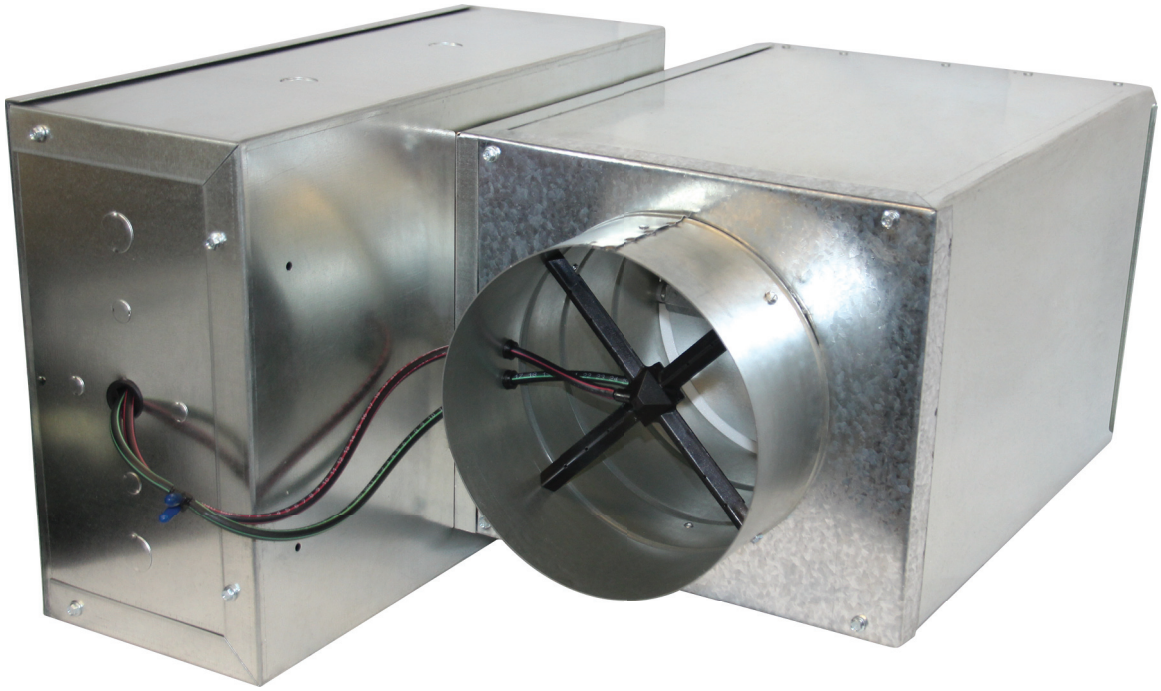
Product Data

Axis™
Single-Duct Terminal Units
For Variable Air Volume Systems
Nominal 40 to 7000 cfm



35E
Single-Duct Terminal Units
for Variable Air Volume Systems

Features/Benefits

Carrier's 35E terminal units are among the most versatile single-duct products on the market today, offering a compact design with diverse control packages (pneumatic, analog, and direct digital control options).

Single-duct variable air volume (VAV) terminal units provide:

- 22-gauge galvanized steel, unit casing lined with 1/2 in. dual-density fiberglass
- Optional 20-gauge galvanized steel casing for additional strength and durability
- Casing and all optional liners meet UL 181 (Underwriters Laboratories) and NFPA 90A (National Fire Protection Association) requirements

Flexible, high-performance units

The 35E unit single-duct variable air volume (VAV) unit provides cooling only or cooling with reheat to meet all your application needs. It is designed to allow maximum flexibility in configuration and control. The 35E unit is offered in 11 sizes with air delivery range from 40 to 7000 cfm. The basic model is a compact, high-performance unit with a standard single blade damper. Damper blade incorporates a flexible gasket for tight airflow shutoff and operates over a full 90 degrees. Minimal leakage and effective use of reheat airflow combine to assure optimum utilization of supplied airflow. The small size of the unit ensures an easy fit in most applications.

Application flexibility

Units have round inlets through size 16 and a rectangular inlet for the largest size. All round inlets have a raised collar bead to ensure tight inlet duct connections. All round collars accommodate standard spiral and flex duct sizes. The 35E unit has a rectangular slip and drive connection on the discharge for quick installation. The units can be specified with electric or hot water heat, a number of linings, and sound attenuator.

Superior control offerings

Each 35E unit is supplied with a 4-quadrant linear-flow sensor as a standard feature. This sensor is a 12-point total pressure sensor with center averaging. Balancing taps are provided to allow for easy airflow verification.

Control offerings include pressure independent pneumatic, analog electronic, pressure independent VAV and pressure dependent VVT®[1] (variable volume and temperature) for the Carrier i-Vu® Open (BACnet®[1]), Carrier i-Vu TruVu™, and Carrier Comfort Network® (CCN) protocols. Both VVT and VAV controls are communicating Product Integrated Controls (PIC).

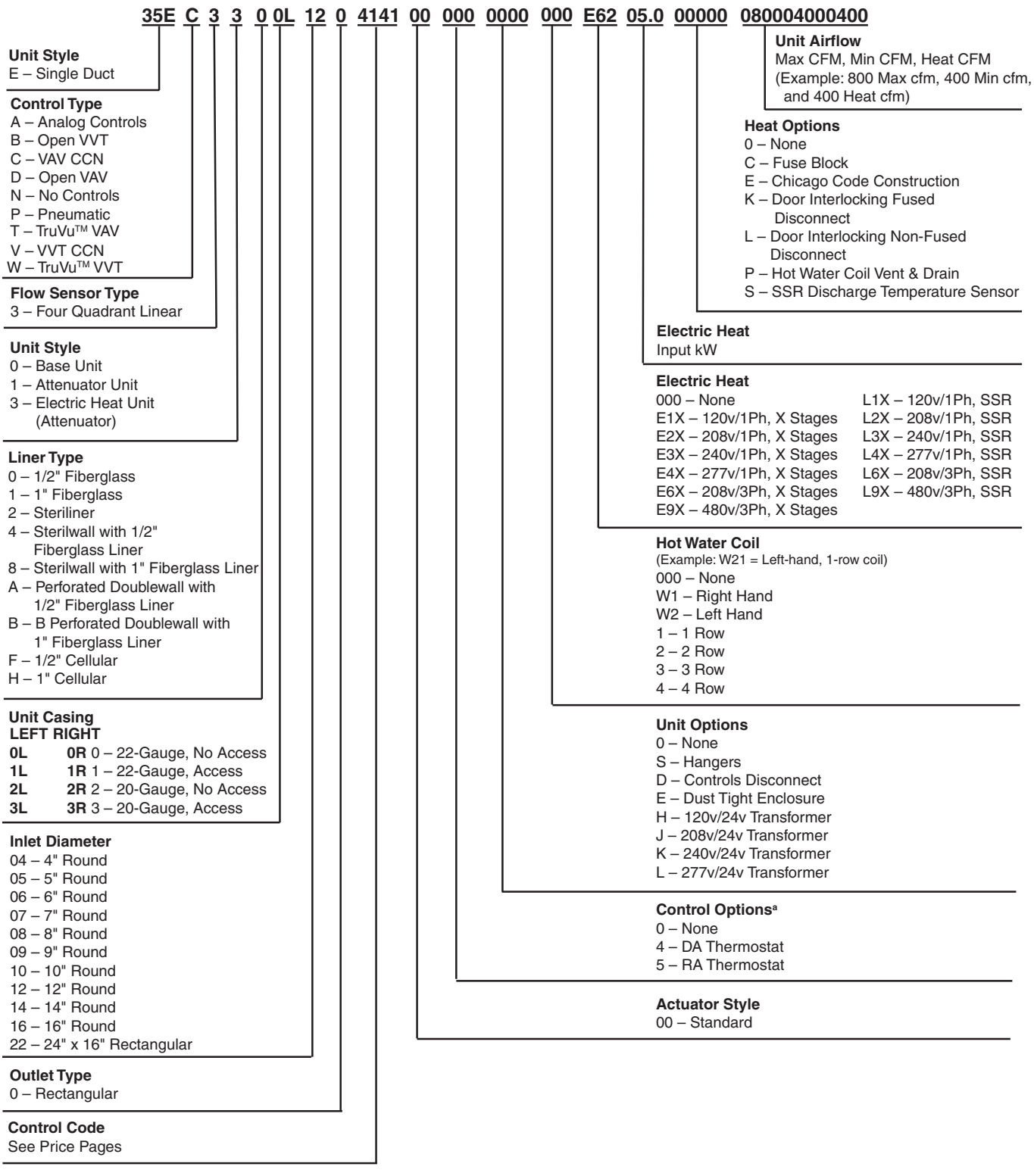
Pneumatic control units utilize a standard linear damper actuator, which, when combined with the 90-degree damper actuator, allows a simple switch-over from normally open to normally closed applications without moving any components.

Analog and direct digital controls (DDC) electronic control units feature a factory-installed enclosure that provides easy access for field connections. Control enclosure location matches unit hand (left or right).

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

Table of contents

Model number nomenclature



LEGEND

CCN — Carrier Comfort Network®
DA — Direct-Acting
RA — Reverse-Acting
SSR — Solid-State Relay
VAV — Variable Air Volume
VVT — Variable Volume and Temperature

a. Shipped with unit for field installation.

AHRI ratings

AHRI Certification Ratings for 35E Units (Discharge)[a,b,c,d,e,f]

INLET SIZE (in.)	RATED CFM	MIN Δ Ps	DISCHARGE DATA					
			Sound Power @ 1.5" Δ Ps					
			2	3	4	5	6	7
4	150	0.100	69	64	55	51	49	44
5	250	0.100	71	69	62	54	50	47
6	400	0.100	71	70	62	54	50	47
7	550	0.100	73	72	61	56	53	52
8	700	0.100	74	71	62	58	54	51
9	900	0.100	71	68	61	57	54	52
10	1100	0.100	71	68	63	59	57	54
12	1600	0.100	74	68	64	61	59	57
14	2100	0.100	74	68	63	61	59	57
16	2800	0.100	75	68	64	60	58	56

NOTE(S):

a. All sound data is based on tests conducted in accordance with AHRI 880-11.
b. Δ Ps is the difference in static pressure from inlet to discharge.
c. Sound power levels are in dB, reference level 10-12 Watts. Discharge sound power is the sound emitted from the unit discharge.
d. Radiated sound power is the sound transmitted through the casing walls.
e. Discharge sound power has been corrected for end reflection.
f. Standard 1/2" dual density liner shown, see builder for other insulation options.

AHRI Certification Ratings for 35E Units (Radiated)[a,b,c,d,e,f]

INLET SIZE (in.)	RATED CFM	MIN Δ Ps	RADIATED DATA					
			Sound Power @ 1.5" Δ Ps					
			2	3	4	5	6	7
4	150	0.100	56	49	42	40	37	33
5	250	0.100	59	52	44	39	35	31
6	400	0.100	60	58	50	40	36	33
7	550	0.100	60	57	51	43	39	35
8	700	0.100	62	59	49	43	38	38
9	900	0.100	60	56	50	42	39	35
10	1100	0.100	58	54	50	43	38	32
12	1600	0.100	64	58	51	46	42	36
14	2100	0.100	60	56	47	44	41	36
16	2800	0.100	66	62	56	49	45	42

NOTE(S):

a. All sound data is based on tests conducted in accordance with AHRI 880-11.
b. Δ Ps is the difference in static pressure from inlet to discharge.
c. Sound power levels are in dB, reference level 10-12 Watts. Discharge sound power is the sound emitted from the unit discharge.
d. Radiated sound power is the sound transmitted through the casing walls.
e. Discharge sound power has been corrected for end reflection.
f. Standard 1/2" dual density liner shown, see builder for other insulation options.

Physical data

Unit Weights[a,b,c,d]

35E SIZE	UNIT ONLY (lb)	WITH PNEUMATIC CONTROLS (lb)	WITH DDC OR ANALOG CONTROLS (lb)	WITH ELECTRIC HEAT (lb)	WITH HOT WATER (1 ROW/2 ROW) (lb)
04, 05, 06	14	+4	+9	+10	+5/+6
07, 08	16	+4	+9	+12	+5/+7
09, 10	21	+4	+9	+16	+7/+9
12	26	+4	+9	+21	+9/+12
14	34	+4	+9	+24	+10/+15
16	38	+4	+9	+27	+12/+17
22	65	+4	+9	+30	+17/+25

NOTE(S):

a. Data is based on the following conditions:
b. Unit casing is 22 gauge.
c. Unit insulation is 1/2-in. thick, 1.5-lb Tuf-Skin Rx®[1] insulation, dual density.
d. Units rated with standard linear flow sensor.

