blower

Example: SB-007-3-0-E70A-000:0000-000-A**B**C-0A0-000000D-E0-0000000AB

0 = *No Airside - Condensing Unit Only*
A = *310 mm (14") Direct Drive Backward Curved Plenum Fan*
B = *355 mm (16") Direct Drive Backward Curved Plenum Fan*
C = *450 mm (18") Direct Drive Backward Curved Plenum Fan*
***D** = 250 mm (12") Direct Drive Backward Curved Plenum Fan*

AAON ECat will select the correct available options 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 supply fans and motors under the "Fan Selection" window. In the "Fan Selection" window you will be able to choose the number of fans and motor efficiency. General fan information, fan sound information and fan curves will be available for viewing in the "Fan Selection" window.

Feature 5C
Supply Air Blower Motor

Example: SB-007-3-0-E70A-000:0000-000-AB**C**-0A0-000000D-E0-0000000AB

0 = *No Airside - Condensing Unit Only*
B = *1.0 kW (1.34 hp)*
C = *1.7 kW (2.3 hp)*
D = *3.0 kW (4.0 hp)*
E = *6.0 kW (8.0 hp)*
F *= 800 W (1.1 hp)*

AAON ECat will select the correct available options 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 supply fans and motors under the "Fan Selection" window. In the "Fan Selection" window you will be able to choose the number of fans and motor efficiency. General fan information, fan sound information and fan curves will be available for viewing in the "Fan Selection" window.

Note: High Efficiency Electronically Commutated Motors are kW rated.

Feature 6A
Pre Filter Type

Example: SB-007-3-0-E70A-000:0000-000-ABC-**0**A0-000000D-E0-0000000AB

0 = *No Pre Filter*
A = 2" Pleated Pre Filter, MERV 8 - 2 inch pleated, MERV 8, pre filters mounted adjacent and upstream of the unit filters (Feature 6B) and downstream of the air intake openings.

Feature 6B
Unit Filter Type

Example: SB-007-3-0-E70A-000:0000-000-ABC-0**A**0-000000D-E0-0000000AB

0 = *No Unit Filter*
A = *2" Pleated Unit Filter, MERV 8* - 2 inch pleated, MERV 8, unit filters mounted adjacent and upstream of the coils and downstream of the air intake openings.
B = *4" Pleated Unit Filter, MERV 8* - 4 inch pleated, MERV 8, unit filters mounted adjacent and upstream of the coils and downstream of the air intake openings.
C = *4" Pleated Unit Filter, MERV 11* - 4 inch pleated, MERV 11, unit filters mounted adjacent and upstream of the coils and downstream of the air intake openings. 2 inch pleated, MERV 8, pre filters are recommended with this option (Feature 6A).
D = *4" Pleated Unit Filter, MERV 13* - 4 inch pleated, MERV 13, unit filters mounted adjacent and upstream of the coils and downstream of the air intake openings. 2 inch pleated, MERV 8, pre filters are recommended with this option (Feature 6A).
E = *4" Pleated Unit Filter, MERV 14* - 4 inch pleated, MERV 14, unit filters mounted adjacent and upstream of the coils and downstream of the air intake openings. 2 inch pleated, MERV 8, pre filters are recommended with this option (Feature 6A).

Feature 6C
Filter Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A**0**-000000D-E0-0000000AB

0 = *Standard*
A = *Clogged Filter Switch* - Normally Open dry contacts, labeled [C1] and [C2], which close for clogged filter indication. Adjustable differential pressure switch senses the pressure drop across the filter bank and cooling coil. The range of adjustment is 0.17" to 5.0" w.c. with contact closure on rise. The switch is mounted in the coil compartment with terminal connections on the low voltage terminal block.
B = *Magnehelic Gauge* - Magnehelic gauge reading pressure drop across the filter bank. The gauge reads from 0 to 3" w.c. in 0.10" w.c. graduations.
C = *Clogged Filter Switch and Magnehelic Gauge* - Options A + B.

Feature 7
Refrigeration Control

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-**0**00000D-E0-0000000AB

0 = *Standard*
C = *Freeze Stats on Each Circuit* - Adjustable temperature sensor (-10 to 70°F) mounted on the tubing of the first cooling circuit and wired to de-energize all cooling circuits if tubing temperature falls below the setpoint. Option is used to prevent freezing of the air coil.

Feature 8
Refrigeration Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-0**0**0000D-E0-0000000AB

0 = *Standard* - Refrigeration circuit features a manual reset high pressure cutout, an automatic reset low pressure cutout, compressor overload protection, and a thermal expansion valve.
D = *Modulating Hot Gas Reheat* - Reheat coil mounted downstream of the evaporator coil and piped to the cooling circuit which provides the unit with a dehumidification mode of operation for when the cooling load has been satisfied. Option includes modulating condenser control valve, modulating reheat control valve, supply air temperature sensor, and MHGRV controller to maintain the supply air temperature during the dehumidification mode of operation. Receiver tank is standard with this option. This option provides supply air temperature control during dehumidification, which prevents space temperature swings and is ideal for VAV and MUA applications. With customer provided controls (Feature 13 = 4, 5, 6) an input terminal, labeled [RH], is included for connecting a humidistat, and 0-10VDC input terminals, labeled [AI1] and [COM], are provided for optional dehumidification mode supply air temperature reset. A wall mounted humidistat is available as an accessory. Supply air temperature and supply air temperature reset dip switches must be set on the MHGRV controller with customer provided controls.

Feature 9
Refrigeration Accessories

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-00**0**000D-E0-0000000AB

0 = *Standard*
A = *Sight Glass* - Moisture indication sight glass attached to the refrigeration circuit liquid lines. A green color refrigerant indicates a dry condition, a chartreuse (green with a yellow tint or bright green) color indicates caution, and a yellow color indicates a wet condition. The sight glass is not a charge indicator.
B = *Compressor Isolation Valves* - Ball type service valves mounted on the refrigeration circuit discharge and suction lines permitting isolation of the compressor for service or replacement. This option can reduce the amount of refrigerant that must be recovered during compressor service or replacement. The valves are located close to the compressors and work through a quarter turn from open to closed. Teflon seals and gaskets are used with a nylon cap gasket to prevent accidental loss.
C = *Sight Glass and Compressor Isolation Valves* - Options A + B

Table 4 - Moisture Content in the Refrigerant, R-410A

Indicator Color	75° F Liquid Line Temperature
Green DRY	Below 75ppm
Chartreuse CAUTION	75-150ppm
Yellow WET	Above 150ppm

Feature 10
Power Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000**0**00D-E0-0000000AB

