SA Series

Vertical Self-Contained Units and Indoor Air Handling Units

Engineering Catalog

Single Cabinet

Dual Cabinet

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R74140 · Rev. A · 190802

SA Series Feature String Nomenclature

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SA	- 035	- 3	- A	- E	R	0	9	- 0	0	0	:	A	C	0	0	-	0	0	0	-	E	B	F	-	A	B	0	-	0	0	0	0	0	0	0	-	H	A	-	0
																													0	0	0	0	0	0	0					B
																													16	17	18	19	20	21	22					23

MODEL OPTIONS

Series and Generation
SA

Unit Size
023 = 23 ton Capacity
028 = 28 ton Capacity
030 = 30 ton Capacity
035 = 35 ton Capacity
045 = 45 ton Capacity
050 = 50 ton Capacity
055 = 55 ton Capacity
058 = 58 ton Capacity
060 = 60 ton Capacity
065 = 65 ton Capacity
070 = 70 ton Capacity

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

Intake Configuration / Interior Protection
A = Left Intake
B = Right Intake
C = Combination - Left and Right Intake
D = Option A + Interior Corrosion Protection
E = Option B + Interior Corrosion Protection
F = Option C + Interior Corrosion Protection

A1: Refrigerant Style
0 = Air Handling Unit
B = R-410A Non-Compressorized DX AHU
E = R-410A Variable Capacity Scroll Compressor

A2: Unit Configuration
0 = No Cooling
J = Shell and Tube Water-Cooled Cond. + Std Evap. Coil
K = Shell and Tube Water-Cooled Cond. + 6 Row Evap. Coil
R = Brazed Plate Water-Cooled Cond. + Std Evap. Coil
T = Brazed Plate Water-Cooled Cond. + 6 Row Evap. Coil
U = Chilled Water Coil - 4 Row
W = Chilled Water Coil - 6 Row
2 = Non-Compressorized + Std Evap. Coil
4 = Non-Compressorized + 6 Row Evap. Coil
8 = Water-Source/Geothermal Heat Pump - Brazed Plate Heat Exchanger

A3: Coil Coating
0 = Standard
1 = Polymer E-Coated Cooling Coil
D = Stainless Steel Cooling Coil Casing

A4: Cooling / Heat Pump Staging
0 = No Cooling
2 = 2 Stage
4 = 4 Stage
9 = Modulating - Lead Variable Capacity Compressors
A = Modulating - All Variable Capacity Compressors
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

SA Series Feature String Nomenclature

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	15	16	17	18	19	20	21	22	23
SA	- 035	- 3	- A	- E	R	0	9	- **0**	**0**	**0**	**:**	**A**	**C**	**0**	**0**	**-**	**0**	**0**	**0**	- E	B	F	- A	B	0	- 0	0	0	0	0	0	0	- H	A	- 0	0	0	0	0	0	0	0	B

B1: Heating Type
0 = No Heating
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
H = 1 Row Coil
J = 2 Row Coil

B3: Heating Stages
0 = No Heating
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

1A: Return / Outside Air Section
0 = Standard
A = Waterside Economizer - 4 Row Coil
B = Waterside Economizer - 6 Row Coil

1B: Plenum Height
0 = 33" Plenum Height
A = 37" Plenum Height
B = 41" Plenum Height
C = 45" Plenum Height
D = 49" Plenum Height
E = 53" Plenum Height
F = 57" Plenum Height
G = 37" Plenum Height + Sound Attenuation
H = 41" Plenum Height + Sound Attenuation
J = 45" Plenum Height + Sound Attenuation
K = 49" Plenum Height + Sound Attenuation
L = 53" Plenum Height + Sound Attenuation
M = 57" Plenum Height + Sound Attenuation

1C: Discharge Configuration
0 = Right - Horizontal Discharge
A = Left - Horizontal Discharge
B = Back - Horizontal Discharge
C = Top - Vertical Discharge
D = Options 0 + A
E = Options 0 + B
F = Options 0 + C
G = Options A + B
H = Options A + C
J = Options B + C
K = Options 0 + A + B
L = Options 0 + A + C
M = Options 0 + B + C
N = Options A + B + C
P = Options 0 + A + B + C

1D: Waterside Economizer Circuiting
0 = Standard - None
E = Single Serpentine 12 fpi

2: Blank
0 = Standard

3: Blank
0 = Standard

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

SA Series Feature String Nomenclature

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		15									
SA	-	035	-	3	-	A	-	E	R	0	9	-	0	0	0	:	A	C	0	0	-	0	0	0	-	**E**	**B**	**F**	-	**A**	**B**	**0**	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	-	H	A	-	0				
																																															0	0	0	0	0	0	0	B
																																16	17	18	19	20	21	22	23									

5A: Supply Air Blower Configuration
0 = 2 Blowers + Standard Efficiency Motors
A = 4 Blowers + Standard Efficiency Motors
B = 2 Blowers + Premium Efficiency Motors
C = 4 Blowers + Premium Efficiency Motors
D = 2 Blowers + Premium Efficiency Motors + 1 VFD
E = 2 Blowers + Premium Efficiency Motors + 2 VFDs
F = 4 Blowers + Premium Efficiency Motors + 2 VFDs
G = 4 Blowers + Premium Efficiency Motors + 4 VFDs
H = 1 Blower + Standard Efficiency Motor
J = 1 Blower + Premium Efficiency Motor
K = 1 Blower + Premium Efficiency Motor + 1 VFD

5B: Supply Air Blower
A = 18.5" Spring Isolated Direct Drive Backward Curved Plenum
B = 22" Spring Isolated Direct Drive Backward Curved Plenum

5C: Supply Air Blower Motor
C = 1 hp - 1760 rpm
D = 2 hp - 1760 rpm
E = 3 hp - 1760 rpm
F = 5 hp - 1760 rpm
G = 7.5 hp - 1760 rpm
H = 10 hp - 1760 rpm
N = 1 hp - 1170 rpm
P = 2 hp - 1170 rpm
Q = 3 hp - 1170 rpm
R = 5 hp - 1170 rpm
S = 7.5 hp - 1170 rpm

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

6B: Unit Filter Type
0 = 2" Pleated - MERV 8
A = 4" Pleated - MERV 8
B = 4" Pleated - MERV 11
C = 4" Pleated - MERV 13
D = 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 Shutdown Terminals
L = Options C + H

12: Controls
0 = Standard
A = Low Limit Controls
B = Phase and Brown Out Protection
C = Options A + B

SA Series Feature String Nomenclature

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	15
SA	- 035	- 3	- A	- E	R	0	9	- 0	0	0	: A	C	0	0	- 0	0	0	- E	B	F	- A	B	0	- 0	0	0	0	0	0	**0**	**- H**	A	- 0
																												0	0	0	0	0	0	B
																												16	17	18	**19**	**20**	**21**	**22**	**23**

13: Special Controls

0 = Terminal Block for Thermostat Control
D = VAV Unit Controller - VAV Cool + CV Heat
E = Constant Volume Unit Controller - CV Cool + CV Heat
F = Makeup Air Unit Controller - CV Cool + CV Heat
L = Terminal Block for Thermostat Control with Isolation Relays
Y = VAV Single Zone Heat Pump Unit Controller - VAV Cool + VAV Heat
Z = Constant Volume Heat Pump Unit Controller - CV Cool + CV Heat
1 = Makeup Air Heat Pump Unit Controller - CV Cool + CV Heat
2 = VAV Single Zone Unit Controller - VAV Cool + CV Heat
4 = Field Installed DDC Controls by Others
5 = Field Installed DDC Controls by Others with Isolation Relays
6 = Factory Installed DDC Controls Furnished by Others with Isolation Relays