LEGEND

DDC — Direct Digital Controls

Recommended Airflow

INLET SIZE (in.)	DESCRIPTION	MINIMUM CFM		MAX PRIMARY AIRFLOW (cfm)
		Standard[a]	Electric Heat[b]	
4	4-in. Round	40	55	230
5	5-in. Round	62	85	360
6	6-in. Round	89	110	515
7	7-in. Round	121	140	700
8	8-in. Round	159	190	920
9	9-in. Round	201	240	1160
10	10-in. Round	248	300	1430
12	12-in. Round	357	425	2060
14	14-in. Round	486	580	2800
16	16-in. Round	634	750	3660
22	24 x 16-in. Rectangular	1212	1800	7000

NOTE(S):

a. The standard minimum cfm value is based on a signal of 0.03 in. wg differential pressure of the inlet sensor. Minimum cfm may be 0. The inlet sensor is capable of reading a signal down to 0.01 in. wg. To operate unit below the standard minimum cfm values listed, DDC controller must be capable to accurately read below 0.03 in. wg.
b. Electric heat minimum is based on cfm necessary to engage airflow proving safety switch. Minimum cfm of unit will depend on the kW selected for that unit.

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Factory-installed options

Unit liner

1. All liners are attached to the unit casing with both adhesive and weld pins to ensure long-term durability (except Sterilwall and Perforated Doublewall).
2. Standard unit liner is 1/2 in. thick, 1-1/2 lb/ft^3 density fiberglass liner meeting UL 181 and NFPA 90A (or ASTM84 and UL 723 Codes) requirements.
3. An optional 1-in. thick, 1-1/2 lb/ft^3 density fiberglass liner is available and meets UL 181 and NFPA 90A requirements.
4. Optional Steriliner liner consists of rigid 13/16 in., 4 lb/ft^3 density duct board insulation with nylon-reinforced foil material covering the insulation fibers that meets UL 181 and NFPA 90A. The lining is attached to the terminal unit casing by insulation adhesive and full-seam-length steel Z-strips, which enclose and seal the insulation edges, thus eliminating the need for tape and adhesives to cover the cut edges.
5. Optional Sterilwall liner consists of standard 1/2 in. or 1 in. thick, 1-1/2 lb/ft^3 dual density fiberglass insulation that meets UL 181 and NFPA 90A, blanket-type insulation, enclosed between the unit's zinc-coated sheet metal casing and a non-perforated internal zinc-coated sheet metal cover, which extends over the fiberglass insulation, as well as the cut edges of the material.
6. Optional Perforated Doublewall liner consists of 1/2-in. or 1 in. thick, 1-1/2 lb/ft^3 dual-density fiberglass insulation, meeting UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
7. Optional Cellular liner consists of a closed-cell elastomeric thermal insulation that is 1/2-in or 1-in. thick, 1-1/2 lb/ft^3 density, has a smooth surface, polyolefin, and is typically used in fiber-free applications. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth.
8. Unlined units are also available with an ETO.

Access panel

An optional gasketed access panel in the terminal unit casing is available for viewing damper components and for upstream cleaning of the hot water coil fins. Not available on units with electric reheat or for size 22 units without the attenuator.

Hot water heat

- Hot water coils are constructed of ten aluminum fins per inch with sweat type, left or right-hand tubing connections.
- The 1/2 in. diameter coil tubing is water-leakage-tested to 400 psig and has a wall thickness of 0.016 in.
- Optional coils with vent and drain are available.

Packaging

- Units with and without hot water coils are individually packaged in a carton and stacked on a pallet.
- Attenuated units and electric heat units are stacked directly on the pallet. All pallets are banded and stretch-wrapped with cellophane.

Electric heat

- Heaters are ETL-listed in accordance with UL standards and are constructed of 20-gauge galvanized steel.
- Heaters are available in single phase (120-v, 208-v, 240-v, 277-v or three phase (208/3 wire, 460-v/4 wire).
- Standard heaters are equipped with primary automatic and secondary manual reset thermal cutout, de-energizing magnetic contactors, airflow proving switch, and 80/20 nickel chromium elements.
- Electric heater options include fused or non-fused door interlocking disconnect switch, proportional solid-state relay (SSR) heater control, discharge temperature sensor, manual reset thermal cut out, fuse block and dust tight control enclosure.

Control transformers

- Units with electric heat and electronic controls (DDC or Analog) include a factory supplied, mounted, and wired 24-v control transformer. The control transformer is located inside the control enclosure and is used for powering unit controllers, actuators, and accessories.
- Units without electric heat and with electronic controls (DDC or Analog) also come with a factory-installed 24-v controls transformer.
- Units can be ordered without a transformer with an ETO.

Controls

Factory-provided and installed pneumatic, analog, or direct digital controls are available.

Units are available with no controls for field or factory mounting of field provided controls.

35EC – VAV CCN controls
35ED - Open VAV controls and
35ET - TruVu™ VAV controls

- The 35EC VAV CCN control units are furnished with factory-installed PICs for integration into the Carrier Comfort Network® controls.
- The 35ED Open VAV and 35ET TruVu™ control units are furnished with factory-installed PICs for intergration into Carrier i-Vu Open and TruVu™ Digital Control Systems.
- The 35ED units with Carrier's OPN-B3-P-02 control or the 35EW units with Carrier's TV-VAVB3-E2 controller include a factory installed field programmed controller for customizable VAV or VVT control applications, and can be integrated into Carrier's i-Vu Building Automation System.
- Each unit with Carrier VAV controls includes:
  - Control enclosure
  - Airflow sensor
  - VAV controller with integral actuator
- Room temperature sensors are not included.

Factory-installed options (cont)

35EV – VVT® CCN controls
35EB – Open VVT® controls and
35EW - TruVu™ VVT controls

- The VVT units are furnished with factory-installed PICs for intergration into the Carrier Comfort Network (35EV), Carrier i-Vu Open VVT (35EB) Digital Control Systems Constant, or Carrier i-Vu TruVu™ VVT (35EW) Building Automation System.
- Each unit with Carrier VVT controls includeincludess:
  - Control enclosure
  - Airflow sensor
  - VAV controller with integral actuator
- Room temperature sensors are not included.

35EA – Analog electronic controls

- The Analog units are furnished standard with analog controls by KMC. Consult the application drawings for control package details.
- Each Analog unit has pressure independent controls and includes:
  - Control enclosure
  - Airflow sensor
  - Digital thermostat
  - Damper actuator and analog controller

35EP – Pneumatic control units

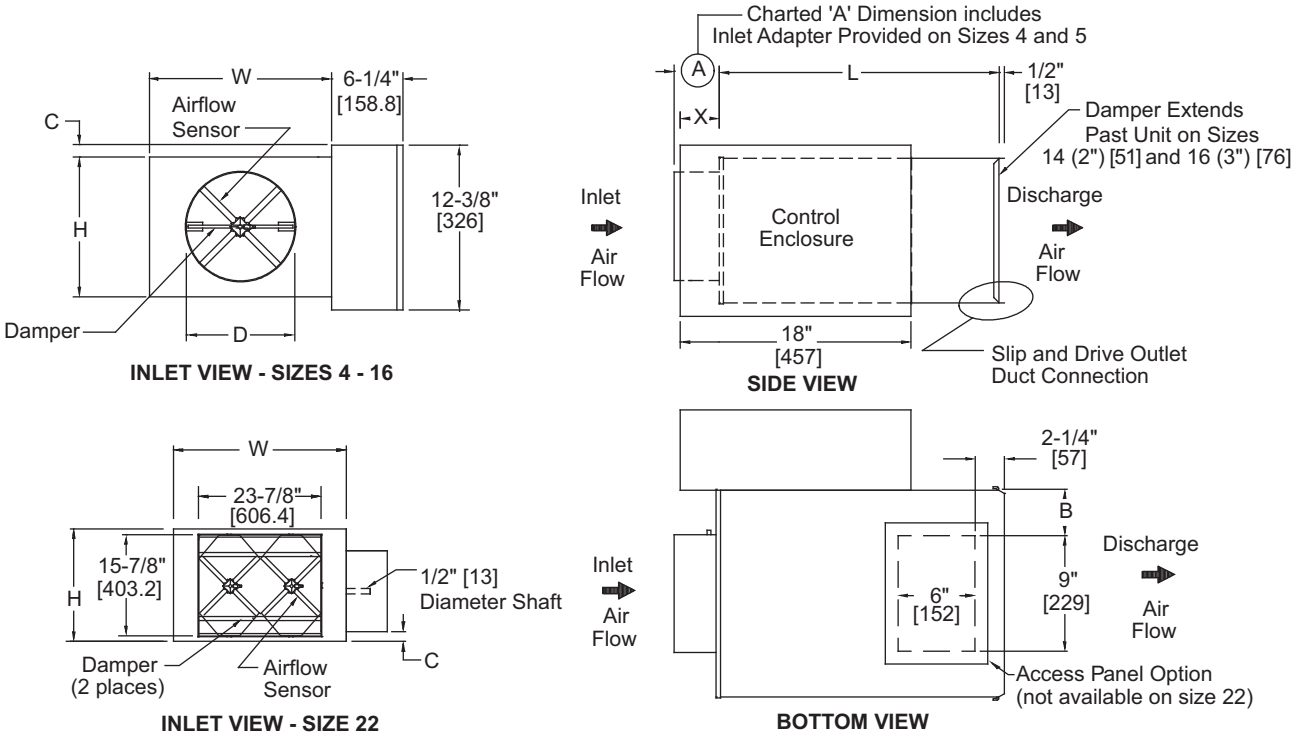
- The Pneumatic units are furnished standard with controls by KMC. The standard 35EP unit includes control sequences that are pressure independent.
- Each unit with Pneumatic controls includes:
  - Airflow sensor
  - Pneumatic damper actuator and volume reset controller
- Thermostats are not included in the standard control packages. Pneumatic thermostats may be ordered in control accessory field.

35EN – No control units (factory-mounted actuator or field mounted)

- The standard no control units are provided with the airflow sensor.
- No control units are available with or without the control enclosure or transformer (Cooling Only or Cooling/Hot Water Heat).
- No control units with electric heat include control enclosure and transformer. Electric heaters may be ordered for use with 35EN units, but the field is responsible for assuring that controls that are supplied will provide proper airflow over the heater to avoid early failure.
- 35EN unit can have field provided controls and accessories mounted and wired at the factory.

Dimensions

35E Base Unit with Analog or DDC Electronic Control



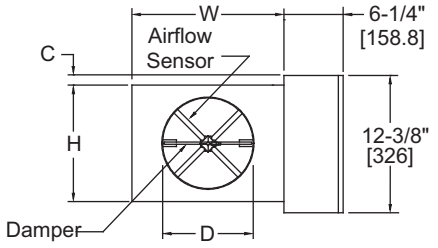
35E UNIT SIZE	MAXIMUM CFM (L/s)	L (in.)	W (in.)	H (in.)	A (in.)	B (in.)	C (in.)	D (in.)	X (in.)
04	230 (109)	15-1/2	12	8	5-3/8	1-1/2	2-1/8	3-7/8	7-1/4
05	360 (170)	15-1/2	12	8	5-3/8	1-1/2	2-1/8	4-7/8	7-1/4
06	515 (243)	15-1/2	12	8	3-3/8	1-1/2	2-1/8	5-7/8	7-1/4
07	700 (330)	15-1/2	12	10	3-3/8	1-1/2	1-1/8	6-7/8	7-1/4
08	920 (434)	15-1/2	12	10	3-3/8	1-1/2	1-1/8	7-7/8	7-1/4
09	1160 (547)	15-1/2	14	12-1/2	3-3/8	2-1/2	—	8-7/8	5-1/4
10	1430 (675)	15-1/2	14	12-1/2	3-3/8	2-1/2	—	9-7/8	5-1/4
12	2060 (972)	15-1/2	16	15	3-3/8	3-1/2	—	11-7/8	5-1/4
14	2800 (1321)	15-1/2	20	17-1/2	3-3/8	5-1/2	—	13-7/8	3-1/4
16	3660 (1727)	15-1/2	24	18	3-3/8	7-1/2	—	15-7/8	3-1/4
22	7000 (3304)	15	38	18	4-1/4	14-1/2	1-1/8	23-7/8 x 15-7/8	5-1/4

NOTES:

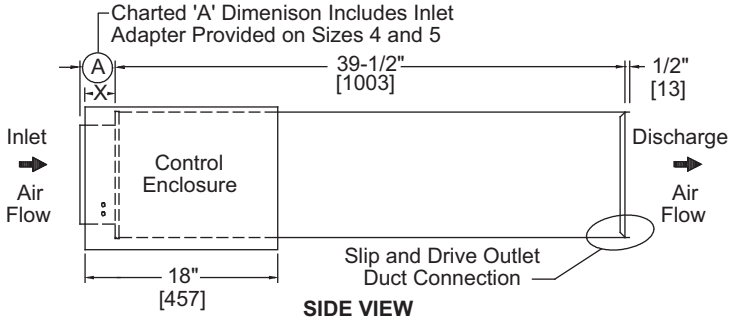
1. Right-hand base unit with electric control enclosure shown. Left hand is available.
2. Unit hand determines the location of the control enclosure and damper shaft and is determined by looking into the unit inlet in the installed position.
3. Dimensions are in inches [ ] are in millimeters.
4. Discharge side of box is fully open. Dimensions are in H x W, as listed.