0 = *Standard Power Block*

Feature 11
Safety Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-0000**0**0D-E0-0000000AB

0 = *Standard*
C = *Supply Air Smoke Detector* - Photoelectric type smoke detector factory mounted on the discharge of the fan plenum of the unit. Detector is wired to shut down the 24 VAC 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.
H = *Remote Safety Shutoff Terminals* - Low voltage terminals, labeled [BI1] and [BI2], for wiring to a field installed smoke detector, firestat, or building safety automatic shutdown system. When contacts are open the unit 24 VAC control circuit is broken and the unit will not operate. Remove the factory supplied jumper before wiring field installed system.
L = *Supply Air Smoke Detector and Remote Safety Shutoff Terminals* - Options C + H

Feature 12
Controls

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-00000**0**D-E0-0000000AB

0 = *Standard*
A = *Low Limit Controls* - Low Limit Controls - Temperature limit switch and factory provided supply air temperature sensor that must be field wired and mounted in the supply air ductwork. Limit switch shuts off the unit when discharge temperature reaches the low limit setpoint. The switch is adjustable from -10°F to 70°F, and is manually reset by disconnecting power to the unit.
B = *Phase and Brown Out Protection* - Voltage monitor that is used to protect motors and compressors from voltage imbalance, over/under voltage, and phase lose. Reset is automatic. With customer provided controls (Feature 13 = 4, 5, 6), the phase and brown out protection will be wired back to a set of terminals, or to the customer supplied controller, for status.
C = *Low Limit Controls and Phase and Brown Out Protection* - Options A + B
D = *Energy Recovery Wheel (ERW) Rotation Detection* - Wheel rotation sensor and speed switch output module mounted in the energy recovery wheel section. The module contains a normally open and a normally closed set of contacts wired to the low voltage terminal block for field indication of wheel rotation.
E = *Low Limit Controls and Energy Recovery Detection* - Options A+D
F = *Phase and Brown Out Protection and Energy Recovery Detection* Options B+D

Feature 12 – Controls Continued

G = *Low Limit Controls, Phase and Brown Out Protection, and Energy Recovery Detection* - Options A+B+D

Feature 13
Special Controls

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000**D**-E0-0000000AB

D = *Variable Air Volume Unit Controller - Variable Air Volume Cooling and Constant Volume Heating* - Standard VAV controls for standard and heat pump systems. During the cooling mode of operation the supply fan modulates based on the supply air duct static pressure and cooling modulates based on the supply air temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
Y = *Single Zone VAV Heat Pump Unit Controller - Variable Air Volume Cooling and Variable Air Volume Heating* - VAV controls for heat pump systems which control the temperature and humidity for only a single zone. During the cooling mode of operation the supply fan modulates based on the space temperature and cooling modulates based on the supply air temperature. During the heating mode of operation the supply fan modulates based on the space temperature setpoint and heat pump heating and auxiliary heating modulates based on the supply air temperature. Air-source or water-source heat pump configuration is required with this option. All variable capacity compressors are required with this option. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
Z = *Constant Volume Heat Pump Unit Controller - Constant Volume Cooling and Constant Volume Heating* - Standard Constant Volume controls for heat pump systems. During the cooling mode of operation the supply fan provides constant airflow and cooling modulates based on the controlling temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature. Air-source or water-source heat pump configuration is required with this option. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
1 = *Make Up Air Heat Pump Unit Controller - Constant Volume Cooling and Constant Volume Heating* - Standard up to 100% outside air Make Up Air controls for heat pump systems. Electric pre-heat may be required in some applications. During the cooling mode of operation the supply fan provides constant airflow and cooling modulates based on the controlling temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature. Air-source or water-source heat pump configuration is required with this option. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.

Feature 13 – Special Controls Continued

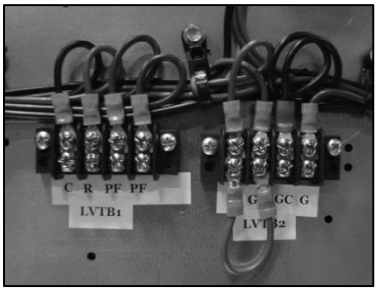

Figure 4 - Terminal Block for ECM Fan

Figure 5 - ECM Potentiometer Dial

4 = *Field Installed DDC Control by Others* - Factory provided terminal strip for use with Customer Provided and Customer Installed Controls. See Controls section and unit specific Control Terminals worksheet in AAON ECat for more information.
5 = *Field Installed DDC Controls by Others with Isolation Relays* - Factory provided terminal strip for use with Customer Provided and Customer Installed Controls, with factory installed isolation relays to prevent voltage drop in the controls circuit. This option is strongly recommended on applications where there is a question about the length of control wiring. See Controls section and unit specific Control Terminals worksheet in AAON ECat for more information.
6 = *Factory Installed DDC Controls Furnished by Others with Isolation Relays (SPA)* - Factory Installed Customer Provided Controls, with factory installed isolation relays to prevent a voltage drop in the controls circuit. Requires a Special Pricing Authorization (SPA) issued by the Applications Department. AAON sales rep must provide a controls parts list, cut sheets, and wiring diagrams before the SPA will be issued. Once the order is entered a completed Special Parts Request Form is sent to the sales rep with control numbers assigned. The sales rep must then forward the form to the controls supplier who must then transfer these numbers to all parts and boxes that are sent to AAON. Proper routing of customer supplied parts to units in production will be delayed if this procedure is not followed. AAON will not deal directly with the controls provider. The AAON sales rep must be the information conduit. See the "Policy Manual for Sales Representatives" for more detailed information on the proper procedure. See Controls section and unit specific Points List worksheet in AAON ECat for more information.

No factory provided unit controller. Low voltage terminal block is factory provided and installed with the 0-10VDC signal from the electrically commutated motor (ECM) jumpered to the terminal block. For variable air flow control, remove the jumper wire and provide a 0-10VDC signal to the GS terminal. For constant air flow, leave the jumper wire in place and use the factory provided and installed supply air cfm setpoint potentiometer. Potentiometer dial uses variable resistance to provide simple setpoint control. The unit includes a factory installed proof of air flow switch that closes when airflow is present. It is wired to a terminal block and labeled PF. Units with electric heat will not include a terminal block; instead the proof of airflow switch is used as a safety and when no air is detected, the electric heat strips will not enable.

