M3 Series
Modular Indoor
Air Handling Units
Engineering Catalog

Table of Contents

Table of Contents 3
Index of Figures 4
Base Model Feature Description 5
Supply Fan Module Feature Description 6
Cooling/Preheat Coil Module Feature Description 9
Heating Coil Module Feature Description 12
Blank Module Feature Description 13
Filter Module Feature Description 15
Mixing Box/Economizer Module Description 16
Discharge Module Feature Description 18
Control Panel Module Feature Description 20
Exhaust Fan Module Feature Description 22
Energy Recovery Module Feature Description 25
Return Fan Module Feature Description 27
M3 Series Modular Air Handling Unit 29
- Introduction 29
- Cabinet Construction 29
- Supply / Return / Exhaust Blowers 30
- Variable Frequency Drives 30
- DX / Chilled Water / Hot Water / Steam Coils 31
- Face and Bypass Dampers 32
- Ultraviolet Light Options 32
- Filters 32
- What is the MERV rating? 32
- Blank Air Handler Modules 33
- Mixing Box / Economizer & Discharge Modules 33
- Energy Recovery Wheels 34
- Controls 35

M3 Series Air Handler AAONEcat Selection 36
- Introduction 36
- Unit and Unit Features 36
- Modules and Module Features 36
- Conditions 36
- Blower and Blower Motor Selection 37

M3 Series Air Handler Application Considerations 38
- Installation Flexibility 38
- Mounting and Access 38
- Ductwork 38
- Piping and Drain Pan Traps 38
- Vibration Isolation and Sound Levels 38
- Air Supply Systems and Fan Laws 38
- Fan and Motor Heat 39
- Variable Air Volume 40
- Variable Frequency Drives 40

Unit Orientation 41

Literature Change History..... 42

Index of Figures

Figure 1 - Lifting Lugs of Two Modules Lined Up for Assembly..... 29
Figure 2 - Foam Panel Cutaway..... 29
Figure 3 - Interior Corrosion Protection M3 Series AHU..... 30
Figure 4 - Four Supply Blowers..... 31
Figure 5 - Drain Pan and Coil Supports..... 31
Figure 6 - Gear Driven Dampers..... 33
Figure 7 - Return and Outside Air Dampers..... 34
Figure 8 - Energy Recovery Wheel..... 34
Figure 9 - M3 Series Air Handler with Exterior Corrosion Protection..... 35
Figure 10 - M3 Selection Software in AAONEcat..... 37
Figure 11 - Unit Orientation..... 41

R53340 · Rev. A · 180521

M3 Series Base Feature String Nomenclature

www.aaon.com

GEN	UNIT TYPE	UNIT SIZE	CROSS SECTION	VOLTAGE	ASSEMBLY	WIRING	ACCESSORIES	COROSSION PROTECTION	BASE RAIL	TYPE
M3	- 0	- 060	- 108 x 099	- 3	- B	- A	- B	- C	- B	- 0

BASE MODEL

Series and Generation
M3

Unit Type
0 = Indoor Unit

Unit Size
032 = 32 ft^2 Coil
039 = 39 ft^2 Coil
045 = 45 ft^2 Coil
054 = 54 ft^2 Coil
060 = 60 ft^2 Coil
067 = 67 ft^2 Coil
074 = 74 ft^2 Coil
083 = 83 ft^2 Coil
094 = 94 ft^2 Coil

Cross Section
092 x 066 = 92” x 66”
092 x 079 = 92” x 79”
092 x 089 = 92” x 89”
108 x 089 = 108” x 89”
108 x 099 = 108” x 99”
122 x 096 = 122” x 96”
134 x 096 = 134” x 96”
134 x 107 = 134” x 107”
134 x 119 = 134” x 119”

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

Assembly
A = Factory Assembled
B = Shipping Splits

Wiring
0 = No Wiring
A = Wiring, Motor Starters & Branch Fusing

Accessories
0 = None
A = 115V Outlet, Factory Wired (12 Amp)
B = 115V Outlet, Field Wired (20 Amp)

Corrosion Protection
0 = No Paint
A = Interior Corrosion Protection
B = Exterior Corrosion Protection
C = Shipping Shrink Wrap
D = Options A + B
E = Options A + C
F = Options B + C
G = Options A + B + C

Base Rail
0 = 6” High
A = 8” High
B = 10” High

Type
0 = None
U= Special Exterior Paint and Special Pricing Authorization
X = Special Pricing Authorization and Standard Paint

Supply Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	CTRL TYPE	CTRL MANU	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	FILT TYPE	FILT ACCESSORY	POWER SWITCH	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
SFA -	106 -	0 -	0 0 -	C	P	H	G	A -	A	C	B	0	R	- B -	0	

SUPPLY FAN MODULE

Module ID

SFA = Supply Fan
SFB = Supply Fan with Flat Filter Bank
SFC = Supply Fan with External Control Panel
SFD = Supply Fan with Flat Filter Bank and External Control Panel

Position

= Level and Position of Module in Air Handling Unit

Connections

0 = No End Wall
B = Air Leaving Side End Wall

CONTROLS

Control Type

0 = No Wiring
A = Terminal Strip, Branch Fusing
B = VAV Controller, Motor Starters, Branch Fusing
C = CAV Controller, Motor Starters, Branch Fusing
D = MUA Controller, Motor Starters, Branch Fusing

Control Manufacturer

0 = No Wiring
A = Terminal Strip
B = WattMaster
D = WattMaster with Specials

BLOWERS AND MOTORS

Blower Quantity

0 = 1 Blower with ODP Motor
A = 2 Blowers with ODP Motors
B = 3 Blowers with ODP Motors
C = 4 Blowers with ODP Motors
D = 1 Blower with TEFC Motor
E = 2 Blowers with TEFC Motors
F = 3 Blowers with TEFC Motors
G = 4 Blowers with TEFC Motors

Blower Type

0 = Standard Efficiency
A = Premium Efficiency
B = Premium Eff with 1 VFD
C = Premium Eff with 1 VFD and Bypass
D = Premium Eff with Field Installed VFD
E = Premium Eff with 1 VFD Shipped Loose
F = Premium Eff with 2 VFDs
G = Premium Eff with 2 VFDs and Bypass
H = Premium Eff with 2 Field Installed VFDs
J = Premium Eff with 2 VFDs Shipped Loose
K = Premium Eff with 3 VFDs
L = Premium Eff with 3 VFDs and Bypass
M = Premium Eff with 3 Field Installed VFDs
N = Premium Eff with 3 VFDs Shipped Loose
P = Premium Eff with 4 VFDs
Q = Premium Eff with 4 VFDs and Bypass
R = Premium Eff with 4 Field Installed VFDs
S = Premium Eff with 4 VFDs Shipped Loose

Blower HP

0 = 1 hp, 1170 rpm
A = 2 hp, 1170 rpm
B = 3 hp, 1170 rpm
C = 5 hp, 1170 rpm
D = 7.5 hp, 1170 rpm
E = 10 hp, 1170 rpm
F = 15 hp, 1170 rpm
G = 20 hp, 1170 rpm
H = 25 hp, 1170 rpm
J = 30 hp, 1170 rpm
K = 40 hp, 1170 rpm
L = 50 hp, 1170 rpm
M = 1 hp, 1760 rpm
N = 2 hp, 1760 rpm
P = 3 hp, 1760 rpm
Q = 5 hp, 1760 rpm
R = 7.5 hp, 1760 rpm
S = 10 hp, 1760 rpm
T = 15 hp, 1760 rpm
U = 20 hp, 1760 rpm
V = 25 hp, 1760 rpm
W= 30 hp, 1760 rpm
Y = 40 hp, 1760 rpm
Z = 50 hp, 1760 rpm
1 = 60 hp, 1760 rpm

Supply Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	CTRL TYPE	CTRL MANU	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	FILT TYPE	FILT ACCESSORY	POWER SWITCH	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
SFA -	106 -	0 -	0 0 -	C	P	H	**G**	**A**	**-**	**A**	**C**	**B**	**0**	R	- B -	0

Blower
0 = 24" Diameter
A = 27" Diameter
B = 30" Diameter
C = 33" Diameter
D = 36.5" Diameter
E = 42.5" Diameter

Blower Isolation
0 = Springs (Unhoused 1" Deflection)
A = Springs (Unhoused 2" Deflection)
B = Springs (Seismic 1" Deflection)
C = Springs (Seismic 2" Deflection)
D = Option 0 + Backdraft Dampers
E = Option A + Backdraft Dampers
F = Option B + Backdraft Dampers
G = Option C + Backdraft Dampers

Filter Type
0 = None
A = 2" Pleated, 30% Eff, MERV 8
B = 4" Pleated, 30" Eff, MERV 8

Filter Accessories
0 = None
A = Clogged Filter Switch
B = Magnehelic Gauge
C = Options A + B
D = Airflow Measurement
E = Options A + D
F = Options B + D
G = Options A + B + D

Power Switch
0 = No Wiring
A = Power Block (No Power Switch)
B = 60 Amp Non-fused Disconnect Switch
C = 100 Amp Non-fused Disconnect Switch
D = 150 Amp Non-fused Disconnect Switch
E = 250 Amp Non-fused Disconnect Switch
F = 400 Amp Non-fused Disconnect Switch
G = 600 Amp Non-fused Disconnect Switch
H = 60 Amp Fused Disconnect Switch
J = 100 Amp Fused Disconnect Switch
K = 150 Amp Fused Disconnect Switch
L = 250 Amp Fused Disconnect Switch
M= 400 Amp Fused Disconnect Switch
N = 600 Amp Fused Disconnect Switch

