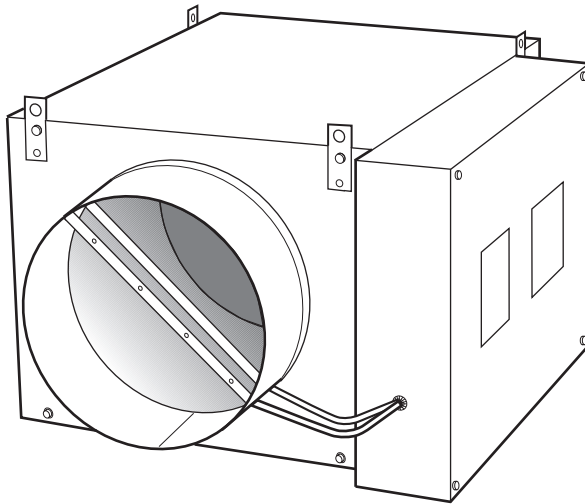




# Product Data

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

Nominal 45 to 7100 cfm



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

- 22-gage galvanized steel, unit casing lined with 1/2-in. dual density fiberglass
- Optional 20-gage 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

## 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, electric and direct digital control options).**

### 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 45 to 7100 cfm. The basic model is a compact, high performance unit with a standard single blade damper. 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 all applications.

# Features/Benefits (cont)



## 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. 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, multiple outlet assembly (octopus), and sound attenuator.

## Superior control offerings

Each 35E unit is supplied with a linear averaging flow probe as a standard feature. This probe offers a flow averaging capability and results in flow sensing capability (see chart below).

Control offerings include: pressure-independent pneumatic, analog electronic, pressure independent VAV (variable air volume) and pressure dependent VVT® (variable volume and temperature) in both BACnet\* 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 switchover from normally open to normally closed applications without moving any components.

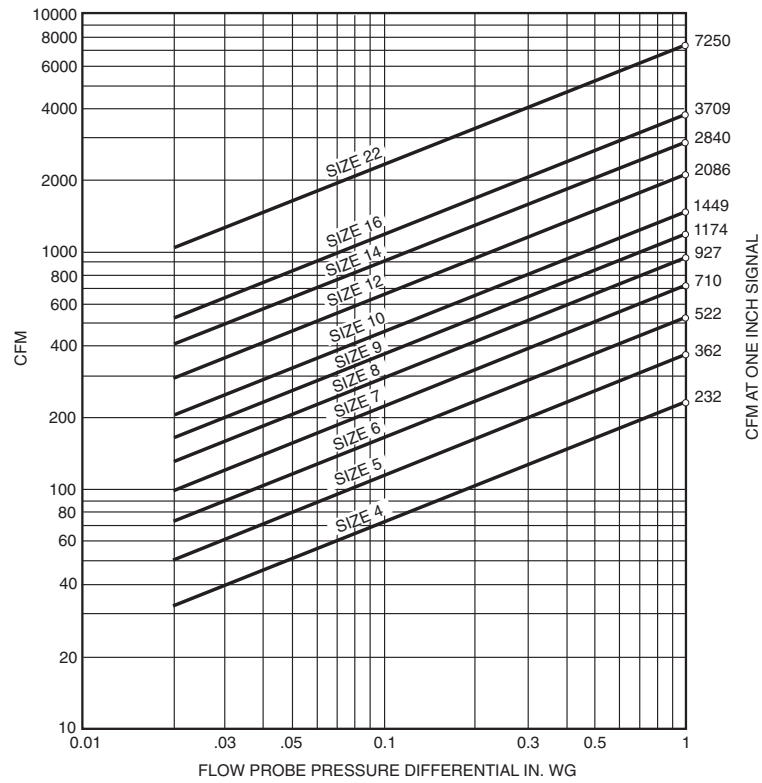
Electronic control units feature a factory-installed enclosure that provides easy access for field connections.

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\* Sponsored by ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers).

### CARRIER 35E LINEAR PROBE CFM VS PRESSURE SIGNAL GRAPH



# Model number nomenclature



35E C 1 0 0 1L 05 0 4140 0

35E – Single Duct Terminal Unit

### Controls

A – Analog                      P – Pneumatic  
 B – BACnet VVT              V – CCN VVT®  
 D – BACnet VAV              C – CCN VAV  
 N – No Controls

### Sensor Type

1 – Linear Averaging (standard)

### Unit Style

0 – Standard – Base Unit  
 1 – Base Unit with Sound Attenuator  
 2 – Base Unit with Multiple Outlets  
 3 – Base Unit with Sound Attenuator and Electric Heat  
 4 – Base Unit with Multiple Outlets and Hot Water Reheat

### Liner

0 – Standard (½-in. thick)  
 1 – Fiberglass (1 in. dual density)  
 2 – Steriliner  
 3 – No Liner  
 4 – Sterilwall  
 5 – Cellular  
 A – Perforated Double Wall

### Unit Casing

LEFT	RIGHT	DESCRIPTION
0L	0R	22 Gage Steel, No Access Panel
1L	1R	22 Gage Steel, With Access Panel
2L	2R	20 Gage Steel, No Access Panel
3L	3R	20 Gage Steel, With Access Panel

### LEGEND

VAV — Variable Air Volume  
 VVT — Variable Volume and Temperature

\*See pages 8 and 9 for complete control code numbers.  
 †Only used with multiple outlet unit styles (2 and 4).

### Factory-Installed Options

0 – None  
 S – Hanger Brackets  
 D – Non-Fused Disconnect  
 E – Dust-Tight Enclosure  
 G – 24 to 24 vac Transformer  
 H – 120 to 24 vac Transformer  
 J – 208 to 24 vac Transformer  
 K – 240 to 24 vac Transformer  
 L – 277 to 24 vac Transformer

### Control Types\*

0000 – No Controls  
 11XX – Pneumatic  
 21XX – Analog  
 41XX – CCN VAV  
 42XX – BACnet VAV  
 82XX – CCN VVT  
 82XX – BACnet VVT

### Outlet Type

0 – Standard Rectangular  
 1 – Round Outlet (size= inlet diameter)  
 A – 2 Outlets, 5 7/8-in. dia. (round)†  
 B – 3 Outlets, 5 7/8-in. dia. (round)†  
 C – 2 Outlets, 7 7/8-in. dia. (round)†  
 D – 3 Outlets, 7 7/8-in. dia. (round)†  
 E – 4 Outlets, 7 7/8-in. dia. (round)†  
 F – 5 Outlets, 7 7/8-in. dia. (round)†  
 G – 2 Outlets, 9 7/8-in. dia. (round)†  
 H – 3 Outlets, 9 7/8-in. dia. (round)†  
 J – 4 Outlets, 9 7/8-in. dia. (round)†  
 K – 5 Outlets, 9 7/8-in. dia. (round)†  
 L – 2 Outlets, 11 7/8-in. dia. (round)†  
 M – 3 Outlets, 11 7/8-in. dia. (round)†

### Unit Inlet Size

04 – 4 in. dia (round)      10 – 10 in. dia (round)  
 05 – 5 in. dia (round)      12 – 12 in. dia (round)  
 06 – 6 in. dia (round)      14 – 14 in. dia (round)  
 07 – 7 in. dia (round)      16 – 16 in. dia (round)  
 08 – 8 in. dia (round)      22 – 24 x 16 in. (square)  
 09 – 9 in. dia (round)

# AHRI\* capacity ratings



## AHRI CERTIFICATION RATINGS FOR 35E UNITS (RADIATED)

OCTAVE BANDS AT 1.5 in. wg STATIC PRESSURE	FREQUENCY (Hz)	35E SIZE									
		04	05	06	07	08	09	10	12	14	16
		Airflow (Cfm)									
		150	250	400	550	700	900	1100	1600	2100	2800
2	125	58	59	60	60	60	60	60	60	60	62
3	250	50	53	58	58	59	56	56	57	58	59
4	500	43	45	50	50	50	50	51	51	51	53
5	1000	38	38	39	41	42	42	42	47	47	49
6	2000	35	35	36	36	37	39	39	44	44	44
7	4000	31	32	33	34	35	35	35	36	36	40

## AHRI CERTIFICATION RATINGS FOR 35E UNITS (DISCHARGE)

OCTAVE BANDS AT 1.5 in. wg STATIC PRESSURE	FREQUENCY (Hz)	35E SIZE									
		04	05	06	07	08	09	10	12	14	16
		Airflow (Cfm)									
		150	250	400	550	700	900	1100	1600	2100	2800
2	125	61	61	63	67	67	67	67	68	69	70
3	250	61	62	68	69	70	66	66	68	68	68
4	500	55	57	61	59	61	61	61	64	64	64
5	1000	51	52	54	55	57	57	58	60	61	62
6	2000	49	50	50	52	54	55	56	57	58	59
7	4000	45	47	48	49	51	52	53	54	56	57

\*Air Conditioning, Heating, and Refrigeration Institute.

NOTE: Both AHRI and ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) provide guidance in measuring sound power levels (per AHRI 880), and in estimating the resultant room sound pressure, typically shown as an NC (noise criteria) level (per AHRI 885). American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) handbooks provide detailed acoustical guidance. Air Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 885 is an application standard which provides tables and equations for determining acoustical deduction based on the

ASHRAE guides, as well as additional information provided by manufacturers.

All sound data shown by octave bands is raw data without any corrections for room absorption or duct attenuation. This sound power data is tested in accordance with AHRI Standard 880.

Accurate sound level estimates for typical office spaces or other applications are reflected by NC values. These NC levels are calculated based on procedures from AHRI Standard 885.



# Physical data



## UNIT WEIGHTS

35E SIZE	UNIT ONLY (lb)	WITH PNEUMATIC CONTROLS (lb)	WITH DDC OR ANALOG CONTROLS (lb)	WITH ELECTRIC HEAT CONTROLS (lb)	WITH HOT WATER (1 ROW/2 ROW) (lb)
04, 05, 06	14	18	23	32	19/20
07, 08	16	20	25	34	21/23
09, 10	21	25	30	44	28/30
12	26	30	35	51	35/38
14	34	38	43	61	44/49
16	38	42	47	66	50/55
22	65	69	74	95	82/90

### LEGEND

**DDC** — Direct Digital Controls

NOTE: Data is based on the following conditions:

1. Unit casing is 22 gage.
2. Unit insulation is 1/2-in. thick, 1.5-lb Tuf-Skin Rx™ insulation, dual density.
3. Units rated with standard linear flow sensor.

## RECOMMENDED AIRFLOW

INLET SIZE (in.)*	MAX. PRIMARY AIRFLOW (Cfm)	MINIMUM RECOMMENDED AIRFLOW (Cfm)			MINIMUM PRESSURE (in. wg)
		Standard†	CCN†	Electric Heat**	
4	230	40 or 0	23 or 0	55	0.01
5	360	62 or 0	36 or 0	85	0.04
6	515	89 or 0	52 or 0	110	0.10
7	700	121 or 0	71 or 0	140	0.10
8	920	159 or 0	93 or 0	190	0.10
9	1160	201 or 0	117 or 0	240	0.18
10	1430	248 or 0	145 or 0	300	0.10
12	2060	357 or 0	209 or 0	425	0.10
14	2800	486 or 0	284 or 0	580	0.10
16	3660	634 or 0	371 or 0	750	0.10
22x16	7000	1212 or 0	725 or 0	1800	0.10

**CCN** — Carrier Comfort Network®

\*Units have round inlets through size 16, and a rectangular inlet for size 22.

†The standard cfm value is based on a signal of 0.03 in. wg differential pressure of the inlet sensor.

\*\*Electric heat airflow is based on the cfm necessary to trip the airflow proving safety switch.

# Factory-installed options



## Factory-installed options

- 20-gage galvanized steel casing construction
- Liner options
- Dust-tight control enclosures
- Sound attenuator
- Water or electric coils
- Hanger brackets
- Non-fused disconnect
- Transformers
- Access panel

**Electric heat** — The 35E electric heat options are ETL listed in accordance with UL standards and meet NEC (National Electrical Code) requirements. Manual and automatic reset thermal cutout and positive pressure airflow switch are standard. Pneumatic electric (PE) switches are standard step controllers when pneumatic control systems are specified. Magnetic contactors are standard step controllers when electronic control systems are specified. Control enclosure houses all control components. Proportional solid-state relay (SSR) electronic-controlled heaters are available with or without leaving air temperature control.

### Available heater voltages

- 120 v/single phase (all except size 22)
- 208/277 v/single phase
- 208/230 v/3 phase/3-wire
- 480 v/3 phase/4-wire

### Electric heat options

- Mercury contactors
- Fuse block with fuses for primary overload protection
- Disconnect switches
- Fused disconnect switches
- Dust-tight construction
- Discharge temperature sensor (with SSR heat only)

Electric heaters are slip-in type, integrally mounted to the terminal unit. Where possible, select heater so that power (kW) is a whole number (see Electrical Data). Rounding to the nearest whole number has negligible impact on discharge temperature and power consumption.

**Hot water coils** — The 35E hot water coils are enclosed in a galvanized steel casing and constructed of corrugated aluminum fins. The coil tubing is water leak tested to 400 psig. Vent and drain options are available.

Features include:

- 1/2 in. OD copper tubing
- Aluminum corrugated fins, 10 per inch
- Galvanized steel casing
- Slip and drive cleat discharge duct connection

**Liner options** — There are 7 different methods in which units can be supplied with internal insulation.

1. Standard unit insulation is 1/2-in. thick, 1 1/2-lb dual density fiberglass liner which meets UL 181 and NFPA 90A requirements.
2. Dual density, 1-in. thick, 1 1/2-lb density fiberglass insulation meets UL 181 and NFPA 90A.
3. Cellular insulation option consists of a unit casing that is lined, glued and riveted with 3/8-in. thick, 1 1/2-lb 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.
4. The Steriliner option consists of 13/16-in., 4 lb density, rigid duct board insulation with nylon reinforced foil material covering the insulation fibers. The insulation 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 cut edges, thus eliminating tape and adhesives to cover the cut edges.

5. The Sterilwall insulation option consists of standard 1/2-in. or 1-in. thick, 1 1/2-lb dual density, fiberglass insulation. The insulation meets UL 181 and NFPA 90A. It is 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. A perforated doublewall insulation option consists of standard 1/2-in. or 1-in. thick, 1 1/2-lb dual density, fiberglass insulation. The insulation meets UL 181 and NFPA 90A. It is 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.
7. The no liner option consists of the unit casing with no internal insulation.

