M2 Series

Modular Indoor Air Handling Units & Self-Contained Units

Engineering Catalog

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Description and Selection

Overview

The M2 Series modular air handling unit from AAON is the industry's premier high performance air handler line. Its flexibility and performance are the best response for challenging applications that would normally require custom equipment. Engineered and built by the world's leading manufacturer of semi-custom, made-to-order equipment, the M2 Series is the best choice.

With the M2 Series, AAON has remained true to its up-front design philosophy: to provide customers with features, benefits, adaptability, functionality, and practicality typically found only in custom equipment, in a convenient manner, and at a reasonable first cost.

AAON has succeeded again with the M2 Series air handling unit.

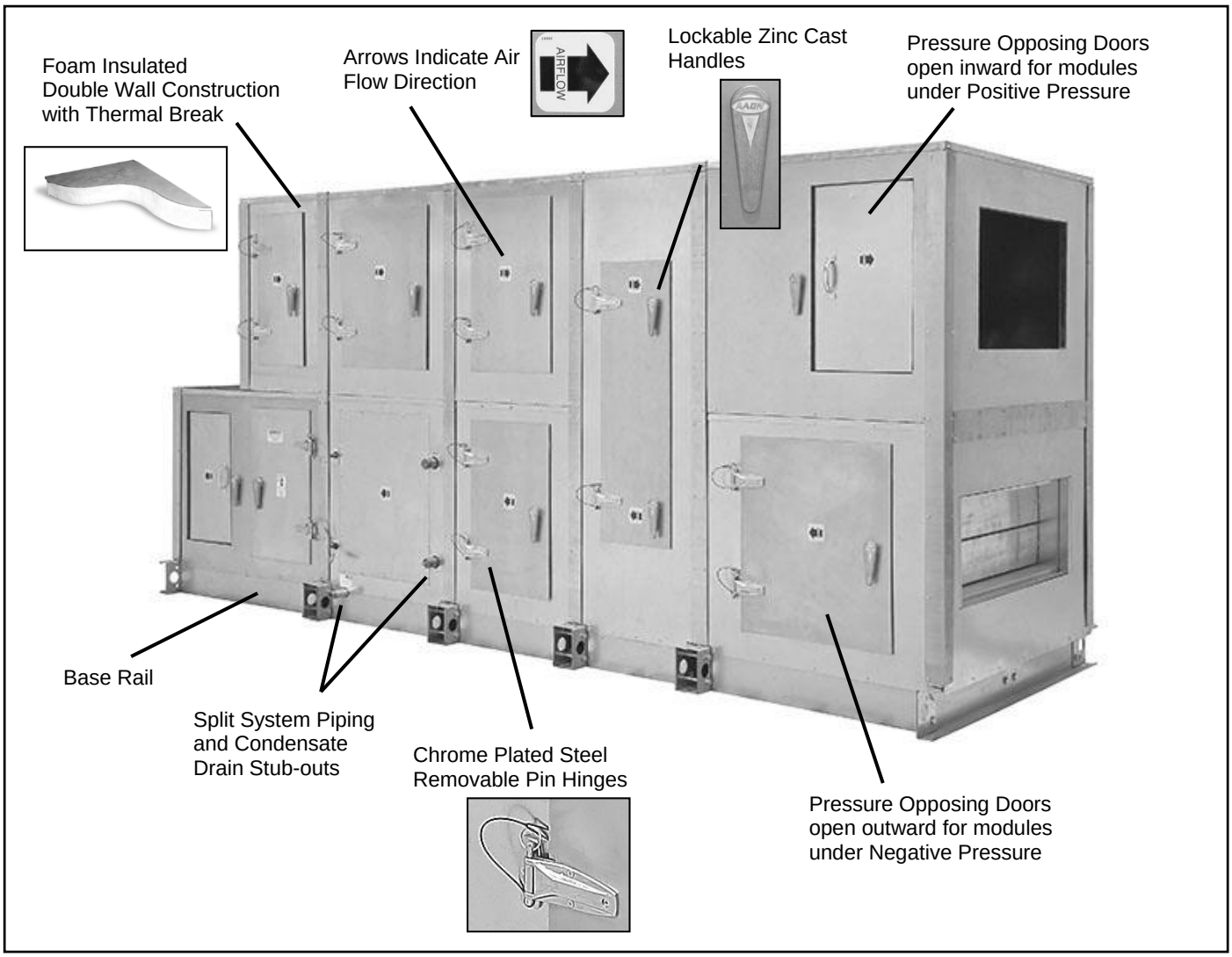


Figure 1 - M2 Series Unit Overview

Features and Options

Configure ***M2 Series Modular Air Handling Units*** for:

- Use with chilled water or DX cooling
- Self-contained units with Water-Source Heat Pump Configuration
- Steam distributing, hot water, gas, electric, and air-source heat pump heating
- Sensible only or total energy recovery
- Makeup air applications up to 100% Outside Air
- Special comfort or process controlled conditioning
- Dehumidification

Using **Advanced Options** Such As:

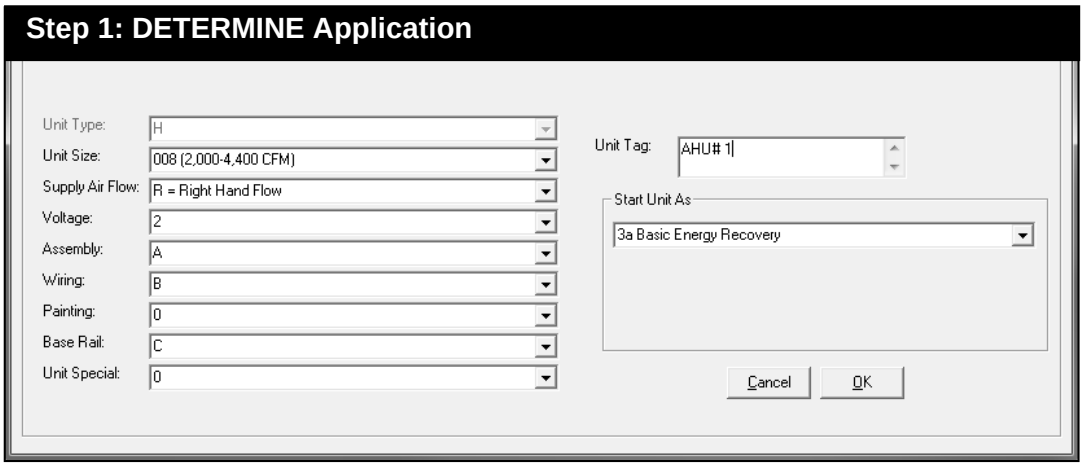
- Horizontal airflow with left or right hand connections
- 1,000 to 21,600 cfm across 9 model sizes
- AAONAIRE® Energy Recovery Wheel
- Modulating hot gas reheat
- Coil face and bypass dampers
- Power exhaust / return
- Mixing boxes
- Up to MERV 14 filtration
- Premium efficiency direct drive or belt drive motors
- Electronically commutated motors
- Variable frequency drives
- Electric heat up to 168 kW, and up to 4 stages
- Gas heat for natural or LP gas applications
- Multiple single/three phase, 60/50 hertz voltages
- Sound absorbing perforated liners
- Shipped factory assembled or as separate modules
- Exterior and/or interior corrosion protection
- AAON Factory Provided Controls or customer provided controls for factory or field installation

With These **Standard Features**:

- Double-wall G90 galvanized steel construction
- Foam insulated panels with thermal break: 1” (R-6.5) M2-005 and M2-008, or 2” (R-13) M2-011 and up.
- Backward curved plenum supply, exhaust, and return fans
- Fan Isolation (rubber-in-shear or neoprene gasket up to M2-014, spring in M2-018 & up)
- Hinged access doors with zinc cast quarter-turn, lockable handles
- Resilient, high quality gaskets and door seals
- Stainless steel sloped drain pan
- Color-coded wiring diagram affixed to control access panel
- Factory installed TXV (DX units)
- Single point power supply

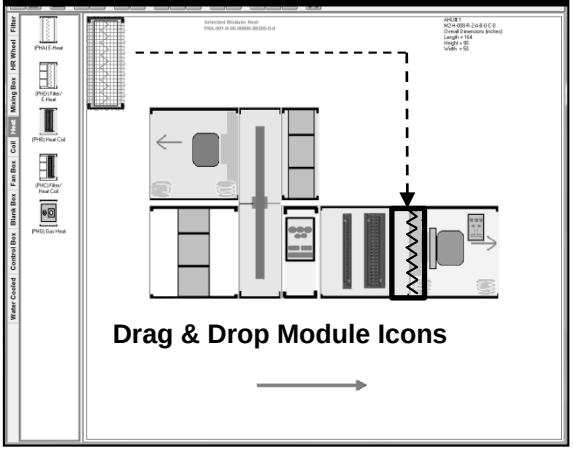
AAON ECat Unit Selection

Step 1: DETERMINE Application



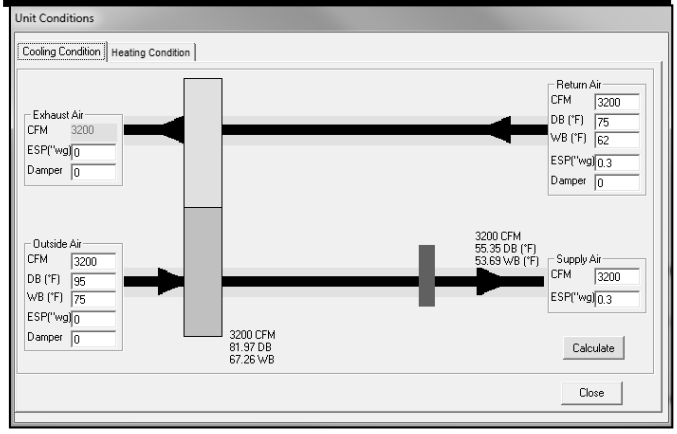
Select Basic Unit Features

Step 2: DESIGNATE Modules



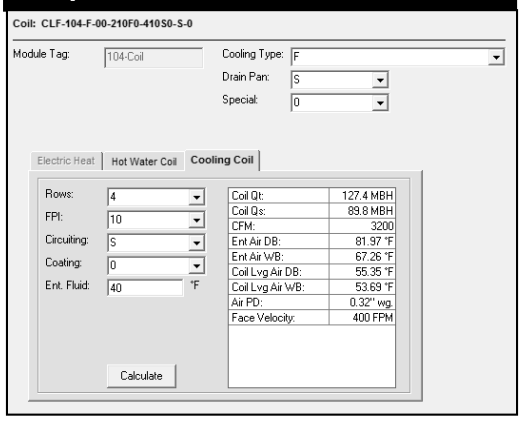
Drag & Drop Module Icons

Step 3: DEFINE Parameters



Enter Actual Unit Conditions

Step 4: DETAIL Modules



Configure Individual Module Details

Feature String Nomenclature

Base Feature String
Identifies the main unit features and options.

Individual Module Feature String
Identifies module configurations, features and options.

M2-H-026-L-2-A-A-0-C-0 :

BBD-101-0-00-00000-00000-0-0
FTH-102-P-C0-20000-CE000-C-X
HRA-103-A-00-00000-00000-0-0
MBH-104-A-00-00000-0000-0-0
CLC-105-E-00-00000-610I0-S-0
SDB-106-M-EI-C0000-00000-0-0
PHG-107-H-00-00000-C0M0A-0-0
EDB-201-L-GI-C0000-00000-0-0
MBD-203-A-A0-00000-B0000-0-0

Complete Feature String

A complete unit feature string consists of a base model feature string followed by a series of individual module feature strings. In the individual module model number, the three numbers after the three letter Module ID indicate the position of the module in unit assembly, increasing in value from the return/outside air section to the discharge air section and from the bottom to the top. In the below example, the cooling coil module in Figure 2, CLC-**105**-E-00-00000-610I0-0-0, is the fifth module on the first level of the unit. The exhaust fan, EDB-**201**-L-GI-C000-00000-0-0, is the first module on the second level.

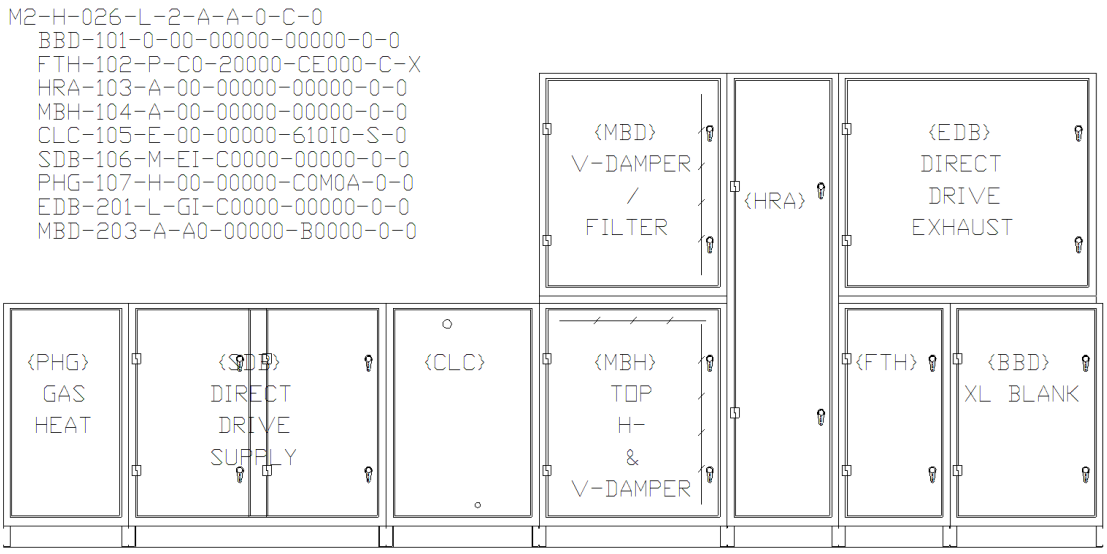


Figure 2 - Typical M2 Series Selection

M2 Series Base Feature String Nomenclature

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Model Options

GEN	TYPE	UNIT SIZE	SUPPLY AIRFLOW	VOLTAGE	ASSEMBLY	WIRING	PAINT	BASE RAIL	SPECIAL
M2	- H	- 011	- R	- 2	- A	- A	- 0	- C	- 0

BASE MODEL DESCRIPTION

Series and Generation
M2

Type
H = Horizontal

Unit Size
005 = 5 ft^2 Coil (1,000 – 2,700 cfm)
008 = 8 ft^2 Coil (2,000 – 4,400 cfm)
011 = 11 ft^2 Coil (3,100 – 6,000 cfm)
014 = 14 ft^2 Coil (5,000 – 7,700 cfm)
018 = 18 ft^2 Coil (6,000 – 10,300 cfm)
022 = 22 ft^2 Coil (9,900 – 13,200 cfm)
026 = 26 ft^2 Coil (11,500 – 15,600 cfm)
032 = 32 ft^2 Coil (13,500 – 19,200 cfm)
036 = 36 ft^2 Coil (15,500 – 21,600 cfm)

Supply Airflow
L = Left Hand
R = Right Hand

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

Assembly
A = Factory Assembled
B = Individual Modules

Wiring
A = Control Wiring in Fan Box
B = Control Wiring in Control Box

Paint
0 = Standard
A = Indoor Unit with Exterior Corrosion Protection
B = Indoor Unit with Interior and Exterior Corrosion Protection
E = Shipping Shrink Wrap
F = Indoor Unit with Exterior Corrosion Protection + Shipping Shrink Wrap
G = Indoor Unit with Interior and Exterior Corrosion Protection + Shipping Shrink Wrap

Base Rail
B = 8” High
C = 6” High
D = 10” High

Special
0 = None
X = Special Pricing Authorization

Base Model Options

Unit Series and Generation, Unit Type, and Unit Size

Example: **M2-H-011**-R-2-A-A-0-C-0

Table 1 - Unit Sizes and Air Flows

Unit Series	Unit Type	Unit Size	Approximate Coil Face Area	Minimum Air Flow	Maximum Air Flow
M2	Horizontal	005	5 ft^2	1,000 cfm	2,700 cfm
		008	8 ft^2	2,000 cfm	4,400 cfm
		011	11 ft^2	3,100 cfm	6,000 cfm
		014	14 ft^2	5,000 cfm	7,700 cfm
		018	18 ft^2	6,000 cfm	10,300 cfm
		022	22 ft^2	9,900 cfm	13,200 cfm
		026	26 ft^2	11,500 cfm	15,600 cfm
		032	32 ft^2	13,500 cfm	19,200 cfm
		036	36 ft^2	15,500 cfm	21,600 cfm

Base Model Option

Supply Airflow

Example: M2-H-011-**R**-2-A-A-0-C-0

R = *Right Hand Connections* - Refrigerant piping stub outs, hydronic coil stub outs, condensate drain pan connections, and unit access panels are located on the right hand side of the air handling unit.
L = *Left Hand Connections* - Refrigerant piping stub outs, hydronic coil stub outs, condensate drain pan connections, and unit access panels are located on the left hand side of the air handling unit.