Feature 14A
Water-Cooled Condenser

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-**E**0-0000000AB

B = *Water Flow Switch* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2).
E = *Balancing Valves and Water Flow Switch* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve.
H = *Water Flow Switch and Motorized Shut-off Valve* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed motorized valve which shuts off water flow to the condenser when the unit is shut down. Valve includes a two position actuator.
J = *Water Flow Switch and Two Way Head Pressure Control* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed modulating head pressure control. Two way condenser water valve with fully modulating actuator modulates based on head pressure using head pressure control module. Option allows operation below 65°F condenser water temperature. Head pressure control is recommended with water-source heat pump configurations (Model Option A2).
L = *Balancing Valves, Water Flow Switch and Motorized Shut-off Valve* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve. Factory installed motorized valve which shuts off water flow to the condenser when the unit is shut down. Valve includes a two position actuator.
M = *Balancing Valves, Water Flow Switch, and Two Way Head Pressure Control* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve. Factory installed modulating head pressure control. Two way condenser water valve with fully modulating actuator modulates based on head pressure using head pressure control module. Option allows operation below 65°F condenser water temperature. Head pressure control is recommended with water-source heat pump configurations (Model Option A2).

Feature 14A – Water-Cooled Condenser Continued

T = *CuNi Corrosion Resistant Heat Exchanger and Water Flow Switch* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.
W = *CuNi Corrosion Resistant Heat Exchanger, Balancing Valves, and Water Flow Switch* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve. CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.
1 = *CuNi Corrosion Resistant Heat Exchanger, Water Flow Switch, and Motorized Shut-off Valve* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed motorized valve which shuts off water flow to the condenser when the unit is shut down. Valve includes a two position actuator. CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.
2 = *CuNi Corrosion Resistant Heat Exchanger, Water Flow Switch, and Two Way Head Pressure Control* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed modulating head pressure control. Two way condenser water valve with fully modulating actuator modulates based on head pressure using head pressure control module. Option allows operation below 65°F condenser water temperature. Head pressure control is recommended with water-source heat pump configurations (Model Option A2). CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.
4 = *CuNi Corrosion Resistant Heat Exchanger, Balancing Valves, Water Flow Switch, and Motorized Shut-off Valve* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve. Factory installed motorized valve which shuts off water flow to the condenser when the unit is shut down. Valve includes a two position actuator. CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.

Feature 14A - Water-Cooled Condenser Continued

5 = *CuNi Corrosion Resistant Heat Exchanger, Balancing Valves, Water Flow Switch, and Two Way Head Pressure Control* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. Water flow switch is required with water-source heat pump configurations (Feature A2). Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve. Factory installed modulating head pressure control. Two way condenser water valve with fully modulating actuator modulates based on head pressure using head pressure control module. Option allows operation below 65°F condenser water temperature. Head pressure control is recommended with water-source heat pump configurations (Model Option A2). CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. CuNi heat exchanger is required with open loop condenser water cooling tower applications.

Feature 14B
Blank

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E**0**-0000000AB

0 = *Standard*

Feature 15
Glycol Percentage

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-**0**000000AB

0 = *Standard - None*
A = *20% Propylene Glycol* - Water-source or geothermal heat pump designed for operation with a minimum of 20% propylene glycol to help prevent the freezing of the water loop.
B = *40% Propylene Glycol* - Water-source or geothermal heat pump designed for operation with a minimum of 40% propylene glycol to help prevent the freezing of the water loop.

Feature 16
Interior Cabinet Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0**0**00000AB

0 = *Standard* - Construction consists of 1 inch thick, double wall, rigid closed cell polyurethane foam injected panels with a minimum R-value of 6.5. A thermal break is included between the inside and outside of the panel to reduce heat transfer and prevent exterior condensation on the panel. Drain pan in the air handling unit section is fabricated of 18 gauge 304 stainless steel, includes 1 inch of fiberglass insulation under the drain pan, and is double sloped to meet ASHRAE 62.1 Indoor Air Quality guidelines. Compressor and control compartment includes factory wired LED service lights and perforated galvanized steel sound attenuators.
A = *Overflow Switch* - Control switch wired to shut down the 24 VAC control circuit when high condensate is detected in the drain pan.
B = *Compressor Sound Blanket* - Factory provided compressor sound blanket installed on the compressor to help attenuate compressor sound.
C = *Overflow Switch and Compressor Sound Blanket* - Options A + B

Feature 17
Exterior Cabinet Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-00**0**0000AB

0 = *Standard*
A = *AAON Gray Exterior Paint* - Cabinet exterior is primer washed then spray coated with a two-part polyurethane, heat-baked exterior paint. The paint is gray in color and capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with the ASTM B 117-95 test procedure.
B = *Special Paint* - Use this designation if a special paint color is specified. The Applications Department must also issue a Special Pricing Authorization (SPA) to include a non-standard paint option (Feature 23).
C = *Interior Corrosion Protection* - Interior ceiling, floor, service doors, fan inlet cone, damper rack, and filter rack in the air stream are spray coated with a two-part polyurethane, heat baked coating. The coils, coil casings, condensate drain pans, damper blades and gears, fan wheels, fan motor, energy recovery wheel casing, and compressor cabinet are not coated. 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 polyurethane coating is acceptable. Coating withstands at least 2,500 hours when tested under ASTM B 117-95 requirements. See Model Option A3 for cooling corrosion protection options and Model Option B1 for heating corrosion protection options.
D = *AAON Gray Exterior Paint and Interior Corrosion Protection* – Options A + C

Feature 18
Energy Recovery Cabinet

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-000**0**000AB

0 = *Standard* - No Energy Recovery Wheel
A = *Top RA + Back EA + Back OA Connections* - Energy Recovery Wheel with no factory installed dampers. Outside and exhaust air dampers must be field provided and installed.
G = *Outside Air + Exhaust Air Dampers - Top RA + Back EA + Back OA Connections* - Energy Recovery Wheel with factory installed on/off outside air and exhaust air dampers. The outside air damper will open with a 24VDC supply fan enable signal, and the supply fan will not be enabled until after the outside air damper is fully opened. The exhaust air damper will open with a 24VDC exhaust fan enable signal, and the exhaust fan will not be enabled until after the exhaust air damper is fully opened.
N = *Outside Air + Economizer Dampers - Top RA + Back EA + Back OA Connections* - Energy Recovery Wheel with factory installed modulating outside air damper and modulating economizer damper. The economizer damper is installed as shown in the figure below. Exhaust air dampers must be field provided and installed. With controls by others, the economizer damper includes an actuator with terminal strip labeled EC in the controls compartment for a field supplied outside air control signal. Actuator is factory configured for a 0-10VDC control signal. Also included on the terminal strip is an energy recovery wheel relay contact so that when the unit is in Economizer mode, the wheel can be disabled. With factory provided controls, an outdoor air temperature sensor will be factory provided and the economizer dampers will modulate based on that sensor. The energy recovery wheel will not operate during economizer mode of operation.
U = *Outside Air + Exhaust Air + Economizer Dampers - Top RA + Back EA + Back OA Connections* - Energy Recovery Wheel with factory installed modulating outside air damper and modulating economizer damper and factory installed on/off exhaust air damper. The economizer damper is installed as shown in the figure below. The on/off exhaust air damper will open with a 24VDC exhaust fan enable signal, and the exhaust fan will not be enabled until after the exhaust air damper is fully opened. With controls by others, the economizer damper includes an actuator with terminal strip labeled EC in the controls compartment for a field supplied outside air control signal. Actuator is factory configured for a 0-10VDC control signal. Also included on the terminal strip is an energy recovery wheel relay contact so that when the unit is in Economizer mode, the wheel can be disabled. With factory provided controls,, an outdoor air temperature sensor will be factory provided and the economizer dampers will modulate based on that sensor. The energy recovery wheel will not operate during economizer mode of operation