**Sound attenuator option** — Units with electric heat are equipped with an attenuator as standard. The attenuator is also available without electric heat, as an option. The resultant decrease in sound levels is dependent on the lining type selected, but is equivalent to 3 feet of duct lining. The Carrier Air Terminal Builder program provides detailed data on the effect of various linings.

**Multiple outlet attenuator option** — Units with or without hot water reheat (but not with electric heat) may be equipped with an optional multiple outlet attenuator. This offers a factory-installed series of round outlets with manual dampers (optional) in a number of configurations, depending on size.

**Control options** — The 35E single duct unit is offered with a wide variety of factory-mounted controls that regulate the volume of air delivery from the unit and respond to cooling and heating load requirements of the conditioned space. Stand-alone controls will fulfill the thermal requirements of a given control space. These devices are available in both pneumatic and electronic arrangements. The CCN and BACnet VVT® and, VAV electronic controls are communicating PIC (product integrated controls) which are integrated with the building system. A number of DDC (Direct Digital Controls) control packages by others are available for consignment mounting, as indicated.

Control offerings are:

- 35EA: Analog electronic
- 35EB: BACnet VVT electronic controls
- 35EC: CCN VAV electronic controls
- 35ED: BACnet VAV electronic controls
- 35EP: Pneumatic
- 35EV: CCN VVT electronic controls
- 35EN: No controls or DDC by others

Each control approach offers a variety of operating functions; a control package number identifies combinations of control functions. The following listings contain the basic function arrangements for each control offering. Because of the variety of functions available, circuit diagrams, operating sequences, and function descriptions are contained in separate Application Data publications. Refer to the specific control publication for details.

# Factory-installed options (cont)



**Analog electronic controls** — Pressure independent control packages are available without supplemental heat, with on/off hot water or electric heat, proportional hot water heat, or with cooling/heating automatic changeover control.

All analog control arrangements include a standard linear inlet flow sensor, 24-v transformer (optional), control enclosure and wall thermostat to match the control type.

- 2100** Heating control
- 2101** Cooling control
- 2102** Cooling with on/off electric heat control
- 2103** Cooling with on/off hot water heat control
- 2104** Cooling/heating automatic changeover control
- 2105** Cooling with proportional hot water heat control
- 2110** Cooling with proportional electric heat control
- 3100** Electric temperature responsive control

**Pneumatic controls** — All control packages are pressure independent (unless otherwise noted) and available with or without hot water heat, dual maximum airflow, heating and cooling maximum airflow and dual minimum airflow. All control arrangements include a standard linear inlet flow sensor.

- 1100** (Actuator only): DA-NC pressure dependent control
- 1101** (Actuator only): RA-NO pressure dependent control
- 1102** (Single function controller): DA-NO with or without hot water or electric heat
- 1103** (Single function controller): RA-NC with or without hot water or electric heat
- 1104** (Multi-function controller): DA-NO with or without hot water or electric heat
- 1105** (Multi-function controller): DA-NC with or without hot water or electric heat
- 1106** (Multi-function controller): RA-NO with or without hot water or electric heat
- 1107** (Multi-function controller): RA-NC with or without hot water or electric heat
- 1108** (Dual Maximum Control): DA-NO with or without hot water or electric heat
- 1109** (Heating/Cooling Maximum Control): DA-NO with or without hot water or electric heat
- 1110** (Dual Minimum Control): DA-NO with or without hot water or electric heat

DA — Direct-acting thermostat

RA — Reverse-acting thermostat

NO — Normally open damper position

NC — Normally closed damper position

The single function controller provides single functions, i.e., DA-NO. Multi-function controllers are capable of providing DA-NO, DA-NC, RA-NC or RA-NO functions.

**CCN VAV controls** — Pressure independent controls are factory-installed in a control enclosure. Factory-mounted transformers are available as an option. Thermostats are supplied separately as a field-installed accessory. The CCN control packages must be used in combination with a thermostat. Thermostats are not included in the package.

- 4140** Cooling only
- 4141** Single-stage and 2-stage electric heat
- 4142** 3-stage electric heat

- 4143** On-Off hot water
- 4144** Proportional (floating) hot water heat
- 4145** Cooling only with supply return tracking
- 4147** Single-stage, 2-stage and 3-stage electric heat with supply return tracking
- 4148** On/Off hot water with supply return tracking
- 4149** Proportional (floating) hot water with supply return tracking
- 4150** Return air damper
- 4151** Cooling with single-stage or 2-stage field-installed electric heat
- 4152** Cooling with 3-stage field-installed electric heat
- 4154** Cooling with proportional solid-state relay (SSR) electric heat

**BACnet VAV controls** — BACnet pressure independent controls are factory-installed in a control enclosure. Factory-mounted transformers are available as an option. Thermostats are supplied separately as a field-installed accessory. BACnet control packages must be used in combination with a thermostat. Thermostats are not included in the package.

- 4240** Cooling only
- 4241** Single-stage electric heat
- 4242** 2-stage or 3-stage electric heat
- 4243** On-Off hot water
- 4244** Proportional (0-10 vdc) hot water heat
- 4251** Single-stage field-installed electric heat
- 4252** 2-stage or 3-stage field-installed electric heat
- 4254** Proportional solid-state relay (SSR) electric heat

**CCN VVT® controls** — Pressure dependent variable volume and temperature (VVT) controls are factory-installed in a control enclosure. Factory-mounted transformers are available as an option. Thermostats are supplied separately as a field-installed accessory.

- 8220** Pressure dependent cooling only
- 8221** Pressure dependent cooling with 3-stage electric heat
- 8222** Pressure dependent cooling with on/off hot water heat
- 8223** Pressure dependent cooling with modulating hot water heat
- 8224** Pressure dependent cooling with combination base-board and 2-stage electric heat
- 8230** Bypass damper control
- 8231** Pressure dependent cooling with 3-stage field-installed electric heat
- 8232** Pressure dependent cooling with solid-state relay (SSR) proportional electric heat

**BACnet VVT controls** — Pressure dependent variable volume and temperature (VVT) controls are factory-installed in a control enclosure. Factory-mounted transformers are available as an option. Thermostats are supplied separately as a field-installed accessory.

- 8260** Pressure dependent cooling only
- 8261** Pressure dependent cooling with 2-stage or 3-stage electric heat





- 8262** Pressure dependent cooling with on/off hot water heat
- 8263** Pressure dependent cooling with proportional (modulating) hot water heat
- 8264** Pressure dependent cooling with combination base board and 2-stage electric heat
- 8270** Bypass damper control
- 8271** Pressure dependent cooling with single-stage or 2-stage field-installed electric heat
- 8272** Pressure dependent cooling with modulating solid-state relay (SSR) proportional electric heat

**Accessory CCN thermostats**

- Thermostat: 33ZCT55SPT: RT (room temperature) sensor, with override only.
- Thermostat: 33ZCT56SPT: RT (room temperature) sensor, with set point adjust and override.
- Thermostat: 33ZCT59SPT: RT (room temperature) sensor, with set point adjust, override and LCD display.
- Inlet Air Temperature Sensor: 33ZCSENPAT (required only if linkage unavailable)

**Accessory BACnet thermostats**

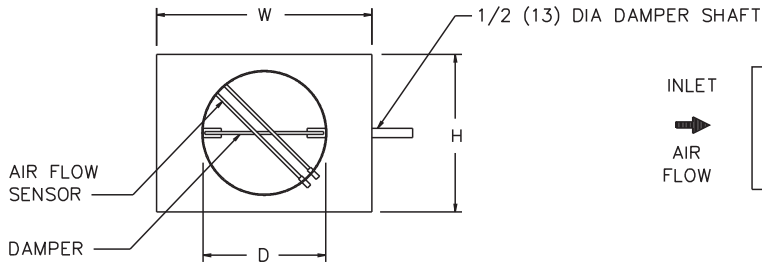
- Thermostat: SPS: RT (room temperature) only.
- Thermostat: SPPL: RT (room temperature) sensor, with set point adjust and override.
- Thermostat: SPP: RT (room temperature) sensor, with set point adjust, override, LCD display, and zone setpoints.

**No controls or direct digital controls (by others) —**

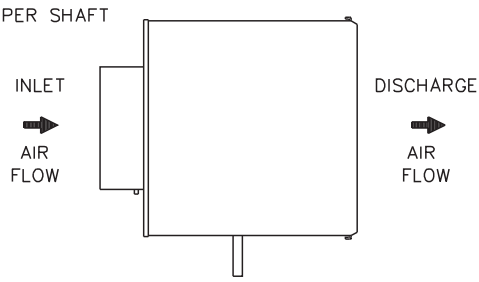
Control packages are field-supplied for factory mounting, unless otherwise noted. All DDC control arrangements include a standard linear inlet flow sensor, transformer to 24 volts and control enclosure. Contact Carrier for detail about mounting field-supplied controls.

- 0000** 35E box only
- D000** 35E box with control box only (For units without electric heat requiring a 24 v control transformer: the control transformer must be ordered from the unit accessories list in Quote Builder.)
- D001** 35E box with control box and 24 v transformer
- P000** 35E box without controls (for DA pneumatic controlled heat unit)
- P001** 35E box without controls (for RA pneumatic controlled electric heat unit)

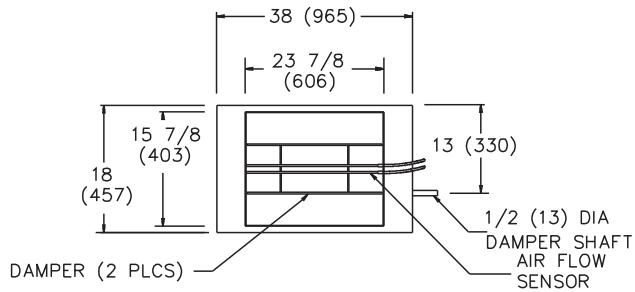
## 35E BASE UNIT WITH NO CONTROLS



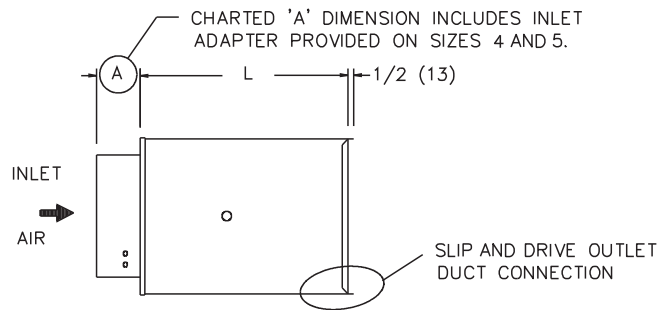
INLET VIEW – SIZES 04-16



TOP VIEW

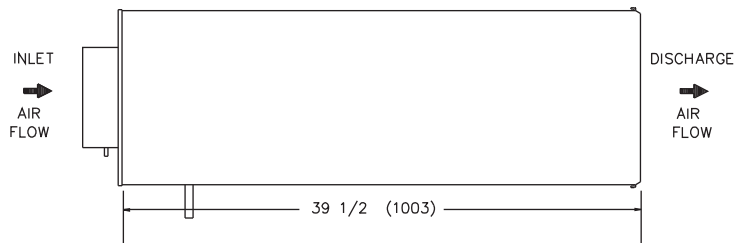


INLET VIEW – SIZE 22



SIDE VIEW

## TOP VIEW WITH OPTIONAL ATTENUATOR

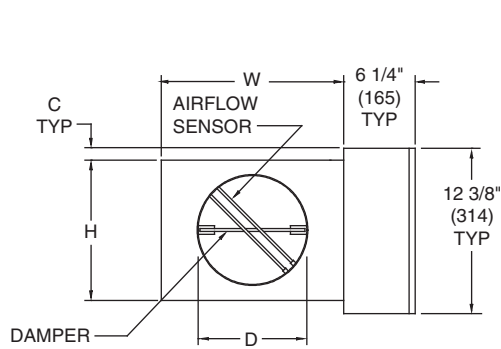


**NOTES:**

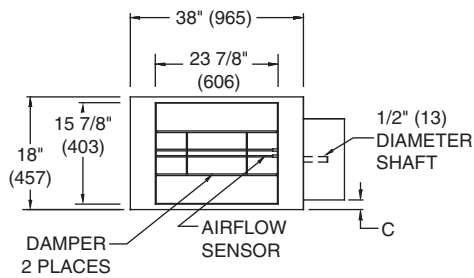
1. Right-hand configuration shown. Left hand is available.
2. Dimensions are given in inches (mm).
3. Discharge side of box is fully open. Dimensions are in H x W, as listed.

