LENNOX DOAS

DLV

Packaged Ventilation System

60 Hz

COMMERCIAL
PRODUCT SPECIFICATIONS

Bulletin No. 210957
September 2021

(D Cabinet)

(C Cabinet shown with Condenser Section)

7 to 60 Ton
Electric Heat Capacity - 10 to 200 kW
Gas Input Heat Capacity - 150 to 1600 MBH

DLV 15 C D 2 A 1 A 8 V G 5 H 2 L H D G 3 U 2

Unit Type
DLV = Dedicated Lennox Ventilation Unit

Unit Nominal Cooling
7, 10, 13 Ton
15, 20 Ton
26 Ton
30 Ton
40, 52, 60 Ton

Cabinet Size
B Cabinet = 7, 10, 13 Ton
B, C Cabinet = 15, 20 Ton
C Cabinet = 26 Ton
C, D Cabinet = 30 Ton
D Cabinet = 40, 52, 60 Ton

Air Control Configuration
A = No Exhaust, OA & RA Dampers
B = Energy Recovery Exhaust, OA & RA Dampers
C = Power Exhaust, OA & RA Dampers
R = Barometric Relief Dampers, OA & RA Dampers
D = No Exhaust, OA Dampers (No RA)
E = Energy Recovery Exhaust, OA Dampers with Exhaust Opening
F = Power Exhaust, OA Dampers with Exhaust Opening

Evaporator Coil
1 = No E-Coat, High Capacity 4 Row, 14fpi DX Coil
2 = With E-Coat, High Capacity 4 Row, 14fpi DX Coil
3 = No E-Coat, High Capacity 6 Row, 14fpi DX Coil
4 = With E-Coat, High Capacity 6 Row, 14fpi DX Coil

Compressor Staging
A = Tandem Digital Scroll
B = Single Digital Scroll
D = Dual Tandem Digital Scroll

Hot Gas Reheat
0 = No Hot Gas Reheat
1 = Modulating Hot Gas Reheat
2 = Modulating Hot Gas Reheat with E-Coat

Condensor Arrangement
A = Microchannel Coils, VFD Head Pressure Control
B = Microchannel Coils with E-Coat (UV), VFD Head Pressure Control
E = Microchannel Coils, Modulating EC Motor Head Pressure Control (30, 40 Ton)
F = Microchannel Coils with E-Coat, Modulating EC Motor Head Pressure Control (30, 40 Ton)
G = Microchannel Coils, Modulating EC Motor Head Pressure Control (52, 60 Ton)
H = Microchannel Coils with E-Coat, Modulating EC Motor Head Pressure Control (52, 60 Ton)

Unit Supply Voltage
4 = 208V, 3ph
5 = 230V, 3ph
6 = 460V, 3ph
7 = 575V, 3ph (Not available on 52/60 Ton, D Cabinet)

Fan Motor Type - Supply (Exhaust)
ODP
1 = B, C, D Cabinets - 1800 RPM (1800 RPM or N/A)
3 = D Cabinet - 1800 RPM (3600 RPM)
5 = D Cabinet - 1800 RPM (1200 RPM)
A = B, C, D Cabinets - 3600 RPM(1800 RPM or N/A)
C = D Cabinet - 3600 RPM (3600 RPM)
E = D Cabinet - 3600 RPM (1200 RPM)
G = B, C, D Cabinets 1200 RPM (1800 RPM or N/A)
J = D Cabinet 1200 RPM (3600 RPM)
M = D Cabinet 1200 RPM(1200 RPM)

Fan Motor Type - Supply (Exhaust)
TE
2 = B, C, D Cabinets 1800 RPM (1800 RPM or N/A)
4 = D Cabinet 1800 RPM (3600 RPM)
6 = D Cabinet 1800 RPM (1200 RPM)
B = B, C, D Cabinets 3600 RPM(1800 RPM or N/A)
D = D Cabinet 3600 RPM (3600 RPM)
F = D Cabinet 3600 RPM (1200 RPM)
H = B, C, D Cabinets 1200 RPM (1800 RPM or N/A)
K = D Cabinet 1200 RPM (3600 RPM)
P = D Cabinet 1200 RPM (1200 RPM)

Supply Fan Motor HP (Includes VFD)

Q = 1 Hp	V = 7-1/2 Hp
R = 1-1/2 Hp	W = 10 Hp
S = 2 Hp	X = 15 Hp
T = 3 Hp	Y = 20 Hp
U = 5 Hp	

Supply Fan Configuration (Direct Drive Plenum Fan)
K = Non-Air Foil Fan, 11 in. Wheel
L = Non-Air Foil Fan, 12 in. Wheel
4 = Air Foil Fan, 12 in. Wheel
7 = Air Foil Fan, 14 in. Wheel
8 = Air Foil Fan, 16 in. Wheel
E = Dual Air Foil Fans, (2) 16 in. Wheels
A = Air Foil Fan, 20 in. Wheel
C = Air Foil Fan, 25 in. Wheel
J = Dual Air Foil Fans, (2) 25 in. Wheels

DLV 15 C D 2 A 1 A 8 V G 5 **H** **2** **L** **H** **D** G 3 U 2

Power Options

N = None (B, C, D Cabinets)
Z = Power by Others (B, C, D Cabinets)
D = 60A, None (B & C Cabinets)
E = 60A, Unit Powered (B & C Cabinets)
F = 60A, Power by Others (B & C Cabinets)
G = 100A, None (B, C, D Cabinets)
H = 100A, Unit Powered (B, C, D Cabinets)
J = 100A, Power by Others (B, C, D Cabinets)
K = 200A, None (B, C, D Cabinets)
L = 200A, Unit Powered (B, C, D Cabinets)
M = 200A, Power by Others (B, C, D Cabinets)
P = 400A, None (D Cabinet)
Q = 400A, Unit Powered (D Cabinet)
R = 400A, Power by Others (D Cabinet)
S = 600A, None (D Cabinet)
T = 600A, Unit Powered (D Cabinet)
U = 600A, Power by Others (D Cabinet)

Heat Control

N = No Heating
D = Modulating

Temperature Rise

N = Not Applicable
H = High Air Temperature Rise (70°F to 100°F)
L = Low Air Temperature Rise (30°F to under 75°F)

Heating Section Type

0 = None (B, C, D Cabinets)
1 = Electric (B, C, D Cabinets)
2 = Natural Gas (B, C, D Cabinets)
3 = Natural Gas with 20 kW Nominal Aux/ Supplemental Electric Heat (B & C Cabinets)
3 = Natural Gas with 40 kW Nominal Aux/ Supplemental Electric Heat (D Cabinet)
5 = Propane (LP) Gas (B, C, D Cabinets)
6 = Propane (LP) Gas with 20 kW Nominal Aux/ Supplemental Electric Heat (B & C Cabinets)
6 = Propane (LP) Gas with 40 kW Nominal Aux/ Supplemental Electric Heat (D Cabinet)
4 = Hot Water (B & C Cabinets)

Nominal Heat Capacity

N = No Heating - B, C, D Cabinets
1 = Electric - 10 kW (B Cabinet), 20 kW (D Cabinet)
A = Electric - 20 kW (B & C Cabinets), 40 kW (D Cabinet)
3 = Electric - 30 kW (B Cabinet), 60 kW (D Cabinet)
B = Electric - 40 kW (B & C Cabinets), 80 kW (D Cabinet)
5 = Electric - 50 kW (B Cabinet), 100 kW (D Cabinet)
C = Electric - 60 kW (B & C Cabinets), 120 kW (D Cabinet)
7 = Electric - 70 kW (B Cabinet), 140 kW (D Cabinet)
D = Electric - 80 kW (B & C Cabinets), 160 kW (D Cabinet)
E = Electric - 100 kW (B & C Cabinets), 200 kW (D Cabinet)
F = Gas - 150 MBH (B Cabinet)
G = Gas - 200 MBH (B Cabinet)
H = Gas - 250 MBH (B Cabinet)
J = Gas - 300 MBH (B & C Cabinets)
K = Gas - 400 MBH (B, C, D Cabinets)
L = Gas - 500 MBH (C & D Cabinets)
M = Gas - 600 MBH (C & D Cabinets)
Q = Gas - 800 MBH (D Cabinet)
1 = Gas - 900 MBH (D Cabinet)
2 = Gas - 1000 MBH (D Cabinet)
3 = Gas - 1200 MBH (D Cabinet)
4 = Gas - 1400 MBH (D Cabinet)
5 = Gas - 1600 MBH (D Cabinet)
R = Condensing Gas - 175 MBH (B Cabinet)
S = Condensing Gas - 225 MBH (B Cabinet)
T = Condensing Gas - 310 MBH (B Cabinet)
U = Condensing Gas - 350 MBH (C Cabinet)
V = Condensing Gas - 450 MBH (C & D Cabinets)
P = Condensing Gas - 620 MBH (D Cabinet)
6 = Hybrid Gas - 850 MBH (D Cabinet)
7 = Hybrid Gas - 950 MBH (D Cabinet)
8 = Hybrid Gas - 1220 MBH (D Cabinet)
9 = Hybrid Gas - 1420 MBH (D Cabinet)
W = Hot Water Coil - See Submittal for Performance Rating (B & C Cabinets)

DLV 15 C D 2 A 1 A 8 V G 5 H 2 L H D **G** **3** **U** **2**

[1] Energy Recovery Wheel Diameter
N = Not Applicable
F = 36” Aluminum 3A Molecular Sieve (B Cabinet)
G = 46” Aluminum 3A Molecular Sieve (B Cabinet)
H = 58” Aluminum 3A Molecular Sieve (D Cabinet)
J = 68” Aluminum 3A Molecular Sieve (D Cabinet)
K = 74” Aluminum 3A Molecular Sieve (D Cabinet)
L = 81” Aluminum 3A Molecular Sieve (D Cabinet)

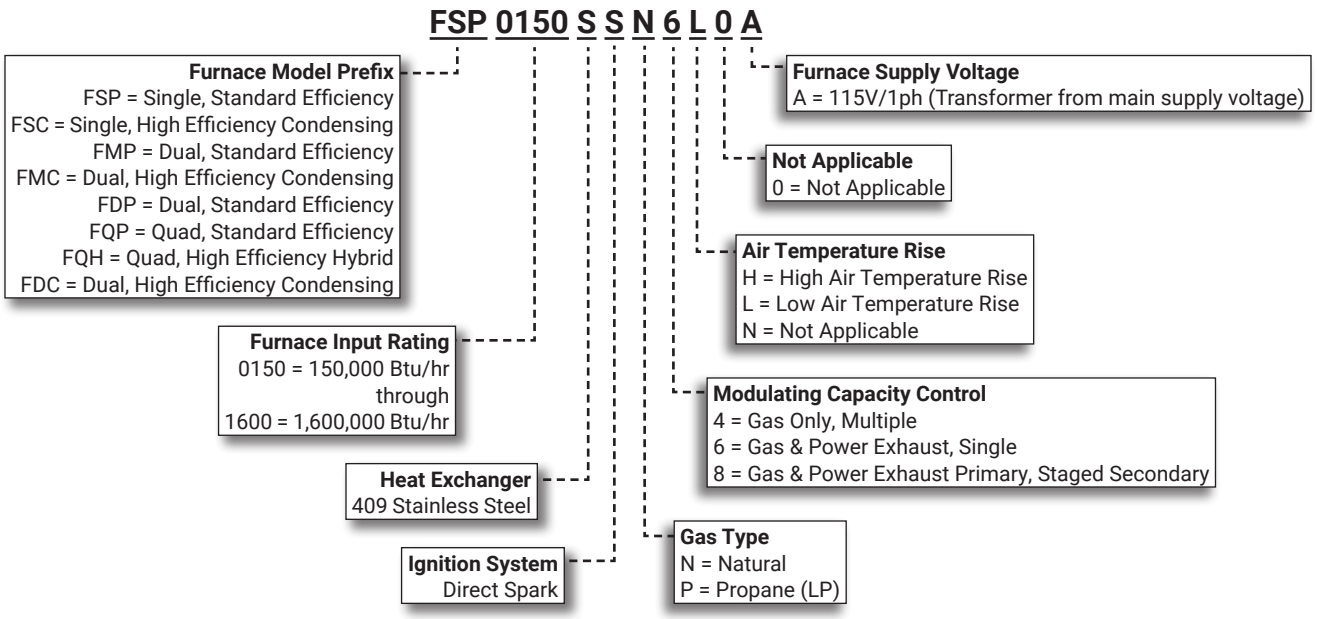
[1] Energy Wheel Preheat
N = None (Not applicable for C Cabinet)
2 = 20 kW (nominal) Electric (B & D Cabinets)
4 = 40 kW (nominal) Electric (D Cabinet)

[1] Exhaust Fan Configuration (Plenum Fan)
N = Not Applicable
1 = Non-Air Foil Fan, Belt Drive, 11 in. Wheel (B Cabinet)
2 = Air Foil Fan, Belt Drive, 16 in. Wheel (B Cabinet)
3 = Air Foil Fan, Belt Drive, 20 in. Wheel (B Cabinet)
A = Air Foil Fan, Direct Drive, 20 in. Wheel (D Cabinet)
C = Air Foil Fan, Direct Drive, 25 in. Wheel (D Cabinet)
J = Dual Air Foil Fans, Direct Drive, (2) 25 in. Wheels (D Cabinet)

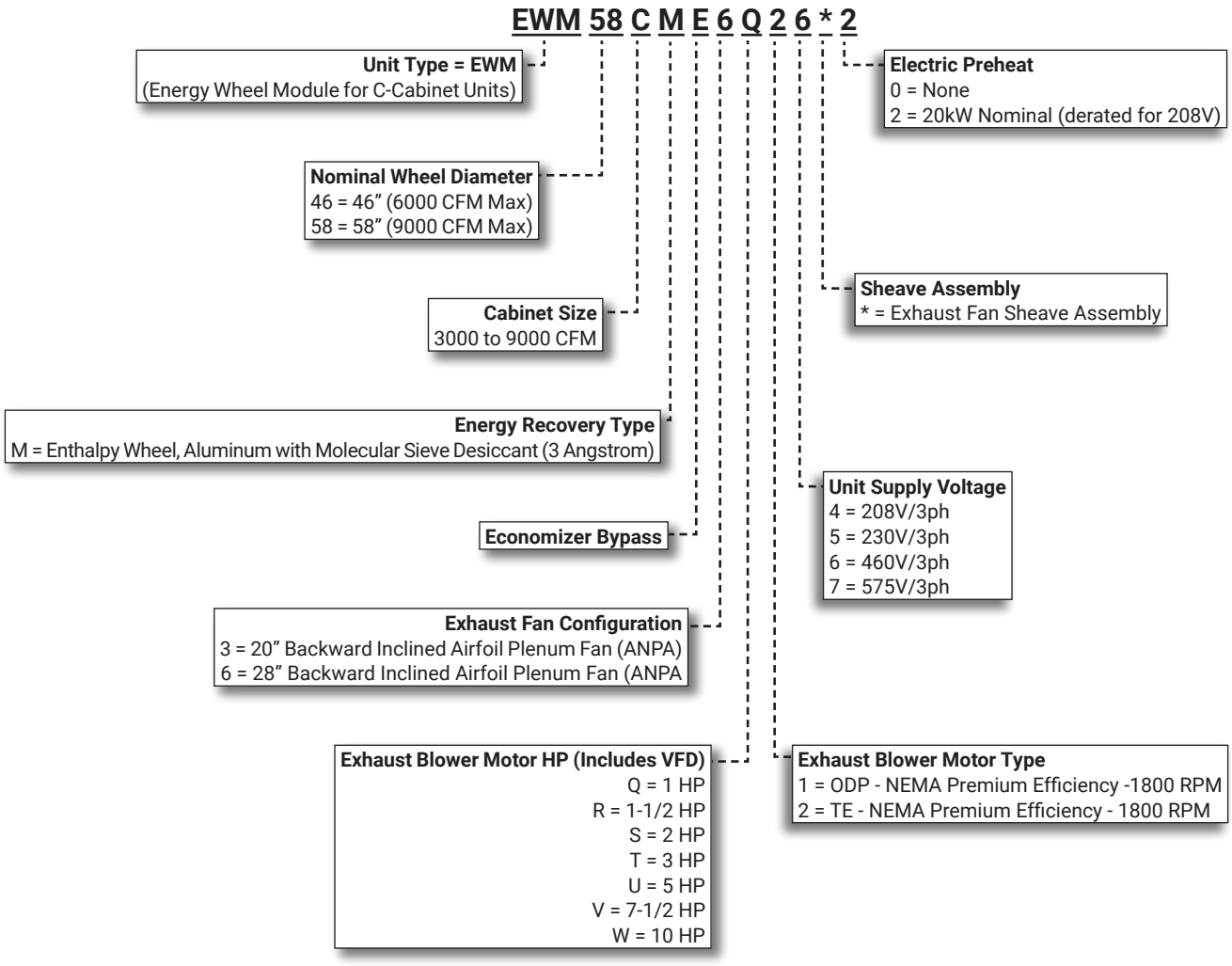
[1] Exhaust Fan Motor HP (includes VFD)
N = None (Not applicable for C Cabinet)
Q = 1 Hp (B & D Cabinets)
R = 1-1/2 Hp (B & D Cabinets)
S = 2 Hp (B & D Cabinets)
T = 3 Hp (B & D Cabinets)
U = 5 Hp (B & D Cabinets)
V = 7-1/2 Hp (B & D Cabinets)
W = 10 Hp (B & D Cabinets)
X = 15 Hp (D Cabinet)
Y = 20 Hp (D Cabinet)

[1] For C-Cabinet units that interface to energy recovery exhaust, Digits 21-24 will always be “N”.

MODEL NUMBER IDENTIFICATION — GAS FURNACE OPTION



MODEL NUMBER IDENTIFICATION — C-CABINET ENERGY WHEEL MODULE OPTION



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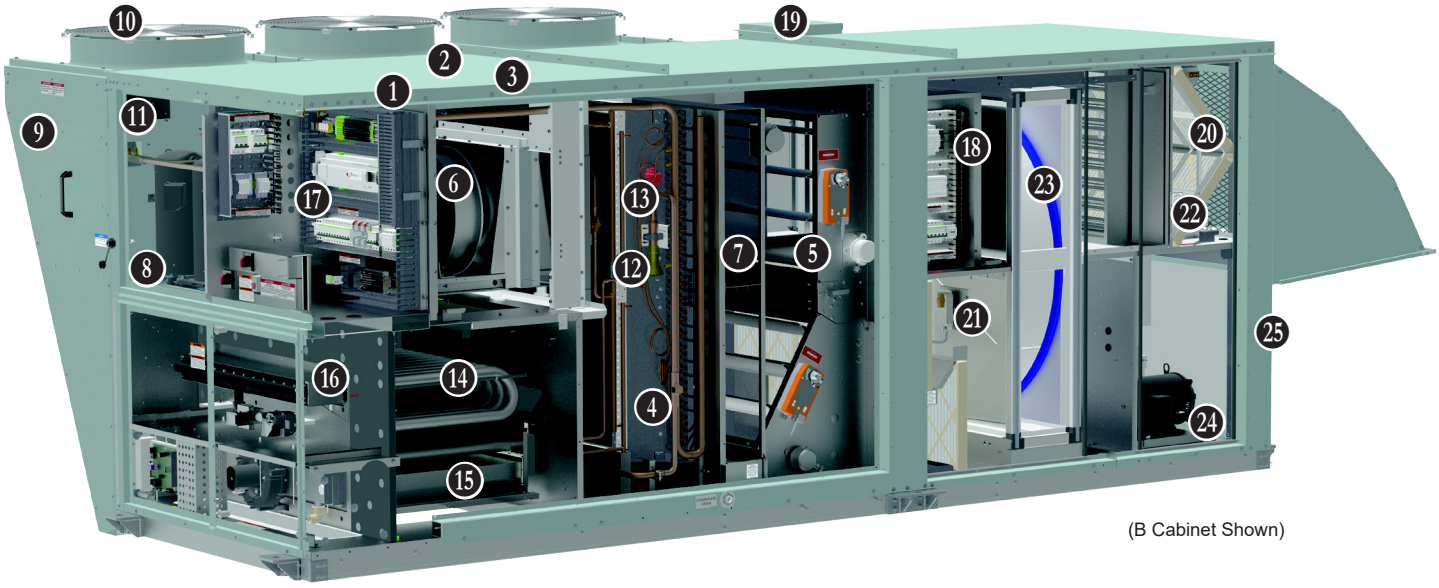
FEATURE HIGHLIGHTS

Lennox' Dedicated Outdoor Air System offers the ideal solution for bringing fresh, tempered outside air into your facility, regardless of your geographic location.



(B Cabinet Shown)

MAIN UNIT

1. Two-Inch Double-Wall Construction
2. Prepainted G90 Galvanized Steel Cabinet
3. Piano-Hinged, Full-Length Access Doors
4. Double-Sloped, Stainless Steel Drain Pan
5. Ultra-Low Leak Dampers
6. Energy Efficient Air Foil Plenum Fan
7. Filters
8. Service Port Access (option)
9. Microchannel Condenser Coils
10. Modulating Variable Speed Head Pressure Control
11. Modulating Tandem Digital Scroll Compressors
12. Modulating Hot Gas Reheat
13. Electronic Expansion Valve(s)
14. Stainless Steel Heat Exchanger
15. Gas Heat (Option)
16. Electric or Hot Water Heat (Option)
17. Carel PCO5 + Controller

ENERGY WHEEL MODULE (OPTIONAL)

18. Energy Wheel Controls
19. Economizer Bypass
20. Air Filters
21. Low Static Pressure
22. Frost Control Preheat (Option)
23. 3A Zeolite Coated Aluminum Wheel
24. Service Access Panel
25. Integrated Energy Recovery (Option for B and D Cabinets)

APPROVALS AND WARRANTY

APPROVALS

- Unit is safety certified by ETL in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment
- Gas-fired furnace options are certified in accordance with ANSI Z83.8/CSA 2.6, "Safety Standard Gas-Fired Furnaces"
- Energy Recovery Wheel performance is AHRI 1060 certified

WARRANTY

- Gas Heat Option Heat Exchangers - Limited ten years
- Compressor, Electric Heat, and other components - Limited two years
- Heat Exchanger Coils and Sheet Metal - Limited one year

NOTE - Refer to Lennox Equipment Limited Warranty certificate included with unit Installation and Service manual for specific details.

CONFIGURATION AND SIZING INFORMATION

Please contact your local Sales Representative (or refer to the submittal, if provided) for Configuration, Sizing, and Submittal information.

FEATURES AND BENEFITS

CABINET

1. Two-inch double wall insulated roof, floor, and walls
   - Standing roof seam, which provides strength and durability
2. Pre-painted G90, galvanized steel cabinet
   - Meets ASTM specs for 2,500 hour salt spray test
3. Full length, hinged access doors, with quarter-turn latches
4. Stainless steel double sloped drain pan prevents corrosion and prevents standing water

Options / Accessories

Corrosion Coat Package
- Meets ASTM specs for 5,000 hour salt spray test

AIR FLOW MANAGEMENT

5. Ultra-Low Leak Dampers
   - AMCA Class 1A 3 cfm/ft² exceeds ASHRAE Standards 90.1
   - Air foil blades with blade edge and jamb seals
   - Provides up to 100% outside air
   - Direct drive damper controls
6. Air Plenum Fan
   - Energy efficient, quiet, direct drive blower assembly
   - NEMA Premium Efficient motor meets Energy Independence and Security Act requirements

FILTERS

7. Air Filter
   - Two-inch MERV 10 (standard), 13 or 15 (primary)
   - Four-inch MERV 13, 14, or 16 (secondary)
   - Air-Side Pressure Drop significantly lowers motor energy

Control Cabinet Door Filter
- Composed of washable rigid polyester
- Located inside cabinet door
  - B and C Cabinets have a single door filter
  - D Cabinets have two door filters

SERVICEABILITY & MAINTENANCE

Options / Accessories

8. External port to access the Controls via a remote user interface without powering down the unit

COOLING SYSTEM

9. Microchannel Condenser Coils
   - Aluminium construction
   - Reduced depth for lower air side static pressure and lower refrigerant volumes
   - Corrosion reistance between fin, tubes, and headers
   - Suited for high refrigerant operating pressures
10. Modulating Variable Speed Head Pressure Control
    - Provides maximum hot gas reheat capacity for dehumidfication at part load conditions
    - Reduces energy costs when fans function at reduced speeds with variable frequency drive or EC motors
    - Regulates refrigerant pressure for use in ambient temperatures as low as 45°F

FEATURES AND BENEFITS

COOLING SYSTEM (CONTINUED)

11 Modulating Tandem Digital Scroll Compressors
- Provides maximum turndown to as low as 6.3% of full capacity for superior temperature control and high part load efficiency
  - Single Modulating Digital Scroll - B Cabinet only (7 ton), 25-100% System Modulation Range
  - Tandem Modulating Digital Scroll
    - B and C Cabinets only (10-30 ton); 12.5-100% System Modulation Range
    - D Cabinets only (30-60 ton); 6.3-100%

12 Modulating Hot Gas Reheat
- Provides supply air temperature control during dehumidification without using additional energy

13 Electronic Expansion Valve
- Provides superheat control and energy savings

HEATING SYSTEM

Options / Accessories

14 Stainless Steel Heat Exchanger
- Provides maximum heat transfer up to 100°F temperature rise
- Modulating capacity turndown ratio as low as 15% of full capacity
- Gas heat also optional with supplemental Electric Heat for enhanced discharge air temperture control

15 High Efficiency Gas Heating
- Up to 94% efficency - up to 100°F temperature rise

16 Electric or Hot Water Heat
- SCR control (up to 200 kW)

CONTROL SYSTEM

CAREL PCO5 + CONTROLLER

17
- Programmable microprocessor controller features inputs/outputs for complex HVAC/R applications
- Factory designed, programmed, and installed integrated control system
- Provides interoperability with all popular network communication protocols, such as BACnet® or LonWorks®, for easy integration into building automation systems
- Housed in a plastic case to ensure protection and reduce risk of electrostatic discharge
- Dirty filter alarm notice
- Real time clock with battery backup and Day-Light Savings adjustment
- Built-In Display
- Alarm Logging
- Run Time and Maintenance Setpoint Logs
- Three Levels of Password Protection
- Manual Control
- Built-In Scheduler up to 7 periods per day; Holiday Day Scheduler up to 20 holiday periods
- Remote Display Option
- All reset points fully adjustable

Electronic Expansion Valve Operation
- Driven by Carel EVD Evolution Twin controller, with one electronic expansion valve per circuit
- Provides emergency power supply
- Enables correct metering of refrigerant
- Valves use a pressure transducer and temperature probe to ensure superheat of the refrigeration system remains accurate
- EEV step position, superheat setpoint, head pressure setpoint, and other features can be viewed and adjusted via the microprocessor display

OPTIONS / ACCESSORIES

ENERGY WHEEL MODULE

In warmer temperatures, an ERV allows for the transfer of humidity from the incoming outdoor air to the exhaust air, keeping it out of the building. In colder temperatures, an ERV works to remove humidity from the exhaust air and transfers it to the outdoor ventilation air, which reduces the need for humidification.

