

**The Carnes** constant volume fan terminal unit provides constant air volume to the space while retaining the advantages of a variable air volume system.

The primary air control assembly operates in the same manner as a standard throttling control valve when cooling loads are high. As cooling loads diminish the integral blower(s) induces warm ceiling plenum air to maintain constant air volume.

*Other Features Include:*

- Air flow capacities to 2850 CFM.
- Durable 22 gauge galvanized steel casing construction.
- Access panel for internal components.
- Standard inlet sizes and slip and drive discharge connections.
- Forward curved centrifugal type fan assemblies with thermally protected, permanent split capacitor type 115 or 277 volt, single phase, fractional horsepower three speed motors.
- Field adjustable fan air flow damper (between three speeds).
- Fan/motor assemblies are isolated from the casing using rubber isolators to minimize vibration transmission.
- Low leakage primary air damper design.
- Secondary air filter rack.
- Performance data based on tests conducted in accordance with ARI Standard 880-89.
- Air flow switch.
- All units are equipped with pressure independent pneumatic or electronic controls.
- Field adjustable P/E switch with pneumatic controls.
- Averaging type velocity sensor and calibration chart for measuring air flow through the primary air damper.
- Insulation is 1" thick, 1½ lb. dual density fiberglass with surface treated to prevent air erosion, UL listed and meets NFPA 90A requirements.
- Optional ETL listing.
- Optional fan speed selector switch.
- Optional primary air controls enclosure.
- Optional one or two row hot water coils (Model ACW). Coil is factory attached to the unit discharge.
- Optional one, two or three stage electric reheat coils (Model ACE). Coil is factory attached to unit discharge or shipped separately for field mounting.
- Optional secondary air filters, Class I (re-usable) or Class II (throw away).
- Optional quick release access panel.
- Optional foil coated insulation (Hospital, Laboratory, etc. applications).

*Available Modules:*

- Basic control unit—Model ACF.
- Basic control unit with hot water coil—Model ACW.
- Basic control unit with electric coil—Model ACE.



**Typical Sequence of Operation**

**Central fan on — Day (occupied) operation.**

When the central system fan is "on" and a positive pressure of at least .10 IWC is present at the primary air inlet, the unit air flow switch senses this pressure and keeps the fan on all the time by overriding the unit P/E switch action with pneumatic controls or electric contactor with electronic controls.

**Central fan off — Night (unoccupied) operation.**

When the central system fan is "off" a 0.0 to negative pressure is present at the primary air inlet. The air flow switch senses the

negative pressure and is taken out of the circuit. The unit fan is then turned on and off by the P/E switch with pneumatic controls or electric contactor with electronic controls.

- CAUTION:** 1. For electronically controlled units, a minimum CFM value other than zero may cause the damper to drive open when the central system is off.  
 2. The "ES" (morning warm-up) electronic option requires a minimum airflow other than zero for proper duct temperature sensing.

**PERFORMANCE DATA — Constant Volume Fan Terminal Units** .....

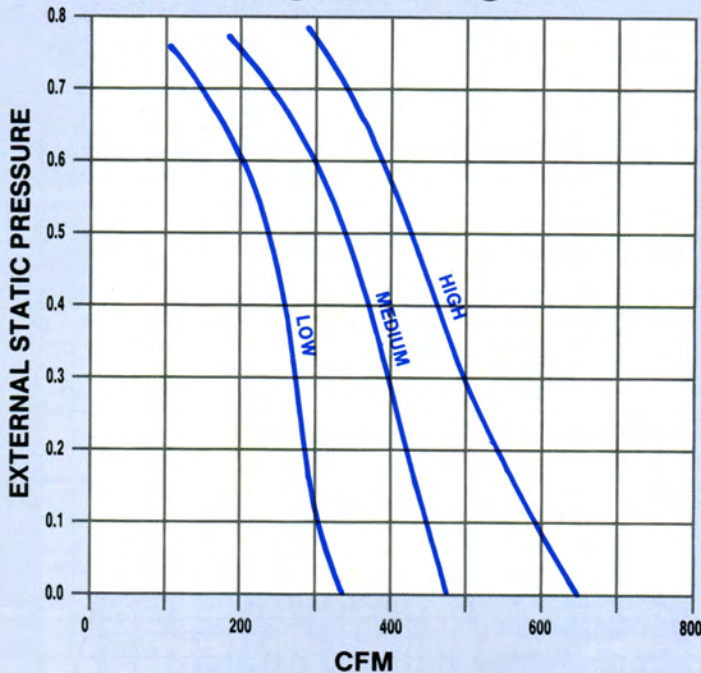
**Fan Motor Full Load Amps (FLA) Rating**

Fan Unit Model	Unit Size	Motor(s) H.P.	120 Volt Motor(s) FLA	277 Volt Motor(s) FLA
AC	06	1 @ 1/6	2.0	.8
AC	07	1 @ 1/6	2.0	.8
AC	08	1 @ 1/5	2.2	.9
AC	10	1 @ 1/4	3.2	1.2
AC	12	1 @ 1/2	6.2	2.3
AC	14	2 @ 1/4	6.4	2.4
AC	16	2 @ 1/2	12.4	4.6