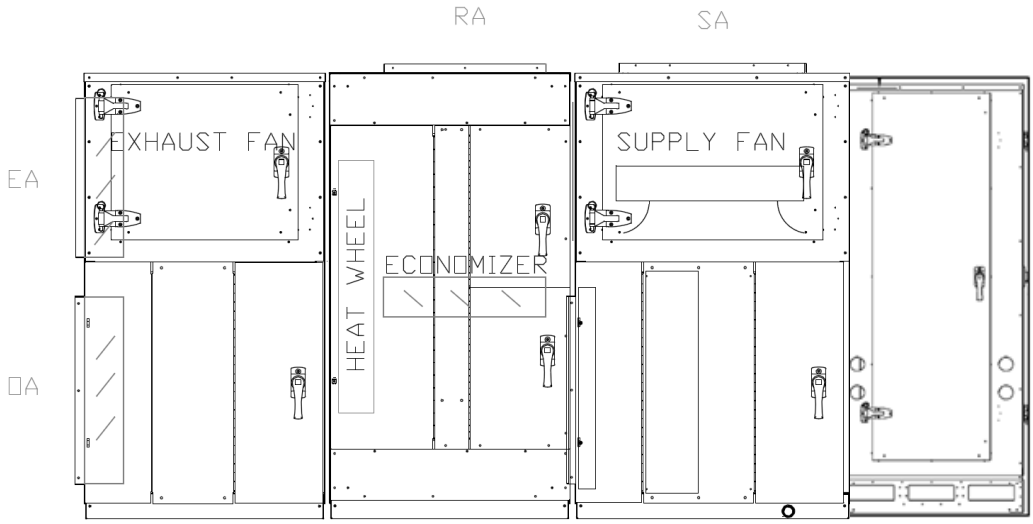

Figure 6 - Energy Recovery Wheel Damper Locations

Feature 19
Code Options

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0000**0**00AB

0 = *Standard - ETL U.S.A. Listing* - All AAON equipment is ETL listed and tested in accordance with the latest revision of Safety Standard UL 1995/CSA C22.2 No. 236. If a Special Pricing Authorization (SPA) is applied there may be additional costs incurred to secure the ETL label.
H = *ETL U.S.A. and Canada Listing* - Equipment is ETL U.S.A. and Canada listed and tested in accordance with the latest revision of UL Standard 1995/CSA C22.2 No. 236. The nameplate, safety labels and warnings will be in English and French.

Feature 20
Crating

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-00000**0**0AB

0 = *Standard* - Standard crating includes plastic wrapping, a wood pallet, and a crate fabricated of dimensional lumber and plywood. Crating must be field disassembled and wood pallet and plastic wrap must be removed for unit installation. Lockable access doors are shipped with a nut and bolt through the latch.
A = *Export Crating* - Optional crating of the unit with additional supports for overseas shipping. Option includes plastic wrapping, a wood pallet, and a crate fabricated of dimensional lumber and plywood. Crating must be field disassembled and wood pallet and plastic wrap must be removed for unit installation. Lockable access doors are shipped with a nut and bolt through the latch.
B = *Forkliftable Base* - 5 inch tall base with forklift slots along all four sides of the unit.
D = *Export Crating and Forkliftable Base* - Options A + B
E = *Shipping Shrink Wrap* - Unit is shrink-wrapped prior to shipment to protect unit during shipment and while in storage awaiting installation.
F = *Shipping Shrink Wrap and Forkliftable Base* - Options B + E
G = *Shipping Shrink Wrap, Forkliftable Base, and Export Crating* - Options A + B + E

Feature 21
Shipping Splits

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-000000**0**AB

0 = *Standard - One Piece Unit* - Single or dual cabinet unit shipped in one piece.
A = 1 Shipping Split (2 pallets)
B = 2 Shipping Splits (3 pallets)
C = 3 Shipping Splits (4 pallets)
D = 4 Shipping Splits (5 pallets)
H = Special Shipping Split

Note: ECat populates the options based on what features are selected. See the example below. Every spot with a **"/"** indicates where the splits will be located.

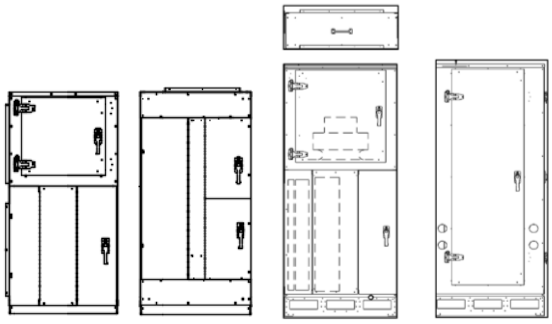

Figure 7 - 3 Shipping Split: Exhaust Fan/ Energy Recovery/ Air Handler + Electric Heat/ Compressorized Section

Feature 22
Control Vendors

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0000000**A**B

0 = *Standard* - Thermostat control or customer provided controls.
A = *AAON Orion Controls System* - AAON supplied and factory installed VCB-X controller. See Feature 13 for available control configurations. Option requires the selection of a AAON operator interface in AAON ECat to setup the controller. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
H = AAON Touchscreen Controller – Factory installed AAON touchscreen controller (Feature 13). See Controls section for more information.