14A: Water-Cooled Condenser

0 = Standard - None
A = Balancing Valves
B = Water Flow Switch
C = Motorized Shut-Off Valve
D = Head Pressure Control
E = Options A + B
F = Options A + C
G = Options A + D
H = Options B + C
J = Options B + D
L = Options A + B + C
M = Options A + B + D
S = Option A + SMO 254 Corrosion Resistant Brazed Plate Condenser
T = Option B + SMO 254 Corrosion Resistant Brazed Plate
U = Option C + SMO 254 Corrosion Resistant Brazed Plate
V = Option D + SMO 254 Corrosion Resistant Brazed Plate
W = Option A + B + SMO 254 Corrosion Resistant Brazed Plate
Y = Option A + C + SMO 254 Corrosion Resistant Brazed Plate
Z = Option A + D + SMO 254 Corrosion Resistant Brazed Plate
1 = Option B + C + SMO 254 Corrosion Resistant Brazed Plate
2 = Option B + D + SMO 254 Corrosion Resistant Brazed Plate
4 = Option A + B + C + SMO 254 Corrosion Resistant Brazed Plate
5 = Option A + B + D + SMO 254 Corrosion Resistant Brazed Plate

SA Series Feature String Nomenclature

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	15	16	17	18	19	20	21	22	23
SA	- 035	- 3	- A	- E	R	0	9	- 0	0	0	: A	C	0	0	- 0	0	0	- E	B	F	- A	B	0	- 0	0	0	0	0	0	0	- H	**A**	**-**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**B**

14B: Waterside Economizer Piping
0 = Standard - None
A = Variable Water Flow Application Field Piped Waterside Economizer
B = Constant Water Flow Application Field Piped Waterside Economizer
C = Variable Water Flow Application Factory Piped Waterside Economizer
D = Constant Water Flow Application Factory Piped Waterside Economizer

15: Glycol Percentage
0 = Standard
A = Minimum 20% Propylene Glycol
B = Minimum 40% Propylene Glycol
C = Field Adjustable for Glycol %

16: Interior Cabinet Options
0 = Standard
A = Overflow Switch
B = UV Lights
C = Options A + B

17: Blank
0 = Standard

18: Blank
0 = Standard

19: Code Options
0 = Standard - ETL U.S.A. Listing
D = Chicago - Cool Only
G = Chicago - No Cool + No Heat

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

21: Shipping Splits
0 = Standard - One Piece Unit
A = Two Piece Single Unit - 1 Blower Plenum + 1 Air Tunnel
B = Two Piece Double Unit - 1 Blower Plenum + 1 Air Tunnel
C = Three Piece Double Unit - 1 Blower Plenum + 2 Air Tunnels
D = Four Piece Double Unit - 2 Blower Plenums + 2 Air Tunnels

22: Control Vendors
0 = Standard
V = VCC-X Controls + Integrated BACnet MSTP

23: Type
B = Standard Paint
U = Special Pricing Authorization + Special Paint
X = Special Pricing Authorization + AAON Gray Paint

Model Number
Unit Size

Example: SA-**035**-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-00000000B

The first number of the model string designates nominal tons of cooling for SA Series self-contained units with brazed plate refrigerant-to-water condensers. Actual capacities will vary with conditions. Refer to the AAON ECat software for performance and cooling capacities at design conditions.

Table 1 - Unit Sizes

Model (Nominal Tons)	Cabinet Type	Intake	Cabinet 1	Cabinet 2	Compressors/ Circuits
SA-**023**	Single	Left or Right Side	SA-023		2/2
SA-**028**			SA-028		
SA-**030**			SA-030		
SA-**035**			SA-035		
SA-**045**	Dual	Left and Right Sides	SA-023	SA-023	4/4
SA-**050**			SA-023	SA-028	
SA-**055**			SA-028	SA-028	
SA-**058**			SA-028	SA-030	
SA-**060**			SA-030	SA-030	
SA-**065**			SA-030	SA-035	
SA-**070**			SA-035	SA-035	

Model Number
Voltage

Example: SA-035-**3**-ER09-000:AC00-000-EBF-AB0-0000000-HA-00000000B

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

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

Model Number
Intake Configuration/Interior Protection

Example: SA-035-3-**A**-ER09-000:AC00-000-EBF-AB0-0000000-HA-00000000B

A = *Left Intake* - Intake air connection on the side of the unit left of the compressor and control service compartment. Interior of the unit is lined with galvanized G90 steel. Drain pan is fabricated of 18 gauge 304 stainless steel. Option is available on 23-35 ton single cabinet units.
B = *Right Intake* - Intake air connection on the side of the unit right of the compressor and controls service compartment. Interior of the unit is lined with galvanized G90 steel. Drain pan is fabricated of 18 gauge 304 stainless steel. Option is available on 23-35 ton single cabinet units.
C = *Combination, Left and Right Intake* - Intake air connections on the sides of the unit left and right of the compressor and controls access compartments of the unit. Interior of the unit is composed of galvanized G90 steel. Drain pans are fabricated of 18 gauge 304 stainless steel. Option is available on 45-70 ton dual cabinet units.
D = *Left Intake and Interior Corrosion Protection* - Intake air connection on the side of the unit left of the compressor and controls access compartment of the unit. All exposed metal surfaces in the air tunnel except the coils, coil casings and drain pans are spray coated with a two-part polyurethane, heat baked coating. Selection covers coating of the fans, filter rack and service door interiors. 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 exceeds 2,500 hours when tested under ASTM B 117-95 requirements. Drain pan is fabricated of 18 gauge 304 stainless steel. See Model Option A3 for cooling corrosion protection options and Model Option B1 for heating corrosion protection options. Option is available on 23-35 ton single cabinet units.
E = *Right Intake and Interior Corrosion Protection* - Intake air connection on the side of the unit right of the compressor and controls access compartment of the unit. All exposed metal surfaces in the air tunnel except the coils, coil casings and drain pans are spray coated with a two-part polyurethane, heat baked coating. Selection covers coating of the fans, filter rack and service door interiors. 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 exceeds 2,500 hours when tested under ASTM B 117-95 requirements. Drain pan is fabricated of 18 gauge 304 stainless steel. See Model Option A3 for cooling corrosion protection options and Model Option B1 for heating corrosion protection options. Option is available on 23-35 ton single cabinet units.

Model Number - Intake Configuration/Interior Protection Continued

F = *Combination, Left and Right Intake, and Interior Corrosion Protection* - Intake air connections on the sides of the unit left and right of the compressor and controls access compartments of the unit. All exposed metal surfaces in the air tunnel except the coils, coil casings and drain pans are spray coated with a two-part polyurethane, heat baked coating. Selection covers coating of the fans, filter rack and service door interiors. 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 exceeds 2,500 hours when tested under ASTM B 117-95 requirements. Drain pans are fabricated of 18 gauge 304 stainless steel. See Model Option A3 for cooling corrosion protection options and Model Option B1 for heating corrosion protection options. Option is available on 45-70 ton dual cabinet units.

Figure 1 - Example Right Intake/Discharge Single Cabinet Orientation

Model Number
Model Option A1 - Refrigerant Style

Example: SA-035-3-A-**E**R09-000:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *Air Handling Unit* - Chilled water coil or heating only air handling unit.
B = *R-410A Non-Compressorized DX Air Handling Unit* - R-410A DX cooling coil air handling unit to be matched with condensing unit.
E = *R-410A Variable Capacity Scroll Compressor (VCC)* - Compressorized R-410A DX cooling with 10-100% variable capacity scroll compressors. 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. For 23-35 ton units with customer provided controls, one analog control signal per variable capacity compressor is required (Feature 13). For 45-70 ton units with customer provided controls, two analog control signals are required (Feature 13); if all variable capacity compressors are ordered compressors 1 and 3 will be wired to one control signal and compressors 2 and 4 will be wired to one control signal.

Model Number
Model Option A2 - Unit Configuration

Example: SA-035-3-A-E**R**09-000:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *No Cooling* - Heating only air handling unit.
A = *Remote Condenser with Standard Evaporator Coil* - Air-cooled self-contained unit with standard DX evaporator coils, thermal expansion valves, and compressors for use with remote condenser. 23-35 ton units include 2 circuits and 45-70 ton units include 4 circuits.
B = *Remote Condenser with 6 Row Evaporator Coil* - Air-cooled self-contained unit with 6 row high capacity DX evaporator coils, thermal expansion valves, and compressors for use with remote condenser. High capacity coils improve unit's energy efficiency and dehumidification capability. 23-35 ton units include 2 circuits and 45-70 ton units include 4 circuits.
J = *Shell and Tube Water-Cooled Condenser with Standard Evaporator Coil* - Self-contained unit with shell and tube water-cooled condensers with standard DX evaporator coils.
K = *Shell and Tube Water-Cooled Condenser with 6 Row Evaporator Coil* - Self-contained unit with shell and tube water-cooled condensers with 6 row high capacity DX evaporator coils. High capacity coils improve unit's energy efficiency and dehumidification capability.
R = *Brazed Plate Water-Cooled Condenser with Standard Evaporator Coil* - Self-contained unit with stainless steel brazed plate water-cooled condensers with standard DX evaporator coils. Brazed plate water-cooled condensers improve the unit's energy efficiency and reduce the amount of refrigerant required by the unit.