- Linked drive belt
- Permanently lubicated bearings
- Self-cleaning wheel; can also be further cleaned with vacuum and brush
- Partial slide out blower wheel for easy maintenance

18 Controls System
- Manages the following sequences:
  - Exhaust Fan
  - Energy recovery wheel is active (when required) based on the operating mode
    - Cooling Mode
    - Dehumidification Mode
    - Heating Mode

19 - Economizer Wheel Bypass Damper - Opens when the energy recovery wheel is not active (standard on all wheel sizes through 74 in.)

NOTE - Not available on 81 in. wheel.

- Economizer Bypass Jog Mode - Periodically rotates the wheel position during economizer mode to avoid wheel contamination from the air stream
- Wheel Defrost
  - Wheel Start/Stop
  - Entering Air Preheater - Prevents frost build up on the EWM wheel during low ambient temperatures
    - Single stage on/off control based on a dynamically calculated frost threshold temperature

20 Air Filters
- Two inch, MERV 10 (standard)

21 Low Static Pressure for Higher Efficiency

22 Optional Preheat for Frost Control
- Prevents frost build up on the EWM wheel during low ambient temperatures

23 3A Zeolite Coated Aluminum Wheel
- Coating prevents wheel from absorbing odors

24 Serviceability and Maintenance
- Slide out energy wheel and exhaust blower/motor access panel

25 Integrated Energy Wheel Module (EWM)
- Outdoor Air preconditioner specifically designed to reduce the operating costs required to cool or heat outdoor air

NOTE - B and D cabinet sizes include an Integrated Energy Recovery option and ships as one unit. The Energy Recovery option for the C cabinet size is a separate attached recovery module.

SEQUENCE OF OPERATION

The Lennox Commercial Packaged Ventilation unit is designed for both Dedicated Outdoor Air Systems (DOAS) and High Outdoor Air Systems (HOAS) applications, allowing space ventilation or make-up air with accurate control of temperature and humidity via mechanical cooling, heating and dehumidification during year round outdoor ambient conditions.

The unit is also available with an additional integrated Energy Wheel Module (EWM) and optional economizer features providing for reduced operating costs and increased energy savings.

The unit is intelligently managed by the factory installed Carel pCO5+ series microprocessor based controller with control operating sequences detailed below.

1. Unit On/Off

In order for the unit to run, power must be applied and the controller display/keypad used to enable the unit via the "ON/OFF UNIT" sub menu.

- If the unit is "ON", control will be determined by the current occupancy mode of the unit and control configuration/ setpoints.
- If the unit is "OFF", no setpoint control will take place and the unit will remain in stand-by with all control devices disabled.

In addition, the following control sources are also available as secondary means to turn the unit on and off:

a. On/Off by Digital Input: Available when Remote On/Off Switch wired to unit controller
b. On/Off by BMS: Available when BMS Interface Card installed in unit controller
c. On/Off by pAD Thermostat: Available when a pAD Thermostat wired to unit controller
d. On/Off by Clock/Schedule: Always available from schedule within the unit controller

2. Occupancy Mode

When the unit is "ON", there are two modes of occupancy – occupied and unoccupied. Occupancy can be determined by any of the following:

a. **Occupancy by Digital Input:** Set via the replacement of jumper wire on controller input ID7 where:
   - 0V = Unoccupied
   - 24V = Occupied
b. **BMS Call:** Available when BMS Interface Card installed in unit controller
c. **Time Schedule:** Configured via the "CLOCK/SCHEDULER" menu.
d. **Space Occupancy Override:** Set via the override button found on the pAD thermostat. Note: To utilize space occupancy control, a space pAD device must be installed. If there is no space pAD installed there will be no option to use occupied and unoccupied control setpoints.

3. Damper Sequences

DOAS Damper Configuration

Utilizes outside air dampers only with a 2-position on/off actuator. The available damper controls are as follows:

A. **Two Position Control:** Outside air dampers are open to 100% outside air position when in the occupied mode. Outside air dampers are closed in the unoccupied mode.

HOAS Damper Configuration

Utilizes outside and return dampers with a modulating 2-10V damper actuator controlled by a modulated signal from an analog output on the controller to drive both the outdoor air damper and return air damper simultaneous in opposing directions. The outside air damper and return air damper positions always total 100%. For example, if the outside air damper is at 70%, the return air damper will be at 30%.

The available damper controls are described below for the occupied mode of operation with minimum 20% outside air (80% return air) for base rate ventilation. In all cases, outside air dampers are closed and return air dampers open in the unoccupied mode.

SEQUENCE OF OPERATION (CONTINUED)

A. **Two Position Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air.

B. **Digital Input (Multi-Position) Control:** The unit controller sends the damper actuator to one of up to four position setpoints determined by the combinational logic at two of the digital inputs (ID15 and ID16) on the controller, as shown in the following table. Each of the four setpoint values can be modified between limits of 20% and 100% outside air.

Control Type	Digital Input 15	pCOe Digital Input 1	Position (Default)
Two Position via Digital Input	Open (0V)	Not Used	1 (50.0%)
	Closed (24V)	Not Used	2 (100.0%)
Three Position via Digital Input	Open (0V)	Open (0V)	1 (50.0%)
	Open (0V)	Closed (24V)	2 (75.0%)
	Closed (24V)	OP or CL	3 (100.0%)

C. **Building Pressure Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:

   a. If the building pressure is below the setpoint, the dampers will modulate to increase the volume of outside air, increasing the building pressure. The dampers will modulate to the maximum outside air setpoint, up to100%.

   b. If the building pressure is above the setpoint, the dampers will modulate to reduce the volume of outside air, decreasing the building pressure. The dampers will modulate to the minimum outside air setpoint, down to 20%.

D. **Differential Enthalpy Economizer with Dew Point Offset Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. Outdoor and return air enthalpy sensors are monitored by the controller and will control as follows:

   a. If the outdoor enthalpy and dew point is higher than the return air enthalpy and dew point, the dampers will modulate to the minimum position setpoint to decrease the volume of outside air to avoid placing additional load on the mechanical cooling/dehumidification system.

   b. If the outdoor enthalpy or dew point is lower than the return air enthalpy or dew point, the dampers will modulate to increase the volume of outside air to maintain a dry bulb temperature based on the intersection of the mixed air process line and target dew point temperature setpoint. The target dew point is control setup selected and can be mixed air, space (requires a space pAD), or mixed air and space (requires a space pAD). The mechanical heating/cooling/dehumidification will then modulate as needed to maintain the active supply air temperature setpoint.

E. **Demand Controlled Ventilation (CO_2) Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. A space mounted CO_2 sensor monitors the space CO_2 level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:

   a. If the CO_2 level is below the setpoint, the dampers will modulate to the minimum outside air position.

   b. If the CO_2 level is above the setpoint, the dampers will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

F. **Differential Enthalpy Economizer with Dew Point Offset Control and CO_2 Override:** Dampers open to a customer defined minimum position between 20% and 100% outside air. Outdoor and return air enthalpy sensors and a space mounted CO_2 sensor are monitored by the controller. The dampers are controlled as follows:
   a. If the outdoor enthalpy and dew point is higher than the return air enthalpy and dew point, the dampers will modulate to the minimum position setpoint to decrease the volume of outside air to avoid placing additional load on the mechanical cooling/dehumidification system.
   b. If the outdoor enthalpy or dew point is lower than the return air enthalpy or dew point, the dampers will modulate to increase the volume of outside air to maintain a dry bulb temperature based on the intersection of the mixed air process line and target dew point temperature setpoint. The target dew point is control setup selected and can be mixed air, space (requires a space pAD), or mixed air and space (requires a space pAD). The mechanical heating/cooling/dehumidification will then modulate as needed to maintain the active supply air temperature setpoint.
   c. Concurrently with conditions (a) and (b) above, the space mounted CO_2 sensor monitors the space CO_2 level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:
      i. If the CO_2 level is below the setpoint, the dampers will control to steps (a) and (b) above.
      ii. If the CO_2 level is above the setpoint, the controller will override the enthalpy economizer dew point control steps (a) and (b) and the dampers will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

G. **Building Management System (BMS) Control:** Dampers will open or close based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

4. Supply Fan Sequences

The unit features direct drive fans with motor controlled by variable frequency drive(s). Supply fan controls are coordinated with damper controls to avoid control conflicts. For example, you cannot have building pressure control on both dampers and supply fan.

The available supply fan controls are described below for the occupied mode of operation. In all cases, the fan is either off during unoccupied or intermittent on a call for space heating, cooling, or dehumidification if equipped with a space pAD and configured for unoccupied setback operation. The fan speed will be based on the occupied control point.

For variable air volume applications described below, there are operating range limitations to protect the equipment. Minimum speed is based on the greater of 50% of design airflow or minimum design airflow. Consider the following scenarios for the B-cabinet size unit which has an allowable airflow range of 1,100 to 6,000CFM:

- If the design airflow is 3,000CFM, 50% airflow is 1,500CFM, which is greater than the 1,100CFM minimum, therefore 1,500CFM (50%) is the minimum airflow.
- If the design airflow is 1,800CFM, 50% airflow is 900CFM. In this case, the minimum 1,100CFM of the allowable airflow range is greater, so the minimum airflow is 1,100CFM (≈61%).

The available supply fan control options are as follows:

A. **Constant Speed:** The supply fan operates at a constant speed that does not dynamically change. The default setpoint is 100% but can be adjusted within the allowable range described above.

B. **Digital Input (Multi-Speed) Control:** The unit controller sends the supply fan VFD to one of up to four speed setpoints determined by the combinational logic at two of the digital inputs (ID15 and ID16) on the controller, as shown in the following table. Each of the four setpoint values can be modified between the range described above.

Control Type	Digital Input 15	pCOe Digital Input 1	Speed (Default)
Two Speed via Digital Input	Open (0V)	Not Used	1 (50.0%)
	Closed (24V)	Not Used	2 (100.0%)
Three Speed via Digital Input	Open (0V)	Open (0V)	1 (50.0%)
	Open (0V)	Closed (24V)	2 (75.0%)
	Closed (24V)	OP or CL	3 (100.0%)

SEQUENCE OF OPERATION (CONTINUED)

C. **Building Pressure Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100" W.C., adjustable between limits of 0.000" and 5.000"W.C.) and control as follows:
   a. If the building pressure is below the setpoint, the VFD will modulate to increase the volume of outside air, increasing the building pressure. The VFD will modulate up within the allowable range described above.
   b. If the building pressure is above the setpoint, the VFD will modulate to reduce the volume of outside air, decreasing the building pressure. The VFD will modulate down with the allowable range described above.

D. **Duct Pressure Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A duct pressure sensor installed downstream in the supply duct monitors the pressure in the duct and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the duct pressure setpoint (default value is 1.500" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:
   a. If the duct pressure is below the setpoint, the VFD will modulate to increase the volume of supply air, increasing the duct pressure. The VFD will modulate up within the allowable range described above.
   b. If the duct pressure is above the setpoint, the VFD will modulate to reduce the volume of supply air, decreasing the duct pressure. The VFD will modulate down with the allowable range described above.

   In order to prevent over pressurization of the duct work, if the duct pressure sensor detects a pressure above 5.000" W.C. then the unit is immediately shutdown via the high static pressure alarm. The unit will remain shut down in alarm until the alarm condition is cleared via the handheld display or BMS reset call.

E. **Demand Controlled Ventilation (CO_2) Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A CO_2 sensor installed in the space monitors the CO_2 level and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:
   a. If the CO_2 level is below the setpoint, the VFD will modulate to reduce the volume of outside air. The VFD will modulate down with the allowable range described above.
   b. If the CO_2 level is above the setpoint, the VFD will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The VFD will modulate up with the allowable range described above.

F. **Building Management System (BMS) Control:** The supply fan VFD will modulate within the range described above based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

Note for Units with Energy Recovery: Energy Recovery equipped units include an economizer bypass, whose function is described in the Energy Recovery section. When the economizer bypass damper opens, the total static pressure that the supply fan must overcome is reduced, which will cause the airflow to increase, increasing energy consumption. For all control types above, there is a setting called "Bypass Offset" (default is 10%, adjustable from 0% to 20%) that reduces the fan speed in an attempt to maintain approximately the same airflow as when the bypass is closed. With the default 10% setting, the supply fan speed will be reduced by 10% when the bypass is opened.

5. Exhaust Fan Sequences

When equipped with an exhaust fan option, the unit features motors controlled by either a motor starter or a variable frequency drive. Exhaust fan controls are coordinated with supply fan controls to avoid control conflicts. For example, you cannot have building pressure control on both supply and exhaust fans.

There are three different exhaust fan configurations that can be enabled. Depending on which exhaust fan configuration is selected determines which control sequences are available. The exhaust fan configurations are:

a. **ON/OFF – Relay:** The exhaust fan is enabled by a relay output on the PRTU controller. The enable signal is sent to the exhaust fan when the unit is in occupied mode and supply fan is active. This is used with either PEM (non-energy recovery Power Exhaust Module) equipped units that are single speed motor starter controlled or for activating remote exhaust fans by others.

b. **EWM (Energy Wheel Module):** This option is for units configured with Energy Recovery Exhaust and is only available with an exhaust fan variable frequency drive for motor control as described below.

c. **PEM (Power Exhaust Module):** This option is for units configured with Non-Energy Recovery Exhaust with variable frequency drive motor control as described below.

For variable air volume exhaust applications described below, there are operating range limitations to provide proper equipment function. For units with an EWM, the allowable range is up to 50% to 100% of design airflow. For units with a PEM, the allowable range is 20% to 100% of design airflow.

The available exhaust fan controls are described below for the occupied mode of operation. In all cases, the fan is off during the unoccupied mode of operation.

A. **Constant Speed:** The supply fan operates at a constant speed that does not dynamically change. There are two options available for Constant Speed:

1. **Variable Frequency Drive (EWM or PEM Units):** The unit includes a variable frequency drive. The default setpoint is 100% but can be adjusted within the allowable range described above.

2. **Single Speed Motor Starter (PEM Units Only):** The unit includes a single speed motor starter. The unit exhaust fan operates at 100% speed and is non-adjustable through the motor starter control.

B. **Digital Input (Multi-Speed) Control (PEM Units Only):** The unit controller sends the exhaust fan VFD to one of up to four speed setpoints determined by the combinational logic at two of the digital inputs (ID15 and ID16) on the controller, as shown in the following table. Each of the four setpoint values can be modified between the range described above.

Control Type	Digital Input 15	pCOe Digital Input 1	Speed (Default)
Two Speed via Digital Input	Open (0V)	Not Used	1 (50.0%)
	Closed (24V)	Not Used	2 (100.0%)
Three Speed via Digital Input	Open (0V)	Open (0V)	1 (50.0%)
	Open (0V)	Closed (24V)	2 (75.0%)
	Closed (24V)	OP or CL	3 (100.0%)

C. **Supply Fan Offset (EWM or PEM Units):** The exhaust fan will run at a constant speed determined by the supply fan speed and a configurable offset value (default -10%, adjustable from -20% to 20%). For example, if the supply fan is operating at 70% and the offset is -10%, then the exhaust fan operate at 60% (70% - 10% = 60%).

D. **Building Pressure Control (EWM or PEM Units):** The exhaust fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:

a. If the building pressure is below the setpoint, the VFD will modulate to decrease the volume of exhaust air, increasing the building pressure. The VFD will modulate down within the allowable range described above.

b. If the building pressure is above the setpoint, the VFD will modulate to increase the volume of exhaust air, increasing the building pressure. The VFD will modulate up with the allowable range described above.

E. **Building Management System (BMS) Control (EWM or PEM Units):** The exhaust fan VFD will modulate within the range described above based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

Note for Units with Energy Recovery: Energy Recovery equipped units include an economizer bypass, whose function is described in the Energy Recovery section. When the economizer bypass damper opens, the total static pressure that the exhaust fan must overcome is reduced, which will cause the airflow to increase, increasing energy consumption. For all control types above, there is a setting called "Bypass Offset" (default is 10%, adjustable from 0% to 20%) that reduces the fan speed in an attempt to maintain approximately the same airflow as when the bypass is closed. With the default 10% setting, the exhaust fan speed will be reduced by 10% when the bypass is opened.

6. Temperature Control Sequences

Supply Air Temperature Control

The temperature control sequences maintain the required supply air temperature with heating, cooling, and economizer modes of operation. The supply air temperature is monitored by a factory supplied, field installed supply air sensor that is mounted downstream of the unit discharge in the supply duct. Temperature is maintained by modulation of cooling and heating systems to meet the supply air temperature setpoint.

The active supply air temperature control will be one of three possible setpoints:

A. **Cooling:** The setpoint will be 55.0°F (adjustable from 45°F to 90°F). Cooling operation requires a supply air reset be used to create a call for cooling, as discussed in the "Supply Air Reset Controls" section.

B. **Heating:** The setpoint will be 85.0°F (adjustable from 60°F to either 100°F [condensing gas heat or electric] or 130°F [non-condensing gas heat]). Heating operation requires a supply air reset be used to create a call for heating, as discussed in the "Supply Air Reset Controls" section.

C. **Neutral Air:** The setpoint will be 70°F (adjustable from 50°F to 90°F). The neutral air setpoint is active if there is no call for heating or cooling from a supply air reset.

Dehumidification is not covered in this section. It will be detailed in a separate section called "Dehumidification Control Sequences".

Economizer Operation

There are two modes of operation that are economizer based control, and will be indicated as such on the controller status screen. The two possible modes indicated on the controller screen are as follows:

A. **Econ:** Econ will be displayed when the Enthalpy Economizer damper control (if equipped) is active without any mechanical cooling active. For more information on the Enthalpy Economizer damper control, refer to the "Damper Sequences" section.

B. **Fan Only:** Fan-Only will be displayed whenever mechanical cooling/dehumidification or heating is not required and the supply air temperature is within +/- 5°F (adjustable) of the active setpoint.

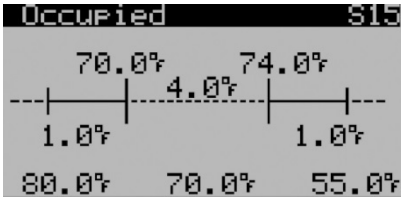
Supply Air Temperature Resets

While the basic control for supply air temperature control is neutral air, reset of the supply air temperature for heating or cooling can be configured using either a space temperature sensor (pAD), the outdoor air temperature sensor, or a combination of both. Each is described as follows:

A. **Space Temperature Reset:** The space reset call comes from the pAD mounted in the conditioned space. This call is generated based on the space temperature and space cooling and heating setpoints. The default space temperature setpoint values are as follows:

1. Occupied Mode
   - Cooling: 74.0°F (adjustable from 50.0°F to 90.0°F)
   - Heating: 70.0°F (determined by the Heat Offset, see next item)
   - Heating Offset: 4.0°F (adjustable from 2.0°F to 20.0°F)
   - Heating Differential: 1.0°F (adjustable from 1.0°F to 10°F)
   - Cooling Differential: 1.0°F (adjustable from 1.0°F to 10°F)

   The Heating Offset determines how far below the cooling setpoint the temperature must fall before the unit enters the heating mode. The Heating and Cooling differentials prevent short cycling. Graphically, the occupied mode setpoints above are as follows:

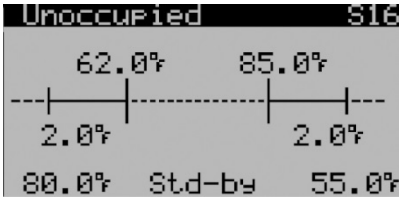


Note the bottom row displays the Heating, Neutral Air, and Cooling supply air reset temperature setpoints.

For example, with a cooling setpoint of 74.0°F the space must exceed 75.0°F (74.0°F + 1.0°F) before a cooling reset call is sent to the unit. The space must fall below 74°F before the cooling reset condition is cleared. On a call for space cooling, the supply air temperature setpoint will be reset to 55°F. Once the call for cooling is satisfied, the unit will return to the neutral air active setpoint which is 70°F.

2. Unoccupied Mode
   - Cooling: 85.0°F (adjustable from 70.0°F to 90.0°F)
   - Heating: 62.0°F (adjustable from 50.0°F to 70.0°F)
   - Heating Differential: 2.0°F (adjustable from 1.0°F to 10°F)
   - Cooling Differential: 2.0°F (adjustable from 1.0°F to 10°F)

   Graphically, the unoccupied mode setpoints above are as follows:



   Note the bottom row displays the Heating and Cooling supply air reset temperature setpoints. For space temperatures between the Heating and Cooling setpoints, the unit is in Stand-By mode.

   For example, with a heating setpoint of 62.0°F the space must fall below 60.0°F (62.0°F - 2.0°F) before a heating reset call is sent to the unit. The space must rise above 62°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset to 80°F (was adjusted from the default reset setting of 85°F in this example). Once the call for heating is satisfied, the unit will return to the Stand-By mode of operation.

B. **Outdoor Air Temperature Reset:** The outdoor reset calls comes from the outdoor air temperature sensor. This call is generated based on the outdoor temperature and outdoor cooling and heating setpoints. The resulting supply air temperature setpoint is proportionally increased in the heating reset mode or decreased in the cooling reset mode. This is only active in the occupied mode. This method of temperature control is best suited to preventing the space temperature rising too high during high ambient conditions or falling too low during low ambient conditions. The default temperature setpoint values are as follows:

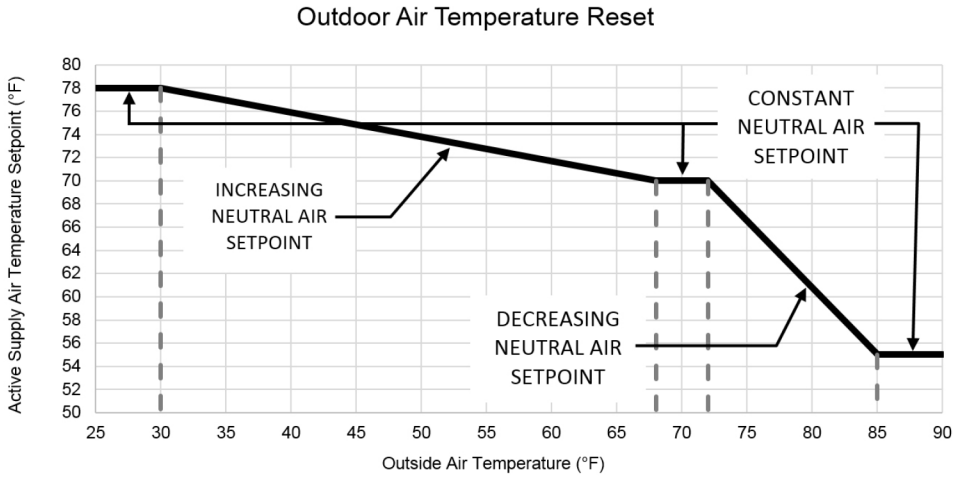
1. **Heating Neutral Air Reset** (values below on Setpoints S1 screen)
   - OA (top left value): 30.0°F (adjustable from 0.0°F to 50.0°F)
   - HTG (top right value): 78.0°F (adjustable from 60.0°F to 100.0°F)
   - OA (bottom left value): 68.0°F (adjustable from 50.0°F to 75.0°F)
   - NA (bottom right value): 70.0°F (adjustable from 60.0°F to 80.0°F)

2. **Cooling Neutral Air Reset** (values shown below on Setpoints S2 screen)
   - OA (top left value): 72.0°F (adjustable from 65.0°F to 75.0°F)
   - NA (top right value): 70.0°F (adjustable from 60.0°F to 80.0°F)
   - OA (bottom left value): 85.0°F (adjustable from 75.0°F - 100.0°F)
   - CLG (bottom right value): 55.0°F (adjustable from 50.0°F - 80.0°F)

SEQUENCE OF OPERATION (CONTINUED)

The Outdoor Air Temperature Reset sequence is much easier to understand if viewed graphically. Reviewing the setpoints and the graphic below, the following is the sequence:

- **Outside Air between 68°F and 72°F**: The neutral air setpoint will be 70.0°F.
- **Outside Air below 68°F:** The neutral air setpoint is adjusted as follows:
  - **From 68°F down to 30°F:** The setpoint will be proportionally increased from 70.1°F to 77.9°F.
  - **Below 30°F:** The setpoint will be 78.0°F.
- **Outside Air above 72°F:** The neutral air setpoint is adjusted as follows:
  - **From 72°F up to 85°F:** The setpoint will be proportionally decreased from 69.9°F to 54.9°F.
  - **Above 85°F:** The setpoint will be 55.0°F.