**FAN CURVES — CFM vs External Static Pressure**

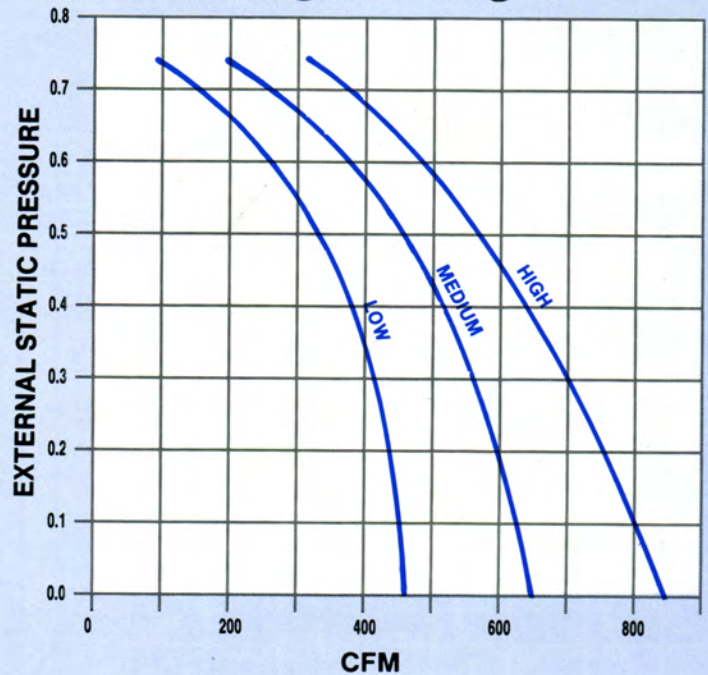
**Models AC 06 & AC 07**

1/6 H. P. Motor  
 F.L.A.: 2.0A @ 120V .8A @ 277V



**Model AC 08**

1/5 H. P. Motor  
 F.L.A.: 2.2A @ 120V .9A @ 277V



- NOTES:** 1. Pressure drops due to heating coils are treated as external static pressures. (Refer to coil sections of this catalog for additional information.)  
 2. F.L.A. = Full Load Amps of motor.