Control Panel / Opening
0 = None
A = Left Control Panel
B = Right Control Panel
C = Left Discharge Opening
D = Options B + C
E = Right Discharge Opening
F = Options A + E
G = Top Discharge Opening
H = Options A + G
I = Options B + G

Supply Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	CTRL TYPE	CTRL MANU	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	FILT TYPE	FILT ACCESSORY	POWER SWITCH	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
SFA	- 106	- 0	- 0	0 -	C	P	H	G	A	- A	C	B	0	**R**	**- B**	**- 0**

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, No Drain
A = Right Door, No Drain
B = Both Doors, No Drain
C = Left Door, Left Drain
D = Left Door, Right Drain
E = Left Door, Both Drains
F = Right Door, Left Drain
G = Right Door, Right Drain
H = Right Door, Both Drains
J = Both Doors, Left Drain
K = Both Doors, Right Drain
L = Both Doors, Both Drains

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Cooling/Preheat Coil Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	COOLING ROWS	FPI	CKTING	COATING	ACCESSORIES	PREHEAT ROWS	FPI	TYPE	COATING	MODULE ACCESSORY	ACCESS	TYPE
CLD	**-** **103**	**-** **A**	**-** **0**	**0**	**-** **A**	**A**	0	0	A	-	C	A	C	0	C	- B - 0

COOLING/PREHEAT COIL MODULE

Module ID

CLA = Chilled Water Coils, External Connection, Standard Drain Pan (30.5")
CLC = Chilled Water Coils, Hydronic Preheat, External Connection, Standard Drain Pan (30.5")
CLD = DX Coils
CLE = DX Coils, Hot Gas Reheat
CLF = DX Coils, Hydronic Preheat
CLG = DX Coils, Hot Gas Reheat, Hydronic Preheat
CLH = Chilled Water Coils, External Connection, Short Drain Pan (9")
CLJ = Chilled Water Coils, Hydronic Preheat, External Connection, Short Drain Pan (9")

Position

= Level and Position of Module in Air Handling Unit

Compartment Pressurization

0 = Blow-Thru, No End Wall
A = Draw-Thru, No End Wall
B = Blow-Thru, Air Leaving Side End Wall

Blank

0 = Standard

Blank

0 = Standard

COOLING COIL

Rows

0 = 4 Rows, 1/2" Tubes, 50/50 Split
A = 6 Rows, 1/2" Tubes, 50/50 Split
B = 8 Rows, 1/2" Tubes, 50/50 Split
C = 4 Rows, 5/8" Tubes, 50/50 Split
D = 6 Rows, 5/8" Tubes, 50/50 Split
E = 8 Rows, 5/8" Tubes, 50/50 Split

FPI

0 = 8 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
A = 10 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
B = 12 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
C = 8 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
D = 10 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
E = 12 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
F = 8 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
G = 10 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
H = 12 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
J = 8 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
K = 10 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
L = 12 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
M = 8 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
N = 10 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
P = 12 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
Q = 8 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
R = 10 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
S = 12 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
T = 8 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
U = 10 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
V = 12 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
W = 8 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
Y = 10 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
Z = 12 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
1 = 8 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
2 = 10 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
3 = 12 FPI, 0.0100" Fin Thick, 0.035" Tube Wall

Cooling/Preheat Coil Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	COOLING ROWS	FPI	CKTING	COATING	ACCESSORIES	PREHEAT ROWS	FPI	TYPE	COATING	MODULE ACCESSORY	ACCESS	TYPE
CLD -	103 -	A -	0	0 -	A	A	**0**	**0**	**A** -	**C**	**A**	C	0	C	- B -	0

Circuiting
0 = Full Serpentine
A = Half Serpentine
B = 1 1/2 Serpentine
C = Double Serpentine
D = DX Single Systems
E = DX Two Interlaced Systems

Coating
0 = Galvanized Coil Casings
A = Polymer E-Coated Coils
B = Stainless Steel Coil Casings
C = Stainless Steel Coil Casings, Copper Fins

Accessories
0 = None
A = UV Lights
B = 2" Pleated Filters, 30% Eff, MERV 8, Coil Inlet
C = 4" Pleated Filters, 30% Eff, MERV 8, Coil Inlet
D = Options A + B
E = Options A + C

PREHEAT COIL
Rows
0 = No Preheat Coil
A = 1 Rows, 1/2" Tubes
B = 2 Rows, 1/2" Tubes
C = 1 Rows, 5/8" Tubes
D = 2 Rows, 5/8" Tubes

FPI
0 = No Preheat Coil
A = 8 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
B = 10 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
C = 12 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
D = 8 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
E = 10 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
F = 12 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
G = 8 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
H = 10 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
J = 12 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
K = 8 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
L = 10 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
M = 12 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
N = 8 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
P = 10 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
Q = 12 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
R = 8 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
S = 10 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
T = 12 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
U = 8 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
V = 10 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
W = 12 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
Y = 8 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
Z = 10 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
1 = 12 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
2 = 8 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
3 = 10 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
4 = 12 FPI, 0.0100" Fin Thick, 0.035" Tube Wall

Cooling/Preheat Coil Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	COOLING ROWS	FPI	CKTING	COATING	ACCESSORIES	PREHEAT ROWS	FPI	TYPE	COATING	MODULE ACCESSORY	ACCESS	TYPE
CLD -	103 -	A -	0	0 -	A	A	0	0	A -	C	A	**C**	**0**	**C**	**- B -**	**0**

Preheat Coil Type
0 = No Preheat Coil
A = Hot Water, Full Serpentine (2 Rows Only)
B = Hot Water, Half Serpentine
C = Hot Water, Quarter Serpentine
D = Steam Distributing

Coating
0 = No Preheat Coil
A = Galvanized Coil Casing
B = Polymer E-Coated Coil
C = Stainless Steel Coil Casing
D = Stainless Steel Coil Casing, Copper Fins

Module Accessories
0 = None
A = Marine Light
B = Door Window
C = Options A + B

Access
0 = Left Door, Left Drain, Left Coil Connections
A = Left Door, Left Drain, Right Coil Connections
B = Left Door, Right Drain, Left Coil Connections
C = Left Door, Right Drain, Right Coil Connections
D = Left Door, Both Drains, Left Coil Connections
E = Left Door, Both Drains, Right Coil Connections
F = Right Door, Left Drain, Left Coil Connections
G = Right Door, Left Drain, Right Coil Connections
H = Right Door, Right Drain, Left Coil Connections
J = Right Door, Right Drain, Right Coil Connections
K = Right Door, Both Drains, Left Coil Connections
L = Right Door, Both Drains, Right Coil Connections
M = Both Doors, Left Drain, Left Coil Connections
N = Both Doors, Left Drain, Right Coil Connections
P = Both Doors, Right Drain, Left Coil Connections
Q = Both Doors, Right Drain, Right Coil Connection
R = Both Doors, Both Drains, Left Coil Connections
S = Both Doors, Both Drains, Right Coil Connections

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Heating Coil Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	HEAT COIL SIZE	ROWS	FPI	TYPE	COATING	BLANK	BLANK	BLANK	BLANK	MODULE ACCESSORY	ACCESS	TYPE
HCA	- 104	- A	- 0	0	- B	B	C	A	A	- 0	0	0	0	0	- B	- 0

HEATING COIL MODULE

Module ID
HCA = Hot Water Coil, External Connections
HCB = Steam Coil, External Connections
HCD = Hot Water Coil with Internal Face and Bypass Dampers
HCE = Hot Water Coil with External Face and Bypass Dampers
HCF = Integral Face and Bypass Hot Water Coil
HCG = Steam Coil with Internal Face and Bypass Dampers
HCH = Steam Coil with External Face and Bypass Dampers
HCJ = Integral Face and Bypass Steam Coil

Position
= Level and Position of Module in Air Handling Unit

Compartment Pressurization
0 = Blow Thru
A = Draw Thru

Blank
0 = Blank

Blank
0 = Blank

HEATING COIL
Size
0 = No Heating Coil
A = Size A
B = Size B
C = Size C
D = Size D

Rows
0 = No Heating Coil
A = 1 Row, 1/2" Tubes
B = 2 Rows, 1/2" Tubes
C = 1 Row, 5/8" Tubes
D = 2 Rows, 5/8" Tubes

FPI
0 = No Heating Coil
A = 8 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
B = 10 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
C = 12 FPI, 0.0060" Fin Thick, 0.017" Tube Wall
D = 8 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
E = 10 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
F = 12 FPI, 0.0075" Fin Thick, 0.017" Tube Wall
G = 8 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
H = 10 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
J = 12 FPI, 0.0100" Fin Thick, 0.017" Tube Wall
K = 8 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
L = 10 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
M = 12 FPI, 0.0060" Fin Thick, 0.025" Tube Wall
N = 8 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
P = 10 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
Q = 12 FPI, 0.0075" Fin Thick, 0.025" Tube Wall
R = 8 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
S = 10 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
T = 12 FPI, 0.0100" Fin Thick, 0.025" Tube Wall
U = 8 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
V = 10 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
W = 12 FPI, 0.0060" Fin Thick, 0.035" Tube Wall
Y = 8 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
Z = 10 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
1 = 12 FPI, 0.0075" Fin Thick, 0.035" Tube Wall
2 = 8 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
3 = 10 FPI, 0.0100" Fin Thick, 0.035" Tube Wall
4 = 12 FPI, 0.0100" Fin Thick, 0.035" Tube Wall

Type
0 = No Heating Coil
A = Hot Water, Full Serpentine (2 Rows Only)
B = Hot Water, Half Serpentine
C = Hot Water, Quarter Serpentine
D = Steam Distributing

Coating
0 = No Heating Coil
A = Galvanized Coil Casing
B = Polymer E-Coated Coil
C = Stainless Steel Coil Casing
D = Stainless Steel Coil Casing, Copper Fins