Mechanical Cooling/Heating System Response to Cooling/Heating Resets

With supply air heating and cooling resets detailed above, the following describes the control of mechanical cooling and heating to maintain the active supply air setpoint.

A. **Cooling:** On receiving a call for cooling the unit controller compares the supply air temperature from the duct sensor with the active supply air temperature setpoint in order to generate a cooling demand, ranging from 0-100%, using a proprietary PI control loop. Up to four scroll compressors (CP1 through CP4) are used on up to two refrigeration circuits. All cabinet sizes have CP1 and CP2 located on circuit 1. The D-Cabinet unit adds an additional circuit with CP3 and CP4. In all cases, CP1 is always a modulated digital scroll compressor while the remaining compressors are fixed speed scroll compressors. The combination of a digitally modulated and fixed speed scroll compressors allows precise capacity modulation at lower loads.

Compressor enabling logic includes the required minimum on/off compressor anti-cycle times in order to ensure mechanical protection of the compressors. Compressor lockout alarms, and temperature lockouts, and compressor envelope control are also managed by the unit controller, inhibiting compressor usage if required, in order to protect the compressor. Compressor envelope control monitors operation to ensure minimum and maximum evaporating and condensing temperatures to ensure the operating limits based of the compressor are not exceeded. The following alarms will inhibit a compressor from being used in the compressor rotation and activation calculation.

<u>Common Compressor Lockouts – Applicable to all units.</u>

1. Supply Air Temperature Sensor Fault or Disconnected.
2. Low Outdoor Air Temperature DX Cool Lockout (45.0°F)
3. Unit Door Open
4. Condensate Float Switch

<u>Circuit 1 Compressor Lockouts – Applicable to all cabinet unit sizes.</u>

1. HP Switch
2. LP Switch
3. Digital Scroll Compressor Discharge Temperature High
4. Low Superheat CCT1
5. Low Suction Temperature CCT1
6. Condenser Fan VFD Alarm
7. EVD1 Motor “A” Alarm
8. EVD1 Not Ready
9. CP1/CP2 Operating Outside Envelope

<u>Circuit 2 Compressor Lockouts – Applicable to D cabinet unit sizes.</u>

1. HP Switch
2. LP Switch
3. Low Superheat CCT2
4. Low Suction Temperature CCT2
5. Condenser Fan VFD Alarm
6. EVD2 Motor “A” Alarm
7. EVD2 Not Ready
8. pCOe Expansion Board Offline
9. CP3/CP4 Operating Outside Envelope

B. **Heating:** On receiving a call for heating the unit controller compares the supply air temperature from the duct sensor with the active supply air temperature in order to generate a heating demand, ranging from 0-100%, using a proprietary PI control loop. The unit is available with Gas, Electric, or Hot Water heating options. Each of these options are available individually, however the Gas is available with Auxiliary Electric Heat that can be used separately or simultaneously. The sequence of each is as follows:

a. **Gas Heating:** Gas burner operation is regulated by a separate microprocessor control board. The unit controller sends a 0-10VDC modulating signal to that controller to indicate heating demand. The control board interprets this demand signal and uses its own internal control scheme to manage the required capacity modulation to maintain the required active supply air temperature setpoint.

b. **Electric Heating:** Electric heating element operation is regulated by separate contactor(s) and SCR controller. The unit controller uses relay output(s) to close the contactor(s) and sends a 0-10VDC modulating signal to the SCR controller to manage the required capacity modulation to maintain the active supply air temperature setpoint.

c. Gas with Auxiliary Electric Heating: The gas heating control previously detailed is paired with 20kW or 40kW (nominal) of fully modulated SCR controlled electric heat as detailed for electric heating. The gas and electric heating are staged based on demand as follows:

i. Aux electric heating is activated when heating demand begins to build and is above 1% but less than the heating demand required to enable a furnace. When the unit heating demand exceeds the minimum percentage to turn on the gas furnace system, then the furnace heat is turned on and the aux electric heat is turned off. The aux electric heat is then locked out until the total heating demand reaches 0% once again.

ii. Aux electric heating is also activated when heating demand exceeds the capacity of the gas heating system. This is referred to as “Aux. Elec. Heat Boost” mode. This function is enabled by default and allows the aux electric heating to assist the gas furnace heating if the furnace heating is active at 100.0% (configurable) for a time period of 20 minutes (configurable). The boost mode will then be exited once the heating demand falls below 90.0% (configurable).

d. **Hot Water Heating:** A fully modulated 2-10VDC analog signal from the unit controller is sent directly to a modulating hot water valve by others.

7. Dehumidification Control Sequences

The dehumidification (dehum) control is sequenced to maintain supply air that has a dew point below the setpoint to reduce or avoid adding to the space relative humidity. Dehum can be initiated based on space relative humidity (RH), mixed air dew point (MADP), outdoor air dew point (OADP), or a combination of space RH / OADP. If the dehum mode is set to none, there is no dehum sequence initiated.

Temperature control is not covered in this section. It is detailed in a separate section called “Temperature Control Sequences”.

Dehum Initiation Options

A. **Space RH Control:** This option requires a space pAD with humidity sensing be installed in the space. The call for dehum comes from the pAD and is generated based on the space RH and the space RH setpoints. The default space humidity setpoints are as follows:

- Occupied Mode: 60% RH (adjustable from 0% to 100% RH)
- Unoccupied Mode: 70% RH (adjustable from 0% to 100% RH)

A 5% RH offset is applied to the space dehum setpoints to prevent short cycling of a dehum call from the space pAD. For example, with an occupied humidity setpoint of 60% RH, the space must be dehumidified to 55% RH before the dehum call is ended.

B. **Outdoor Air DP Control:** This option requires an outdoor temperature/humidity sensor be installed, which is factory installed on all DOAS and HOAS units. The call for dehum comes from the outdoor sensor and is generated based on the calculated outdoor air dew point and comparing against the outdoor air dew point setpoint. This cannot call for dehum in unoccupied. See Combination Outdoor DP/Space RH control option. The default dew point setpoint is:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

C. **Combination Outdoor Air DP and Space RH Control:** This option is a combination of both Outdoor Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as outdoor air DP control alone does not permit unoccupied operation. The default dew point setpoints are:
   - Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
   - Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

D. **Mixed Air DP Control:** This option requires a return air temperature/humidity sensor, an outdoor air temperature/humidity sensor, and mixed air dry bulb temperature sensor be installed. These sensors are standard with all HOAS units. The call for dehum comes from the calculated mixed air DP value and compared against the mixed air DP setpoint. This cannot call for dehum in unoccupied. See Combination Mixed Air DP/Space RH control option. The default mixed air DP setpoints are:
   - Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
   - Unoccupied Mode: Not Applicable

E. **Combination Mixed Air DP and Space RH Control:** This option is a combination of both Mixed Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as mixed air DP control alone does not permit unoccupied operation. The default mixed air DP setpoints are:
   - Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
   - Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

Dehum/Cooling Control Priority

Dehumidification is given priority over cooling as follows:

- **No Cooling Demand:** When a call for dehum is received, the unit will transition into dehum mode immediately.
- **Cooling Demand:** When a call for dehum is received while the unit is in cooling mode, the unit will transition from cooling to dehum mode, via a demand transfer process. The demand transfer process allows both cooling and dehum demand to build simultaneously so that compressors already operational from cooling can remain active and modulation changes based on dehum demand in place of cooling demand, without the need to restart the compressor or compressor rotation calculation. This results in more precise supply air temperature control and less cycling of the units compressors as it transitions from one mode to the other.

Mechanical Cooling/Heating System Response to Dehum Initiation

With dehum initiation controls and dehum/cooling control priority detailed above, the following describes the control of the mechanical cooling system, including hot gas reheat and condenser fans, to maintain the active supply air setpoint required to achieve dehumidification.

A. **Compressor Control:** Compressor(s) are controlled to decreased and hold the evaporator coil temperature below the dew point of the air passing through the evaporator coil to enable dehumidification of the air. The compressor control is handled in one of two ways:

   1. **Single Circuit Configurations (B & C-Cabinet):** Compressors are controlled to maintain a suction line pressure. The suction line pressure default setpoint is 130.0 PSI (adjustable from 110.0 to 155.0 PSI). This suction pressure equates to an evaporating temperature of 45.0°F. The average air off coil temperature is slightly higher than the evaporating temperature.

   2. **Dual Circuit Configurations (D-Cabinet):** Compressors are controlled to maintain an evaporator coil leaving air temperature. The evaporator coil leaving air temperature default setpoint is 50.0°F (adjustable from 45.0°F to 70.0°F).

B. **Hot Gas Reheat (HGRH) Control:** The supply air temperature sensor mounted in the supply duct is monitored by the unit controller. The HGRH modulating valves are controlled to maintain the active supply air setpoint, as described in Section “6. Temperature Control Sequences” (see Note). For example, if there is a call for cooling reset, it will control to that supply air setpoint, typically 55°F. If there is a call for heating, it will control to that supply air setpoint, typically 85°F. If there is neither a call for heating or cooling, it will control to the neutral air setpoint, typically 70°F.

Notes:

1. The HGRH control can be configured to control to a single supply air setpoint that is different than the Neutral Air, Cooling Reset, or Heating Reset setpoints. It is called the HGRH setpoint and can be set in the Service Settings CS16 screen. The range of adjustability on that setpoint is 50.0°F to 90.0°F and would be maintained in dehum mode, even if there is a call for cooling or heating reset. This control is not normally used.

2. In some cases, especially low load conditions, HGRH capacity may be reduced and the supply air temperature may fall short of the active setpoint. This is usually a transient issue that is resolved once the load increases. In select cases, if equipped with a natural gas heating option, space pAD enabled gas heating can be used as an auxiliary reheat source to prevent overcooling of the space. The use of this setting must be reviewed by Lennox.

C. **Condenser Fan (Head Pressure) Control:** The liquid line pressure transducer for each circuit is monitored by the unit controller. All condenser fans are modulated together to control the air volume passing through the condenser coil to maintain head pressure, or liquid line pressure for each circuit. The default liquid line setpoint is 310.0 PSI.

8. Energy Recovery Sequences

If the unit is equipped with an optional Energy Wheel Module (EWM), the EWM is active in the occupied mode. The unit controller manages sequencing of the exhaust fan, energy recovery wheel, economizer wheel bypass damper, and entering air pre-heater, if equipped. The control sequence for the EWM is as follows:

Exhaust Fan: The exhaust fan control sequence is described above in the “Exhaust Fan Sequences” section.

Energy Recover Wheel: The energy recovery wheel is active when required based on the current operating mode:

A. **Cooling Mode:** Return air (RA) and outdoor air (OA) enthalpy sensors are actively monitored and will control as follows:

1. If the OA enthalpy is 3.0 BTU/lb. (adjustable from 2.0 to 10.0 BTU/lb.) or more higher than the RA enthalpy, the wheel operates to pre-condition the outside air before it reaches the DX coil.

2. If the OA enthalpy is less than 2.0 BTU/lb. (adjustable from 0.0 to 2.0 BTU/lb.) higher than the RA enthalpy, the wheel is stopped, as energy recovery is minimal or may actually add load to the mechanical cooling system. The economizer bypass damper is opened as described below.

B. **Dehumidification Mode:** Return air (RA) and outdoor air (OA) enthalpy sensors are actively monitored and will control as follows:

1. If the OA humidity ratio is 10Gr/lb. or more higher than the RA humidity ratio, the wheel operates to pre-condition the outside air before it reaches the DX coil.

2. If the OA humidity ratio is less than 10Gr/lb. higher than the RA humidity ratio, the wheel is stopped, as energy recovery is minimal or may actually add load to the mechanical cooling system. The economizer bypass damper is opened as described below.

C. **Heating Mode:** Return air (RA) and outdoor air (OA) dry bulb temperature sensors are actively monitored and will control as follows:

1. If the RA temperature is higher than the OA temperature, the wheel operates to pre-condition the air before it reaches the heating system.

2. If the RA temperature is below the OA temperature, the wheel is stopped, as energy recovery is minimal or may actually add load to the heating system. The economizer bypass damper is opened as described below.

Energy Wheel Economizer Bypass Damper: The Energy Wheel Module includes an economizer bypass damper that opens when the energy recovery wheel is not being used. Opening the bypass reduces air side pressure drop and resulting fan power. The controller monitors outside air, return air, and energy recovery wheel supply air conditions. If the use of the wheel is adding load to the mechanical cooling or heating system (mode dependent), the wheel is stopped and the bypass damper is opened. The supply fan VFD speed is reduced by 10% (adjustable) to prevent the supply air volume from increasing due to the drop in static pressure when the air is bypassed around the wheel.

Economizer Bypass Jog Mode: The module shall include energy recovery wheel start-stop-jog control to periodically rotate the wheel position during economizer mode to avoid wheel contamination from the air stream. When the wheel is stopped in this mode, the wheel is run for 5 seconds every 20 minutes to prevent a buildup of dirt or dust on the face of the wheel.

Wheel Defrost: If the temperature of the wheel falls below the dew point of the exhaust air stream, condensation can form on the wheel and form frost that significantly degrades performance. There are two methods used for frost control:

A. **Wheel Start/Stop:** The standard sequence on all energy recovery wheel equipped units that do not have the optional electric preheat option is a wheel start/stop sequence. If the outside ambient temperature is above 20°F, the wheel defrost sequence is not active. If the outside ambient temperature is below 20°F, the following is the defrost sequence:

1. Run energy wheel for 30 minutes.
2. Stop energy wheel for 60 seconds to allow the exhaust air to defrost one half of the wheel.
3. Run energy wheel for 6 seconds to rotate the wheel ½ turn.
4. Stop energy wheel for 60 seconds to all the exhaust air to defrost the other half of the wheel.
5. Check the outside air temperature. If the temperature is still below the 20°F, the control will repeat sequence until the outside temperature rises above 22°F.

B. **Entering Air Preheater:** The energy recovery wheel entering air preheater is used to avoid frost build up on the EWM wheel during low ambient temperatures. The preheater is a single stage, on-off control based on a dynamically calculated frost threshold temperature. The controller monitors outside ambient temperature, return air temperature, and return air humidity and dynamically calculates the frost threshold temperature, which is the line tangent to the psychrometric saturation curve that passes through the actual indoor temperature/humidity condition. The preheater is then turned on to maintain an incoming airflow temperature that is above the frost threshold temperature. A 5.0°F band is used for enabling and disabling of the output.

Exhaust Air Damper: The exhaust air damper is not motorized and therefore is not managed by the unit controller. This damper opens when there is sufficient differential pressure across it from the exhaust fan operation.

GENERAL SPECIFICATIONS

Feature		Cabinet Size	Data
Basic Unit Capabilities	Model Size (Nominal Tons)	B	7, 10, 13, 15, 20
		C	15, 20, 26, 30
		D	30, 40, 52, 60
	Airflow Range (CFM)	B	[1] 1,100-6,000
		C	[1] 3,000-10,500
		D	[1] 4,000-18,000
	Voltages (60 Hz)	B, C, D	208V-3ph, 230V-3ph, 460V-3ph, 575V-3ph
Controls	Control Hardware	B, C, D	Carel pC05+
	Optional Communications	B, C, D	BACNet® MS/TP or Ethernet, LonWorks® FTT-10
Cooling System	Compressor	B - 7 Ton	Modulating Single Digital Scroll
		B, C (10 through 30 Ton)	Modulating Tandem Digital - On/Off Scroll
		D	Modulating Tandem Digital - On/Off Scroll + Tandem On/Off - On/Off Scroll
	Modulating Range	B - 7 Ton	25-100%
		B, C (10 through 30 Ton)	12.5-100%
		D	6.25-100%
	Evaporator Coil	B, C	High Capacity 4 Row, 14 Fins per Inch
		D	High Capacity 6 Row, 14 Fins per Inch
	Condenser Coil	B, C, D	Aluminum Micro-channel
	Condenser Fan Motor Control	B, C, D	Variable Speed for Precise Head Pressure Control
Hot Gas Reheat (Optional)	Hot Gas Reheat Coil	B, C	1 Row, 2-Circuit (patented), 14 Fins per Inch
		D	1 Row, 1-Circuit, 14 Fins per Inch
	Modulating Range	B, C, D	0-100%
Heating Section (Optional)	[2] Natural Gas Heat Options (Efficiency)	B	150 to 400MBH (81%), 175 to 310MBH (94%)
		C	300 to 600MBH (81%), 350 to 450MBH (90%)
		D	400 to 1,600MBH (81%), 450 to 1,420MBH (86-94%)
	Heat Exchanger Type	B, C, D	Tubular 409 Stainless Steel with Inshot Burners
	[2] Natural Gas Modulation Range	B	As low as 20 to 100%
		C	As low as 15 to 100%
		D	As low as 5 to 100%
	Optional Auxiliary Electric	B, C	20 kW SCR Controlled
		D	40 kW SCR Controlled
	Maximum Temp Rise	B, C	100°F
	Electric Heat Options	B	10 through 80 kW
		C	10 through 100 kW
		D	20 through 200 kW
	Electric Modulation Range	B, C, D	Full SCR Modulating
	Maximum Temp Rise	B, C, D	100°F

[1] Design conditions and/or application may limit the airflow to less than maximum airflow shown.

[2] LPG/Propane gas 81% efficient heating options are also available, but in a reduced number of ratings compared to natural gas. Turndown range is slightly less than natural gas.

GENERAL SPECIFICATIONS

Feature		Cabinet Size	Data
Supply Blower	Blower Type	B, C, D	High Efficiency, Backward Inclined, Air Foil and Non-Air Foil Plenum Fans
	Blower Qty	B, C	1
		D	1 or 2
	Blower Sizes (Diameter)	B	11, 12, 14 or 16 inch
		C	16, 20 or Dual 16 inch
		D	20, 25 or Dual 25 inch
	Blower Motor Range	B, C, D	1 to 20HP, ODP and TE NEMA Premium Efficiency
Filtration	Primary Filter Ratings	B, C, D	MERV 10, 13, or 15 (2 inch)
	Secondary Filter Ratings (Optional)	B, C, D	MERV 13 or 14 (4 inch)
Power Exhaust Blower (Optional)	Blower Type	B, C, D	High Efficiency, Backward Inclined, Air Foil and Non-Air Foil Plenum Fans
	Blower Qty	B, C	1
		D	1 or 2
	Blower Sizes (Diameter)	B	11, 16 or 20 inch
		C	20 or 28 inch
		D	20, 25 or Dual 25 inch
	Blower Motor Range (HP)	B, C, D	1 to 20HP, ODP and TE NEMA Premium Efficiency
Energy Recovery (Optional)	Wheel Type	B, C, D	Total Energy Recovery, 3Å Molecular Sieve over Aluminum
	Wheel Effectiveness	B, C	Minimum 50% to Meet ASHRAE 90.1
	Wheel Sizes (Diameter)	B	36 or 46 inch
		C	46 or 58 inch
		D	58, 68 or 74 inch

[1] Design conditions and/or application may limit the airflow to less than maximum airflow shown.

[2] LPG/Propane gas 81% efficient heating options are also available, but in a reduced number of ratings compared to natural gas. Turndown range is slightly less than natural gas.

FILTER SPECIFICATIONS

Cabinet Size	Filter Location	Standard or Optional	MERV Rating	Quantity / Size
B	Unit Primary Filters (2" Depth)	Standard	10	Qty 6 - 16x25
		Optional	13	Qty 6 - 16x25
		Optional	15	Qty 6 - 16x25
	Unit Secondary Filters (4" Depth)	Optional	13	Qty 6 - 16x25
		Optional	14	Qty 6 - 16x25
	Energy Recovery Outside Air Filters (2" Depth)	Standard (if Energy Recovery selected)	10	Qty 6 - 16x16
	Energy Recovery Return Air Filters (2" Depth)	Optional	10	Qty 6 - 16x16
C	Unit Primary Filters (2" Depth)	Standard	10	Qty 9 - 20x20
		Optional	13	Qty 9 - 20x20
		Optional	15	Qty 9 - 20x20
	Unit Secondary Filters (4" Depth)	Optional	13	Qty 9 - 20x20
		Optional	14	Qty 9 - 20x20
	Energy Recovery Outside Air Filters (2" Depth)	Standard (if Energy Recovery selected)	10	Qty 6 - 20x20
	Energy Recovery Return Air Filters (2" Depth)	Optional	10	Qty 6 - 20x20
D	Unit Primary Filters (2" Depth)	Standard	10	Qty 4 - 12x24, 8 - 24x24
		Optional	13	Qty 4 - 12x24, 8 - 24x24
		Optional	15	Qty 4 - 12x24, 8 - 24x24
	Unit Secondary Filters (4" Depth)	Optional	13	Qty 4 - 12x24, 8 - 24x24
		Optional	14	Qty 4 - 12x24, 8 - 24x24
	Energy Recovery Outside Air Filters (2" Depth)	Standard (if Energy Recovery selected)	10	Qty 8 - 24x24
	Energy Recovery Return Air Filters (2" Depth)	Optional	10	Qty 6 - 20x20

OPTIONS / ACCESSORIES

Item		Cabinet Size		
		B	C	D
UNIT APPLICATION CONTROLLER SETTINGS				
Damper Control Types	2-Position via Occupancy (Maximum % Open or Closed)	O	O	O
	2-Position via Digital Input (Maximum % Open or Closed)	O	O	O
	3-Position via Digital Input (100% Open, Minimum Position, or Closed)	O	O	O
	Modulating Building Pressure Control	O	O	O
	Modulating Enthalpy Economizer Control	O	O	O
	Modulating Enthalpy Control with CO_2 Override (DCV)	O	O	O
	Modulating Space CO_2 Control (DCV)	O	O	O
	Modulating BMS Control	O	O	O
Supply Air Temperature Reset Control Types	None	O	O	O
	Space Dry Bulb	O	O	O
	Outdoor Air Dry Bulb	O	O	O
	Space and Outdoor Air Dry Bulb	O	O	O
Dehumidificaton Initiation Control Types	Outside Air Dew Point	O	O	O
	Space Humidity and Outside Air Dew Point	O	O	O
	Mixed Air Dew Point	O	O	O
	Space Humidity and Mixed Air Dew Point	O	O	O
Supply Fan Control Types	Constant Speed Adjustable	O	O	O
	Two Speed	O	O	O
	Three Speed	O	O	O
	Building Pressurization	O	O	O
	Duct Pressurization	O	O	O
	Demand Controlled Ventilation	O	O	O
	Building Management System Control	O	O	O
Exhaust Fan Control Types (if equipped)	Single Speed Exhaust Fan	O	O	O
	Constant Speed Adjustable Exhaust Fan	O	O	O
	Supply Fan Speed Offset Exhaust Fan	O	O	O
	Building Pressurization Exhaust Fan	O	O	O
	Building Management System Control	O	O	O
SENSORS				
Supply Air Temperature Sensor (Required)	Fixed Length - 18”	X	X	X
	Averaging Sensor - 6 ft. For typical duct widths up to 54”	X	X	X
	Averaging Sensor - 12 ft. For typical duct widths of 50 to 100”	- - -	X	X
Space Temperature or Temperature/Humidity	Digital Wall Sensor	X	X	X
	Faceless Space Sensor (Up to Qty 4)	X	X	X
Outside Air Temperature/Humidity	Factory Installed (All DOAS units - Digit 7=D,E, or F)	S	S	S
	Field Installed (All HOAS units - Digit 7=A,B,C, or R)	X	X	X
Space CO_2 Sensor	Used with DCV Damper or Supply Fan controls	X	X	X
Building Pressure Sensor	Used with Building Pressure Control Damper, Supply Fan, or Exhaust Fan Controls	X	X	X
Duct Pressure Sensor	Used with Duct Pressure (Multi-Zone VAV) Supply Fan controls	X	X	X

NOTE - This list is for general reference only. Not all options and accessories are compatible with each other and/or the unit as configured. Please contact your local Sales Representative (or refer to the submittal if provided) for Configuration, Sizing, and Submittal information.

