Product Data

WeatherMaster® Applied Rooftop Units

27.5 to 100 Nominal Tons

WeatherMaster®

48V Single-Package Gas Heating/Electric Cooling Applied Rooftop Units
50V Single-Package Electric Cooling Applied Rooftop Units with Optional Electric or Hot Water Heat
with Puron Advance™ (R-454B) Refrigerant and SmartVu™ Controls

Form 48-50V-05PD Rev A

Table of contents

Overview

The 48/50V Series continues Carrier's legacy of delivering reliable, efficient, and versatile applied rooftop units for new construction and replacement applications.

The WeatherMaster® 48/50V Series are Carrier's latest in a long line of applied rooftop products. This generation continues Carrier's tradition of designing new products that fit legacy curbs.

The 48/50V standard chassis models fit on legacy Carrier 48/50P and most 48/50Z Series curbs with minimal changes required for electrical and gas connections, making replacement easy.

What is new are the 48/50V compact chassis models, which fit select competitor roof curbs, providing customers with a new solution for replacement or new construction in tight spaces.

The 48/50V Series also uses Carrier's new Puron Advance™ refrigerant. This innovative refrigerant, also known as R-454B, has a global warming potential (GWP) rating of 465, well below the Environmental Protection Agency's (EPA) 700 GWP limit, effective 2025 for packaged equipment.

Other new features include a standard capacity lead variable speed scroll compressor, low ambient mechanical cooling with variable-speed condenser fans, a direct drive indoor fan array with electronically commutated motors (ECM), foil-faced insulation, electronic expansion valves (EXVs), and Carrier SmartVu™ controls.

The new WeatherMaster® applied rooftop units are highly adaptable and are selectable with options that improve unit performance, efficiency, comfort, or indoor air quality (IAQ).

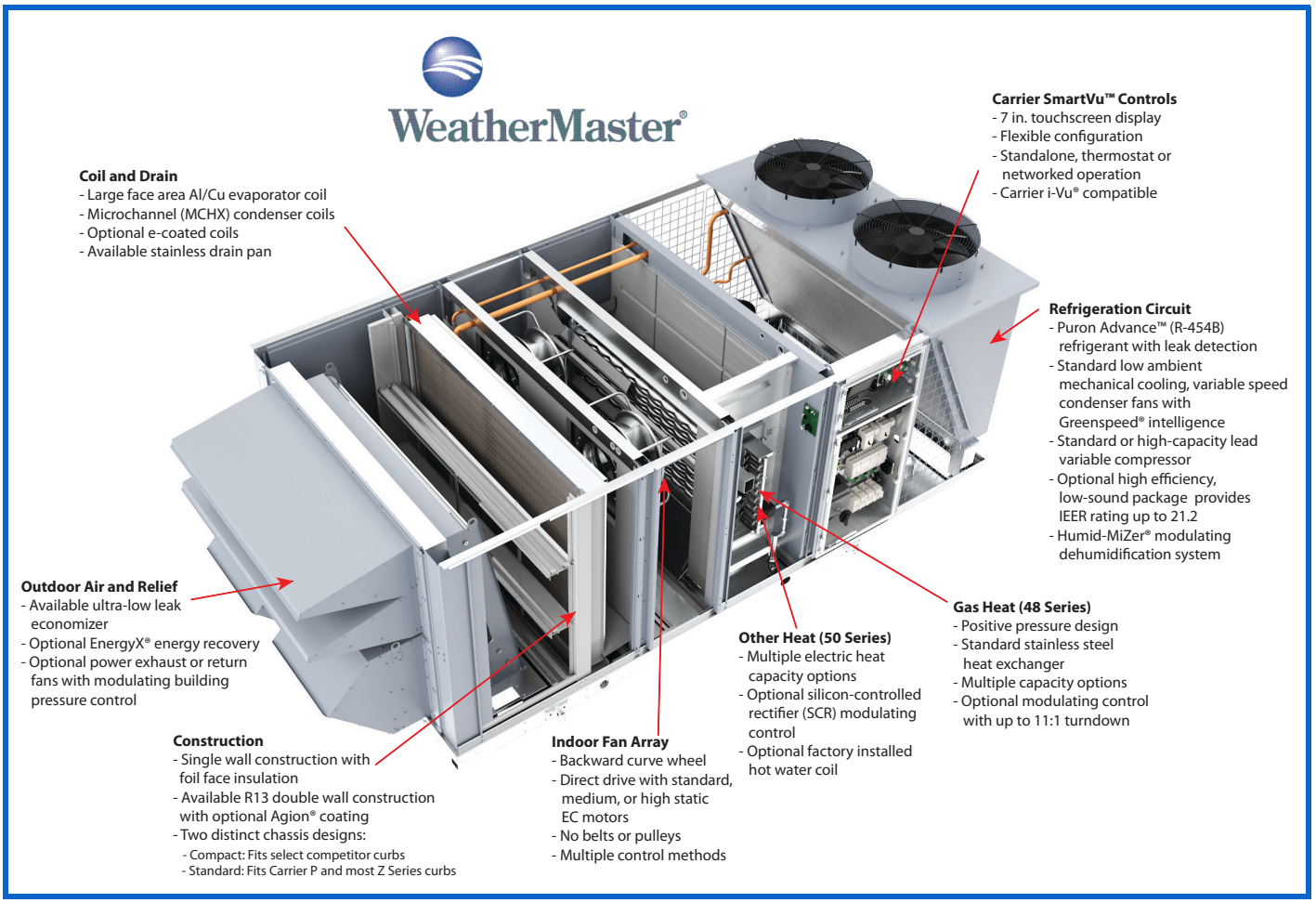
New factory-installed options include direct drive exhaust fans with EC motors, direct drive return fans with EC motors and modulating exhaust air dampers, EnergyX® rotary energy recovery wheel with VFD defrost and bypass dampers, and R-13 double wall construction with available Agion® antimicrobial coating.

The Carrier SmartVu control provides flexibility while being user-friendly. Setup and commissioning is simple with the included 7 in. touchscreen display and easy-to-navigate user interface. The SmartVu control can operate standalone, with a thermostat, with Carrier i-Vu™ 8.0 web-based interfaces, or with other BACnet®[1] building automation systems (BAS).

The SmartVu control includes multiple factory-programmed control methods for the indoor fan system, including modulation based on field-provided hardwired or network inputs.

Cooling and modulating heating operation is based on supply air temperature, with user-adjustable setpoints. The control is configurable for single-zone or multi-zone applications using space or return air temperature sensors, a two-stage heat/cool thermostat, or network inputs for cooling and heating determination.

1. Third-party trademarks and logos are the property of their respective owners.



Model number nomenclature

48V Model Number Nomenclature

Position:	1	2	3	4	5	6	7	8	9	10	11-18
Example:	4	8	V	2	C	Q	2	8	A	0	-1B8A0A0

Heat Type (1,2)
48 – Packaged Cooling/Gas Heat

Model Series (3)
V – WeatherMaster® Applied Rooftop Unit

Application, Supply and Return (4)
2 – SAV, Vertical Supply and Return
3 – VAV, Vertical Supply and Return
4 – SAV, Horizontal Supply and Return
5 – VAV, Horizontal Supply and Return

48V Standard Chassis and Gas Heat (5)
C – Standard Chassis, Low Gas Heat, 2-Stage, Stainless Steel HX
D – Standard Chassis, High Gas Heat, 2-Stage, Stainless Steel HX
E – Standard Chassis, Low Gas Heat, Modulating, Stainless Steel HX
F – Standard Chassis, High Gas Heat, Modulating, Stainless Steel HX

48V Compact Chassis and Heat (5)
T – Compact Chassis, Low Gas Heat, 2-Stage, Stainless Steel HX
U – Compact Chassis, High Gas Heat, 2-Stage, Stainless Steel HX
V – Compact Chassis, Low Gas Heat, Modulating, Stainless Steel HX
W – Compact Chassis, Low Gas Heat, Modulatuing, Stainless Steel HX

Direct Expansion System (6)
Q – Standard Efficiency, Low Ambient, Standard Capacity VSC[a]
R – Standard Efficiency, Low Ambient, Standard Capacity VSC Humidi-MiZer
S – High Efficiency, Low Sound, Low Ambient, High Capacity VSC
T – High Efficiency, Low Sound, Low Ambient, High Capacity VSC, Humidi-MiZer
X – High Efficiency, Low Sound, Low Ambient, Standard Capacity VSC
Y – High Efficiency, Low Sound, Low Ambient, Standard Capacity VSC, Humidi-MiZer

SEE NEXT PAGE FOR REMAINDER OF MODEL NUMBER NOMENCLATURE

Indoor Fan and Fan Measuring (10)
0 – Direct Drive Fan Array, Standard Static Motor
1 – Direct Drive Fan Array, Med. Static Motor
2 – Direct Drive Fan Array, High Static Motor

Construction (9)
A – Single Wall
C – Double Wall
D – Agion® [b] Double Wall
F – Single Wall, Extended Standard Chassis
H – Double Wall, Extended Standard Chassis
J – Agion® Double Wall, Extended Standard Chassis
L – Single Wall, Standard Chassis with Plenum
N – Double Wall, Standard Chassis with Plenum
P – Agion® Double Wall, Standard Chassis with Plenum
R – Single Wall, Extended Standard Chassis with Plenum
T – Double Wall, Extended Standard Chassis with Plenum
U – Agion® Double Wall, Extended Standard Chassis with Plenum

Size and Refrigerant (7,8)

28 – 27.5 Ton, R-454B	
30 – 30 Ton, R-454B	60 – 60 Ton, R-454B
34 – 35 Ton, R-454B	70 – 70 Ton, R-454B
40 – 40 Ton, R-454B	74 – 75 Ton, R-454B
50 – 50 Ton, R-454B	90 – 90 Ton, R-454B
54 – 55 Ton, R-454B	98 –100 Ton, R-454B

NOTE(S):
a. VSC (Variable Speed Compressor).
b. Third-party trademarks and logos are the property of their respective owners.

Model number nomenclature (cont)

48V Model Number Nomenclature (cont)

Position:	1-10	11	12	13	14	15	16	17	18
Example:	48V2CQ28A0	-	1	B	8	A	0	A	0

SEE PREVIOUS PAGE FOR REMAINDER OF MODEL NUMBER NOMENCLATURE

Drain Pan and Coils (11)
- - – Galvanized DP, Al/Cu Evap, MCHX Cond
- A – Galvanized DP, Al/Cu Evap, E-Coat MCHX Cond
- B – Stainless DP, Al/Cu Evap, MCHX Cond
- C – Stainless DP, Al/Cu Evap, E-Coat MCHX Cond
- D – Stainless DP, E-Coat Al/Cu Evap, E-Coat MCHX Cond
- E – Galvanized DP, Al/Cu Evap, MCHX Cond, Hail Guard
- F – Galvanized DP, Al/Cu Evap, E-Coat MCHX Cond, Hail Guard
- G – Stainless DP, Al/Cu Evap, MCHX Cond, Hail Guard
- H – Stainless DP, Al/Cu Evap, E-Coat MCHX Cond, Hail Guard
- J – Stainless DP, E-Coat Al/Cu Evap, E-Coat MCHX Cond, Hail Guard

Voltage (12)
- 1 – 575V
- 5 – 208V/230V
- 6 – 460V

Design Series (13)
- B – First Revision
- S – ETO

Controls (14)
- 8 – Standard Controls
- 9 – Humidity Sensors
- A – Return Air Carbon Dioxide Sensor (RA CO_2)
- B – Outdoor AIrflow Measuring (OA CFM)
- C – Humidity Sensors, RA CO_2
- D – Humidity Sensors, OA CFM
- E – RA CO_2 ,OA CFM
- F – Humidity Sensors, RA CO_2 ,OA CFM

Outdoor Air and Relief (15)
- 1 – ULL, Low CFM EnergyX w/Bypass and Defrost, Standard Static PE, Modulating BP Control
- 2 – ULL, Low CFM EnergyX w/Bypass and Defrost, Medium Static PE, Modulating BP Control
- 3 – ULL, Low CFM EnergyX w/Bypass and Defrost, High Static PE, Modulating BP Control
- A – Manual OA Damper, No Relief
- B – Ultra Low Leak Economizer, No Relief
- C – Ultra Low Leak Economizer, Barometric Relief
- E – Ultra Low Leak Economizer, Low Static Power Exhaust (PE), Two-Stage Control
- G – Ultra Low Leak Economizer, Low Static PE, Modulating Building Pressure (BP) Control
- H – Ultra Low Leak Economizer, Standard Static PE, Modulating Building Pressure (BP) Control
- J – Ultra Low Leak Economizer, Medium Static PE, Modulating BP Control
- K – Ultra Low Leak Economizer, High Static PE, Modulating BP Control
- L – Ultra Low Leak Economizer, Medium Static Return Fan (RF), Modulating Exhaust Damper w/BP Control
- M – Ultra Low Leak Economizer, High Static Return Fan (RF), Modulating Exhaust Damper w/BP Control

Indoor Air Quality (18)
- 0 – 4" Pre-Filter Rack with 2" Throwaway Filter
- 1 – 4" Pre-Filter Rack with 2" M8 Filter
- 2 – 4" Pre-Filter Rack with 4" M8 Filter
- 3 – 4" Pre-Filter Rack with 4" M13 Filter
- 4 – 4" Pre-Filter Rack with 4" M13 Filter, Ultraviolet Light (UV-C) Fixture
- 5 – 6" Pre-Filter Rack with 2" M8 and 4" M13 Filter
- 6 – 6" Pre-Filter Rack with 2" M8 and 4" M13 Filter, UV-C Fixture
- 7 – Pre-Filter Rack with 2" M8 and 12" M15 Cartridge Filter
- 8 – Pre-Filter Rack with 2" M8 and 12" M15 Cartridge Filter, UV-C Fixture
- 9 – Pre-Filter Rack with 2" M8 and 12" M14 Bag Filter
- A – Pre-Filter Rack with 2" M8 and 12" M14 Bag Filter, UV-C Fixture

Service and Safety (17)
- A – Standard Service and Safety
- B – Condensate Overflow Switch (COFS)
- C – Pre-Filter Status Switch + Access Door Retainer (FSS + ADR)
- D – Return Air Smoke Detector (RASD)
- E – Service Pack (Comp Isolation Valve, Replaceable Core Filter Drier)
- F – COFS, FSS + ADR
- G – COFS, RASD
- H – COFS, Service Pack
- J – FSS + ADR, RASD
- K – FSS + ADR, Service Pack
- L – RASD, Service Pack
- M – COFS, FSS + ADR, RASD
- N – COFS, FSS + ADR, Service Pack
- P – COFS, RASD, Service Pack
- Q – RASD, FSS + ADR, Service Pack
- R – COFS, FSS + ADR, RASD, Service Pack
- S – Chicago Relief Valve (CRV), COFS, FSS + ADR, RASD, Service Pack
- T – Pre-Filter Measuring (PFM) + ADR, COFS
- U – PFM + ADR, COFS, RASD
- V – PFM + ADR, COFS, Service Pack
- W – PFM + ADR, COFS, RASD, Service Pack
- X – CRV, PFM + ADR, COFS, RASD, Service Pack

Electrical (16)
- 0 – Standard Electrical
- 1 – Powered Convenience Outlet (PCO)
- 2 – Unpowered Convenience Outlet (UCO)
- 3 – Non-Fused Disconnect (NFD)
- 4 – NFD + PCO
- 5 – NFD + UCO
- 6 – Phase Monitor (PM)
- 7 – PM + PCO
- 8 – PM + UCO
- 9 – PM + Non-Fused Disconnect (NFD)
- A – PM + NFD + PCO
- B – PM + NFD + UCO
- C – High Short Circuit Current Rating (SCCR)
- E – High SCCR + UCO
- F – High SCCR + PM
- H – High SCCR + UCO + PM

Model number nomenclature (cont)

50V Model Number Nomenclature

Position:	1	2	3	4	5	6	7	8	9	10	11-18
Example:	5	0	V	2	A	Q	2	8	A	0	-1B8A0A0

Heat Type (1,2)
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Model Series (3)
V – WeatherMaster® Applied Rooftop Unit

Application, Supply and Return (4)
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3 – VAV, Vertical Supply and Return
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50V Standard Chassis and Heat (5)
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B – Standard Chassis, Low Electric Heat, 2-Stage
C – Standard Chassis, Med Electric Heat, 2-Stage
D – Standard Chassis, High Electric Heat, 2-Stage
E – Standard Chassis, Low Electric Heat, SCR
F – Standard Chassis, Med Electric Heat, SCR
G – Standard Chassis, High Electric Heat, SCR
H – Standard Chassis, Standard Hot Water Coil

50V Compact Chassis and Heat (5)
S – Compact Chassis, No Heat
T – Compact Chassis, Low Electric Heat, 2-Stage
U – Compact Chassis, Med Electric Heat, 2-Stage
V – Compact Chassis, High Electric Heat, 2-Stage
W – Compact Chassis, Low Electric Heat, Modulating
X – Compact Chassis, Med Electric Heat, Modulating
Y – Compact Chassis, High Electric Heat, Modulating
Z – Compact Chassis, Standard Hot Water Heat

Direct Expansion System (6)
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K – Ultra Low Leak Economizer, High Static PE, Modulating BP Control
L – Ultra Low Leak Economizer, Medium Static Return Fan (RF), Modulating Exhaust Damper w/BP Control
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3 – 4" Pre-Filter Rack with 4" M13 Filter
4 – 4" Pre-Filter Rack with 4" M13 Filter, Ultraviolet Light (UV-C) Fixture
5 – 6" Pre-Filter Rack with 2" M8 and 4" M13 Filter
6 – 6" Pre-Filter Rack with 2" M8 and 4" M13 Filter, UV-C Fixture
7 – Pre-Filter Rack with 2" M8 and 12" M15 Cartridge Filter
8 – Pre-Filter Rack with 2" M8 and 12" M15 Cartridge Filter, UV-C Fixture
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G – COFS, RASD
H – COFS, Service Pack
J – FSS + ADR, RASD
K – FSS + ADR, Service Pack
L – RASD, Service Pack
M – COFS, FSS + ADR, RASD
N – COFS, FSS + ADR, Service Pack
P – COFS, RASD, Service Pack
Q – RASD, FSS + ADR, Service Pack
R – COFS, FSS + ADR, RASD, Service Pack
S – Chicago Relief Valve (CRV), COFS, FSS + ADR, RASD, Service Pack
T – Pre-Filter Measuring (PFM) + ADR, COFS
U – PFM + ADR, COFS, RASD
V – PFM + ADR, COFS, Service Pack
W – PFM + ADR, COFS, RASD, Service Pack
X – CRV, FM + ADR, COFS, RASD, Service Pack

Electrical (16)
0 – Standard Electrical
1 – Powered Convenience Outlet (PCO)
2 – Unpowered Convenience Outlet (UCO)
3 – Non-Fused Disconnect (NFD)
4 – NFD + PCO
5 – NFD + UCO
6 – Phase Monitor (PM)
7 – PM + PCO
8 – PM + UCO
9 – PM + Non-Fused Disconnect (NFD)
A – PM + NFD + PCO
B – PM + NFD + UCO
C – High Short Circuit Current Rating (SCCR)
E – High SCCR + UCO
F – High SCCR + PM
H – High SCCR + UCO + PM

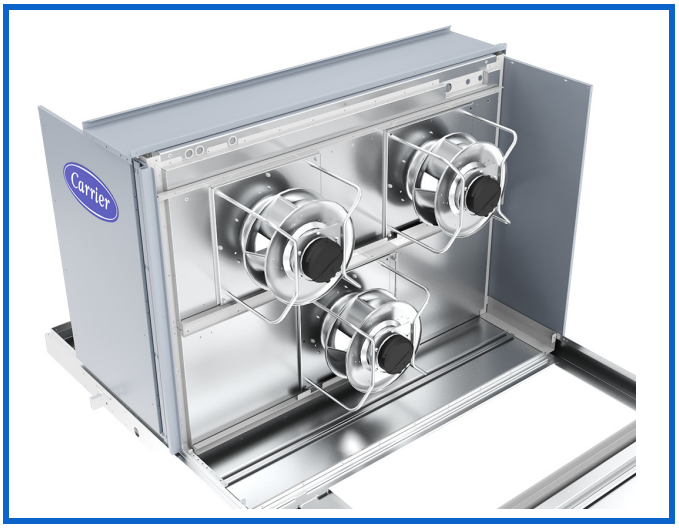
Features/Benefits

Reliable operation

Carrier conducts rigorous testing to ensure each unit will perform as designed. The 48/50V Series units completed testing in Carrier and third-party psychometric labs to verify performance and efficiency.

All 48/50V Series units use all-aluminum microchannel heat exchanger (MCHX) condenser coils for their strength and resistance to galvanic corrosion. Electronic expansion valve (EXV) metering devices ensure reliable performance across a wide operating envelope.

Units are standard with variable frequency drive (VFD) controlled condenser fan motors with Greenspeed® intelligence to allow low ambient mechanical cooling down to –10°F (–23.3°C) and provide part-load energy savings and radiated sound reduction.



Belt slippage or breakage is not a concern for 48/50V Series units, which use a direct drive indoor fan array with electronically commutated motors (ECMs).

After production, every unit must pass a run test and quality check before shipment. Vibration and shake tests are performed on each model to ensure it withstands the rigors of shipping and installation.

Efficient by design

WeatherMaster® applied rooftop units are efficient in all modes of operation. Electronically commutated (ECM) indoor fan motors maintain near peak efficiency through the entire operating range. The direct drive indoor fan array provides optimum airflow and static performance and avoids the inefficiencies of belt drive fan systems.

Applied rooftop units spend most of their life operating at part-load cooling conditions, making part-load cooling efficiency important. The standard variable speed compressor and condenser fans modulate based on system operating conditions and control setpoints, resulting in energy savings during part-load conditions. MCHX condenser coils and EXV metering devices also provide improved efficiency under a wide range of conditions.

The 27.5 to 40 ton units utilize a single circuit design that allows for a fully active evaporator and condenser coils during cooling operation, which further maximizes cooling efficiency and performance. 50 to 100 ton units utilize a dual refrigerant circuit with intertwined evaporator coil.

Flexible application

The 48/50V Series unit is highly configurable to meet a variety of project requirements. Units are available with a variety of chassis types, cooling capacities, and heating types and capacities. The 27.5 to 75 ton units are available in 208/230v-3Ph-60Hz. All sizes are available in 460v-3Ph-60Hz and 575v-3Ph-60Hz. Units are designed with a short circuit current rating (SCCR) of 10kA.

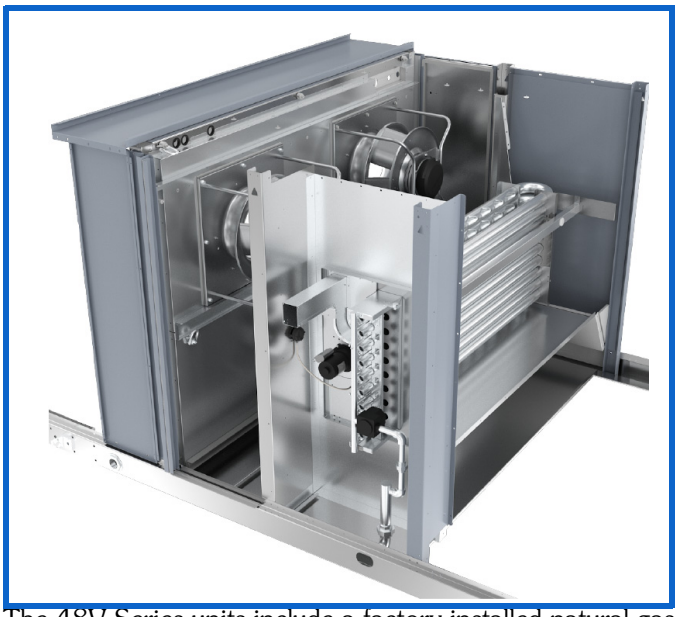
Compact chassis models are available in 27.5 to 50 ton and provide a short footprint for new construction or retrofit applications with tight installation requirements and minimal return ducting. Compact models also fit on select competitor rooftop curbs, making them great for replacement applications.

Standard chassis models are available in 27.5 to 100 tons and are good fit for new construction or retrofit applications with high indoor air quality (IAQ) requirements or extensive return duct systems with optional high-grade filtration and standard or medium static exhaust fans. Standard chassis units are also a direct curb fit for replacing Carrier 48/50P and 48/50Z models.

The 48/50V Series unit can be installed on roof curbs, structure mounted, or pad mounted with supply and return duct connections selectable for vertical or horizontal to meet a variety of applications.

All units are available with standard or medium static ECM indoor fan motors to support a variety of application airflow and static pressure requirements. Units can be selected for staged air volume (SAV™) for single-zone applications or for variable air volume (VAV) for single-zone VAV (SZ-VAV) or supply duct pressure control for multizone variable air volume (MZ-VAV) applications with additional configurations being field-selectable.

Features/Benefits (cont)



The 48V Series units include a factory-installed natural gas heater that is selectable for low or high capacity based on temperature rise requirements. All units have a stainless steel heat exchanger for high-temperature rise capability with cold entering air temperatures.

Easy to install

All 48/50V Series feature a heavy-duty base rail with integral lifting lugs for rigging.

Replacement installations are made easy with models that fit Carrier 48/50P Series, select 48/50Z Series, and select competitor curbs. Power wiring, control wiring, and gas connections require minimal changes.

Units with Puron Advance™ R-454B refrigerant include A2L refrigerant leak detection sensors with dissipation control, eliminating the need for field installed sensors and controls and simplifying compliance.

All units include a terminal block for a single-point power connection. Power wire can pass through the unit base or end, providing installation flexibility.

Field control wiring terminations are made at conveniently located and labeled terminal strips to simplify the installation of field wiring for sensors and communication wiring. Control wiring can pass through the base of the unit using the factory-installed couplings.

The 48V gas heat units include a single-point gas connection with a pre-punched gas access point for easy installation.

The SmartVu™ control is factory-installed and configured to match the unit order configuration for factory-installed sensors and options, which reduces setup time.

The 7 in. touch screen display provides a simple user interface for setup and commissioning. Navigation consists of a graphical menu with descriptive icons. Most setpoints and settings can be adjusted using the user-level password to simplify setup and configuration.

Plug and play compatibility with the Carrier i-Vu® Building Automation System (via Bacnet) and Field Assistant reduces control setup time and complexity.

Simple to service

All 48/50V Series units include hinged access doors with latches to access maintainable components, such as pre-filters, gas heat, and controls. Periodic maintenance is performed entirely from a single side of the unit.

The indoor fan section includes a hinged, locking access panel with a pressure catch and a fan shutoff interlock to prevent injury to service personnel if the door opens while the fans are operating.

Less frequently accessed components, such as electronic expansion valves (EXVs) and condenser fans, are accessible through large access panels for service.

The MCHX condenser coils are easy to maintain and can be brushed or rinsed with low-pressure water. Side panels are easily removable to access the back side of the coils for cleaning.

The SmartVu control provides maintenance reminders and an alarm history for easier maintenance and troubleshooting.

Factory-installed condensing and suction pressure sensors allow service personnel to monitor the refrigerant circuit from the SmartVu control or building automation system, minimizing the need to connect refrigerant gauges for start-up and troubleshooting.

Features/Benefits (cont)

Quality indoor air

Flexible filtration capability is integral to the 48/50V Series. Standard units include a 4 in. pre-filter rack (before evaporator) with spacers to accept a single 2 in. filter. With the spacer removed, the filter rack can accept two, 2 in. filters (in series) or a single 4 in. filter for easy field upgrades to meet the customer's indoor air quality requirements. Standard units ship with 2 in. throwaway pre-filters (MERV 5 equivalent).

All 48/50V Series units are standard with foil-faced fiberglass insulation on the interior top and side panels that touch the indoor air and help prevent fiber intrusion. The foil surface doesn't easily catch dirt and debris and can be wiped clean.

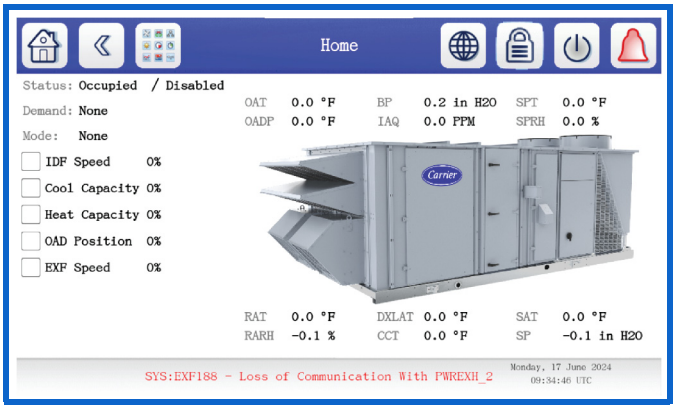
Base units include a factory-installed manual outdoor air damper. The pressure-activated damper (no actuator) opens when the indoor fan is on and closes when the indoor fan is off. The adjustable damper can allow up to 25% outdoor air when open.

The included outdoor air hoods and screens filter large debris from the outdoor air and help prevent rain and show ingress into the unit.

Adaptable controls

The SmartVu™ controls allow for application and operation flexibility. The controls are factory configured to meet the most common application types and is field configurable to meet project specific requirements.

Units selected for SAV are factory-configured for SAV indoor fan control for single-zone applications and are field-configurable for constant volume (CV) or third-party input control.



Single-zone cooling and heating demands can be established based on an accessory space temperature (SPT) sensor or 2-stage heat/cool thermostat inputs.

Units selected for VAV include a supply duct static pressure transducer for supply pressure control for multi-zone variable air volume (MZ-VAV) applications with air terminal units. Units are field configurable for single-zone VAV (SZ-VAV), SAV, CV, or third-party input control.

Multi-zone cooling and heating demands can be established based on the included return temperature (RAT) sensor or the network thermostat inputs to meet application specific needs.

For all units, cooling and heating operation is based on user-adjustable supply air temperature (SAT) setpoints with available SAT resets based on a temperature sensor or third-party input.

In addition to normal cooling and heating modes, all units can be configured for advanced modes of operation, including cool-tempered venting and heat-tempered venting (with heat source). Appropriately equipped units can be configured for dehumidification and heat-tempered cooling operation.

Factory-installed options

Modulating gas heat

The 48V Series unit is available with modulating gas heat in low or high heat capacities. With turndowns of up to 11:1 (11% of full capacity), modulating gas heat provides better low-load operation and supply air temperature control than two-stage gas heat.

Hot water coil

The 50V Series units can be selected with a factory-installed hot water coil in the heating section, eliminating the need for an extended cabinet. The 2-row hot water coil includes piping stubs inside the unit cabinet. Field-supplied water piping can pass through the side panel or base pan of the heat vestibule with field cut access holes. Hot water coil requires a field-provided and installed actuated water valve that can be controlled by the SmartVu controls.

Two-stage electric heat

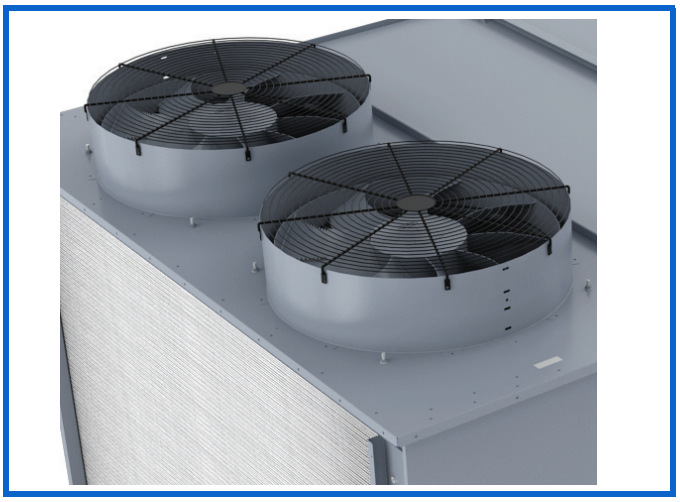
Select 50V Series units are available with a factory-installed, 2-stage electric heater in low, medium, or high capacity with two-stages of capacity. The electric heater is factory wired to the main power terminal block, eliminating the need for field power wiring or single-point kits.

Modulating electric heat

Factory-installed silicon controlled rectifier (SCR) modulating electric heat is available on select 50V Series units in low, medium, or high capacities. The modulated heat control provides improved supply air temperature control over two-stage heat.

High-capacity variable speed compressor

For applications in hot or humid climates or where high cooling or dehumidification loads are present, the high-capacity variable speed compressor option provides enhanced full-load cooling and dehumidification capability.



High-efficiency, low-sound package

The high efficiency, low-sound option includes compressor sound blankets and replaces all standard condenser fans with shrouded, AeroAcoustic™ condenser fans and low rpm motors that reduce unit radiated sound during cooling and dehumidification operation.

The low sound condenser fans also provide high-efficiency cooling and dehumidification performance and improved efficiency ratings, reduces energy consumption during cooling and dehumidification operation, and improves unit cooling efficiency ratings.

Humidi-MiZer® dehumidification

Carrier's patented Humidi-MiZer modulating dehumidification system provides unparalleled operation to meet varying environmental conditions.

The Humidi-MiZer system includes an e-coated reheat coil, a two-position reheat valve, and a modulating condenser bypass valve, which allows a variable mixture of hot gas and liquid refrigerant for modulated reheat operation during dehumidification mode.

The Humidi-Mizer system also includes a cooling coil temperature sensor (used to approximate supply air dewpoint), a supply air temperature sensor, and requires the humidity and enthalpy sensor option (for return air relative humidity sensor).

The SmartVu™ controls can monitor return air relative humidity, space relative humidity, or dehumidify input to determine if there is a dehumidify demand.

The Humidi-MiZer system is disabled when there is no dehumidify demand or if dehumidification is prevented (except at circuit start-up or reheat coil purge).

When there is a demand for both cooling and dehumidification, the Humidi-MiZer system operates in "subcooling mode" to provide cool, dehumidified air to the space. The subcooling operation increases the evaporator capacity, providing improved dehumidification compared to normal cooling mode.

When there is a demand for dehumidification and either ventilation or heating, the Humidi-MiZer system operates in "hot gas reheat mode" to provide neutral or warm, dehumidified air to the space.

Factory-installed options (cont)

Extended standard chassis

The extended standard chassis includes an extra 25-1/4 in. of chassis length on the return side. The extended section is required when replacing 48/50P and 48/50Z Series units with extended chassis. For 50V (27.5 to 50 ton) units, the extended standard chassis has a larger filter access door for use with an optional factory-installed bag or cartridge filters.

Plenum section

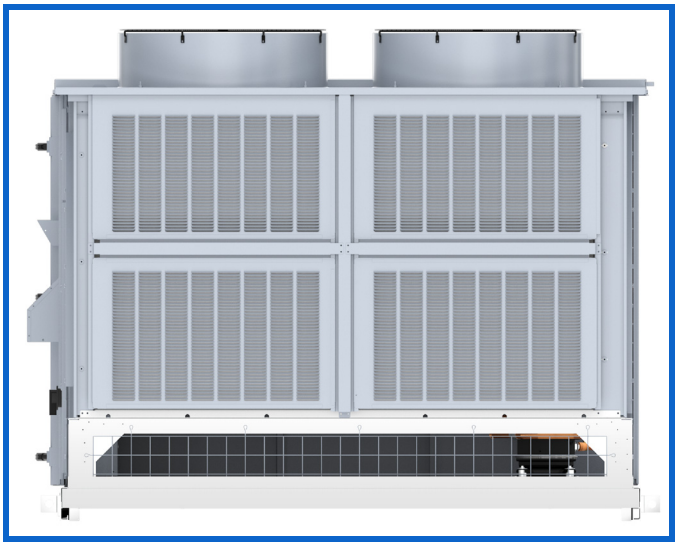
The plenum section is available for the 50V series standard chassis and extended standard chassis units up to 70 tons, and includes extra chassis length on the return (sizes 28-50) or supply (sizes 54-98) section. The plenum section is required for double wall construction when replacing 50P and 50Z Series units with discharge plenum or replacing 48P or 48Z units with a 50V series unit. On 50V (27.5 to 50 ton) units, the plenum section includes a larger filter access door for use with an optional factory-installed bag or cartridge filters.

E-coated evaporator and condenser coils

Units are selectable for e-coated condenser coils or e-coated condenser and evaporator coils. E-coat is a durable epoxy coating that completely and uniformly encapsulates the coil.

E-coat provides superior protection with unmatched edge coverage, metal adhesion, thermal performance, and corrosion resistance for mildly corrosive environments, such as coastal applications.

E-coated coils can withstand an 8,000-hour salt spray test per ASTM (American Society for Testing and Materials) Standard B-117.



Hail guard

A factory-installed louvered metal panel is installed on exterior vertical condenser coil faces for 27.5 to 60 ton units. This panel protects against hail damage and can act as a wind baffle for windy environments. Hail Guards are not available for unit sizes 70-98 because the condenser section already includes a standard security grille and cannot accommodate additional hail guards.

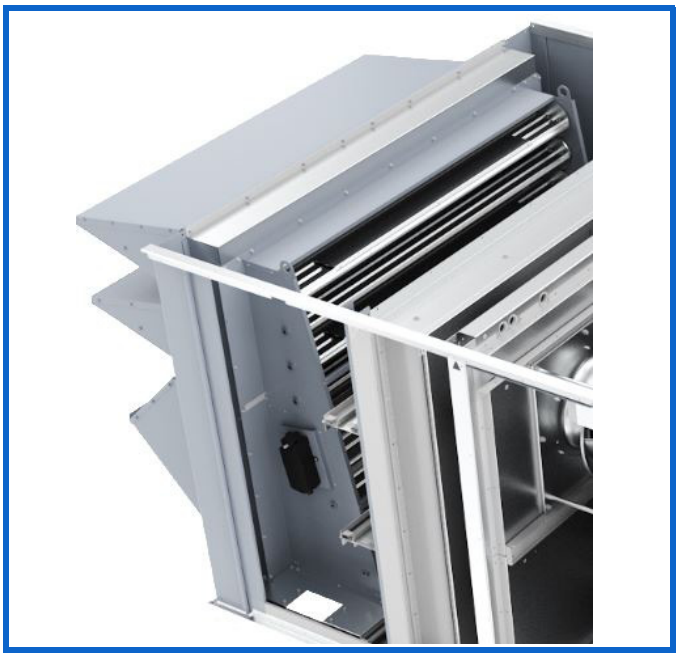
Humidity and enthalpy sensing

Units include factory-installed outdoor air and return air relative humidity sensors. These humidity sensors are used for dehumidification control with Humidi-MiZer system or for free cooling control with enthalpy, differential enthalpy, or dewpoint limit operation.

The SmartVu control uses the outdoor or return air temperature and relative humidity readings to calculate enthalpy and dewpoint.

Outdoor airflow measuring

Units include a factory-installed outdoor air flow measuring station to measure the airflow through the economizer outdoor air damper. The airflow measuring devices use thermal dispersion technology for accurate and reliable measurements. The SmartVu control can be configured to use the outdoor airflow readings for ventilation control.



Ultra-low leak economizer

The factory-installed ultra-low leak economizer provides improved ventilation control over the manual outdoor air damper and enables free cooling operation with outdoor air.

The economizer assembly includes gear-driven return and outdoor air dampers with ultra-low leak blades and edge seals that restrict leakage to 3 cfm per sq ft at 1 in. water column when tested per AMCA (Air Movement and Control Association) Standard 500. Compact chassis with vertical discharge and economizer include a single actuator with mechanically interlocked outdoor air and return air dampers. Compact chassis with horizontal discharge and all standard chassis units with economizer include separate outdoor air and return air dampers with dedicated actuators.

SmartVu™ controls the economizer and includes fault detection and diagnostic (FDD) functionality and ventilation control based on indoor fan speed, return or space CO_2 levels, or a third-party modulation signal.

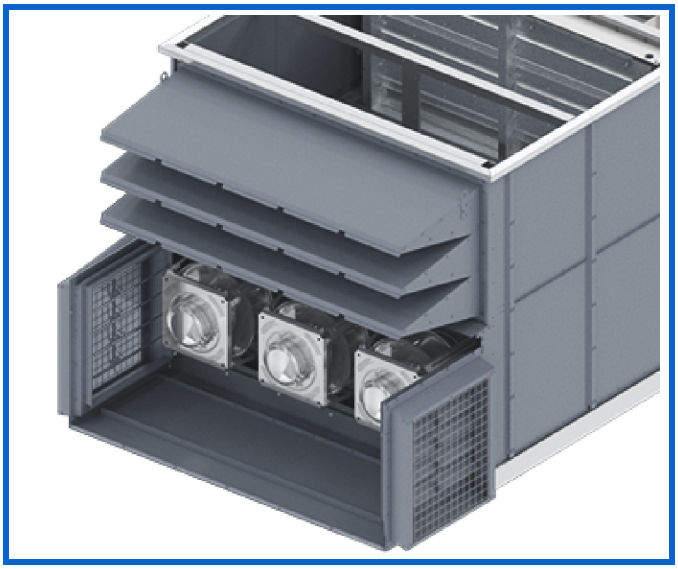
Factory-installed options (cont)

Free cooling operation based on outdoor air dry bulb temperature or differential outdoor and return air dry bulb temperatures is standard. Free cooling based on outdoor air enthalpy, differential outdoor and return air enthalpy, or outdoor air dewpoint are available with the humidity and enthalpy sensing option.

Low static exhaust fans

The 27.5 to 50 ton standard and compact chassis models are available with a low static exhaust fan system, with axial exhaust fans and electronically commutating motors (ECMs).

The fans are configurable for operation based on economizer position, a third-party modulation signal, or building pressure with the modulating building pressure control option and included building pressure sensor.



Standard, medium, and high static exhaust fans

Standard chassis units are available with a static exhaust fan system, with backward curve exhaust fans with ECMs and a building pressure sensor.

The standard, medium, or high static exhaust fans discharge to the side of the unit and meet code requirements for separation of outdoor intake and exhaust on different sides of the unit. The 27.5 to 50 ton units use two, side mounted exhaust fans for both standard and medium static, and three end mounted exhaust fans with side discharge for high static. The 55 to 100 ton units use two side mounted exhaust fans for standard static, and three end mounted exhaust fans with side outlets for medium static.

The exhaust fan is configurable for operation based on economizer position, a third-party modulation signal, or modulating building pressure control with the included building pressure sensor.

Medium and high static return fans with modulating exhaust air dampers

Standard chassis units are available with a return fan system with direct drive fans with EC motors. Return fans are often used in applications with long return duct runs to reduce the static pressure on the supply fan and provide improved building pressure control. The 27.5 to 50 ton units include two fans for medium static and three fans for high static. The 55 to 100 ton units include three fans for medium static and four fans for high static. Return fans can be configured to control based on return plenum pressure, indoor fan speed tracking, or a third-party input.

All units with return fans also include actuated exhaust air dampers. The exhaust air dampers discharge to the side of the unit and are used to relieve air from the unit to control building pressure while the return fans are running. The modulating exhaust air dampers can be controlled based on building pressure, outdoor air damper position, or a third-party input.

EnergyX® energy recovery ventilator (ERV)

Select standard chassis units are available with an EnergyX energy recovery system. EnergyX is a factory integrated and tested energy recovery ventilator (ERV) that includes a total energy recovery wheel with VFD defrost and wheel bypass dampers. The EnergyX system preconditions outdoor air used for building ventilation, which can reduce operating costs, allow for increased ventilation, or allow for downsizing of mechanical cooling and heating systems.

EnergyX operation can be configured for differential enthalpy or differential dry bulb control with user-adjustable fixed temperature and enthalpy limits for cooling and heating.

Powered 115-v convenience outlet

A dual plug, grounded receptacle in the unit control panel provides up to 10A at 120-v for light-duty use for charging devices or small power tools.

The transformer that powers the receptacle connects to the load side of the unit power feed. The outlet is not powered when the unit power is disconnected.

Unpowered 115-v convenience outlet

For applications that require a separate power supply or higher amperage operation, the field-wired convenience outlet includes a dual plug grounded receptacle that can handle up to 15A loads at 115-v with a field supplied and installed power feed.

High short circuit current rating (SCCR)

Upgraded power and control components improve the SCCR rating of 208/230-v and 460-v units to 65kA and 575-v units for 25kA.

High SCCR is only available with a terminal block power connection and for units without powered convenience outlet. Field-supplied J-type, current-limiting fuses must be installed before the terminal block in an external fuse box or fused disconnect.

Service pack

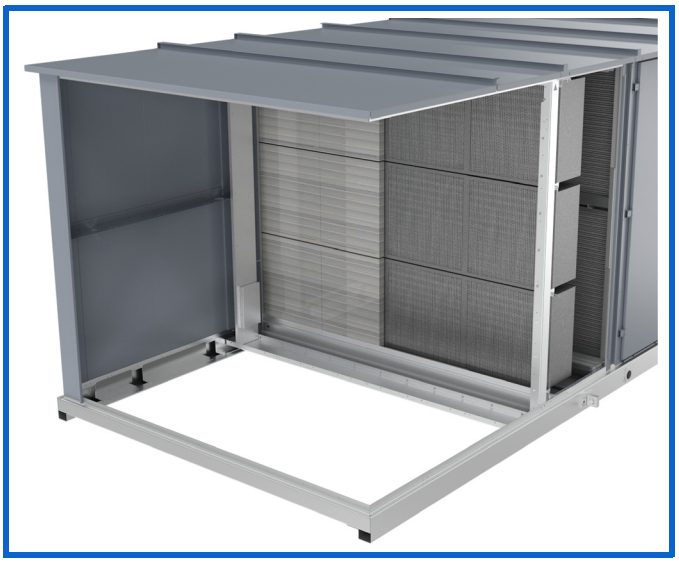
This service pack includes isolation valves for the tandem compressor assembly to allow removal of the compressors without recovering the entire refrigerant charge.

The service pack also includes a changeable core filter drier with isolation valves to allow easy changeout in the event of a compressor burnout or clogged filter drier.

Chicago refrigerant relief valve

This valve provides a mechanical relief device installed on the high-pressure side of the refrigerant circuit to comply with building code requirements for refrigerant safety.

Factory-installed options (cont)



Pre-filters

Units can be configured to ship with 2 in. MERV 8, 4 in. MERV 8, or 4 in. MERV 13 pleated filters in the standard pre-filter rack for improved indoor air quality to meet customer or code requirements.

All 27.5 to 50 ton units are available with a 2 in. plus 4 in. pre-filter rack with 2 in. MERV 8 filters before 4 in. MERV 13 filters for improved filtration effectiveness and extended filter life, which can reduce maintenance costs. The 2 in. and 4 in. filter rack is not convertible to accept 6 in. filters.

For more demanding applications, all 48V standard chassis units, and select 50V standard chassis units are available with a 2 in. pre-filter rack with 2 in. MERV 8 pleated filters before 12 in. MERV 14 bag filters, or 12 in. MERV 15 cartridge filters.

Ultraviolet (UV-C) fixtures

All standard chassis and 40 to 50 ton compact chassis units are available with a factory-installed UV-C fixtures on the downstream side of the evaporator coil.

The UV-C light requires a field-installed 115-v power feed (10A minimum) and field-installed UV-C emitters (bulbs). Emitters are available as an accessory.

The UV-C fixtures include factory-installed fixtures with power wiring back to a shutoff switch for 115-v field-supplied power (10A minimum). The power wiring includes door interlock switches to disconnect the UV-C fixture power when the door is opened. A UV-C safe view port is installed in the access door to verify if the emitter is operational.

R-13 double wall construction

Select standard chassis units are available with double wall construction on the airside section of the unit, including double wall panels and access doors with galvanized interior liner and R-13 foam insulation. All access doors are hinged with locking handles and door retainers. R-13 double wall construction provides a wipe down capable interior surface, improved structural rigidity, and can reduce cabinet heat gain or loss, which can reduce unit operating costs.

Units with R-13 double wall construction can also be selected with Agion® anti-microbial coating on interior airside panels. The Agion coating is engineered to slowly release silver ions, which helps protect the unit interior from the buildup of odor-causing bacterial, mold, and mildew.

Other factory-installed options include:

- Barometric relief
- Return air CO_2 sensor
- Stainless steel condensate drain pan
- Non-fused disconnect
- Phase monitor
- Return air smoke detector
- Condensate overflow switch
- Pre-filter status switch
- Pre-filter measuring
- Access door retainers

Field-installed accessories and warranty

Carrier non-communicating sensors

The SmartVu™ control supports a variety of field-provided communicating (Rnet) and non-communicating (33ZC Series) sensors and sensor functions, including:

- Space temperature
- Space relative humidity
- Space CO_2
- Occupancy override
- Space temperature adjustment
- Supply duct temperature
- Return air CO_2

Commercial thermostats

When the customer requires simple control over the unit, the SmartVu control supports two-stage heat/cool thermostats.

Carrier offers a variety of thermostats, including non-programmable, programmable, Wi-Fi, and BACnet. The SmartVu controls can accept a dehumidify input for dehumidification operation with Humidi-MiZer system.

Additional accessories include:

- Competitor replacement centering kit
- Roof curbs
- Full perimeter curb conversion kits
- Pleated filter kits
- Cartridge filter kits
- Bag filter kits
- Rnet sensor power harness
- Hot water control valve (RC part)
- Hail guard
- Supply or return air smoke detector
- CCN to Modbus translator
- CCN to LON translator
- UV-C emitters
- Compressor sound blankets
- Flue vent extension
- High altitude gas heat kit (RC part)
- Natural gas to propane heat conversion kit

Extended warranty protection and start-up service

All 48/50V units include Carrier's limited warranty coverage of five (5) year parts on ultra-low leak economizers, three (3) year parts on MCHX coils, ten (10) year parts on stainless steel heat exchangers (48V only), and one (1) year parts on all other non-consumable parts. Available equipment start-up and extended warranty protection includes:

- Up to 5 year coverage on all non-consumable parts
- Up to 20 year coverage on gas heat exchanger parts (48V only)
- Up to 5 year labor coverage
- Cooling start-up by factory-trained personnel
- Heating start-up by factory-trained personnel

Extended warranty protection does not require factory start-up. See the Carrier commercial rooftop equipment limited warranty statement for details.

Features, options, and accessories

DESCRIPTION	STANDARD	OPTION	ACCESSORY
CHASSIS OPTIONS			
Compact Chassis (Fits select competitor curbs, shortest chassis.)	X		
Standard Chassis (Fits select Carrier standard legacy curbs.)	X		
14 in. Knock-down Roof Curbs			X
Centering Kit (For installing compact chassis on competitor curbs.)			X
APPLICATION AND CONFIGURATION			
SAV (Staged indoor fan for single-zone applications)	X		
VAV (SZ-VAV for single-zone or supply duct pressure control for multi-zone VAV applications)	X		
Vertical Supply	X		
Horizontal Supply (Left)		X	
Vertical Return	X		
Horizontal Return (Left side on compact, end on standard chassis)		X	
NATURAL GAS HEAT (48 SERIES)			
Stainless Steel Gas Heat Exchanger	X		
Low or High Natural Gas Heat with Two-Stage Control	X		
Low or High Natural Gas Heat with Modulating Control (Up to 11:1 turndown)		X	
High Elevation Conversion Kit (up to 10,000 ft)			RC
Propane Conversion Kit			X
Flue Extension Kit			X
OTHER HEAT (50 SERIES)			
No Heat	X		
Low, Medium, or High Electric Heat with Two-Stage Control		X	
Low, Medium, or High Electric Heat with Modulating (SCR) Control		X	
Hot Water Coil (post-heat position)		X	
Hot Water Control Valve			**RC**
COOLING			
Puron Advance™ (R-454B) Low Global Warming Potential (GWP) Refrigerant	X		
Refrigerant Leak Detection System with Leak Mitigation	X		
Electronic Expansion Valve (EXV) Metering Devices	X		
Single Refrigerant Circuit	Sizes 28-40		
Dual Refrigerant Circuits	Sizes 50-98		
Crankcase Heaters	X		
Low Ambient Mechanical Cooling (Variable Speed Outdoor Fans with Greenspeed® Intelligence)	X		
Standard Efficiency, Standard Sound Package (Metal Outdoor Fans)	X[a]		
High-Efficiency, Low Sound Package (Low Sound Outdoor Fans, Compressor Sound Blankets)		X	
Standard-Capacity, Lead Variable Speed Scroll Compressor	X		
High-Capacity, Lead Variable Speed Scroll Compressor		X[a]	
Fixed Speed Lag Scroll Compressors	X		
Humidi-MiZer Modulating Dehumidification System		X	
CONSTRUCTION			
Single Wall with R4 Foil-Faced Fiberglass Insulation	X		
Standard Chassis with Plenum (50V Only)		Sizes 28-70	
Extended Standard Chassis		X	
Extended Standard Chassis with Plenum (50V Only)		X	
INDOOR FAN			
Direct Drive, Backward Curve Fan Array	X		
Standard Static ECM	X		
Medium Static ECM		X	
High Static ECM (All standard chassis or 40-50 ton compact chassis only)		X	
DRAIN AND COIL			
Galvanized Steel Condensate Drain Pan	X		
Stainless Steel Condensate Drain Pan		X	
Al/Cu Evaporator Coil	X		
MCHX Condenser Coil	X		

Features, options, and accessories (cont)

DESCRIPTION	STANDARD	OPTION	ACCESSORY
E-coated Condenser Coils		X	
E-coated Condenser and Evaporator Coils		X	
Louvered Hail Guards		Sizes 28-60[b]	
Security Grilles (Sizes 28-34 and 70-98)	X		
OUTDOOR AIR AND RELIEF			
Outdoor Air Hoods with Mesh Screens	X		
Manual Outdoor Air Damper (Non-Actuated)	X		
Ultra Low-leak Economizer		X	
No Relief	X		
Barometric Relief		X	
Low Static ECM Exhaust		Sizes 28-50	
Standard or Medium Static ECM Exhaust Fans (Standard Chassis Only)		X[c]	
High Static ECM Exhaust Fans (Standard Chassis Only)		Sizes 28-50	
Medium or High Static ECM Return Fans with Modulating Damper (Standard Chassis Only)		X	
Modulating Building Pressure Control (with BP Sensor)		X	
EnergyX® Energy Recovery Ventilator (Standard Chassis Only)		X	
SENSOR AND CONTROL			
Carrier SmartVu™ Controls with 7 in. Touchscreen	X		
BACnet Communication (MS/TP or IP)	X		
Carrier Comfort Network (CCN) Communication	X		
Plug and Play with Carrier i-Vu (8.0+) Building Automation System (BACnet Only)	X		
LonWorks and Modbus Communication Translator (Limited Points)			X
Terminal Blocks for Field-Installed Control Devices	X		
Factory-Installed Outdoor, Return, and DX Leaving Air Temperature Sensors	X		
Supply Air Temperature Sensor (with Modulating Heat or Humidi-MiZer)		X	
DX Condensing and Suction Pressure Transducers, Readable from SmartVu	X		
Humidity and Enthalpy Sensors for Dehumidification or Enthalpy/Dew Point Free Cooling		X	
Return Air CO_2 Sensor		X	
Outdoor Air Measuring Station		X	
Non-Communicating Space Temperature, CO_2, and Relative Humidity Sensors			X
Communication Space Temperature, CO_2, and Relative Humidity Sensors (Rnet)			X[d]
Two-Stage Heating and Cooling Thermostats			X
Rnet Sensor Power Harness			X
ELECTRICAL (v-Ph-Hz)			
208/230-3-60	Sizes 28-74		
460-3-60	X		
575-3-60	X		
Thru-the-Base Power and Control Wiring Couplings	X		
Dedicated High and Low Voltage Sections	X		
Single Point Terminal Block Power Connection	X		
Non-Fused Disconnect		X[e]	
Powered Convenience Outlet		X[e]	
Non-Powered Convenience Outlet		X	
Standard SCCR (10kA)	X		
High SCCR (65kA for 208/230/460-v or 25kA for 575-v)		X[f]	
Phase Monitor		X	
SERVICE AND SAFETY			
Hinged, Double-Wall Maintenance Access Doors	X		
Hinged, Double-Wall Indoor Fan Access Door with Pressure Catch and Safety Interlock	X		
Removable Service Access Panels	X		
Condensate Overflow Switch		X	
Pre-Filter Status Switch		X	X
Access Door Retainers		X	
Return Air Smoke Detector		X	X
Supply Duct Smoke Detector			X
Service Pack (Compressor Service Valves, Replaceable Core Filter Drier)		X	
Chicago Relief Valve (Refrigerant Pressure Safety Relief)		X	
Pre-Filter Measuring		X	

Features, options, and accessories (cont)

DESCRIPTION	STANDARD	OPTION	ACCESSORY
IAQ OPTIONS			
Double Wall Construction in Airstream		X	
Agion® Double Wall Construction in Airstream		X	
4 in. Pre-Filter Rack (Accepts 2 in., 2 in. + 2 in., or 4 in. filters)	X		
2 in. Throwaway Filters	X		
2 in. or 4 in. MERV 8, 4 in. MERV 13 Pleated Filters		X	
Pre-Filter Rack with 2 in. MERV 8 Filters + 4 in. MERV 13 Pleated Filters		Sizes 28-98	
Pre-Filter Rack with 2 in. MERV 8 Pleat + 12 in. MERV 14 Bag Filters (Standard Chassis Only)		X[g]	
Pre-Filter Rack with 2 in. MERV 8 Pleat + 12 in. MERV 15 Cartridge Filters (Standard Chassis Only)		X[g]	
Replacement Filters			X
Ultraviolet (UV-C) Fixtures (Standard Chassis Only)		X	
Ultraviolet (UV-C) Emitters			X
WARRANTY AND START-UP			
Five (5) Year Low-Leak Economizer Damper Parts Coverage	X		
Three (3) Year MCHX Coil Parts Coverage	X		
Ten (10) Year Stainless Steel Gas Heat Exchanger Parts Coverage (48V)	X		
One (1) Year All Other Non-Consumable Parts Coverage	X		
Up To Twenty (20) Year Stainless Steel Gas Heat Exchanger Parts Coverage (48V)		X	
Up To Five (5) Year Non-Consumable Parts Coverage		X	
Up To Five (5) Year Labor Coverage		X	
Cooling Start-Up Service By Factory Trained Personnel		X	
Heating Start-Up Service By Factory Trained Personnel		X	

NOTE(S):

a. Size 34 units are not available with standard efficiency option or high capacity compressor option.
b. Louvered hail guards are not available for sizes 70 to 98 because the condenser section already includes a standard security grille and cannot accommodate additional hail guards.
c. Medium static power exhaust is not available with horizontal return on sizes 54 to 98 units.
d. Rnet sensors require a field provided power supply or accessory Rnet power kit. Rnet displays require field supplied power.
e. Not available with high SCCR.
f. Requires field provided and installed current limiting fused before the unit terminal block.
g. The 50V Series, sizes 28 to 50 units require standard chassis w/plenum, extended standard chassis, or extended standard chassis with plenum.

LEGEND

RC — Replacement Components Part

Capacities and ratings

48/50V AHRI Ratings (Standard Chassis)[a,b]

SIZE	CHASSIS	SAV/VAV	EFFICIENCY	CAPACITY	48V		50V	
					EER	IEER	EER	IEER
28	Standard	SAV	Standard	Standard	10.5	20.1	10.6	20.4
		VAV	Standard	Standard	10.5	17.8	10.6	18.0
		SAV	High	Standard	10.8	20.9	10.9	21.2
		VAV	High	Standard	10.8	19.0	10.9	19.1
		SAV	High	High	10.5	20.8	10.6	21.1
		VAV	High	High	10.5	19.0	10.6	19.1
30	Standard	SAV	Standard	Standard	10.0	19.1	10.0	19.4
		VAV	Standard	Standard	10.0	17.0	10.0	17.1
		SAV	High	Standard	10.3	20.7	10.5	21.1
		VAV	High	Standard	10.3	19.0	10.5	19.1
		SAV	High	High	10.3	20.6	10.5	20.9
		VAV	High	High	10.3	19.3	10.5	19.1
34	Standard	SAV	High	Standard	9.8	19.4	10.0	19.7
		VAV	High	Standard	9.8	18.2	10.0	18.4
40	Standard	SAV	Standard	Standard	9.8	18.8	10.0	19.3
		VAV	Standard	Standard	9.8	16.9	10.0	17.2
		SAV	High	Standard	10.3	19.7	10.5	20.1
		VAV	High	Standard	10.3	17.9	10.5	18.2
		SAV	High	High	9.8	19.7	10.0	20.1
		VAV	High	High	9.8	17.9	10.0	18.2
50	Standard	SAV	Standard	Standard	9.8	17.7	10.0	17.9
		VAV	Standard	Standard	9.8	17.9	10.0	18.0
		SAV	High	Standard	10.3	18.0	10.5	18.2
		VAV	High	Standard	10.3	18.2	10.5	18.4
		SAV	High	High	9.8	17.6	10.0	17.8
		VAV	High	High	9.8	18.0	10.0	18.1
54	Standard	SAV	Standard	Standard	9.8	17.0	10.0	17.1
		VAV	Standard	Standard	9.8	16.6	10.0	16.7
		SAV	High	Standard	9.8	17.4	10.0	17.6
		VAV	High	Standard	9.8	16.9	10.0	17.1
		SAV	High	High	9.8	17.2	10.0	17.6
		VAV	High	High	9.8	17.0	10.0	17.2
60	Standard	SAV	Standard	Standard	9.8	16.2	10.0	16.3
		VAV	Standard	Standard	9.8	16.2	10.0	16.2
		SAV	High	Standard	9.8	16.5	10.0	16.6
		VAV	High	Standard	9.8	16.4	10.0	16.5
		SAV	High	High	9.8	16.5	10.0	16.5
		VAV	High	High	9.8	16.5	10.0	16.6
70	Standard	SAV	Standard	Standard	9.8	16.7	10.0	16.9
		VAV	Standard	Standard	9.8	16.5	10.0	16.6
		SAV	High	Standard	9.8	16.9	10.0	17.1
		VAV	High	Standard	9.8	16.7	10.0	16.9
		SAV	High	High	9.8	16.8	10.0	17.0
		VAV	High	High	9.8	16.7	10.0	16.9

NOTE(S):

a. Ratings are in accordance with AHRI 340/360, as appropriate.
b. Refer to http://www.ECAT.carrier.com for 75-100 ton unit ratings.

LEGEND

AHRI — Air Conditioning, Heating, and Refrigeration
EER — Energy Efficiency Ratio
IEER — Integrated Energy Efficiency Ratio
VAV — Variable Air Volume
SAV — Staged Air Volume

Capacities and ratings (cont)

48/50V AHRI Ratings (Compact Chassis)[a]

SIZE	CHASSIS	SAV/VAV	EFFICIENCY	CAPACITY	48V		50V	
					EER	IEER	EER	IEER
28	Compact	SAV	Standard	Standard	10.4	19.9	10.5	20.2
		VAV	Standard	Standard	10.4	17.8	10.5	17.9
		SAV	High	Standard	10.8	20.8	10.9	21.0
		VAV	High	Standard	10.8	18.9	10.9	19.0
		SAV	High	High	10.5	20.7	10.6	20.9
		VAV	High	High	10.5	18.9	10.6	19.0
30	Compact	SAV	Standard	Standard	9.8	19.1	10.0	19.4
		VAV	Standard	Standard	9.8	16.9	10.0	17.1
		SAV	High	Standard	10.3	20.4	10.5	20.8
		VAV	High	Standard	10.3	18.9	10.5	19.1
		SAV	High	High	10.3	20.3	10.0	20.7
		VAV	High	High	10.3	19.0	10.5	19.1
34	Compact	SAV	High	Standard	9.8	18.9	10.0	19.3
		VAV	High	Standard	9.8	18.1	10.0	18.4
40	Compact	SAV	Standard	Standard	9.8	18.5	10.0	18.8
		VAV	Standard	Standard	9.8	16.8	10.0	17.1
		SAV	High	Standard	9.8	19.2	10.0	19.5
		VAV	High	Standard	9.8	17.7	10.0	17.8
		SAV	High	High	9.8	19.2	10.0	19.5
		VAV	High	High	9.8	17.8	10.0	17.8
50	Compact	SAV	Standard	Standard	9.8	17.2	10.0	17.3
		VAV	Standard	Standard	9.8	17.1	10.0	17.0
		SAV	High	Standard	10.3	17.8	10.5	18.0
		VAV	High	Standard	10.3	18.0	10.5	18.2
		SAV	High	High	9.8	17.3	10.0	17.5
		VAV	High	High	9.8	17.8	10.0	18.0

NOTE(S):

a. Ratings are in accordance with AHRI 340/360, as appropriate.

LEGEND

AHRI — Air Conditioning, Heating, and Refrigeration
EER — Energy Efficiency Ratio
IEER — Integrated Energy Efficiency Ratio
SAV — Staged Air Volume
VAV — Variable Air Volume

Cooling and Dehumidifying Airflow Limits

UNIT SIZE 48/50V	LEAD COMPRESSOR TYPE	EVAPORTAOR TYPE	MIN. PART LOAD AIRFLOW (cfm)[a]	MIN .FULL LOAD AIRFLOW (cfm)[b]	MAX. FULL LOAD AIRFLOW (cfm)[b]
28	Variable Capacity	Al/Cu (Standard)	2,750	5,500	16,700
		E-Coat Al/Cu			14,500
30		Al/Cu (Standard)	3,000	6,000	16,700
		E-Coat Al/Cu			14,500
34		Al/Cu (Standard)	3,500	7,000	16,700
		E-Coat Al/Cu			14,500
40		Al/Cu (Standard)	4,000	8,000	20,000
		E-Coat Al/Cu			16,500
50		Al/Cu (Standard)	5,000	10,000	20,000
		E-Coat Al/Cu			16,500
54		Al/Cu (standard)	5,400	10,800	32,300
		E-Coat Al/Cu			27,900
60		Al/Cu (Standard)	6,000	12,000	32,300
		E-Coat Al/Cu			27,900
70		Al/Cu (Standard)	7,000	14,000	32,300
		E-Coat Al/Cu			27,900
74		Al/Cu (Standard)	7,400	15,000	32,300
		E-Coat Al/Cu			27,900
90		Al/Cu (Standard)	9,000	18,000	40,500
		E-Coat Al/Cu			27,900
98		Al/Cu (Standard)	10,000	19,600	44,100
		E-Coat Al/Cu			27,900

NOTE(S):

a. Part-load cooling cfm is based on 67°F/57°F (19.4°C/13.9°C) entering evaporator, 67°F (19.4°C) ambient, minimum cooling capacity.
b. Full-load cooling cfm is based on 80°F/67°F (26.6°C/19.4°C) entering evaporator, 95°F (30°C) ambient, maximum cooling capacity.

Capacities and ratings (cont)

Cooling Capacity Staging — Sizes 28, 30, 34, and 40

COMPRESSOR	STAGE		
	0	1	2
	COMPRESSOR STATUS		
A1 (Variable)[a]	OFF	ON	ON
A2	OFF	OFF	ON
UNIT	CAPACITY 48/50V		
28	0%	13%-51%	62%-100%
30	0%	13%-53%	60%-100%
34	0%	13%-47%	64%-100%
40	0%	13%-57%	58%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor. The A2 compressor is a fixed speed and does not operate without A1 under normal conditions.

Cooling Capacity Staging — Size 50

COMPRESSOR	STAGE				
	0	1	2	3	3
	COMPRESSOR STATUS				
A1 (Variable)[a]	OFF	ON	ON	ON	ON
B1[b]	OFF	OFF	OFF	ON	ON
B2	OFF	OFF	ON	OFF	ON
UNIT	CAPACITY 48/50V				
50	0%	13%-52%	53%-71%	72%-81%	82%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor.
b. The B1 compressor is a fixed speed compressor larger than the B2 fixed speed compressor.

Cooling Capacity Staging — Sizes 54, 60

COMP	STAGE			
	0	1	2	3
	Compressor Status			
A1 (Variable)[a]	OFF	ON	ON	ON
B1/B2[b]	OFF	OFF	B1 or B2	BOTH
UNIT	Capacity 48/50V			
54	0%	14%-39%	39%-74%	74%-100%
60	0%	13%-40%	40%-73%	73%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor. The B1 and B2 compressors are fixed speed.
b. The B1 and B2 Compressor are equal sizes.

Cooling Capacity Staging — Sizes 70, 74

COMP	STAGE						
	0	1	2	3	4	5	6
	Compressor Status						
A1 (Variable)[a]	OFF	ON	ON	ON	ON	ON	ON
A2	OFF	OFF	OFF	OFF	ON	ON	ON
B1	OFF	OFF	OFF	ON	OFF	ON	ON
B2	OFF	OFF	ON	OFF	ON	OFF	ON
UNIT	Capacity 48/50V						
70	0%	8%-28%	29%-36%	36%-53%	55%-58%	58%-78%	79%-100%
74	0%	7%-26%	30%-36%	36%-52%	52%-59%	59%-78%	81%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor. The A2 compressor is a fixed speed. The A2 does not operate without A1 under normal conditions.

Cooling Capacity Staging — Size 90

COMP	STAGE						
	0	1	2	3	4	5	6
	Compressor Status						
A1 (Variable)[a]	OFF	ON	ON	ON	ON	ON	ON
A2	OFF	OFF	OFF	OFF	ON	ON	ON
B1	OFF	OFF	OFF	ON	OFF	ON	ON
B2	OFF	OFF	ON	OFF	ON	OFF	ON
UNIT	Capacity 48/50V						
90	0%	9%-28%	28%-30%	30%-47%	47%-58%	58%-77%	77%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor. The A2 compressor is a fixed speed. The A2 does not operate without A1 under normal conditions.

Cooling Capacity Staging — Size 98

COMP	STAGE					
	0	1	2	3	3	4
	Compressor Status					
A1 (Variable)[a]	OFF	ON	ON	ON	ON	ON
A2[b]	OFF	OFF	OFF	ON	ON	ON
B1[b]	OFF	OFF	OFF	OFF	ON	ON
B2[b]	OFF	OFF	ON	ON	OFF	ON
UNIT	Capacity 48/50V					
98	0%	8%-30%	32%-53%	55%-77%	55%-77%	78%-100%

NOTE(S):

a. The A1 compressor is a variable speed compressor. The A2 compressor is a fixed speed. The A2 does not operate without A1 under normal conditions.
b. The A2, B1, and B2 Compressor are equal sizes.

Capacities and ratings (cont)

Two-Stage Gas Heating Capacities — Natural Gas and LP Gas (Sizes 28-98) [a,b,c,d,e,f]

UNIT SIZE 48V	HEAT SIZE	INPUT CAPACITY (MBH)		OUTPUT CAPACITY (MBH)		EFFICIENCY (%)	TEMP RISE (°F)	AIRFLOW STAGE 1 (cfm)		AIRFLOW STAGE 2 (cfm)	
		Stage 1	Stage 2	Stage 1	Stage 2			Min.	Max.	Min.	Max.
28-34	Low Heat	285	380	231	308	81.0%	20-50	4,270	10,690	5,700	14,250
	High Heat	488	650	395	527	81.0%	20-55	6,650	14,640	8,860	17,500
40-50	Low Heat	285	380	231	308	81.0%	20-50	4,270	10,690	5,700	14,250
	High Heat	548	730	444	591	81.0%	25-55	7,470	16440	9,950	21,890
54-98	Low Heat	548	730	444	591	81.0%	30-60	7,500	16,400	10,000	21,900
	High Heat	795	1068	631	872	81.0%	35-65	9,700	19,500	13,500	26,900

NOTE(S):

a. All heaters are factory configured for natural gas and field converted to LP using an accessory kit.
b. Ratings are approved for altitudes up to 2000 ft. At altitudes over 2000 ft, ratings are 4% less for each 1000 ft above sea level. See unit installation instructions for high elevation conversion.
c. At altitudes up to 2000 ft, the following formula may be used to calculate air temperature rise:

$$\Delta t = \frac{\text{maximum output capacity}}{1.10 \times \text{air quantity}}$$

d. At altitudes above 2000 ft, the following formula may be used:

$$\Delta t = \frac{\text{maximum output capacity}}{(.24 \times \text{specific weight of air} \times 60) \times (\text{air quantity})}$$

e. The listed temperature rise limits must be honored during high and low fire.
f. On VAV (variable air volume) applications set the zone terminals to provide minimum unit heating airflow as indicated in the table upon command from Zone Damper Override Relay (ZDOR).

LEGEND

LP — Propane

Low Two-Stage Gas Heat Staging (Sizes 28-50)

HEATER	STAGE		
	0	1	2
	Heater Status		
Heater 1	OFF	Low Fire	High Fire
UNIT SIZE 48V	Heating Capacity (Total)		
28-50	0%	75%	100%

High Two-Stage Gas Heat Staging (Sizes 28-50)

HEATER	STAGE		
	0	1	2
	Heater Status		
Heater 1	OFF	Low Fire	High Fire
Heater 2	OFF	Low Fire	High Fire
UNIT SIZE 48V	Heating Capacity (Total)		
28-50	0%	75%	100%

Low Two-Stage Gas Heat Staging (Sizes 54-98)

HEATER	STAGE		
	0	1	2
	Heater Status		
Heater 1	OFF	Low Fire	High Fire
Heater 2	OFF	Low Fire	High Fire
UNIT SIZE 48V	Heating Capacity (Total)		
54-98	0%	75%	100%

High Two-Stage Gas Heat Staging (Sizes 54-98)

HEATER	STAGE		
	0	1	2
	Heater Status		
Heater 1	OFF	Low Fire	High Fire
Heater 2	OFF	Low Fire	High Fire
Heater 3	OFF	Low Fire	High Fire
UNIT SIZE 48V	Heating Capacity (Total)		
54-98	0%	75%	100%

Capacities and ratings (cont)

Modulating Gas Heating Capacities — Natural Gas and LP Gas[a,b,c,d,e,f]

UNIT SIZE 48V	HEAT SIZE	INPUT CAPACITY (MBH)		OUTPUT CAPACITY (MBH)		EFFICIENCY (%)	TEMP RISE (°F)	CAPACITY STEPS (%)	PART LOAD AIRFLOW (cfm)	FULL LOAD AIRFLOW (cfm)	
		Min.	Max.	Min.	Max.				Min.	Min.	Max.
28-34	Low Heat	100	380	81	308	81.0%	20-50	29-100	1,500	5,700	14,250
	High Heat	93	650	75	527	81.0%	25-55	14-50, 52-100	1,500	8,860	19,500
40-50	Low Heat	100	380	81	308	81.0%	20-50	29-100	1,500	5,700	14,250
	High Heat	100	730	81	591	81.0%	25-55	14-50, 52-100	1,500	9,950	21,890
54-98	Low Heat	100	730	81	591	81.0%	30-60	14-50, 52-100	1,500	10,000	21,890
	High Heat	100	1068	81	872	81.0%	35-65	9-50, 52-100	1,500	13,500	26,900

NOTE(S):

a. All heaters are factory configured for natural gas and field converted to LP using an accessory kit.
b. Ratings are approved for altitudes to 2000 ft. At altitudes over 2000 ft, ratings are 4% less for each 1000 ft above sea level. See unit installation instructions for high elevation conversion
c. At altitudes up to 2000 ft, the following formula may be used to calculate air temperature rise:

$$\Delta t = \frac{\text{maximum output capacity}}{1.10 \times \text{air quantity}}$$

d. At altitudes above 2000 ft, the following formula may be used:

$$\Delta t = \frac{\text{maximum output capacity}}{(.24 \times \text{specific weight of air} \times 60)\ (\text{air quantity})}$$

e. The listed temperature rise limit is for full load (100% capacity). The temperature rise can be lower at part load.
f. On VAV (variable air volume) applications set the zone terminals to provide minimum unit heating airflow as indicated in the table upon command from Zone Damper Override Relay (ZDOR).

LEGEND

LP — Propane

Low Modulating Gas Heat Staging (Sizes 28-50)

HEATER	STAGE			
	0	1	2	3
	HEATER STATUS			
Heater 1	OFF	MOD	—	—
UNIT SIZE 48V	HEATING CAPACITY (TOTAL)			
28-50	0%	29-100%	—	—

High Modulating Gas Heat Staging (Sizes 28-50)

HEATER	STAGE			
	0	1	2	3
	HEATER STATUS			
Heater 1	OFF	MOD	MOD	MOD
Heater 2	OFF	OFF	LOW FIRE	HIGH FIRE
UNIT SIZE 48V	HEATING CAPACITY (TOTAL)			
28-50	0%	14-50%	52-63%	64-100%

Low Modulating Gas Heat Staging (Sizes 54-98)

HEATER	STAGE			
	0	1	2	3
	HEATER STATUS			
Heater 1	OFF	MOD	—	—
Heater 2	OFF	OFF	LOW FIRE	HIGH FIRE
UNIT SIZE 48V	HEATING CAPACITY (TOTAL)			
54-98	0%	14-50%	52-63%	64-100%

High Modulating Gas Heat Staging (Sizes 54-98)

HEATER	STAGE						
	0	1	2	3	4	5	6
	Heater Status						
Heater 1	OFF	MOD	MOD	MOD	MOD	MOD	MOD
Heater 2	OFF	OFF	LOW FIRE	HIGH FIRE	LOW FIRE	HIGH FIRE	HIGH FIRE
Heater 3	OFF	OFF	OFF	OFF	LOW FIRE	LOW FIRE	HIGH FIRE
UNIT SIZE 48V	Heating Capacity (% Total)						
54-98	0%	9 - 33%	34 - 58%	43 - 67%	59 - 83%	68 - 92%	76 - 100%

Capacities and ratings (cont)

Electric Heat Capacities and Staging[a,b]

UNIT SIZE 50V	VOLTAGE	2-STAGE CAPACITY	HEAT CAPACITY (kW)			MIN. SCR CFM	MIN. FULL LOAD CFM			MAX. CFM
			Low Heat	Med. Heat	High Heat		Low Heat	Med. Heat	High Heat	
28-34	208	50%, 100%	27	54	81	5,000	7,500	9,000	10,000	17,500
	230		36	72	108					
	460		36	72	108					
	575		36	72	108					
40-50	208		27	54	81	5,000	7,500	9,000	10,000	25,000
	230		36	72	108					
	460		36	72	108					
	575		36	72	108					
54-70	208		27	54	81	5,000	7,500	9,000	10,000	35,000
	230		36	72	108					
	460		36	72	108					
	575		36	72	108					
74	208		54	81	—	6,000	9,000	10,000	20,000	37,500
	230		72	108	—					
	460		72	108	216					
	575		72	108	216					
90-98	460		108	—	216	7,500	10,000	—	20,000	50,000
	575		108	—	216					

NOTE(S):

a. For MZ-VAV applications, set the zone terminals to provide minimum unit heating airflow as indicated in the table upon command from the Zone Damper Override Relay (ZDOR).
b. SCR heaters can modulate down to 0% output, but a minimum airflow is required to activate the heater air proving safeties.