Heating Coil Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	HEAT COIL SIZE	ROWS	FPI	TYPE	COATING	BLANK	BLANK	BLANK	BLANK	MODULE ACCESSORY	ACCESS	TYPE
HCA -	104 -	A -	0	0 -	B	B	C	A	A -	**0**	**0**	**0**	**0**	**0**	**- B -**	**0**

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Module Accessories
0 = None
A = Heating Coil Drain Pan

Access
0 = No Drain, Left Coil Connections
A = No Drain, Right Coil Connections
B = Left Drain, Left Coil Connections
C = Left Drain, Right Coil Connections
D = Right Drain, Left Coil Connections
E = Right Drain, Right Coil Connections
F = Both Drain, Left Coil Connections
G = Both Drain, Right Coil Connections
H = No Drain, No Coil Connections

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Blank Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	BLANK	BLANK	DRAIN PAN	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	MODULE ACCESSORY	ACCESS	TYPE
BMC	105	A	0	0	0	0	0	0	0	0	0	0	0	Q	B	0

BLANK MODULE

Module ID
BMA = 2’ Access Section
BMB = 2.5’ Access Section
BMC = 3’ Access Section
BMD = 4’ Access Section

Position
= Level and Position of Module in Air Handling Unit

Compartment Pressurization
0 = Blow-Thru, No End Wall
A = Draw-Thru, No End Wall
B = Blow-Thru, Air Leaving Side End Wall

Blank
0 = Standard

Blank
0 = Standard

Drain Pan
0 = None
A = Stainless Steel Drain Pan

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, No Drain
A = Right Door, No Drain
B = Both Doors, No Drain
C = Left Door, Left Drain
D = Left Door, Right Drain
E = Left Door, Both Drains
F = Right Door, Left Drain
G = Right Door, Right Drain
H = Right Door, Both Drains
J = Both Doors, Left Drain
K = Both Doors, Right Drain
L = Both Doors, Both Drains
M = No Door, No Drain
N = No Door, Left Drain
P = No Door, Right Drain
Q = No Door, Both Drains

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Filter Module Feature String Nomenclature

MODULE ID	POSITION	BLANK	BLANK	BLANK	PREFILTER	FINAL FILTER	FINAL FILTER EFF	ACCESSORIES	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	TYPE
FMA	- 102	- 0	- 0	0 -	A	B	C	A	0	- 0	0	0	0	- 0	- 0	

FILTER MODULE

Module ID
FMA = Flat Filter Bank
FMB = Angle Filter Bank
FMC = Flat Cartridge Filter Bank
FMD = Staggered Cartridge Filter Bank
FME = Bag Filter Bank

Position
= Level and Position of Module in Air Handling Unit

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Pre-filter
0 = None
A = 2" Pleated, 30% Eff, MERV 8
B = 4" Pleated, 30% Eff, MERV 8

Final Filter
0 = None
A = 4" Cartridge Filter
B = 12" Cartridge Filter
C = 30" Bag Filter

Final Filter Efficiency
0 = None
A = MERV 11 (65% Eff)
B = MERV 13 (85% Eff)
C = MERV 14 (95% Eff)

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

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Mixing Box/Economizer Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	BLANK	BLANK	OA LOC	RA LOC	EA LOC	ACTUATOR TYPE	OPENING ACCESSORY	FILTER	FILT ACCESSORY	BLANK	BLANK	MODULE ACCESSORY	ACCESS	TYPE
MBA	- 101	- 0	- 0	0	- B	B	C	A	0	- A	B	0	0	Q	- B	- 0

MIXING BOX/ECONOMIZER MODULE

Module ID
MBA = Mixing Box (RA & OA Openings)
MBB = Mixing Box, Flat Filter Bank
MBC = Economizer Box (RA, EA, & OA Openings)
MBD = Economizer Box, Flat Filter Bank

Position
= Level and Position of Module in Air Handling Unit

Connections
0 = No End Wall
A = Air Entering End Wall

Blank
0 = Standard

Blank
0 = Standard

Outside Air Location
0 = None
A = End
B = Bottom
C = Left
D = Right
E = Top
F = End, Dampers
G = Bottom, Dampers
H = Left, Dampers
J = Right, Dampers
K = Top, Dampers

Return Air Location
0 = None
A = End
B = Bottom
C = Left
D = Right
E = Top
F = End, Dampers
G = Bottom, Dampers
H = Left, Dampers
J = Right, Dampers
K = Top, Dampers

Exhaust Air Location
0 = None
A = End
B = Bottom
C = Left
D = Right
E = Top
F = End, Dampers
G = Bottom, Dampers
H = Left, Dampers
J = Right, Dampers
K = Top, Dampers

Damper Actuator Type
0 = None
A = Standard Damper, No Actuator
B = Standard Damper, On/Off Actuator
C = Standard Damper, 0-10 VDC Actuator

Opening Accessories
0 = None
A = Burglar Bars

Filter
0 = None
A = 2" Pleated, 30% Eff, MERV 8
B = 4" Pleated, 30% Eff, MERV 8

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

Blank
0 = Standard

Blank
0 = Standard

Mixing Box/Economizer Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	BLANK	BLANK	OA LOC	RA LOC	EA LOC	ACTUATOR TYPE	OPENING ACCESSORY	FILTER	FILT ACCESSORY	BLANK	BLANK	MODULE ACCESSORY	ACCESS	TYPE
MBA	- 101	- 0	- 0	0 -	B	B	C	A	0	- A	B	0	0	**Q**	**- B**	**- 0**

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, No Drain
A = Right Door, No Drain
B = Left and Right Doors, No Drain
C = Left Door, Left Drain
D = Left Door, Right Drain
E = Left Door, Both Drains
F = Right Door, Left Drain
G = Right Door, Right Drain
H = Right Door, Both Drains
J = Left and Right Doors, Left Drain
K = Left and Right Doors, Right Drain
L = Left and Right Doors, Both Drains
M = Left and End Doors, No Drain
N = Left and End Doors, Left Drain
P = Left and End Doors, Right Drain
Q = Left and End Doors, Both Drains
R = Right and End Doors, No Drain
S = Right and End Doors, Left Drain
T = Right and End Doors, Right Drain
U = Right and End Doors, Both Drains
V = End Door, No Drain
W = End Door, Left Drain
Y = End Door, Right Drain
Z = End Door Both Drains

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Discharge Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	CTRL TYPE	CTRL MANU	DISCH OPEN LOC	ACTUATOR TYPE	OPENING ACCESSORIES	BLANK	PWR SWITCH	BLANK	BLANK	BLANK	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
DPA -	107 -	0 -	A	A -	B	A	0	0	B -	0	0	0	0	Q -	B -	0

DISCHARGE MODULE

Module ID
DPA = Discharge Plenum
DPB = Discharge Plenum with Control Panel

Position
= Level and Position of Module in Air Handling Unit

Connections
0 = No End Wall
A = Air Leaving Side End Wall

CONTROLS

Type
0 = No Wiring
A = Terminal Strip, Branch Fusing
B = VAV Controller, Motor Starters, Branch Fusing
C = CAV Controller, Motor Starters, Branch Fusing
D = MUA Controller, Motor Starters, Branch Fusing

Manufacturer
0 = No Wiring
A = Terminal Strip
B = WattMaster
D = WattMaster with Specials

Discharge Opening Location
0 = End
A = Bottom
B = Left
C = Right
D = Top
E = End, Dampers
F = Bottom, Dampers
G = Left, Dampers
H = Right, Dampers
J = Top, Dampers

Damper Actuator Type
0 = None
A = Standard Damper
B = Standard Damper, On/Off Actuator
C = Standard Damper, 0-10 VDC Actuator

Opening Accessories
0 = None
A = Burglar Bars

Blank
0 = Standard

Power Switch
0 = No Wiring
A = Power Block (No Power Switch)
B = 60 Amp Non-fused Disconnect Switch
C = 100 Amp Non-fused Disconnect Switch
D = 150 Amp Non-fused Disconnect Switch
E = 250 Amp Non-fused Disconnect Switch
F = 400 Amp Non-fused Disconnect Switch
G = 600 Amp Non-fused Disconnect Switch
H = 60 Amp Fused Disconnect Switch
J = 100 Amp Fused Disconnect Switch
K = 150 Amp Fused Disconnect Switch
L = 250 Amp Fused Disconnect Switch
M= 400 Amp Fused Disconnect Switch
N = 600 Amp Fused Disconnect Switch

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Control Panel
0 = No Control Panel
A = Left Control Panel
B = Right Control Panel
C = Center Control Panel

Discharge Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	CTRL TYPE	CTRL MANU	DISCH OPEN LOC	ACTUATOR TYPE	OPENING ACCESSORIES	BLANK	PWR SWITCH	BLANK	BLANK	BLANK	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
DPA	- 107	- 0	- A	A -	B	A	0	0	B -	0	0	0	0	**Q**	**- B**	**- 0**

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, No Drain
A = Right Door, No Drain
B = Both Doors, No Drain
C = Left Door, Left Drain
D = Left Door, Right Drain
E = Left Door, Both Drains
F = Right Door, Left Drain
G = Right Door, Right Drain
H = Right Door, Both Drains
J = Both Doors, Left Drain
K = Both Doors, Right Drain
L = Both Doors, Both Drains
M = No Door, No Drain

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Control Panel Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	CTRL TYPE	CTRL MANU	BLANK	BLANK	BLANK	BLANK	PWR SWITCH	BLANK	BLANK	BLANK	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
CMB	- 104	- 0	- A	A	- 0	0	0	0	A	- 0	0	0	0	Q	- B	- 0

CONTROL PANEL MODULE

Module ID
CMA = 36" Access Selection
CMB = 48" Access Selection
CMC = 60" Access Selection