35E UNIT SIZE	MAXIMUM CFM	L	W	H	A	D
04	230	15 <sup>1</sup> / <sub>2</sub>	12	8	5 <sup>3</sup> / <sub>8</sub>	3 <sup>7</sup> / <sub>8</sub>
05	360	15 <sup>1</sup> / <sub>2</sub>	12	8	5 <sup>3</sup> / <sub>8</sub>	4 <sup>7</sup> / <sub>8</sub>
06	515	15 <sup>1</sup> / <sub>2</sub>	12	8	3 <sup>3</sup> / <sub>8</sub>	5 <sup>7</sup> / <sub>8</sub>
07	700	15 <sup>1</sup> / <sub>2</sub>	12	10	3 <sup>3</sup> / <sub>8</sub>	6 <sup>7</sup> / <sub>8</sub>
08	920	15 <sup>1</sup> / <sub>2</sub>	12	10	3 <sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>
09	1160	15 <sup>1</sup> / <sub>2</sub>	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	8 <sup>7</sup> / <sub>8</sub>
10	1430	15 <sup>1</sup> / <sub>2</sub>	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>
12	2060	15 <sup>1</sup> / <sub>2</sub>	16	15	3 <sup>3</sup> / <sub>8</sub>	11 <sup>7</sup> / <sub>8</sub>
14	2800	15 <sup>1</sup> / <sub>2</sub>	20	17 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	13 <sup>7</sup> / <sub>8</sub>
16	3660	15 <sup>1</sup> / <sub>2</sub>	24	18	3 <sup>3</sup> / <sub>8</sub>	15 <sup>7</sup> / <sub>8</sub>
22	7000	15	38	18	4 <sup>1</sup> / <sub>4</sub>	See Above

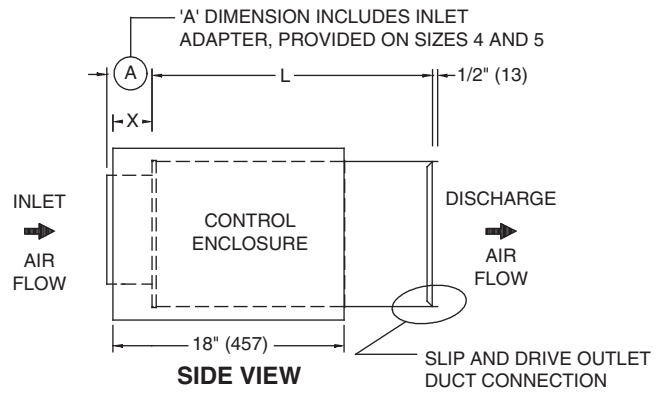
### 35E BASE UNIT WITH ANALOG, VVT®, AND VAV CONTROLS



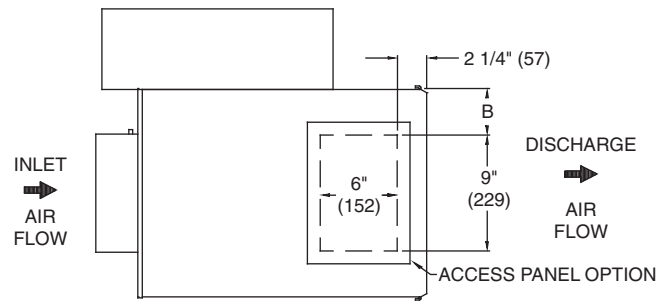
**INLET VIEW - SIZES 04 - 16**



**INLET VIEW - SIZE 22**



**SIDE VIEW**



**BOTTOM VIEW**

**NOTES:**

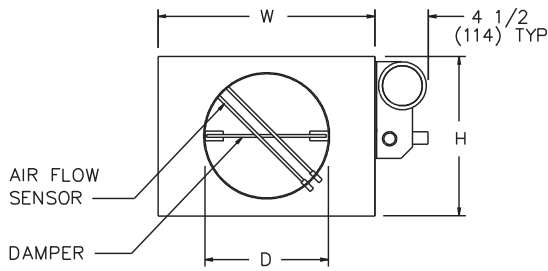
1. Left and right-hand configurations are available. Right hand is shown.
2. Dimensions are given in inches (mm).
3. A control box will be factory-supplied for installation of Analog, VVT®, VAV, or field-supplied DDC controls.

35E UNIT SIZE	MAXIMUM CFM	L	W	H	A	B	C	D	X
04	230	15 1/2	12	8	5 3/8	7 1/4	2 1/8	3 7/8	7 1/4
05	360	15 1/2	12	8	5 3/8	7 1/4	2 1/8	4 7/8	7 1/4
06	515	15 1/2	12	8	3 3/8	7 1/4	2 1/8	5 7/8	7 1/4
07	700	15 1/2	12	10	3 3/8	7 1/4	1 1/8	6 7/8	7 1/4
08	920	15 1/2	12	10	3 3/8	7 1/4	1 1/8	7 7/8	7 1/4
09	1160	15 1/2	14	12 1/2	3 3/8	5 1/4	—	8 7/8	5 1/4
10	1430	15 1/2	14	12 1/2	3 3/8	5 1/4	—	9 7/8	5 1/4
12	2060	15 1/2	16	15	3 3/8	5 1/4	—	11 7/8	5 1/4
14	2800	15 1/2	20	17 1/2	3 3/8	3 1/4	—	13 7/8	3 1/4
16	3660	15 1/2	24	18	3 3/8	3 1/4	—	15 7/8	3 1/4
22	7000	15	38	18	4 1/4	5 1/4	1 1/8	See Above	5 1/4

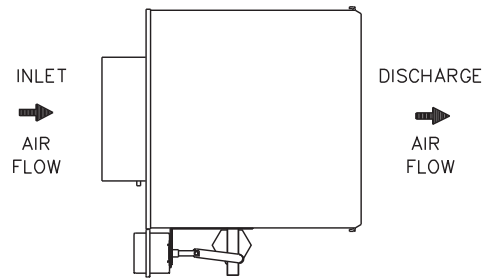
# Dimensions (cont)



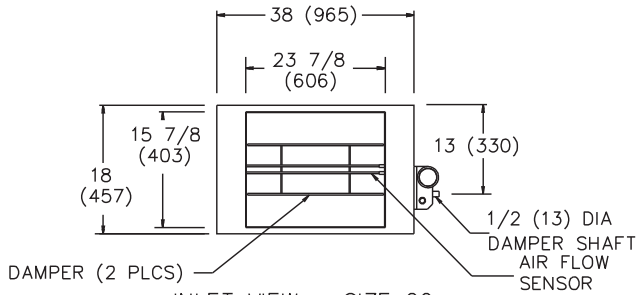
## 35E BASE UNIT WITH PNEUMATIC CONTROLS (TYPICAL)



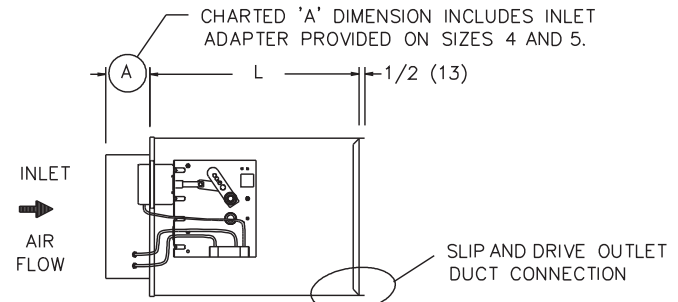
INLET VIEW - SIZES 4-16



TOP VIEW



INLET VIEW - SIZE 22



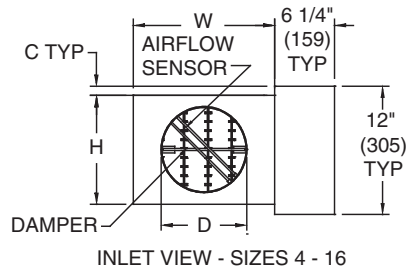
SIDE VIEW

NOTE: Dimensions are given in inches (mm).

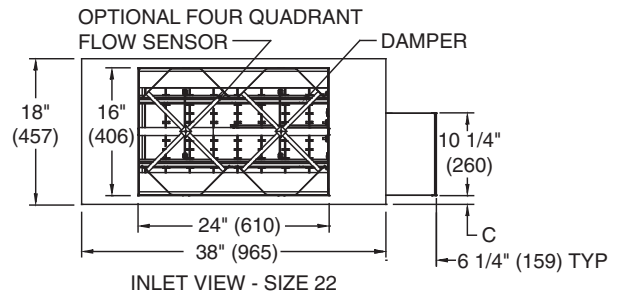
### 35E PNEUMATIC MULTI-FUNCTION CONTROL

35E UNIT SIZE	NOM MAX CFM	L	W	H	A	D
04	230	15 <sup>1</sup> / <sub>2</sub>	12	8	5 <sup>3</sup> / <sub>8</sub>	3 <sup>7</sup> / <sub>8</sub>
05	360	15 <sup>1</sup> / <sub>2</sub>	12	8	5 <sup>3</sup> / <sub>8</sub>	4 <sup>7</sup> / <sub>8</sub>
06	520	15 <sup>1</sup> / <sub>2</sub>	12	8	3 <sup>3</sup> / <sub>8</sub>	5 <sup>7</sup> / <sub>8</sub>
07	710	15 <sup>1</sup> / <sub>2</sub>	12	10	3 <sup>3</sup> / <sub>8</sub>	6 <sup>7</sup> / <sub>8</sub>
08	925	15 <sup>1</sup> / <sub>2</sub>	12	10	3 <sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>
09	1200	15 <sup>1</sup> / <sub>2</sub>	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	8 <sup>7</sup> / <sub>8</sub>
10	1450	15 <sup>1</sup> / <sub>2</sub>	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>
12	2100	15 <sup>1</sup> / <sub>2</sub>	16	15	3 <sup>3</sup> / <sub>8</sub>	11 <sup>7</sup> / <sub>8</sub>
14	2900	15 <sup>1</sup> / <sub>2</sub>	20	17 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	13 <sup>7</sup> / <sub>8</sub>
16	3700	15 <sup>1</sup> / <sub>2</sub>	24	18	3 <sup>3</sup> / <sub>8</sub>	15 <sup>7</sup> / <sub>8</sub>
22	7100	15	38	18	3 <sup>3</sup> / <sub>8</sub>	23 <sup>7</sup> / <sub>8</sub> x 15 <sup>7</sup> / <sub>8</sub>

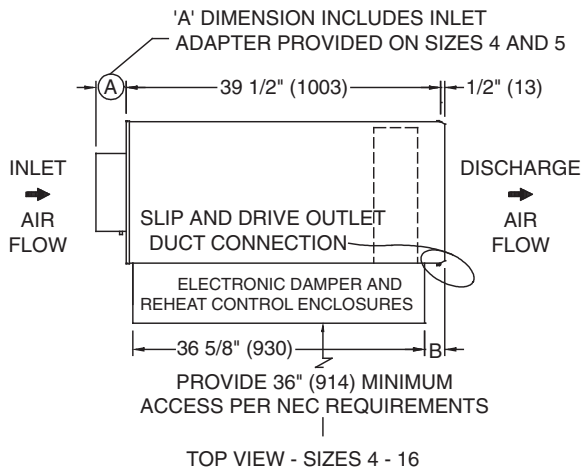
### 35E BASE UNIT WITH ELECTRIC REHEAT



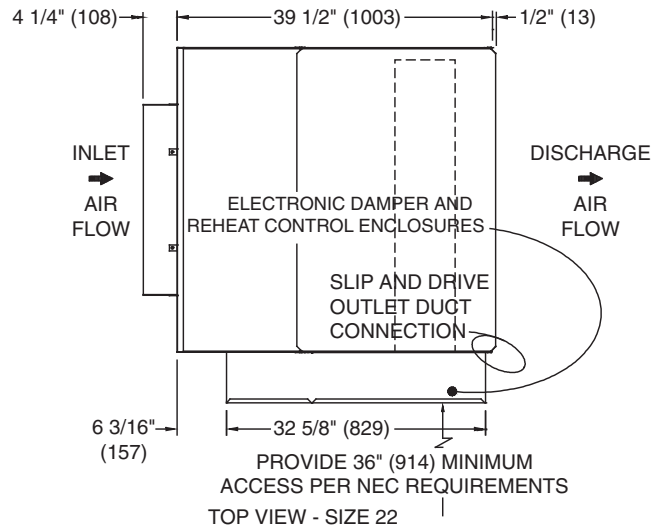
INLET VIEW - SIZES 4 - 16



INLET VIEW - SIZE 22



TOP VIEW - SIZES 4 - 16



TOP VIEW - SIZE 22

**LEGEND**

**NEC** — National Electrical Code

**NOTES:**

1. Right-hand configuration shown. Left hand is available.
2. Dimensions are given in inches (mm).
3. Units with electric heat coils automatically get the attenuator option. The overall length is 39 1/2 inches.

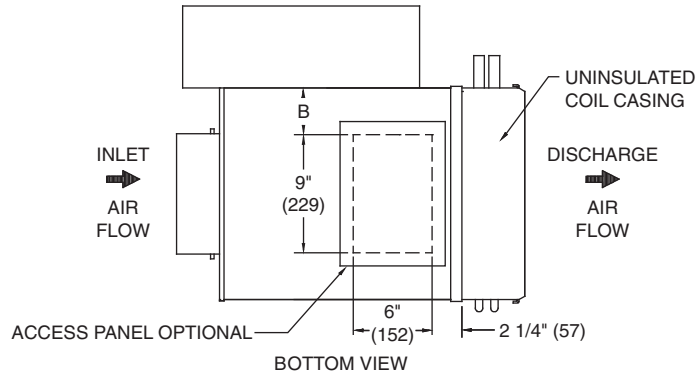
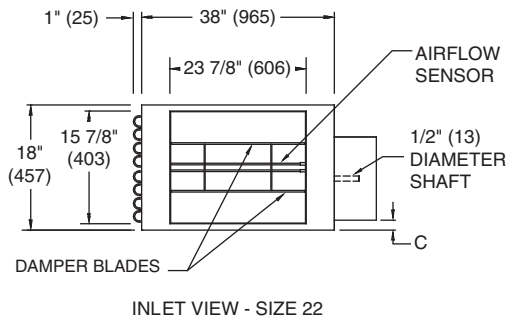
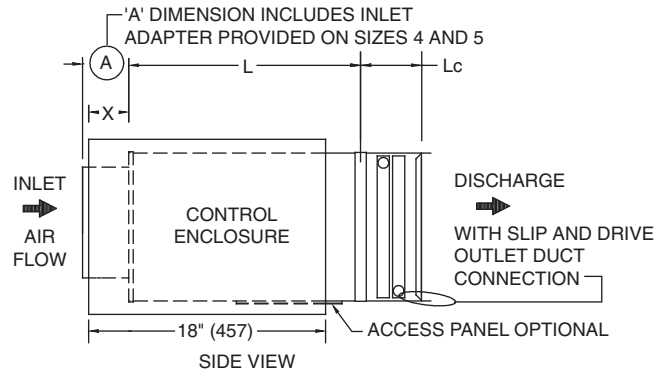
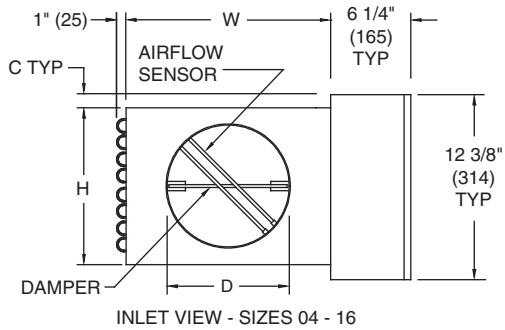
**35E WITH OPTIONAL ELECTRIC HEAT**

35E UNIT SIZE	MAXIMUM CFM	W	H	A	B	C	D
04	230	12	8	5 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	2	3 <sup>7</sup> / <sub>8</sub>
05	360	12	8	5 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	2	4 <sup>7</sup> / <sub>8</sub>
06	515	12	8	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	2	5 <sup>7</sup> / <sub>8</sub>
07	700	12	10	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	1	6 <sup>7</sup> / <sub>8</sub>
08	920	12	10	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	1	7 <sup>7</sup> / <sub>8</sub>
09	1160	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>	—	8 <sup>7</sup> / <sub>8</sub>
10	1430	14	12 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>	—	9 <sup>7</sup> / <sub>8</sub>
12	2060	16	15	3 <sup>3</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>	—	11 <sup>7</sup> / <sub>8</sub>
14	2800	20	17 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	—	13 <sup>7</sup> / <sub>8</sub>
16	3660	24	18	3 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	—	15 <sup>7</sup> / <sub>8</sub>
22	7000	38	18	4 <sup>1</sup> / <sub>4</sub>	—	1 <sup>1</sup> / <sub>8</sub>	23 <sup>7</sup> / <sub>8</sub> x 15 <sup>7</sup> / <sub>8</sub>

# Dimensions (cont)



## 35E BASE UNIT WITH HOT WATER REHEAT

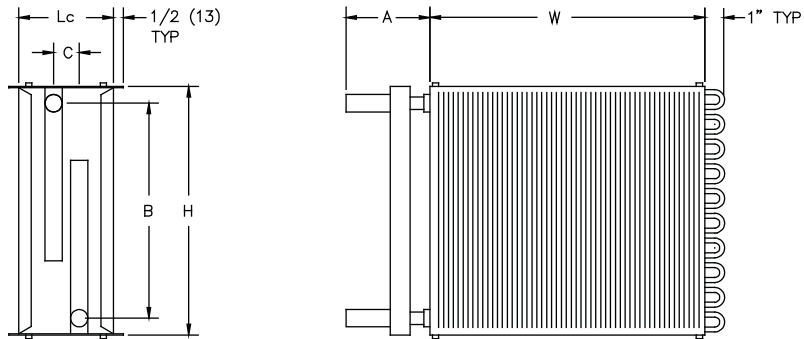


**NOTES:**

1. Right-hand configurations shown. Left hand is available.
2. Dimensions are given in inches (mm).
3. Dimension "Lc" would be added to base 35E unit as shown or would be same if added to base unit with attenuator.