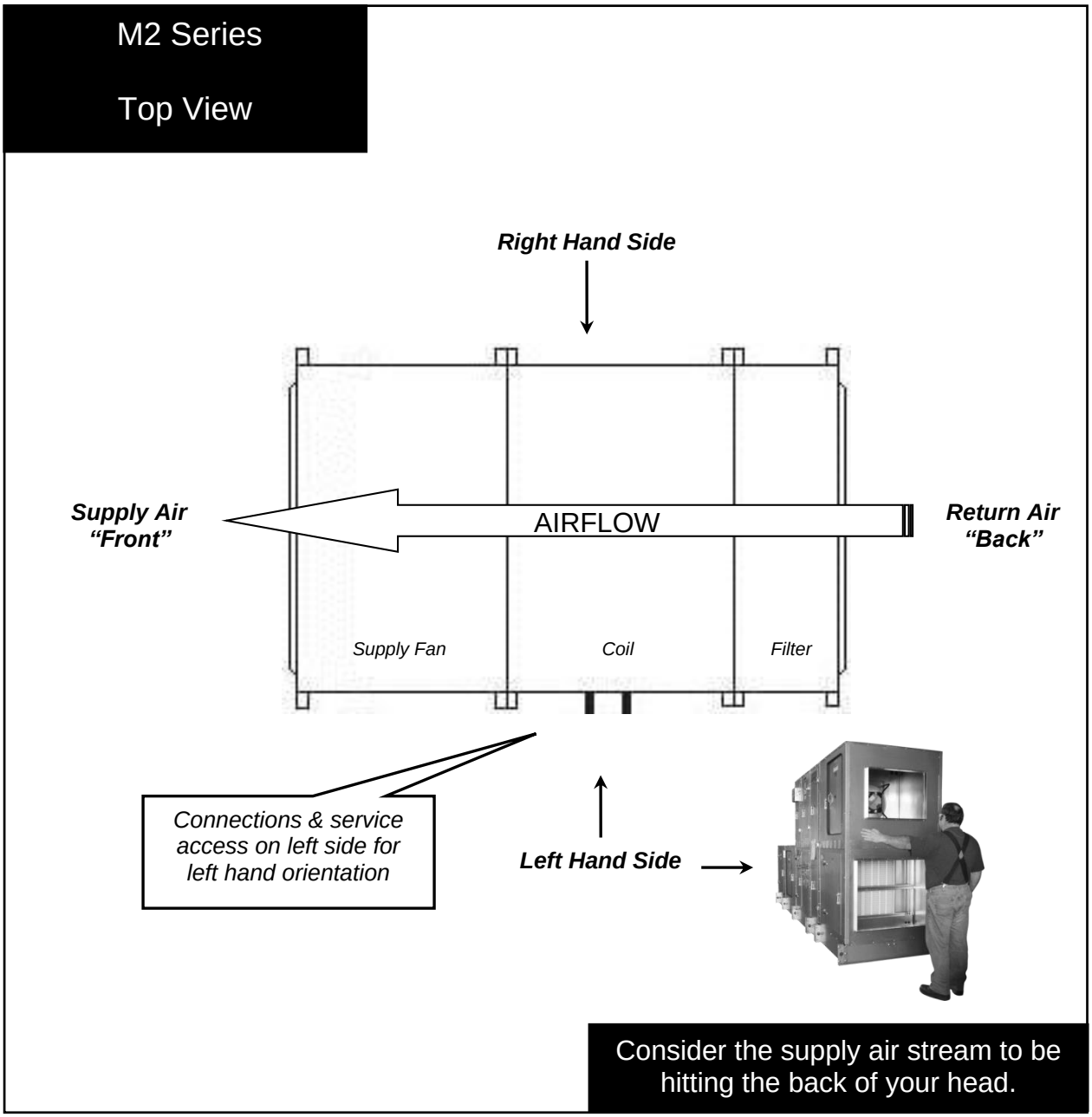


Figure 3 - Unit Orientation

Base Model Option
Unit Voltage

Example: M2-H-011-R-**2**-A-A-0-C-0

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

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

Base Model Option
Assembly

Example: M2-H-011-R-2-**A**-A-0-C-0

A = *Factory Assembled* - All modules will be connected as configured and shown on submittal drawings prior to shipping. Any internal refrigerant piping will be done at the factory. All piping stub outs will be labeled for field connection.
B = *Individual Modules* - All modules will be shipped individually for field assembly. Top tier modules will ship banded to a wooden pallet and bottom tier modules ship as built since they are designed with a base rail. Option includes joining hardware and gasket material. Each module will have all individual module wiring done but will not be connected to any adjacent module. The low voltage wiring will include quick connects for easier field wiring. The high voltage wiring must be wired in the field according to the factory provided unit wiring diagram. All refrigerant piping will be external to the unit. All piping stub outs will be labeled for field connection.

Figure 4 - Power and Control Wiring

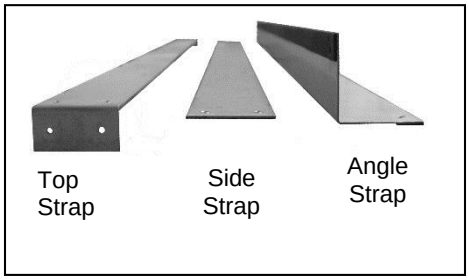


Figure 5 - Strap Types

Base Model Option
Wiring

Example: M2-H-011-R-2-A-**A**-0-C-0

0 = *No Factory Wiring* – All components are wired to labeled terminal blocks. This cannot be selected if AAON controls are provided.
A = *Controls Wired in Fan Box* - If possible, all high voltage and low voltage components will be wired and located in the fan module. In the event that the unit contains multiple fan modules, the electrical components may be located in each of the fan modules. ECat will require an additional control box if it is needed to fit all the controls.
B = *Controls Wired in Control Box* - If possible, all high voltage and low voltage components will be wired and located in the control module. Option requires a control module to be selected with the unit. If controls do not fit into the selected control box and the fan module includes a controls section, controls will be installed in the fan module as well.

Base Model Option
Paint

Example: M2-H-011-R-2-A-A-**0**-C-0

0 = *Standard* - Lockable access doors are shipped with a nut and bolt through the latch.
A = *Indoor Unit with Exterior Corrosion Protection* - Cabinet exterior is primer washed then spray coated with a two-part polyurethane 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 = *Indoor Unit with Interior and Exterior Corrosion Protection* - Option A + 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 wheel, fan motor, and heat wheel casing 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 exceeds 2,500 hours when tested under ASTM B 117-95 requirements. Corrosion protection for the coils must be selected in the coil modules.
E = *Shipping Shrink Wrap* - Option includes special heat shrink plastic covering the entire unit for supplemental unit protection during shipping and storage before startup. If the Unit Assembly is configured for loose boxes, each individual module will be shrink wrapped separately.
F = *Indoor Unit with Exterior Corrosion Protection + Shipping Shrink Wrap* - Options A + E.
G = *Indoor Unit with Interior and Exterior Corrosion Protection + Shipping Shrink Wrap* - Options B + E.

Paint Continued

Figure 6 - Shipping Shrink Wrap (Individual Modules)

Base Model Option
Base Rail

Example: M2-H-011-R-2-A-A-0-**C**-0

B = *8" High* - Unit is equipped with an 8 inch high base rail around the perimeter of the bottom of the unit.
C = *6" High* - Unit is equipped with a 6 inch high base rail around the perimeter of the bottom of the unit. 6 inch high base rail is the standard option for M2 Series units.
D = *10" High* - Unit is equipped with a 10 inch high base rail around the perimeter of the bottom of the unit.

Base Model Option
Unit Special

Example: M2-H-011-R-2-A-A-0-C-**0**

0 = *Standard - None*
X = *Special Price Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for any SPAs that affect every module of the unit.

Fan Module Feature String Nomenclature

MDULE ID	POSITION	MOTOR SIZE	BLOWER	ISOLATION	MOTOR TYPE	BLANK	PULLEYS	SAFETY CONTROL	BLANK	BLANK	TYPE
SDD -	103 -	J -	B	I -	F	00	00 -	A	0000 -	0 -	0

FAN MODULE DESCRIPTION

Module ID
SFA = Belt Driven Supply
SFC = Belt Drive Supply, Top Discharge
SFD = Belt Driven Supply, No Control Panel
SDB = Direct Drive Supply
SDD = Direct Drive Supply, Top Discharge
SDM = Dual Fan Direct Drive Supply
SDN = Dual Fan Direct Drive Supply, Top Discharge
PEA = Belt Driven Power Exhaust
PEC = Belt Driven Power Exhaust, Top Discharge
EDB = Direct Drive Power Exhaust
EDD = Direct Drive Power Exhaust, Top Discharge
RFA = Belt Driven Power Return
RDB = Direct Drive Power Return
RDM = Dual Fan Direct Drive Power Return

Position
= Level and Position of Module in Air Handling Unit

Motor Size
E = 1 hp
F = 2 hp
G = 3 hp
H = 5 hp
J = 7.5 hp
K = 10 hp
L = 15 hp
M = 20 hp
N = 25 hp
P = 30 hp
Q = 1.0 kW (1.3 hp)
S = 1.7 kW (2.3 hp)
T = 3.0 kW (4.0 hp)
U = 5.4 kW (8.0 hp)

Blower
A = 15" Backward Curved Plenum
B = 18" Backward Curved Plenum
C = 22" Backward Curved Plenum
D = 27" Backward Curved Plenum
E = 30" Backward Curved Plenum
F = 33" Backward Curved Plenum
G = 37" Backward Curved Plenum

Blower Continued
H = 24" Backward Curved Plenum
J = 15" BC Plenum - 50% Width
K = 18" BC Plenum - 30% Width
L = 2 x 18" Backward Curved Plenum
M = 2 x 22" Backward Curved Plenum
N = 2 x 24" Backward Curved Plenum
P = 2 x 27" Backward Curved Plenum
Q = 14" ECM Backward Curved Plenum
R = 16" ECM Backward Curved Plenum
S = 18" ECM Backward Curved Plenum
T = 18" ECM Backward Curved Plenum

Isolation
0 = Standard
I = Fan Isolation

Motor Type
B = Premium Efficiency 1760 rpm
C = Premium Eff. 1760 rpm with VFD
D = Premium Eff. 1760 rpm with VFD and Bypass
E = Premium Efficiency 1170 rpm
F = Premium Eff. 1170 rpm with VFD
G = EC Motor

Blank
00 = Standard

Pulleys
= Pulley Combination

Safety Control
0 = None
A = Phase & Brownout Protection

Blank
0000 = Standard

Blank
0 = Standard

Type
0 = None
X = Special Pricing Authorization

Fan Module Option

Module ID

Example: **SDD**-103-J-BI-F0000-A0000-0-0

SFA = *Belt Drive Supply* - Option includes a belt driven supply fan with end discharge and an integrated control panel on the access side of the module. Discharge air opening includes duct flanges. Option may require a control module elsewhere on the unit.
SFC = *Belt Drive Supply, Top Discharge* - Option includes a belt driven supply fan with top discharge and an integrated control panel on the access side of the module. Discharge air opening includes duct flanges. Option may require a control module elsewhere on the unit.
SFD = *Belt Drive Supply, No Control Panel* - Option includes a belt driven supply fan with end discharge. Option requires a control module elsewhere on the unit. Discharge air opening includes duct flanges.
SDB = *Direct Drive Supply* - Option includes a direct drive supply fan with end discharge and integrated control panel on the access side of the module. M2-005 units with blower options Q, R, S, or T will not include an integrated control panel and will require a control module elsewhere on the unit. Other sized units may require a control module elsewhere on the unit. Discharge air opening includes duct flanges.
SDD = *Direct Drive Supply, Top Discharge* - Option includes a direct drive fan with top discharge and integrated control panel on the access side of the module. M2-005 units with blower options Q, R, S, or T will not include an integrated control panel and will require a control module elsewhere on the unit. Other sized units may require a control module elsewhere on the unit. Discharge air opening includes duct flanges.
SDM = *Dual Fan Direct Drive Supply* - Option includes two direct drive supply fans with end discharge and integrated control panel on the access side of the module. Option may require a control module elsewhere on the unit. Fans are wired to operate off a single demand signal. Option is only available on M2-032 and M2-036. Discharge air opening includes duct flanges.
SDN = *Dual Fan Direct Drive Supply, Top Discharge* - Option includes two direct drive supply fans with top discharge and integrated control panel on the access side of the module. Option may require a control module elsewhere on the unit. Fans are wired to operate off a single demand signal. Option is only available on M2-032 and M2-036. Discharge air opening includes duct flanges.
PEA = *Belt Drive Power Exhaust* - Option includes a belt driven exhaust fan with end discharge and integrated control panel. Discharge air opening includes duct flanges.
PEC = *Belt Drive Power Exhaust, Top Discharge* - Option includes a belt driven exhaust fan with top discharge and integrated control panel. Discharge air opening includes duct flanges.
EDB = *Direct Drive Power Exhaust* - Option includes a direct drive exhaust fan with end discharge and integrated control panel. M2-005 units with blower options Q, R, S, or T will not include an integrated control panel. Discharge air opening includes duct flanges.
EDD = *Direct Drive Power Exhaust, Top Discharge* - Option includes a direct drive exhaust fan with top discharge and integrated control panel. M2-005 units with blower options Q, R, S, or T will not include an integrated control panel. Discharge air opening includes duct flanges.

Module ID Continued

RFA = *Belt Drive Power Return* - Option includes a belt driven return fan with end discharge. Discharge air opening includes duct flanges.
RDB = *Direct Drive Power Return* - Option includes a direct return fan with end discharge. Discharge air opening includes duct flanges.
RDM = *Dual Fan Direct Drive Power Return* - Option includes two direct drive return fans with end charge. Fans are wired to operate off a single demand signal. Option is only available on M2-032 and M2-036. Discharge air opening includes duct flanges.

Fan Module Option
Position

Example: SDD-**103**-J-BI-F0000-A0000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the third module in the airstream for "03" as the final two digits.

Fan Module Option
Motor Size

Example: SDD-103-**J**-BI-F0000-A0000-0-0

E = *1 hp*	**M** = *20 hp*
F = *2 hp*	**N** = *25 hp*
G = *3 hp*	**P** = *30 hp*
H = *5 hp*	**Q** = *1.0 kW (1.3 hp)*
J = *7.5 hp*	**S** = *1.7 kW (2.3 hp)*
K = *10 hp*	**T** = *3.0 kW (4.0 hp)*
L = *15 hp*	**U** = *5.4 kW (8.0 hp)*

AAON ECat will select the available options for Motor Size based on unit conditions and the input from the fan box module detail. General fan information, fan sound information and fan curves will be available for viewing in the fan box module detail window. High efficiency Electronically Commutated Motors (ECM) are kW rated.

Fan Module Option
Blower

Example: SDD-103-J-**B**I-F0000-A0000-0-0

A = *15" Backward Curved Plenum Fan*
B = *18" Backward Curved Plenum Fan*
C = *22" Backward Curved Plenum Fan*
D = *27" Backward Curved Plenum Fan*
E = *30" Backward Curved Plenum Fan*
F = *33" Backward Curved Plenum Fan*
G = *37" Backward Curved Plenum Fan*
H = *24" Backward Curved Plenum Fan*
J = *15" Backward Curved Plenum Fan, 50% Width*
K = *18" Backward Curved Plenum Fan, 30% Width*
L = *2 x 18"Backward Curved Plenum Fans*
M = *2 x 22" Backward Curved Plenum Fans*
N = *2 x 24" Backward Curved Plenum Fans*
P = *2 x 27" Backward Curved Plenum Fans*
Q = *14" ECM Backward Curved Plenum Fans*
R = *16" ECM Backward Curved Plenum Fans*
S = *18" ECM Backward Curved Plenum Fans*
T = *18" ECM Backward Curved Plenum Fans*

AAON ECat will select the available options for Blower based on unit conditions and the input from the fan box module detail. General fan information, fan sound information and fan curves will be available for viewing in the fan box module detail window.

Fan Module Option
Isolation

Example: SDD-103-J-B**I**-F0000-A0000-0-0

0 = *Standard* - Includes neoprene gasket on the EC motors between the motor and the bulkhead. Option only available on EC motors size M2-005 through M2-014.
I = *Fan Isolation* - M2-005 through M2-014 non-EC motors will include rubber-in-shear isolation, and M2-018 through M2-036 will include spring isolation.

Fan Module Option
Motor Type

Example: SDD-103-J-BI-**F**0000-A0000-0-0

B = *Premium Efficiency 1760 rpm*
C = *Premium Efficiency 1760 rpm with VFD*
D = *Premium Efficiency 1760 rpm with VFD and Bypass*
E = *Premium Efficiency 1170 rpm*
F = *Premium Efficiency 1170 rpm with VFD*
G* = *EC Motor*

*Only available on M2-005 through M2-014.

AAON ECat will select the correct available options for Motor Type based on unit conditions and the input from the fan box module detail. General fan information, fan sound information and fan curves will be available for viewing in the fan box module detail window.

Fan Module Option
Blank

Example: SDD-103-J-BI-F**00**00-A0000-0-0

00 = *Standard - None*

Fan Module Option
Pulleys

Example: SDD-103-J-BI-F00**00**-A0000-0-0

00 = *Standard - None*
= *Pulley Combination* - Option is only available for belt driven fan assemblies. AAON ECat will automatically select the correct pulley and belt combination to maintain the rated rpm based on the unit conditions.

Fan Module Option
Safety Control

Example: SDD-103-J-BI-F0000-**A**0000-0-0

0 = *Standard - None*
A = *Phase & Brownout Protection* - Voltage monitor that is used to protect motors from voltage imbalance, over/under voltage and phase loss. Reset is automatic.

Figure 7 - Phase and Brown Out Protection

Fan Module Option
Blank

Example: SDD-103-J-BI-F0000-A**0000**-0-0

0000 = *Standard - None*

Fan Module Option
Blank

Example: SDD-103-J-BI-F0000-A0000-**0**-0

0 = *Standard - None*

Fan Module Option
Type

Example: SDD-103-J-BI-F0000-A0000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Fan Module.

Filter Module Feature String Nomenclature

MDULE ID	POSITION	FILTER TYPE	FILTERS	SAFETY CONTROL	BLANK	2ND FILTER TYPE	2ND FILTER	BLANK	FILTER OPTIONS	TYPE
FTA	- 102	- P	- A0	- 0	0000	- 0	00	00	- 0	- 0

FILTER MODULE DESCRIPTION

Module ID
FTA = Small Flat Filter
FTC = Cartridge Filter
FTE = Medium Flat Filter
FTF = Large Flat Filter
FTH = Cartridge Filter with Flat Pre-Filter
FTK = Extra Large Flat Filter

Position
= Level and Position of Module in Air Handling Unit

Filter Type
P = Pleated
C = Cartridge

Filters
A0 = 2" Pleated, 30% Eff.
B0 = 4" Pleated, 30% Eff.
C0 = 4" Pleated, 65% Eff. or 12" Cartridge, 65% Eff.
D0 = 4" Pleated, 85% Eff. or 12" Cartridge, 85% Eff.
E0 = 4" Pleated, 95% Eff. or 12" Cartridge, 95% Eff.

Safety Control
0 = Standard
2 = Firestat

Blank
0000 = Standard

Second Filter Type
0 = Standard - None
C = Cartridge

Second Filter
00 = Standard - None
C0 = 12" Cartridge, 65% Eff.
D0 = 12" Cartridge, 85% Eff.
E0 = 12" Cartridge, 95% Eff.

Blank
00 = Standard

Filter Options
0 = Standard - None
A = Magnehelic Gauge
B = Clogged Filter Switch
C = Magnehelic Gauge & Clogged Filter Switch

Type
0 = None
X = Special Pricing Authorization

Filter Module Option
Module ID

Example: **FTA**-102-P-A0-00000-00000-0-0

FTA = *Small Flat Filter* - Option includes a small footprint module with either a 2" or 4" flat filter. Module footprint will be shown on unit submittal drawing. See General Data section for filter sizes for each unit size.
FTC = *Cartridge Filter* - Option includes a 12" cartridge filter. See General Data section for filter sizes for each unit size.
FTE = *Medium Flat Filter* - Option includes a medium footprint module with either a 2" or 4" flat filter. Module footprint will be shown on unit submittal drawing. See General Data section for filter sizes for each unit size.
FTF = *Large Flat Filter* - Option includes a large footprint module with either a 2" or 4" flat filter. Module footprint will be shown on unit submittal drawing. See General Data section for filter sizes for each unit size.
FTH = *Cartridge Filter with Flat Pre-Filter* - Option includes a combination filter module consisting of a 12" cartridge filter and either a 2" or 4" flat filter. Flat filter will be factory installed in the pre-filter position. See General Data section for filter sizes for each unit size.
FTK = *Extra Large Flat Filter* - Option includes an extra-large footprint module with either a 2" or 4" flat filter. Module footprint will be shown on unit submittal drawing. See General Data section for filter sizes for each unit size.

Filter Module Option
Position

Example: FTA-**102**-P-A0-00000-00000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the second module in the airstream for "02" as the final two digits.

Filter Module Option
Filter Type

Example: FTA-102-**P**-A0-00000-00000-0-0

P = *Pleated Filter* - Option includes pleated filters as the primary filter in the filter module. When cartridge and flat combination filters are chosen, pleated filters will show as the filter type and be factory installed in the pre-filter position.
C = *Cartridge Filter* - Option includes cartridge filters as the primary filter in the filter module.