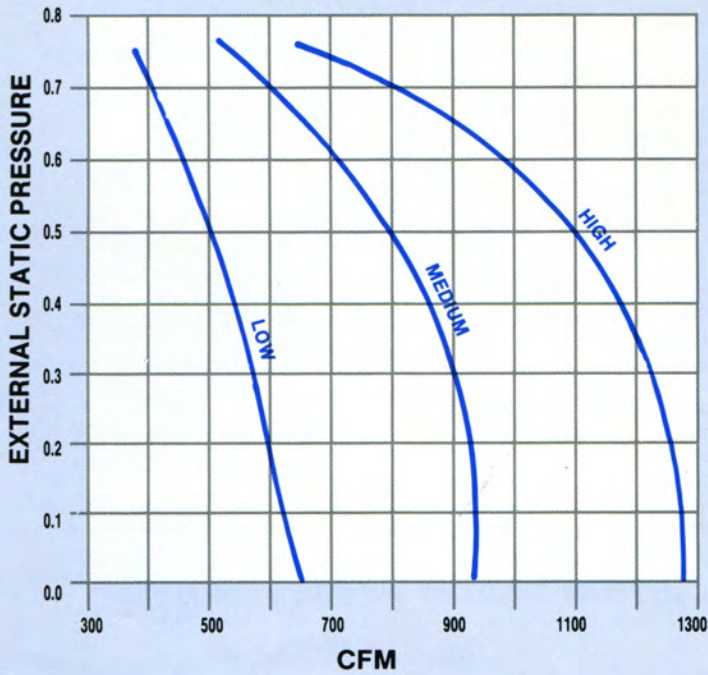


## FAN CURVES — CFM vs External Static Pressure

### Model AC 10

1/4 H. P. Motor

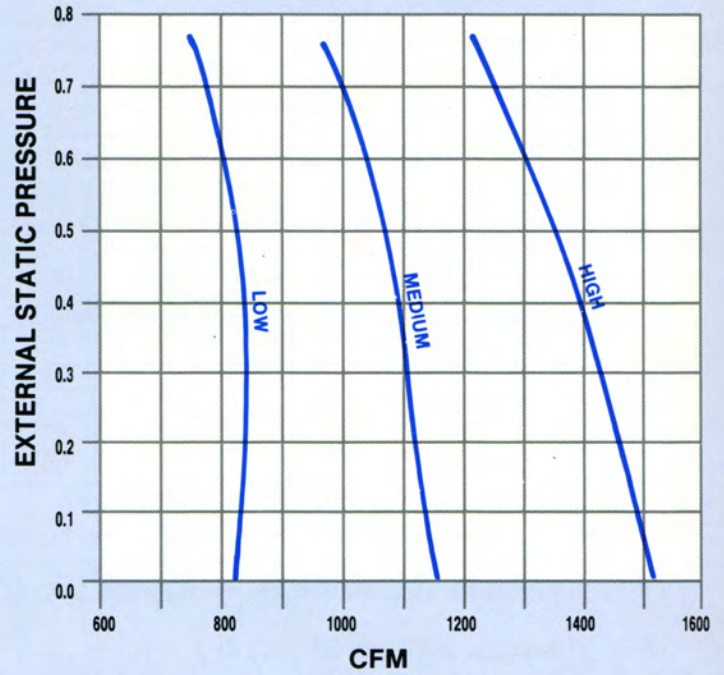
F.L.A.: 3.2A @ 120V 1.2A @ 277V



### Model AC 12

1/2 H. P. Motor

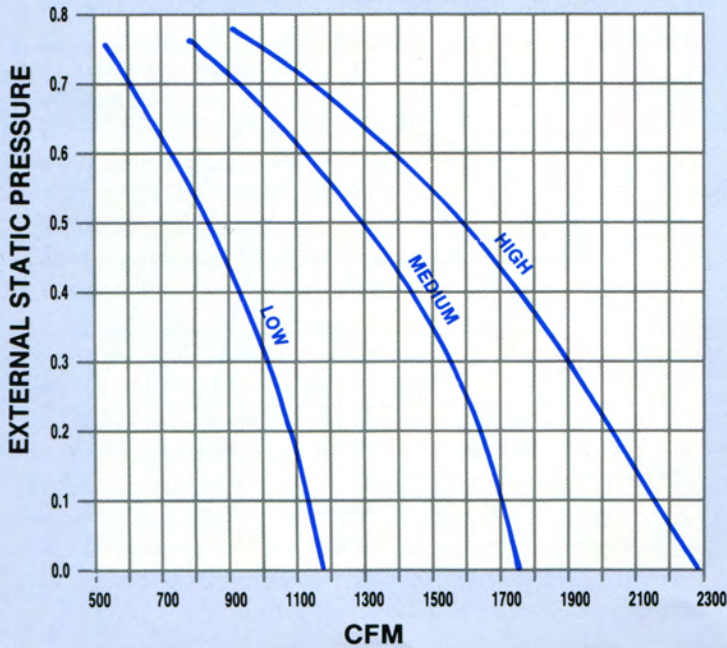
F.L.A.: 6.2A @ 120V 2.3A @ 277V



### Model AC 14

(2) 1/4 H. P. Motors

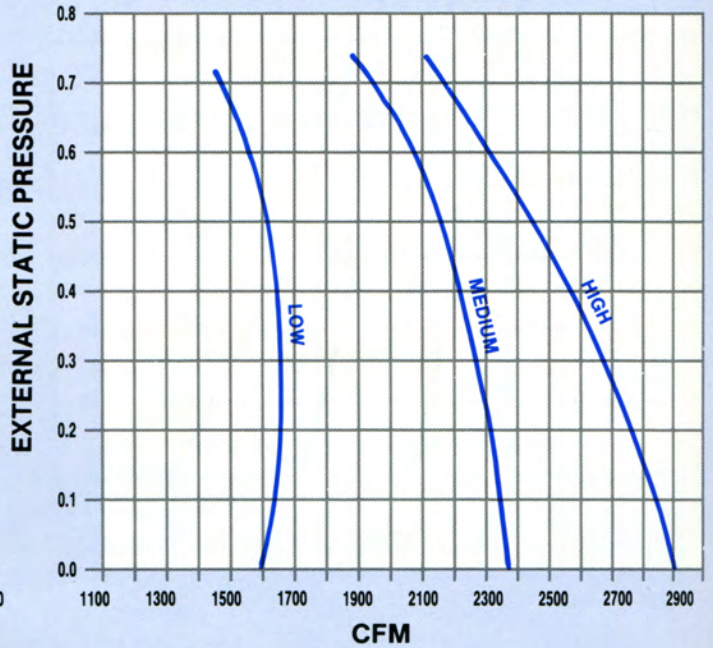
F.L.A.: 6.4A @ 120V 2.4A @ 277V



### Model AC 16

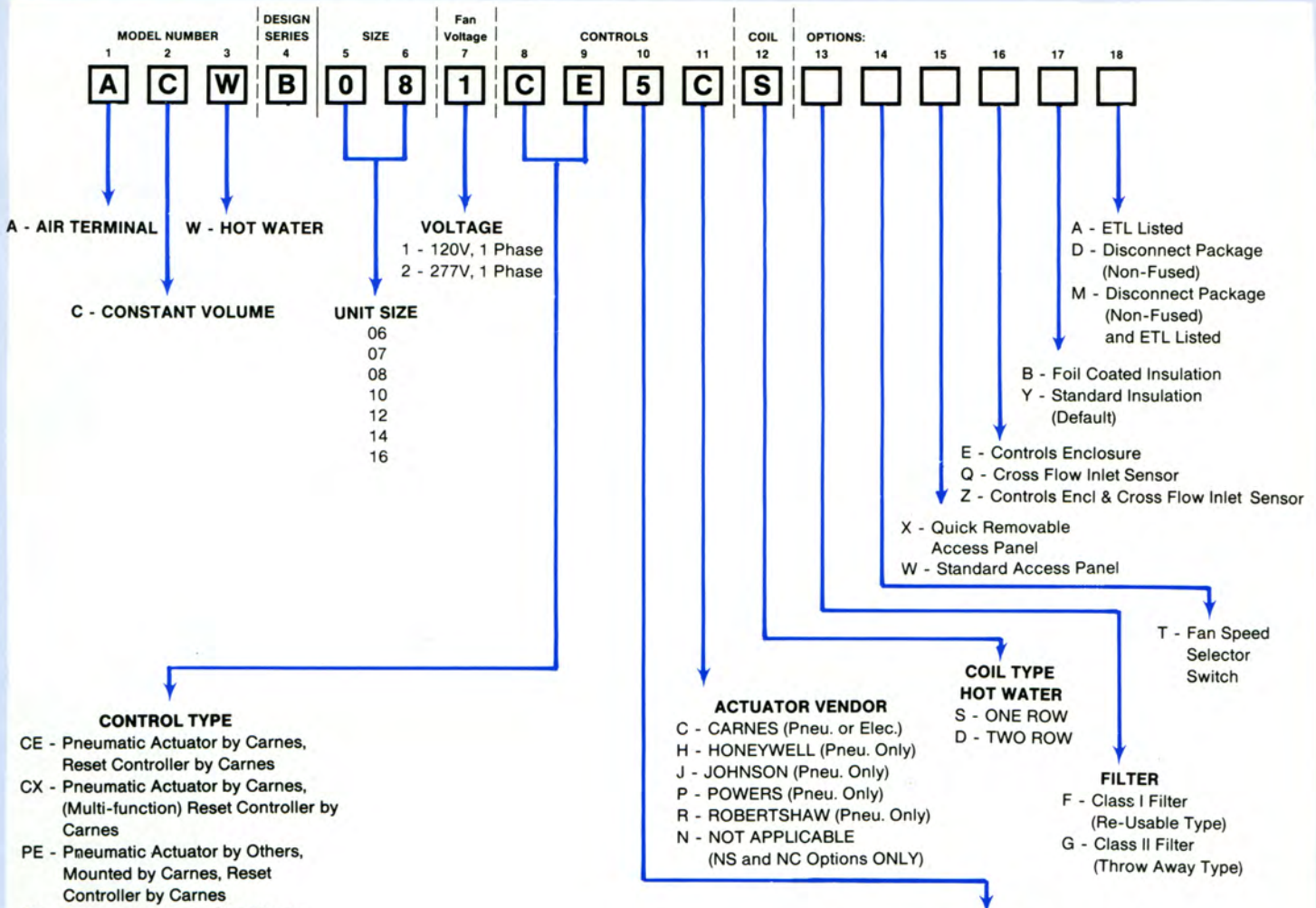
(2) 1/2 H. P. Motors

F.L.A.: 12.4A @ 120V 4.6A @ 277V



NOTES: 1. Pressure drops due to heating coils are treated as external static pressures (Refer to coil sections of this catalog for additional information.)  
2. F.L.A. = Full Load Amps of motor.





- CONTROLS, DAMPER & COIL ARRANGEMENT**
- \* 1 - Normally Open—Right Hand Controls & Coil Tubing Connections (All Electric/Electronic/NS, NC, NA) (All Pneumatic Control Types for Reverse Acting Thermostat)
  - \* 2 - Normally Open—Left Hand Controls & Coil Tubing Connections (All Electric/Electronic/NS, NC, NA) (All Pneumatic Control Types for Reverse Acting Thermostat)
  - 3 - Normally Closed—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 4 - Normally Closed—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 5 - Normally Open—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 6 - Normally Open—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 7 - Normally Closed—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Reverse Acting Thermostat)
  - 8 - Normally Closed—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Reverse Acting Thermostat)

† Minimum setting cannot be zero with these controls. Duct sensor needs at least 20% of maximum rated CFM to sense duct air temperature.