Model Option A2 - Unit Configuration Continued

T = *Brazed Plate Water-Cooled Condenser with 6 Row Evaporator Coil* - Self-contained unit with stainless steel brazed plate water-cooled condensers with 6 row high capacity DX evaporator coils. High capacity coils improve unit's energy efficiency and dehumidification capability. Brazed plate water-cooled condensers improve the unit's energy efficiency and reduce the amount of refrigerant required by the unit.
U = *Chilled Water Coil, 4 Row* - Air handling unit with 4 row chilled water cooling coils. No valves or valve controls are included with this option. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
W = *Chilled Water Coil, 6 Row* - Air handling unit with 6 row chilled water cooling coils. No valves or valve controls are included with this option. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
2 = *Non-Compressorized with Standard DX Evaporator Coil* - Air handling unit with standard DX evaporator coils, but no compressors or condenser, for use with remote condensing unit. Thermal expansion valves and hot gas bypass connections are included. 23-35 ton units include 2 coils and 2 circuits and 45-70 ton units include 4 coils and 4 circuits.
4 = *Non-Compressorized with 6 Row DX Evaporator Coil* - Air handling unit with 6 row high capacity DX evaporator coils, but no compressors or condenser, for use with remote condensing unit. Thermal expansion valves and hot gas bypass connections are included. High capacity coils improve unit's energy efficiency and dehumidification capability. 23-35 ton units include 2 coils and 2 circuits and 45-70 ton units include 4 coils and 4 circuits.
7 = *Water-Source/Geothermal Heat Pump with Shell and Tube Heat Exchanger* - Self-contained unit with shell and tube heat exchangers with standard heat pump coils. Refrigerant piping with reversing valves, filter dryers, receiver tank and thermal expansion valves is factory installed. With this option the water is in the barrel and the refrigerant is in the tubes of the shell and tube heat exchangers.
8 = *Water-Source/Geothermal Heat Pump with Brazed Plate Heat Exchanger* - Self-contained unit with stainless steel brazed plate heat exchangers with standard heat pump coils. Refrigerant piping with reversing valves, filter dryers, receiver tank and thermal expansion valves is factory installed. Brazed plate water-cooled condensers improve the unit's energy efficiency and reduce the amount of refrigerant required by the unit.

Model Number
Model Option A3 - Coil Coating

Example: SA-035-3-A-ER**0**9-000:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *Standard* - No cooling coil coating.
1 = *Polymer E-Coated Cooling Coil* - Polymer e-coating is applied only to the cooling 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.
D = *Stainless Steel Cooling Coil Casing* - 18 gauge 304 stainless steel casing on the cooling coils.

Model Number
Model Option A4 - Cooling/Heat Pump Staging

Example: SA-035-3-A-ER0**9**-000:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *No Cooling* - Heating only air handling unit.
2 = 2 Stage - 2 stage non-compressorized DX air handling unit. 23-35 ton units include 2 coils and 2 circuits.
4 = 4 Stage - 4 stage non-compressorized DX air handling unit. 45-70 ton units include 4 coils and 4 circuits.
9 = *Modulating - Lead Stage Variable Capacity Compressors* - 10-100% variable capacity scroll compressor on the lead refrigerant circuits of the unit with standard on/off scroll compressor on the lag refrigerant circuits of the unit. With factory provided controls, on/off compressors are staged on while the variable capacity compressors modulate their capacity as needed. 23-35 ton units include a single 10-100% variable capacity scroll compressor and a single standard on/off scroll compressor. 45-70 ton units include two 10-100% variable capacity scroll compressors and two standard on/off scroll compressors.
A = *Modulating - All Stages Variable Capacity Compressors* - 10-100% variable capacity scroll compressor on all of the circuits of the unit. With factory provided controls, variable capacity compressors are staged on, as efficiently as possible, while modulating their capacity as needed. 23-35 ton units include two 10-100% variable capacity scroll compressors and 45-70 ton units include four 10-100% variable capacity scroll compressors.
H = *Single Serpentine 8 fpi* - Chilled water coils with single serpentine circuitry and 8 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.

Model Option A4 - Cooling/Heat Pump Staging Continued

J = *Half Serpentine 8 fpi* - Chilled water coils with half serpentine circuitry and 8 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
K = *Single Serpentine 10 fpi* - Standard chilled water coil option with single serpentine circuitry and 10 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
L = *Half Serpentine 10 fpi* - Chilled water coils with half serpentine circuitry and 10 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
M = *Single Serpentine 12 fpi* - Chilled water coils with single serpentine circuitry and 12 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.
N = *Half Serpentine 12 fpi* - Chilled water coils with half serpentine circuitry and 12 fins per inch. 23-35 ton units include 2 coils and 2 inlet and 2 outlet water connections. 45-70 ton units include 4 coils and 4 inlet and 4 outlet water connections.

Model Number

Model Option B1 - Heating Type

Example: SA-035-3-A-ER09-**0**00:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *No Heating* - Unit without auxiliary heating.
C = *Steam Distributing Standard Coil* - Steam distributing heating coils in the preheat position. 23-35 ton units include 1 coil and 1 inlet and 1 outlet water connection. 45-70 ton units include 2 coils and 2 inlet and 2 outlet water connections. 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* -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 coils in the preheat position. 23-35 ton units include 1 coil and 1 inlet and 1 outlet water connection. 45-70 ton units include 2 coils and 2 inlet and 2 outlet water connections. No valves or valve controls are included with this option.

Model Option B1 - Heating Type Continued

F = *Hot Water Polymer E-Coated Coil* - Polymer e-coating is applied only to the hot water heating coils in the preheat position. 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: SA-035-3-A-ER09-0**0**0:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *No Heating* - Unit without auxiliary heating.
H = *1 Row Coil* - Single row hot water or steam heating coils. No valves or valve controls are included with this option.
J = *2 Row Coil* - Two row hot water or steam heating coils. No valves or valve controls are included with this option.

Model Number

Model Option B3 - Heating Staging

Example: SA-035-3-A-ER09-00**0**:AC00-000-EBF-AB0-0000000-HA-00000000B

0 = *No Heating* - Unit without auxiliary heating.
H = *Single Serpentine 8 fpi* - Hot water or steam coils 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 coils with half serpentine circuitry and 8 fins per inch. No valves or valve controls are included with this option.
K = *Single Serpentine 10 fpi* - Hot water or steam coils with single serpentine circuitry and 10 fins per inch. Standard steam coil option and standard 2 row hot water coil option. No valves or valve controls are included with this option.
L = *Half Serpentine 10 fpi* - Hot water coils with half serpentine circuitry and 10 fins per inch. Standard 1 row hot water coil option. No valves or valve controls are included with this option.
M = *Single Serpentine 12 fpi* - Hot water or steam coils 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 coils with half serpentine circuitry and 12 fins per inch. No valves or valve controls are included with this option.

Feature 1A
Return Air/Outside Air Section

Example: SA-035-3-A-ER09-000:**A**C00-000-EBF-AB0-0000000-HA-00000000B

0 = *Standard* - No waterside economizer.
A = *Waterside Economizer 4 Row Coil* - 4 row standard capacity waterside economizer coils upstream of the evaporator coils. See Feature 1D for waterside economizer circuitry and Feature 14B for waterside economizer piping and control options.
B = *Waterside Economizer 6 Row Coil* - 6 row high capacity waterside economizer coils upstream of the evaporator coils. See Feature 1D for waterside economizer circuitry and Feature 14B for waterside economizer piping and control options.