Filter Module Option
Filters

Example: FTA-102-P-**A0**-00000-00000-0-0

A0 = *2" Pleated MERV 8* - 2 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
B0 = *4" Pleated MERV 8* - 4 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
C0 = *4" Pleated MERV 11 or 12" Cartridge MERV 11* - 4 inch pleated MERV 11 unit filters or 12 inch cartridge MERV 11 unit filters factory installed in an internal filter rack.
D0 = 4*" Pleated MERV 13 or 12" Cartridge MERV 13* - 4 inch pleated MERV 13 unit filters or 12 inch cartridge MERV 13 unit filters factory installed in an internal filter rack.
E0 = *4" Pleated MERV 14 or 12" Cartridge MERV 14* - 4 inch pleated MERV 14 unit filters or 12 inch cartridge MERV 14 unit filters factory installed in an internal filter rack.

Filter Module Option
Safety Control

Example: FTA-102-P-A0-**0**0000-00000-0-0

0 = *Standard*
2 = *Firestat* - Bimetallic snap-action safety switch sensing temperature only. The switch is rated to 125°F. Switch manually resets and is wired to shut down the 24 VAC control circuit. Firestats are non-addressable.

Filter Module Option
Blank

Example: FTA-102-P-A0-0**0000**-00000-0-0

0000 = *Standard*

Filter Module Option
Second Filter Type

Example: FTA-102-P-A0-00000-**0**0000-0-0

0 = *Standard - None*
C = *Cartridge Filter* - Option includes cartridge filters as the secondary filter in the filter module. Option is only available with combination filter modules.

Filter Module Option
Second Filter

Example: FTA-102-P-A0-00000-0**00**00-0-0

00 = *Standard - None*
C0 = *12" Cartridge Filter MERV 11* - 12 inch cartridge MERV 11 unit filters factory installed in an internal filter rack.
D0 = *12" Cartridge Filter MERV 13* - 12 inch cartridge MERV 13 unit filters factory installed in an internal filter rack.
E0 = *12" Cartridge Filter MERV 14* - 12 inch cartridge MERV 14 unit filters factory installed in an internal filter rack.

Filter Module Option
Blank

Example: FTA-102-P-A0-00000-000**00**-0-0

00 = *Standard*

Filter Module Option
Filter Option

Example: FTA-102-P-A0-00000-00000-**0**-0

0 = *Standard - None*
A = *Magnehelic Gauge* - Magnehelic gauge reading pressure drop across the filter bank. The gauge reads from 0 to 3 in. W.C. in 0.10 in. graduations.
B = *Clogged Filter Switch* - Adjustable differential pressure switch sensing pressure drop across the filter bank. The range of adjustment is 0.17 to 5.0 in. W.C. with contact closure on rise. Includes terminal connections in the low voltage control section. Normally open dry contacts (CF) are provided for clogged filter indication.
C = *Magnehelic Gauge + Clogged Filter Switch* - Options A + B.

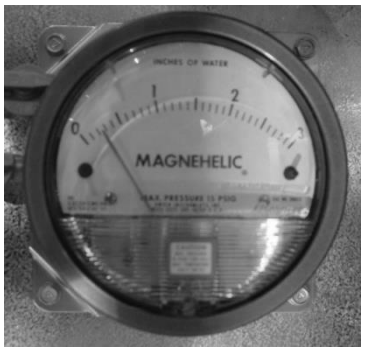


Figure 9 - Magnehelic Gauge

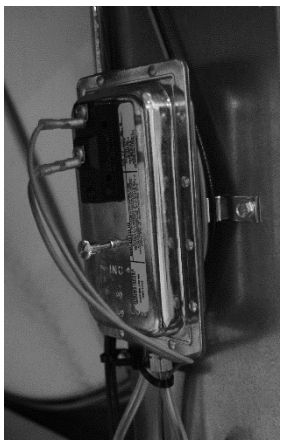


Figure 8 - Clogged Filter Switch

Filter Module Option
Type

Example: FTA-102-P-A0-00000-00000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Filter Module.

Mixing Box Module Feature String Nomenclature

MDULE ID	POSITION	ACTUATOR	FILTERS	SAFETY CONTROL	BLANK	BYPASS OPENING	BLANK	FILTER OPTIONS	TYPE
MBH	- 101	- A	- 00	- 0	0000	- 0	0000	- 0	- 0

MIXING BOX MODULE DESCRIPTION

Module ID
MBA = Vertical Damper
MBB = Horizontal Top Damper
MBC = Vertical & Horizontal Bottom Damper
MBD = Vertical Damper with Filter
MBE = Horizontal Top Damper with Filter
MBF = Horizontal Bottom Damper
MBH = Vertical & Horizontal Top Damper
MBI = Horizontal Bottom Damper with Filter
MBJ = Vertical & Horizontal Top Damper with Filter
MBK = Vertical & Horizontal Bottom Damper with Filter

Position
= Level and Position of Module in Air Handling Unit

Actuator
0 = Standard - None
A = Two Position Actuator
B = DDC Actuator

Filters
00 = Standard - None
A0 = 2" Pleated, 30% Eff.
B0 = 4" Pleated, 30% Eff.
C0 = 4" Pleated, 65% Eff.
D0 = 4" Pleated, 85% Eff.
E0 = 4" Pleated, 95% Eff.

Safety Control
0 = Standard
2 = Firestat

Blank
0000 = Standard

Bypass Opening
0 = Standard - None
A = Top Open
B = Bottom Open

Blank
0000 = Standard

Filter Options
0 = Standard - None
A = Magnehelic Gauge
B = Clogged Filter Switch
C = Options A + B

Type
0 = Standard - None
X = Special Pricing Authorization

Mixing Box Module Option

Module ID

Example: **MBH**-101-A-00-00000-00000-0-0

MBA = *Vertical Damper* - Option includes a single damper assembly mounted vertically in the entering air opening in the end of the module.
MBB = *Horizontal Top Damper* - Option includes a single damper assembly mounted horizontally in the entering air opening on the top of the module.
MBC = *Vertical and Horizontal Bottom Damper* - Option includes two damper assemblies, one mounted vertically in the entering air opening in the end of the module and one mounted horizontally in the bottom opening of the module. Option is only available in modules on the second level of two tier units.
MBD = *Vertical Damper with Filter* - Option includes a single damper assembly mounted vertically in the entering air opening in the end of the module. Option also includes an internal filter rack and factory installed filters.
MBE = *Horizontal Top Damper with Filter* - Option includes a single damper assembly mounted horizontally in the entering air opening on the top of the module. Option also includes an internal filter rack and factory installed filters.
MBF = *Horizontal Bottom Damper* - Option includes a single damper assembly mounted horizontally in the bottom opening of the module. Option is only available in modules on the second level of two tier units.
MBH = *Vertical and Horizontal Top Damper* - Option includes two damper assemblies, one mounted vertically in the entering air opening in the end of the module and one mounted horizontally in the entering air opening on the top of the module.
MBI = *Horizontal Bottom Damper with Filter* - Option includes a single damper assembly mounted horizontally in the bottom of the module. Option also includes an internal filter rack and factory installed filters.
MBJ = *Vertical and Horizontal Top Damper with Filter* - Option includes two damper assemblies, one mounted vertically in the entering air opening in the end of the module and one mounted horizontally in the entering air opening on the top of the module. Option also includes an internal filter rack and factory installed filters.
MBK = *Vertical and Horizontal Bottom Damper with Filter* - Option includes two damper assemblies, one mounted vertically in the entering air opening in the end of the module and one mounted horizontally in the bottom opening of the module. Option also includes an internal filter rack and factory installed filters. Option is only available in modules on the second level of two tier units.

Mixing Box Module Option
Position

Example: MBH-**101**-A-00-00000-00000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the first module in the airstream for "01" as the final two digits.

Mixing Box Module Option
Actuator

Example: MBH-101-**A**-00-00000-00000-0-0

0 = *Standard - None*
A = *Two Position Actuator* - Two position actuators on each damper assembly in the module. The actuators are spring return closed.
B = *DDC Actuator* - Fully modulating actuators on each damper assembly in the module. The minimum outside air position can be field adjusted for the desired amount of outside air. The actuators are spring return closed.

Mixing Box Module Option
Filters

Example: MBH-101-A-**00**-00000-00000-0-0

00 = *Standard - None*
A0 = *2" Pleated MERV 8* - 2 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
B0 = *4" Pleated MERV 8* - 4 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
C0 = *4" Pleated MERV 11* - 4 inch pleated MERV 11 unit filters factory installed in an internal filter rack.
D0 = *4" Pleated MERV 13* - 4 inch pleated MERV 13 unit filters factory installed in an internal filter rack.
E0 = *4" Pleated MERV 14* - 4 inch pleated MERV 14 unit filters factory installed in an internal filter rack.

Mixing Box Module Option
Safety Control

Example: MBH-101-A-00-**0**0000-00000-0-0

0 = *Standard*
2 = *Firestat* - Bimetallic snap-action safety switch sensing temperature only. The switch is rated to 125°F. Switch manually resets and is wired to shut down the 24 VAC control circuit. Firestats are non-addressable.

Mixing Box Module Option
Blank

Example: MBH-101-A-00-0**0000**-00000-0-0

0000 = *Standard - None*

Mixing Box Module Option
Bypass Opening

Example: MBH-101-A-00-00000-**0**0000-0-0

0 = *Standard - None*
A = *Top Open* - Module will be built with an opening in the top of the module. Opening will include duct flanges and will not include dampers.
B = *Bottom Open* - Module will be built with an opening in the bottom of the module. Opening will not have duct flanges or dampers.

Mixing Box Module Option
Blank

Example: MBH-101-A-00-00000-0**0000**-0-0

0000 = *Standard - None*

Mixing Box Module Option
Filter Options

Example: MBH-101-A-00-00000-00000-**0**-0

0 = *Standard - None*
A = *Magnehelic Gauge* - Magnehelic gauge reading pressure drop across the filter bank. The gauge reads from 0 to 3 in. W.C. in 0.10 in. graduations, and is mounted in the control cabinet.
B = *Clogged Filter Switch* - Adjustable differential pressure switch sensing pressure drop across the filter bank. The range of adjustment is 0.17 to 5.0 in. W.C. with contact closure on rise. Includes terminal connections in the low voltage control section. Normally open dry contacts (CF) are provided for clogged filter indication.
C = *Magnehelic Gauge + Clogged Filter Switch* - Options A + B.

Mixing Box Module Option

Type

Example: MBH-101-A-00-00000-00000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Mixing Box Module.

Heat Module Feature String Nomenclature

MDULE ID	POSITION	FUNCTION	FILTERS	ROWS	FPI	CIRCUITING	COATING	HEAT CAPACITY	STAGES	FUEL GAS	COMB INTAKE	FILTER OPTIONS	TYPE
PHA	**-101**	**-H**	**-00**	**-0**	**00**	**0**	**0**	**-E**	02	0	0	-0	-0

HEAT MODULE DESCRIPTION

Module ID
PHA = Electric Heat
PHB = Hot Water Coil
PHC = Hot Water Coil with Filter
PHD = Electric Heat with Filter
PHG = Gas Heat

Position
= Level and Position of Module in Air Handling Unit

Function
H = Heating

Filters
00 = None
A0 = 2" Pleated, 30% Eff.
B0 = 4" Pleated, 30% Eff.
C0 = 4" Pleated, 65% Eff.
D0 = 4" Pleated, 85% Eff.
E0 = 4" Pleated, 95% Eff.

HEATING COIL

Rows
0 = No Hot Water Heating
1 = 1 Row
2 = 2 Rows

FPI
00 = No Hot Water Heating
08 = 8 Fins Per Inch
10 = 10 Fins Per Inch
12 = 12 Fins Per Inch

Circuiting
0 = No Hot Water Heating
F = Single Serpentine
H = Half Serpentine
Q = Quarter Serpentine

Coating
0 = Standard
H = Stainless Steel Coil Casing & Copper Fins
P = Polymer E-Coating
S = Stainless Steel Coil Casing
K = Stainless Steel Coil Casing & Polymer E-Coating

Heat Capacity
0 = Hot Water Heating Coil
1 = 50 MBH input
2 = 75 MBH input
3 = 100 MBH input
4 = 125 MBH input
5 = 150 MBH input
6 = 175 MBH input
7 = 200 MBH input
8 = 250 MBH input
A = 300 MBH input OR 7 kW (5.3 kW @ 208V)
B = 350 MBH input OR 14 kW (10.5kW @ 208V)
C = 400 MBH input OR 21 kW (15.8 kW @ 208V)
D = 28 kW (21 kW @ 208V)
E = 42 kW (31.5 kW @ 208V)
F = 56 kW (42 kW @ 208V)
G = 70 kW (52.2 kW @ 208V)
H = 35 kW (26.3 kW @ 208V)
J = 84 kW (63 kW @ 208V)
K = 112 kW (84.1 kW @ 208V)
L = 126 kW (94.6 kW @ 208V)
M = 168 kW (126.2 kW @ 208V)
N = 10 kW (7.5 kW @ 208V)
P = 20 kW (15 kW @ 208V)
Q = 30 kW (22.5 kW @ 208V)
R = 40 kW (30 kW @ 208V)
S = 50 kW (37.5 kW @ 208V)
T = 80 kW (60.1 kW @ 208V)
U = 100 kW (75.1 kW @ 208V)
V = 120 kW (90.1 kW @ 208V)
W = 160 kW (120.1 kW @ 208V)

Heat Module Feature String Nomenclature

MDULE ID	POSITION	FUNCTION	FILTERS	ROWS	FPI	CIRCUITING	COATING	HEAT CAPACITY	STAGES	FUEL GAS	COMB INTAKE	FILTER OPTIONS	TYPE
PHA	101	H	00	0	00	0	0	E	**02**	**0**	**0**	**0**	**0**

Stages
00 = Hot Water Heating Coil
01 = 1 Stage
02 = 2 Stage
03 = 3 Stage
04 = 4 Stage
0M = Modulating 5:1 Stage Natural Gas
Modulating 3:1 Stage LP Gas

Fuel Gas
0 = Natural Gas [Hot Water/Electric Heat]
A = LP Gas

Combustion Intake
0 = Open Combustion [Hot Water/Electric Heat]
A = Separated Combustion

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

Type
0 = None
S = Steam Heating Coil
X = Special Pricing Authorization

Table 2 – Heating Coil Module Face Areas

Unit Size	PHB, PHC **Hot Water Coil** Face Area	PHB, PHC **Steam Coil** Face Area
005	5.0 ft^2	5.3 ft^2
008	8.1 ft^2	8.3 ft^2
011	11.2 ft^2	11.0 ft^2
014	14.4 ft^2	14.4 ft^2
018	17.6 ft^2	17.5 ft^2
022	21.9 ft^2	21.9 ft^2
026	26.7 ft^2	27.0 ft^2
032	31.9 ft^2	31.7 ft^2
036	36.7 ft^2	36.0 ft^2

Heat Module Option
Module ID

Example: **PHA**-104-H-00-00000-E0200-0-0

PHA = *Electric Heat* - Electric heater with multiple elements.
PHB = *Hot Water Coil* - Hot water heating coil. No valves or valve controls are included with this option. Hot water coil connections will be sweat type.
PHC = *Hot Water Coil with Filter* - Hot water heating coil. No valves or valve controls are included with this option. Option includes an internal filter rack and factory installed filters upstream of the hot water coil. Hot water coil connections will be sweat type.
PHD = *Electric Heat with Filter* - Electric heater with multiple elements. Option includes an internal filter rack and factory installed filters upstream of the electric heater elements.
PHG = *Gas Heat* - Indirect fired gas heater with Type 409 stainless steel heat exchanger and 10 year prorated warranty. Gas heaters have a 5:1 (3:1 with LP fuel type) turndown ratio and are 80% efficient. The maximum temperature rise for the stainless steel heat exchanger is 80°F. Gas heaters include a combustion motor for positive venting of flue exhaust. Gas heaters must be located downstream of the supply fan.

Heat Module Option
Position

Example: PHA-**104**-H-00-00000-E0200-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the fourth module in the airstream for "04" as the final two digits.

Heat Module Option
Function

Example: PHA-104-**H**-00-00000-E0200-0-0

H = *Heating* - Standard heating controls. No valves or valve controls are included with hot water heating.

Heat Module Option
Filters

Example: PHA-104-H-**00**-00000-E0200-0-0

00 = *Standard - None*
A0 = *2" Pleated MERV 8* - 2 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
B0 = *4" Pleated MERV 8* - 4 inch pleated MERV 8 unit filters factory installed in an internal filter rack.
C0 = *4" Pleated MERV 11* - 4 inch pleated MERV 11 unit filters factory installed in an internal filter rack.
D0 = 4*" Pleated MERV 13* - 4 inch pleated MERV 13 unit filters factory installed in an internal filter rack.
E0 = *4" Pleated MERV 14* - 4 inch pleated MERV 14 unit filters factory installed in an internal filter rack.

Heat Module Option
Heating Coil Rows

Example: PHA-104-H-00-**0**0000-E0200-0-0

0 = *Standard - None*
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.

Heat Module Option
Heating Coil FPI

Example: PHA-104-H-00-0**00**00-E0200-0-0

00 = *Standard - None*
08 = *8 Fins per Inch* - Hot water or steam heating coil with 8 fins per inch.
10 = *10 Fins per Inch* - Hot water or steam heating coil with 10 fins per inch.
12 = *12 Fins per Inch* - Hot water or steam heating coil with 12 fins per inch. Standard heating coil fpi option.

Heat Module Option
Heating Coil Circuitry

Example: PHA-104-H-00-000**0**0-E0200-0-0

0 = *Standard - None*
F = *Single Serpentine* - Hot water or steam heating coil with single serpentine circuitry. In single serpentine coils, # feeds = # tubes high. This option gives the lowest pressure drop and lowest velocities. Standard heating coil circuiting option.
H = *Half Serpentine* - Hot water heating coil with half serpentine circuitry. In half serpentine coils, # feeds = (# tubes high) ÷ 2. Option is not available with steam heating coils.
Q = *Quarter Serpentine* - Hot water heating coil with quarter serpentine circuitry. In quarter serpentine coils, # feeds = (# tubes high) ÷ 4. Option is not available with steam heating coils.