Physical data

48-50V Physical Data — Sizes 28, 30, 34

UNIT 48/50V2,V3,V4,V5	28		30		34	
NOMINAL CAPACITY (TONS)	27.5		30		35	
OPERATING WEIGHT (lb, Med. Static IDF, Vertical/Vertical)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Low Heat Base Unit (48V) lb	4815	5415	4815	5415	4940	5540
No Heat Base Unit (50V) lb	4165	4765	4165	4765	4290	4890
COMPRESSOR	Variable Speed + Fixed Speed		Variable Speed + Fixed Speed		Variable Speed + Fixed Speed	
Refrigerant Circuits	1		1		1	
Circuit A Type (A1/A2)	Variable Speed / Fixed Speed		Variable Speed / Fixed Speed		Variable Speed / Fixed Speed	
Circuit A, Qty...Model (A1/A2)	1…VZH117 / 1… DSH140		1…VZH117 / 1… DSH140		1…VZH117 / 1… DSH184	
Circuit A Oil Charge (oz.) (A1/A2)	139 / 111		139 / 111		139 / 128	
Circuit B Type (B1/B2)	—		—		—	
Circuit B, Qty...Model (B1/B2)	—		—		—	
Circuit B Oil Charge (oz.) (B1/B2)	—		—		—	
System Capacity Steps (%)	13 - 51%, 62 -100%		13 - 53%, 60 - 100%		13 - 47%, 64 - 100%	
REFRIGERANT	Puron Advance™ (R-454B)		Puron Advance™ (R-454B)		Puron Advance™ (R-454B)	
Circuit A Operating Charge (lb) Circuit A/Circuit B	35.7 / —		32.8 / —		34.6 / —	
Circuit A Operating Charge with Humidi-MiZer (lb) Circuit A/Circuit B	50.4 / —		46.3 / —		48.3 / —	
High Pressure Switch Auto-Reset (psig)	500		500		500	
High Pressure Switch Cutout (psig)	650		650		650	
CONDENSER COIL	Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)	
Quantity	2		2		2	
Total Face Area (sq ft)	53.3		53.3		53.3	
EVAPORATOR COIL	Al/Cu RTPF		Al/Cu RTPF		Al/Cu RTPF	
Quantity	1		1		1	
Total Face Area (sq ft)	32.1		32.1		32.1	
Rows...Fins (in.)	4...15		4...15		4...15	
Fin Type	Double Wavy		Double Wavy		Double Wavy	
Tube Type	Enhanced		Enhanced		Enhanced	
Circuit A/B, Metering Device Quantity...Type	2...EXV / —		2...EXV / —		2...EXV / —	
HUMIDI-MIZER SYSTEM (OPTIONAL)	Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)	
Coil Quantity	1		1		1	
Coil Total Face Area (sq ft)	26.5		26.5		26.5	
Reheat Valve Qty...Type	1...On/Off Three-Way		1...On/Off Three-Way		1...On/Off Three-Way	
Bypass Valve Qty...Type	1...Modulating Three-Way		1...Modulating Three-Way		1...Modulating Three-Way	
STANDARD CONDENSER FANS	Metal Propeller, Direct Drive		Metal Propeller, Direct Drive		Metal Propeller, Direct Drive	
Qty...Diameter (in.)	2...30		2...30		2...30	
Motor Qty...Type	2...AC		2...AC		2...AC	
Motor HP...rpm	2.0-2.5… 1140		2.0-2.5…1140		2.0-2.5…1140	
Nominal cfm	18,000		18,000		18,000	
LOW SOUND CONDENSER FANS (OPTIONAL, except Size 34)	Composite AeroAcoustic™, Direct Drive		Composite AeroAcoustic™, Direct Drive		Composite AeroAcoustic™, Direct Drive	
Qty...Diameter (in.)	2...30		2...30		2...30	
Motor Qty...Type	2...AC		2...AC		2...AC	
Motor HP...rpm	1.5-1.75…850		1.5-1.75…850		1.5-1.75…850	
Nominal cfm	18,000		18,000		18,000	
INDOOR FAN	Backward Curve, Direct Drive		Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty...Diameter (in.)	3...17.7		3...17.7		3...17.7	
Motor Qty...Type	3...EC		3...EC		3...EC	
Standard/Medium/High Static Total Power (hp)[a]	13.2 / 17.7 / 27.3		13.2 / 17.7 / 27.3		13.2 / 17.7 / 27.3	
Nominal cfm	8,250		9,000		10,500	
LOW STATIC EXHAUST (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	Aluminum Propeller, Direct Drive		Aluminum Propeller, Direct Drive		Aluminum Propeller, Direct Drive	
Fan Qty...Diameter (in.)	2...26	2...30	2...26	2...30	2...26	2...30
Motor Qty...Type	2...EC		2...EC		2...EC	
Total Motor Power (hp)	2.0	3.0	2.0	3.0	2.0	3.0
Nominal cfm	8,000	12,000	8,000	12,000	8,000	12,000

Physical data (cont)

48-50V Physical Data — Sizes 28, 30, 34 (cont)

UNIT 48/50V2,V3,V4,V5	28		30		34	
NOMINAL CAPACITY (TONS)	27.5		30		35	
STANDARD STATIC EXHAUST (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	2...19.7	—	2...19.7	—	2...19.7
Motor Qty...Type	—	2...EC	—	2...EC	—	2...EC
Total Motor Power (hp)[a]	—	10.2	—	10.2	—	10.2
Nominal cfm	—	14,500	—	14,500	—	14,500
MEDIUM STATIC EXHAUST/ RETURN (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	2...19.7	—	2...19.7	—	2...19.7
Motor Qty...Type	—	2...EC	—	2...EC	—	2...EC
Total Motor Power (hp)[a]	—	19.4	—	19.4	—	19.4
Nominal cfm	—	17,500	—	17,500	—	17,500
HIGH STATIC EXHAUST/RETURN (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	3...19.7	—	3...19.7	—	2...19.7
Motor Qty...Type	—	3...EC	—	3...EC	—	3...EC
Total Motor Power (hp)[a]	—	29.1	—	29.1	—	29.1
Nominal cfm	—	27,500	—	27,500	—	27,500
TWO-STAGE GAS HEAT (48V)	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	1	2	1	2	1	2
Input (MBH)	380	650	380	650	380	650
Output (MBH)	308	527	308	527	308	527
Efficiency (%)	81	81	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	9	16	9	16	9	16
Stage 1/Stage 2 Manifold Pressure (in. wg)	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2
Min...Max Line Pressure (in. wg)	5… 13	5… 13	5… 13	5… 13	5… 13	5… 13
Firing Stages	2	2	2	2	2	2
Number of Gas Valves	1	2	1	2	1	2
Gas Connection Qty...Size (in.)	1...1.5 NPT					
MODULATING GAS HEAT (48V-OPTIONAL)	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	1	2	1	2	1	2
Input (MBH)	380	650	380	650	380	650
Output (MBH)	308	527	308	527	308	527
Efficiency (%)	81	81	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	9	16	9	16	9	16
Low Fire/High Fire Manifold Pressure (in. wg)	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2
Min-Max Line Pressure (in. wg)	5… 13	5… 13	5… 13	5… 13	5… 13	5… 13
System Capacity Steps (%)	26-100%	14-50%, 52-100%	26-100%	14-50%, 52-100%	26-100%	14-50%, 52-100%
Number of Gas Valves	1	2	1	2	1	2
Gas Connection Qty...Size (in.)	1...1.5 NPT					
STANDARD PRE-FILTERS	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
2 in.Throwaway	Fiberglass		Fiberglass		Fiberglass	
Qty...Size (in.)	12...20x20x2		12...20x20x2		12...20x20x2	
Outdoor Air Screen	Metal Mesh		Metal Mesh		Metal Mesh	
Qty...Size (in.)	8...16x25x1		8...16x25x1		8...16x25x1	

Physical data (cont)

48-50V Physical Data — Sizes 28, 30, 34 (cont)

UNIT 48/50V2,V3,V4,V5	28		30		34	
NOMINAL CAPACITY (TONS)	27.5		30		35	
OPTIONAL PRE-FILTERS	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
2 in. MERV 8	Pleated		Pleated		Pleated	
Qty...Size (in.)	12...20x20x2		12...20x20x2		12...20x20x2	
4 in. MERV 8 and 13	Pleated		Pleated		Pleated	
Qty...Size (in.)	12...20x20x4		12...20x20x4		12...20x20x4	
2 in. MERV 8 and 4 in. MERV 13	Pleated		Pleated		Pleated	
Qty...Size (in.)	12...20x20x2 and 12...20x20x4		12...20x20x2 and 12...20x20x4		12...20x20x2 and 12...20x20x4	
2 in. MERV 8 and 12 in. MERV 14 Bag	—	Pleated / Bag	—	Pleated / Bag	—	Pleated / Bag
Qty...Size (in.)	—	6...20x20x2, 6...20x24x2 / 6...20x20x12, 6...20x24x12	—	6...20x20x2, 6...20x24x2 / 6...20x20x12, 6...20x24x12	—	6...20x20x2, 6...20x24x2 / 6...20x20x12, 6...20x24x12
2 in. MERV 8 and 12 in. MERV 15 Cartridge	—	Pleated / High Velocity Cartridge	—	Pleated / High Velocity Cartridge	—	Pleated / High Velocity Cartridge
Qty...Size (in.)	1...12x25x2 2...20x25x2	4...16x24x2 2...16x20x2	1...12x25x2 2...0x25x2	4...16x24x2 2...16x20x2	1...12x25x2 2...20x25x2	4...16x24x2 2...16x20x2
ENERGYX® (OPTIONAL)						
Low Flow ENERGYX (ERV)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Model	—	ERC-6488	—	ERC-6488	—	ERC-6488
Max Airflow ERV (cfm)	—	12,000	—	12,000	—	12,000
Motor (rpm)	—	860	—	860	—	860
Belt Type	—	Link Style	—	Link Style	—	Link Style
Filter Qty…Size (in.)	—	1...16x25x2 2...20x25x2	—	1...16x25x2 2...20x25x2	—	1...16x25x2 2...20x25x2
High Flow ENERGYX (ERV)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Model	—	ERC-5262	—	ERC-5262	—	ERC-5262
Max Airflow ERV (cfm)	—	8,475	—	8,475	—	8,475
Motor (rpm)	—	1,160	—	1,160	—	1,160
Belt Type	—	Link Style	—	Link Style	—	Link Style
Filter Qty…Size (in.)	—	4...16x24x2 2...16x20x2	—	4...16x24x2 2...16x20x2	—	4...16x24x2 2...16x20x2
HOT WATER COIL (50V-OPTIONAL)	Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header	
Coil Quantity	1		1		1	
Total Face Area (sq ft)	22.6		22.6		22.6	
Coil Rows...Fins Per Inch	2...8		2...8		2...8	
Tube Size (in.)...Circuiting	1/2" OD Half Circuit		1/2" OD...Half Circuit		1/2" OD...Half Circuit	
Supply Connection Qty...Size (in.)	1...2-1/2 NPT		1...2-1/2 NPT		1...2-1/2 NPT	
Return Connection Qty...Size (in.)	1...2-1/2 NPT		1...2-1/2 NPT		1...2-1/2 NPT	
Total Coil Internal Volume (gal)	6.36		6.36		6.36	

NOTE(S):

a. See fan tables for maximum HP by voltage (460-v HP shown).

Physical data (cont)

48-50V Physical Data — Sizes 40 and 50

UNIT 48/50V2,V3,V4,V5	40		50	
NOMINAL CAPACITY (TONS)	40		50	
OPERATING WEIGHT (lb, Med Static IDF, Vertical/Vertical)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Low Heat Base Unit (48V) lb	6075	6675	6225	6825
No Heat Base Unit (50V) lb	5425	6025	5575	6175
COMPRESSOR	Variable Speed + Fixed Speed		Variable Speed + Fixed Speed	
Refrigerant Circuits	1		2	
Circuit A Type (A1/ A2)	Variable Speed / Fixed Speed		Variable Speed / —	
Circuit A, Qty...Model (A1/ A2)	1…VZH170 / 1… DSH184		1…VZH170 / —	
Circuit A Oil Charge (oz.) (A1/A2)	260 / 128		260 / —	
Circuit B Type (B1/ B2)	—		Fixed Speed/Fixed Speed	
Circuit B, Qty...Model (B1/ B2)	—		1… DSH140 / 1… DSH090	
Circuit B Oil Charge (oz.) (B1/ B2)	—		111 / 101	
System Capacity Steps (%)	14 - 57%, 58 - 100%		13 - 100%	
REFRIGERANT	Puron Advance™ (R-454B)		Puron Advance™ (R-454B)	
Circuit A Operating Charge (lb) Circuit A / Circuit B	40.4 / —		29.1 / 29.4	
Circuit A Operating Charge with Humidi-MiZer (lb) Circuit A / Circuit B	55.5 / —		44.2 / 29.4	
High Pressure Switch Auto-Reset (psig)	500		500	
High Pressure Switch Cutout (psig)	650		650	
CONDENSER COIL	Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)	
Quantity	2		2	
Total Face Area (sq ft)	65.6		65.6	
EVAPORATOR COIL	Al/Cu RTPF		Al/Cu RTPF	
Quantity	1		1	
Total Face Area (sq ft)	38.3		38.3	
Rows...Fins (in.)	4…16		6...16	
Fin Type	Double Wavy		Double Wavy	
Tube Type	Enhanced		Enhanced	
Circuit A/B, Metering Device Quantity... Type	2...EXV / —		2...EXV / 2...EXV	
HUMIDI-MIZER SYSTEM (OPTIONAL)	Aluminum, Novation (MCHX)		Aluminum, Novation (MCHX)	
Coil Quantity	1		1	
Coil Total Face Area (sq ft)	26.5		26.5	
Reheat Valve Qty...Type	1...On/Off Three-Way		1...On/Off Three-Way	
Bypass Valve Qty...Type	1...Modulating Three-Way		1...Modulating Three-Way	
STANDARD CONDENSER FANS	Metal Propeller, Direct Drive		Metal Propeller, Direct Drive	
Qty...Diameter (in.)	3...30		4...30	
Motor Qty...Type	3...AC		4...AC	
Motor HP...rpm	2.0-2.5… 1140		2.0-2.5… 1140	
Nominal cfm	27,000		36,000	
LOW SOUND CONDENSER FANS (OPTIONAL)	Composite AeroAcoustic™, Direct Drive		Composite AeroAcoustic™, Direct Drive	
Qty...Diameter (in.)	3...30		4...30	
Motor Qty...Type	3...AC		4...AC	
Motor HP...rpm	1.5-1.75…850		1.5-1.75…850	
Nominal cfm	27,000		36,000	
INDOOR FAN	Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty...Diameter (in.)	3...17.7 (Std and Med.) /19.7 High		3...17.7 (Std and Med.) /19.7 High	
Motor Qty...Type	3...EC		3...EC	
Standard/Medium/High Static Total Power (hp)[a]	14.4 / 17.7 / 29.1		14.4 / 17.7 / 29.1	
Nominal cfm	12,000		15,000	
LOW STATIC EXHAUST (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	Aluminum Propeller, Direct Drive		Aluminum Propeller, Direct Drive	
Fan Qty...Diameter (in.)	2...30	2...30	2...30	2...30
Motor Qty...Type	2...EC		2...EC	
Total Motor Power (hp)	3.0	3.0	3.0	3.0
Nominal cfm	12,000	12,000	12,000	12,000

Physical data (cont)

48-50V Physical Data — Sizes 40 and 50 (cont)

UNIT 48/50V2,V3,V4,V5	40		50	
NOMINAL CAPACITY (TONS)	40		50	
STANDARD STATIC EXHAUST (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	2...19.7	—	2...19.7
Motor Qty...Type	—	2...EC	—	2...EC
Total Motor Power (hp)[a]	—	10.2	—	10.2
Nominal cfm	—	14,500	—	14,500
MEDIUM STATIC EXHAUST/RETURN (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	2...19.7	—	2...19.7
Motor Qty...Type	—	2...EC	—	2...EC
Total Motor Power (hp)[a]	—	19.4	—	19.4
Nominal cfm	—	17,500	—	17,500
HIGH STATIC EXHAUST/RETURN (OPTIONAL)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Fan Type	—	Backward Curve	—	Backward Curve
Fan Qty...Diameter (in.)	—	3…19.7	—	3…19.7
Motor Qty...Type	—	3...EC	—	3...EC
Total Motor Power (hp)[a]	—	29.1	—	29.1
Nominal cfm	—	27,500	—	27,500
TWO-STAGE GAS HEAT (48V)	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	1	2	1	2
Input (MBH)	380	730	380	730
Output (MBH)	308	591	308	591
Efficiency (%)	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	9	18	9	18
Stage 1/Stage 2 Manifold Pressure (in. wg)	2.0 / 3.4	2.0 / 3.3	2.0 / 3.4	2.0 / 3.3
Min...Max Line Pressure (in. wg)	5…13	5…13	5…13	5…13
Firing Stages	2	2	2	2
Number of Gas Valves	1	2	1	2
Gas Connection Qty...Size (in.)	1...1.5 NPT			
MODULATING GAS HEAT 48V (OPTIONAL)	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	1	2	1	2
Input (MBH)	380	730	380	730
Output (MBH)	308	591	308	591
Efficiency (%)	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	9	18	9	18
Low Fire/High Fire Manifold Pressure (in. wg)	0.3 / 3.4	0.3 / 3.3	0.3 / 3.4	0.3 / 3.3
Min-Max Line Pressure (in. wg)	5…13	5…13	5…13	5…13
System Capacity Steps (%)	26-100%	14-50%, 52-100%	26-100%	14-50%, 52-100%
Number of Gas Valves	1	2	1	2
Gas Connection Qty...Size (in.)	1...1.5 NPT			
STANDARD PRE-FILTERS	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
2 in.Throwaway	Fiberglass		Fiberglass	
Qty...Size (in.)	12...20x24x2		12...20x24x2	
Outdoor Air Screen	Metal Mesh		Metal Mesh	
Qty...Size (in.)	8...16x25x1		8...16x25x1	

Physical data (cont)

48-50V Physical Data — Sizes 40 and 50 (cont)

UNIT 48/50V2,V3,V4,V5	40		50	
NOMINAL CAPACITY (TONS)	40		50	
OPTIONAL PRE-FILTERS	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
2 in. MERV 8	Pleated		Pleated	
Qty...Size (in.)	12...20x24x2		12...20" X 24" X 2"	
4 in. MERV 8 & 13	Pleated		Pleated	
Qty...Size (in.)	12...20x24x4		12...20" X 24" X 4"	
2 in. MERV 8 & 4 in. MERV 13	Pleated		Pleated	
Qty...Size (in.)	12...20x24x2 and 12...20x24x4		12...20x24x2 and 12...20x 24x4	
2 in. MERV 8 and 12 in. MERV 14 Bag	—	Pleated / Bag	—	Pleated / Bag
Qty...Size (in.)	—	6...20x24x2, 6...24x24x2 / 6...20x24 x12, 6...24x24x12	—	6…20x24x2, 6…24x24x2 / 6…20x24x12, 6...24x24x12
2 in. MERV 8 and 12 in. MERV 15 Cartridge	—	Pleated / High Velocity Cartridge	—	Pleated / High Velocity Cartridge
Qty...Size (in.)	—	6...20x 24x2, 6...24x24x 2 / 6...20x24x12, 6...24x24x12	—	6...20x 24x 2, 6...24x 24x 2 / 6...20x24 x12, 6...24x24x12
ENERGYX® (OPTIONAL)				
Low Flow ENERGYX (ERV)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Model	—	ERC-5882	—	ERC-5882
Max Airflow ERV (cfm)	—	11,000	—	11,000
Motor (rpm)	—	860	—	860
Belt Type	—	Link Style	—	Link Style
Filter Qty...Size (in.)	—	1...16x25x2, 2...20x25x2	—	1...16x25x2, 2...20x25x2
High Flow ENERGYX (ERV)	Compact Chassis	Standard Chassis	Compact Chassis	Standard Chassis
Model	—	ERC-68100	—	ERC-68100
Max Airflow ERV (cfm)	—	14,000	—	14,000
Motor (rpm)	—	860	—	860
Belt Type	—	Link Style	—	Link Style
Filter Qty...Size (in.)	—	1...16x25x2, 2...20x25x2	—	1...16x25x2, 2...20x25x2
HOT WATER COIL 50V(OPTIONAL)	Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header	
Coil Quantity	1		1	
Total Face Area (sq ft)	22.6		22.6	
Coil Rows...Fins Per Inch	2...8		2...8	
Tube Size (in.)...Circuiting	1/2" OD...Half Circuit		1/2" OD...Half Circuit	
Supply Connection Qty...Size (in.)	1...2-1/2 NPT		1...2-1/2 NPT	
Return Connection Qty...Size (in.)	1...2-1/2 NPT		1...2-1/2 NPT	
Total Coil Internal Volume (gal)	6.36		6.36	

NOTE(S):

a. See fan tables for maximum HP by voltage (460-v HP shown).

Physical data (cont)

48-50V Physical Data — Sizes 54 -74

UNIT 48/50V2,V3,V4,V5	54	60	70	74
NOMINAL CAPACITY (TONS)	55	60	70	75
OPERATING WEIGHT (lb, Med Static IDF, Vertical/Vertical)				
Low Heat Base Unit (48V)	8171	8171	8518	8898
No Heat Base Unit (50V)	7058	7058	7405	8638
COMPRESSOR	Variable Speed + Fixed Speed	Variable Speed + Fixed Speed	Variable Speed + Fixed Speed	Variable Speed + Fixed Speed
Refrigerant Circuits	2	2	2	2
Circuit A Type (A1/A2)	Variable Speed / —	Variable Speed / —	Variable Speed / Fixed Speed	Variable Speed / Fixed Speed
Circuit A, Qty...Model (A1/A2)	1…VZH170 / —	1…VZH170 /—	1…VZH117 / 1…DSH184	1…VZH117 / 1…DSH184
Circuit A Oil Charge (oz, A1/A2)	260 /—	260 / —	139 / 122	139 / 122
Circuit B Type (B1 / B2)	Fixed Speed / Fixed Speed	Fixed Speed / Fixed Speed	Fixed Speed / Fixed Speed	Fixed Speed / Fixed Speed
Circuit B, Qty...Model (B1/B2)	1…DSH161 / 1…DSH161	1…DSH184 / 1…DSH184	1…DSH184 / 1…DSH161	1…DSH240 / 1…DSH184
Circuit B Oil Charge (oz, B1/B2)	112 / 112	122 / 122	122 / 112	206 / 122
System Capacity Steps (%)	14-39%, 39-74%, 74-100%	13-40%, 40-73%, 73-100%	8-36%, 36-58%, 58-100%	7-36%, 36-59%, 59-100%
REFRIGERANT	Puron Advance™ (R-454B)	Puron Advance™ (R-454B)	Puron Advance™ (R-454B)	Puron Advance™ (R-454B)
Circuit A Operating Charge (lb) Circuit A / Circuit B	29.2 / 29.7	28.9 / 29.3	34.8 / 35.0	46.0 / 46.3
Circuit A Operating Charge with Humidi-MiZer (lb) Circuit A / Circuit B	40.0 / 29.7	44.6 / 29.3	47.6 / 35.0	56.8 / 46.3
High Pressure Switch Auto-Reset (psig)	500	500	500	500
High Pressure Switch Cutout (psig)	650	650	650	650
CONDENSER COIL	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)
Quantity	2	2	4	4
Total Face Area (sq ft)	65.8	65.8	105.4	105.4
EVAPORATOR COIL	Al/Cu RTPF	Al/Cu RTPF	Al/Cu RTPF	Al/Cu RTPF
Quantity	2	2	2	2
Total Face Area (sq ft)	62	62	62	62
Rows...Fins/in.	4...15	4...15	4...15	6…16
Fin Type	Double Wavy	Double Wavy	Double Wavy	Double Wavy
Tube Type	Enhanced	Enhanced	Enhanced	Enhanced
Circuit A/B, Metering Device Quantity, Type	2...EXV / 2…EXV	2...EXV / 2…EXV	2...EXV / 2…EXV	2...EXV / 2…EXV
HUMIDI-MIZER SYSTEM (OPTIONAL)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)
Coil Quantity	1	1	1	1
Coil Total Face Area (sq ft)	27	27	27	27
Reheat Valve Qty...Type	1...On/Off Three-Way	1...On/Off Three-Way	1...On/Off Three-Way	1...On/Off Three-Way
Bypass Valve Qty...Type	1...Modulating Three-Way	1...Modulating Three-Way	1...Modulating Three-Way	1...Modulating Three-Way
STANDARD CONDENSER FANS	Metal Propeller, Direct Drive	Metal Propeller, Direct Drive	Metal Propeller, Direct Drive	Metal Propeller, Direct Drive
Qty...Diameter (in.)	4...30	4...30	4...30	4...30
Motor Qty...Type	4...AC	4...AC	4...AC	4...AC
Motor HP...rpm	2.0-2.5…1140	2.0-2.5…1140	2.0-2.5…1140	2.0-2.5…1140
Nominal cfm	37,125	40,500	47,250	50,625
LOW SOUND CONDENSER FANS (OPTIONAL)	Composite AeroAcoustic™, Direct Drive	Composite AeroAcoustic™, Direct Drive	Composite AeroAcoustic™, Direct Drive	Composite AeroAcoustic™, DirectDrive
Qty...Diameter (in.)	4...30	4...30	4...30	4...30
Motor Qty...Type	4...AC	4...AC	4...AC	4...AC
Motor HP...rpm	1.5-1.75… 850	1.5-1.75… 850	1.5-1.75… 850	1.5-1.75… 850
Nominal cfm	36,000	36,000	36,000	36,000
INDOOR FAN	Backward Curve, Direct Drive	Backward Curve, Direct Drive	Backward Curve, Direct Drive	Backward Curve, Direct Drive
Fan Qty...Diameter (in.)	4...17.7	4...17.7	4...17.7 (Std and Med.) / 6 High	4...17.7 (Std and Med.) / 6 High
Motor Qty...Type	4...EC	4...EC	4...EC	4...EC
Standard/Medium/High Static Total Power (hp)[a]	19.2 / 23.6 / 37.6	19.2 / 23.6 / 37.6	25.6 / 37.6 / 37.4	25.6 / 37.6 / 37.4
Nominal cfm	16,500	18,000	21,000	22,500

Physical data (cont)

48-50V Physical Data — Sizes 54 -74 (cont)

UNIT 48/50V2,V3,V4,V5	54		60		70		74	
NOMINAL CAPACITY (tons)	55		60		70		75	
STANDARD STATIC EXHAUST (OPTIONAL)	Backward Curve, Direct Drive		Backward Curve, Direct Drive		Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty…Diameter (in.)	2...19.7		2...19.7		2...19.7		2...19.7	
Motor Qty…Type	2...EC		2...EC		2...EC		2...EC	
Total Motor Power (hp)[a]	15.0		15.0		15.0		15.0	
Nominal cfm	22,000		22,000		22,000		22,000	
MEDIUM STATIC EXHAUST/ RETURN (OPTIONAL)	Backward Curve, Direct Drive		Backward Curve, Direct Drive		Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty…Diameter (in.)	3...19.7		3...19.7		3...19.7		3...19.7	—
Motor Qty…Type	3...EC		3...EC		3...EC		3...EC	—
Total Motor Power (hp)[a]	22.5		22.5		22.5		22.5	
Nominal cfm	27,500		27,500		27,500		27,500	
HIGH STATIC RETURN (OPTIONAL)	Backward Curve		Backward Curve		Backward Curve		Backward Curve	
Fan Qty…Diameter (in.)	4...19.7		4...19.7		4...19.7		4...19.7	
Motor Qty…Type	4...EC		4...EC		4...EC		4...EC	
Total Motor Power (hp)[a]	38.8		38.8		38.8		38.8	
Nominal cfm	38,000		38,000		38,000		38,000	
TWO-STAGE GAS HEAT (48V)	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	2	3	2	3	2	3	2	3
Input (MBH)	730	1068	730	1068	730	1068	730	1068
Output (MBH)	591	872	591	591	591	872	591	872
Efficiency (%)	81	81	81	81	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	18	27	18	27	18	27	18	27
Stage 1/Stage 2 Manifold Pressure (in. wg)	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2
Min...Max Line Pressure (in. wg)	5…13	5…13	5…13	5…13	5…13	5…13	5…13	5…13
Firing Stages	2	2	2	2	2	2	2	2
Number of Gas Valves	2	3	2	3	2	3	2	3
Gas Connection Qty...Size (in.)	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT
MODUALTING GAS HEAT (48V-OPTIONAL)	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	2	3	2	3	2	3	2	3
Input (MBH)	1068	730	1068	730	1068	730	1068	730
Output (MBH)	872	591	872	591	872	591	872	591
Efficiency (%)	81	81	81	81	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	18	27	18	27	18	27	18	27
Low Fire/High Fire Manifold Pressure (in. wg)	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2
Min-Max Line Pressure (in. wg)	5…13	5…13	5…13	5…13	5…13	5…13	5…13	5…13
System Capacity Steps (%)	14-50%, 52-100%	9-50%, 52-100%	14-50%, 52-100%	9-50%, 52-100%	14-50%, 52-100%	9-50%, 52-100%	14-50%, 52-100%	9-50%, 52-100%
Number of Gas Valves	2	3	2	3	2	3	2	3
Gas Connection Qty...Size (in.)	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT

Physical data (cont)

48-50V Physical Data — Sizes 54 -74 (cont)

UNIT 48/50V2,V3,V4,V5	54		60		70		74	
NOMINAL CAPACITY (tons)	55		60		70		75	
STANDARD PRE-FILTERS								
2 in.Throwaway	Fiberglass		Fiberglass		Fiberglass		Fiberglass	
Qty...Size (in.)	12…20x25x2, 12...20x20x2		12…20x25x2, 12...20x20x2		12…20x25x2, 12...20x20x2		12…20x25x2, 12...20x20x2	
Outdoor Air Screen	Metal Mesh		Metal Mesh		Metal Mesh		Metal Mesh	
Qty...Size (in.)	15...16" x 25" x 1"		15...16x25x1		15...16x25x1		15...16x25x1	
OPTIONAL PRE-FILTERS								
2 in. MERV 8	Pleated		Pleated		Pleated		Pleated	
Qty...Size (in.)	12…20 x 25 x 2, 12...20 x 20 x 2		12…20x25x2, 12...20x20x2		12…20x25x2, 12...20x20x2		12…20x25x2, 12...20x20x2	
4 in. MERV 8 and 13	Pleated		Pleated		Pleated		Pleated	
Qty...Size (in.)	12…20x25x4, 12...20x20x4		12…20x25x4, 12...20x20x4		12…20x25x4, 12...20x20x4		12…20x25x4, 12...20x20x4	
2 in. MERV 8 and 4 in. MERV 13	Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge	
Qty...Size (in.)	10…20x20x2, 10…20x25x2, 10…20x20x4, 10…20x25x4		10…20x20x2, 10…20x25x2, 10…20 x20x4, 10…20x25x4		10…20x20x2, 10…20x25x2, 10…20x20x4, 10…20x25x4		10…20x20x2, 10…20x25x2, 10…20x20x4, 10…20x25x4	
2 in. MERV 8 and 12 in. MERV 14 Bag	Pleated / Bag		Pleated / Bag		Pleated / Bag		Pleated / Bag	
Qty...Size (in.)	6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12	
2 in. MERV 8 and 12 in. MERV 15 Cartridge	Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge	
Qty...Size (in.)	6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12		6… 24x24x2, 6… 20x24x2, 6… 24x24x12, 6… 20x24x12	
ENERGYX® (OPTIONAL)	Low Flow	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow	High Flow
Model (in.)	ERC-5882	ERC-74122	ERC-5882	ERC-74122	ERC-5882	ERC-74122	ERC-5882	ERC-74122
Max Airflow ERV (cfm)	12,000	16,000	12,000	16,000	12,000	16,000	12,000	16,000
Motor (rpm)	860	860	860	860	860	860	860	860
Filter Qty...Size (in.)	6...14x20x2	6...18x18x2 2...18x24x2	6...14x20x2	6...18x18x2 2...18x24x2	6...14x20x2	6...18x18x2 2...18x24x2	6...14x20x2	6...18x18x2 2...18x24x2
HOT WATER COIL 50V (OPTIONAL)	Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header	
Coil Quantity	2		2		2		2	
Total Face Area (sq ft)	45.2		45.2		45.2		45.2	
Coil Rows...Fins Per Inch	2...8		2...8		2...8		2...8	
Tube Size (in.)...Circuiting	1/2" OD Half Circuit		1/2" OD...Half Circuit		1/2" OD...Half Circuit		1/2" OD...Half Circuit	
Supply Connection Qty...Size (in.)	2...2-1/2 NPT		2...2-1/2 NPT		2...2-1/2 NPT		2...2-1/2 NPT	
Return Connection Qty...Size (in.)	2...2-1/2 NPT		2...2-1/2 NPT		2...2-1/2 NPT		2...2-1/2 NPT	
Total Coil Internal Volume (gal)	12.72		12.72		12.72		12.72	

NOTE(S):

a. See fan tables for maximum HP by voltage (460-v HP shown).

Physical data (cont)

48-50V Physical Data — Sizes 90, 98

UNIT 48/50V2,V3,V4,V5	90	98
NOMINAL CAPACITY (tons)	90	100
OPERATING WEIGHT (lb, Med Static IDF, Vertical/Vertical)		
Low Heat Base Unit (48V)	10,563	10,563
No Heat Base Unit (50V)	10,303	10,303
COMPRESSOR	Variable Speed + Fixed Speed	Variable Speed + Fixed Speed
Refrigerant Circuits	2	2
Circuit A Type (A1/A2)	Variable Speed / Fixed Speed	Variable Speed / Fixed Speed
Circuit A, Qty...Model (A1/A2)	1…VZH170 / 1…DSH184	1…VZH170 / 1…DSH240
Circuit A Oil Charge (oz, A1/A2)	260 / 122	260 / 206
Circuit B Type (B1 / B2)	Fixed Speed / Fixed Speed	Fixed Speed / Fixed Speed
Circuit B, Qty...Model (B1/B2)	1… DSH295 / 1… DSH184	1…DSH240 / 1…DSH240
Circuit B Oil Charge (oz, B1/B2)	206 / 122	206 / 206
System Capacity Steps (%)	8-28%, 29-36%, 36-53%, 55-58%, 58-78%, 79-100%	8-30%, 32-53%, 55-77%, 78-100%
REFRIGERANT	Puron Advance™ (R-454B)	Puron Advance™ (R-454B)
Circuit A Operating Charge (lb) Circuit A/Circuit B	50.5 / 51.0	53.5 / 54.0
Circuit A Operating Charge with Humidi-MiZer (lb) Circuit A/Circuit B	70.7 / 51.0	70.0 / 54.0
High Pressure Switch Auto-Reset (psig)	500	500
High Pressure Switch Cutout (psig)	650	650
CONDENSER COIL	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)
Quantity	6	6
Total Face Area (sq ft)	158.1	158.1
EVAPORATOR COIL	Al/Cu RTPF	Al/Cu RTPF
Quantity	2	2
Total Face Area (sq ft)	62	62
Rows...Fins/in.	6… 16	6… 16
Fin Type	Double Wavy	Double Wavy
Tube Type	Enhanced	Enhanced
Circuit A/B, Metering Device (Quantity...Type)	2...EXV / 2…EXV	2...EXV / 2…EXV
HUMIDI-MIZER SYSTEM (OPTIONAL)	Aluminum, Novation (MCHX)	Aluminum, Novation (MCHX)
Coil Quantity	1	1
Coil Total Face Area (sq ft)	33	33
Reheat Valve (Qty...Type)	1...On/Off Three-Way	1...On/Off Three-Way
Bypass Valve (Qty...Type)	1...Modulating Three-Way	1...Modulating Three-Way
STANDARD CONDENSER FANS	Metal Propeller, Direct Drive	Metal Propeller, Direct Drive
Qty...Diameter (in.)	6...30	6...30
Motor Qty...Type	6...AC	6...AC
Motor HP...rpm	2.0-2.5…1140	2.0-2.5…1140
Nominal cfm	54,000	54,000
LOW SOUND CONDENSER FANS (OPTIONAL)	Composite AeroAcoustic™, Direct Drive	Composite AeroAcoustic™, Direct Drive
Qty...Diameter (in.)	6...30	6...30
Motor Qty...Type	6...AC	6...AC
Motor HP...rpm	1.125-1.75…850	1.5-1.75…850
Nominal cfm	54,000	54,000
INDOOR FAN	Backward Curve, Direct Drive	Backward Curve, Direct Drive
Fan Qty...Diameter (in.)	6...17.7 (STD and MED)/ 6...19.7 (HIGH)	6...17.7 (STD and MED)/ 6...19.7 (HIGH)
Motor Qty...Type	6...EC	6...EC
Standard/Medium/High Static Total Power (HP)[a]	38.4 / 56.4 / 58.2	38.4 / 56.4 / 58.2
Nominal cfm	27,000	30,000

Physical data (cont)

48-50V Physical Data — Sizes 90, 98 (cont)

UNIT 48/50V2,V3,V4,V5	90		98	
NOMINAL CAPACITY (tons)	90		100	
STANDARD STATIC EXHAUST (OPTIONAL)	Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty...Diameter (in.)	2...19.7		2...19.7	
Motor Qty...Type	2...EC		2...EC	
Total Motor Power (hp)[a]	19.4		19.4	
Nominal cfm	22,000		22,000	
MEDIUM STATIC EXHAUST/RETURN (OPTIONAL)	Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty...Diameter (in.)	3...19.7		3...19.7	
Motor Qty...Type	3...EC		3...EC	
Total Motor Power (hp)[a]	29.1		29.1	
Nominal cfm	27,500		27,500	
HIGH STATIC RETURN (OPTIONAL)	Backward Curve, Direct Drive		Backward Curve, Direct Drive	
Fan Qty...Diameter (in.)	4...19.7		4...19.7	
Motor Qty...Type	4...EC		4...EC	
Total Motor Power (hp)[a]	38.8		38.8	
Nominal cfm	38,000		38,000	
TWO-STAGE GAS HEAT (48V)	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	2	3	2	3
Input (MBH)	730	1068	730	1068
Output (MBH)	548	795	548	795
Efficiency (%)	81	81	81	81
Burner Orifice Diameter (in...drill no)	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	18	27	18	27
Stage 1/Stage 2 Manifold Pressure (in. wg)	2.0 / 3.4	1.8 / 3.2	2.0 / 3.4	1.8 / 3.2
Min...Max Line Pressure (in. wg)	5… 13	5…13	5…13	5…13
Firing Stages	2	2	2	2
Number of Gas Valves	2	3	2	3
Gas Connection Qty...Size (in.)	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT
MODUALTING GAS HEAT 48V (OPTIONAL)	Low Heat	High Heat	Low Heat	High Heat
Heat Exchanger Material	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel	409 Stainless Steel
Number of Heat Exchangers	2	3	2	3
Input (MBH)	730	1068	730	1068
Output (MBH)	591	872	591	872
Efficiency (%)	81	81	81	81
Burner Orifice Diameter (in...drill no.)	0.1200...31	0.1200...31	0.1200...31	0.1200...31
Quantity	18	27	18	27
Low Fire/High Fire Manifold Pressure (in. wg)	0.3 / 3.4	0.3 / 3.2	0.3 / 3.4	0.3 / 3.2
Min...Max Line Pressure (in. wg)	5…13	5…13	5…13	5…13
System Capacity Steps (%)	14-50%, 52-100%	9-50%, 52-100%	14-50%, 52-100%	9-50%, 52-100%
Number of Gas Valves	2	3	2	3
Gas Connection Qty...Size (in.)	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT	1...1.5 NPT
STANDARD PRE-FILTERS				
2 in.Throwaway	Fiberglass		Fiberglass	
Qty...Size (in.)	12…20x25x2 and 12...20x20x2		12…20x25x2 and 12...20x20x2	
Outdoor Air Screen	Metal Mesh		Metal Mesh	
Qty...Size (in.)	15...16x25x1		15...16x25x1	

Physical data (cont)

48-50V Physical Data — Sizes 90, 98 (cont)

UNIT 48/50V2,V3,V4,V5	90		98	
NOMINAL CAPACITY (tons)	90		100	
OPTIONAL PRE-FILTERS				
2 in. MERV 8	Pleated		Pleated	
Qty...Size (in.)	12…20x25x2 and 12...20x20x2		12…20x25x2, and 12...20x20x2	
4 in. MERV 8 and MERV 13	Pleated		Pleated	
Qty...Size (in.)	12…20x25x4 and 12...20x20x4		12…20x25x4 and 12...20x20x4	
2 in. MERV 8 and 4 in. MERV 13	Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge	
Qty...Size (in.)	10…20x25x2, 10…20x20x2, 10…20x25x4, 10…20x20x4		10…20x25x2, 10…20x20x2, 10…20x25x4, 10…20x20x4	
2 in. MERV 8 and 12 in. MERV 14 Bag	Pleated / Bag		Pleated / Bag	
Qty...Size (in.)	6… 24x24x2/ 6… 24x20x2/ 6… 24x24x12/ 6… 24x20x12		6… 24x24x2/ 6… 24x20x2/ 6… 24x24x12/ 6… 24x20x12	
2 in. MERV 8 and 12 in. MERV 15 Cartridge	Pleated / High Velocity Cartridge		Pleated / High Velocity Cartridge	
Qty...Size (in.)	6… 24x24x2/ 6… 20x24x2/ 6… 24x24x12/ 6… 24x20x12		6… 24x24x2/ 6… 20x24x2/ 6… 24x24x12/ 6… 24x20x12	
ENERGYX® (OPTIONAL)	Low Flow	High Flow	Low Flow	High Flow
Model	ERC-5882	ERC-74122	ERC-5882	ERC-74122
Max Airflow (cfm)	14,000	16,000	14,000	16,000
Motor (rpm)	860	860	860	860
Filter Qty...Size (in.)	6...14x20x2	6...18x18x2, 2...18x24x2	6...14x20x2	6...18x18x2, 2...18x24x2
HOT WATER COIL (50V-OPTIONAL)	Al/Cu RTPF, Steel Header		Al/Cu RTPF, Steel Header	
Coil Quantity	2		2	
Total Face Area (sq ft)	45.2		45.2	
Coil Rows...Fins Per Inch	2...8		2...8	
Tube Size (in.)...Circuiting	1/2" OD...Half Circuit		1/2" OD...Half Circuit	
Supply Connection Qty...Size (in.)	2...2-1/2 NPT		2...2-1/2 NPT	
Return Connection Qty...Size (in.)	2...2-1/2 NPT		2...2-1/2 NPT	
Coil Internal Volume (gal)	12.72		12.72	

NOTE(S):

a. See fan tables for maximum HP by voltage (460-v HP shown).

Dimensions

Weights

Refer to the physical data tables for base unit weights starting on page 25. Refer to http://ecat.carrier.com for configuration specific unit weights. Refer to the unit rigging label for the worst-case unit weights.

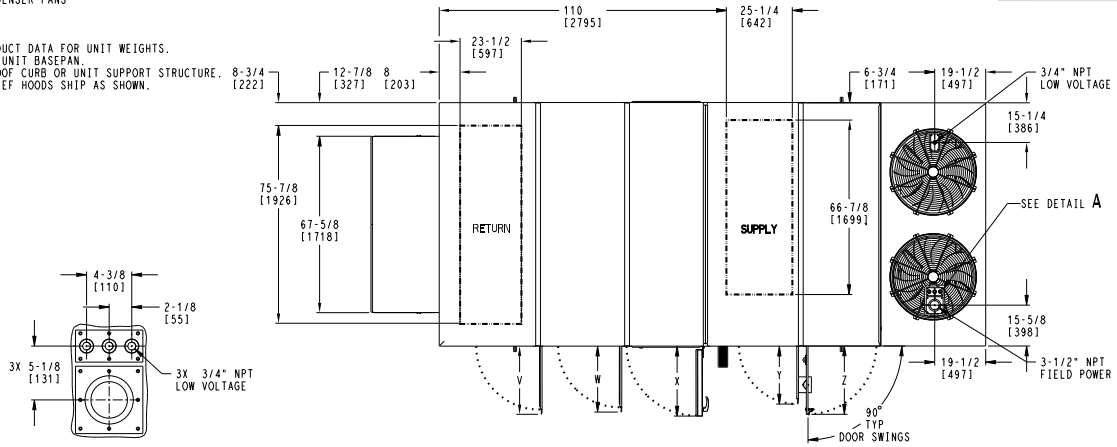
Dimensions

This section contains base unit certified drawings. Refer to http://ecat.carrier.com or the 48/50V certified drawings guide for configuration specific certified drawings.

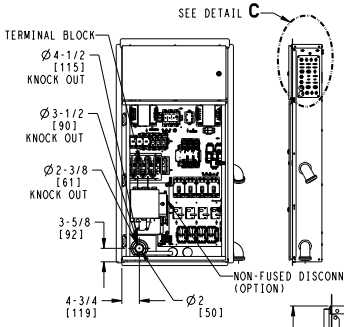
48V 27.5-35 Ton Compact Chassis with High Heat

NOTES:
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT)
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0",
   ECONOMIZER END - 6'-0"
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN.
   DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS AND RELIEF HOODS SHIP AS SHOWN.

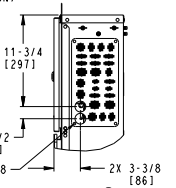
	DOOR WIDTH
V	26-1/8 [664]
W	25-1/4 [642]
X	26-3/4 [681]
Y	22-1/4 [564]
Z	26-1/8 [663]



DETAIL A



CONTROL BOX



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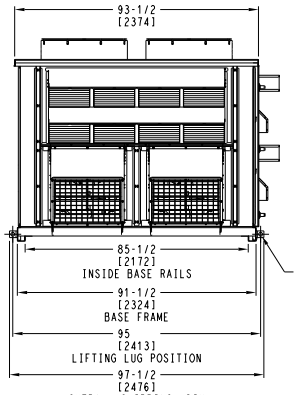
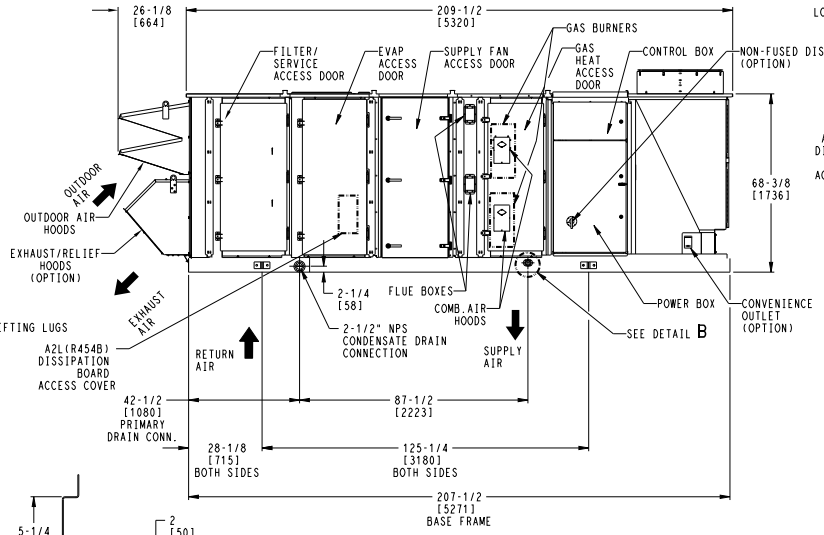
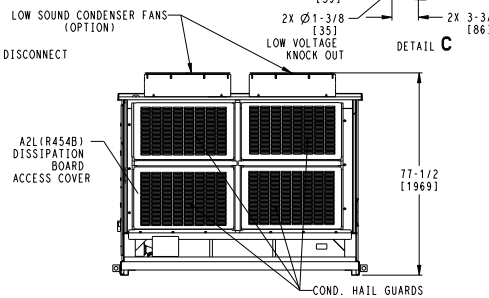
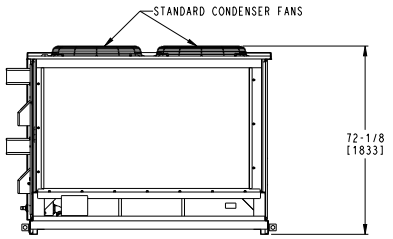
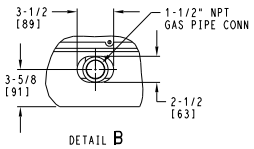


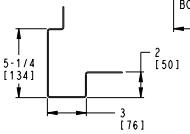








DETAIL B



BASE RAIL PROFILE

VERTICAL SUPPLY & RETURN

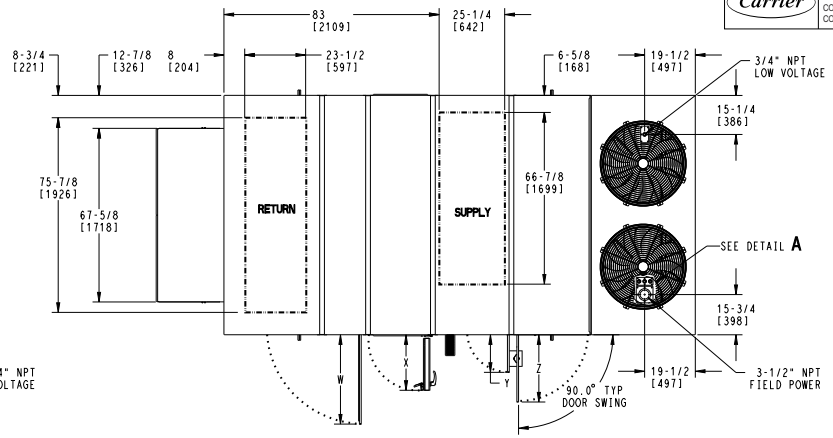
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 2	02/22/24	-	48V COMPACT CHASSIS 27-35 TON HIGH HEAT	48VV004796	A

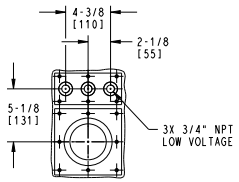
48V 27.5-35 Ton Compact Chassis with Low Heat

NOTES:

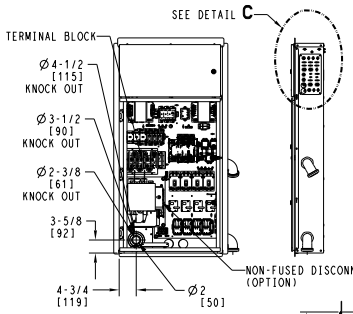
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT)
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0"
   ECONOMIZER END - 6'-0"
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN.
   DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS AND RELIEF HOODS SHIP AS SHOWN.

	DOOR WIDTH
W	34-3/4 [884]
X	21-1/2 [549]
Y	14-5/8 [372]
Z	26-1/8 [664]

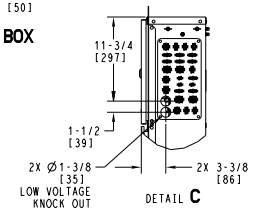




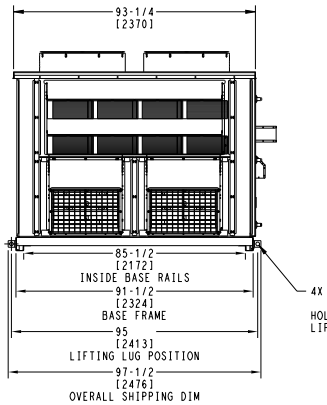
DETAIL A

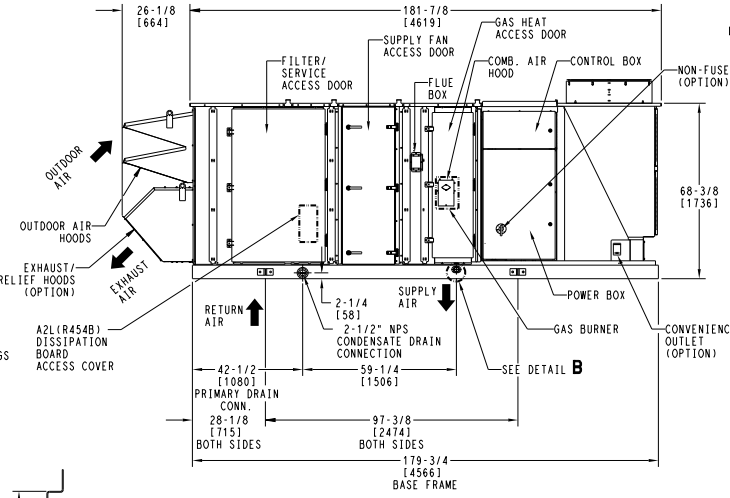


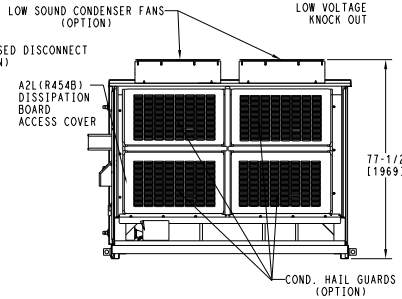
CONTROL BOX

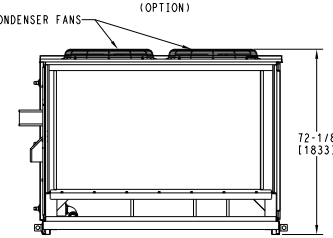


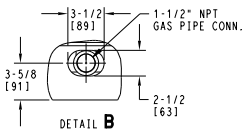
DETAIL C



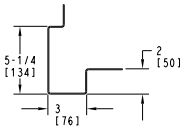








DETAIL B

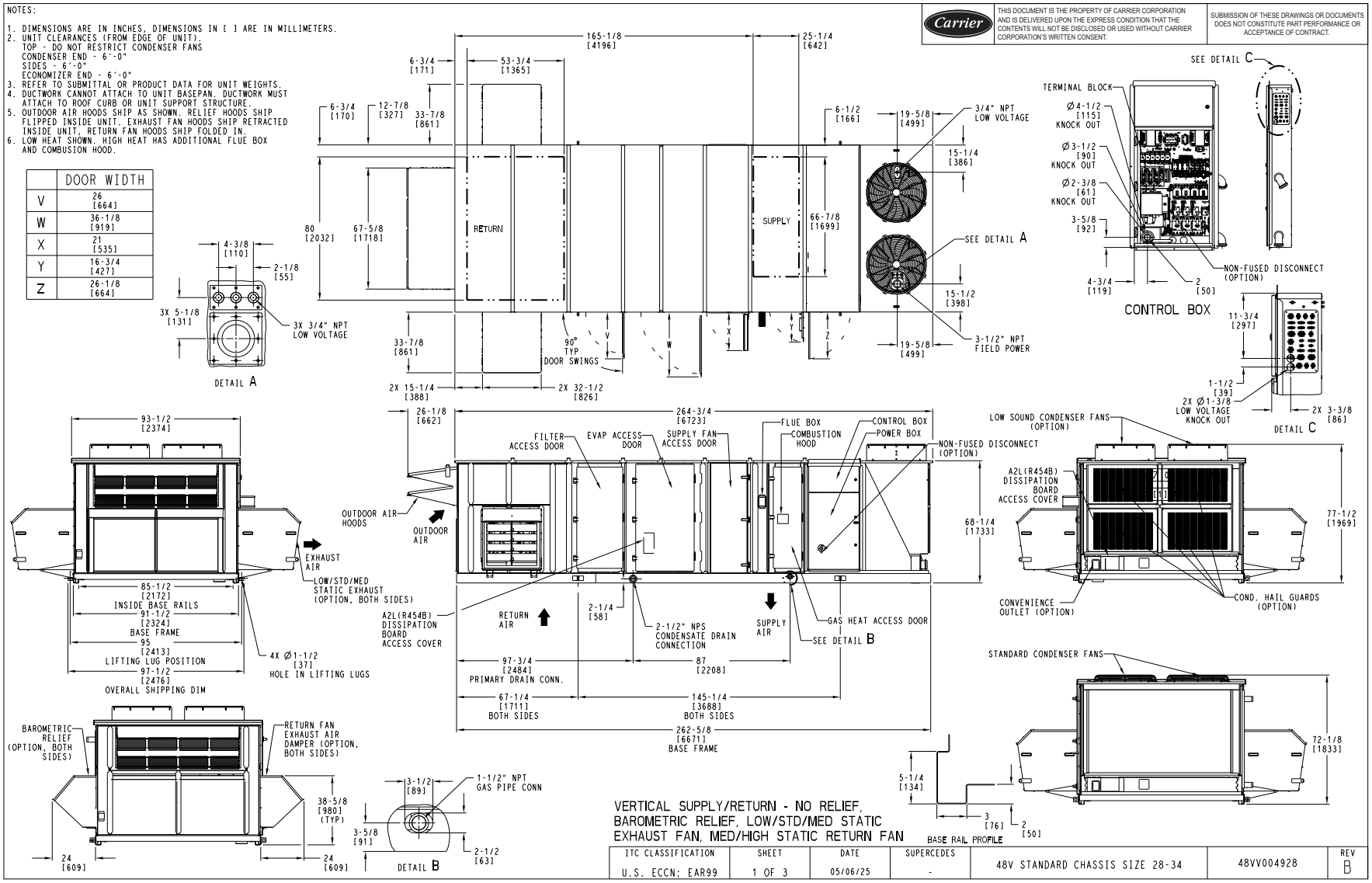


BASE FRAME PROFILE

VERTICAL SUPPLY & RETURN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 2	2/22/24	-	48V COMPACT CHASSIS 27-35 TON LOW HEAT	48VV004798	A

48V 27.5-35 Ton Standard Chassis

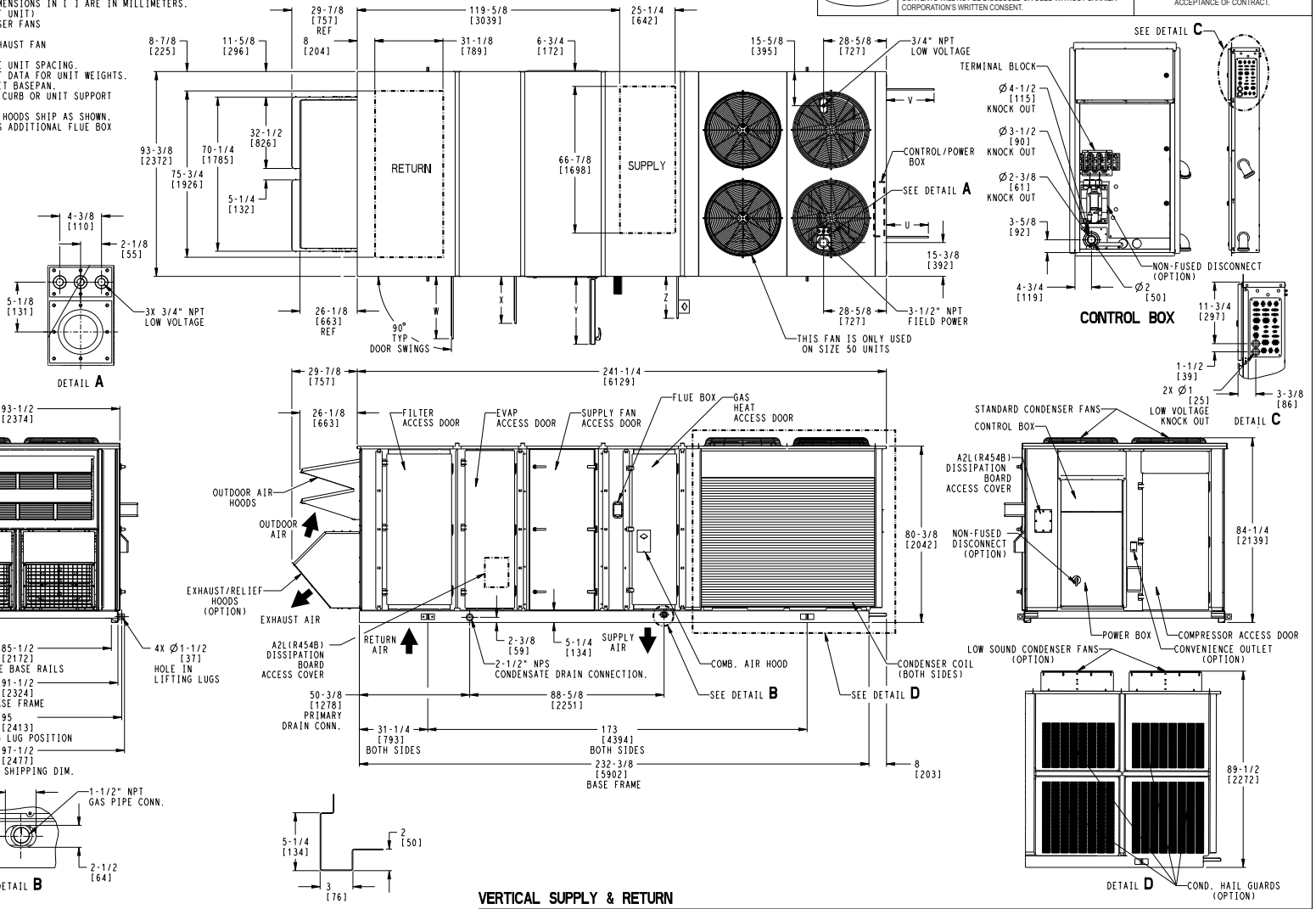


48V 40-50 Ton Compact Chassis

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT)
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN.
   DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS AND RELIEF HOODS SHIP AS SHOWN.
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSION HOOD.

	DOOR WIDTH
U	19-1/8 [486]
V	21-3/4 [552]
W	28-3/8 [721]
X	21-3/8 [544]
Y	30-7/8 [785]
Z	19-1/8 [486]



VERTICAL SUPPLY & RETURN

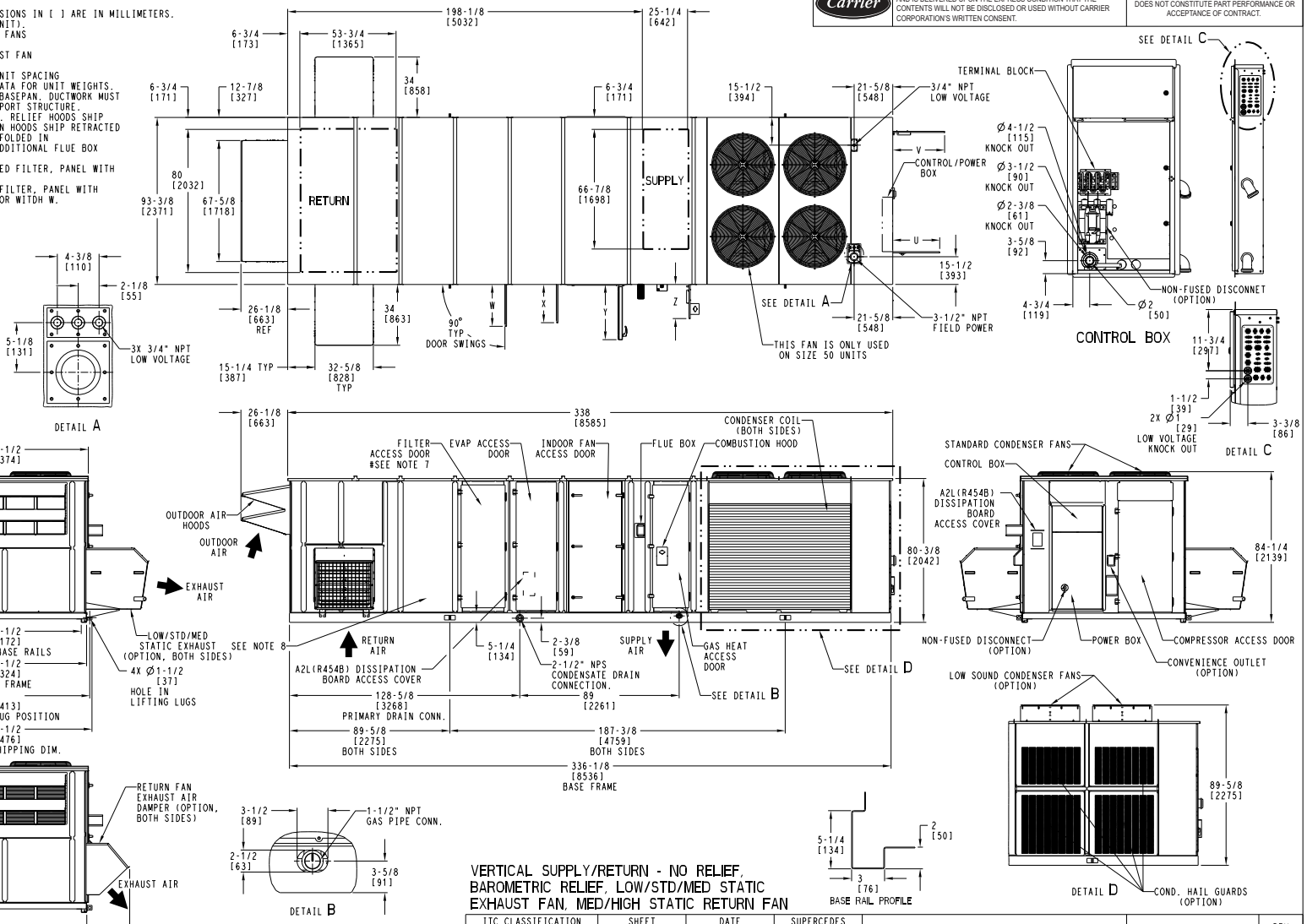
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	48V COMPACT CHASSIS SIZE 40-50 ALL HEAT		REV
U.S. ECCN: EAR99	1 OF 2	01/14/24	-		48VV006558	-

48V 40-50 Ton Standard Chassis

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. RELIEF HOODS SHIP FLIPPED INSIDE UNIT. EXHAUST FAN HOODS SHIP RETRACTED IN UNIT, RETURN FAN HOODS SHIP FOLDED IN
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSION HOOD.
7. ACCESS DOOR WITH STANDARD/PLEATED FILTER, PANEL WITH BAG/CARTRIDGE FILTER.
8. ACCESS DOOR WITH BAG/CARTRIDGE FILTER, PANEL WITH STANDARD/PLEATED FILTER. SEE DOOR WITDH W.

	DOOR WIDTH
U	26 [666]
V	29 [736]
W	23-3/8 [594]
X	21-3/8 [542]
Y	30-7/8 [784]
Z	19-1/8 [484]



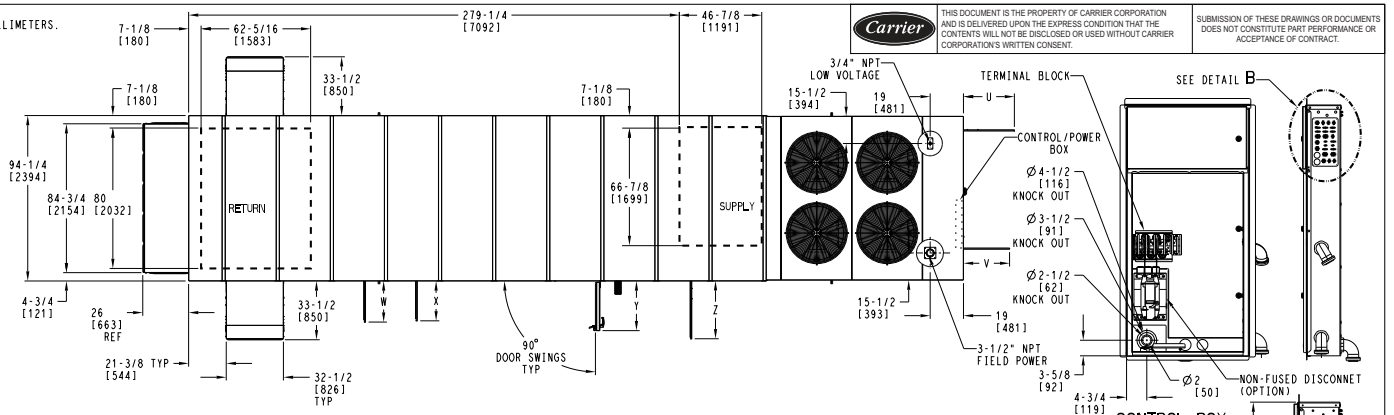
VERTICAL SUPPLY/RETURN - NO RELIEF,
BAROMETRIC RELIEF, LOW/STD/MED STATIC
EXHAUST FAN, MED/HIGH STATIC RETURN FAN

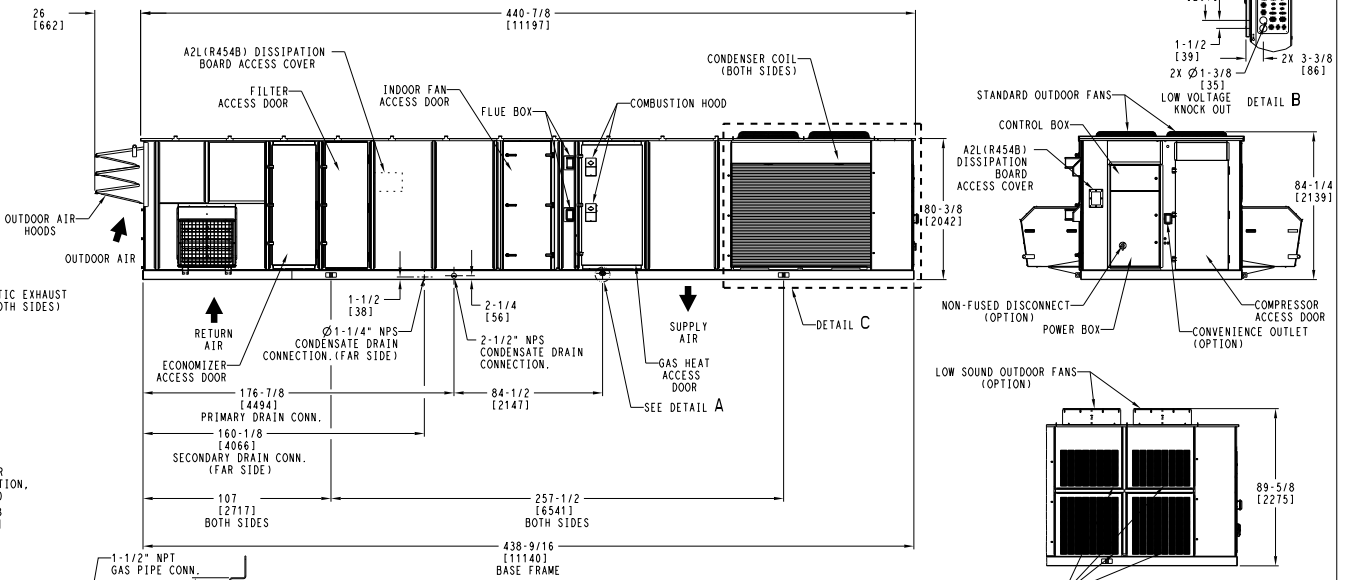
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES		
U.S. ECCN: EAR99	1 OF 3	04/30/25	-	48V STANDARD CHASSIS SIZE 40-50	48VV006561 REV A

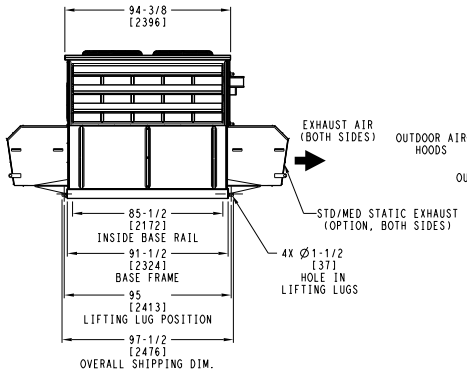
48V 55-60 Ton Standard Chassis

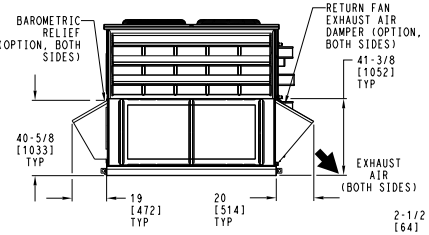
NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. RELIEF HOODS SHIP FLIPPED INSIDE UNIT. EXHAUST FAN HOODS SHIP RETRACTED IN UNIT, RETURN FAN HOODS SHIP FOLDED IN
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSTION HOOD.

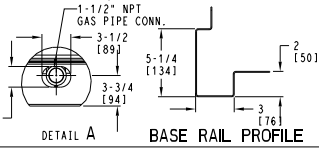
	DOOR WIDTH
U	29 [736]
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]
Z	33 [837]









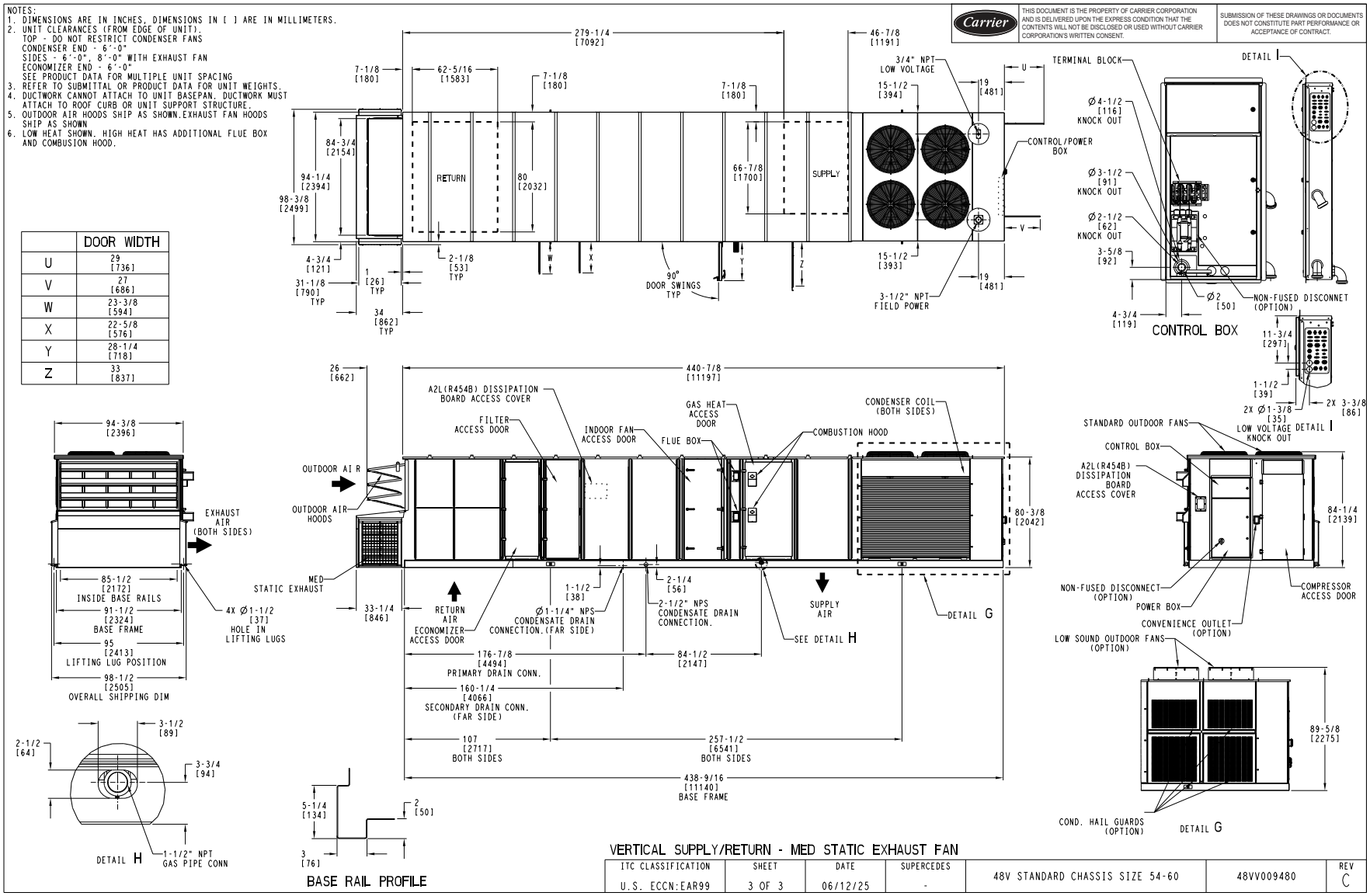


BASE RAIL PROFILE

VERTICAL SUPPLY/RETURN - NO RELIEF,
BAROMETRIC RELIEF, STD STATIC
EXHAUST FAN, MED/HIGH STATIC RETURN FAN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES		
U.S. ECCN:EAR99	1 OF 3	06/12/25	-	48V STANDARD CHASSIS SIZE 54-60	48VV009480	REV C

48V 55-60 Ton Standard Chassis (cont)

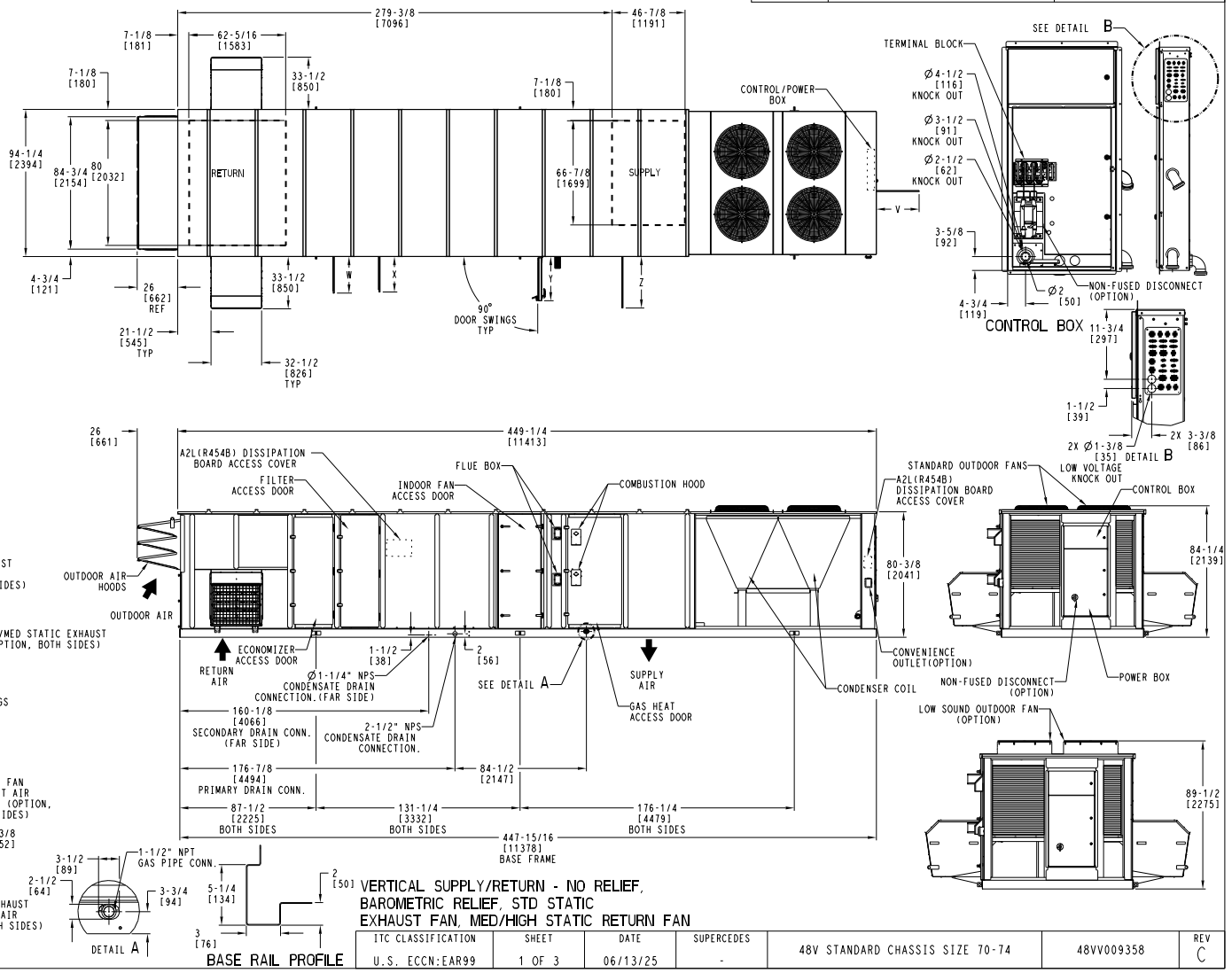


48V 70-75 Ton Standard Chassis

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. RELIEF HOODS SHIP FLIPPED INSIDE UNIT. EXHAUST FAN HOODS SHIP RETRACTED IN UNIT, RETURN FAN HOODS SHIP FOLDED IN.
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSION HOOD.
7. CONDENSER COVERS HIDDEN.TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSER SECTION.

	DOOR WIDTH
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]
Z	33 [837]



VERTICAL SUPPLY/RETURN - NO RELIEF, BAROMETRIC RELIEF, STD STATIC EXHAUST FAN, MED/HIGH STATIC RETURN FAN

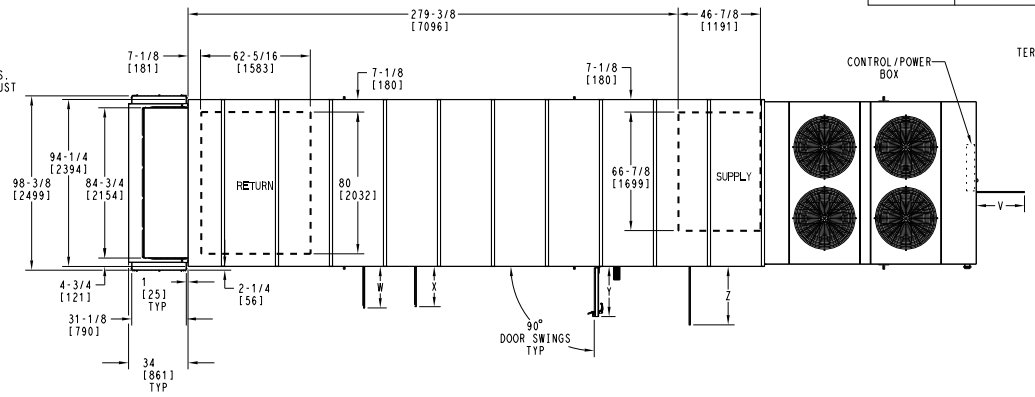
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	48V STANDARD CHASSIS SIZE 70-74	48VV009358	REV
U.S. ECCN:EAR99	1 OF 3	06/13/25	-			C

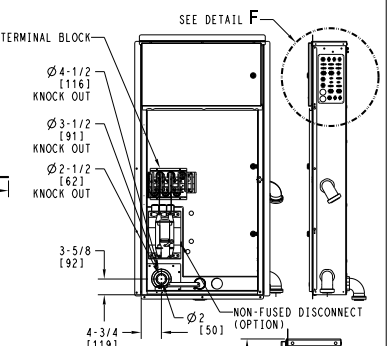
48V 70-75 Ton Standard Chassis (cont)

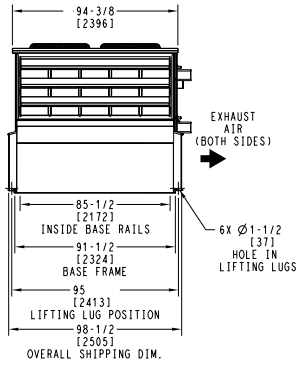
NOTES:

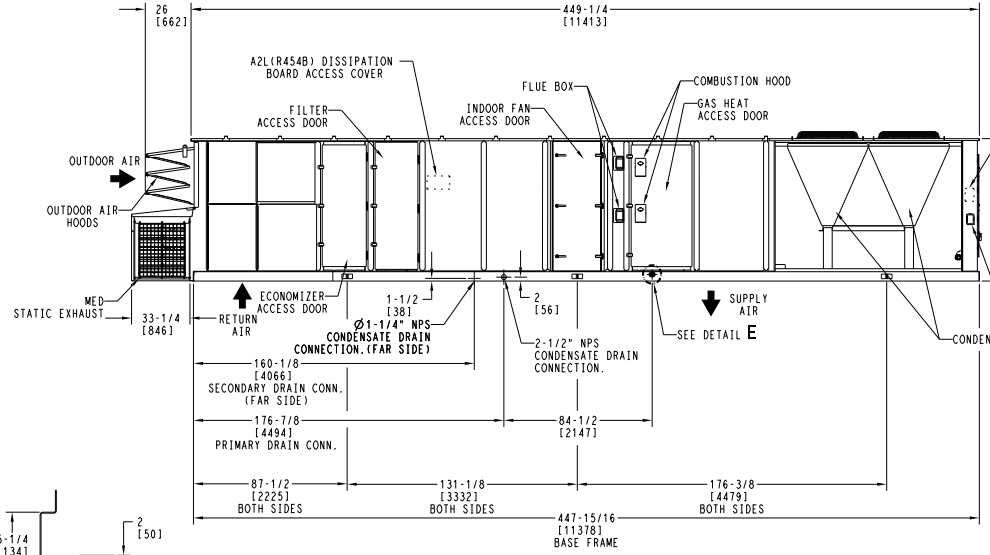
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN.EXHAUST FAN HOODS SHIP AS SHOWN.
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSTION HOOD.
7. CONDENSER COVERS HIDDEN.TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSER SECTION.