Dimensions (cont)

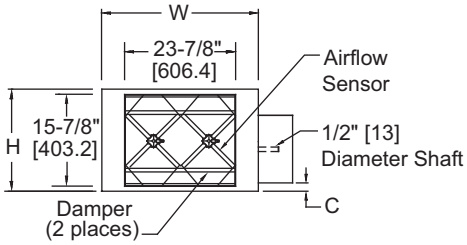
35E Attenuator Unit with Analog or DDC Electronic Control



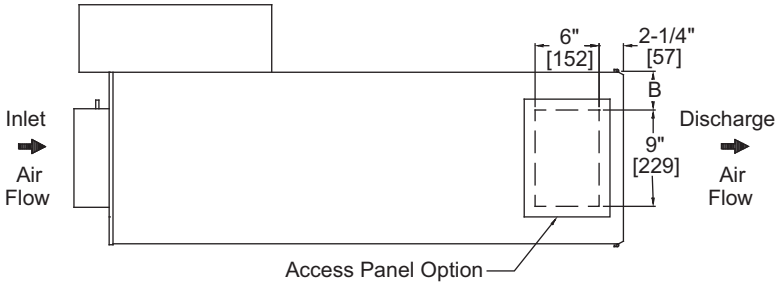
INLET VIEW - SIZES 4 - 16



SIDE VIEW



INLET VIEW - SIZE 22



BOTTOM VIEW

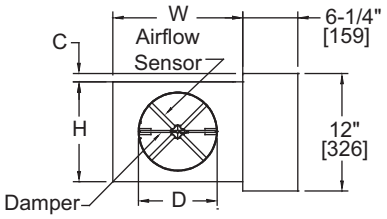
35E UNIT SIZE	MAXIMUM CFM (L/s)	W (in.)	H (in.)	A (in.)	B (in.)	C (in.)	D (in.)	X (in.)
04	230 (109)	12	8	5-3/8	1-1/2	2-1/8	3-7/8	7-1/4
05	360 (170)	12	8	5-3/8	1-1/2	2-1/8	4-7/8	7-1/4
06	515 (243)	12	8	3-3/8	1-1/2	2-1/8	5-7/8	71/4
07	700 (330)	12	10	3-3/8	1-1/2	1-1/8	6-7/8	7-1/4
08	920 (434)	12	10	3-3/8	1-1/2	1-1/8	7-7/8	7-1/4
09	1160 (547)	14	12-1/2	3-3/8	2-1/2	—	8-7/8	5-1/4
10	1430 (675)	14	12-1/2	3-3/8	2-1/2	—	9-7/8	5-1/4
12	2060 (972)	16	15	3-3/8	3-1/2	—	1-7/8	5-1/4
14	2800 (1321)	20	17-1/2	3-3/8	5-1/2	—	13-7/8	3-1/4
16	3660 (1727)	24	18	3-3/8	7-1/2	—	15-7/8	3-1/4
22	7000 (3304)	38	18	4-1/4	14-1/2	1-1/8	23-7/8 x 15-7/8	5-1/4

NOTES:

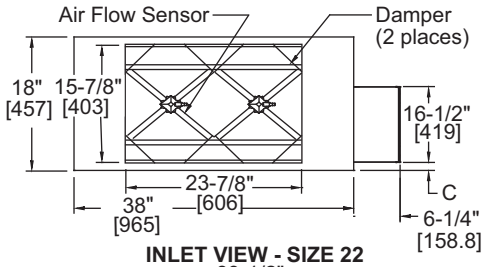
1. Right-hand base unit with electric control enclosure shown. Left hand is available.
2. Unit hand determines the location of the control enclosure and damper shaft and is determined by looking into the unit inlet in the installed position.
3. Dimensions are in inches [ ] are in millimeters.
4. Discharge side of box is fully open. Dimensions are in H x W, as listed.

Dimensions (cont)

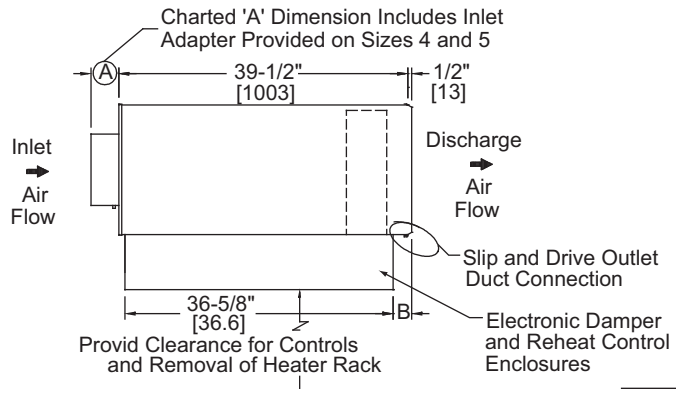
35E Base Unit with Electric Heat and Analog or DDC Electronic Control



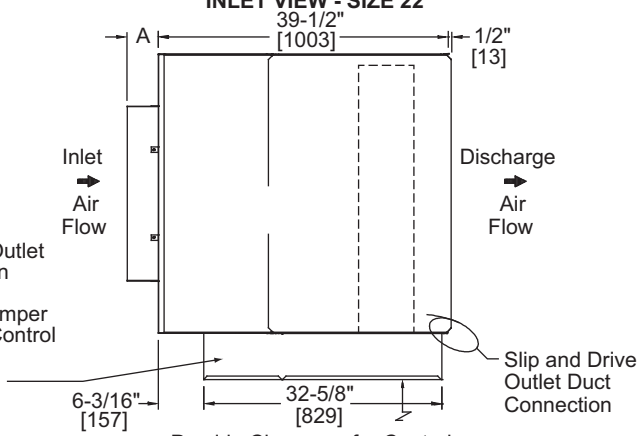
INLET VIEW - SIZES 4 - 16



INLET VIEW - SIZE 22



TOP VIEW - SIZES 4 - 16



TOP VIEW - SIZE 22

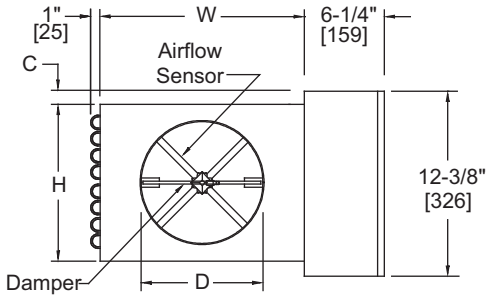
35E UNIT SIZE	MAXIMUM CFM (L/s)	W (in.)	H (in.)	A (in.)	B (in.)	C (in.)	D (in.)
04	230 (109)	12	8	5-3/8	5-1/2	2	3-7/8
05	360 (170)	12	8	5-3/8	5-1/2	2	4-7/8
06	515 (243)	12	8	3-3/8	5-1/2	2	5-7/8
07	700 (330)	12	10	3-3/8	5-1/2	1	6-7/8
08	920 (434)	12	10	3-3/8	5-1/2	1	7-7/8
09	1160 (547)	14	12-1/2	3-3/8	3-1/2	—	8-7/8
10	1430 (675)	14	12-1/2	3-3/8	3-1/2	—	9-7/8
12	2060 (972)	16	15	3-3/8	3-1/2	—	11-7/8
14	2800 (1321)	20	17-1/2	3-3/8	1-1/2	—	13-7/8
16	3660 (1727)	24	18	3-3/8	1-1/2	—	15-7/8
22	7000 (3304)	38	18	4-1/4	—	1-1/8	23-7/8 x 15-7/8

NOTES:

1. Right-hand base unit with electric control enclosure shown. Left hand is available.
2. Unit hand determines the location of the control enclosure and damper shaft and is determined by looking into the unit inlet in the installed position.
3. Dimensions are in inches [ ] are in millimeters.
4. Units with electric heat coils automatically get the attenuator option. The overall length is 39-1/2 inches.
5. Check NEC (National Electrical Code) for unit clearance requirements.

Dimensions (cont)

35E Base Unit with Hot Water Heat and Analog or DDC Electronic Control



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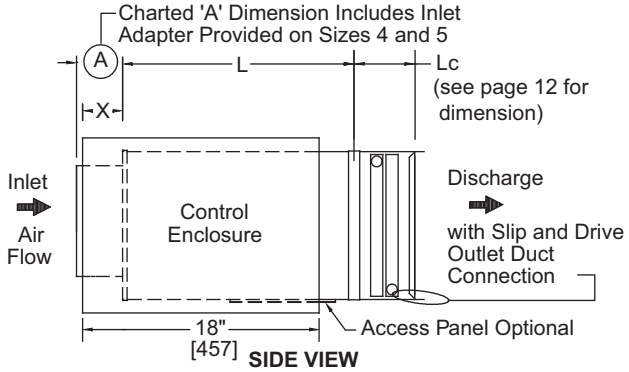
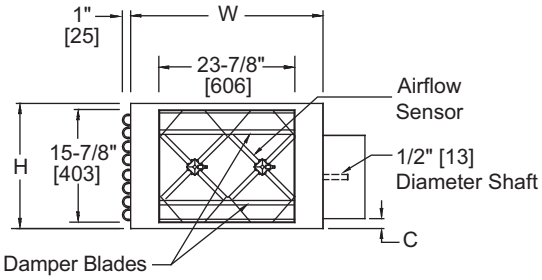
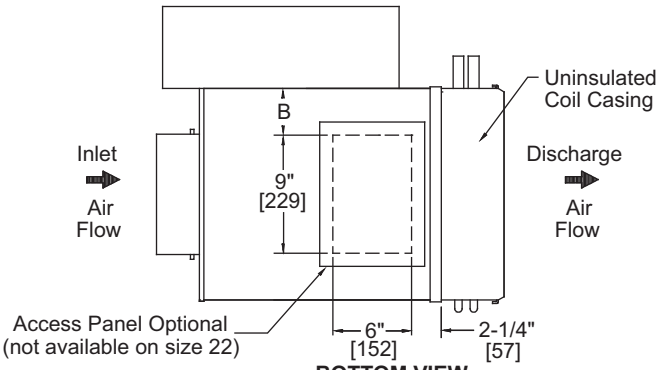


SIDE VIEW



INLET VIEW - SIZE 22



BOTTOM VIEW

NOTE: Dimensions in [ ] are in millimeters.

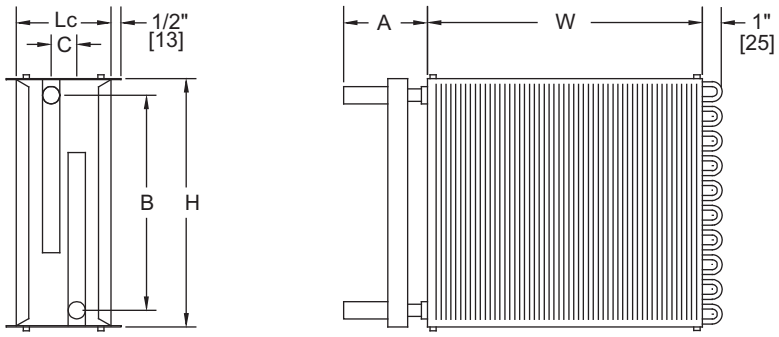
35E UNIT SIZE	MAXIMUM CFM (L/s)	L (in.)	W (in.)	H (in.)	A (in.)	B (in.)	C (in.)	D (in.)	X (in.)
04	230 (109)	15-1/2	12	8	5-3/8	1-1/2	2-1/8	3-7/8	7-1/4
05	360 (170)	15-1/2	12	8	5-3/8	1-1/2	2-1/8	4-7/8	7-1/4
06	515 (243)	15-1/2	12	8	3-3/8	1-1/2	2-1/8	5-7/8	7-1/4
07	700 (330)	15-1/2	12	10	3-3/8	1-1/2	1-1/8	6-7/8	7-1/4
08	920 (434)	15-1/2	12	10	3-3/8	1-1/2	1-1/8	7-7/8	7-1/4
09	1160 (547)	15-1/2	14	12-1/2	3-3/8	2-1/2	—	8-7/8	5-1/4
10	1430 (675)	15-1/2	14	12-1/2	3-3/8	2-1/2	—	9-7/8	5-1/4
12	2060 (972)	15-1/2	16	15	3-3/8	3-1/2	—	11-7/8	5-1/4
14	2800 (1321)	15-1/2	20	17-1/2	3-3/8	5-1/2	—	13-7/8	3-1/4
16	3600 (1727)	15-1/2	24	18	3-3/8	7-1/2	—	15-7/8	3-1/4
22	7000 (3304)	15	38	18	4-1/4	14-1/2	1-1/8	23-7/8 X 15-7/8	5-1/4

NOTES:

1. Right-hand base unit with electric control enclosure shown. Left hand is available.
2. Unit hand determines the location of the control enclosure and damper shaft and is determined by looking into the unit inlet in the installed position.
3. Dimensions are in inches [ ] are in millimeters.
4. Discharge side of box is fully open. Dimensions are in H x W, as listed.