Heat Module Option

Heating Coil Coating

Example: PHA-104-H-00-0000**0**-E0200-0-0

0 = *Standard - None*
H = *Stainless Steel Casing and Copper Fins* - 18 gauge 304 stainless steel casing on the heating coil with copper fins mechanically bonded to the copper tubes of the coil.
P = *Polymer E-coating* - Polymer e-coating applied to both the cooling and heating coils. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117, 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.
S = *Stainless Steel Casing* - 18 gauge 304 stainless steel casing on the heating coil.
K = *Stainless Steel Casing and Polymer E-coating* - Option S + Option P

Heat Module Option

Heat Capacity

Example: PHA-104-H-00-00000-**E**0200-0-0

Table 3 - Electric and Gas Heating Capacities

	Gas Heat		Electric Heat Capacity	
	Input Capacity	Output Capacity		
	MBH	MBH	kW (230V, 460V, 575V)	kW (208V)
0 = *Hot Water*				
A = *Heat A*	300	240	7	5.3
B = *Heat B*	350	280	14	10.5
C = *Heat C*	400	320	21	15.8
D = *Heat D*			28	21.0
E = *Heat E*			42	31.5
F = *Heat F*			56	42.0
G = *Heat G*			70	52.5
H = *Heat H*			35	26.3
J = *Heat J*			84	63.0
K = *Heat K*			112	84.1
L = *Heat L*			126	94.6
M = *Heat M*			168	126.2
N = *Heat N*			10	7.5
P = *Heat P*			20	15.0
Q = *Heat Q*			30	22.5
R = *Heat R*			40	30.0
S = *Heat S*			50	37.5
T = *Heat T*			80	60.1
U = *Heat V*			100	75.1
V = *Heat V*			120	90.1
W = *Heat W*			160	120.1
1 = *Heat 1*	50	40		
2 = *Heat 2*	75	60		
3 = *Heat 3*	100	80		
4 = *Heat 4*	125	100		
5 = *Heat 5*	150	120		
6 = *Heat 6*	175	140		
7 = *Heat 7*	200	160		
8 = *Heat 8*	250	200		

Heat Module Option
Stages

Example: PHA-104-H-00-00000-E**02**00-0-0

00 = *Hot Water Heating Coil*
01 = *1 Stage* - Single stage heat control.
02 = *2 Stage* - Two stage heat control.
03 = *3 Stage* - Three stage heat control.
04 = *4 Stage* - Four stage heat control.
0M = *Modulating 5:1 Stage* - Option is only available with gas heat selections. Heater gas valve and the speed of the induce draft fan are modulated by a controller. If LP Gas is selected as the Fuel Gas, the gas heater will have a 3:1 modulation range.

Heat Module Option
Fuel Gas

Example: PHA-104-H-00-00000-E02**0**0-0-0

0 = *Natural Gas [Hot Water/Electric Heat]* - Gas heater with burner orifices sized for natural gas. If Gas Heat is not selected, option will be standard for hot water or electric heat.
A = *LP Gas* - Gas heater with burner orifices sized for liquefied petroleum gas.

Heat Module Option

Combustion Intake

Example: PHA-104-H-00-00000-E020**0**-0-0

0 = *Open Combustion [Hot Water/Electric Heat]* - Combustion intake configured to pull combustion air from space via a vent on the access door. If Gas Heat is not selected, option will be standard for hot water or electric heat.
A = *Separated Combustion* - Combustion intake configured to pull combustion air from outside the space via combustion intake vent on the top of the module. Option requires field ducting of both the combustion intake and flue exhaust.

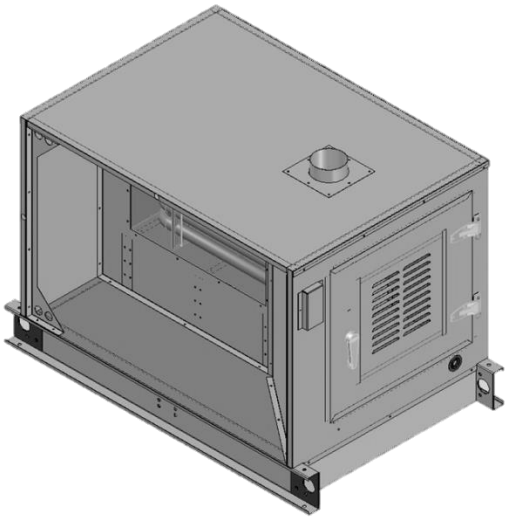


Figure 10 - Open Combustion

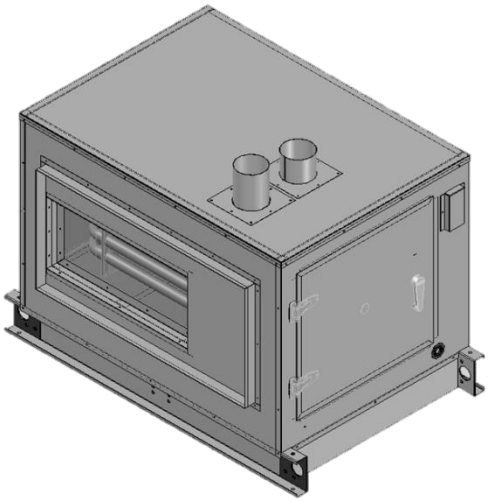


Figure 11 - Separated Combustion

Heat Module Option
Filter Options

Example: PHA-104-H-00-00000-E0200-**0**-0

0 = *Standard - None*
A = *Magnehelic Gauge* - Magnehelic gauge reading pressure drop across the filter bank. The gauge reads from 0 to 3 in. W.C. in 0.10 in. graduations, and is mounted in the control cabinet.
B = *Clogged Filter Switch* - Adjustable differential pressure switch sensing pressure drop across the filter bank. The range of adjustment is 0.17 to 5.0 in. W.C. with contact closure on rise. Includes terminal connections in the low voltage control section. Normally open dry contacts (CF) are provided for clogged filter indication.
C = *Magnehelic Gauge + Clogged Filter Switch* - Options A + B.

Heat Module Option
Type

Example: PHA-104-H-00-00000-E0200-0-**0**

0 = *Standard - None*
S = *Steam Heating Coil* - Steam distributing heating coil. The maximum steam operating pressure is 25 psi. No valves or valve controls are included with this option.
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Heat Module.

Blank Module Feature String Nomenclature

MDULE ID	POSITION	BLANK	AIRWAY TYPE	SAFETY CONTROL	BLANK	BYPASS OPENING	BLANK	DRAIN PAN TYPE	TYPE
BBA	- 101	- 0	- AR	- 0	0000	- 0	0000	- 0	- 0

BLANK MODULE DESCRIPTION

Module ID
BBA = Small
BBB = Medium
BBC = Large
BBD = XL
BBE = XXL
BBF = XXXL
BBG = Extended Large
CBA = Small with Drain Pan
CBB = Medium with Drain Pan
CBC = Large with Drain Pan
CBD = XL with Drain Pan
CBE = XXL with Drain Pan
CBF = XXXL with Drain Pan
CBG = Extended Large with Drain Pan

Position
= Level and Position of Module in Air Handling Unit

Blank
0 = Standard

Airway Type
00 = Standard
AR = Top Open, Right Hand End Panel
AL = Top Open, Left Hand End Panel

Safety Control
0 = None
2 = Firestat

Blank
0000 = Standard

Bypass Opening
0 = None
A = Top Opening
B = Bottom Opening

Blank
0000 = Standard

Drain Pan Type
0 = Standard
A = Auxiliary

Type
0 = None
X = Special Pricing Authorization

Blank Module Option

Module ID

Example: **BBA**-101-0-AR-00000-00000-0-0

BBA = *Small* - Option includes a small footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBB = *Medium* - Option includes a medium footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBC = *Large* - Option includes a large footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBD = *XL* - Option includes an extra-large footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBE = *XXL* - Option includes an extra, extra-large footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBF = *XXXL* - Option includes an extra, extra, extra-large footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
BBG = *Extended Large* - Option includes a large extended footprint module. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
CBA = *Small with Auxiliary Drain Pan* - Option includes a small footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.
CBB = *Medium with Auxiliary Drain Pan* - Option includes a medium footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.
CBC = *Large with Auxiliary Drain Pan* - Option includes a large footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.
CBD = *XL with Auxiliary Drain Pan* - Option includes an extra-large footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.
CBE = *XXL with Auxiliary Drain Pan* - Option includes an extra, extra-large footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.
CBF = *XXXL with Auxiliary Drain Pan* - Option includes an extra, extra, extra-large footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.

Module ID Continued

CBG = *Extended Large with Auxiliary Drain Pan* - Option includes an extended large footprint module with an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.

Blank Module Option
Position

Example: BBA-**101**-0-AR-00000-00000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the first module in the airstream for "01" as the final two digits.

Blank Module Option
Blank

Example: BBA-101-**0**-AR-00000-00000-0-0

0 = *Standard - None*

Blank Module Option
Airway Type

Example: BBA-101-0-**AR**-00000-00000-0-0

00 = *Standard* - If the position of the module is on the end of the unit, the end wall will include an opening with duct flanges. If the position of the module is not on the end of the unit, the ends will remain open. Option includes a solid top and bottom. Duct opening dimensions will be shown on unit submittal drawing.

Airway Type Continued

AR = *Top Open, Right Hand End Panel* - Option includes an opening in the top of the module with a solid wall on the right hand side of the module. The left hand side of the module will remain open. If Position begins with "2", the top opening will include duct flanges. Option includes a solid bottom. Option is only available if the position of the module is on the right hand end of the unit. Duct opening dimensions will be shown on unit submittal drawing.
AL = *Top Open, Left Hand End Panel* - Option includes an opening in the top of the module with a solid wall on the left hand side of the module. The right hand side of the module will remain open. If Position begins with "2", the top opening will include duct flanges. Option includes a solid bottom. Option is only available if the position of the module is on the left hand end of the unit. Duct opening dimensions will be shown on unit submittal drawing.

Blank Module Option
Safety Options

Example: BBA-101-0-AR-**0**0000-00000-0-0

0 = *Standard - None*
2 = *Firestat* - Bimetallic snap-action safety switch sensing temperature only. The switch is rated to 125°F. Switch manually resets and is wired to shut down the 24 VAC control circuit. Firestats are non-addressable.

Blank Module Option
Blank

Example: BBA-101-0-AR-0**0000**-00000-0-0

0000 = *Standard - None*

Blank Module Option
Bypass Opening

Example: BBA-101-0-AR-00000-**0**0000-0-0

0 = *Standard - None*
A = *Top Open* - Module will be built with an opening in the top of the module. Opening will include duct flanges if Position begins with "2".
B = *Bottom Open* - Module will be built with an opening in the bottom of the module. Opening will not have duct flanges.

Blank Module Option
Blank

Example: BBA-101-0-AR-00000-0**0000**-0-0

0000 = *Standard - None*

Blank Module Option
Drain Pan Type

Example: BBA-101-0-AR-00000-00000-**0**-0

0 = *Standard - None*
A = *Auxiliary* - Option includes an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.

Blank Module Option
Type

Example: BBA-101-0-AR-00000-00000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Blank Module.

Coil Module Feature String Nomenclature

MDULE ID	POSITION	COOLING TYPE	ELECTRIC HEAT kW	ELEC HEAT STAGES	HEATING COIL ROWS	HEATING COIL FPI	HEATING COIL CKT	HEAT COIL COATING	COOLING COIL ROWS	COOLING COIL FPI	COOLING COIL CKT	COOL COIL COATING	DRAIN PAN TYPE	TYPE
CLC	- 103 -	F	- 0	0	- 0	00	0	0	- 6	10	I	P	- S	- 0

COIL MODULE DESCRIPTION

Module ID
CLB = Chilled Water or DX
CLC = DX + Hot Gas Reheat
CLF = Hot Water + Chilled Water or DX
CLG = Electric Heat + Chilled Water or DX
CLI = Hot Water, Steam, Chilled Water, or DX with Face and Bypass Dampers
CLM = Chilled Water or DX, Optional Size

Position
= Level and Position of Module in Air Handling Unit

Cooling Type
0 = None
A = Hot Gas Bypass [HGB] Lead + HGB Lag
B = HGB Non-Variable Compressors [HGBNV]
C = Chilled Water
F = DX R-410A
G = HGB Lead
H = Heat Pump
J = HGB Lead + Heat Pump
K = HGB Lead + HGB Lag + Heat Pump
L = HGBNV + Heat Pump

ELECTRIC HEAT
Capacity
0 = No Electric Heat
A = 7 kW (5.3 kW)
B = 14 kW (10.5 kW)
C = 21 kW (15.8 kW)
D = 28 kW (21.0 kW)
H = 35 kW (26.3 kW)
E = 42 kW (35.0 kW)
F = 56 kW (42.0 kW)
G = 70 kW (52.5 kW)
J = 84 kW (63.1 kW)
K = 112 kW (84.1 kW)
L = 126 kW (94.6 kW)
M = 168 kW (126.2 kW)

Stages
0 = Standard - None
1 = 1 Stage
2 = 2 Stage
3 = 3 Stage
4 = 4 Stage

HEATING COIL
Rows
0 = No Hot Water Heating
1 = 1 Row
2 = 2 Rows

FPI
00 = No Hot Water Heating
08 = 8 Fins Per Inch
10 = 10 Fins Per Inch
12 = 12 Fins Per Inch
14 = 14 Fins Per Inch

Circuiting
0 = No Hot Water Heating
F = Single Serpentine
H = Half Serpentine
Q = Quarter Serpentine

Coating
0 = Standard
P = Polymer E-Coating
S = Stainless Steel Coil Casing
H = Stainless Steel Coil Casing & Copper Fins
K = Stainless Steel Coil Casing & Polymer E-Coating

COOLING COIL
Rows
0 = No Cooling Coil
4 = 4 Rows
6 = 6 Rows
8 = 8 Rows

FPI
00 = No Cooling Coil
08 = 8 Fins Per Inch
10 = 10 Fins Per Inch
12 = 12 Fins Per Inch

Coil Module Feature String Nomenclature

MDULE ID	POSITION	COOLING TYPE	ELECTRIC HEAT kW	ELEC HEAT STAGES	HEAT COIL ROWS	HEAT COIL FPI	HEAT COIL CKT	HEAT COIL COATING	COOLING COIL ROWS	COOLING COIL FPI	COOLING COIL CKT	COOL COIL COATING	DRAIN PAN TYPE	TYPE
CLC	- 103 -	F	- 0	0	- 0	00	0	0	- 6	10	**I**	**P**	**- S**	**- 0**

Circuiting
0 = No Cooling Coil
D = Double Serpentine
F = Single Serpentine
H = Half Serpentine
Q = Quarter Serpentine
S = DX Single Circuit
I = DX Dual Circuit, Interlaced

Coating
0 = Standard
P = Polymer E-Coating
S = Stainless Steel Coil Casing
H = Stainless Steel Coil Casing & Copper Fins
K = Stainless Steel Coil Casing & Polymer E-Coating

Drain Pan
S = Stainless Steel

Type
0 = None
S = Steam Heating Coil
X = Special Pricing Authorization

Table 4 –Cooling Coil Module Face Areas

Unit Size	CL_ -B, C, F, G, M **DX Coil** Face Area	CL_ -B, C, F, G, M **Chilled & Hot Water Coil** Face Area	CLC **Reheat Coil** Face Area	CLI **DX Coil** Face Area	CLI **Chilled & Hot Water Coil** Face Area	CLI **Steam Coil** Face Area
005	5.0 ft^2	5.0 ft^2	4.9 ft^2	3.5 ft^2	3.8 ft^2	3.8 ft^2
008	8.0 ft^2	8.1 ft^2	7.8 ft^2	5.0 ft^2	5.0 ft^2	5.3 ft^2
011	10.9 ft^2	11.2 ft^2	10.6 ft^2	6.4 ft^2	6.4 ft^2	6.7 ft^2
014	14.1 ft^2	14.4 ft^2	13.8 ft^2	8.3 ft^2	8.0 ft^2	8.1 ft^2
018	17.5 ft^2	17.6 ft^2	17.3 ft^2	12.6 ft^2	12.2 ft^2	12.4 ft^2
022	21.4 ft^2	21.9 ft^2	21.1 ft^2	15.6 ft^2	15.8 ft^2	16.0 ft^2
026	27.2 ft^2	26.7 ft^2	26.8 ft^2	17.5 ft^2	17.0 ft^2	17.5 ft^2
032	32.2 ft^2	31.9 ft^2	31.8 ft^2	20.0 ft^2	21.1 ft^2	21.1 ft^2
036	36.0 ft^2	36.7 ft^2	35.3 ft^2			

Coil Module Option

Module ID

Example: **CLC**-103-F-00-00000-610IP-S-0

CLB = *Chilled Water or DX* - Chilled water or R-410A DX cooling coil. Chilled water cooling coil will have a single inlet and outlet connection. Supply water connection will be the bottom connection of the coil. Chilled water and DX cooling coil stub outs will be labeled accordingly on the access panel. No valves or valve controls are included with chilled water cooling coils. DX cooling coil will include a thermal expansion valve. Chilled water and DX cooling coils will have sweat type connections.

CLC = *DX + Hot Gas Reheat* - R-410A DX cooling coil with a modulating hot gas reheat coil downstream of the cooling coil. DX cooling coil and modulating hot gas reheat coil stub outs will be labeled accordingly on the access panel. DX cooling coil will include a thermal expansion valve. Modulating 3-way hot gas reheat valve will be included in the matching AAON condensing unit. DX cooling and modulating hot gas reheat coils will have sweat type connections.

CLF = *Hot Water + Chilled Water or DX* - Hot water coil in the preheat position with a chilled water or R-410A DX cooling coil. Chilled water cooling and hot water heating coil will have a single inlet and outlet connection. Supply water connection will be the bottom connection of the coil. Chilled water and DX cooling coil stub outs will be labeled accordingly on the access panel. No valves or valve controls are included with chilled water cooling coils. DX cooling coil will include a thermal expansion valve. Chilled water and DX cooling coils will have sweat type connections.

CLG = *Electric Heat + Chilled Water or DX* - Electric heater with multiple elements in the preheat position with a chilled water or R-410A DX cooling coil. Chilled water cooling coil will have a single inlet and outlet connection. Supply water connection will be the bottom connection of the coil. Chilled water and DX cooling coil stub outs will be labeled accordingly on the access panel. No valves or valve controls are included with chilled water cooling coils. DX cooling coil will include a thermal expansion valve. Chilled water and DX cooling coils will have sweat type connections.

CLI = *Hot Water, Chilled Water, or DX with Face and Bypass Dampers* - Hot water coil, chilled water, or R-410A DX cooling coil with face and bypass dampers. Option reduces the standard face area of the hot water coil, chilled water, or DX cooling coil and reduces the standard maximum airflow of the unit. Chilled water and DX cooling coils will have sweat type connections.

CLM = *Chilled Water or DX, Optional Size* - Chilled water or R-410A DX cooling coil. Chilled water cooling coil will have a single inlet and outlet connection. Supply water connection will be the bottom connection of the coil. Chilled water and DX cooling coil stub outs will be labeled accordingly on the access panel. No valves or valve controls are included with chilled water cooling coils. DX cooling coil will include a thermal expansion valve. Module footprint is reduced from Option CLB and limits coil access. Chilled water and DX cooling coils will have sweat type connections.

Coil Module Option
Position

Example: CLC-**103**-F-00-00000-610IP-S-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the third module in the airstream for "03" as the final two digits.

Coil Module Option
Cooling Type

Example: CLC-103-**F**-00-00000-610IP-S-0

0 = *Standard - None*
A = *Hot Gas Bypass on the Lead and Lag Stages* - Option F + Field adjustable pressure activated bypass valves on the lead and lag refrigeration circuits factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. Option is required on all circuits of Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation.
DX air handling unit includes factory installed expansion valves, a check valve on the hot gas bypass line and liquid, suction, and hot gas line stub outs for connection to a matching AAON condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Hot gas bypass valves will be installed in the matching AAON condensing unit.

Cooling Type Continued

B = *Hot Gas Bypass on Non-Variable Compressors* - Option F + Field adjustable pressure activated bypass valves on only the non-variable compressor refrigeration circuit factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. Option is required on all circuits of Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation.
DX air handling unit includes factory installed expansion valves, a check valve on the hot gas bypass line and liquid, suction, and hot gas line stub outs for connection to a matching AAON condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Hot gas bypass valves will be installed in the matching AAON condensing unit.