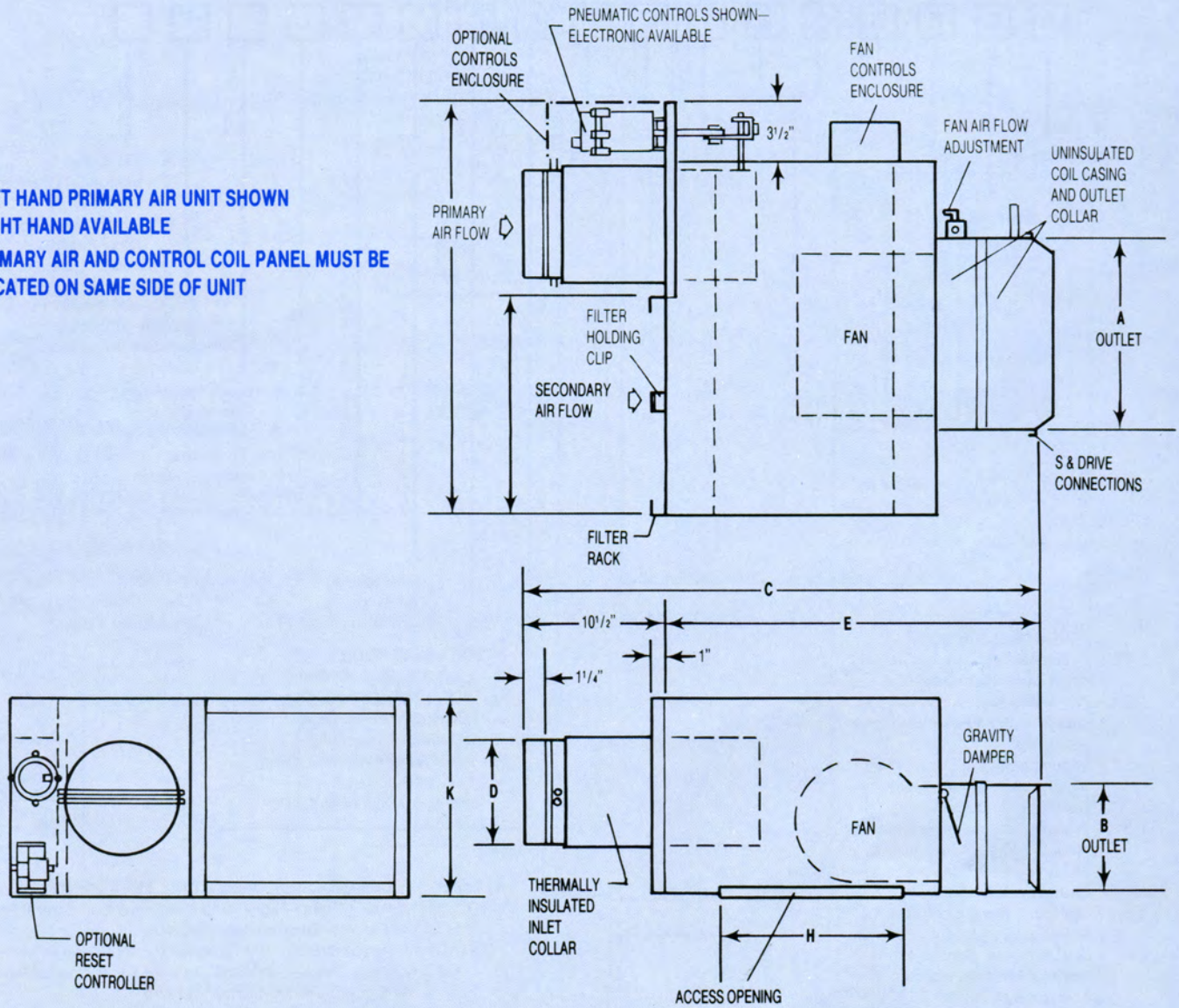
**NOTE:** Hand of controls is determined by facing the averaging flow sensor (inlet of the unit) with the supply air hitting the back of your head.

\* Electric/Electronic Units **DO NOT** Fail Open. '1' or '2' is used for Model Numbering Only. Electric/Electronic Units are shipped with the Damper in the Closed Position. (Refer to the Controls Catalog AV-02 for additional operating information.)

A Carnes Electronic Thermostat **must be ordered** with the electronic EC, ES, and ET Control Options.



—LEFT HAND PRIMARY AIR UNIT SHOWN  
RIGHT HAND AVAILABLE  
—PRIMARY AIR AND CONTROL COIL PANEL MUST BE  
LOCATED ON SAME SIDE OF UNIT