Feature 23
Type

Example: SB-007-3-0-E70A-000:0000-000-ABC-0A0-000000D-E0-0000000A**B**

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

General Data
Unit Information

Table 5 - 3-5 ton (B Cabinet) Cooling Information

	Model		
	SB-003	SB-004	SB-005
Compressors			
Quantity/Nominal tons			
R-410A, Variable Capacity Scroll Compressor	1/3 Var.	1/4 Var.	1/5 Var.
Capacity Steps (%)	10-100% with variable capacity scroll compressor		
Evaporator Coil			
Circuits	1		
Heat Pump Standard Coil			
Quantity/Face Area	1/3.7 ft^2		
Rows/fpi	4/12		
Heat Pump 6 Row Coil			
Quantity/Face Area	1/3.7 ft^2		
Rows/fpi	6/12		
Water-Cooled Condenser			
Minimum gpm	4.05	5.40	6.75
Maximum gpm	16.20	21.60	27.00

Table 6 - 3-5 ton (B Cabinet) Heating and Fan Information

	Model		
	SB-003	SB-004	SB-005
Electric Heat			
Capacity (kW)			
230/460/575V 3Φ	7, 14, 21, 28		
208V 3Φ	5.3, 10.5, 15.8, 21		
Stages	7 kW - 1 or Fully Modulating with SCR 14 kW - 1, 2, or Fully Modulating with SCR 21 kW - 1, 2, 3, or Fully Modulating with SCR 28 kW - 2, 3, 4, or Fully Modulating with SCR		
Hot Water Heating Coil			
Quantity/Face Area	1/3.44 ft^2		
Rows/fpi	1 or 2/10 or 12 (Single or Half Serpentine)		
Standard Coil	Single Serpentine 10 fpi		
Steam Heating Coil			
Quantity/Face Area	1/3.44 ft^2		
Rows/fpi	1 or 2/10 or 12 (Single Serpentine)		
Standard Coil	Single Serpentine 10 fpi		
Supply Fans			
Quantity/Type	1/Direct Drive Backward Curved Plenum		
Energy Recovery Wheel Exhaust Fans			
Quantity/Type	1/ ECM Driven Direct Drive Backward Curved Plenum		

Table 7 - 6-10 ton (C Cabinet) Cabinet Cooling Information

	Model			
	SB-006	SB-007	SB-009	SB-010
Compressors				
Quantity/Nominal tons				
R-410A, Variable Capacity Scroll Compressor	1/6 Var.	1/7 Var.	1/9 Var.	1/10 Var.
Capacity Steps	10-100% with variable capacity scroll compressor			
Evaporator Coil				
Circuits	1			
Heat Pump Standard Coil				
Quantity/Face Area	1/7.1 ft^2			
Rows/fpi	4/12			
Heat Pump 6 Row Coil				
Quantity/Face Area	1/7.1 ft^2			
Rows/fpi	6/12			
Water-Cooled Condenser				
Minimum gpm	8.10	9.45	10.80	13.50
Maximum gpm	32.40	37.80	43.20	54.00

Table 8 - 6-10 ton (C Cabinet) Heating and Fan Information

	Model			
	SB-006	SB-007	SB-009	SB-010
Electric Heat				
Capacity (kW)				
230/460V 3Φ	14, 21, 28, 35, 42, 49, 56			
208V 3Φ	10.5, 15.8, 21.0, 26.3, 31.5, 37, 42			
Stages	14 kW - 1, 2 or Fully Modulating with SCR 21 kW - 1, 2, 3 or Fully Modulating with SCR 28 kW - 2, 3, 4 or Fully Modulating with SCR 35 kW - 2, 3, 4 or Fully Modulating with SCR 42 kW - 3, 4 or Fully Modulating with SCR 49 kW - 3, 4 or Fully Modulating with SCR 56 kW - 3, 4 or Fully Modulating with SCR			
Hot Water Heating Coil				
Quantity/Face Area	1/7.22 ft^2			
Rows/fpi	1 or 2/10 or 12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine 10 fpi			
Steam Heating Coil				
Quantity/Face Area	1/7.22 ft^2			
Rows/fpi	1 or 2/10 or 12 (Single Serpentine)			
Standard Coil	Single Serpentine 10 fpi			
Supply Fans				
Quantity/Type	1/Direct Drive Backward Curved Plenum			
Energy Recovery Wheel Exhaust Fans				
Quantity/Type	1 or 2/ ECM Driven Direct Drive Backward Curved Plenum			

Table 9 - 14-16 ton (D Cabinet) Cooling Information

	Model		
	SB-014	SB-016	SB-018
Compressors			
Quantity/Nominal tons			
R-410A, Variable Capacity Scroll Compressor	1/14 Var.	1/16 Var.	1/18 Var.
Capacity Steps	10-100% with variable capacity scroll compressor		
Evaporator Coil			
Circuits	1		
Heat Pump Standard Coil			
Quantity/Face Area	1/10.2 ft^2		
Rows/fpi	4/12		
Heat Pump 6 Row Coil			
Quantity/Face Area	1/10.2 ft^2		
Rows/fpi	6/12		
Water-Cooled Condenser			
Minimum gpm	18.90	21.60	24.30
Maximum gpm	75.60	86.40	97.20

Table 10 - 14-16 ton (D Cabinet) Heating and Fan Information

	Model		
	SB-014	SB-016	SB-018
Electric Heat			
Capacity (kW)			
230/460V 3Φ	14, 21, 28, 35, 42, 49, 56, 63, 70		
208V 3Φ	10.5, 15.8, 21.0, 26.3, 31.5, 37.0, 42.0, 47.3, 52.5		
Stages	14 kW - 1, 2 or Fully Modulating with SCR 21 kW - 1, 2, 3 or Fully Modulating with SCR 28 kW - 2, 3, 4 or Fully Modulating with SCR 35 kW - 2, 3, 4 or Fully Modulating with SCR 42 kW - 3, 4 or Fully Modulating with SCR 49 kW - 3, 4 or Fully Modulating with SCR 56 kW - 3, 4 or Fully Modulating with SCR 63 kW - 3, 4 or Fully Modulating with SCR 70 kW - 4 or Fully Modulating with SCR		
Hot Water Heating Coil			
Quantity/Face Area	1/10.38 ft^2		
Rows/fpi	1 or 2/10 or 12 (Single or Half Serpentine)		
Standard Coil	Single Serpentine 10 fpi		
Steam Heating Coil			
Quantity/Face Area	1/10.38 ft^2		
Rows/fpi	1 or 2/10 or 12 (Single Serpentine)		
Standard Coil	Single Serpentine 10 fpi		
Supply Fans			
Quantity/Type	1 or 2/Direct Drive Backward Curved Plenum		
Energy Recovery Wheel Exhaust Fans			
Quantity/Type	1 or 2/ ECM Driven Direct Drive Backward Curved Plenum		