Feature 1B
Plenum Height

Example: SA-035-3-A-ER09-000:A**C**00-000-EBF-AB0-0000000-HA-00000000B

0 = *33" Plenum Height* - Standard 33 inch tall supply fan plenum.
A = *37" Plenum Height* - 37 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
B = *41" Plenum Height* - 41 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
C = *45" Plenum Height* - 45 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
D = *49" Plenum Height* - 49 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
E = *53" Plenum Height* - 53 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
F = *57" Plenum Height* - 57 inch tall supply fan plenum. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
G = *37" Plenum Height with Sound Attenuation* - 37 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).

Feature 1B - Plenum Height Continued

H = *41" Plenum Height with Sound Attenuation* - 41 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
J = *45" Plenum Height with Sound Attenuation* - 45 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
K = *49" Plenum Height with Sound Attenuation* - 49 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
L = *53" Plenum Height with Sound Attenuation* - 53 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).
M = *57" Plenum Height with Sound Attenuation* - 57 inch tall supply fan plenum with perforated and acoustically insulated metal liners on the interior sides of the plenum which do not have discharge openings. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 21).

Feature 1C
Discharge Configuration

Example: SA-035-3-A-ER09-000:AC**0**0-000-EBF-AB0-0000000-HA-00000000B

0 = *Right Side, Horizontal Discharge* - Supply air connection on the right side of the supply air plenum.
A = *Left Side, Horizontal Discharge* - Supply air connection on the left side of the supply air plenum.
B = *Back, Horizontal Discharge* - Supply air connection on the back of the supply air plenum.
C = *Top, Vertical Discharge* - Supply air connection on the top of the supply air plenum.
D = *Right and Left Side, Horizontal Discharge* - Supply air connections on the right side and left side of the supply air plenum.
E = *Right Side and Back, Horizontal Discharge* - Supply air connections on the right side and back of the supply air plenum.
F = *Right Side and Top, Horizontal and Vertical Discharge* - Supply air connections on the right side and top of the supply air plenum.
G = *Left Side and Back, Horizontal Discharge* - Supply air connection on the left side and back of the supply air plenum.

Feature 1C - Discharge Configuration Continued

H = *Left Side and Top, Horizontal and Vertical Discharge* - Supply air connection on the left side and top of the supply air plenum.
J = *Back and Top, Horizontal and Vertical Discharge* - Supply air connection on the back and top of the supply air plenum.
K = *Right Side, Left Side, and Back, Horizontal Discharge* - Supply air connection on the right side, left side and back of the supply air plenum.
L = *Right Side, Left Side, and Top, Horizontal and Vertical Discharge* - Supply air connection on the right side, left side and top of the supply air plenum.
M = *Right Side, Back, and Top, Horizontal and Vertical Discharge* - Supply air connection on the right side, back and top of the supply air plenum.
N = *Left Side, Back, and Top, Horizontal and Vertical Discharge* - Supply air connection on the left side, back and top of the supply air plenum.
P = *Right Side, Left Side, Back, and Top, Horizontal and Vertical Discharge* - Supply air connection on the right side, left side, back and top of the supply air plenum.

Figure 2 - Example Left Intake/Discharge Single Cabinet Orientation

Feature 1D
Waterside Economizer Circuitry

Example: SA-035-3-A-ER09-000:AC0**0**-000-EBF-AB0-0000000-HA-00000000B

0 = *Standard - None*
E = *Single Serpentine 12 fpi* - Waterside economizer coils with single serpentine circuitry and 12 fins per inch. See Feature 14B for waterside economizer piping and control options.

Feature 2
Blank

Example: SA-035-3-A-ER09-000:AC00-**0**00-EBF-AB0-0000000-HA-00000000B

0 = *Standard*.

Feature 3
Blank

Example: SA-035-3-A-ER09-000:AC00-0**0**0-EBF-AB0-0000000-HA-00000000B

0 = *Standard*

Feature 4
Maintenance Options

Example: SA-035-3-A-ER09-000:AC00-00**0**-EBF-AB0-0000000-HA-00000000B

0 = *Standard*
A = *Blower Auxiliary Contacts, Low Voltage Terminal Block* - Normally Open output terminals, labeled [BA1] and [BA2], which close when the supply fans energize. 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: SA-035-3-A-ER09-000:AC00-000-**E**BF-AB0-0000000-HA-00000000B

0 = *2 Blowers with Standard Efficiency Motors*
A = *4 Blowers with Standard Efficiency Motors*
B = *2 Blowers with Premium Efficiency Motors*
C = *4 Blowers with Premium Efficiency Motors*
D = *2 Blowers with Premium Efficiency Motors on 1 VFD*
E = *2 Blowers with Premium Efficiency Motors with 2 Motors on 2 VFDs*
F = *4 Blowers with Premium Efficiency Motors on 2 VFDs*
G = *4 Blowers with Premium Efficiency Motors with 4 Motors on 4 VFDs*
H = *1 Blower with Standard Efficiency Motor*
J = *1 Blower with Premium Efficiency Motor*
K = *1 Blower with Premium Efficiency Motor with 1 Motor on 1 VFD*

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

Note: 23-35 ton units are available with 1 or 2 blowers and 45-70 ton units are available with 2 or 4 blowers.

Note: If a bypass on the VFD is required it should be selected in AAON ECat and the Applications Department should also be contacted for required Special Pricing Authorization (SPA).

Feature 5B
Supply Air Blower

Example: SA-035-3-A-ER09-000:AC00-000-E**B**F-AB0-0000000-HA-00000000B

D = *18.5" Spring Isolated Direct Drive Backward Curved Plenum Fan*
E = *22.0" Spring Isolated 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, motors and VFDs under the "Fan Selection" window. In the "Fan Selection" window you will be able to choose the number of fans, VFDs, 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: SA-035-3-A-ER09-000:AC00-000-EB**F**-AB0-0000000-HA-00000000B

C = *1.0 hp - 1760 rpm*
D = *2.0 hp - 1760 rpm*
E = *3.0 hp - 1760 rpm*
F = *5.0 hp - 1760 rpm*
G = *7.5 hp - 1760 rpm*
H = *10 hp - 1760 rpm*
***N** = *1.0 hp - 1140 rpm*
***P** = *2.0 hp - 1140 rpm*
***Q** = *3.0 hp - 1140 rpm*
***R** = *5.0 hp - 1140 rpm*
***S** = *7.5 hp - 1140 rpm*

*Options allow selection of motor rpm closest to application requirements, such as VFD applications and high volume, low static applications.

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

Feature 6A
Pre Filter Type

Example: SA-035-3-A-ER09-000:AC00-000-EBF-**A**B0-0000000-HA-00000000B

0 = *No Pre Filter*
A = *2" Pleated Pre Filter, 30% Efficient, MERV 8* - 2 inch pleated, 30% efficient, MERV 8 pre filters mounted adjacent and upstream of 4" high efficiency unit filters (Feature 6B) and downstream of the air intake connection.

Feature 6B
Unit Filter Type

Example: SA-035-3-A-ER09-000:AC00-000-EBF-A**B**0-0000000-HA-00000000B

0 = *2" Pleated Unit Filter, 30% Efficient, MERV 8* - 2 inch pleated, 30% efficient, MERV 8 unit filters mounted next to and upstream of the evaporator coil and downstream of the air intake connection.
A = *4" Pleated Unit Filter, 30% Efficient, MERV 8* - 4 inch pleated, 30% efficient, MERV 8 unit filters mounted next to and upstream of the evaporator coil and downstream of the air intake connection.
B = *4" Pleated Unit Filter, 65% Efficient, MERV 11* - 4 inch pleated, 65% efficient, MERV 11 unit filters mounted next to and upstream of the evaporator coil and downstream of the air intake connection. 2 inch, 30% efficient, MERV 8 pre filters are standard with this option (Feature 6A = A).
C = *4" Pleated Unit Filter, 85% Efficient, MERV 13* - 4 inch pleated, 85% efficient, MERV 13 unit filters mounted next to and upstream of the evaporator coil and downstream of the air intake connection. 2 inch, 30% efficient, MERV 8 pre filters are standard with this option (Feature 6A = A).
D = *4" Pleated Unit Filter, 95% Efficient, MERV 14* - 4 inch pleated, 95% efficient, MERV 14 unit filters mounted next to and upstream of the evaporator coil and downstream of the air intake connection. 2 inch, 30% efficient, MERV 8 pre filters are standard with this option (Feature 6A = A).