C = *Chilled Water* - Chilled water cooling coil with 1/2" OD copper tubes expanded with sine wave enhanced aluminum fins. Supply water connection will be on the bottom of the coil. Chilled water cooling coil includes threaded plugs on both the supply and return headers for water draining and air venting.

F = *DX R-410A* - R-410A DX cooling with 3/8" OD copper tubes mechanically expanded with sine wave enhanced aluminum fins.

G = *Hot Gas Bypass Lead* - Option F + Field adjustable pressure activated bypass valves on the lead and lag refrigeration circuits factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. Option is required on all circuits of Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation.
DX air handling unit includes factory installed expansion valves, a check valve on the hot gas bypass line and liquid, suction, and hot gas line stub outs for connection to a matching AAON condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Hot gas bypass valves will be installed in the matching AAON condensing unit.

H = *Heat Pump* - Heat pump air handling unit which can provide energy efficient heating and cooling.
DX air handling unit includes factory installed expansion valves with check valve, and liquid and suction line stub outs for connection to a matching heat pump condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Matching AAON condensing unit includes reversing valve, suction line accumulator, liquid line receiver, outdoor coil filter dryers, and thermal expansion valves with check valves.

Cooling Type Continued

J = *Heat Pump with Hot Gas Bypass Lead* - Option H + G - Heat pump air handling unit with external hot gas bypass on either a single circuit unit with an on/off compressor or a dual circuit unit with on/off compressor in the second circuit. Factory installed and field adjustable pressure activated bypass valve on the lead refrigeration circuit factory setup to divert hot compressor discharge gas to the evaporator coil if pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option is used to prevent coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation. Hot gas bypass on the lead circuit is required on all Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. Hot gas bypass on the lag circuit is recommended on all VAV and MUA units with variable capacity scroll compressors on only the lead circuit. When lead circuit includes a variable capacity scroll compressor, this option includes hot gas bypass on the lag circuit.
DX air handling unit includes factory installed expansion valves with check valve, a check valve on the hot gas bypass line, and liquid, suction, and hot gas bypass line stub outs for connection to a matching heat pump condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Matching AAON condensing unit includes reversing valve, suction line accumulator, liquid line receiver, outdoor coil filter dryers, hot gas bypass valve, and thermal expansion valves with check valves.

K = *Heat Pump Hot Gas Bypass on the Lead and Lag Stages* - Option H + A - Heat pump air handling unit with external hot gas bypass on both circuits. Factory installed and field adjustable pressure activated bypass valve on both refrigeration circuits factory setup to divert hot compressor discharge gas to the evaporator coil if pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option is used to prevent coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation. Hot gas bypass on the lead and lag circuit is required on all Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors.
DX air handling unit includes factory installed expansion valves with check valve, a check valves on the hot gas bypass lines, and liquid, suction, and two hot gas bypass line stub outs for connection to a matching heat pump condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Matching AAON condensing unit includes reversing valve, suction line accumulator, liquid line receiver, outdoor coil filter dryers, hot gas bypass valves, and thermal expansion valves with check valves.

Cooling Type Continued

L = *Heat Pump with Hot Gas Bypass on Non-Variable Compressors* - Option H + B - Heat pump air handling unit with external hot gas bypass on either a single circuit unit with an on/off compressor or a dual circuit unit with on/off compressor in the second circuit. Factory installed and field adjustable pressure activated bypass valve on the lead refrigeration circuit factory setup to divert hot compressor discharge gas to the evaporator coil if pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option is used to prevent coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation. Hot gas bypass on the lead circuit is required on all Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. Hot gas bypass on the lag circuit is recommended on all VAV and MUA units with variable capacity scroll compressors on only the lead circuit. When lead circuit includes a variable capacity scroll compressor, this option includes hot gas bypass on the lag circuit.
DX air handling unit includes factory installed expansion valves with check valve, a check valve on the hot gas bypass line, and liquid, suction, and hot gas bypass line stub outs for connection to a matching heat pump condensing unit. Expansion valve sensing bulbs must be field installed on the suction lines. Matching AAON condensing unit includes reversing valve, suction line accumulator, liquid line receiver, outdoor coil filter dryers, hot gas bypass valve, and thermal expansion valves with check valves.

Coil Module Option
Electric Heat Capacity

Example: CLC-103-F-**0**0-00000-610IP-S-0

Table 5 - Coil Module Electric Heat Capacities

	Electric Heat Capacity	
	kW (230V, 460V, 575V)	kW (208V)
0 = No Electric Heat		
A = *Heat A*	7	5.3
B = *Heat B*	14	10.5
C = *Heat C*	21	15.8
D = *Heat D*	28	21.0
E = *Heat E*	42	31.5
F = *Heat F*	56	42.0
G = *Heat G*	70	52.5
H = *Heat H*	35	26.3
J = *Heat J*	84	63.0
K = *Heat K*	112	84.1
L = *Heat L*	126	94.6
M = *Heat M*	168	126.2

Coil Module Option
Electric Heat Stages

Example: CLC-103-F-0**0**-00000-610IP-S-0

0 = *Standard - None*
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.

Coil Module Option
Heating Coil Rows

Example: CLC-103-F-00-**0**0000-610IP-S-0

0 = *Standard - None*
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.

Coil Module Option
Heating Coil FPI

Example: CLC-103-F-00-0**00**00-610IP-S-0

00 = *Standard - None*
08 = *8 Fins Per Inch* - Hot water or steam heating coil with 8 fins per inch.
10 = *10 Fins Per Inch* - Hot water or steam heating coil with 10 fins per inch.
12 = *12 Fins Per Inch* - Hot water or steam heating coil with 12 fins per inch. Standard heating coil fpi option.
14 = *14 Fins Per Inch* - Hot water or steam heating coil with 14 fins per inch.

Coil Module Option
Heating Coil Circuiting

Example: CLC-103-F-00-000**0**0-610IP-S-0

0 = *Standard - None*
F = *Single Serpentine* - Hot water or steam heating coil with single serpentine circuitry. In single serpentine coils, # feeds = # tubes high. This option gives the lowest pressure drop and lowest velocities. Standard heating coil circuiting option.
H = *Half Serpentine* - Hot water heating coil with half serpentine circuitry. In half serpentine coils, # feeds = (# tubes high) ÷ 2. Option is not available with steam heating coils.
Q = *Quarter Serpentine* - Hot water heating coil with quarter serpentine circuitry. In quarter serpentine coils, # feeds = (# tubes high) ÷ 4. Option is not available with steam heating coils.

Coil Module Option
Heating Coil Coating

Example: CLC-103-F-00-0000**0**-610IP-S-0

0 = *Standard* - Heating coil includes aluminum casing.
P = *Polymer E-coating* - Polymer e-coating applied to the heating coil. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117, 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.
S = *Stainless Steel Casing* - 18 gauge 304 stainless steel casing on the heating coil.
H = *Stainless Steel Casing and Copper Fins* - Option S + copper fins mechanically bonded to the copper tubes of the coil.
K = *Stainless Steel Casing and Polymer E-coating* - Option S + Option P

Coil Module Option
Cooling Coil Rows

Example: CLC-103-F-00-00000-**6**10IP-S-0

0 = *Standard - None*
4 = *4 Row Coil* - Four row cooling coil. No valves or valve controls are included with a chilled water cooling coil.
6 = *6 Row Coil* - Six row cooling coil. No valves or valve controls are included with a chilled water cooling coil.
8 = *8 Row Coil* - Eight row cooling coil. No valves or valve controls are included with a chilled water cooling coil. Option is only available with chilled water cooling coils.

Coil Module Option
Cooling Coil FPI

Example: CLC-103-F-00-00000-6**10**IP-S-0

00 = *Standard - None*
08 = *8 Fins Per Inch* - Chilled water or R-410A DX cooling coil with 8 fins per inch.
10 = *10 Fins Per Inch* - Chilled water or R-410A DX cooling coil with 10 fins per inch. Standard cooling coil fpi option.
12 = *12 Fins Per Inch* - Chilled water or R-410A DX cooling coil with 12 fins per inch.

Coil Module Option
Cooling Coil Circuiting

Example: CLC-103-F-00-00000-610**I**P-S-0

D = *Double Serpentine* - Chilled water cooling coil with double serpentine circuitry. In double serpentine coils, # feeds = 2*(# tubes high). This option gives the lowest pressure drop and lowest velocities.
F = *Single Serpentine* - Chilled water cooling coil with single serpentine circuitry. In single serpentine coils, # feeds = # tubes high. Standard chilled water cooling coil circuiting option.
H = *Half Serpentine* - Chilled water cooling coil with half serpentine circuitry. In half serpentine coils, # feeds = (# tubes high) ÷ 2.
Q = *Quarter Serpentine* - Chilled water cooling coil with quarter serpentine circuitry. In quarter serpentine coils, # feeds = (# tubes high) ÷ 4.
S = *DX Single Circuit* - Single circuited R-410A DX cooling coil with one liquid and suction coil connections.
I = *DX Dual Circuit, Interlaced* - Dual circuited R-410A DX cooling coil with two liquid and suction coil connections. Coil includes interlaced circuitry.

Coil Module Option
Cooling Coil Coating

Example: CLC-103-F-00-00000-610I**P**-S-0

0 = *Standard* - Cooling coil includes aluminum casing.
P = *Polymer E-coating* - Polymer e-coating applied to both the cooling and heating coils. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117, 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.
S = *Stainless Steel Casing* - 18 gauge 304 stainless steel casing on the heating coil. Modulating hot gas reheat coil will also include a stainless steel casing.
H = *Stainless Steel Casing and Copper Fins* - Option S + copper fins mechanically bonded to the copper tubes of the coil. Modulating hot gas reheat coil will also include copper fins.
K = *Stainless Steel Casing and Polymer E-coating* - Option S + Option P

Coil Module Option
Drain Pan

Example: CLC-103-F-00-00000-610IP-**S**-0

S = *Stainless Steel* - Option includes an 18 gauge 304 stainless steel, sloped drain pan with 1" MPT stainless steel drain pipe on the access side of the unit. Option requires field installed condensate p-trap.

Coil Module Option

Type

Example: CLC-103-F-00-00000-610IP-S-**0**

0 = *Standard - None*
S = *Steam Heating Coil* - Steam distributing heating coil. The maximum steam operating pressure is 25 psi. No valves or valve controls are included with this option. Coil Module must be selected with a heating coil option.
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Coil Module.

Controls Module Feature String Nomenclature

MDULE ID	POSITION	BLANK	BLANK	SAFETY CONTROL	BLANK	BLANK	BLANK	TYPE
TRA	- 101 -	0	- 00 -	0	0000	- 00000 -	0	- 0

CONTROLS MODULE DESCIPTION

Module ID
TRA = Small
TRB = Medium
TRC = Large
TRD = XL
TRE = XXL
TRF = XXXL

Position
= Level and Position of Module in Air Handling Unit

Blank
0 = Standard

Blank
00 = Standard

Safety Options
0 = Standard
2 = Firestat

Blank
0000 = Standard

Blank
00000 = Standard

Blank
0 = Standard

Type
0 = None
X = Special Pricing Authorization

Controls Module Option
Module ID

Example: **TRA**-101-0-00-00000-00000-0-0

TRA = *Small* - Option includes a small footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
TRB = *Medium* - Option includes a medium footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
TRC = *Large* - Option includes a large footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
TRD = *XL* - Option includes an extra-large footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
TRE = *XXL* - Option includes an extra, extra-large footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.
TRF = *XXXL* - Option includes an extra, extra, extra-large footprint module with integrated control panel. Module will have a hinged access door with lockable handle on access side of the unit. Module footprint will be shown on unit submittal drawing.

Controls Module Option
Position

Example: TRA-**101**-0-00-00000-00000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number 1 indicates the module is on the first level, and a number 2 indicates the module is on the second level. The final two digits of the position indicate the module position in the airstream. For example, this module would be the first module in the airstream for "01" as the final two digits.

Controls Module Option
Blank

Example: TRA-101-**0**-00-00000-00000-0-0

0 = *Standard - None*

Controls Module Option
Blank

Example: TRA-101-0-**00**-00000-00000-0-0

00 = *Standard - None*

Controls Module Option
Safety Options

Example: TRA-101-0-00-**0**0000-00000-0-0

0 = *Standard*
2 = *Firestat* - Bimetallic snap-action safety switch sensing temperature only. The switch is rated to 125°F. Switch manually resets and is wired to shut down the 24 VAC control circuit. Firestats are non-addressable.

Controls Module Option
Blank

Example: TRA-101-0-00-0**0000**-00000-0-0

0000 = *Standard - None*

Controls Module Option
Blank

Example: TRA-101-0-00-00000-**00000**-0-0

00000 = *Standard - None*

Controls Module Option
Blank

Example: TRA-101-0-00-00000-00000-**0**-0

0 = *Standard - None*

Controls Module Option
Type

Example: TRA-101-0-00-00000-00000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Control Module.

Energy Recovery Module Feature String Nomenclature

MDULE ID	POSITION	WHEEL SIZE	RECOVERY TYPE	BLANK	BLANK	VFD CONTROL	TYPE
HRA	- 101 -	A	- 00 -	00000	- 00000 -	0	- 0

ENERGY RECOVERY MODULE DESCRIPTION

Module ID
HRA = AAONAIRE® Energy Recovery Wheel

Position
= Level and Position of Module in Air Handling Unit

Wheel Size
A = Standard

Recovery Type
00 = Standard
0A = Total Energy Recovery + 1% Purge
A0 = Sensible Only Energy Recovery
AA = Sensible Only Energy Recovery + 1% Purge

Blank
00000 = Standard

Blank
00000 = Standard

VFD Control
0 = Standard
A = VFD Controlled Wheel

Type
0 = None
X = Special Pricing Authorization

Energy Recovery Module Option
Module ID

Example: **HRA**-102-A-00-00000-00000-0-0

HRA = *AAONAIRE® Energy Recovery Wheel* - Factory installed energy recovery wheel. Options includes full length access door with removable pin hinges and lockable handles on the access side of the unit.

Energy Recovery Module Option
Position

Example: HRA-**102**-A-00-00000-00000-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number "1" indicates the module is on the first level, and a number "2" indicates the module is on the second level. Units with Energy Recovery modules will have two levels. The first digit of an Energy Recovery module will always be "1". The final two digits of the position indicate the module position in the airstream. For example, this module would be the second module in the airstream for "02" as the final two digits.

Energy Recovery Module Option
Wheel Size

Example: HRA-102-**A**-00-00000-00000-0-0

Table 6 - Standard Energy Recovery Wheel Sizes

M2 Model Size	Energy Recovery Wheel	
	Diameter / Width	Maximum Air Flow Through the Wheel
M2-005	36" / 3"	3,900 cfm
M2-008	41" / 3"	4,800 cfm
M2-011	52" / 3"	8,250 cfm
M2-014		
M2-018	64" / 3"	12,000 cfm
M2-022	68" / 3"	13,500 cfm
M2-026	74" / 3"	16,000 cfm
M2-032	86" / 3"	22,000 cfm
M2-036		

Energy Recovery Module Option
Energy Recovery Type

Example: HRA-102-A-**00**-00000-00000-0-0

00 = *Standard* - 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.
0A = *Total Energy Recovery, 1% Purge* - 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. The wheel also includes a mechanical purge that uses the outdoor air stream to flush potential exhaust air carryover. Purge angle is field adjustable.
A0 = *Sensible Only Energy Recovery* - Sensible only energy recovery wheel without mechanical purge. The wheel does not include silica gel desiccant on the substrate.
AA = *Sensible Only Energy Recovery, 1% Purge* - Sensible only energy recovery wheel with mechanical purge. The wheel does not include silica gel desiccant on the substrate. The wheel also includes a mechanical purge that uses the outdoor air stream to flush potential exhaust air carryover. Purge angle is field adjustable.

Energy Recovery Module Option
Blank

Example: HRA-102-A-00-**00000**-00000-0-0

00000 = *Standard - None*

Energy Recovery Module Option
Blank

Example: HRA-102-A-00-00000-**00000**-0-0

00000 = *Standard - None*

Energy Recovery Module Option
VFD Control

Example: HRA-102-A-00-00000-00000-**0**-0

0 = *Standard - None*
A = *VFD Controlled Wheel* - Option includes a premium efficiency energy recovery wheel motor and factory supplied VFD for speed control of the energy recovery wheel. VFD requires field provided control signal.

Energy Recovery Module Option
Type

Example: HRA-102-A-00-00000-00000-0-**0**

0 = *Standard - None*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Energy Recovery Module.

Water-Source Heat Pump Module Feature String Nomenclature

MDULE ID	POSITION	REVISION	CAPACITY	COMP	STAGING	BLANK	REFRIG OPTIONS	REFRIG ACCESS	BLANK	WATER SIDE	HEAT EXCHANGER	BLANK	TYPE
WHP	**-**	**204**	**-**	**A**	**-**	**25**	**-**	**D**	**K**	**000**	**-**	**D**	**A**	**0**	H	0	-	0	-	0

WATER-SOURCE HEAT PUMP MODULE DESCRIPTION

Module ID
WHP = Water-source heat pump
WCC = Water-cooled condenser (A/C only)

Position
= Level and Position of Module in Air Handling Unit

Revision
A

Capacity
03 = 3 tons
04 = 4 tons
05 = 5 tons
06 = 6 tons
07 = 7 tons
08 = 8 tons
10 = 10 tons
11 = 11 tons
13 = 13 tons
15 = 15 tons
16 = 16 tons
18 = 18 tons
20 = 20 tons
25 = 25 tons
30 = 30 tons
40 = 40 tons
50 = 50 tons
60 = 60 tons
70 = 70 tons

Compressor Style
A = R-410A Scroll Compressor
B = R-410A Two-Step Capacity Scroll Compressor
D = R-410A Variable Capacity Scroll Compressor
E = R-410A Tandem Scroll Compressor
G = R-410A Tandem Variable Capacity Scroll Compressor

Staging
G = 1 On/Off Refrigeration System
H = 1 Variable Capacity Refrigeration System
J = 2 On/Off Refrigeration Systems
K = Lead Variable Capacity Refrigeration System + Lag On/Off Refrigeration System
L = 2 Variable Capacity Refrigeration Systems

Blank
000 = Standard

Refrigeration Options
0 = Standard
A = Hot Gas Bypass [HGB] - Lead Stage
B = HGB Lead + HGB Lag
C = HGB Lag
D = Modulating Hot Gas Reheat [MHGR]
E = Options A + D
F = Options A + C + D
G = Options C + D

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

Blank
0 = Standard

Water-Source Heat Pump Module Feature String Nomenclature

MDULE ID	POSITION	REVISION	CAPACITY	COMP STAGING	BLANK	REFRIG OPTIONS	REFRIG ACCESS	BLANK	WATER SIDE	HEAT EXCHANGER	BLANK	TYPE
WHP	- 204	- A	- 25	- D	K	000	- D	A	0	**H**	**0**	**- 0 - 0**

Water-Side Options
0 = Standard
A = Balancing Valves
B = Water Flow Switch
C = Motorized Shut-off Valve
D = 2 Way Head Pressure Control
E = 3 Way Head Pressure Control
F = Options B + A
G = Options B + C
H = Options B + D
J = Options B + E
K = Options B +A + C
L = Options B + A + D
M = Options B + A + E
P = Options A + C
Q = Options A + D
R = Options A + E

Heat Exchanger Type
0 = Standard
A = SMO 254 Brazed Plate Heat Exchanger
B = Cupronickel Coaxial Heat Exchanger

Blank
0 = Standard

Type
0 = None
X = Special Pricing Authorization

Water-Source Heat Pump Module Option
Module ID

Example: **WHP**-204-A-25-DK000-DA0H0-0-0

WHP = *Water-Source Heat Pump* - Water-source heat pump that can provide energy efficient heating and cooling. Refrigerant-to-water heat exchangers and refrigerant piping with reversing valves, filter dryers, check valves, and thermal expansion valves are factory installed. Refer to Heat Exchanger Type section for the type of factory installed refrigerant-to-water heat exchanger. Units shipped as individual modules will have refrigerant piping stub outs external to the unit and will be labeled for field connection.
WCC = *Water-Cooled Condenser* - Water-cooled condenser that can provide energy efficient cooling only. Refer to Heat Exchanger Type section for the type of factory installed refrigerant-to-water heat exchanger. Option is only available on units with capacities greater than 20 tons. Units shipped as individual modules will have refrigerant piping stub outs external to the unit and will be labeled for field connection.