35E UNIT SIZE	MAXIMUM CFM	L	W	H	A	B	C	D	Lc	X
04	230	15 1/2	12	8	5 3/8	1 1/2	2 1/8	3 7/8	See Next Page	7 1/4
05	360	15 1/2	12	8	5 3/8	1 1/2	2 1/8	4 7/8		7 1/4
06	515	15 1/2	12	8	3 3/8	1 1/2	2 1/8	5 7/8		7 1/4
07	700	15 1/2	12	10	3 3/8	1 1/2	1 1/8	6 7/8		7 1/4
08	920	15 1/2	12	10	3 3/8	1 1/2	1 1/8	7 7/8		7 1/4
09	1160	15 1/2	14	12 1/2	3 3/8	2 1/2	—	8 7/8		5 1/4
10	1430	15 1/2	14	12 1/2	3 3/8	2 1/2	—	9 7/8		5 1/4
12	2060	15 1/2	16	15	3 3/8	3 1/2	—	11 7/8		5 1/4
14	2800	15 1/2	20	17 1/2	3 3/8	5 1/2	—	13 7/8		3 1/4
16	3660	15 1/2	24	18	3 3/8	7 1/2	—	15 7/8		3 1/4
22	7000	15	38	18	4 1/4	14 1/2	1 1/8	See Above		5 1/4

### 35E HOT WATER COILS



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.

CONNECTION TUBING — 0.032-in. thick copper. Refer to O.D. sweat connection diameter shown in table below.

COIL CASING — 20 Ga. Galvanized steel.

COIL TUBING — 1/2-in. diameter x 0.016-in. thick copper.

COIL FINS — 0.006-in. thick aluminum, 10 per inch, mechanically bonded to tubing.

COIL ACCESSORIES:

- Optional air vent and water drain.

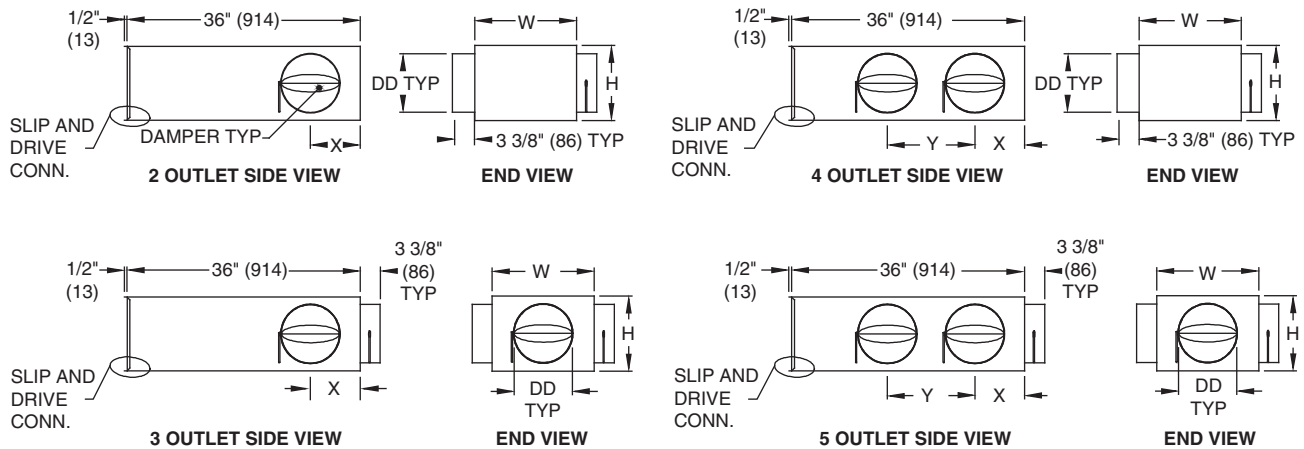
Unit dimensions given in inches (mm).

35E UNIT SIZE	NO. OF COILS	H	W	Lc	A	B	C	WATER CONN. (O.D.)
04, 05, 06	1 Row	8	12	5	3	6 <sup>1</sup> / <sub>4</sub>	—	1/2
	2 Row	8	12	5	4 <sup>1</sup> / <sub>4</sub>	6 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	8	12	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	6 <sup>7</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	7/8
	4 Row	8	12	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	6 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	7/8
07, 08	1 Row	10	12	5	3	8 <sup>3</sup> / <sub>4</sub>	—	1/2
	2 Row	10	12	5	4 <sup>1</sup> / <sub>4</sub>	9	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	10	12	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	9	2 <sup>1</sup> / <sub>8</sub>	7/8
	4 Row	10	12	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	9	3 <sup>1</sup> / <sub>4</sub>	7/8
09, 10	1 Row	12 <sup>1</sup> / <sub>2</sub>	14	5	4 <sup>1</sup> / <sub>4</sub>	10 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	7/8
	2 Row	12 <sup>1</sup> / <sub>2</sub>	14	5	4 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	12 <sup>1</sup> / <sub>2</sub>	14	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>8</sub>	7/8
	4 Row	12 <sup>1</sup> / <sub>2</sub>	14	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>4</sub>	7/8
12	1 Row	15	16	5	4 <sup>1</sup> / <sub>4</sub>	13 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	7/8
	2 Row	15	16	5	4 <sup>1</sup> / <sub>4</sub>	13 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	15	16	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	2 <sup>5</sup> / <sub>8</sub>	7/8
	4 Row	15	16	7 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	3 <sup>1</sup> / <sub>4</sub>	7/8
14	1 Row	17 <sup>1</sup> / <sub>2</sub>	20	7 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	15 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	7/8
	2 Row	17 <sup>1</sup> / <sub>2</sub>	20	7 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	16 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	17 <sup>1</sup> / <sub>2</sub>	20	9 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	2 <sup>1</sup> / <sub>8</sub>	7/8
	4 Row	17 <sup>1</sup> / <sub>2</sub>	20	9 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	3 <sup>1</sup> / <sub>4</sub>	7/8
16	1 Row	18	24	7 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	15 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	7/8
	2 Row	18	24	7 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	16 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	7/8
	3 Row	18	24	9 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	2 <sup>1</sup> / <sub>8</sub>	7/8
	4 Row	18	24	9 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	14	3 <sup>1</sup> / <sub>4</sub>	7/8
22	1 Row	18	38	5	3 <sup>5</sup> / <sub>8</sub>	15 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>	7/8
	2 Row	18	38	5	3 <sup>5</sup> / <sub>8</sub>	16 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>32</sub>	7/8
	3 Row	18	38	7 <sup>1</sup> / <sub>4</sub>	3 <sup>5</sup> / <sub>8</sub>	14	2 <sup>5</sup> / <sub>32</sub>	7/8
	4 Row	18	38	7 <sup>1</sup> / <sub>4</sub>	3 <sup>5</sup> / <sub>8</sub>	14	3 <sup>1</sup> / <sub>4</sub>	7/8

# Dimensions (cont)

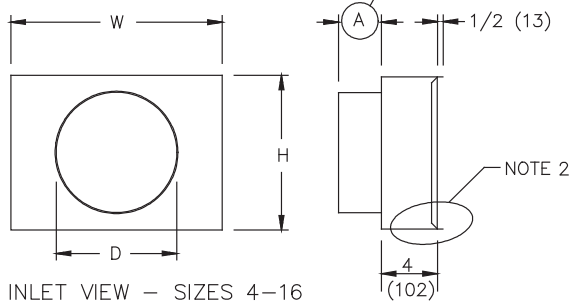


## 35E BASE UNIT WITH MULTI-OUTLET ATTENUATOR OR SINGLE ROUND OUTLET OPTIONS



OUTLET TYPE	OUTLET QUANTITY	DD OUTLET SIZE in. (mm)	UNIT SIZES	DIM X in. (mm)	DIM Y in. (mm)
A	2	5 7/8 (149)	04,05,06	4 3/8 (111)	—
B	3	5 7/8 (149)	04,05,06	4 3/8 (111)	—
C	2	7 7/8 (200)	07,08	5 3/8 (137)	—
D	3	7 7/8 (200)	07,08,09,10	5 3/8 (137)	—
E	4	7 7/8 (200)	07,08,09,10	5 3/8 (137)	12 (305)
F	5	7 7/8 (200)	08	5 3/8 (137)	12 (305)
G	2	9 7/8 (251)	09,10	6 3/8 (162)	—
H	3	9 7/8 (251)	09,10,12,14,16	6 3/8 (162)	—
J	4	9 7/8 (251)	09,10,12,14,16	6 3/8 (162)	14 (356)
K	5	9 7/8 (251)	12,14,16	6 3/8 (162)	14 (356)
L	2	11 7/8 (302)	12,14,16	6 3/8 (162)	—
M	3	11 7/8 (302)	12,14,16	6 3/8 (162)	—

CHARTED 'A' DIMENSION INCLUDES INLET ADAPTER PROVIDED ON SIZES 4 AND 5.



- NOTES:
1. Dimensions are given in inches (mm).
  2. Denotes slip and drive connection.
  3. Multi-outlet attenuator optional on 35E unit.

35E UNIT SIZE	ROUND OUTLET			
	W	H	A	D
04	12	8	5 3/8	3 7/8
05	12	8	5 3/8	4 7/8
06	12	8	3 3/8	5 7/8
07	12	10	3 3/8	6 7/8
08	12	10	3 3/8	7 7/8
09	14	12 1/2	3 3/8	8 7/8
10	14	12 1/2	3 3/8	9 7/8
12	16	15	3 3/8	11 7/8
14	20	17 1/2	3 3/8	13 7/8
16	24	18	3 3/8	15 3/8

## Selection procedure

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

See the performance data tables in this document for airflow, hot water heat and electric heat performance information.



## 35E BASIC PRESSURE DATA

INLET SIZE (in.) (Area in sq ft)	CFM	MIN AIRFLOW (Cfm)*		ELECTRIC HEAT** MAX kW AT 55 F EAT	MINIMUM INLET STATIC PRESSURE (Unit and Heat Pressure Drop)						
		Cooling Only or Cooling with Hot Water	Electric Heat †		Velocity Press (Δ Vps)	Basic Unit (Δ Ps)	Basic + 1 Row Coil (Δ Ps)	Basic + 2 Row Coil (Δ Ps)	Basic + 3 Row Coil (Δ Ps)	Basic + 4 Row Coil (Δ Ps)	Basic + Heater † (Δ Ps)
4 (0.09)	55	40 or 0	55	1.1	0.02	0.00	0.00	0.01	0.01	0.01	0.00
	110			2.3	0.10	0.01	0.02	0.03	0.03	0.04	0.01
	170			3††	0.23	0.02	0.04	0.06	0.08	0.10	0.02
	230			3††	0.43	0.03	0.07	0.11	0.15	0.18	0.03
5 (0.14)	85	62 or 0	85	1.7	0.02	0.00	0.01	0.02	0.02	0.03	0.00
	170			3.5	0.09	0.02	0.04	0.06	0.08	0.10	0.02
	265			5††	0.23	0.04	0.10	0.15	0.20	0.24	0.04
	360			5††	0.43	0.08	0.18	0.27	0.36	0.45	0.08
6 (0.20)	100	89 or 0	110	2.1	0.02	0.01	0.01	0.02	0.03	0.03	0.01
	240			4.9	0.09	0.04	0.08	0.12	0.16	0.20	0.04
	380			7.5††	0.22	0.09	0.20	0.30	0.40	0.50	0.09
	520			7.5††	0.42	0.17	0.38	0.57	0.75	0.94	0.17
7 (0.27)	140	121 or 0	140	2.9	0.02	0.01	0.01	0.02	0.03	0.04	0.01
	330			6.8	0.09	0.04	0.08	0.12	0.16	0.20	0.04
	525			9.5††	0.23	0.09	0.20	0.30	0.40	0.50	0.09
	710			9.5††	0.41	0.17	0.37	0.55	0.73	0.91	0.17
8 (0.35)	190	159 or 0	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
	675			13††	0.21	0.09	0.27	0.44	0.60	0.76	0.09
	925			13††	0.39	0.17	0.51	0.82	1.13	1.43	0.17
9 (0.44)	240	201 or 0	240	4.9	0.02	0.01	0.02	0.03	0.04	0.05	0.01
	550			11.3	0.08	0.07	0.12	0.17	0.22	0.27	0.07
	875			16††	0.21	0.17	0.31	0.44	0.57	0.69	0.17
	1200			16††	0.40	0.32	0.59	0.83	1.07	1.31	0.32
10 (0.55)	300	248 or 0	300	6.2	0.02	0.01	0.02	0.04	0.05	0.07	0.01
	675			13.9	0.08	0.04	0.12	0.20	0.27	0.35	0.04
	1075			21††	0.20	0.10	0.31	0.50	0.69	0.89	0.10
	1450			21††	0.36	0.17	0.56	0.91	1.26	1.62	0.17
12 (0.78)	425	357 or 0	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
	1550			30††	0.19	0.09	0.33	0.54	0.75	0.96	0.09
	2100			30††	0.34	0.17	0.60	0.99	1.37	1.76	0.17
14 (1.07)	580	486 or 0	580	11.9	0.01	0.01	0.02	0.04	0.05	0.06	0.01
	1375			28.3	0.07	0.04	0.13	0.21	0.28	0.36	0.04
	2125			36††	0.17	0.10	0.31	0.49	0.68	0.86	0.10
	2900			36††	0.31	0.19	0.57	0.92	1.26	1.60	0.19
16 (1.40)	750	634 or 0	750	15.4	0.01	0.01	0.02	0.04	0.06	0.07	0.01
	1775			36††	0.06	0.04	0.14	0.22	0.31	0.40	0.04
	2725			36††	0.14	0.09	0.32	0.53	0.73	0.94	0.09
	3700			36††	0.25	0.17	0.59	0.97	1.35	1.73	0.17
24x16 (2.63)	1800	1212 or 0	1800	36††	0.02	0.01	0.05	0.09	0.13	0.16	0.01
	3300			36††	0.07	0.04	0.17	0.30	0.42	0.55	0.04
	5200			36††	0.16	0.09	0.43	0.74	1.05	1.36	0.09
	7100			36††	0.31	0.17	0.81	1.38	1.95	2.53	0.17

### LEGEND

- CCN — Carrier Comfort Network®
- DDC — Direct Digital Controls
- EAT — Entering Air Temperature
- UL — Underwriters Laboratories
- Δ Ps — The difference in static pressure from inlet to discharge with damper fully open
- Δ Vps — Change in velocity pressure

\*Minimums are for all except CCN controls, which may be lower. Minimum for DDC by others is to be provided by the control's provider.