Feature 6C
Filter Options

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB**0**-0000000-HA-00000000B

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, and is mounted in the control cabinet.
C = *Clogged Filter Switch with Magnehelic Gauge* - Options A + B.

Feature 7
Refrigeration Control

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-**0**000000-HA-00000000B

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 evaporator coil.

Feature 8
Refrigeration Options

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0**0**00000-HA-00000000B

0 = *Standard* - Each refrigeration circuit features a manual reset high pressure cutout, an automatic reset low pressure cutout, compressor overload protection, and a thermal expansion valve.

Feature 8 - Refrigeration Options Continued

D = *Modulating Hot Gas Reheat* - Reheat coils mounted downstream of the evaporator coils and piped to the lead cooling circuits which provide 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 MGHRV controller to maintain the supply air temperature during the dehumidification mode of operation. Receiver tanks are 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.

Thermostat Control - With thermostat control (Feature 13 = 0, L) a dehumidification mode enable input terminal, labeled [RH1], is included for connecting a humidistat. With dry contact closure from the humidistat and no call for cooling or heating 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. A wall mounted humidistat is available as an accessory. Supply air temperature dip switch must be set on the MGHRV controller.

Customer Provided Controls - With customer provided controls (Feature 13 = 4, 5, 6) a dehumidification mode enable input terminal, labeled [RH1], and optional dehumidification mode supply air temperature reset 0-10VDC input terminals, labeled [AI1] and [COM], are provided for connecting to the controller. Supply air temperature and supply air temperature reset dip switches must be set on the MGHRV controller. Customer provided controller must provide control logic to enable the compressors and modulate any variable capacity compressors during dehumidification, and also set cooling or dehumidification priority.

Feature 9
Refrigeration Accessories

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-00**0**0000-HA-00000000B

0 = *Standard* - None
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 + Compressor Isolation Valves* - Options A + B

Feature 9 - Refrigeration Accessories Continued

Table 2 - 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: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-000**0**000-HA-00000000B

0 = *Standard Power Block* - Power block for connecting power to the unit. Individual components within the controls cabinet are fused.

Feature 11
Safety Options

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000**0**00-HA-00000000B

0 = *Standard* - None
C = *Supply Air Smoke Detector* - Photoelectric type smoke detector factory mounted on the discharge of the fan plenum of the unit. It is wired to shut down the 24V control circuit upon detector activation, thereby shutting off the unit. Relay contacts, labeled [] and [], 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 Shutdown 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: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-00000**0**0-HA-00000000B

0 = *Standard*
A = *Low Limit Controls* - Temperature limit switch factory mounted in the unit supply air to shut off the unit when discharge temperature reaches 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* - Three phase power monitor that shuts down the unit if the supplied power phases are out of balance, over/under voltage, or in case of a phase loss. Option is used to prevent damage to motors and compressors from electrical phase loss or low voltage brownout. Reset is automatic.
C = *Low Limit Controls + Phase and Brown Out Protection* - Options A + B

Feature 13
Special Controls

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-000000**0**-HA-00000000B

0 = *Terminal Block* - Terminal strip for use with a thermostat. See Control section in the catalog and the unit specific Controls Worksheet in AAON ECat for more information.
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 static pressure and mechanical 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. Return air temperature sensor, supply air duct temperature sensor and supply air duct static pressure sensor are factory supplied for field installation. Space temperature sensor with setpoint reset and unoccupied override is factory supplied for field installation with AAON Orion Controller. See Controls section for more information.
E = *Constant Volume Unit Controller - Constant Volume Cooling and Constant Volume Heating* - Standard Constant Volume controls for standard 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. Supply air temperature sensor and space temperature sensor with setpoint reset and unoccupied override are factory supplied for field installation. See Controls section for more information.

Feature 13 - Special Controls Continued

F = *Makeup Air Unit Controller - Constant Volume Cooling and Constant Volume Heating* - Standard Makeup Air controls for standard 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. Supply air duct temperature sensor and outside air temperature sensor are factory supplied for field installation. See Controls section for more information.

L = *Terminal Block with Isolation Relays / Field Installed DDC Controls by Others with Isolation Relays* - Standard terminal strip for use with thermostats, or to interface with controls by others, 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 thermostat wiring. See Controls section for more information.

Y = *VAV Single Zone 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 zone temperature and mechanical cooling modulates based on the supply air temperature. During the heating mode of operation the supply fan will modulate based on the space temperature and heat pump heating and auxiliary heating will modulate 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. Return air temperature sensor and supply air temperature sensor are factory supplied for field installation. Space temperature sensor with setpoint reset and unoccupied override is factory supplied with AAON Orion Controller for field installation. See Controls section 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 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. Air-source or water-source heat pump configuration is required with this option. Supply air duct temperature sensor, outside air temperature sensor, and space temperature sensor with setpoint reset and unoccupied override are factory provided for field installation. See Controls section for more information.

1 = *Makeup Air Heat Pump Unit Controller - Constant Volume Cooling and Constant Volume Heating* - Standard Makeup Air controls for 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. Air-source or water-source heat pump configuration is required with this option. Supply air temperature sensor and outside air temperature sensor are factory provided for field installation. See Controls section for more information.

Feature 13 - Special Controls Continued

2 = *VAV Single Zone Unit Controller - Variable Air Volume Cooling and Constant Volume Heating* - VAV controls for standard 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 zone temperature and mechanical 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. All variable capacity compressors are required with this option. Return air temperature sensor and supply air temperature sensor are factory supplied for field installation. Space temperature sensor with setpoint reset and unoccupied override is factory supplied with AAON Orion Controller for field installation. See Controls section for more information.
4 = *Field Installed DDC Control by Others* - Option includes a terminal strip to interface with controls by others. See Controls section 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 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 representative 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.

Feature 14A
Water-Cooled Condenser

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-**H**A-00000000B

0 = *Standard - None*
A = *Balancing Valves* - Factory installed manual adjustment ball type valve in the condenser plumbing with pressure taps on either side of the valve.
B = *Water Flow Switch* - Factory installed flow switch which shuts down the unit compressors if the water flow to the condenser is interrupted. This option is required with water-source heat pump options and recommended with water-cooled condenser options (Feature A2).
C = *Motorized Shut-off Valve* - Factory installed motorized valve which shuts off water flow to the condenser when the unit is shut down. Option includes a two position actuator.
D = *Head Pressure Control* - 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; exception for waterside economizer selections which come with a three way condenser water valve. Option allows operation below 65°F condenser water temperature and includes balancing/bypass valve. Option is required with waterside economizer options (Feature 1A). Option is recommended with water-cooled condenser and water-source heat pump options (Model Option A2).
E = *Balancing Valves + Water Flow Switch* - Options A + B
F = *Balancing Valves + Motorized Shut-off Valve* - Options A + C
G = *Balancing Valves + Head Pressure Control* - Options A + D
H = *Water Flow Switch + Motorized Shut-off Valve* - Options B + C
J = *Water Flow Switch + Head Pressure Control* - Options B + D
L = *Balancing Valves + Water Flow Switch + Motorized Shut-off Valve* - Options A + B + C
M = *Balancing Valves + Water Flow Switch + Head Pressure Control* - Options A + B + D
S = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves* - Options A + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
T = *SMO 254 Corrosion Resistant Brazed Plate + Water Flow Switch* - Options B + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
U = *SMO 254 Corrosion Resistant Brazed Plate + Motorized Shut-off Valve* - Options C + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
V = *SMO 254 Corrosion Resistant Brazed Plate + Head Pressure Control* - Options D + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.