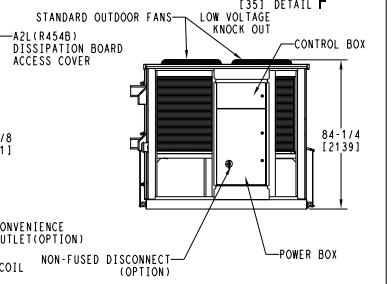
	DOOR WIDTH
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]
Z	33 [837]

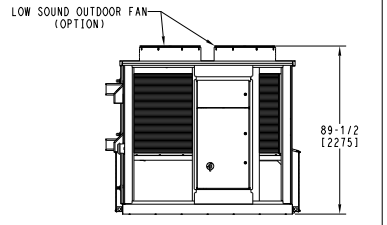


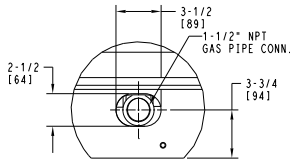




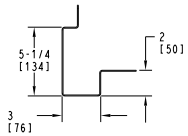








DETAIL E



BASE RAIL PROFILE

VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

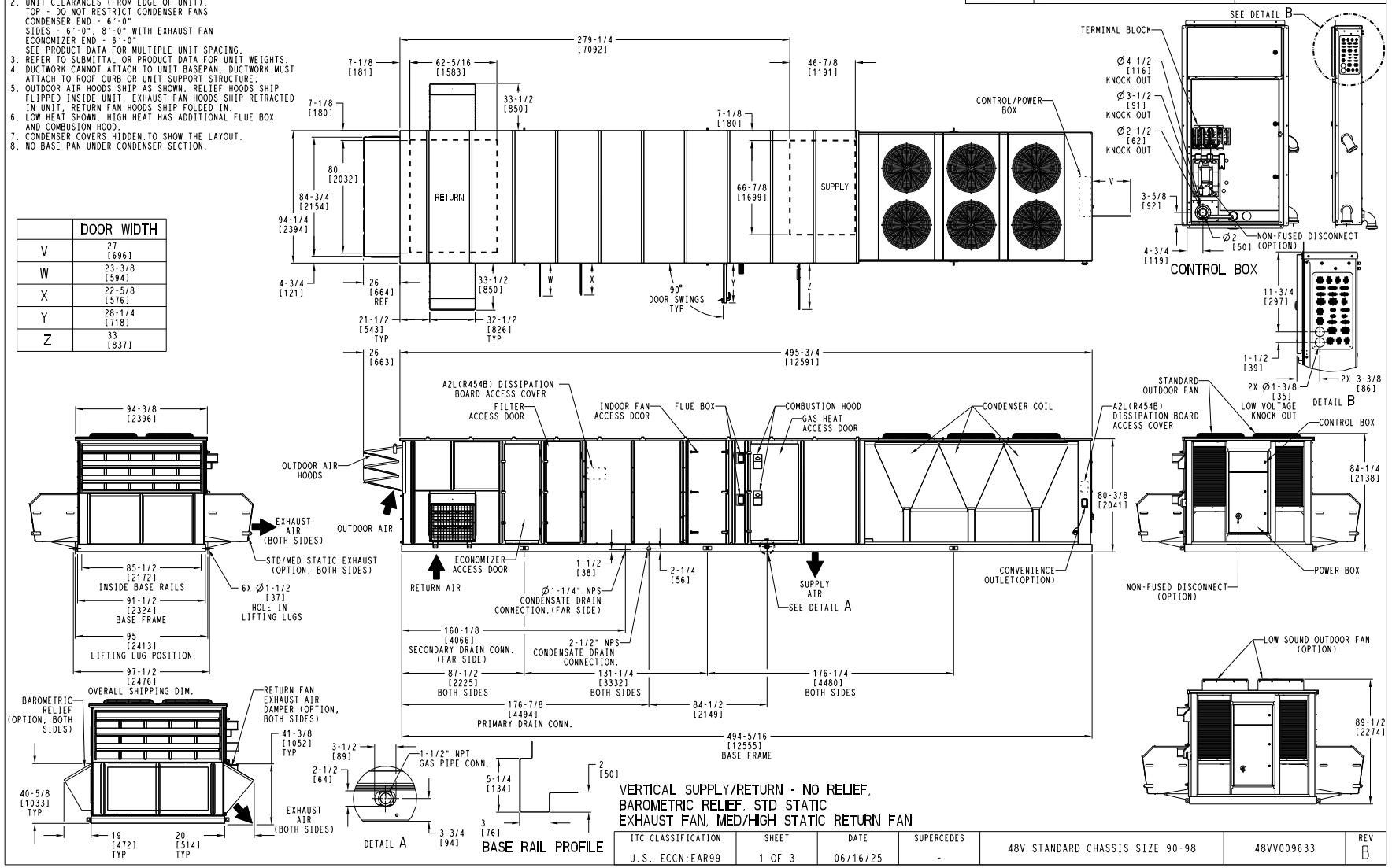
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	3 OF 3	06/13/25	-	48V STANDARD CHASSIS SIZE 70-74	48VV009358	C

48V 90-100 Ton Standard Chassis

NOTES:

1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. RELIEF HOODS SHIP FLIPPED INSIDE UNIT. EXHAUST FAN HOODS SHIP RETRACTED IN UNIT, RETURN FAN HOODS SHIP FOLDED IN.
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSION HOOD.
7. CONDENSER COVERS HIDDEN,TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSER SECTION.

	DOOR WIDTH
V	27 [696]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]
Z	33 [837]



VERTICAL SUPPLY/RETURN - NO RELIEF,
BAROMETRIC RELIEF, STD STATIC
EXHAUST FAN, MED/HIGH STATIC RETURN FAN

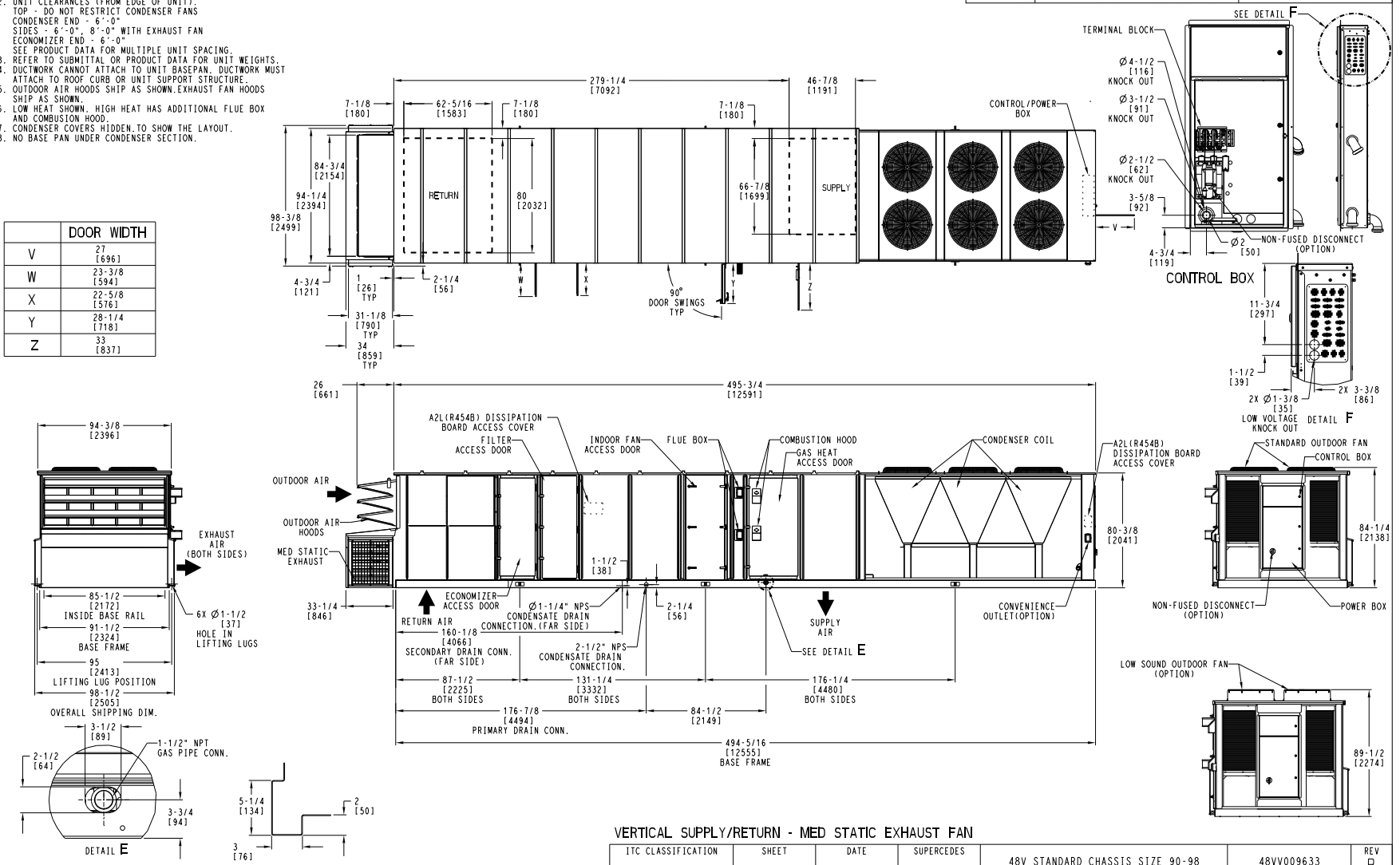
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES		
U.S. ECCN:EAR99	1 OF 3	06/16/25	-	48V STANDARD CHASSIS SIZE 90-98	48VV009633	REV B

48V 90-100 Ton Standard Chassis (cont)

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN.EXHAUST FAN HOODS SHIP AS SHOWN.
6. LOW HEAT SHOWN. HIGH HEAT HAS ADDITIONAL FLUE BOX AND COMBUSION HOOD.
7. CONDENSER COVERS HIDDEN.TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSER SECTION.

	DOOR WIDTH
V	27 [696]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]
Z	33 [837]



VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

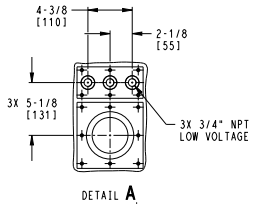
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	3 OF 3	06/16/25	-	48V STANDARD CHASSIS SIZE 90-98	48VV009633	B

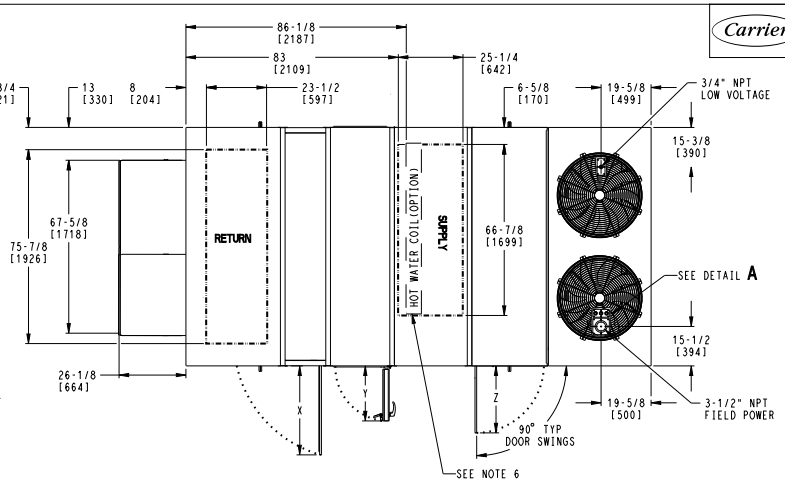
50V 27.5-35 Ton Compact Chassis

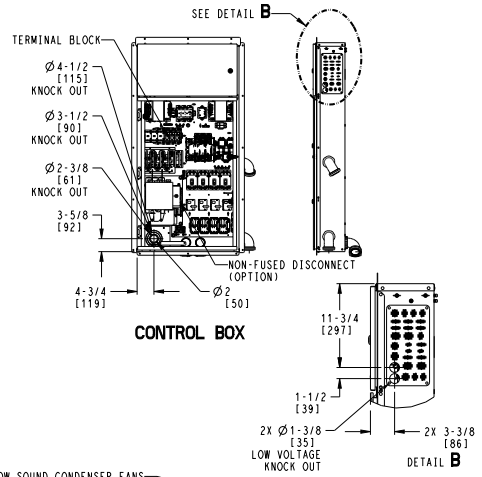
NOTES:

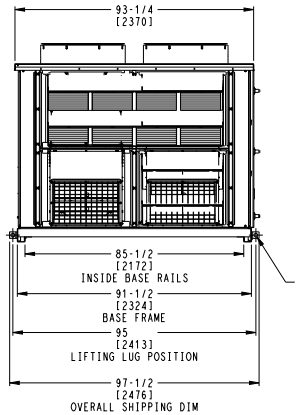
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0"
   ECONOMIZER END - 6'-0"
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS AND RELIEF HOODS SHIP AS SHOWN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.

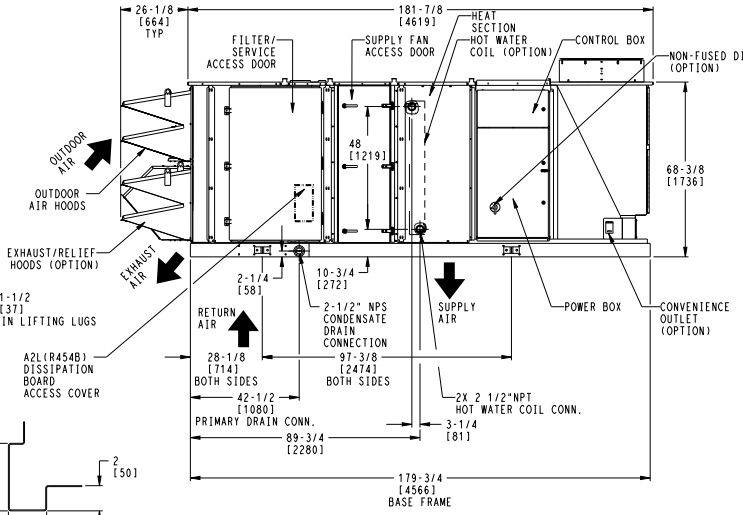
	DOOR WIDTH
X	34-3/4 [884]
Y	21-1/2 [545]
Z	26-1/8 [665]

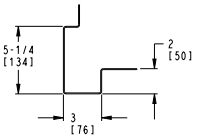


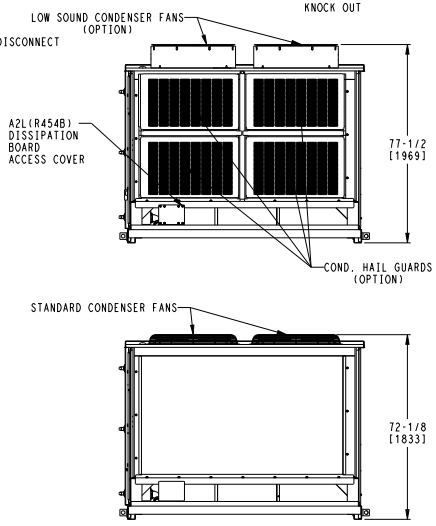








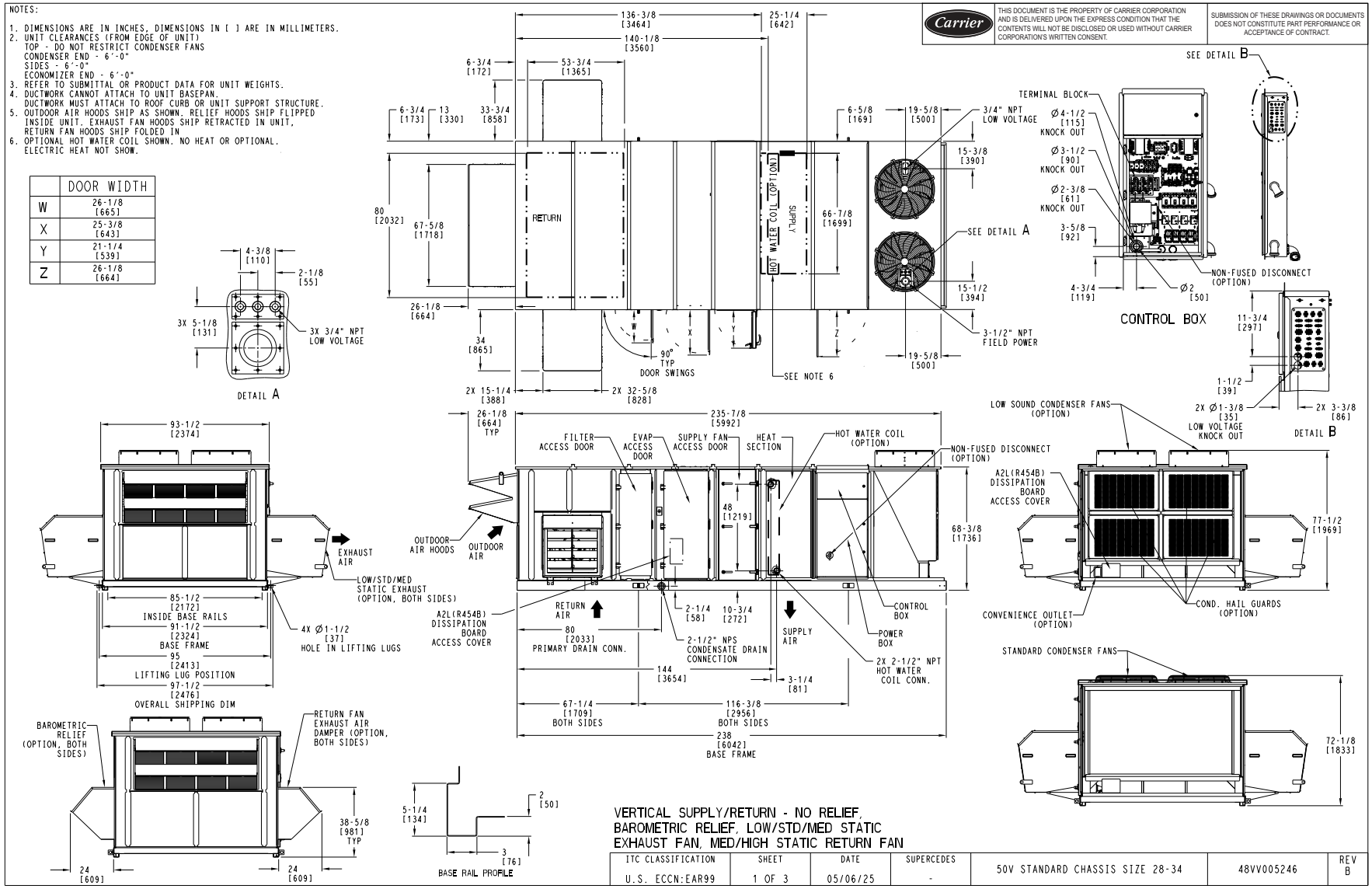




VERTICAL SUPPLY & RETURN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 2	02/22/24	-	50V COMPACT CHASSIS 27-35 TON	48VV005047	A

50V 27.5-35 Ton Standard Chassis

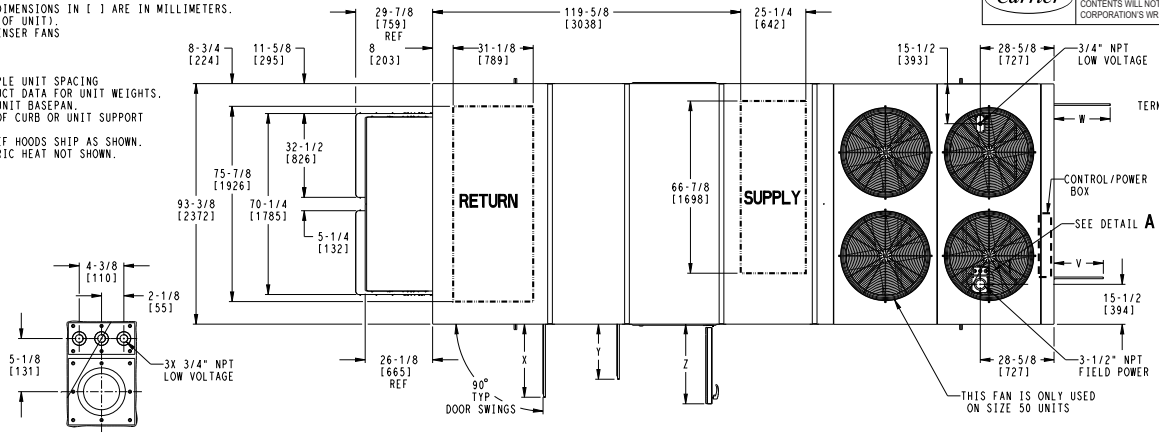


50V 40-50 Ton Compact Chassis

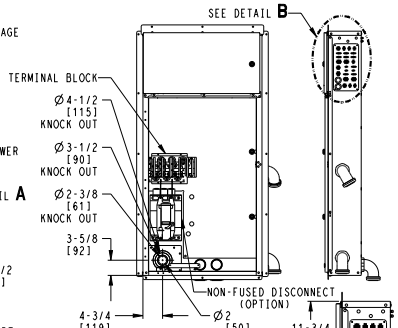
NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0"
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN.
   DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS AND RELIEF HOODS SHIP AS SHOWN.
6. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.

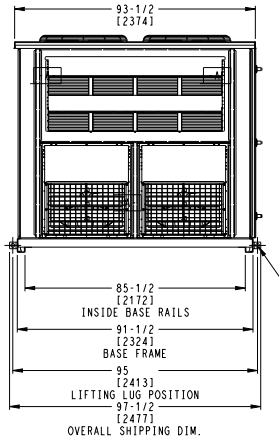
	DOOR WIDTH
V	19-1/8 [486]
W	21-3/4 [554]
X	28-3/8 [721]
Y	21-3/8 [543]
Z	30-7/8 [784]

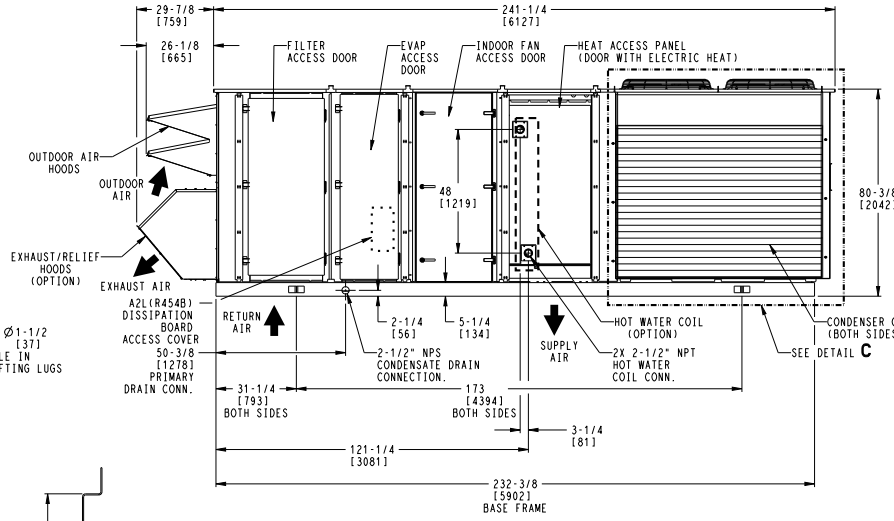


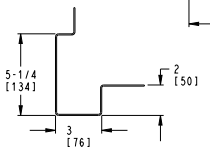
DETAIL **A**



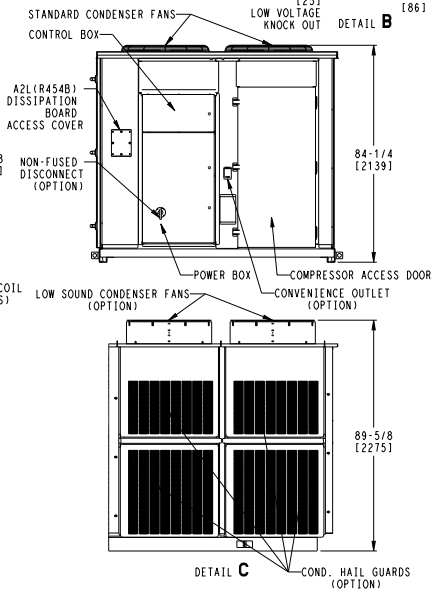
CONTROL BOX







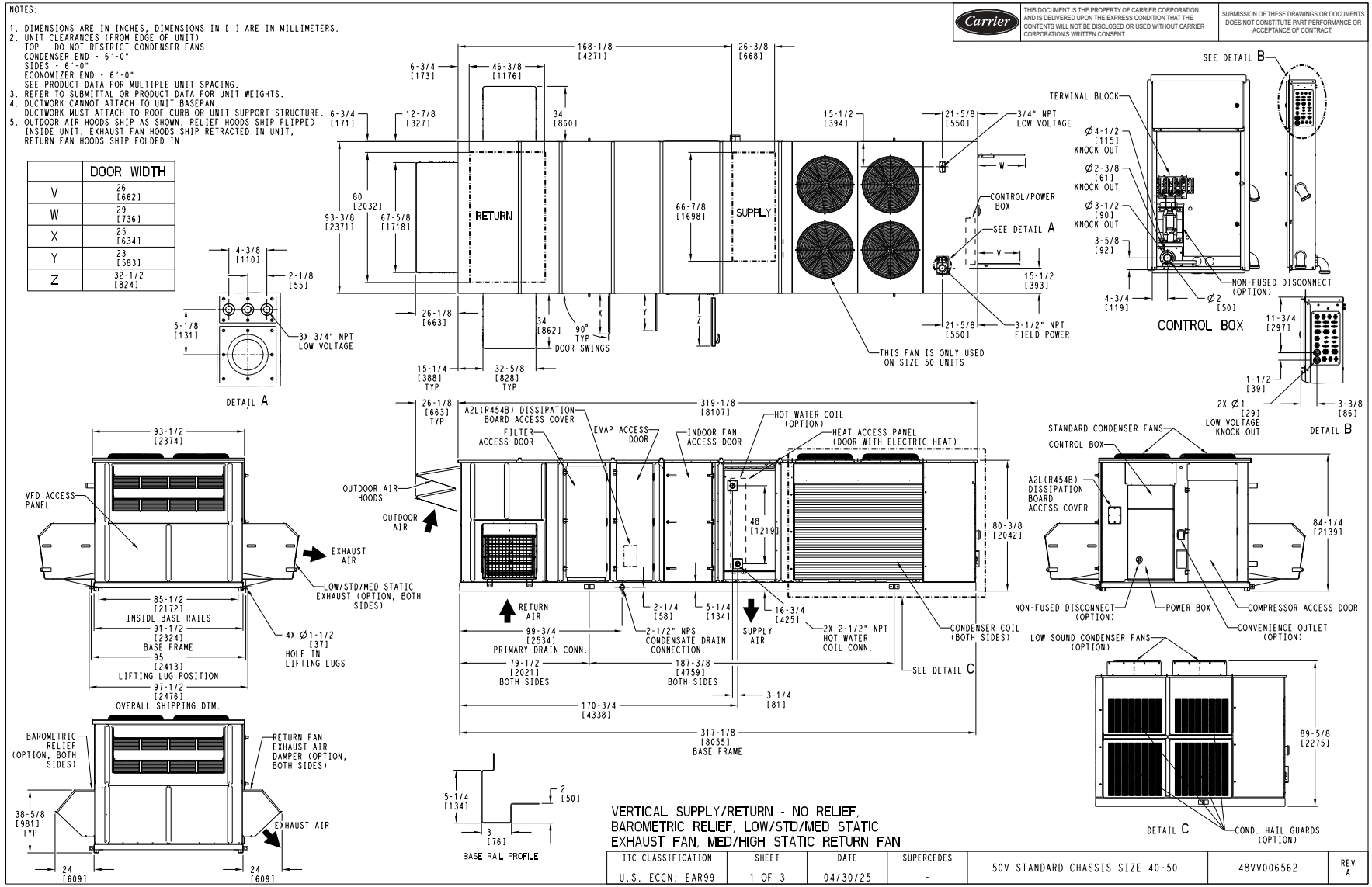
BASE RAIL PROFILE



VERTICAL SUPPLY & RETURN

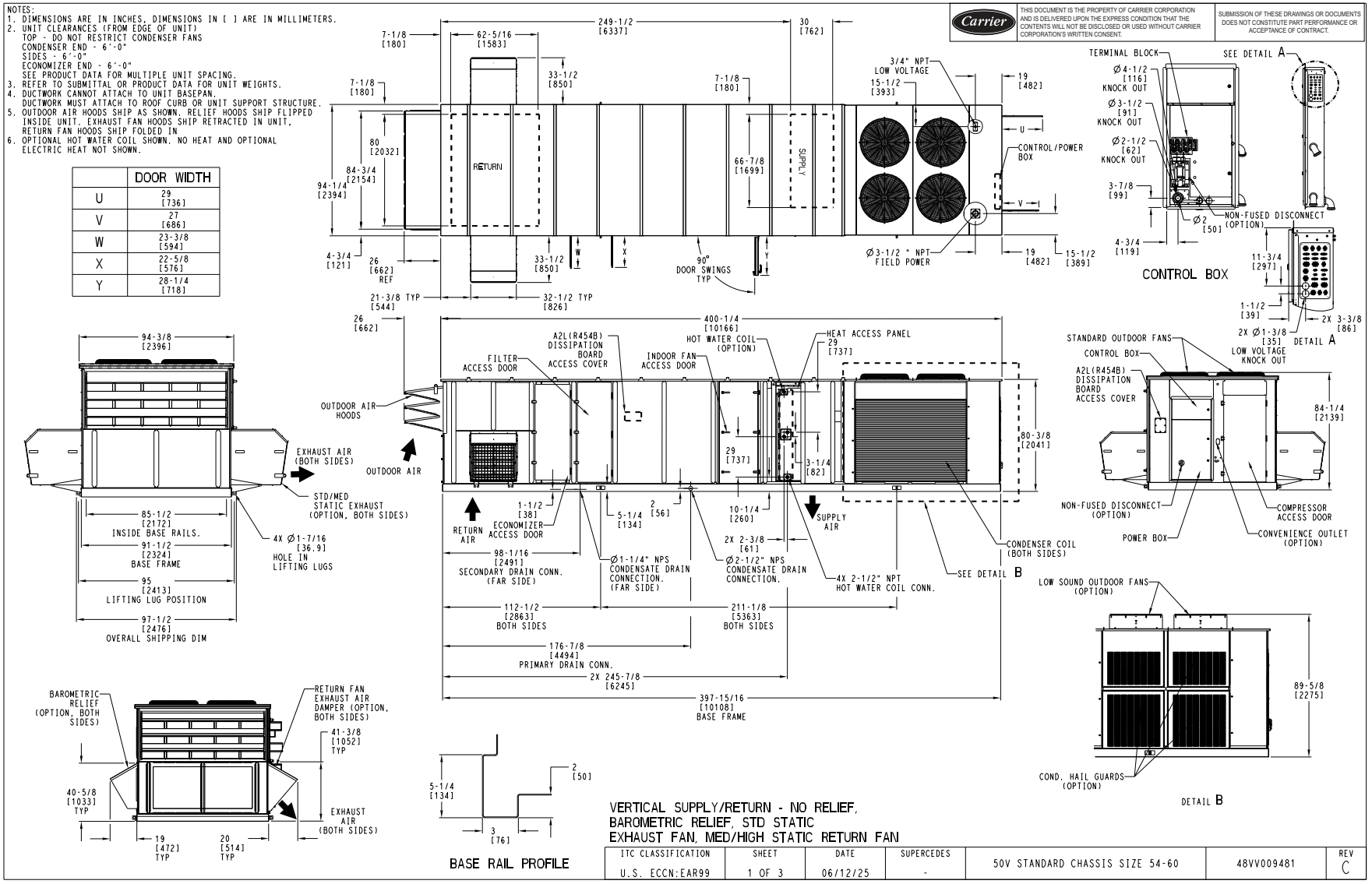
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN: EAR99	1 OF 2	02/01/24	-	50V COMPACT CHASSIS SIZE 40-50	48VV006560	-

50V 40-50 Ton Standard Chassis



ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES		
U.S. ECCN: EAR99	1 OF 3	04/30/25	-	50V STANDARD CHASSIS SIZE 40-50	48VV006562	REV A

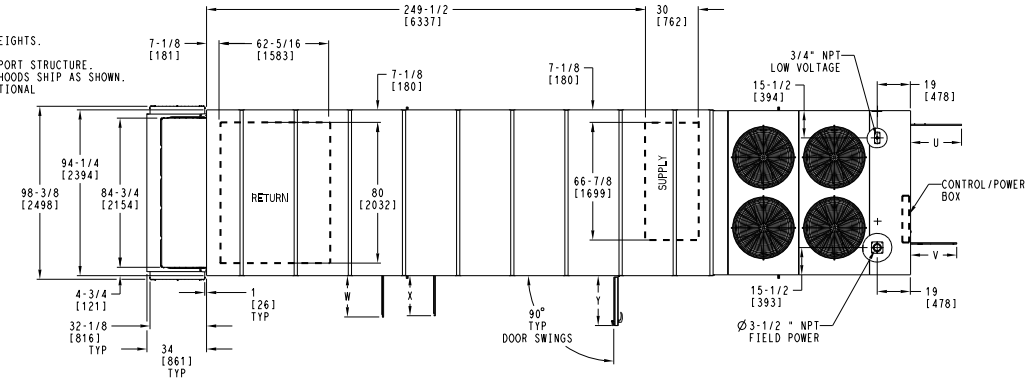
50V 55-60 Ton Standard Chassis

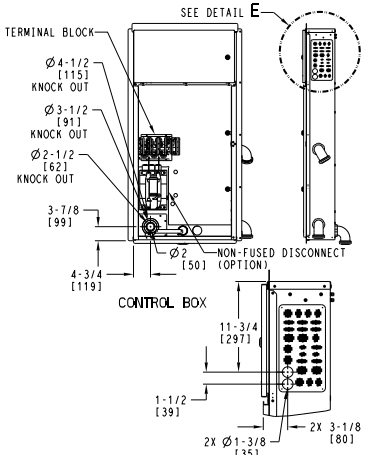


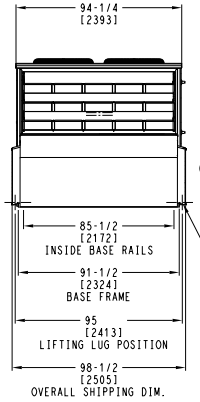
50V 55-60 Ton Standard Chassis (cont)

NOTES:
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT)
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0"
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN.
   DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. EXHAUST FAN HOODS SHIP AS SHOWN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.

	DOOR WIDTH
U	29 [736]
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]

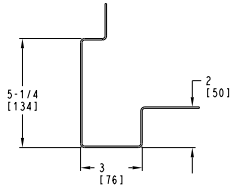




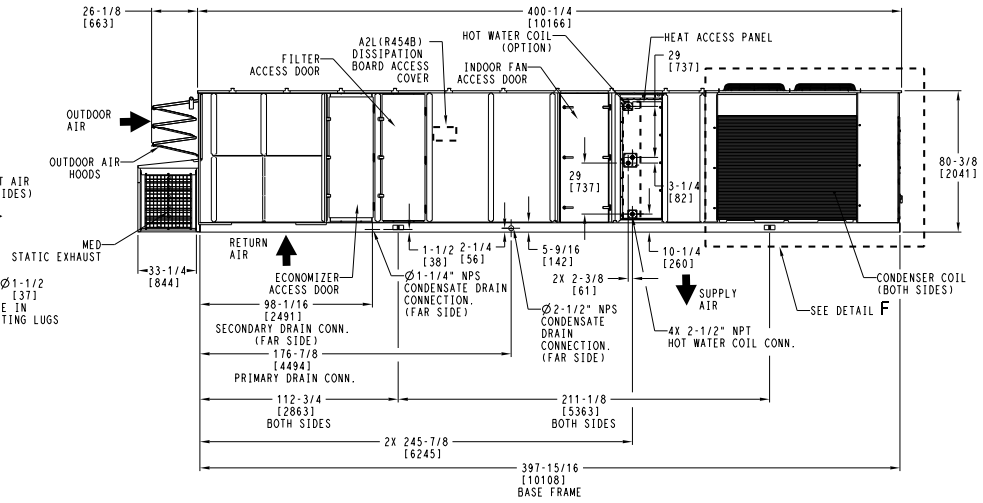


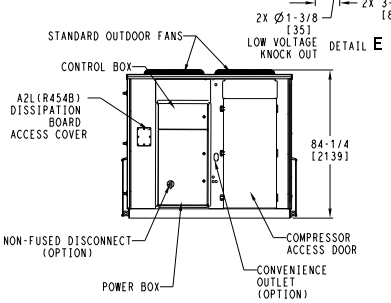
EXHAUST AIR (BOTH SIDES)

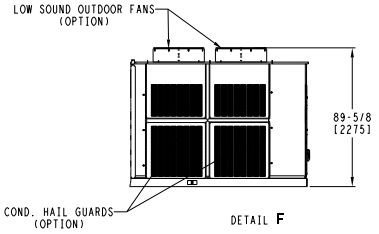
4X Ø1-1/2 [37] HOLE IN LIFTING LUGS



BASE RAIL PROFILE



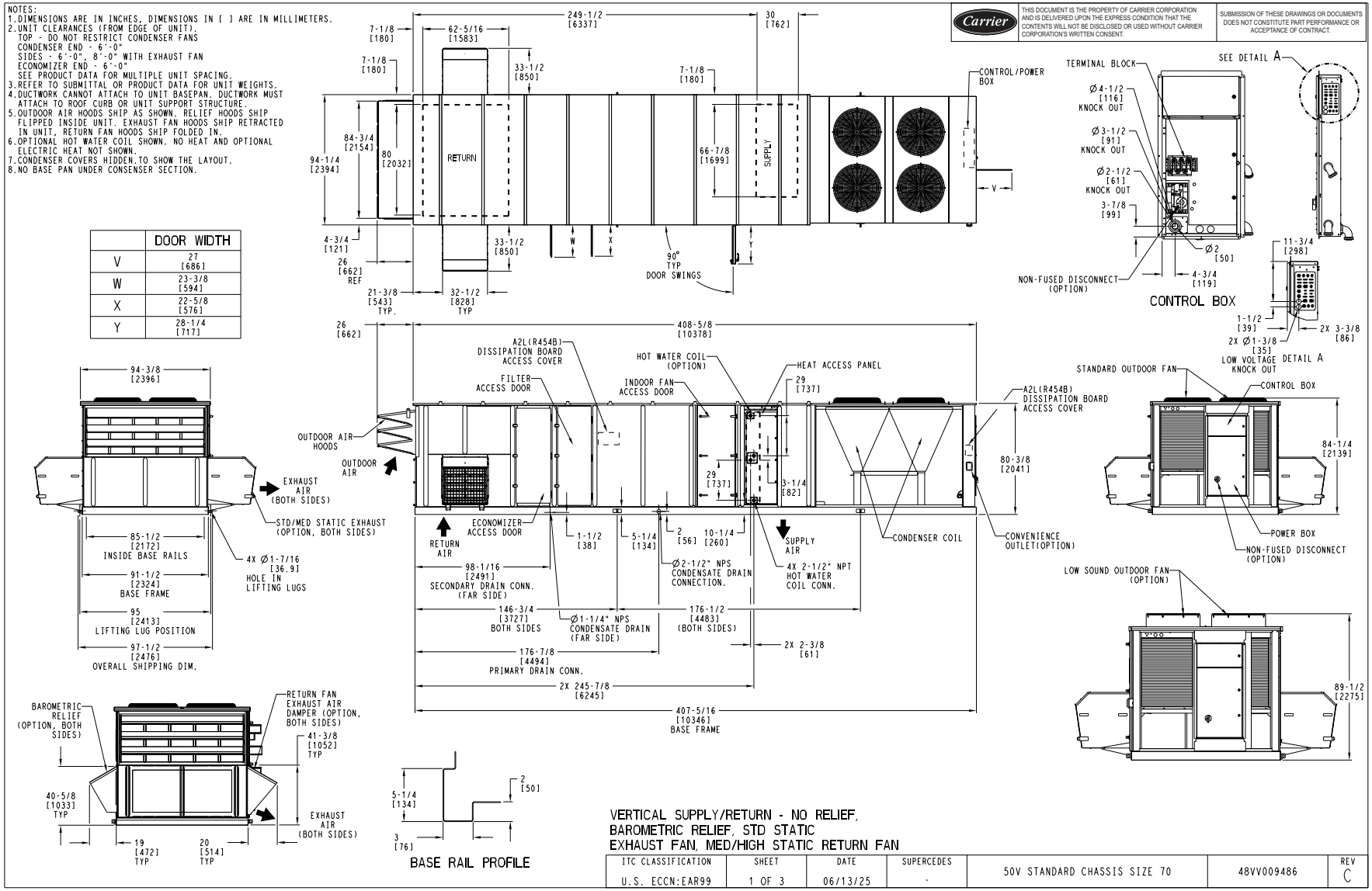




VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	3 OF 3	06/12/25	-	50V STANDARD CHASSIS SIZE 54-60	48VV009481	C

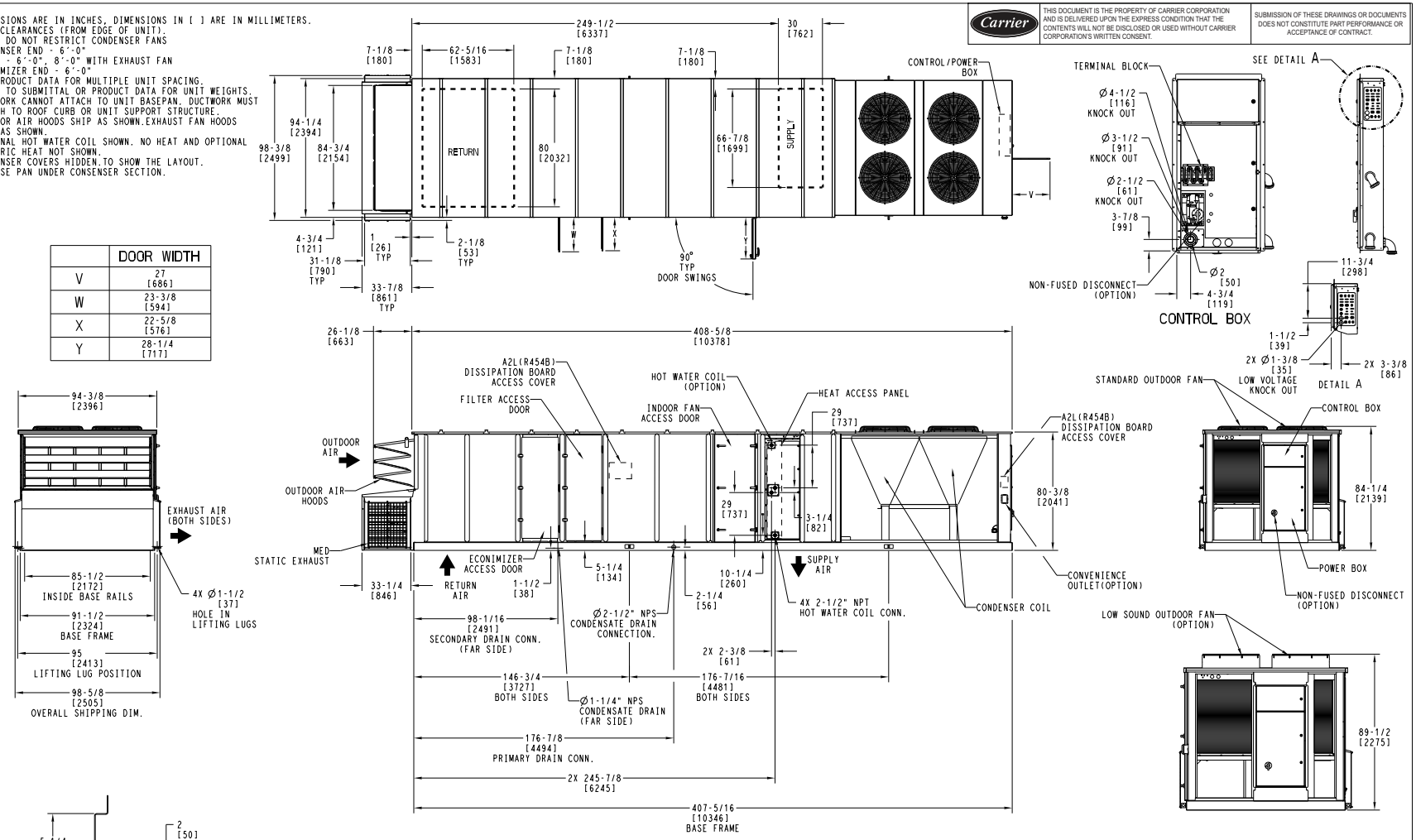
50V 70 Ton Standard Chassis



50V 70 Ton Standard Chassis (cont)

NOTES:
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. EXHAUST FAN HOODS SHIP AS SHOWN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.
7. CONDENSER COVERS HIDDEN. TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONSENSER SECTION.

	DOOR WIDTH
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [717]



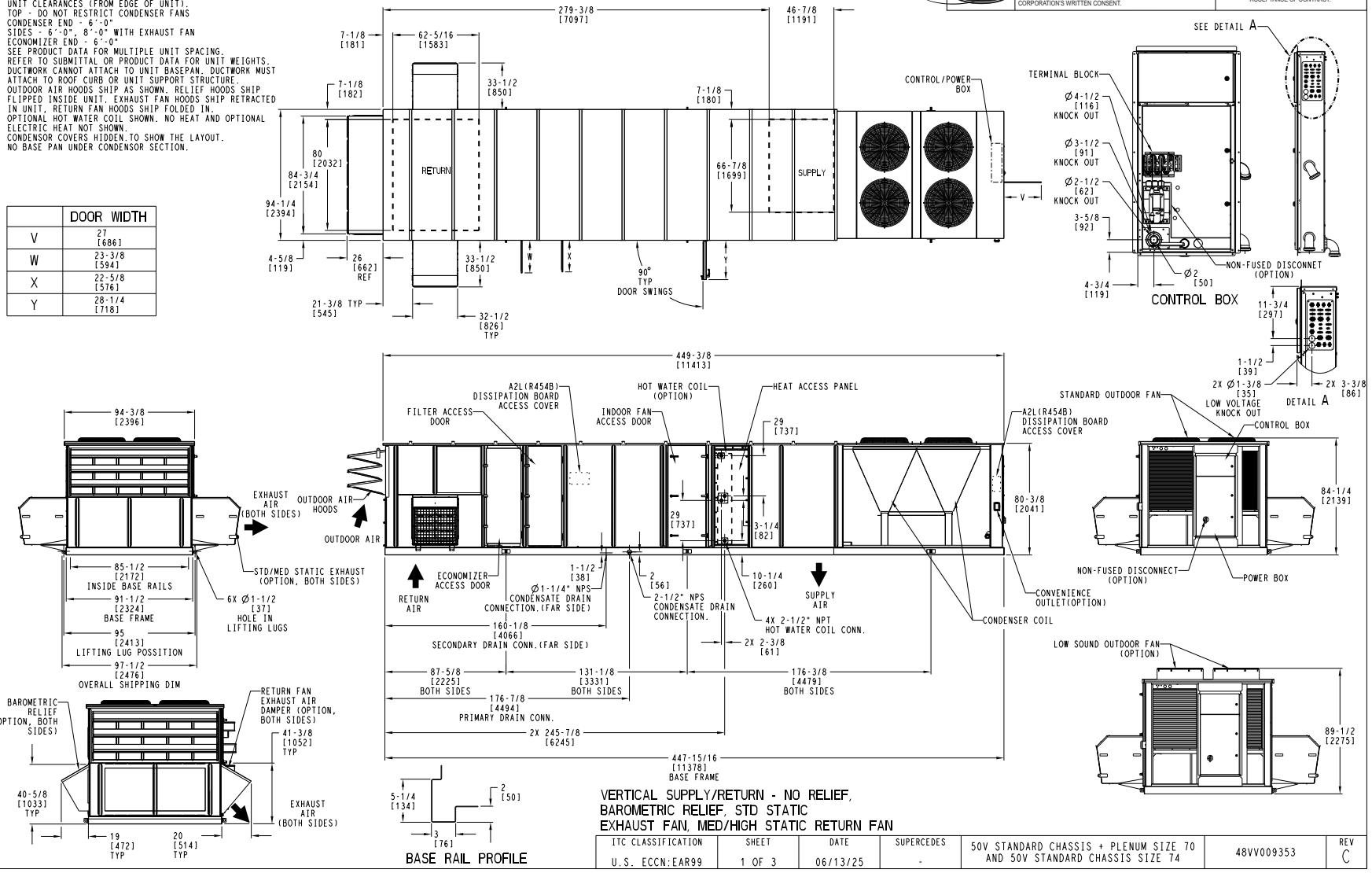
VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	3 OF 3	06/13/25	-	50V STANDARD CHASSIS SIZE 70	48VV009486	C

50V 70 Ton Standard Chassis with Plenum Section and 50V 75 Ton Standard Chassis

NOTES:
1. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN. RELIEF HOODS SHIP FLIPPED INSIDE UNIT. EXHAUST FAN HOODS SHIP RETRACTED IN UNIT, RETURN FAN HOODS SHIP FOLDED IN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.
7. CONDENSOR COVERS HIDDEN TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSOR SECTION.

	DOOR WIDTH
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]



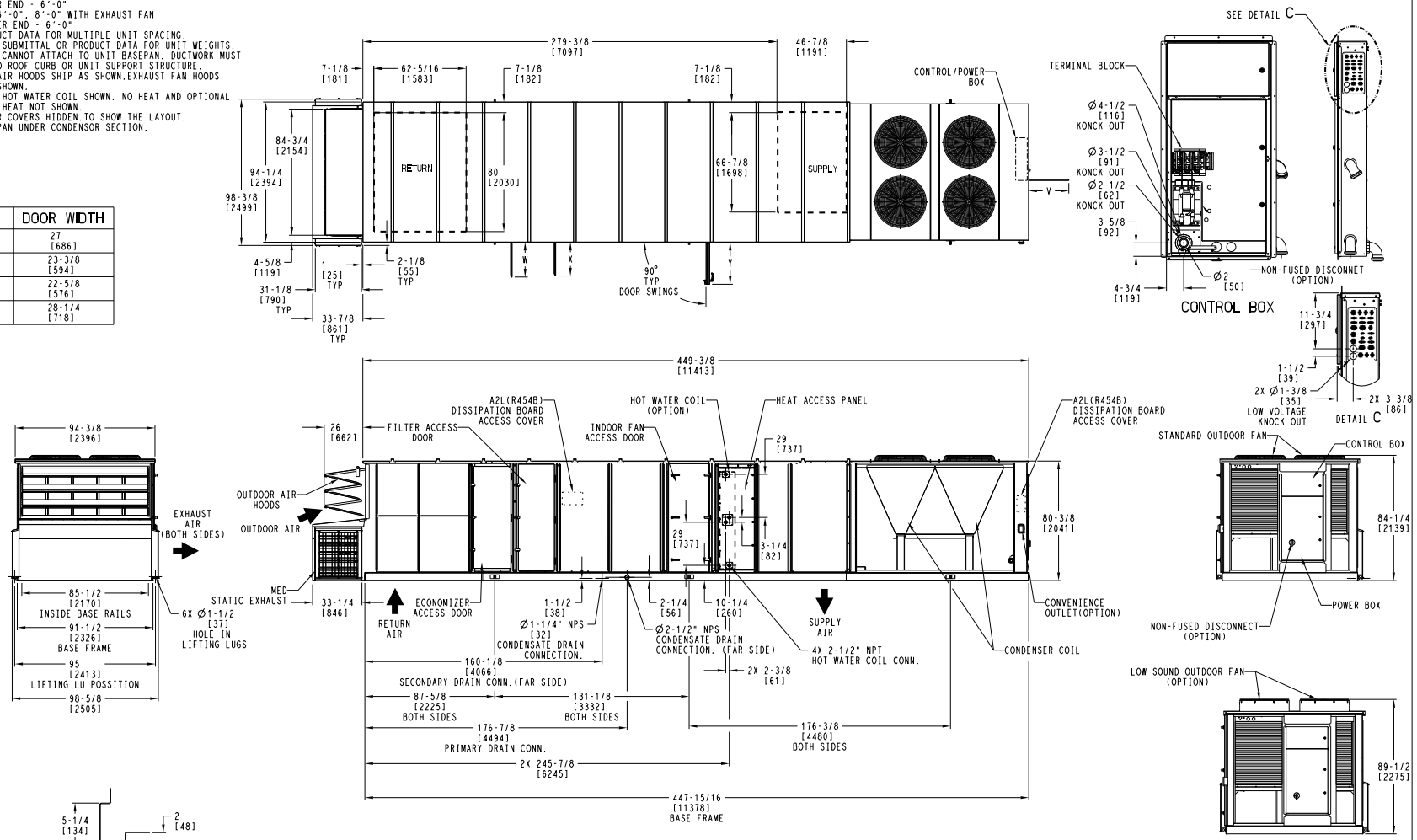
VERTICAL SUPPLY/RETURN - NO RELIEF, BAROMETRIC RELIEF, STD STATIC EXHAUST FAN, MED/HIGH STATIC RETURN FAN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 3	06/13/25	-	50V STANDARD CHASSIS + PLENUM SIZE 70 AND 50V STANDARD CHASSIS SIZE 74	48VV009353	C

50V 70 Ton Standard Chassis with Plenum Section and 50V 75 Ton Standard Chassis (cont)

NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN.EXHAUST FAN HOODS SHIP AS SHOWN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.
7. CONDENSOR COVERS HIDDEN.TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSOR SECTION.

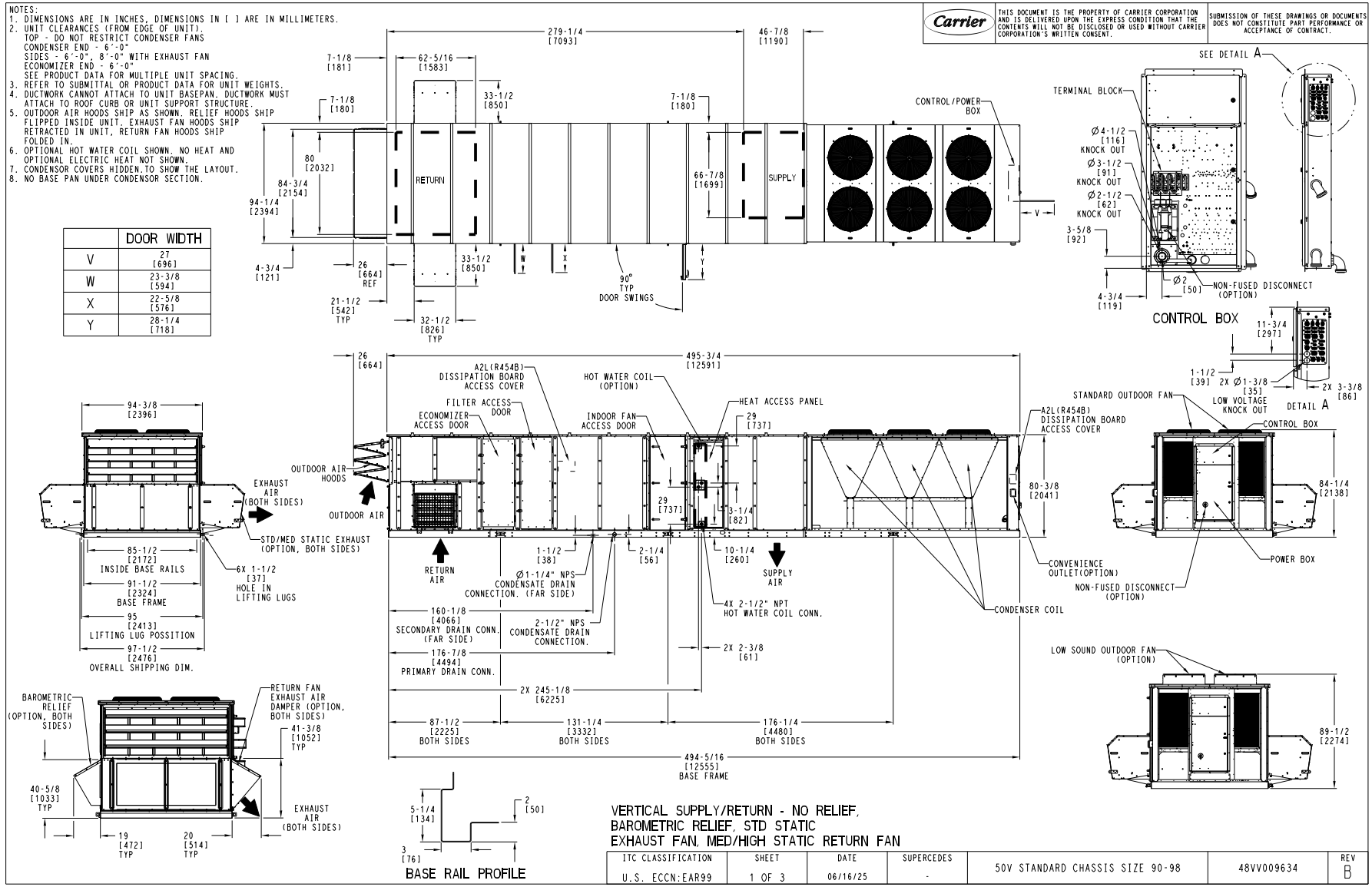
	DOOR WIDTH
V	27 [686]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]



VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	3 OF 3	06/13/25	-	50V STANDARD CHASSIS + PLENUM SIZE 70 AND 50V STANDARD CHASSIS SIZE 74	48VV009353	C

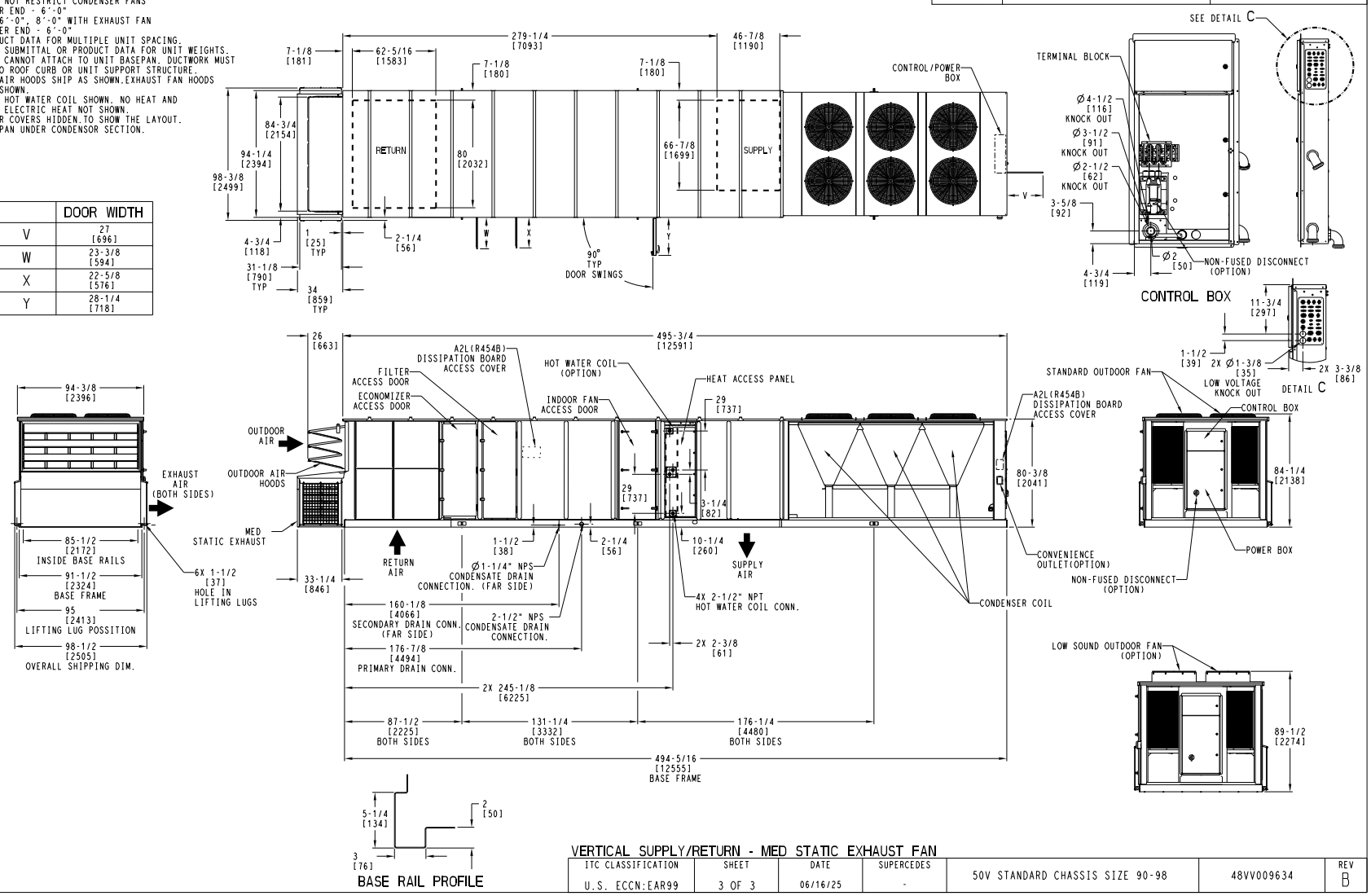
50V 90-100 Ton Standard Chassis



50V 90-100 Ton Standard Chassis (cont)

NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. UNIT CLEARANCES (FROM EDGE OF UNIT).
   TOP - DO NOT RESTRICT CONDENSER FANS
   CONDENSER END - 6'-0"
   SIDES - 6'-0", 8'-0" WITH EXHAUST FAN
   ECONOMIZER END - 6'-0"
   SEE PRODUCT DATA FOR MULTIPLE UNIT SPACING.
3. REFER TO SUBMITTAL OR PRODUCT DATA FOR UNIT WEIGHTS.
4. DUCTWORK CANNOT ATTACH TO UNIT BASEPAN. DUCTWORK MUST ATTACH TO ROOF CURB OR UNIT SUPPORT STRUCTURE.
5. OUTDOOR AIR HOODS SHIP AS SHOWN.EXHAUST FAN HOODS SHIP AS SHOWN.
6. OPTIONAL HOT WATER COIL SHOWN. NO HEAT AND OPTIONAL ELECTRIC HEAT NOT SHOWN.
7. CONDENSOR COVERS HIDDEN.TO SHOW THE LAYOUT.
8. NO BASE PAN UNDER CONDENSOR SECTION.

	DOOR WIDTH
V	27 [696]
W	23-3/8 [594]
X	22-5/8 [576]
Y	28-1/4 [718]

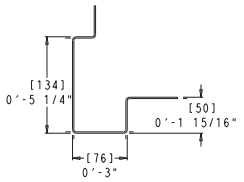


VERTICAL SUPPLY/RETURN - MED STATIC EXHAUST FAN

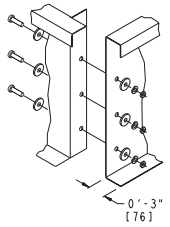
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	50V STANDARD CHASSIS SIZE 90-98	48VV009634	REV
U.S. ECCN:EAR99	3 OF 3	06/16/25	-			B

Roof Curb — 48/50V 27.5-35 Ton Standard Chassis

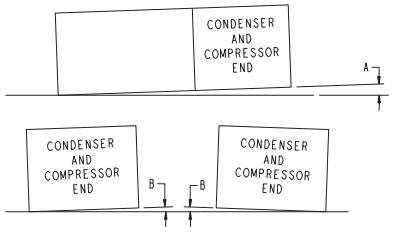
NOTES:
1. Roof curb is shipped disassembled.
2. Roofcurb: 14ga (VA03-56) STL.
3. Dimensions are inches (millimeters).



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS



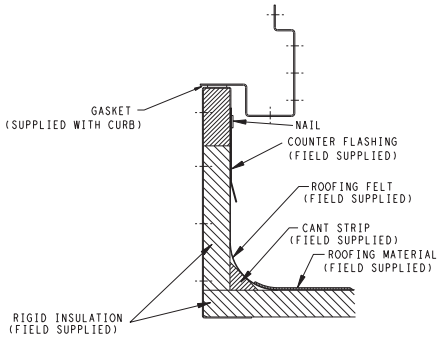
(CORNER CONNECTIONS AND
SPLICE PLATE CONNECTIONS)



DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

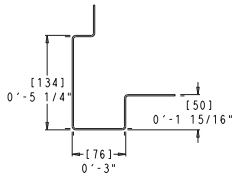
UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.



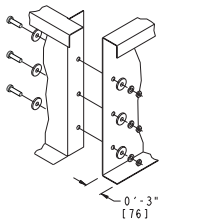
Accessory Part No.	Unit Type	Dimension	Unit Size (28-34)
CRRFCURB064A00	50V Standard Chassis	A	19' 2-3/8"
		B	10' 10-3/8"
CRRFCURB065A00	50V Extended Standard Chassis	A	21' 3-9/16"
		B	12' 11-9/16"
CRRFCURB057A00	48V Standard Chassis 50V Standard Chassis w/ Plenum	A	20' 9-1/16"
		B	13' 3-11/16"
CRRFCURB058A00	48V Extended Standard Chassis 50V Extended Standard Chassis w/ Plenum	A	22' 10-1/4"
		B	15' 4-7/8"

Roof Curb — 48/50V 40-50 Ton Standard Chassis

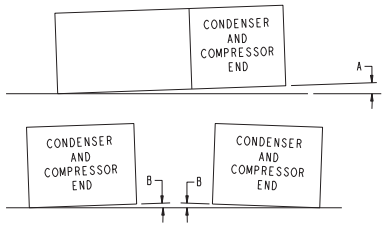
NOTES:
1. Roof curb is shipped disassembled.
2. Roofcurb: 14ga (VA03-56) STL.
3. Dimensions are inches (millimeters).



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS



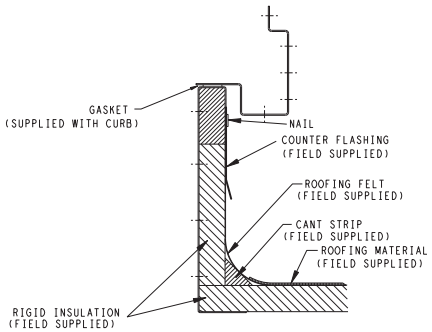
(CORNER CONNECTIONS AND
SPLICE PLATE CONNECTIONS)



DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.

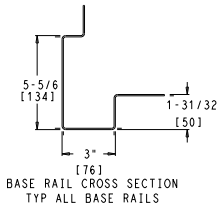


Accessory Part No.	Unit Type	Dimension	Unit Size (40-50)
CRRFCURB066A00	50V Standard Chassis	A	25' 9-5/8"
		B	13' 7-1/16"
CRRFCURB067A00	50V Extended Standard Chassis	A	27' 10-13/16"
		B	15' 8-7/32"
CRRFCURB059A00	48V Standard Chassis 50V Standard Chassis w/ Plenum	A	27' 4-9/16"
		B	16' 0-5/8"
CRRFCURB060A00	48V Extended Standard Chassis 50V Extended Standard Chassis w/ Plenum	A	29' 5-13/16"
		B	18' 1-7/8"

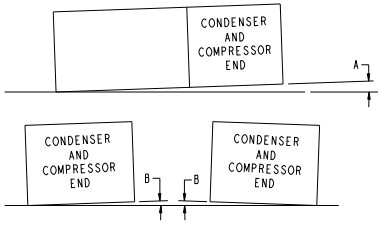
Roof Curb — 48V 27.5-35 Ton Compact Chassis High Heat

NOTES:

1. ROOF CURB ACCESSORY CRRFCURB041A00 IS SHIPPED DISASSEMBLED.
2. ROOFCURB: 14 GA.[VA03-56] STL.
3. DIMENSIONS IN [ ] ARE MILLIMETERS.



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS



DIMENSIONS
(DEGREES AND INCHES)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*FROM EDGE OF UNIT TO HORIZONTAL.

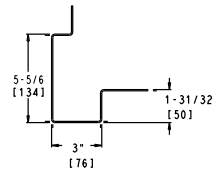
Accessory Part No.	Unit Type
CRRFCURB041A00	48V Compact Chassis - High Heat

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN: EAR99	1 OF 1	02/19/24	-	ROOF CURB ASSY	48VV006087	-

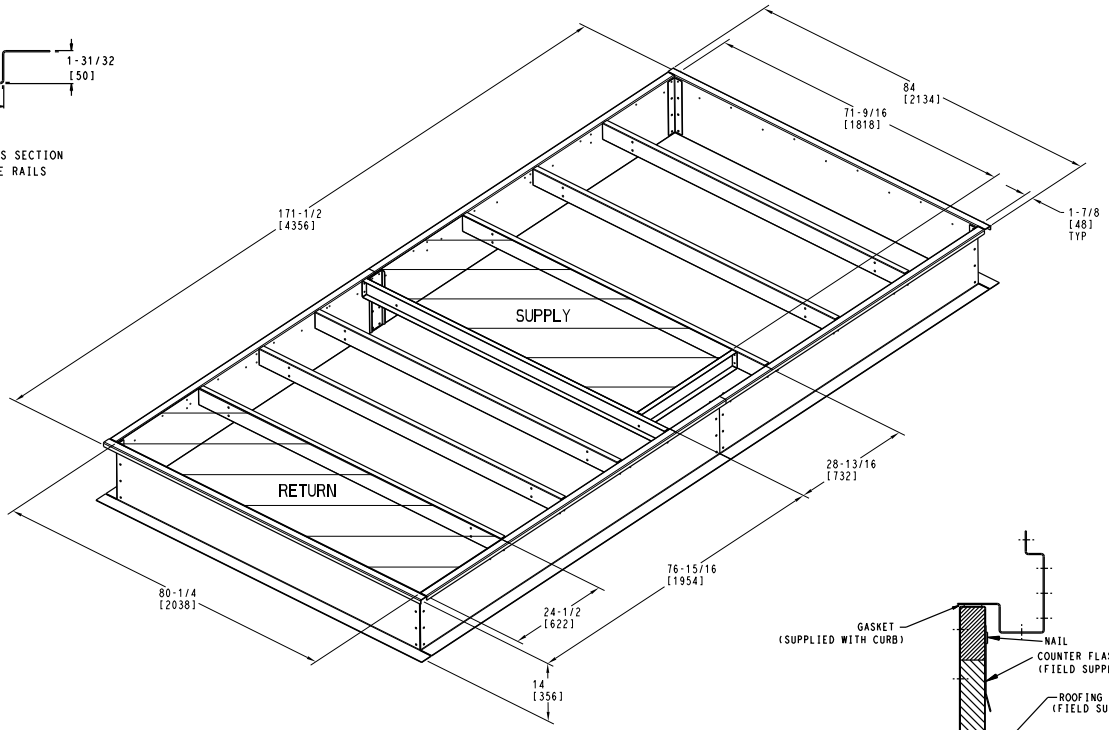
Roof Curb - 48V 27.5-35 Ton Compact Chassis Low Heat, 50V 27-35 Ton Compact Chassis

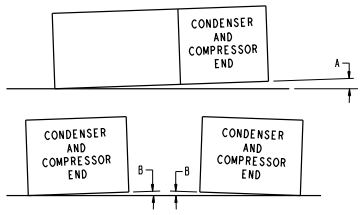
NOTES:

1. ROOF CURB ACCESSORY CRRFCURB040A00 IS SHIPPED DISASSEMBLED.
2. ROOFCURB: 14 GA.[VA03-56] STL.
3. DIMENSIONS IN [ ] ARE MILLIMETERS.



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS





DIMENSIONS
(DEGREES AND INCHES)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*FROM EDGE OF UNIT TO HORIZONTAL.

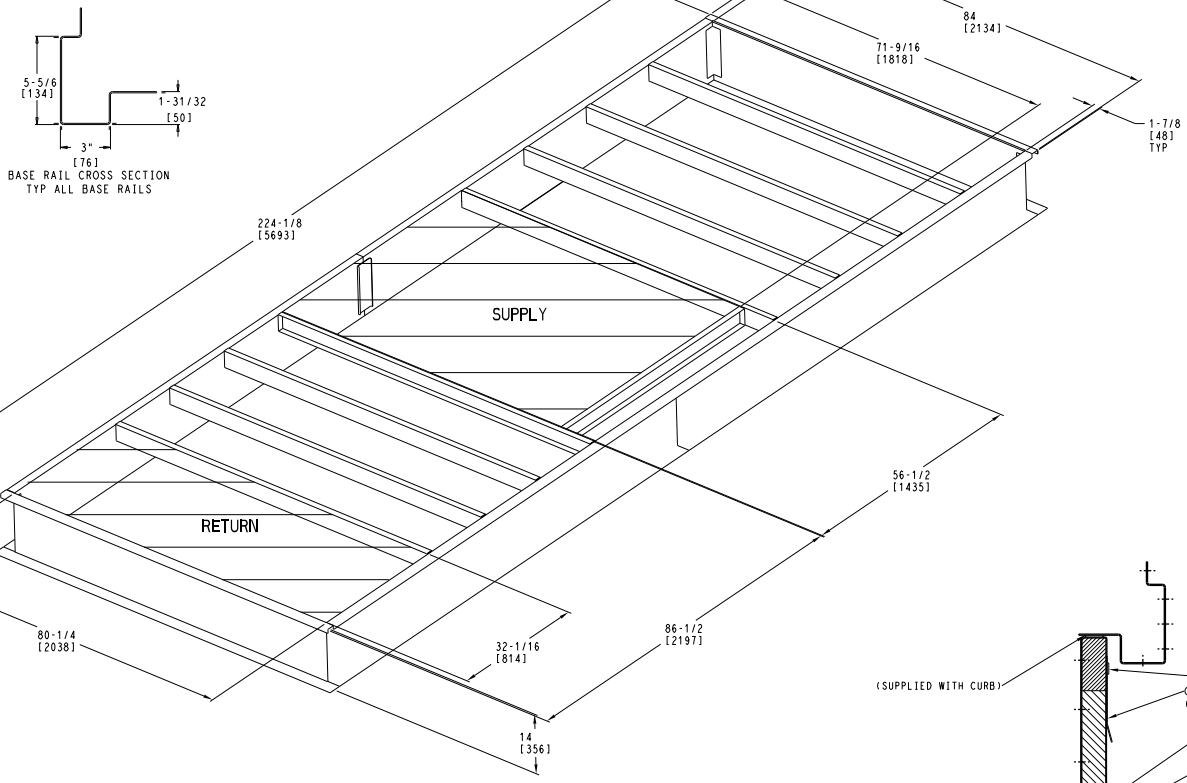
Accessory Part No.	Unit Type
CRRFCURB040A00	48V Compact Chassis - Low Heat 50V Compact Chassis

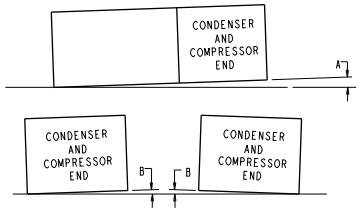
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 1	02/19/24	-	ROOF CURB ASSY	48VV006086	-

Roof Curb — 48/50V 40-50 Ton Compact Chassis

NOTES:

1. ROOF CURB ACCESSORY CRRFCURB042A00 IS SHIPPED DISASSEMBLED.
2. ROOFCURB: 14 GA.[VA03-56] STL.
3. DIMENSIONS IN [ ] ARE MILLIMETERS.





DIMENSIONS (DEGREES AND INCHES)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

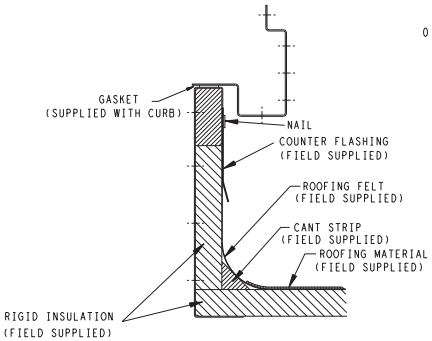
UNIT LEVELING TOLERANCES
•FROM EDGE OF UNIT TO HORIZONTAL..

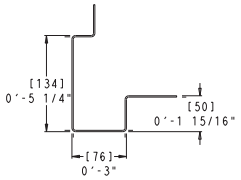
Accessory Part No.	Unit Type
CRRFCURB042A00	48/50V Compact Chassis

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			
U.S. ECCN:EAR99	1 OF 1	03/11/25	02/19/24	ROOF CURB ASSY	48VV007196	REV A

Roof Curb — 48/50V 55-60 Ton Standard Chassis

NOTES:
1. ROOF CURB IS SHIPPED DISASSEMBLED.
2. ROOF CURB: 14 GA.[VA03-56] STL.
3. DIMENSIONS IN [ ] ARE MILLIMETERS.



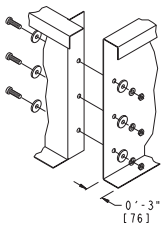


BASE RAIL CROSS SECTION
TYP ALL BASE RAILS

DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.

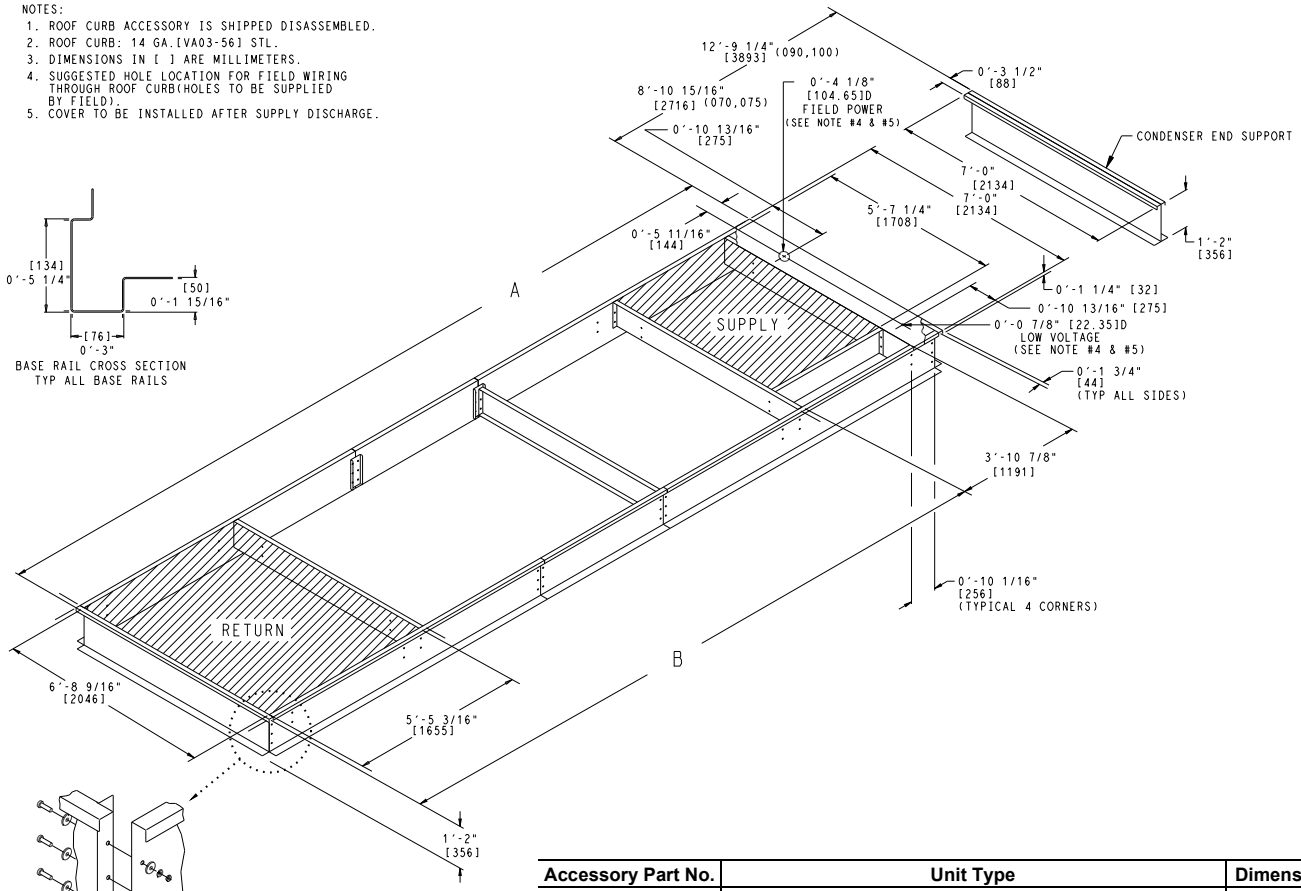


(CORNER CONNECTIONS AND
SPLICE PLATE CONNECTIONS)

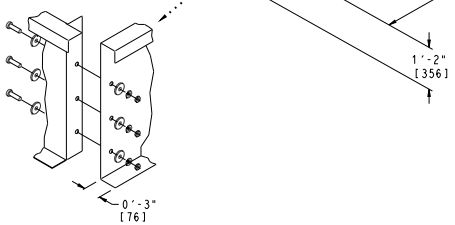
Accessory Part No.	Unit Type	Dimension	Unit Size (54,60)
CRRFCURB068A00	50V Standard Chassis	A	32' 6-7/16"
		B	19' 5-9/16"
CRRFCURB069A00	50V Extended Standard Chassis	A	34' 7-5/8"
		B	21' 6-3/4"
CRRFCURB061A00	48V Standard Chassis 50V Standard Chassis with Plenum	A	35' 11-1/16"
		B	22' 10-3/16"
CRRFCURB062A00	48V Extended Standard Chassis 50V Extended Standard Chassis with Plenum	A	38' 0-1/4"
		B	24' 11-3/8"

Roof Curb — 48/50V 70-100 Ton Standard Chassis

NOTES:
1. ROOF CURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. ROOF CURB: 14 GA.[VA03-56] STL.
3. DIMENSIONS IN [ ] ARE MILLIMETERS.
4. SUGGESTED HOLE LOCATION FOR FIELD WIRING THROUGH ROOF CURB(HOLES TO BE SUPPLIED BY FIELD).
5. COVER TO BE INSTALLED AFTER SUPPLY DISCHARGE.