Position
= Level and Position of Module in Air Handling Unit

Compartment Pressurization
0 = Blow-Thru
A = Draw-Thru

CONTROLS
Type
0 = No Wiring
A = Terminal Strip, Branch Fusing
B = VAV Controller, Motor Starters, Branch Fusing
C = CAV Controller, Motor Starters, Branch Fusing
D = MUA Controller, Motor Starters, Branch Fusing

Manufacturer
0 = No Wiring
A = Terminal Strip
B = WattMaster
D = WattMaster with Specials

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Power Switch
0 = No Wiring
A = Power Block (No Power Switch)
B = 60 Amp Non-fused Disconnect Switch
C = 100 Amp Non-fused Disconnect Switch
D = 150 Amp Non-fused Disconnect Switch
E = 250 Amp Non-fused Disconnect Switch
F = 400 Amp Non-fused Disconnect Switch
G = 600 Amp Non-fused Disconnect Switch
H = 60 Amp Fused Disconnect Switch
J = 100 Amp Fused Disconnect Switch
K = 150 Amp Fused Disconnect Switch
L = 250 Amp Fused Disconnect Switch
M= 400 Amp Fused Disconnect Switch
N = 600 Amp Fused Disconnect Switch

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Control Panel Location
0 = No Control Panel
A = Left Control Panel
B = Right Control Panel

Control Panel Module Feature String Nomenclature

MODULE ID	POSITION	AIRFLOW	CTRL TYPE	CTRL MANU	BLANK	BLANK	BLANK	BLANK	PWR SWITCH	BLANK	BLANK	BLANK	CTRL PANEL	MODULE ACCESSORY	ACCESS	TYPE
CMB	- 104	- 0	- A	A	- 0	0	0	0	A	- 0	0	0	0	**Q**	**- B**	**- 0**

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = No Door, No Drain
C = Left Door, No Drain
D = Right Door, No Drain
E = Left Door, Left Drain
F = Right Door, Left Drain
G = Left Door, Right Drain
H = Right Door, Right Drain

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Exhaust Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	PREHEAT TYPE	PREHEAT SIZE	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	OA FILTER	OA LOC	EA LOC	ACTUATOR TYPE	MODULE ACCESSORY	ACCESS	TYPE
EFA	**- 108**	**- A**	**- A**	**B**	**- A**	**B**	**B**	A	A	- B	B	E	C	R	- 0	- 0

EXHAUST FAN MODULE

Module ID
EFA = Exhaust Fan
EFB = Exhaust Fan for Energy Recovery Wheel

Position
= Level and Position of Module in Air Handling Unit

Connections
0 = No Air Entering End Wall
A = Air Entering Side End Wall

PREHEAT COIL

Type
0 = No Preheat
A = Hot Water Preheat
B = Steam Preheat

Size
0 = None
A = Preheat Size A
B = Preheat Size B
C = Preheat Size C
D = Preheat Size D

BLOWERS AND MOTORS

Quantity
0 = 1 Blower with ODP Motor
A = 2 Blowers with ODP Motors
B = 3 Blowers with ODP Motors
C = 4 Blowers with ODP Motors
D = 1 Blower with TEFC Motor
E = 2 Blowers with TEFC Motors
F = 3 Blowers with TEFC Motors
G = 4 Blowers with TEFC Motors

Blower Type
0 = Standard Efficiency
A = Premium Efficiency
B = Premium Eff with 1 VFD
C = Premium Eff with 1 VFD and Bypass
D = Premium Eff with Field Installed VFD
E = Premium Eff with 1 VFD Shipped Loose
F = Premium Eff with 2 VFDs
G = Premium Eff with 2 VFDs and Bypass
H = Premium Eff with 2 Field Installed VFDs
J = Premium Eff with 2 VFDs Shipped Loose
K = Premium Eff with 3 VFDs
L = Premium Eff with 3 VFDs and Bypass
M = Premium Eff with 3 Field Installed VFDs
N = Premium Eff with 3 VFDs Shipped Loose
P = Premium Eff with 4 VFDs
Q = Premium Eff with 4 VFDs and Bypass
R = Premium Eff with 4 Field Installed VFDs
S = Premium Eff with 4 VFDs Shipped Loose

Blower HP
0 = 1 hp, 1170 rpm
A = 2 hp, 1170 rpm
B = 3 hp, 1170 rpm
C = 5 hp, 1170 rpm
D = 7.5 hp, 1170 rpm
E = 10 hp, 1170 rpm
F = 15 hp, 1170 rpm
G = 20 hp, 1170 rpm
H = 25 hp, 1170 rpm
J = 30 hp, 1170 rpm
K = 40 hp, 1170 rpm
L = 50 hp, 1170 rpm
M = 1 hp, 1760 rpm
N = 2 hp, 1760 rpm
P = 3 hp, 1760 rpm
Q = 5 hp, 1760 rpm
R = 7.5 hp, 1760 rpm
S = 10 hp, 1760 rpm
T = 15 hp, 1760 rpm
U = 20 hp, 1760 rpm
V = 25 hp, 1760 rpm
W= 30 hp, 1760 rpm
Y = 40 hp, 1760 rpm
Z = 50 hp, 1760 rpm
1 = 60 hp, 1760 rpm

Exhaust Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	PREHEAT TYPE	PREHEAT SIZE	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	OA FILTER	OA LOC	EA LOC	ACTUATOR TYPE	MODULE ACCESSORY	ACCESS	TYPE
EFA -	108 -	A -	A	B	- A	B	B	**A**	**A**	**- B**	**B**	**E**	C	R	- 0	- 0

Blower
0 = 24" Diameter
A = 27" Diameter
B = 30" Diameter
C = 33" Diameter
D = 36.5" Diameter
E = 42.5" Diameter
F = 36" Diameter, 3 Blade, 6W Prop
G = 42" Diameter, 4 Blade, 6W Prop
H = 42" Diameter, 6 Blade, 6W Prop
I = 48" Diameter, 6 Blade, 6W Prop

Blower Isolation
0 = None
A = Springs (Unhoused 1" Deflection)
B = Springs (Unhoused 2" Deflection)
C = Springs (Seismic 1" Deflection)
D = Springs (Seismic 2" Deflection)
E = Option 0 + Backdraft Dampers
F = Option A + Backdraft Dampers
G = Option B + Backdraft Dampers
H = Option C + Backdraft Dampers

Outside Air Filters
0 = None
A = 2" Pleated, 30% Eff, MERV 8
B = 4" Pleated, 30" Eff, MERV 8
C = Option A + Clogged Filter Switch
D = Option B + Clogged Filter Switch
E = Option A + Magnehelic Gauge
F = Option B + Magnehelic Gauge
G = Option A + Clogged Filter Switch + Magnehelic Gauge
H = Option B + Clogged Filter Switch + Magnehelic Gauge

Outside Air Location
0 = None
A = End
B = Left
C = Right
D = Left and Right
E = Top
F = End, Dampers
G = Left, Dampers
H = Right, Dampers
J = Left and Right, Dampers
K = Top, Dampers

Exhaust Air Location
A = End
B = Left
C = Right
D = Left and Right
E = End, Dampers
F = Left, Dampers
G = Right, Dampers
H = Left and Right, Dampers

Exhaust Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	PREHEAT TYPE	PREHEAT SIZE		BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION		OA FILTER	OA LOC	EA LOC	ACTUATOR TYPE	MODULE ACCESSORY		ACCESS		TYPE
EFA	- 108	- A	- A	B	-	A	B	B	A	A	-	B	B	E	**C**	**R**	-	**0**	-	**0**

Damper Actuator Type
0 = None
A = Standard Damper
B = Standard Damper, On/Off Actuator
C = Standard Damper, 0-10 VDC Actuator

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, No Drain
A = Right Door, No Drain
B = Both Doors, No Drain
C = Left Door, Left Drain
D = Left Door, Right Drain
E = Left Door, Both Drains
F = Right Door, Left Drain
G = Right Door, Right Drain
H = Right Door, Both Drains
J = Both Doors, Left Drain
K = Both Doors, Right Drain
L = Both Doors, Both Drains
M = No Doors, No Drain
N = No Doors, Left Drain
P = No Doors, Right Drain
Q = No Doors, Both Drain

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Energy Recovery Module Feature String Nomenclature

MODULE ID	POSITION	BLANK	ERW TYPE & QTY	ERW SIZE	BLANK	BLANK	BLANK	BLANK	BLANK	RA FILT	RA LOC	ERW ACCESSORY	ACTUATOR TYPE	MODULE ACCESSORY	ACCESS	TYPE
HRA -	103 -	0 -	A	C -	0	0	0	0	0 -	G	A	A	A	C	- D -	0

ENERGY RECOVERY MOUDLE

Module ID
HRA = AAONAIRE® Energy Recovery Wheel

Position
= Level and Position of Module in Air Handling Unit

Blank
0 = Standard

Energy Recovery Wheel Type and Quantity
0 = 1 Total Energy Recovery Wheel
A = 2 Total Energy Recovery Wheels
B = 1 Sensible Energy Recovery Wheel
C = 2 Sensible Energy Recovery Wheels

Energy Recovery Wheel Size
0 = 25" Wheel
A = 36" Wheel
B = 52" Wheel
C = 64" Wheel
D = 74" Wheel
E = 81" Wheel
F = 86" Wheel
G = 92" Wheel
H = 99" Wheel
J = 104" Wheel
K = 110" Wheel

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Return Air Filters
0 = None
A = 2" Pleated, 30% Eff, MERV 8
B = 4" Pleated, 30" Eff, MERV 8
C = Option A + Clogged Filter Switch
D = Option B + Clogged Filter Switch
E = Option A + Magnehelic Gauge
F = Option B + Magnehelic Gauge
G = Option A + Clogged Filter Switch + Magnehelic Gauge
H = Option B + Clogged Filter Switch + Magnehelic Gauge