Table 11 - Hot Water and Steam Coil Connection Sizes

SB Series Model	Hot Water Coil Sweat Connection Size (inches)	Steam Coil Sweat Connection Size (inches)
B	1 1/8	2 1/8
C	1 3/8	2 1/8
D	1 5/8	2 1/8

Table 12 - Condenser Water Connections

Model (SB-)	Supply and Return Connection Size (in. FPT)
003, 004, 005	1
006, 007	1 1/4
009, 010	1 1/2
014, 016, 018	2

Filter Information

Table 13 - 3-5 ton (B Cabinet) Pre and Unit Filters

Feature 6A	**Quantity/Size**	**Type**
0	No Pre Filters	
A	(1) 24” x 24” x 2”	Pleated, MERV 8
Feature 6B	**Quantity/Size**	**Type**
0	No Standard Filters	
A	(1) 24” x 24” x 2”	Pleated, MERV 8
B	(1) 24” x 24” x 4”	Pleated, MERV 8
C		Pleated, MERV 11
D		Pleated, MERV 13
E		Pleated, MERV 14
F		Carbon

Table 14 - 6-10 ton (C Cabinet) Pre and Unit Filters

Feature 6A	**Quantity/Size**	**Type**
0	No Pre Filters	
A	(4) 16” x 20” x 2”	Pleated, MERV 8
Feature 6B	**Quantity/Size**	**Type**
0	No Standard Filters	
A	(4) 16” x 20” x 2”	Pleated, MERV 8
B	(4) 16” x 20” x 4”	Pleated, MERV 8
C		Pleated, MERV 11
D		Pleated, MERV 13
E		Pleated, MERV 14
F		Carbon

Table 15 - 14-18 ton (D Cabinet) Pre and Unit Filters

Feature 6A	Quantity/Size	Type
0	No Pre Filters	
A	(4) 18” x 24” x 2”	Pleated, MERV 8
Feature 6B	**Quantity/Size**	**Type**
0	No Standard Filters	
A	(4) 18” x 24” x 2”	Pleated, MERV 8
B	(4) 18” x 24” x 4”	Pleated, MERV 8
C		Pleated, MERV 11
D		Pleated, MERV 13
E		Pleated, MERV 14
F		Carbon

Table 16- 3-5 ton (B Cabinet) Mixing Box Filters

Feature 6A	Quantity/Size	Type
A	(1) 24” x 24” x 2” (located in the mixing box)	2” Pleated, MERV 8 Pre-Filters
Feature 6B	**Quantity/Size**	**Type**
G	(1) 24” x 24” x 4” (located in the mixing box) and (1) 24” x 24” x 4” (located in the unit)	Pleated, MERV 11 and Carbon
H		Pleated, MERV 13 and Carbon
J		Pleated, MERV 14 and Carbon
K		Pleated, MERV 11 and Pleated, MERV 13
L		Pleated, MERV 11 and Pleated, MERV 14

Table 17 - 6-10 ton (C Cabinet) Mixing Box Filters

Feature 6A	Quantity/Size	Type
A	(4) 16” x 20” x 2” (located in the mixing box)	2” Pleated, MERV 8 Pre-Filters
Feature 6B	**Quantity/Size**	**Type**
G	(4) 16” x 20” x 4” (located in the mixing box) and (4) 16” x 20” x 4” (located in the unit)	Pleated, MERV 11 and Carbon
H		Pleated, MERV 13 and Carbon
J		Pleated, MERV 14 and Carbon
K		Pleated, MERV 11 and Pleated, MERV 13
L		Pleated, MERV 11 and Pleated, MERV 14

Table 18 - 14-18 ton (D Cabinet) Mixing Box Filters

Feature 6A	Quantity/Size	Type
A	(4) 18” x 24” x 2” (located in the mixing box)	2” Pleated, MERV 8 Pre-Filters
Feature 6B	**Quantity/Size**	**Type**
G	(4) 18” x 24” x 4” (located in the mixing box) and (4) 18” x 24” x 4” (located in the unit)	Pleated, MERV 11 and Carbon
H		Pleated, MERV 13 and Carbon
J		Pleated, MERV 14 and Carbon
K		Pleated, MERV 11 and Pleated, MERV 13
L		Pleated, MERV 11 and Pleated, MERV 14

Controls
Control Options

Terminal Block

Low voltage terminal block for field wiring unit controls

Required Features

Feature B3 - Modulating/SCR Electric - Potentiometer Control

Feature 13 - Field Installed DDC Controls by Others, with or without Isolation Relays

Standard Terminals

[R] - 24VAC control voltage

[E] - Common

[G] - Fan enable

[GC] - Fan EBM Common

[GS] - Fan EBM 0-10VDC – remove jumper for 0-10VDC operation

[9] - Fan EBM Jumper for potentiometer control (connected to GS)

[RA] - EBM RSA Communication

[RB] - EBM RSB Communication

[PF] - Proof of Air Flow

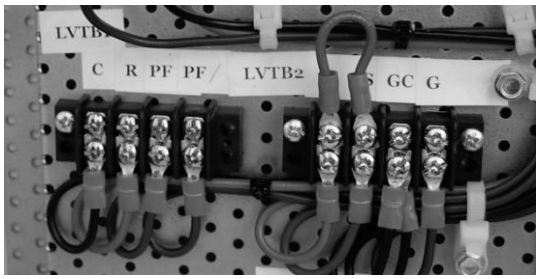

Figure 8 - Example Low Voltage Terminal Block

[O] - Reversing valve cool enable

[HW] - Heat wheel enable

[Y1], [Y2], [Y3], [Y4] - Cooling stage enables

[W1], [W2], [W3], [W4] - Heating stage enables

[WS] - SCR Signal 0-10 VDC

[WC] - SCR Signal Common

[RH] - Humidistat or dehumidification enable input control terminal, used to activate hot gas reheat option

[B], [W], [R/G], [G/R] - wiring from air handling unit AAON controller to condensing unit AAON controller for modulating hot gas reheat valves

[EC] - 2 position actuator, 24V

OR DDC actuator control signal, 4-20mA. Remove resistor for 0-10VDC operation

[CF] - Clogged filter switch contacts

[P5] - Discharge or suction pressure Common

[P6] - Discharge or suction pressure Signal, 0-5VDC

[CS] - Variable capacity compressor 1-5 VDC

[CC] - Variable capacity compressor common

Variable Air Volume (VAV) Unit Controller

Operation - Variable Air Volume Cooling and Constant Volume Heating
Standard AAON VAV controls for standard and heat pump systems. During the cooling mode of operation the supply fan modulates based on the supply air duct static pressure and cooling modulates based on the supply air temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature.