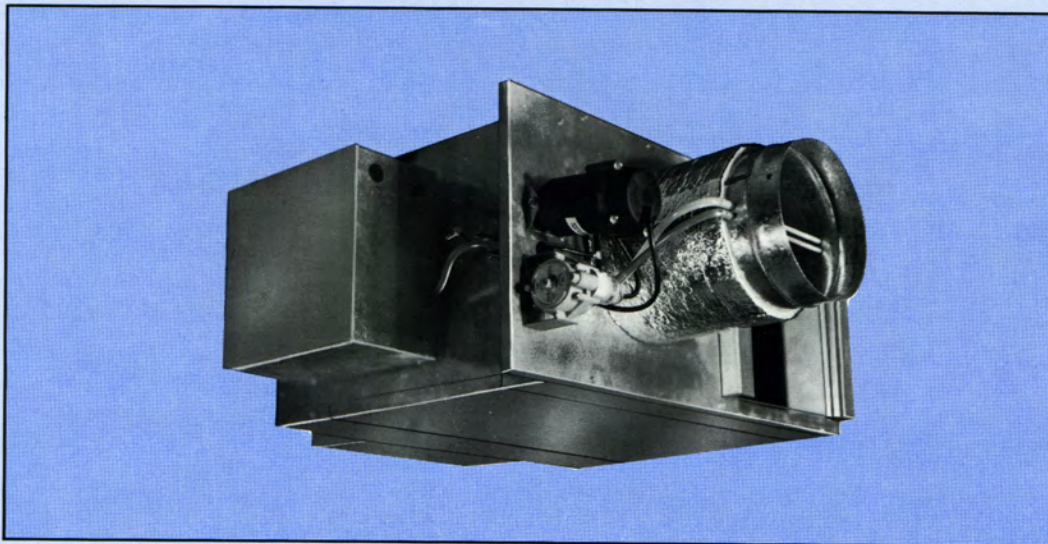


**DIMENSIONS LISTED IN INCHES**

Unit Size	*Primary Nominal CFM	Nominal Fan CFM @ .10" E.S.P.	Fan H.P.	S & Drive Outlet		1 Row C	2 Row C	Inlet		1 Row E	2 Row E	G	H	Secondary Air Inlet	
				A	B			D	E					J	K
06	500	580	1/6	14	10	39 3/8	40 1/2	5 7/8	28 5/8	30	29 1/2	13 1/2	12	14	
07	580	580	1/6	14	10	39 3/8	40 1/2	6 7/8	28 5/8	30	29 1/2	13 1/2	12	14	
08	800	800	1/5	14	10	39 3/8	40 1/2	7 7/8	28 5/8	30	29 1/2	13 1/2	12	14	
10	1250	1250	1/4	14	12 1/2	42 5/8	44	9 7/8	32 1/8	33 1/2	35 1/2	17	16	17 1/2	
12	1500	1500	1/2	16	15	42 5/8	44	11 7/8	32 1/8	33 1/2	35 1/2	17	16	17 1/2	
14	2100	2100	(2) 1/4	32	17 1/2	44 5/8	46	13 3/8	34 1/8	35 1/2	49 1/2	19	26	17 1/2	
16	2850	2850	(2) 1/2	32	17 1/2	44 5/8	46	15 3/8	34 1/8	35 1/2	49 1/2	19	26	17 1/2	

\* Refer to "Primary Air Inlet Parameters" (page 6) when selecting MINIMUM CFM.





The **Carnes** low profile constant volume fan terminal unit provides constant air volume to the space while retaining the advantages of a variable air volume system.

The primary air control assembly operates in the same manner as a standard throttling control valve when cooling loads are high. As cooling loads diminish the integral blower(s) induces warm ceiling plenum air to maintain constant air volume.

*Other Features Include:*

- Air flow capacities to 2000 CFM.
- Maximum unit height dimension of 11 inches.
- Durable 22 gauge galvanized steel casing construction.
- Access to internal components.
- Standard inlet sizes and slip and drive discharge connections.
- Forward curved centrifugal type fan assemblies with thermally protected, permanent split capacitor type 120 or 277 volt, single phase, fractional horsepower three speed motors.
- Field adjustable fan air flow damper (between three speeds).
- Low leakage primary air damper design.
- Performance data based on tests conducted in accordance with ARI Standard 880-89.
- Air flow switch.
- All units are equipped with pressure independent pneumatic or electronic controls.
- Field adjustable P/E switch with pneumatic controls.
- Averaging type velocity sensor and calibration chart for measuring air flow through the primary air damper.
- Insulation is 1/2" thick, 1 1/2 lb. dual density fiberglass with surface treated to prevent air erosion, UL listed and meets NFPA 90A requirements.
- Optional fan speed selector switch.
- Optional primary air controls enclosure.
- Optional one or two row hot water coils (Model ACW). Coil is factory attached to the unit discharge.
- Optional electric reheat coils (Model ACE). Coil is factory attached to unit discharge or shipped separately for field mounting.
- Optional secondary air filters, Class I (re-usable) or Class II (throw away).
- Optional foil coated insulation (Hospital, Laboratory, etc. applications).
- Optional ETL listing.

*Available Modules:*

- Basic control unit—Model ACF.
- Basic control unit with hot water coil—Model ACW.
- Basic control unit with or without electric coil—Model ACE.



**Typical Sequence of Operation**

**Central fan on — Day (occupied) operation.**

When the central system fan is "on" and a positive pressure of at least .10 IWC is present at the primary air inlet, the unit air flow switch senses this pressure and keeps the fan on all the time by overriding the unit P/E switch action with pneumatic controls or electric contactor with electronic controls.

**Central fan off — Night (unoccupied) operation.**

When the central system fan is "off" a 0.0 to negative pressure is present at the primary air inlet. The air flow switch senses the

negative pressure and is taken out of the circuit. The unit fan is then turned on and off by the P/E switch with pneumatic controls or electric contactor with electronic controls.

- CAUTION:**
1. For electronically controlled units, a minimum CFM value other than zero may cause the damper to drive open when the central system is off.
  2. The "ES" (morning warm-up) electronic option requires a minimum airflow other than zero for proper duct temperature sensing.

**PERFORMANCE DATA — Low Profile Constant Volume Fan Terminal Units .....**

**Motor Full Load Amp (FLA) Rating**

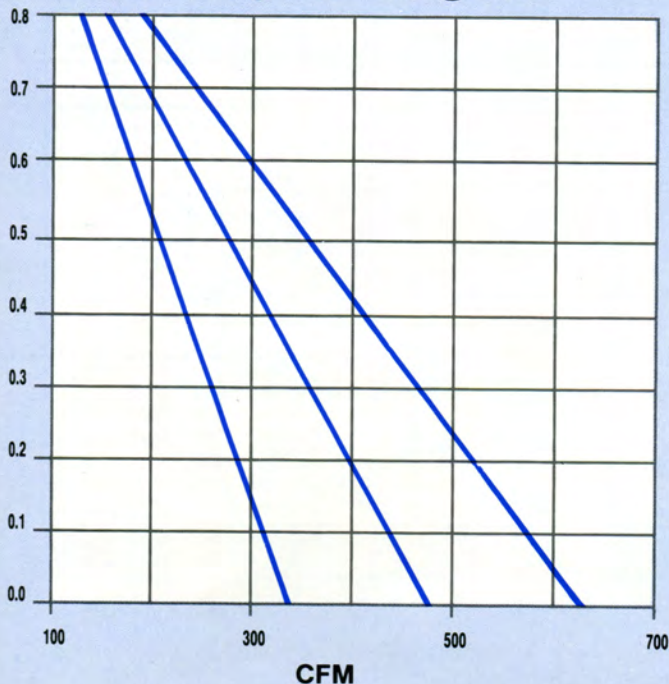
Fan Unit Model	Unit Size	Motor(s) H.P.	120 Volt Motors(s) FLA	277 Volt Motors(s) FLA
AC	L1	1 @ 1/6	2.0	.8
AC	L2	1 @ 1/4	3.2	1.2
AC	L3	2 @ 1/6	4.0	1.6
AC	L4	2 @ 1/4	6.4	2.4