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS

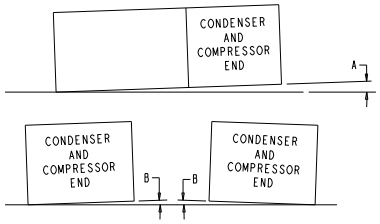


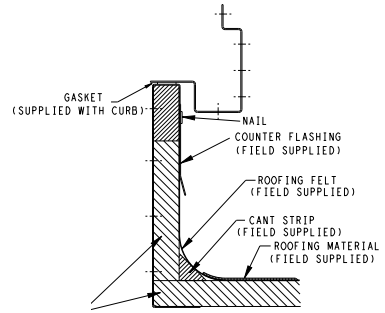
(CORNER CONNECTIONS AND SPLICE PLATE CONNECTIONS)

DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.



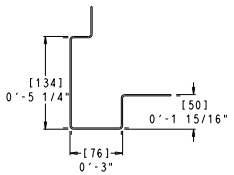


Accessory Part No.	Unit Type	Dimensions	Unit Size 70-98
50DJ-901---001	50V Standard Chassis (70 Ton)	A	24' 5-1/16"
		B	19' 5-9/16"
50DJ-902---641	50V Extended Standard Chassis (70 Ton)	A	26' 6-1/4"
		B	21' 6-3/4"
50DJ-901---011	48V Standard Chassis 50V Standard Chassis with Plenum (70 Ton) 50V Standard Chassis with Plenum (75-100 Ton)	A	27' 9-11/16"
		B	22' 10-3/16"
50DJ-902---631	48V Extended Standard Chassis 50V Extended Standard Chassis (70 Ton) 50V Extended Standard Chassis with Plenum (75-100 Ton)	A	29' 10-7/8"
		B	24' 11-3/8"

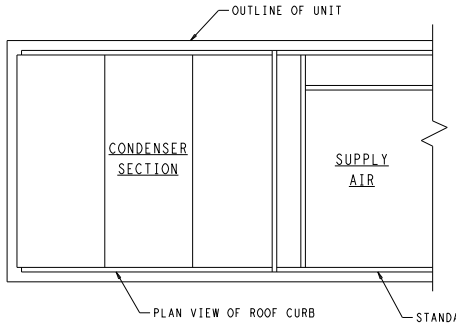
SHEET					
1 OF 1	02/19/09	50DW412157	48/50P070-100 VERTICAL & HORIZONTAL SUPPLY & RETURN W/EXTENDED CHASSIS & PLENUM	48ZZ501985	A.3

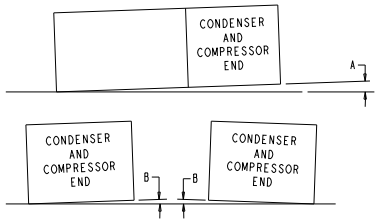
Roof Curb — 48/50V 70-75 Ton Full Perimeter Curb Conversion kit

NOTES:
1. ROOF CURB ACCESSORY CRRFCURB070A00 IS SHIPPED DISASSEMBLED.
2. DIMENSIONS IN [ ] ARE MILLIMETERS.
3. ROOF CURB: 14 GA.[VA03-56] STL.
   ROOF CURB PANS: 16 GA.[VA03-56] STL.



BASE RAIL CROSS SECTION
TYP ALL BASE RAILS

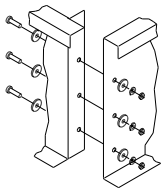


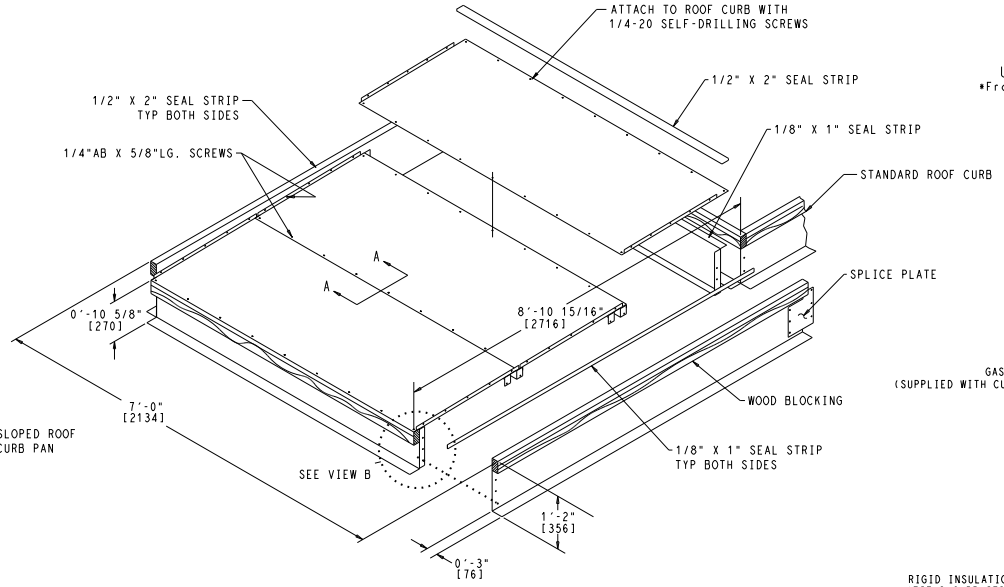


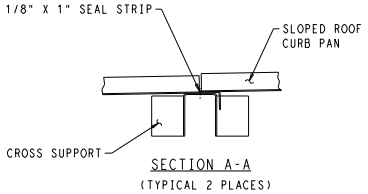
DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

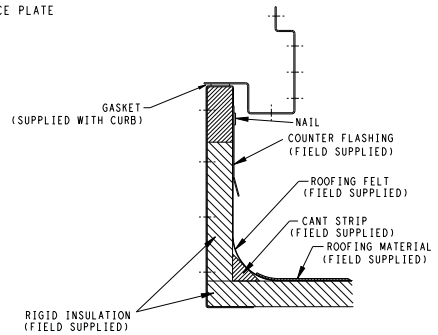
UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.


VIEW B
(CORNER CONNECTIONS AND SPLICE PLATE CONNECTIONS)





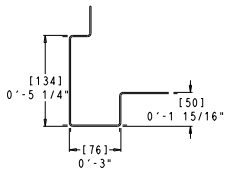
SECTION A-A
(TYPICAL 2 PLACES)



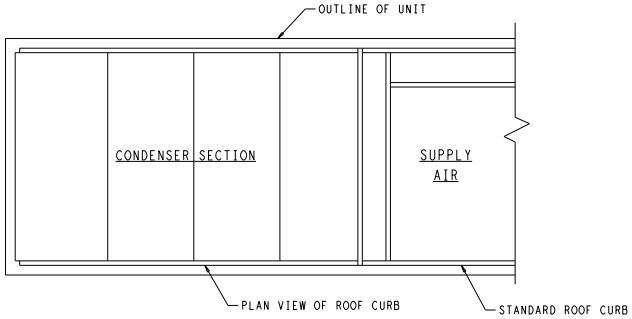
SHEET	DATE	SUPERCEDES			
1 OF 1	08/27/24	02/19/09	50P AND 50V CONDENSER SECTION 70-75 TON	48ZZ501983	B.2

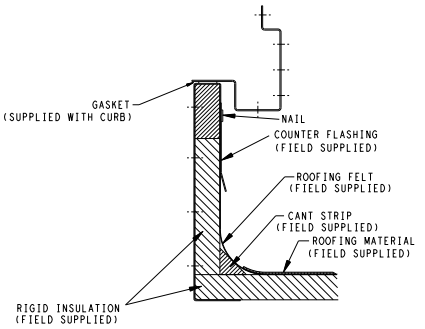
Roof Curb — 48/50V 90-100 Ton Full Perimeter Curb Conversion Kit

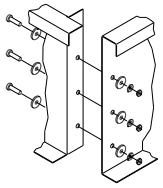
NOTES:
1. ROOF CURB ACCESSORY CRRFCURB071A00 IS SHIPPED DISASSEMBLED.
2. DIMENSIONS IN [ ] ARE MILLIMETERS.
3. ROOF CURB: 14 GA.[VA03-56] STL.
   ROOF CURB PANS: 16 GA.[VA03-56] STL.



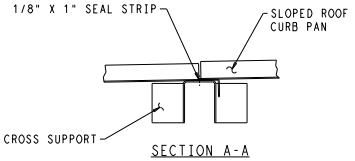
BASE RAIL CROSS SECTION
TYP ALL BASE RAILS



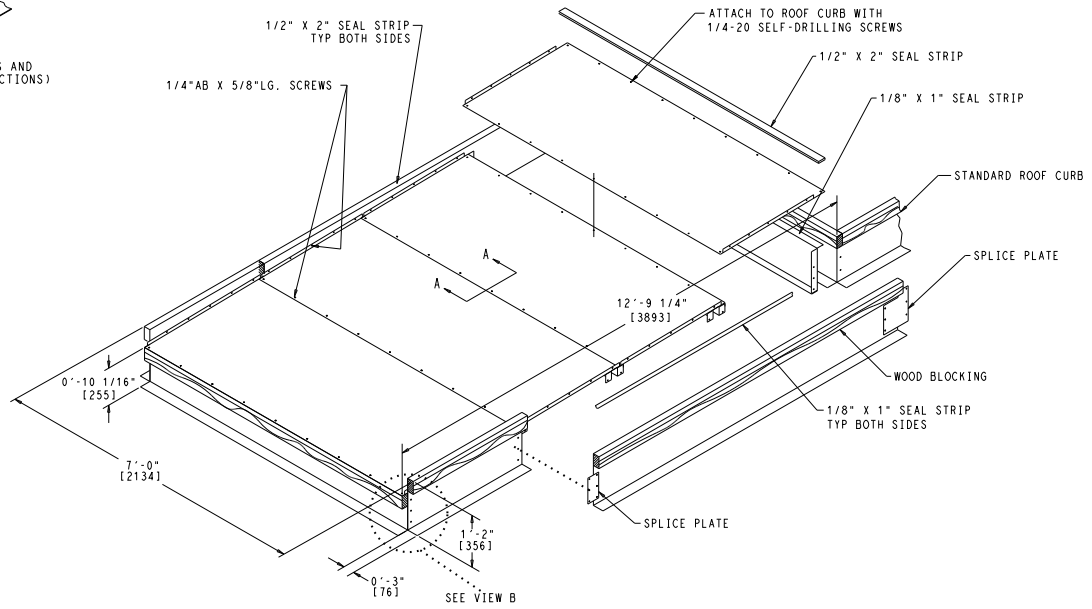


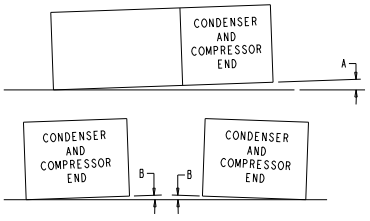


VIEW B
(CORNER CONNECTIONS AND
SPLICE PLATE CONNECTIONS)



SECTION A-A
(TYPICAL 3 PLACES)
SCALE 1:3





DIMENSIONS
(degrees and inches)

A		B	
DEG.	IN.	DEG.	IN.
1.0	2.0	.50	.75

UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.

SHEET	DATE	SUPERCEDES			
1 OF 1	08/27/24	02/19/09	50P AND 50V CONDENSER SECTION 90-100 TON	48ZZ501984	B.2

Performance data

Indoor Fan Performance Data — 48V Size 28-34[a,b,c,d,e]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	567	185	701	344	809	517	901	704	983	904	1058	1116	1127	1340
4,000	659	289	781	484	884	693	973	914	1053	1146	1126	1388	1194	1641
5,000	759	437	870	667	966	913	1051	1171	1128	1438	1199	1715	1265	2000
6,000	866	639	965	906	1054	1188	1134	1481	1208	1786	1277	2099	1341	2420
7,000	976	908	1066	1210	1148	1528	1224	1858	1294	2198	1359	2548	1421	2905
8,000	1090	1254	1172	1592	1247	1945	1318	2311	1384	2687	1447	3073	1506	3467
9,000	1206	1688	1280	2062	1350	2450	1416	2851	1479	3263	1538	3685	1595	4116
10,000	1324	2220	1392	2631	1457	3056	1518	3492	1577	3940	1633	4397	1688	4863
11,000	1442	2863	1505	3310	1566	3771	1623	4242	1679	4726	1732	5219	1784	5720
12,000	1562	3625	1621	4110	1677	4607	1731	5114	1783	5634	1834	6162	1883	6699
13,000	1683	4519	1737	5041	1790	5575	1841	6119	1890	6673	1938	7237	1985	7810
14,000	1804	5556	1855	6115	1904	6686	1952	7266	1999	7857	2045	8456	2089	9064
15,000	1926	6745	1974	7343	2020	7951	2065	8567	2110	9193	2153	9829	2195	10473
16,000	2048	8100	2093	8736	2137	9380	2180	10033	2222	10696	2263	11367	2304	12047
17,000	2171	9629	2213	10303	2255	10985	2295	11675	2335	12375	2375	13083	2413	13797
17,500	2232	10464	2273	11155	2314	11856	2354	12566	2393	13283	2431	14009	2469	14742

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1191	1575	1251	1821	1309	2077	1363	2344	1415	2621	1465	2907	1514	3203
4,000	1257	1902	1317	2173	1374	2453	1428	2742	1480	3040	1530	3347	1577	3661
5,000	1327	2295	1386	2596	1442	2907	1496	3224	1547	3550	1596	3883	1644	4223
6,000	1402	2749	1459	3085	1514	3429	1566	3780	1617	4137	1665	4501	1712	4872
7,000	1480	3271	1536	3644	1589	4023	1641	4409	1690	4801	1738	5199	1784	5604
8,000	1563	3870	1617	4278	1669	4694	1719	5116	1767	5544	1814	5978	1859	6418
9,000	1649	4554	1701	5000	1752	5452	1800	5911	1847	6376	1893	6846	1937	7322
10,000	1740	5337	1790	5819	1838	6308	1885	6803	1931	7304	1975	7812	2018	8323
11,000	1833	6230	1882	6748	1928	7273	1974	7805	2018	8342	2061	8885	2103	9434
12,000	1930	7244	1977	7798	2022	8359	2065	8926	2108	9499	2149	10078	2190	10663
13,000	2030	8391	2074	8980	2118	9576	2160	10179	2201	10788	2241	11404	2280	12025
14,000	2132	9681	2175	10304	2216	10936	2257	11575	2296	12219	2335	12870	2373	13529
15,000	2237	11125	2277	11784	2317	12452	2356	13125	2394	13806	2432	14494	2468	15185
16,000	2343	12734	2382	13430	2420	14132	2458	14842	2494	15558	2531	16280	2566	17009
17,000	2451	14522	2488	15252	2525	15989	2561	16735	2597	17486	2631	18244	2666	19006
17,500	2506	15483	2542	16231	2578	16987	2614	17751	2648	18520	2683	19296	2716	20076

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1560	3508	1605	3823	1649	4146	1691	4477	1732	4817	1772	5165	1812	5522
4,000	1624	3984	1669	4316	1712	4654	1754	5001	1795	5356	1835	5718	1874	6088
5,000	1690	4571	1734	4925	1777	5288	1819	5656	1860	6033	1900	6416	1939	6804
6,000	1758	5250	1802	5633	1845	6023	1886	6420	1927	6822	1966	7231	2005	7646
7,000	1829	6014	1872	6430	1914	6852	1955	7279	1996	7713	2035	8151	2073	8596
8,000	1903	6863	1945	7314	1987	7771	2028	8232	2067	8698	2106	9170	2143	9647
9,000	1980	7803	2022	8290	2063	8782	2102	9278	2141	9780	2179	10286	2216	10797
10,000	2060	8842	2101	9365	2141	9893	2180	10425	2218	10963	2256	11506	2292	12053
11,000	2143	9989	2183	10549	2222	11113	2260	11682	2298	12256	2335	12836	2370	13419
12,000	2230	11255	2269	11852	2307	12453	2344	13058	2380	13670	2416	14285	2451	14905
13,000	2319	12652	2356	13284	2393	13922	2430	14564	2465	15213	2500	15864	2535	16521
14,000	2410	14191	2447	14860	2483	15534	2518	16212	2553	16895	2587	17585	2621	18278
15,000	2505	15885	2540	16589	2575	17299	2609	18012	2643	18732	2676	19457	2709	20187
16,000	2601	17742	2635	18482	2669	19228	2703	19979	—	—	—	—	—	—
17,000	2700	19778	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00158 bhp.
d. Fan performance based on 460-v. See voltage table on page 71 for maximum rpm and watts by fan motor static for alternate voltages.
e. See legend on page 71.

Performance data (cont)

Indoor Fan Performance Data — 48V Size 28-34[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1850	5886	1887	6258	1924	6638	1960	7025	1995	7419
4,000	1912	6464	1950	6848	1986	7239	2022	7638	2057	8042
5,000	1977	7201	2014	7604	2050	8013	2086	8428	2121	8851
6,000	2042	8067	2079	8495	2115	8927	2151	9365	2186	9810
7,000	2110	9046	2147	9501	2183	9962	2218	10429	2252	10900
8,000	2180	10128	2217	10616	2252	11108	2287	11604	2321	12106
9,000	2253	11314	2289	11835	2324	12359	2358	12890	2392	13424
10,000	2328	12604	2363	13160	2398	13720	2432	14285	2465	14854
11,000	2406	14006	2440	14599	2474	15194	2508	15794	2541	16400
12,000	2486	15529	2520	16156	2553	16790	2586	17425	2619	18067
13,000	2569	17181	2602	17846	2635	18516	2667	19188	2699	19865
14,000	2654	18975	2686	19676	2719	20382	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	2029	7821	2063	8230	2096	8647	2129	9069
4,000	2091	8454	2125	8873	2158	9298	2191	9730
5,000	2155	9280	2189	9713	2222	10154	2254	10601
6,000	2220	10260	2253	10716	2286	11179	2319	11646
7,000	2286	11377	2320	11859	2352	12345	2385	12838
8,000	2355	12612	2388	13125	2420	13639	2452	14161
9,000	2425	13963	2458	14507	2490	15055	2522	15606
10,000	2498	15427	2530	16004	2562	16585	2594	17172
11,000	2573	17007	2605	17620	2636	18236	2667	18858
12,000	2650	18712	2682	19360	2713	20012	—	—
13,000	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00158 bhp.
d. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,000	8,000
	Medium	2,290	1,155
	High	2,260	16,800
575	Standard	2,000	8,000
	Medium	2,477	14,000
	High	2,685	18,180

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)
— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 40 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1021	962	1101	1285	1176	1621	1245	1963	1310	2311	1372	2664	1431	3024
9,000	1129	1278	1202	1634	1271	2005	1336	2385	1397	2770	1456	3161	1512	3556
10,000	1238	1665	1305	2052	1369	2458	1430	2875	1487	3298	1543	3726	1596	4159
11,000	1348	2130	1411	2549	1470	2988	1527	3440	1581	3900	1634	4366	1684	4837
12,000	1460	2682	1518	3132	1573	3603	1626	4090	1678	4586	1727	5089	1775	5596
13,000	1572	3329	1626	3810	1678	4313	1728	4832	1776	5363	1824	5901	1869	6447
14,000	1685	4078	1735	4589	1784	5124	1831	5675	1877	6240	1922	6814	1966	7395
15,000	1798	4938	1845	5479	1891	6045	1936	6629	1980	7226	2022	7834	2064	8451
16,000	1912	5916	1956	6488	2000	7084	2042	7698	2084	8328	2124	8970	2164	9621
17,000	2026	7020	2068	7622	2109	8249	2149	8895	2189	9556	2228	10230	2266	10915
18,000	2140	8258	2180	8891	2219	9548	2257	10225	2295	10918	2332	11625	2369	12343
19,000	2254	9638	2292	10301	2330	10988	2366	11697	2402	12421	2438	13158	—	—
20,000	2369	11168	2405	11862	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1488	3391	1542	3764	1594	4146	1645	4535	1694	4933	1741	5339	1787	5753
9,000	1566	3957	1618	4363	1668	4776	1716	5194	1763	5619	1809	6052	1854	6492
10,000	1648	4596	1697	5037	1745	5484	1792	5935	1838	6392	1882	6854	1925	7322
11,000	1733	5311	1781	5789	1827	6272	1872	6758	1916	7249	1958	7745	2000	8245
12,000	1822	6109	1868	6625	1912	7145	1955	7668	1997	8195	2038	8726	2079	9261
13,000	1914	6996	1957	7551	2000	8108	2041	8670	2082	9233	2122	9801	2160	10372
14,000	2008	7982	2050	8574	2090	9168	2130	9767	2169	10368	2208	10974	2245	11582
15,000	2105	9074	2144	9702	2183	10334	2222	10971	2259	11610	2296	12254	2332	12899
16,000	2203	10280	2241	10943	2279	11613	2315	12287	2351	12964	—	—	—	—
17,000	2303	11608	2339	12308	2375	13013	—	—	—	—	—	—	—	—
18,000	2404	13069	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1832	6177	1876	6608	1918	7047	1960	7497	2000	7952	2040	8418	2079	8890
9,000	1897	6939	1940	7393	1981	7854	2022	8324	2062	8802	2100	9286	2139	9778
10,000	1967	7797	2008	8278	2049	8765	2088	9259	2127	9760	2165	10267	2202	10781
11,000	2041	8750	2081	9261	2120	9777	2158	10298	2196	10827	2233	11360	2269	11899
12,000	2118	9799	2157	10343	2195	10890	2232	11442	2268	12000	2304	12562	2340	13129
13,000	2199	10946	2236	11524	2273	12105	2309	12690	—	—	—	—	—	—
14,000	2282	12194	2318	12808	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00158 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 40 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2118	9371	2155	9859	2192	10356	2228	10859	2264	11369
9,000	2176	10278	2213	10785	2249	11299	2284	11820	2319	12350
10,000	2238	11302	2274	11829	2310	12365	2344	12905	—	—
11,000	2305	12444	2340	12995	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2299	11887	2333	12412	2367	12943	—	—
9,000	2354	12886	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00158 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 40 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	911	1281	977	1595	1040	1922	1100	2260	1157	2609	1211	2968	1264	3335
9,000	1000	1686	1060	2034	1118	2393	1174	2763	1227	3142	1278	3532	1328	3929
10,000	1084	2137	1140	2517	1194	2908	1246	3309	1296	3719	1344	4139	1391	4567
11,000	1165	2633	1218	3044	1268	3466	1317	3897	1364	4338	1409	4788	1454	5245
12,000	1244	3173	1293	3614	1340	4066	1386	4528	1431	4998	1474	5478	1516	5964
13,000	1320	3756	1366	4226	1411	4708	1454	5199	1497	5699	1538	6207	1578	6722
14,000	1395	4381	1438	4880	1480	5390	1522	5911	1562	6439	1602	6976	1640	7520
15,000	1467	5047	1509	5575	1549	6114	1588	6662	1627	7219	1665	7783	1702	8356
16,000	1539	5754	1578	6310	1616	6876	1654	7452	1691	8037	1727	8630	1763	9229
17,000	1609	6500	1647	7085	1683	7677	1719	8280	1755	8893	1790	9513	1824	10141
18,000	1679	7288	1714	7898	1750	8519	1784	9148	1818	9787	1852	10434	1885	11088
19,000	1747	8115	1781	8752	1815	9398	1849	10055	1881	10719	1914	11391	1946	12072
20,000	1815	8981	1848	9645	1880	10315	1913	10999	1944	11688	1975	12389	2006	13095

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1314	3713	1363	4099	1411	4495	1457	4898	1501	5310	1545	5730	1587	6157
9,000	1376	4336	1422	4752	1467	5175	1511	5607	1554	6046	1596	6494	1636	6947
10,000	1437	5003	1481	5447	1524	5899	1566	6359	1607	6827	1647	7301	1686	7783
11,000	1497	5711	1539	6184	1581	6664	1621	7153	1660	7649	1699	8151	1737	8659
12,000	1558	6459	1598	6961	1638	7471	1676	7987	1714	8510	1751	9040	1788	9577
13,000	1618	7247	1657	7777	1695	8316	1732	8860	1768	9411	1804	9969	1840	10533
14,000	1678	8072	1715	8631	1752	9197	1788	9771	1823	10350	1858	10935	1892	11527
15,000	1738	8935	1774	9523	1809	10118	1844	10717	1878	11326	1911	11938	1944	12558
16,000	1798	9837	1833	10452	1866	11074	1900	11703	1933	12338	1965	12978	1997	13625
17,000	1858	10775	1891	11416	1924	12067	1956	12723	1988	13384	2019	14053	2050	14726
18,000	1918	11750	1950	12419	1981	13094	2013	13778	2043	14466	2074	15161	2104	15861
19,000	1977	12761	2008	13456	2039	14160	2069	14868	2099	15584	2128	16305	2158	17034
20,000	2037	13808	2067	14531	2096	15258	2126	15995	2155	16734	2183	17483	2212	18236

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1629	6593	1669	7037	1709	7487	1747	7946	1785	8411	1822	8884	1859	9364
9,000	1676	7410	1715	7878	1754	8355	1791	8839	1828	9328	1864	9825	1899	10329
10,000	1725	8271	1762	8767	1799	9269	1836	9779	1871	10293	1906	10816	1941	11344
11,000	1774	9175	1810	9697	1846	10226	1881	10762	1916	11304	1950	11851	1983	12405
12,000	1824	10120	1859	10669	1894	11226	1928	11786	1961	12355	1994	12928	2027	13509
13,000	1874	11104	1908	11680	1942	12264	1975	12853	2008	13446	2040	14046	2071	14653
14,000	1925	12126	1958	12729	1991	13340	2023	13956	2055	14577	2086	15203	2117	15836
15,000	1977	13183	2009	13816	2040	14451	2071	15095	2102	15744	2133	16397	2163	17056
16,000	2029	14277	2060	14936	2090	15601	2121	16269	2150	16944	2180	17626	2209	18312
17,000	2081	15407	2111	16091	2141	16784	2170	17480	2199	18182	2228	18890	2257	19602
18,000	2133	16569	2163	17281	2192	17999	2220	18724	2249	19453	2277	20186	2304	20925
19,000	2186	17766	2215	18505	2243	19250	2271	20001	2299	20757	2326	21517	—	—
20,000	2240	18998	2267	19762	2295	20532	2322	21310	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 40 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1895	9851	1930	10344	1965	10845	1999	11352	2033	11866
9,000	1934	10840	1969	11357	2002	11881	2036	12410	2068	12947
10,000	1975	11879	2008	12420	2041	12967	2073	13521	2106	14081
11,000	2016	12966	2049	13532	2081	14103	2113	14681	2144	15265
12,000	2059	14095	2091	14685	2122	15284	2153	15887	2183	16495
13,000	2103	15264	2133	15883	2164	16505	2194	17133	2224	17767
14,000	2147	16474	2177	17119	2207	17766	2236	18420	2265	19080
15,000	2192	17720	2221	18391	2250	19065	2279	19746	2307	20431
16,000	2238	19002	2267	19700	2295	20401	2323	21107	—	—
17,000	2285	20319	2313	21044	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2066	12387	2098	12912	2130	13445	2162	13985
9,000	2101	13489	2132	14038	2164	14592	2195	15154
10,000	2137	14646	2168	15218	2199	15796	2229	16379
11,000	2174	15853	2205	16449	2235	17050	2264	17656
12,000	2213	17108	2243	17728	2272	18353	2301	18984
13,000	2253	18405	2282	19050	2311	19700	2339	20354
14,000	2294	19746	2322	20415	2350	21089	—	—
15,000	2335	21122	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 50 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1264	1863	1333	2247	1398	2644	1459	3053	1518	3472	1575	3901	1629	4339
11,000	1376	2392	1440	2811	1501	3242	1559	3683	1614	4136	1668	4598	1719	5068
12,000	1490	3021	1549	3474	1606	3938	1660	4414	1713	4899	1763	5394	1812	5897
13,000	1604	3758	1659	4244	1713	4744	1764	5253	1814	5771	1862	6299	1908	6836
14,000	1719	4611	1771	5132	1821	5665	1869	6209	1916	6761	1962	7322	2007	7891
15,000	1835	5589	1883	6146	1931	6713	1976	7290	2021	7877	2065	8471	2107	9074
16,000	1951	6701	1997	7294	2041	7896	2085	8507	2127	9126	2169	9755	2209	10391
17,000	2067	7958	2110	8586	2153	9223	2194	9867	2234	10522	2274	11184	2313	11854
18,000	2184	9368	2225	10030	2265	10701	2304	11381	2343	12069	2381	12766	—	—
19,000	2300	10938	2339	11634	2378	12340	2415	13055	—	—	—	—	—	—
20,000	2417	12679	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1681	4785	1732	5239	1780	5701	1828	6170	1874	6646	1919	7129	1962	7619
11,000	1769	5547	1817	6034	1864	6527	1910	7028	1954	7536	1997	8051	2040	8573
12,000	1860	6409	1906	6928	1951	7454	1995	7987	2038	8528	2080	9075	2120	9628
13,000	1954	7379	1998	7932	2041	8490	2083	9057	2125	9629	2165	10208	2204	10794
14,000	2050	8468	2092	9053	2134	9645	2174	10243	2214	10848	2253	11460	2291	12077
15,000	2149	9684	2189	10302	2229	10927	2268	11557	2306	12195	2344	12839	—	—
16,000	2249	11036	2288	11686	2326	12344	2364	13008	—	—	—	—	—	—
17,000	2351	12531	2388	13216	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	2005	8116	2047	8618	2087	9128	2127	9643	2166	10165	2205	10691	2242	11224
11,000	2081	9100	2121	9634	2161	10174	2200	10720	2238	11272	2275	11828	2312	12392
12,000	2160	10186	2200	10752	2238	11324	2276	11901	2313	12484	2349	13073	—	—
13,000	2243	11385	2281	11981	2318	12585	2355	13194	—	—	—	—	—	—
14,000	2329	12702	—	—	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 50 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	2279	11762	2316	12306	2351	12856	—	—	—	—
11,000	2348	12961	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 50 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1098	2226	1153	2608	1207	3001	1258	3404	1307	3817	1355	4238	1402	4668
11,500	1219	3014	1269	3444	1317	3883	1364	4332	1410	4790	1454	5256	1497	5731
13,000	1335	3907	1381	4381	1425	4866	1468	5359	1510	5862	1551	6372	1591	6891
14,500	1447	4902	1489	5420	1530	5948	1570	6485	1609	7032	1648	7586	1685	8148
16,000	1556	5999	1595	6559	1633	7130	1671	7710	1707	8298	1743	8894	1779	9498
17,500	1663	7196	1699	7799	1735	8411	1770	9031	1804	9661	1838	10299	1872	10944
19,000	1768	8494	1802	9138	1835	9789	1868	10452	1901	11121	1933	11799	1965	12484
20,500	1871	9893	1903	10575	1935	11267	1966	11967	1997	12677	2027	13394	2057	14120
22,000	1973	11394	2003	12115	2033	12845	2063	13582	2092	14330	2121	15086	2149	15849
23,500	2073	12996	2102	13752	2131	14521	2159	15297	2187	16081	2214	16874	2242	17674
25,000	2173	14699	2200	15493	2227	16297	2254	17109	2281	17932	2307	18762	2334	19598

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1447	5107	1491	5553	1534	6007	1576	6469	1616	6937	1656	7413	1695	7897
11,500	1539	6213	1580	6703	1620	7200	1659	7704	1698	8215	1735	8733	1772	9258
13,000	1631	7417	1669	7949	1707	8489	1744	9036	1780	9591	1816	10150	1851	10717
14,500	1722	8715	1758	9292	1794	9874	1829	10463	1863	11059	1897	11662	1930	12269
16,000	1813	10109	1848	10727	1881	11352	1914	11982	1947	12621	1979	13264	2011	13913
17,500	1905	11596	1937	12255	1969	12922	2001	13594	2032	14273	2062	14958	2093	15646
19,000	1996	13176	2027	13876	2057	14582	2087	15295	2117	16015	2146	16740	2175	17472
20,500	2087	14852	2116	15591	2145	16337	2174	17088	2202	17848	2230	18612	2258	19382
22,000	2178	16620	2206	17397	2233	18182	2261	18973	2288	19773	2315	20575	2341	21385
23,500	2269	18484	2295	19300	2322	20122	2348	20952	—	—	—	—	—	—
25,000	2359	20443	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1734	8388	1771	8885	1808	9389	1844	9899	1880	10416	1915	10939	1949	11470
11,500	1809	9790	1844	10327	1879	10871	1914	11421	1948	11979	1981	12540	2014	13108
13,000	1885	11290	1919	11868	1953	12453	1986	13043	2018	13639	2050	14242	2081	14849
14,500	1963	12883	1996	13504	2028	14130	2059	14760	2090	15398	2121	16040	2151	16687
16,000	2042	14568	2073	15229	2104	15896	2134	16568	2164	17247	2193	17930	2222	18617
17,500	2123	16345	2152	17045	2181	17753	2210	18467	2239	19184	2267	19909	2295	20637
19,000	2204	18208	2232	18950	2260	19698	2288	20451	2315	21209	—	—	—	—
20,500	2285	20161	2312	20941	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 50 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1983	12007	2016	12548	2049	13098	2081	13653	2113	14214
11,500	2046	13683	2078	14264	2110	14850	2141	15442	2172	16038
13,000	2113	15463	2143	16082	2174	16707	2204	17338	2233	17972
14,500	2181	17341	2210	17999	2239	18664	2268	19333	2297	20007
16,000	2251	19310	2279	20009	2307	20713	2335	21422	—	—
17,500	2322	21370	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	2144	14781	2175	15354	2206	15933	2236	16518
11,500	2202	16641	2232	17252	2261	17865	2291	18485
13,000	2262	18613	2291	19259	2320	19912	2348	20567
14,500	2325	20686	2353	21371	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 54-60 Standard and Medium Static [a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	675	406	792	663	893	946	983	1252	1065	1578	1140	1922	1211	2283
7,000	778	592	883	900	976	1235	1060	1591	1138	1968	1210	2363	1278	2775
9,000	903	878	996	1241	1080	1630	1158	2039	1230	2469	1299	2916	1363	3380
11,000	1043	1296	1125	1719	1201	2163	1272	2629	1339	3114	1402	3615	1463	4133
13,000	1192	1881	1265	2365	1334	2869	1398	3393	1460	3934	1519	4492	1575	5065
15,000	1349	2667	1414	3214	1475	3779	1535	4363	1591	4963	1646	5579	1698	6211
17,000	1509	3689	1568	4300	1624	4929	1678	5575	1730	6236	1781	6911	1830	7601
19,000	1673	4983	1726	5659	1778	6352	1827	7061	1876	7784	1922	8520	1968	9270
21,000	1840	6582	1888	7325	1935	8084	1981	8856	2026	9643	2069	10441	2112	11254
23,000	2008	8524	2053	9334	2096	10158	2139	10997	2180	11847	2221	12709	2261	13583
25,000	2178	10843	2219	11720	2259	12612	2299	13516	2338	14431	2376	15358	2413	16298
27,000	2349	13575	2387	14521	2424	15479	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1278	2660	1342	3052	1402	3458	1460	3877	1515	4308	1569	4752	1620	5208
7,000	1343	3203	1404	3645	1463	4102	1519	4571	1573	5054	1625	5548	1676	6055
9,000	1424	3860	1483	4355	1539	4862	1593	5384	1646	5918	1696	6464	1745	7023
11,000	1521	4666	1576	5213	1630	5775	1682	6349	1732	6937	1780	7535	1827	8146
13,000	1630	5653	1682	6256	1733	6872	1782	7500	1830	8141	1876	8794	1921	9458
15,000	1749	6855	1798	7514	1846	8185	1893	8869	1938	9565	1982	10274	2025	10994
17,000	1877	8304	1924	9021	1969	9751	2013	10491	2055	11244	2097	12009	2138	12783
19,000	2013	10034	2056	10810	2098	11597	2140	12397	2180	13207	2220	14029	2259	14863
21,000	2154	12077	2194	12914	2234	13761	2274	14621	2312	15491	2350	16373	2387	17262
23,000	2300	14471	2338	15368	2376	16278	2413	17198	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1670	5675	1719	6154	1766	6642	1812	7142	1857	7650	1900	8170	1943	8698
7,000	1725	6573	1772	7102	1819	7642	1864	8191	1908	8752	1951	9322	1992	9901
9,000	1793	7592	1839	8173	1884	8764	1928	9366	1971	9977	2013	10599	2054	11230
11,000	1873	8767	1918	9401	1962	10045	2004	10698	2046	11361	2087	12036	2127	12719
13,000	1965	10134	2008	10821	2050	11516	2092	12223	2132	12940	2172	13668	2210	14404
15,000	2068	11723	2109	12464	2149	13215	2189	13976	2228	14746	2266	15528	2303	16317
17,000	2179	13570	2218	14366	2257	15172	2295	15989	2332	16815	—	—	—	—
19,000	2298	15706	2335	16558	2372	17422	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	14,200
	Medium	2,290	15,720
575	Standard	2,200	14,200
	Medium	2,477	18,680

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 54-60 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1985	9236	2026	9783	2066	10339	2105	10904	2143	11477
7,000	2034	10490	2074	11088	2113	11695	2152	12310	2190	12935
9,000	2094	11869	2134	12520	2172	13178	2210	13845	2248	14520
11,000	2166	13411	2205	14113	2242	14823	2280	15542	2316	16270
13,000	2248	15148	2286	15903	2323	16667	2359	17438	—	—
15,000	2340	17116	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	2181	12058	2218	12647	2255	13245	2290	13851
7,000	2227	13567	2264	14208	2300	14858	2336	15515
9,000	2284	15205	2321	15897	2356	16598	2391	17307
11,000	2352	17006	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	14,200
	Medium	2,290	15,720
575	Standard	2,200	14,200
	Medium	2,477	18,680

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 54-60 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	728	545	829	792	918	1058	1000	1340	1076	1636	1146	1945	1213	2267
7,000	912	1073	995	1391	1070	1725	1141	2074	1208	2437	1271	2812	1331	3199
9,000	1080	1762	1150	2146	1216	2545	1279	2958	1339	3384	1396	3822	1451	4272
11,000	1237	2610	1299	3058	1358	3519	1414	3994	1469	4481	1521	4980	1572	5489
13,000	1388	3618	1443	4127	1497	4649	1548	5183	1598	5730	1646	6287	1693	6854
15,000	1534	4790	1584	5357	1633	5939	1680	6531	1726	7134	1771	7750	1815	8374
17,000	1677	6125	1723	6751	1768	7389	1812	8038	1854	8699	1896	9370	1937	10050
19,000	1817	7627	1860	8311	1901	9005	1942	9710	1982	10427	2021	11152	2059	11889
21,000	1956	9300	1995	10040	2034	10790	2072	11551	2109	12320	2146	13101	2182	13891
23,000	2092	11146	2129	11942	2166	12747	2201	13562	2237	14386	2271	15221	2305	16063
25,000	2227	13169	2262	14018	2296	14877	2330	15746	2363	16625	2396	17511	2429	18408
27,000	2361	15372	2394	16277	2427	17189	2459	18112	2490	19041	2521	19981	2552	20930
29,000	2495	17760	2526	18716	2556	19681	2587	20657	2617	21640	2646	22633	2676	23636
30,000	2561	19021	2591	20007	2621	20997	2651	22001	2680	23011	2709	24030	2738	25058
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1276	2599	1336	2941	1393	3294	1449	3657	1502	4028	1553	4408	1603	4796
7,000	1389	3597	1444	4005	1498	4423	1549	4850	1599	5286	1647	5731	1694	6183
9,000	1504	4732	1555	5202	1605	5682	1653	6171	1700	6669	1745	7176	1790	7690
11,000	1621	6009	1668	6539	1715	7079	1760	7628	1804	8184	1847	8751	1889	9326
13,000	1739	7433	1783	8022	1826	8619	1869	9226	1910	9840	1951	10464	1991	11097
15,000	1857	9008	1899	9653	1940	10307	1980	10971	2019	11641	2057	12322	2095	13010
17,000	1977	10741	2016	11441	2055	12151	2092	12868	2129	13595	2166	14329	2202	15073
19,000	2097	12633	2134	13388	2170	14153	2206	14924	2241	15705	2276	16495	2310	17291
21,000	2218	14691	2253	15500	2287	16315	2321	17142	2355	17975	2388	18817	2420	19668
23,000	2339	16916	2372	17778	2405	18647	2437	19525	2469	20412	2501	21307	2532	22210
25,000	2461	19314	2492	20229	2523	21152	2554	22083	2585	23020	2615	23968	2644	24921
27,000	2583	21890	2613	22857	2642	23829	2672	24811	2701	25805	2730	26800	2758	27806
29,000	2705	24644	2734	25664	2762	26689	2790	27724	—	—	—	—	—	—
30,000	2766	26093	2794	27137	—	—	—	—	—	—	—	—	—	—
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1651	5192	1698	5597	1744	6008	1788	6427	1832	6854	1874	7287	1916	7726
7,000	1740	6644	1785	7114	1828	7589	1870	8072	1912	8563	1953	9061	1992	9566
9,000	1833	8212	1875	8743	1917	9281	1957	9826	1997	10379	2036	10938	2074	11505
11,000	1930	9907	1970	10497	2009	11094	2048	11700	2086	12311	2123	12931	2160	13556
13,000	2030	11735	2068	12384	2105	13038	2142	13700	2179	14370	2214	15047	2249	15730
15,000	2132	13705	2169	14410	2204	15121	2240	15840	2274	16565	2309	17298	2342	18038
17,000	2237	15824	2272	16582	2306	17347	2340	18120	2373	18902	2406	19690	2438	20483
19,000	2344	18095	2377	18908	2410	19727	2442	20555	2474	21388	2505	22230	2536	23076
21,000	2452	20525	2484	21390	2515	22263	2546	23142	2577	24030	2607	24924	2637	25826
23,000	2562	23120	2593	24039	2623	24963	2652	25893	2682	26835	2711	27780	—	—
25,000	2674	25882	2703	26851	2732	27828	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 54-60 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1956	8173	1996	8625	2035	9085	2073	9551	2111	10021
7,000	2031	10076	2070	10594	2107	11117	2144	11647	2181	12182
9,000	2112	12077	2148	12656	2185	13241	2220	13834	2255	14430
11,000	2196	14188	2231	14826	2266	15472	2301	16124	2334	16781
13,000	2284	16420	2318	17117	2352	17820	2385	18529	2417	19244
15,000	2375	18783	2408	19537	2441	20295	2472	21061	2504	21832
17,000	2470	21284	2501	22093	2533	22907	2563	23726	2594	24553
19,000	2567	23931	2597	24795	2627	25660	2657	26536	2686	27416
21,000	2666	26733	2696	27647	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	2148	10499	2184	10982	2220	11471	2255	11966
7,000	2216	12724	2251	13272	2286	13825	2320	14385
9,000	2290	15035	2324	15644	2357	16259	2390	16881
11,000	2368	17445	2401	18114	2433	18788	2465	19470
13,000	2450	19967	2481	20694	2513	21427	2544	22166
15,000	2535	22610	2566	23393	2596	24183	2626	24978
17,000	2624	25387	2653	26226	2683	27068	2712	27920
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 70 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	912	1073	995	1391	1070	1725	1141	2074	1208	2437	1271	2812	1331	3199
9,000	1080	1762	1150	2146	1216	2545	1279	2958	1339	3384	1396	3822	1451	4272
11,000	1237	2610	1299	3058	1358	3519	1414	3994	1469	4481	1521	4980	1572	5489
13,000	1388	3618	1443	4127	1497	4649	1548	5183	1598	5730	1646	6287	1693	6854
15,000	1534	4790	1584	5357	1633	5939	1680	6531	1726	7134	1771	7750	1815	8374
17,000	1677	6125	1723	6751	1768	7389	1812	8038	1854	8699	1896	9370	1937	10050
19,000	1817	7627	1860	8311	1901	9005	1942	9710	1982	10427	2021	11152	2059	11889
21,000	1956	9300	1995	10040	2034	10790	2072	11551	2109	12320	2146	13101	2182	13891
23,000	2092	11146	2129	11942	2166	12747	2201	13562	2237	14386	2271	15221	2305	16063
25,000	2227	13169	2262	14018	2296	14877	2330	15746	2363	16625	2396	17511	2429	18408
27,000	2361	15372	2394	16277	2427	17189	2459	18112	2490	19041	2521	19981	2552	20930
29,000	2495	17760	2526	18716	2556	19681	2587	20657	2617	21640	2646	22633	2676	23636
31,000	2627	20332	2656	21343	2686	22360	2715	23391	2743	24426	2772	25470	2800	26525
33,000	2759	23097	2787	24161	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1389	3597	1444	4005	1498	4423	1549	4850	1599	5286	1647	5731	1694	6183
9,000	1504	4732	1555	5202	1605	5682	1653	6171	1700	6669	1745	7176	1790	7690
11,000	1621	6009	1668	6539	1715	7079	1760	7628	1804	8184	1847	8751	1889	9326
13,000	1739	7433	1783	8022	1826	8619	1869	9226	1910	9840	1951	10464	1991	11097
15,000	1857	9008	1899	9653	1940	10307	1980	10971	2019	11641	2057	12322	2095	13010
17,000	1977	10741	2016	11441	2055	12151	2092	12868	2129	13595	2166	14329	2202	15073
19,000	2097	12633	2134	13388	2170	14153	2206	14924	2241	15705	2276	16495	2310	17291
21,000	2218	14691	2253	15500	2287	16315	2321	17142	2355	17975	2388	18817	2420	19668
23,000	2339	16916	2372	17778	2405	18647	2437	19525	2469	20412	2501	21307	2532	22210
25,000	2461	19314	2492	20229	2523	21152	2554	22083	2585	23020	2615	23968	2644	24921
27,000	2583	21890	2613	22857	2642	23829	2672	24811	2701	25805	2730	26800	2758	27806
29,000	2705	24644	2734	25664	2762	26689	2790	27724	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1740	6644	1785	7114	1828	7589	1870	8072	1912	8563	1953	9061	1992	9566
9,000	1833	8212	1875	8743	1917	9281	1957	9826	1997	10379	2036	10938	2074	11505
11,000	1930	9907	1970	10497	2009	11094	2048	11700	2086	12311	2123	12931	2160	13556
13,000	2030	11735	2068	12384	2105	13038	2142	13700	2179	14370	2214	15047	2249	15730
15,000	2132	13705	2169	14410	2204	15121	2240	15840	2274	16565	2309	17298	2342	18038
17,000	2237	15824	2272	16582	2306	17347	2340	18120	2373	18902	2406	19690	2438	20483
19,000	2344	18095	2377	18908	2410	19727	2442	20555	2474	21388	2505	22230	2536	23076
21,000	2452	20525	2484	21390	2515	22263	2546	23142	2577	24030	2607	24924	2637	25826
23,000	2562	23120	2593	24039	2623	24963	2652	25893	2682	26835	2711	27780	—	—
25,000	2674	25882	2703	26851	2732	27828	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 70 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2031	10076	2070	10594	2107	11117	2144	11647	2181	12182
9,000	2112	12077	2148	12656	2185	13241	2220	13834	2255	14430
11,000	2196	14188	2231	14826	2266	15472	2301	16124	2334	16781
13,000	2284	16420	2318	17117	2352	17820	2385	18529	2417	19244
15,000	2375	18783	2408	19537	2441	20295	2472	21061	2504	21832
17,000	2470	21284	2501	22093	2533	22907	2563	23726	2594	24553
19,000	2567	23931	2597	24795	2627	25660	2657	26536	2686	27416
21,000	2666	26733	2696	27647	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2216	12724	2251	13272	2286	13825	2320	14385
9,000	2290	15035	2324	15644	2357	16259	2390	16881
11,000	2368	17445	2401	18114	2433	18788	2465	19470
13,000	2450	19967	2481	20694	2513	21427	2544	22166
15,000	2535	22610	2566	23393	2596	24183	2626	24978
17,000	2624	25387	2653	26226	2683	27068	2712	27920
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 70 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	830	1178	919	1567	1001	1979	1077	2413	1147	2865	1214	3336	1277	3822
9,000	963	1875	1041	2341	1114	2827	1182	3334	1247	3859	1308	4401	1367	4958
11,000	1084	2696	1154	3233	1220	3790	1283	4366	1342	4960	1400	5570	1455	6194
13,000	1196	3628	1259	4233	1320	4858	1378	5500	1434	6160	1488	6836	1539	7526
15,000	1301	4664	1360	5335	1416	6024	1470	6731	1523	7453	1573	8192	1622	8946
17,000	1401	5795	1456	6529	1508	7281	1559	8050	1609	8834	1657	9634	1703	10449
19,000	1497	7015	1548	7809	1598	8622	1646	9451	1693	10295	1739	11154	1783	12028
21,000	1589	8317	1638	9170	1685	10041	1731	10929	1775	11830	1819	12748	1861	13681
23,000	1679	9695	1725	10607	1770	11535	1813	12479	1856	13437	1898	14410	1938	15400
25,000	1766	11145	1810	12112	1853	13095	1894	14095	1935	15111	1975	16139	2014	17181
27,000	1851	12660	1893	13681	1934	14720	1974	15773	2013	16843	2052	17926	2090	19022
29,000	1935	14234	1975	15311	2014	16402	2053	17510	2090	18630	2127	19766	2164	20916
31,000	2017	15866	2055	16995	2093	18139	2130	19297	2166	20471	2202	21658	2238	22861
33,000	2098	17548	2135	18730	2171	19926	2207	21135	2242	22361	2276	23599	2310	24851
35,000	2177	19280	2213	20511	2248	21756	2282	23016	2316	24291	2350	25579	2383	26883
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1337	4324	1394	4841	1449	5372	1503	5917	1554	6474	1604	7043	1652	7626
9,000	1423	5531	1477	6118	1530	6719	1580	7332	1629	7960	1676	8597	1723	9248
11,000	1507	6835	1559	7490	1608	8157	1656	8838	1703	9531	1749	10237	1793	10954
13,000	1590	8231	1638	8951	1685	9683	1731	10428	1776	11185	1820	11956	1862	12737
15,000	1670	9714	1716	10496	1761	11291	1805	12097	1848	12919	1890	13749	1931	14594
17,000	1749	11278	1793	12119	1836	12975	1878	13843	1920	14723	1960	15615	2000	16519
19,000	1826	12916	1869	13817	1910	14732	1951	15657	1991	16597	2030	17548	2068	18509
21,000	1903	14626	1944	15584	1984	16556	2023	17540	2061	18534	2099	19543	2136	20562
23,000	1978	16400	2018	17415	2056	18443	2094	19482	2131	20534	2167	21597	2203	22673
25,000	2053	18237	2091	19307	2128	20389	2164	21483	2200	22590	2236	23708	2270	24835
27,000	2127	20132	2163	21255	2199	22391	2234	23538	2269	24696	2303	25869	2337	27050
29,000	2200	22077	2235	23252	2270	24442	2304	25642	2338	26853	2371	28078	2404	29310
31,000	2272	24075	2306	25300	2340	26540	2373	27791	2406	29057	2438	30331	2470	31618
33,000	2344	26115	2377	27391	2410	28682	2442	29982	2474	31299	2505	32623	2536	33958
35,000	2415	28197	2447	29522	2479	30864	2511	32213	2542	33578	2572	34953	2602	36337
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1699	8218	1745	8824	1789	9438	1832	10064	1875	10701	1916	11347	1957	12003
9,000	1768	9910	1812	10584	1854	11267	1896	11962	1937	12667	1977	13381	2017	14105
11,000	1836	11681	1878	12421	1920	13171	1960	13932	2000	14702	2039	15482	2077	16274
13,000	1904	13528	1945	14332	1985	15145	2024	15971	2062	16805	2100	17649	2137	18502
15,000	1971	15446	2011	16312	2049	17189	2087	18075	2125	18970	2161	19876	2197	20792
17,000	2039	17433	2077	18358	2114	19294	2151	20241	2187	21198	2223	22163	2258	23142
19,000	2105	19483	2142	20467	2179	21462	2214	22467	2249	23482	2284	24507	2318	25543
21,000	2172	21592	2208	22634	2243	23685	2278	24748	2312	25819	2346	26903	2379	27995
23,000	2238	23760	2273	24856	2307	25963	2341	27081	2374	28207	2407	29346	2439	30496
25,000	2305	25978	2338	27128	2372	28291	2404	29463	2437	30644	2469	31838	2500	33039
27,000	2370	28245	2403	29450	2436	30666	2468	31890	2499	33125	2530	34373	2561	35629
29,000	2436	30558	2468	31814	2500	33080	2531	34361	2561	35647	2592	36946	2622	38256
31,000	2502	32912	2533	34220	2563	35538	2594	36869	2624	38208	2654	39559	2683	40916
33,000	2567	35307	2597	36665	2627	38036	2657	39414	2686	40804	—	—	—	—
35,000	2632	37735	2662	39144	2691	40561	2720	41994	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 70 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1996	12668	2035	13344	2074	14028	2111	14722	2148	15425
9,000	2055	14840	2093	15581	2130	16334	2167	17096	2203	17865
11,000	2114	17072	2151	17881	2187	18699	2223	19526	2258	20363
13,000	2173	19368	2209	20240	2244	21121	2279	22012	2313	22912
15,000	2233	21720	2267	22653	2302	23598	2336	24550	2369	25512
17,000	2292	24125	2326	25121	2360	26126	2393	27138	2425	28161
19,000	2352	26584	2385	27641	2417	28702	2450	29773	2481	30853
21,000	2411	29096	2444	30207	2476	31328	2507	32454	2538	33593
23,000	2471	31653	2503	32819	2534	33994	2565	35177	2595	36372
25,000	2531	34253	2562	35472	2592	36702	2623	37944	2652	39192
27,000	2591	36894	2621	38167	2651	39450	2681	40744	2710	42047
29,000	2652	39574	2681	40897	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2184	16134	2220	16854	2255	17582	2290	18318
9,000	2238	18645	2273	19431	2307	20227	2341	21031
11,000	2292	21207	2326	22060	2360	22921	2393	23789
13,000	2347	23820	2380	24737	2413	25663	2445	26596
15,000	2402	26483	2434	27460	2466	28446	2498	29444
17,000	2457	29191	2489	30229	2520	31275	2551	32333
19,000	2513	31942	2544	33043	2575	34147	2605	35262
21,000	2569	34739	2599	35896	2629	37056	2659	38230
23,000	2625	37577	2655	38788	2684	40005	2713	41235
25,000	2682	40450	2711	41713	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 74 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	946	1199	1026	1524	1099	1864	1169	2219	1234	2587	1296	2967	1355	3358
9,000	1120	1979	1188	2373	1252	2780	1314	3201	1372	3634	1428	4078	1482	4534
11,000	1283	2941	1343	3399	1400	3871	1455	4354	1508	4850	1559	5357	1608	5874
13,000	1439	4083	1492	4604	1544	5137	1594	5683	1642	6239	1689	6806	1735	7383
15,000	1589	5407	1637	5989	1684	6582	1730	7187	1775	7802	1818	8428	1861	9065
17,000	1735	6914	1779	7556	1823	8208	1865	8870	1907	9544	1947	10228	1987	10921
19,000	1878	8607	1919	9307	1959	10016	1999	10736	2038	11467	2076	12207	2113	12957
21,000	2019	10489	2057	11246	2095	12014	2132	12790	2168	13575	2204	14371	2239	15176
23,000	2157	12566	2193	13378	2229	14199	2263	15031	2298	15873	2332	16724	2365	17584
25,000	2295	14834	2328	15702	2362	16579	2395	17467	2427	18363	2459	19268	2491	20182
27,000	2431	17303	2463	18225	2494	19157	2525	20101	2556	21049	2586	22008	2616	22977
29,000	2565	19971	2596	20950	2626	21936	2655	22931	2685	23936	2713	24947	2742	25969
31,000	2699	22848	2728	23881	2757	24922	2785	25967	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1412	3760	1466	4172	1519	4594	1570	5025	1619	5464	1667	5913	1713	6368
9,000	1534	5000	1584	5476	1633	5961	1680	6455	1726	6958	1771	7469	1815	7989
11,000	1656	6402	1703	6939	1748	7486	1793	8041	1836	8605	1878	9177	1919	9758
13,000	1779	7971	1823	8567	1865	9173	1907	9787	1947	10411	1987	11042	2026	11680
15,000	1903	9710	1943	10365	1983	11028	2022	11701	2061	12380	2098	13069	2135	13766
17,000	2026	11623	2064	12334	2102	13054	2139	13783	2175	14520	2211	15265	2246	16019
19,000	2150	13715	2186	14483	2221	15258	2256	16044	2291	16835	2325	17635	2358	18442
21,000	2274	15990	2308	16811	2341	17643	2375	18483	2407	19329	2440	20184	2472	21047
23,000	2398	18451	2430	19328	2462	20213	2494	21107	2525	22008	2556	22917	2586	23832
25,000	2522	21104	2553	22034	2583	22974	2613	23920	2643	24872	2672	25836	2702	26804
27,000	2646	23952	2676	24936	2705	25925	2733	26926	2762	27930	—	—	—	—
29,000	2771	26999	2799	28032	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1758	6832	1802	7304	1845	7783	1887	8270	1928	8763	1969	9263	2008	9770
9,000	1857	8516	1899	9051	1940	9592	1980	10142	2019	10699	2058	11262	2096	11831
11,000	1960	10345	1999	10941	2038	11543	2076	12153	2114	12771	2151	13395	2187	14025
13,000	2065	12327	2102	12983	2139	13644	2175	14312	2211	14989	2246	15671	2281	16361
15,000	2172	14471	2207	15181	2243	15902	2277	16627	2311	17361	2345	18100	2378	18847
17,000	2281	16779	2315	17547	2348	18323	2381	19105	2414	19892	2446	20690	2478	21492
19,000	2391	19259	2424	20081	2456	20911	2487	21749	2519	22594	2550	23445	2580	24301
21,000	2503	21915	2534	22793	2565	23677	2595	24567	2625	25465	2655	26371	2684	27282
23,000	2616	24755	2646	25685	2675	26622	2704	27566	—	—	—	—	—	—
25,000	2730	27780	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,240
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 74 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2047	10284	2085	10803	2122	11329	2159	11862	2195	12401
9,000	2133	12409	2169	12990	2205	13580	2240	14175	2275	14776
11,000	2222	14662	2257	15306	2292	15956	2326	16612	2359	17274
13,000	2315	17057	2349	17759	2382	18469	2415	19184	2447	19904
15,000	2411	19600	2443	20360	2475	21126	2507	21899	2538	22676
17,000	2509	22301	2540	23116	2571	23939	2601	24767	2631	25600
19,000	2610	25166	2640	26035	2670	26912	2699	27796	—	—
21,000	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2231	12945	2265	13494	2300	14050	2334	14611
9,000	2309	15383	2343	15997	2376	16614	2409	17238
11,000	2392	17942	2425	18616	2457	19295	2489	19979
13,000	2479	20632	2510	21364	2541	22101	2572	22845
15,000	2568	23460	2599	24251	2629	25047	2658	25847
17,000	2661	26440	2690	27287	—	—	—	—
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,240
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 74 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	904	1519	987	1938	1064	2379	1135	2840	1202	3319	1266	3814	1326	4326
9,500	1042	2364	1115	2861	1183	3378	1247	3913	1309	4466	1367	5035	1424	5620
11,500	1167	3353	1232	3923	1294	4512	1353	5119	1410	5741	1465	6381	1517	7034
13,500	1282	4473	1342	5113	1399	5770	1454	6446	1507	7137	1558	7842	1608	8564
15,500	1391	5714	1446	6421	1500	7146	1551	7887	1601	8643	1649	9414	1696	10199
17,500	1495	7070	1546	7842	1596	8630	1644	9436	1691	10254	1737	11088	1782	11937
19,500	1594	8532	1642	9366	1689	10217	1735	11084	1780	11964	1823	12859	1866	13769
21,500	1690	10093	1735	10988	1780	11899	1823	12827	1866	13766	1907	14721	1948	15691
23,500	1783	11748	1826	12703	1868	13672	1910	14659	1950	15656	1990	16671	2029	17695
25,500	1873	13488	1914	14503	1955	15530	1994	16574	2033	17628	2071	18699	2109	19780
27,500	1961	15312	2000	16381	2039	17468	2077	18566	2114	19677	2151	20802	2187	21941
29,500	2047	17215	2085	18338	2122	19478	2159	20630	2195	21799	2230	22976	2265	24172
31,500	2132	19186	2168	20366	2204	21560	2239	22767	2274	23986	2308	25221	2341	26465
33,500	2215	21226	2250	22458	2284	23705	2318	24966	2352	26239	2385	27524	2417	28824
35,500	2297	23329	2330	24614	2364	25913	2396	27223	2429	28548	2461	29886	2492	31238
37,500	2377	25488	2410	26823	2442	28173	2474	29540	2505	30917	2536	32305	2567	33704

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	1384	4853	1440	5394	1493	5948	1545	6516	1595	7097	1643	7689	1691	8294
9,500	1478	6219	1530	6830	1580	7456	1629	8095	1677	8746	1723	9410	1768	10084
11,500	1568	7702	1617	8384	1665	9078	1711	9784	1757	10504	1801	11234	1844	11977
13,500	1656	9297	1702	10045	1748	10806	1792	11579	1835	12363	1878	13160	1919	13967
15,500	1741	10998	1786	11811	1829	12634	1872	13471	1913	14318	1954	15179	1993	16049
17,500	1825	12797	1868	13672	1909	14559	1950	15457	1989	16367	2028	17288	2067	18221
19,500	1907	14690	1948	15624	1988	16573	2027	17530	2065	18501	2103	19482	2140	20476
21,500	1988	16672	2027	17665	2065	18671	2103	19689	2140	20718	2176	21758	2212	22809
23,500	2067	18733	2105	19786	2142	20850	2178	21923	2214	23011	2249	24108	2283	25218
25,500	2145	20876	2182	21984	2217	23104	2252	24234	2287	25376	2321	26530	2354	27695
27,500	2223	23092	2258	24253	2292	25428	2326	26614	2359	27815	2392	29021	2425	30241
29,500	2299	25377	2333	26591	2366	27823	2399	29062	2431	30313	2463	31576	2495	32851
31,500	2375	27724	2407	28993	2440	30276	2472	31571	2503	32877	2534	34189	2565	35515
33,500	2449	30133	2481	31458	2513	32791	2543	34134	2574	35492	2604	36858	2634	38238
35,500	2524	32601	2554	33974	2585	35358	2615	36755	2645	38166	2674	39584	2703	41013
37,500	2597	35117	2627	36540	2657	37981	2686	39424	2715	40884	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	1736	8909	1781	9536	1825	10174	1867	10821	1909	11479	1949	12147	1989	12825
9,500	1812	10769	1854	11465	1896	12173	1937	12891	1977	13618	2017	14355	2055	15103
11,500	1886	12729	1927	13494	1967	14268	2007	15053	2046	15846	2084	16650	2121	17465
13,500	1959	14785	1999	15615	2038	16453	2076	17304	2114	18163	2150	19032	2187	19911
15,500	2032	16932	2070	17824	2108	18728	2145	19641	2181	20562	2217	21496	2252	22437
17,500	2104	19165	2141	20118	2178	21082	2213	22059	2248	23041	2283	24035	2317	25038
19,500	2176	21479	2212	22492	2247	23518	2281	24551	2315	25595	2349	26648	2382	27713
21,500	2247	23872	2281	24944	2316	26027	2349	27120	2382	28222	2415	29335	2447	30455
23,500	2317	26335	2351	27466	2384	28606	2417	29754	2449	30917	2481	32083	2512	33262
25,500	2387	28872	2420	30058	2452	31252	2484	32460	2515	33674	2546	34901	2577	36132
27,500	2457	31472	2489	32713	2520	33961	2551	35222	2581	36496	2611	37773	2641	39066
29,500	2526	34135	2557	35430	2587	36732	2618	38047	2647	39369	2677	40707	2706	42050
31,500	2595	36855	2625	38202	2655	39557	2684	40923	—	—	—	—	—	—
33,500	2664	39629	2693	41027	—	—	—	—	—	—	—	—	—	—
35,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
37,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 74 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	2028	13512	2067	14209	2105	14916	2142	15630	2178	16352
9,500	2093	15858	2130	16624	2167	17397	2203	18182	2238	18975
11,500	2158	18289	2194	19122	2229	19963	2264	20812	2299	21670
13,500	2222	20799	2257	21697	2292	22603	2326	23518	2359	24442
15,500	2287	23389	2321	24348	2354	25318	2387	26296	2420	27281
17,500	2351	26051	2384	27071	2417	28102	2449	29143	2481	30190
19,500	2415	28786	2447	29865	2479	30958	2510	32056	2541	33162
21,500	2479	31584	2510	32727	2541	33875	2572	35034	2602	36200
23,500	2543	34450	2574	35649	2604	36856	2634	38070	2663	39294
25,500	2607	37379	2637	38633	2666	39892	2696	41162	—	—
27,500	2671	40360	2700	41669	—	—	—	—	—	—
29,500	—	—	—	—	—	—	—	—	—	—
31,500	—	—	—	—	—	—	—	—	—	—
33,500	—	—	—	—	—	—	—	—	—	—
35,500	—	—	—	—	—	—	—	—	—	—
37,500	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	2214	17084	2249	17825	2284	18574	2318	19330
9,500	2273	19775	2307	20584	2341	21401	2374	22226
11,500	2333	22537	2366	23412	2399	24297	2431	25189
13,500	2392	25373	2425	26313	2457	27263	2489	28218
15,500	2452	28275	2484	29279	2515	30290	2546	31310
17,500	2512	31246	2543	32313	2574	33383	2604	34464
19,500	2572	34279	2602	35403	2632	36537	2662	37677
21,500	2632	37372	2662	38559	2691	39746	2720	40946
23,500	2693	40527	2722	41765	—	—	—	—
25,500	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—
29,500	—	—	—	—	—	—	—	—
31,500	—	—	—	—	—	—	—	—
33,500	—	—	—	—	—	—	—	—
35,500	—	—	—	—	—	—	—	—
37,500	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 90-98 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1009	2139	1084	2617	1154	3115	1220	3632	1283	4167	1342	4718	1400	5284
12,000	1196	3620	1260	4208	1321	4816	1379	5439	1435	6080	1488	6735	1540	7406
15,000	1365	5393	1421	6083	1475	6792	1527	7516	1578	8257	1626	9011	1674	9780
18,000	1520	7426	1571	8214	1620	9017	1667	9838	1714	10673	1759	11522	1803	12385
21,000	1666	9694	1712	10574	1758	11470	1802	12382	1845	13309	1886	14247	1928	15201
24,000	1805	12175	1848	13144	1890	14130	1931	15128	1971	16143	2010	17170	2049	18211
27,000	1939	14849	1979	15904	2018	16976	2057	18060	2094	19158	2131	20269	2168	21393
30,000	2068	17699	2106	18838	2143	19991	2179	21158	2214	22338	2250	23533	2284	24738
33,000	2194	20708	2229	21929	2264	23163	2299	24410	2332	25671	2366	26945	2398	28229
36,000	2317	23861	2350	25160	2383	26470	2416	27796	2448	29136	2480	30485	2511	31851
39,000	2437	27142	2469	28519	2500	29905	2531	31307	2562	32722	2592	34151	2622	35586
42,000	2555	30537	2585	31987	2615	33453	2645	34928	2674	36418	2703	37915	2732	39430
45,000	2671	34032	2700	35557	2729	37095	2757	38645	2785	40207	—	—	—	—
48,000	2785	37613	—	—	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1455	5865	1508	6460	1559	7069	1608	7689	1656	8323	1703	8970	1749	9627
12,000	1590	8091	1639	8789	1686	9500	1732	10224	1777	10959	1820	11706	1863	12465
15,000	1720	10563	1765	11360	1809	12169	1852	12989	1894	13822	1935	14665	1975	15520
18,000	1846	13262	1888	14152	1929	15053	1969	15966	2008	16893	2047	17829	2085	18778
21,000	1968	16167	2007	17146	2046	18138	2084	19140	2121	20156	2158	21181	2194	22218
24,000	2087	19262	2124	20328	2161	21407	2197	22495	2232	23597	2267	24708	2301	25831
27,000	2204	22532	2239	23680	2273	24841	2308	26015	2341	27200	2375	28394	2407	29599
30,000	2318	25956	2352	27186	2385	28430	2417	29684	2449	30947	2481	32224	2512	33509
33,000	2431	29526	2463	30837	2494	32156	2526	33489	2556	34833	2587	36187	2617	37553
36,000	2542	33224	2573	34611	2603	36008	2633	37419	2662	38842	2692	40272	2720	41713
39,000	2652	37039	2681	38500	2710	39973	2739	41457	—	—	—	—	—	—
42,000	2761	40956	—	—	—	—	—	—	—	—	—	—	—	—
45,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1793	10295	1836	10975	1878	11663	1920	12365	1960	13074	2000	13795	2039	14525
12,000	1904	13235	1945	14016	1985	14806	2024	15606	2063	16417	2100	17238	2137	18069
15,000	2014	16388	2053	17263	2091	18151	2128	19048	2164	19957	2200	20872	2236	21799
18,000	2122	19735	2159	20704	2195	21685	2230	22674	2265	23674	2300	24681	2333	25701
21,000	2229	23267	2264	24326	2298	25392	2332	26472	2366	27558	2398	28655	2431	29763
24,000	2335	26964	2368	28108	2401	29263	2433	30427	2465	31601	2497	32781	2528	33975
27,000	2440	30815	2471	32042	2503	33279	2534	34526	2565	35782	2595	37050	2625	38325
30,000	2543	34808	2574	36115	2604	37436	2634	38759	2664	40099	2693	41444	—	—
33,000	2647	38927	2676	40317	2705	41709	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
39,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
45,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	28,500
	Medium	2,610	34,320
575	Standard	2,400	28,500
	Medium	2,685	36,360

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 90-98 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	2077	15265	2114	16012	2151	16769	2188	17537	2223	18312
12,000	2174	18909	2210	19757	2245	20616	2280	21482	2314	22355
15,000	2270	22734	2305	23679	2339	24632	2372	25594	2405	26566
18,000	2367	26729	2400	27766	2432	28809	2464	29866	2496	30928
21,000	2463	30878	2495	32006	2526	33140	2557	34284	2587	35433
24,000	2559	35176	2589	36390	2620	37610	2649	38837	2679	40073
27,000	2655	39612	2684	40904	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—	—	—
39,000	—	—	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—	—	—
45,000	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	2258	19094	2293	19886	2327	20686	2360	21496
12,000	2347	23239	2381	24131	2413	25032	2446	25940
15,000	2437	27545	2469	28533	2501	29527	2532	30531
18,000	2527	31998	2558	33079	2588	34168	2619	35263
21,000	2617	36596	2647	37765	2677	38939	2706	40127
24,000	2708	41324	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—
39,000	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—
45,000	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	28,500
	Medium	2,610	34,320
575	Standard	2,400	28,500
	Medium	2,685	36,360

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 90-98 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	1486	10975	1529	11926	1570	12893	1610	13878	1650	14883	1689	15902	1727	16939
26,000	1550	12449	1590	13450	1630	14470	1669	15507	1707	16560	1744	17630	1781	18713
28,000	1611	13966	1650	15020	1688	16090	1725	17174	1762	18277	1798	19394	1833	20530
30,000	1671	15520	1708	16622	1745	17743	1781	18877	1816	20028	1851	21194	1885	22376
32,000	1729	17102	1765	18256	1800	19423	1835	20607	1869	21805	1902	23019	1936	24248
34,000	1785	18707	1820	19908	1854	21126	1888	22357	1921	23605	1953	24864	1985	26138
36,000	1840	20329	1874	21580	1907	22842	1939	24122	1971	25414	2003	26721	2034	28043
38,000	1894	21960	1927	23258	1959	24568	1990	25893	2021	27233	2052	28586	2082	29952
40,000	1947	23593	1979	24937	2010	26296	2040	27668	2070	29052	2100	30448	2130	31860
42,000	1999	25222	2029	26614	2060	28017	2089	29433	2119	30863	2148	32309	2176	33764
44,000	2050	26841	2080	28281	2109	29727	2138	31192	2166	32666	2195	34154	2223	35654
46,000	2100	28444	2129	29925	2157	31419	2185	32927	2213	34447	2241	35979	2268	37521
48,000	2149	30027	2177	31550	2205	33091	2233	34644	2260	36207	2287	37781	2313	39370
50,000	2198	31575	2225	33143	2252	34728	2279	36323	2306	37933	2332	39552	2358	41185
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	1764	17991	1800	19058	1836	20142	1871	21238	1906	22353	1940	23480	1974	24623
26,000	1816	19813	1852	20929	1886	22059	1921	23206	1954	24365	1987	25539	2020	26727
28,000	1868	21677	1902	22838	1936	24018	1969	25209	2002	26414	2034	27635	2065	28868
30,000	1919	23571	1952	24780	1984	26003	2016	27242	2048	28493	2079	29759	2110	31034
32,000	1968	25490	2000	26744	2032	28014	2063	29299	2094	30594	2125	31905	2155	33225
34,000	2017	27425	2048	28730	2079	30044	2109	31372	2139	32711	2169	34066	2198	35432
36,000	2065	29374	2095	30723	2125	32083	2155	33455	2184	34842	2213	36238	2242	37648
38,000	2112	31330	2142	32723	2171	34127	2200	35545	2228	36972	2257	38417	2285	39869
40,000	2159	33282	2188	34723	2216	36172	2244	37630	2272	39104	2300	40590	2327	42088
42,000	2205	35232	2233	36712	2261	38205	2288	39710	2316	41230	2342	42756	—	—
44,000	2250	37166	2278	38689	2305	40228	2332	41778	—	—	—	—	—	—
46,000	2295	39080	2322	40649	2349	42228	—	—	—	—	—	—	—	—
48,000	2340	40968	2366	42580	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	2007	25777	2039	26948	2072	28131	2103	29330	2134	30539	2165	31762	2196	32998
26,000	2052	27927	2084	29142	2115	30372	2146	31615	2176	32867	2206	34136	2236	35416
28,000	2097	30115	2128	31372	2158	32646	2188	33932	2218	35230	2247	36542	2276	37864
30,000	2141	32326	2171	33631	2201	34947	2230	36278	2259	37618	2288	38973	2316	40340
32,000	2184	34560	2214	35910	2243	37270	2271	38644	2300	40030	2328	41425	2356	42836
34,000	2227	36812	2256	38206	2284	39608	2312	41022	2340	42454	—	—	—	—
36,000	2270	39071	2298	40506	2326	41953	—	—	—	—	—	—	—	—
38,000	2312	41338	2340	42813	—	—	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
44,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
46,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,400	43,200
575	High	2,174	32,640

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 48V Size 90-98 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	2226	34249	2255	35512	2285	36786	2314	38069	2342	39370
26,000	2265	36706	2294	38010	2323	39329	2352	40660	—	—
28,000	2305	39200	2333	40549	2361	41906	—	—	—	—
30,000	2344	41715	2372	43107	—	—	—	—	—	—
32,000	—	—	—	—	—	—	—	—	—	—
34,000	—	—	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—	—	—
44,000	—	—	—	—	—	—	—	—	—	—
46,000	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	2371	40679	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—
28,000	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—
32,000	—	—	—	—	—	—	—	—
34,000	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—
44,000	—	—	—	—	—	—	—	—
46,000	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	High	2,400	43,200
575	High	2,174	32,640

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 28-34[a,b,c,d,e]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	563	179	697	333	805	504	898	691	981	894	1057	1111	1126	1343
4,000	652	277	775	467	878	671	967	887	1048	1116	1121	1357	1190	1610
5,000	749	416	861	642	958	882	1043	1132	1121	1393	1192	1664	1259	1945
6,000	851	605	954	867	1044	1144	1125	1430	1199	1726	1268	2031	1332	2344
7,000	958	855	1052	1153	1135	1466	1212	1789	1283	2121	1349	2461	1411	2809
8,000	1068	1176	1153	1509	1231	1858	1303	2218	1371	2586	1434	2963	1493	3348
9,000	1180	1579	1258	1946	1331	2330	1399	2726	1462	3132	1523	3545	1580	3966
10,000	1293	2073	1366	2475	1434	2894	1497	3325	1558	3767	1615	4217	1670	4674
11,000	1408	2669	1475	3105	1539	3559	1599	4025	1656	4503	1711	4990	1763	5483
12,000	1524	3377	1586	3848	1646	4336	1703	4837	1757	5350	1809	5872	1859	6403
13,000	1640	4207	1699	4713	1755	5234	1808	5771	1860	6318	1910	6876	1958	7442
14,000	1757	5169	1812	5709	1865	6266	1916	6836	1965	7419	2013	8011	2059	8613
15,000	1875	6274	1927	6849	1977	7439	2025	8045	2072	8662	2117	9290	2161	9926
16,000	1993	7532	2042	8142	2089	8766	2135	9406	2180	10057	2223	10719	2265	11390
17,000	2112	8951	2158	9596	2203	10256	2247	10929	2289	11616	2331	12312	2371	13017
17,500	2171	9726	2216	10388	2260	11066	2303	11756	2344	12459	2385	13172	2425	13895

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1192	1588	1253	1846	1312	2116	1367	2399	1420	2694	1471	3000	1521	3317
4,000	1254	1874	1314	2150	1372	2437	1427	2734	1479	3042	1530	3361	1578	3689
5,000	1321	2235	1380	2535	1437	2845	1491	3164	1542	3493	1592	3831	1640	4177
6,000	1393	2665	1451	2995	1506	3333	1559	3679	1610	4033	1658	4395	1706	4766
7,000	1470	3165	1526	3527	1579	3897	1631	4274	1681	4659	1729	5050	1775	5447
8,000	1550	3739	1605	4136	1657	4541	1707	4950	1755	5368	1802	5791	1848	6221
9,000	1635	4394	1687	4827	1738	5267	1787	5713	1834	6165	1879	6622	1924	7085
10,000	1723	5139	1773	5610	1822	6086	1870	6568	1915	7055	1960	7549	2003	8047
11,000	1814	5984	1863	6491	1910	7004	1956	7524	2000	8047	2043	8577	2085	9111
12,000	1908	6939	1955	7483	2001	8034	2045	8589	2088	9150	2130	9716	2171	10286
13,000	2005	8016	2050	8596	2094	9182	2136	9774	2178	10372	2219	10975	2259	11582
14,000	2103	9222	2147	9839	2189	10461	2231	11091	2271	11724	2310	12363	2349	13008
15,000	2204	10570	2246	11222	2287	11881	2327	12546	2366	13216	2404	13892	2441	14573
16,000	2307	12070	2347	12758	2386	13451	2425	14153	2463	14859	2500	15571	2536	16288
17,000	2411	13733	2450	14456	2488	15184	2525	15922	2561	16664	2597	17411	2632	18165
17,500	2464	14628	2502	15368	2539	16115	2576	16870	2611	17629	2647	18396	2681	19166

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1568	3644	1614	3983	1659	4332	1702	4690	1744	5059	1785	5436	1825	5823
4,000	1625	4027	1671	4375	1715	4733	1758	5099	1800	5475	1841	5859	1881	6252
5,000	1687	4533	1732	4897	1775	5269	1818	5651	1859	6040	1900	6437	1939	6844
6,000	1751	5144	1796	5530	1839	5924	1881	6325	1922	6734	1962	7150	2001	7574
7,000	1820	5853	1864	6266	1906	6685	1947	7111	1988	7543	2027	7984	2066	8429
8,000	1892	6656	1935	7098	1976	7546	2017	8001	2057	8462	2096	8928	2134	9401
9,000	1967	7554	2009	8029	2050	8508	2090	8995	2129	9485	2167	9982	2204	10484
10,000	2045	8550	2086	9059	2126	9573	2165	10091	2204	10615	2241	11144	2278	11678
11,000	2126	9650	2167	10195	2206	10743	2244	11297	2281	11855	2318	12417	2354	12986
12,000	2211	10863	2250	11442	2288	12027	2325	12617	2362	13210	2398	13808	2433	14411
13,000	2297	12195	2335	12812	2373	13432	2409	14059	2445	14688	2480	15323	2515	15960
14,000	2387	13658	2424	14311	2460	14969	2496	15631	2531	16298	2565	16969	2599	17643
15,000	2478	15259	2514	15949	2549	16645	2584	17344	2618	18046	2652	18754	2685	19465
16,000	2572	17012	2607	17739	2641	18471	2675	19206	2708	19947	—	—	—	—
17,000	2667	18924	2701	19687	—	—	—	—	—	—	—	—	—	—
17,500	2715	19943	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table on page 97 for maximum rpm and watts by fan motor static for alternate voltages.
e. See legend on page 97.