Return Air Opening Location
0 = None
A = Bottom
B = Left
C = Right
D = Bottom, Dampers
E = Left, Dampers
F = Right, Dampers
G = Bottom, Burglar Bars
H = Left, Burglar Bars
J = Bottom, Dampers
K = Bottom, Dampers, Burglar Bars
L = Left, Dampers, Burglar Bars
M = Right, Dampers, Burglar Bars

Energy Recovery Wheel Accessories
0 = None
A = Energy Recovery Wheel Purge
C = Defrost Timer
D = Rotation Detector
G = Options A + C
H = Options A + D
N = Options C + D
U = Options A + C + D

Damper Actuator Type
0 = None
A = Standard Damper
B = Standard Damper, On/Off Actuator
C = Standard Damper, 0-10 VDC Actuator

Energy Recovery Module Feature String Nomenclature

MODULE ID	POSITION	BLANK	ERW TYPE & QTY	ERW SIZE	BLANK	BLANK	BLANK	BLANK	BLANK	RA FILT	RA LOC	ERW ACCESSORY	ACTUATOR TYPE	MODULE ACCESSORY	ACCESS	TYPE
HRA	- 103	- 0	- A	C	- 0	0	0	0	0	- G	A	A	A	**C**	**- D**	**- 0**

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
0 = Left Door, Left Drain
1 = Left Door, No Drain
2 = Right Door, No Drain
3 = Both Doors, No Drain
B = Left Door, Right Drain
D = Left Door, Both Drains
F = Right Door, Left Drain
H = Right Door, Right Drain
K = Right Door, Both Drain
M = Both Doors, Left Drain
P = Both Doors, Right Drain
R = Both Doors, Both Drains

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

Return Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	BLANK	BLANK	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	BLANK	BLANK	BLANK	CONNECTION	MODULE ACCESSORY	ACCESS	TYPE
RFA	**-**	**101**	**-**	**0**	**-**	**0**	**0**	**-**	**C**	**P**	**H**	**D**	A	-	0	0	0	A	R	-	B	-	0

RETURN FAN MODULE

Module ID
RFA = Return Fan Module

Position
= Level and Position of Module in Air Handling Unit

Connections
0 = No End Wall
A = Air Entering End Wall

Blank
0 = Standard

Blank
0 = Standard

BLOWERS AND MOTORS

Quantity
0 = 1 Blower with ODP Motor
A = 2 Blowers with ODP Motors
B = 3 Blowers with ODP Motors
C = 4 Blowers with ODP Motors
D = 1 Blower with TEFC Motor
E = 2 Blowers with TEFC Motors
F = 3 Blowers with TEFC Motors
G = 4 Blowers with TEFC Motors

Blower Type
0 = Standard Efficiency
A = Premium Efficiency
B = Premium Eff with 1 VFD
C = Premium Eff with 1 VFD and Bypass
D = Premium Eff with Field Installed VFD
E = Premium Eff with 1 VFD Shipped Loose
F = Premium Eff with 2 VFDs
G = Premium Eff with 2 VFDs and Bypass
H = Premium Eff with 2 Field Installed VFDs
J = Premium Eff with 2 VFDs Shipped Loose
K = Premium Eff with 3 VFDs
L = Premium Eff with 3 VFDs and Bypass
M = Premium Eff with 3 Field Installed VFDs
N = Premium Eff with 3 VFDs Shipped Loose
P = Premium Eff with 4 VFDs
Q = Premium Eff with 4 VFDs and Bypass
R = Premium Eff with 4 Field Installed VFDs
S = Premium Eff with 4 VFDs Shipped Loose

Blower HP
0 = 1 hp, 1170 rpm
A = 2 hp, 1170 rpm
B = 3 hp, 1170 rpm
C = 5 hp, 1170 rpm
D = 7.5 hp, 1170 rpm
E = 10 hp, 1170 rpm
F = 15 hp, 1170 rpm
G = 20 hp, 1170 rpm
H = 25 hp, 1170 rpm
J = 30 hp, 1170 rpm
K = 40 hp, 1170 rpm
L = 50 hp, 1170 rpm
M = 1 hp, 1760 rpm
N = 2 hp, 1760 rpm
P = 3 hp, 1760 rpm
Q = 5 hp, 1760 rpm
R = 7.5 hp, 1760 rpm
S = 10 hp, 1760 rpm
T = 15 hp, 1760 rpm
U = 20 hp, 1760 rpm
V = 25 hp, 1760 rpm
W= 30 hp, 1760 rpm
Y = 40 hp, 1760 rpm
Z = 50 hp, 1760 rpm
1 = 60 hp, 1760 rpm

Blower
0 = 24” Diameter
A = 27” Diameter
B = 30” Diameter
C = 33” Diameter
D = 36.5” Diameter
E = 42.5” Diameter
F = 36” Diameter, 3 Blade, 6W Prop
G = 42” Diameter, 4 Blade, 6W Prop
H = 42” Diameter, 6 Blade, 6W Prop
I = 48” Diameter, 6 Blade, 6W Prop

Return Fan Module Feature String Nomenclature

MODULE ID	POSITION	CONNECTION	BLANK	BLANK	BLWR QUANTITY	BLWR TYPE	BLWR HP	BLOWER	BLWR ISOLATION	BLANK	BLANK	BLANK	CONNECTION	MODULE ACCESSORY	ACCESS	TYPE
RFA	- 101	- 0	- 0	0 -	C	P	H	D	**A**	**- 0**	**0**	**0**	**A**	**R**	**- B**	**- 0**

Blower Isolation
A = Springs (Unhoused 1" Deflection)
B = Springs (Unhoused 2" Deflection)
C = Springs (Seismic 1" Deflection)
D = Springs (Seismic 2" Deflection)
E = Option 0 + Backdraft Dampers
F = Option A + Backdraft Dampers
G = Option B + Backdraft Dampers
H = Option C + Backdraft Dampers

Blank
0 = Standard

Blank
0 = Standard

Blank
0 = Standard

Connections
0 = No End Wall
A = Air Entering End Wall

Module Accessories
0 = None
A = Treadplate Floor
B = Base Drain
C = Marine Light
D = Door Window
F = Options A + B
G = Options A + C
H = Options A + D
J = Options B + C
K = Options B + D
L = Options C + D
P = Options A + B + C
Q = Options A + B + D
R = Options A + C + D
S = Options B + C + D
U = Options A + B + C + D

Access
M = No Door, No Drain
N = No Door, Left Drain
P = No Door, Right Drain
Q = No Door, Both Drains

Type
0 = Standard
A = Stainless Steel Interior
B = Stainless Steel Exterior
C = Options A + B
X = Special Pricing Authorization
Y = Options A + X
Z = Options B + X
1 = Options A + B + X

M3 Series Modular Air Handling Unit

Introduction

AAON M3 Series modular air handling units are available from 17,500 to 51,500 nominal cfm. It has been designed and engineered to be rigid, tightly sealed, exceptionally quiet, and easy to install and service. Eleven different modules are available to for semi-customization of an M3 including a Supply Fan module, Cooling/Preheat Coil module, Heating Coil module, Blank module, Filter module, Mixing Box/Economizer module, Discharge module, Control Panel module, Exhaust Fan module, Energy Recovery Wheel module, and Return Fan module. Unit construction and an extensive amount of superior features and premier options allow the unit to be specified to meet the job requirements

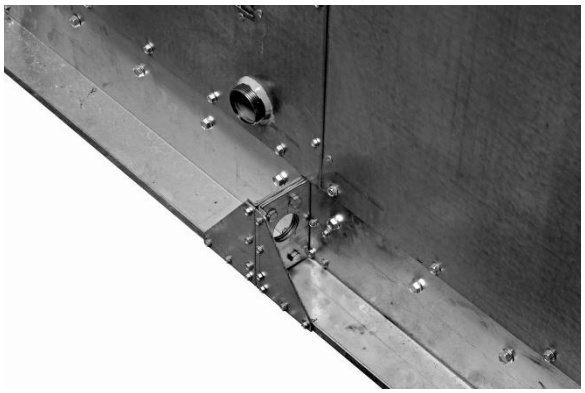

Figure 1 - Lifting Lugs of Two Modules Lined Up for Assembly

Cabinet Construction

Heat transfer and air leakage through the air handler's cabinet can rob an HVAC system of efficiency. The M3 Series air handling unit's casing offers maximum thermal performance in the floors, walls and roof. Laminar composite construction consisting of high performance closed cell polyurethane foam insulation encapsulated between two layers of galvanized steel offers a better insulating value than standard single wall 1-1/2 lb density fiberglass construction.

This panel construction also provides an additional benefit of rigidity which allows the panels to have a maximum of L/240 deflection. The cabinet is designed for a maximum leakage of less than 1% at +/-8 inches static pressure. This performance saves energy dollars by preventing conditioned air from escaping through the cabinet. Low leakage rates also improve indoor air quality by not allowing dirty, unfiltered air to infiltrate the airstream downstream of the unit filters.

Figure 2 - Foam Panel Cutaway

Access doors can be provided in all areas subject to scheduled maintenance. Doors open against air pressure, which provides better seals around the doors and an added aspect of safety for service personnel. Stainless steel piano hinges and zinc cast lockable handles are provided standard on all doors. Additionally, the M3 Series design includes wall panels and access doors that are constructed of a symmetrical design so that it is possible to changes the handing of the door in the field or if the access door needs to be moved to the opposite side of the unit, it is possible.

As an addition option, corrosion resistance is available with the M3 Series air handler with interior and/or exterior paint which

surpasses a 2,500 hour salt spray test or with the interior and/or exterior of the panels constructed of stainless steel.