Dimensions (cont)

35E Hot Water Coils



35E UNIT SIZE	NO. OF ROWS IN COILS	H in. (mm)	W in. (mm)	Lc in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	WATER CONN. (OD)
4, 5, 6	1 Row	7-7/8 (200)	12 (305)	5 (127)	3 (76)	6-1/4 (159)	—	1/2 (13)
	2 Row	7-7/8 (200)	12 (305)	5 (127)	3 (76)	6-1/4 (159)	—	5/8 (16)
	3 Row	7-7/8 (200)	12 (305)	7-1/4 (184)	4-1/4 (108)	5-7/8 (149)	2-3/16 (56)	7/8 (22)
	4 Row	7-7/8 (200)	12 (305)	7-1/4 (184)	4-1/4 (108)	6-1/4 (159)	3-1/4 (83)	7/8 (22)
7, 8	1 Row	10-1/4 (260)	12 (305)	5 (127)	3 (76)	8-3/4 (222)	—	1/2 (13)
	2 Row	10-1/4 (260)	12 (305)	5 (127)	2-4/7 (65)	8-3/4 (222)	—	5/8 (16)
	3 Row	10-1/4 (260)	12 (305)	7-1/4 (184)	4-1/4 (108)	8-3/8 (213)	2-3/16 (56)	7/8 (22)
	4 Row	10-1/4 (260)	12 (305)	7-1/4 (184)	4-1/4 (108)	9 (229)	3-1/4 (83)	7/8 (22)
9, 10	1 Row	12-3/4 (324)	14 (365)	5 (127)	4-1/4 (108)	10-7/8 (276)	1-1/8 (29)	7/8 (22)
	2 Row	12-3/4 (324)	14 (365)	5 (127)	4-1/4 (108)	11-1/2 (292)	1-1/16 (27)	7/8 (22)
	3 Row	12-3/4 (324)	14 (365)	7-1/4 (184)	4-1/4 (108)	13-3/8 (34)	2-3/16 (56)	7/8 (22)
	4 Row	12-3/4 (324)	14 (365)	7-1/4 (184)	4-1/4 (108)	14 (356)	3-1/4 (83)	7/8 (22)
12	1 Row	15-1/4 (387)	16 (365)	5 (127)	4-1/4 (108)	13-3/8 (340)	1-1/8 (29)	7/8 (22)
	2 Row	15-1/4 (387)	16 (365)	5 (127)	4-1/4 (108)	14 (356)	1-1/8 (29)	7/8 (22)
	3 Row	15-1/4 (387)	16 (365)	7-1/4 (184)	4-1/4 (108)	13-3/8 (340)	1-1/16 (27)	7/8 (22)
	4 Row	15-1/4 (387)	16 (365)	7-1/4 (184)	4-1/4 (108)	14 (356)	3-1/4 (83)	7/8 (22)
14	1 Row	17-3/4 (451)	20 (508)	7-1/2 (191)	4-1/4 (108)	15-7/8 (403)	1-1/8 (29)	7/8 (22)
	2 Row	17-3/4 (451)	20 (508)	7-1/2 (191)	4-1/4 (108)	16-1/2 (419)	1-1/16 (27)	7/8 (22)
	3 Row	17-3/4 (451)	20 (508)	9-3/4 (248)	4-1/4 (108)	15-7/8 (403)	2-3/16 (56)	7/8 (22)
	4 Row	17-3/4 (451)	20 (508)	9-3/4 (248)	4-1/4 (108)	16-1/2 (419)	3-1/4 (83)	7/8 (22)
16	1 Row	17-3/4 (451)	24 (610)	7-1/2 (191)	4-1/4 (108)	15-7/8 (403)	1-1/8 (29)	7/8 (22)
	2 Row	17-3/4 (451)	24 (610)	7-1/2 (191)	4-1/4 (108)	16-1/2 (419)	1-1/16 (27)	7/8 (22)
	3 Row	17-3/4 (451)	24 (610)	9-3/4 (248)	4-1/4 (108)	15-7/8 (403)	2-3/16 (56)	7/8 (22)
	4 Row	17-3/4 (451)	24 (610)	9-3/4 (248)	4-1/4 (108)	16-1/2 (419)	3-1/4 (83)	7/8 (22)
20	1 Row	10-1/4 (260)	16 (406)	5 (127)	3 (76)	8-3/4 (222)	—	1/2(13)
	2 Row	10-1/4 (260)	16 (406)	5 (127)	2-9/16 (65)	8-3/4 (222)	—	5/8 (16)
	3 Row	10-1/4 (260)	16 (406)	7-1/4 (184)	4-1/4 (108)	8-3/8 (213)	2-3/6 (56)	7/8 (22)
	4 Row	10-1/4 (260)	16 (406)	7-1/4 (184)	4-1/4 (108)	9 (229)	3-1/4 (83)	7/8 (22)
22	1 Row	17-3/4 (451)	38 (965)	5 (127)	4-1/4 (108)	15-7/8 (403)	1-1/8 (29)	7/8 (22)
	2 Row	17-3/4 (451)	38 (965)	5 (127)	4-1/4 (108)	16-1/2 (419)	1-1/16 (27)	7/8 (22)
	3 Row	17-3/4 (451)	38 (965)	7-1/4 (184)	4-1/4 (108)	15-7/8 (403)	2-3/16 (56)	7/8 (22)
	4 Row	17-3/4 (451)	38 (965)	7-1/4 (184)	4-1/4 (108)	16-1/2 (419)	3-1/4	7/8 (22)

NOTES:

1. 35E coils are shipped from the factory attached to the unit discharge. Coil discharge is configured for slip and drive field ductwork installation. Coil section is uninsulated. Coils are not for steam applications.
2. CONNECTION TUBING – 0.032-in. thick copper, male solder connection. Refer to connection diameter in the table.
3. COIL CASING – 20-gauge galvanized steel.
4. COIL TUBING – 1/2 in. OD x 0.016-in. thick copper.
5. COIL FINS – 0.0045-in. thick aluminum, 10 per inch, mechanically bonded to tubing.
6. COILS OPTION– optional air vent and drain.
7. Dimensions are in inches [ ] are in millimeters.

Selection procedure

Refer to the Carrier Air Terminal Builder program for information to determine unit sizing for your needs.

Performance data

Damper and Casing Leakage

UNIT SIZE 35E	DAMPER LEAKAGE[a] (cfm)			CASING LEAKAGE[b] (cfm)			
	1.5 in. wg	3.0 in. wg	6.0 in. wg	0.5 in. wg	1.0 in. wg	1.5 in. wg	3.0 in. wg
04	4	5	7	2	3	4	5
05	4	5	7	2	3	4	5
06	4	5	7	2	3	4	5
07	4	5	7	4	5	6	9
08	4	5	7	4	5	6	9
09	4	5	7	4	6	7	10
10	4	5	7	4	6	7	10
12	4	5	7	5	7	9	12
14	4	6	8	6	9	11	16
16	5	7	9	7	10	13	17

NOTE(S):

a. Damper leakage is measured with the damper fully closed using an actuator. A precision low-flow orifice is used upstream of the unit to measure the leakage rate as a function of the measured upstream static pressure.

b. Casing leakage is determined with the damper fully open and the discharge of the unit sealed. A precision low-flow orifice is used upstream of the unit to measure the leakage rate as a function of the supplied static pressure. Leakage testing conducted in accordance with ASHRAE 130-2008.

Performance data (cont)

35E Basic Pressure Data[a,b,c,d]

INLET SIZE (in.) (area in sq ft)	MAXIMUM AIRFLOW (cfm)	MINIMUM AIRFLOW (cfm)		ELECTRIC HEAT[e] MAX kW vs. CFM at 55°F EAT		MINIMUM INLET STATIC PRESSURE (unit and heat pressure drop)						
		Cooling Only or with Hot Water	Electric Heat			Velocity Press. (ΔV_{PS})	Basic Unit (ΔP_S)	Basic + 1-Row Coil (ΔP_S)	Basic + 2-Row Coil (ΔP_S)	Basic + 3-Row Coil (ΔP_S)	Basic + 4-Row Coil (ΔP_S)	Basic + Heater[f] (ΔP_S)
4 (0.09)	230	40	55	55	1.1	0.02	0.01	0.02	0.02	0.02	0.02	0.01
				110	2.2	0.10	0.05	0.06	0.07	0.08	0.09	0.05
				150	3.0[g]	0.18	0.10	0.12	0.13	0.15	0.16	0.10
				230	3.0[g]	0.43	0.24	0.28	0.31	0.35	0.39	0.24
5 (0.14)	360	62	85	85	1.7	0.02	0.01	0.02	0.02	0.03	0.03	0.01
				140	2.8	0.06	0.03	0.05	0.06	0.07	0.09	0.03
				250	5.0[g]	0.21	0.10	0.15	0.19	0.24	0.28	0.10
				360	5.0[g]	0.43	0.21	0.31	0.40	0.49	0.58	0.21
6 (0.20)	515	89	110	110	2.0	0.02	0.01	0.01	0.02	0.03	0.03	0.01
				250	5.1	0.10	0.04	0.09	0.13	0.17	0.22	0.04
				400	7.5[g]	0.25	0.10	0.22	0.34	0.45	0.56	0.10
				520	7.5[g]	0.42	0.17	0.38	0.57	0.75	0.94	0.17
7 (0.27)	700	121	140	140	2.9	0.02	0.01	0.01	0.02	0.03	0.04	0.01
				330	6.7	0.09	0.04	0.08	0.12	0.16	0.20	0.04
				550	9.5[g]	0.25	0.10	0.22	0.33	0.44	0.54	0.10
				700	9.5[g]	0.40	0.16	0.36	0.53	0.71	0.88	0.16
8 (0.35)	920	159	190	190	3.9	0.02	0.01	0.02	0.03	0.05	0.06	0.01
				440	9.1	0.09	0.04	0.12	0.19	0.25	0.32	0.04
				700	13.0[g]	0.23	0.10	0.29	0.47	0.64	0.82	0.10
				920	13.0[g]	0.39	0.17	0.51	0.81	1.11	1.42	0.17
9 (0.44)	1160	201	240	240	4.9	0.02	0.01	0.02	0.03	0.04	0.05	0.01
				550	11.3	0.08	0.04	0.09	0.14	0.19	0.24	0.04
				900	16.0[g]	0.23	0.10	0.25	0.38	0.52	0.66	0.10
				1160	16.0[g]	0.38	0.17	0.42	0.64	0.86	1.09	0.17
10 (0.55)	1430	248	300	300	5.1	0.01	0.01	0.02	0.03	0.04	0.05	0.01
				700	14.3	0.08	0.04	0.13	0.21	0.29	0.38	0.04
				1100	21.0[g]	0.21	0.10	0.32	0.53	0.73	0.93	0.10
				1450	21.0[g]	0.36	0.17	0.56	0.91	1.26	1.62	0.17
12 (0.78)	2060	357	425	425	8.7	0.01	0.01	0.02	0.04	0.06	0.07	0.01
				1000	20.6	0.08	0.04	0.14	0.22	0.31	0.40	0.04
				1600	30.0[g]	0.20	0.10	0.35	0.57	0.80	1.02	0.10
				2060	30.0[g]	0.33	0.17	0.58	0.95	1.32	1.69	0.17
14 (1.07)	2800	486	580	580	11.9	0.01	0.01	0.02	0.04	0.05	0.06	0.01
				1375	28.2	0.07	0.04	0.13	0.21	0.28	0.36	0.04
				2100	36.0[g]	0.16	0.10	0.30	0.48	0.66	0.84	0.10
				2800	36.0[g]	0.29	0.18	0.53	0.85	1.17	1.49	0.18
16 (1.40)	3660	634	750	750	15.4[g]	0.01	0.01	0.02	0.04	0.06	0.07	0.01
				1775	36.0[g]	0.06	0.04	0.14	0.22	0.31	0.40	0.04
				2800	36.0[g]	0.14	0.10	0.34	0.56	0.77	0.99	0.10
				3660	36.0[g]	0.24	0.17	0.58	0.95	1.32	1.69	0.17
22 (2.63)	7000	1212	1800	1800	36.0[g]	0.02	0.01	0.05	0.09	0.13	0.16	0.01
				3300	36.0[g]	0.07	0.04	0.18	0.30	0.42	0.55	0.04
				5300	36.0[g]	0.17	0.10	0.45	0.77	1.09	1.14	0.10
				7000	36.0[g]	0.30	0.17	0.79	1.35	1.91	2.46	0.17

NOTE(S):

a. To obtain Total Pressure (P_t), add the Velocity Pressure for a given cfm to the Static Pressure drop (ΔP_S) of the desired configuration, e.g., P_t for a Size 8 Basic Unit at 920 cfm = 0.39 + 0.17 = 0.56.
b. Maximum discharge temperatures with electric heat are set at 120°F by the National Electric Code.
c. Maximum kW shown assumes 55°F entering air and is limited by unit's selected voltage, phase, max capacity and design. Min cfm for electric heat is based on UL/ETL listings. (Diffuser performance will likely be poor at this low flow rate).
d. Minimums for DDC by others are the responsibility of the controls provider.
e. The ASHRAE Handbook of Fundamentals does not recommend a discharge temperature exceeding 90°F for satisfactory air mixing and comfort.
f. A minimum of 0.10 in. discharge static pressure is required to ensure steady operation for the airflow switch in the electric heater.
g. Max kW is limited by design.