Performance data (cont)

Indoor Fan Performance Data — 50V Size 28-34[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	1864	6218	1903	6624	1940	7038	1977	7460	2013	7892
4,000	1920	6654	1958	7065	1995	7483	2031	7910	2067	8345
5,000	1978	7258	2016	7679	2053	8108	2089	8545	2124	8990
6,000	2039	8006	2076	8443	2113	8889	2149	9341	2184	9800
7,000	2104	8883	2140	9342	2177	9808	2212	10281	2247	10760
8,000	2171	9879	2207	10364	2243	10856	2278	11352	2313	11855
9,000	2241	10991	2277	11505	2312	12023	2347	12548	2381	13077
10,000	2314	12217	2349	12761	2384	13310	2418	13864	2452	14424
11,000	2390	13558	2424	14135	2458	14715	2492	15302	2525	15892
12,000	2468	15018	2502	15629	2536	16244	2569	16864	2601	17487
13,000	2549	16603	2582	17249	2615	17899	2647	18554	2679	19213
14,000	2632	18321	2665	19003	2697	19691	2729	20380	—	—
15,000	2717	20180	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	2048	8331	2083	8779	2117	9235	2150	9697
4,000	2102	8788	2137	9239	2171	9697	2204	10162
5,000	2159	9442	2194	9901	2227	10368	2260	10841
6,000	2219	10268	2253	10741	2286	11220	2319	11707
7,000	2281	11246	2315	11738	2348	12236	2381	12740
8,000	2346	12363	2380	12877	2413	13398	2445	13924
9,000	2414	13612	2447	14152	2480	14697	2511	15248
10,000	2485	14987	2517	15555	2549	16129	2581	16707
11,000	2558	16487	2590	17087	2621	17690	2652	18299
12,000	2633	18115	2664	18747	2696	19385	2726	20025
13,000	2711	19875	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,000	8,000
	Medium	2,290	1,155
	High	2,260	16,800
575	Standard	2,000	8,000
	Medium	2,477	14,000
	High	2,685	18,180

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)
— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 40 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	998	877	1080	1194	1156	1527	1226	1868	1293	2214	1356	2566	1415	2924
9,000	1103	1166	1178	1513	1248	1880	1314	2258	1377	2642	1436	3031	1493	3424
10,000	1210	1520	1279	1896	1344	2296	1406	2710	1465	3130	1521	3557	1575	3988
11,000	1319	1949	1382	2353	1443	2784	1501	3231	1556	3687	1610	4151	1661	4619
12,000	1428	2457	1487	2890	1544	3351	1598	3830	1651	4322	1701	4821	1750	5327
13,000	1538	3054	1593	3515	1647	4006	1698	4516	1747	5041	1795	5575	1842	6116
14,000	1649	3748	1701	4236	1751	4755	1799	5296	1846	5852	1892	6421	1936	6996
15,000	1761	4544	1809	5060	1856	5608	1902	6178	1946	6765	1990	7365	2032	7976
16,000	1872	5451	1918	5995	1962	6571	2006	7170	2048	7788	2090	8420	2130	9062
17,000	1984	6476	2028	7049	2070	7652	2111	8279	2151	8928	2191	9589	2229	10264
18,000	2097	7626	2138	8228	2178	8858	2217	9516	2256	10191	2293	10883	2330	11590
19,000	2210	8909	2248	9539	2287	10199	2324	10883	2361	11587	2397	12310	2432	13046
20,000	2322	10333	2360	10992	2396	11680	2432	12391	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
8,000	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1473	3289	1527	3660	1580	4039	1631	4426	1680	4822	1728	5226	1775	5638
10,000	1548	3823	1600	4227	1651	4637	1700	5054	1748	5477	1794	5907	1839	6344
11,000	1628	4423	1678	4863	1727	5307	1774	5756	1820	6211	1865	6671	1908	7137
12,000	1711	5093	1759	5569	1806	6049	1851	6534	1896	7023	1939	7516	1981	8014
13,000	1798	5836	1844	6351	1889	6868	1932	7389	1975	7915	2017	8444	2057	8976
14,000	1887	6663	1931	7215	1974	7771	2016	8329	2057	8892	2098	9456	2137	10025
15,000	1979	7579	2021	8168	2063	8761	2103	9357	2143	9956	2181	10560	2219	11166
16,000	2073	8594	2114	9217	2154	9848	2192	10481	2230	11118	2268	11759	2305	12402
17,000	2170	9714	2208	10373	2246	11039	2284	11708	2320	12382	2357	13061	—	—
18,000	2267	10950	2305	11642	2341	12342	2377	13047	—	—	—	—	—	—
19,000	2367	12307	2402	13031	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
8,000	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1820	6058	1864	6488	1907	6926	1948	7371	1989	7826	2029	8288	2069	8759
10,000	1883	6789	1926	7241	1968	7700	2008	8167	2048	8642	2088	9124	2126	9613
11,000	1951	7609	1992	8088	2033	8572	2073	9064	2112	9561	2150	10067	2187	10578
12,000	2022	8517	2062	9025	2102	9539	2141	10058	2179	10582	2216	11114	2252	11651
13,000	2097	9513	2136	10054	2175	10599	2212	11150	2249	11704	2285	12263	2321	12829
14,000	2176	10598	2213	11173	2251	11753	2287	12337	2323	12923	—	—	—	—
15,000	2257	11775	2293	12386	2329	13001	—	—	—	—	—	—	—	—
16,000	2341	13048	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 40 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2107	9236	2145	9723	2182	10217	2218	10718	2254	11227
9,000	2164	10111	2201	10615	2237	11127	2273	11646	2308	12172
10,000	2224	11096	2260	11620	2296	12153	2331	12692	—	—
11,000	2288	12192	2324	12742	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2289	11743	2324	12266	2358	12796	—	—
9,000	2342	12706	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 40 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	891	1196	959	1507	1023	1831	1084	2166	1141	2512	1196	2867	1249	3233
9,000	979	1573	1041	1917	1099	2272	1156	2638	1209	3015	1261	3401	1311	3796
10,000	1061	1990	1119	2366	1173	2752	1226	3149	1276	3556	1325	3972	1373	4397
11,000	1141	2448	1194	2853	1245	3271	1294	3697	1342	4134	1389	4580	1434	5033
12,000	1217	2943	1267	3379	1315	3825	1362	4282	1407	4748	1451	5223	1494	5705
13,000	1292	3476	1338	3940	1384	4415	1428	4901	1471	5396	1513	5898	1554	6409
14,000	1364	4043	1408	4537	1451	5041	1493	5554	1534	6076	1575	6607	1614	7147
15,000	1435	4647	1477	5168	1518	5699	1558	6240	1597	6790	1636	7348	1673	7914
16,000	1504	5284	1544	5832	1584	6389	1622	6957	1659	7534	1696	8121	1733	8715
17,000	1573	5955	1611	6528	1648	7113	1685	7707	1721	8311	1757	8923	1791	9542
18,000	1640	6658	1677	7258	1713	7868	1748	8487	1783	9117	1817	9756	1850	10401
19,000	1707	7394	1742	8019	1776	8655	1810	9299	1844	9954	1876	10617	1909	11290
20,000	1772	8161	1806	8812	1839	9472	1872	10142	1904	10821	1936	11510	1967	12206

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1301	3608	1350	3992	1398	4384	1444	4786	1489	5195	1533	5613	1576	6039
9,000	1360	4200	1407	4613	1452	5033	1497	5462	1540	5899	1582	6344	1623	6795
10,000	1419	4830	1463	5271	1507	5720	1549	6177	1591	6641	1631	7113	1671	7592
11,000	1477	5496	1520	5965	1562	6443	1603	6927	1642	7419	1681	7918	1720	8425
12,000	1536	6195	1577	6693	1617	7199	1656	7713	1694	8232	1732	8759	1769	9291
13,000	1594	6928	1633	7454	1672	7989	1709	8529	1746	9077	1783	9630	1818	10191
14,000	1652	7693	1690	8247	1727	8809	1763	9377	1799	9952	1834	10534	1868	11121
15,000	1710	8489	1747	9072	1782	9660	1817	10255	1852	10857	1885	11466	1919	12081
16,000	1768	9315	1803	9925	1837	10539	1871	11163	1905	11792	1937	12428	1970	13069
17,000	1826	10171	1859	10806	1893	11450	1925	12099	1958	12754	1989	13416	2021	14085
18,000	1883	11055	1916	11717	1948	12385	1980	13061	2011	13743	2042	14433	2072	15126
19,000	1941	11969	1972	12655	2003	13350	2034	14051	2064	14759	2094	15475	2124	16194
20,000	1998	12910	2029	13624	2059	14342	2089	15070	2118	15803	2147	16543	2176	17288

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1617	6471	1658	6913	1698	7363	1737	7818	1775	8282	1812	8753	1849	9230
9,000	1663	7255	1702	7721	1741	8195	1779	8676	1816	9165	1852	9660	1888	10161
10,000	1710	8077	1748	8570	1785	9070	1821	9576	1857	10089	1893	10609	1927	11135
11,000	1757	8937	1794	9457	1830	9982	1865	10515	1900	11053	1934	11598	1968	12149
12,000	1805	9831	1840	10377	1875	10929	1910	11488	1944	12054	1977	12624	2010	13201
13,000	1853	10758	1888	11330	1922	11909	1955	12495	1988	13087	2020	13684	2052	14286
14,000	1902	11716	1936	12314	1969	12921	2001	13532	2033	14151	2064	14774	2096	15403
15,000	1952	12703	1984	13330	2016	13962	2048	14601	2079	15243	2109	15894	2140	16549
16,000	2002	13717	2033	14370	2064	15031	2095	15696	2125	16366	2155	17043	2184	17724
17,000	2052	14759	2082	15440	2112	16125	2142	16817	2172	17513	2201	18216	2230	18925
18,000	2102	15828	2132	16535	2161	17246	2190	17964	2219	18689	2247	19416	2275	20149
19,000	2153	16923	2182	17653	2211	18393	2239	19136	2267	19884	2294	20641	2322	21399
20,000	2204	18040	2232	18798	2260	19562	2288	20334	2315	21108	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 40 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	1885	9716	1920	10207	1955	10706	1990	11211	2023	11722
9,000	1923	10670	1957	11185	1991	11705	2025	12233	2057	12767
10,000	1961	11667	1995	12206	2028	12751	2061	13302	2093	13859
11,000	2001	12707	2034	13270	2066	13839	2098	14414	2129	14996
12,000	2042	13783	2074	14371	2105	14967	2136	15566	2167	16171
13,000	2084	14894	2115	15509	2145	16127	2176	16753	2206	17383
14,000	2126	16038	2156	16676	2186	17323	2216	17972	2245	18628
15,000	2169	17210	2199	17875	2228	18546	2257	19224	2286	19904
16,000	2213	18410	2242	19101	2271	19799	2299	20501	2327	21209
17,000	2258	19637	2286	20355	2314	21078	—	—	—	—
18,000	2303	20890	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
8,000	2057	12242	2089	12767	2121	13297	2153	13835
9,000	2090	13308	2122	13853	2153	14407	2185	14966
10,000	2125	14422	2156	14992	2187	15566	2217	16148
11,000	2160	15581	2191	16175	2221	16772	2251	17376
12,000	2197	16781	2227	17399	2257	18021	2286	18647
13,000	2235	18018	2264	18659	2293	19307	2322	19958
14,000	2274	19290	2303	19955	2331	20625	2359	21304
15,000	2314	20590	2342	21282	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 50 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1235	1716	1306	2094	1372	2486	1435	2890	1495	3305	1553	3730	1608	4164
11,000	1346	2205	1411	2617	1473	3042	1532	3479	1589	3927	1643	4384	1696	4851
12,000	1457	2787	1518	3232	1576	3690	1632	4161	1685	4641	1737	5130	1787	5629
13,000	1570	3469	1626	3949	1681	4440	1733	4944	1784	5457	1833	5979	1880	6510
14,000	1683	4260	1736	4774	1787	5300	1836	5836	1884	6381	1931	6936	1976	7501
15,000	1796	5169	1846	5717	1894	6275	1941	6846	1987	7425	2031	8013	2074	8609
16,000	1910	6203	1957	6785	2003	7379	2047	7981	2091	8595	2133	9216	2174	9846
17,000	2025	7372	2069	7990	2112	8616	2155	9253	2196	9899	2236	10553	2276	11216
18,000	2139	8684	2181	9335	2223	9997	2263	10667	2302	11346	2341	12035	2379	12731
19,000	2254	10147	2294	10833	2334	11529	2372	12234	2410	12947	—	—	—	—
20,000	2370	11770	2408	12491	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1661	4608	1712	5059	1761	5518	1809	5984	1856	6458	1901	6938	1945	7425
11,000	1746	5325	1795	5808	1843	6298	1889	6797	1934	7301	1978	7813	2020	8332
12,000	1835	6136	1882	6652	1927	7174	1972	7704	2015	8240	2057	8783	2099	9334
13,000	1926	7050	1971	7596	2015	8151	2058	8713	2100	9281	2141	9857	2181	10439
14,000	2020	8072	2064	8652	2106	9240	2147	9833	2187	10433	2226	11041	2265	11654
15,000	2117	9215	2158	9827	2198	10446	2238	11071	2277	11704	2315	12344	2352	12989
16,000	2215	10482	2254	11127	2293	11780	2331	12438	2369	13104	—	—	—	—
17,000	2315	11887	2353	12564	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1988	7920	2030	8420	2071	8926	2112	9440	2151	9957	2190	10483	2228	11014
11,000	2062	8856	2103	9389	2143	9925	2182	10469	2220	11018	2258	11571	2295	12132
12,000	2139	9889	2179	10453	2218	11020	2256	11595	2293	12173	2330	12759	—	—
13,000	2220	11025	2258	11619	2296	12219	2333	12824	—	—	—	—	—	—
14,000	2303	12274	2340	12899	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 50 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	2265	11550	2301	12091	2337	12638	2373	13191	—	—
11,000	2331	12699	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—
14,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
18,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 50 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1075	2078	1132	2456	1186	2845	1238	3244	1288	3653	1337	4071	1384	4499
11,500	1194	2806	1245	3230	1294	3664	1341	4108	1387	4562	1432	5025	1476	5495
13,000	1307	3625	1353	4093	1398	4571	1442	5059	1485	5556	1526	6063	1567	6576
14,500	1416	4532	1459	5043	1500	5564	1541	6095	1581	6634	1620	7183	1658	7738
16,000	1522	5526	1562	6077	1601	6640	1639	7212	1676	7793	1712	8383	1748	8980
17,500	1626	6605	1663	7196	1699	7799	1735	8411	1770	9031	1804	9661	1838	10299
19,000	1728	7767	1762	8398	1797	9040	1830	9691	1863	10351	1896	11019	1928	11694
20,500	1828	9013	1861	9681	1893	10361	1925	11049	1956	11747	1987	12453	2018	13168
22,000	1927	10341	1958	11046	1988	11762	2018	12487	2048	13221	2078	13965	2107	14716
23,500	2024	11752	2054	12492	2083	13243	2111	14003	2140	14775	2168	15554	2196	16341
25,000	2121	13246	2149	14020	2176	14804	2204	15602	2231	16405	2258	17219	2285	18041

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1429	4934	1474	5377	1517	5828	1559	6285	1600	6751	1641	7225	1680	7706
11,500	1518	5973	1560	6459	1600	6953	1640	7454	1679	7962	1717	8477	1754	8998
13,000	1607	7098	1646	7626	1684	8162	1721	8705	1758	9255	1794	9811	1830	10373
14,500	1695	8302	1732	8872	1768	9451	1804	10035	1838	10626	1873	11223	1906	11826
16,000	1784	9585	1818	10197	1852	10815	1886	11441	1919	12073	1952	12712	1984	13355
17,500	1872	10944	1905	11596	1937	12255	1969	12922	2001	13594	2032	14273	2062	14958
19,000	1960	12379	1991	13071	2022	13770	2052	14474	2082	15187	2112	15905	2142	16630
20,500	2048	13891	2078	14621	2107	15357	2136	16101	2165	16853	2193	17608	2221	18371
22,000	2136	15476	2164	16242	2192	17018	2220	17798	2248	18587	2275	19383	2302	20184
23,500	2223	17136	2251	17941	2277	18750	2304	19568	2331	20395	2357	21227	—	—
25,000	2311	18873	2337	19711	2363	20558	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1719	8194	1757	8688	1794	9190	1830	9698	1866	10211	1901	10733	1935	11260
11,500	1791	9526	1827	10061	1862	10601	1897	11149	1931	11701	1965	12261	1998	12826
13,000	1865	10943	1899	11516	1933	12099	1966	12686	1998	13279	2031	13877	2062	14481
14,500	1939	12436	1972	13052	2004	13673	2036	14301	2068	14935	2098	15573	2129	16217
16,000	2016	14006	2047	14663	2078	15325	2108	15991	2138	16665	2168	17344	2197	18026
17,500	2093	15649	2123	16345	2152	17045	2181	17753	2210	18467	2239	19184	2267	19909
19,000	2171	17360	2199	18097	2228	18837	2256	19585	2283	20336	2311	21095	—	—
20,500	2249	19139	2277	19916	2304	20695	2331	21481	—	—	—	—	—	—
22,000	2329	20990	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 50 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1969	11794	2003	12335	2036	12882	2068	13433	2100	13993
11,500	2031	13399	2063	13975	2094	14560	2126	15147	2157	15742
13,000	2094	15092	2125	15707	2155	16328	2185	16956	2215	17588
14,500	2159	16867	2189	17521	2218	18180	2247	18846	2276	19516
16,000	2226	18716	2255	19411	2283	20111	2311	20815	2339	21523
17,500	2295	20637	2322	21370	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	2132	14556	2163	15127	2194	15703	2224	16286
11,500	2187	16343	2217	16949	2247	17560	2276	18178
13,000	2245	18225	2274	18868	2302	19516	2331	20168
14,500	2305	20194	2333	20874	2360	21560	—	—
16,000	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
575	High	2,174	16,230

LEGEND

— High Static (208/230/460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 54-60 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	512	162	661	381	780	634	883	915	974	1219	1056	1543	1133	1885
7,000	679	365	799	649	902	962	993	1301	1076	1662	1152	2042	1224	2441
9,000	841	671	941	1017	1030	1391	1112	1788	1187	2206	1258	2643	1324	3097
11,000	999	1095	1085	1505	1164	1939	1237	2395	1306	2870	1371	3363	1433	3873
13,000	1155	1655	1231	2128	1301	2622	1368	3137	1431	3670	1491	4220	1548	4786
15,000	1310	2369	1377	2903	1441	3458	1502	4032	1560	4623	1615	5230	1669	5852
17,000	1464	3251	1525	3848	1583	4464	1638	5097	1692	5746	1744	6410	1794	7090
19,000	1618	4319	1673	4978	1726	5655	1777	6348	1827	7056	1875	7779	1922	8515
21,000	1771	5590	1822	6311	1871	7049	1918	7803	1964	8569	2010	9350	2054	10146
23,000	1924	7081	1971	7866	2016	8663	2060	9476	2104	10304	2146	11144	2187	11995
25,000	2076	8809	2120	9656	2162	10516	2204	11388	2244	12274	2284	13174	2323	14085
27,000	2229	10791	2269	11699	2309	12620	2348	13553	2386	14499	2424	15458	—	—
29,000	2381	13043	2419	14013	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1204	2244	1271	2620	1335	3010	1396	3415	1454	3832	1510	4263	1563	4705
7,000	1291	2856	1355	3286	1415	3731	1474	4190	1529	4663	1583	5147	1635	5645
9,000	1387	3567	1448	4053	1505	4553	1561	5067	1614	5593	1666	6132	1716	6683
11,000	1492	4398	1549	4939	1603	5494	1656	6062	1707	6642	1756	7235	1804	7841
13,000	1604	5367	1657	5963	1708	6572	1758	7194	1807	7830	1854	8476	1900	9136
15,000	1721	6489	1771	7141	1819	7805	1867	8483	1913	9171	1957	9873	2001	10587
17,000	1842	7784	1890	8491	1935	9211	1980	9944	2024	10687	2067	11443	2108	12210
19,000	1968	9265	2012	10029	2056	10804	2098	11592	2140	12391	2180	13203	2220	14025
21,000	2096	10953	2138	11773	2179	12603	2220	13448	2259	14302	2298	15168	2336	16045
23,000	2228	12861	2267	13738	2306	14626	2345	15525	2382	16438	2419	17357	—	—
25,000	2361	15008	2399	15942	2436	16887	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1615	5159	1665	5625	1714	6103	1761	6590	1807	7088	1852	7597	1896	8114
7,000	1685	6153	1734	6673	1781	7204	1827	7746	1872	8298	1916	8860	1959	9432
9,000	1764	7246	1811	7820	1857	8405	1901	8999	1945	9605	1988	10220	2029	10846
11,000	1851	8457	1896	9084	1940	9722	1983	10371	2025	11031	2067	11698	2107	12376
13,000	1944	9805	1988	10486	2030	11178	2072	11880	2113	12592	2152	13314	2192	14046
15,000	2044	11311	2086	12044	2127	12790	2167	13545	2206	14311	2244	15085	2282	15871
17,000	2149	12989	2189	13777	2228	14576	2267	15385	2305	16204	2342	17031	—	—
19,000	2259	14856	2297	15699	2335	16551	2372	17415	—	—	—	—	—	—
21,000	2373	16932	—	—	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	14,200
	Medium	2,290	15,720
575	Standard	2,200	14,200
	Medium	2,477	18,680

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 54-60 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1939	8641	1980	9178	2021	9724	2061	10280	2101	10844
7,000	2000	10014	2041	10604	2081	11204	2121	11812	2159	12429
9,000	2070	11480	2110	12125	2149	12777	2187	13439	2225	14111
11,000	2147	13066	2186	13762	2224	14467	2261	15183	2298	15906
13,000	2230	14787	2268	15537	2305	16295	2341	17064	—	—
15,000	2319	16664	2356	17468	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	2139	11415	2177	11997	2214	12586	2251	13182
7,000	2197	13055	2234	13690	2271	14333	2307	14982
9,000	2262	14788	2299	15477	2335	16171	2370	16875
11,000	2334	16638	2370	17378	—	—	—	—
13,000	—	—	—	—	—	—	—	—
15,000	—	—	—	—	—	—	—	—
17,000	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	14,200
	Medium	2,290	15,720
575	Standard	2,200	14,200
	Medium	2,477	18,680

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 54-60 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	597	298	717	520	819	765	909	1029	992	1309	1068	1604	1139	1912
7,000	840	829	929	1132	1009	1453	1084	1791	1154	2143	1220	2508	1283	2885
9,000	1035	1537	1108	1911	1176	2301	1241	2706	1303	3124	1362	3556	1418	3998
11,000	1205	2392	1269	2833	1329	3288	1386	3756	1442	4237	1495	4730	1547	5234
13,000	1361	3378	1417	3879	1471	4395	1523	4924	1574	5464	1623	6016	1670	6579
15,000	1505	4476	1556	5035	1606	5609	1654	6195	1701	6793	1746	7402	1790	8020
17,000	1642	5671	1689	6288	1735	6916	1779	7557	1823	8211	1865	8874	1907	9547
19,000	1774	6952	1817	7624	1860	8307	1901	9000	1942	9705	1982	10421	2021	11148
21,000	1900	8307	1941	9031	1981	9766	2020	10511	2058	11268	2096	12034	2133	12812
23,000	2023	9725	2061	10500	2099	11284	2135	12079	2172	12886	2207	13703	2243	14531
25,000	2142	11195	2178	12018	2214	12853	2249	13698	2284	14554	2317	15417	2351	16292
27,000	2259	12707	2294	13579	2327	14461	2361	15353	2394	16257	2426	17169	2458	18091
29,000	2374	14249	2407	15169	2439	16098	2471	17037	2502	17986	2533	18947	2564	19913
30,000	2430	15031	2462	15973	2494	16925	2525	17887	2556	18861	2586	19844	2616	20834

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1206	2232	1269	2563	1330	2905	1388	3257	1443	3618	1496	3988	1548	4368
7,000	1343	3275	1400	3674	1455	4084	1508	4504	1559	4932	1608	5370	1656	5816
9,000	1472	4452	1525	4916	1575	5390	1624	5874	1672	6365	1718	6867	1763	7377
11,000	1596	5748	1645	6274	1692	6808	1737	7352	1782	7906	1825	8467	1868	9038
13,000	1717	7153	1762	7736	1806	8329	1848	8931	1890	9542	1931	10162	1971	10789
15,000	1833	8649	1876	9289	1917	9937	1957	10595	1997	11261	2036	11938	2074	12621
17,000	1947	10231	1987	10923	2026	11625	2064	12337	2102	13058	2139	13787	2175	14524
19,000	2059	11883	2097	12629	2134	13384	2170	14146	2206	14919	2241	15700	2276	16488
21,000	2169	13599	2205	14394	2240	15199	2275	16014	2309	16836	2342	17666	2376	18506
23,000	2277	15367	2311	16211	2345	17065	2378	17928	2411	18800	2443	19679	2475	20567
25,000	2384	17176	2417	18070	2449	18972	2480	19882	2512	20803	2543	21730	2573	22667
27,000	2490	19023	2521	19963	2552	20912	2582	21868	2612	22834	2642	23810	2671	24791
29,000	2594	20891	2624	21879	2654	22873	2683	23877	2712	24887	2740	25908	2769	26937
30,000	2646	21834	2675	22841	2704	23860	2733	24884	2761	25921	2790	26961	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1598	4755	1646	5150	1693	5554	1739	5965	1784	6383	1827	6809	1870	7240
7,000	1703	6271	1749	6733	1793	7203	1836	7681	1879	8167	1920	8658	1960	9156
9,000	1807	7895	1850	8421	1892	8954	1933	9496	1973	10043	2012	10598	2051	11160
11,000	1909	9617	1950	10202	1990	10796	2029	11397	2067	12006	2105	12621	2142	13243
13,000	2011	11426	2049	12070	2087	12721	2125	13380	2161	14045	2197	14718	2232	15399
15,000	2111	13312	2148	14012	2184	14719	2220	15432	2255	16155	2289	16882	2323	17618
17,000	2211	15269	2246	16021	2281	16781	2315	17550	2348	18325	2381	19107	2414	19897
19,000	2310	17286	2344	18090	2377	18903	2409	19722	2442	20550	2474	21382	2505	22225
21,000	2408	19353	2441	20208	2472	21069	2504	21940	2535	22818	2566	23703	2596	24594
23,000	2506	21463	2537	22369	2568	23279	2598	24198	2628	25122	2658	26059	2687	26996
25,000	2603	23610	2633	24562	2663	25520	2692	26486	2721	27460	—	—	—	—
27,000	2700	25781	2729	26779	2758	27784	—	—	—	—	—	—	—	—
29,000	2797	27973	—	—	—	—	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 54-60 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1911	7680	1952	8126	1992	8578	2031	9036	2069	9501
7,000	2000	9662	2039	10175	2077	10693	2114	11218	2151	11749
9,000	2089	11729	2126	12303	2163	12885	2199	13473	2234	14067
11,000	2178	13872	2214	14509	2249	15150	2283	15798	2318	16452
13,000	2267	16085	2302	16780	2335	17479	2369	18185	2402	18898
15,000	2357	18361	2390	19110	2422	19866	2454	20627	2486	21397
17,000	2446	20692	2478	21495	2510	22304	2541	23121	2571	23942
19,000	2536	23071	2567	23926	2597	24789	2627	25654	2657	26530
21,000	2626	25492	2656	26396	2685	27307	—	—	—	—
23,000	2716	27945	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	2107	9972	2144	10449	2180	10931	2216	11419
7,000	2187	12286	2223	12829	2258	13377	2293	13931
9,000	2269	14668	2303	15274	2337	15885	2371	16504
11,000	2351	17113	2384	17781	2417	18451	2449	19130
13,000	2434	19616	2466	20340	2498	21070	2529	21807
15,000	2518	22170	2548	22950	2579	23737	2609	24528
17,000	2602	24770	2632	25606	2661	26446	2690	27292
19,000	2686	27409	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 70 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	840	829	929	1132	1009	1453	1084	1791	1154	2143	1220	2508	1283	2885
9,000	1035	1537	1108	1911	1176	2301	1241	2706	1303	3124	1362	3556	1418	3998
11,000	1205	2392	1269	2833	1329	3288	1386	3756	1442	4237	1495	4730	1547	5234
13,000	1361	3378	1417	3879	1471	4395	1523	4924	1574	5464	1623	6016	1670	6579
15,000	1505	4476	1556	5035	1606	5609	1654	6195	1701	6793	1746	7402	1790	8020
17,000	1642	5671	1689	6288	1735	6916	1779	7557	1823	8211	1865	8874	1907	9547
19,000	1774	6952	1817	7624	1860	8307	1901	9000	1942	9705	1982	10421	2021	11148
21,000	1900	8307	1941	9031	1981	9766	2020	10511	2058	11268	2096	12034	2133	12812
23,000	2023	9725	2061	10500	2099	11284	2135	12079	2172	12886	2207	13703	2243	14531
25,000	2142	11195	2178	12018	2214	12853	2249	13698	2284	14554	2317	15417	2351	16292
27,000	2259	12707	2294	13579	2327	14461	2361	15353	2394	16257	2426	17169	2458	18091
29,000	2374	14249	2407	15169	2439	16098	2471	17037	2502	17986	2533	18947	2564	19913
31,000	2487	15815	2518	16781	2549	17756	2579	18742	2609	19737	2639	20743	2668	21755
33,000	2598	17394	2627	18406	2657	19429	2686	20458	2715	21497	2744	22546	2772	23604
35,000	2707	18981	2736	20037	2764	21103	2792	22177	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1343	3275	1400	3674	1455	4084	1508	4504	1559	4932	1608	5370	1656	5816
9,000	1472	4452	1525	4916	1575	5390	1624	5874	1672	6365	1718	6867	1763	7377
11,000	1596	5748	1645	6274	1692	6808	1737	7352	1782	7906	1825	8467	1868	9038
13,000	1717	7153	1762	7736	1806	8329	1848	8931	1890	9542	1931	10162	1971	10789
15,000	1833	8649	1876	9289	1917	9937	1957	10595	1997	11261	2036	11938	2074	12621
17,000	1947	10231	1987	10923	2026	11625	2064	12337	2102	13058	2139	13787	2175	14524
19,000	2059	11883	2097	12629	2134	13384	2170	14146	2206	14919	2241	15700	2276	16488
21,000	2169	13599	2205	14394	2240	15199	2275	16014	2309	16836	2342	17666	2376	18506
23,000	2277	15367	2311	16211	2345	17065	2378	17928	2411	18800	2443	19679	2475	20567
25,000	2384	17176	2417	18070	2449	18972	2480	19882	2512	20803	2543	21730	2573	22667
27,000	2490	19023	2521	19963	2552	20912	2582	21868	2612	22834	2642	23810	2671	24791
29,000	2594	20891	2624	21879	2654	22873	2683	23877	2712	24887	2740	25908	2769	26937
31,000	2697	22777	2726	23808	2755	24848	2783	25896	—	—	—	—	—	—
33,000	2800	24673	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1703	6271	1749	6733	1793	7203	1836	7681	1879	8167	1920	8658	1960	9156
9,000	1807	7895	1850	8421	1892	8954	1933	9496	1973	10043	2012	10598	2051	11160
11,000	1909	9617	1950	10202	1990	10796	2029	11397	2067	12006	2105	12621	2142	13243
13,000	2011	11426	2049	12070	2087	12721	2125	13380	2161	14045	2197	14718	2232	15399
15,000	2111	13312	2148	14012	2184	14719	2220	15432	2255	16155	2289	16882	2323	17618
17,000	2211	15269	2246	16021	2281	16781	2315	17550	2348	18325	2381	19107	2414	19897
19,000	2310	17286	2344	18090	2377	18903	2409	19722	2442	20550	2474	21382	2505	22225
21,000	2408	19353	2441	20208	2472	21069	2504	21940	2535	22818	2566	23703	2596	24594
23,000	2506	21463	2537	22369	2568	23279	2598	24198	2628	25122	2658	26059	2687	26996
25,000	2603	23610	2633	24562	2663	25520	2692	26486	2721	27460	—	—	—	—
27,000	2700	25781	2729	26779	2758	27784	—	—	—	—	—	—	—	—
29,000	2797	27973	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 70 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2000	9662	2039	10175	2077	10693	2114	11218	2151	11749
9,000	2089	11729	2126	12303	2163	12885	2199	13473	2234	14067
11,000	2178	13872	2214	14509	2249	15150	2283	15798	2318	16452
13,000	2267	16085	2302	16780	2335	17479	2369	18185	2402	18898
15,000	2357	18361	2390	19110	2422	19866	2454	20627	2486	21397
17,000	2446	20692	2478	21495	2510	22304	2541	23121	2571	23942
19,000	2536	23071	2567	23926	2597	24789	2627	25654	2657	26530
21,000	2626	25492	2656	26396	2685	27307	—	—	—	—
23,000	2716	27945	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2187	12286	2223	12829	2258	13377	2293	13931
9,000	2269	14668	2303	15274	2337	15885	2370	16504
11,000	2351	17113	2384	17781	2417	18451	2449	19130
13,000	2434	19616	2466	20340	2498	21070	2529	21807
15,000	2518	22170	2548	22950	2579	23737	2609	24528
17,000	2602	24770	2632	25606	2661	26446	2690	27292
19,000	2686	27409	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460v-)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 70 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	750	883	848	1250	936	1644	1016	2061	1090	2498	1160	2954	1226	3427
9,000	913	1605	995	2056	1071	2530	1142	3025	1208	3538	1272	4070	1332	4618
11,000	1047	2436	1120	2962	1188	3510	1252	4076	1313	4662	1371	5264	1427	5881
13,000	1163	3342	1229	3938	1291	4553	1350	5187	1407	5838	1462	6507	1515	7191
15,000	1266	4295	1327	4954	1384	5632	1440	6330	1493	7044	1545	7774	1595	8519
17,000	1359	5266	1415	5985	1470	6724	1522	7480	1572	8252	1622	9042	1669	9846
19,000	1443	6233	1496	7010	1548	7804	1597	8617	1646	9444	1693	10290	1738	11148
21,000	1520	7177	1571	8006	1620	8854	1667	9718	1714	10599	1759	11497	1803	12407
23,000	1591	8077	1640	8956	1687	9852	1733	10767	1777	11699	1821	12645	1863	13607
25,000	1658	8914	1704	9840	1749	10784	1794	11746	1837	12722	1879	13718	1920	14727
27,000	1719	9672	1764	10642	1808	11631	1850	12636	1892	13658	1933	14696	1973	15751
29,000	1777	10337	1820	11348	1862	12379	1904	13426	1945	14489	1984	15569	2023	16667
31,000	1830	10891	1872	11942	1914	13011	1954	14098	1994	15201	2033	16323	2071	17458
33,000	1881	11324	1922	12412	1962	13517	2001	14642	2040	15780	2078	16939	2115	18112
35,000	1928	11622	1968	12744	2007	13884	2046	15040	2084	16214	2121	17407	2157	18614

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1288	3917	1348	4422	1405	4942	1460	5475	1513	6023	1564	6582	1613	7155
9,000	1389	5181	1445	5760	1498	6352	1550	6958	1600	7578	1648	8209	1695	8853
11,000	1481	6515	1533	7162	1584	7823	1632	8497	1680	9185	1726	9884	1771	10594
13,000	1566	7889	1615	8602	1663	9327	1709	10066	1754	10817	1799	11582	1842	12358
15,000	1643	9279	1690	10053	1736	10841	1781	11642	1824	12455	1867	13280	1908	14116
17,000	1715	10664	1761	11497	1804	12341	1847	13202	1889	14072	1930	14956	1971	15849
19,000	1783	12022	1826	12910	1869	13811	1910	14726	1951	15653	1990	16590	2029	17540
21,000	1846	13335	1888	14275	1929	15227	1969	16194	2008	17174	2047	18167	2085	19170
23,000	1905	14582	1945	15573	1985	16576	2024	17594	2063	18623	2100	19664	2137	20719
25,000	1960	15749	2000	16786	2039	17838	2077	18901	2114	19980	2151	21069	2187	22171
27,000	2012	16818	2051	17900	2089	18996	2126	20108	2162	21230	2198	22365	2234	23512
29,000	2062	17777	2099	18902	2136	20040	2173	21192	2208	22357	2243	23537	2278	24727
31,000	2108	18608	2145	19774	2181	20951	2217	22145	2252	23351	2286	24571	2320	25800
33,000	2152	19299	2188	20501	2223	21720	2258	22951	2293	24194	2327	25453	2360	26725
35,000	2193	19840	2229	21076	2263	22329	2298	23597	2332	24879	2365	26174	2398	27480

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1661	7738	1708	8334	1753	8939	1797	9557	1841	10185	1883	10824	1924	11471
9,000	1741	9508	1785	10174	1829	10852	1871	11539	1912	12237	1953	12945	1993	13664
11,000	1815	11317	1857	12052	1899	12795	1940	13551	1980	14317	2019	15092	2058	15877
13,000	1884	13144	1925	13943	1965	14751	2005	15570	2044	16400	2082	17239	2119	18089
15,000	1949	14964	1989	15823	2028	16694	2066	17574	2104	18464	2141	19366	2177	20275
17,000	2010	16756	2049	17675	2087	18603	2124	19541	2160	20490	2196	21449	2232	22420
19,000	2068	18503	2105	19478	2142	20461	2178	21454	2214	22459	2249	23476	2284	24501
21,000	2122	20184	2159	21210	2195	22247	2230	23297	2265	24353	2299	25424	2333	26501
23,000	2174	21783	2209	22862	2244	23947	2279	25048	2313	26157	2347	27276	2380	28407
25,000	2222	23283	2257	24410	2292	25545	2326	26695	2359	27851	2392	29021	2425	30199
27,000	2268	24672	2303	25841	2336	27026	2370	28220	2403	29424	2435	30636	2467	31863
29,000	2312	25930	2346	27145	2379	28370	2412	29608	2444	30859	2476	32117	2507	33386
31,000	2354	27045	2387	28301	2419	29570	2451	30848	2483	32142	2514	33443	2545	34753
33,000	2393	28007	2425	29304	2457	30610	2489	31928	2520	33261	2551	34600	2582	35953
35,000	2430	28800	2462	30134	2494	31477	2525	32835	2556	34203	2586	35582	2616	36974

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 70 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1964	12129	2004	12796	2043	13475	2081	14161	2118	14856
9,000	2032	14393	2070	15131	2108	15878	2145	16633	2181	17398
11,000	2096	16672	2133	17478	2169	18292	2205	19114	2240	19945
13,000	2156	18947	2192	19816	2227	20693	2262	21580	2297	22475
15,000	2213	21197	2248	22124	2283	23065	2317	24012	2350	24968
17,000	2267	23397	2301	24386	2335	25383	2368	26390	2401	27406
19,000	2318	25533	2351	26578	2385	27631	2417	28695	2449	29766
21,000	2367	27591	2399	28689	2432	29794	2464	30910	2496	32039
23,000	2413	29547	2445	30694	2477	31855	2508	33021	2539	34200
25,000	2457	31387	2488	32586	2520	33795	2551	35013	2581	36238
27,000	2498	33101	2530	34344	2560	35601	2591	36865	2621	38141
29,000	2538	34669	2569	35957	2599	37257	2629	38569	2659	39888
31,000	2576	36078	2606	37410	2636	38755	2665	40107	2695	41470
33,000	2612	37320	2642	38694	2671	40075	2700	41472	—	—
35,000	2646	38379	2675	39791	2704	41215	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2155	15560	2191	16272	2227	16994	2262	17723
9,000	2217	18171	2252	18954	2287	19744	2321	20543
11,000	2275	20786	2309	21633	2343	22492	2376	23355
13,000	2331	23378	2364	24292	2397	25214	2430	26142
15,000	2383	25934	2416	26908	2448	27889	2480	28881
17,000	2434	28428	2466	29460	2497	30501	2528	31553
19,000	2481	30846	2513	31935	2544	33035	2574	34140
21,000	2527	33173	2558	34314	2588	35467	2618	36627
23,000	2570	35388	2600	36582	2630	37787	2660	38999
25,000	2611	37475	2641	38718	2671	39972	2700	41235
27,000	2651	39424	2680	40717	2709	42020	—	—
29,000	2688	41217	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 74 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	877	949	962	1260	1040	1587	1113	1931	1181	2288	1246	2659	1307	3041
9,000	1077	1749	1148	2132	1214	2531	1277	2944	1337	3370	1394	3807	1449	4257
11,000	1253	2719	1314	3170	1372	3634	1428	4112	1482	4602	1534	5103	1584	5616
13,000	1412	3836	1466	4350	1519	4877	1570	5417	1619	5968	1666	6530	1713	7102
15,000	1561	5084	1610	5659	1658	6245	1704	6844	1750	7454	1794	8074	1837	8704
17,000	1701	6448	1747	7081	1791	7724	1834	8380	1876	9045	1917	9722	1958	10408
19,000	1835	7915	1878	8604	1919	9301	1959	10013	1999	10732	2037	11462	2075	12203
21,000	1965	9472	2004	10214	2043	10966	2081	11728	2118	12502	2155	13285	2191	14077
23,000	2090	11108	2127	11901	2164	12704	2200	13520	2235	14343	2269	15177	2304	16020
25,000	2212	12810	2247	13654	2282	14508	2316	15373	2349	16247	2382	17133	2415	18026
27,000	2331	14570	2365	15465	2398	16369	2430	17283	2462	18205	2493	19136	2525	20079
29,000	2448	16376	2480	17319	2511	18271	2542	19235	2573	20205	2603	21185	2633	22173
31,000	2563	18222	2593	19212	2623	20210	2653	21219	2682	22237	2711	23265	2740	24302
33,000	2676	20096	2705	21132	2734	22177	2762	23231	2790	24298	—	—	—	—
35,000	2787	21989	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1366	3434	1422	3838	1476	4252	1529	4675	1579	5108	1628	5549	1675	5998
9,000	1502	4717	1554	5187	1603	5665	1652	6154	1698	6652	1744	7159	1788	7673
11,000	1633	6138	1680	6670	1726	7212	1771	7764	1814	8323	1857	8891	1899	9467
13,000	1758	7686	1802	8278	1845	8878	1887	9489	1928	10108	1968	10735	2007	11370
15,000	1879	9344	1920	9993	1961	10653	2000	11320	2039	11996	2077	12679	2114	13372
17,000	1997	11103	2036	11809	2074	12521	2112	13244	2148	13976	2184	14714	2220	15462
19,000	2113	12951	2150	13711	2186	14478	2221	15254	2256	16037	2291	16831	2324	17630
21,000	2226	14879	2261	15690	2295	16508	2329	17335	2362	18172	2395	19016	2428	19867
23,000	2337	16873	2371	17733	2403	18604	2436	19481	2468	20367	2499	21261	2530	22163
25,000	2447	18926	2479	19838	2510	20756	2541	21684	2572	22617	2602	23562	2632	24514
27,000	2555	21030	2586	21989	2616	22954	2645	23929	2675	24912	2704	25905	2733	26905
29,000	2662	23170	2691	24176	2720	25191	2749	26214	2777	27244	—	—	—	—
31,000	2768	25343	2796	26396	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	1722	6456	1767	6922	1811	7395	1853	7875	1895	8363	1936	8858	1976	9359
9,000	1832	8195	1874	8725	1915	9263	1956	9809	1996	10361	2035	10919	2073	11485
11,000	1940	10052	1980	10644	2019	11243	2057	11848	2095	12462	2132	13083	2169	13711
13,000	2046	12014	2084	12664	2121	13323	2158	13988	2194	14662	2229	15340	2264	16027
15,000	2151	14071	2187	14779	2223	15495	2258	16216	2292	16947	2326	17682	2360	18426
17,000	2255	16217	2289	16978	2323	17749	2357	18527	2390	19311	2422	20100	2455	20898
19,000	2358	18438	2391	19254	2423	20076	2455	20906	2487	21744	2518	22588	2549	23439
21,000	2460	20726	2491	21592	2523	22469	2553	23349	2584	24239	2614	25134	2644	26037
23,000	2561	23075	2591	23990	2621	24917	2651	25846	2680	26786	2709	27731	—	—
25,000	2661	25471	2691	26436	2720	27412	—	—	—	—	—	—	—	—
27,000	2761	27909	—	—	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 74 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2016	9869	2054	10382	2092	10904	2129	11431	2166	11965
9,000	2110	12057	2147	12637	2183	13221	2219	13814	2254	14411
11,000	2205	14345	2240	14984	2275	15631	2309	16284	2343	16942
13,000	2299	16718	2333	17419	2366	18125	2399	18836	2431	19555
15,000	2393	19174	2425	19932	2457	20694	2489	21463	2520	22238
17,000	2486	21702	2518	22515	2549	23331	2579	24153	2609	24986
19,000	2580	24296	2610	25160	2640	26030	2669	26906	2699	27790
21,000	2673	26945	2702	27859	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2202	12504	2237	13049	2272	13600	2306	14157
9,000	2289	15014	2323	15625	2356	16239	2389	16860
11,000	2376	17608	2409	18279	2441	18955	2473	19638
13,000	2463	20278	2495	21007	2526	21745	2557	22485
15,000	2551	23018	2582	23804	2612	24597	2642	25394
17,000	2639	25820	2669	26661	2698	27509	—	—
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	19,000
	Medium	2,610	22,880
575	Standard	2,400	19,000
	Medium	2,685	24,240

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 74 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	837	1221	926	1622	1007	2047	1082	2493	1152	2958	1218	3442	1281	3942
9,500	998	2091	1074	2575	1144	3081	1211	3606	1274	4149	1334	4708	1392	5284
11,500	1134	3083	1201	3643	1264	4224	1325	4821	1383	5438	1438	6068	1492	6715
13,500	1252	4163	1313	4793	1371	5442	1427	6109	1481	6792	1533	7491	1583	8204
15,500	1357	5299	1414	5997	1468	6710	1520	7441	1571	8188	1620	8950	1668	9728
17,500	1452	6468	1505	7225	1557	8002	1606	8793	1654	9600	1701	10422	1746	11260
19,500	1540	7642	1590	8458	1638	9292	1685	10141	1731	11007	1776	11885	1819	12780
21,500	1620	8802	1668	9674	1714	10562	1759	11465	1803	12385	1846	13319	1888	14266
23,500	1695	9926	1740	10851	1785	11791	1828	12746	1870	13716	1912	14702	1952	15702
25,500	1764	10999	1808	11969	1851	12959	1892	13964	1933	14984	1973	16020	2013	17067
27,500	1829	11997	1871	13015	1913	14052	1953	15102	1993	16170	2032	17252	2070	18346
29,500	1890	12907	1931	13972	1971	15050	2010	16146	2049	17259	2086	18384	2124	19522
31,500	1947	13715	1987	14822	2026	15941	2064	17081	2101	18232	2138	19400	2175	20580
33,500	2001	14406	2040	15551	2077	16710	2115	17887	2151	19081	2187	20288	2223	21508
35,500	2052	14962	2089	16145	2126	17341	2163	18558	2199	19786	2234	21032	2269	22292
37,500	2100	15378	2136	16592	2173	17826	2208	19073	2243	20338	2278	21620	2312	22917

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	1341	4457	1398	4987	1453	5532	1506	6089	1558	6661	1607	7244	1655	7839
9,500	1447	5874	1500	6480	1552	7098	1601	7729	1650	8374	1697	9030	1742	9697
11,500	1543	7375	1593	8050	1642	8738	1689	9439	1735	10153	1780	10878	1823	11615
13,500	1632	8932	1680	9674	1726	10427	1770	11195	1814	11972	1857	12764	1899	13565
15,500	1714	10517	1759	11323	1803	12139	1846	12968	1888	13809	1929	14663	1970	15526
17,500	1791	12111	1834	12974	1876	13851	1917	14740	1958	15642	1997	16554	2036	17478
19,500	1862	13688	1904	14609	1944	15542	1984	16488	2023	17446	2062	18413	2099	19395
21,500	1929	15229	1969	16205	2008	17190	2047	18192	2085	19204	2122	20226	2159	21261
23,500	1992	16715	2031	17743	2069	18783	2106	19835	2143	20897	2180	21974	2215	23060
25,500	2051	18131	2089	19207	2126	20294	2163	21395	2198	22509	2234	23636	2269	24770
27,500	2107	19456	2144	20579	2180	21715	2216	22863	2251	24025	2285	25197	2319	26381
29,500	2160	20678	2196	21845	2231	23024	2266	24217	2300	25424	2334	26642	2368	27872
31,500	2210	21777	2245	22987	2280	24211	2314	25445	2348	26694	2381	27955	2413	29229
33,500	2258	22744	2292	23995	2326	25259	2359	26536	2392	27825	2425	29127	2457	30438
35,500	2303	23566	2337	24854	2370	26154	2403	27470	2435	28797	2467	30137	2498	31489
37,500	2346	24225	2379	25549	2411	26885	2443	28236	2475	29601	2507	30979	2538	32368

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	1702	8447	1748	9065	1792	9695	1835	10335	1878	10985	1919	11646	1960	12316
9,500	1787	10377	1830	11067	1873	11768	1914	12480	1955	13202	1994	13934	2033	14674
11,500	1866	12362	1907	13121	1948	13890	1988	14670	2027	15460	2065	16260	2103	17068
13,500	1940	14379	1980	15202	2019	16037	2057	16882	2095	17737	2132	18601	2169	19475
15,500	2009	16404	2048	17288	2086	18186	2123	19091	2160	20010	2196	20936	2231	21871
17,500	2074	18412	2112	19359	2149	20315	2185	21282	2221	22258	2256	23243	2290	24239
19,500	2136	20387	2173	21390	2208	22403	2244	23426	2278	24461	2312	25502	2346	26556
21,500	2195	22308	2230	23364	2265	24433	2299	25510	2333	26600	2367	27696	2399	28804
23,500	2250	24159	2285	25267	2319	26388	2352	27517	2385	28658	2418	29808	2450	30968
25,500	2303	25919	2337	27080	2370	28246	2403	29429	2435	30617	2467	31819	2499	33031
27,500	2353	27576	2386	28781	2418	29998	2451	31228	2482	32465	2514	33715	2545	34975
29,500	2400	29111	2433	30364	2465	31624	2496	32900	2527	34185	2558	35481	2589	36784
31,500	2446	30513	2477	31809	2509	33112	2540	34433	2570	35760	2601	37100	2631	38448
33,500	2488	31762	2520	33101	2551	34447	2581	35806	2611	37179	2641	38560	2671	39952
35,500	2529	32853	2560	34232	2590	35616	2621	37018	2650	38429	2680	39847	2709	41281
37,500	2568	33768	2599	35183	2628	36607	2658	38044	2687	39494	2716	40950	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 74 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	1999	12997	2038	13686	2076	14385	2114	15093	2151	15809
9,500	2072	15426	2109	16187	2146	16956	2182	17734	2218	18522
11,500	2140	17887	2176	18715	2212	19552	2247	20398	2282	21253
13,500	2205	20359	2240	21252	2275	22152	2309	23064	2343	23982
15,500	2266	22817	2300	23772	2334	24737	2367	25708	2400	26689
17,500	2324	25244	2358	26258	2391	27281	2423	28313	2455	29356
19,500	2379	27619	2412	28690	2444	29771	2476	30861	2508	31957
21,500	2432	29923	2464	31049	2496	32184	2527	33328	2558	34483
23,500	2482	32139	2513	33319	2544	34504	2575	35705	2605	36909
25,500	2530	34249	2561	35479	2591	36718	2621	37967	2651	39223
27,500	2575	36240	2606	37521	2635	38809	2665	40103	2694	41412
29,500	2619	38100	2648	39423	2678	40757	—	—	—	—
31,500	2660	39807	2689	41178	—	—	—	—	—	—
33,500	2700	41351	—	—	—	—	—	—	—	—
35,500	—	—	—	—	—	—	—	—	—	—
37,500	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,500	2187	16536	2223	17270	2258	18013	2292	18763
9,500	2253	19317	2288	20121	2322	20932	2355	21753
11,500	2316	22115	2350	22988	2383	23866	2416	24756
13,500	2376	24910	2409	25846	2441	26791	2473	27743
15,500	2433	27680	2465	28680	2497	29685	2528	30699
17,500	2487	30404	2518	31464	2549	32528	2580	33603
19,500	2539	33065	2569	34180	2600	35306	2630	36438
21,500	2588	35643	2618	36817	2648	37993	2677	39182
23,500	2635	38123	2665	39348	2694	40582	2723	41821
25,500	2680	40490	2709	41765	—	—	—	—
27,500	—	—	—	—	—	—	—	—
29,500	—	—	—	—	—	—	—	—
31,500	—	—	—	—	—	—	—	—
33,500	—	—	—	—	—	—	—	—
35,500	—	—	—	—	—	—	—	—
37,500	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,610	22,880
575	High	2,685	24,240

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 90-98 Standard and Medium Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in.wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	961	1860	1039	2325	1112	2811	1180	3317	1245	3841	1306	4382	1365	4939
12,000	1164	3346	1230	3925	1292	4522	1351	5138	1408	5770	1463	6419	1515	7083
15,000	1332	5011	1389	5692	1445	6390	1498	7106	1549	7837	1599	8584	1647	9345
18,000	1475	6761	1527	7534	1578	8325	1626	9132	1674	9953	1720	10791	1765	11641
21,000	1601	8515	1649	9372	1695	10246	1741	11138	1785	12044	1829	12964	1871	13898
24,000	1712	10200	1757	11136	1801	12089	1844	13057	1886	14041	1927	15038	1968	16051
27,000	1813	11754	1856	12763	1897	13786	1938	14826	1978	15883	2017	16951	2056	18037
30,000	1904	13121	1945	14195	1985	15285	2024	16391	2062	17511	2100	18648	2137	19801
33,000	1988	14244	2027	15381	2065	16532	2102	17699	2139	18880	2175	20080	2211	21290
36,000	2064	15082	2101	16271	2138	17476	2174	18702	2210	19939	2245	21194	2280	22461
39,000	2134	15584	2170	16824	2206	18082	2241	19355	2275	20645	2309	21952	2343	23273
42,000	2198	15714	2233	17002	2268	18305	2302	19623	2336	20960	2369	22312	2402	23683
45,000	2257	15435	2291	16764	2325	18108	2358	19468	2391	20847	2423	22241	2455	23651
48,000	2311	14714	2344	16075	2377	17458	2410	18856	2442	20268	2474	21702	2505	23148
50,000	2344	13974	2377	15355	2410	16758	2442	18175	2474	19615	2505	21067	2536	22540

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1421	5511	1476	6098	1528	6698	1578	7312	1627	7937	1675	8577	1721	9226
12,000	1566	7761	1616	8453	1663	9157	1710	9875	1755	10605	1799	11346	1842	12100
15,000	1694	10120	1740	10910	1784	11710	1828	12525	1870	13351	1912	14187	1952	15037
18,000	1809	12507	1852	13385	1893	14276	1934	15180	1975	16096	2014	17023	2052	17960
21,000	1912	14847	1953	15810	1993	16785	2032	17771	2070	18769	2107	19780	2144	20803
24,000	2007	17077	2046	18115	2083	19167	2121	20232	2157	21309	2193	22397	2229	23496
27,000	2093	19135	2130	20244	2167	21368	2203	22507	2238	23654	2273	24814	2307	25987
30,000	2173	20965	2209	22143	2244	23333	2278	24537	2312	25754	2346	26982	2379	28222
33,000	2246	22517	2281	23755	2315	25011	2348	26276	2381	27556	2414	28846	2446	30150
36,000	2314	23746	2347	25042	2380	26354	2413	27677	2445	29014	2477	30365	2508	31728
39,000	2376	24608	2409	25959	2441	27321	2473	28698	2504	30088	2535	31490	2566	32908
42,000	2434	25065	2466	26463	2497	27871	2528	29297	2559	30740	2589	32190	2619	33655
45,000	2487	25076	2518	26517	2549	27971	2580	29443	2610	30926	2639	32425	2669	33934
48,000	2536	24613	2567	26093	2597	27585	2627	29095	2656	30620	2686	32156	2715	33711
50,000	2567	24027	2597	25529	2627	27047	2656	28578	2686	30129	2715	31690	2743	33265

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
9,000	1766	9888	1810	10560	1853	11244	1895	11938	1936	12642	1976	13358	2015	14081
12,000	1885	12864	1926	13639	1966	14425	2006	15223	2044	16028	2082	16845	2120	17670
15,000	1992	15898	2031	16769	2069	17649	2107	18541	2144	19442	2180	20354	2216	21275
18,000	2090	18910	2127	19871	2164	20841	2200	21821	2235	22813	2270	23813	2304	24824
21,000	2180	21834	2216	22877	2251	23931	2286	24997	2320	26071	2353	27157	2386	28249
24,000	2264	24608	2298	25728	2332	26863	2365	28004	2398	29157	2431	30322	2463	31494
27,000	2341	27171	2374	28365	2407	29572	2439	30788	2471	32014	2502	33251	2533	34498
30,000	2412	29475	2444	30736	2476	32010	2507	33298	2538	34592	2569	35900	2599	37216
33,000	2478	31466	2509	32793	2540	34132	2571	35480	2601	36837	2631	38211	2661	39588
36,000	2539	33098	2570	34488	2600	35882	2630	37290	2660	38711	2689	40144	2718	41583
39,000	2596	34337	2626	35775	2656	37227	2685	38691	2714	40168	2743	41651	—	—
42,000	2649	35134	2678	36622	2707	38129	2736	39642	2765	41167	—	—	—	—
45,000	2698	35456	2727	36992	2755	38541	2783	40101	—	—	—	—	—	—
48,000	2743	35275	2772	36851	2800	38439	—	—	—	—	—	—	—	—
50,000	2771	34854	2799	36455	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	28,500
	Medium	2,610	34,320
575	Standard	2,400	28,500
	Medium	2,685	36,360

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Sizes 90-98 Standard and Medium Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2054	14814	2092	15558	2129	16309	2166	17071	2202	17839
9,000	2156	18504	2193	19349	2228	20202	2263	21065	2297	21935
11,000	2251	22205	2285	23144	2320	24093	2353	25051	2386	26017
13,000	2338	25844	2371	26873	2404	27909	2437	28956	2469	30012
15,000	2419	29355	2451	30468	2483	31587	2514	32719	2545	33859
17,000	2494	32675	2525	33867	2556	35070	2587	36281	2617	37500
19,000	2564	35757	2594	37021	2625	38300	2654	39581	2684	40877
21,000	2629	38540	2659	39875	2688	41221	—	—	—	—
23,000	2690	40981	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
7,000	2237	18618	2272	19406	2306	20201	2340	21004
9,000	2331	22814	2365	23704	2398	24598	2430	25505
11,000	2419	26990	2451	27975	2483	28966	2514	29965
13,000	2500	31077	2531	32151	2562	33232	2593	34319
15,000	2576	35007	2606	36166	2636	37331	2666	38505
17,000	2647	38729	2676	39963	2705	41211	—	—
19,000	—	—	—	—	—	—	—	—
21,000	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—
29,000	—	—	—	—	—	—	—	—
31,000	—	—	—	—	—	—	—	—
33,000	—	—	—	—	—	—	—	—
35,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,400	28,500
	Medium	2,610	34,320
575	Standard	2,400	28,500
	Medium	2,685	36,360

LEGEND

— Standard Static (460-v)
— Medium Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 90-98 High Static[a,b,c,d]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	1423	9640	1467	10564	1510	11506	1552	12467	1593	13444	1633	14439	1672	15452
26,000	1477	10741	1519	11710	1560	12700	1600	13706	1640	14731	1678	15772	1716	16829
28,000	1525	11760	1566	12776	1606	13809	1644	14860	1683	15927	1720	17012	1757	18112
30,000	1569	12679	1608	13737	1647	14814	1684	15907	1721	17016	1758	18143	1793	19284
32,000	1608	13481	1646	14582	1684	15697	1720	16831	1756	17980	1792	19145	1827	20324
34,000	1644	14145	1681	15286	1717	16443	1753	17613	1788	18799	1823	20004	1857	21221
36,000	1676	14659	1712	15836	1747	17029	1782	18238	1817	19460	1851	20703	1884	21957
38,000	1705	15003	1740	16216	1775	17445	1809	18687	1842	19949	1876	21222	1908	22509
40,000	1730	15161	1765	16408	1799	17671	1832	18950	1865	20239	1898	21547	1930	22870
42,000	1753	15116	1787	16398	1821	17692	1853	19004	1886	20330	1918	21667	1949	23021
44,000	1774	14859	1807	16170	1840	17495	1872	18837	1904	20195	1935	21564	1966	22948
46,000	1792	14368	1824	15711	1856	17068	1888	18436	1920	19824	1950	21221	1981	22637
48,000	1807	13634	1839	15002	1871	16387	1902	17787	1933	19201	1964	20629	1994	22074
50,000	1820	12637	1852	14037	1883	15447	1914	16876	1945	18318	1975	19773	2004	21240

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	1710	16481	1748	17526	1784	18589	1821	19664	1856	20755	1891	21864	1925	22983
26,000	1753	17903	1790	18992	1825	20094	1861	21215	1895	22348	1929	23496	1963	24660
28,000	1793	19227	1828	20358	1863	21503	1897	22666	1931	23841	1964	25031	1997	26235
30,000	1828	20437	1863	21612	1897	22795	1930	23998	1963	25211	1996	26438	2028	27681
32,000	1861	21521	1895	22731	1928	23955	1960	25193	1993	26444	2024	27711	2056	28993
34,000	1890	22454	1923	23701	1956	24962	1988	26239	2019	27528	2051	28831	2081	30144
36,000	1917	23225	1949	24506	1981	25803	2012	27112	2043	28439	2074	29775	2104	31128
38,000	1940	23812	1972	25132	2003	26462	2034	27806	2065	29164	2095	30533	2125	31919
40,000	1962	24206	1993	25556	2024	26920	2054	28297	2084	29690	2114	31091	2143	32511
42,000	1980	24389	2011	25770	2041	27170	2071	28576	2101	29998	2130	31436	2159	32883
44,000	1997	24346	2027	25760	2057	27187	2087	28625	2116	30078	2145	31545	2173	33021
46,000	2011	24066	2041	25506	2071	26962	2100	28428	2128	29909	2157	31403	2185	32911
48,000	2023	23526	2053	24999	2082	26481	2111	27979	2139	29484	2167	31008	2195	32545
50,000	2034	22722	2063	24220	2092	25732	2120	27252	2148	28791	2176	30337	2204	31900

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	3.0		3.2		3.4		3.6		3.8		4.0		4.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	1959	24119	1992	25270	2025	26434	2058	27612	2089	28801	2121	30009	2152	31223
26,000	1996	25839	2028	27030	2060	28234	2092	29453	2123	30687	2154	31930	2184	33189
28,000	2029	27451	2061	28683	2092	29926	2123	31182	2154	32456	2184	33738	2213	35036
30,000	2059	28938	2090	30207	2121	31492	2151	32787	2181	34097	2211	35414	2240	36750
32,000	2087	30284	2117	31593	2147	32910	2177	34242	2207	35590	2236	36948	2265	38316
34,000	2112	31473	2142	32815	2171	34172	2201	35540	2230	36918	2258	38314	2287	39718
36,000	2134	32493	2164	33868	2193	35259	2222	36659	2250	38072	2278	39498	2306	40937
38,000	2154	33316	2183	34727	2212	36148	2240	37586	2269	39033	2296	40491	2324	41961
40,000	2172	33941	2201	35380	2229	36838	2257	38303	2285	39785	2312	41273	2339	42777
42,000	2188	34344	2216	35813	2244	37300	2272	38798	2299	40308	2326	41828	—	—
44,000	2201	34510	2229	36017	2257	37530	2284	39060	2311	40594	2338	42150	—	—
46,000	2213	34430	2241	35962	2268	37510	2295	39063	2322	40632	2348	42209	—	—
48,000	2223	34093	2250	35652	2277	37222	2304	38807	2331	40402	2357	42011	—	—
50,000	2231	33474	2258	35059	2285	36660	2311	38269	2337	39888	2364	41526	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,400	43,200
575	High	2,174	32,640

LEGEND

— High Static (460-v)

Performance data (cont)

Indoor Fan Performance Data — 50V Size 90-98 High Static[a,b,c,d] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	4.4		4.6		4.8		5.0		5.2	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	2182	32454	2213	33697	2242	34956	2272	36226	2301	37506
26,000	2214	34456	2244	35739	2273	37036	2302	38343	2330	39663
28,000	2243	36344	2272	37666	2301	38998	2329	40343	2357	41700
30,000	2269	38096	2298	39456	2326	40823	2354	42208	—	—
32,000	2293	39701	2321	41094	2349	42499	—	—	—	—
34,000	2315	41135	2342	42563	—	—	—	—	—	—
36,000	2334	42392	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—	—	—
44,000	—	—	—	—	—	—	—	—	—	—
46,000	—	—	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)							
	5.4		5.6		5.8		6.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts
24,000	2330	38800	2358	40102	—	—	—	—
26,000	2359	40997	—	—	—	—	—	—
28,000	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—
32,000	—	—	—	—	—	—	—	—
34,000	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—
42,000	—	—	—	—	—	—	—	—
44,000	—	—	—	—	—	—	—	—
46,000	—	—	—	—	—	—	—	—
48,000	—	—	—	—	—	—	—	—
50,000	—	—	—	—	—	—	—	—

NOTE(S):

a. Fan performance based on standard chassis, wet coils, and clean, standard filters.
b. See Component Pressure Drop table before using Fan Performance tables.
c. Conversion - 1 watt = 0.00114 bhp.
d. Fan performance based on 460-v. See voltage table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,400	43,200
575	High	2,174	32,640

LEGEND

— High Static (460-v)

Performance data (cont)

Exhaust Fan Performance — Sizes 28-34 Low Static (Compact Chassis)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.0		0.1		0.2		0.3		0.4		0.5		0.6	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	343	36	588	220	720	431	822	659	910	905	989	1165	1062	1441
3,500	400	57	633	265	765	503	866	756	952	1024	1030	1307	1101	1602
4,000	457	85	677	317	810	581	911	861	996	1153	1072	1458	1142	1776
4,500	514	120	721	375	855	667	956	973	1041	1291	1116	1621	1185	1962
5,000	571	165	765	442	900	761	1001	1093	1086	1438	1161	1793	—	—
5,500	629	220	809	517	944	863	1046	1223	1131	1593	—	—	—	—
6,000	686	285	854	603	988	974	1091	1361	1176	1760	—	—	—	—
6,500	743	363	900	701	1032	1096	1135	1510	—	—	—	—	—	—
7,000	800	453	946	811	1076	1229	1179	1671	—	—	—	—	—	—
7,500	857	557	994	936	1120	1376	—	—	—	—	—	—	—	—
8,000	914	676	1042	1075	1164	1536	—	—	—	—	—	—	—	—
8,500	971	811	1091	1230	—	—	—	—	—	—	—	—	—	—
9,000	1029	963	1141	1402	—	—	—	—	—	—	—	—	—	—
9,500	1086	1133	1192	1592	—	—	—	—	—	—	—	—	—	—
10,000	1143	1321	—	—	—	—	—	—	—	—	—	—	—	—
10,500	1200	1529	—	—	—	—	—	—	—	—	—	—	—	—

Exhaust Fan Performance — Sizes 28-34 Low Static (Standard Chassis)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
	0.0		0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	244	25	508	255	642	546	746	884	835	1262	915	1677	987	2127	1054	2607	1116	3116
4,000	277	35	569	344	703	685	806	1066	893	1484	971	1937	1041	2420	1107	2933	—	—
5,000	346	68	629	449	765	850	867	1282	954	1746	1030	2240	1100	2764	—	—	—	—
6,000	415	118	687	572	826	1040	929	1528	1015	2043	1092	2586	1160	3155	—	—	—	—
7,000	485	187	743	712	886	1254	990	1806	1077	2378	1153	2973	—	—	—	—	—	—
8,000	554	279	796	869	944	1493	1051	2114	1138	2748	—	—	—	—	—	—	—	—
9,000	623	398	848	1046	1001	1757	1110	2452	1199	3153	—	—	—	—	—	—	—	—
10,000	692	546	900	1244	1056	2044	1168	2820	—	—	—	—	—	—	—	—	—	—
11,000	762	726	952	1467	1109	2356	—	—	—	—	—	—	—	—	—	—	—	—
12,000	831	943	1005	1722	1162	2694	—	—	—	—	—	—	—	—	—	—	—	—
13,000	900	1199	1059	2013	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14,000	969	1497	1115	2345	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	1039	1841	1172	2723	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Exhaust Fan Performance — Sizes 40-50 Low Static[a]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
	0.0		0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
3,000	244	25	508	255	642	546	746	884	835	1262	915	1677	987	2127	1054	2607	1116	3116
4,000	277	35	569	344	703	685	806	1066	893	1484	971	1937	1041	2420	1107	2933	—	—
5,000	346	68	629	449	765	850	867	1282	954	1746	1030	2240	1100	2764	—	—	—	—
6,000	415	118	687	572	826	1040	929	1528	1015	2043	1092	2586	1160	3155	—	—	—	—
7,000	485	187	743	712	886	1254	990	1806	1077	2378	1153	2973	—	—	—	—	—	—
8,000	554	279	796	869	944	1493	1051	2114	1138	2748	—	—	—	—	—	—	—	—
9,000	623	398	848	1046	1001	1757	1110	2452	1199	3153	—	—	—	—	—	—	—	—
10,000	692	546	900	1244	1056	2044	1168	2820	—	—	—	—	—	—	—	—	—	—
11,000	762	726	952	1467	1109	2356	—	—	—	—	—	—	—	—	—	—	—	—
12,000	831	943	1005	1722	1162	2694	—	—	—	—	—	—	—	—	—	—	—	—
13,000	900	1199	1059	2013	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14,000	969	1497	1115	2345	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15,000	1039	1841	1172	2723	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 28-34 Standard and Medium Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
2,500	499	126	639	283	753	475	853	697	943	945	1025	1216	1100	1509
4,000	626	217	741	401	841	615	930	858	1012	1124	1088	1414	1159	1723
5,500	776	374	871	590	956	834	1035	1102	1109	1392	1178	1704	1244	2036
7,000	937	618	1017	870	1091	1147	1160	1445	1226	1765	1289	2103	1349	2459
8,500	1105	971	1173	1262	1238	1575	1299	1907	1358	2258	1415	2627	1469	3011
10,000	1277	1456	1336	1787	1393	2138	1448	2507	1501	2892	1552	3293	1602	3710
11,500	1451	2095	1504	2469	1554	2859	1604	3265	1652	3687	1698	4123	1743	4574
13,000	1627	2913	1674	3329	1720	3760	1765	4205	1808	4665	1851	5139	1892	5625
14,500	1805	3931	1847	4390	1889	4863	1929	5349	1969	5847	2008	6359	2047	6882
16,000	1983	5173	2022	5676	2060	6190	2097	6717	2134	7257	2170	7807	—	—
17,500	2162	6662	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
2,500	1171	1822	1238	2153	1302	2503	1363	2869	1421	3251	1477	3649	1531	4061
4,000	1226	2052	1290	2399	1351	2764	1409	3145	1465	3541	1519	3952	1571	4378
5,500	1306	2385	1366	2751	1423	3135	1478	3534	1531	3948	1582	4377	1632	4820
7,000	1406	2833	1461	3223	1514	3629	1566	4050	1616	4485	1664	4935	1712	5398
8,500	1522	3413	1573	3829	1622	4261	1670	4708	1717	5168	1762	5640	1807	6126
10,000	1650	4142	1697	4588	1743	5049	1787	5523	1831	6009	1873	6509	1915	7021
11,500	1788	5039	1831	5518	1873	6009	1915	6513	1955	7030	1995	7557	2034	8098
13,000	1933	6124	1973	6636	2012	7160	2051	7698	2089	8245	2126	8805	2162	9376
14,500	2084	7418	2121	7966	2158	8525	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
2,500	1583	4488	1633	4928	1682	5383	1730	5849	1776	6328	1821	6821
4,000	1621	4819	1670	5272	1718	5739	1764	6218	1809	6711	1854	7215
5,500	1680	5277	1727	5746	1773	6229	1818	6725	1862	7232	1904	7751
7,000	1757	5874	1802	6364	1846	6865	1889	7379	1930	7905	1971	8443
8,500	1850	6626	1892	7137	1934	7661	1975	8196	2014	8743	2054	9301
10,000	1956	7545	1996	8081	2035	8630	2073	9189	2111	9758	2148	10339
11,500	2072	8650	2110	9214	2147	9788	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—	—	—
14,500	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	1,900	7,600
	Medium	2,372	14,400
575	Standard	19,00	7,600
	Medium	2,174	10,900

LEGEND

— Standard Static (460v-)
— Medium Static(460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 28-34 High Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	577	320	705	616	808	946	897	1301	975	1680	1047	2078	1113	2494
6,500	665	464	785	816	883	1201	969	1613	1046	2047	1116	2501	1181	2974
8,000	758	659	870	1067	963	1508	1046	1975	1120	2465	1189	2976	1252	3504
9,500	856	918	959	1382	1048	1878	1127	2401	1199	2946	1265	3512	1327	4098
11,000	956	1252	1052	1772	1136	2325	1212	2903	1281	3504	1345	4125	1405	4766
12,500	1060	1672	1149	2249	1228	2858	1300	3492	1366	4148	1429	4826	1487	5522
14,000	1165	2190	1248	2826	1322	3490	1391	4180	1455	4893	1515	5626	1571	6377
15,500	1271	2818	1349	3511	1419	4234	1484	4980	1546	5749	1603	6538	1658	7344
17,000	1379	3568	1451	4320	1518	5099	1580	5902	1639	6727	1694	7572	1747	8436
18,500	1488	4451	1556	5261	1619	6098	1678	6959	1734	7840	1788	8741	1839	9659
20,000	1598	5479	1661	6349	1721	7244	1778	8161	1831	9100	1883	10057	1932	11033
21,500	1708	6663	1768	7593	1825	8547	1879	9521	1930	10516	1980	11530	2027	12562
23,000	1819	8016	1875	9005	1929	10018	1981	11051	2030	12103	2078	13174	2124	14264
24,500	1930	9549	1984	10598	2035	11668	2084	12760	2132	13870	2178	15000	2222	16144
26,000	2041	11272	2093	12383	2142	13512	2189	14662	2234	15832	2278	17019	2321	18221
27,500	2153	13200	2202	14370	2249	15561	2294	16771	2338	17995	2380	19240	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1175	2927	1233	3377	1289	3840	1341	4319	1392	4810	1440	5313	1487	5830
6,500	1242	3464	1299	3970	1354	4490	1406	5025	1456	5573	1503	6134	1550	6708
8,000	1312	4050	1368	4612	1422	5189	1473	5781	1523	6386	1570	7003	1616	7634
9,500	1385	4699	1441	5317	1494	5950	1544	6598	1592	7259	1639	7933	1684	8619
11,000	1462	5423	1517	6097	1568	6786	1618	7490	1665	8206	1711	8936	1756	9679
12,500	1542	6235	1595	6964	1646	7709	1694	8468	1741	9241	1786	10027	1830	10825
14,000	1625	7146	1676	7931	1726	8731	1773	9546	1819	10373	1863	11216	1906	12070
15,500	1710	8169	1760	9010	1808	9865	1855	10735	1899	11619	1943	12516	1985	13425
17,000	1798	9315	1846	10212	1893	11122	1938	12049	1982	12987	2024	13940	2066	14906
18,500	1888	10596	1935	11548	1980	12515	2024	13497	2067	14492	2108	15500	2149	16521
20,000	1979	12024	2025	13031	2069	14054	2112	15091	2154	16142	2194	17205	2233	18283
21,500	2073	13610	2117	14673	2160	15754	2202	16845	2242	17951	2282	19072	2320	20205
23,000	2168	15368	2211	16487	2253	17622	2293	18771	2333	19934	2371	21110	—	—
24,500	2265	17307	2306	18483	2347	19675	2386	20880	—	—	—	—	—	—
26,000	2363	19438	2403	20673	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,732	21,600
575	High	2,174	16,320

LEGEND

— High Static (460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 28-34 High Static[a,b] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1532	6359	1575	6898	1618	7450	1659	8011	1699	8583	1737	9165
6,500	1594	7293	1638	7891	1679	8499	1720	9118	1760	9746	1799	10386
8,000	1660	8275	1702	8929	1744	9595	1784	10270	1824	10955	1862	11652
9,500	1728	9317	1770	10027	1811	10749	1851	11481	1890	12225	1928	12978
11,000	1799	10434	1840	11200	1881	11978	1920	12766	1959	13565	1997	14374
12,500	1872	11635	1913	12459	1953	13292	1992	14137	2030	14992	2067	15856
14,000	1947	12936	1988	13815	2027	14705	2066	15605	2103	16516	2140	17438
15,500	2025	14349	2065	15281	2104	16228	2142	17184	2179	18149	2215	19128
17,000	2106	15883	2145	16872	2183	17873	2220	18886	2256	19907	2292	20940
18,500	2188	17554	2226	18597	2263	19654	2300	20721	—	—	—	—
20,000	2272	19371	2309	20472	2346	21583	—	—	—	—	—	—
21,500	2358	21348	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—	—	—
24,500	—	—	—	—	—	—	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,732	21,600
575	High	2,174	16,320

LEGEND

— High Static (460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 40-50 Standard and Medium Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	626	217	741	401	841	615	930	858	1012	1124	1088	1414	1159	1723
5,500	776	374	871	590	956	834	1035	1102	1109	1392	1178	1704	1244	2036
7,000	937	618	1017	870	1091	1147	1160	1445	1226	1765	1289	2103	1349	2459
8,500	1105	971	1173	1262	1238	1575	1299	1907	1358	2258	1415	2627	1469	3011
10,000	1277	1456	1336	1787	1393	2138	1448	2507	1501	2892	1552	3293	1602	3710
11,500	1451	2095	1504	2469	1554	2859	1604	3265	1652	3687	1698	4123	1743	4574
13,000	1627	2913	1674	3329	1720	3760	1765	4205	1808	4665	1851	5139	1892	5625
14,500	1805	3931	1847	4390	1889	4863	1929	5349	1969	5847	2008	6359	2047	6882
16,000	1983	5173	2022	5676	2060	6190	2097	6717	2134	7257	2170	7807	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	1226	2052	1290	2399	1351	2764	1409	3145	1465	3541	1519	3952	1571	4378
5,500	1306	2385	1366	2751	1423	3135	1478	3534	1531	3948	1582	4377	1632	4820
7,000	1406	2833	1461	3223	1514	3629	1566	4050	1616	4485	1664	4935	1712	5398
8,500	1522	3413	1573	3829	1622	4261	1670	4708	1717	5168	1762	5640	1807	6126
10,000	1650	4142	1697	4588	1743	5049	1787	5523	1831	6009	1873	6509	1915	7021
11,500	1788	5039	1831	5518	1873	6009	1915	6513	1955	7030	1995	7557	2034	8098
13,000	1933	6124	1973	6636	2012	7160	2051	7698	2089	8245	2126	8805	2162	9376
14,500	2084	7418	2121	7966	2158	8525	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17,500			—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	1621	4819	1670	5272	1718	5739	1764	6218	1809	6711	1854	7215
5,500	1680	5277	1727	5746	1773	6229	1818	6725	1861	7232	1904	7751
7,000	1757	5874	1802	6364	1846	6865	1889	7379	1930	7905	1971	8443
8,500	1850	6626	1892	7137	1934	7661	1974	8196	2014	8743	2054	9301
10,000	1956	7545	1996	8081	2035	8630	2073	9189	2111	9758	2148	10339
11,500	2072	8650	2110	9214	2147	9788	—	—	—	—	—	—
13,000	—	—	—	—	—	—	—	—	—	—	—	—
14,500	—	—	—	—	—	—	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	1,900	7,600
	Medium	2,372	14,400
575	Standards	1,900	7,600
	Medium	2,174	10,900