†A minimum 0.03 in. wg discharge static pressure is required to set the flow switch in the electric heater.

\*\*Maximum discharge temperatures with electric heat are set at 120 F by the National Electric Code. Max kW shown assumes 55 F entering air and is limited by unit's selected voltage, phase, max capacity and design (see table on page 25). Min cfm for electric heat is based on UL/ETL listings. (Diffuser performance will likely be poor at this low flow rate.) The ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) Handbook of Fundamentals does not recommend a discharge temperature exceeding 90 F for satisfactory air mixing and comfort.

††Max. kW is limited by design.

### NOTES:

1. To obtain Total Pressure (Pt), add the Velocity Pressure for a given cfm to the Static Pressure drop (Δ Ps) of the desired configuration.  
Example: Pt for a Size 8 Basic Unit at 925 cfm = 0.39 + 0.17 = 0.56
2. The electric heat max kW is based on 3 phase power. For more details, refer to the air terminal selection program.

## 35E DAMPER AND CASING LEAKAGE

UNIT SIZE 35E	DAMPER LEAKAGE						CASING LEAKAGE					
	1.5 in. wg		3.0 in. wg		6.0 in. wg		0.25 in. wg		0.5 in. wg		1.0 in. wg	
	cfm	Leakage (%)	cfm	Leakage (%)	cfm	Leakage (%)	cfm	Leakage (%)	cfm	Leakage (%)	cfm	Leakage (%)
04	4	1.7	5	2.2	7	3.0	2	0.9	3	1.3	5	2.2
05	4	1.1	5	1.4	7	1.9	2	0.6	3	0.8	5	1.4
06	4	0.8	5	1.0	7	1.3	2	0.4	3	0.6	5	1.0
07	4	0.6	5	0.7	7	1.0	3	0.4	4	0.6	6	0.8
08	4	0.4	5	0.5	7	0.8	3	0.3	4	0.4	6	0.6
09	4	0.3	5	0.4	7	0.6	4	0.3	5	0.4	7	0.6
10	4	0.3	5	0.3	7	0.5	4	0.3	5	0.3	7	0.5
12	4	0.2	5	0.2	7	0.3	5	0.2	7	0.3	9	0.5
14	4	0.1	6	0.2	8	0.3	6	0.2	9	0.3	12	0.4
16	5	0.1	7	0.2	9	0.2	7	0.2	10	0.3	14	0.4

### NOTES:

1. Damper leakage is measured with the damper fully closed and by 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.

2. Casing leakage is determined with the damper fully opened 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.

# Performance data (cont)



## 35E UNIT RADIATED SOUND POWER

35E UNIT SIZE	FLOW RATE		MIN. ΔPs		0.5 in. ΔPs*							1.0 in. ΔPs*							2.0 in. ΔPs*						
					Octave Band Sound Power, L <sub>w</sub>							L <sub>p</sub>	Octave Band Sound Power, L <sub>w</sub>							L <sub>p</sub>	Octave Band Sound Power, L <sub>w</sub>				
	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
04	40	19	0.007	1.77	33	23	18	18	12	4	—	34	24	22	21	14	8	—	35	26	25	23	16	13	—
	103	49	0.047	11.79	48	40	32	31	28	20	—	49	41	35	33	30	24	—	50	43	38	35	32	29	—
	167	79	0.124	30.74	56	48	38	37	36	28	—	57	50	42	40	38	32	—	58	52	45	42	40	37	—
	230	109	0.235	58.51	61	54	43	42	41	33	24	62	56	46	44	43	38	25	63	57	50	46	45	42	26
05	62	29	0.006	1.53	37	19	14	11	6	3	—	42	24	19	14	10	9	—	48	29	24	17	14	15	—
	161	76	0.042	10.35	48	36	29	27	22	16	—	53	41	34	30	26	22	—	58	46	39	33	29	28	—
	261	123	0.109	27.07	53	45	36	34	30	22	—	58	49	41	38	34	28	—	63	54	46	41	37	34	26
06	360	170	0.207	51.60	56	50	41	40	35	26	—	61	55	46	43	39	32	24	67	60	51	46	43	39	31
	90	42	0.005	1.26	40	31	20	19	15	8	—	43	35	24	22	18	14	—	46	40	28	25	22	20	—
	233	110	0.034	8.46	50	43	35	32	28	22	—	53	47	39	35	32	27	—	56	52	43	39	36	33	—
07	377	178	0.089	22.08	55	49	43	39	35	28	—	58	53	47	42	39	34	22	61	58	51	45	43	40	27
	520	245	0.169	42.05	58	53	48	44	40	33	22	61	57	52	47	43	39	26	64	62	56	50	47	44	32
	120	57	0.005	1.18	36	38	21	14	9	3	—	39	44	27	19	13	8	—	43	50	33	23	17	14	—
08	330	156	0.036	8.96	48	45	35	29	24	17	—	51	51	41	33	28	23	—	55	56	47	37	32	28	25
	525	248	0.091	22.67	53	48	41	36	31	23	—	57	54	47	40	35	29	22	61	59	53	44	39	35	29
	700	330	0.162	40.31	57	50	45	40	36	27	—	60	56	51	44	39	33	25	64	61	57	48	43	39	32
09	160	76	0.005	1.30	40	34	26	22	20	12	—	43	39	33	27	25	19	—	46	45	40	32	30	26	—
	440	208	0.040	9.83	50	43	37	33	30	22	—	53	49	44	38	35	29	—	56	54	51	43	40	36	25
	675	319	0.093	23.14	54	47	41	38	34	27	—	57	52	48	42	39	34	22	60	58	55	47	44	40	30
	920	434	0.175	42.98	57	49	44	41	37	30	—	60	55	51	46	42	37	26	63	61	58	51	47	44	33
10	200	94	0.005	1.23	36	31	19	20	18	15	—	40	37	23	24	24	23	—	43	43	28	28	29	32	—
	550	260	0.037	9.29	48	39	34	32	28	21	—	52	45	39	36	33	29	—	55	51	43	40	39	38	—
	875	413	0.095	23.52	54	43	41	37	32	23	—	57	49	46	41	38	32	—	61	55	50	45	43	40	24
12	1160	547	0.166	41.34	57	45	46	41	35	25	—	61	51	50	45	40	33	24	64	57	54	49	46	42	29
	250	118	0.005	1.29	29	29	16	14	8	-3	—	35	35	20	19	16	9	—	41	41	23	23	24	20	—
	675	319	0.038	9.37	42	38	36	29	21	9	—	48	44	39	34	29	21	—	54	50	43	38	37	32	—
	1075	507	0.096	23.77	48	42	45	36	27	15	—	54	48	48	41	35	26	22	60	54	52	45	43	38	26
14	1430	675	0.169	42.95	52	44	51	40	30	18	25	58	51	54	45	39	30	29	64	57	58	50	47	41	32
	360	170	0.005	1.26	36	41	26	21	19	12	—	40	45	30	25	23	18	—	45	50	35	29	28	24	—
	1000	472	0.039	9.72	47	46	39	35	32	24	—	51	50	43	39	36	30	—	56	55	48	43	41	35	23
	1550	731	0.094	23.35	52	48	44	40	37	29	—	56	52	49	44	42	35	23	60	57	54	48	47	40	28
16	2060	972	0.166	41.25	55	49	48	44	41	32	22	59	54	53	48	46	38	27	63	59	57	52	50	44	32
	480	227	0.005	1.30	31	31	19	23	22	20	—	36	37	23	26	25	25	—	41	42	26	30	29	29	—
	1375	649	0.043	10.67	45	41	37	35	34	30	—	49	47	40	38	37	35	—	54	52	43	42	41	39	20
	2125	1003	0.102	25.48	50	45	44	40	39	34	—	55	51	48	43	43	39	22	59	56	51	47	46	43	25
22	2800	1321	0.178	44.24	53	48	49	43	42	37	23	58	53	52	47	46	41	27	63	59	55	50	49	46	30
	630	297	0.005	1.26	35	33	26	26	23	17	—	39	38	31	31	30	25	—	44	44	36	36	37	33	—
	1775	838	0.040	10.00	48	43	40	37	32	25	—	52	49	45	42	39	33	—	57	54	50	47	46	41	24
22	2725	1286	0.095	23.57	53	47	45	41	36	29	—	58	53	50	47	43	37	25	63	59	55	52	50	45	30
	3660	1727	0.171	42.52	57	50	49	45	38	31	23	62	56	54	50	46	39	29	66	62	59	55	53	47	34
	1200	566	0.005	1.29	46	49	39	39	40	39	—	50	52	43	41	42	41	—	53	54	47	43	44	43	23
	3300	1557	0.039	9.74	55	55	50	48	49	48	24	59	58	54	50	51	50	28	63	61	58	52	53	52	32
22	5200	2454	0.097	24.18	60	58	55	51	53	52	30	64	61	59	54	55	54	34	68	64	62	56	57	56	38
	7000	3304	0.176	43.81	63	60	58	54	56	55	33	67	63	62	56	58	57	37	70	66	66	58	60	59	41

### LEGEND

- AHRI — Air Conditioning, Heating, and Refrigeration Institute
- CFM — Air Volume (cubic feet per minute)
- L<sub>p</sub> — Room Sound Pressure
- L<sub>w</sub> — Sound Power
- MIN ΔPs — Minimum Static Pressure required to achieve rated airflow
- NC — Application Data from AHRI 885 Test Conditions (see Application Assumptions section on page 20)
- ΔPs — The difference in static pressure from inlet to discharge
- — Indicates an NC level less than 20
- — Sound Power Noise Criteria

\*Pressure drop across damper only.