S = Standard
O = Factory Installed Option
X = Field Installed Accessory

OPTIONS / ACCESSORIES

Item		Cabinet Size		
		B	C	D
OUTSIDE AIR FILTERS				
Primary Filters	2” MERV 10 (replacement filters available)	S	S	S
	2” MERV 13 (replacement filters available)	O	O	O
	2” MERV 15 (replacement filters available)	O	O	O
Secondary Filters	4” MERV 13 (replacement filters available)	O	O	O
	4” MERV 14 (replacement filters available)	O	O	O
HEATING OPTIONS				
Hot Water Heating Coils	Available in 2 or 4 Row with 6, 8, 10, 12, or 14 FPI configurations, with or without E-Coat. Requires Digit 17=4	O	O	- - -
Hot Water Coil Freeze Stat	An averaging coil freeze stat that runs the length of the hot water coil and located below the coil and monitored by the microprocessor controller	O	O	- - -
Extended Vent Kit	Extends gas heat vent termination above the unit	X	X	X
Condensate Neutralizer	Used for condensing gas heat units. Reduces acidity of condensate where code requires neutralization. Recharge kits available	X	X	X
POWER OPTIONS				
Disconnect Switch	Field Mounted Non-Fusible Disconnect Switch. See also Deadfront Non-Fusible option in base model nomenclature	X	X	X
Dual Point Supply Power	Unit has two sets of 3-phase power lugs to which the power feed conductors are landed. This option is for use with auxiliary power systems requiring a low power mode of unit operation. Circuit 1 contains Compressors, Condenser Fan Motors, Primary or Aux Electric Heat*, and Powered Convenience Outlet*. Circuit 2 contains Unit Controls, Supply Fan Motor(s), Dampers, Gas Heating*, Exhaust Fan Motor(s)*, and Energy Recovery Wheel Motor*. Items denoted with * apply only if selected. During NORMAL POWER operation, both Circuits 1 and 2 are fed from the utility feed. During AUXILIARY POWER operation, the utility feed is removed from Circuits 1 and 2 and the auxiliary power feed is applied to Circuit 2 only. The circuits are split as follows: Notes: 1) All power feed switching and circuit protection is provided by others, external to the unit. 2) The Control System must be notified that the supply power system is in the auxiliary power mode by external contact closure (by others) at digital input DI12. 3) Phase monitors are required on both circuits and will be added automatically to the order. 4) Deadfront disconnects, smoke detectors, unit powered convenience outlet, and energy recovery pre-heat are not available with this selection. 5) If equipped with an energy recovery wheel, the energy recovery wheel motor will be on Circuit 2, however the unit controls will disable the energy wheel and open the energy wheel bypass damper, if equipped.	O	O	O
Supply Power Phase/Voltage Monitor	Monitors for correct sequencing of phases, failure of one or more phases, asymmetry, as well as overvoltage and undervoltage. (All voltages except 575V/3ph)	O	O	O
Supply Power Phase Monitor	Monitors for correct sequencing of phases and failure of one or more phases. (575V/3ph)	O	O	O

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OPTIONS / ACCESSORIES

Item		Cabinet Size		
		B	C	D
MISCELLANEOUS CONTROL OPTIONS				
Smoke Detector(s)	Supply Air - Monitors the air stream for the presence of smoke and disables unit controls and closes the outside air dampers	X	X	X
	Return Air - Monitors the air stream for the presence of smoke and disables unit controls and closes the outside air dampers	O	O	O
Unit Occupied Initiation Contacts for External Control	A digital input to the unit microprocessor controller that starts the unit in Occupied mode based on contact closure from an external control device by others	O	O	O
Exhaust Fan Initiation Contacts	Auxillary relay with two sets of contacts. When relay is energized during the Occupied mode, the contacts close and can be used to initiate a remote exhaust fan starter control circuit	O	O	O
Network Interface Card for Microprocessor Controller	BACnet MS/TP Protocol	O	O	O
	BACnet IP/Ethernet Protocol	O	O	O
	LonWorks FTT-10 Protocol	O	O	O
Remote User Interface Module	Hand held display/interface module that allows for set point changes, control adjustments, and unit troubleshooting from outside the unit. Duplicates microprocessor screen and keypad	X	X	X
External Remote User Interface Module Port	A weatherproof RJ-11 jack for connection of the Remote User Interface Module (previous item) to the unit without opening the cabinet or shutting the unit off	O	O	- - -
Microprocessor Controller Expansion Module	Carel pCOe Expansion Module used for certain unit selections	O	O	O
RAINHOODS AND ROOF CURBS				
Inlet Rainhood	Field installed to prevent rain or snow from entering the unit outside air intake opening	X	X	X
Exhaust Rainhood	Field installed to prevent rain or snow from entering the unit outside air intake opening	X	X	X
Roof Curb (14” or 24” high, insulated or uninsulated)	Curb is shipped knocked down for field assembly. Curb is designed for flat (no pitch) roofs only	X	X	X
Roof Curb Duct Connectors	Available for supply and/or return air, the duct connector permits the installation of ductwork to the roof curb prior to the unit installation Connections will align with the unit openings when set on the curb	X	X	X
Custom Roof Curbs (Third Party Drop Ship)	Configurations include End, Right, Left, or Bottom supply and/or return duct connections, non-spring or spring vibration isolation. All custom curbs are fully assembled and insulated. Other customizations available upon request	X	X	X
CABINET CORROSION PROTECTION				
Prepainted G90 Galvanized External Casing Panels	Standard construction, capable of withstanding a minimum 2500 hour salt spray and fog atmosphere exposure in accordance with ASTM B117 test procedure	S	S	S
Coastal Coat Casing Package	Adds an additional electrostatically applied polyester powdercoat paint finish to extend capability to a minimum of 5000 hours	O	O	O
Insitu® Clear Coat, Insitu®, Tropi-Coat, or Insitu® EX	Premium protection from corrosion, capable of withstanding a minimum 10000 hour salt spray and fog atmosphere exposure in accordance with ASTM B117 test procedure	Please contact your local Sales Representative or refer to the submittal (if provided)		

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X = Field Installed Accessory

OPTIONS / ACCESSORIES

Item		Cabinet Size		
		B	C	D
ENERGY RECOVERY SECTION OPTIONS (IF EQUIPPED)				
Outside Air Filters	2” MERV 10	S	S	S
Return Air Filters	2” MERV 10	O	O	O
Pressure Switch(es)	Outside Air Filters. Monitored by the microprocessor controller and initiates an alarm if the pressure drop across filters exceeds the maximum setpoint	O	O	O
	Return Air Filters. Same controller function as above	O	O	O
	Energy Recovery Wheel. Same controller function as above	O	O	O
Energy Wheel Rotation Sensor	Microprocessor controller monitors the rotation detection sensor and initiates an alarm if the wheel is not rotating when it is energized	O	O	O
Energy Wheel Speed Control	Contactor (on/off control)	O	O	O
	VFD (variable speed capacity control for part load conditions)	O	O	O

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GAS CONNECTION SIZES

Cabinet Size (Digit 6)	[1] Gas Type (Digit 17)	Furnace Size (MBH)	Gas Connection Size
B	Natural Gas	Below 200	1/2 Inch
		200 and Larger	3/4 Inch
	LPG/Propane Gas	Below 300	1/2 Inch
		300 and Larger	3/4 Inch
[2] C	Natural Gas	All	1 Inch
	LPG/Propane Gas	All	3/4 Inch
[3] D	Natural Gas	Below 850	1 Inch (Qty 2)
		850 and Larger	1-1/2 Inch (Qty 2)
	LPG/Propane Gas	All	1 Inch (Qty 2)

[1] Units with Natural Gas heating option have model nomenclature Digit 17 = 2 or 3.
Units with LPG/Propane Gas heating option have model nomenclature Digit 17 = 5 or 6.

[2] C-Cabinet units consist of two furnaces that together total the value shown.

[3] D-Cabinet units consist of two furnaces that together total the value shown for sizes up to 800,000 Btu/hr.
For sizes over 800,000 Btu/hr, the unit consists of four furnaces that together total the value shown.

PIPING CAPACITIES

[1] NATURAL GAS

Pipe Length (ft)	Nominal Gas Pipe Diameter and Capacity (MBH)				
	1 Inch	1-1/4 Inch	1-1/2 Inch	2 Inch	2-1/2 Inch
10	540	1113	1659	3203	5103
20	371	762	1145	2195	3507
30	298	612	917	1764	2814
40	255	524	784	1512	2405
50	226	464	695	1344	2132
60	205	420	630	1218	1932
80	175	360	540	1038	1659
100	155	319	478	921	1470
125	138	282	423	816	1302
150	125	256	384	739	1176
175	114	235	353	680	1082

NOTE - Minimum gas pressure - 6 in. W.C. (Natural Gas), 11 in. W.C. (LPG/Propane).

[1] Capacities based on gas pressure from 6 in. (min) up to 14 in. (max) W.C. through Schedule 40 pipe with a pressure drop of 0.3 in. W.C. for Natural Gas with a specific gravity of 0.60.

[2] LPG/PROPANE GAS

Pipe Length (ft)	Nominal Gas Pipe Diameter and Capacity (MBH)				
	1 Inch	1-1/4 Inch	1-1/2 Inch	2 Inch	2-1/2 Inch
10	1150	2350	3520	6790	10800
20	787	1620	2420	4660	7430
30	632	1300	1940	3750	5970
40	541	1110	1660	3210	5110
50	480	985	1480	2840	4530
60	434	892	1340	2570	4100
80	400	821	1230	2370	3770
100	372	763	1140	2200	3510
125	349	716	1070	2070	3290
150	330	677	1010	1950	3110
175	292	600	899	1730	2760
200	265	543	814	1570	2500
200	107	219	329	632	1008

NOTE - Minimum gas pressure - 6 in. W.C. (Natural Gas), 11 in. W.C. (LPG/Propane).

[2] Capacities based on gas pressure 11 in. (min) up to 14 in. (max) W.C. through Schedule 40 pipe with a pressure drop of 0.5 in. W.C. for LPG/Propane Gas with a specific gravity of 1.50.

TEMPERATURE RISE

Cabinet Size (Digit 6)	Heating Type (Digit 17)	Heating Capacity (Digit 18)	Temperature Rise (Digit 19)	Allowable Temperature Rise Range	Maximum Supply Air Temperature	[1] Efficiency (%)
B	1	A, B, C, D, 1, 3, 5, 7	N	1-100°F	100°F	1.00
	2 or 3	F, G, H, J, K	L	30-70°F	130°F	0.81
			H	70-100°F		
		R, S, T	N	30-100°F	100°F	0.94
	5 or 6	F, G, H	L	30-70°F	130°F	0.81
		F, G, H, J, K	H	70-100°F		
C	1	A, B, C, D, E	N	1-100°F	100°F	1.00
	2 or 3	J	N	30-75°F	130°F	0.81
		K, L, M	L	30-70°F		
			H	70-100°F		
		U, V	L	30-70°F	100°F	0.90
			H	70-100°F		
	5 or 6	J	N	30-75°F	130°F	0.81
		K, L	L	30-70°F		
			H	70-100°F		
D	1	A, B, C, D, E, 1, 3, 5, 7	N	1-100°F	100°F	1.00
	2 or 3	K	L	30-75°F	130°F	0.81
		L, M, Q	L	30-70°F		
		L, M, Q	H	70-100°F		
		1, 4	H	70-120°F		
		2, 3, 5	H	60-120°F		
		6, 7, 8, 9	H	70-120°F	130°F	0.87
		P, V	N	30-100°F	100°F	0.94
	5 or 6	1	H	70-120°F	130°F	0.81
		2	H	60-120°F		
		K	L	30-75°F		
		L	L	30-70°F		
			H	70-100°F		

[1] Airflow and Temperature Rise Formulas:

Airflow (CFM) = (Input MBH x 1000 x Eff) / (1.08 x ATR) or

Temperature Rise (ATR) = (Input MBH x 1000 x Eff) / (1.08 x CFM)

REFRIGERANT CHARGE

Cabinet Size (Digit 6)	Unit Tons (Digits 4-5)	Hot Gas Reheat (Digit 10)	Refrigerant Charge per Circuit (lbs.)	Circuit Qty
B	07	0	17.0	1
		1 or 2	20.0	
	10	0	17.0	
		1 or 2	20.5	
	13	0	23.0	
		1 or 2	28.5	
	15	0	24.0	
		1 or 2	28.5	
	20	0	28.5	
		1 or 2	35.5	
C	15	0	35.0	1
		1 or 2	39.0	
	20	0	37.0	
		1 or 2	42.0	
	26	0	38.0	
		1 or 2	44.0	
	30	0	39.0	
		1 or 2	46.0	
D	30	0	34.5	2
		1 or 2	45.0	
	40	0	36.0	
		1 or 2	46.5	
	52	0	40.0	
		1 or 2	55.0	
	60	0	41.0	
		1 or 2	56.0	

WEIGHT DATA

Section	Description	Cabinet Size					
		B		C		D	
		lb.	kg	lb.	kg	lb.	kg
Base Unit	MPR07	2377	1078	- - -	- - -	- - -	- - -
	MPR10	2489	1129	- - -	- - -	- - -	- - -
	MPR13	2570	1166	- - -	- - -	- - -	- - -
	MPR15	2585	1173	2710	1229	- - -	- - -
	MPR20	2685	1218	2894	1313	- - -	- - -
	MPR26	- - -	- - -	2898	1315	- - -	- - -
	MPR30	- - -	- - -	2907	1319	6464	2932
	MPR40	- - -	- - -	- - -	- - -	6656	3019
	MPR52	- - -	- - -	- - -	- - -	6974	3163
	MPR60	- - -	- - -	- - -	- - -	6974	3163
Dampers	Fresh Air Only (Digit 7=D, E, F)	40	18	45	20	200	91
	Fresh and Return Air (Digit 7=A, B, C, R)	80	36	95	43	362	164
Hot Gas Reheat	MPR07, 10	22	10	- - -	- - -	- - -	- - -
	MPR13	26	12	- - -	- - -	- - -	- - -
	MPR15, 20	26	12	64	29	- - -	- - -
	MPR26	- - -	- - -	64	29	- - -	- - -
	MPR30	- - -	- - -	64	29	70	32
	MPR40	- - -	- - -	- - -	- - -	70	32
	MPR52, 60	- - -	- - -	- - -	- - -	80	36
Supply Air Fan (Direct Drive)	ANPL 11 in., 12 in.	34	15	- - -	- - -	- - -	- - -
	ANPA 12 in.	35	16	- - -	- - -	- - -	- - -
	ANPA 14 in.	51	23	- - -	- - -	- - -	- - -
	ANPA 16 in.	57	26	57	26	- - -	- - -
	ANPA 16 in. Dual	- - -	- - -	114	52	- - -	- - -
	ANPA 20 in.	- - -	- - -	97	44	97	44
	ANPA 25 in.	- - -	- - -	- - -	- - -	163	74
	ANPA 25 in. Dual	- - -	- - -	- - -	- - -	326	148
[1] Motors (most common)	1 HP	29	13	29	13	29	13
	1-1/2 HP	37	17	37	17	37	17
	2 HP	40	18	40	18	40	18
	3 HP	69	31	69	31	69	31
	5 HP	84	38	84	38	84	38
	7-1/2 HP	115	52	115	52	115	52
	10 HP	128	58	128	58	128	58
	15 HP	211	96	211	96	211	96
	20 HP	232	105	232	105	232	105

[1] Motors weights shown are for a single Open Drip Proof (ODP) 1800 rpm motor. If configuration is dual fan, multiply the weight shown by two.

[2] If equipped with the hot water heat option, please contact your local Sales Representative (or refer to the submittal, if provided) for option weights.

[3] 20kW electric heat is derated for 208V and 230V.

[4] Auxiliary Electric Heat Weight Adder is additive for certain Natural and LPG/Propane Gas heat rating weights.

[5] For Energy Wheel Module weights on C-Cabinet (if applicable), see page 37.

For Power Exhaust Module weights (Units with Digit 7=C or F) or Barometric Relief Damper Module (Units with Digit 7=R), please contact your local Sales Representative or refer to the submittal (if provided).

WEIGHT DATA

Section	Description		Cabinet Size					
			B		C		D	
			lb.	kg	lb.	kg	lb.	kg
Power Option	Dead-Front Disconnect (pick one)	None	- - -	- - -	- - -	- - -	- - -	- - -
		60A & 100A	5	2	5	2	5	2
		200A	10	5	10	5	10	5
		400A	- - -	- - -	- - -	- - -	10	5
		600A	- - -	- - -	- - -	- - -	15	7
	Convenience Outlet (pick one)	None	- - -	- - -	- - -	- - -	- - -	- - -
		Powered by Others	2	1	2	1	2	1
		Powered by Unit	40	18	40	18	40	18
[2] Heat Option	[3] Electric	10 & 20kW	164	74	164	74	- - -	- - -
		30 & 40kW	174	79	174	79	328	149
		50 & 60kW	185	84	185	84	- - -	- - -
		70 & 80kW	195	88	195	88	348	158
		100kW	205	93	205	93	- - -	- - -
		100 & 120kW	- - -	- - -	- - -	- - -	370	168
		140 & 160kW	- - -	- - -	- - -	- - -	390	177
		200kW	- - -	- - -	- - -	- - -	410	186
	Natural Gas (Ratings with * are available as LP)	* 150 MBH	128	58	- - -	- - -	- - -	- - -
		* 200 MBH	154	70	- - -	- - -	- - -	- - -
		* 250 MBH	154	70	- - -	- - -	- - -	- - -
		* 300 MBH	234	106	256	116	- - -	- - -
		* 400 MBH	234	106	308	140	308	140
		* 500 MBH	- - -	- - -	308	140	308	140
		600 MBH	- - -	- - -	313	142	468	212
		800 MBH	- - -	- - -	- - -	- - -	468	212
		* 900 MBH	- - -	- - -	- - -	- - -	616	279
		* 1000 MBH	- - -	- - -	- - -	- - -	616	279
		1200 MBH	- - -	- - -	- - -	- - -	936	425
		1400 MBH	- - -	- - -	- - -	- - -	936	425
		1600 MBH	- - -	- - -	- - -	- - -	936	425
		175 MBH - 94%	158	72	- - -	- - -	- - -	- - -
		225 MBH - 94%	160	73	- - -	- - -	- - -	- - -
		310 MBH - 94%	173	78	- - -	- - -	- - -	- - -
		350 MBH - 90%	- - -	- - -	316	143	- - -	- - -
		450 MBH - 90%	- - -	- - -	320	145	320	145
		620 MBH - 94%	- - -	- - -	- - -	- - -	346	157
		850 MBH - 87%	- - -	- - -	- - -	- - -	628	285
		950 MBH - 87%	- - -	- - -	- - -	- - -	628	285
		1220 MBH - 87%	- - -	- - -	- - -	- - -	814	369
		1420 MBH - 87%	- - -	- - -	- - -	- - -	814	369
	[3, 4] Auxiliary Electric Heat Adder	20kW	164	74	164	74	- - -	- - -
		40kW	- - -	- - -	- - -	- - -	328	149

[1] Motors weights shown are for a single Open Drip Proof (ODP) 1800 rpm motor. If configuration is dual fan, multiply the weight shown by two.

[2] If equipped with the hot water heat option, please contact your local Sales Representative (or refer to the submittal, if provided) for option weights.

[3] 20kW electric heat is derated for 208V and 230V.

[4] Auxiliary Electric Heat Weight Adder is additive for certain Natural and LPG/Propane Gas heat rating weights.

[5] For Energy Wheel Module weights on C-Cabinet (if applicable), see page 37.

For Power Exhaust Module weights (Units with Digit 7=C or F) or Barometric Relief Damper Module (Units with Digit 7=R), please contact your local Sales Representative or refer to the submittal (if provided).

WEIGHT DATA

Section	Description		Cabinet Size					
			B		C		D	
			lb.	kg	lb.	kg	lb.	kg
[5] Integral Energy Recovery Wheel Option	Energy Recovery Wheel Section	None	0	0	0	0	0	0
		36 in. Wheel (21=F)	1013	459	- - -	- - -	- - -	- - -
		46 in. Wheel (21=G)	1088	494	- - -	- - -	- - -	- - -
		58 in. Wheel (21=H)	- - -	- - -	- - -	- - -	3083	1398
		68 in. Wheel (21=J)	- - -	- - -	- - -	- - -	3224	1462
		74 in. Wheel (21=K)	- - -	- - -	- - -	- - -	3348	1519
		81 in. Wheel (21=L)	- - -	- - -	- - -	- - -	3403	1544
	Exhaust Air Fan	None	0	0	0	0	0	0
		11 in.	114	52	- - -	- - -	- - -	- - -
		16 in.	126	57	- - -	- - -	- - -	- - -
		20 in.	148	67	- - -	- - -	- - -	- - -
		ANPA 20 in.	- - -	- - -	- - -	- - -	97	44
		ANPA 25 in.	- - -	- - -	- - -	- - -	163	74
		ANPA 25 in. Dual	- - -	- - -	- - -	- - -	326	148
	[1] Motors (most common)	Refer to Supply Fan Motor for comparable weights	*	- - -	- - -	- - -	*	- - -
	[3] Energy Wheel Electric Preheat	None	0	0	0	0	0	0
		20kW Nominal	103	47	- - -	- - -	103	47
		40kW Nominal	- - -	- - -	- - -	- - -	108	49
Inlet Hood	(Ships loose for field installation)		68	31	72	33	112	51
Roof Curbs	14 in. Insulated (no ERV)		179	81	- - -	- - -	430	195
	24 in. Insulated (no ERV)		273	124	- - -	- - -	547	248
	14 in. Insulated (with ERV)		266	121	- - -	- - -	503	228
	24 in. Insulated (with ERV)		401	182	- - -	- - -	737	334
	14 in. Insulated		- - -	- - -	205	93	- - -	- - -
	24 in. Insulated		- - -	- - -	310	141	- - -	- - -

[1] Motors weights shown are for a single Open Drip Proof (ODP) 1800 rpm motor. If configuration is dual fan, multiply the weight shown by two.

[2] If equipped with the hot water heat option, please contact your local Sales Representative (or refer to the submittal, if provided) for option weights.

[3] 20kW electric heat is derated for 208V and 230V.

[4] Auxiliary Electric Heat Weight Adder is additive for certain Natural and LPG/Propane Gas heat rating weights.

[5] For Energy Wheel Module weights on C-Cabinet (if applicable), see page 37.

For Power Exhaust Module weights (Units with Digit 7=C or F) or Barometric Relief Damper Module (Units with Digit 7=R), please contact your local Sales Representative or refer to the submittal (if provided).