LEGEND

— Standard Static (460-v)
— Medium Static(460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 40-50 High Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	577	320	705	616	808	946	897	1301	975	1680	1047	2078	1113	2494
6,500	665	464	785	816	883	1201	969	1613	1046	2047	1116	2501	1181	2974
8,000	758	659	870	1067	963	1508	1046	1975	1120	2465	1189	2976	1252	3504
9,500	856	918	959	1382	1048	1878	1127	2401	1199	2946	1265	3512	1327	4098
11,000	956	1252	1052	1772	1136	2325	1212	2903	1281	3504	1345	4125	1405	4766
12,500	1060	1672	1149	2249	1228	2858	1300	3492	1366	4148	1429	4826	1487	5522
14,000	1165	2190	1248	2826	1322	3490	1391	4180	1455	4893	1515	5626	1571	6377
15,500	1271	2818	1349	3511	1419	4234	1484	4980	1546	5749	1603	6538	1658	7344
17,000	1379	3568	1451	4320	1518	5099	1580	5902	1639	6727	1694	7572	1747	8436
18,500	1488	4451	1556	5261	1619	6098	1678	6959	1734	7840	1788	8741	1839	9659
20,000	1598	5479	1661	6349	1721	7244	1778	8161	1831	9100	1883	10057	1932	11033
21,500	1708	6663	1768	7593	1825	8547	1879	9521	1930	10516	1980	11530	2027	12562
23,000	1819	8016	1875	9005	1929	10018	1981	11051	2030	12103	2078	13174	2124	14264
24,500	1930	9549	1984	10598	2035	11668	2084	12760	2132	13870	2178	15000	2222	16144
26,000	2041	11272	2093	12383	2142	13512	2189	14662	2234	15832	2278	17019	2321	18221
27,500	2153	13200	2202	14370	2249	15561	2294	16771	2338	17995	2380	19240	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1175	2927	1233	3377	1289	3840	1341	4319	1392	4810	1440	5313	1487	5830
6,500	1242	3464	1299	3970	1354	4490	1406	5025	1456	5573	1503	6134	1550	6708
8,000	1312	4050	1368	4612	1422	5189	1473	5781	1523	6386	1570	7003	1616	7634
9,500	1385	4699	1441	5317	1494	5950	1544	6598	1592	7259	1639	7933	1684	8619
11,000	1462	5423	1517	6097	1568	6786	1618	7490	1665	8206	1711	8936	1756	9679
12,500	1542	6235	1595	6964	1646	7709	1694	8468	1741	9241	1786	10027	1830	10825
14,000	1625	7146	1676	7931	1726	8731	1773	9546	1819	10373	1863	11216	1906	12070
15,500	1710	8169	1760	9010	1808	9865	1855	10735	1899	11619	1943	12516	1985	13425
17,000	1798	9315	1846	10212	1893	11122	1938	12049	1982	12987	2024	13940	2066	14906
18,500	1888	10596	1935	11548	1980	12515	2024	13497	2067	14492	2108	15500	2149	16521
20,000	1979	12024	2025	13031	2069	14054	2112	15091	2154	16142	2194	17205	2233	18283
21,500	2073	13610	2117	14673	2160	15754	2202	16845	2242	17951	2282	19072	2320	20205
23,000	2168	15368	2211	16487	2253	17622	2293	18771	2333	19934	2371	21110	—	—
24,500	2265	17307	2306	18483	2347	19675	2386	20880	—	—	—	—	—	—
26,000	2363	19438	2403	20673	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,732	21,600
575	High	2,174	16,320

LEGEND

— High Static (460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 40-50 High Static[a,b] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1532	6359	1575	6898	1618	7450	1659	8011	1699	8583	1737	9165
6,500	1594	7293	1638	7891	1679	8499	1720	9118	1760	9746	1799	10386
8,000	1660	8275	1702	8929	1744	9595	1784	10270	1824	10955	1862	11652
9,500	1728	9317	1770	10027	1811	10749	1851	11481	1890	12225	1928	12978
11,000	1799	10434	1840	11200	1881	11978	1920	12766	1959	13565	1997	14374
12,500	1872	11635	1913	12459	1953	13292	1992	14137	2030	14992	2067	15856
14,000	1947	12936	1988	13815	2027	14705	2066	15605	2103	16516	2140	17438
15,500	2025	14349	2065	15281	2104	16228	2142	17184	2179	18149	2215	19128
17,000	2106	15883	2145	16872	2183	17873	2220	18886	2256	19907	2292	20940
18,500	2188	17554	2226	18597	2263	19654	2300	20721	—	—	—	—
20,000	2272	19371	2309	20472	2346	21583	—	—	—	—	—	—
21,500	2358	21348	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—	—	—
24,500	—	—	—	—	—	—	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,732	21,600
575	High	2,174	16,320

LEGEND

— High Static (460-v)

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 54-98 Standard Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	626	217	741	401	841	615	930	858	1012	1124	1088	1414	1159	1723
5,500	776	374	871	590	956	834	1035	1102	1109	1392	1178	1704	1244	2036
7,000	937	618	1017	870	1091	1147	1160	1445	1226	1765	1289	2103	1349	2459
8,500	1105	971	1173	1262	1238	1575	1299	1907	1358	2258	1415	2627	1469	3011
10,000	1277	1456	1336	1787	1393	2138	1448	2507	1501	2892	1552	3293	1602	3710
11,500	1451	2095	1504	2469	1554	2859	1604	3265	1652	3687	1698	4123	1743	4574
13,000	1627	2913	1674	3329	1720	3760	1765	4205	1808	4665	1851	5139	1892	5625
14,500	1805	3931	1847	4390	1889	4863	1929	5349	1969	5847	2008	6359	2047	6882
16,000	1983	5173	2022	5676	2060	6190	2097	6717	2134	7257	2170	7807	2205	8369
17,500	2162	6662	2197	7209	2232	7767	2267	8335	2301	8914	2334	9505	2367	10108
19,000	2341	8422	2374	9012	2406	9613	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	1226	2052	1290	2399	1351	2764	1409	3145	1465	3541	1519	3952	1571	4378
5,500	1306	2385	1366	2751	1423	3135	1478	3534	1531	3948	1582	4377	1632	4820
7,000	1406	2833	1461	3223	1514	3629	1566	4050	1616	4485	1664	4935	1712	5398
8,500	1522	3413	1573	3829	1622	4261	1670	4708	1717	5168	1762	5640	1807	6126
10,000	1650	4142	1697	4588	1743	5049	1787	5523	1831	6009	1873	6509	1915	7021
11,500	1788	5039	1831	5518	1873	6009	1915	6513	1955	7030	1995	7557	2034	8098
13,000	1933	6124	1973	6636	2012	7160	2051	7698	2089	8245	2126	8805	2162	9376
14,500	2084	7418	2121	7966	2158	8525	2194	9096	2229	9677	2264	10268	2298	10871
16,000	2240	8942	2275	9527	2309	10122	2342	10727	2375	11344	2408	11971	—	—
17,500	2400	10720	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
4,000	1621	4819	1670	5272	1718	5739	1764	6218	1809	6711	1854	7215
5,500	1680	5277	1727	5746	1773	6229	1818	6725	1861	7232	1904	7751
7,000	1757	5874	1802	6364	1846	6865	1889	7379	1930	7905	1971	8443
8,500	1850	6626	1892	7137	1934	7661	1974	8196	2014	8743	2054	9301
10,000	1956	7545	1996	8081	2035	8630	2073	9189	2111	9758	2148	10339
11,500	2072	8650	2110	9214	2147	9788	2184	10372	2219	10969	2255	11575
13,000	2198	9957	2234	10549	2269	11152	2303	11765	2337	12390	2371	13023
14,500	2332	11485	2365	12109	2398	12743	—	—	—	—	—	—
16,000	—	—	—	—	—	—	—	—	—	—	—	—
17,500	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—
20,500	—	—	—	—	—	—	—	—	—	—	—	—
22,000	—	—	—	—	—	—	—	—	—	—	—	—
23,500	—	—	—	—	—	—	—	—	—	—	—	—
25,000	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

Performance data (cont)

Exhaust and Return Fan Performance — Sizes 54-98 Medium Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	577	320	705	616	808	946	897	1301	975	1680	1047	2078	1113	2494
6,500	665	464	785	816	883	1201	969	1613	1046	2047	1116	2501	1181	2974
8,000	758	659	870	1067	963	1508	1046	1975	1120	2465	1189	2976	1252	3504
9,500	856	918	959	1382	1048	1878	1127	2401	1199	2946	1265	3512	1327	4098
11,000	956	1252	1052	1772	1136	2325	1212	2903	1281	3504	1345	4125	1405	4766
12,500	1060	1672	1149	2249	1228	2858	1300	3492	1366	4148	1429	4826	1487	5522
14,000	1165	2190	1248	2826	1322	3490	1391	4180	1455	4893	1515	5626	1571	6377
15,500	1271	2818	1349	3511	1419	4234	1484	4980	1546	5749	1603	6538	1658	7344
17,000	1379	3568	1451	4320	1518	5099	1580	5902	1639	6727	1694	7572	1747	8436
18,500	1488	4451	1556	5261	1619	6098	1678	6959	1734	7840	1788	8741	1839	9659
20,000	1598	5479	1661	6349	1721	7244	1778	8161	1831	9100	1883	10057	1932	11033
21,500	1708	6663	1768	7593	1825	8547	1879	9521	1930	10516	1980	11530	2027	12562
23,000	1819	8016	1875	9005	1929	10018	1981	11051	2030	12103	2078	13174	2124	14264
24,500	1930	9549	1984	10598	2035	11668	2084	12760	2132	13870	2178	15000	2222	16144
26,000	2041	11272	2093	12383	2142	13512	2189	14662	2234	15832	2278	17019	2321	18221
27,500	2153	13200	2202	14370	2249	15561	2294	16771	2338	17995	2380	19240	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1175	2927	1233	3377	1289	3840	1341	4319	1392	4810	1440	5313	1487	5830
6,500	1242	3464	1299	3970	1354	4490	1406	5025	1456	5573	1503	6134	1550	6708
8,000	1312	4050	1368	4612	1422	5189	1473	5781	1523	6386	1570	7003	1616	7634
9,500	1385	4699	1441	5317	1494	5950	1544	6598	1592	7259	1639	7933	1684	8619
11,000	1462	5423	1517	6097	1568	6786	1618	7490	1665	8206	1711	8936	1756	9679
12,500	1542	6235	1595	6964	1646	7709	1694	8468	1741	9241	1786	10027	1830	10825
14,000	1625	7146	1676	7931	1726	8731	1773	9546	1819	10373	1863	11216	1906	12070
15,500	1710	8169	1760	9010	1808	9865	1855	10735	1899	11619	1943	12516	1985	13425
17,000	1798	9315	1846	10212	1893	11122	1938	12049	1982	12987	2024	13940	2066	14906
18,500	1888	10596	1935	11548	1980	12515	2024	13497	2067	14492	2108	15500	2149	16521
20,000	1979	12024	2025	13031	2069	14054	2112	15091	2154	16142	2194	17205	2233	18283
21,500	2073	13610	2117	14673	2160	15754	2202	16845	2242	17951	2282	19072	2320	20205
23,000	2168	15368	2211	16487	2253	17622	2293	18771	2333	19934	2371	21110	—	—
24,500	2265	17307	2306	18483	2347	19675	2386	20880	—	—	—	—	—	—
26,000	2363	19438	2403	20673	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
5,000	1532	6359	1575	6898	1618	7450	1659	8011	1699	8583	1737	9165
6,500	1594	7293	1638	7891	1679	8499	1720	9118	1760	9746	1799	10386
8,000	1660	8275	1702	8929	1744	9595	1784	10270	1824	10955	1862	11652
9,500	1728	9317	1770	10027	1811	10749	1851	11481	1890	12225	1928	12978
11,000	1799	10434	1840	11200	1881	11978	1920	12766	1959	13565	1997	14374
12,500	1872	11635	1913	12459	1953	13292	1992	14137	2030	14992	2067	15856
14,000	1947	12936	1988	13815	2027	14705	2066	15605	2103	16516	2140	17438
15,500	2025	14349	2065	15281	2104	16228	2142	17184	2179	18149	2215	19128
17,000	2106	15883	2145	16872	2183	17873	2220	18886	2256	19907	2292	20940
18,500	2188	17554	2226	18597	2263	19654	2300	20721	—	—	—	—
20,000	2272	19371	2309	20472	2346	21583	—	—	—	—	—	—
21,500	2358	21348	—	—	—	—	—	—	—	—	—	—
23,000	—	—	—	—	—	—	—	—	—	—	—	—
24,500	—	—	—	—	—	—	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—	—	—	—	—
27,500	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
208/203	Standard	2,200	10,800
	Medium	2,600	16,800
575	Standard	2,200	10,800
	Medium	2,477	14,000

LEGEND

— Medium Static(460-v)

Performance data (cont)

Return Fan Performance — Sizes 54-98 High Static[a,b]

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	727	785	841	1300	936	1859	1020	2457	1095	3092	1164	3759	1228	4455
12,000	823	1103	929	1693	1019	2324	1099	2992	1172	3693	1239	4425	1302	5187
14,000	923	1515	1021	2182	1106	2887	1183	3627	1253	4398	1318	5198	1379	6027
16,000	1025	2035	1116	2783	1197	3564	1270	4377	1337	5220	1400	6092	1459	6989
18,000	1129	2681	1214	3509	1291	4369	1360	5258	1425	6175	1486	7118	1543	8087
20,000	1236	3468	1315	4377	1387	5315	1453	6282	1515	7274	1573	8291	1629	9334
22,000	1343	4410	1417	5401	1485	6420	1548	7464	1608	8534	1664	9627	1717	10743
24,000	1452	5522	1521	6597	1585	7697	1645	8820	1702	9967	1756	11137	1808	12329
26,000	1561	6822	1626	7980	1687	9160	1744	10366	1799	11591	1851	12838	1901	14108
28,000	1671	8323	1732	9564	1790	10829	1845	12114	1897	13418	1947	14746	1995	16092
30,000	1782	10043	1840	11369	1894	12714	1947	14082	1997	15468	2045	16872	2091	18297
32,000	1893	11996	1947	13404	2000	14834	2050	16282	2098	17750	2144	19234	2189	20739
34,000	2004	14195	2056	15689	2106	17202	2154	18733	2200	20283	2245	21849	2288	23432
36,000	2116	16660	2165	18240	2213	19838	2259	21452	2303	23080	2346	24728	2388	26391
38,000	2228	19406	2275	21067	2321	22751	2365	24447	2407	26161	—	—	—	—
40,000	2340	22445	2385	24196	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
	1.6		1.8		2.0		2.2		2.4		2.6		2.8	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1288	5180	1345	5932	1399	6709	1450	7511	1500	8336	1547	9184	1593	10053
12,000	1361	5975	1416	6791	1469	7629	1520	8494	1569	9380	1616	10288	1661	11216
14,000	1436	6883	1491	7762	1543	8666	1593	9592	1641	10542	1687	11513	1731	12504
16,000	1515	7913	1569	8860	1619	9830	1668	10822	1715	11836	1761	12872	1805	13927
18,000	1597	9080	1649	10095	1699	11134	1746	12195	1792	13274	1837	14378	1880	15498
20,000	1682	10398	1732	11486	1780	12593	1827	13723	1872	14871	1916	16039	1958	17228
22,000	1768	11881	1817	13039	1865	14220	1910	15419	1954	16638	1997	17876	2038	19132
24,000	1857	13540	1905	14773	1951	16025	1995	17298	2038	18589	2080	19898	2121	21226
26,000	1949	15393	1995	16702	2039	18028	2083	19373	2125	20739	2165	22118	2205	23517
28,000	2042	17456	2086	18838	2130	20241	2172	21659	2213	23097	2252	24552	2291	26021
30,000	2136	19739	2180	21200	2222	22678	2263	24173	2302	25684	2341	27213	2379	28758
32,000	2232	22259	2274	23798	2315	25351	2355	26923	2394	28512	—	—	—	—
34,000	2330	25031	2371	26649	—	—	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

a. Conversion - 1 watt = 0.00114 bhp.
b. Fan performance based on 460-v. See table below for maximum rpm and watts by fan motor static for alternate voltages.

Voltage	Motor Static	Max rpm	Max Watts
203/230	High	2,732	28,800
575	High	2,174	21,760

LEGEND

— High Static (460-v)

Performance data (cont)

Return Fan Performance — Sizes 54-98 High Static[a,b] (cont)

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	3.0		3.2		3.4		3.6		3.8		4.0	
	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts	rpm	watts
10,000	1638	10942	1681	11854	1722	12781	1763	13732	1802	14698	1841	15684
12,000	1705	12165	1747	13136	1789	14126	1829	15133	1868	16159	1906	17201
14,000	1775	13515	1817	14545	1857	15596	1897	16665	1936	17749	1973	18854
16,000	1847	15000	1889	16096	1929	17208	1968	18337	2006	19485	2043	20653
18,000	1922	16637	1963	17796	2002	18972	2041	20166	2079	21378	2115	22606
20,000	1999	18434	2039	19659	2078	20903	2116	22162	2153	23440	2190	24733
22,000	2079	20409	2118	21700	2156	23010	2194	24336	2230	25681	2266	27041
24,000	2160	22570	2199	23931	2236	25309	2273	26702	2309	28115	—	—
26,000	2244	24933	2281	26363	2318	27812	—	—	—	—	—	—
28,000	2329	27510	—	—	—	—	—	—	—	—	—	—
30,000	—	—	—	—	—	—	—	—	—	—	—	—
32,000	—	—	—	—	—	—	—	—	—	—	—	—
34,000	—	—	—	—	—	—	—	—	—	—	—	—
36,000	—	—	—	—	—	—	—	—	—	—	—	—
38,000	—	—	—	—	—	—	—	—	—	—	—	—
40,000	—	—	—	—	—	—	—	—	—	—	—	—

NOTE(S):

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LEGEND

— High Static (460-v)

Application guidance

General

Overview

Consider the following guidance on unit installation and application.

Storage

Unit packaging is not design for long term, outdoor storage. Carrier recommends storing the unit(s) indoors in a dry, level location. If a unit(s) is stored outdoors or installed prior to building completion, refer to the installation instructions for storage guidance.

NOTE: Special start-up procedures are required for units that have been non-operational (in storage or installed) for more than three (3) months or have been exposed to cold or humidity outside of the recommended storage conditions. Refer to the installation instructions for start-up guidance.

Minimum Space Area

The space area served by ducted equipment with A2L refrigerant is restricted by building code based on refrigerant volume that the releasable to the conditioned space served by the duct system.

Determine the conditioned space area by calculating the floor area (room length x room width) of all spaces served by a common duct system and adding them all together to get the total conditioned space area.

Compare the calculated total conditioned space area to the minimum conditioned space area (TA_{min}) listed in the MCSA table, based on the unit size and configuration (with or without Humidi-MiZer).

Minimum Conditioned Space Area (MCSA or TA_{min})

UNIT SIZE 48V	HUMIDI-MIZER[a]	(TA_{MIN})[b]	
		Sq Ft	Sq Meter
28	No	1102	102
	Yes	1532	142
30	No	1013	94
	Yes	1409	131
34	No	1066	99
	Yes	1468	136
40	No	1236	115
	Yes	1679	156
50	No	1817	169
	Yes	1964	182
54	No	1829	170
	Yes	2145	199
60	No	1905	177
	Yes	2201	205
70	No	2213	206
	Yes	2530	235
74	No	2809	261
	Yes	3126	290
90	No	TBD	TBD
	Yes	TBD	TBD
98	No	TBD	TBD
	Yes	TBD	TBD

NOTE(S):

a. Humidi-Mizer system is indicated by position 6 of the model number being R,T, or Y.
b. TA_{min} is based on a minimum ceiling height of 7.2 ft (2.2 m) and the worst-case unit refrigerant charge.

Climate

Verify the geographic location of the installation. The location's climate determines the outdoor air and entering condenser air conditions for sizing and selecting the equipment.

The location can impact the type of operation the unit will need to perform. Warm climates may only require cooling, while mild climates may require both cooling and heating. Humid climates may require dehumidification.

Environment

Consider the areas around the installation site that can impact the unit. Forests, gardens, and fields generate pollen and seeds that can clog condenser coils, outdoor air intake screens, and filters.

Air conditioning units installed near coastlines or in highly polluted areas require special consideration for protecting coils and other metal surfaces from corrosion.

Elevation and altitude

Verify the jobsite elevation as it can impact selection conditions. Air is less dense as elevation increases and affects selection conditions, airflow performance, and gas heat performance.

High altitude units may be subject to high winds and require special attention. The condenser coils may require wind baffles for mechanical cooling during high winds. Gas heat units exposed to high winds may require flue vent extensions.

Units exposed to very high winds require mechanical attachment to the curb or mounting structure with curb clips or anchor bolts.

Codes

Municipalities can have code requirements for packaged air conditioning and heating equipment. Examples include:

- California Title 24 energy code has specific requirements for HVAC units, including economizer operation, demand control ventilation, and demand shedding.
- Chicago Construction Code mandates refrigerant relief valves on any circuit with more than four pounds of refrigerant.
- Florida Building Code has requirements for wind load and full perimeter roof curbs.

Review local codes before configuring and installing packaged air conditioning equipment.

Unit location

Overview

Review plans or site notes for obstructions that impede the installation, service access, or airflow. Note utility connection points and sources, including power and control wiring, condensate disposal, gas connections (48V units), and hot water connections (50V units with hot water coil). Review local code requirements for clearances before finalizing the unit location. Ensure equipment is not accessible by the general public.

Installation clearances

Verify access is available for the rigging and installation of equipment. Review the equipment path for rigging and obstructions that may be present. Avoid rigging equipment over power lines or occupied areas.

Application guidance (cont)

Consider access requirements for installing accessories, condensate pipe connections, and power and control wiring connections. Verify clearance for gas piping connections and flue vents for gas heat units. Verify coil piping connection clearances for units with hot water coil.

Service clearances

Refer to the certified drawings for service clearance requirements. Clearances are from the end or side of the unit. The provided dimensions allow for the removal of the largest component in each unit section.

Consider additional service clearances for equipment, such as cranes, gantries, or hoists required to support equipment service.

Control and power box service clearance may be higher if the control box is adjacent to a conductive surface. Review local code requirements for clearance requirements with conductive surfaces.

Condenser airflow clearances

Consider airflow clearance for the condenser. Airflow may be required on the sides and the end of the condenser. Overhead obstructions (within 20 ft) of the condenser fans are not permitted. Side or end obstructions may be permitted if they allow air to pass or do not obstruct more than 25% of the condenser surface.

Do not locate condenser coils near exhaust or scrubber outlets, as the contaminants from the exhaust system can clog or damage the condenser coils.

Keep the condenser coils away from corrosive sources. Use e-coated coils where the environment is mildly corrosive, such as coastal locations.

Outdoor air intake clearances

Do not locate outdoor air intakes within 10 ft of exhaust air sources, flue vent outlets, or other sources of contaminated air. If possible, locate the outdoor air intake away from prevailing winds.

Gas heat clearances

For units with gas heat, clearance is required for the combustion air inlet and flue exhaust. Do not locate combustion inlets near combustible or highly contaminated exhaust air sources.

Do not locate flue gas outlets near the outdoor air intakes of other air conditioning units or ventilation devices.

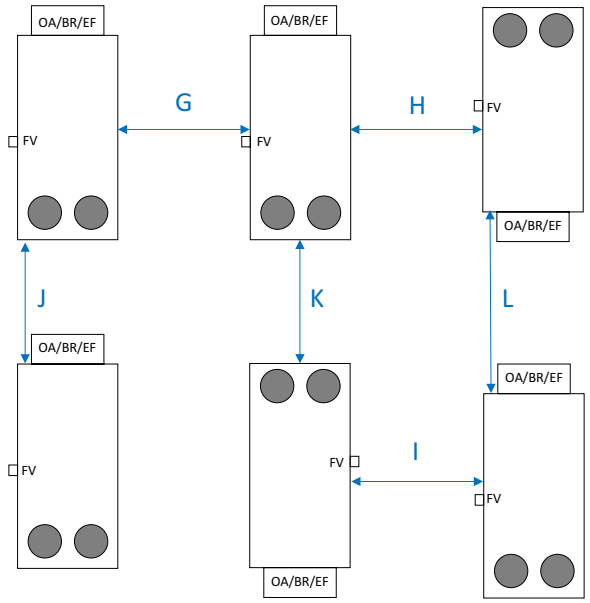
Exhaust outlet clearance

For units with factory-installed exhaust fans, do not locate the exhaust air outlets near the outdoor air intake of other air conditioning units or ventilation devices. Do not locate exhaust outlets of heavily contaminated air near condenser coils or combustion gas inlets.

Multi-unit spacing

For applications with multiple units installed side-by-side or end-by-end, see figure below for minimum unit separation distances. When units have different clearance requirements, use the higher spacing requirement.

Multiple Unit Spacing — 48/50V Compact Chassis



Minimum Unit Spacing (ft)

UNIT	CHASSIS	RELIEF	G	H	I	J	K	L
48V	Compact	None/BR	6	6	8	8	8	8
		EF	6	6	8	8	8	12
50V	Compact	None/BR	6	6	6	8	8	8
		EF	6	6	6	8	8	12

LEGEND

BR — Barometric Relief
EF — Exhaust Fan
FV — Flue Vent (Gas Heat Only)
OA — Outside Air Intake

Utility sources

Verify the distance and location of the unit compared to utility sources. Power wire length may be limited by the unit minimum circuit ampacity, available wire size, and the factory terminal block or disconnect lug size.

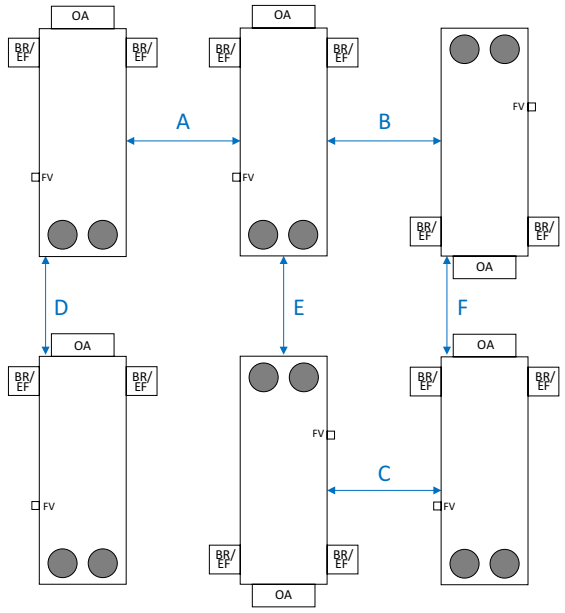
Control wiring distances can be limited based on wiring size and type. Long wire-length installations may require repeaters.

For gas heat units, verify the distance between the unit and the main gas line and the gas shut-off.

For units with a hot water coil, verify the distance between the hot water coil and the nearest pipe connection. Verify the pump is sized for the flow and pressure drop of the hot water coil and piping.

Application guidance (cont)

Multiple Unit Spacing — 48/50V Standard Chassis



Minimum Unit Spacing (ft)

UNIT	CHASSIS	RELIEF	A	B	C	D	E	F
48V	Standard	None/BR	6	6	8	8	8	8
		EF	12	8	12	8	8	8
50V	Standard	None/BR	6	6	6	8	8	8
		EF	12	8	8	8	8	8

LEGEND

BR — Barometric Relief
EF — Exhaust Fan
FV — Flue Vent (Gas Heat Only)
OA — Outside Air Intake

Unit support

Consider how the unit will be mounted. Direct ground installation is not recommended. Verify structure weight, service clearances and clearances for ducting, power and control wiring, and condensate draining for all support types. Use the following recommended unit support methods: roof curb, support structure, or slab mount.

Roof curb

Units can be installed on an accessory or field-provided roof curb. The roof curb support rails must support the unit base pan, not the unit base rail. For field-provided roof curbs, the location and size of curb rails should be no less than the Carrier roof curbs accessory for airside section support. Sleeper rails may be used under the condenser section if within 6 ft of the end of the unit.

Verify sufficient structure is available to support the roof curb and unit weight, as well as any additional loads from wind or heavy snow.

For units with vertical supply or return duct connections, the ductwork must connect to the roof curb, not the unit base pan. The air handling section of the unit must use a full perimeter roof curb. The end of the condenser section can rest on a sleeper rail.

For applications that require mechanical attachment of the unit to the roof curb, use field-provided curb clips. The curb clips must connect to the side of the unit base rail.

Consider power and control wire routing when using roof curbs. All units include couplings for thru-the-base power and control wiring.

Support structure or curb adapter

Units can be installed on a field-provided support structure, including curb adaptors. The structure can support the unit base pan or the base rails.

For a base pan support structure, the structure must provide the same support as a Carrier roof curb accessory. For 27.5 to 35 ton units support must be provided along the entire perimeter edge of the unit base pan and around the supply and return duct openings.

For a base rail support structure, the support structure must provide support along the entire length of the side base rails. Additional support under the two base pan ends is recommended.

For units with a support structure and vertical supply or return duct connections, the ductwork must connect to the support structure, not the unit base pan or base rails.

Verify that the support structure and other supporting members can support the unit weight and additional loads from wind or heavy snow. Verify that the structure height provides sufficient clearance for condensate drainage.

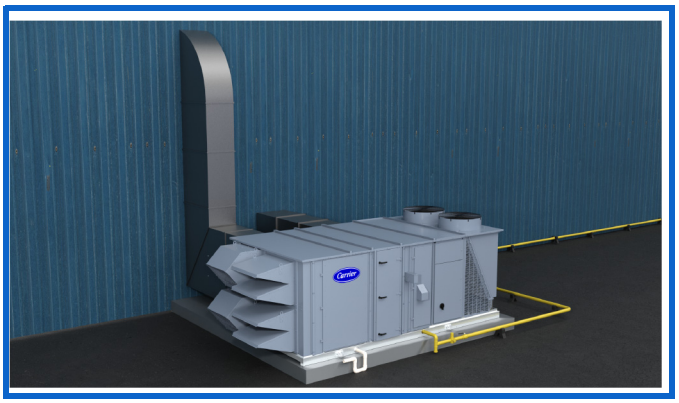
For applications that require mechanical attachment of the unit to the support structure, use field-provided curb clips or anchor bolts. The curb clips or anchor bolts must connect to the side of the unit base rail.

For installations where the unit bottom is exposed to the elements, protection is required for the base pan insulation. A special order double-wall base pan is available.

Consider power and control wire routing when using support structures. All units include couplings for thru-the-base power and control wiring.

NOTE: Only use one curb adapter at a time.

Application guidance (cont)



Slab mount

Units can be installed on a field-provided slab. The slab must provide adequate height for condensate drainage.

The slab should be a minimum of 8 in. thick and at least 4 in. above grade. Extend the slab 6 in. beyond the cabinet edge to ensure sufficient space for unit placement.

Carrier recommends using four, semi-equally spaced vibration pads on each side of base rail to reduce vibration and sound transmission. The end vibration pads should be within 12 in. of the end of the unit.

Do not locate the slab near roads, exhaust systems, or foliage, where dirt, debris, and pollen can clog the condenser coil, outdoor air screens, and filters. Use a gravel apron near the outdoor air intake, condenser, and gas heat inlet (if equipped) to inhibit the growth of foliage next to the unit.

For installations where the unit bottom is exposed to the elements, protection is required for the base pan insulation. A special order double-wall base pan is available.

Screening

For installation where screening is required, Carrier does not recommend supporting the screen from the unit or curb. The screen should have a separate support system.

For solid panel screens, maintain airflow clearances for the condenser, outdoor air intake, exhaust (if equipped), and gas heat (if equipped) systems.

For perforated or screened panels that allow airflow to pass, airflow clearances may be reduced depending on the panel airflow resistance and air entrapment.

In applications where the screening system is not removable, service clearances must be maintained.

In applications where the screens are removable, the screen can be installed closer to the unit if service clearances can be maintained when the screens are removed.

Ductwork

Review project plans or site reports for supply and return duct orientations and connection locations.

For units with vertical supply or return, the ductwork must connect to the roof curb or support structure. Do not attach the ductwork to the base pan or base rails.

For units with horizontal supply or return, a factory-provided flange is included for ductwork connections.

NOTE: Unit supply and return duct connection orientations are not field convertible.

Primary condensate drain

All units require a field-connected primary condensate drain. The unit must be installed with allowed tolerances to promote drainage. Roof curb, support structures, or slabs should provide adequate clearance to install a condensate drain.

A drain trap is required to prevent unfiltered air from entering the unit The drain trap size must be sized for a draw-thru application based on the installed static pressure. Consider waterless traps or trap shutoffs for indoor air quantity-conscious applications.

For units where mechanical cooling or dehumidification active while ambient temperateness are below freezing, provide freeze protection for the condensate drain.

Secondary condensate drain

All 55 to 100 ton units include a secondary condensate drain connection in the base rail on the right side of the unit (opposite side of the primary drain connection). This secondary drain provides protection in the event that the primary drain overflows into the unit base pan.

Power wiring and protection

For new construction installations, review project documentation for voltage, minimum circuit ampacity (MCA), maximum overcurrent protection (MOCP), and short circuit current rating (SCCR).

For retrofit or replacement installations, review the existing unit information for voltage, minimum circuit ampacity, maximum overcurrent protection, and short circuit current rating. Also review the existing power feed information (if re-used) for voltage, wire size, breaker size, fuse size, disconnect size, and maximum short circuit fault current.

The unit voltage must match the power feed voltage. The units are not field convertible for alternate voltages. For applications with high voltage fluctuations (>10% of nominal), a phase monitor or isolation transformer may be required.

Review the unit minimum circuit ampacity (MCA). This information is used to size the power conductors feeding the unit. The conductors must be rated to handle no less than the MCA value based on the installation length, rated temperature, and wiring arrangement.

Review the unit maximum overcurrent protection (MOCP). This value is used to size the breaker or fuses for the unit power feed. The installed overcurrent protection device cannot be rated higher than the unit MOCP.

It may be acceptable to install an overcurrent protection device that is rated lower than the nameplate MOCP if it has a protection rating no lower than the unit MCA. Using an overcurrent protection device that is rated lower than the MOCP can lead to nuisance trips.

The field-provided power wiring enters the power box through the back panel on the bottom left side (when looking at the front of the power box). Power conductors must be copper. Aluminum conductors are NOT allowed.

Power wiring connections are made in the dedicated high voltage power box at the terminal block or non-fused disconnect.

For units without a factory-installed non-fused disconnect, a field-provided disconnect is required.

Verify the required short circuit current rating (SCCR) for the unit as specified in the National Electric Code (NEC).

Application guidance (cont)

For units with the high short circuit current rating option, a field-provided disconnect or fuse block with J-type current-limiting fuses must be installed and wired upstream of the unit terminal block.

For units without a factory-installed non-fused disconnect, a field-provided disconnect is required.

All units have factory-installed couplings for thru-the-base power and control wiring. The couplings must be sealed-up in the field during installation.

Controls

Review project documentation or jobsite reports on control requirements. Review application details for control methodology and required sensors and control inputs.

For job sites with a building automation system (BAS), verify communication type (BACnet, CCN, Modbus, etc.) and method (MS/TP, IP, etc.)

Most field control wiring connections are made at the terminal blocks in the front of the dedicated low voltage control box. The control wiring enters the control box through the top of the right-side panel (when looking at the front of the control box).

Acoustics

To minimize sound transmitted to the space or areas around the unit, consider the following recommendations:

Location

Avoid locating the unit above sound-sensitive areas. Locate the unit above restrooms, storage areas, corridors, or other noise-tolerant areas.

Locate the units at least 25 ft away from critical areas. If this is not possible, the ductwork and ceiling structure should be acoustically treated. Consider the use of vibration isolators or an acoustic curb.

Avoid locating the unit next to exterior walls or windows of sound-sensitive areas. If unavoidable, locate the condenser away from the occupied space. Use the low-sound condenser fans and compressor sound blankets to reduce radiated sound levels. Use sound barriers as necessary.

Avoid mounting the unit in the middle of large roof expanses between vertical supports. This will minimize the phenomenon known as roof bounce. Install the units close to vertical roof supports (columns or load-bearing walls).

Ductwork

Use flexible connectors between the unit and the supply and return ducts. Supply and return air main trunk ducts should be located over hallways and/or public areas. Provide trailing edge turning vanes in ductwork elbows and tees to reduce air turbulence. Make the ductwork as stiff as possible. Use round duct wherever possible because it is less noisy.

Seal all penetrations around ductwork entering the space. Make sure that ceiling and wall contractors do not attach hangers or supports to ductwork. Provide as smooth and gradual transition as possible when connecting the rooftop unit discharge to the supply duct.

If a ceiling plenum return is used, provide a return elbow or tee to eliminate line-of-sight noise to the space. Face the entrance of the return duct away from other adjacent units.

Acoustic insulation

Provide acoustic interior lining for the first 20 ft of supply and return duct or until the first elbow is encountered. The elbow prevents line-of-sight transmission in the supply and return ducts.

Install a double layer of 2 in. acoustical pads with mass-loaded vinyl facing on top of the roof deck before building insulation and roofing installation occur. Place the material inside the curb and for 4 to 8 ft beyond the unit perimeter.

Openings in the pad should only be large enough for the supply and return ducts. An alternate approach is to use two layers of gypsum board with staggered seams in addition to the acoustical pad.

Indoor fan control

Consider using an indoor fan control method that allows for incremental levels of speed modulation, such as variable air volume (VAV) control. The incremental fan speed changes are less noticeable to occupants than discrete fan speed changes.

Application type

General

Consider how the unit is being applied, as the application type can dictate required operation and factory-installed options.

Single-zone

For most single-zone comfort cooling applications, precise supply air temperature isn't required. In these applications, it may be acceptable to use SAV™ or CV indoor fan control with staged cooling and heating systems, such as staged compressor and two-stage heat.

If precise supply air temperature control is required, or the cooling or heating airflow is modulated based on the space temperature (SZ-VAV) then modulating cooling and heating systems, such as variable-capacity compressor and modulating heat, are required. Modulating cooling and heating systems should also be used for third-party modulated indoor fan operation.

Consider using a dehumidification system, like Humidi-MiZer, in applications in humid climates or with high latent loads. Having a dedicated dehumidification mode will allow the unit to dehumidify the space without overcooling. A variable-capacity compressor is recommended with dehumidification operation.

Multi-zone variable air volume (VAV)

Multi-zone VAV applications with air terminal units require VAV indoor fan control based on duct static pressure. The wide airflow range of multi-zone VAV systems requires modulating cooling and heating systems (such as variable-capacity compressor and modulating heat).

Multi-zone VAV systems do not typically require dedicated dehumidification operation, as the unit typically provides constant cool, dehumidified air whenever there isn't a ventilate or heating demand.

Application guidance (cont)

Advanced applications

Contact your local Carrier applied sales representative for guidance on advanced applications, including:

- Process applications
- Mission or condition critical
- Two or more units on a common duct system, "twinned"
- 100% outdoor air or high mixed air (>90°F/32.2°C) operation
- Applications above 115°F (46.1°C) ambient

Application conditions

Consider both full and part-load operating conditions, including airflows, static pressures, and temperatures to ensure the unit is appropriately sized and configured for the application.

For new construction or major retrofit applications, the operating conditions are often subject to the project plans and mechanical schedules.

For replacement applications, operating conditions can be difficult to determine and "like-for-like" replacement is not always the best option. Information on operating conditions can be obtained from original plans and mechanical schedules, air balance documentation, and BAS trends. If application direct data is not available, compare existing unit operating parameters (fan speeds, sheave settings, DX temperatures and pressures, etc.) to product data. Also consider changes to the climate and to building loads since the original equipment was installed.

Mechanical cooling and dehumidification airflow

This ensures the application full-load airflow for cooling and dehumidification is within the minimum and maximum full load airflows for the unit. Ensure the part-load airflow for cooling, cool-tempered venting, and part-load dehumidification is at or above the minimum part-load airflow. See "Cooling and Dehumidifying Airflow Limits" on page 20 for airflow limits.

Mechanical cooling and dehumidification recommended temperatures

- Minimum entering evaporator air temperature: 67°F (19.4°C)
- Maximum entering evaporator air temperature: 90°F (32.2°C)
- Minimum entering condenser air temperature: –10°F (–23.3°C)
- Maximum entering condenser air temperature: 115°F (46.1°C)

Heating airflow

Heating airflow ensures the application full-load airflow for heating is within the minimum and maximum full-load airflows for the heat type. Ensure the part-load airflow for heating, heat-tempered venting, or heat-tempered cooling is above the minimum airflow for heat stage 1 or modulating heat. See "Features, options, and accessories" on page 16 for airflow limits by heat type.

Alternate minimum or maximum temperatures may be allowable based on application airflow or unit configuration. Contact your local Carrier applied sales representative for guidance.

Heating recommended temperatures

- Minimum gas heat entering air temperature: 20°F (–6.7°C)
- Maximum gas heat entering air temperature: 75°F (23.8°C)
- Minimum electric heat entering air temperature: 50°F (10°C)
- Maximum electric heat entering air temperature: 75°F (23.8°C)

Alternate minimum or maximum temperatures may be allowable based on application airflow or unit configuration. Contact your local Carrier applied sales representative for guidance.

Construction operation

Operating the unit during the construction phase or before significant building completion is not recommended.

Construction debris and off-gassing from construction materials can enter the unit and damage system components.

Operating the unit with incomplete duct systems, and without proper unit control setup or associated building controls can damage the indoor fan system. Carrier recommends completing a system air balance before operating the indoor fan in automatic mode.

Running cooling, dehumidification, or heating systems without sufficient load, due to lack of airflow, lack of building load, or improper setup and configuration can damage unit systems.

Operating the unit temporarily in heating during finishing stages of construction may be allowable. See the unit installation and start-up instructions for the temporary heating start-up checklist.

Contact your local Carrier applied sales representative if construction or pre-occupancy operation is required.

Factory-installed option guidance

General

Consider the following guidance on when to use factory-installed options based on application or customer requirements.

NOTE: Factory-installed options cannot be field-installed unless they are available as an accessory.

Application type

Staged air volume (SAV™)

Units are intended for use in single-zone applications without air terminal units for space temperature or thermostat input control.

SAV units default to SAV indoor fan control and are field configurable for CV, SZ-VAV, or third-party input control.

SAV units can be field converted to supply duct static pressure control for true constant volume operation by adding the appropriate duct static pressure sensor and required pneumatic tubing and wiring.

Variable air volume (VAV)

Units are intended for VAV indoor fan with SZ-VAV for single-zone applications or based on supply duct static pressure for MZ-VAV applications with air terminal units and return air temperature control.

VAV units default to MZ-VAV supply duct static pressure control. Units can be field configured for SZ-VAV, third-party modulating control, SAV, or CV.

A modulating heat source (modulating gas, SCR electric, or hot water coil) or no heat is recommended for VAV applications.

Chassis type

Compact chassis

Compact chassis models fit select competitor roof curbs for retrofit applications and provide a small footprint for new construction or retrofit applications with space constraints or lower filtration and static pressure requirements.

Due to the short chassis length, the compact chassis is limited to a maximum of up to 6 in. of total filtration, with a 2 in. pre-filter before a 4 in. pre-filter, and with low static exhaust fans, which can handle up to 0.5 in. of external static pressure.

Standard chassis

Standard chassis models have a larger footprint for retrofit applications of Carrier 48/50P and 48/50Z Series units and have increased fan and filtration capabilities for new construction or retrofit applications.

The longer chassis length allows for up to 12 in. MERV 14 bag or MERV 15 cartridge pre-filters and for medium static exhaust fan motors that can handle up to 43 in. of external static pressure.

Direct expansion options

Standard efficiency, low ambient

Includes standard sound, metal outdoor fans and high-speed outdoor fan motors with variable speed control using Greenspeed® intelligence. Provides a higher MCA/MOCP, higher radiated sound, and lower EER/IEER than high efficiency, low sound, low ambient. Recommended for non-sound sensitive, cooling dominant applications with inexpensive power.

High efficiency, low sound, low ambient

Includes compressor sound blankets, shrouded, AeroAcoustic™ outdoor fans, and low rpm outdoor fan motors with variable speed control using Greenspeed® intelligence. Provides a lower MCA/MOCP, lower radiated sound, and higher EER/IEER than standard efficiency, low ambient. Recommended for sound sensitive applications, cooling dominant or high electric cost applications, or for replacement applications to provide a slightly lower MCA to match existing power wire.

Standard-capacity variable speed compressor

Includes a low-speed, lead variable speed compressor. Provides a lower cooling capacity and lower MCA/MOCP than high-capacity variable speed compressor. Recommended for replacement applications to provide a lower MCA to re-use existing power wire.

High-capacity variable speed compressor

Includes a high-speed, lead variable speed compressor. Provides a higher cooling capacity and a higher MCA/MOCP than standard-capacity variable speed compressor. Recommended for new construction applications or in replacement applications with high cooling or dehumidification loads. May require new power wire in replacement applications.

Humidi-MiZer® adaptive dehumidification

Adaptive dehumidification provides a reheat source that allows the unit to dehumidify without overcooling the space. Humid-MiZer dehumidification can also improve system performance during simultaneous cooling and dehumidification.

It is recommended for applications where dedicated dehumidification operation is required, such as humid climates, spaces with high humidity loads (gymnasiums, conference areas), or applications with high quantities of outdoor air.

Construction options

Extended standard chassis

Required for replacing Carrier 48/50P and 48/50Z Series extended chassis units or to fit an optional factory-installed bag or cartridge filters on 50V standard chassis units (sizes 28-50).

Plenum section (50V unit sizes 28-70 only)

The plenum section is required for replacing Carrier 50P and 50Z Series discharge plenum. It is also required for replacing legacy gas heat (48P and 48Z) units with cooling only/electric and heat/hot water heat (50V) unit. Can be used to fit a factory-installed bag or cartridge filters on 50V standard chassis units (sizes 28-50).

R-13 double wall construction (select standard chassis only)

Includes air handling section construction (top, sides, and base) using foam filled double wall doors and panels with galvanized interior liner.

Recommended for indoor air quality (IAQ) conscious applications. Applications in dirty environments to provide wipe down capability for easy cleaning. Applications requiring increased thermal transfer resistance due to application conditions, or for more robust unit construction due to application conditions.

Factory-installed option guidance (cont)

R-13 double wall construction with Agion® coating (select standard chassis only)

Includes air handling section construction (top, sides, and base) using foam filled double wall doors and panels with galvanized interior liner. Select top, side panels, and doors will receive Agion coated galvanized liners.

Recommended for indoor air quality (IAQ) conscious applications to resist microbial growth.

Drain pan and coil

Stainless steel drain pan

This drain pan is required for applications with mildly corrosive indoor environments or with mildly corrosive outdoor environments and operation with outdoor air.

E-coated MCHX condenser coil

Provides condenser coil protection, which can help maintain unit efficiency and performance.

NOTE: It is required for applications in mildly corrosive environments.

Recommended in rainy climates or applications with frequent condenser coil cleaning to help prevent moisture entrapment in the coil, which can cause head pressure issues or reduces efficiency.

E-coated (Al/Cu) evaporator coil

Provides evaporator coil protection, which can help maintain unit efficiency and performance. E-coated evaporator coils are more susceptible to moisture carry-over than non-coated coils, so the allowable maximum cooling airflow may be limited.

Required for applications with mildly corrosive indoor environments or with mildly corrosive outdoor environments and operation with outdoor air.

E-coat coils have a lower water carry-over threshold and limits the maximum application cooling airflow.

Hail guard

Provides outdoor coil protection against damage from hail, small blowing debris, and incidental contact. Also acts as a wind baffle for windy environments.

Required for units sizes 28-60 in locations where hail is prevalent. Recommended for any units mounted on the ground.

Unit sizes 70-98 are standard with louvered security grilles around the outdoor coil section, eliminating the need for extra hail guards.

Sensors and controls

Humidity and enthalpy sensors

Provides SmartVu controls with the ability to read return air and outdoor air relative humidity, which are also used to calculate outdoor and return air enthalpy.

Required for applications with Humidi-MiZer system or dehumidification with a field-provided reheat source. Also required for applications with ultra-leak economizer and free cooling based on outdoor air enthalpy or differential outdoor air and return air enthalpy.

Return air CO_2

Allows SmartVu controls to read return air CO_2 levels to approximate indoor air quality or occupancy for units with an ultra-low leak economizer.

Recommended for multi-zone applications where demand-controlled ventilation (DCV) operation is required.

Outdoor airflow measuring

Allows SmartVu controls to read the outdoor airflow through the economizer outdoor air damper. Recommended for applications where ventilation measuring is required or for improved ventilation control for energy savings or improved indoor air quality.

Outdoor air intake and relief options

Ultra-low leak economizer

Provides a modulating outdoor and return air damper for improved ventilation and free cooling.

Required in applications that need constant ventilation rates at varying indoor fan speeds, modulated ventilation rates based on space occupancy, free cooling using outdoor air, energy recovery, or building pressure control. Frequently required by code.

Consider the building pressure control that will be used in conjunction with the ultra-low leak economizer. Configure the unit without building pressure relief or with:

Barometric relief

Allows the relief excess building pressure to be relieved when the outdoor air damper is almost fully opened, and the return air section is mostly fully closed, which commonly occurs during free cooling operation.

Barometric relief should only be used to relieve building pressure during free cooling economizer operation in applications with very low return duct static pressure drops (<0.1 in. wg). An exhaust fan should be used to control building pressure during normal ventilation operation or in applications with more than 0.5 in. wg return duct static pressure drops.

Low static ECM exhaust fans with 2-stage control

Enables two-stage, mechanical building pressure relief based on outdoor air damper position.

Recommended for buildings with low return duct static pressure drops (0.8 in. wg) where the unit isn't required to maintain a specific building pressure.

Low static ECM exhaust fans with modulating building pressure control

Provides modulated mechanical building pressure relief based on a building pressure reading.

Recommended for buildings with low return duct static pressure drops (<0.8 in. wg) where specific building pressure control is required.

Standard, medium, or high static ECM exhaust fans with modulating building pressure control

Allows modulated mechanical building pressure relief based on a building pressure reading.

Recommended for buildings with up to 1 in. wg return duct static pressure. Required for applications with EnergyX.

Factory-installed option guidance (cont)

Medium or high static return fans with modulating exhaust dampers

Allows a reduction in supply fan size by handing the return duct static pressure drop. During normal operation, the return fan pulls return air to the unit. Most of the air is pulled into the supply fan, but some of the air can exit the unit through the exhaust air dampers. During free cooling operation, the return fan behaves like an exhaust fan and provides building pressure control.

Recommended for buildings with over 1 in. wg return duct static pressure or in high airflow applications.

EnergyX® (ERV)

Provides pre-conditioning of the outdoor air by transferring latent and sensible energy between the exhaust and outdoor air streams. Can allow for a reduction in mechanical cooling and auxiliary heating system capacity or an increase in ventilation air. For very cold climates, consider auxiliary heat capacity sizing during wheel defrost operation.

Recommended for applications with more than 20% outdoor air, for energy savings, for mechanical cooling and heating capacity reduction, or where required by code.

Electrical

High short circuit current rating (SCCR)

Provides an upgraded power box with terminal block. Required for applications that require SCCR ratings over 10kA. Field-provided, J-type current-limiting fuses must be installed before the unit terminal block in field-supplied fuse box or disconnect.

Non-fused disconnect

Non-fused disconnect provides the ability to disconnect and lock out electrical service to the unit.

Recommended for most applications with standard SCCR requirements for reduced installation time.

Factory-wired convenience outlet

Includes a 115-v, 10A duplex power outlet that is powered by the main unit power feed using a transformer.

Recommended for most applications to provide power for charging mobile devices or battery-powered tools to facilitate equipment maintenance.

Field-wired convenience outlet

Provides a 115-v duplex power outlet for a field-provided power feed.

Recommended for applications where the outlet is used to support high-power draw devices, such as air compressors or vacuum pumps or where the outlet needs to remain energized when the unit power feed is de-energized (NEC compliance).

Phase monitor

Protects against phase loss, voltage imbalance, and reversed phases.

Recommended for applications with poor power quality to help protect the unit against damage.

Service and safety options

Condensate overflow switch

Protects against drain pan overflow caused by clogged drains.

Recommended for humid climates or where the unit is installed over the occupied space.

Pre-filter status switch and access door retainers

Improves serviceability and can help promote equipment maintenance.

Recommended for ease of service and applications concerned with energy savings or high indoor air quality.

Return air smoke detector

Allows SmartVu controller to shut down the unit when smoke is detected in the return air stream.

May be required by code. Recommended for applications for reduced installation time compared to a field-provided smoked detector.

Direct expansion service package

Provides provisions to isolate the compressors from the refrigerant circuit to allow compressor removal without recovering the entire refrigerant charge. Also includes a replaceable core filter drier for easy refrigerant circuit clean-up in the event of refrigerant charge contamination.

Recommended for applications that require minimum downtime, ease of service, or have high annual compressor run hours.

Chicago refrigerant relief valve

Includes a mechanical refrigerant circuit pressure relief device installed on all unit refrigerant circuits.

Required by select building codes (Chicago) for systems with more than 4 lb of refrigerant.

Pre-filter measuring and access door retainers

Improves serviceability and can help promote equipment maintenance.

Recommended for applications with MERV 14 or higher filters to promote high indoor air quality and help reduce wasted energy caused by operation with dirty filters.

Indoor air quality

4 in. MERV 8 pleated pre-filters

Effective at filtering contaminants from 3 to 10 microns in size, such as pollen, mold, and some types of dust.

Recommended for most commercial applications with basic indoor air quantity requirements.

4 in. MERV 13 pleated pre-filters

Effective at filtering contaminants from 1 to 3 microns in size, such as bacteria, smoke, and most types of dust.

Recommended for applications with high indoor air quantity requirements.

Factory-installed option guidance (cont)

12 in. MERV 14 bag pre-filter

Effective at filtering contaminants from 1 to 3 microns in size, such as bacteria, smoke, and most types of dust.

Recommended for applications that require very high indoor air quality and low replacement filter costs. Not recommended for applications with airflows below 250 ft per minute or in humid applications.

12 in. MERV 15 cartridge pre-filter

Effective at filtering contaminants from 1 to 3 microns in size, such as bacteria, smoke, and most types of dust.

Recommended for applications that require very high indoor air quality and have airflows below 250 ft per minute or high humidity.

Ultraviolet wavelength C fixtures (UV-C)

The field-installed UV-C emitters can help inhibit microbial growth on the evaporator coil and in the condensate drain pan.

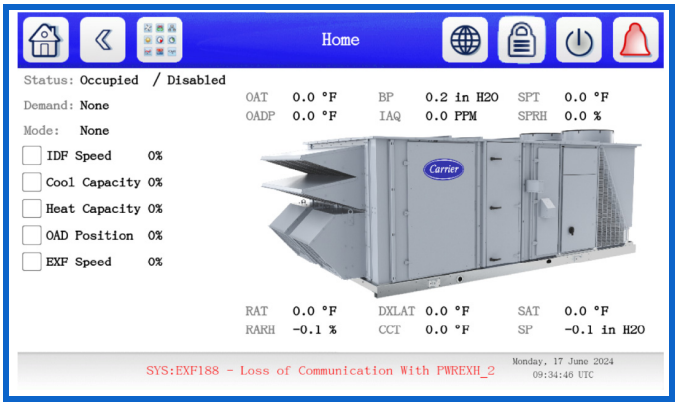
Recommended for applications that require high indoor air quality.

Controls

All 48/50V units feature the factory-installed Carrier SmartVu™ control which is factory-configured to match factory-installed options and can be configured for accessories or field-use devices.

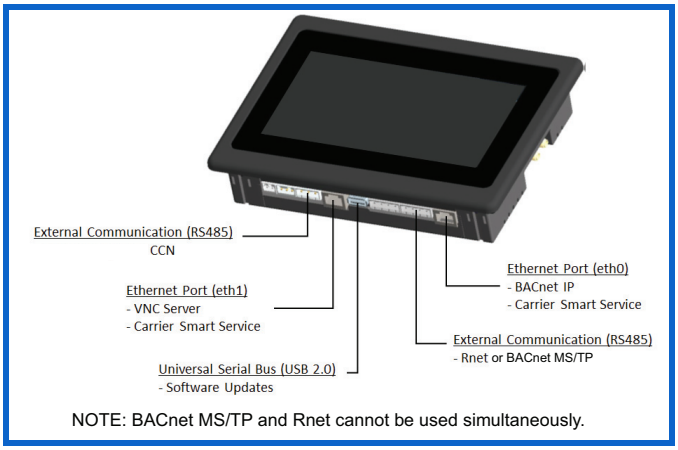
Control interface

The SmartVu touchscreen display is the primary method of interfacing with the controls for setup and equipment start-up. The touchscreen is a resistive-type, 7 in. LCD that can be activated with a finger, touch-compatible gloves, or stylus. The display is in the dedicated low voltage control box.



The control navigation is user-friendly with icon-based navigation and descriptive point and property names. Menus and settings are protected by multiple levels of access control, with user level access allowing equipment setup and start-up capability.

The SmartVu control provides a suite of ports for communication including two RS-485 ports, one dedicated to CCN communication and the other dedicated to either BACnet MS/TP communication or Rnet sensors, a USB port for software upgrades or data collection, and two Ethernet ports for BACnet IP communication, VNC access, or Carrier® SMART Service connectivity.



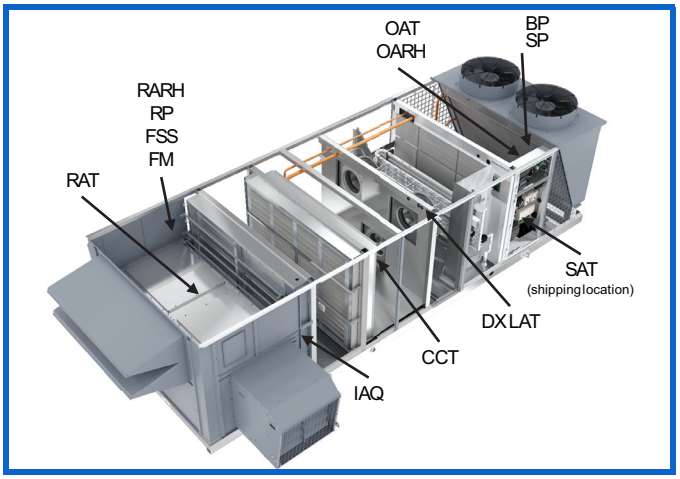
NOTE: BACnet MS/TP and Rnet cannot be used simultaneously.

Sensors

The SmartVu control system for the 48/50V Series includes a wide array of standard and optional factory-installed sensors. SmartVu control provides the ability to expand functionality by adding an accessory or field-provided sensors using the easy-to-access terminal strip connection. See below for air sensor locations.

Air Sensors

TYPE	INSTALLED
Wheel Leaving Air Temperature	Option (EnergyX)
Return Air Temperature	Standard
Outdoor Air Temperature	Standard
Space Temperature	Accessory
DX Leaving Air Temperature	Standard
Cooling Coil Air Temperature	Option (HZMR)
Supply Air Temperature	Option (Modulating Heat or HZMR)
Space Relative Humidity	Accessory
Return Air Relative Humidity	Option
Outdoor Air Relative Humidity	Option
Outdoor Air Quality	Accessory
Filter Measuring	Option
Return Pressure	Option (Return Fan)
Supply Duct Pressure	Option (VAV)
Building Pressure	Option (Mod BP or Return Fan)
Return Air CO_2	Option or Accessory
Space CO_2	Accessory



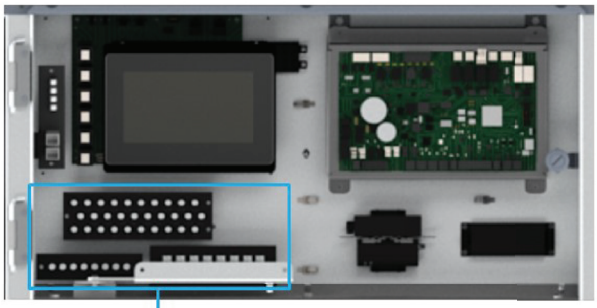
Field-use control inputs

The SmartVu control system supports a range of field-use control inputs for field-supplied sensors or control inputs to adapt unit operation to project-specific needs.

Field-Use Inputs/Outputs

INPUT TYPE	AVAILABLE
Auxiliary Relay (Alarm/Occupancy Status)	Standard
Zone Damper Override Relay	Standard
Thermostat Inputs (Y1, Y2, W1, W2, G)	Standard
Dehumidify Input (H)	Standard
Demand Limit Switch (X2)	Standard
Demand Limit or Third-party Supply Air Temperature Reset	Standard
Third-Party OAD Modulation or IAQ	Standard
Third-party IDF Modulation or Supply Static Pressure Reset	Standard
Third-party EXF Modulation	Standard
Remote Switch (Shutdown or Occupancy)	Standard
Emergency Shutdown or Phase Monitor	Standard
Smoke Detector/Fire Shutdown Input	Standard
Smoke Purge	Standard
Smoke Pressurization	Standard
Smoke Evacuation	Standard
IAQ or OAQ Switch	Standard
Pre-filter Status	Standard

Most connections for accessory sensor or field-use control inputs are made at conveniently located terminal blocks in the control panel. See figure below for terminal block locations.



Communication

The SmartVu™ controls support native Carrier Comfort Network® (CCN) and BACnet MS/TP and IP communication. The control is plug-and-play with Carrier i-Vu® 8.0+ systems and supports auto-discovery, built-in unit graphics, and organized point and properties pages.

Modbus®[1] and LonWorks[1] communication are available with accessory translator devices with support for a limited amount of network points.

Sequence of operation

The 48/50V operating sequence will vary based on the unit and control configurations. SmartVu controls all aspects of the unit operation; the cooling system, Humidi-MiZer® system, heating system, indoor fan, exhaust fan, and the economizer. See the 48/50V controls, service, and troubleshooting manual for details. Below is a summary of control configurations and the resulting operating sequence.

Occupancy sources

The occupancy source determines if the unit is in the occupied or unoccupied period and affects active setpoints and available modes. The occupied period provides optimal comfort control for occupants, and the unoccupied period provides reduced or no comfort control for energy savings.

Occupancy Sources

NAME	DESCRIPTION
Occupancy Switch	An input switch status determines occupancy.
BAS Occupancy	A network input determines occupancy.
Unit Schedule	The local unit schedule (in SmartVu) determines occupancy.

Simultaneous use of multiple occupancy sources is allowed. The SmartVu controller uses the higher priority occupancy source when sources conflict. The level of priority (highest first) and description of the source types are as follows:

Occupancy switch

A hardwired, normally open occupancy switch controls occupancy. The unit is unoccupied when the occupancy switch is open, and the unit is occupied when the switch is closed. A field-provided relay and control signal is required to operate the occupancy switch.

BAS occupancy

The unit will monitor the network occupancy command point to determine occupancy. A field-provided and installed BAS system is required.

Local schedule

SmartVu controls determine occupancy based on user-configured schedules. Eight standard schedules are available with optional holiday and override schedules. Each schedule allows a single occupancy start time and stop time, selectable in hour/minute increments and for each day of the week.

Indoor fan operation

The indoor fan operation configurations determine when the indoor fan operates based on the occupancy period. The indoor fan control type can limit indoor fan operation.

Occupied Indoor Fan Operation

NAME	DESCRIPTION
Continuous	The indoor fan operates continuously during the occupied period.
Demand	The indoor fan operates only when there is a cool, heat, ventilate, or dehumidify demand during the occupied period.

The sequence of operation is as follows:

Continuous

The indoor fan is on when the unit is in the occupied period. Continuous indoor fan is the recommended configuration for most applications where the unit is the primary source of ventilation.

Demand

The indoor fan will only operate when there is an occupied cool, heat, ventilate, or dehumidify demand. The indoor fan is off when there isn't an active demand.

Demand operation is not available when the indoor fan control is configured for supply duct pressure. Do not use occupied demand indoor fan control in applications where the unit is the primary source of ventilation.

Unoccupied Indoor Fan Operation

NAME	DESCRIPTION
Demand	The indoor fan operates only when there is a cool, heat, ventilate, or dehumidify demand during the unoccupied period.
Disabled	The indoor fan is off during the unoccupied period.

The sequence of operation is as follows:

Demand

The indoor fan will only operate when there is an unoccupied cool, heat, ventilate, or dehumidify demand. The indoor fan is off when there isn't an active demand.

Disabled

The indoor fan is off during the unoccupied period. This configuration prevents the selection of cooling, heating, or dehumidification modes during the unoccupied period.

1. Third-party trademarks and logos are the property of their respective owners.

Indoor fan control

The indoor fan control configuration determines how the indoor fan operates when it's on. This control configuration may be limited based on the cooling and heating demand determination configuration.

Indoor Fan Control Methods

NAME	DESCRIPTIONS
Constant Volume (CV)	Indoor fan operates at a constant speed for cool or heat demands.
Staged Air Volume (SAV)	Indoor fan stages between discrete speeds based on demand levels or cooling capacity.
Multi-Zone VAV (MZ-VAV)	Indoor fan modulates based on supply duct static pressure.
Single-Zone VAV (SZ-VAV)	Indoor fan modulates based on space temperature.
Third-party Control	Indoor fan modulates based on a third-party signal.

The sequence of operation is as follows:

Constant volume (CV)

The indoor fan operates at the high cool indoor fan speed with a vent, cool, or dehumidify demand. The indoor fan operates at the high heat indoor fan speed with a heat demand.

CV control is intended for single-zone space air conditioning or multi-zone variable volume and temperature (VVT) applications with a bypass damper. Consult local code requirements before using CV control in single-zone space air conditioning applications.

Staged air volume (SAV)

Staged air volume is configurable for two types of operation, SAV Demand or SAV Capacity.

When the indoor fan is configured for SAV Demand, the indoor fan will operate at the IDF minimum speed with a vent demand. It will operate at the IDF low cool speed with a low cool demand. The indoor fan will operate at the IDF high cool speed with a high cool, VAV cool, or dehumidify demand. It operates at the IDF low heat speed with a low heat demand, or the IDF high heat speed with a high heat demand.

When the indoor fan is configured for SAV Capacity, the indoor fan will operate at the IDF minimum speed with a vent demand. It will operate at the IDF low cool speed when the cooling capacity is at or below the low cool capacity threshold. It operates at the IDF medium cool speed when the cooling capacity between the low cool and high cool capacity thresholds. It operates at the high cool IDF speed when the system capacity is at or above the high cool capacity threshold or there is a dehumidify demand. The indoor fan operates at the IDF low heat speed when the heating capacity is at or below 75%, and the IDF high heat speed when the heating capacity is above 75%.

SAV control is intended for single-zone space air conditioning applications to provide energy savings, quieter operation, and better dehumidification at part-load conditions compared to CV operation.

Single-zone variable air volume (SZ-VAV)

When the indoor fan is configured for SZ-VAV and there is only a cooling demand, the indoor fan will modulate linearly between the low and high cool IDF speeds based on the deviation between the space temperature and the cooling space temperature setpoint. The further away the space temperature is from the setpoint, the higher the indoor fan speed will be.

For units equipped with modulating or multi-stage heat and only a heating demand, the indoor fan will modulate linearly between the low and high heat IDF speeds based on the deviation between the space temperature and the heating space temperature setpoint.

For units equipped with two-stage heat, the IDF will operate between the low or high heat IDF speeds based on the demand level. The IDF will be at the minimum indoor fan speed with a vent demand or the high cool IDF with a dehumidify demand.

The indoor fan will operate at the following speeds based on the below operating conditions:

- IDF minimum speed with only a vent demand
- IDF high cool speed with any dehumidification demand
- IDF low cool speed with a low cool demand during free cooling
- IDF high cool speed with a high cool demand during free cooling

SZ-VAV is recommended for sound sensitive applications or applications with higher sensible loads than latent loads. SZ-VAV requires a space temperature sensor and SPT demand source.

Multi-zone variable air volume (MZ-VAV)

When the indoor fan is enabled during a cooling, venting, dehumidifying, or heating mode with modulating heat; the fan will modulate between the minimum and maximum indoor fan speeds to maintain the supply duct static pressure at the static pressure setpoint.

For units equipped with a two-stage heat source, the duct pressure control signal is ignored when heat mode is activated. The indoor fan will operate at the low heat fan speed when the first stage of heat is activated, and the high heat fan speed when the second stage of heat is activated.

MZ-VAV duct static pressure control requires the VAV factory-installed option (supply duct pressure transducer) or a field-provided supply duct pressure transducer.

Supply duct static pressure control is intended for multi-zone variable air volume (VAV) or variable volume and temperature (VVT) applications with pressure-independent air terminal units. Supply duct static pressure control can be used for single-zone space air conditioning applications for true constant volume operation to account for filter loading.

Third-party control

A field-provided binary or network input is required to enable the indoor fan. When enabled, the indoor fan speed modulates between the minimum and maximum fan speeds based on the third-party input signal. For units equipped with a two-stage heat source, the third-party signal is ignored when heat mode is activated. The indoor fan will operate at the low heat fan speed when the first stage of heat is activated, and the high heat fan speed when the second stage of heat is activated.

Third-party indoor fan control is for applications with field-provided direct digital control or building automation system control where a specific method of indoor fan operation is required.

Supply duct static pressure reset

For applications that require reduced operating static at part-load for reduced sound, energy savings, or code compliance. Static pressure reset can only be used with MZ-VAV control and should not be used in applications with pressure dependent air terminal units.

Supply Duct Static Pressure Reset

NAME	DESCRIPTION
None	No reset.
SPT	Reset is based on the cooling space temperature.
RAT	Reset is based on the cooling return air temperature.
Third-party	Reset is based on a third-party input.

The sequence of operation is as follows:

None

Supply pressure reset is not performed. The indoor fan will operate to a constant static pressure setpoint. This configuration is recommended for CV, SAV, or third-party indoor fan control application.

Space temperature (SPT)

When the unit is configured for MZ-VAV, is in a cooling or vent mode, and the space temperature is below the occupied cooling setpoint, the duct static pressure control point is reduced. The static pressure reset is disabled when there is a heat or dehumidify demand.

SPT static pressure reset is recommended for multi-zone VAV applications with a large central zone.

Return air temperature (RAT)

When the unit is configured for MZ-VAV, is in a cooling or vent mode, and the return air temperature is below the occupied cooling setpoint, the duct static pressure control point is reduced. The static pressure reset is disabled when there is a heat or dehumidify demand.

RAT static pressure reset is recommended for multi-zone VAV applications without a dominant central zone.

Third-party reset

When the unit is configured for VAV, is in a cooling or vent mode, and a third-party input is present, the duct static pressure control point is reduced. The static pressure reset is disabled when there is a heat or dehumidify demand.

Third-party static pressure reset is recommended for applications as an alternate to third-party indoor fan control.

Exhaust fan control

The exhaust fan control configuration determines how the exhaust fans are enabled and how they operate. All exhaust fans turn on and operate simultaneously at the same speed. Units ordered with exhaust fans with modulating building pressure control include a building pressure sensor.

Exhaust Fan Control

NAME	DESCRIPTION
None	No exhaust fans.
Two-stage Exhaust	Exhaust fans operate at one of two speeds based on outdoor air damper position.
Building Pressure Control	Exhaust fans modulate based on building pressure.
Third-party Control	Exhaust fans modulate based on a third-party signal.

The sequence of operation is as follows:

Two-stage exhaust

The exhaust fans are enabled and will operate at low fan speed when the outdoor air damper position is at or above the first damper position configuration. The exhaust fans will operate at high fan speed when the outdoor air damper position is at or above the second adjustable damper position configuration.

The exhaust fans are off when the outdoor air damper position is below the first adjustable outdoor air damper position, or the outdoor air damper is closed.

Two-stage exhaust control is intended for single-zone space air conditioning applications.

Building static pressure control

When the outdoor air damper is open and the building static pressure is above the building static pressure setpoint, the exhaust fans turn on and simultaneously modulate between the minimum and maximum speeds to maintain the building static pressure at the building static pressure setpoint.

When the building static pressure drops below the building static pressure setpoint or the outdoor air damper closes, the exhaust fans turn off.

Building pressure control requires a factory-installed exhaust fan with the building pressure control option or a field-provided building pressure sensor.

Building pressure control is recommended for multi-zone applications or in applications where building pressure is regulated by code (accessibility).

Third-party control

The exhaust fans are enabled and will modulate based on the outdoor air damper operation and a third-party hard-wired or network input. When the outdoor air damper is open, and the third-party input is active. the exhaust are enabled and will modulate between minimum and maximum speed. Otherwise, the exhaust fans are off.

Third-party exhaust fan control is for applications with field-provided direct digital control or building automation system control where a specific method of exhaust fan operation is required.

Return fan system control

The return fan system is comprised of the return fans and the modulating exhaust air dampers. The return fan control determines how the return fans operate. All return fans turn on and operate at the same speed.

The exhaust air damper control determines how the exhaust air dampers operate. Both exhaust air dampers open and operate at the same percentage. Unit with return fan can be configured for building pressure override of return fan control during free cooling. All units with return fans include return pressure and building pressure sensors.

Return Fan Control

NAME	DESCRIPTION
Return Pressure	Return fans modulate based on return pressure.
Speed Tracking	Return fans modulate based on the indoor fans speed.
Third-party Control	Return fans modulate based on a third-party control.

Return pressure

When the indoor fan is on, the return fans are enabled and will modulate between minimum and maximum speed to maintain the return pressure at the return pressure setpoint. The return fans are off when the indoor fan is off.

Return pressure control is recommended for most applications.

Speed tracking

When the indoor fan is on, the return fans are enabled and will modulate between minimum and maximum speed based on the indoor fan speed and user-adjustable return fan speed configurations. The return fans are off when the indoor fan is off.

Speed tracking is recommended for CV or SAV indoor fan control applications.

Third-party control

Requires return airflow measuring. When the indoor fan is on, the return fans are enabled and will modulate between minimum and maximum speed based on a third-party input signal. The return fans are off when the indoor fan is off.

Third-party return fan control is for applications with field-provided direct digital control or building automation system control where a specific method of operation is required.

Exhaust Air Damper Control

NAME	DESCRIPTION
None	No exhaust air damper.
Building Pressure	Exhaust air dampers modulate based on building pressure.
Outdoor Air Damper Mapping	Exhaust air dampers modulate based OAD position.
Third-party Control	Exhaust air dampers modulate base on third-party signal.

Building Pressure

When the return fans are on and the outdoor air damper is open, the exhaust air dampers are enabled and will modulate between minimum and maximum position to maintain the building pressure at the building pressure setpoint. The exhaust air dampers are closed when the return fans are off, or the outdoor air damper is closed.

Building pressure control is recommended for most applications.

Outdoor air damper mapping

When the return fans are on and the outdoor air damper is open, the exhaust air dampers are enabled and will modulate between minimum and maximum position based on the outdoor air damper position and user-adjustable exhaust air damper configurations. The exhaust air dampers are closed when the return fans are off, or the outdoor air damper is closed.

Outdoor air damper mapping is only recommended for constant volume applications.

Third-party control

When the return fans are on and the outdoor air damper is open, the exhaust air dampers are enabled and will modulate between minimum and maximum position based on a third-party input signal. The exhaust air dampers are closed when the return fans are off, or the outdoor air damper is closed.

Third-party exhaust air damper control is for applications with field-provided direct digital control or building automation system control where a specific method of operation is required.

Return fan building pressure override

When building pressure override is enabled, the indoor fan is on, the outdoor air damper is greater than 80% open, and the building pressure is above the building pressure setpoint, then building pressure override mode is enabled. The exhaust air dampers go to their maximum position. If the building pressure is still high, the return fans switch to modulating to maintain the building pressure at the building pressure setpoint. If the indoor fan turns off, outdoor air damper closes below 80%, or the building pressure drops below the building pressure setpoint, then building pressure override is disabled.

Outdoor air damper ventilation control

Requires a factory-installed economizer. This configuration determines how the economizer outdoor air damper provides building ventilation during the occupied period.

Outdoor Air Ventilation Control

NAME	DESCRIPTION
Indoor Fan Mapping	Outdoor air damper stages based on the indoor fan speed.
IAQ Control	Outdoor air damper modulates based on CO_2.
Third-party Minimum Position Control	Outdoor air damper modulates the minimum position based on a third-party input.
Third-party Full Control	Outdoor air damper modulates based on a third-party input.

The sequence of operation is as follows:

Indoor fan mapping

When the indoor fan is on during the occupied period, the economizer outdoor air damper opens and modulates between the minimum and maximum positions to maintain a constant ventilation rate at varying indoor fan speeds. The damper position is based on a field configurable four-point damper position curve at four different indoor fan speeds.

Ventilation is not normally performed during the unoccupied period or when the indoor fan is off during the occupied period (demand-based operation).

Indoor fan mapping is intended for use in applications with modulating indoor fan control, including SAV, and supply duct pressure control, or third-party control.

IAQ control

Requires factory-installed return air CO_2 sensor option or field-provided and installed return air or space CO_2 sensor. When the indoor fan is on during the occupied period, the outdoor air damper opens and modulates between the minimum and maximum positions to maintain return air or space CO_2 levels at the indoor air quality (IAQ) level setpoint.

Ventilation is not normally performed during the unoccupied period or when the indoor fan is off during the occupied period (demand-based operation).

IAQ control is intended for use in applications with variable space occupancy levels, such as gymnasiums, conference areas, and cafeterias.

Third-party minimum position control

When the indoor fan is on during the occupied period, the outdoor air damper modulates between the closed and maximum position based on the third-party analog or network signal. Free cooling operation or IAQ reset overrides the third-party commanded damper position.

Ventilation is not normally performed during the unoccupied period or when the indoor fan is off during the occupied period (demand-based operation).

Third-party control is intended for use in applications that require operations that differ from the factory ventilation control methodology but still want SmartVu controls to perform free cooling or IAQ override.

Third-party full control

When the indoor fan is on during the occupied period, the economizer outdoor air damper modulates between the minimum and maximum position based on the third-party analog or network signal. Free cooling operation or IAQ reset are not allowed to override the third-party commanded outdoor air damper position.

Ventilation is not normally performed during the unoccupied period or when the indoor fan is off during the occupied period (demand-based operation).

Third-party control is intended for use in applications that require operations that differ from the factory ventilation control methodology and do not require SmartVu controls to provide free cooling or IAQ overrides.

Cool and heat demand source

The cool and heat demand source configuration determines which inputs control monitors to establish a cool or heat demand. The demand source configuration also affects how the unit operates and must match the intended application type.

Cool and Heat Demand Sources

NAME	DESCRIPTION
Space Temperature (SPT)	Cool and heat demands are based on space temperature (intended for single-zone applications).
Return Air Temperature (RAT)	Cool and heat demands are based on return air temperature (intended for multi-zone applications).
Third-party Input (TSTAT)	Cool and heat demands are based on thermostat-style hardwired or network inputs (Y1, Y2, W1, W2).

For temperature-based demand sources (SPT and RAT), the control compares the demand source temperature sensor reading to the occupied or unoccupied cooling and heating setpoints.

The control will use the occupied setpoints during the occupied period. If the indoor fan is configured for unoccupied demand operation, the control will use the unoccupied setpoint during the unoccupied periods. If the indoor fan is configured for disabled during the unoccupied period, unoccupied demands are ignored.

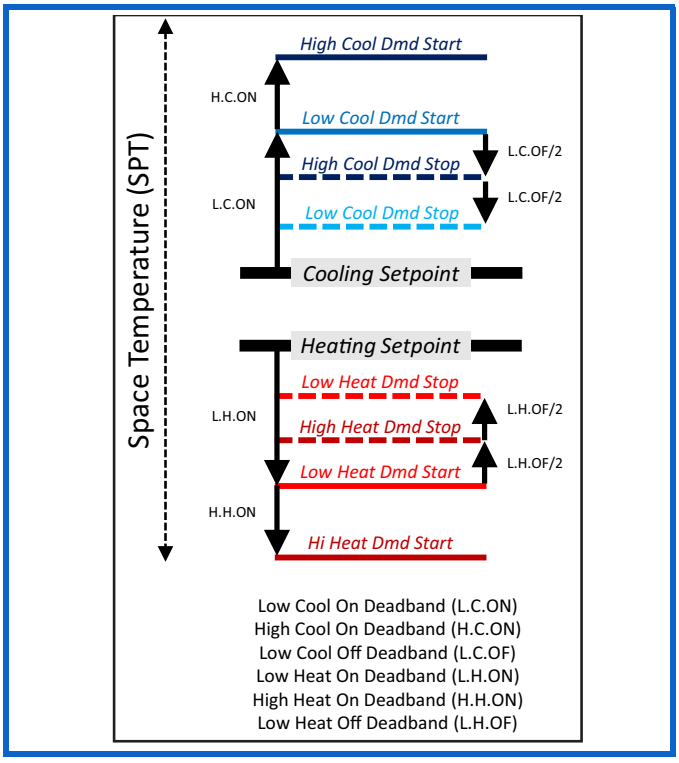
For the input-based cool and heat demand source (TSTAT), the control will monitor the hardwired or networked control inputs to determine if there is a cooling or heating demand.

Once a cool or heat demand is established, the control sets the demand supply air temperature to the supply air temperature setpoint associated with the active demand level.

The following is a summary of each configuration and demand determination:

Space temperature (SPT)

SPT is intended for single-zone space air conditioning applications. Requires a field-installed space temperature sensor.



A cool demand is established when the space temperature is above the space temperature setpoint plus the applicable deadband. A heat demand is established when the space temperature is below the space temperature setpoint minus the applicable deadband. Below is a summary of available demands, demand determination, and supply air temperature setpoints for the SPT demand source:

Low cool (occupied or unoccupied)

If the space temperature is above the occupied or unoccupied cooling setpoint plus the low cool on deadband, the demand is set to low cool. The control sets the demand supply air temperature to the low cool supply air temperature setpoint.