### NOTES:

1. Sound power levels are in decibels, re: 10<sup>-12</sup> watts.

2. All sound power data is based on tests conducted in accordance with AHRI Standard 880.





### 35E UNIT DISCHARGE SOUND

35E UNIT SIZE	FLOW RATE		MIN. ΔPs		0.5 in. ΔPs*							1.0 in. ΔPs*							2.0 in. ΔPs*						
					Octave Band Sound Power, L <sub>w</sub>							L <sub>p</sub>	Octave Band Sound Power, L <sub>w</sub>							L <sub>p</sub>	Octave Band Sound Power, L <sub>w</sub>				
	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	40	19	0.007	1.77	42	32	29	28	24	19	—	43	34	32	32	27	25	—	44	35	36	36	31	31	—
	103	49	0.047	11.79	54	51	43	40	37	30	—	55	52	47	44	41	36	—	56	53	50	48	45	42	—
	167	79	0.124	30.74	61	60	50	46	44	36	—	62	62	54	50	48	42	20	63	63	57	54	52	47	22
	230	109	0.235	58.51	65	67	55	50	49	40	26	66	68	59	54	52	46	28	67	69	62	58	56	51	29
05	62	29	0.006	1.53	42	31	30	27	26	21	—	45	35	34	31	31	27	—	49	38	39	35	36	32	—
	161	76	0.042	10.35	55	49	44	40	37	31	—	58	53	48	44	42	37	—	61	56	53	48	46	43	—
	261	123	0.109	27.07	61	58	51	46	42	37	—	64	62	55	50	47	43	21	68	66	60	54	52	49	25
	360	170	0.207	51.60	65	64	56	50	46	41	23	68	68	60	54	51	47	27	72	71	65	59	55	52	31
06	90	42	0.005	1.26	41	40	29	27	29	24	—	44	45	34	31	34	31	—	47	50	40	35	39	38	—
	233	110	0.034	8.46	52	51	44	40	37	32	—	55	57	49	44	42	39	—	59	62	54	48	48	46	21
	377	178	0.089	22.08	57	57	51	46	41	36	—	61	63	57	51	47	43	20	64	68	62	55	52	50	26
	520	245	0.169	42.05	61	61	56	51	44	39	—	65	67	62	55	49	45	25	68	72	67	59	55	52	31
07	120	57	0.005	1.18	46	47	29	26	28	25	—	51	54	35	29	35	32	—	55	60	40	33	41	40	—
	330	156	0.036	8.96	55	55	44	42	38	33	—	59	61	50	46	44	41	—	64	68	55	49	50	48	26
	525	248	0.091	22.67	60	58	51	50	42	37	—	64	65	57	53	49	45	23	68	71	62	57	55	52	30
	700	330	0.162	40.31	62	60	55	54	45	40	—	66	67	61	58	51	47	24	70	73	66	61	57	55	32
08	160	76	0.005	1.30	47	44	39	32	34	29	—	50	50	45	36	39	36	—	53	55	51	41	45	43	—
	440	208	0.040	9.83	56	54	49	45	42	37	—	60	60	55	49	47	44	—	63	65	61	54	53	50	24
	675	319	0.093	23.14	60	58	53	50	45	40	—	63	64	59	55	51	47	22	67	70	65	59	56	53	29
	920	434	0.173	42.98	63	61	56	54	48	42	—	66	67	62	59	53	49	25	70	73	68	63	59	56	31
09	200	94	0.005	1.23	43	41	32	30	32	32	—	45	46	36	33	37	38	—	48	50	41	37	42	44	—
	550	260	0.037	9.29	55	52	46	44	41	39	—	58	57	51	47	47	45	—	61	62	55	51	52	51	—
	875	413	0.095	23.52	61	58	53	50	46	42	—	64	63	57	54	51	48	—	67	67	62	58	56	54	25
	1160	547	0.166	41.34	64	61	57	54	49	44	—	67	66	61	58	54	50	23	70	71	66	61	59	56	29
10	250	118	0.005	1.29	42	43	36	35	36	34	—	46	48	41	39	41	40	—	49	53	46	44	47	46	—
	675	319	0.038	9.37	54	53	48	46	44	41	—	58	58	53	51	49	47	—	61	63	58	55	55	53	21
	1075	507	0.096	23.77	60	58	54	51	48	44	—	63	63	59	56	53	50	—	66	68	64	60	59	56	25
	1430	675	0.169	42.05	64	61	58	55	50	46	—	67	66	63	59	55	52	23	70	70	68	64	61	58	28
12	360	170	0.005	1.26	43	42	34	36	37	37	—	47	47	38	40	42	43	—	50	52	42	45	47	49	—
	1000	472	0.039	9.72	57	53	49	47	46	44	—	60	58	54	51	51	50	—	64	63	58	56	56	56	20
	1550	731	0.094	23.35	63	58	56	52	50	47	—	66	63	60	56	55	53	20	70	68	65	61	60	59	26
	2060	972	0.166	41.25	67	61	60	55	53	48	—	70	67	64	59	57	54	24	74	72	69	64	62	60	30
14	480	227	0.005	1.30	39	38	31	35	34	36	—	42	43	34	39	39	41	—	46	47	37	42	43	47	—
	1375	649	0.043	10.67	56	53	50	48	46	44	—	59	57	54	52	51	50	—	63	61	57	56	55	55	—
	2125	1003	0.102	25.48	63	59	58	53	51	48	—	66	63	61	57	55	53	—	70	67	65	61	60	59	25
	2800	1321	0.178	44.24	68	62	63	57	54	50	—	71	67	66	61	59	55	24	74	71	70	65	63	61	29
16	630	297	0.005	1.26	33	27	18	27	28	26	—	36	31	21	31	32	31	—	40	35	25	35	37	37	—
	1775	838	0.040	10.00	54	48	44	45	44	41	—	57	52	48	49	48	46	—	61	57	51	53	53	52	—
	2725	1286	0.095	23.57	63	57	55	52	50	47	—	66	61	59	56	55	53	—	69	65	62	60	59	58	22
	3660	1727	0.171	42.52	69	63	63	57	55	52	—	72	67	66	61	59	57	24	75	71	70	65	64	62	30
22	1200	566	0.005	1.29	52	46	44	38	35	26	—	58	54	47	44	40	32	—	64	62	50	49	45	38	—
	3300	1557	0.039	9.74	63	58	59	53	50	44	—	69	66	62	59	55	50	23	75	74	65	64	61	57	32
	5200	2454	0.097	24.18	68	63	66	60	57	52	20	74	71	69	65	62	59	29	80	79	72	71	68	65	38
	7000	3304	0.176	43.81	71	67	71	64	61	58	24	77	75	74	70	67	64	33	83	83	77	75	72	70	43

**LEGEND**

- AHRI — Air Conditioning, Heating, and Refrigeration Institute
- CFM — Air Volume (cubic feet per minute)
- L<sub>p</sub> — Room Sound Pressure
- L<sub>w</sub> — Sound Power
- MIN ΔPs — Minimum Static Pressure required to achieve rated airflow
- NC — Application data from AHRI 885 Test Conditions (see Application Assumptions section on page 20)
- ΔPs — The difference in static pressure from inlet to discharge
- — Indicates an NC level less than 20
- — Sound Power Noise Criteria

\*Pressure drop across damper only.

**NOTES:**

1. Sound power levels are in decibels, re: 10<sup>-12</sup> watts.

2. All sound power data is based on tests conducted in accordance with AHRI Standard 880.



# Performance data (cont)



## 35E UNIT APPLICATION ASSUMPTIONS

AHRI 885 DISCHARGE < 300 cfm	DISCHARGE SOUND APPLICATION ASSUMPTIONS (dB)					
	Octave Bands					
	2	3	4	5	6	7
Environmental Effect	2	1	0	0	0	0
Duct Lining, 5 ft, 8x8x1-in.	2	6	12	25	29	18
End Reflection	9	5	2	0	0	0
Power Division (0 outlets)	0	0	0	0	0	0
5-ft, 8-in. Flex Duct	6	10	18	20	21	12
Space Effect	5	6	7	8	9	10
<b>Total Attenuation</b>	<b>24</b>	<b>28</b>	<b>39</b>	<b>53</b>	<b>59</b>	<b>40</b>

AHRI 885 DISCHARGE > 700 cfm	DISCHARGE SOUND APPLICATION ASSUMPTIONS (dB)					
	Octave Bands					
	2	3	4	5	6	7
Environmental Effect	2	1	0	0	0	0
Duct Lining, 5 ft, 15x15x1-in.	2	3	9	18	17	12
End Reflection	9	5	2	0	0	0
Power Division (3 outlets)	5	5	5	5	5	5
5 ft, 8-in. Flex Duct	6	10	18	20	21	12
Space Effect	5	6	7	8	9	10
<b>Total Attenuation</b>	<b>29</b>	<b>30</b>	<b>41</b>	<b>51</b>	<b>52</b>	<b>39</b>

AHRI 885 DISCHARGE 300-700 cfm	DISCHARGE SOUND APPLICATION ASSUMPTIONS (dB)					
	Octave Bands					
	2	3	4	5	6	7
Environmental Effect	2	1	0	0	0	0
Duct Lining, 5 ft, 12x12x1-in.	2	4	10	20	20	14
10-in. End Reflection	9	5	1	0	0	0
Power Division (2 outlets)	3	3	3	3	3	3
5-ft, 8-in. Flex Duct	6	10	18	20	21	12
Space Effect	5	6	7	8	9	10
<b>Total Attenuation</b>	<b>27</b>	<b>29</b>	<b>40</b>	<b>51</b>	<b>53</b>	<b>39</b>

AHRI 885 RADIATED	RADIATED SOUND APPLICATION ASSUMPTIONS (dB)					
	Octave Bands					
	2	3	4	5	6	7
Mineral Tile Space/ Ceiling Effect	16	18	20	26	31	36
Environmental Effect	2	1	0	0	0	0
<b>Total Attenuation</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>26</b>	<b>31</b>	<b>36</b>

### Notes for Sound Data Tables:

Air Conditioning, Heating, and Refrigeration Institute (AHRI) and ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) provide guidance in both measuring sound power levels, and in estimating the resultant room sound pressure. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) handbooks provide detailed acoustical guidance. Air Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 885 is an application standard which provides tables and equations for determining acoustical deducts based on the ASHRAE guides, as well as additional information provided by manufacturers.

The above application assumptions per AHRI Standard 885 Appendix E were used to determine NC levels shown on pages 18 and 19.



**UNIT 35E — HOT WATER COIL VOLUMES**

UNIT SIZE	1 ROW			2 ROW		
	cu in.	Gallons	Weight (lb)	cu in.	Gallons	Weight (lb)
04,05,06	16.2	0.07	0.59	35.0	0.15	1.26
07,08	21.4	0.09	0.77	50.3	0.22	1.82
09,10	32.5	0.14	1.17	64.3	0.28	2.32
12	51.8	0.22	1.87	95.5	0.41	3.45
14	63.3	0.27	2.29	113.1	0.49	4.08
16	74.0	0.32	2.67	131.7	0.57	4.75
22	122.4	0.53	4.42	210.2	0.98	8.18

**UNIT 35E — HOT WATER COIL DATA — 1 AND 2 ROW  
SIZES 04, 05, 06**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			50	100	150	200	250	300	350	400	450
ONE ROW SINGLE CIRCUIT	0.5	0.20	4.0	5.4	6.3	6.9	7.6	8.1	8.6	9.1	9.4
	1.0	0.50	4.2	6.0	7.0	7.8	8.7	9.5	10.2	10.8	11.3
	2.0	1.80	4.4	6.3	7.5	8.4	9.4	10.4	11.2	11.9	12.6
	3.0	3.70	4.4	6.4	7.7	8.6	9.7	10.7	11.6	12.4	13.2
	Airside Δ PS		0.05	0.06	0.02	0.03	0.05	0.07	0.09	0.12	0.14
TWO ROWS MULTI-CIRCUIT	1.0	0.30	5.3	8.7	11.1	13.0	14.5	15.8	16.9	17.9	18.7
	2.0	0.90	5.5	9.2	12.1	14.5	16.5	18.2	19.7	21.0	22.2
	3.0	1.80	5.5	9.4	12.5	15.0	17.2	19.2	20.9	22.4	23.8
	4.0	3.00	5.6	9.5	12.7	15.4	17.7	19.7	21.5	23.1	24.6
	Airside Δ PS		0.01	0.02	0.04	0.07	0.10	0.13	0.18	0.22	0.27
Cfm Range		Size 04									
		Size 05									
		Size 06									

**SIZES 07, 08**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			100	200	300	400	500	600	700	800	900
ONE ROW SINGLE CIRCUIT	0.5	0.20	6.3	8.1	9.3	10.4	11.2	11.9	12.5	13.0	13.4
	1.0	0.70	6.9	9.2	10.8	12.3	13.6	14.6	15.5	16.3	17.0
	2.0	2.50	7.2	9.9	11.8	13.6	15.2	16.5	17.7	18.8	19.7
	3.0	5.10	7.4	10.2	12.1	14.2	15.9	17.3	18.6	19.8	20.9
	Airside Δ PS		0.01	0.02	0.04	0.07	0.10	0.14	0.19	0.24	0.30
TWO ROWS MULTI-CIRCUIT	1.0	0.40	9.4	14.4	17.8	20.3	22.2	23.8	25.1	26.1	27.1
	2.0	1.20	9.9	15.9	20.3	23.7	26.5	28.9	30.9	32.6	34.1
	3.0	2.50	10.1	16.5	21.3	25.2	28.4	31.1	33.5	35.6	37.5
	4.0	4.10	10.2	16.8	21.9	26.0	29.4	32.4	35.0	37.3	39.4
	Airside Δ PS		0.01	0.04	0.08	0.13	0.20	0.27	0.36	0.46	0.56
Cfm Range		Size 07									
		Size 08									

**SIZES 09, 10**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			250	380	510	640	770	900	1030	1160	1290
ONE ROW SINGLE CIRCUIT	0.5	0.10	9.8	10.9	12.0	12.9	13.6	14.1	14.6	15.0	15.3
	1.0	0.20	11.7	13.3	15.1	16.5	17.6	18.6	19.5	20.2	20.9
	2.0	0.70	12.9	15.0	17.3	19.3	20.9	22.3	23.5	24.7	25.7
	3.0	1.50	13.4	15.7	18.3	20.5	22.3	23.9	25.4	26.7	27.9
	Airside Δ PS		0.02	0.03	0.06	0.08	0.12	0.15	0.19	0.24	0.29
TWO ROWS MULTI-CIRCUIT	1.0	0.20	17.9	21.9	24.7	26.9	28.6	29.9	31.1	32.1	32.9
	2.0	0.70	20.2	25.8	30.0	33.4	36.2	38.6	40.7	42.5	44.0
	3.0	1.40	21.1	27.4	32.3	36.4	39.8	42.8	45.3	47.6	49.7
	4.0	2.30	21.6	28.3	33.6	38.1	41.9	45.2	48.1	50.8	53.1
	Airside Δ PS		0.03	0.06	0.11	0.16	0.22	0.29	0.37	0.45	0.55
Cfm Range		Size 09									
		Size 10									

# Performance data (cont)



## UNIT 35E — HOT WATER COIL DATA — 1 AND 2 ROW (cont) SIZE 12

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			300	500	700	900	1100	1300	1500	1700	1900
ONE ROW SINGLE CIRCUIT	0.5	0.10	12.3	13.9	15.3	16.4	17.2	17.8	18.3	18.8	19.2
	1.0	0.30	14.8	17.5	19.8	21.7	23.2	24.5	25.6	26.5	27.3
	2.0	0.90	16.5	20.0	23.2	26.0	28.3	30.2	31.9	33.4	34.7
	3.0	1.90	17.2	21.1	24.7	27.8	30.5	32.8	34.8	36.6	38.2
	Airside Δ PS		0.01	0.03	0.06	0.09	0.12	0.17	0.21	0.27	0.33
TWO ROWS MULTI-CIRCUIT	1.0	0.30	21.9	27.7	31.5	34.1	36.1	37.7	38.9	40.0	40.8
	2.0	0.90	24.9	33.5	39.6	44.2	47.9	51.0	53.5	55.7	57.6
	3.0	1.80	26.1	35.9	43.2	48.9	53.6	57.6	61.0	64.0	66.6
	4.0	2.90	26.7	37.2	45.2	51.6	57.0	61.6	65.5	69.0	72.1
	Airside Δ PS		0.02	0.06	0.11	0.16	0.24	0.32	0.41	0.51	0.62

## SIZE 14

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			400	700	1000	1300	1600	1900	2200	2500	2800
ONE ROW SINGLE CIRCUIT	0.5	0.00	15.1	17.0	18.3	19.3	20.1	20.7	21.2	21.5	21.9
	1.0	0.10	19.1	22.5	25.2	27.4	29.1	30.4	31.5	32.5	33.3
	2.0	0.50	22.0	27.0	31.0	34.5	37.4	39.7	41.7	43.5	45.0
	3.0	1.00	23.2	28.9	33.6	37.9	41.4	44.3	46.9	49.1	51.1
	Airside Δ PS		0.01	0.03	0.05	0.08	0.12	0.17	0.22	0.27	0.33
TWO ROWS MULTI-CIRCUIT	1.0	0.20	27.7	34.8	38.8	41.5	43.4	44.8	45.9	46.8	47.6
	2.0	0.60	32.7	44.2	51.9	57.4	61.7	65.1	67.8	70.1	72.1
	3.0	1.20	34.6	48.4	58.1	65.5	71.3	76.1	80.1	83.5	86.5
	4.0	2.00	35.7	50.8	61.8	70.3	77.2	83.0	87.9	92.2	95.9
	Airside Δ PS		0.02	0.05	0.10	0.16	0.23	0.32	0.41	0.51	0.63