**FAN CURVES — CFM vs External Static Pressure**

**Size L1**

1/6 H. P. Motor

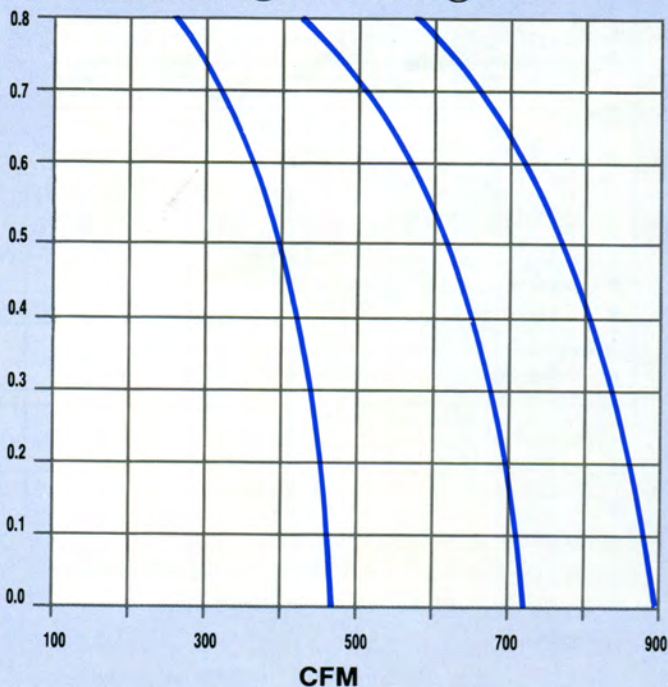
F.L.A.: 2.0A @ 120V .8A @ 277V



**Size L2**

1/4 H. P. Motor

F.L.A.: 3.2A @ 120V 1.2A @ 277V



- NOTES:**
1. Pressure drops due to heating coils are treated as external static pressures (Refer to coil sections of this catalog for additional information.)
  2. F.L.A. = Full Load Amps of motor.

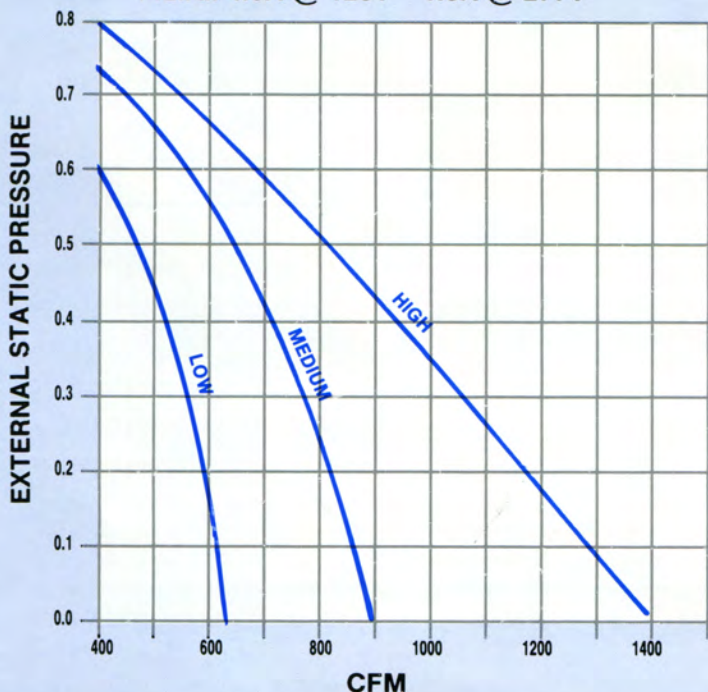


**FAN CURVES — CFM vs External Static Pressure**

**Size L3**

(2) 1/6 H. P. Motors

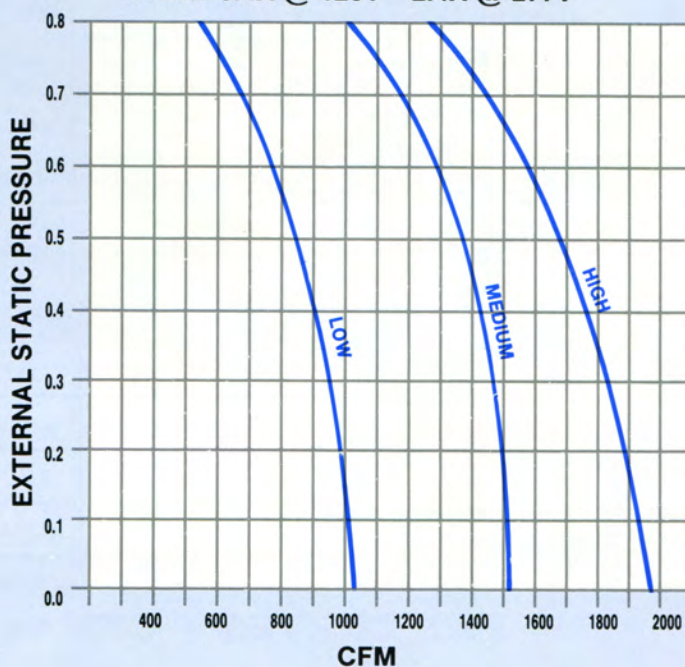
F.L.A.: 4.0A @ 120V 1.6A @ 277V



**Size L4**

(2) 1/4 H. P. Motors

F.L.A.: 6.4A @ 120V 2.4A @ 277V



**NOTES:** 1. Pressure drops due to heating coils are treated as external static pressures (Refer to coil sections of this catalog for additional information.)  
2. F.L.A. = Full Load Amps of motor.