When the space temperature drops below the occupied or unoccupied cooling temperature, plus the low cool on deadband, minus the low cool off deadband, the low cool demand stops.

High cool (occupied or unoccupied)

If the space temperature rises above the occupied or unoccupied cooling setpoint, plus the low cool on deadband, plus the high cool on deadband, the demand is set to high cool. The control sets the demand supply air temperature to the high cool supply air temperature setpoint.

When the space temperature drops below the occupied or unoccupied cooling setpoint, plus the low cool on deadband, and minus one-half of the low cool off deadband, the high cool demand stops.

Low heat (occupied or unoccupied)

If the space temperature is below the occupied or unoccupied heating setpoint minus the low heat on deadband, the demand is set to low heat. For units with a modulating or multi-stage heat source, the control sets the demand supply air temperature to the low heat supply air temperature setpoint.

When the space temperature rises above the occupied or unoccupied heating setpoint, minus the low heat on deadband, plus the low heat off deadband, the low heat demand stops.

High heat (occupied or unoccupied)

If the space temperature drops below the occupied or unoccupied heating setpoint, minus the low heat on deadband, minus the high heat on deadband, the demand is set to high heat. For units with a modulating or multi-stage heat source, the control sets the demand supply air temperature to the high heat supply air temperature setpoint.

When the space temperature rises above the occupied or unoccupied heating setpoint, minus the low heat on deadband, plus one-half of the low heat off deadband, the high heat demand stops.

Ventilate (occupied or unoccupied)

When there is no cool or heat demand and the indoor fan is on, demand is set to ventilate. The supply air temperature control point is set to the vent supply air temperature setpoint.

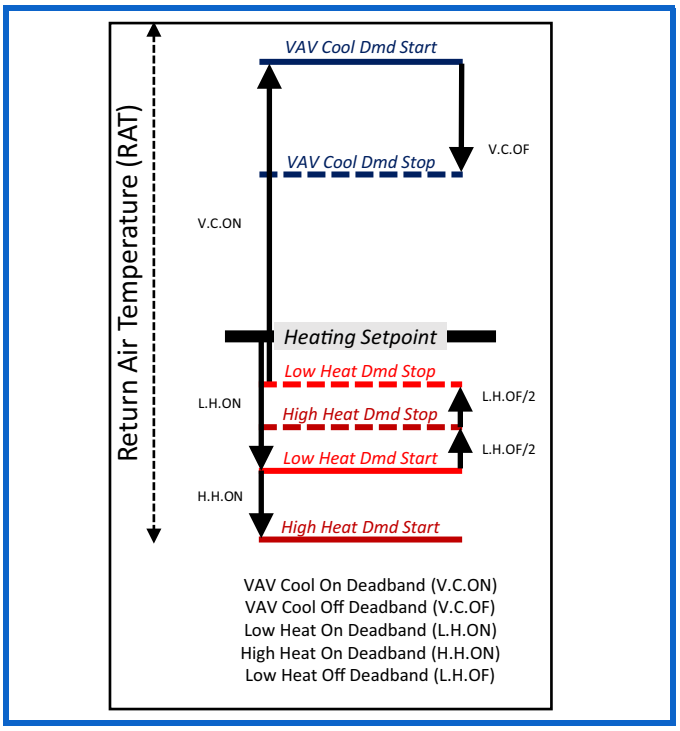
None (occupied or unoccupied)

When there is no cool or heat demand and the indoor fan is off, demand is set to none.

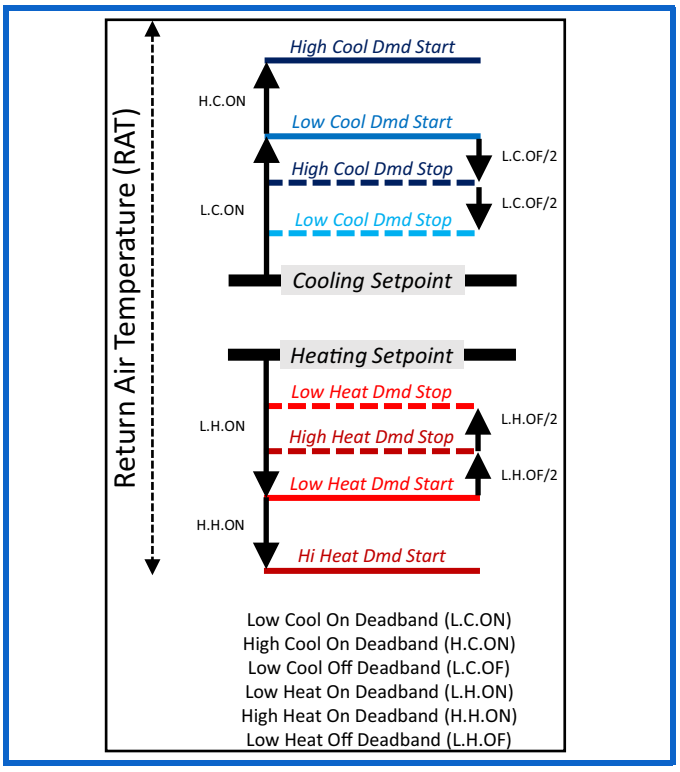
Return air temperature (RAT)

RAT is intended for multi-zone space air conditioning applications with air terminal units. RAT may be used in other applications without air terminal units. The return air temperature sensor used for RAT control is standard on all units.

The figure below illustrates RAT Occupied Demand Levels.



The figure below illustrates RAT Unoccupied Demand Levels.



During the occupied period, the control compares the return air temperature to the occupied heating setpoint and applicable deadbands to establish a VAV cool demand. During the unoccupied period, the control compares the return air temperature to the unoccupied cooling setpoint plus applicable deadbands to establish a low or high cool demand.

A heat demand is established when the return air temperature is below the occupied or unoccupied heating setpoint minus the applicable deadband. Below is a summary of available demands, demand determination, and supply air temperature setpoints for the RAT demand source.

VAV cool (occupied only)

If the return air temperature is above the occupied heating setpoint, minus the low heat on deadband, plus the low heat off deadband, plus the VAV cool on deadband, the demand is set to VAV cool. The control sets the demand supply air temperature to the VAV cool supply air temperature setpoint.

When the return air temperature drops below the occupied heating setpoint, minus the low heat on deadband, plus the low heat off deadband, plus the VAV cool on deadband, minus the VAV cool off deadband, the VAV cool demand stops.

Low cool (unoccupied only)

If the return air temperature is above the unoccupied cooling setpoint plus the low cool on deadband, the demand is set to low cool. The control sets the demand supply air temperature to the low cool supply air temperature setpoint.

When the return air temperature drops below the unoccupied cooling temperature, plus the low cool on deadband, minus the low cool off deadband, the low cool demand stops.

High cool (unoccupied only)

If the return air temperature is above the unoccupied cooling setpoint, plus the low cool on deadband, plus the high cool on deadband, the demand is set to high cool. The control sets the demand supply air temperature to the high cool supply air temperature setpoint.

When the return air temperature drops below the unoccupied cooling setpoint, plus the low cool on deadband, and minus one-half of the low cool off deadband, the high cool demand stops.

Low heat (occupied or unoccupied)

If the return air temperature is below the occupied or unoccupied heating setpoint minus the low heat on deadband, the demand is set to low heat. For units with a modulating or multi-stage heat source, the control sets the demand supply air temperature to the low heat supply air temperature setpoint.

When the return air temperature rises above the occupied or unoccupied heating setpoint, minus the low heat on deadband, plus the low heat off deadband, the low heat demand stops.

High heat (occupied or unoccupied)

If the return air temperature is below the occupied or unoccupied heating setpoint, minus the low heat on deadband, minus the high heat on deadband, the demand is set to high heat. For units with a modulating or multi-stage heat source, the controls set the demand supply air temperature to the high heat supply air temperature setpoint.

When the return air temperature rises above occupied or unoccupied heating setpoint, minus the low heat on deadband, plus one-half of the low heat off deadband, the high heat demand stops.

Ventilate (occupied only)

When there is no cool or heat demand and the indoor fan is on, demand is set to ventilate. The supply air temperature control point is set to the vent supply air temperature setpoint.

None (occupied or unoccupied)

When there is no cool or heat demand and the indoor fan is off, demand is set to none.

Thermostat/third-party input (TSTAT)

TSTAT is intended for single-zone space air conditioning applications with a field-installed, two-stage heat/cool thermostat or single or multi-zone applications with a field-provided digital control system. The cool and heat demand inputs can be enabled using hardwired inputs or network inputs.

A cool demand is established when the Y1 or Y2 inputs are activated. A heat demand is established when the W1 or W2 inputs are activated. An alert is triggered if both a Y and W input are active at the same time. Below is a summary of available demands, demand determination, and supply air temperatures setpoints for the TSTAT demand source.

Low cool (occupied or unoccupied)

When the Y1 input is activated, the demand is set to low cool. The control sets the demand supply air temperature to the low cool supply air temperature setpoint.

When the Y1 input is deactivated, the low cool demand stops.

High cool (occupied or unoccupied)

When the Y1 and Y2 inputs are activated, the demand is set to high cool. The control sets the demand supply air temperature to the high cool supply air temperature setpoint.

If the Y2 input is activated without the Y1 input being activated, the control issues an alarm but the demand is still set to high cool.

Low heat (occupied or unoccupied)

When the W1 input is activated, the demand is set to low heat. For units with a modulating or multi-stage heat source, the controls set the demand supply air temperature to the low heat supply air temperature setpoint.

When the W1 input is deactivated, the low heat demand stops.

High heat (occupied or unoccupied)

When the W1 and W2 inputs are activated, the demand is set to high heat. For units with a modulating or multi-stage heat source, the control sets the demand supply air temperature to the high heat supply air temperature setpoint.

If the W2 input is activated without the W1 input being activated, the control issues an alarm but the demand is still set to high heat.

When the W2 input is deactivated, the high heat demand stops.

Ventilate (occupied or unoccupied)

When there is no cool or heat demand and the indoor fan is on, demand is set to ventilate. The supply air temperature control point is set to the vent supply air temperature setpoint.

None (occupied or unoccupied)

When there is no cool or heat demand and the indoor fan is off, demand is set to none.

Free cooling control

The free cooling control configurations determine if free cooling with outdoor air is allowed during the occupied and unoccupied periods. Requires the factory-installed economizer option.

Occupied Free Cooling

NAME	DESCRIPTION
Disabled	Free cooling is not allowed during the occupied period.
Enabled	Free cooling is available during the occupied period.

The sequence of operation is as follows:

Disabled

Free cooling is disabled during the occupied period. Intended for applications without factory-installed economizers or where code does not require free cooling.

Enabled

Free cooling using outdoor air is available during the occupied period. Intended for applications for energy savings or where required by code.

Unoccupied Free Cooling

NAME	DESCRIPTION
Disabled	Free cooling is not allowed during the unoccupied period.
Enabled	Free cooling is available during the unoccupied period.

The sequence of operation is as follows:

Disabled

Free cooling is disabled during the unoccupied period. Intended for applications without factory-installed economizers or where code does not require unoccupied free cooling.

Enabled

Free cooling using outdoor air is available during the unoccupied period. Intended for applications for energy savings or where required by code.

Free cooling checks

When free cooling is allowed, the control will try to satisfy a cooling demand using free cooling before enabling mechanical cooling. The free cooling checks configurations determine what sensors and setpoints the control checks to prevent free cooling mode.

Free cooling requires the factory-installed economizer and for free cooling operation to be enabled during either the occupied or unoccupied periods. Where allowed, multiple free cooling checks can be used simultaneously.

Outdoor Air Dry Bulb Limit

NAME	DESCRIPTION
Disabled	Outdoor air dry bulb temperature is not checked to prevent free cooling.
Enabled	Outdoor air dry bulb temperature is checked to prevent free cooling.

A factory-installed outdoor air temperature sensor is standard on all units and can be used for dry bulb limit control. Dry bulb limit is recommended for most applications. The sequence of operation is as follows:

Disabled

The outdoor air dry bulb temperature is not checked to prevent free cooling.

Enabled

When free cooling is allowed and there is a demand for cooling, the control compares the outdoor air dry bulb temperature to the dry-bulb temperature. If the outdoor air temperature is at or above the dry bulb limit setpoint, free cooling mode is prevented.

If the outdoor air temperature is below the dry bulb limit setpoint and other free checks prevent free cooling, free cooling mode is prevented.

If the outdoor air temperature is below the dry bulb limit setpoint and no other checks prevent free cooling, free cooling mode is enabled.

Outdoor Air Dewpoint Limit

NAME	DESCRIPTION
Disabled	Outdoor air dewpoint is not checked to prevent free cooling.
Enabled	Outdoor air dewpoint is checked to prevent free cooling.

The outdoor air dewpoint limit requires the factory-installed humidity and enthalpy sensor option (OARH and RARH sensors). The control calculates the dewpoint from outdoor air temperature and relative humidity. The dewpoint limit is recommended for humid climates. The sequence of operation is as follows:

Disabled

The outdoor air dewpoint is not checked to prevent free cooling.

Enabled

When free cooling is available and there is a demand for cooling, the control compares the outdoor air dewpoint to the dewpoint limit. If the outdoor air dewpoint is at or above the dewpoint limit setpoint, free cooling mode is prevented.

If the outdoor air dewpoint is below the dewpoint limit setpoint and other checks prevent free cooling, free cooling mode is prevented.

If the outdoor air dewpoint is below the dewpoint limit setpoint and no other checks prevent free cooling, free cooling mode is enabled.

Free Cooling Changeover

NAME	DESCRIPTION
None	Differential outdoor and return air dry bulb, outdoor air enthalpy, and differential outdoor and return air enthalpy are not checked to prevent free cooling.
Differential Dry Bulb	The differential between outdoor air and return air dry bulb temperatures is checked to prevent free cooling.
Outdoor Enthalpy	Outdoor air enthalpy is checked to prevent free cooling.
Differential Enthalpy	The differential between outdoor air and return air enthalpy is checked to prevent free cooling.

A factory-installed return air temperature sensor is standard on all units and can be used for differential dry bulb changeover. Dewpoint limit is recommended in addition to differential dry bulb changeover.

Enthalpy or differential enthalpy control requires factory-installed humidity and enthalpy sensor option (OARH and RARH). The control calculates enthalpy from outdoor and return air temperature and relative humidity. The dry bulb limit is recommended with enthalpy or differential enthalpy changeover. The sequence of operation is as follows:

None

Differential enthalpy, outdoor air enthalpy, or differential outdoor and return air enthalpy are not checked to prevent free cooling.

Differential dry bulb

Requires the humidity and enthalpy sensing option (OARH and RARH). When free cooling is available and there is a demand for cooling, the control calculates the temperature differential between the outdoor air temperature and return air temperature and compares it to the differential dry bulb threshold.

If the temperature differential is at or above the differential dry bulb limit setpoint, free cooling mode is prevented.

If the temperature differential is below the differential dry bulb limit setpoint and other checks are enabled and prevent free cooling, free cooling mode is prevented.

If the temperature differential is below the differential dry bulb limit setpoint and no other checks are enabled or no other checks prevent free cooling, free cooling mode is enabled.

Enthalpy

Requires the humidity and enthalpy sensing option (OARH and RARH). When free cooling is available and there is a demand for cooling, the control calculates the outdoor air enthalpy.

If the outdoor air enthalpy is at or above 28 Btu/lb, free cooling mode is prevented.

If the outdoor air enthalpy is below 28 Btu/lb and other checks are enabled and prevent free cooling, free cooling mode is prevented.

If the outdoor air enthalpy is below 28 Btu/lb and no other checks are enabled or no other checks prevent free cooling, free cooling mode is enabled.

Differential enthalpy

When free cooling is available and there is a demand for cooling, the control calculates the outdoor air and return air enthalpy levels.

If the outdoor air enthalpy is at or above the return air enthalpy, free cooling mode is prevented.

If the outdoor air enthalpy is below the return air enthalpy and other checks are enabled and prevent free cooling, free cooling mode is prevented.

If the outdoor air enthalpy is below the return air enthalpy and no other checks are enabled or no other checks prevent free cooling, free cooling mode is enabled.

Occupied heating control (morning warm-up)

For units equipped with a heat source and configured for RAT control, the control is configurable to allow morning warm-up only or heating operation anytime during the occupied period.

Occupied Heating

NAME	DESCRIPTION
Disabled	Heating is only allowed at the start of the occupied period.
Enabled	Heating is allowed anytime during the occupied period.

The sequence of operation is as follows:

Disabled (morning warm-up only)

Heating modes are only allowed at the start of the occupied period before a cooling mode starts. The heating mode can start and stop multiple times, up until a cooling mode is enabled. After the cooling mode is enabled, the heating mode is disabled until the start of the next occupied period (or if unoccupied heating is enabled).

Enabled

Heating modes are allowed anytime during the occupied period.

Supply air temperature reset

SAT reset is intended for applications with constant cooling supply air temperatures (VAV) to provide energy savings at part-load conditions.

When the system is cooling and the SAT reset input indicates that the system is at part-load conditions, the supply air temerature control point is increased to save compressor energy. SAT reset is prevented when a dehumidify demand is present.

Supply Air Temperature Reset

NAME	DESCRIPTION
None	No SAT reset.
SPT	Space temperature is used as the SAT reset source.
RAT	Return air temperature is used as the SAT reset.
Third-Party Input	A third-party analog input is used as the SAT reset source.

The sequence of operation is as follows:

None

SAT reset is not performed. Recommended for single-zone applications or multi-zone applications in humid climates.

Space temperature (SPT)

When the unit is configured for RAT, is in a cooling mode, and the space temperature is below the occupied cooling setpoint, the SAT control point is increased based on the SAT reset ratio. The SAT reset is disabled when there is a vent, heat, or dehumidify demand.

SPT SAT reset is recommended for multi-zone VAV applications with a large central zone.

Return air temperature (RAT)

When the unit is configured for RAT, is in a cooling mode, and the return air temperature is below the occupied cooling setpoint, the SAT control point is increased based on the SAT reset ratio. The SAT reset is disabled when there is a vent, heat, or dehumidify demand.

RAT SAT reset is recommended for multi-zone VAV applications without a dominant central zone.

Third-party input (TSTAT)

When the unit is configured for RAT, is in a cooling mode, and a third-party input is present, the SAT control point is increased based on a scale of the input signal between 0°F and 3°F (default). The SAT reset is disabled when there is a vent, heat, or dehumidify demand.

Third-party static pressure reset is recommended for applications as an alternate to third-party input control.

Cooling and heating modes

When there is a cool or heat demand during the occupied period and a cooling or heating source is available, a cooling and heating mode is selected to satisfy the demand. Except for units with a two-stage heat source, heating and cooling operation is based on the supply air temperature control point, which is determined from the demand supply air temperature and any applicable resets (SAT control point = demand SAT ± SAT reset). For units with a 2-stage heat source, operation is based on the demand level.

When there is a cool or heat demand during the unoccupied period, the indoor fan is configured for demand operation during the unoccupied demand, and a cooling or heating source is available, a cooling and heating mode is selected to satisfy the demand.

If the indoor fan is configured for disabled during the unoccupied period, the unit is off during the unoccupied period and will not initiate a cooling or heating mode if there is a cool or heat demand.

The cooling or heating mode that is selected will depend on the supply air temperature control point, the unit and control configuration, and the mixed air temperature. Below is a summary of available cooling and heating modes:

Mechanical cooling

When there is a cool demand, free cooling is disabled or not available, compressors are available, and the mixed air temperature is above the active supply air temperature control point, the mechanical cooling mode is enabled. The compressors turn on and operate to maintain the unit supply air temperature at the supply air temperature control point.

Free cooling (requires economizer)

When there is a cool demand and free cooling is available, and the mixed air temperature is above the supply air temperature control point, free cooling mode is enabled. The outdoor air damper opens and modulates between the ventilation position and maximum position to maintain the unit supply air temperature at the supply air temperature control point.

Integrated cooling (requires economizer)

When there is a cool demand, free cool and compressors are available, and the outdoor air temperature is above the supply air temperature control point, integrated cooling mode is enabled. The outdoor air damper opens to its maximum position and the lowest stage of compression is enabled. Additional stages of compression can be added to maintain the supply air temperature at the supply air temperature control point.

Heat-tempered cooling (requires modulating heat)

When there is a cool demand, and the mixed air temperature is below the supply air temperature control point by the heat tempered cool deadband, the heat-tempered cooling mode is enabled. The modulating heat source turns on and operates to maintain the unit supply air temperature at the supply air temperature control point.

Two-stage heating (requires 2-stage gas or 2-stage electric heat)

When there is a heat demand and the heat source is available, the two-stage heating mode is enabled. Heat stage 1 turns on with a low heat demand, and heat stage 2 turns on with a high heat demand.

Modulated heating (requires modulating gas, modulating electric, or hot water heat)

When there is a heat demand and the heat source is available, modulated heating mode is enabled. The heat source turns on and modulates to maintain the unit supply air temperature at the supply air temperature control point.

Fan-only venting

When there is a demand for ventilate and the mixed air temperature is within the vent supply air temperature setpoint by the vent deadbands, fan-only venting mode is enabled. The indoor fan is on, the outdoor air damper operates at the ventilation control point, and the heating and cooling sources are off.

Cool-tempered venting

When there is a demand for ventilate and the mixed air temperature is above the vent supply air temperature setpoint plus the vent deadband, cool-tempered venting mode is enabled. The compressors turn on and operate to maintain the unit supply air temperature at the vent supply air temperature setpoint.

When the mixed air temperature drops below the vent supply air temperature setpoint, plus the vent deadband, minus one-half of the vent deadband, cool-tempered venting stops.

Heat-tempered venting (requires modulating heat)

When there is a demand for ventilate and the mixed air temperature is below the vent supply air temperature setpoint minus the vent deadband, heat-tempered venting mode is enabled. For units with a modulating or multi-stage heat source, the heat source turns on and operates to maintain the unit supply air temperature at the vent supply air temperature setpoint. For units with a two-stage heat source, heat stage 1 is enabled.

When the mixed air temperature rises above the vent supply air temperature setpoint, minus the vent deadband, plus one-half of the vent deadband, heat-tempered venting stops.

Standby

When there is no cool, heat, or ventilate demand, standby mode is enabled. All components are off.

Oil recovery

If the refrigerant circuit is operating at low capacity for an extended period of time, oil recovery mode will be initiated. The refrigerant circuit capacity will be temporarily increased to promote oil recovery from the refrigerant circuit.

Electronic expansion valve (EXV) recalibration

If the refrigerant circuit has been operating continuously for an extended period of time, the refrigerant circuit is shut down to allow recalibration of the EXVs.

Dehumidify demand source

The dehumidify demand source configuration determines which input is monitored to establish a dehumidify demand. Dehumidify demands are only established if the unit is configured for dehumidification with a reheat source, such as Humidi-MiZer system.

Dehumidify Demand Sources

NAME	DESCRIPTION
Space Relative Humidity (SPRH)	Dehumidify demand is based on space relative humidity(intended for single-zone applications).
Return Air Relative Humidity (RARH)	Dehumidify demand is based on return air relative humidity (intended for multi-zone applications).
Dehumidify Input (HSTAT)	Dehumidify demand is based on dehumidify input.

For relative humidity-based demand sources (SPRH or RARH), the control compares the demand source relative humidity sensor reading to the dehumidify relative humidity setpoint.

For the input based dehumidify demand source (TSAT), the control will monitor the hardwired or networked control inputs to determine if there is a dehumidify demand.

Once a dehumidify demand is established, the control sets the cooling coil temperature control point to the dehumidify cooling coil temperature setpoint. The cooling coil temperature is an approximate for the supply air dewpoint temperature.

A dehumidify demand can co-exist with a cool, heat, or ventilate demand. If the current demand is none and a dehumidify demand starts, the demand is changed to ventilate. Below is a summary of each configuration and demand determination:

Space relative humidity (SPRH)

Requires a field-provided and installed space relative humidity sensor. SPRH is intended for single-zone space air conditioning applications. The following figure illustrates SPRH Demand Levels.

When the space relative humidity is above the dehumidify relative humidity setpoint, plus the dehumidify deadband, a dehumidify demand starts. The control set the cooling coil temperature control point to the dehumidify cooling coil temperature setpoint.

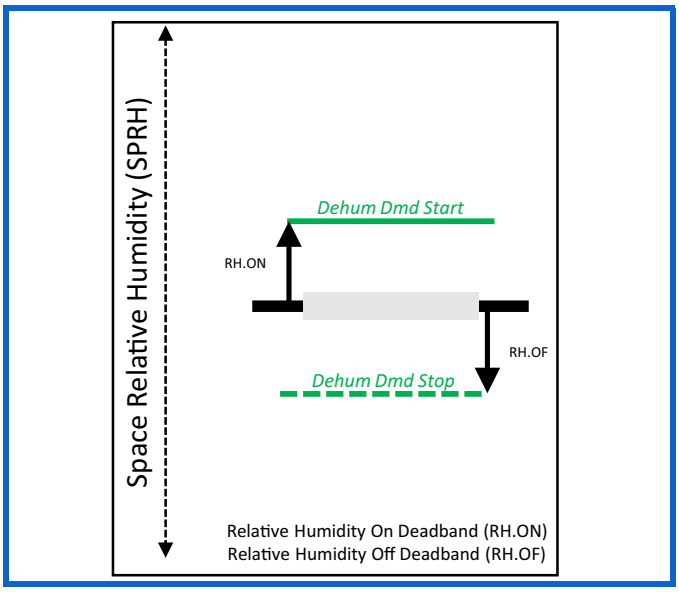
When the space relative humidity drops below the dehumidify relative humidity setpoint, minus the dehumidify off deadband, the dehumidify demand stops.

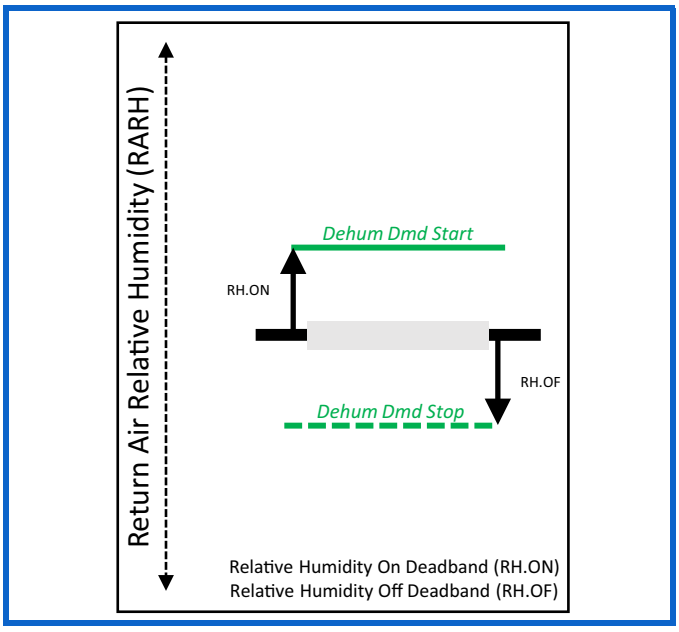
Return air relative humidity (RARH)

Requires the humidity and enthalpy sensor option (OARH and RARH sensors). RARH is intended for multi-zone space air conditioning applications but can also be used for single-zone applications.

When the return air relative humidity is above the dehumidify relative humidity setpoint, plus the dehumidify deadband, a dehumidify demand starts. The control set the cooling coil temperature control point to the dehumidify cooling coil temperature setpoint.

When the return air relative humidity drops below the dehumidify relative humidity setpoint, minus the dehumidify off deadband, the dehumidify demand stops.





Dehumidify input (HSTAT)

HSTAT requires a field-provided humidistat or thermostat with dehumidification output for single-zone space air conditioning applications. A digital control with hardwired or network dehumidification output can be used for single or multi-zone applications.

When the dehumidify input is active, a dehumidify demand starts. The control set the cooling coil temperature control point to the dehumidify cooling coil temperature setpoint. When the dehumidify input is deactivated, the dehumidify demand stops.

Dehumidify co-demands

The dehumidify co-demand configuration determines when the system is allowed to satisfy a dehumidification demand based on the existence of a cooling, heating, or ventilate demand.

The control can be configured to ignore a dehumidify demand when there is a cooling demand (low, high, or VAV cool) or a heating demand (low or high heat) for applications where temperature control is paramount. A dehumidify demand is always allowed with a ventilate demand.

For single-zone comfort cooling applications, the recommended configuration is to allow dehumidification with a low cool or ventilate demand. For multi-zone applications with constant cooling supply air temperatures, the recommended configuration is dehumidification only with a ventilate demand.

Dehumidification modes

If the unit is equipped with a reheat source, such as Humidi-MiZer® system, the compressors are available and a dehumidify demand isn't prevented, the SmartVu controller can enable a dehumidification mode to satisfy a dehumidify demand. When a dehumidification mode is activated, the compressors are controlled to maintain the cooling coil (evaporator) leaving air temperature at the dehumidify cooling coil temperature (CCT) setpoint. The reheat system is controlled to maintain the supply air temperature at the demand supply air temperature. Since SAT reset is disabled during dehumidification mode, the supply air temperature control point is the demand supply air temperature.

Dehumidification modes are available during the occupied period and are only available during the unoccupied period when the indoor fan is configured for demand unoccupied operation.

Below is a summary of available dehumidification modes and with the modulating Humidi-MiZer adaptive dehumidification system. The dehumidification operation will be similar for other reheat types.

Venting dehumidification

When there is a dehumidify demand, but no cool or heat demand, venting dehumidification mode is enabled.

The compressors are enabled and will operate to maintain the cooling coil leaving air temperature at the dehumidify CCT setpoint.

The Humidi-MiZer system is enabled, and mostly hot refrigerant gas is directed to the Humidi-MiZer coil. The mix of hot gas and warm liquid refrigerant entering the Humidi-Mizer coil modulates to maintain the unit supply air temperature at the ventilate demand supply air temperature.

Cooling dehumidification

When cooling dehumidification mode is available, and there is both a dehumidify and a cool demand, cooling dehumidification mode is enabled.

The compressors are enabled, and will operate to maintain the cooling coil leaving air temperature at the dehumidify CCT setpoint.

The Humidi-MiZer system is enabled mostly warm refrigerant liquid is directed to the Humidi-MiZer coil to sub-cool the refrigerant and increase the evaporator capacity, which improves dehumidification performance. The mix of hot gas and warm liquid refrigerant entering the Humidi-Mizer coil modulates to maintain the unit supply air temperature at the active cool demand supply air temperature. Under some conditions, the Humidi-MiZer leaving air temperature may be higher than the cool demand air temperature.

Heating dehumidification (requires modulating heat)

When heating dehumidification mode is available, and there is both a dehumidify and a heat demand, heating dehumidification mode is enabled.

The compressors are enabled and will operate to maintain the cooling coil leaving air temperature at the dehumidify CCT setpoint.

The Humidi-MiZer system is enabled, and mostly hot refrigerant gas is directed to the Humidi-MiZer coil. The mix of hot gas and warm liquid refrigerant entering the Humidi-Mizer coil modulates to maintain the unit supply air temperature at the heat demand supply air temperature.

Humidi-MiZer recharge

At the first start-up of a cooling circuit with Humidi-MiZer (for cooling or dehumidification) and periodically during extended Humidi-MiZer operation, a Humidi-MiZer recharge is initialed to recharge the Humidi-MiZer coil with liquid refrigerant.

Humidi-MiZer purge

When the Humidi-MiZer system is operating for extended periods with the bypass valve mostly open, a Humidi-MiZer purge is initiated to recovery any oil that may be trapped in the condenser coils.

Controls (cont)

Special Operating Modes

SmartVu™ controls are available with special operating modes to override normal unit operation to meet unique conditions.

Special Operating Modes

NAME	DESCRIPTION
Service Test	Normal operation is disabled to allow component or system testing.
Service Run	Normal unit operation is enabled and unit components and systems can be manipulated for testing.
Pre-occupancy Purge	The outdoor air damper is open, and the indoor fan is on to ventilate the building before occupancy.
Temperature Compensated Start	The indoor fan and cooling or heating systems are on to pre-cool or pre-heat the building before occupancy.
Occupied Standby	When the space is unoccupied during the occupied period, the unit disables ventilation and sets back cooling and heating setpoints. Ventilation is only performed with cooling or heating.
Recycle Mode	When the SAT well below the SAT setpoint but a cooling demand persists, the system disables mechanical cooling until the SAT rises to allow mechanical cooling to start again.
A2L Leak Mitigation	When the A2L sensors detect a refrigerant leak, the system enters leak dissipation mode. Cooling and heating are disabled, the indoor fans operates at the leak dissipation speed and the outdoor fans operate at full speed.
Emergency Shutdown	The unit operation is disabled due to: – Indoor fan door switch – Phase monitor shutdown – Active emergency shutdown input – Emergency shutdown from the user interface
Smoke Shutdown	The unit operation is disabled due to an active fire or smoke shutdown input.
Smoke Pressurization	The indoor fans are on at the max speed and the outdoor air damper is open to its max position to pressurize the building. The exhaust fans are off.
Smoke Evacuation	The indoor fans are off, and the outdoor air damper is closed. The exhaust fans are on at the max speed to de-pressurize the building.
Smoke Purge	The indoor fans and exhaust fans are on at max speed and the outdoor air damper is open to max position to purge smoke from the building.

Advanced Control Functions

SmartVu™ controls are available with additional advance control functions to meet application or operational requirements.

Advanced Control Functions

NAME	DESCRIPTION
Cool Demand Limit	Increases the effective occupied cooling setpoint based on a setpoint, limit switches, or analog input.
Heat Demand Limit	Decreases the effective occupied heating setpoint based on a setpoint, limit switches, or analog input.
Cool Capacity Limit	Restricts the maximum cooling capacity (%) based on a setpoint, limit switches, or analog input.
Heat Capacity Limit	Restricts the maximum heating capacity (%) based on a setpoint, limit switches, or analog input.
Economizer FDD	Provides economizer fault detection and diagnostics.
RAD Mapping	For units with an independent return air damper actuator, this allows modification of RAD position based on OAD position.
IAQ Reset	Resets the damper ventilation position based on IAQ switch or sensor.
OAQ Shutoff	Prevents free cooling and ventilation based on an OAQ sensor or switch.

48/50V Electrical Data[a]

48/50V UNIT SIZE	V-Ph-Hz	VOLTAGE RANGE		COMPRESSOR								OUTDOOR FAN MOTOR				CONTROLS	PWRED C/O
				A1 High Cap	A1 Std Cap	A2		B1		B2		STD		LOW SOUND			
		Min.	Max.	MRC	MRC	RLA	LRA	RLA	LRA	RLA	LRA	Qty	MOC (ea)	Qty	MOC (ea)	FLA	FLA
28	208-3-60	187	253	59.7	57.8	41.0	304	—	—	—	—	2	6.8	2	5.8	5.3	4.8
	230-3-60	187	253	59.7	57.8	41.0	304	—	—	—	—	2	6.8	2	5.8	4.8	4.8
	460-3-60	414	506	27.0	26.2	19.2	147	—	—	—	—	2	3.4	2	2.8	2.4	2.2
	575-3-60	518	633	21.6	21.0	16.7	122	—	—	—	—	2	3.3	2	2.4	2.0	1.7
30	208-3-60	187	253	64.2	61.1	41.0	304	—	—	—	—	2	6.8	2	5.8	5.3	4.8
	230-3-60	187	253	64.2	61.1	41.0	304	—	—	—	—	2	6.8	2	5.8	4.8	4.8
	460-3-60	414	506	29.0	27.6	19.2	147	—	—	—	—	2	3.4	2	2.8	2.4	2.2
	575-3-60	518	633	23.2	22.1	16.7	122	—	—	—	—	2	3.3	2	2.4	2.0	1.7
34	208-3-60	187	253	—	66.5	48.1	351	—	—	—	—	2	6.8	2	5.8	5.3	4.8
	230-3-60	187	253	—	66.5	48.1	351	—	—	—	—	2	6.8	2	5.8	4.8	4.8
	460-3-60	414	506	—	30.1	24.7	197	—	—	—	—	2	3.4	2	2.8	2.4	2.2
	575-3-60	518	633	—	24.1	22.4	135	—	—	—	—	2	3.3	2	2.4	2.0	1.7
40	208-3-60	187	253	85.5	69.4	48.1	351	—	—	—	—	3	6.8	3	5.8	5.3	4.8
	230-3-60	187	253	85.5	69.4	48.1	351	—	—	—	—	3	6.8	3	5.8	4.8	4.8
	460-3-60	414	506	40.2	31.4	24.7	197	—	—	—	—	3	3.4	3	2.8	2.4	2.2
	575-3-60	518	633	32.2	25.2	22.4	135	—	—	—	—	3	3.3	3	2.4	2.0	1.7
50	208-3-60	187	253	94.5	74.8	—	—	41.0	304	27.6	203	4	6.8	4	5.8	5.3	4.8
	230-3-60	187	253	94.5	74.8	—	—	41.0	304	27.6	203	4	6.8	4	5.8	4.8	4.8
	460-3-60	414	506	42.8	33.8	—	—	19.2	147	14.1	98	4	3.4	4	2.8	2.4	2.2
	575-3-60	518	633	34.2	27.1	—	—	16.7	122	11.5	84	4	3.3	4	2.4	2.0	1.7
54	208-3-60	187	253	90.5	69.0	—	—	44.2	315	44.2	315	4	6.8	4	5.8	5.3	4.8
	230-3-60	187	253	90.5	69.0	—	—	44.2	315	44.2	315	4	6.8	4	5.8	4.8	4.8
	460-3-60	414	506	40.9	31.2	—	—	22.4	158	22.4	158	4	3.4	4	2.8	2.4	2.2
	575-3-60	518	633	32.7	25.0	—	—	18.6	136	18.6	136	4	3.3	4	2.4	2.0	1.7
60	208-3-60	187	253	83.2	68.2	—	—	48.1	351	48.1	351	4	6.8	4	5.8	5.3	4.8
	230-3-60	187	253	83.2	68.2	—	—	48.1	351	48.1	351	4	6.8	4	5.8	4.8	4.8
	460-3-60	414	506	37.6	30.8	—	—	24.7	197	24.7	197	4	3.4	4	2.8	2.4	2.2
	575-3-60	518	633	30.1	24.7	—	—	22.4	135	22.4	135	4	3.3	4	2.4	2.0	1.7
70	208-3-60	187	253	66.4	61.1	48.1	351	48.1	351	44.2	315	4	6.8	4	5.8	5.3	4.8
	230-3-60	187	253	66.4	61.1	48.1	351	48.1	351	44.2	315	4	6.8	4	5.8	4.8	4.8
	460-3-60	414	506	33.2	27.6	24.7	197	24.7	197	22.4	158	4	3.4	4	2.8	2.4	2.2
	575-3-60	518	633	24.0	22.1	22.4	135	22.4	135	18.6	136	4	3.3	4	2.4	2.0	1.7
74	208-3-60	187	253	66.4	63.9	48.1	351	66.7	485	48.1	351	4	6.8	4	5.8	5.3	4.8
	230-3-60	187	253	66.4	63.9	48.1	351	66.7	485	48.1	351	4	6.8	4	5.8	4.8	4.8
	460-3-60	414	506	34.7	28.9	24.7	197	29.5	227	24.7	197	4	3.4	4	2.8	2.4	2.2
	575-3-60	518	633	24.0	23.1	22.4	135	25.0	175	22.4	135	4	3.3	4	2.4	2.0	1.7
90	208-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	230-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	460-3-60	414	506	49.2	38.9	24.7	197	24.7	197	39.7	260	6	3.4	6	2.8	2.4	2.2
	575-3-60	518	633	39.3	31.2	22.4	135	22.4	135	28.2	210	6	3.3	6	2.4	2.0	1.7
98	208-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	230-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	460-3-60	414	506	49.2	38.9	29.5	227	29.5	227	29.5	227	6	3.4	6	2.8	2.4	2.2
	575-3-60	518	633	39.3	31.2	25.0	175	25.0	175	25.0	175	6	3.3	6	2.4	2.0	1.7

NOTE(S):

a. Data is preliminary and subject to change.

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
MOC — Maximum Operating Current
MRC — Maximum Run Current
RLA — Run Load Amps

48/50V Electrical Data[a] (cont)

48/50V UNIT SIZE	V-Ph-Hz	INDOOR FAN MOTOR									ELECTRIC HEAT (50V ONLY)						POWER EXHAUST/RETURN FAN											
		STD STATIC			MED STATIC			HIGH STATIC			LOW		MED		HIGH		LOW STAT (CPT)			LOW STAT (STD)			STD STATIC			MED STATIC		
		Qty	HP (ea)	MOC (ea)	Qty	HP (ea)	MOC (ea)	Qty	HP (ea)	MOC (ea)	kW	FLA	kW	FLA	kW	FLA	Qty	HP (ea)	MOC (ea)	Qty	HP (ea)	MOC (ea)	Qty	HP (ea)	MOC (ea)	Qty	HP (ea)	MOC (ea)
28	208-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	2	1	3.6	2	1.5	3.9	2	5.1	10.2	2	9.7	19.2
	230-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	36.0	86.6	72.0	173.2	108.0	259.8	2	1	3.3	2	1.5	3.5	2	5.1	10.2	2	9.7	19.2
	460-3-60	3	4.4	5.0	3	5.9	6.8	3	9.1	10.3	36.0	43.3	72.0	86.6	108.0	129.9	2	1	2.0	2	1.5	2.3	2	5.1	5.3	2	9.7	10.1
	575-3-60	3	3.6	3.3	3	6.3	5.3	3	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	2	1	1.8	2	1.5	2.0	2	5.1	4.4	2	7.2	6.2
30	208-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	2	1	3.6	2	1.5	3.9	2	5.1	10.2	2	9.7	19.2
	230-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	36.0	86.6	72.0	173.2	108.0	259.8	2	1	3.3	2	1.5	3.5	2	5.1	10.2	2	9.7	19.2
	460-3-60	3	4.4	5.0	3	5.9	6.8	3	9.1	10.3	36.0	43.3	72.0	86.6	108.0	129.9	2	1	2.0	2	1.5	2.3	2	5.1	5.3	2	9.7	10.1
	575-3-60	3	3.6	3.3	3	6.3	5.3	3	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	2	1	1.8	2	1.5	2.0	2	5.1	4.4	2	7.2	6.2
34	208-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	2	1	3.6	2	1.5	3.9	2	5.1	10.2	2	9.7	19.2
	230-3-60	3	3.8	8.3	3	5.2	11.6	3	7.5	16.5	36.0	86.6	72.0	173.2	108.0	259.8	2	1	3.3	2	1.5	3.5	2	5.1	10.2	2	9.7	19.2
	460-3-60	3	4.4	5.0	3	5.9	6.8	3	9.1	10.3	36.0	43.3	72.0	86.6	108.0	129.9	2	1	2.0	2	1.5	2.3	2	5.1	5.3	2	9.7	10.1
	575-3-60	3	3.6	3.3	3	6.3	5.3	3	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	2	1	1.8	2	1.5	2.0	2	5.1	4.4	2	7.2	6.2
40	208-3-60	3	4.8	10.8	3	7.5	16.5	3	9.7	19.2	27.0	75.1	54.1	150.1	81.1	225.2	2	1.5	3.9	2	1.5	3.9	2	5.1	10.2	2	9.7	19.2
	230-3-60	3	4.8	10.8	3	7.5	16.5	3	9.7	19.2	36.0	86.6	72.0	173.2	108.0	259.8	2	1.5	3.5	2	1.5	3.5	2	5.1	10.2	2	9.7	19.2
	460-3-60	3	4.8	5.5	3	5.8	6.8	3	9,7	10.1	36.0	43.3	72.0	86.6	108.0	129.9	2	1.5	2.3	2	1.5	2.3	2	5.1	5.3	2	9.7	10.1
	575-3-60	3	4.8	4.0	3	6.3	5.3	3	7.2	6.2	36.0	34.6	72.0	69.3	108.0	103.9	2	1.5	2.0	2	1.5	2.0	2	5.1	4.4	2	7.2	6.2
50	208-3-60	3	4.8	10.8	3	7.5	16.5	3	9.7	19.2	27.0	75.1	54.1	150.1	81.1	225.2	2	1.5	3.9	2	1.5	3.9	2	5.1	10.2	2	9.7	19.2
	230-3-60	3	4.8	10.8	3	7.5	16.5	3	9.7	19.2	36.0	86.6	72.0	173.2	108.0	259.8	2	1.5	3.5	2	1.5	3.5	2	5.1	10.2	2	9.7	19.2
	460-3-60	3	4.8	5.5	3	5.8	6.8	3	9,7	10.1	36.0	43.3	72.0	86.6	108.0	129.9	2	1.5	2.3	2	1.5	2.3	2	5.1	5.3	2	9.7	10.1
	575-3-60	3	4.8	4.0	3	6.3	5.3	3	7.2	6.2	36.0	34.6	72.0	69.3	108.0	103.9	2	1.5	2.0	2	1.5	2.0	2	5.1	4.4	2	7.2	6.2
54	208-3-60	4	4.8	9.4	4	4.8	10.8	4	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	230-3-60	4	4.8	9.4	4	4.8	10.8	4	7.5	16.5	36.0.	86.6	72.0	173.2	108.0	259.8	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	460-3-60	4	4.8	5.0	4	5.9	6.8	4	9.4	10.0	36.0	43.3	72.0	86.6	108.0	129.9	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	4	4.8	4.0	4	6.3	5.3	4	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2
60	208-3-60	4	4.8	9.4	4	4.8	10.8	4	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	230-3-60	4	4.8	9.4	4	4.8	10.8	4	7.5	16.5	36.0	86.6	72.0	173.2	108.0	259.8	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	460-3-60	4	4.8	5.0	4	5.9	6.8	4	9.4	10.0	36.0	43.3	72.0	86.6	108.0	129.9	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	4	4.8	4.0	4	6.3	5.3	4	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2
70	208-3-60	4	6.4	13.5	4	7.5	16.5	6	7.5	16.5	27.0	75.1	54.1	150.1	81.1	225.2	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	230-3-60	4	6.4	13.5	4	7.5	16.5	6	7.5	16.5	36.0	86.6	72.0	173.2	108.0	259.8	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	460-3-60	4	6.4	6.8	4	9.4	10.0	6	9.4	10.0	36.0	43.3	72.0	86.6	108.0	129.9	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	4	6.4	5.5	4	8.2	7.1	6	8.2	7.1	36.0	34.6	72.0	69.3	108.0	103.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2
74	208-3-60	4	6.4	13.5	4	7.5	16.5	6	7.5	16.5	54.1	150.1	81.1	225.2	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	230-3-60	4	6.4	13.5	4	7.5	16.5	6	7.5	16.5	72.0	173.2	108.0	259.8	—	—	—	—	—	—	2	9.7	19.2	3	9.7	19.2
	460-3-60	4	6.4	6.8	4	9.4	10.0	6	9.4	10.0	72.0	86.6	108.0	129.9	216.0	259.8	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	4	6.4	5.5	4	8.2	7.1	6	8.2	7.1	72.0	69.3	108.0	103.9	216.0	207.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2
90	208-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	230-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	460-3-60	6	6.4	6.8	6	9.4	10.0	6	9.7	10.1	108.0	129.9	—	—	216.0	259.8	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	6	6.4	5.5	6	8.2	7.1	6	7.2	6.2	108.0	103.9	—	—	216.0	207.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2
98	208-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	230-3-60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	460-3-60	6	6.4	6.8	6	9.4	10.0	6	9.7	10.1	108.0	129.9	—	—	216.0	259.8	—	—	—	—	—	—	2	9.7	10.1	3	9.7	10.1
	575-3-60	6	6.4	5.5	6	8.2	7.1	6	7.2	6.2	108.0	103.9	—	—	216.0	207.9	—	—	—	—	—	—	2	7.2	6.2	3	7.2	6.2

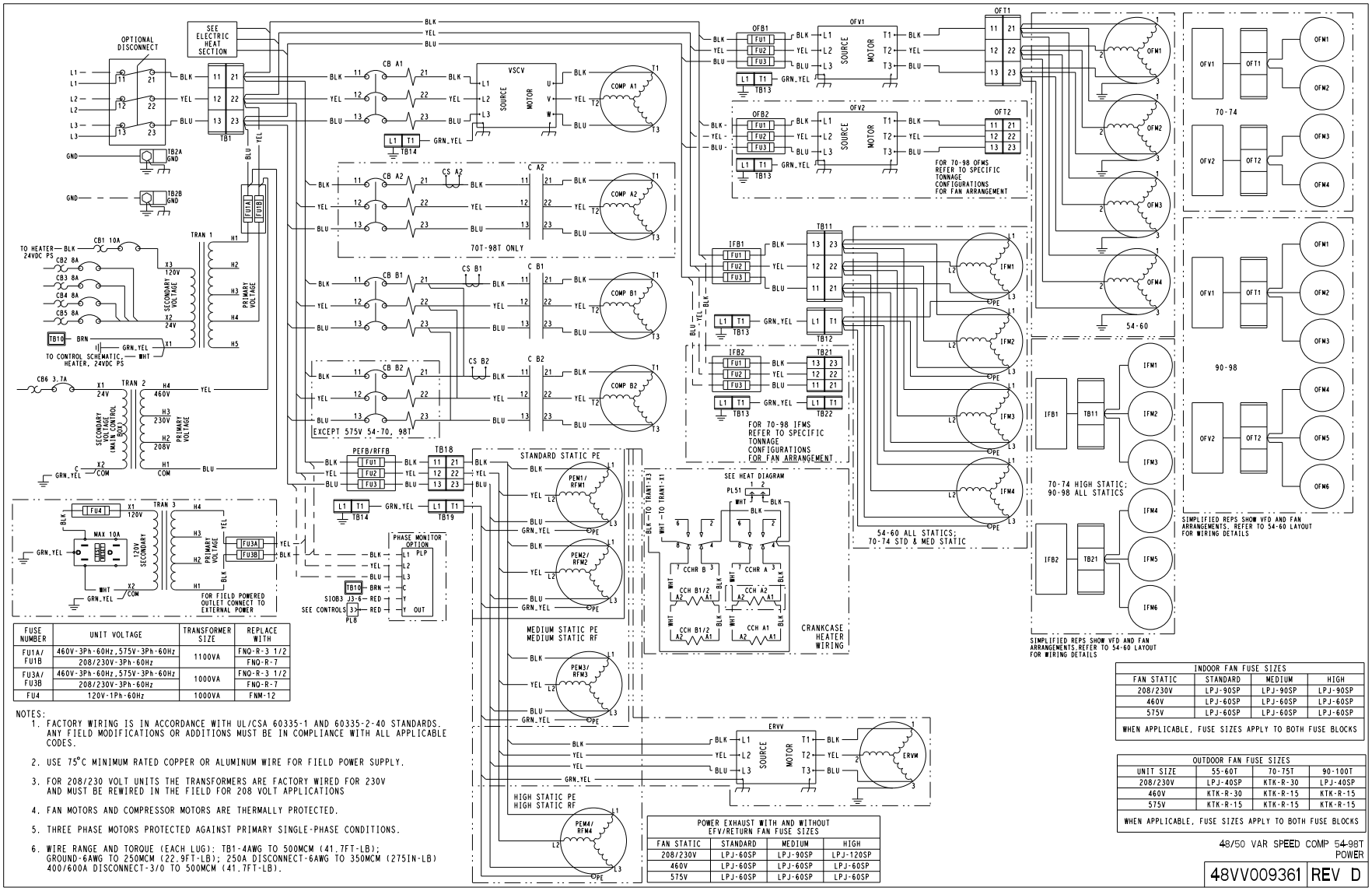
NOTE(S):

a. Data is preliminary and subject to change.

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amp
MOC — Maximum Operating Current
MRC — Maximum Run Current
RLA — Run Load Amps

48/50V Power Schematic



FUSE NUMBER	UNIT VOLTAGE	TRANSFORMER SIZE	REPLACE WITH
FU1A/ FU1B	460V-3Ph-60Hz,575V-3Ph-60Hz	1100VA	FNQ-R-3 1/2
	208/230V-3Ph-60Hz		FNQ-R-7
FU3A/ FU3B	460V-3Ph-60Hz,575V-3Ph-60Hz	1000VA	FNQ-R-3 1/2
	208/230V-3Ph-60Hz		FNQ-R-7
FU4	120V-1Ph-60Hz	1000VA	FNM-12

NOTES:
1. FACTORY WIRING IS IN ACCORDANCE WITH UL/CSA 60335-1 AND 60335-2-40 STANDARDS. ANY FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. USE 75°C MINIMUM RATED COPPER OR ALUMINUM WIRE FOR FIELD POWER SUPPLY.
3. FOR 208/230 VOLT UNITS THE TRANSFORMERS ARE FACTORY WIRED FOR 230V AND MUST BE REWIRED IN THE FIELD FOR 208 VOLT APPLICATIONS
4. FAN MOTORS AND COMPRESSOR MOTORS ARE THERMALLY PROTECTED.
5. THREE PHASE MOTORS PROTECTED AGAINST PRIMARY SINGLE-PHASE CONDITIONS.
6. WIRE RANGE AND TORQUE (EACH LUG): TB1-4AWG TO 500MCM (41.7FT-LB); GROUND-6AWG TO 250MCM (22.9FT-LB); 250A DISCONNECT-6AWG TO 350MCM (275IN-LB) 400/600A DISCONNECT-3/0 TO 500MCM (41.7FT-LB).

INDOOR FAN FUSE SIZES			
FAN STATIC	STANDARD	MEDIUM	HIGH
208/230V	LPJ-90SP	LPJ-90SP	LPJ-90SP
460V	LPJ-60SP	LPJ-60SP	LPJ-60SP
575V	LPJ-60SP	LPJ-60SP	LPJ-60SP
WHEN APPLICABLE, FUSE SIZES APPLY TO BOTH FUSE BLOCKS			

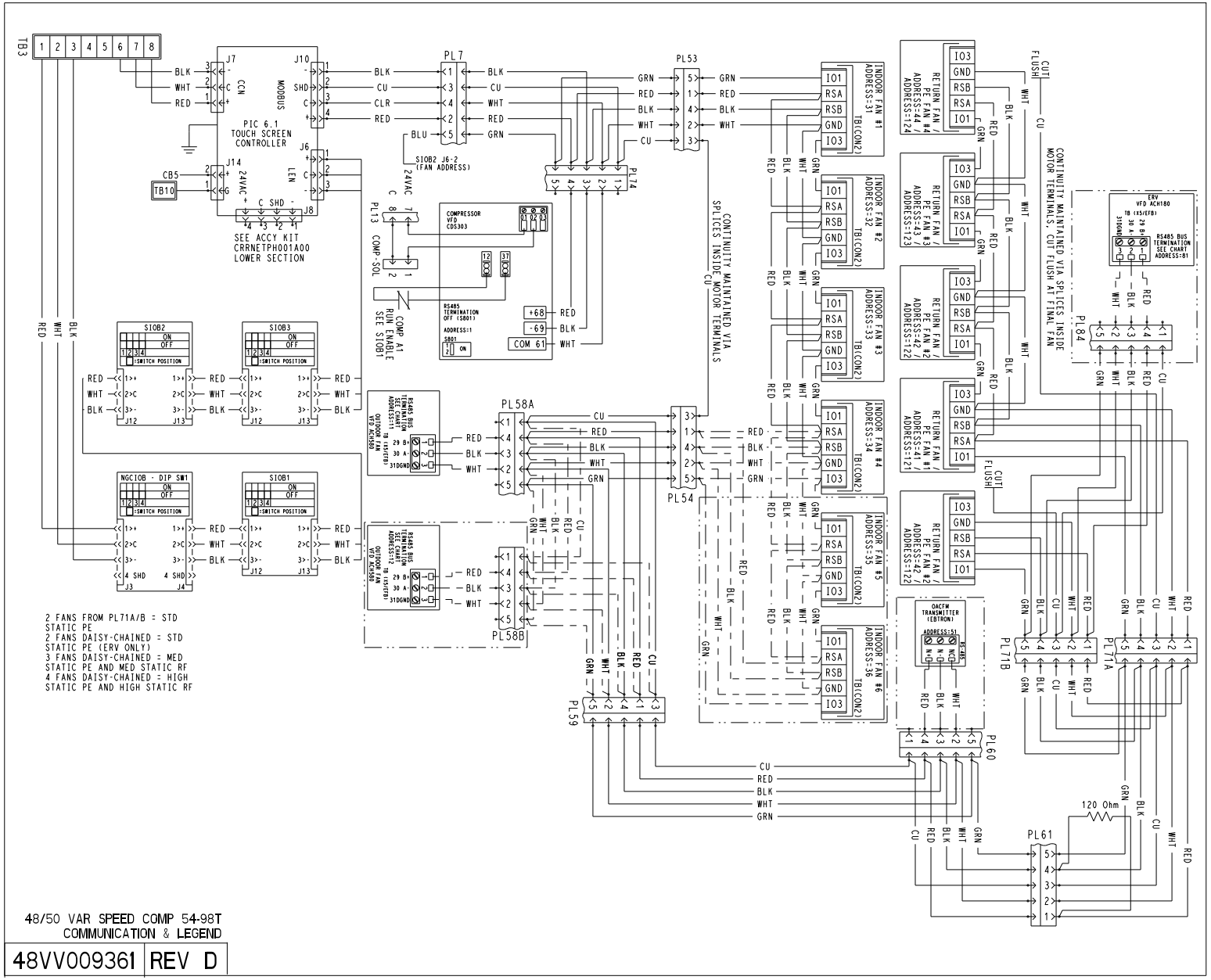
OUTDOOR FAN FUSE SIZES			
UNIT SIZE	55-60T	70-75T	90-100T
208/230V	LPJ-40SP	KTK-R-30	LPJ-40SP
460V	KTK-R-30	KTK-R-15	KTK-R-15
575V	KTK-R-15	KTK-R-15	KTK-R-15
WHEN APPLICABLE, FUSE SIZES APPLY TO BOTH FUSE BLOCKS			

POWER EXHAUST WITH AND WITHOUT EFV/RETURN FAN FUSE SIZES			
FAN STATIC	STANDARD	MEDIUM	HIGH
208/230V	LPJ-60SP	LPJ-90SP	LPJ-120SP
460V	LPJ-60SP	LPJ-60SP	LPJ-60SP
575V	LPJ-60SP	LPJ-60SP	LPJ-60SP

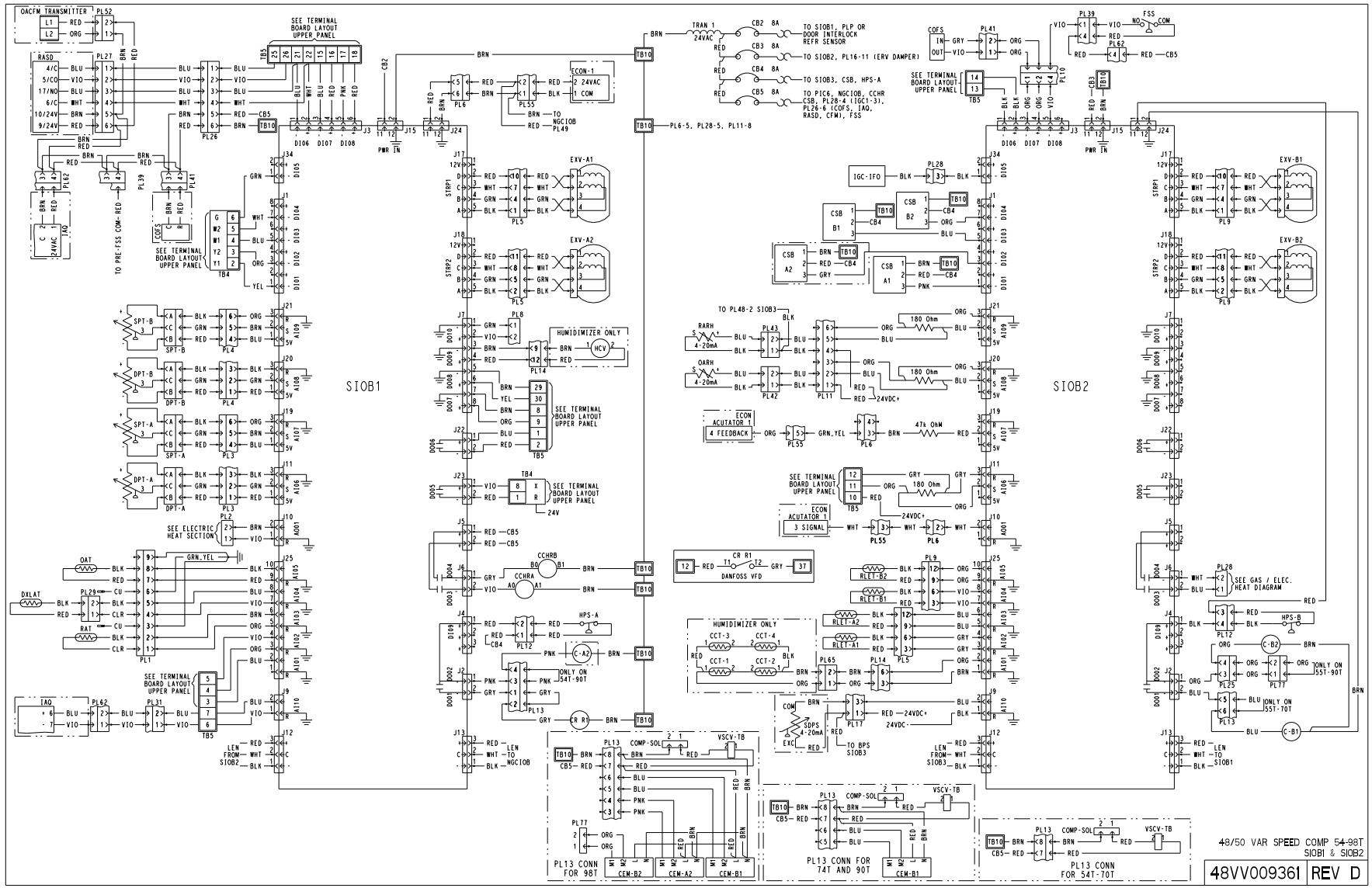
48/50 VAR SPEED COMP 54-98T POWER

48VV009361 REV D

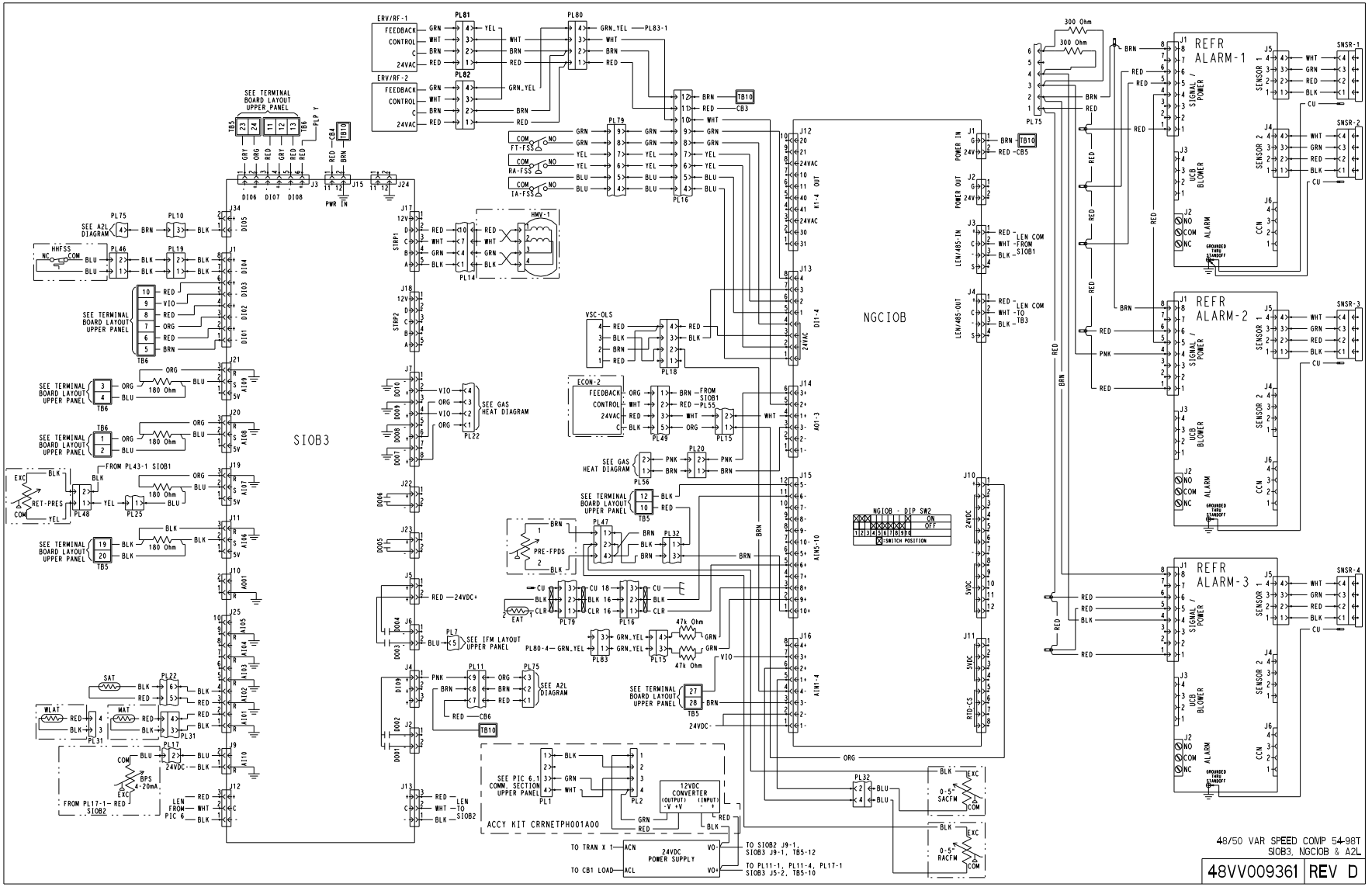
48/50V Communication Schematic



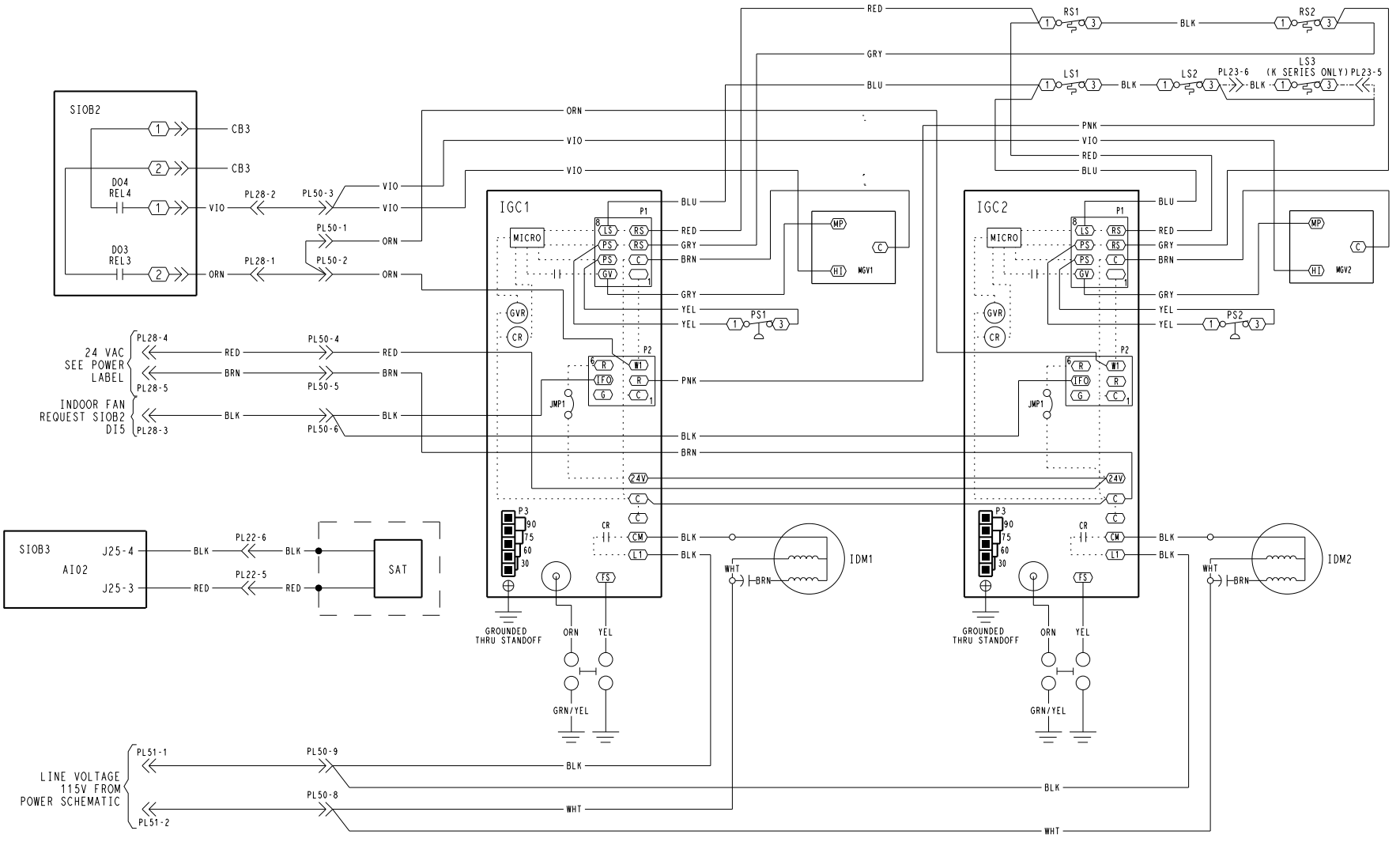
48/50V SIOB 1/2



48/50V NGCIOB and SIOB3



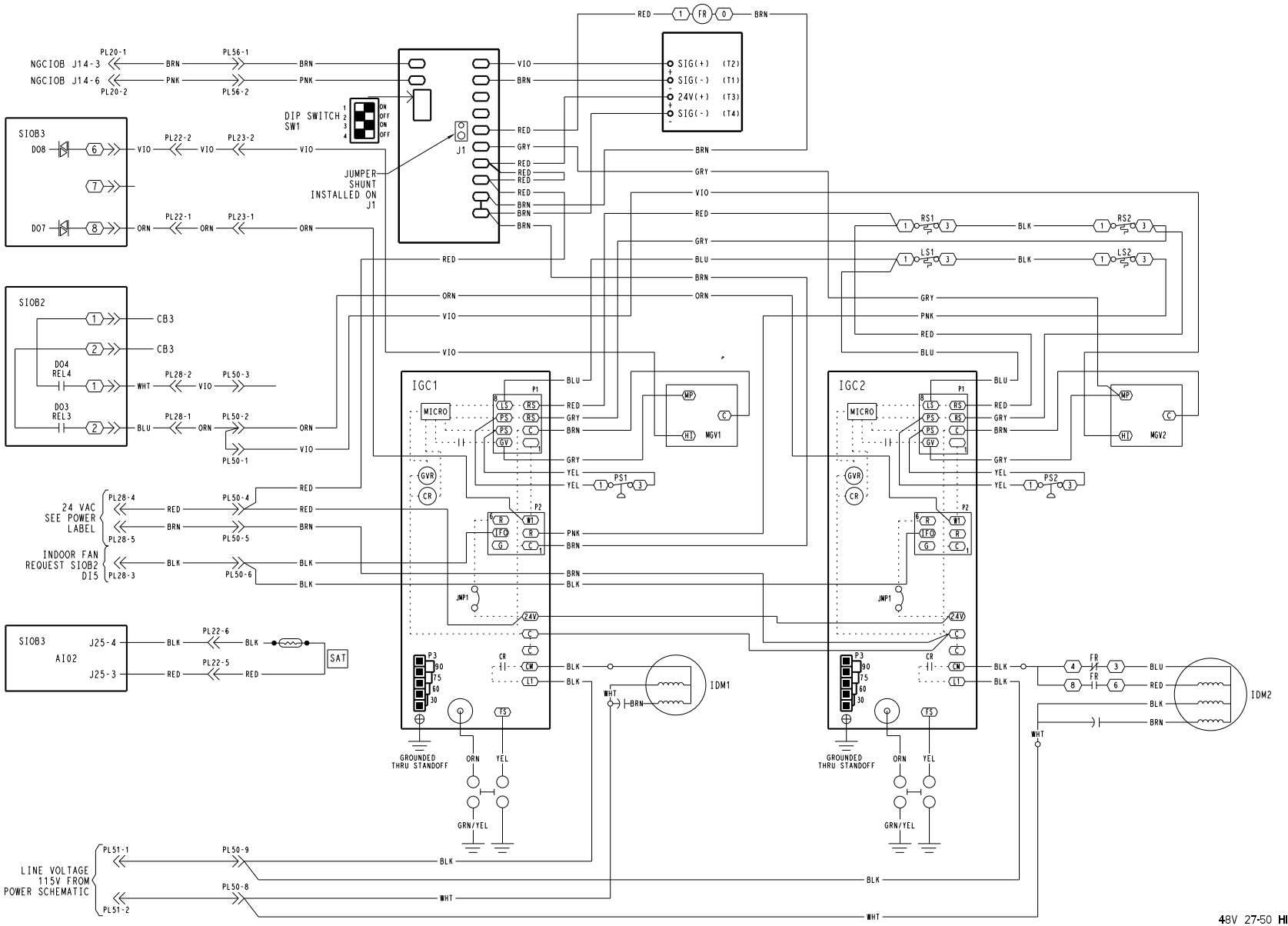
48/50V High 2-Stage Gas Heat Control Circuit



50V 27-50 HIGH 2 STG GH
K 20-50 2 STG GH

48VV000811	REV C

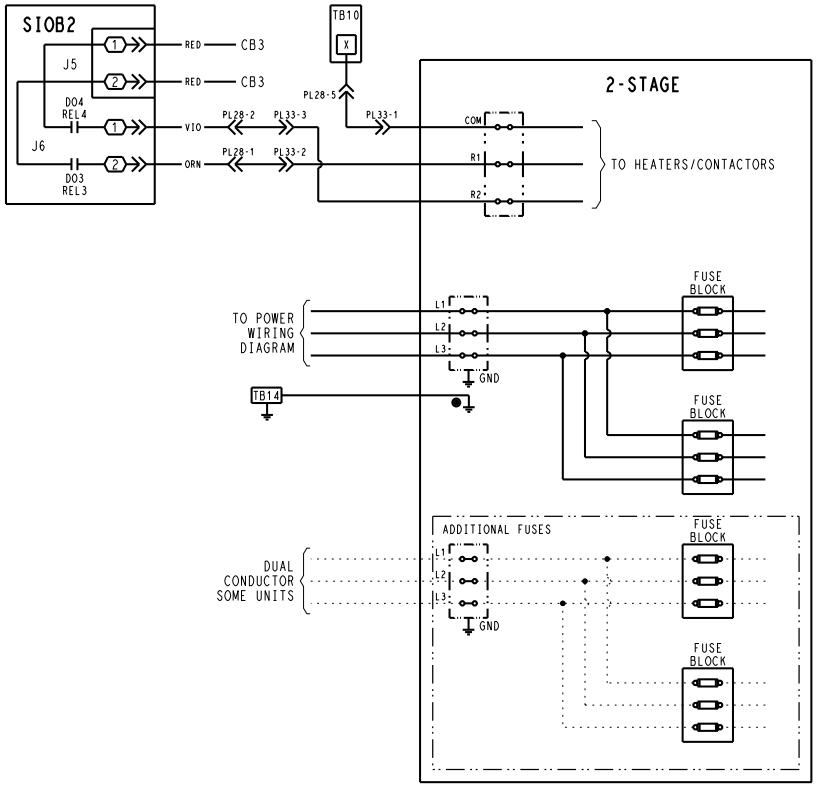
48/50V High Modulating Gas Heat

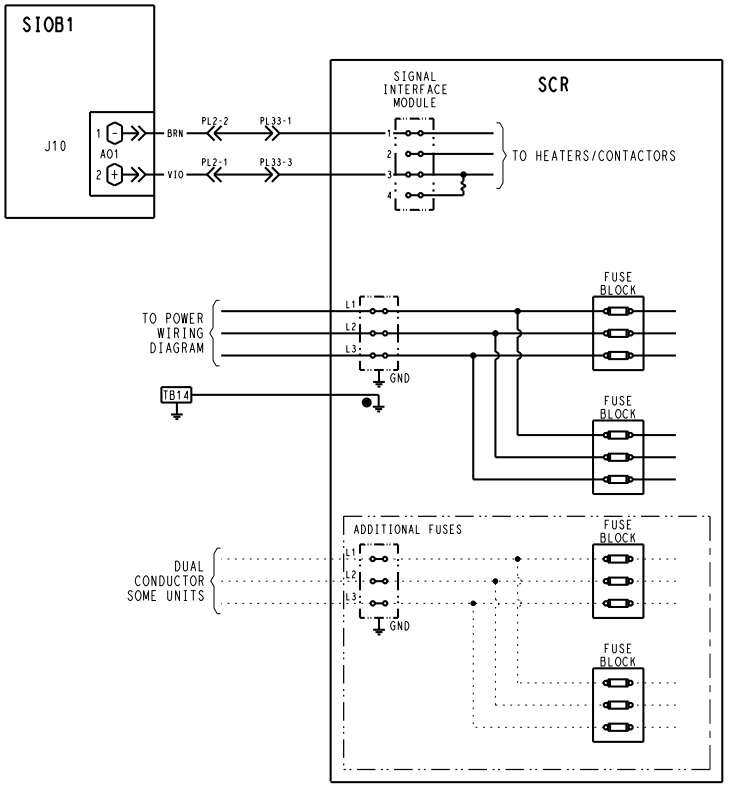


48V 27-50 HIGH MOD GH

48VV000815	REV B

50V Electric Heat (2-Staged and Modulating)

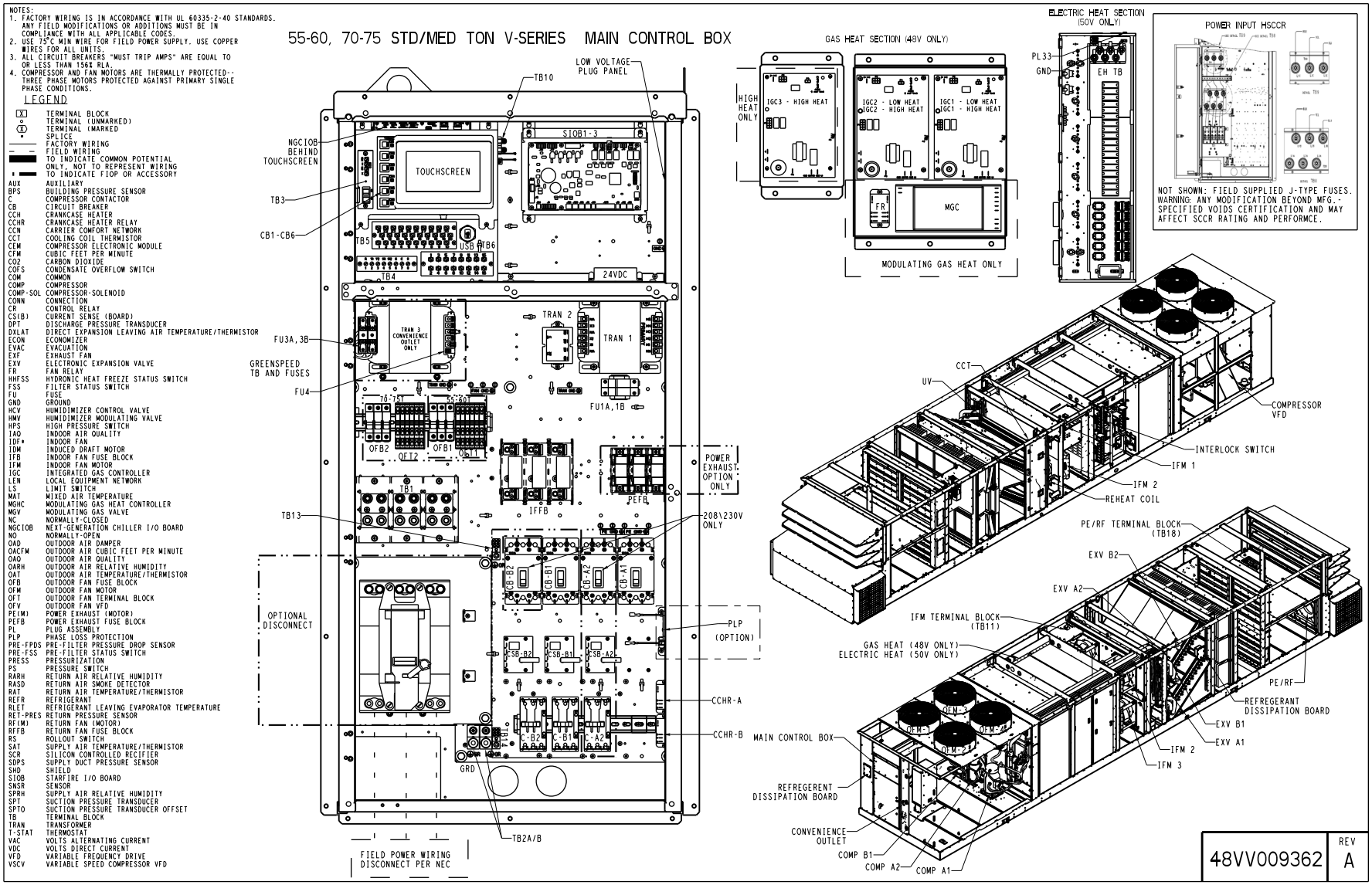




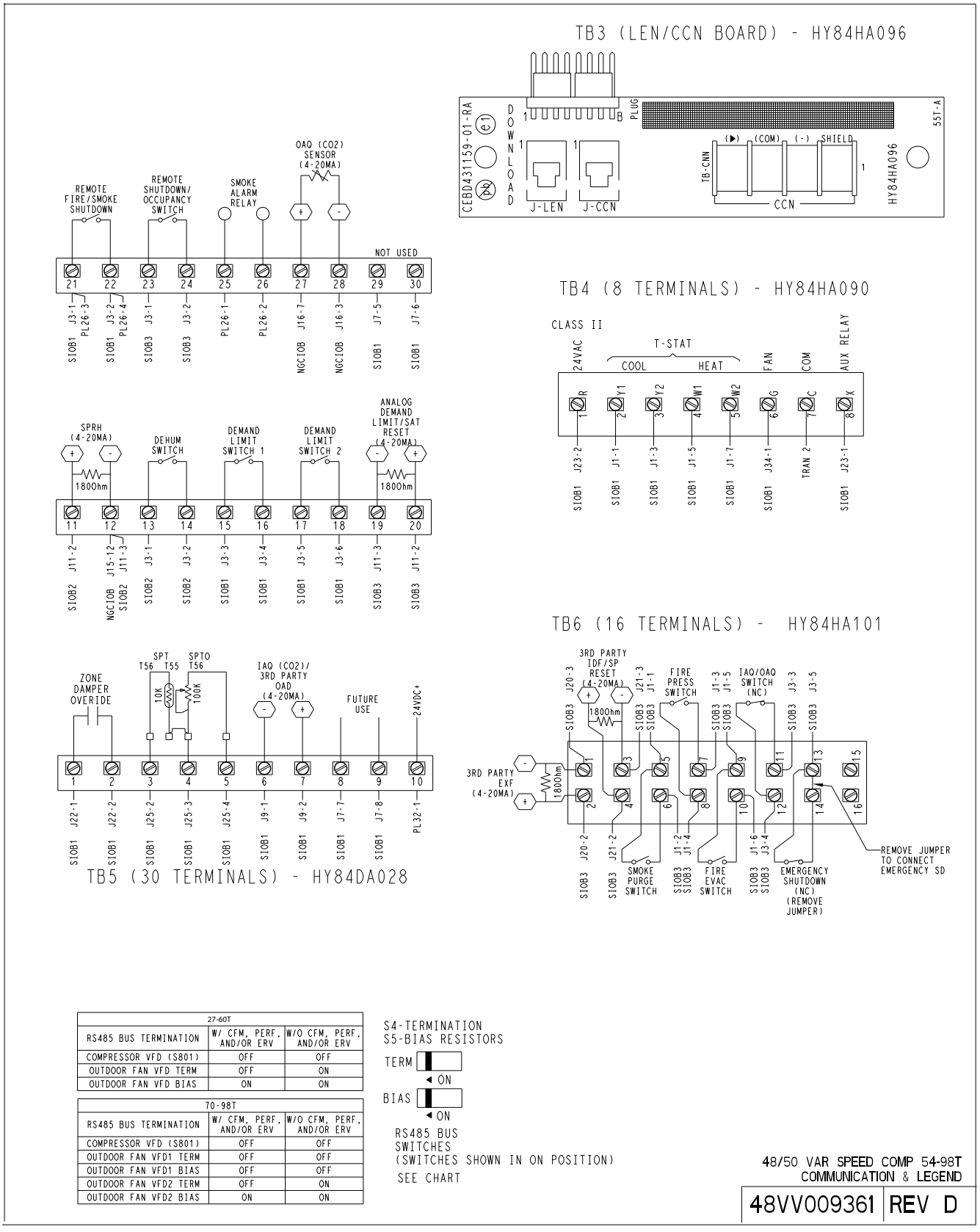
50V 27-50 EH STG SCR

48VV000816	REV -

48/50V Component Arrangement



Typical wiring diagram (cont)



27-60T		
RS485 BUS TERMINATION	W/ CFM, PERF, AND/OR ERV	W/O CFM, PERF, AND/OR ERV
COMPRESSOR VFD (S801)	OFF	OFF
OUTDOOR FAN VFD TERM	OFF	ON
OUTDOOR FAN VFD BIAS	ON	ON

70-98T		
RS485 BUS TERMINATION	W/ CFM, PERF, AND/OR ERV	W/O CFM, PERF, AND/OR ERV
COMPRESSOR VFD (S801)	OFF	OFF
OUTDOOR FAN VFD1 TERM	OFF	OFF
OUTDOOR FAN VFD1 BIAS	OFF	OFF
OUTDOOR FAN VFD2 TERM	OFF	ON
OUTDOOR FAN VFD2 BIAS	ON	ON

S4-TERMINATION
S5-BIAS RESISTORS

RS485 BUS SWITCHES
(SWITCHES SHOWN IN ON POSITION)
SEE CHART

48/50 VAR SPEED COMP 54-98T
COMMUNICATION & LEGEND

48VV009361 | REV D

Guide specifications 48V

NOTE: this specification is in the "Masterformat" as published by the Construction Specification Institute for use in a mechanical specification.