Figure 3 - Interior Corrosion Protection M3 Series AHU

Supply / Return / Exhaust Blowers

AAON M3 Series air handlers are provided with direct drive, unhoused, single width, single inlet backward curved plenum blowers. Backward curved blowers are more energy efficient, quieter, and can handle higher static pressures than forward curved blowers. Direct drive plenum blowers are also more efficient than belt driven plenum blowers because no energy is lost due to sound creation, friction, or belt wear. The M3 air handler's backward curved plenum blowers will operate with up to 8.0" of total static pressure.

Plenum blowers can save building space by eliminating turns in ductwork. This is because they allow flexibility when locating the outlet ductwork. Because plenum blowers generate a uniform outlet velocity profile they can be easily applied in both blow-through and draw-through applications. Discharge locations are available on the supply fan module on the front, top, or sides of the air handler. An external control panel is also available on the supply fan module.

M3 Series air handler blowers are available in numerous wheel diameters with numerous motors per unit size. Blower selection will always be optimized with the fan selection software in the AAONEcat. It considers performance, efficiency, sound generation, and first cost and offers a number of blowers and motors from which to select.

Motors cannot be undersized, but may be oversized if desired. Motor options include open drip proof (ODP) and totally enclosed fan cooled (TEFC). Motor efficiencies available include standard and premium efficiency. Blower and motor assemblies are provided with spring isolators and optional backdraft dampers. In factory wired units, fans are dynamically tested at the plant as an assembly, including the motors and optional variable frequency drives.

Variable Frequency Drives

A variable frequency drive (VFD) provides adjustable speed control of single or multiple blower motors. M3 Series air handler supply, return, and exhaust blowers can all be VFD controlled. VFD options available for the M3 Series include: factory installed in a unit control panel, factory provided and shipped loose, and field provided and field installed. Factory installed VFDs reduce installation costs versus field installed and they are provided

in an optimal installation location. In addition, VFDs are factory programmed when factory controls are ordered, reducing installation costs. Finally, VFD with bypass options are available to allow full operation of the fan motor in case of VFD failure.

Figure 4 - Four Supply Blowers

DX / Chilled Water / Hot Water / Steam Coils

The AAON M3 Series air handler offers broad application flexibility in coil modules and coils. Coil modules can be arranged in draw-through and blow-through configurations. Cooling coil modules, cooling coil with preheat coil modules, and heating coil modules are available.

Coils are installed with space between each coil to allow access for cleaning and mounting of controls accessories. Hinged access doors can be provided in the modules that will not interfere with piping connections extending through the unit side panels.

All cooling coils are mounted over a double-sloped stainless steel drain pan. Drain pans are sloped in two planes to promote proper condensate removal. The cooling coil rests on coil supports located in the drain pan, holding the coil above the drain pan, and allowing easy access to the stainless steel drain pan for complete drain pan cleaning. The primary drain pan extends beyond the leaving air side of the coil to help recover condensate. A standard length primary drain pan extends 9" beyond the coil and an extended primary drain pan option extends 30.5" beyond the coil. A intermediate drain pan is located below the top coil with a drain line to the primary drain pan below the bottom coil. The primary drain pan also extends under the coil headers and return bends to help remove condensate from the unit.

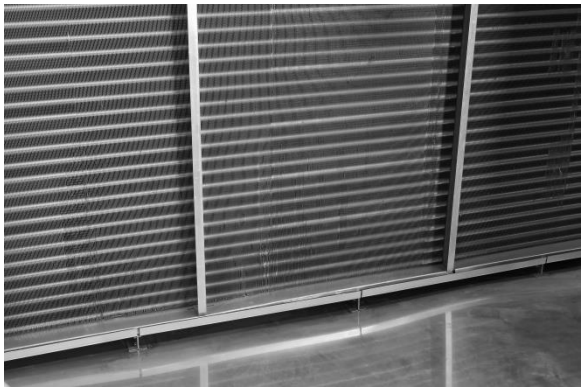

Figure 5 - Drain Pan and Coil Supports

Coil connections always extend through the unit cabinetry, allowing for the easy connection of valves and piping.

All coils in the M3 Series air handler can be configured with the AAONEcat software to meet job specifications. Multiple row, FPI, tube size, fin thickness, and tube wall

thickness options are available with calculated performance values.

Face and Bypass Dampers

Face and bypass dampers can be provided on an M3 Series air handler to modulate the discharge air temperature by bypassing air around the coil. The opposed damper blades varying air volumes through the coil face and through the bypass (around the coil) to obtain the discharge air temperature needed. M3 Series air handlers use low leakage, gear driven, dampers in their face and bypass sections. Three face and bypass options are available: *Internal Face and Bypass Dampers*, for use with medium face area coils with the bypass inside the module, *External Face and Bypass Dampers*, for larger face area coils with the bypass outside the module, and *Integral Heating Face and Bypass Coils*, which can isolate multiple sections of the coil from both the front and back and open multiple bypass channels in the coil, providing more precise discharge air temperature and reducing the possibility of coil freezing.

Ultraviolet Light Options

M3 Series air handlers can include factory installed ultraviolet (UV) light options that are factory pre-engineered for optimal placement to provide maximum effectiveness. UV lights can be beneficial in increasing system efficiency and improving building indoor air quality by keeping coils free of mold and microbial growth that can degrade system performance and add objectionable odors to the air.

Filters

The AAON M3 Series air handler is designed to have flat, angular, bag, or cartridge filtration. The media types range in efficiencies up to 95% and MERV 14. For light or pre-filtering 30% efficient, MERV 8, pleated filters may be specified. For higher efficiency filtration needs 65% to 95% efficient, MERV 11 to 14, cartridge or bag filters may be specified.

Optional magnehelic filter pressure gauges and clogged filter switches may be ordered with each filter section to help promote regular servicing and prevent filter clogging.

Both bag and cartridge filters include pre-filters and can be front-loaded. Doors can be provided on either or both sides of the unit to provide access the filter section. Filters can be positioned almost any place in the unit, and multiple filtration sections can be used. Many health and food industries require stringent filtration. Often, a filter section must be the last component in the air stream. The AAON M3 Series air handler can meet requirements, such as these, with its filtration capabilities.

Available Filters:
- 2" or 4" Pleated, 30% Eff, MERV 8
- 4” or 12” Cartridge, 65%, 85%, and 95% Eff, MERV 11, 13, 14
- 30” Bag, 65%, 85%, and 95% Eff, MERV 11, 13, 14

What is the MERV rating?

MERV, or Minimum Efficiency Reporting Value, is a number from 1 to 16 that is relative to an air filter’s efficiency (ASHRAE Standard 52.2). The higher the MERV rating, the more efficient the air filter is at removing particles, however, a higher MERV rating creates more resistance to airflow because the filter media becomes denser as efficiency increases. At the lower end of the efficiency spectrum, a fiberglass panel filter may have a MERV of 4 or 5. At the higher end, a MERV 14 filter is typically the filter of choice for critical areas of a hospital to help prevent the transfer of bacteria and infectious diseases. Higher MERV rated filters are capable of removing

higher quantities of extremely small contaminants (particles as small as 1/300 the diameter of a human hair). For the cleanest air, the highest MERV rated filter that the unit is capable of forcing air through, based on the limit of the unit's fan power, should be specified.

• 95% Eff, MERV 14 - Typically applied as the final filter in hospital HVAC systems.
• 85% Eff, MERV 13 - Typically applied in LEED® and superior commercial buildings.
• 65% Eff, MERV 11 - Typically applied in above average commercial buildings.
• 30% Eff, MERV 8 (Pleated Panel Filters) - Typically applied in office environments and used as pre-filters for higher efficiency filters.
• < 20% Eff, MERV 1 to 5 (Fiberglass Panel Filters) - Typically applied in residential systems and used as pre-filters (Metal Mesh).

Blank Air Handler Modules
Blank modules can be added to an M3 Series air handler meet specific application criteria. They can be placed anywhere in a unit in a variety of depths including 24", 30", 36", and 48". Blank modules can be placed adjacently for additional blank module depth, as well. Typically, blank access modules are used for field-installed components, air-monitoring devices, or to provide space for service between components.

Mixing Box / Economizer & Discharge Modules
When air mixing or exhausting is required a mixing box/economizer module should be selected. The mixing box option of the mixing box/economizer module includes return and outside air openings, with or without dampers, and the economizer option includes return air, outside air, and exhaust air openings, with or without dampers. With a mixing box/economizer module the air handler can make use of economizer free cooling by opening outside air dampers when the ambient air can condition the supply air stream without the need for mechanical refrigeration.


Figure 6 - Gear Driven Dampers

The discharge module allows discharge opening locations on the end, top, bottom, left and right sides of the module, with or without dampers. A control panel is also available on the discharge module.

Low leak dampers are available on the return air and outside air openings, to regulate the amount of outside and return air supplied to the conditioned space, and on the exhaust and discharge air openings. The parallel airfoil blades of the dampers are hollow core, fully gasketed, and are gear driven for improved reliability and a more

precise control over linkage driven damper assemblies. Continuous vinyl seals are provided between the damper blades. On/Off and fully modulating actuators are available for the dampers or actuators can be field installed.

Figure 7 - Return and Outside Air Dampers

Energy Recovery Wheels

Maintaining acceptable indoor air quality is generally accomplished by introducing ventilation from outdoors; however, this ventilation air must then be conditioned to match the indoor space requirements. Sensible and Total (sensible and latent) factory installed AAONAIRE® energy recovery wheels are available for M3 Series air handlers.