LEGEND

DDC — Direct Digital Controls
EAT — Entering Air Temperature
UL — Underwriters Laboratories
ΔP_S — The difference in static pressure from inlet to discharge
ΔV_{PS} — Change in velocity pressure

Performance data (cont)

35E Unit Radiated Sound Power[a,b,c,d]

35E UNIT SIZE	FLOW RATE		MIN ΔP_S		0.75 IN. ΔP_S[e]							1.5 IN. ΔP_S[e]							2.5 IN. ΔP_S[e]						
					Octave Band Sound Power, L_w						L_P	Octave Band Sound Power, L_w						L_P	Octave Band Sound Power, L_w						L_P
	cfm	(L/s)	in. wg	(Pa)	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC
4	50	(24)	0.011	(2.76)	37	28	24	23	17	10	—	38	29	27	25	19	15	—	38	30	30	27	21	18	—
	110	(52)	0.054	(13.37)	50	42	34	33	30	23	—	51	43	38	35	32	28	—	51	45	40	37	34	31	—
	150	(71)	0.100	(24.88)	55	47	39	37	35	29	—	56	49	42	40	37	33	—	56	50	45	41	39	37	—
	230	(109)	0.235	(58.51)	62	55	45	43	42	36	24	62	57	48	45	44	40	26	53	58	51	47	46	44	27
5	60	(28)	0.006	(1.43)	38	21	17	12	8	6	—	43	26	22	15	11	12	—	47	30	26	18	14	17	—
	140	(66)	0.031	(7.80)	47	36	30	26	22	17	—	52	41	35	29	25	23	—	56	45	39	32	28	28	—
	250	(118)	0.100	(24.88)	53	47	39	36	31	25	—	59	52	44	39	35	31	20	62	55	47	41	38	36	25
	360	(179)	0.207	(51.60)	57	53	44	42	37	30	21	62	58	49	45	41	36	27	66	62	53	47	44	41	31
6	100	(47)	0.006	(1.56	43	35	24	15	10	6	—	46	40	28	20	16	13	—	49	44	31	24	20	19	—
	250	(118)	0.039	(9.72)	52	47	38	28	23	19	—	56	52	43	33	29	26	—	58	55	46	37	33	32	24
	400	(189)	0.100	(24.88)	57	53	46	35	30	26	21	60	58	50	40	36	33	27	63	61	53	43	40	38	31
	520	(245)	0.169	(42.05)	60	56	50	39	34	29	25	63	61	54	43	39	37	30	65	64	57	47	43	42	35
7	120	(57)	0.005	(1.18)	38	42	25	17	12	7	—	42	47	31	21	16	14	—	44	51	35	24	19	19	—
	330	(156)	0.036	(8.96)	50	48	38	31	27	22	—	54	54	44	36	31	28	22	57	58	49	39	34	33	27
	550	(260)	0.100	(24.88)	5	52	45	39	34	29	—	60	57	51	43	39	35	26	62	61	55	46	42	40	31
	700	(330)	0.162	(40.31)	59	53	48	42	38	32	23	63	59	54	46	42	38	29	66	63	49	50	45	43	34
8	160	(76)	0.005	(1.30)	45	39	27	22	18	16	—	48	45	34	27	23	23	—	50	49	39	30	27	28	—
	440	(208)	0.040	(9.83)	55	49	38	33	28	26	—	58	54	45	38	33	33	23	60	59	50	41	37	38	28
	700	(330)	0.100	(24.88)	59	53	43	38	32	31	21	62	59	49	43	38	38	28	64	63	55	46	41	43	33
	920	(434)	0.173	(42.98)	52	56	45	41	35	34	24	65	52	52	46	40	41	31	67	66	57	49	44	46	37
9	200	(94)	0.005	(1.23)	37	36	21	22	21	19	—	42	42	26	26	26	27	—	44	47	29	29	30	33	—
	550	(260)	0.037	(9.29)	50	45	38	33	30	24	—	54	51	42	37	35	32	—	56	56	45	40	39	38	25
	900	(425)	0.100	(24.88)	56	49	46	38	34	27	—	60	56	50	42	39	35	24	62	60	53	45	43	41	30
	1160	(547)	0.166	(43.24)	59	52	50	41	37	28	24	63	58	54	45	42	36	28	65	63	57	48	46	42	32
10	250	(118)	0.005	(1.29)	33	33	17	16	11	3	—	39	39	21	20	19	14	—	43	44	23	24	25	23	—
	700	(330)	0.040	(10.08)	46	43	37	31	24	15	—	52	50	41	36	32	27	—	56	54	44	40	38	35	23
	1100	(519)	0.100	(24.88)	52	48	46	38	30	21	20	58	54	50	43	38	32	24	62	59	52	46	44	41	28
	1450	(684)	0.174	(41.34)	55	51	52	42	33	24	26	61	57	55	47	42	36	30	66	62	58	51	48	44	33
12	400	(189)	0.006	(1.56)	42	44	29	24	20	15	—	46	49	33	28	24	20	—	50	53	37	31	28	25	21
	1000	(472)	0.039	(9.72)	54	50	41	36	32	25	—	58	55	45	40	36	31	23	61	58	48	43	40	35	27
	1600	(755)	0.100	(24.88)	60	53	47	42	38	31	22	64	58	51	46	42	36	28	67	61	54	49	46	41	32
	2060	(972)	0.166	(41.25)	63	55	50	45	41	33	26	67	59	54	49	46	39	32	71	63	58	52	49	43	36
14	480	(227)	0.005	(1.30)	35	35	19	24	21	18	—	39	40	22	27	24	22	—	43	44	25	30	27	26	—
	1375	(649)	0.043	(10.67)	50	46	37	36	33	28	—	54	51	40	39	37	32	—	58	55	43	42	39	36	24
	2100	(991)	0.100	(24.88)	56	51	44	41	38	32	—	60	56	47	44	41	36	25	64	60	50	47	44	40	29
	2800	(1321)	0.178	(44.24)	60	54	49	44	41	34	23	65	59	52	48	45	39	28	68	63	55	50	47	42	33
16	630	(297)	0.005	(1.26)	38	36	29	28	25	22	—	43	43	34	33	32	30	—	47	48	38	37	38	36	—
	1775	(838)	0.040	(10.00)	54	49	44	39	34	30	—	59	56	49	44	41	38	25	61	61	53	48	47	44	31
	2800	(1321)	0.100	(24.88)	60	55	51	44	38	34	25	66	62	56	49	45	42	31	69	67	60	53	51	48	37
	3660	(1727)	0.171	(42.52)	64	58	55	47	41	36	30	70	65	60	52	48	44	36	73	70	64	55	53	50	42
22	1200	(566)	0.005	(1.27)	51	50	41	42	39	37	—	56	55	51	49	44	41	25	59	59	58	54	48	44	33
	3300	(1557)	0.039	(9.64)	65	61	55	53	51	47	30	69	66	65	60	56	51	41	73	69	73	99	60	54	49
	5300	(2501)	0.100	(24.86)	71	66	62	58	56	52	37	76	71	72	66	61	56	48	79	74	79	71	65	59	56
	7000	(3304)	0.174	(43.37)	75	69	66	62	59	55	42	80	74	76	69	65	59	52	83	77	83	74	69	61	60

NOTE(S):

a. Radiated sound power is the sound transmitted through the casing walls.
b. All sound data is based on tests conducted in accordance with AHRI-880.
c. Sound power levels are in dB, re: 10^{-12} watts.
d. AHRI certification points are shown in shaded blocks.
e. Pressure drop across damper only.

LEGEND

AHRI — Air-Conditioning, Heating, and Refrigeration Institute
CFM — Air Volume (cubic feet per minute)
L_P — Room Sound Pressure
L_W — Sound Power
MIN ΔP_S — Minimum Static Pressure required to achieve rated airflow
NC — Application Data from AHRI 885 Test conditions
ΔP_S — The difference in static pressure from inlet to discharge
— — Indicates an NC level less than 20

Performance data (cont)

35E Unit Discharge Sound Power[a,b,c,d]

35E UNIT SIZE	FLOW RATE		MIN ΔP_S		0.75 IN. ΔP_S[e]							1.5 IN. ΔP_S[e]							2.5 IN. ΔP_S[e]						
					Octave Band Sound Power, L_w						L_P	Octave Band Sound Power, L_w						L_P	Octave Band Sound Power, L_w						L_P
	cfm	(L/s)	in. wg	(Pa)	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC
04	50	(24)	0.011	(2.76)	53	41	35	34	29	25	—	54	42	39	38	33	31	—	55	43	42	41	36	35	—
	110	(52)	0.054	(13.37)	63	56	47	43	40	34	—	64	58	51	47	44	40	20	65	59	53	50	47	44	21
	150	(71)	0.100	(24.88)	68	62	52	47	45	38	24	69	64	55	51	49	44	26	69	65	58	54	51	48	27
	230	(109)	0.235	(58.51)	73	71	58	52	51	43	32	74	72	62	56	55	49	33	75	73	64	59	57	53	34
05	60	(28)	0.006	(1.43)	49	41	39	31	30	25	—	52	44	44	35	35	31	—	55	47	47	38	38	35	—
	140	(66)	0.031	(7.80)	60	55	50	43	39	34	—	63	59	55	47	44	40	—	66	61	58	50	48	45	22
	250	(118)	0.100	(24.88)	67	66	58	50	46	41	25	71	69	62	54	50	47	29	73	72	66	57	54	51	32
	360	(170)	0.207	(51.60)	72	72	63	55	50	45	31	76	75	67	59	55	51	35	78	78	70	62	58	55	38
06	100	(47)	0.006	(1.56)	51	47	35	31	33	29	—	55	52	40	35	38	36	—	57	56	44	39	42	41	—
	250	(118)	0.039	(9.72	62	59	49	44	41	36	—	66	64	54	48	46	43	23	68	68	58	51	50	48	28
	400	(189)	0.100	(24.88)	68	65	56	50	45	40	23	71	70	62	54	50	47	29	74	74	66	57	54	52	33
	520	(245)	0.169	(42.05)	71	68	60	54	47	43	27	74	73	66	58	53	50	33	77	77	70	61	57	55	37
07	120	(57)	0.005	(1.18)	56	54	33	28	32	32	—	60	60	39	32	38	40	—	63	65	43	34	43	45	25
	330	(156)	0.036	(8.96)	65	61	48	44	42	41	—	69	68	54	48	48	48	27	72	73	58	50	52	54	32
	550	(260)	0.100	(24.88)	69	65	56	53	47	45	23	73	72	61	56	53	52	31	76	76	66	59	57	58	37
	700	(330)	0.162	(40.31)	71	67	59	57	49	47	24	75	73	65	60	55	54	32	78	78	69	62	59	60	38
08	160	(76)	0.005	(1.30)	57	51	42	34	37	33	—	60	57	48	39	42	40	—	62	61	53	42	47	45	—
	440	(208)	0.040	(9.83)	66	61	52	47	45	41	—	69	67	58	52	51	48	25	72	71	62	55	55	53	30
	700	(330)	0.100	(24.88)	70	66	56	53	49	44	24	74	71	62	58	54	51	31	76	76	67	61	58	56	36
	920	(434)	0.173	(42.98)	73	68	59	56	51	46	26	76	74	65	61	57	53	33	78	78	69	64	61	58	38
09	200	(94)	0.005	(1.23)	50	46	35	32	35	35	—	53	51	39	36	40	42	—	55	54	43	39	44	46	—
	550	(260)	0.037	(9.29)	62	57	49	46	44	42	—	65	62	54	50	50	48	—	67	66	57	53	53	53	24
	900	(425)	0.100	(24.88)	68	62	56	53	49	46	—	71	68	61	57	54	52	25	73	71	64	59	58	56	30
	1160	(547)	0.166	(41.34)	72	66	60	56	52	47	23	74	71	65	60	57	53	29	76	74	68	63	60	58	33
10	250	(118)	0.005	(1.29)	50	48	40	38	39	37	—	53	53	45	42	45	43	—	55	57	48	45	49	48	—
	700	(330)	0.040	(10.08)	62	58	52	49	48	45	—	65	63	57	54	53	51	21	68	67	61	57	57	55	26
	1100	(519)	0.100	(24.88)	68	63	58	54	51	48	—	71	68	63	59	57	54	26	73	72	67	62	61	58	30
	1450	(684)	0.174	(43.24)	71	66	61	58	53	50	23	74	71	66	62	59	56	29	77	74	70	65	63	61	33
12	400	(189)	0.006	(1.56)	52	47	39	42	42	42	—	56	52	43	46	47	48	—	58	56	46	50	50	52	—
	1000	(472)	0.039	(9.72)	64	58	53	52	50	48	—	68	63	57	56	55	54	—	70	67	60	60	58	58	24
	1600	(755)	0.100	(24.88)	71	63	60	57	54	51	22	74	68	64	61	59	57	26	77	72	67	65	62	61	30
	2060	(972)	0.166	(41.25)	74	66	63	59	56	52	26	78	71	68	64	61	58	30	80	75	71	67	64	63	34
14	480	(227)	0.005	(1.30)	47	44	33	39	38	40	—	50	48	37	43	42	46	—	52	52	39	46	45	50	—
	1375	(649)	0.043	(10.67)	64	58	53	52	50	48	—	67	62	56	56	54	54	—	69	65	58	59	57	58	22
	2100	(991)	0.100	(24.88)	71	63	60	58	55	52	22	74	68	63	61	59	57	26	76	71	66	64	61	62	29
	2800	(1321)	0.178	(44.24)	75	67	66	61	58	54	28	78	71	69	65	62	60	32	81	75	71	68	65	64	35
16	630	(297)	0.005	(1.26)	41	37	22	31	30	29	—	44	41	26	34	35	34	—	47	45	28	37	38	38	—
	1775	(838)	0.040	(10.00)	62	55	49	48	46	44	—	65	60	52	52	51	50	—	68	63	55	55	54	54	—
	2800	(1321)	0.100	(24.88)	71	63	60	56	53	51	23	75	68	64	60	58	56	27	77	71	66	63	61	60	30
	3660	(1727)	0.171	(42.52)	77	68	67	61	58	55	30	80	72	71	64	62	60	34	83	76	73	67	65	64	37
22	1200	(566)	0.005	(1.27)	67	57	55	50	46	38	—	73	65	58	55	51	44	25	78	70	60	59	55	49	31
	3300	(1557)	0.039	(9.64)	78	69	71	65	61	56	31	84	77	73	70	67	62	39	88	82	76	74	71	67	44
	5300	(2501)	0.100	(24.88)	83	75	78	72	69	65	37	89	82	81	77	74	71	45	93	88	83	81	78	76	51
	7000	(3304)	0.174	(43.37)	86	78	82	76	73	70	41	92	86	85	81	78	76	49	96	91	87	85	82	81	54