**SOUND PERFORMANCE DATA . . . . .**

(FAN ON — 100% Primary)

Fan Speed	ESP	Unit Size	Pri./Sec. CFM	Primary Air $\Delta P_s$	Discharge NC	Radiated NC
HI	.25	L1	460/0	.12	22	20
MED	.25		370/0	.09	19	18
LO	.25		280/0	.07	21	17
HI	.25	L2	840/0	.13	21	23
MED	.25		680/0	.07	16	20
LO	.25		440/0	.05	14	14
HI	.25	L3	1100/0	.44	27	22
MED	.25		760/0	.14	18	22
LO	.25		560/0	.11	17	20
HI	.25	L4	1850/0	.98	17	27
MED	.25		1480/0	.66	15	23
LO	.25		960/0	.23	13	18

**NOTES:** 1. Performance data on this page is considered to be application data. Although this data is presented in a format that cannot be certified, it is based on testing in accordance with ARI Standard 880. Certified performance data is shown on page 71.  
2.  $\Delta P_s$  is static pressure difference from inlet to discharge and does not include hot water or electric coils. (Refer to coil section of this catalog for pressure drop and performance information.)  
3. External Static Pressure (ESP) is pressure due to the air flow adjustment damper, heating coils, and/or downstream ductwork.  
4. The CFM indicated is the maximum attainable at the external static pressure (ESP) shown.

**NC LEVELS ARE CALCULATED IN ACCORDANCE WITH ARI 885-90. NC LEVELS ARE NOT WITHIN THE SCOPE OF ARI STANDARD 880 AND THEREFORE CANNOT BE CERTIFIED.**

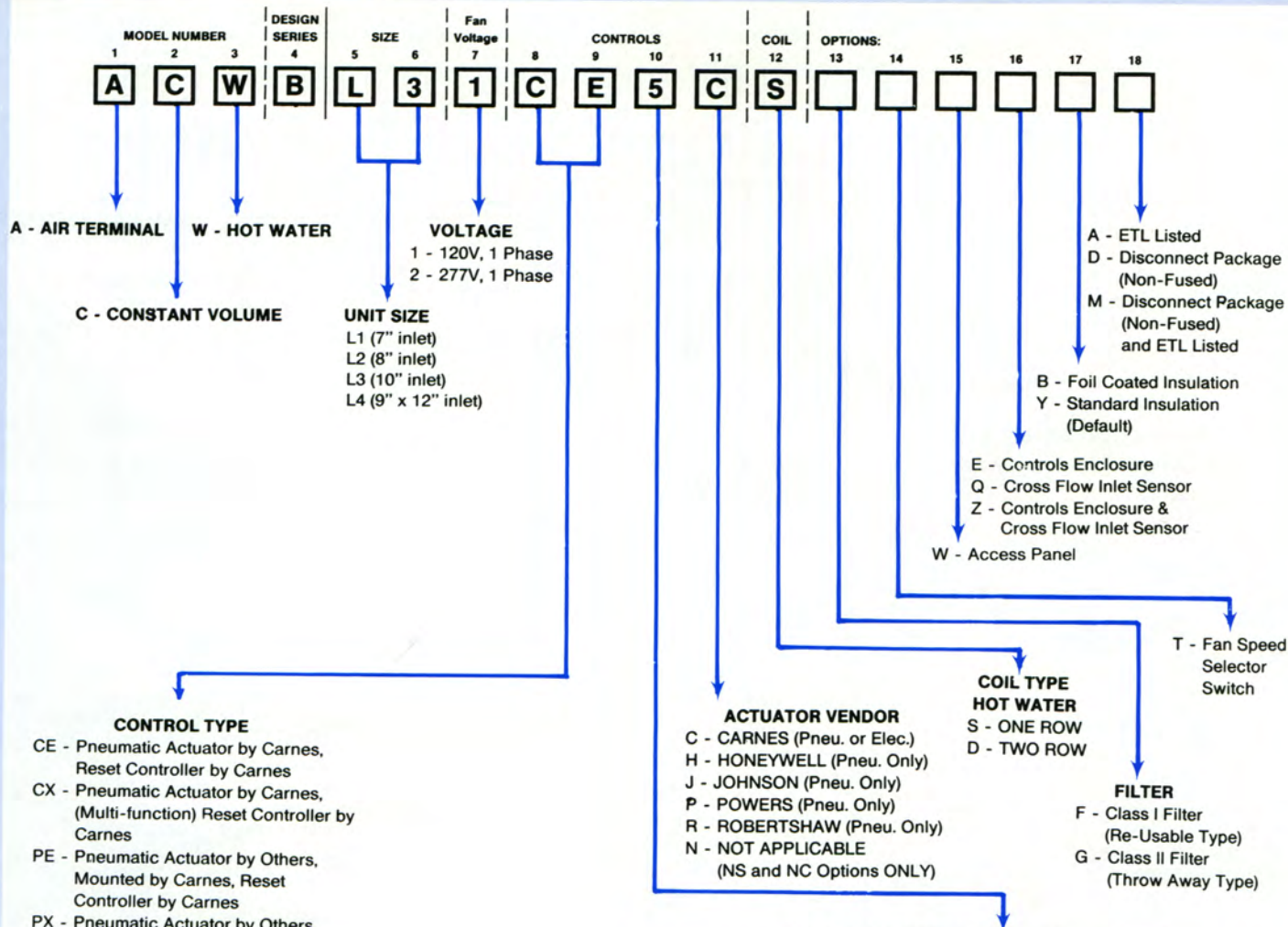
Discharge NC levels are based on:

- a) 5 foot rectangular 12" x 12" duct lined with 1" fiberglass insulation.
- b) Rectangular tee attenuation entering branch duct.
- c) 6 foot lined flex duct (8" diameter).
- d) Maximum of 300 CFM per outlet.
- e) Space effect factor (5000 ft<sup>3</sup>) at 5 feet from outlet.
- f) 10 db for room absorption.

Radiated NC levels are based on:

- a) Plenum/ceiling effect - 5/8" mineral fiber tile, 35 lb/ft<sup>3</sup> - 3 foot plenum
- b) Space effect factor (5000 ft<sup>3</sup>) at 10 feet from outlet.
- c) 10 db for room absorption.