Electric Cooling/Gas Heat Packaged Applied Rooftop Unit

HVAC Guide Specifications

Size Range: **27.5 to 100 Nominal Tons**

Carrier Model Number: **48V**

Part 1 — (23 06 80) Schedules for Decentralized HVAC Equipment

1.01 (23 06 80.13) Decentralized Unitary HVAC Equipment Schedule:

A. (23 06 80.13.A.) Rooftop unit (RTU) schedule:

1. Schedule is per the project specification requirements.

Part 2 — (23 07 16) HVAC equipment insulation

2.01 (23 07 16.13) Decentralized, Rooftop Units:

A. (23 07 16.13.A.) Air handling compartment (standard construction):

1. Interior cabinet surfaces shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation with aluminum foil-faced on the air side.
2. Access doors shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation covered with galvanized steel liner on the air side (double wall).
3. The gas heat compartment shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation covered with galvanized steel liner on the air side (double wall).
4. The bottom of the base pan (exterior) shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation with aluminum foil-faced on the exterior facing side.
5. Air touching doors and panels shall have a minimum nominal thermal efficiency rating of R4.
6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

Part 3 — (23 09 13) Instrumentation and control devices for HVAC

3.01 (23 09 13.23) Sensors and Transmitters:

A. (23 09 13.23.A.) Thermostats:

1. Thermostat shall:
   a. Energize both "W and "G" when calling for heat.
   b. Have capability to energize up to two-stages of cooling, and two-stages of heating.
   c. Include capability for occupancy scheduling.

B. (23 09 13.23.B.) Sensors:

1. Standard sensors shall have outdoor air temperature, return air temperature, evaporator/DX reheat coil leaving air temperature, suction pressure (all circuits), condensing pressure (all circuits), and leaving evaporator refrigerant temperature (all circuits).

Part 4 — (23 09 23) Direct Digital Control system for HVAC

4.01 (23 09 23.13) Decentralized, Rooftop Units:

A. (23 09 23.13.A.) Carrier SmartVu™ intelligent integrated unit controller with Direct Digital Control (DDC) shall:

1. Provide integrated unit operation for cooling, heating, and ventilation as well as monitoring, recording, and reporting capabilities. Controller shall also provide diagnostics and alarms of abnormal unit operation through the user interface.
2. Operate standalone, with a two-stage cooling, two-stage heating thermostat, or via building automation system (BAS) using either Carrier Comfort Network (CCN), BACnet MS/TP, or BACnet IP communication.
3. Have plug-and-play compatibility with Carrier i-Vu® Open 8.0+ building automation system, including communication, points and properties pages, and graphics.
4. Include a 7 in. color touch screen user interface with intuitive icon based navigation as the primary user interface. Keypad or rotary interfaces or touchscreens less than 7 in. are not acceptable.
5. Provide a minimum of four control interface access levels, including basic access (no password), user access (static password), service access (static password), and factory access (controlled password).
6. Provide the ability to read refrigerant pressures at local display or via BAS network without the use of external refrigerant gauges.
7. Include a USB data port to allow for software upgrades without the need for special tools or programs.
8. Provide service capabilities of:
   a. Manual component test
   b. Service run mode
   c. Track component run hours and starts
   d. Data trending
   e. Alarm history
9. Allow the use of multiple occupancy sources, including BAS, remote input, local schedules with 365 day real time clock, 8 occupancy schedules and 16 holiday schedules.

10. Include field use control inputs, including space temperature, space temperature offset, space relative humidity, supply air temperature, mixed air temperature, two-stage cool/heat thermostat (Y1, Y2, W1, W2, G), dehumidify switch, two demand/capacity limit switches, analog demand limit/third-party supply air temperature reset, pre-filter status switch, indoor air quality (IAQ)/third-party outdoor air damper control, IAQ switch, outdoor air quality (OAQ)/indoor air quality (IAQ) switch, third-party supply static pressure reset/third-party indoor fan control, third-party exhaust fan control, remote shutdown/occupancy switch, smoke detector/fire shutdown, emergency shut-down, smoke purge, smoke pressurization, and smoke evacuation, as standard.
11. Include field use control outputs, including alarm/aux relay and zone damper override relay, as standard.
12. Provide cooling and heating demand source configurations for space temperature sensors, two-stage cool/heat thermostat or network inputs, or return air temperature.
13. Provide supply air temperature based operation for cooling with user adjustable supply air temperature setpoints for low cool, high cool, VAV cool, and vent demands.
14. Include occupied cooling, unoccupied cooling, occupied heating, and unoccupied heating setpoints and maintain a 5°F temperature difference between cooling and heating set points to meet the latest ASHRAE 90.1 Energy Standard. Single setpoint configurations are not allowed.
15. Provide the ability to perform cool-tempered venting operation to prevent hot discharge air during vent mode.
16. Allow mechanical cooling operation down to –10°F (–23.3°C) entering condenser coil through the modulation of condenser fan speeds as standard using Greenspeed® intelligence.
17. Provide user-adjustable compressor lockouts based on outdoor air temperature and mixed air temperature, and user-adjustable heating lockouts based on outdoor air temperature.
18. Shall read and display the indoor fan motor, voltage, current, temperature, and modulation level.
19. Include an RS-485 port for Carrier Comfort Network (CCN) or BACnet MS/TP communication.
20. Include an RS-485 port for Rnet communicating sensors and displays.
21. Include an Ethernet port for BACnet IP communication.

Part 5 — (23 09 33) Electric and Electronic Control System for HVAC

5.01 (23 09 33.13) Decentralized, Rooftop Units:

A. (23 09 33.13.A.) General:
   1. Shall be complete with self-contained low-voltage control circuit.
   2. Shall utilize color-coded wiring.
   3. Shall have wiring diagrams affixed to the interior door panels.

B. (23 09 33.13.B.) Safeties:
   1. Compressors:
      a. Over-temperature.
      b. Over-current.
      c. High refrigerant circuit pressure switch.
      d. Refrigerant circuit leak detection and mitigation.
   2. Indoor fan
      a. Overcurrent protection.
      b. Line under voltage detection.
      c. Phase loss detection.
      d. Blocked rotor detection.
      e. Rotor position detection error.
      f. Indoor fan door interlock switch to prevent indoor fan operation with the fan access door open.
   3. Heating section shall be provided with the following minimum protections:
      a. Indoor fan request.
      b. Inducer pressure switch.
      c. High temperature limit switches.
      d. Flame rollout switch.
      e. Flame proving controls.

Part 6 — (23 09 93) Sequence of Operations for HVAC Controls

6.01 (23 09 93.13) Decentralized, Rooftop Units:

A. (23 09 93.13.A.) INSERT SEQUENCE OF OPERATION

Part 7 — (23 40 13) Panel Air Filters

7.01 (23 40 13.13) Decentralized, Rooftop Units:

A. 23 40 13.13.A.) Standard Pre-filter Section
   1. Shall consist of factory-installed, disposable 2 in. fiberglass filters of commercially available sizes, unless optional filters are selected.

Part 8 — (23 81 19) Self-Contained Air Conditioners

8.01 (23 81 19.16) Large-Capacity Self-Contained Air Conditioners:

A. (23 81 19.13.A.) General:
   1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.

2. Factory-assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge, operating oil charge, microprocessor-based control system and associated hardware, and all special features required prior to field start-up.
3. Unit shall use Puron Advance™ (R-454B) refrigerant and include a factory refrigerant charge. The nameplate must contain the refrigerant type and charge weight.
4. Unit shall ship as a single piece and shall be installed in accordance with the manufacturer's instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

B. (23 81 19.13.B.) Quality Assurance:
1. Unit meets and exceeds ASHRAE 90.1 (latest edition) minimum efficiency requirements.
2. Unit performance shall be certified in accordance with AHRI Standards 340/360 (latest edition).
3. Unit shall be designed to conform to ASHRAE 15 and 62.1 (latest editions).
4. Gas heater shall be designed to conform with in accordance with ANSI Standard Z21.47 (U.S.A.)-20212021/CSA Standard 2.3 (Canada).
5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
6. Unit casing shall be capable of withstanding a minimum 500-hour salt spray exposure per ASTM B117 (scribed specimen).
7. Unit shall be manufactured in a facility registered by ISO 9001:2015.
8. Roof curb shall be designed to conform to National Roofing Contractors Association (NRCA) criteria per Guideline B-1986.
9. Unit shall pass an automated factory run test, including validation of refrigerant circuit performance, verification of operation of key components. A run test certificate shall ship with the unit.
10. Unit shall be designed in accordance with UL Standard 1995 or 60335-2-40, including tested to withstand rain. Compliance shall be listed with UL and UL Canada.

C. (23 81 19.13.C.) Delivery, Storage, and Handling:
1. Unit shall be stored and handled per manufacturer's recommendations.
2. Lifted by crane requires spreader bars.
3. Unit shall only be stored or positioned in the upright position.

D. (23 81 19.13.D.) Project Conditions:
1. As specified in the contract.

E. (23 81 19.13.E.) Operating Characteristics:
1. Unit shall be capable of starting and running in mechanical cooling from –10°F (–23.3°C) to 115°F (46.1°C) entering condenser air temperature.
2. Unit shall meet or exceed ASHRAE 90.1 requirements for a minimum of 4 stages of cooling capacity with the lowest stage being no higher than 25% of unit capacity.
3. Unit shall discharge supply air vertically or horizontally as shown on drawings.
4. Unit shall provide supply air temperature control in cooling.
5. Unit shall provide two-stages of gas heat.

F. (23 81 19.13.F.) Electrical Requirements:
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
2. The unit power panel shall have a short circuit current rating (SCCR) of no less than 10kA.
3. The single point electrical connection shall be at a factory-installed terminal block in the power panel.
4. Power wiring shall be a copper conductor (no aluminum) sized for no less than 167°F (75°C).
5. Separate enclosures shall be provided for high and low voltage components.

G. (23 81 19.13.G.) Unit Cabinet:
1. Unit cabinet shall be constructed of galvanized steel (designated G60 per ASTM Standard A653) and shall be bonderized with a pre-painted finish or powder-coat on the outer surface.
2. Unit cabinet exterior shall be capable of withstanding ASTM Standard B117 500-hour salt spray test.
3. Unit cabinet interior top and side panels/doors (supply air touching) shall be lined minimum 1/2 in. thick, 1 lb density, aluminum foil-faced fiberglass insulation.
4. Unit cabinet shall have an insulation rating of R4.
5. Unit shall be available in dedicated compact or standard chassis footprints to facilitate replacement of existing units or meet new construction requirements.
6. Drawings shall be available to show the dimensions of the specified cabinet configurations. Certified drawings with a table to decode unit lengths is not acceptable.
7. Basepan:
   a. Unit shall have base rails on a minimum of 2 sides.
   b. Include a minimum of four lifting lugs to support rigging shackles for maneuvering and overhead rigging.

c. Base rail shall be a minimum of 16 gauge thickness.
d. Shall have a single thru-the-base power coupling and primary and secondary thru-the-base control couplings.
e. Bottom shall be lined with minimum 1/2 in. thick, 1 lb density, fiberglass insulation.

8. Condensate Pan:
a. Shall be a sloped condensate drain pan made of galvanized steel.
b. Shall comply with ASHRAE Standard 62.
c. Shall use a single, drain connector through the side of the unit base rail. Connection shall be made per manufacturer's recommendations.

9. Gas Connections:
a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit.

10. Electrical Connections:
a. All unit power wiring shall enter the power box at the bottom or back.
b. Thru-the-base capability.
1) Standard unit shall have a thru-the-base power and control couplings in the basepan.
2) No basepan penetration, other than those authorized by the manufacturer, is permitted.

11. Access Doors:
a. Hinged access doors shall be provided on a single side of the unit to facilitate single side maintenance access.
b. At a minimum, doors must be provided on the filter section, indoor fan section and gas heat section. The door shall deal against a rubber gasket to prevent air and water leakage.
c. All doors shall require the use of tools to open the door to help prevent unauthorized access.
d. The indoor fan section door shall have a minimum of one locking handle and pressure safety latch.
e. Doors shall be double wall construction.

12. Access Panels:
a. Removable panels shall be provided on areas that require infrequent access.

13. Security Grilles (Sizes 28-34, 70-98)
a. Units shall include painted metal security grilles on the condenser section.

H. (23 81 19.13.H.) Gas Heat:
1. General:
a. Low and high capacity gas heat options shall be available.
b. Shall be factory configured for natural gas (NG) and shall be field convertible to propane (LP) using an accessory kit.
c. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
d. Shall incorporate a direct-spark ignition system and redundant main gas valve.
e. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
f. High-corrosion areas such as flue gas collection and exhaust areas shall be lined with corrosion-resistant material.
g. The heat assembly shall be mounted on rollers for easy inspection and servicing.

2. Control:
a. The gas heater shall be controlled by an integrated gas controller (IGC) microprocessor.
b. IGC board shall notify users of fault using an LED (light-emitting diode).
c. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.
d. Required gas heat stage signals shall be provided by SmartVu controls.

3. Heat Exchanger:
a. The heat exchanger shall be constructed of minimum 18-gauge Type 409 Stainless Steel. Tubing material shall be suited for high temperature and corrosion resisting service. Tubing material shall comply with ASTM A268, Grade TP409. Tubing shall be welded and annealed.
b. Burners shall be of the in-shot type constructed of aluminum-coated steel.
c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610 m) elevation. Additional accessory kits may be required for applications above 2000 ft (610 m) elevation, depending on local gas supply conditions.
d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.

4. Induced Draft System:
a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.
b. Shall be made from steel with a corrosion resistant finish.
c. Shall have permanently lubricated sealed bearings.
d. Shall have inherent thermal overload protection.

Guide specifications 48V (cont)

I. (23 81 19.13.I.) Coils:
   1. Evaporator (Standard):
      a. Shall be round tube, plate fin style coil with aluminum fins mechanically bonded to copper tubes (Al/Cu).
      b. Tube diameter shall be 1/2 in. OD (outside diameter).
      c. Coil shall be fully active during full and part load operation.
      d. Intertwined circuiting constructed of aluminum fins mechanically bonded to seamless copper tubes.
      e. Full-face active type during full and part load conditions.
      f. Coils shall be leak tested at 150 psig and pressure tested at 650 psig.
   2. Condenser (Standard):
      a. Shall be a microchannel design, constructed of an aluminum alloy. The coils shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds.
      b. Microchannel coils shall consist of a two-pass arrangement.
      c. Coils shall be leak tested at 150 psig and pressure tested at 650 psig.

J. (23 81 19.13.J.) Refrigerant Circuit:
   1. Refrigerant circuit shall have the following control, safety, and maintenance features:
      a. Single circuit refrigerant circuit on sizes 28-40 and dual refrigerant circuits on sizes 50-98.
      b. Electronic expansion valve (EXV) metering devices on all models. Thermostatic expansion valves (TXV) are not acceptable.
      c. Refrigerant filter drier.
      d. Service ports on suction and discharge lines.
      e. Sight glass.
      f. Fusible plug.
      g. Refrigerant leak detection sensor.
      h. Refrigerant leak mitigation board.
   2. Compressors:
      a. The unit shall have a maximum of two compressors per refrigerant circuit to ensure proper oil management.
      b. Units must have a minimum of one variable speed compressor for improved supply air temperature control and load matching. Variable-capacity digital compressors or two-stage compressors are not acceptable alternate.
      c. Compressors shall be mounted on rubber-in-shear vibration isolation.
      d. Each compressor shall have crankcase heater that is only on when the compressor is off and the outdoor air temperature is below 80°F (26.6°C).

K. (23 81 19.13.K.) Pre-Filter Section:
   1. The standard pre-filter is specified in the filter of this specification.
   2. Shall have a minimum 4 in. pre-filter rack with 2 in. spacer.
   3. Must be able to accept a single 2 in. filter, two 2 in. filters, or a single 4 in. filter by removing the spacer.
   4. Filters shall be accessible through a hinged access door.

L. (23 81 19.13.L.) Indoor Fan:
   1. Motor:
      a. Shall be an electronically commutated (ECM) motor, available in standard, medium, or high static (ALL STANDARD CHASSIS AND SIZE 40-50 COMPACT CHASSIS).
      b. Must have a minimum IP54 ingress protection rating, a Moisture (F)/Environmental (H) protection class if H1, and an insulation class of F.
      c. Must have permanently lubricated bearings.
      d. Shall be controlled directly from the Carrier SmartVu control system via Modbus protocol. External analog or pulse width modulation control is not acceptable.
      e. The Modbus address shall be automatically set from the SmartVu control system.
      f. Provide internal diagnostics and EMI/RFI (electromagnetic/radio frequency interference) filters.
      g. Bearings shall have an L10 life of over 100,000 hours.
   2. Fan:
      a. Unit shall have a direct drive indoor fan array containing a minimum of three fans (sizes 28-50), four fans (sizes 54-60 and sizes 70-74) standard and medium static, or six fans (sizes 70-74 high static and sizes 90-98). Belt drive fans are not acceptable.
      b. Shall be single width, single inlet (SWSI) backward curve impeller.
      c. Impeller, shaft, bearings, drive components, and motor shall be mounted on a formed steel assembly bolted to a galvanized steel mounting plate.
      d. Fans shall have a galvanized steel inlet nozzle, aluminum impeller with five blades, and die cast aluminum electronics housing. Composite impellers are not acceptable.
      e. Impellers shall be designed for continuous operation at the maximum rated fan speed and motor power.

f. Fan and motor shall be statically and dynamically balanced as an assembly to G6.3.

3. Control:
   a. The indoor fan speed shall be controlled by SmartVu conrols.
   b. SAV™: The control shall default to Staged Air Volume (SAV) indoor fan control for single zone applications.
      1) Staged air volume (SAV) shall be field configurable for operation based on cool demands (2 fan speeds) or cool capacity (3 fan speeds).
      2) The control shall be field configurable for Constant volume (CV), Single-Zone VAV (SZ-VAV), Third-party modulation, or MZ-VAV duct pressure (with field-installed sensor).
   c. VAV: The control shall default to multi-zone variable air volume (MZ-VAV) duct pressure indoor fan control for multi-zone applications.
      1) Shall have a duct pressure transducer with 0 to 5 in. wg. range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and duct pressure pick-up port.
      2) The control shall be field configurable for Single-Zone VAV (SZ-VAV), Staged Air Volume (SAV™), Constant Volume (CV), or Third-party modulation.

M. (23 81 19.13.M.) Outdoor Fans:
1. Motor:
   a. Shall be a three-phase, 6 or 8 (size 34 only) pole, totally enclosed motors. Single-phase motors are not acceptable.
   b. Shall use permanently lubricated bearings.
   c. Must be statically and dynamically balanced.
   d. Shall be variable speed (electronically commutated or variable frequency drive).
   e. The fan speed shall be modulated by the unit control based on saturated condensing temperature for improved efficiency and low ambient mechanical cooling. Fixed speed or staged fans are not acceptable.
2. Fans (Standard) excluding size 34:
   a. Shall be a direct-driven propeller type fan constructed of metal.
   b. Must be protected by PVC-coated steel wire safety guards.
   c. Shall discharge air vertically.

N. (23 81 19.13.N.) Manual Outdoor Air Damper (Standard):
1. Shall have pressure activated (no actuator) damper assembly, sized to allow up to 25% outdoor air at maximum position. The damper is open when the indoor fan is on and closes when the indoor fan is off.
2. Must include an adjustable maximum position stopper.
3. Must include factory-installed outdoor air intake hoods that ship in the installation location to reduce installation time. Field installed outdoor air hoods are not acceptable.

O. (23 81 19.13.O.) Factory-installed Options:
1. Modulating Gas Heat:
   a. The unit shall have a factory-installed modulating gas heat system with stainless steel heat exchanger for improved supply air temperature control.
   b. Low capacity gas heat shall have a minimum output of no more than 26% of full capacity (3.8:1 turn-down).
   c. High capacity gas heat shall have a minimum output of no more than 14% of full capacity (7:1 turndown).
   d. Includes a factory-supplied, field-installed supply air temperature (SAT) duct sensor.
   e. Shall provide supply air temperature based operation for heating.
   f. Must include user adjustable supply air temperature setpoints for low heat and high heat.
   g. Must have the capability of providing tempering operation, including heat tempered cooling and heat tempered venting.
2. Low-Sound Condenser Fans (With High Efficiency, Low Sound Option):
   a. The unit shall have factory-installed low-sound condenser fans that reduce sound output during cooling or dehumidification operation.
   b. Shall include only AeroAcoustic™ composite condenser fans with swept fan blades and blade edge optimization to reduce radiated sound and allows for lower rpm operation. Metal condenser fans are not acceptable.
   c. Must include vertically extended shrouds on all condenser fans to reduce radiated sound at ground levels.
3. Compressor Sound Blankets (With High Efficiency, Low Sound Option):
   a. The unit shall have factory-installed sound blankets on all compressors to reduce radiated sound. If factory-installed sound blankets are not available, field-installed sound enclosures shall be provided.
4. Humidi-MiZer Adaptive Dehumidification:
   a. The unit shall have a factory-installed dehumidification system that allows dehumidification in cooling, venting, or heating modes using a variable mixture of warm liquid

refrigerant and hot gas refrigerant as a reheat source. Reheat systems that use only hot gas or liquid refrigerant in dedicated coils are not acceptable.

b. During dehumidification mode, the compressors shall control to cooling coil temperature (CCT, an approximation of supply air dew point temperature) and the reheat system shall be modulated to supply air temperature (SAT).

c. The dehumidification system shall have an e-coated reheat coil, on/off reheat valve, modulating condenser bypass valve, interconnecting refrigerant piping, and a cooling coil leaving air temperature sensor. Requires the enthalpy and humidity sensing options (OARH and RARH).

d. When the dehumidification system must provide cool, dehumidified air, the reheat coil shall utilize liquid refrigerant as a reheat source (sub-cooling mode). The further cooling of the liquid refrigerant increases the evaporator dehumidification capacity and improves latent capacity.

e. When the dehumidification system must provide warm, dehumidified air, the reheat coil shall utilize hot gas refrigerant as a reheat source (hot gas mode). The use of hot gas refrigerant allows for higher discharge air temperatures to be achieved compared to sub-cooling mode.

f. When the dehumidification system must dehumidify air and supply it between cool and warm, a modulated mix of hot gas and warm liquid refrigerant is supplied to the reheat coil as a reheat source.

g. The control shall provide configurations for dehumidification demands based on space relative humidity, return air relative humidity, or a discrete dehumidification input.

h. The control shall provide configurations to prevent dehumidification demands with low cool, high cool, VAV cool, low heat, high heat, or vent demands for improved space temperature control.

5. Extended Standard Chassis:
   a. The unit shall have a factory-installed chassis extension for replacement of legacy Carrier 48P and Z Series units with extended chassis.
6. Double Wall Construction (STANDARD CHASSIS ONLY):
   a. The unit shall have a double wall cabinet with 2 in. R-13 foam insulation on roof, doors, and walls, and 1.9 in. insulation on the base pan for improved thermal performance and a smooth, cleanable interior.
   b. An optional Agion® anti-microbial coating is available for added protection within the airstream.
7. Stainless Steel Drain Pan:
   a. The unit shall have a factory-installed condensate drain pan constructed of 409 stainless steel for corrosion protection.
8. E-Coated Condenser Coils:
   a. The unit shall have factory-installed e-coated MCHX condenser coils for corrosion protection.
   b. Coating shall be flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
   c. E-coat thickness of 0.8 to 1.2 mil with topcoat having a uniform dry thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
   d. Coated coils shall have a hardness characteristics of 2H per ASTM D3363-00 and crosshatch adhesion of 4B-5B per ASTM D3359-02.
   e. Coated coils shall have superior impact resistance with no cracking, chipping, or peeling per NSF/ANSI 51-2002 Method 10.2. Impact resistance shall be up to 160 in./lb per ASTM D2794-93.
   f. E-coated aluminum microchannel coils shall be capable of withstanding more than 8,000-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 Standard.
9. E-coated Evaporator Coil:
   a. The unit shall have factory-installed, e-coated Al/Cu evaporator coil(s) for corrosion protection.
   b. Coating shall be flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
   c. E-coat thickness of 0.8 to 1.2 mil with topcoat having a uniform dry thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
   d. Coated coils shall have a hardness characteristics of 2H per ASTM D3363-00 and crosshatch adhesion of 4B-5B per ASTM D3359-02.
   e. Coated coils shall have superior impact resistance with no cracking, chipping, or peeling per NSF/ANSI 51-2002 Method 10.2. Impact resistance shall be up to 160 in./lb per ASTM D2794-93.

f. E-coated aluminum fin, copper tube coils shall be capable of withstanding an 8,000-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 Standard.

10. Condenser Hail Guard (Sizes 28-60):
    a. The unit shall have factory-installed louvered panels on all vertically mounted condenser coils for hail protection.
    b. Louvered panel shall be constructed of galvanized steel (designated G60 per ASTM Standard A653) and shall be pre-painted on the outer surface.
    c. Unit cabinet exterior shall be capable of withstanding ASTM Standard B117 500-hour salt spray test.
    d. Hail guard shall attach mechanically to the unit frame. Factory provided hardware shall be used to reduce the risk of coil and refrigerant piping puncture.
11. Humidity and Enthalpy Sensing:
    a. The unit shall have factory-installed outdoor air relative humidity and return air relative humidity sensors for use with dehumidification (return air relative humidity demand) or free cooling control (enthalpy or differential enthalpy changeover, outdoor air dew point lockout).
12. Return Air CO_2:
    a. The unit shall have a factory-installed return air CO_2 sensor to help detect space IAQ.
    b. The sensor shall be mounted in the unit return air section and shall measure carbon dioxide (CO_2) concentration in parts per million with an accuracy of ± 3%.
    c. The sensor shall be connected to the control system to display the IAQ and for use as part of demand controlled ventilation (DCV) or IAQ override control.
13. Outdoor Airflow Measuring:
    a. The unit shall have an airflow transmitter with thermal dispersion type airflow sensing probes installed in the outdoor air intake.
    b. The airflow reading accuracy shall be within ±5%.
    c. The airflow information shall be viewable from the user interface and available as a network point.
14. Ultra-Low Leak Economizer:
    a. The unit shall have a factory-installed economizer assembly with modulating outdoor air and return air dampers with damper actuator(s) for ventilation and free cooling operation.
    b. The economizer shall be controlled by the unit controller. Separate, standalone economizer control systems are not acceptable.
    c. Dampers shall be a gear-driven ultra low leakage type with blade and edge seals. Dampers shall exhibit a maximum leakage rate of 3 cfm per square foot of area at 1 in. wg pressure differential when tested in accordance with AMCA (Air Movement and Control Association) Standard 500.
    d. Actuator shall have a spring-return feature which shuts dampers upon a power interruption or unit shutdown. Actuators are capable of internal diagnostics.
    e. The unit controller shall have configuration to control ventilation based on indoor fan speed, outdoor air cfm, demand controlled ventilation (DCV), Third-party minimum position control, or third-party full control.
    f. The economizer shall be controlled by the unit controller and shall meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
    g. The unit controller shall have configurations to allow free cooling based on outdoor air temperature and differential outdoor air and return air temperature as standard. Configurations shall also be available for outdoor air enthalpy, differential outdoor air and return air enthalpy, outdoor air enthalpy switch, or outdoor air dew point (optional or accessory sensors required).
    h. Must include factory-installed outdoor air intake hoods that ship in the installation location to reduce installation time. Field installed outdoor air hoods are not acceptable.
    i. COMPACT CHASSIS: The outdoor air intake shall be on the same side of the unit as exhaust or relief outlets.
    j. STANDARD CHASSIS: The outdoor air intake shall be on a different side of the unit than the exhaust or relief outlets to prevent recirculation and support proper ventilation.
15. Barometric Relief:
    a. The unit shall have a factory-installed barometric relief system with relief hoods and two pressure-activated damper assemblies in the unit return air section for relieving building pressure during free cooling operation.
    b. The damper shall start to open when back pressure exceeds approximately 0.04 in. wg and shall gravity close when back-pressure is reduced.
    c. COMPACT CHASSIS: The relief hoods and dampers ship in the installation location.
    d. STANDARD CHASSIS: The relief hoods and dampers ship rotated into the unit and are field rotated to their final installation location.

16. Low Static Power Exhaust (Sizes 28-50):
    a. The unit shall have a factory-installed exhaust system with two, direct-drive propeller fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.
    b. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, or a third-party signal.
    c. COMPACT CHASSIS: The exhaust hoods and fans ship in the final shipping location. Exhaust hoods are a tip out design to allow easy inspection and servicing.
    d. STANDARD CHASSIS: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.
17. Low Static Power Exhaust with Building Pressure Control (Sizes 28-50):
    a. The unit shall have a factory-installed exhaust system with two, direct-drive propeller fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.
    b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.
    c. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, building pressure, or a Third party signal.
    d. COMPACT CHASSIS: The exhaust hoods and fans ship in the final shipping location. Exhaust hoods are a tip out design to allow easy inspection and servicing.
    e. STANDARD CHASSIS: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.
18. Standard, Medium, or High Static Power Exhaust with Building Pressure Control (STANDARD CHASSIS ONLY):
    a. The unit shall have a factory-installed exhaust system with two (sizes 28-50) or three (sizes 28-50 for high static option), and (size 54-98 medium static only) direct-drive backward curve (SWSI) fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.
    b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.
    c. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, building pressure, or a third-party signal.
    d. ALL STANDARD STATIC AND SIZE 28-50 MEDIUM STATIC: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.
    e. SIZES 28-50 HIGH STATIC or 54-98 MEDIUM STATIC: The exhaust hoods and dampers ship in place at the end of the unit. This exhaust is only available with vertical return.
19. Medium or High Static Return Fan with Modulating Exhaust Air Dampers:
    a. The unit shall include a factory-installed return fan system equipped with either two (for sizes 28-50 with medium static), three (for sizes 28-50 with high static or sizes 54-98 with medium static), or four (for sizes 54-98 with high static) direct-drive backward curve (SWSI) fans with ECM motors, modulating backdraft dampers, and two exhaust air dampers with actuated damper assembly and exhaust hoods.
    b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.
    c. The unit shall have a factory-installed return pressure transducer with 0 to 1 in. wg range with the high side reading the return plenum pressure and the low side reading atmospheric pressure.
    d. The control system shall offer configurable options to operate the return fan based on one of the following modes: return pressure control, indoor fan speed tracking, or third-party modulation signal.
    e. Exhaust air damper shall offer configurable options to operate the exhaust air dampers based on one of the following modes: building pressure, outdoor air damper mapping, or third modulation signal.
    f. The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.

20. EnergyX® (ERV)
    a. The unit shall feature a factory-installed energy recovery cassette with variable speed defrost control and wheel bypass dampers. NOTE: Double wall construction is required with EnergyX® option.
    b. The energy recovery cassette shall incorporate a rotary wheel in a cassette frame complete with removable energy transfer media, seals, drive motor and drive belt.
    c. Energy recovery wheel performance shall be AHRI 1060 certified and bear the AHRI certified label. Components that are independently tested or "rated in accordance with" shall not be acceptable.
    d. The energy recovery cassette shall be an Underwriters Laboratory UR recognized component for fire and electrical safety and bear the UR symbol.
    e. The energy recovery cassette shall comply with NFPA 90A by virtue of UL standard 1812 and UL900 fire test for determination of flammability and smoke density.
    f. Cassette frame and structural components shall be constructed of G90 galvanized steel for corrosion resistance.
    g. Wheel structure shall consist of a welded hub, spoke and continuous rolled rim assembly of stainless steel, and shall be self-supporting without energy transfer segments present.
    h. Wheel structure shall be connected to the shaft by means of taper lock bushings.
    i. Wheel bearings shall be permanently sealed and selected for a minimum 30 year L-10 life of 400,000 hours. Bearings requiring external grease fittings or periodic maintenance are not acceptable.
    j. Desiccant shall be either silica gel and permanently bonded to the energy transfer media without the use of binders or adhesives, which may degrade desiccant performance. Desiccants not permanently bonded are not acceptable due to potential de-lamination or erosion of the desiccant from the energy transfer media.
    k. Desiccant shall be non-migrating nor shall it dissolve or deliquesce in the presence of water or high humidity.
    l. The cassette shall include a factory-installed, field adjustable mechanical purge.
    m. The wheel drive system shall include a VFD driven three phase motor.
    n. 2 in. MERV 8 filters shall be installed on the outdoor air intake and exhaust air intake sides of the wheel.
    o. The system shall include actuated low-leak bypass dampers to allow air to bypass the wheel.
    p. The EnergyX system shall include the following sensors: exhaust air temperature, wheel leaving air temperature, wheel pressure switch.
21. Powered Outlet:
    a. The unit shall have a factory-installed 115-v, ground-fault protected (GFI) duplex outlet for loads of up to 10A total.
    b. The outlet shall be powered from the unit power feed, using a factory-installed mains to 115-v transformer connected to the load side of the unit terminal block. When the main unit power feed is disconnected, power to the outlet is also disconnected.
    c. Fusing shall be provided on both the line side and load side of the transformer.
    d. The outlet shall be accessible from outside the unit.
    e. The unit nameplate minimum circuit ampacity (MCA) and maximum over-current protection (MOCP) shall have the outlet amp draw.
22. Unpowered Outlet:
    a. The unit shall have a factory-installed 115-v, ground-fault protected (GFI) duplex outlet for loads of up to 15A total.
    b. The outlet requires a field-supplied and installed 115-v power source.
    c. The outlet shall be accessible from outside the unit.
    d. Does not include a transformer.
23. Non-Fused Disconnect:
    a. The unit shall have a factory-installed, non-fused disconnect for disconnecting the unit power feed during maintenance or servicing.
    b. The disconnect shall be installed in the unit power box with an interlocking, through-the-door style disconnect handle. External disconnects are not acceptable.
    c. The disconnect shall be nominally sized to meet or exceed National Electric Code (NEC) requirements for combination loads. Field-provided breakers or fuses are still required for over-current protection.
    d. The disconnect handle shall support lock-out, tag-out locks.
24. Power Monitor:
    a. The unit shall have a factory-installed power monitor to help protect against damage from abnormal power.
    b. The monitor shall be normally closed and shall detect phase loss and phase reversal.

c. The monitor shall trigger the control emergency shutdown to shut down the unit when a fault is detected.

25. High Short Circuit Current Rating (SCCR):
    a. The unit shall have factory-installed power box with upgraded high voltage components to provide an SCCR rating of 65kA for 208/230/460-v units or 25kA for 575-v units.
    b. Includes a terminal block for power connection.
    c. The unit nameplate must reflect the high SCCR rating.
    d. Requires field-provided J-type fuses and fuse holder to be installed and wired before the unit terminal block.
26. Condensate Overflow Switch:
    a. The unit shall have a factory-installed condensate overflow switch to help protect against clogged drain pans.
    b. The overflow switch shall be an conducting type. Float switches are not acceptable.
27. Pre-Filter Status Switch and Access Door Retainers:
    a. The unit shall have a factory-installed pressure measuring switch across the entire pre-filter bank to detect when the filters are dirty.
    b. The unit shall have factory-installed retainers on all access doors to hold the doors open during maintenance.
    c. The pressure switch shall be field-set and adjustable from 0-2 in. wg.
    d. The dirty filter alert shall be viewable from the control interface.
    e. The door retainer shall be rod and stopper type with multiple stopping points.
28. Return Air Smoke Detector:
    a. The unit shall have a factory-installed smoke detector in the return air section of the unit, to shut down the unit when smoke is detected.
29. Service Pack:
    a. The unit shall have factory-installed discharge and suction line isolation valves on the compressor tandem assembly and a replaceable core filter drier assembly with isolation valves on all circuits to facilitate faster service.
30. Chicago Refrigerant Relief Valve:
    a. The unit shall have a factory-installed, pressure-activated, mechanical relief valve in all refrigerant circuits to comply with Chicago Building Code. Fusible plugs are not acceptable.
    b. The relief valve shall activate at 650 psig.
    c. The relief valve shall have a National Pipe Thread (NPT) connection for field relief outlet piping.
31. 2 in. MERV 8, 4 in. MERV 8, or 4 in. MERV 13 Pre-Filters:
    a. The unit shall have a factory-installed 4 in. pre-filter rack with either 2 in. MERV 8, 4 in. MERV 8, or 4 in. MERV 13 pleated filters.
32. 2 in. MERV 8 and 4 in. MERV 13 Pre-Filters (Sizes 28-98):
    a. The unit shall have a factory-installed 2 in. and 4 in. pre-filter rack with in. MERV 8 pleated filters before 4 in. MERV 13 pleated filters for improved filtration and extended filter life.
33. 2 in. MERV 8 and 12 in. MERV 14 Bag Pre-Filters (STANDARD CHASSIS ONLY):
    a. The unit shall have a factory-installed 2 in. pre-filter rack with 2 in. MERV 8 pleated filters before a bag filter track with 12 in. MERV 14 bag filters for high filtration and extended filter life.
    b. Bag filter header shall be constructed of thermoplastic polymer and media shall be synthetic. Paper headers or fiberglass media is not acceptable.
34. 2 in. MERV 8 and 12 in. MERV 15 Cartridge Pre-Filters (STANDARD CHASSIS ONLY):
    a. The unit shall have a factory-installed 2 in. pre-filter track with 2 in. MERV 8 pleated filters before a cartridge filter track with 12 in. MERV 15 pleated filters for improved filtration and extended filter life.
    b. Cartridge filter header shall be constructed of galvanized steel and media shall be synthetic. Fiberglass media is not acceptable.
35. Ultraviolet (UV-C) Fixtures (ALL STANDARD CHASSIS AND SIZE 40-50 COMPACT CHASSIS):
    a. Unit shall have factory-installed fixtures for field-provided and installed UV-C emitters.
    b. Fixtures shall be mounted down stream of the evaporator coil.
    c. Fixtures shall have factory wiring with evaporator door interlock switch, disconnect switch, and UV safe view port.
    d. Fixtures require field-provided and installed 115-v power supply.
36. Double Wall Construction (STANDARD CHASSIS ONLY):
    a. The unit shall have a double wall cabinet with 2 in. R-13 foam insulation on roof, doors, and walls for improved thermal performance and a smooth, cleanable interior.
    b. An optional Agion® anti-microbial coating is available for added protection within the airstream.

Guide specifications 50V

NOTE: This specification is in the "Masterformat" as published by the Construction Specification Institute for use in a mechanical specification.

Electric Cooling Only or Electric Heat/Hot Water Heat Applied Rooftop Unit

Part 1 — HVAC Guide Specifications

Size Range: **27.5 to 100 Nominal Tons**

Carrier Model Number: **50V**

Part 1 — (23 06 80) Schedules for Decentralized HVAC Equipment

1.01 (23 06 80.13) Decentralized Unitary HVAC Equipment Schedule:

A. 23 06 80.13.A.) Rooftop unit (RTU) schedule:

1. Schedule is per the project specification requirements.

Part 2 — (23 07 16) HVAC equipment insulation

2.01 (23 07 16.13) Decentralized, Rooftop Units:

A. (23 07 16.13.A.) Air handling compartment (standard construction):

1. Interior cabinet surfaces shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation with aluminum foil-faced on the air side.
2. Access doors shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation covered with galvanized steel liner on the air side (double wall).
3. The heat compartment shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiber-glass insulation covered with galvanized steel liner on the air side (double wall).
4. The bottom of the base pan (exterior) shall be insulated with a minimum 1/2 in. thick, minimum 1-3/4 lb density, flexible fiberglass insulation with aluminum foil-faced on the exterior facing side.
5. Air touching doors and panels shall have a minimum nominal thermal efficiency rating of R4.
6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

Part 3 — (23 09 13) Instrumentation and control devices for HVAC

3.01 (23 09 13.23) Sensors and Transmitters:

A. (23 09 13.23.A.) Thermostats:

1. Thermostat shall:
   a. Have capability to energize up to two-stages of cooling, and two-stages of heating (for units with heating).

B. (23 09 13.23.B.) Sensors:

1. Standard sensors shall have outdoor air temperature, return air temperature, evaporator/DX reheat coil leaving air temperature, suction pressure (all circuits), discharge pressure (all circuits), and leaving evaporator refrigerant temperature (all circuits).

Part 4 — (23 09 23) Direct Digital Control system for HVAC

4.01 (23 09 23.13) Decentralized, Rooftop Units:

A. (23 09 23.13.A.) Carrier SmartVu™ intelligent integrated unit controller with Direct Digital Control (DDC) shall:

1. Provide integrated unit operation for cooling, heating, and ventilation as well as monitoring, recording, and reporting capabilities. Controller shall also provide diagnostics and alarms of abnormal unit operation through the user interface.
2. Operate standalone, with a two-stage cooling, two-stage heating thermostat, or via building automation system (BAS) using either Carrier Comfort Network (CCN), BACnet MS/TP, or BACnet IP communication.
3. Have plug-and-play compatibility with Carrier i-Vu® Open 8.0+ building automation system, including communication, points and properties pages, and graphics.
4. Include a 7 in. color touch screen user interface with intuitive icon based navigation as the primary user interface. Keypad or rotary interfaces or touchscreens less than 7 in. are not acceptable.
5. Provide a minimum of four control interface access levels, including basic access (no password), user access (static password), service access (static password), and factory access (controlled password).
6. Provide the ability to read refrigerant pressures at local display or via BAS network without the use of external refrigerant gauges.
7. Include a USB data port to allow for software upgrades without the need for special tools or programs.
8. Provide service capabilities of:
   a. Manual component test.
   b. Service run mode.
   c. Track component run hours and starts.
   d. Data trending.
   e. Alarm history.
9. Allow the use of multiple occupancy sources, including BAS, remote input, local schedules with 365 day real time clock, 8 occupancy schedules and 16 holiday schedules.

10. Include field use control inputs, including space temperature, space temperature offset, space relative humidity, supply air temperature, mixed air temperature, two-stage cool/heat thermostat (Y1, Y2, W1, W2, G), dehumidify switch, two demand/capacity limit switches, analog demand limit/third-party supply air temperature reset, pre-filter status switch, indoor air quality (IAQ)/third-party outdoor air damper control, IAQ switch, outdoor air quality (OAQ)/indoor air quality (IAQ) switch, third-party supply static pressure reset/third-party indoor fan control, third-party exhaust fan control, remote shutdown/occupancy switch, smoke detector/fire shutdown, emergency shut-down, smoke purge, smoke pressurization, and smoke evacuation, as standard.
11. Include field use control outputs, including alarm/auxilary relay and zone damper override relay, as standard.
12. Provide cooling and heating demand source configurations for space temperature sensors, two-stage cool/heat thermostat or network inputs, or return air temperature.
13. Provide supply air temperature based operation for cooling with user adjustable supply air temperature setpoints for low cool, high cool, VAV cool, and vent demands.
14. Include occupied cooling, unoccupied cooling, occupied heating, and unoccupied heating setpoints and maintain a 5°F temperature difference between cooling and heating set points to meet the latest ASHRAE 90.1 Energy Standard. Single setpoint configurations are not allowed.
15. Provide the ability to perform cool-tempered venting operation to prevent hot discharge air during vent mode.
16. Allow mechanical cooling operation down to –10°F (–23.3°C) entering condenser coil, through the modulation of condenser fan speeds as standard using Greenspeed® intelligence.
17. Provide user-adjustable compressor lockouts based on outdoor air temperature and mixed air temperature, and user-adjustable heating lockouts based on outdoor air temperature.
18. Shall read and display the indoor fan motor, voltage, current, temperature, and modulation level.
19. Include an RS-485 port for Carrier Comfort Network (CCN) or BACnet MS/TP communication.
20. Include an RS-485 port for Rnet communicating sensors and displays.
21. Include an Ethernet port for BACnet IP communication.

Part 5 — (23 09 33) Electric and Electronic Control System for HVAC

5.01 (23 09 33.13) Decentralized, Rooftop Units:

A. (23 09 33.13.A.) General:
   1. Shall be complete with self-contained low-voltage control circuit.
   2. Shall utilize color-coded wiring.
   3. Shall have wiring diagrams affixed to the interior door panels of each section.

B. (23 09 33.13.B.) Safeties:
   1. Compressors.
      a. Over-temperature.
      b. Over-current.
      c. High refrigerant circuit pressure switch.
      d. Refrigerant circuit leak detection and mitigation.
   2. Indoor Fan
      a. Overcurrent protection.
      b. Line under voltage detection.
      c. Phase loss detection.
      d. Blocked rotor detection.
      e. Rotor position detection error.
      f. Indoor fan door interlock switch to prevent indoor fan operation with the fan access door open.

Part 6 — (23 09 93) Sequence of Operations for HVAC Controls

6.01 (23 09 93.13) Decentralized, Rooftop Units:

A. (23 09 93.13.A.) INSERT SEQUENCE OF OPERATION:

Part 7 — (23 40 13) Panel Air Filters

7.01 (23 40 13.13) Decentralized, Rooftop Units:

A. (23 40 13.13.A.) Standard Pre-filter Section:
   1. Shall consist of factory-installed, disposable 2 in. fiberglass filters of commercially available sizes, unless optional filters are selected.

Part 8 — (23 81 19) Self-Contained Air Conditioners

8.01 (23 81 19.16) Large-Capacity Self-Contained Air Conditioners:

A. (23 81 19.13.A.) General:
   1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty.
   2. Factory-assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge, operating oil charge, microprocessor-based control system and associated hardware, and all special features required prior to field start-up.

3. Unit shall use Puron Advance™ (R-454B) refrigerant and include a factory refrigerant charge. The unit exterior must be marked as using R-454B and the nameplate must contain the refrigerant change weight.
4. Unit shall ship as a single piece and shall be installed in accordance with the manufacturer's instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

B. (23 81 19.13.B.) Quality Assurance:
1. Unit meets and exceeds ASHRAE 90.1 (latest edition) minimum efficiency requirements.
2. Unit performance shall be certified in accordance with AHRI Standards 340/360 (latest edition).
3. Unit shall be designed to conform to ASHRAE 15 and 62.1 (latest editions).
4. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
5. Pre-painted exterior coating shall be capable of withstanding a minimum 500-hour salt spray exposure per ASTM B117 (scribed specimen).
6. Unit shall be manufactured in a facility registered by ISO 9001:2015.
7. Roof curb shall be designed to conform to National Roofing Contractors Association (NRCA) criteria per Guideline B-1986.
8. Unit shall pass an automated factory run test, including validation of refrigerant circuit performance, verification of operation of key components. A run test certificate shall ship with the unit.
9. Unit shall be designed in accordance with UL Standard 1995 or 60335-2-40, including tested to withstand rain. Compliance shall be listed with UL and UL Canada.

C. (23 81 19.13.C.) Delivery, Storage, and Handling:
1. Unit shall be stored and handled per manufacturer's recommendations.
2. Lifted by crane requires spreader bars.
3. Unit shall only be stored or positioned in the upright position.

D. (23 81 19.13.D.) Project Conditions:
1. As specified in the contract.

E. (23 81 19.13.E.) Operating Characteristics:
1. Unit shall be capable of starting and running in mechanical cooling from –10°F (–23.3°C) to 115°F (46.1°C) entering condenser air temperature.
2. Unit shall meet or exceed ASHRAE 90.1 requirements for a minimum of 4 stages of cooling capacity with the lowest stage being no higher than 25% of unit capacity.
3. Unit shall discharge supply air vertically or horizontally as shown on drawings.
4. Unit shall provide supply air temperature control in cooling

F. (23 81 19.13.F.) Electrical Requirements:
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
2. The unit power panel shall have a short circuit current rating (SCCR) of no less than 10kA.
3. The single point electrical connection shall be at a factory-installed terminal block in the power panel.
4. Power wiring shall be a copper conductor (no aluminum) sized for no less than 167°F (75°C).
5. Separate enclosures shall be provided for high and low voltage components.

G. (23 81 19.13.G.) Unit Cabinet:
1. Unit cabinet shall be constructed of galvanized steel (designated G60 per ASTM Standard A653) and shall be bonderized with a pre-painted finish or powder-coat on the outer surface.
2. Unit cabinet exterior shall be capable of withstanding ASTM Standard B117 500-hour salt spray test.
3. Unit cabinet interior top and side panels/doors (supply air touching) shall be lined minimum 1/2 in. thick, 1 lb density, aluminum foil-faced fiberglass insulation.
4. Unit cabinet shall have an insulation rating of R4.
5. Unit shall be available in dedicated compact or standard chassis footprints to facilitate replacement of existing units or meet new construction requirements.
6. Drawings shall be available to show the dimensions of the specified cabinet configurations. Certified drawings with a table to decode unit lengths is not acceptable.
7. Basepan:
   a. Unit shall have base rails on a minimum of 2 sides.
   b. Include a minimum of four lifting lugs to support rigging shackles for maneuvering and overhead rigging.
   c. Base rail shall be a minimum of 16 gauge thickness.
   d. Shall have a single thru-the-base power coupling and primary and secondary thru-the-base control couplings.
   e. Bottom shall be lined with minimum 1/2 in. thick, 1 lb density, fiberglass insulation.

8. Condensate Pan:
   a. Shall be a sloped condensate drain pan made of galvanized steel.
   b. Shall comply with ASHRAE Standard 62.
   c. Shall use a single, drain connector through the side of the unit base rail. Connection shall be made per manufacturer's recommendations.
9. Electrical Connections:
   a. All unit power wiring shall enter the power box at the bottom or back.
   b. Thru-the-base capability.
      1) Standard unit shall have a thru-the-base power and control couplings in the basepan.
      2) No basepan penetration, other than those authorized by the manufacturer, is permitted.
10. Access Doors:
   a. Hinged access doors shall be provided on a single side of the unit to facilitate single side maintenance access.
   b. At a minimum, doors must be provided on the filter section, and indoor fan section. The door shall deal against a rubber gasket to prevent air and water leakage.
   c. All doors shall require the use of tools to open the door to help prevent unauthorized access.
   d. The indoor fan section door shall have a minimum of one locking handle and pressure safety latch.
   e. Doors shall be double wall construction.
11. Access Panels:
   a. Removable panels shall be provided on areas that require infrequent access.
12. Security Grilles (Sizes 28-34, 70-98)
   a. Units shall include painted metal security grilles on the condenser section.

H. (23 81 19.13.H.) Coils:
1. Evaporator (Standard):
   a. Shall be round tube, plate fin style coil with aluminum fins mechanically bonded to copper tubes (Al/Cu).
   b. Tube diameter shall be 1/2 in. OD (outside diameter).
   c. Coil shall be fully active during full and part load operation.
   d. Intertwined circuiting constructed of aluminum fins mechanically bonded to seamless copper tubes.
   e. Full-face active type during full and part-load conditions.
   f. Coils shall be leak tested at 150 psig and pressure tested at 650 psig.
2. Condenser (Standard):
   a. Shall be an microchannel design, constructed of an aluminum alloy. The coils shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds.
   b. Microchannel coils shall consist of a two-pass arrangement.
   c. Coils shall be leak tested at 150 psig and pressure tested at 650 psig.

I. (23 81 19.13.I.) Refrigerant Circuit:
1. Refrigerant circuit shall have the following control, safety, and maintenance features:
   a. Single circuit refrigerant circuit on sizes 28-40 and dual refrigerant circuits on sizes 50-98.
   b. Electronic expansion valve (EXV) metering devices on all models. Thermostatic expansion valves (TXV) are not acceptable.
   c. Refrigerant filter drier.
   d. Service ports on suction and discharge lines.
   e. Sight glass.
   f. Fusible plug.
   g. Refrigerant leak detection sensor.
   h. Refrigerant leak mitigation board.
2. Compressors:
   a. The unit shall have a maximum of two compressors per refrigerant circuit to ensure proper coil management.
   b. Units must have a minimum of one variable speed compressor for improved supply air temperature control and load matching. Variable-capacity digital compressors or two-stage compressors are not acceptable alternates.
   c. Compressors shall be mounted on rubber-in-shear vibration isolation.
   d. Each compressor shall have crankcase heater that is only on when the compressor is off and the outdoor air temperature is below 80°F (26.6°C).

J. (23 81 19.13.J.) Pre-Filter Section:
1. The standard pre-filter is specified in the filter of this specification.
2. Shall have a minimum 4 in. pre-filter rack with 2 in. spacer.
3. Must be able to accept a single 2 in. filter, two 2 in. filters, or a single 4 in. filter by removing the spacer.
4. Filters shall be accessible through a hinged access door.

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K. (23 81 19.13.K.) Indoor Fan:
   1. Motor:
      a. Shall be an electronically commutated (ECM) motor, available in standard, medium, or high static (ALL STANDARD CHASSIS AND SIZE 40-50 COMPACT CHASSIS).
      b. Must have a minimum IP54 ingress protection rating, a Moisture (F)/Environmental (H) protection class if H1, and an insulation class of F.
      c. Must have permanently lubricated bearings.
      d. Shall be controlled directly from the Carrier SmartVu control system via Modbus protocol. External analog or pulse width modulation control is not acceptable.
      e. The Modbus address shall be automatically set from the SmartVu control system.
      f. Provide internal diagnostics and EMI/RFI (electromagnetic/radio frequency interference) filters.
      g. Bearings shall have an L10 life of over 100,000 hours.
   2. Fan:
      a. Unit shall have a direct drive indoor fan array containing a minimum of three fans (sizes 28-50), four fans (sizes 54-60 and sizes 70-74 standard and medium static, or six fans (sizes 70-74 high static and sizes 90-98). Belt drive fans are not acceptable.
      b. Shall be single width, single inlet (SWSI) backward curve impeller.
      c. Impeller, shaft, bearings, drive components, and motor shall be mounted on a formed steel assembly bolted to a galvanized steel mounting plate.
      d. Fans shall have a galvanized steel inlet nozzle, aluminum impeller with five blades, and die cast aluminum electronics housing. Composite impellers are not acceptable.
      e. Impellers shall be designed for continuous operation at the maximum rated fan speed and motor power.
      f. Fan and motor shall be statically and dynamically balanced as an assembly to G6.3.
   3. Control:
      a. The indoor fan speed shall be controlled by SmartVu controls.
      b. SAV™: The control shall default to Staged Air Volume (SAV) indoor fan control for single zone applications.
         1) Staged air volume (SAV) shall be field configurable for operation based on cool demands (2 fan speeds) or cool capacity (3 fan speeds).
         2) The control shall be field configurable for Constant Volume (CV), Single-Zone VAV (SZ-VAV), Third-party modulation, or MZ-VAV duct pressure (with field-installed sensor).
      c. VAV: The control shall default to mutli-zone variable air volume (MZ-VAV) duct pressure indoor fan control for multi-zone applications.
         1) Shall have a duct pressure transducer with 0 to 5 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and duct pressure pick-up port.
         2) The control shall be field configurable for Single-Zone VAV (SZ-VAV), Staged Air Volume (SAV), Constant volume (CV), or Third-party modulation.

L. (23 81 19.13.L.) Outdoor Fans:
   1. Motor:
      a. Shall be a three-phase, 6 or 8 (size 34 only) pole, totally enclosed motor (except size 34). Single-phase motors are not acceptable.
      b. Shall use permanently lubricated bearings.
      c. Must be statically and dynamically balanced.
      d. Shall be variable speed (electronically commutated or variable frequency drive).
      e. The fan speed shall be modulated by the unit control based on saturated condensing temperature for improved efficiency and low ambient mechanical cooling. Fixed speed or staged fans are not acceptable.
   2. Fans (Standard) excluding size 34:
      a. Shall be a direct-driven propeller type fan constructed of metal.
      b. Must be protected by PVC-coated steel wire safety guards.
      c. Shall discharge air vertically.

M. (23 81 19.13.M.) Manual Outdoor Air Damper (Standard):
   1. Shall have pressure activated (no actuator) damper assembly, sized to allow up to 25% outdoor air at maximum position. The damper is open when the indoor fan is on and closes when the indoor fan is off.
   2. Must include an adjustable maximum position stopper.
   3. Must include factory-installed outdoor air intake hoods that ship in the installation location to reduce installation time. Field-installed outdoor air hoods are not acceptable.
   4. Outdoor air screens shall ship inside the unit for field installation.

Guide specifications 50V (cont)

N. (23 81 19.13.N.) Factory-installed Options:
   1. Two-Stage Electric Heat:
      a. The unit shall have a factory-installed electric heater with two-stages of operation, powered from the unit power feed to reduce installation cost.
      b. The heater shall be available in low, medium, and high capacity options.
      c. The heater shall have nickel-chromium (NiCr) resistive heating elements, internal fusing, and manual reset thermal cut-outs.
   2. Silicon-Controlled Rectifier (SCR) Modulating Electric Heat:
      a. The unit shall have a factory-installed modulating electric heater with SCR control for improved supply air temperature control. Solid state relay (SSR) controlled electric heat is not acceptable.
      b. The heater shall be powered from the unit power feed to reduce installation cost.
      c. The heater shall be available in low, medium (except sizes 90-98), and high capacity options.
      d. The heater shall have nickel-chromium (NiCr) resistive heating elements, internal fusing, and manual reset thermal cut-outs.
      e. Shall include a factory-provided, field-installed supply air temperature sensor.
   3. Hot Water Coil:
      a. The unit shall have a factory-installed hot water coil in the heat section of the unit, downstream of the indoor fans.
      b. The hot water coil shall have inlet and outlet stubs to allow field-installed water piping connections inside the unit cabinet.
      c. The field-installed hot water piping shall be able to pass through the heat section door or the basepan of the heat vestibule using field cut holes.
      d. The hot water control valve shall be field-provided and installed and controlled by the unit controller using a 2-10v analog control signal.
      e. Shall include a factory-provided, field-installed supply air temperature sensor.
   4. Low-Sound Condenser Fans (With High Efficiency, Low Sound Option):
      a. The unit shall have factory-installed low-sound condenser fans that reduce sound output during cooling or dehumidification operation.
      b. Shall include only AeroAcoustic™ composite condenser fans with swept fan blades and blade edge optimization to reduce radiated sound and allows for lower RPM operation. Metal condenser fans are not acceptable.
      c. Must include vertically extended shrouds on all condenser fans to reduce radiated sound at ground levels.
   5. Compressor Sound Blankets (With High Efficiency, Low Sound Option):
      a. The unit shall have factory-installed sound blankets on all compressors to reduce radiated sound. If factory-installed sound blankets are not available, field installed sound enclosures shall be provided.
   6. Humidi-MiZer Adaptive Dehumidification:
      a. The unit shall have a factory-installed dehumidification system that allows dehumidification in cooling, venting, or heating modes using a variable mixture of warm liquid refrigerant and hot gas refrigerant as a reheat source. Reheat systems that use only hot gas or liquid refrigerant in dedicated coils are not acceptable.
      b. During dehumidification mode, the compressors shall control to cooling coil temperature (CCT, an approximation of supply air dew point temperature) and the reheat system shall be modulated to supply air temperature (SAT).
      c. The dehumidification system shall have an e-coated reheat coil, on/off reheat valve, modulating condenser bypass valve, interconnecting refrigerant piping, and a cooling coil leaving air temperature sensor. Requires the enthalpy and humidity sensing options (OARH and RARH).
      d. When the dehumidification system must provide cool, dehumidified air, the reheat coil shall utilize liquid refrigerant as a reheat source (sub-cooling mode). The further cooling of the liquid refrigerant increases the evaporator dehumidification capacity and improves latent capacity.
      e. When the dehumidification system must provide warm, dehumidified air, the reheat coil shall utilize hot gas refrigerant as a reheat source (hot gas mode). The use of hot gas refrigerant allows for higher discharge air temperatures to be achieved compared to sub-cooling mode.
      f. When the dehumidification system must dehumidify air and supply it between cool and warm, a modulated mix of hot gas and warm liquid refrigerant is supplied to the reheat coil as a reheat source.
      g. The control shall provide configurations for dehumidification demands based on space relative humidity, return air relative humidity, or a discrete dehumidification input.
      h. The control shall provide configurations to prevent dehumidification demands with low cool, high cool, VAV cool, low heat, high

heat, or vent demands for improved space temperature control.

7. Extended Standard Chassis:
   a. The unit shall have a factory-installed chassis extension, for replacement of legacy Carrier 50P and 50Z Series units with extended chassis or for an optional factory-installed bag or cartridge filters on unit sizes 28-50.
8. Plenum Section (STANDARD CHASSIS ONLY):
   a. The unit shall have a factory-installed plenum section for replacement of legacy Carrier 50P and 50Z Series units with discharge plenum or for an optional factory-installed bag or cartridge filters on unit sizes 28-50.
9. Double Wall Construction (STANDARD CHASSIS ONLY):
   a. The unit shall have a double wall cabinet with 2 in. R-13 foam insulation on roof, doors, and walls, and 1.9 in. insulation on the base pan for improved thermal performance and a smooth, cleanable interior. NOTE: On 50V Series standard chassis units in sizes 28-70, a plenum section is required when selecting the double wall construction option.
   b. An optional Agion® antimicrobial coating is available for added protection within the airstream.
10. Stainless Steel Drain Pan:
    a. The unit shall have a factory-installed condensate drain pan constructed of 409 stainless steel for corrosion protection.
11. E-coated Condenser Coils:
    a. The unit shall have factory-installed E-coated MCHX condenser coils for corrosion protection.
    b. Coating shall be flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
    c. E-coat thickness of 0.8 to 1.2 mil with topcoat having a uniform dry thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
    d. Coated coils shall have a hardness characteristics of 2H per ASTM D3363-00 and crosshatch adhesion of 4B-5B per ASTM D3359-02.
    e. Coated coils shall have superior impact resistance with no cracking, chipping, or peeling per NSF/ANSI 51-2002 Method 10.2. Impact resistance shall be up to 160 in./lb per ASTM D2794-93.
    f. E-coated aluminum microchannel coils shall be capable of withstanding more than 8,000-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 Standard.
12. E-coated Evaporator Coil:
    a. The unit shall have factory-installed, E-coated Al/Cu evaporator coil(s) for corrosion protection.
    b. Coating shall be flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
    c. E-coat thickness of 0.8 to 1.2 mil with topcoat having a uniform dry thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
    d. Coated coils shall have a hardness characteristics of 2H per ASTM D3363-00 and crosshatch adhesion of 4B-5B per ASTM D3359-02.
    e. Coated coils shall have superior impact resistance with no cracking, chipping, or peeling per NSF/ANSI 51-2002 Method 10.2. Impact resistance shall be up to 160 in./lb per ASTM D2794-93.
    f. E-coated copper tube, aluminum fin coils shall be capable of withstanding an 8,000-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 Standard.
13. Condenser Hail Guard (SIZES 28-60):
    a. The unit shall have factory-installed louvered panels on all vertically mounted condenser coils for hail protection.
    b. Louvered panel shall be constructed of galvanized steel (designated G60 per ASTM Standard A653) and shall be bonderized and pre-painted on the outer surface.
    c. Unit cabinet exterior shall be capable of withstanding ASTM Standard B117 500-hour salt spray test.
    d. Hail guard shall attach mechanically to the unit frame. Factory provided hardware shall be used to reduce the risk of coil and refrigerant piping puncture.
14. Humidity and Enthalpy Sensing:
    a. The unit shall have factory-installed outdoor air relative humidity and return air relative humidity sensors for use with dehumidification (return air relative humidity demand) or free cooling control (enthalpy or differential enthalpy changeover, outdoor air dew point lockout).
15. Return Air CO_2:
    a. The unit shall have a factory-installed return air CO_2) sensor to help detect space IAQ.

b. The sensor shall be mounted in the unit return air section and shall measure carbon dioxide (CO_2) concentration in parts per million with an accuracy of ± 3%.

c. The sensor shall be connected to the control system to display the IAQ and for use as part of demand controlled ventilation (DCV) or IAQ override control.

16. Outdoor Airflow Measuring:
    a. The unit shall have an airflow transmitter with thermal dispersion type airflow sensing probes installed in the outdoor air intake.
    b. The airflow reading accuracy shall be within ±5%.
    c. The airflow information shall be viewable from the user interface and available as a network point.
17. Ultra-Low Leak Economizer:
    a. The unit shall have a factory-installed economizer assembly with modulating outdoor air and return air dampers with damper actuator(s) for ventilation and free cooling operation.
    b. The economizer shall be controlled by the unit controller. Separate, standalone economizer control systems are not acceptable.
    c. Dampers shall be a gear-driven ultra low leakage type with blade and edge seals. Dampers shall exhibit a maximum leakage rate of 3 cfm per square foot of area at 1 in. wg pressure differential when tested in accordance with AMCA (Air Movement and Control Association) Standard 500.
    d. Actuator shall have a spring-return feature which shuts dampers upon a power interruption or unit shutdown. Actuators are capable of internal diagnostics.
    e. The unit controller shall have configuration to control ventilation based on indoor fan speed, outdoor air cfm, demand controlled ventilation (DCV), third-party minimum position control, or third-party full control.
    f. The economizer shall be controlled by the unit controller and shall meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
    g. The unit controller shall have configurations to allow free cooling based on outdoor air temperature and differential outdoor air and return air temperature as standard. Configurations shall also available for outdoor air enthalpy, differential outdoor air and return air enthalpy, outdoor air enthalpy switch, or outdoor air dew point (optional or accessory sensors required).
    h. Must include factory-installed outdoor air intake hoods that ship in the installation location to reduce installation time. Field installed outdoor air hoods are not acceptable.
    i. COMPACT CHASSIS: The outdoor air intake shall be on the same side of the unit as exhaust or relief outlets
    j. STANDARD CHASSIS: The outdoor air intake shall be on a different side of the unit than the exhaust or relief outlets to prevent recirculation and support proper ventilation.
18. Barometric Relief:
    a. The unit shall have a factory-installed barometric relief system with relief hoods and two pressure-activated damper assemblies in the unit return air section for relieving building pressure during free cooling operation.
    b. The damper shall start to open when back pressure exceeds approximately 0.04 in. wg and shall gravity close when back-pressure is reduced.
    c. COMPACT CHASSIS: The relief hoods and dampers ship in the installation location.
    d. STANDARD CHASSIS: The relief hoods and dampers ship rotated into the unit and are field rotated to their final installation location.
19. Low Static Power Exhaust (Sizes 28-50):
    a. The unit shall have a factory-installed exhaust system with two, direct-drive propeller fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.
    b. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, or a third-party signal.
    c. COMPACT CHASSIS: The exhaust hoods and fans ship in the final shipping location. Exhaust hoods are a tip out design to allow easy inspection and servicing.
    d. STANDARD CHASSIS: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.
20. Low Static Power Exhaust with Building Pressure Control (Sizes 28-50):
    a. The unit shall have a factory-installed exhaust system with two, direct-drive propeller fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.
    b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.

c. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, building pressure, or a third-party signal.

d. COMPACT CHASSIS: The exhaust hoods and fans ship in the final shipping location. Exhaust hoods are a tip out design to allow easy inspection and servicing.

e. STANDARD CHASSIS: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.

21. Standard, Medium, or High Static Power Exhaust with Building Pressure Control (STANDARD CHASSIS ONLY):

a. The unit shall have a factory-installed exhaust system with two (sizes 28-50) or three (sizes 28-50 for high static option, and sizes 54-98 medium static only) direct-drive backward curve (SWSI) fans with ECM motors, barometric dampers, and exhaust air hoods for relieving building pressure.

b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.

c. The control system shall have configurations to control the exhaust fan based on outdoor air damper position, building pressure, or a third-party signal.

d. ALL STANDARD STATIC AND SIZES 28-50 MEDIUM STATIC: The exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.

e. HIGH STATIC SIZES 28-50 or SIZES 54-98 MEDIUM STATIC: The exhaust hoods and dampers ship in place at the end of the unit. This exhaust is only available with vertical return.

22. Medium or High Static Return Fan with Modulating Exhaust Air Dampers:

a. The unit shall include a factory-installed return fan system equipped with either two (for sizes 28-50 with medium static), three (for sizes 28-50 with high static or sizes 54-98 with medium static), or four (for sizes 54-98 with high static) direct-drive backward curve (SWSI) fans with ECM motors, and two exhaust air dampers with actuated damper assembly and exhaust hoods.

b. The unit shall have a factory-installed building pressure transducer with –0.25 to 0.25 in. wg range and low side pressure port reading atmospheric pressure. Requires field-supplied and installed high side pressure tubing and space pressure pick-up port.

c. The unit shall have a factory-installed return pressure transducer with 0 to 1 in. wg range with the high side reading the return plenum pressure and the low side reading atmospheric pressure.

d. The control system shall offer configurable options to operate the return fan based on one of the following modes: return pressure control, indoor fan speed tracking, or third-party modulation signal.

e. Exhaust air damper shall offer configurable options to operate the exhaust air dampers based on one of the following modes: building pressure, outdoor air damper mapping, or third modulation signal.

f. Exhaust hoods and fans ship retracted into the unit and are field slid into their final installation location. Access panels are included on the hood for fan inspection and servicing.

23. EnergyX® (ERV):

a. The unit shall feature a factory-installed energy recovery cassette with variable speed defrost control and wheel bypass dampers. NOTE: Double wall construction is required with EnergyX® option.

b. The energy recovery cassette shall incorporate a rotary wheel in a cassette frame complete with removable energy transfer media, seals, drive motor and drive belt.

c. Energy recovery wheel performance shall be AHRI 1060 certified and bear the AHRI certified label. Components that are independently tested or "rated in accordance with" shall not be acceptable.

d. The energy recovery cassette shall be an Underwriters Laboratory UR recognized component for fire and electrical safety and bear the UR symbol.

e. The energy recovery cassette shall comply with NFPA 90A by virtue of UL standard 1812 and UL900 fire test for determination of flammability and smoke density.

f. Cassette frame and structural components shall be constructed of G90 galvanized steel for corrosion resistance.

g. Wheel structure shall consist of a welded hub, spoke and continuous rolled rim assembly of stainless steel, and shall be self-supporting without energy transfer segments present.

h. Wheel structure shall be connected to the shaft by means of taper lock bushings.

i. Wheel bearings shall be permanently sealed and selected for a minimum 30 year L-10

life of 400,000 hours. Bearings requiring external grease fittings or periodic maintenance are not acceptable.

j. Desiccant shall be either silica gel and permanently bonded to the energy transfer media without the use of binders or adhesives, which may degrade desiccant performance. Desiccants not permanently bonded are not acceptable due to potential de-lamination or erosion of the desiccant from the energy transfer media.

k. Desiccant shall be non-migrating nor shall it dissolve or deliquesce in the presence of water or high humidity.

l. The cassette shall include a factory-installed, field adjustable mechanical purge.

m. The wheel drive system shall include a VFD driven three phase motor.

n. 2 in. MERV 8 filters shall be installed on the outdoor air intake and exhaust air intake sides of the wheel.

o. The system shall include actuated low-leak bypass dampers to allow air to bypass the wheel.

p. The EnergyX system shall include the following sensors: exhaust air temperature, wheel leaving air temperature, wheel pressure switch.

24. Powered Outlet:
    a. The unit shall have a factory-installed 115-v, ground-fault protected (GFI) duplex outlet for loads of up to 10A total.
    b. The outlet shall be powered from the unit power feed, using a factory-installed mains to 115-v transformer connected to the load side of the unit terminal block. When the main unit power feed is disconnected, power to the outlet is also disconnected.
    c. Fusing shall be provided on both the line side and load side of the transformer.
    d. The outlet shall be accessible from outside the unit.
    e. The unit nameplate minimum circuit ampacity (MCA) and maximum over-current protection (MOCP) shall have the outlet amp draw.
25. Unpowered Outlet:
    a. The unit shall have a factory-installed 115-v, ground-fault protected (GFI) duplex outlet for loads of up to 15A total.
    b. The outlet requires a field-supplied and installed 115-v power source.
    c. The outlet shall be accessible from outside the unit.
    d. Does not include a transformer.
26. Non-Fused Disconnect:
    a. The unit shall have a factory-installed, non-fused disconnect for disconnecting the unit power feed during maintenance or servicing.
    b. The disconnect shall be installed in the unit power box with an interlocking, through-the-door style disconnect handle. External disconnects are not acceptable.
    c. The disconnect shall be nominally sized to meet or exceed National Electric Code (NEC) sizing for combination loads. Field-provided breakers or fuses are still required for over-current protection.
    d. The disconnect handle shall support lock-out, tag-out locks.
27. Power Monitor:
    a. The unit shall have a factory-installed power monitor to help protect against damage from abnormal power.
    b. The monitor shall be normally closed and shall detect phase loss and phase reversal.
    c. The monitor shall trigger the control emergency shutdown to shut down the unit when a fault is detected.
28. High Short Circuit Current Rating (SCCR):
    a. The unit shall have factory-installed power box with upgraded high voltage components to provide an SCCR rating of 65kA for 208/230/460-v units or 25kA for 575-v units.
    b. Includes a terminal block for power connection.
    c. The unit nameplate must reflect the high SCCR rating.
    d. Requires field-provided J-type fuses and fuse holder to be installed and wired before the unit terminal block.
29. Condensate Overflow Switch:
    a. The unit shall have a factory-installed condensate overflow switch to help protect against clogged drain pans.
    b. The overflow switch shall be an conducting type. Float switches are not acceptable.
30. Pre-Filter Status Switch and Access Door Retainers:
    a. The unit shall have a factory-installed pressure measuring switch across the entire pre-filter bank to detect when the filters are dirty.
    b. The unit shall have factory-installed retainers on all access doors to hold the doors open during maintenance.
    c. The pressure switch shall be field-set and adjustable from 0-2 in. wg.
    d. The dirty filter alert shall be viewable from the control interface.

e. The door retainer shall be rod and stopper type with multiple stopping points.

31. Return Air Smoke Detector:
    a. The unit shall have a factory-installed smoke detector in the return air section of the unit, to shut down the unit when smoke is detected.
32. Service Pack:
    a. The unit shall have factory-installed discharge and suction line isolation valves on the compressor tandem assembly and a replaceable core filter drier assembly with isolation valves on all circuits to facilitate faster service.
33. Chicago Refrigerant Relief Valve:
    a. The unit shall have a factory-installed, pressure-activated, mechanical relief valve in all refrigerant circuits to comply with Chicago Building Code. Fusible plugs are not acceptable.
    b. The relief valve shall activate at 650 psig.
    c. The relief valve shall have a National Pipe Thread (NPT) connection for field relief outlet piping.
34. 2 in. MERV 8, 4 in. MERV 8, or 4 in. MERV 13 Pre-Filters:
    a. The unit shall have a factory-installed 4 in. pre-filter rack with either 2 in. MERV 8, 4 in. MERV 8, or 4 in. MERV 13 pleated filters.
35. 2 in. MERV 8 and 4 in. MERV 13 Pre-Filters (SIZE 28-98):
    a. The unit shall have a factory-installed 2 in. and 4 in. pre-filter rack with 2 in. MERV 8 pleated filters before 4 in. MERV 13 pleated filters for improved filtration and extended filter life.
36. 2 in. MERV 8 and 12 in. MERV 14 Bag Pre-Filters (STANDARD CHASSIS ONLY):
    a. The unit shall have a factory-installed 2 in. pre-filter rack with 2 in. MERV 8 pleated filters before a bag filter track with 12 in. MERV 14 bag filters for high filtration and extended filter.
    b. Bag filter header shall be constructed of thermoplastic polymer and media shall be synthetic. Paper headers or fiberglass media is not acceptable.
37. 2 in. MERV 8 and 12 in. MERV 15 Cartridge Pre-Filters (STANDARD CHASSIS ONLY):
    a. The unit shall have a factory-installed 2 in. pre-filter track with 2 in. MERV 8 pleated filters before a cartridge filter track with 12 in. MERV 15 pleated filters for improved filtration and extended filter life.
    b. Cartridge filter header shall be constructed of galvanized steel and media shall be synthetic. Fiberglass media is not acceptable.
38. Ultraviolet (UV-C) Fixtures (ALL STANDARD CHASSIS AND SIZE 40-50 COMPACT CHASSIS):
    a. Unit shall have factory-installed fixtures for field-provided and installed UV-C emitters.
    b. Fixtures shall be mounted down stream of the evaporator coil.
    c. Fixtures shall have factory wiring with evaporator door interlock switch, disconnect switch, and UV safe view port.
    d. Fixtures require field-provided and installed 115-v power supply.

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Replaces: 48-50V-04PD