NOTE(S):

a. Discharge sound power is the sound emitted from the unit discharge.
b. All sound data is based on tests conducted in accordance with AHRI 880.
c. Sound power levels are in dB, re: 10^{-12} watts.
d. AHRI certification points are shown in shaded blocks.
e. Pressure drop across damper only.

LEGEND

AHRI — Air-Conditioning, Heating, and Refrigeration Institute
CFM — Air Volume (cubic feet per minute)
L_P — Room Sound Pressure
L_W — Sound Power
MIN ΔP_S — Minimum Static Pressure required to achieve rated airflow
NC — Application Data from AHRI 885 Test conditions
ΔP_S — The difference in static pressure from inlet to discharge
— — Indicates an NC level less than 20

Performance data (cont)

Unit 35E Hot Water Coil Data[a,b,c,d,e,f,g,h]

Unit Sizes 04, 05, and 06, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				50	125	200	275	350	425	500
4-6	1	1.0	0.47	3.7	6.2	7.8	9.0	9.8	10.6	11.2
		2.0	1.82	3.8	6.6	8.5	9.9	11.0	11.9	12.7
		3.0	3.98	3.9	6.8	8.7	10.2	11.4	12.4	13.3
		4.0	6.96	3.9	6.9	8.9	10.4	11.7	12.7	13.6
		Air Pressure Drop		**0.00**	**0.02**	**0.04**	**0.06**	**0.10**	**0.13**	**0.18**
	2	1.0	0.12	5.0	9.3	12.0	14.0	15.5	16.7	17.6
		2.0	0.47	5.3	10.2	13.5	16.1	18.2	19.9	21.3
		4.0	1.81	5.4	10.7	14.5	17.5	20.0	22.1	24.0
		6.0	3.98	5.4	10.9	14.9	18.1	20.7	23.0	25.0
		Air Pressure Drop		**0.01**	**0.04**	**0.08**	**0.14**	**0.21**	**0.29**	**0.38**
	3	1.5	0.40	6.0	12.4	16.8	20.2	22.8	24.9	26.7
		2.0	0.70	6.1	12.7	17.5	21.1	24.1	26.6	28.7
		4.0	2.68	6.2	13.2	18.5	22.8	26.4	29.5	32.2
		6.0	5.88	6.2	13.3	18.9	23.5	27.3	30.7	33.6
		Air Pressure Drop		**0.01**	**0.06**	**0.12**	**0.21**	**0.31**	**0.43**	**0.57**
	4	2.0	0.50	6.4	14.0	19.6	24.0	27.5	30.4	32.8
		3.0	1.11	6.5	14.3	20.4	25.4	29.4	32.9	35.8
		4.0	1.95	6.5	14.5	20.9	26.1	30.5	34.3	37.5
		6.0	4.32	6.5	14.7	21.3	26.9	31.6	35.8	39.4
		Air Pressure Drop		**0.02**	**0.08**	**0.16**	**0.28**	**0.42**	**0.58**	**0.76**
		CFM Range	Size 04							
			Size 05							
			Size 06							

Unit Sizes 07 and 08, 1 – 4 Row

UNIT SIZES	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				160	285	410	535	660	785	900
7-8	1	1.0	0.64	8.0	10.5	12.1	13.4	14.4	15.2	15.8
		2.0	2.45	8.6	11.5	13.6	15.2	16.5	17.6	18.5
		3.0	5.37	8.8	11.9	14.2	16.0	17.4	18.6	19.6
		4.0	9.37	8.9	12.2	14.5	16.4	17.9	19.2	20.3
		Air Pressure Drop		**0.02**	**0.04**	**0.08**	**0.12**	**0.18**	**0.24**	**0.30**
	2	1.0	0.17	11.8	15.9	18.7	20.6	22.2	23.4	24.3
		2.0	0.64	13.0	18.4	22.2	25.1	27.4	29.4	30.9
		4.0	2.44	13.7	19.9	24.5	28.2	31.2	33.8	35.9
		6.0	5.36	14.0	20.5	25.5	29.5	32.8	35.7	38.0
		Air Pressure Drop		**0.04**	**0.09**	**0.17**	**0.26**	**0.37**	**0.50**	**0.63**
	3	1.5	0.28	15.4	21.9	26.3	29.5	32.0	33.9	35.4
		2.0	0.50	15.9	23.1	28.2	32.0	35.0	37.4	39.3
		4.0	1.95	16.7	25.1	31.5	36.5	40.7	44.2	47.0
		6.0	4.32	17.0	25.9	32.8	38.3	43.0	47.0	50.2
		Air Pressure Drop		**0.05**	**0.14**	**0.25**	**0.39**	**0.56**	**0.75**	**0.94**
	4	2.0	0.36	17.6	26.2	32.2	36.7	40.2	43.0	45.2
		3.0	0.79	18.2	27.7	34.8	40.4	44.8	48.5	51.4
		4.0	1.40	18.5	28.6	36.3	42.5	47.5	51.8	55.2
		6.0	3.12	18.8	29.4	37.9	44.8	50.6	55.6	59.6
		Air Pressure Drop		**0.07**	**0.18**	**0.34**	**0.53**	**0.75**	**1.00**	**1.26**
		CFM Range	Size 07							
			Size 08							

NOTE(S):

a. Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
b. Data is based upon 180°F entering water with 0% Glycol and 55°F entering air.
c. Head Loss is in feet of water.
d. Air Pressure Drop (in. wg) is defined as the minimum static pressure at the maximum cfm with the damper full open.
e. Air Temperature Rise = 927 x MBtuh/CFM.
f. Water Temperature Drop = 2.04 x MBtuh/GPM.
g. Coils are not for steam application.
h. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBtuh values by correction factors below.

MBtuh Correction Factors

DELTA-T	50	60	70	80	90	100	115	125
Factor	0.38	0.46	0.54	0.62	0.70	0.78	0.89	1.00

Performance data (cont)

Unit 35E Hot Water Coil Data[a,b,c,d,e,f,g,h] (cont)

Unit Sizes 09 and 10, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				250	445	640	835	1030	1225	1400
9-10	1	1.0	0.13	10.2	13.0	14.8	16.0	17.0	17.8	18.3
		2.0	0.41	11.3	14.8	17.2	19.0	20.4	21.6	22.4
		3.0	0.87	11.7	15.6	18.2	20.2	21.8	23.2	24.2
		4.0	1.51	11.9	16.0	18.8	20.9	22.6	24.1	25.2
		Air Pressure Drop		**0.02**	**0.04**	**0.07**	**0.11**	**0.15**	**0.20**	**0.25**
	2	1.5	0.19	17.4	23.5	27.4	30.1	32.1	33.8	35.0
		2.0	0.27	18.2	25.2	29.9	33.3	35.9	38.0	39.6
		4.0	0.99	19.5	27.9	33.9	38.5	42.2	45.3	47.6
		6.0	2.13	20.0	29.0	35.5	40.7	44.8	48.3	51.0
		Air Pressure Drop		**0.03**	**0.08**	**0.14**	**0.22**	**0.31**	**0.40**	**0.50**
	3	2.0	0.22	25.8	34.7	39.8	43.2	45.7	47.6	49.0
		3.0	0.38	27.1	37.9	44.6	49.2	52.7	55.5	57.5
		4.0	0.66	27.8	39.5	47.1	52.4	56.5	59.8	62.2
		6.0	1.41	28.5	41.2	49.8	56.0	60.8	64.7	67.6
		Air Pressure Drop		**0.04**	**0.12**	**0.22**	**0.34**	**0.48**	**0.64**	**0.80**
	4	2.5	0.46	26.9	41.2	48.5	53.6	57.2	60.0	62.0
		3.0	0.66	27.4	42.8	51.3	57.1	61.5	64.9	67.3
		4.0	1.16	28.0	44.7	54.4	61.3	66.5	70.6	73.7
		6.0	2.58	28.7	46.7	57.7	65.8	72.1	77.2	81.0
		Air Pressure Drop		**0.08**	**0.16**	**0.29**	**0.45**	**0.64**	**0.86**	**1.07**
		CFM Range	Size 09							
			Size 10							

Unit Sizes 12, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				400	660	920	1180	1440	1700	1950
12	1	1.0	0.17	14.5	17.5	19.3	20.7	21.8	22.6	23.3
		2.0	0.51	16.5	20.6	23.4	25.6	27.3	28.7	29.8
		3.0	1.10	17.2	21.8	25.0	27.5	29.5	31.1	32.5
		4.0	1.90	17.6	22.4	25.9	28.6	30.7	32.6	34.1
		Air Pressure Drop		**0.02**	**0.05**	**0.08**	**0.11**	**0.16**	**0.20**	**0.25**
	2	1.5	0.23	25.1	31.6	35.8	38.8	41.0	42.8	44.2
		2.0	0.32	26.7	34.5	39.8	43.7	46.7	49.1	51.0
		4.0	1.17	29.3	39.3	46.5	52.0	56.5	60.2	63.2
		6.0	2.51	30.2	41.1	49.1	55.5	60.6	65.0	68.5
		Air Pressure Drop		**0.04**	**0.09**	**0.15**	**0.23**	**0.31**	**0.41**	**0.51**
	3	2.0	0.26	37.3	46.5	51.9	55.5	58.2	60.2	61.7
		3.0	0.45	40.2	52.2	59.7	64.9	68.3	72.0	74.4
		4.0	0.77	41.7	55.1	63.8	70.1	74.8	79.5	81.7
		6.0	1.66	43.1	58.2	68.4	75.9	81.7	86.4	90.2
		Air Pressure Drop		**0.06**	**0.13**	**0.23**	**0.35**	**0.50**	**0.65**	**0.82**
	4	2.5	0.26	43.0	56.0	63.9	69.2	73.0	75.9	78.1
		3.0	0.31	44.3	59.1	68.3	74.7	79.5	83.1	86.0
		4.0	1.29	42.6	62.5	73.6	81.5	87.4	92.1	95.8
		6.0	2.88	44.0	66.2	79.3	89.0	96.6	102.6	107.5
		Air Pressure Drop		**0.08**	**0.18**	**0.31**	**0.47**	**0.66**	**0.87**	**1.10**

NOTE(S):

a. Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
b. Data is based upon 180°F entering water with 0% Glycol and 55°F entering air.
c. Head Loss is in feet of water.
d. Air Pressure Drop (in. wg) is defined as the minimum static pressure at the maximum CFM with the damper full open.
e. Air Temperature Rise = 927 x MBtuh/CFM.
f. Water Temperature Drop = 2.04 x MBtuh/GPM.
g. Coils are not for steam application.
h. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBtuh values by correction factors below.