ECM driven motors are used to vary the speed of the supply fans and thus vary the amount of supply air. Because of the reduced speed, VAV units can be very energy efficient at part load conditions. VAV units can be used to serve multiple spaces with diverse or changing heating and cooling requirements, with only a single unit being required for multiple zones. Space temperature sensor included with AAON controller is used for supply air temperature setpoint reset and unoccupied override.

See Control Venders section for specifics.

Required Features
Model Option A4 - Variable Capacity Compressor
Feature 13 - VAV Unit Controller

Standard Supplied Sensors
Supply Air Duct Temperature - Field Installed
Supply Air Duct Static Pressure - Field Installed
Proof of Flow Sensor
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override - Field Installed

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Model Option B3 - Modulating/SCR Electric Heat
Feature 8 - Modulating Hot Gas Reheat

Constant Volume (CV/CAV) Unit Controller

Operation - Constant Volume Cooling and Constant Volume Heating
Standard AAON Constant Volume controls for standard and heat pump systems. During the cooling mode of operation the supply fan provides constant airflow and cooling modulates based on the controlling temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature.

A Constant Volume unit can be used to serve a single space or multiple zones with uniform heating and cooling requirements. Multiple units may be required for multiple zones. Space or supply air temperature sensor can be used as the controlling sensor. If supply air temperature is not used as the controlling sensor it is used as a temperature lockout. If supply air temperature sensor is used as the controlling sensor, space temperature sensor is used for supply air temperature setpoint reset and unoccupied override.

See Control Venders section for specifics.

Required Features
Model Option A4 - Variable Capacity Compressor
Feature 13 - Constant Volume Unit Controller

Standard Supplied Sensors
Supply Air Duct Temperature - Field Installed
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override - Field Installed

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Model Option B3 - Modulating/SCR Electric Heat
Feature 8 - Modulating Hot Gas Reheat

Makeup Air (MUA) Unit Controller

Operation - Constant Volume Cooling and Constant Volume Heating
Standard up to 100% outside air AAON Makeup Air controls for standard and heat pump systems. During the cooling mode of operation the supply fan provides constant airflow and mechanical cooling modulates based on the controlling temperature. During the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature.

Makeup Air units are designed to provide 100% outside air to the system for ventilation purposes. Makeup Air units can improve indoor air quality (IAQ) and also be used to positively pressurize to the space. Electric pre-heat may be required in some applications.

See Control Venders section for specifics.

Required Features
Model Option A4 - Variable Capacity Compressor
Feature 13 - Makeup Air Unit Controller

Standard Supplied Sensors
Outside Air Temperature - Field Installed
Supply Air Temperature - Field Installed

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Model Option B3 - Modulating/SCR Electric Heat
Feature 2 - Modulating Hot Gas Reheat

Single Zone Variable Air Volume (Single Zone VAV) Unit Controller

Operation - Variable Air Volume Cooling and Constant Volume or Variable Air Volume Heating

Standard AAON Single Zone VAV controls for standard and heat pump systems. During the cooling mode of operation the supply fan modulates based on the space temperature and cooling modulates based on the supply air temperature. For constant volume heating, during the heating mode of operation the supply fan provides constant airflow and heating modulates based on the controlling temperature. For variable air volume heating, the supply fan modulates based on the space temperature and heating modulates based on the supply air temperature.

ECM driven motors are used to vary the speed of the supply fans and thus vary the amount of supply air. Because of the reduced speed, single zone VAV units can be very energy efficient at part load conditions. Single zone VAV units can be used to serve a single space or multiple zones with uniform heating and cooling requirements. Space temperature sensor included with AAON controller is used for supply air temperature setpoint reset and unoccupied override.

See Control Venders section for specifics.

Required Features

Model Option A4 - Variable Capacity Compressor
Model Option B3 - Modulating/SCR Electric Heat, with auxiliary electric VAV heating
Feature 13 - Single Zone VAV Unit Controller

Standard Supplied Sensors

Supply Air Duct Temperature - Field Installed
Proof of Flow Sensor
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override - Field Installed

Recommended Features

Feature 8 - Modulating Hot Gas Reheat

Control Vendors

AAON Orion™ Controls System

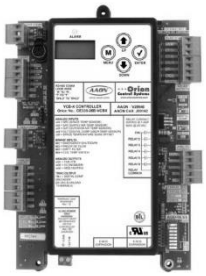

Figure 9 - AAON VCB-X Controller

The AAON VCB-X unit controller, which is part of the Orion Controls System, can be factory provided and factory installed in AAON SB Series units. It provides advanced control features, without complexity, in an easy to install and setup package. The VCB-X controller can be individually configured, including setpoint adjustment, sensor status viewing, and occupancy scheduling. It can control VAV, CV, MUA, and Single Zone VAV units. Additional features and options can be managed by the controller with the addition of modular expansion I/O boards for the controller.

The VCB-X controller can be operated as a Stand Alone System, connected via modular cable to multiple VCB-X controllers in an Interconnected System, or connected via modular cable to multiple VCB-X controllers, VAV/Zone controllers, and add-on controllers in a Networked System.

Protocol Adaptability™ is available from AAON for interfacing to LonWorks®, BACnet® or Johnson Controls N2 controls systems with the addition of specific gateways.

Required Options

To configure the VCB-X controller an operator interface is needed. Available operator interfaces are the Modular Service Tool, Modular System Manager, System Manager TS, Tactio SI Touch Screen Interface connected via a Commlink II and a PC equipped with free Microsoft Windows® based Orion Prism II software connected via a Commlink II. With optional accessories, remote connectivity to the controller via Prism II software can be accomplished.

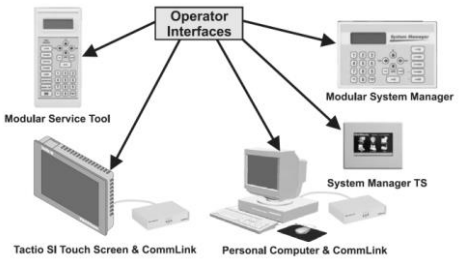

Figure 10 - VCB-X Controller Operator Interfaces

AAON Touchscreen Controller

Figure 11 - Remote Mounted AAON Touchscreen Controller

The AAON Touchscreen Controller is a simple controls option for energy saving applications. It is remote mounted in the space similar to a conventional thermostat.

Controllable Features
A lead/single variable capacity scroll compressor (with up to two total compressor stages), heat pump configuration, ECM driven controlled variable speed supply fan, sensible or enthalpy controlled economizer and modulating SCR electric heating are controllable with the AAON Touchscreen Controller. Modulating hot gas reheat is available with a space temperature sensor and space relative humidity sensor version of the controller. Push button override, alarms and trend logging are available directly from the controller.