Feature 14A - Water-Cooled Condenser Continued

W = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves + Water Flow Switch* - Options A + B + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
Y = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves + Motorized Shut-off Valve* - Options A + C + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
Z = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves + Head Pressure Control* - Options A + D + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
1 = *SMO 254 Corrosion Resistant Brazed Plate + Water Flow Switch + Motorized Shut-off Valve* - Options B + C + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
2 = *SMO 254 Corrosion Resistant Brazed Plate + Water Flow Switch + Head Pressure Control* - Options B + D + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
4 = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves + Water Flow Switch + Motorized Shut-off Valve* - Options A + B + C + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.
5 = *SMO 254 Corrosion Resistant Brazed Plate + Balancing Valves + Water Flow Switch + Head Pressure Control* - Options A + B + D + SMO 254 brazed plate refrigerant-to-water heat exchanger which provides additional chloride corrosion resistance. SMO 254 Corrosion Resistant Brazed Plate is required with open loop condenser water cooling tower applications.

Feature 14B
Waterside Economizer Piping

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-H**A**-00000000B

0 = *Standard - None*
A = *Variable Water Flow Application Field Piped Waterside Economizer* - Factory installed waterside economizer coil without piping between the waterside economizer and refrigerant-to-water heat exchanger. This option is used with variable flow condenser water applications.

Feature 14B - Waterside Economizer Piping Continued

B = *Constant Water Flow Application Field Piped Waterside Economizer* - Factory installed waterside economizer coil without piping between the waterside economizer and refrigerant-to-water heat exchanger. This option is used with constant flow condenser water applications.
C = *Variable Water Flow Application Factory Piped Waterside Economizer* - Motorized valves and piping kit which is field connected to the factory installed waterside economizer coil. After installation of the kit only one supply and one return condenser water connection per condenser is required. External waterside economizer piping kit is factory tested before being broken down into 3 or 4 pieces, crated and shipped with the unit. Actuators are included within the unit. This option is used with variable flow condenser water applications.
D = *Constant Water Flow Application Factory Piped Waterside Economizer* - Motorized valves and piping kit which is field connected to the factory installed waterside economizer coil. After installation of the kit only one supply and one return condenser water connection per condenser is required. External waterside economizer piping kit is factory tested before being broken down into 3 or 4 pieces, crated and shipped with the unit. Actuators are included within the unit. This option is used with constant flow condenser water applications.

Feature 15
Glycol Percent

Example: SA-035-3-A- ER09-000:AC00-000-EBF-AB0-0000000-HA-**0**0000000B

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.
C = *Field Adjustable for Glycol%* - Water-source/geothermal heat pump designed for operation with a field adjusted percent propylene glycol to help prevent the freezing of heat pump source water. The controller is factory set at 0% glycol and must be field adjusted from 5-40% in 5% increments.

Feature 16
Interior Cabinet Options

Example: SA-035-3-A- ER09-000:AC00-000-EBF-AB0-0000000-HA-0**0**000000B

0 = *Standard* - Construction consists of 2 inch thick, double wall, rigid closed cell polyurethane foam panels with a minimum R-value of 13. 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 pans are fabricated of 18 gauge 304 stainless steel, include 1 inch of fiberglass insulation under the drain pan, and are double sloped to meet ASHRAE 62.1 Indoor Air Quality guidelines.
A = *Overflow Switch* - Control switch wired to shut down the 24V control circuit when overflow of the drain pan is detected.
B = *UV Lights* - Factory installed ultraviolet lights downstream of the cooling coil which can increase system efficiency, improve Indoor Air Quality, and reduce odors by keeping the cooling coils free of microbial growth.
C = *Overflow Switch + UV Lights* - Options A + B

Feature 17
Blank

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-00**0**00000B

0 = *Standard*

Feature 18
Customer Code

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-000**0**0000B

0 = *Standard - None*

Used for national account customers.

Feature 19
Code Options

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-0000**0**000B

0 = *Standard - ETL U.S.A. 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.
D = *Chicago - Cool Only* - Chicago code for a DX cooling only unit. Chicago code states that unit wiring to the condenser fan motors must be in flexible conduit and refrigerant pressure relief valves must be supplied.
G = *Chicago - No Cool and No Heat* - Chicago code for a unit with no DX cooling and no 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.

Feature 20
Crating

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-00000**0**00B

0 = *Standard* - Lockable access doors are shipped with nut and bolt through the latch. Intake and discharge include sheet metal shipping covers.
A = *Export Crating* - Crating for overseas shipping fabricated from blocked, braced, and banded dimensional lumber and plywood.
B = *Forkliftable Base* - 6 inch tall base with forklift slots along all four sides of the unit.
C = *Shipping Shrink Wrap* - Unit is shrink-wrapped prior to shipment to protect unit during shipment and while in storage awaiting installation.
D = *Export Crating + Forkliftable Base* - Options A + B
E = *Export Crating + Shipping Shrink Wrap* - Options A + C
F = *Forkliftable Base + Shipping Shrink Wrap* - Options B + C
G = *Export Crating + Forkliftable Base + Shipping Shrink Wrap* - Options A + B + C

Feature 21
Shipping Splits

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-000000**0**0B

0 = *Standard, One Piece Unit* - Single or dual cabinet unit shipped in one piece.
A = *Two Piece Single Unit* - Single cabinet unit with supply fan plenum shipped separate from air tunnel section. Units with a plenum height greater than 33 inches require supply fan plenum to be shipped separate from air tunnel section (Feature 1B).
B = *Two Piece Double Unit* - Dual cabinet unit with the two blower plenums shipped attached, but separate from the two attached air tunnel sections. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 1B).
C = *Three Piece Double Unit* - Dual cabinet unit with the two blower plenums shipped attached, but separate from the two separate air tunnel sections. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 1B).
D = *Four Piece Double Unit* - Dual cabinet unit with the two blower plenums shipped separate and the two air tunnel sections shipped separate. Units with a plenum height greater than 33 inches require supply fan plenums to be shipped separate from air tunnel sections (Feature 1B).

Feature 22
Control Vendors

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-0000000**0**B

0 = *Standard* - Thermostat control or customer provided controls.
A = AAON *Orion Controls System* - AAON supplied and factory installed AAON VCM-X controller. See Feature 13 for available control configurations. Option requires the selection of an operator interface in AAON ECat to setup the controller. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
C = AAON *Orion Controls System with Specials* - AAON supplied and factory installed AAON VCM-X controller with additional controls features. Use AAON ECat to select these features. See Feature 13 for available control configurations. Option requires the selection of an operator interface in AAON ECat to setup the controller. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.
V = *VCC-X Controls + Integrated BACnet MSTP* - AAON supplied and factory installed VCC-X controller. See Feature 13 for available configurations. Option requires the selection of an operator interface in AAON ECat to setup the controller. See Controls section and unit specific Controller Components worksheet in AAON ECat for more information.

Feature 23
Type

Example: SA-035-3-A-ER09-000:AC00-000-EBF-AB0-0000000-HA-00000000**B**

B = *Standard* - 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.
U = *Special Price Authorization and Special Paint* - If a special paint color is specified, a set-up charge and price add per unit is required. Use this designation if other special paint options are necessary. The Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.
X = *Special Price Authorization and Gray Paint* - The Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.

General Data
Unit Information

Table 3 - 23-35 ton Cooling Information

	Model			
	SA-023	SA-028	SA-030	SA-035
Compressors				
Quantity/Nominal tons				
R-410A, Lead Variable Capacity Scroll Compressor	1/8, 1/10 Var.	1/11, 1/11 Var.	1/13, 1/13 Var.	1/15, 1/15 Var.
R-410A, All Variable Capacity Scroll Compressors	1/8 Var., 1/10 Var.	2/11 Var.	2/13 Var.	2/15 Var.
Capacity Steps	5-100% with variable capacity scroll compressors			
Evaporator Coil				
Number of Circuits	1 per coil			
Standard Coil				
Quantity/Face Area	2/13.4 ft^2 (26.8 ft^2 total)			
Rows/fpi	3/14		4/14	
6 Row Coil				
Quantity/Face Area	2/13.4 ft^2 (26.8 ft^2 total)			
Rows/fpi	6/12			
Heat Pump Coil				
Quantity/Face Area	2/13.4 ft^2 (26.8 ft^2 total)			
Rows/fpi	3/14		4/14	
Chilled Water Coil				
Quantity/Face Area	2/11.9 ft^2 (23.9 ft^2 total)			
Rows/fpi	4 or 6/8, 10, or 12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Waterside Economizer Coil				
Quantity/Face Area	1/26.7 ft^2			
Rows/fpi	4 or 6/12 (Single Serpentine)			
Water-Cooled Condenser				
Minimum gpm	27.5	38.5	45.0	51.0
Maximum gpm	116.0	164.0	186.0	212.0