MBtuh Correction Factors

DELTA-T	50	60	70	80	90	100	115	125
Factor	0.38	0.46	0.54	0.62	0.70	0.78	0.89	1.00

Performance data (cont)

Unit 35E Hot Water Coil Data[a,b,c,d,e,f,g,h] (cont)

Unit Size 14, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				500	860	1220	1580	1940	2300	2650
14	1	1.0	0.08	17.3	20.7	22.7	24.1	25.1	25.9	26.5
		2.0	0.22	21.0	26.6	30.2	32.9	35.0	36.6	38.0
		3.0	0.46	22.3	28.7	33.1	36.3	38.9	41.0	42.8
		4.0	0.79	23.0	29.9	34.7	38.3	41.2	43.6	45.6
		Air Pressure Drop		**0.02**	**0.04**	**0.07**	**0.10**	**0.14**	**0.18**	**0.23**
	2	2.0	0.23	33.2	43.1	49.4	53.8	57.0	59.5	61.5
		3.0	0.41	35.9	48.4	56.8	62.9	67.6	71.4	74.5
		4.0	0.70	37.3	51.2	60.8	68.0	73.7	78.4	82.1
		6.0	1.51	38.8	54.2	65.4	73.9	80.8	86.5	91.2
		Air Pressure Drop		**0.03**	**0.07**	**0.13**	**0.20**	**0.28**	**0.36**	**0.46**
	3	2.5	0.25	49.1	63.0	70.8	75.8	79.4	82.1	84.2
		3.0	0.30	51.1	67.1	76.4	82.7	87.2	90.7	93.4
		4.0	0.52	53.3	71.9	83.3	91.2	97.1	101.6	105.2
		6.0	1.10	55.5	77.0	91.1	101.1	108.7	114.8	119.6
		Air Pressure Drop		**0.04**	**0.11**	**0.20**	**0.31**	**0.43**	**0.57**	**0.73**
	4	3.5	0.28	56.7	77.2	89.4	97.5	103.3	107.7	111.0
		4.0	0.92	53.5	80.2	94.1	103.5	110.3	115.6	119.7
		5.0	1.43	54.8	83.9	99.8	111.0	119.3	125.7	130.8
		6.0	2.05	55.6	86.4	103.9	116.4	125.8	133.3	139.2
		Air Pressure Drop		**0.06**	**0.15**	**0.26**	**0.41**	**0.58**	**0.77**	**0.97**

Unit Size 16, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				700	1135	1570	2005	2440	2875	3300
16	1	1.5	0.16	24.7	29.4	32.5	37.4	36.4	37.7	38.8
		2.0	0.24	26.5	32.2	36.0	38.8	41.0	42.8	44.3
		3.0	0.52	28.5	35.2	39.9	43.4	46.2	48.5	50.4
		4.0	0.89	29.5	36.9	42.1	46.0	49.2	51.9	54.1
		Air Pressure Drop		**0.02**	**0.04**	**0.07**	**0.11**	**0.15**	**0.19**	**0.24**
	2	2.0	0.09	38.9	47.0	52.0	55.5	58.0	59.9	61.5
		3.0	0.18	44.7	56.1	63.7	69.2	73.3	76.6	82.8
		4.0	0.27	47.3	62.4	72.0	79.2	82.7	87.1	90.7
		6.0	0.58	50.1	65.9	77.3	86.0	93.0	98.7	103.5
		Air Pressure Drop		**0.04**	**0.09**	**0.15**	**0.22**	**0.30**	**0.39**	**0.48**
	3	2.5	0.11	56.7	67.0	72.7	76.4	79.1	81.0	82.6
		3.0	0.15	60.9	73.6	80.9	85.7	89.2	91.9	93.9
		4.0	0.23	66.5	82.9	92.9	99.7	104.7	108.6	111.7
		6.0	0.44	71.2	92.1	105.7	115.3	122.5	128.3	132.9
		Air Pressure Drop		**0.06**	**0.13**	**0.22**	**0.34**	**0.47**	**0.62**	**0.78**
	4	3.0	0.10	65.7	80.0	88.0	93.2	96.8	99.4	101.5
		4.0	0.16	72.1	91.4	102.9	110.6	116.2	120.4	123.7
		5.0	0.24	76.0	98.8	113.2	123.1	129.8	136.0	140.5
		6.0	0.31	78.0	103.7	120.4	132.2	141.1	148.0	153.5
		Air Pressure Drop		**0.08**	**0.17**	**0.30**	**0.45**	**0.62**	**0.82**	**1.03**

NOTE(S):

a. Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
b. Data is based upon 180°F entering water with 0% Glycol and 55°F entering air.
c. Head Loss is in feet of water.
d. Air Pressure Drop (in. wg) is defined as the minimum static pressure at the maximum cfm with the damper full open.
e. Air Temperature Rise = 927 x MBtuh/CFM.
f. Water Temperature Drop = 2.04 x MBtuh/GPM.
g. Coils are not for steam application.
h. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBtuh values by correction factors below.

MBtuh Correction Factors

DELTA-T	50	60	70	80	90	100	115	125
Factor	0.38	0.46	0.54	0.62	0.70	0.78	0.89	1.00

Performance data (cont)

Unit 35E Hot Water Coil Data[a,b,c,d,e,f,g,h] (cont)

Unit Size 22, 1 – 4 Row

UNIT SIZE	ROWS	GPM	HEAD LOSS	AIRFLOW, CFM, AND RESULTING MBTUH						
				1250	2045	2840	3635	4430	5225	6000
22	1	1.5	0.21	37.5	43.5	47.1	49.6	51.4	52.9	54.0
		2.0	0.33	41.4	49.1	53.9	57.4	60.0	62.1	63.8
		3.0	0.71	45.5	55.3	61.7	66.4	70.1	73.1	75.5
		4.0	1.21	47.9	58.9	66.4	71.9	76.3	79.9	82.9
		Air Pressure Drop		**0.02**	**0.05**	**0.09**	**0.13**	**0.18**	**0.24**	**0.30**
	2	2.0	0.11	58.4	67.7	73.0	76.4	78.7	80.5	81.9
		3.0	0.23	69.6	84.7	93.8	99.9	104.4	107.8	110.5
		4.0	0.37	75.8	94.7	107.0	115.6	122.1	127.1	131.1
		6.0	0.78	82.1	105.7	121.7	133.5	142.7	150.0	156.0
		Air Pressure Drop		**0.05**	**0.11**	**0.18**	**0.27**	**0.37**	**0.48**	**0.60**
	3	2.5	0.13	83.6	93.9	99.2	102.5	104.7	106.4	107.7
		3.0	0.18	92.0	105.7	112.9	117.4	120.6	122.9	124.7
		4.0	0.30	103.7	123.6	134.5	141.5	146.5	150.3	153.2
		6.0	0.57	115.5	143.7	160.6	172.1	180.5	187.0	192.1
		Air Pressure Drop		**0.07**	**0.16**	**0.28**	**0.42**	**0.59**	**0.77**	**0.98**
	4	3.0	0.12	98.9	113.5	120.8	125.3	128.3	130.6	132.2
		4.0	0.20	113.0	135.3	147.1	154.5	159.6	163.4	166.2
		5.0	0.30	121.9	150.9	166.9	177.3	184.6	190.0	194.2
		6.0	0.40	127.7	162.1	182.3	195.6	205.1	212.4	218.0
		Air Pressure Drop		**0.09**	**0.21**	**0.37**	**0.56**	**0.78**	**1.03**	**1.30**

NOTE(S):

a. Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
b. Data is based upon 180°F entering water with 0% Glycol and 55°F entering air.
c. Head Loss is in feet of water.
d. Air Pressure Drop (in. wg) is defined as the minimum static pressure at the maximum cfm with the damper full open.
e. Air Temperature Rise = 927 x MBtuh/CFM.
f. NWater Temperature Drop = 2.04 x MBtuh/GPM.
g. Coils are not for steam application.
h. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBtuh values by correction factors below.

MBtuh Correction Factors

DELTA-T	50	60	70	80	90	100	115	125
Factor	0.38	0.46	0.54	0.62	0.70	0.78	0.89	1.00

Electrical data

Staged Electric Heat kW Range per Inlet Size

HEATER CODE	DESCRIPTION (volts/phase/stages)	04		05		06		07		08		09	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
E11	120-v/1Ph/1S	0.5	3.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0
E12	120-v/1Ph/2S	1.0	3.0	1.0	5.0	1.0	5.0	1.0	5.0	1.0	5.0	1.0	5.0
E13	120-v/1Ph/3S	1.5	3.0	1.5	5.0	1.5	5.0	1.5	5.0	1.5	5.0	1.5	5.0
E21	208-v/1Ph/1S	0.5	3.0	0.1	5.0	0.1	7.5	0.1	9.5	0.1	9.5	0.1	9.5
E22	208-v/1Ph/2S	1.0	3.0	1.0	5.0	1.0	7.5	1.0	9.5	1.0	9.5	1.0	9.5
E23	208-v/1Ph/3S	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	9.5	1.5	9.5
E31	240-v/1Ph/1S	1.0	3.0	1.0	5.0	1.0	7.5	1.0	9.5	1.0	11.0	1.0	11.0
E32	240-v/1Ph/2S	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	11.0	1.5	11.0
E33	240-v/1Ph/3S	2.0	3.0	2.0	5.0	2.0	7.5	2.0	9.5	2.0	11.0	2.0	11.0
E41	277-v/1Ph/1S	1.0	3.0	1.0	5.0	1.0	7.5	1.0	9.5	1.0	13.0	1.0	13.0
E42	277-v/1Ph/2S	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	13.0	1.5	13.0
E43	277-v/1Ph/3S	2.5	3.0	2.5	5.0	2.5	7.5	2.5	9.5	2.5	13.0	2.5	13.0
E61	208-v/3Ph/1S (3-Wire)	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	13.0	1.5	16.0
E62	208-v/3Ph/2S (3-Wire)	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	13.0	1.5	16.0
E63	208-v/3Ph/3S (3-Wire)	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	13.0	1.5	16.0
E91	480-v/3Ph/1S (4-Wire)	2.5	3.0	2.5	5.0	2.5	7.5	2.5	9.5	2.5	13.0	2.5	16.0
E92	480-v/3Ph/2S (4-Wire)	2.5	3.0	2.5	5.0	2.5	7.5	2.5	9.5	2.5	13.0	2.5	16.0
E93	480-v/3Ph/3S (4-Wire)	2.5	3.0	2.5	5.0	2.5	7.5	2.5	9.5	2.5	13.0	2.5	16.0

HEATER CODE	DESCRIPTION (volts/phase/stages)	10		12		14		16		22	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
E11	120-v/1Ph/1S	0.5	5.0	0.5	5.0	1.0	5.0	1.0	5.0	1.0	5.0
E12	120-v/1Ph/2S	1.0	5.0	1.0	5.0	2.0	5.0	2.0	5.0	2.0	5.0
E13	120-v/1Ph/3S	1.5	5.0	1.5	5.0	3.0	5.0	3.0	5.0	3.0	5.0
E21	208-v/1Ph/1S	0.5	9.5	0.5	9.5	1.0	9.5	1.0	9.5	1.0	9.5
E22	208-v/1Ph/2S	1.0	9.5	1.0	9.5	2.0	9.5	2.0	9.5	2.0	9.5
E23	208-v/1Ph/3S	1.5	9.5	1.5	9.5	3.0	9.5	3.0	9.5	3.0	9.5
E31	240-v/1Ph/1S	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0
E32	240-v/1Ph/2S	1.5	11.0	1.5	11.0	2.0	11.0	2.0	11.0	2.0	11.0
E33	240-v/1Ph/3S	2.0	11.0	2.0	11.0	3.0	11.0	3.0	11.0	3.0	11.0
E41	277-v/1Ph/1S	1.0	13.0	1.0	13.0	1.0	13.0	1.0	13.0	1.5	13.0
E42	277-v/1Ph/2S	1.5	13.0	1.5	13.0	2.0	13.0	2.0	13.0	3.0	13.0
E43	277-v/1Ph/3S	2.5	13.0	2.5	13.0	3.0	13.0	3.0	13.0	4.5	13.0
E61	208-v/3Ph/1S (3-Wire)	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E62	208-v/3Ph/2S (3-Wire)	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E63	208-v/3Ph/3S (3-Wire)	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E91	480v/3Ph/1S (4-Wire)	2.5	21.0	2.5	21.0	3.0	36.0	3.0	36.0	4.5	36.0
E92	480-v/3Ph/2S (4-Wire)	2.5	21.0	2.5	21.0	3.0	36.0	3.0	36.0	4.5	36.0
E93	480-v/3Ph/3S (4-Wire)	2.5	21.0	2.5	21.0	3.0	36.0	3.0	36.0	4.5	36.0

Electrical data (cont)

Proportional Electric Heat kW Range per Inlet Size[a,b]

HEATER CODE	VOLTAGE	04		05		06		07		08	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
L1X	120-v/1Ph	0.5	3.0	0.5	5.0	0.5	5	0.5	5.0	0.5	5.0
L2X	208-v/1Ph	0.5	3.0	0.5	5.0	0.5	7.5	0.5	9.5	0.5	9.5
L3X	240-v/1Ph	1.0	3.0	1.0	5.0	1.0	7.5	1.0	9.5	1.0	11.0
L4X	277-v/1Ph	1.0	3.0	1.0	5.0	1.0	7.5	1.0	9.5	1.0	13.0
L6X	208-v/3Ph (3 Wire)	1.5	3.0	1.5	5.0	1.5	7.5	1.5	9.5	1.5	10.5
L9X	480-v/3Ph (4 Wire)	2.5	3.0	2.5	5.0	2.5	7.5	2.5	9.5	2.5	13.0

HEATER CODE	VOLTAGE	10		12		14		16		22	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
L1X	120-v/1Ph	0.5	5.0	0.5	5.0	1.0	5.0	1.0	5.0	1.0	5.0
L2X	208-v/1Ph	0.5	9.5	0.5	9.5	1.0	9.5	1.0	9.5	1.0	9.5
L3X	240-v/1Ph	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0
L4X	277-v/1Ph	1.0	13.0	1.0	13.0	1.0	13.0	1.0	13.0	1.5	13.0
L6X	208-v/3Ph (3 Wire)	1.5	10.5	1.5	10.5	3.0	10.5	3.0	10.5	3.0	10.5
L9X	480-v/3Ph (4 Wire)	2.5	21.0	2.5	25.0	3.0	25.0	3.0	25.0	4.0	25.0

NOTE(S):

a. The ASHRAE handbook of fundamentals states that discharge temperatures in excess of 90°F are likely to result in objectionable air temperature stratification in the space. Also, ventilation short circuiting may occur. ASHRAE Standard 62.1 limits discharge temperatures to 90°F or increasing the ventilation rate when heating from the ceiling.

b. Electric heaters are provided as slip-in type integrally mounted to the terminal unit.