WEIGHT DATA — C-CABINET (ENERGY WHEEL MODULE)

Section	Description		Weight	
			lbs	kg
Model EWM Base Unit	Digit 7 = M	46 in. Wheel	1967	892
		58 in. Wheel	2113	958
Exhaust Air Blower	Digit 9 = 3	20 in. ANPA	126	57
	Digit 9 = 6	28 in. ANPA	173	78
Motors (most common)	Digit 10 = Q	1 HP	29	13
	Digit 10 = R	1-1/2 HP	37	17
	Digit 10 = S	2 HP	40	18
	Digit 10 = T	3 HP	69	31
	Digit 10 = U	5 HP	84	38
	Digit 10 = V	7-1/2 HP	115	52
	Digit 10 = W	10 HP	128	58
Other	Electric Preheat (Digit 14)	None	- - -	- - -
		20 kW Nominal (derated for 208V)	103	47
	Inlet Hood (ships loose for field installation)		72	33
Roof Curbs	14 in. Uninsulated ERV only		185	84
	24 in. Insulated ERV only		273	124

AIR RESISTANCE DATA — B-CABINET SUPPLY FAN

Feature			1111	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500	6000
Unit	Evaporator Coil	7 and 10 Ton	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.28	0.35	0.42	0.50	0.58	0.67	0.76
		13 and 15 Ton	0.05	0.05	0.07	0.09	0.11	0.13	0.15	0.18	0.20	0.25	0.30	0.36	0.42	0.48	0.55
	Hot Gas Reheat Coil	7 and 10 Ton	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08
		13 and 15 Ton	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06
Filters	2 in. Primary	MERV 10	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.11
		MERV 13	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.12	0.15	0.17	0.20	0.23
		MERV 15	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.19
	4 in. Secondary	MERV 13	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.09	0.11	0.12	0.14	0.16	0.19
		MERV 14	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.16	0.18	0.21	0.24	0.27	0.30
Air Control	Rain Hood		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02
	Dampers		0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05
Electric Heat	10 and 20kW		0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	30 and 40kW		- - -	- - -	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
	50 and 60kW		- - -	- - -	- - -	- - -	0.03	0.03	0.04	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09
	70 and 80kW		- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09
Gas Heat	150 MBH	High Temp Rise	0.03	0.03	0.04	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.05	0.06	0.07	0.08	0.1	0.11	0.15	- - -	- - -	- - -	- - -	- - -
	200 MBH	High Temp Rise	- - -	- - -	0.06	0.08	0.09	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.1	0.11	0.13	0.16	0.21	0.27	0.34	- - -	- - -	- - -
	250 MBH	High Temp Rise	- - -	- - -	- - -	- - -	0.09	0.11	0.14	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.13	0.16	0.21	0.27	0.34	0.43	0.52	0.62
	300 MBH	High Temp Rise	- - -	- - -	- - -	- - -	- - -	0.07	0.08	0.09	0.11	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.09	0.12	0.14	0.17	0.2	0.23
	400 MBH	High Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.11	0.14	0.17	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.14	0.17	0.2	0.23
	175 MBH		- - -	- - -	- - -	0.1	0.13	0.16	0.19	0.22	0.26	0.34	0.44	0.54	0.65	- - -	- - -
	225 MBH		- - -	- - -	- - -	- - -	0.13	0.16	0.19	0.22	0.26	0.34	0.44	0.54	0.65	0.78	0.91
	310 MBH		- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.17	0.2	0.25	0.32	0.38	0.46	0.53	0.62
Gas Heat + Aux/ Supplemental Electric	150 MBH	High Temp Rise	0.03	0.04	0.04	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.05	0.06	0.08	0.09	0.11	0.12	0.17	- - -	- - -	- - -	- - -	- - -
	200 MBH	High Temp Rise	- - -	- - -	0.07	0.08	0.1	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.1	0.12	0.14	0.17	0.22	0.28	0.36	- - -	- - -	- - -
	250MBH	High Temp Rise	- - -	- - -	- - -	- - -	0.1	0.12	0.15	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.14	0.17	0.22	0.28	0.36	0.44	0.54	0.64
	300MBH	High Temp Rise	- - -	- - -	- - -	- - -	- - -	0.07	0.09	0.1	0.12	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.11	0.13	0.16	0.19	0.22	0.25
	400MBH	High Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.12	0.15	0.18	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.16	0.19	0.22	0.25
	175 MBH		- - -	- - -	- - -	0.11	0.13	0.16	0.2	0.23	0.27	0.35	0.45	0.55	0.67	- - -	- - -
	225 MBH		- - -	- - -	- - -	- - -	0.13	0.16	0.2	0.23	0.27	0.35	0.45	0.55	0.67	0.8	0.93
	310 MBH		- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.18	0.21	0.27	0.33	0.4	0.47	0.55	0.64
Energy Wheel Module	Supply Side	2 in. MERV 10 OA Filters	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.09	0.11	0.13	0.16	0.18	- - -
		36 in. Wheel (21=F)	0.35	0.39	0.46	0.54	0.62	0.7	0.78	0.86	0.94	- - -	- - -	- - -	- - -	- - -	- - -
		46 in. Wheel (21=G)	0.23	0.26	0.31	0.36	0.41	0.46	0.51	0.57	0.62	0.73	0.85	0.96	1.08	1.21	- - -
	Exhaust Side	2 in. MERV 10 RA Filters	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.09	0.11	0.13	0.16	0.18	- - -
		36 in. Wheel (21=F)	0.48	0.53	0.61	0.69	0.77	0.85	0.94	1.02	1.11	- - -	- - -	- - -	- - -	- - -	- - -
		46 in. Wheel (21=G)	0.36	0.39	0.45	0.5	0.56	0.62	0.67	0.73	0.79	0.91	1.04	1.16	1.29	1.43	- - -

NOTE - Option and accessory static pressure drop data shown are approximate. Please contact your local Sales Representative (or refer to the submittal, if provided) for static pressure drop data at conditions other than shown above.

AIR RESISTANCE DATA — C-CABINET SUPPLY FAN

Feature			3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	10,000	12,000
Unit	Evaporator Coil		0.11	0.15	0.18	0.21	0.25	0.29	0.32	0.36	0.40	0.44	0.49	0.53	0.58	0.67	0.87
	Hot Gas Reheat Coil		0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.13	0.18
Filters	2 in. Primary	MERV 10	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.12	0.16
		MERV 13	0.04	0.05	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.17	0.19	0.21	0.23	0.27	0.35
		MERV 15	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.14	0.16	0.17	0.19	0.22	0.29
	4 in. Secondary	MERV 13	0.05	0.06	0.07	0.07	0.09	0.10	0.11	0.12	0.13	0.14	0.16	0.17	0.19	0.22	0.29
		MERV 14	0.08	0.10	0.11	0.13	0.15	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.34	0.43
Air Control	Rain Hood		0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.04
	Dampers		0.01	0.01	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.08	0.10	0.14
Electric Heat	10 and 20kW		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
	30 and 40kW		0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06
	50 and 60kW		0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.10
	70 and 80kW		0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.13
	100kW		- - -	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.13
Gas Heat	300 MBH		0.07	0.09	0.11	0.14	0.17	0.21	0.25	0.30	0.35	- - -	- - -	- - -	- - -	- - -	- - -
	400 MBH	High Temp Rise	0.09	0.11	0.14	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.14	0.17	0.20	0.24	0.28	0.33	0.37	0.43	0.48	0.54	- - -	- - -
	500 MBH	High Temp Rise	- - -	- - -	0.14	0.18	0.21	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.20	0.24	0.28	0.33	0.37	0.43	0.48	0.54	0.67	0.98
	600 MBH	High Temp Rise	- - -	- - -	- - -	0.21	0.25	0.29	0.33	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.37	0.42	0.46	0.51	0.56	0.61	0.71	0.94
	350 MBH	High Temp Rise	0.14	0.18	0.23	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.25	0.31	0.36	0.42	0.47	0.53	0.58	0.64	0.70	0.75	- - -	- - -
	450 MBH	High Temp Rise	- - -	- - -	0.23	0.28	0.34	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.36	0.42	0.47	0.53	0.58	0.64	0.70	0.75	0.87	1.09
Gas Heat + Aux/ Supplemental Electric	300 MBH		0.08	0.09	0.12	0.14	0.18	0.22	0.26	0.31	0.36	- - -	- - -	- - -	- - -	- - -	- - -
	400 MBH	High Temp Rise	0.10	0.12	0.15	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.15	0.18	0.21	0.25	0.29	0.34	0.39	0.44	0.50	0.56	- - -	- - -
	500 MBH	High Temp Rise	- - -	- - -	0.15	0.18	0.22	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.21	0.25	0.29	0.34	0.39	0.44	0.50	0.56	0.69	1.00
	600 MBH	High Temp Rise	- - -	- - -	- - -	0.22	0.26	0.30	0.34	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.39	0.43	0.48	0.52	0.57	0.62	0.73	0.96
	350 MBH	High Temp Rise	0.14	0.19	0.24	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.26	0.32	0.37	0.43	0.48	0.54	0.60	0.66	0.71	0.77	- - -	- - -
	450 MBH	High Temp Rise	- - -	- - -	0.24	0.29	0.35	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.37	0.43	0.48	0.54	0.60	0.66	0.71	0.77	0.88	1.12
Energy Wheel Module	Supply Side	2 in. MERV 10 OA Filters	0.04	0.02	0.03	0.03	0.04	0.05	0.11	0.12	0.13	0.15	0.16	0.18	0.20	- - -	- - -
		46 in. Wheel (EWM 7=M)	0.59	0.69	0.80	0.90	1.01	1.12	1.23	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		58 in. Wheel (EWM 7=M)	0.37	0.44	0.51	0.59	0.66	0.73	0.81	0.89	0.97	1.05	1.13	1.21	1.30	- - -	- - -
	Exhaust Side	2 in. MERV 10 RA Filters	0.04	0.05	0.06	0.07	0.08	0.09	0.11	0.12	0.13	0.15	0.16	0.18	0.20	- - -	- - -
		46 in. Wheel (EWM 7=M)	0.74	0.85	0.96	1.08	1.19	1.30	1.42	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		58 in. Wheel (EWM 7=M)	0.53	0.61	0.68	0.76	0.84	0.92	1.00	1.08	1.17	1.26	1.35	1.44	1.53	- - -	- - -

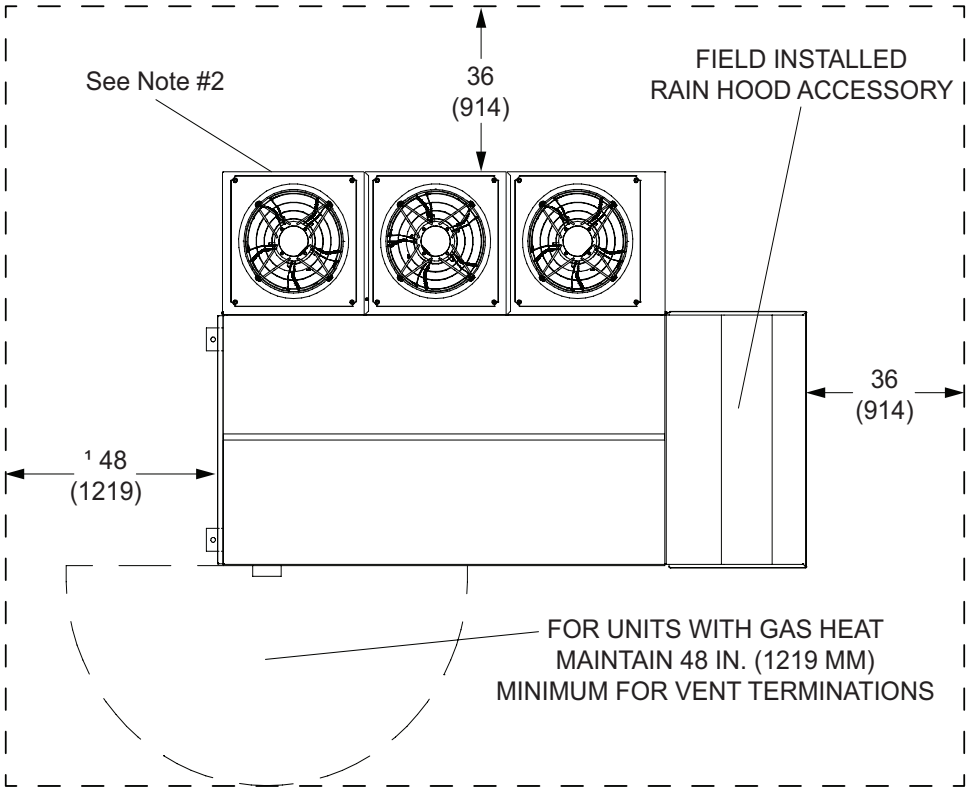
NOTE - Option and accessory static pressure drop data shown are approximate. Please contact your local Sales Representative (or refer to the submittal, if provided) for static pressure drop data at conditions other than shown above.

If equipped with the hot water heat option, please contact your local Sales Representative (or refer to the submittal, if provided) for static pressure drop at design conditions.

AIR RESISTANCE DATA — D-CABINET SUPPLY FAN

Feature			4000	5000	6000	7000	8000	9000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000
Unit	Evaporator Coil	30 & 40 Ton	0.17	0.24	0.32	0.41	0.51	0.62	0.73	0.86	0.99	- - -	- - -	- - -	- - -	- - -	- - -
		52 & 60 Ton	- - -	0.14	0.18	0.23	0.29	0.35	0.42	0.49	0.57	0.65	0.74	0.83	0.92	1.03	1.13
	Hot Gas Reheat Coil	30 & 40 Ton	0.05	0.06	0.09	0.11	0.13	0.16	0.19	0.22	0.26	- - -	- - -	- - -	- - -	- - -	- - -
		52 & 60 Ton	- - -	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.11	0.13	0.14	0.16	0.18	0.20
Filters	2 in. Primary	MERV 10	0.01	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15
		MERV 13	0.05	0.07	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.30	0.32
		MERV 15	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25
	4 in. Secondary	MERV 13	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.20	0.22	0.24
		MERV 14	0.06	0.08	0.10	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.29	0.32	0.34	0.37	0.40
Air Control	Rain Hood		0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03
	Dampers		0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10
Electric Heat	40 kW		0.03	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.12	0.13
	80 kW		0.01	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06
	120 kW		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	160 kW		- - -	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	200 kW		- - -	- - -	- - -	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Gas Heat	400 MBH	Low Temp Rise	0.08	0.11	0.16	0.21	0.27	0.34	0.43	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	500 MBH	High Temp Rise	0.09	0.14	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	0.16	0.21	0.27	0.34	0.43	0.52	0.62	- - -	- - -	- - -	- - -	- - -	- - -
	600 MBH	High Temp Rise	- - -	0.13	0.17	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.15	0.17	0.20	0.22	0.25	0.28	0.32	0.35	0.39	- - -	- - -	- - -
	800 MBH	High Temp Rise	- - -	- - -	0.17	0.21	0.25	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.20	0.22	0.25	0.28	0.32	0.35	0.39	0.42	0.46	0.51
	900 MBH		- - -	- - -	- - -	0.51	0.64	0.79	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	1000 MBH		- - -	- - -	- - -	- - -	0.64	0.79	0.96	1.15	1.35	- - -	- - -	- - -	- - -	- - -	- - -
	1200 MBH		- - -	- - -	- - -	- - -	- - -	0.53	0.63	0.73	0.84	0.96	1.09	1.22	- - -	- - -	- - -
	1400 MBH		- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.73	0.84	0.96	1.09	1.22	- - -	- - -	- - -
	1600 MBH		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0.84	0.96	1.09	1.22	1.36	1.51	1.67
	850 MBH - 87%		- - -	- - -	0.56	0.72	0.90	1.11	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	950 MBH - 87%		- - -	- - -	- - -	0.72	0.90	1.11	1.34	1.59	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	1220 MBH - 87%		- - -	- - -	- - -	- - -	- - -	1.00	1.15	1.31	1.47	1.64	1.83	- - -	- - -	- - -	- - -
	1420 MBH - 87%		- - -	- - -	- - -	- - -	- - -	- - -	1.15	1.31	1.47	1.64	1.83	2.02	2.22	- - -	- - -
	450 MBH - 94%		0.14	0.21	0.28	0.36	0.45	0.56	0.67	0.80	0.93	1.08	- - -	- - -	- - -	- - -	- - -
	620 MBH - 94%		- - -	- - -	0.24	0.30	0.36	0.43	0.50	0.58	0.66	0.75	0.84	0.94	1.05	1.16	1.28
Gas Heat + Aux/ Supplemental Electric	400 MBH	Low Temp Rise	0.11	0.15	0.20	0.26	0.33	0.41	0.50	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	500 MBH	High Temp Rise	0.12	0.18	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	0.20	0.26	0.33	0.41	0.50	0.60	0.71	- - -	- - -	- - -	- - -	- - -	- - -
	600 MBH	High Temp Rise	- - -	0.17	0.21	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	0.20	0.23	0.26	0.30	0.33	0.37	0.41	0.45	0.50	- - -	- - -	- - -
	800 MBH	High Temp Rise	- - -	- - -	0.21	0.26	0.31	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		Low Temp Rise	- - -	- - -	- - -	- - -	- - -	0.26	0.30	0.33	0.37	0.41	0.45	0.50	0.54	0.59	0.64
	450 MBH - 94%		0.17	0.24	0.32	0.41	0.51	0.62	0.74	0.88	1.02	1.17	- - -	- - -	- - -	- - -	- - -
	620 MBH - 94%		- - -	- - -	0.29	0.35	0.42	0.49	0.57	0.66	0.75	0.84	0.95	1.05	1.17	1.29	1.41
Energy Wheel Module	Supply Side	2 in. MERV 10 OA Filters	- - -	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.11	0.13	0.14	0.16	0.17	0.19	0.21
		58 in. Wheel	- - -	0.58	0.70	0.82	0.94	1.06	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		68 in. Wheel	- - -	0.45	0.54	0.63	0.72	0.81	0.91	1.01	1.11	- - -	- - -	- - -	- - -	- - -	- - -
		74 in. Wheel	- - -	0.38	0.46	0.54	0.62	0.70	0.78	0.87	0.96	1.04	1.13	1.22	- - -	- - -	- - -
		81 in. Wheel	- - -	0.32	0.38	0.45	0.52	0.59	0.66	0.73	0.80	0.88	0.95	1.03	1.11	1.19	1.28
	Exhaust Side	2 in. MERV 10 RA Filters	- - -	0.04	0.05	0.07	0.08	0.10	0.11	0.13	0.15	- - -	- - -	- - -	- - -	- - -	- - -
		58 in. Wheel	- - -	0.61	0.74	0.88	1.01	1.15	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		68 in. Wheel	- - -	0.48	0.58	0.69	0.80	0.91	1.03	1.15	1.27	- - -	- - -	- - -	- - -	- - -	- - -
		74 in. Wheel	- - -	0.41	0.50	0.60	0.70	0.80	0.90	1.01	1.12	1.24	1.36	1.49	- - -	- - -	- - -
		81 in. Wheel	- - -	0.35	0.43	0.51	0.59	0.68	0.77	0.87	0.97	1.07	1.18	1.29	1.41	1.53	1.65

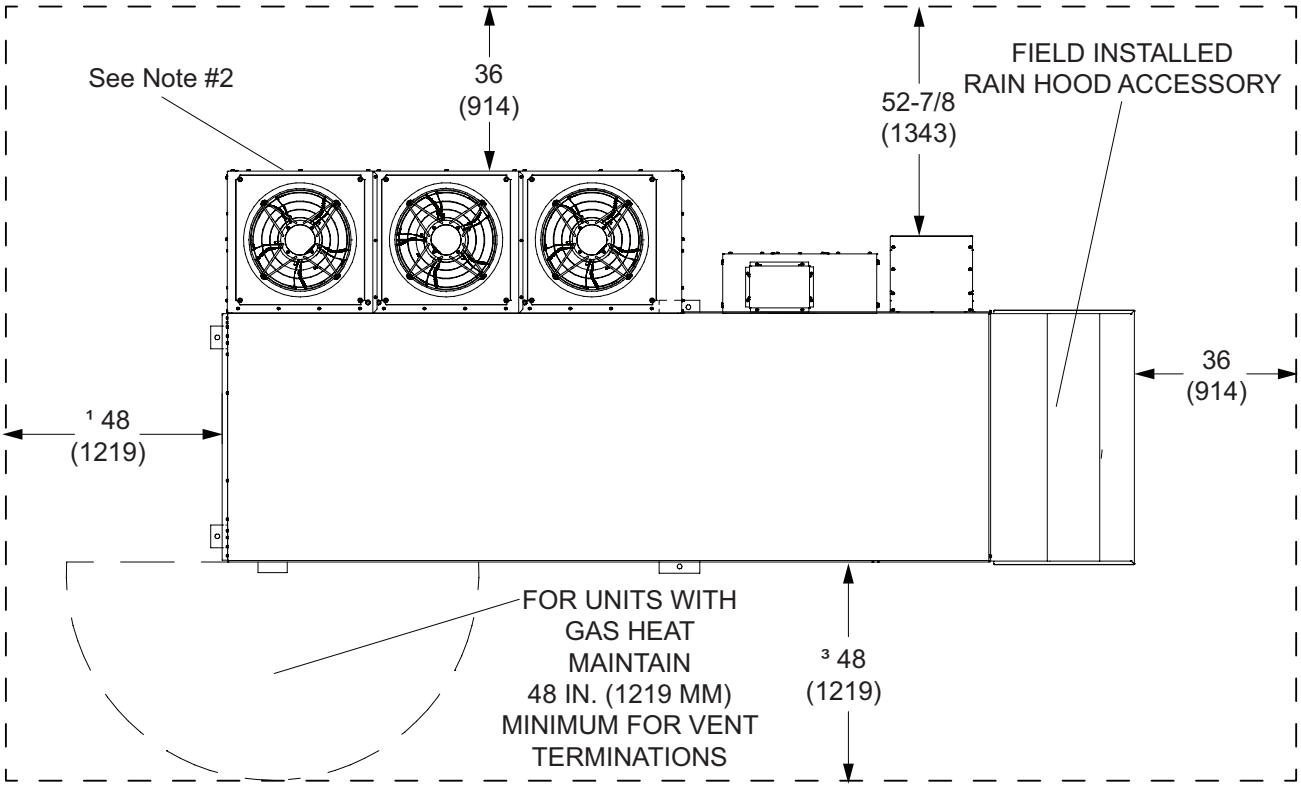
NOTE - Option and accessory static pressure drop data shown are approximate. Please contact your local Sales Representative (or refer to the submittal, if provided) for static pressure drop data at conditions other than shown above.



NOTES:
Clearance above the unit - Unobstructed.
Clearance to combustibles below the unit - Minumum 6 inch (152 mm).

[1] The minimum recommended clearance for service is 48 inch (1219 mm). For service clearances less than shown, applicable local code requirements must be followed.

[2] If condenser coil replacement is required in the future, the minimum clearance must be:
- 102 inch (2591 mm) for B-Cabinet units
- 112 inch (2845 mm) for C-Cabinet units



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Clearance to combustibles below the unit - Minumum 6 inch (152 mm).

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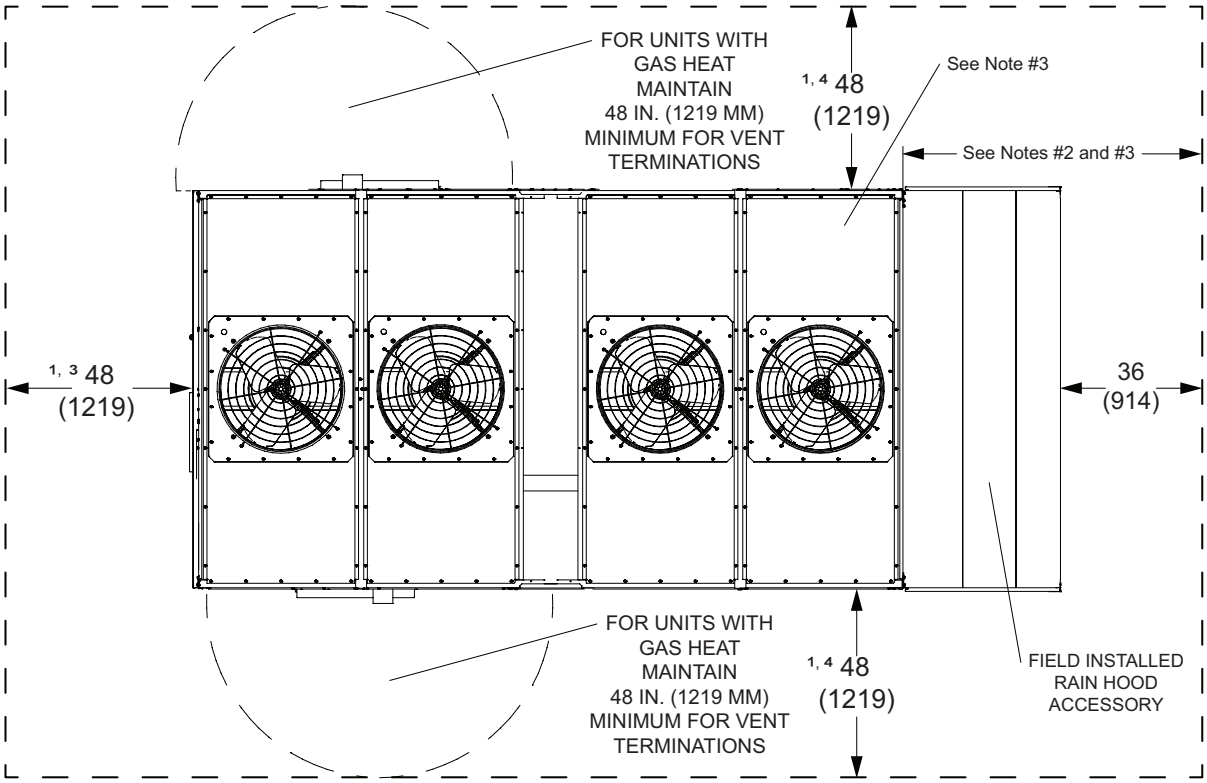
[2] If condenser coil replacement is required in the future, the minimum clearance must be:
- 102 inch (2591 mm) for B-Cabinet units
- 112 inch (2845 mm) for C-Cabinet units

[3] If evaporator coil, hot gas reheat coil, and/or energy wheel replacement is required in the future, the minimum clearance must be:
- 55 inch (1397 mm) for B-Cabinet units
- 64 inch (1626 mm) for C-Cabinet units



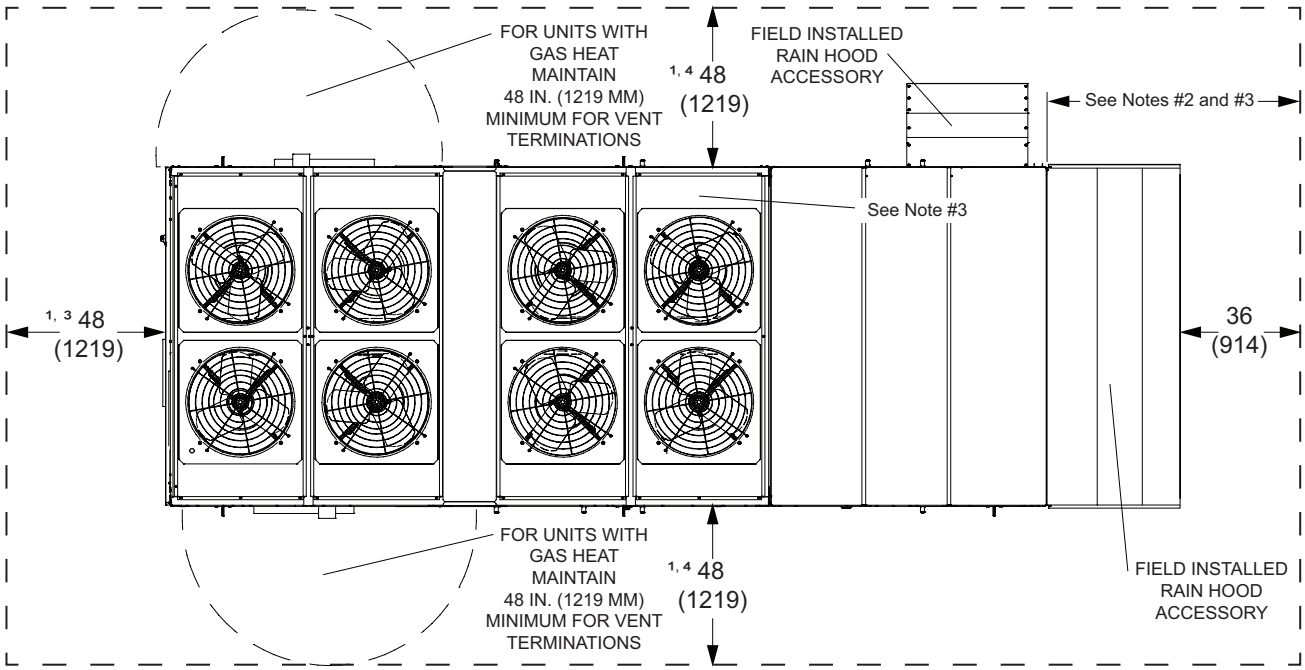
NOTES:
Clearance above the unit - Unobstructed.
Clearance to combustibles below the unit - Minumum 6 inch (152 mm).