Table 4 - 23-35 ton Heating and Fan Information

	Model			
	SA-023	SA-028	SA-030	SA-035
Hot Water Heating Coil				
Quantity/Face Area	1/20.63 ft^2			
Rows/fpi	1 or 2/8, 10, or 12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Steam Heating Coil				
Quantity/Face Area	1/20.63 ft^2			
Rows/fpi	1 or 2/8, 10, or 12 (Single Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Supply Fans				
Quantity/Type	1 or 2/Direct Drive Backward Curved Plenum			

Table 5 - 45-58 ton Cooling Information

	Model			
	SA-045	SA-050	SA-055	SA-058
Compressors				
Quantity/Nominal tons				
R-410A, Lead Variable Capacity Scroll Compressor	2/8, 2/10 Var.	1/8, 1/11, 1/10 Var., 1/11 Var.	2/11, 2/11 Var.	1/11, 1/13, 1/11 Var., 1/13 Var.
R-410A, All Variable Capacity Scroll Compressors	2/8 Var., 2/10 Var.	1/8 Var., 1/10 Var., 2/11 Var.	4/11 Var.	2/11 Var., 2/13 Var.
Capacity Steps	5-100% with variable capacity scroll compressors			
Evaporator Coil				
Number of Circuits	1 per coil			
Standard Coil				
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)			
Rows/fpi	3/14			3/14, 4/14
6 Row Coil				
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)			
Rows/fpi	6/12			
Heat Pump Coil				
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)			
Rows/fpi	3/14			3/14, 4/14
Chilled Water Coil				
Quantity/Face Area	4/11.9 ft^2 (23.9 ft^2 per cabinet, 47.7 ft^2 total)			
Rows/fpi	4 or 6/8, 10, or 12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Waterside Economizer Coil				
Quantity/Face Area	2/26.7 ft^2 (53.4 ft^2 total)			
Rows/fpi	4 or 6/12 (Single Serpentine)			
Water-Cooled Condenser				
Minimum gpm	55.5	66.0	76.5	82.0
Maximum gpm	232.0	280.0	328.0	348.0

Table 6 - 45-58 ton Heating and Fan Information

	Model			
	SA-045	SA-050	SA-055	SA-058
Hot Water Heating Coil				
Quantity/Face Area	2/20.63 ft^2 per cabinet (41.26 ft^2 total)			
Rows/fpi	1 or 2/8, 10 or 12 (Single or Half Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Steam Heating Coil				
Quantity/Face Area	2/20.63 ft^2 per cabinet (41.26 ft^2 total)			
Rows/fpi	1 or 2/8, 10 or 12 (Single Serpentine)			
Standard Coil	Single Serpentine with 10 fpi			
Supply Fans				
Quantity/Type	2 or 4/Direct Drive Backward Curved Plenum			

Table 7 - 60-70 ton Cooling Information

	Model		
	SA-060	SA-065	SA-070
Compressors			
Quantity/Nominal tons			
R-410A, Lead Variable Capacity Scroll Compressor	2/13, 2/13 Var.	1/13, 1/15, 1/13 Var., 1/15 Var.	2/15, 2/15 Var.
R-410A, All Variable Capacity Scroll Compressors	4/13 Var.	2/13 Var., 2/15 Var.	4/15 Var.
Capacity Steps	5-100% with variable capacity scroll compressors		
Evaporator Coil			
Number of Circuits	1 per coil		
Standard Coil			
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)		
Rows/fpi	4/14		
6 Row Coil			
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)		
Rows/fpi	6/12		
Heat Pump Coil			
Quantity/Face Area	4/13.4 ft^2 (26.8 ft^2 per cabinet, 53.6 ft^2 total)		
Rows/fpi	4/14		
Chilled Water Coil			
Quantity/Face Area	4/11.9 ft^2 (23.9 ft^2 per cabinet, 47.7 ft^2 total)		
Rows/fpi	4 or 6/8, 10 or 12 (Single or Half Serpentine)		
Standard Coil	Single Serpentine with 10 fpi		
Waterside Economizer Coil			
Quantity/Face Area	2/26.7 ft^2 (53.4 ft^2 total)		
Rows/fpi	4 or 6/12 (Single Serpentine)		
Water-Cooled Condenser			
Minimum gpm	88.0	95.0	100.0
Maximum gpm	364.0	392.0	412.0

Table 8 - 60-70 ton Heating and Fan Information

	Model		
	SA-060	SA-065	SA-070
Hot Water Heating Coil			
Quantity/Face Area	2/20.63 ft^2 per cabinet (41.26 ft^2 total)		
Rows/fpi	1 or 2/8, 10 or 12 (Single or Half Serpentine)		
Standard Coil	Single Serpentine with 10 fpi		
Steam Heating Coil			
Quantity/Face Area	2/20.63 ft^2 per cabinet (41.26 ft^2 total)		
Rows/fpi	1 or 2/8, 10 or 12 (Single Serpentine)		
Standard Coil	Single Serpentine with 10 fpi		
Supply Fans			
Quantity/Type	2 or 4/Direct Drive Backward Curved Plenum		

Filter Information

Table 9 - 23-35 ton Pre Filters

Feature 6A	Quantity/Size	Type
0	No Pre Filters	
A	9/20” x 20” x 2”	Pleated, 30% Eff, MERV 8

Table 10 - 45-70 ton Pre Filters

Feature 6A	Quantity/Size	Type
0	No Pre Filters	
A	18/20” x 20” x 2”	Pleated, 30% Eff, MERV 8

Table 11 - 23-35 ton Unit Filters

Feature 6B	Quantity/Size	Type
0	9/20” x 20” x 2”	Pleated, 30% Eff, MERV 8
A	9/20” x 20” x 4”	Pleated, 30% Eff, MERV 8
B	9/20” x 20” x 4”	Pleated, 65% Eff, MERV 11
C	9/20” x 20” x 4”	Pleated, 85% Eff, MERV 13
D	9/20” x 20” x 4”	Pleated, 95% Eff, MERV 14

Table 12 - 45-70 ton Unit Filters

Feature 6B	Quantity/Size	Type
0	18/20” x 20” x 2”	Pleated, 30% Eff, MERV 8
A	18/20” x 20” x 4”	Pleated, 30% Eff, MERV 8
B	18/20” x 20” x 4”	Pleated, 65% Eff, MERV 11
C	18/20” x 20” x 4”	Pleated, 85% Eff, MERV 13
D	18/20” x 20” x 4”	Pleated, 95% Eff, MERV 14

Component Static Pressure Drops

At Minimum, Nominal, and Maximum CFM
Refer to AAON ECat for static pressure drops at specific unit conditions.

Table 13 - 23-35 ton Evaporator and Reheat Coil Static Pressure Drops
*95°F Ambient, 80°F EDB, 67°F EWB

Model	cfm	Standard/Heat Pump Coil (in. w.g.)	6 Row Coil (in. w.g.)	Reheat Coil (in. w.g.)
SA-023	4,800	0.09	0.14	0.02
	7,200	0.15	0.23	0.03
	14,600	0.50	0.66	0.14
SA-028	5,800	0.14	0.21	0.02
	8,800	0.24	0.36	0.05
	14,600	0.50	0.70	0.14
SA-030	6,000	0.19	0.23	0.02
	9,000	0.33	0.39	0.05
	14,300	0.63	0.73	0.13
SA-035	7,300	0.27	0.31	0.03
	10,200	0.42	0.49	0.07
	14,200	0.67	0.77	0.13