Energy recovery wheels are installed with two counter-flowing air streams, exhaust air and outside air. Energy is captured from the air stream with the highest energy content as it passes through the air handler and this energy is then transferred to the lower energy air stream, reducing the cost of heating, cooling, humidifying, and dehumidifying the outside air (depending on the type of wheel and ambient conditions). Thus, energy from the warmer air stream is transferred to the colder air stream - heating (and humidifying) cold outside air during the winter and cooling (and dehumidifying) hot outside air during the summer.

The ability of the total energy recovery wheel to transfer both sensible and latent heat gives it several advantages. First, the required full load capacity of the mechanical cooling system is significantly reduced. Next, dehumidification provided by the unit during the cooling season is increased because the outside air's humidity is reduced while passing through the wheel and, because of the sensible cooling provided by the wheel, the mixed air (return and outside air) will be cooled by the coil to a lower temperature, closer to the dew point. Additionally, the energy recovery wheel works at lower temperatures without frosting, when compared to plate heat exchangers. Finally, the wheel provides humidification during the heating season, so that a humidifier can be downsized.

Figure 8 - Energy Recovery Wheel

Controls

Controls flexibility is a feature that makes the M3 Series a superior product in the air handler market. For jobs that involve a controls contractor, AAON offers no factory wiring so that all power and controls wiring can be done in the field as the controls contractor desires. To lower field labor costs, AAON can provide the unit factory wiring, with branch circuit fusing, and have all control points wired to a standard terminal strip and unit power wired to a power block or factory installed disconnect switch. For higher quality and consistency, AAON also offers pre-engineered, factory provided and mounted controls. Finally, AAON can provide the unit with factory installed controls by others.

Figure 9 - M3 Series Air Handler with Exterior Corrosion Protection

M3 Series Air Handler AAONEcat Selection

Introduction
AAON M3 Series modular air handler selection depends on many different criteria. To simplify this process, AAON designed the innovative M3 selection software in AAONEcat. It allows the user to design an air handler from the ground up and obtain all of the details required for proper design and specification within a matter of minutes.

While using AAONEcat all input data for the unit and individual modules are carried through the selection process and considered as additional data is input and calculations are made. This reduces the opportunity for errors and allows less experienced users to be able to select air handlers accurately. Designing an efficient air handler system depends on accurate system design and proper equipment selection. Factors that affect unit selection include applicable codes, ventilation requirements, heating and cooling loads, acceptable temperature differentials, and thermal media and installation limitations. M3 Series air handler selection can be broken down into four basic steps: Selecting unit size and unit features, selecting modules and module features, specifying unit conditions, and selecting blowers and motors.

Unit and Unit Features
Generally, an air handler's size is selected based on the air volume required and the desired face velocity through the cooling coil. M3 Series air handlers unit size description includes the cooling coil face are with the CFM at a face velocity of 500 fpm. For cooling coils, 400 to 600 feet per minute is considered the optimum face velocity range for dehumidification and the prevention of any moisture carryover. Based on the CFM input for the unit, AAONEcat will check the face velocity to make sure it is within an acceptable range. Next, features for the entire air handler can be selected including the supply voltage, and base rail height.

Modules and Module Features
Once the unit size is selected, modules can be added to the unit in a various positions of the air handler to meet the requirements of the job. Coil modules, blower modules, air mixing modules, filter modules, and energy recovery wheel modules are all available for the M3 Series air handler. For each of the individual modules, features can be selected such as opening locations, individual coil specifics, and access and serviceability options.

Conditions
A complete selection of component and section types in a variety of unit arrangements and configurations is available for air mixing, filtration, and temperature control to meet specific application requirements. The outside and/or return air can be brought into the unit through a plenum, mixing box, or economizer. For mixing of the two air streams, dampers are required to modulate and direct outside and return air, which is accomplished using a mixing box or economizer. Blenders/air mixers also are available to provide proper mixing of two air streams, to prevent stratification and to help avoid damage to equipment due to freezing temperatures. To promote good air filtration, many different filter media types and arrangements are offered. Filters can be provided in angular or flat filter racks, a variety of media efficiencies, and with or without a pre-filter. The filter section can be located anywhere in the unit to filter air as it enters the unit, or in a final filter arrangement before it leaves the unit. Bag or cartridge filters are front

loading. Also available are many different size access sections for field-installed components or to provide access between components. Other options include diffusers, plenums, face and bypass dampers, sound attenuators and blenders/air mixers. Standard access doors open outward for maximum accessibility to internal components. On pressurized sections, doors open inward to help maintain the extremely low cabinet leakage rate of the M3 unit and to prevent doors from being inadvertently opened when the cabinet is under pressure.

Blower and Blower Motor Selection

The final step in M3 Series air handler design is selection of the unit blowers. With all of the required unit modules selected and conditions input into AAONEcat, the fan selection program is be used to select return, exhaust, and supply blowers. Based on the require airflow for the unit, internal and external static pressure drops, and blower control options including horsepower, VFDs, blower wheel banding, and standard and premium efficiency motors, the program will display available blowers and motor and a selection can be made based on efficiency, quantity, noise, fan curves, and other available blower specific information.

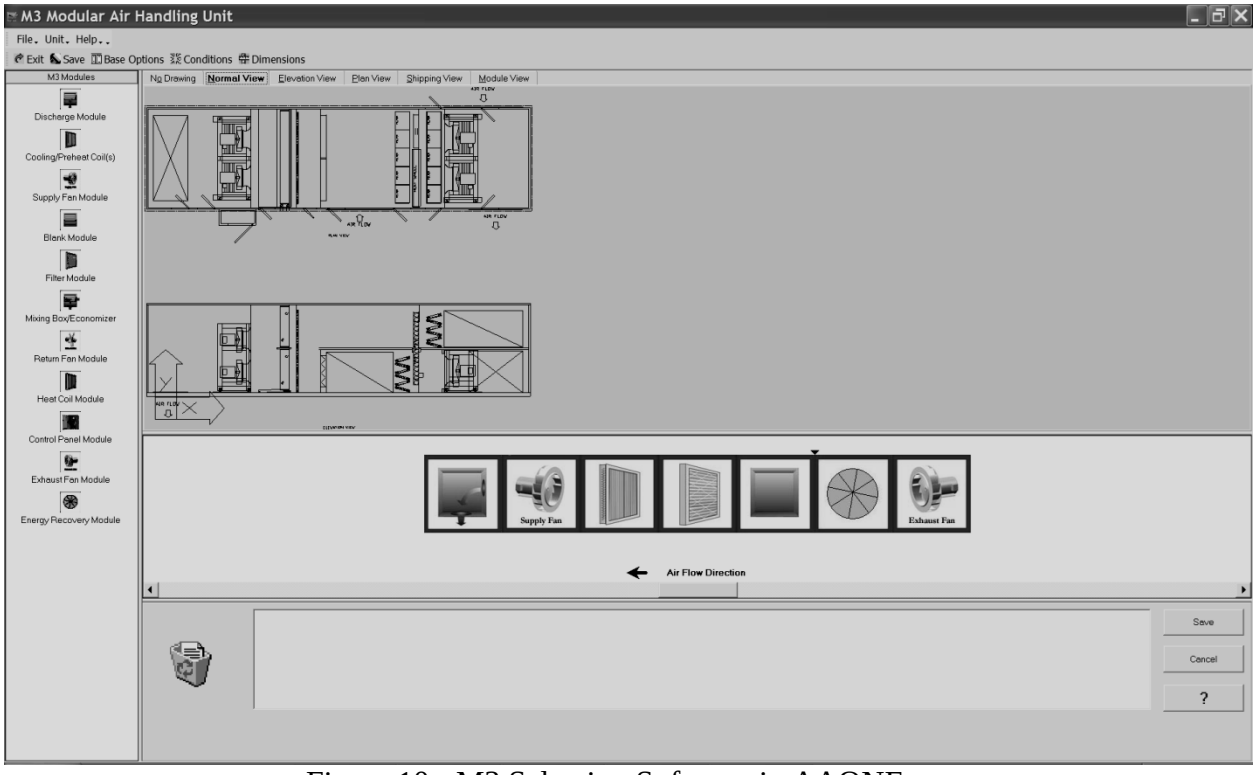

Figure 10 - M3 Selection Software in AAONEcat

M3 Series Air Handler Application Considerations

Installation Flexibility
Central station M3 Series air handlers feature a modular design and can be ship factory assembled or in modules with multiple shipping splits, as required by the job site conditions to provide maximum installation flexibility. Multiple blower, coil, filter, mixing box/economizer, and access components allow the design flexibility of custom systems with the cost advantages of factory fabricated units.

Mounting and Access
The supporting structure of an M3 Series air handler should be level, rigid, and high enough for proper unit drainage operation. It should also be capable of supporting the weight of the unit, including water in the coils.

Locate air handler so there is proper access for routine maintenance and service. Clearance for filter removal on both sides of the filter section may be necessary. Provide clearance as required for access doors and coil removal. A minimum clearance of one unit width is recommended on one side for coil removal.

Access to the interior of the M3 Series air handler is provided by hinged access doors with zinc cast lockable handles or removable panels. Access doors, either on one or both sides, can be selected for each module with the AAONEcat selection software. Additional access between components can be added with blank modules with access doors.

Ductwork
Duct layout should minimize system resistance and sound generation. Duct connections to and from the air handler should allow straight, smooth airflow. Avoid abrupt change in duct size and sharp turns in the fan discharge. If sharp bends are necessary, use turning vanes.

Piping and Drain Pan Traps
Design and install piping in accordance with accepted industry standards. Do not apply undue stress at the connection to coil headers. Support pipe work independently of the coils with adequate piping flexibility for thermal expansion.

Run drain lines and traps the full size of the drain pan connection. Condensate drain pans must be trapped for proper operation.