[1] The minimum recommended clearance for service is 48 inch (1219 mm).
For service clearances less than shown, applicable local code requirements must be followed.

[2] The minimum recommended clearance for service is 36 inch (914 mm).
For service clearances less than shown, applicable local code requirements must be followed.

[3] If condenser coil replacement is required in the future, the minimum clearance must be:
• 100 inch (2540 mm) for D-Cabinet unit

[4] If evaporator coil, hot gas reheat coil, and/or energy wheel replacement is required in the future, the minimum clearance must be:
• 100 inch (2540 mm) for D-Cabinet unit



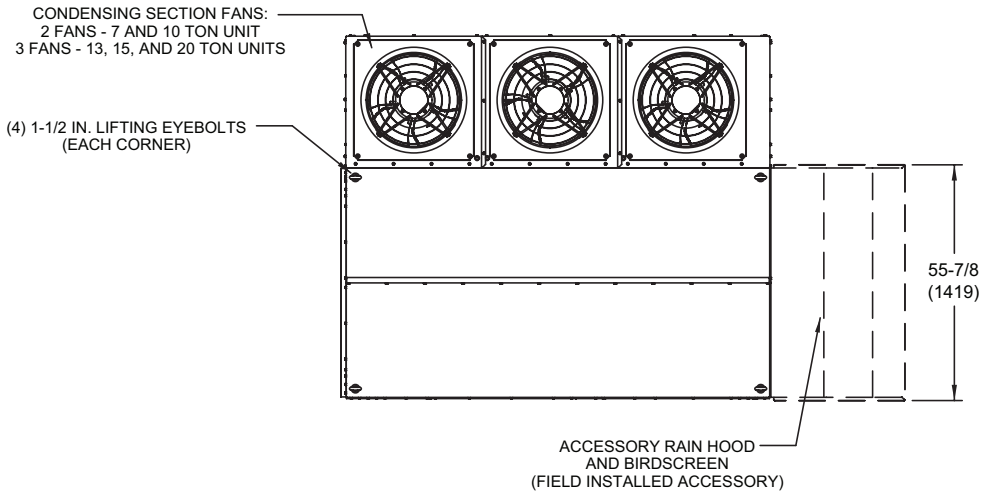
NOTES:
Clearance above the unit - Unobstructed.
Clearance to combustibles below the unit - Minumum 6 inch (152 mm).

[1] The minimum recommended clearance for service is 48 inch (1219 mm).
For service clearances less than shown, applicable local code requirements must be followed.

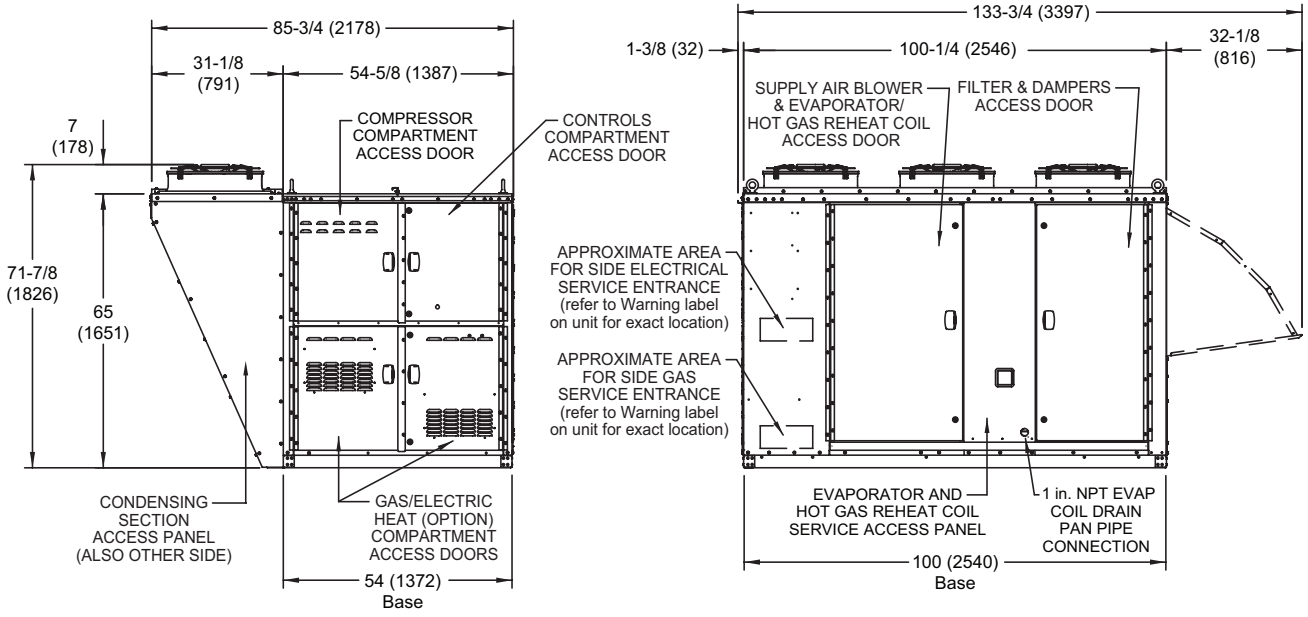
[2] The minimum recommended clearance for service is 36 inch (914 mm).
For service clearances less than shown, applicable local code requirements must be followed.

[3] If condenser coil replacement is required in the future, the minimum clearance must be:
- 100 inch (2540 mm) for D-Cabinet unit

[4] If evaporator coil, hot gas reheat coil, and/or energy wheel replacement is required in the future, the minimum clearance must be:
- 100 inch (2540 mm) for D-Cabinet unit



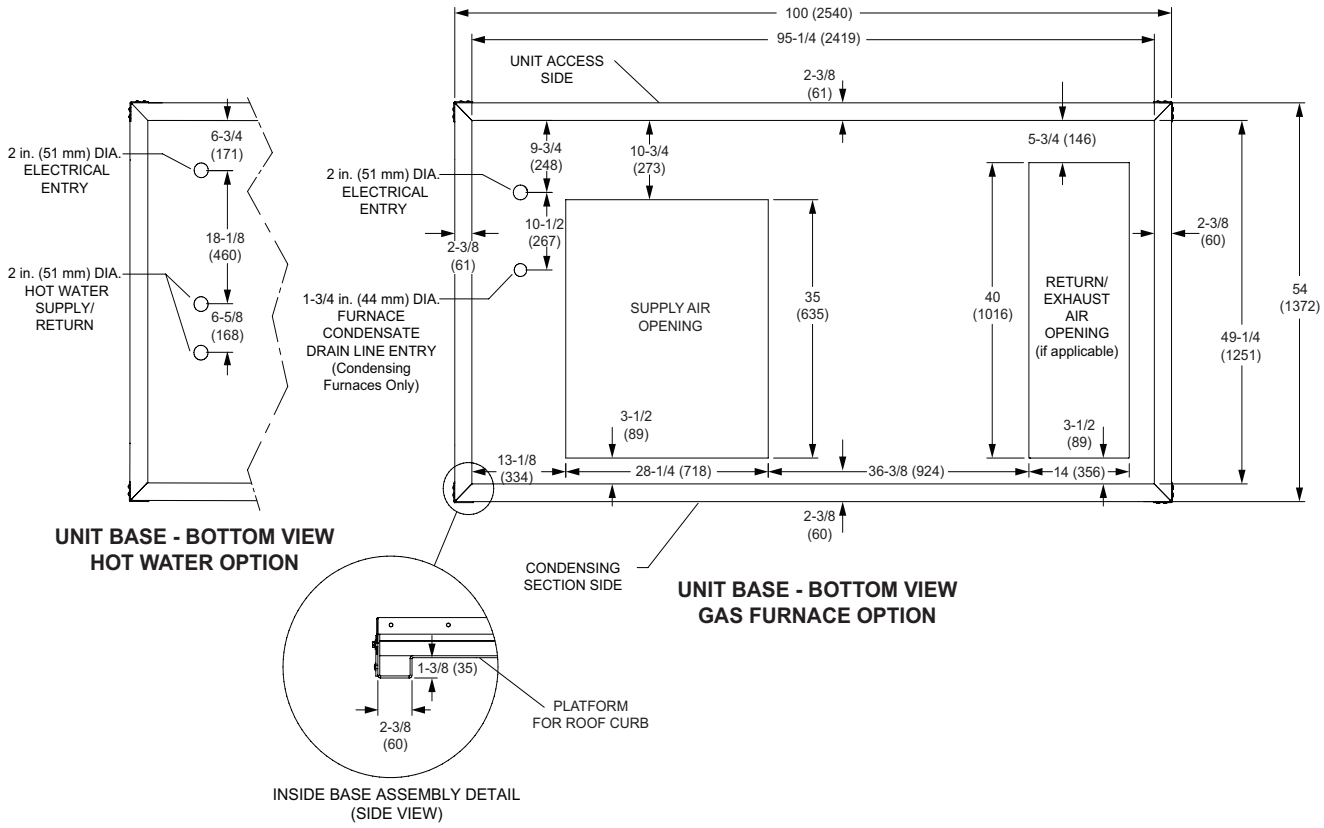
TOP VIEW

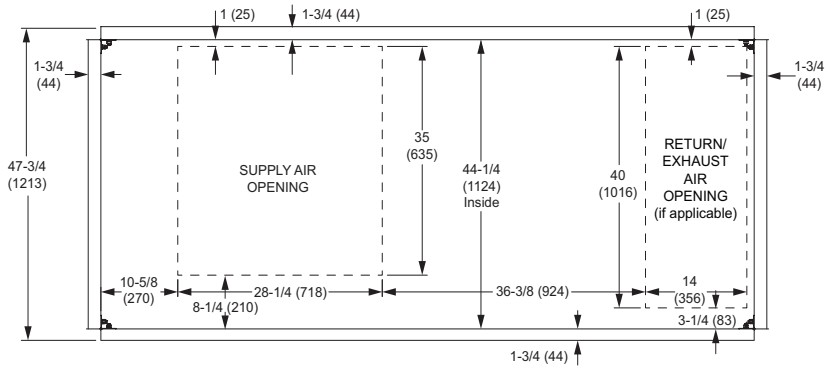


END VIEW
(Condenser/Compressor/Heating/Controls)

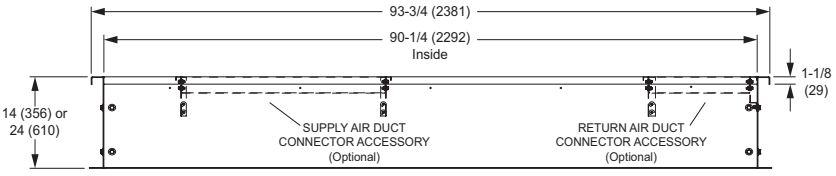
SIDE VIEW
(Evaporator/Reheat/Blower/Filters/Dampers)

NOTE - Also See B-Cabinet Unit Base and Roof Curb Drawing on Next Page.

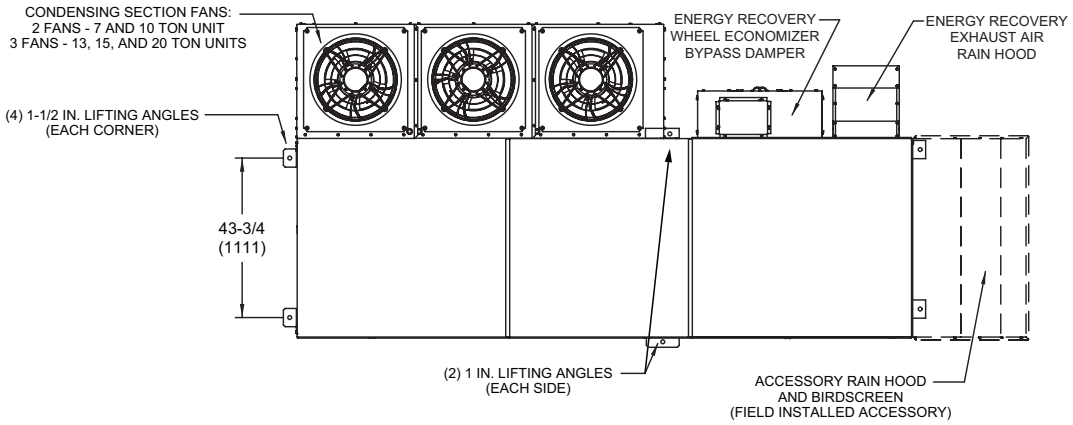


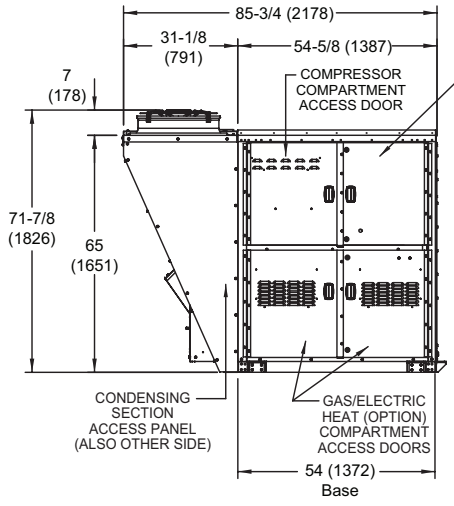


ROOF CURB - TOP VIEW

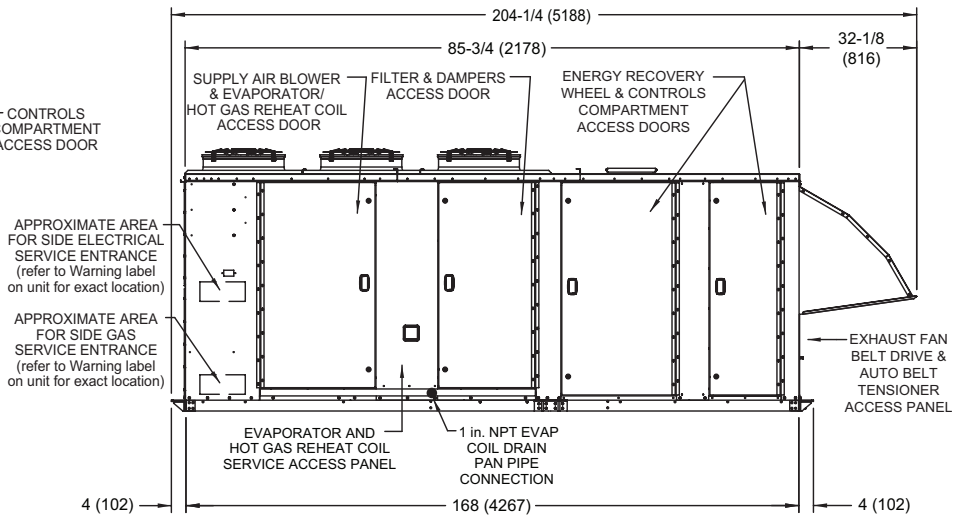


ROOF CURB - SIDE VIEW



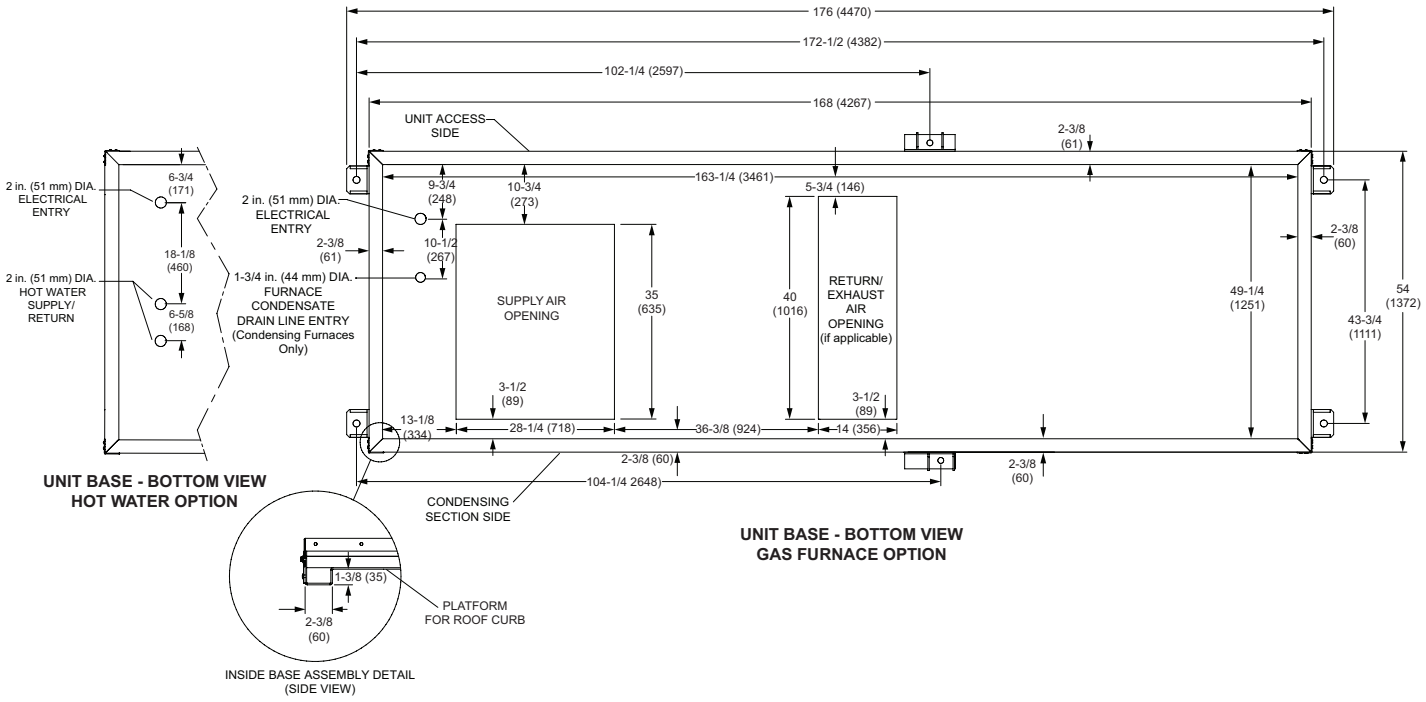


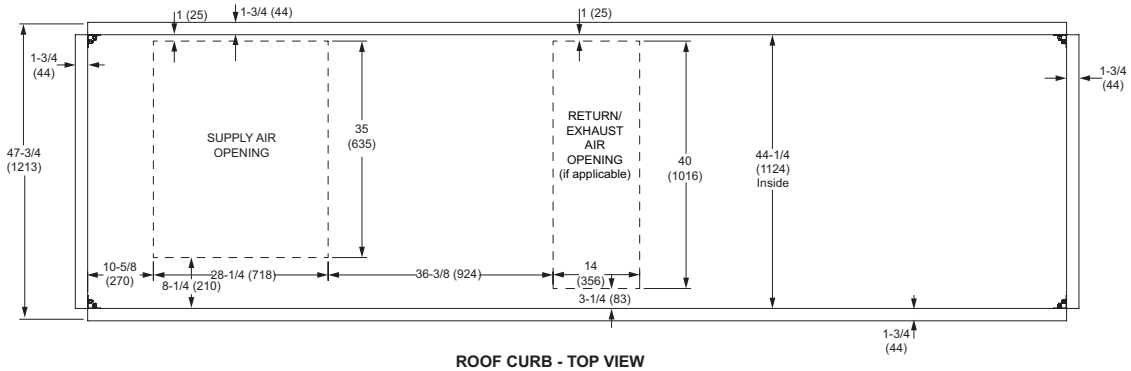
END VIEW
(Condenser/Compressor/Heating/Controls)

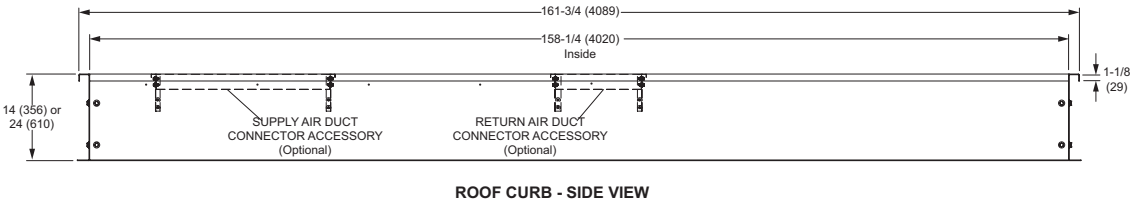


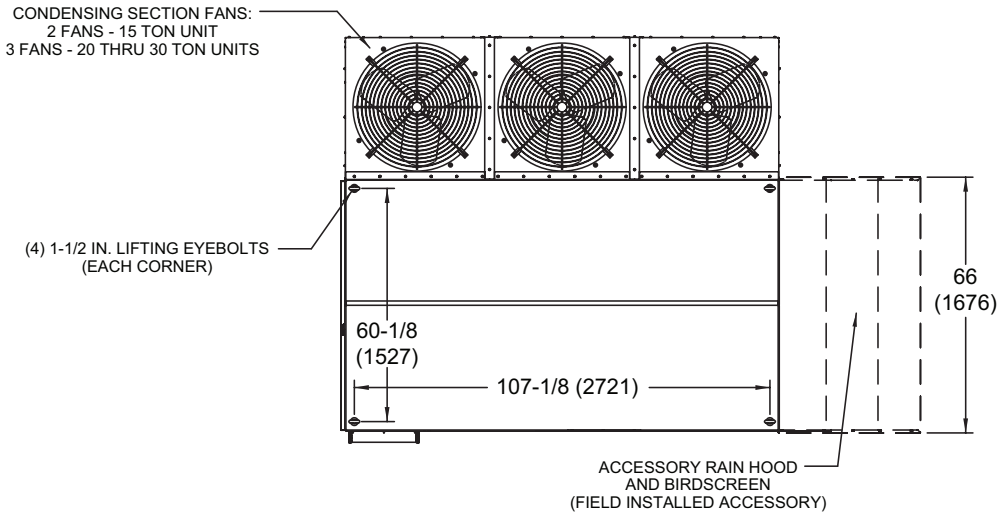
SIDE VIEW
(Evaporator/Reheat/Blower/Filters/Dampers/ Energy Recovery/Exhaust Fan)

NOTE - Also See B-Cabinet Unit Base and Roof Curb Drawing on Next Page.