Table 14 - 23-35 ton Filter Static Pressure Drops

Model	cfm	2” 30% MERV 8 Pleated (in. w.g.)	4” 30% MERV 8 Pleated (in. w.g.)	4” 65% MERV 11 Pleated (in. w.g.)	4” 85% MERV 13 Pleated (in. w.g.)	4” 95% MERV 14 Pleated (in. w.g.)
SA-023	4,800	0.03	0.04	0.12	0.12	0.18
	7,200	0.07	0.09	0.20	0.20	0.30
	14,600	0.27	0.36	0.56	0.57	0.74
SA-028	5,800	0.04	0.06	0.15	0.16	0.23
	8,800	0.10	0.14	0.27	0.27	0.38
	14,600	0.27	0.36	0.56	0.57	0.74
SA-030	6,000	0.05	0.06	0.15	0.16	0.24
	9,000	0.11	0.14	0.28	0.28	0.39
	14,300	0.26	0.35	0.55	0.55	0.72
SA-035	7,300	0.07	0.09	0.20	0.21	0.30
	10,200	0.14	0.18	0.32	0.33	0.46
	14,200	0.26	0.34	0.54	0.54	0.71

Table 15 - 45-70 ton Evaporator and Reheat Coil Static Pressure Drops
*95°F Ambient, 80°F EDB, 67°F EWB

Model	cfm	Standard/Heat Pump Coil (in. w.g.)	6 Row Coil (in. w.g.)	Reheat Coil
SA-045	9,500	0.09	0.14	0.01
	14,000	0.15	0.22	0.03
	27,100	0.36	0.53	0.12
SA-050	9,700	0.11	0.16	0.02
	15,500	0.20	0.31	0.04
	26,800	0.44	0.62	0.12
SA-055	11,600	0.14	0.21	0.02
	16,000	0.21	0.32	0.04
	26,800	0.44	0.63	0.12
SA-058	11,700	0.18	0.22	0.02
	16,500	0.29	0.35	0.04
	26,700	0.57	0.66	0.12
SA-060	11,900	0.19	0.22	0.02
	17,000	0.31	0.36	0.05
	26,700	0.57	0.66	0.12
SA-065	11,900	0.20	0.24	0.02
	17,500	0.34	0.40	0.05
	26,600	0.61	0.71	0.12
SA-070	14,500	0.26	0.31	0.03
	18,000	0.36	0.42	0.05
	26,600	0.61	0.71	0.12

Table 16 - 45-70 ton Filter Static Pressure Drops

Model	cfm	2" 30% MERV 8 Pleated (in. w.g.)	4" 30% MERV 8 Pleated (in. w.g.)	4" 65% MERV 11 Pleated (in. w.g.)	4" 85% MERV 13 Pleated (in. w.g.)	4" 95% MERV 14 Pleated (in. w.g.)
SA-045	9,500	0.03	0.04	0.11	0.12	0.18
	14,000	0.07	0.09	0.19	0.19	0.28
	27,100	0.23	0.31	0.51	0.51	0.67
SA-050	9,700	0.03	0.04	0.12	0.12	0.19
	15,500	0.08	0.11	0.22	0.23	0.32
	26,800	0.23	0.31	0.49	0.50	0.66
SA-055	11,600	0.04	0.06	0.15	0.16	0.23
	16,000	0.08	0.11	0.23	0.24	0.34
	26,800	0.23	0.31	0.49	0.50	0.66
SA-058	11,700	0.05	0.06	0.14	0.15	0.23
	16,500	0.09	0.12	0.24	0.25	0.35
	26,700	0.23	0.30	0.49	0.49	0.65
SA-060	11,900	0.05	0.06	0.15	0.16	0.23
	17,000	0.10	0.13	0.25	0.25	0.36
	26,700	0.23	0.30	0.49	0.49	0.65
SA-065	11,900	0.05	0.06	0.15	0.16	0.23
	17,500	0.10	0.13	0.26	0.27	0.38
	26,600	0.23	0.30	0.48	0.49	0.65
SA-070	14,500	0.07	0.09	0.20	0.21	0.30
	18,000	0.11	0.14	0.27	0.28	0.39
	26,600	0.23	0.30	0.48	0.49	0.65

Controls
Control Options

Terminal Block

Low voltage terminal block for field wiring unit controls

Required Features
Feature 13 - Terminal Block, or
Feature 13 - Field Installed DDC Controls by Others, or
Feature 13 - Terminal Block with Isolation Relays

Standard Terminals Labels
[R] - 24VAC control voltage
[E] - Common
[G] - Fan enable
[Y1], [Y2], … - Cooling stages' control signals
[W1], [W2], … - Heating stages' control signals
[RV] - Reversing Valve (Heat Pump) Enable
[O] - Reversing Valve (Cooling) Enable
[ST1], [ST2] - Remote start/stop contacts, must be closed for unit to operate.
[RH1] - Humidistat control signal, used with modulating hot gas reheat option.
[BI1], [BI2] - Field installed smoke detector contacts, must be closed for unit to operate.
[C1], [C2] - Clogged filter switch contacts, normally open.
[C6], [C7] - Supply air temperature sensor control signal, 0-10VDC.
[S1], [S2], … - Supply fan VFD control contacts, 0-10VDC or 4-20mA.

Figure 3 - Example Low Voltage Terminal Block

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 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.

Factory mounted and tested supply fan VFDs are used to vary the speed of the supply fans and thus varying 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. AAON VAV units can also be applied to a single zone. 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
Feature 13 - VAV Unit Controller

Standard Supplied Sensors
Supply Air Duct Temperature
Supply Air Duct Static Pressure
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override (AAON)

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Feature 5 - VFD Controlled Supply Fans
Feature 8 - Modulating Hot Gas Reheat

Constant Volume (CV) Unit Controller

Operation - Constant Volume Cooling and Constant Volume Heating
Standard AAON Constant Volume controls for standard 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.

A Constant Volume unit can be used to serve spaces with uniform heating and cooling requirements. Multiple units may be required for multiple zones allowing for redundancy. 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
Feature 13 - Constant Volume Unit Controller

Standard Supplied Sensors
Supply Air Duct Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Feature 8 - Modulating Hot Gas Reheat

Makeup Air (MUA) Unit Controller

Operation - Constant Volume Cooling and Constant Volume Heating
Standard AAON Makeup Air controls for standard 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.

See Control Venders section for specifics.

Required Features
Feature 13 - Makeup Air Unit Controller

Standard Supplied Sensors
Outside Air Temperature
Supply Air Duct Temperature

Recommended Features
Model Option A1 - Variable Capacity Scroll Compressor
Feature 8 - Modulating Hot Gas Reheat

Control Vendors

AAON - Orion™ Controls System

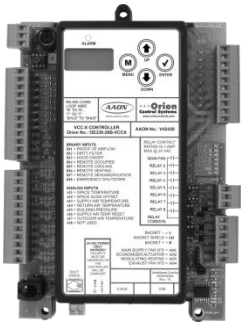

Figure 4- AAON VCC-X Controller

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

The VCC-X controller can be operated as a Stand Alone System, connected via modular cable to multiple VCC-X controllers in an Interconnected System, or connected via modular cable to multiple VCC-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 VCC-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.

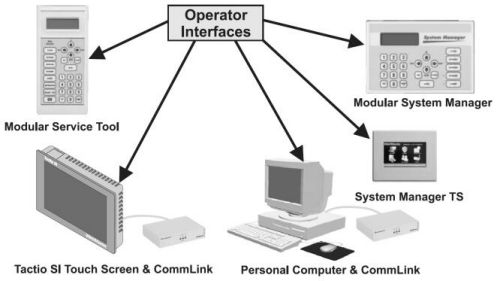

Figure 5- VCC-X Controller Operator Interfaces

Electrical Service Sizing Data

Use the following equations to correctly 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 and the heating mode of 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 a water-cooled DX unit or a water-source heat pump the supply fans and compressors are all in operation. During the heating mode of operation of a water-source heat pump the supply fans and compressors 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
Load 2 = Sum of the currents of the remaining motors/compressors
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 ≥ 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.

Literature Change History

August 2010
Update of catalog revising the Head Pressure Control option description (Feature 14A).

October 2010
Update of the catalog revising the waterside economizer options (Feature 1A, 1D and 14B) and adding heat pump information (Model Option A2)

July 2014
Added maximum steam coil operating pressure and reversing valve control signals.

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

September 2017
Update **Feature A2** – Unit Configuration. Update **Feature 11** – *Safety Options.* Update **Feature 22** – *Control Vendors.*

January 2019
Updated **Feature 5A** – Supply Blower Configuration and **Feature 22** – Control Vendors.

August 2019
Updated the E-Coil Coating information.

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