Applications
The controller can be used for constant volume air heat pump applications, single zone VAV heat pump applications, VAV heat pump applications, or makeup heat pump applications

Scheduling
Weekday, weekend, or daily scheduling is available with the AAON Touchscreen Controller.

Networking
The AAON Touchscreen Controller can be directly connected to a BACnet® MSTP or Modbus RTU network through an EIA-485 connection. The MAC Address, Baud Rate and Max Master are configurable.

Security
The AAON Touchscreen Controller includes password protected User, Operator and Administrator profiles for configuration, scheduling and setpoint adjustment levels of control.

Required Options
The AAON Touchscreen Controller is available on SB Series units with a variable capacity compressor and either Constant Volume, Makeup Air, VAV, or Single Zone VAV unit controller selected. 4 stages of heating, modulating SCR electric heat are available. The controller has a limited quantity of inputs and outputs and thus the quantity of features which can be controlled and are available in AAON ECat are limited.

Electrical Service Sizing Data

Use the following equations to size the electrical service wiring and disconnect switch for the unit. Electrical data for a specific unit configuration can be found with the AAON ECat software. For further assistance in determining the electrical ratings, contact the Applications Department, or consult U.L. 1995.

The Minimum Circuit Ampacity (MCA) and Maximum Overcurrent Protection (MOP) must be calculated for all modes of operation which include the cooling mode of operation, the heating mode of operation, and if the unit is a heat pump the emergency heating mode of operation and auxiliary heating mode of operation. The emergency or backup heating mode of operation is when the secondary heater is in operation and heat pump or compressor heating is not in operation. The auxiliary or supplemental heating mode of operation is when heat pump or compressor heating is in operation and the secondary heater is also in operation.

To calculate the MCA and MOP, the number of motors and other current drawing devices in operation must be known for each mode of operation. The largest MCA and MOP values calculated from all the modes operation are the correct values and are also on the unit nameplate.

For example, during the cooling mode of operation of an air-cooled DX unit or an air-source heat pump the supply fans, compressors, and condenser fans are all in operation. During the heating mode of operation of an air-cooled DX unit or the emergency heating mode of operation of an air-source heat pump only the supply fans and heater are in operation. During the auxiliary heating mode of operation of an air-source heat pump the supply fans, compressors, condenser fans, and secondary heater are all in operation.

Once it is determined what current drawing devices are operating during each mode of operation use the equations shown below to calculate the MCA and MOP.

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

Load 1 = Current of the largest motor/compressor in operation
Load 2 = Sum of the currents of the remaining motors/compressors in operation
Load 3 = Current of electric heaters in operation
Load 4 = Any remaining loads greater than or equal to 1 amp

Electric Heat FLA Calculation

Single Phase

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

Three Phase

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

Electrical Service Sizing Data Continued

Cooling Mode Equations

MCA = 1.25(Load 1) + Load 2 + Load 4
MOP = 2.25(Load 1) + Load 2 + Load 4

Heating Mode or Emergency/Backup Heating Mode without Electric Heat Equations

MCA = 1.25(Load 1) + Load 2 + Load 4
MOP = 2.25(Load 1) + Load 2 + Load 4

Heating Mode or Emergency/Backup Heating Mode with Less than 50 kW of Electric Heat Equations

MCA = 1.25(Load 1 + Load 2 + Load 3 + Load 4)
MOP = 2.25(Load 1) + Load 2 + Load 3 + Load 4

Heating Mode or Emergency/Backup Heating Mode with Greater than or Equal to 50 kW of Electric Heat Equations

MCA = 1.25(Load 1 + Load 2) + Load 3 + 1.25(Load 4)
MOP = 2.25(Load 1) + Load 2 + Load 3 + Load 4

Auxiliary/Supplemental Heating Mode without Electric Heat Equations

MCA = 1.25(Load 1) + Load 2 + Load 4
MOP = 2.25(Load 1) + Load 2 + Load 4

Auxiliary/Supplemental Heating Mode with Less than 50 kW of Electric Heat Equations

MCA = 1.25(Load 1) + Load 2 + 1.25(Load 3) + Load 4
MOP = 2.25(Load 1) + Load 2 + Load 3 + Load 4

Auxiliary/Supplemental Heating Mode with Greater than or Equal to 50 kW of Electric Heat Equations

MCA = 1.25(Load 1) + Load 2 + Load 3 + Load 4
MOP = 2.25(Load 1) + Load 2 + Load 3 + Load 4

Electrical Service Sizing Data Continued

Fuse Selection

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.

The standard ampere ratings for fuses, from the *NEC Handbook, 240-6,* 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

DSS $\geq$ MOP

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

Literature Change History

October 2012
First Revision, Rev. A, of the SB Series Engineering Catalog.

January 2013
Updated with additional mixing box filter details.

September 2013
Updated crating verbiage, factory contact information, and required features for controls options.

July 2014
Added maximum steam coil operating pressure, revised filter and waterside economizer features, and updated hot water coil connections.

November 2015
Updated *Low Limit Controls* description.

March 2016
Updated **Feature 14A -** *Water-Cooled Condenser.*

June 2016
Updated **Feature 14A** - *Water-Cooled Condenser.*

October 2016
Added **Feature 3** – *Energy Recovery Type.*

November 2016
Added **Feature 18** - *Energy Recovery Cabinet*. Updated **Feature 13** - *Special Controls.* Updated **Feature 21**- *Shipping Splits.* Updated **Model Option A3** - Coil Coating.

June 2017
Added Table 12 - *Condenser Water Connections* to Unit Information.

July 2017
Interior Corrosion description updated.

September 2017
Updated Feature 14A - *Water-Cooled Condenser.* Added *ETL U.S.A. + Canada Listing* option; Feature 19. Updated Feature 5B - *Supply Air Blower.* Updated Feature 5C – *Supply Air Blower Motor.* Removed *Terminal Block* option; Feature 13.

December 2017
Added AAON touchscreen controller option.

January 2018
Updated Feature 3 – Energy Recovery Type.

April 2019
Updated Feature 14A – Water-Cooled Condenser. Updated E-Coil Coating hours to 10,000.

August 2019
Replaced WattMaster with AAON Orion Controls System references. Update Table 6 - 3-5 ton (B Cabinet) Heating and Fan Information. Table 6 - 3-5 ton (B Cabinet) Heating and Fan Information. Updated E-Coil Coating information. Updated Table 3 - Energy Recovery Wheel Information.

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