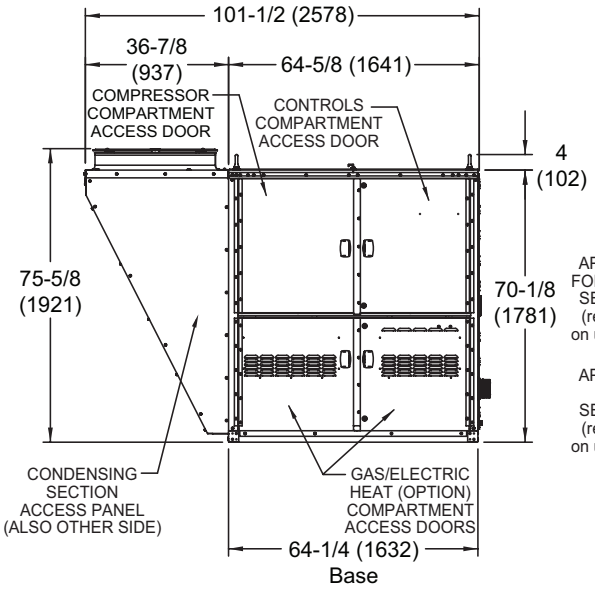

176 (4470)
172-1/2 (4382)
102-1/4 (2597)
168 (4267)
UNIT ACCESS SIDE
2-3/8 (61)
163-1/4 (3461)
5-3/4 (146)
9-3/4 (248)
10-3/4 (273)
2 in. (51 mm) DIA. ELECTRICAL ENTRY
6-3/4 (171)
18-1/8 (460)
2 in. (51 mm) DIA. HOT WATER SUPPLY/ RETURN
6-5/8 (168)
2 in. (51 mm) DIA. ELECTRICAL ENTRY
2-3/8 (61)
10-1/2 (267)
1-3/4 in. (44 mm) DIA. FURNACE CONDENSATE DRAIN LINE ENTRY (Condensing Furnaces Only)
SUPPLY AIR OPENING
35 (635)
40 (1016)
RETURN/ EXHAUST AIR OPENING (if applicable)
3-1/2 (89)
3-1/2 (89)
13-1/8 (334)
28-1/4 (718)
36-3/8 (924)
14 (356)
2-3/8 (60)
2-3/8 (60)
2-3/8 (60)
49-1/4 (1251)
43-3/4 (1111)
54 (1372)
104-1/4 2648)
CONDENSING SECTION SIDE
UNIT BASE - BOTTOM VIEW HOT WATER OPTION
UNIT BASE - BOTTOM VIEW GAS FURNACE OPTION
1-3/8 (35)
2-3/8 (60)
PLATFORM FOR ROOF CURB
INSIDE BASE ASSEMBLY DETAIL (SIDE VIEW)


1 (25)
1-3/4 (44)
1 (25)
1-3/4 (44)
1-3/4 (44)
SUPPLY AIR OPENING
35 (635)
RETURN/ EXHAUST AIR OPENING (if applicable)
40 (1016)
44-1/4 (1124) Inside
47-3/4 (1213)
10-5/8 (270)
8-1/4 (210)
28-1/4 (718)
36-3/8 (924)
14 (356)
3-1/4 (83)
1-3/4 (44)
ROOF CURB - TOP VIEW

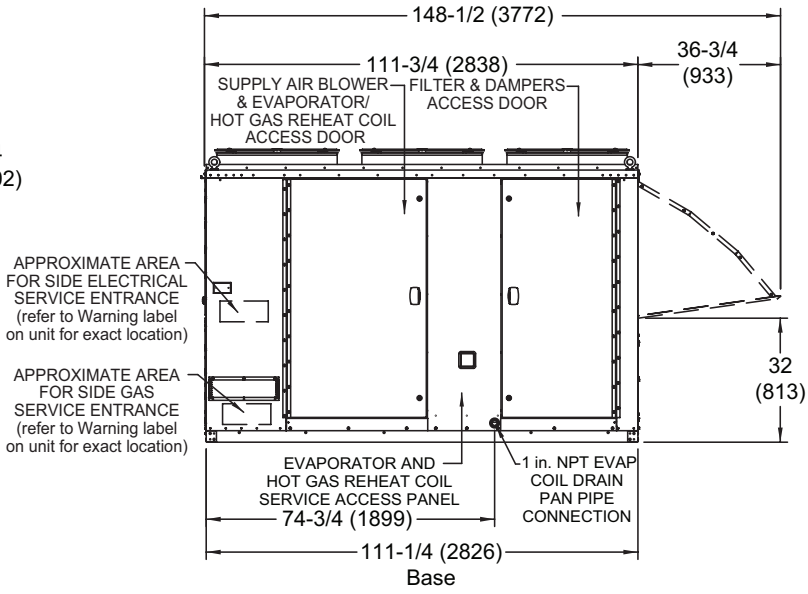

161-3/4 (4089)
158-1/4 (4020) Inside
1-1/8 (29)
14 (356) or 24 (610)
SUPPLY AIR DUCT CONNECTOR ACCESSORY (Optional)
RETURN AIR DUCT CONNECTOR ACCESSORY (Optional)
ROOF CURB - SIDE VIEW



TOP VIEW

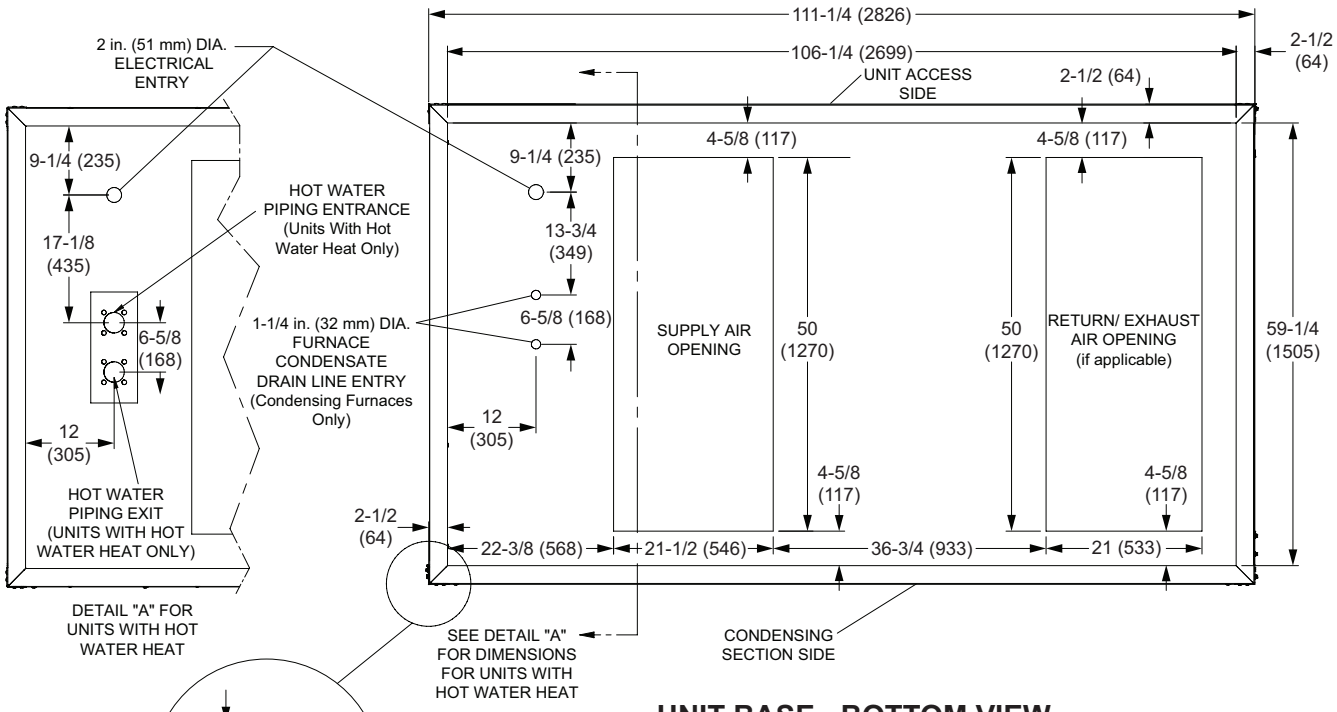


END VIEW
(Condenser/Compressor/Heating/Controls)

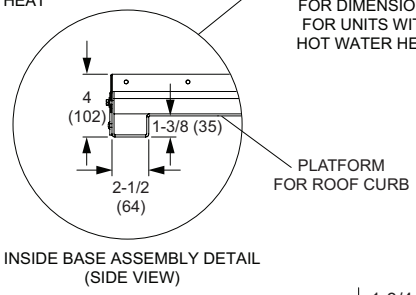


SIDE VIEW
(Evaporator/Reheat/Blower/Filters/Dampers)

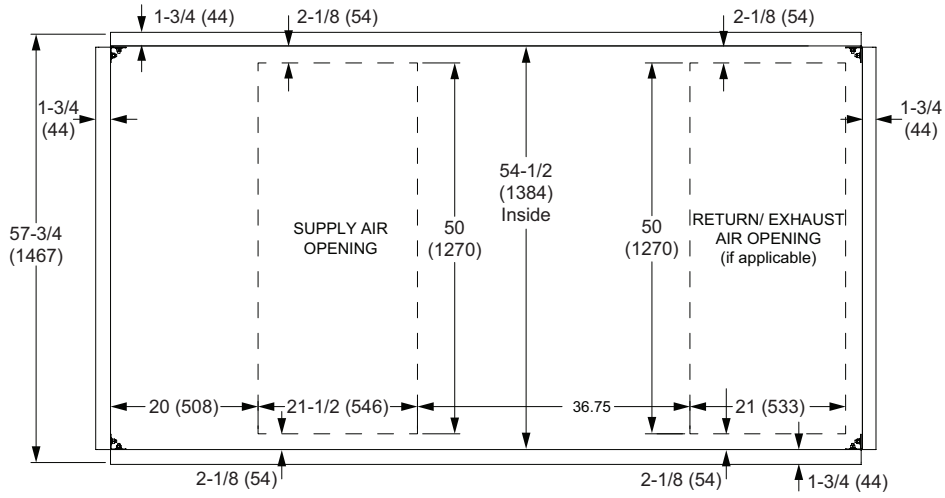
NOTE - Also See C-Cabinet Unit Base and Roof Curb Drawing on Next Page.



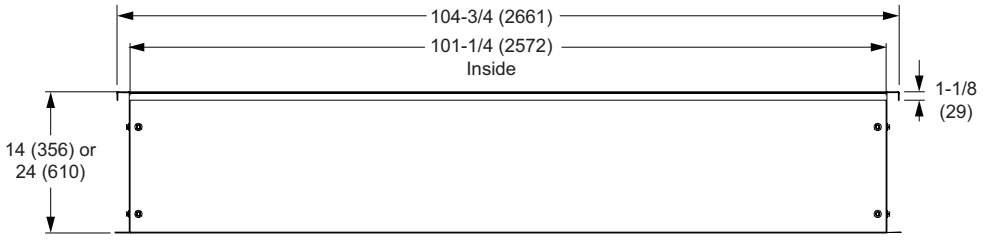
UNIT BASE - BOTTOM VIEW



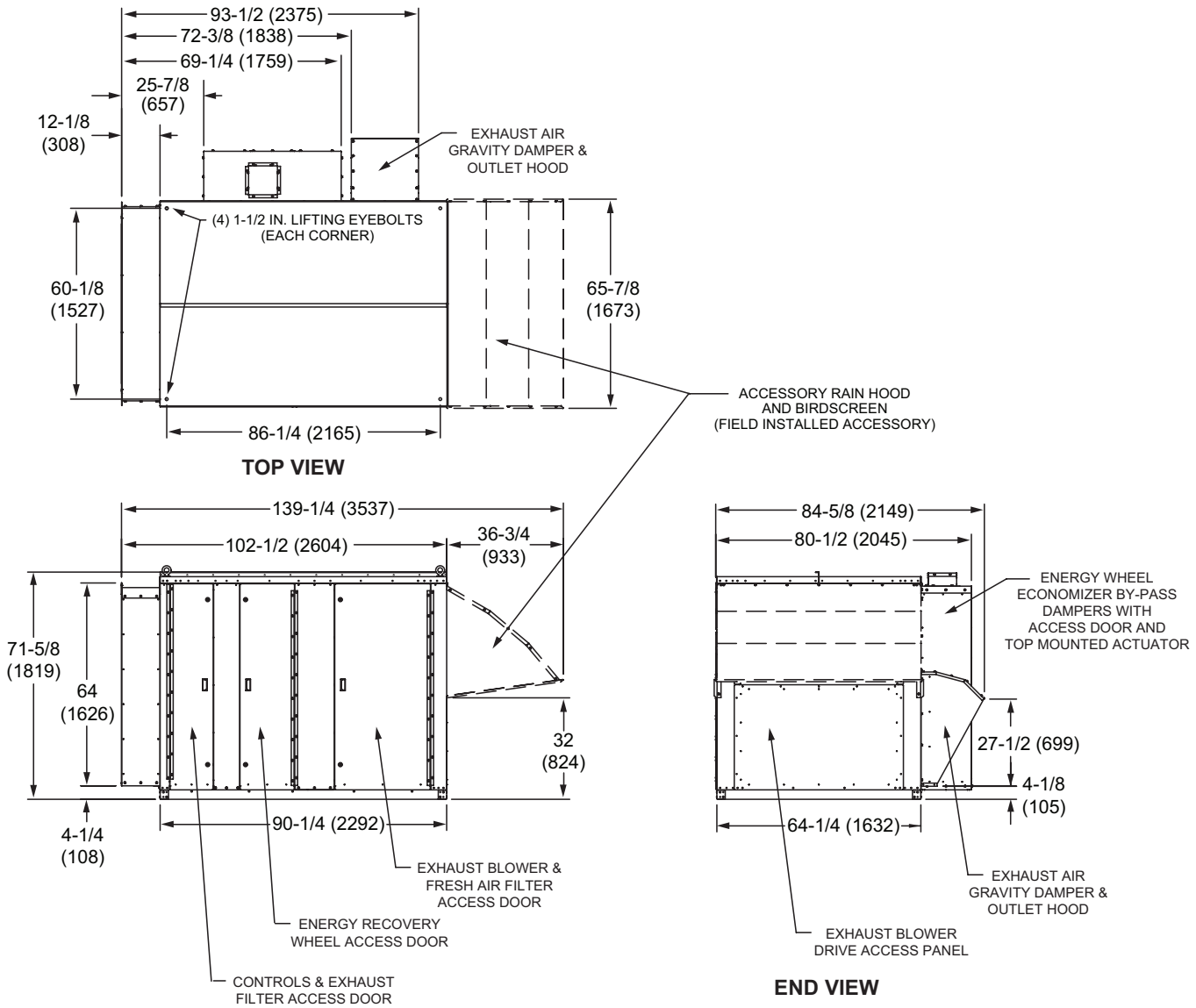
INSIDE BASE ASSEMBLY DETAIL (SIDE VIEW)

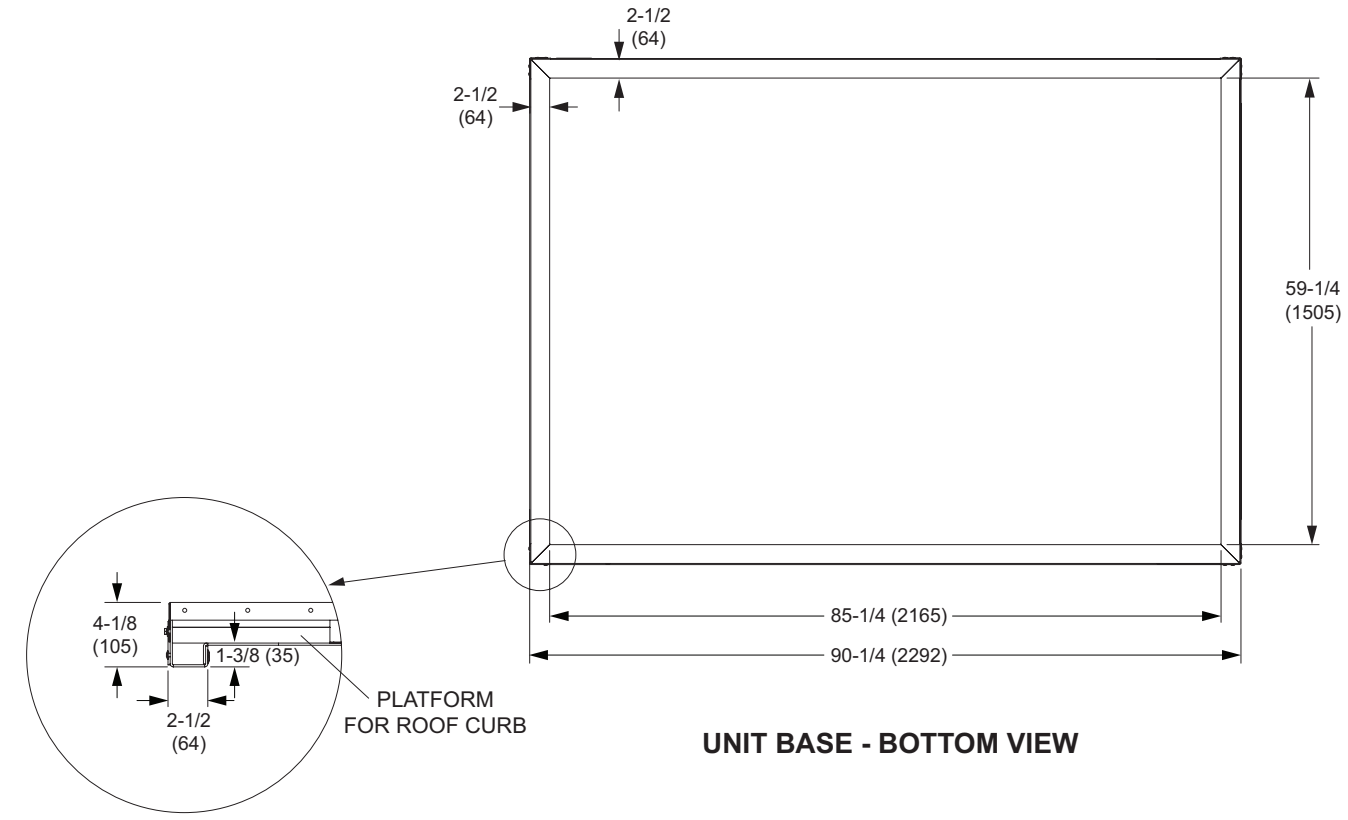


ROOF CURB - TOP VIEW



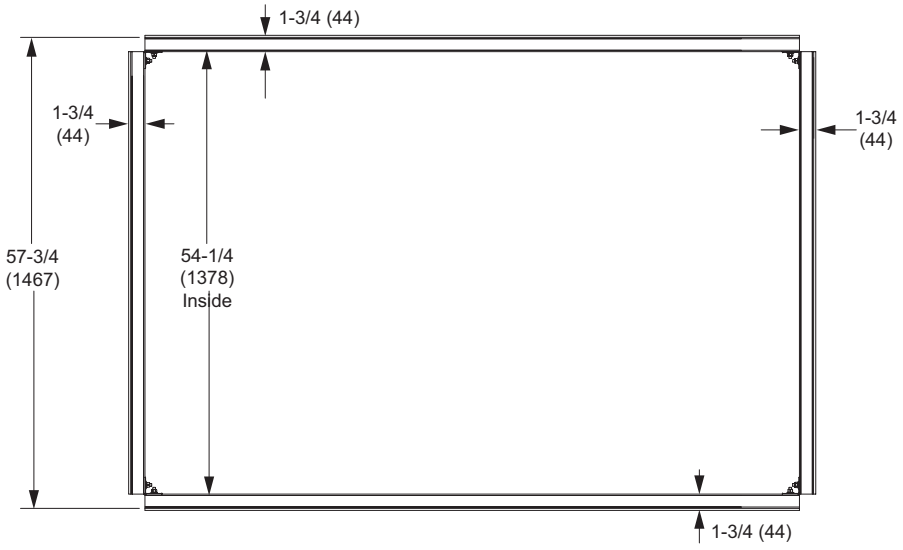
ROOF CURB - SIDE VIEW


93-1/2 (2375)
72-3/8 (1838)
69-1/4 (1759)
25-7/8 (657)
12-1/8 (308)
EXHAUST AIR GRAVITY DAMPER & OUTLET HOOD
(4) 1-1/2 IN. LIFTING EYEBOLTS (EACH CORNER)
60-1/8 (1527)
65-7/8 (1673)
ACCESSORY RAIN HOOD AND BIRDSCREEN (FIELD INSTALLED ACCESSORY)
86-1/4 (2165)
TOP VIEW
139-1/4 (3537)
102-1/2 (2604)
36-3/4 (933)
71-5/8 (1819)
64 (1626)
32 (824)
4-1/4 (108)
90-1/4 (2292)
EXHAUST BLOWER & FRESH AIR FILTER ACCESS DOOR
ENERGY RECOVERY WHEEL ACCESS DOOR
CONTROLS & EXHAUST FILTER ACCESS DOOR
SIDE VIEW
84-5/8 (2149)
80-1/2 (2045)
ENERGY WHEEL ECONOMIZER BY-PASS DAMPERS WITH ACCESS DOOR AND TOP MOUNTED ACTUATOR
27-1/2 (699)
4-1/8 (105)
64-1/4 (1632)
EXHAUST AIR GRAVITY DAMPER & OUTLET HOOD
EXHAUST BLOWER DRIVE ACCESS PANEL
END VIEW

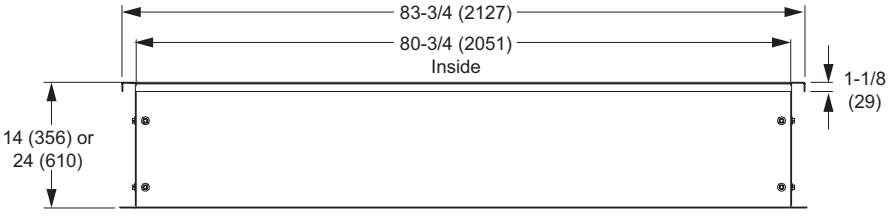


UNIT BASE - BOTTOM VIEW

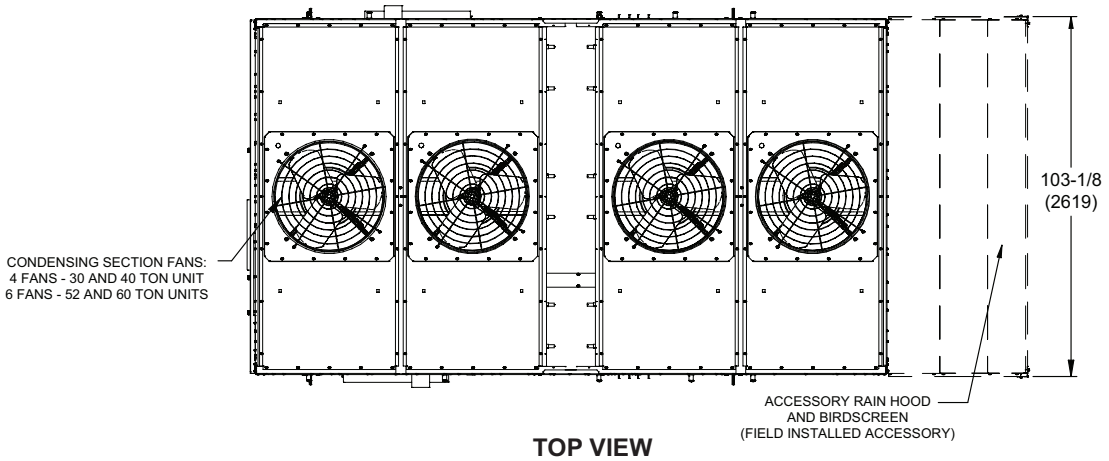
INSIDE BASE ASSEMBLY DETAIL
(SIDE VIEW)



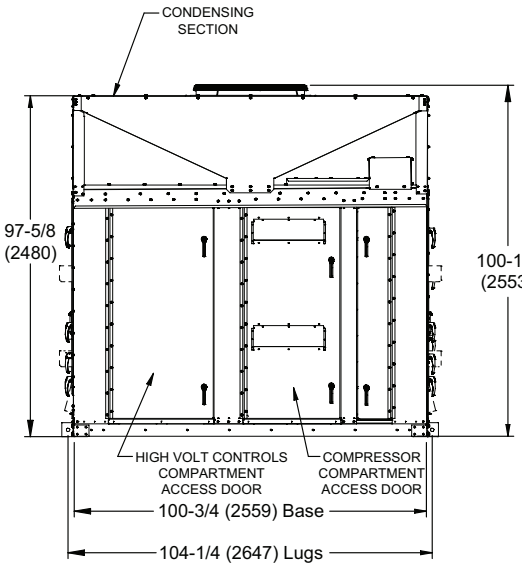
ROOF CURB - TOP VIEW



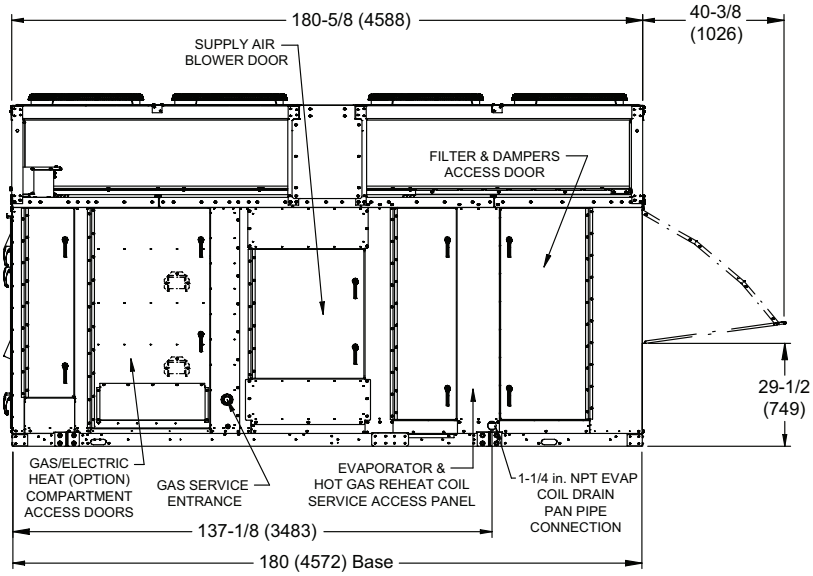
ROOF CURB - SIDE VIEW



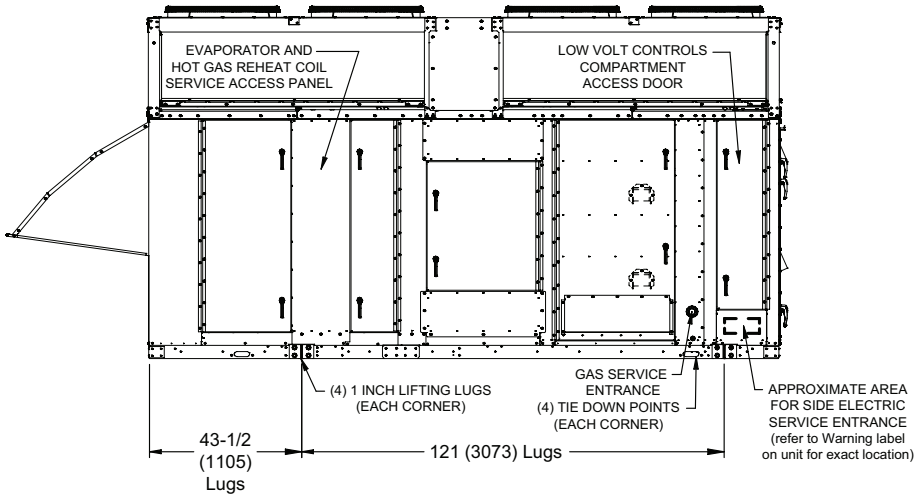
TOP VIEW



END VIEW
(Compressor/Hi-Volt Controls)