- CONTROLS, DAMPER & COIL ARRANGEMENT**
- \* 1 - Normally Open—Right Hand Controls & Coil Tubing Connections (All Electric/Electronic/NS, NC, NA) (All Pneumatic Control Types for Reverse Acting Thermostat)
  - \* 2 - Normally Open—Left Hand Controls & Coil Tubing Connections (All Electric/Electronic/NS, NC, NA) (All Pneumatic Control Types for Reverse Acting Thermostat)
  - 3 - Normally Closed—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 4 - Normally Closed—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 5 - Normally Open—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 6 - Normally Open—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Direct Acting Thermostat)
  - 7 - Normally Closed—Right Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Reverse Acting Thermostat)
  - 8 - Normally Closed—Left Hand Controls & Coil Tubing Connections (All Pneumatic Control Types for Reverse Acting Thermostat)

† Minimum setting cannot be zero with these controls. Duct sensor needs at least 20% of maximum rated CFM to sense duct air temperature.

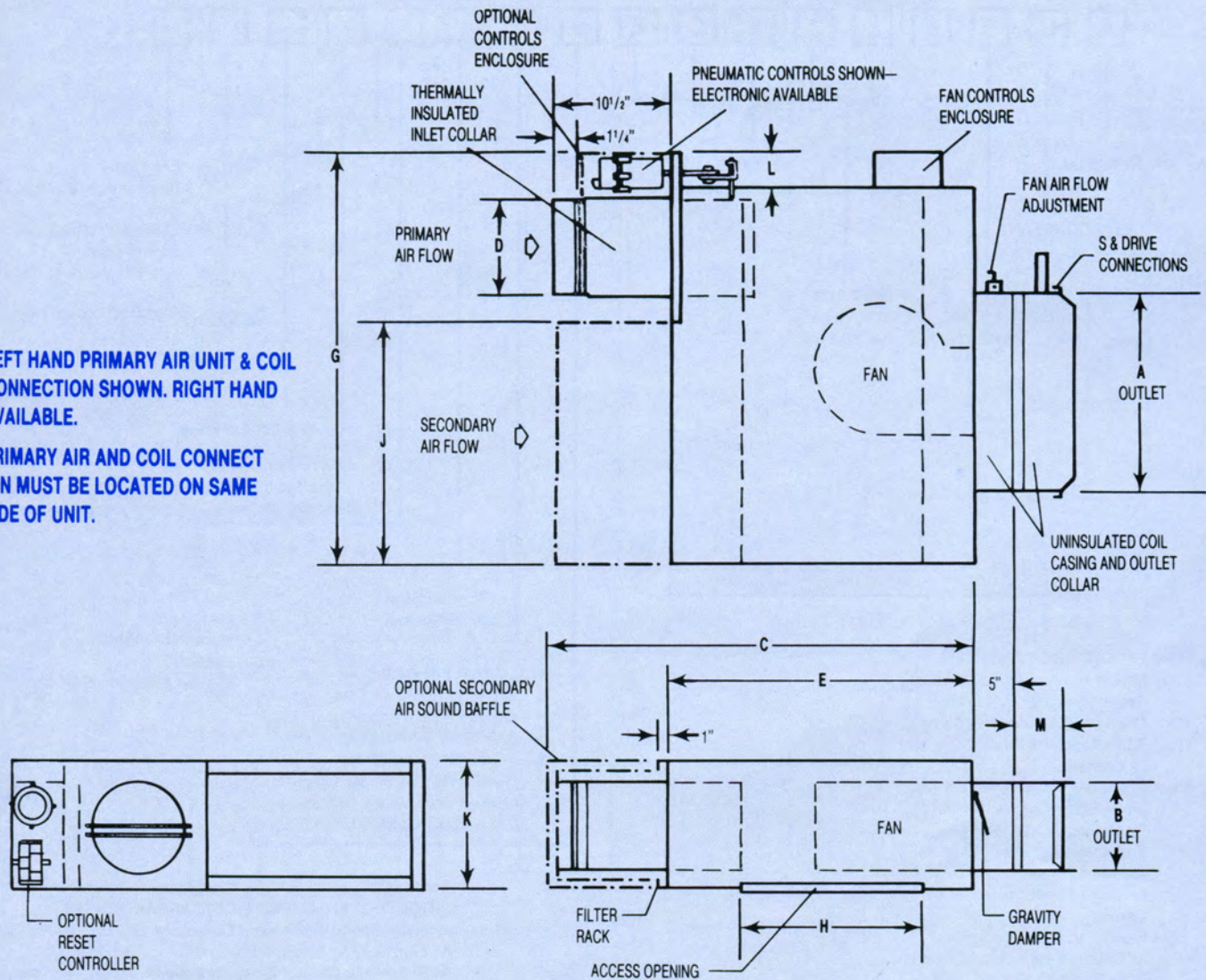
**NOTE:** Hand of controls is determined by facing the averaging flow sensor (inlet of the unit) with the supply air hitting the back of your head.

\* Electric/Electronic Units **DO NOT** Fail Open. '1' or '2' is used for Model Numbering Only. Electric/Electronic Units are shipped with the Damper in the Closed Position. (Refer to the Controls Catalog AV-02 for additional operating information.)

A Carnes Electronic Thermostat **must be ordered** with the electronic EC, ES, and ET Control Options.



- LEFT HAND PRIMARY AIR UNIT & COIL CONNECTION SHOWN. RIGHT HAND AVAILABLE.
- PRIMARY AIR AND COIL CONNECTION MUST BE LOCATED ON SAME SIDE OF UNIT.



**DIMENSIONS LISTED IN INCHES**

Unit Size	*Primary Nominal CFM	Nominal Fan CFM @ .10" E.S.P	Fan H.P.	S & Drive Outlet		C	Inlet		G	H	Secondary Air Inlet		L	1 Row M	2 Row M
				A	B		D	E			J	K			
L1	565	565	1/6	14	10	38½	6⅞	28	31½	18	13	11	3½	3⅞	4½
L2	875	875	1/4	14	10	38½	7⅞	28	31½	18	13	11	3½	3⅞	4½
L3	1300	1300	(2) 1/6	20	10	47	9⅞	33	48½	18	31	11	3½	3⅞	4½
L4	1940	1940	(2) 1/4	20	10	47	9 x 12	33	48½	18	28	11	3½	3⅞	4½

\* Refer to "Primary Air Inlet Parameters" (page 6) when selecting MINIMUM CFM.