Water-Source Heat Pump Module Option
Position

Example: WHP-**204**-A-25-DK000-DA0H0-0-0

= *Module Position* - The first digit of the position indicates on which level the module is located. A number "1" indicates the module is on the first level, and a number "2" indicates the module is on the second level. Units with Energy Recovery modules will have two levels. The first digit of an Energy Recovery module will always be "1". The final two digits of the position indicate the module position in the airstream. For example, this module would be the fourth module in the airstream for "04" as the final two digits.

Water-Source Heat Pump Module Option
Revision

Example: WHP-204-**A**-25-DK000-DA0H0-0-0

A = *Design Revision* - This digit is used for future product updates and improvements.

Water-Source Heat Pump Module Option

Capacity

Example: WHP-204-A-**25**-DK000-DA0H0-0-0

The capacity designation denotes the nominal capacity in tons of cooling at AHRI conditions for M2 Series units with water-cooled condensers. Actual capacities will vary with conditions. Refer to the AAON ECat software for performance, cooling, and heating capacities at design conditions.

Table 7 - Water-Source Heat Pump Module Capacities

Cooling Capacity (tons)	Cabinet Size*	Compressors/Circuits	Refrigerant-to-Water Heat Exchanger
03	005	1/1	Coaxial
04			
05			
06	008		Brazed Plate
07			
08			
10			
11	011 014	2/2	
13			
15			
16	018 022		
18			
20			
25			
30	018 022 026		
40	026 032	4/2**	
50	026 032 036		
60	032 036		
70			

* The cabinet size corresponds to the cabinet size in the base model description section.
**Compressors are tandem circuited.

Water-Source Heat Pump Module Option
Compressor Style

Example: WHP-204-A-25-**D**K000-DA0H0-0-0

A = *R-410A Scroll Compressor* - Compressorized DX cooling with R-410A refrigerant using on/off compressors. See Table 7 for the quantity of on/off scroll compressors.
B = *R-410A Two-Step Capacity Scroll Compressor* – Compressorized DX cooling with R-410A refrigerant using two-step scroll compressors. Capacity steps are 100% and 67%. See Table 7 for the quantity of two-step scroll compressors. Option provides the unit with improved temperature control, improved humidity control, and energy savings at part load conditions. Option is only available up to a capacity of 5 tons.
D = *R-410A Variable Capacity Scroll Compressor* - Compressorized DX cooling with R-410A refrigerant using 10-100% variable capacity scroll compressors. See Table 7 for the quantity of variable capacity scroll compressors. A suction pressure transducer will be provided per variable capacity compressor. Option provides the unit with tighter temperature control, improved humidity control, and energy savings at part load conditions. Option is only available up to a capacity of 30 tons.
E = *R-410A Tandem Scroll Compressor* - Compressorized DX cooling with R-410A refrigerant using tandem scroll compressors. See Table 7 for the quantity of individual scroll compressors. Option is only available from capacities of 40 to 70 tons.
G = *R-410A Tandem Variable Capacity Scroll Compressor* - Compressorized DX cooling with R-410A refrigerant using tandem 10-100% variable capacity scroll compressors. See Table 7 for the quantity of individual compressors. Option is only available from capacities of 40 to 70 tons. See Staging selection for the number of variable capacity compressors.

Water-Source Heat Pump Module Option
Staging

Example: WHP-204-A-25-D**K**000-DA0H0-0-0

G = *1 On/Off Refrigeration System* - DX cooling and/or heat pump heating unit with an on/off compressor on the refrigeration circuit. Option is available with a 2-step compressor offering a second stage of capacity control. Option is only available with single refrigeration circuit units, capacities up to 10 tons.
H = *1 Variable Capacity Refrigeration System* - Modulating DX cooling and/or heat pump heating unit. Option includes a 10-100% variable capacity compressor. Option is only available with single refrigeration circuit units, capacities up to 10 tons.
J = *2 On/Off Refrigeration Systems* - DX cooling and/or heat pump heating unit with an on/off compressor on each refrigeration circuit. Option is only available with two refrigeration circuit units, capacities of 11 to 70 tons.

Refrigeration Options Continued

K = *Lead Variable Capacity Refrigeration System + Lag On/Off Refrigeration System* - Modulating DX cooling and/or heat pump heating unit. Option includes a 10-100% variable capacity compressor on lead refrigeration circuit and an on/off compressor on the lag refrigeration circuit. Option is only available on two refrigeration circuit units, capacities of 11 to 70 tons.
L = *2 Variable Capacity Refrigeration Systems* - Modulating DX cooling and/or heat pump heating unit. Option includes a 10-100% variable capacity compressor on both the lead and lag refrigeration circuits. Option is only available on two refrigeration circuit units, capacities of 11 to 70 tons.

Water-Source Heat Pump Module Option
Blank

Example: WHP-204-A-25-DK**000**-DA0H0-0-0

000 = *Standard*

Water-Source Heat Pump Module Option
Refrigeration Options

Example: WHP-204-A-25-DK000-**D**A0H0-0-0

0 = *Standard* - Each refrigeration circuit includes a manual reset high pressure cutout, an automatic reset low pressure cutout, compressor overload protection, and a thermal expansion valve.
A = *Hot Gas Bypass [HGB] - Lead Stage* - Field adjustable pressure activated bypass valve on the lead refrigeration circuit factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option is used to prevent coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. This option is used for refrigeration system protection only and cannot be used for cooling capacity modulation. **Hot gas bypass is required on all Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors. Hot gas bypass on the lag refrigeration circuit(s) is recommended on all VAV and MUA units with variable capacity scroll compressors on only the lead refrigeration circuit.**

Refrigeration Options Continued

B = *HGB Lead + HGB Lag* - Field adjustable pressure activated bypass valves on the lead and lag refrigeration circuits factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator side of the valve drops below 105 psi (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low air flow or cold entering coil conditions without cycling of the compressors on and off. This option is used for refrigerant system protection only and cannot be used for cooling capacity modulation. **Hot gas bypass is required on all Variable Air Volume (VAV) and Makeup Air (MUA) units without variable capacity scroll compressors.**
C = *HGB Lag* - Field adjustable pressure activated bypass valves on the lag refrigeration circuit(s) factory setup to divert hot compressor discharge gas to the evaporator coil if the pressure on the evaporator sided of the valve drops below 105 psi (34°F at sea level). The bypass valve is at full capacity after six degrees of differential (28°F at sea level). This option prevents coil freeze-up during periods of low air flow or cold entering coil conditions without cycling the compressors on and off. This option is used for refrigerant system protection only and cannot be used for cooling capacity modulation. **Hot gas bypass on the lag refrigeration circuit(s) is recommended on all VAV and MUA units with variable capacity scroll compressors on only the lead refrigeration circuits.**
D = *Modulating Hot Gas Reheat [MHGR]* - Reheat coil mounted downstream of the evaporator and piped to the lead refrigeration circuit which provides the unit with a dehumidification mode of operation for when the cooling load has been satisfied. Option includes 3-way modulating reheat control valve, supply air temperature sensor, and DDC controller to maintain the supply air temperature during the dehumidification mode of operation.
E = *HGB Lead + MHGR* - Options A + D.
F = *HGB Lead + HGB Lag + MHGR* - Options A + C + D.
G = *HGB Lag + MHGR* - Options C + D.

Water-Source Heat Pump Module Option

Refrigeration Accessories

Example: WHP-204-A-25-DK000-D**A**0H0-0-0

0 = *Standard*
A = *Sight Glass* - Moisture indications sight glass attached to the refrigeration circuit liquid lines. A green color refrigerant indicates a dry condition, a chartreuse color (green with a yellow tint or bright green) indicates caution, and a yellow color indicates a wet condition. The sight glass is not a charge indicator.

Refrigeration Accessories Continued

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 compressor 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.

Water-Source Heat Pump Module Option
Blank

Example: WHP-204-A-25-DK000-DA**0**H0-0-0

0 = *Standard*

Water-Source Heat Pump Module Option
Water Side Options

Example: WHP-204-A-25-DK000-DA0**H**0-0-0

0 = *Standard*
A = *Balancing Valves* - Option includes factory installed ball type valves in the condenser water piping with pressure taps on either side of the valve for water balancing.
B = *Water Flow Switch* - Options includes a factory installed flow switch that shuts down the unit's compressors if the condenser water flow is interrupted.
C = *Motorized Shut-off Valve* - Option includes a factory installed two position motorized valve that shuts off condenser water flow when the unit is off.
D = *2 Way Head Pressure Control* - Option includes a two way modulating head pressure control condenser water valve and head pressure control module that allows unit operation below 65°F condenser water temperature. The modulating valve restricts water flow through the condenser to maintain proper head pressure. Option requires a field supplied, field installed variable speed water pump up stream of the condenser.
E = *3 Way Head Pressure Control* - Option includes a three way head pressure control condenser water valve and head pressure control module that allows unit operation below 65°F condenser water temperature. The three way valve bypasses a portion of the entering condenser water in order to maintain proper head pressure.

Water Side Options Continued

F = *Water Flow Switch + Balancing Valves* - Options B + A.
G = *Water Flow Switch + Motorized Shut-off Valve* - Options B + C.
H = *Water Flow Switch + 2 Way Head Pressure Control* - Options B + D.
J = *Water Flow Switch + 3 Way Head Pressure Control* - Options B + E.
K = *Water Flow Switch + Balancing Valves + Motorized Shut-off Valve* - Options B + A + C.
L = *Water Flow Switch + Balancing Valves + 2 Way Head Pressure Control* - Options B + A + D.
M = *Water Flow Switch + Balancing Valves + 3 Way Head Pressure Control* - Options B + A + E.
P = *Balancing Valves + Motorized Shut-off Valves* - Options A + C.
Q = *Balancing Valves + 2 Way Head Pressure Control* - Options A + D.
R = *Balancing Valves + 3 Way Head Pressure Control* - Options A + E.

Water-Source Heat Pump Module Option
Heat Exchanger Type

Example: WHP-204-A-25-DK000-DA0H**0**-0-0

0 = *Standard* - Units with capacities of 5 tons and below will be factory assembled with a coaxial refrigerant-to-water heat exchanger. Units with capacities greater than 5 tons will be factory assembled with a brazed plate refrigerant-to-water heat exchanger.
A = *SMO 254 Brazed Plate Heat Exchanger* - SMO 254 brazed plate refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. This option is required with open loop condenser water cooling tower applications. Option is not available on capacities less than 8 tons. Option is also not available on sizes 40-70 tons.
B = *Cupronickel Coaxial Heat Exchanger* - CuNi coaxial refrigerant-to-water heat exchanger provides additional chloride corrosion resistance. This option is required with open loop condenser water cooling tower applications. Option is only available on capacities of 3 to 5 tons.

Water-Source Heat Pump Module Option
Blank

Example: WHP-204-A-25-DK000-DA0H0-**0**-0

0 = *Standard*

Water-Source Heat Pump Module Option

Type

Example: WHP-204-A-25-DK000-DA0H0-0-**0**

0 = *Standard*
X = *Special Pricing Authorization* - The Product Support Department must issue a Special Pricing Authorization (SPA) to include any non-standard options. This option is reserved for SPAs that only affect the Water-Source Heat Pump Module.

Design Considerations

Air System
Design possibilities are numerous. The M2 Series can be used for horizontal draw-through, blow-through, and single or two tier arrangements. Single tier designs can accommodate most applications using the available options, or configure a two tier unit for energy recovery systems.

Module Configuration
M2 Series modules are stackable. All modules are engineered for the easiest arrangement, so there are no spacers or overhangs to contend with during design. For assistance with module arrangement possibilities, contact your local AAON representative.

Installation Flexibility
M2 Series modular air handlers are engineered for maximum adaptability to jobsite conditions. The unit can be shipped with modules connected in a fully assembled unit or as separate modules for assembly on the jobsite. In either case, all features are factory installed.

Placement
Single level size M2-005 to M2-014 can be suspended from overhead structures. All other units can be set on the floor. The unit must be installed level for proper operation.

For floor setting, a concrete slab surface or other similarly rigid flooring is recommended. Units with cooling coils will require enough height in order to properly trap the condensate drain line according to application needs.

Accessibility
Units must be placed to ensure proper service access. All internal components are accessible from the access side of the M2 via hinged doors, or removable panels. Hinged doors can be removed if necessary by pulling the pin from the steel hinge. Coils, energy recovery wheels, filters, and fan components can all be removed through the service access side. Ensure that there is enough clearance for these internal components to be removed. In general, service access side clearance equal to or greater than the unit width is recommended. The non-service access side may be placed adjacent to a wall.

Vibration Isolation
Acoustical requirements should be considered long before the unit is set into place. Use good vibration engineering practices in tandem with the M2 internal fan isolation. Rubber-in-shear isolation is standard in units up to M2-014, except ECM fans which use neoprene gasket. Spring isolation is standard in M2-018 and up.

Piping
Design piping according to professionally accepted industry standards and practices. Piping to the coil header connections must be supported independently of the coil to prevent undue stress from weakening connections over time. Allow adequate flexibility for thermal expansion of the piping.

Water Piping
Be aware of the potential for lower than normal entering air temperatures (typically air temperatures below 40°F) when specifying water piping. Use proper glycol solutions to help prevent coil freezing. Several preheat options are also available for the M2 Series.

Supply and return connections are stubbed externally to the unit, and labeled. Supply and return connections will be as sweat type.

Vent and drain connections can be accessed within the cabinet.

Steam Piping
Ensure that adequate flexibility for thermal expansion has been allowed to prevent damage to coils and connections. Make pipe size reductions before the trap and not at the return connection. **Do not** undersize traps and ensure that the required pressure differential will always be available. Bucket traps are recommended on systems using low pressure steam.

Refrigerant Piping
Refer to the ASHRAE handbooks, ASME standards, and the instructions for proper refrigerant piping design information.

The AAON Refrigerant Piping Calculator can also help with selection.

The piping between the condenser and low side must ensure:

Minimum pressure drop
Continuous oil return
Prevention of liquid refrigerant slugging or carryover to the compressor

Acceptable system design and installation will include consideration as follows:

Use only clean type L copper tubing that has been joined with high temperature brazing alloy.

The pipe sizes must be selected to meet the actual installation conditions, not based on the connection sizes at the evaporator and condensing unit.

When sizing refrigerant lines, cost considerations favor keeping line sizes as small as possible. However, excessive suction or discharge line pressure drops cause loss of compressor capacity and increased power usage resulting in reduced system efficiency. Furthermore, excessive liquid line pressure drops can cause the liquid refrigerant to flash, resulting in faulty expansion valve operation.

Correct sizing must be based on minimizing cost and maximizing efficiency. Pressure drop calculations are referenced as normal pressure loss associated with a change in saturation temperature of the refrigerant.

Line Length
Equivalent line length (total line length) is the sum of all interconnecting copper tubing including all horizontal and vertical lengths, elbows, fittings, valves and other accessories. Use equivalent line lengths when calculating pressure drop. Special piping provisions must be taken when lines run up vertical risers or in excessively long line runs.

Maximum equivalent line length for a given system design **will be determined by good selection practices**. Always refer to ASHRAE and ASME standards for the most complete piping information.

Refrigerant Piping Calculator

The program contained in the *AAON Engineering Toolkit* section of the *AAON ECat* equipment rating and selection software can be used to size liquid, discharge, and suction lines.

The program calculates the equivalent line length as the sum of the actual length plus the number of elbows times the equivalent length per elbow. Pressure drop of other components should be incorporated using the *ASHRAE Refrigeration Handbook* to determine fitting and valve losses in equivalent lengths of pipe. Additional losses should be added to the total length before calculation.

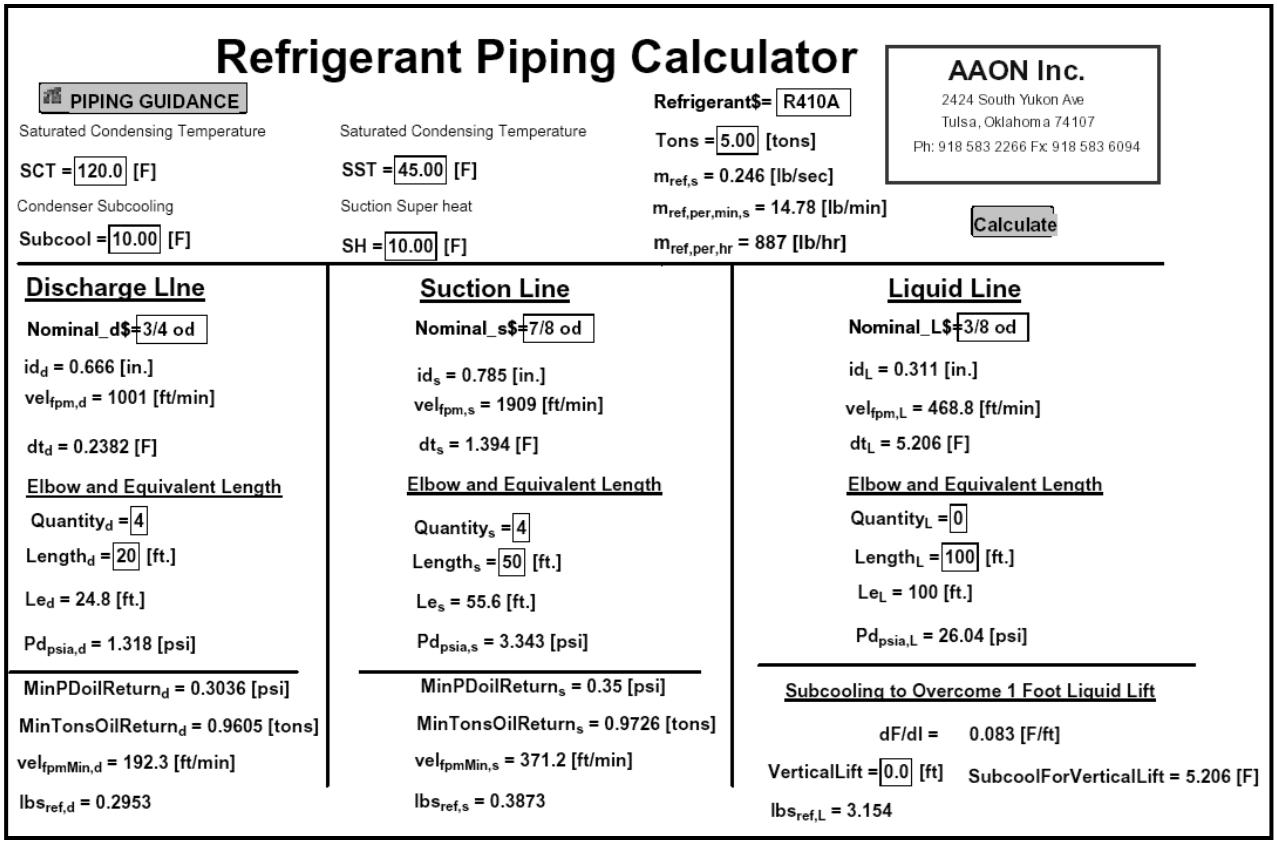


Figure 12 - AAON ECat: Refrigerant Piping Calculator

Cabinet Construction

All M2 Series units are insulated with closed-cell polyurethane foam, which has a significantly greater R-value than fiberglass insulation. All cabinet walls and roof use double-wall G90 galvanized steel. The solid core foam interior provides a rigid, impact resistant surface. All panels have a thermal break with no metal-to-metal contact from outside to inside.