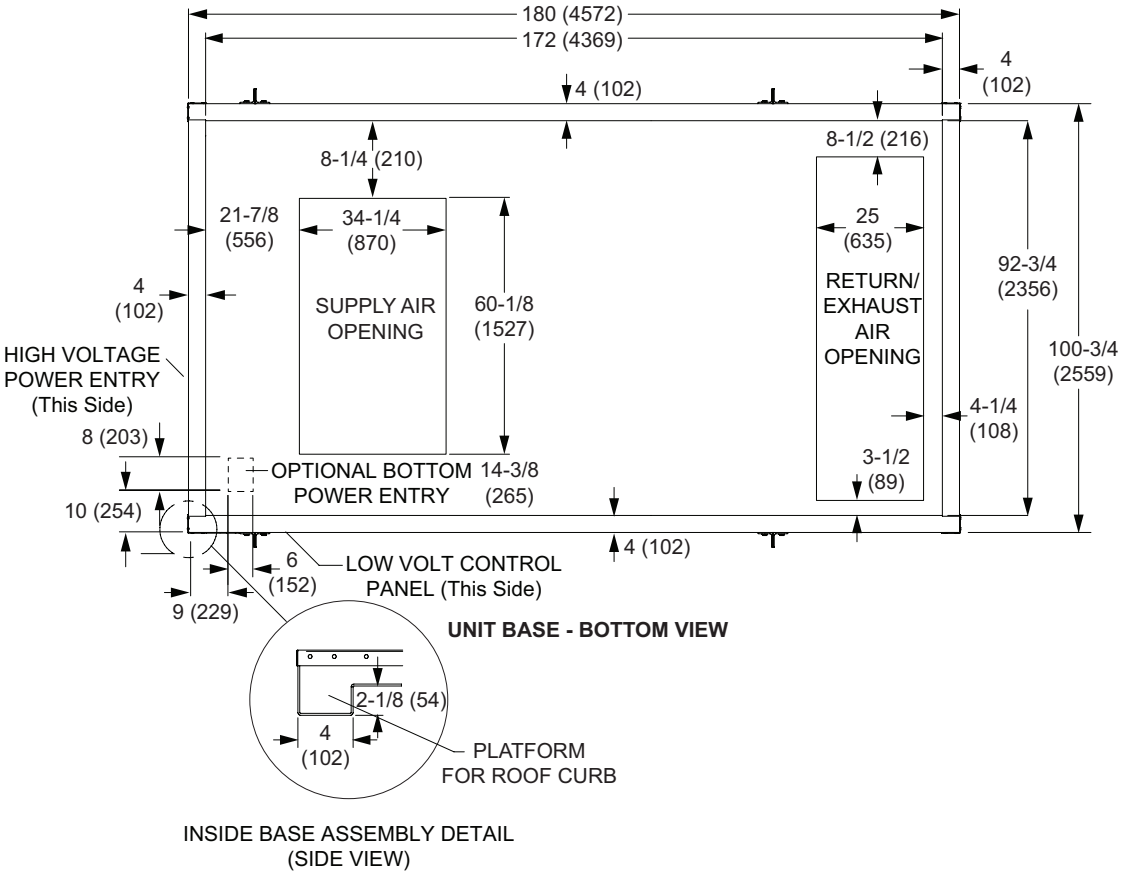


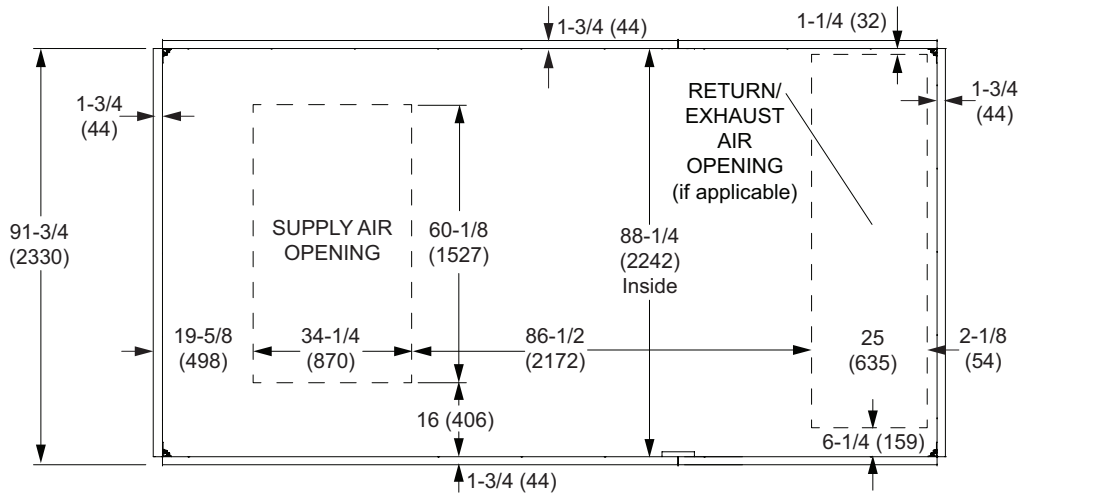
SIDE VIEW
(Heating/Evaporator/Blower/Filters/Dampers)

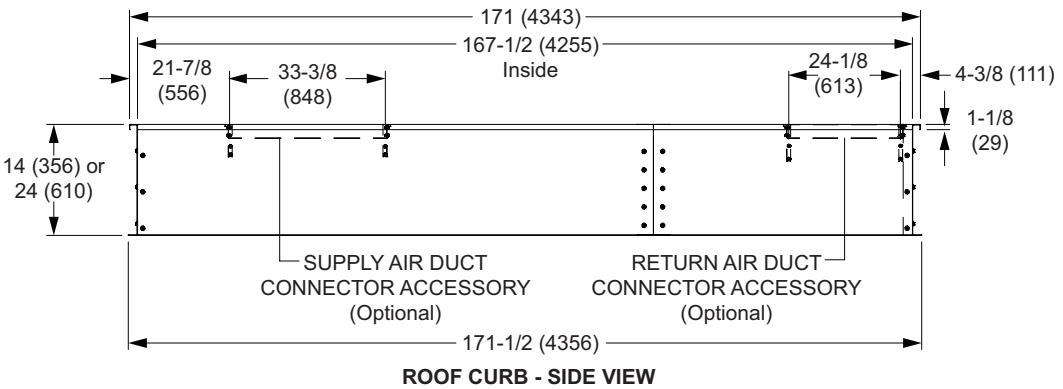


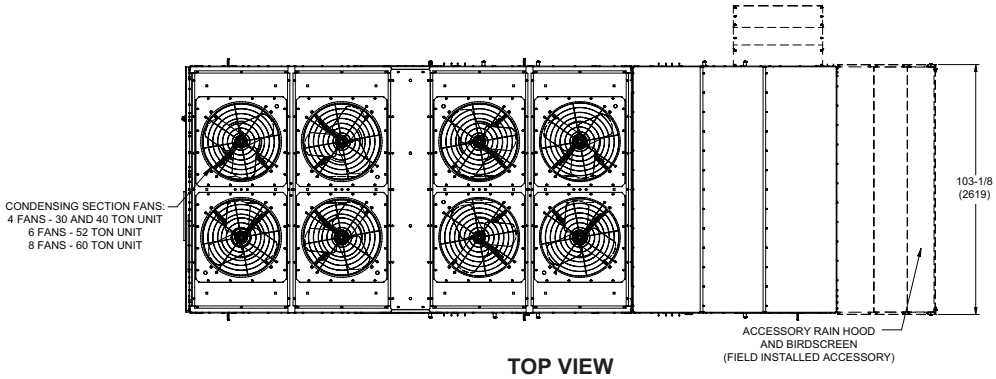
SIDE VIEW
(Evaporator/Reheat/Gas Service/Low-Volt Controls)

NOTE - Also See D-Cabinet Unit Base and Roof Curb Drawing on Next Page.

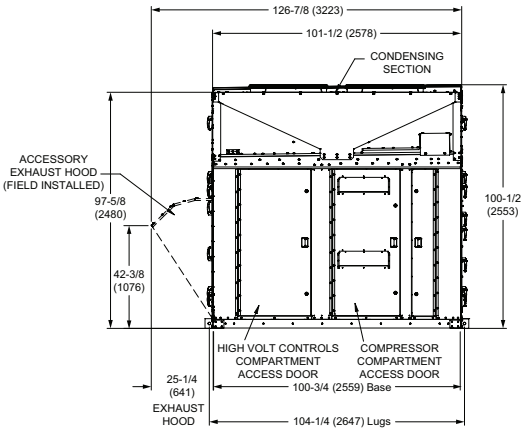

180 (4572)
172 (4369)
4 (102)
4 (102)
8-1/4 (210)
8-1/2 (216)
21-7/8 (556)
34-1/4 (870)
SUPPLY AIR OPENING
60-1/8 (1527)
25 (635)
RETURN/ EXHAUST AIR OPENING
92-3/4 (2356)
100-3/4 (2559)
4 (102)
HIGH VOLTAGE POWER ENTRY (This Side)
8 (203)
OPTIONAL BOTTOM POWER ENTRY
14-3/8 (265)
4-1/4 (108)
3-1/2 (89)
10 (254)
4 (102)
6 (152)
LOW VOLT CONTROL PANEL (This Side)
9 (229)
UNIT BASE - BOTTOM VIEW
2-1/8 (54)
4 (102)
PLATFORM FOR ROOF CURB
INSIDE BASE ASSEMBLY DETAIL (SIDE VIEW)


1-3/4 (44)
1-1/4 (32)
1-3/4 (44)
RETURN/ EXHAUST AIR OPENING (if applicable)
1-3/4 (44)
91-3/4 (2330)
SUPPLY AIR OPENING
60-1/8 (1527)
88-1/4 (2242) Inside
19-5/8 (498)
34-1/4 (870)
86-1/2 (2172)
25 (635)
2-1/8 (54)
16 (406)
6-1/4 (159)
1-3/4 (44)
ROOF CURB - TOP VIEW

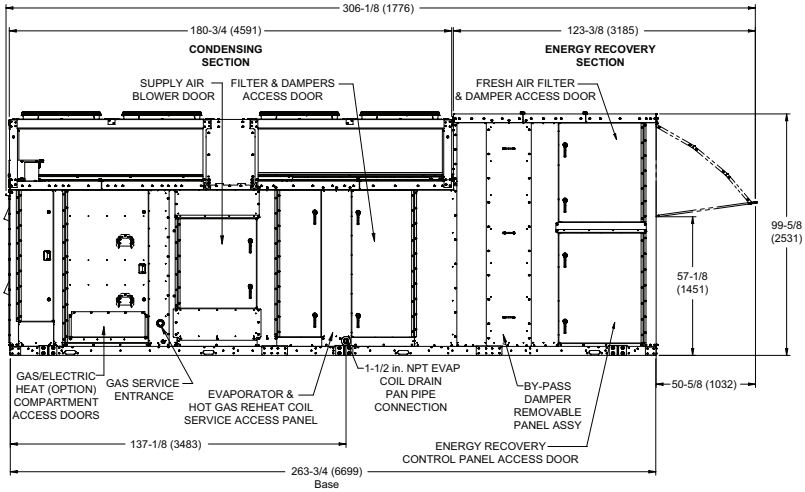

171 (4343)
167-1/2 (4255) Inside
21-7/8 (556)
33-3/8 (848)
24-1/8 (613)
4-3/8 (111)
1-1/8 (29)
14 (356) or 24 (610)
SUPPLY AIR DUCT CONNECTOR ACCESSORY (Optional)
RETURN AIR DUCT CONNECTOR ACCESSORY (Optional)
171-1/2 (4356)
ROOF CURB - SIDE VIEW



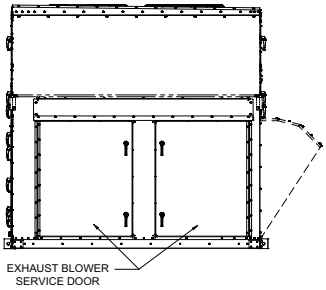
TOP VIEW



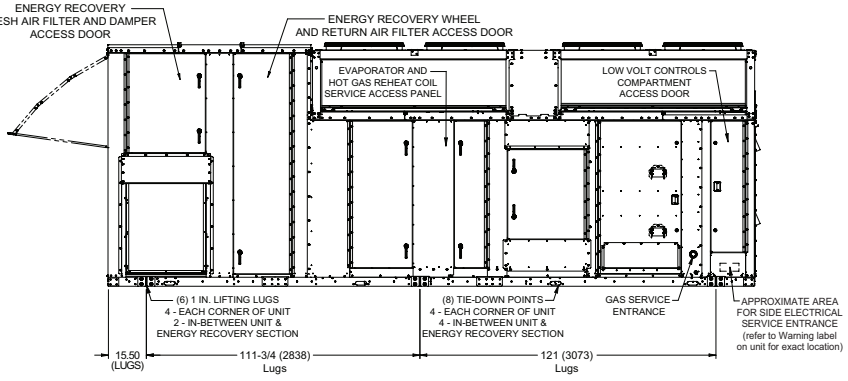
END VIEW
(Compressor/Hi-Volt Controls)



SIDE VIEW
(Condensing/Blower/Filters/Dampers/By-Pass Damper/Fresh Air Filters)

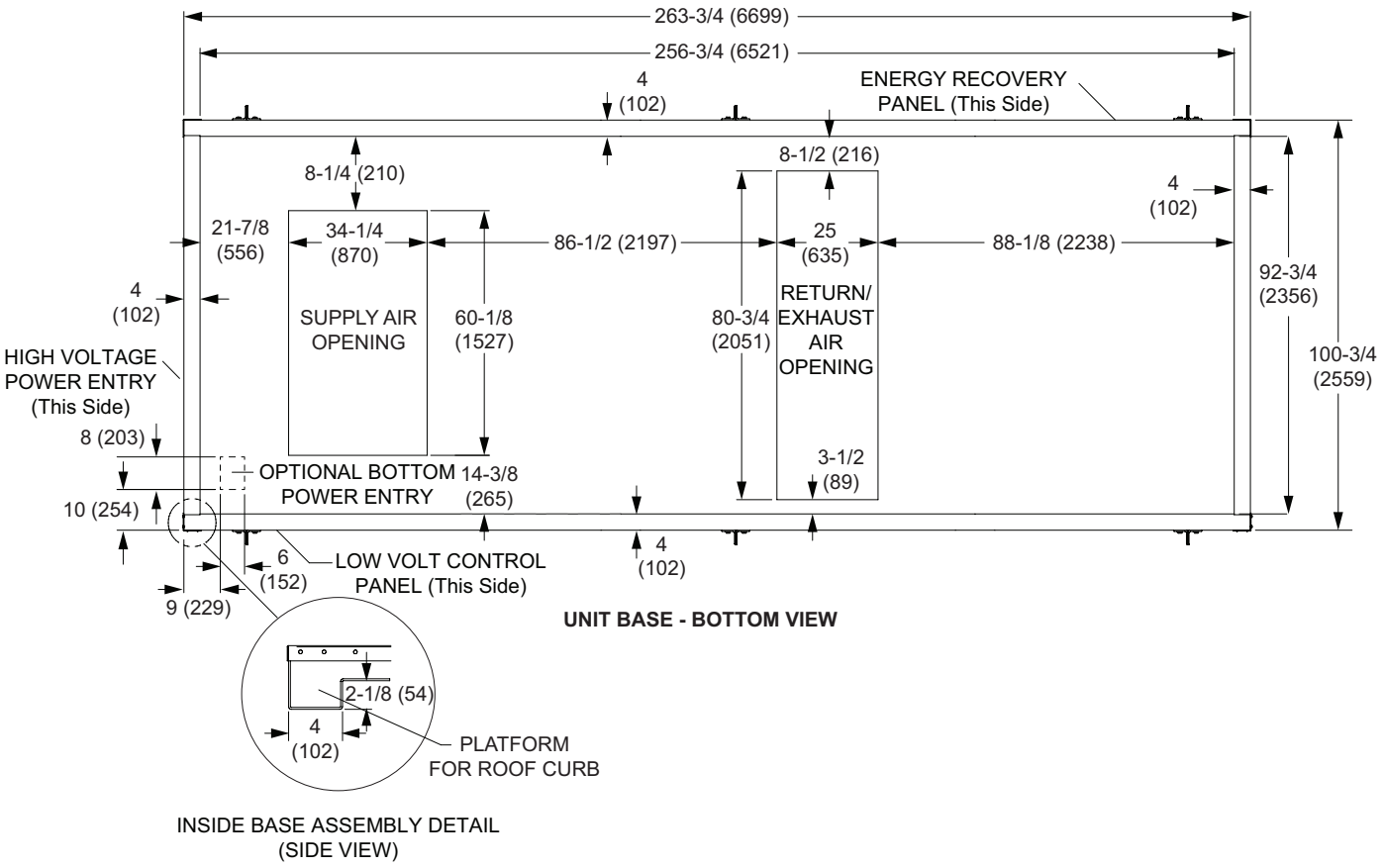


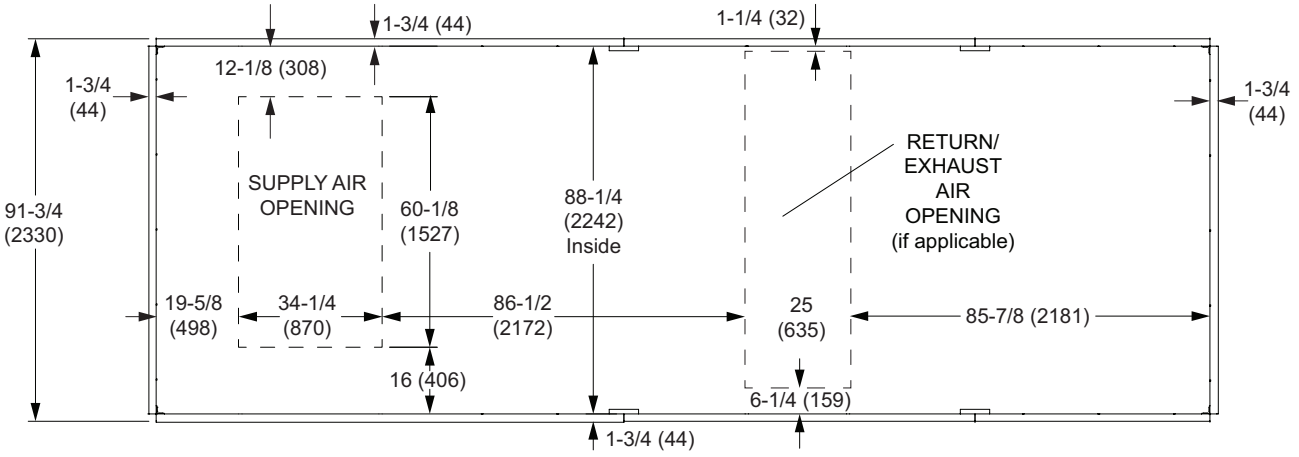
INLET END VIEW
(Exhaust Blower)

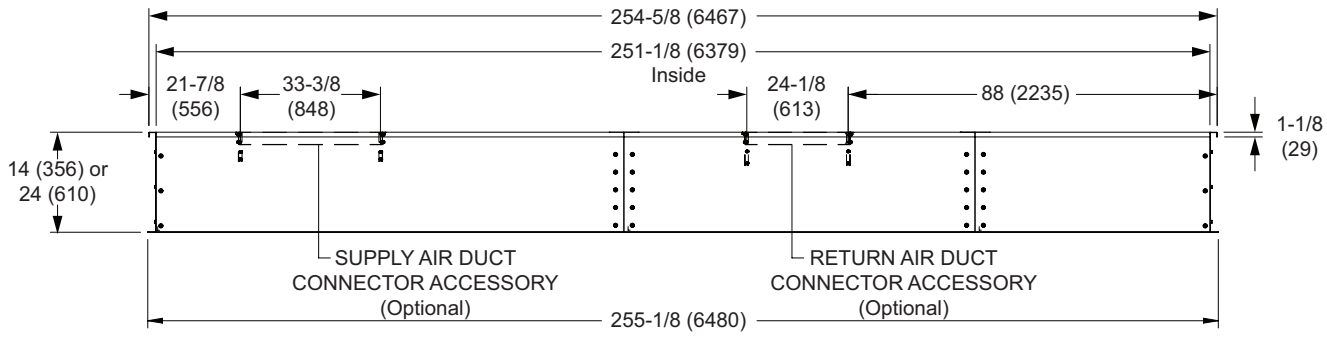


SIDE VIEW
(Energy Recovery Section/Evaporator/Reheat/Lo-Volt Controls)

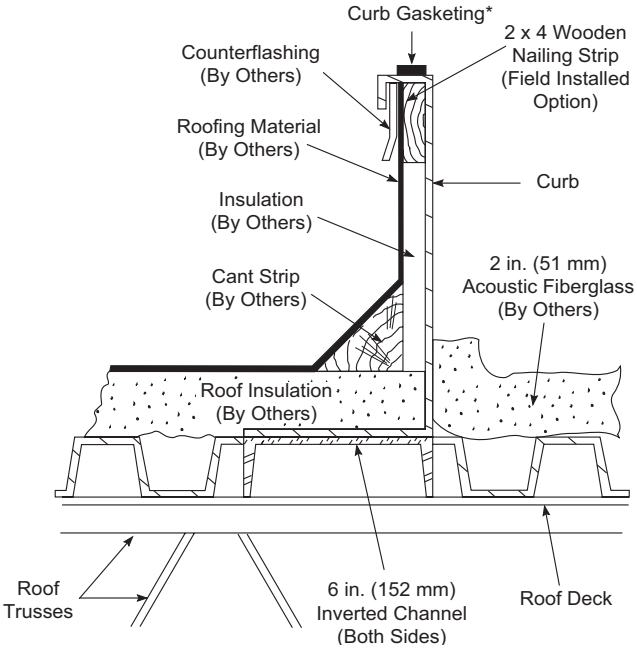
NOTE - Also See D-Cabinet Unit Base and Roof Curb Drawing on Next Page.


263-3/4 (6699)
256-3/4 (6521)
4 (102)
ENERGY RECOVERY PANEL (This Side)
8-1/4 (210)
8-1/2 (216)
4 (102)
21-7/8 (556)
34-1/4 (870)
86-1/2 (2197)
25 (635)
88-1/8 (2238)
92-3/4 (2356)
4 (102)
SUPPLY AIR OPENING
60-1/8 (1527)
80-3/4 (2051)
RETURN/ EXHAUST AIR OPENING
HIGH VOLTAGE POWER ENTRY (This Side)
100-3/4 (2559)
8 (203)
OPTIONAL BOTTOM POWER ENTRY
14-3/8 (265)
3-1/2 (89)
10 (254)
6 (152)
LOW VOLT CONTROL PANEL (This Side)
4 (102)
9 (229)
UNIT BASE - BOTTOM VIEW
2-1/8 (54)
4 (102)
PLATFORM FOR ROOF CURB
INSIDE BASE ASSEMBLY DETAIL (SIDE VIEW)


1-3/4 (44)
1-1/4 (32)
12-1/8 (308)
1-3/4 (44)
1-3/4 (44)
SUPPLY AIR OPENING
60-1/8 (1527)
88-1/4 (2242) Inside
RETURN/ EXHAUST AIR OPENING (if applicable)
91-3/4 (2330)
19-5/8 (498)
34-1/4 (870)
86-1/2 (2172)
25 (635)
85-7/8 (2181)
16 (406)
6-1/4 (159)
1-3/4 (44)
ROOF CURB - TOP VIEW


254-5/8 (6467)
251-1/8 (6379) Inside
21-7/8 (556)
33-3/8 (848)
24-1/8 (613)
88 (2235)
1-1/8 (29)
14 (356) or 24 (610)
SUPPLY AIR DUCT CONNECTOR ACCESSORY (Optional)
RETURN AIR DUCT CONNECTOR ACCESSORY (Optional)
255-1/8 (6480)
ROOF CURB - SIDE VIEW

TYPICAL CURB DETAILS



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