Vibration Isolation and Sound Levels
To help keep noise and vibration compatible with the intended use of the conditioned space, apply good acoustical and vibration engineering practices during the system design. Since most applications require vibration isolation, all M3 Series air handlers include factory installed internal isolation. Internally isolated units feature spring isolators sized specifically for each fan assembly and unit size. Seismic isolation is also available for the M3 Series.

The unit inlet and outlet sound levels for each octave band are calculated by the AAONEcat software, based on the unit and application. The effects of various components, cabinet construction, and unit configuration are taken into account.

Air Supply Systems and Fan Laws
An air supply system consists of an air handler cabinet, heat exchanger, filters, ductwork, grilles and registers used to distribute air throughout the building. The system is independent of the fan used to supply the system.

The resistance of the system, referred to as static pressure (sp), is dependent upon the quantity of air (cfm) that is moved through it. The air quantity is determined by the cooling, heating, and ventilating requirements.

The performance of a fan at varying speeds and air densities may be predicted by certain basic fan laws, when performance test data is available for the given fan. This test data is obtained at a certain speed and at a standard air density.

These fan laws provide air volume, static, velocity or total pressure and required horsepower at varying speeds and air densities. Fan laws for variation in fan speed at constant air density with a constant system are:

The quantity of air (cfm) increases proportionally as the fan speed (rpm) increases:

$$cfm_{new} = cfm_{old} \times \left(\frac{rpm_{new}}{rpm_{old}} \right)$$

The static pressure (sp) increases as the square of the speed (rpm):

$$sp_{new} = sp_{old} \times \left(\frac{rpm_{new}}{rpm_{old}} \right)^2$$

The brake horse power (bhp) increases as the cube of the speed (rpm) or as the cube of the quantity of air (cfm):

$$bhp_{new} = bhp_{old} \times \left(\frac{rpm_{new}}{rpm_{old}} \right)^3$$

The system curve is unique for a particular system configuration. Any change to the system caused by dirty filters, damper changes, etc., results in a new system curve.

The system static pressure (sp) and brake horse power (bhp) are directly proportional to the air density:

$$sp_{new} = sp_{old} \times \left(\frac{density_{new}}{density_{old}} \right)$$

or

$$bhp_{new} = bhp_{old} \times \left(\frac{density_{new}}{density_{old}} \right)$$

Consequently, the static pressure and brake horsepower decrease with an increase in air temperature or higher altitude, and increase with a decrease in air temperature or lower altitude.

To determine fan performance for temperatures and altitudes other than standard (70°F, 0 ft. altitude), the static pressure must be adjusted by the density ratio before the fan rpm and bhp requirements can be determined.

Fan and Motor Heat

The total energy input to any fan motor is consumed in two ways: by heat dissipated through the motor frame and by work output. The amount of heat dissipated by the motor is a function of its operating efficiency:

Motor heat = energy input × (1 – motor efficiency)

Motor work output is dissipated by the v-belt drive mechanism, which also results in a heat gain. Belt drive losses are a function of belt tension and number of belts as well as power transmitted. Typical belt drive losses range from 2% to 8% of bhp.

Whether motor and drive heat gain become part of an air handling system cooling load depends on the motor location relative to the conditioned space. For air handlers with internal motors, the motor and drive are within the conditioned space. Therefore, the motor and drive add heat to the system.

Subtract this heat from the cooling capacity and add it to the heating capacity of the unit.

Fan heat generation. All of the power input to a fan results in heat gain, which must be considered as a cooling load. The amount of heat generated is directly proportional to the fan bhp:

Fan heat (Btuh) = bhp × 2545Btuh/hp

Much of this heat generation occurs within the fan itself. Fans are not 100% efficient, and the energy losses that occur convert directly into heat. The work done by the fan on the airstream increases the temperature, pressure, and velocity of air. The heat of compression required to raise the airstream to this increased energy level is also a heat gain.

Variable Air Volume

Variable air volume systems (VAV) employ the concept of varying the air quantity to a space at a constant temperature thereby balancing the heat gains or losses and maintaining the desired space temperature. In a VAV system, supply air is diverted from areas where it is not required to areas that need cooling and, at system part load conditions, this reduces the total fan volume. This ability to reduce supply air quantities not only provides substantial fan energy savings at partial load conditions, but it also minimizes equipment sizing.

VAV systems offer the following advantages:

• Lower operating costs by reducing fan energy demands, especially at part load conditions.

• System flexibility to match changing occupancy demands.

Variable Frequency Drives

VFDs offer reliable operation over a wide range of airflow, with advantages in sound and energy performance. VFDs provide the most efficient means of variable volume control by taking advantage of the fan law relation between fan speed (rpm) and fan brake horsepower (bhp). In addition, because airflow is reduced by changing fan speed, the noise penalties often associated with mechanical variable volume control devices (i.e. inlet vanes) are not introduced.

From the fan law equations previously discussed, in an ideal system, at 50% fan speed, brake horsepower would be reduced by 87.5%.

Variable frequency control varies the speed of the fan by adjusting the frequency and voltage to the motor. Keeping a constant volts/frequency ratio (constant magnetic flux) to the motor allows the motor to run at its peak efficiency over a wide range of speeds and resulting fan airflow volumes.

Unit Orientation

Determine left hand or right hand orientation (connections):

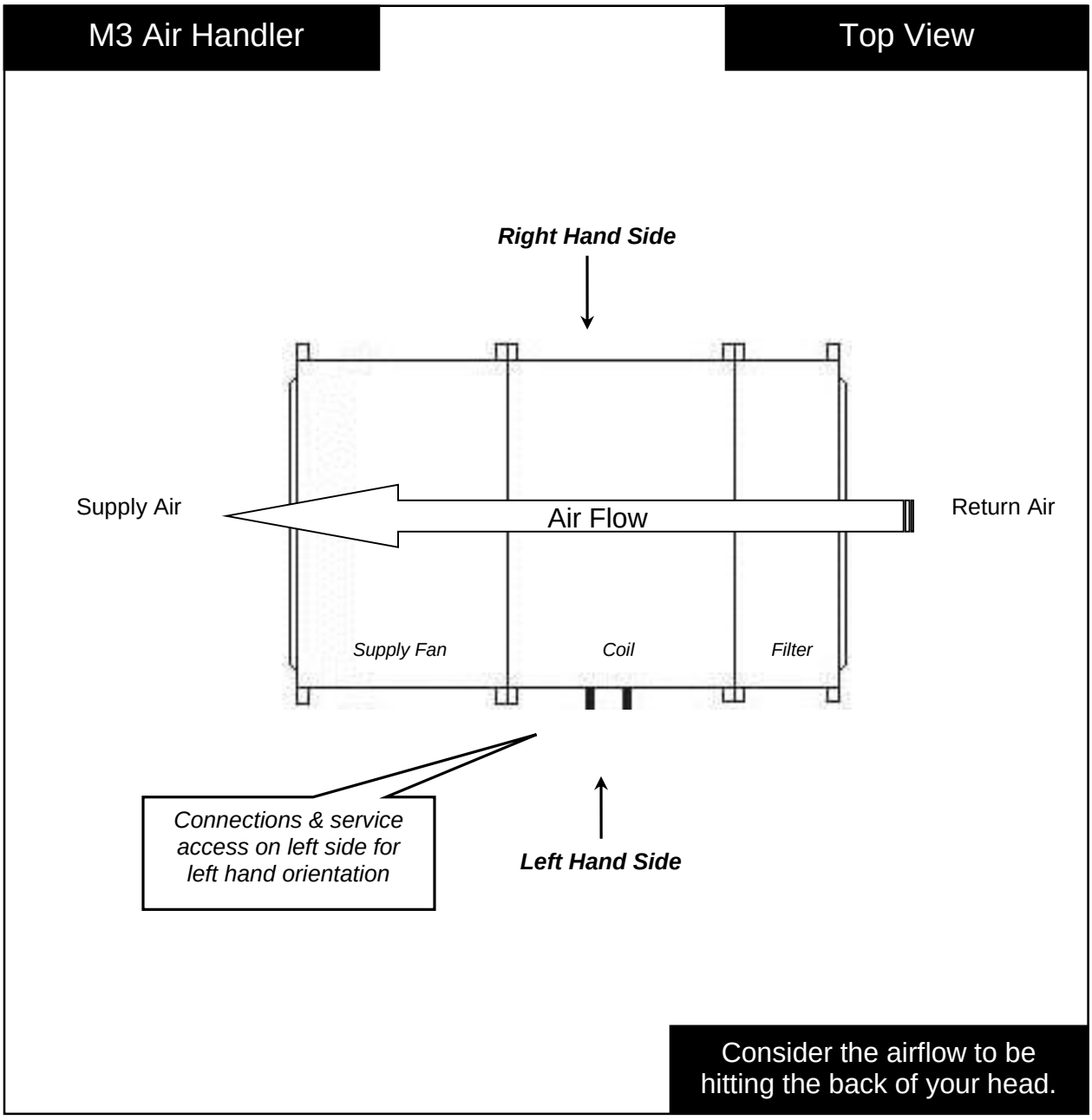

Figure 11 - Unit Orientation

Literature Change History

November 2010
Revision of the IOM changing steam coil connection type from threaded to sweat.

March 2014
Updated feature string nomenclature and MERV 8 filtration

July 2015
Updated feature string nomenclature; removed option 6 from *Voltage* selection

November 2016
Revision of the amp rating of the factory installed convenience outlet.

January 2018
Remove references to electric heat.

May 2018
Remove references to outdoor units and HEPA filters.

AAON
2425 South Yukon Ave.
Tulsa, OK 74107-2728
Phone: 918-583-2266
Fax: 918-583-6094
www.aaon.com

M3 Series Engineering Catalog
R53340 · Rev A · 180521