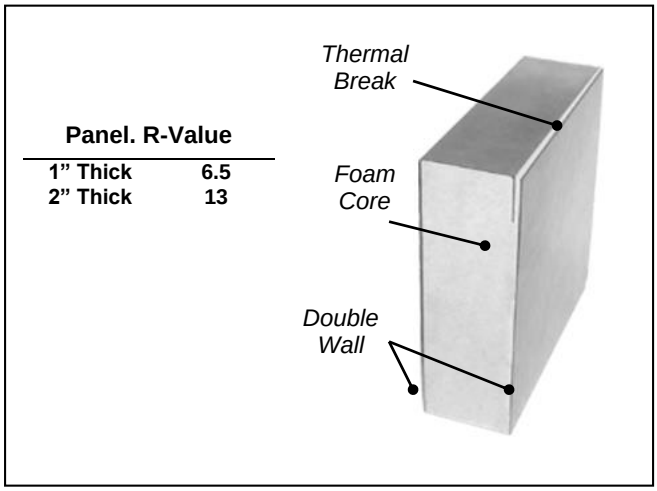


Figure 13 - Rigid Polyurethane Foam Panel Construction

Special Applications

Modulating Hot Gas Reheat (MHGR)

Dehumidification with reheat systems is accomplished by allowing longer cooling run times for moisture removal. Long run cycles cannot be accomplished if the space temperature sensor is satisfied too quickly. Thus, a reheat system can be used to maintain neutral air temperatures during the dehumidification process.

A hot gas reheat coil can be placed after the cooling coil for reheat dehumidification. Hot gas reheat coils are built into the same module as the accompanying DX evaporator.

AAON MHGR is a very effective modulating reheat system for use in dual circuit DX cooling applications. *Modulating* means that the amount of reheat used can be controlled.

Hot Gas Bypass

HGB is required on DX systems that may have low suction pressure during the operating cycle due to varying load conditions. Varying loads include variable air volume (VAV) applications and units with a large percentage of outside air. HGB is not necessary on circuits that have variable capacity compressors.

Total Energy Recovery

The AAONAIRE energy recovery unit recovers sensible and/or latent energy from exhaust air and preconditions entering air. This saves energy by reducing mechanical heating and cooling use, and lowers costs by allowing the selection of smaller equipment. When used with heating and cooling systems, AAONAIRE total energy recovery can increase effective system capacity by 30% or more.

The energy recovery wheel is a disc composed of spirally wound desiccant matrix material. The wheel is divided across the center when installed, and rotated by an electric motor at up to 60 RPM so that one half of the matrix material is exposed at one moment to the exhaust air stream, and at the next moment to the ventilation supply air stream. With a heat wheel, efficiencies of 70 to 85% are achievable for both sensible and latent energy transfer.

General Data

Table 8 - M2 Series Size 005 and 008 DX Cooling and Electric Heat Data

	Model Size						
	M2-005			M2-008			
cfm Range	1,000-2,700			2,000-4,400			
Water-Source Heat Pump*							
Nominal Capacity (tons)	3	4	5	6	7	8	10
Compressors*							
Quantity/Nominal Tons							
R-410A	1/3	1/4	1/5	1/6	1/7	1/8	1/10
R-410A Two-Step	1/3 T-S.	1/4 T-S.	1/5 T-S.				
R-410A 1 Variable Capacity Refrigeration System	1/3 Var.	1/4 Var.	1/5 Var.	1/6 Var.	1/7 Var.	1/8 Var.	1/10 Var.
R-410A 2 Variable Capacity Refrigeration Systems							
Capacity Steps	100, 100/67 with two-step compressor, or 10-100% with variable capacity compressor			100 or 10-100% with variable capacity compressor			
Refrigeration Circuits	1						
Evaporator Coil							
R-410A High Efficiency Coil							
Quantity/Face Area	1/5.0ft^2			1/8.0ft^2			
Coil Rows/fpi	6/10						
Coil Circuiting	Single Circuit						
R-410A Standard Efficiency Coil							
Quantity/Face Area	1/5.0ft^2			1/8.0ft^2			
Coil Rows/fpi	4/10						
Coil Circuiting	Single Circuit						
Water-Cooled Condenser*							
Minimum gpm	6.00	7.00	10.00	8.10	9.45	11.50	13.50
Maximum gpm	24.00	28.00	40.00	32.40	37.80	47.50	54.00
Electric Heat							
Minimum / Maximum Capacity (kW)							
230/380/460/575V 3Φ	7 / 30			14 / 100			
208V 3Φ	5.3 / 22.5			10.5 / 75.0			

*Only applies to units configured with a water-source heat pump module.

Table 9 - M2 Series Size 005 and 008 Hydronic, Gas Heat, and Fan Data

	Model Size	
	M2-005	M2-008
Gas Heat		
Capacity (MBH)		
Minimum Natural Gas Input/Output	50/40	50/40
Maximum Natural Gas Input/Output	175/140	300/240
Hot Water Heating Coil		
Quantity/Face Area	1/5.0ft^2	1/8.1ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Steam Heating Coil		
Quantity/Face Area	1/5.3ft^2	1/8.3ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Chilled Water Cooling Coil		
Quantity/Face Area	1/5.0ft^2	1/8.1ft^2
Standard Rows/fpi	6/10	
Standard Circuiting	Single Serpentine	
Supply Fan		
Quantity	1	
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD or ECM	
Fan Isolation	Rubber-in-Shear or Neoprene Gasket	
Power Exhaust/Return Fan		
Quantity	1	
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD or ECM	
Fan Isolation	Rubber-in-Shear or Neoprene Gasket	
Energy Recovery Wheel		
Wheel Diameter/Width	36” / 3”	41” / 3”
Maximum Airflow (cfm)	3,900	4,800

Table 10 - M2 Series Size 011 and 014 DX Cooling and Electric Heat Data

	Model Size					
	M2-011			M2-014		
cfm Range	3,100-6,000			5,000-7,700		
Water-Source Heat Pump*						
Nominal Capacity (tons)	11	13	15	11	13	15
Compressors*						
Quantity/Nominal Tons						
R-410A	2/5	2/6	2/7	2/5	2/6	2/7
R-410A Two-Step	2/5 T-S.			2/5 T-S.		
R-410A 1 Variable Capacity Refrigeration System	1/5, 1/5 Var.	1/6, 1/6 Var.	1/7, 1/7 Var.	1/5, 1/5 Var.	1/6, 1/6 Var.	1/7, 1/7 Var.
R-410A 2 Variable Capacity Refrigeration Systems	2/5 Var.	2/6 Var.	2/7 Var.	2/5 Var.	2/6 Var.	2/7 Var.
Capacity Steps	100, 100/67 with two-step compressor, or 10-100% with variable capacity compressor			100 or 10-100% with variable capacity compressor		
Refrigeration Circuits	2					
Evaporator Coil						
R-410A High Efficiency Coil						
Quantity/Face Area	1/10.9ft^2			1/14.1ft^2		
Coil Rows/fpi	6/10					
Coil Circuiting	Interlaced					
R-410A Standard Efficiency Coil						
Quantity/Face Area	1/10.9ft^2			1/14.1ft^2		
Coil Rows/fpi	4/10					
Coil Circuiting	Interlaced					
Water-Cooled Condenser*						
Minimum gpm	16.00	19.25	23.00	16.00	19.25	23.00
Maximum gpm	67.00	80.00	95.00	67.00	80.00	95.00
Electric Heat						
Minimum / Maximum Capacity (kW)						
230/380/460/575V 3Φ	14 / 100					
208V 3Φ	10.5 / 75.0					

*Only applies to units configured with a water-source heat pump module.

Table 11 - M2 Series Size 011 and 014 Hydronic, Gas Heat, and Fan Data

	Model Size	
	M2-011	M2-014
Gas Heat		
Capacity (MBH)		
Minimum Natural Gas Input/Output	75/60	100/80
Maximum Natural Gas Input/Output	350/280	400/320
Hot Water Heating Coil		
Quantity/Face Area	1/11.2ft^2	1/14.4ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Steam Heating Coil		
Quantity/Face Area	1/11.0ft^2	1/14.4ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Chilled Water Cooling Coil		
Quantity/Face Area	1/11.2ft^2	1/14.4ft^2
Standard Rows/fpi	6/10	
Standard Circuiting	Single Serpentine	
Supply Fan		
Quantity	1	
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD or ECM	
Fan Isolation	Rubber-in-Shear or Neoprene Gasket	
Power Exhaust/Return Fan		
Quantity	1	
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD or ECM	
Fan Isolation	Rubber-in-Shear or Neoprene Gasket	
Energy Recovery Wheel		
Wheel Diameter/Width	52” / 3”	
Maximum Airflow (cfm)	8,250	

Table 12 - M2 Series Size 018 DX Cooling and Electric Heat Data

	Model Size				
	M2-018				
cfm Range	6,000-10,300				
Water-Source Heat Pump*					
Nominal Capacity (tons)	16	18	20	25	30
Compressors*					
Quantity/Nominal Tons					
R-410A	2/7	2/8	2/9	2/11	2/13
R-410A Two-Step					
R-410A 1 Variable Capacity Refrigeration System	1/7, 1/7 Var.	1/8, 1/8 Var.	1/9, 1/9 Var.	1/11, 1/11 Var.	1/13, 1/13 Var.
R-410A 2 Variable Capacity Refrigeration Systems	2/7 Var.	2/8 Var.	2/9 Var.	2/11 Var.	2/13 Var.
Capacity Steps	100 or 10-100% with variable capacity compressor				
Refrigeration Circuits	2				
Evaporator Coil					
R-410A High Efficiency Coil					
Quantity/Face Area	1/17.5ft^2				
Coil Rows/fpi	6/10				
Coil Circuiting	Interlaced				
R-410A Standard Efficiency Coil					
Quantity/Face Area	1/17.5ft^2				
Coil Rows/fpi	4/10				
Coil Circuiting	Interlaced				
Water-Cooled Condenser*					
Minimum gpm	21.60	24.30	27.00	33.75	40.50
Maximum gpm	86.40	97.20	108.00	135.00	162.00
Electric Heat					
Minimum / Maximum Capacity (kW)					
230/380/460/575V 3Φ	14 / 160				
208V 3Φ	10.5 / 120.0				

*Only applies to units configured with a water-source heat pump module.

Table 13 - M2 Series Size 018 Hydronic, Gas Heat, and Fan Data

	Model Size
	M2-018
Gas Heat	
Capacity (MBH)	
Minimum Natural Gas Input/Output	125/100
Maximum Natural Gas Input/Output	400/320
Hot Water Heating Coil	
Quantity/Face Area	1/17.6ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine
Steam Heating Coil	
Quantity/Face Area	1/17.5ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine
Chilled Water Cooling Coil	
Quantity/Face Area	1/17.5ft^2
Standard Rows/fpi	6/10
Standard Circuiting	Single Serpentine
Supply Fan	
Quantity	1
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Power Exhaust/Return Fan	
Quantity	1
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Energy Recovery Wheel	
Wheel Diameter/Width	64” / 3”
Maximum Airflow (cfm)	12,000

Table 14 - M2 Series Size 022 DX Cooling and Electric Heat Data

	Model Size				
	M2-022				
cfm Range	9,900-13,200				
Water-Source Heat Pump*					
Nominal Capacity (tons)	16	18	20	25	30
Compressors*					
Quantity/Nominal Tons					
R-410A	2/7	2/8	2/9	2/11	2/13
R-410A Two-Step					
R-410A 1 Variable Capacity Refrigeration System	1/7, 1/7 Var.	1/8, 1/8 Var.	1/9, 1/9 Var.	1/11, 1/11 Var.	1/13, 1/13 Var.
R-410A 2 Variable Capacity Refrigeration Systems	2/7 Var.	2/8 Var.	2/9 Var.	2/11 Var.	2/13 Var.
Capacity Steps	100 or 10-100% with variable capacity compressor				
Refrigeration Circuits	2				
Evaporator Coil					
R-410A High Efficiency Coil					
Quantity/Face Area	1/21.4ft^2				
Coil Rows/fpi	6/10				
Coil Circuiting	Interlaced				
R-410A Standard Efficiency Coil					
Quantity/Face Area	1/21.4ft^2				
Coil Rows/fpi	4/10				
Coil Circuiting	Interlaced				
Water-Cooled Condenser*					
Minimum gpm	21.60	24.30	27.00	33.75	40.50
Maximum gpm	86.40	97.20	108.00	135.00	162.00
Electric Heat					
Minimum / Maximum Capacity (kW)					
230/380/460/575V 3Φ	70 / 160				
208V 3Φ	52.5 / 120.0				

*Only applies to units configured with a water-source heat pump module.

Table 15 - M2 Series Size 022 Hydronic, Gas Heat, and Fan Data

	Model Size
	M2-022
Gas Heat	
Capacity (MBH)	
Minimum Natural Gas Input/Output	150/120
Maximum Natural Gas Input/Output	400/320
Hot Water Heating Coil	
Quantity/Face Area	1/21.9ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine
Steam Heating Coil	
Quantity/Face Area	1/21.9ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine
Chilled Water Cooling Coil	
Quantity/Face Area	1/21.9ft^2
Standard Rows/fpi	6/10
Standard Circuiting	Single Serpentine
Supply Fan	
Quantity	1
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Power Exhaust/Return Fan	
Quantity	1
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Energy Recovery Wheel	
Wheel Diameter/Width	68” / 3”
Maximum Airflow (cfm)	13,500

Table 16 - M2 Series Size 026 and 032 DX Cooling and Electric Heat Data

	Model Size					
	M2-026			M2-032		
cfm Range	11,500-15,600			13,500-19,200		
Water-Source Heat Pump*						
Nominal Capacity (tons)	30	40	50	40	50	60
Compressors*						
Quantity/Nominal Tons						
R-410A	2/13	4/9	4/11	4/9	4/11	4/13
R-410A Two-Step						
R-410A 1 Variable Capacity Refrigeration System	1/13, 1/13 Var.	3/9, 1/9 Var.	3/11, 1/11 Var.	3/9, 1/9 Var.	3/11, 1/11 Var.	3/13, 1/13 Var.
R-410A 2 Variable Capacity Refrigeration Systems	2/13 Var.	2/9, 2/9 Var.	2/11, 2/11 Var.	2/9, 2/9 Var.	2/11, 2/11 Var.	2/13, 2/13 Var.
Capacity Steps	100 or 10-100% with variable capacity compressor					
Refrigeration Circuits	2					
Evaporator Coil						
R-410A High Efficiency Coil						
Quantity/Face Area	1/27.2ft^2			1/32.2ft^2		
Coil Rows/fpi	6/10					
Coil Circuiting	Interlaced					
R-410A Standard Efficiency Coil						
Quantity/Face Area	1/27.2ft^2			1/32.2ft^2		
Coil Rows/fpi	4/10					
Coil Circuiting	Interlaced					
Water-Cooled Condenser*						
Minimum gpm	40.50	54.00	67.50	54.00	67.50	81.00
Maximum gpm	162.00	216.00	270.00	216.00	270.00	324.00
Electric Heat						
Minimum / Maximum Capacity (kW)						
230/380/460/575V 3Φ	70 / 160					
208V 3Φ	52.5 / 120.0					

*Only applies to units configured with a water-source heat pump module.

Table 17 - M2 Series Size 026 and 032 Hydronic, Gas Heat, and Fan Data

	Model Size	
	M2-026	M2-032
Gas Heat		
Capacity (MBH)		
Minimum Natural Gas Input/Output	175/140	200/160
Maximum Natural Gas Input/Output	400/320	
Hot Water Heating Coil		
Quantity/Face Area	1/26.7ft^2	1/31.9ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Steam Heating Coil		
Quantity/Face Area	1/27.0ft^2	1/31.7ft^2
Standard Rows/fpi	2/12	
Standard Circuiting	Single Serpentine	
Chilled Water Cooling Coil		
Quantity/Face Area	1/26.7ft^2	1/31.9ft^2
Standard Rows/fpi	6/10	
Standard Circuiting	Single Serpentine	
Supply Fan		
Quantity	1	1 or 2
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD	
Fan Isolation	Spring	
Power Exhaust/Return Fan		
Quantity	1	1 or 2
Type	Backward Curved Plenum Fan	
Variable Speed Control	VFD	
Fan Isolation	Spring	
Energy Recovery Wheel		
Wheel Diameter/Width	74” / 3”	86” / 3”
Maximum Airflow (cfm)	16,000	22,000

Table 18 - M2 Series Size 036 DX Cooling and Electric Heat Data

	Model Size		
	M2-036		
cfm Range	15,500-21,600		
Water-Source Heat Pump*			
Nominal Capacity (tons)	50	60	70
Compressors*			
Quantity/Nominal Tons			
R-410A	4/11	4/13	4/15
R-410A Two-Step			
R-410A 1 Variable Capacity Refrigeration System	3/11, 1/11 Var.	3/13, 1/13 Var.	3/15, 1/15 Var.
R-410A 2 Variable Capacity Refrigeration Systems	2/11, 2/11 Var.	2/13, 2/13 Var.	2/15, 2/15 Var.
Capacity Steps	100 or 10-100% with variable capacity compressor		
Refrigeration Circuits	2		
Evaporator Coil			
R-410A High Efficiency Coil			
Quantity/Total Face Area	2/36.0ft^2		
Coil Rows/fpi	6/10		
Coil Circuiting	2 per coil, Interlaced**		
R-410A Standard Efficiency Coil			
Quantity/Total Face Area	2/36.0ft^2		
Coil Rows/fpi	4/10		
Coil Circuiting	2 per coil, Interlaced**		
Water-Cooled Condenser*			
Minimum gpm	67.50	81.00	94.50
Maximum gpm	270.00	324.00	378.00
Electric Heat			
Maximum / Minimum Capacity (kW)			
230/380/460/575V 3Φ	70 / 160		
208V 3Φ	52.5 / 120.0		

*Only applies to units configured with a water-source heat pump module.
**Circuit 1 from first evaporator coil and circuit 1 from second evaporator coil piped together; circuit 2 from first evaporator coil and circuit 2 from second evaporator coil piped together, to make a two refrigeration circuit system.