Electric heat selection

Select heater so that power (kW) is a whole number. Rounding to the nearest whole number has negligible impact on the discharge temperature and power consumption.

Factors:

a. Specify electric duct heaters using voltage, kW, and number of steps.

b. Required kW is calculated using the following relationship.

$$kW = \frac{Btuh}{3413} \qquad kW = \frac{CFM \times \Delta T}{3160}$$

Where:

Btuh = Required heating capacity

CFM = Volume of air controlled during heating (typically 30-100% of maximum cooling volume)

ΔT = Leaving air temperature minus the entering air temperature or the desired air temperature rise across the electric heater

Application data

Several factors should be considered when selecting single-duct units. These include:

Airflow range

Carrier single-duct units are equipped with a 4-quadrant, 12-point total pressure sensor in the unit inlet to allow pressure-independent control of airflow on the basis of a control signal. The flow range is limited by the sensitivity of the controller employed, the inlet duct conditions, and the size of the selected unit.

In most cases, inlet duct minimum airflow of less than 500 fpm should be avoided to prevent erratic control. A minimum flow less than 500 fpm results in differential pressure signals less than 0.03 in. wg, which cannot be resolved reliably by most control systems. Carrier Comfort Network® (CCN) and Carrier i-Vu® Open controllers will allow a lower minimum cfm.

Maximum inlet flow limits are typically restricted to less than 2500 fpm by duct pressure loss limitations, although acoustical limits may also limit selection above this range.

System pressure

Control of duct pressures is the most effective means of ensuring low sound levels, accurate flow control, and minimum energy use. For each terminal unit, there is a minimum static pressure difference required to assure delivery of the design airflow rate. The pressure difference is measured across the terminal inlet to discharge and is reported in inches of water (in. wg). The inlet pressure required by any given unit is the rated static pressure plus the pressure requirements of the discharge ducts and outlets. Inlet static pressure is also a determining characteristic for the sound level that can be anticipated downstream from the terminal unit. The minimum inlet static pressure shown in the terminal unit performance tables is the pressure required by a given size terminal unit to push a specified amount of airflow through the unit with the damper wide open. The pressure was measured by tests conducted in accordance with AHRI Standard 880.

Acoustics

Two types of sound transmission are traceable to air terminal units. “Radiated Sound” escapes through the casing walls and induced air ports of fan-powered units, entering a room randomly. “Discharge Sound” travels through the duct work and enters a room via the outlet. The most common method for analyzing these sound levels is by the use of noise criteria (NC) curves. The curves cover a range of decibel (dB re: 10^{-12} watts) levels, per octave band, that are most recognizable to the human ear. These bands are designated 2 through 7. (See “Sound Power [Lp] vs. Center Frequency” graph.).

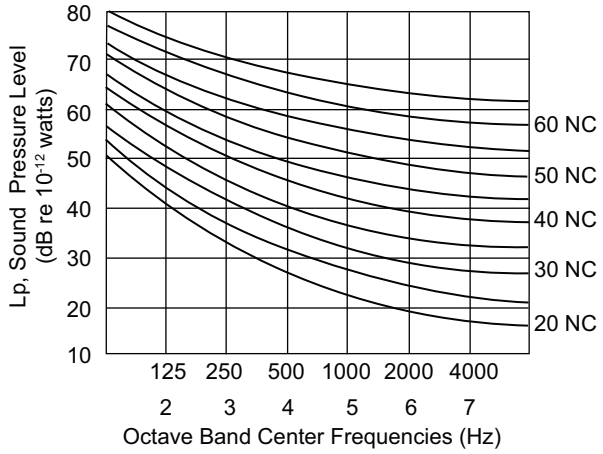
Equipment performance for VAV terminals is usually rated in terms of sound power levels (Lw). Sound pressure is measured in a special acoustical chamber and then printed in sound tables in the form of sound power. Each terminal unit size, various static pressure levels, and flow capacities in both radiated (LwRAD) and discharge (LwDIS) are recorded. By taking these ratings and subtracting various attenuation factors, a sound pressure level (Lp) is arrived at, which can be compared against the recommended NC values, as shown.

For radiated sound power levels (LwRAD), the readings from the acoustical chamber are measured and various adjustments are then subtracted. NC is determined from Octave Band Sound Power data with allowances for an environmental factor and a combined ceiling/space factor for a typical mineral tile ceiling. The reductions are calculated in accordance with AHRI 885-08 Appendix E, a procedure for estimating occupied space sound levels in the application of air terminals and air outlets. Reductions used to determine Discharge NC levels are different than that of Radiated NC levels. AHRI 885 was modified in 1998 to reflect data obtained in ASHRAE sponsored research.

For discharge sound power levels (LwDIS), NC was determined from octave band sound power data with allowances for environmental factor, 5 ft of 1-in. lined duct matching the discharge dimension of the terminal, branch division, end reflection assuming 5 ft of 8-in. diameter flexible duct and room absorption based on a 2,500 ft^3 room with an observer 5 ft from the sound source. These reductions are calculated in accordance with AHRI 885-08, Appendix E.

End reflection loss accounts for low frequency sound reflecting from a room through a diffuser. The attenuation of frequencies through various sizes, shapes, and lengths of duct is known as duct insertion and is a significant reduction. Branching represents a reduction in sound as the air is divided into separate airstreams.

Sound Power (Lp) vs. Center Frequency



Guide specifications

Single-Duct VAV Terminal Unit

HVAC Guide Specifications

Size Range: **Nominal 23 to 7100 cfm**

Carrier Model Number:

35EA (Analog Electronic Controls)

35EB (Open BACnet™[1] VAV Electronic Controls)

35EC (VAV CCN Controls)

35ED (BACnet™ VAV Electronic Controls)

35EN (No control units; factory-mounted actuator or field mounted)

35EP (Pneumatic Control Units)

35ET (TruVu BACnet™ VAV Electronic Controls)

35EV (VVT® CCN Controls)

35EW (TruVu BACnet™ VVT Electronic Controls)

Part 1 — General

1.01 SYSTEM DESCRIPTION:

A. Factory-assembled, externally powered, variable air volume control terminal. Unit shall be complete with a damper assembly, flow sensor, externally mounted volume controller, collars for duct connection, and all required features. Control box shall be clearly marked with an identification label that lists such information as nominal cfm, maximum and minimum airflow limits, coil-type and coil hand, where applicable.

1.02 QUALITY ASSURANCE

A. Insulation shall meet National Fire Protection Association (NFPA) 90A requirements for flame spread and smoke generation and Underwriters Laboratory (UL) 181 requirements for anti-erosion, corrosion, and fungus properties.

B. Hot water coils, when specified, shall be tested for leakage at 250 psig with the coil submerged in water.

C. Electric heating coils, when specified, shall be UL or Engineering Testing Laboratory (ETL) listed and designed to comply with UL Standard 1096.

D. Sound power levels shall be Air-Conditioning, Heating, and Refrigeration Institute (AHRI) certified in accordance with the requirements of AHRI 880.

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory-assembled, externally powered, variable air volume control terminal. Unit shall be complete with a damper assembly, flow sensor, externally mounted volume controller, collars for duct connection and all required features. Control box shall be clearly marked with an identification label that lists such information as nominal cfm, maximum and minimum airflow limits, coil-type and coil hand, balancing chart, and tagging data, where applicable.

B. Unit Cabinet:

Constructed of 22-gauge (20-gauge optional) galvanized steel with round or rectangular inlet collar and rectangular discharge with slip and drive connection. All primary air inlet collars shall accommodate standard flex duct sizes

C. Insulation:

1. Standard casing shall be lined with 1/2-in. thick, 1/2-lb/cf dual-density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.
2. Optional Insulation:
   a. 1-IN.-THICK INSULATION: Unit casing shall be lined with dual-density, 1-in. thick, 1/2-lb/cf density fiberglass insulation that meets UL 181 and NFPA 90A.
   b. CELLULAR INSULATION: Unit casing shall be lined with 1/2-in. or 1-in. thick, 1/2-lb/cf density, smooth surface, polyolefin, closed-cell foam insulation for fiber-free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth. Insulation shall be attached to the unit casing by adhesive and weld pins.
   c. STERILINER INSULATION: Unit casing shall be lined with 13/16-in. thick, 4-lb/cf density, rigid-board insulation with nylon-reinforced foil covering insulation fibers that meets UL 181 and NFPA 90A. Liner shall be attached to unit casing by adhesive and weld pins with full-seam-length Z-strips to enclose and seal the insulation cut edges.
   d. NO LINER: Unit casing shall be equipped with no internal insulation liner.
   e. STERILWALL INSULATION: Unit casing shall be lined with 1/2-in. or 1-in. thick, 1/2-lb/cf density insulation, meeting UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
   f. PERFORATED DOUBLE WALL: Unit casing shall be lined with 1/2-in. thick, 1/2-lb/cf dual-density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.

D. Damper Assembly:

1. The control air damper assembly shall be constructed of heavy gauge galvanized steel with 1/2-in. solid shaft rotating in Delrin®[1] bearings. Damper shaft shall be marked on the end to indicate damper position. Damper blade shall incorporate a flexible gasket for tight airflow shutoff and operate over a full 90 degrees.

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Guide specifications (cont)

E. Controls:
   1. Units shall have pressure-independent pneumatic, analog, or communicating controls, as specified, capable of maintaining required airflow set points ±5% of the unit's capacity at any inlet pressure up to 6 in. wg. The controllers shall be capable of resetting between factory or field-set maximum and minimum (>350 fpm inlet duct velocity) set points to satisfy the room thermostat demand.
   2. The unit shall be equipped with an amplified flow probe located in the unit inlet. Air flow for the pressure independent controller (supplied by others) shall be determined with a factory-supplied 12-point total pressure, center-averaging cross flow sensor, having a magnification resulting in no greater than 2625 fpm at 1 in. developed signal.

F. Special Features:
   1. Hot Water Heating Coil:

      Coil shall be mounted in a minimum 20-ga. galvanized steel casing with slip and drive discharge connections and factory mounted on the base unit as shown on the equipment drawings. Coils shall have:

      a. Aluminum fins (10 fins per in.) bonded to the copper tubes by mechanical expansion.
      b. Number of coil rows and circuits shall be selected to provide performance as required by the plans.
      c. Up to 4 rows as shown on equipment drawings or designed on the equipment schedule. Right or left-hand fittings with sweat connection sizes as indicated on equipment drawings.

   2. Electric Heating Coil:

      Electric coils shall be supplied by the terminal unit manufacturer and shall be ETL listed in accordance with UL standards. Construct coil casing with minimum of 20-gauge zinc-coated steel. Elements shall be nickel-chrome and supported by ceramic isolators. The integral control panel shall be housed in a NEMA (National Electrical Manufacturers) 1 enclosure, with access door to all controls and safety devices. Electric coils shall contain a primary automatic reset thermal cutout and differential pressure airflow switch for proof of airflow. Heaters shall:

      a. Be designed for the capacity, electrical characteristics and steps of control as shown on the equipment schedule.
      b. Have open coil construction with 80% nickel, 20% chromium wire supported in free-floating ceramic bushings. Coil frame shall be constructed of corrosion resistant steel.
      c. Be factory wired and include all limit switches.
      d. Have electric coils that shall include fused or non-fused door interlocking disconnect switch, alternating current (AC) solid state relays (SSRs) for silent operation, fuse block, dust tight enclosure construction, all mounted and/or wired within the control enclosure.
      e. Have an SSR proportional control of electric heat that shall meet the requirements of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Standard 62, Addenda N.
      f. Have an SSR proportional electronic controlled electric heater with control of the leaving air temperature limiting the unit discharge temperature to a set value.

   3. Sound Attenuator:

      The integral sound attenuator section shall consist of a continuous extension of the standard zinc-coated steel casing. When electric heat is required, the attenuator will be used as a standard feature.

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