## SIZE 16

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			600	1000	1400	1800	2200	2600	3000	3400	3800
ONE ROW SINGLE CIRCUIT	0.5	0.00	17.9	19.6	21.0	22.0	22.7	23.2	23.6	23.9	24.2
	1.0	0.10	23.8	27.2	30.3	32.5	34.1	35.5	36.6	37.5	38.3
	2.0	0.50	28.3	33.5	38.6	42.4	45.5	48.0	50.2	52.0	53.6
	3.0	1.00	30.2	36.4	42.5	47.3	51.2	54.5	57.3	59.8	61.9
	Airside Δ PS		0.02	0.04	0.07	0.11	0.16	0.21	0.27	0.34	0.41
TWO ROWS MULTI-CIRCUIT	1.0	0.10	33.1	38.8	42.1	44.1	45.6	46.7	47.6	48.2	48.8
	2.0	0.30	41.8	52.8	59.8	64.8	68.5	71.4	73.8	75.8	77.4
	3.0	0.50	45.7	59.7	69.3	76.3	81.8	86.3	90.0	93.1	95.8
	4.0	0.90	47.8	63.8	75.1	83.7	90.6	96.2	100.9	105.0	108.5
	Airside Δ PS		0.03	0.07	0.13	0.21	0.30	0.40	0.51	0.64	0.78

## SIZE 22

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			600	1200	1800	2400	3000	3600	4200	4800	5400
ONE ROW SINGLE CIRCUIT	0.5	0.00	21.7	24.1	25.3	26.3	26.9	27.4	27.7	27.9	28.2
	1.0	0.20	29.6	35.4	38.8	41.6	43.6	45.1	46.3	47.2	48.0
	2.0	0.50	35.6	45.2	51.6	57.2	61.5	64.9	67.7	70.0	72.0
	3.0	1.10	38.1	49.7	57.7	65.0	70.8	75.5	79.4	82.8	85.8
	Airside Δ PS		0.01	0.02	0.05	0.08	0.12	0.17	0.22	0.28	0.34
TWO ROWS MULTI-CIRCUIT	1.0	0.10	38.2	47.0	50.8	52.8	54.2	55.1	55.8	56.3	56.7
	2.0	0.30	48.3	66.8	76.8	83.2	87.6	90.9	93.4	95.4	97.1
	3.0	0.50	52.4	76.6	91.2	101.2	108.5	114.1	118.5	122.2	125.3
	4.0	0.90	54.6	82.4	100.2	112.9	122.5	130.1	136.3	141.4	145.8
	Airside Δ PS		0.01	0.05	0.09	0.15	0.23	0.31	0.41	0.52	0.64

### LEGEND

**PS** — Static Pressure Drop (in. wg)  
**ΔPs** — Difference in static pressure from inlet to discharge

### NOTES:

- Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
- Btuh = 1.08 x cfm x ΔT (Temp rise across coil).
- Data is based upon 180 F entering water and 55 F entering air.
- HD (head loss) is in feet of water.

- Tables are based upon a temperature difference of 125 F between entering air and entering water. For other temperature differences, multiply MBtuh values by factors below.
- LAT (leaving air temperature) = entering air temp + air temp rise.
- Air temperature rise = 927 x MBtuh/cfm.
- Water temperature drop = 2.04 x MBtuh/gpm.
- Coils are not for steam application. Contact a Carrier representative for steam coil data.

### CORRECTION FACTORS FOR OTHER ENTERING CONDITIONS

ΔT	50	60	70	80	90	100	115	125	140	150
Factor	0.40	0.48	0.56	0.64	0.72	0.80	0.88	1.00	1.12	1.20



**UNIT 35E — HOT WATER COIL DATA — 3 AND 4 ROW  
SIZES 04, 05, 06**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			50	100	150	200	250	300	350	400	450
THREE ROWS MULTI-CIRCUIT	2.0	1.40	6.2	11.0	14.9	18.2	21.0	23.5	25.6	27.5	29.2
	3.0	2.80	6.2	11.2	15.4	18.9	22.0	24.7	27.1	29.3	31.3
	4.0	4.70	6.2	11.3	15.6	19.2	22.5	25.3	27.9	30.3	32.4
	5.0	6.90	6.3	11.4	15.7	19.5	22.8	25.8	28.5	30.9	33.2
	Airside Δ PS		0.01	0.03	0.06	0.10	0.14	0.20	0.26	0.33	0.40
FOUR ROWS MULTI-CIRCUIT	3.0	1.70	6.5	12.1	17.0	21.1	24.8	28.0	31.0	33.6	36.0
	4.0	2.80	6.5	12.2	17.2	21.5	25.4	28.9	32.0	34.9	37.5
	5.0	4.10	6.5	12.3	17.3	21.8	25.8	29.4	32.7	35.7	38.4
	6.0	5.70	6.5	12.3	17.4	22.0	26.0	29.7	33.1	36.2	39.1
	Airside Δ PS		0.01	0.04	0.08	0.13	0.19	0.26	0.34	0.43	0.53
<b>Cfm Range</b>		<b>Size 04</b>									
		<b>Size 05</b>									
		<b>Size 06</b>									

**SIZES 07, 08**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			100	200	300	400	500	600	700	800	900
THREE ROWS MULTI-CIRCUIT	2.0	0.80	11.5	19.3	25.0	29.5	33.1	36.1	38.6	40.8	42.7
	3.0	1.70	11.7	20.0	26.4	31.5	35.8	39.4	42.6	45.3	47.7
	4.0	2.80	11.8	20.4	27.2	32.7	37.3	41.3	44.9	48.0	50.8
	5.0	4.10	11.8	20.6	27.6	33.4	38.3	42.6	46.4	49.7	52.8
	Airside Δ PS		0.02	0.06	0.12	0.20	0.29	0.40	0.53	0.67	0.83
FOUR ROWS MULTI-CIRCUIT	3.0	1.30	12.5	22.2	29.8	36.0	41.2	45.5	49.3	52.6	55.5
	4.0	2.10	12.6	22.6	30.7	37.4	43.1	48.0	52.2	56.0	59.4
	5.0	3.20	12.6	22.9	31.2	38.3	44.3	49.5	54.2	58.3	62.0
	6.0	4.40	12.7	23.0	31.6	38.9	45.1	50.7	55.6	59.9	63.9
	Airside Δ PS		0.02	0.08	0.16	0.26	0.39	0.53	0.70	0.89	1.10
<b>Cfm Range</b>		<b>Size 07</b>									
		<b>Size 08</b>									

**SIZES 09, 10**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			250	380	510	640	770	900	1030	1160	1290
THREE ROWS MULTI-CIRCUIT	2.0	0.60	24.3	31.7	37.3	41.7	45.2	48.2	50.8	53.0	54.9
	3.0	1.20	25.4	33.8	40.4	45.8	50.4	54.3	57.6	60.6	63.2
	4.0	2.00	26.0	34.9	42.2	48.2	53.4	57.8	61.8	65.2	68.4
	5.0	3.00	26.4	35.7	43.3	49.8	55.3	60.2	64.5	68.4	71.9
	Airside Δ PS		0.04	0.09	0.16	0.23	0.32	0.42	0.54	0.67	0.80
FOUR ROWS MULTI-CIRCUIT	3.0	1.10	28.1	38.1	46.1	52.6	58.1	62.7	66.7	70.2	73.3
	4.0	1.80	28.7	39.4	48.2	55.5	61.8	67.2	72.0	76.2	79.9
	5.0	2.60	29.0	40.2	49.5	57.4	64.2	70.2	75.5	80.2	84.5
	6.0	3.70	29.3	40.7	50.4	58.7	65.9	72.3	78.0	83.1	87.8
	Airside Δ PS		0.06	0.12	0.21	0.31	0.43	0.56	0.71	0.88	1.06
<b>Cfm Range</b>		<b>Size 09</b>									
		<b>Size 10</b>									

**SIZE 12**

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			300	500	700	900	1100	1300	1500	1700	1900
THREE ROWS MULTI-CIRCUIT	2.0	0.70	29.8	40.9	48.7	54.5	59.1	62.7	65.7	68.3	70.5
	3.0	1.50	31.2	44.1	53.7	61.2	67.3	72.4	76.7	80.4	83.6
	4.0	2.50	31.9	45.8	56.5	65.1	72.2	78.3	83.4	88.0	92.0
	5.0	3.80	32.4	46.9	58.3	67.7	75.5	82.2	88.1	93.2	97.8
	Airside Δ PS		0.04	0.09	0.16	0.24	0.35	0.47	0.60	0.75	0.91
FOUR ROWS MULTI-CIRCUIT	3.0	1.30	34.3	49.6	61.1	70.1	77.3	83.1	88.1	92.3	95.9
	4.0	2.20	35.0	51.6	64.5	74.9	83.4	90.6	96.7	102.1	106.7
	5.0	3.30	35.5	52.8	66.6	77.9	87.5	95.6	102.6	108.8	114.3
	6.0	4.50	35.7	53.6	68.1	80.1	90.4	99.2	106.9	113.7	119.8
	Airside Δ PS		0.05	0.11	0.21	0.32	0.46	0.62	0.79	0.99	1.20

# Performance data (cont)



## UNIT 35E — HOT WATER COIL DATA — 3 AND 4 ROW (cont) SIZE 14

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			400	700	1000	1300	1600	1900	2200	2500	2800
THREE ROWS MULTI-CIRCUIT	2.0	0.60	39.0	53.9	63.4	70.0	74.9	78.7	81.7	84.2	86.3
	3.0	1.20	41.4	59.4	72.0	81.4	88.7	94.5	99.4	103.4	106.9
	4.0	2.00	42.6	62.5	77.1	88.3	97.3	104.7	110.9	116.2	120.8
	5.0	2.90	43.3	64.5	80.4	92.9	103.1	111.7	118.9	125.2	130.7
	Airside Δ PS			0.03	0.08	0.15	0.24	0.34	0.46	0.60	0.75
FOUR ROWS MULTI-CIRCUIT	3.0	0.80	45.2	66.2	80.7	91.2	99.3	105.6	110.7	115.0	118.5
	4.0	1.40	46.4	69.8	86.8	99.8	110.1	118.4	125.3	131.1	136.1
	5.0	2.00	47.1	72.0	90.8	105.6	117.5	127.3	135.7	142.8	148.9
	6.0	2.80	47.6	73.5	93.6	109.6	122.9	133.9	143.4	151.6	158.7
	Airside Δ PS			0.04	0.10	0.20	0.31	0.45	0.61	0.80	1.00

## SIZE 16

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			600	1000	1400	1800	2200	2600	3000	3400	3800
THREE ROWS MULTI-CIRCUIT	2.0	0.20	50.1	63.5	71.7	77.2	81.2	84.2	86.6	88.6	90.2
	3.0	0.50	55.0	72.9	84.8	93.3	99.8	104.9	109.0	112.4	115.3
	4.0	0.80	57.7	78.5	93.0	103.8	112.3	119.1	124.7	129.4	133.5
	5.0	1.10	59.4	82.2	98.6	111.2	121.2	129.4	136.3	142.1	147.2
	Airside Δ PS			0.04	0.11	0.20	0.31	0.44	0.59	0.76	0.95
FOUR ROWS MULTI-CIRCUIT	3.0	0.40	61.1	82.1	95.6	105.1	112.2	117.6	121.9	125.4	128.3
	4.0	0.70	64.0	88.7	105.7	118.2	127.7	135.3	141.4	146.6	150.9
	5.0	1.00	65.8	93.0	112.5	127.3	138.9	148.3	156.1	162.7	168.3
	6.0	1.40	67.0	96.0	117.5	134.1	147.4	158.3	167.5	175.3	182.0
	Airside Δ PS			0.06	0.14	0.26	0.41	0.58	0.78	1.00	1.25

## SIZE 22

ROWS/ CIRCUITS	GPM	PRESSURE LOSS (in. wg)	AIRFLOW (CFM)								
			600	1200	1800	2400	3000	3600	4200	4800	5400
THREE ROWS MULTI-CIRCUIT	2.0	0.20	56.6	78.6	89.5	95.8	100.0	102.9	105.0	106.7	108.1
	3.0	0.50	61.6	91.9	109.3	120.5	128.3	134.1	138.6	142.1	145.0
	4.0	0.80	64.1	99.7	121.9	137.1	148.2	156.6	163.3	168.8	173.3
	5.0	1.20	65.7	104.8	130.5	148.8	162.6	173.5	182.2	189.4	195.5
	Airside Δ PS			0.02	0.07	0.14	0.23	0.34	0.46	0.61	0.77
FOUR ROWS MULTI-CIRCUIT	3.0	0.40	67.2	102.2	121.4	133.2	141.1	146.7	150.9	154.1	156.7
	4.0	0.70	69.8	111.4	136.8	153.6	165.5	174.3	181.1	186.5	190.9
	5.0	1.00	71.2	117.2	147.3	168.2	183.6	195.4	204.7	212.2	218.4
	6.0	1.40	72.2	121.2	154.8	179.1	197.4	211.8	223.3	232.8	240.8
	Airside Δ PS			0.03	0.09	0.18	0.30	0.44	0.61	0.80	1.20

### LEGEND

**PS** — Static Pressure Drop (in. wg)  
**ΔPs** — Difference in static pressure from inlet to discharge

### NOTES:

- Hot water capacities are in MBtuh (MBtuh = 1000 Btuh).
- Btuh = 1.08 x cfm x ΔT (Temp rise across coil).
- Data is based upon 180 F entering water and 55 F entering air.
- HD (head loss) is in feet of water.

- Tables are based upon a temperature difference of 125 F between entering air and entering water. For other temperature differences, multiply MBtuh values by factors below.
- LAT (Leaving Air Temperature) = Entering Air Temp + air temp rise.
- Air temperature rise = 927 x MBtuh/cfm.
- Water temperature drop = 2.04 x MBtuh/gpm.
- Coils are not for steam application. Contact a Carrier representative for steam coil data.