Table 19 - M2 Series Size 036 Hydronic, Gas Heat, and Fan Data

	Model Size
	M2-036
Gas Heat	
Capacity (MBH)	
Minimum Natural Gas Input/Output	300/240
Maximum Natural Gas Input/Output	400/300
Hot Water Heating Coil	
Quantity/Total Face Area	2/36.7ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine per Coil
Steam Heating Coil	
Quantity/Total Face Area	2/36.0ft^2
Standard Rows/fpi	2/12
Standard Circuiting	Single Serpentine per Coil
Chilled Water Cooling Coil	
Quantity/Total Face Area	2/36.7ft^2
Standard Rows/fpi	6/10
Standard Circuiting	Single Serpentine per Coil
Supply Fan	
Quantity	1 or 2
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Power Exhaust/Return Fan	
Quantity	1 or 2
Type	Backward Curved Plenum Fan
Variable Speed Control	VFD
Fan Isolation	Spring
Energy Recovery Wheel	
Wheel Diameter/Width	86” / 3”
Maximum Airflow (cfm)	22,000 cfm

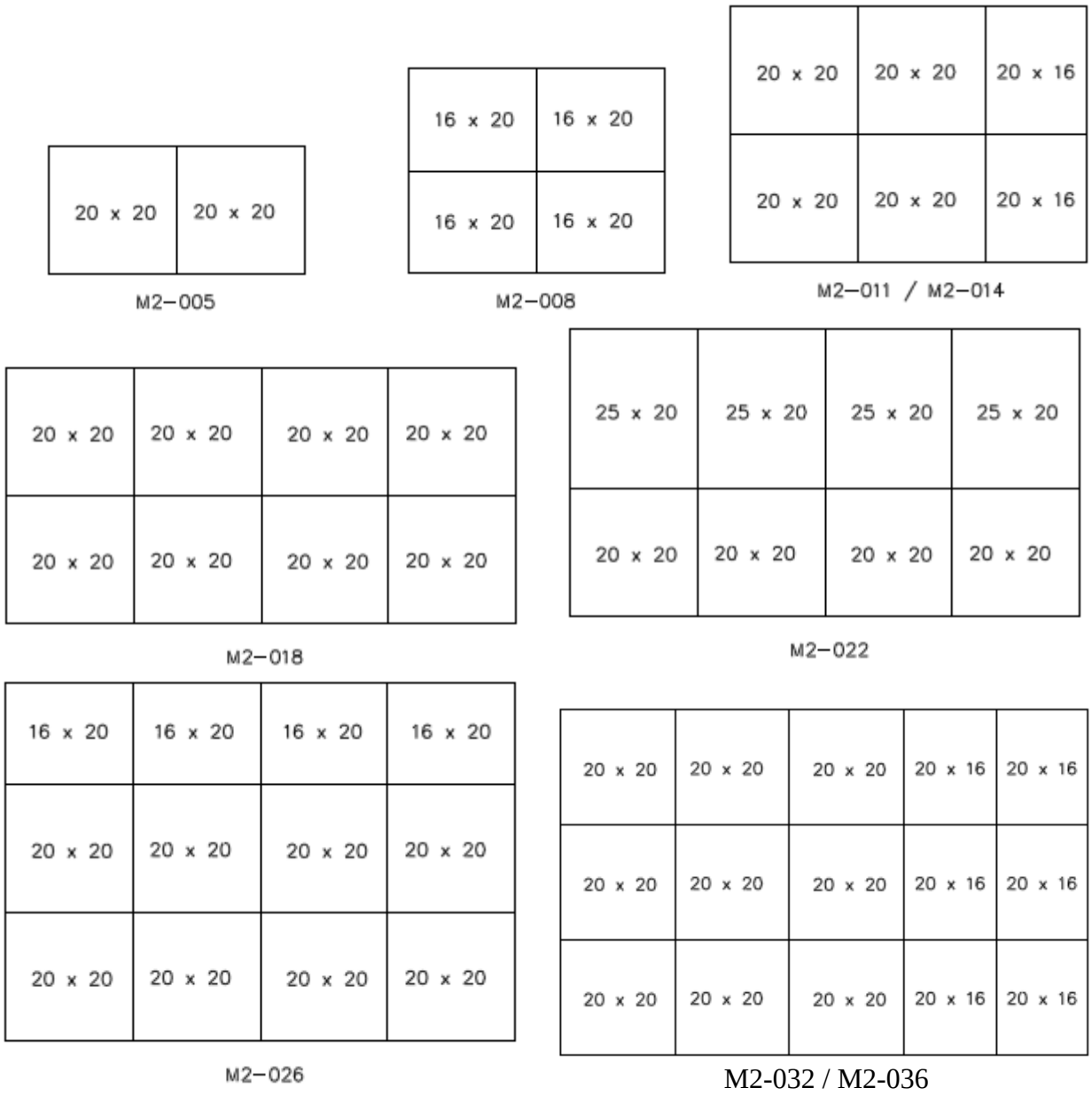


Figure 14 - Filter Layout
(Viewed from the Upstream Side of the Cooling Coil)

Table 20 - M2-005 and M2-008 Filters

Filter Type	(Quantity) Size	
	M2-005	M2-008
2” Pleated - MERV 8	(2) 20” x 20”	(4) 16” x 20”
4” Pleated - MERV 8, MERV 11, MERV 13, or MERV 14		
12” Cartridge - MERV 11, MERV 13, or MERV 14		

Table 21 - M2-011 and M2-014 Filters

Filter Type	(Quantity) Size	
	M2-011	M2-014
2” Pleated - MERV 8	(2) 16” x 20” and (4) 20” x 20”	
4” Pleated - MERV 8, MERV 11, MERV 13, or MERV 14		
12” Cartridge - MERV 11, MERV 13, or MERV 14		

Table 22 - M2-018 and M2-022 Filters

Filter Type	(Quantity) Size	
	M2-018	M2-022
2” Pleated - MERV 8	(8) 20” x 20”	(4) 25” x 20” (4) 20” x 20”
4” Pleated - MERV 8, MERV 11, MERV 13, or MERV 14		
12” Cartridge - MERV 11, MERV 13, or MERV 14		

Table 23 - M2-026 Filters

Filter Type	(Quantity) Size
	M2-026
2” Pleated - MERV 8	(4) 16” x 20” (8) 20” x 20”
4” Pleated - MERV 8, MERV 11, MERV 13, or MERV 14	
12” Cartridge - MERV 11, MERV 13, or MERV 14	

Table 24 - M2-032 and M2-036 Filters

Filter Type	(Quantity) Size	
	M2-032	M2-036
2” Pleated - MERV 8	(6) 16” x 20” and (9) 20” x 20”	
4” Pleated - MERV 8, MERV 11, MERV 13, or MERV 14		
12” Cartridge - MERV 11, MERV 13, or MERV 14		

Controls
Control Options

Terminal Block

Low voltage terminal block for field wiring unit controls

Required Features
Terminal Block, or
Field Installed Controls by Others

Standard Terminals Labels
[R] - 24VAC control voltage
[C] - 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

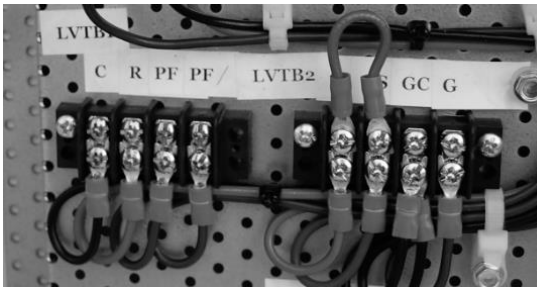


Figure 15 - Example Low Voltage Terminal Block

[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
[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.

Factory provided VFDs or 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. AAON VAV units can also be applied to a single zone. Space temperature sensor included is used for supply air temperature setpoint reset and unoccupied override.

See Control Venders section for VCCX2 and AAON Touchscreen Controller specifics.

Required Features

Hot Gas Bypass - Circuits without variable capacity scroll compressors.
VAV Unit Controller

Standard Supplied Sensors

Outside Air Temperature - Field Installed
Supply Air Duct Temperature - Field Installed
Supply Air Duct Static Pressure - Field Installed
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override - Field Installed

Recommended Features

Modulating/SCR Electric Heat
VFD Controlled or ECM Driven Supply Fans
Modulating Hot Gas Reheat
Mixing Box
Fully Modulating Actuators

Constant Volume (CV/CAV) 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. 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 VCCX2 and AAON Touchscreen Controller specifics.

Required Features

Constant Volume Unit Controller

Standard Supplied Sensors

Outside Air Temperature - Field Installed
Supply Air Duct Temperature - Field Installed
Return Air Temperature
Space Temperature with Temperature Setpoint Reset and Unoccupied Override - Field Installed

Recommended Features

Modulating/SCR Electric Heat
VFD Controlled or ECM Driven Supply Fans
Modulating Hot Gas Reheat
Mixing Box
Fully Modulating Actuators

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 VCCX2 and AAON Touchscreen Controller specifics.

Required Features

Hot Gas Bypass - Circuits without variable capacity scroll compressors.
Makeup Air Unit Controller

Standard Supplied Sensors

Outside Air Temperature - Field Installed
Supply Air Temperature - Field Installed

Recommended Features

Modulating/SCR Electric Heat
VFD Controlled or ECM Driven Supply Fans
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.

Factory provided VFDs or ECM driven motors are used to vary the speed of the supply fans and 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 WattMaster controller is used for supply air temperature setpoint reset and unoccupied override.

See Control Venders section for VCCX2 and AAON Touchscreen Controller specifics.

Required Features

Hot Gas Bypass - Circuits without variable capacity scroll compressors
Modulating/SCR Electric Heat, with auxiliary electric VAV heating
Single Zone VAV Unit Controller

Standard Supplied Sensors

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

Recommended Features

VFD Controlled or ECM Driven Supply Fans
Modulating Hot Gas Reheat
Mixing Box
Fully Modulating Actuators

Control Vendors

VCCX2 - Orion™ Controls System

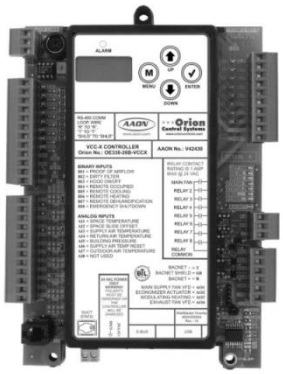


Figure 16 - VCCX2 Controller

The VCCX2 unit controller, which is part of the Orion Controls System, can be factory provided and factory installed in the AAON air handling unit while the Refrigerant System Module (RSM) board is factory installed in the matching AAON condensing unit. Combined, the boards provide advanced control features, without complexity, in an easy to install and setup package. The VCCX2 controllers can be individually configured, including setpoint adjustment, sensor status viewing, and occupancy scheduling. It can control Single Zone VAV, VAV with optional morning warm-up or supply air tempering, CAV with hood/on operation, MUA, and Space Temperature Control of High Percentage Outdoor Air. Additional features and options can be managed by the controller with the addition of modular expansion I/O boards for the controller. Space temperature sensor included with VCCX2 controller is used for supply air temperature setpoint reset and unoccupied override.

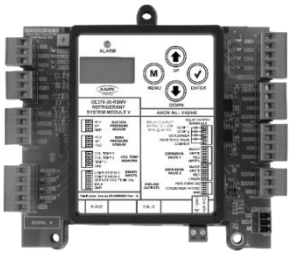


Figure 17 - RSM Board

The VCCX2 controller can be operated as a Stand Alone System, connected via modular cable to multiple VCCX2 controllers in an Interconnected System, or connected via modular cable to multiple VCCX2 controllers, VAV/Zone controllers, and Add-On controllers in a Networked System.

The VCCX2 controller has on-board BACnet® port for connection to an MS/TP network. LON is available with a field provided PT-Link.

Required Operator Interfaces

To configure the VCCX2 controller, an operator interface is needed. Available operator interfaces are the Modular Service Tool SD, Modular System Manager SD, System Manager TS-L, and a PC equipped with free Microsoft Windows® based Prism2 software connected via a CommLink 5. With optional USB-Link2, remote connectivity to the controller via Prism2 software can be accomplished.

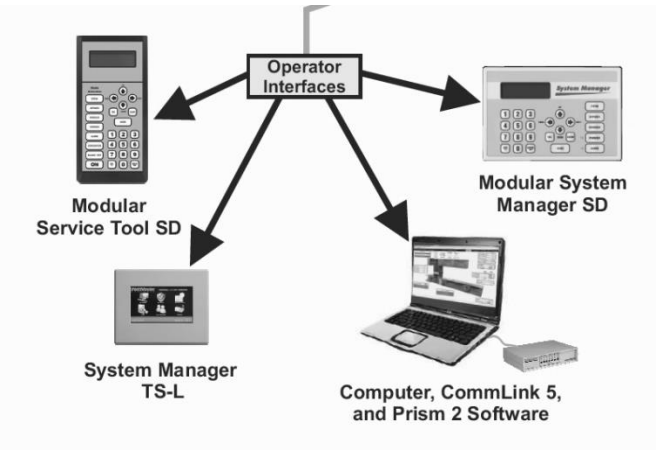


Figure 18 - VCCX2 Controller Operator Interfaces

AAON Touchscreen Controller

Figure 19 - Remote Mounted AAON Touchscreen Controller

The AAON Touchscreen Controller is a simple controls option for energy saving applications. It can be remote mounted in the space similar to a conventional thermostat or left inside the air handling unit.

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.

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 AAONECat™ 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

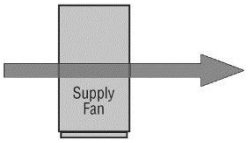
DSS ≥ MOP

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

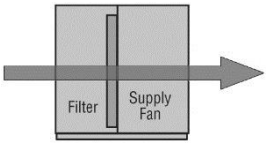
M2 Series
Typical Configurations

M2 Series units have been designed as practical, high performance alternative to expensive custom air handling equipment.

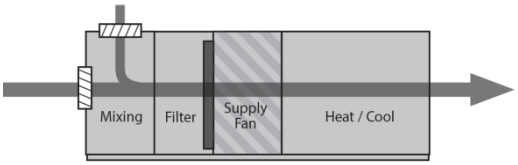
Figure 20 - Typical Configurations



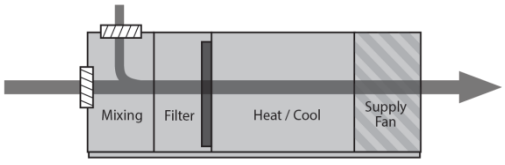
Fan Only



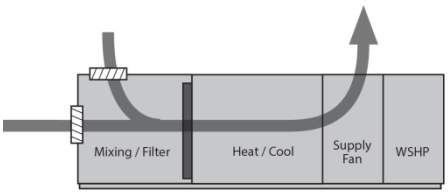
Filter and Fan



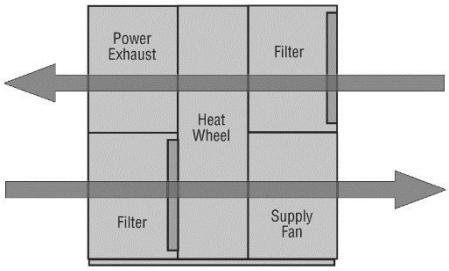
Blow-Through with Mixed Air



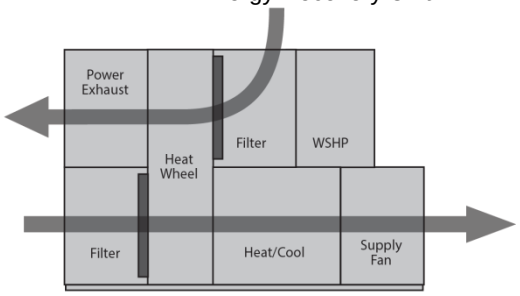
Draw-Through with Mixed Air



Top Discharge

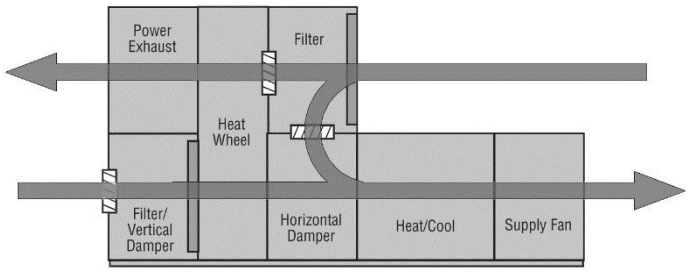


AAONAIRE® (HRU)
Energy Recovery Unit



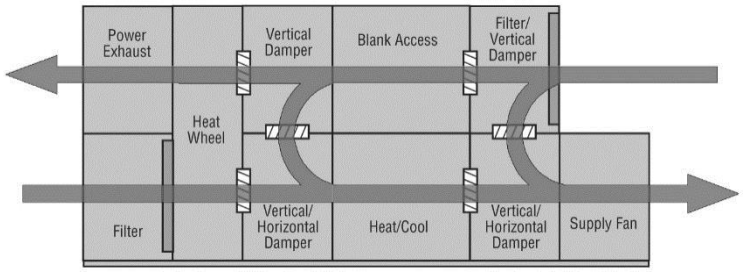
AAONAIRE® (HRU) with:

- Water Source Heat Pump
- Hot Water, Steam or Electric Auxiliary Heat



AAONAIRE® (HRU) with:

- DX or Chilled Water Cooling
- Hot Water, Steam or Electric Heat
- Outside Air and Return Air Mixing



AAONAIRE® (HRU) with:

- DX or Chilled Water Cooling
- Hot Water, Steam or Electric Heat
- Outside Air and Return Air Mixing
- Return Air Bypass

Literature Change History

June 2014
Added water-source heat pump module and revised feature explanations.

August 2014
Added maximum steam operating pressure and updated polymer e-coating warranty information.

November 2014
Updated water-source heat pump module configurator, added general data tables, and added filter configurations.

March 2015
Updated water-source heat pump configurator string.

August 2016
Updated module description information. Added a description of *No Factory Wiring.* Added table for heating and cooling coil module face areas. Removed mention of cartridge filters from mixing box and heating box. Included explanation of coil serpentine. Added more labels to the standard terminals list.

June 2017
Added a photo for Unit Orientation figure. Clarified shipment of individual modules. Clarified wording in Wiring Base Model Option. Added wording that control modules might be necessary on some supply fan modules depending on the amount of control space needed. Stated that neoprene gasket is used on EC motors. Added Open Combustion and Separated Combustion figures under Heat Module Option Combustion Intake. Added several cooling type options to the Coil Module Option Cooling Type. Removed VCM-X from Control Vendors section, VCCX2 is the replacement.

March 2018
Updated the definition of interior corrosion protection. Added AAON Touchscreen Controller page.

November 2018
Removed references to WattMaster.

June 2019
Updated e-coating description. Updated energy recovery wheel description.

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