### CORRECTION FACTORS FOR OTHER ENTERING CONDITIONS

ΔT	50	60	70	80	90	100	115	125	140	150
Factor	0.40	0.48	0.56	0.64	0.72	0.80	0.88	1.00	1.12	1.20

### HOT WATER COIL NOTES TEMPERATURE DIFFERENTIAL TABLE

#### ETHYLENE GLYCOL CORRECTION

0%	10%	20%	30%	40%	50%
1.00	0.96	0.93	0.89	0.86	0.82

NOTE: See Carrier Air Terminal Builder program for other fluids and information.



## 35E UNIT WITH ELECTRIC HEAT

ELECTRIC REHEAT CODE	DESCRIPTION (VOLTS/PHASE/STEPS)	MINIMUM/MAXIMUM ALLOWABLE kW BY UNIT SIZE*																							
		35E Unit Size																							
		04		05		06		07		08		09		10		12		14		16		22			
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
0	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
E11	120v/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	0.5	5.0	0.5	5.0	1.0	5.0	1.0	5.0	1.0	5.0	1.0	5.0
E12	120v/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	1.0	5.0	1.0	5.0	2.0	5.0	2.0	5.0	2.0	5.0	2.0	5.0
E13	120v/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	1.5	5.0	1.5	5.0	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0
E21	208v/1Ph/1S	0.5	3.0	0.5	5.0	0.5	7.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	1.0	9.5	1.0	9.5	1.0	9.5	1.0	9.5
E22	208v/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	1.0	9.5	1.0	9.5	2.0	9.5	2.0	9.5	2.0	9.5	2.0	9.5
E23	208v/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	1.5	9.5	1.5	9.5	3.0	9.5	3.0	9.5	3.0	9.5	3.0	9.5
E31	240v/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	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0	1.0	11.0
E32	240v/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	1.5	11.0	1.5	11.0	2.0	11.0	2.0	11.0	2.0	11.0	2.0	11.0
E33	240v/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	2.0	11.0	2.0	11.0	3.0	11.0	3.0	11.0	3.0	11.0	3.0	11.0
E41	277v/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	1.0	13.0	1.0	13.0	1.0	13.0	1.0	13.0	1.0	13.0	1.5	13.0
E42	277v/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	1.5	13.0	1.5	13.0	2.0	13.0	2.0	13.0	2.0	13.0	3.0	13.0
E43	277v/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	2.5	13.0	2.5	13.0	3.0	13.0	3.0	13.0	3.0	13.0	4.5	13.0
E61	208v/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	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E62	208v/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	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E63	208v/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	1.5	16.0	1.5	16.0	3.0	16.0	3.0	16.0	3.0	16.0	3.0	16.0
E91	480v/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	2.5	21.0	2.5	30.0	3.0	36.0	3.0	36.0	3.0	36.0	4.0	36.0
E92	480v/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	2.5	21.0	2.5	30.0	3.0	36.0	3.0	36.0	3.0	36.0	4.0	36.0
E93	480v/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	2.5	21.0	2.5	30.0	3.0	36.0	3.0	36.0	3.0	36.0	4.0	36.0
EXX	Custom Heater																								

### LEGEND

**kW** — Heating Capacity (kilowatts)

\*Based on maximum cfm for box size. See 35E Basic Pressure Data table on page 17 for maximum kW limits based on lower cfm.

### NOTES:

- See Selection Procedure section below for more information.
- Analog and CCN VVT® control sequences are available with 2 steps of electric heat.
- A minimum 0.03 in. wg discharge static pressure is required to set the flow switch in the electric heater.

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

Factors:

- Specify electric duct heaters using voltage, kW and number of steps.
- Required kW can be calculated using the following relationship.

$$kW = \text{Btuh}/3413$$

$$kW = \frac{\text{CFM} \times \Delta T}{3160}$$

Where:

Btuh = Required heating capacity

$$(1.08 \times \text{cfm} \times \Delta T)$$

OR

$$(\text{kW} \times 3413)$$

Cfm = volume of air controlled during heating (typically 30% to 100% of maximum cooling volume).

$\Delta T$  = desired air temperature rise across the electric heater

Inlet air temperature = primary air temperature, usually 55 F.

Select the discharge temperature so that it does not exceed 120 F. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommends discharge temperatures do not exceed 90 F to avoid air stratification and poor ventilation mixing.

Heater kW selected must be within the maximum and minimum kW's listed in the table above.

# Application data



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

**Airflow range** — Carrier single duct units are equipped with a linear averaging flow probe 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 350 fpm should be avoided to prevent erratic control. A minimum flow less than 350 fpm results in pressure signals less than 0.01 in. wg, which cannot be resolved reliably by most control systems. Carrier Comfort Network® (CCN) systems 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. The 35E units will operate well up to 3000 fpm inlet velocity, but with increased pressure drop through the supply duct and high noise levels.

**System pressure** — Control of duct pressures is the most effective means of ensuring low noise levels, accurate flow control, and minimum energy use. The use of various fan-tracking techniques can ensure optimum system efficiency and operation. Response times of the fan tracking system should be adjustable in order to prevent system oscillations between the pressure independent controllers and the fan system.

Minimum inlet static pressure is the pressure required by a given size box at a specified airflow with the unit damper wide open. This pressure was measured by tests conducted in accordance with AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard 880, using 3 ft of discharge duct of the same size as the unit plenum. The pressure shown is for the unit only or for unit plus hot water coil or electric heat coil. To determine the total static pressure loss in the distribution system, the minimum inlet static pressure must be added to the duct pressure drop (both upstream and downstream of the 35E unit) and the outlet pressure drop.

**Acoustics** — The primary determinant to terminal acoustics is the inlet and duct size and static pressure. Velocity (flow rate) is also a factor. System sound can be limited by reducing duct pressures in the branch duct supplying the unit.

Lined duct downstream of the unit is effective in reducing discharge noise levels. Where no duct lining is employed between the unit and the room diffusers, a noisy system is possible. Reducing inlet pressure drop will help, provided the techniques used to reduce local duct pressure levels do not increase noise levels in the duct that will be carried into the space.

Radiated sound is seldom a problem with single duct terminals. Flexible ducts at the inlet can transmit airborne sound levels into the plenum space, where they add to the radiated sound component.

Sound performance data shown for model 35E is based on tests conducted in accordance with AHRI Standard 880. Data is presented as sound power for the units indicated. When the attenuator, octopus, or electric reheat version is ordered, a long unit will be shipped. The added length of this unit reduces sound power in a similar manner as 3 ft of lined duct, producing an effective 3 NC (noise criteria) reduction in room sound levels in most cases.

Application sound levels are provided as NC levels. These are determined by applying factors provided in Standard 885, as indicated below. Lined duct, ceiling effect, and room attenuation are typical for many office spaces. These assumptions, for discharge (airborne) sound, also include a typical end reflection effect. Alternate effects can be examined by using the Air Terminal Builder program or AHRI Standard 885, from AHRI's website ([www.ahrinet.org](http://www.ahrinet.org)).

The use of multiple outlet plenum will result in reduced sound levels due to power division. The supplied application data assumes that the sound power levels are split, based on a fixed cfm maximum per split, as indicated, assuming split flows are not directed to the same conditioned space. Two split flows directed to the same space often negate the desired effect of power splits.

Adding electric or hot water heat affects the pressure assumptions. Sound data is based on unit pressure drop vs sound generated. If there is low downstream pressure (0.3 in. wg or less), the inlet static pressure (duct pressure) is used to enter the sound level tables. If there is significant discharge pressure drop, the pressure drop across the unit is less than the inlet duct pressure and should be accounted for when determining discharge sound.

Example: 35E size 10 unit with a 4-row coil is selected at 900 cfm; the unit pressure drop is 0.56 in. wg. If the duct pressure is 1.5 in. wg, then the sound is a function of only 0.94 in. wg pressure drop (1.5 – 0.56).

If both the diffuser and the terminal are selected at the same delivered sound power level, the discharge (airborne) sound levels should be combined, by octave band, with the sound power generated by the selected diffuser when predicting sound levels in the space. In many cases, diffusers generate higher frequency sound than the terminal, and the two power levels combine without raising the room NC level. Each application of unit and diffuser must be examined individually to verify that the net NC does not increase. (Equal sound power levels, when added, increase the sound level by 3 dB.)

NOTE: Refer to Carrier publication: **HVAC Acoustical Application Guidelines** (catalog no. 811-449) for additional information.

# Guide specifications



## Single Duct VAV Terminal Unit

### HVAC Guide Specifications

Size Range: **45 to 7100 cfm**

Carrier Model Number:

**35EA** (Analog Electronic Control)

**35EC** (CCN Variable Air Volume [VAV] Electronic Control)

**35ED** (BACnet VAV Electronic Controls)

**35EN** (No Control or DDC by Others)

**35EP** (Pneumatic Control)

**35EV** (CCN Variable Volume and Temperature [VVT®] Electronic Control)

**35EB** (BACnet VVT Electronic Controls)

### Part 1 — General

#### 1.01 SYSTEM DESCRIPTION:

Unit shall be a single-duct, variable air volume terminal unit with control box for installation in a ceiling that permits access to the unit. Manufacturer shall supply unit(s) of the design, number, size and performance as shown on equipment drawings and schedules. Unit(s) are for use in conjunction with air distribution manifolds, distribution ductwork and ceiling-mounted diffusers.

#### 1.02 QUALITY ASSURANCE:

- A. Insulation shall meet NFPA 90A requirements for flame spread and smoke generation and UL 181 requirements for anti-erosion, corrosion and fungus properties.
- B. Hot water coils, when specified, shall be tested for leakage at 400 psig with the coil submerged in water.
- C. Electric heating coils, when specified, shall be UL or ETL listed and designed to comply with UL Standard 1096.
- D. Sound power levels shall be AHRI certified in accordance with the requirements of AHRI 880.

#### 1.03 DELIVERY AND STORAGE:

Units shall be stored and handled per manufacturer's recommendations.

### 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 factory-set airflow limits, coil type and coil hand, where applicable.

\* Registered trademark of DuPont.

##### B. Unit Cabinet:

Constructed of 22-gage (20-gage 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 cabinet insulation shall be 1/2-in. thick, 1 1/2-lb equivalent dual density fiberglass insulation that meets the requirements of UL 181 and NFPA 90A.
2. Optional Insulation:
  - a. Dual density, 1-in. thick, 1 1/2-lb density fiberglass insulation shall meet UL 181 and NFPA 90A.
  - b. Cellular insulation option shall consist of a unit casing that is lined, glued and riveted with 3/8-in. thick, 1 1/2-lb density, smooth surface, polyolefin, closed cell foam insulation for fiber free application. Cellular insulation shall meet UL 181 and NFPA 90A and shall not support mold or bacteria growth.
  - c. The Steriliner option shall consist of 13/16-in., 4 lb density, rigid duct board insulation with nylon reinforced foil material covering the insulation fibers. The insulation shall meet UL 181 and NFPA 90A. The lining shall be attached to the terminal unit casing by insulation adhesive and full-seam-length steel Z-strips which enclose and seal the insulation cut edges, thus eliminating tape and adhesives to cover the cut edges.
  - d. The Sterilwall insulation option shall consist of standard 1/2-in. or 1-in. thick, 1 1/2-lb dual density, fiberglass insulation. The insulation shall meet UL 181 and NFPA 90A. It shall be 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.
  - e. A perforated doublewall insulation option shall consist of standard 1/2-in. or 1-in. thick, 1 1/2-lb dual density, fiberglass insulation. The insulation shall meet UL 181 and NFPA 90A. It shall be 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.
  - f. The no liner option shall consist of the unit casing with no internal insulation.

##### D. Damper Assembly:

The control air damper assembly shall be constructed of heavy gage steel with solid shaft rotating in Delrin\* bearings. Damper shaft shall be marked on the end to indicate damper position. Damper

# Guide specifications (cont)



blade shall incorporate a flexible gasket for tight airflow shutoff and operate over a full 90 degrees.

## E. Controls:

1. Units shall have pressure-independent pneumatic, electronic, or communicating controls, as specified, capable of maintaining required airflow set points to  $\pm 5\%$  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 linear averaging flow probe located across the inlet. The sensor will provide a differential pressure signal amplified to equal 3 times the velocity pressure with an accuracy of at least  $\pm 10\%$  throughout the range of 350 to 2600 fpm inlet duct velocity, depending on the controller employed.

## F. Special Features:

### 1. Hot Water Heating Coil:

Coil shall be mounted in a minimum 20 gage 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/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 mounted in a minimum 20 gage zinc coated steel casing and shall be UL listed. Coils shall have:

- a. Elements shall be nickel chrome and supported by ceramic isolators.
- b. The integral control panel shall be housed in a NEMA 2 enclosure, with hinged access door for access to all controls and safety devices.
- c. Electric coils shall contain a primary automatic reset thermal cutout and differential pressure airflow switch for proof of airflow (optional).
- d. Electric coils shall include fused or non-fused door interlocking disconnect switch,

mercury contactors, fuseblock, dust tight enclosure construction, all mounted and/or wired within the control enclosure.

- e. Heaters shall be designed for the capacity, electrical characteristics and steps of control as shown on the equipment schedule.
- f. Coils are factory-wired and include all limit switches.
- g. An SSR (solid-state relay) proportional heat control shall meet the requirements of ASHRAE Standard 62, Addendum N.

### 3. Multiple Outlet Attenuator:

The multiple outlet attenuator shall be 36 in. long and factory installed on the non-attenuated base unit that is not equipped with electric heat. Refer to equipment schedule for affected units. The attenuator shall be:

- a. Equipped with 6-in. or 8-in. diameter collars in the quantity and configuration specified on the equipment drawings. Each collar shall include a locking butterfly balancing damper.
- b. Insulated with 1-in. thick, 1.5 lb equivalent dual density or mat-faced insulation.

### 4. Sound Attenuator:

The 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.

### 5. Control Transformers:

- a. Electric heat units shall include a factory supplied, mounted and wired control transformer inside the electric heat enclosure for electronic control applications.
- b. Non-electric heat units, with electronic controls, shall be available with an optional factory supplied, mounted, and wired control transformer, mounted inside the control enclosure.

### 6. Access Panel:

An access panel in the terminal unit casing shall be available for viewing damper components and for upstream cleaning of the hot water coil fins.

### 7. Hanger Brackets:

Shall be field-installed for use with ceiling installation of the terminal unit.

### 8. Non-Fused Disconnect:

Non-fused switch shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.

