



External Insulation
Standard



▼ Model ARR

The Carnes Model ARR offers low pressure drop, low sound levels, and valve characteristics which create stable control conditions within the conditioned space. There is no insulation in contact with the air stream.

This product is ideal for Hospitals, Labs, Schools, Government Buildings, i.e., anywhere where Indoor Air Quality (IAQ) concerns exist.

Features Include:

- Air flow capacities from full shut-off to 4,200 CFM (0-3,000 FPM for each unit size).
- Round inlet/outlet connections.
- Low leakage damper design.
- Pneumatic, electric, electronic, or manual control options available.
- Tri-Averaging type air flow sensor at inlet of unit.
- No insulation in the air stream makes this unit an excellent choice of application for Hospitals, Labs, Government Buildings, and Schools.
- Optional pressure independent and pressure dependent controls.
- Standard controls enclosure.
- Optional hanger brackets.
- Optional 304 stainless steel design.
- Unit externally wrapped with 1/2" foil faced insulation that meets **UL** and **NFPA** standards.

VAV RETROFIT

HIGH VELOCITY CONSTANT VOLUME REHEAT UNITS

The system with constant volume reheat terminal units can be easily converted to variable air volume by adding a retrofit unit upstream of the existing terminal unit which can now serve as a sound attenuator.

The unit for this conversion is the Model ARR Unit which replaces a short section of duct ahead of the

existing terminal unit. The internal damper of the existing terminal unit should be removed, or placed in the full open position. This allows the existing terminal unit to act as a sound attenuator.

ARR

Discharge and Radiated (NC) Noise Criteria

Inlet Size (Inches)	CFM	Minimum Pressure Drop (Damper Full Open)
		Basic Unit
5	75	.05
	100	.06
	200	.11
	300	.15
	350	.17
6	110	.01
	200	.04
	300	.08
	400	.14
	500	.22
7	140	.01
	200	.02
	400	.08
	600	.18
	700	.25
8	185	.01
	400	.04
	600	.08
	800	.14
	1000	.21
10	300	.01
	500	.02
	800	.04
	1200	.09
	1500	.14
12	430	.01
	800	.03
	1200	.05
	1800	.09
	2300	.12
14	600	.00
	1000	.01
	1600	.02
	2400	.08
	3100	.13
16	780	.00
	1600	.02
	2400	.04
	3600	.08
	4200	.10

Min. Δ P _s (Damper Full Open)		1.0" Δ P _s		1.5" Δ P _s		3.0" Δ P _s	
Discharge NC	Rad. NC	Discharge NC	Rad. NC	Discharge NC	Rad. NC	Discharge NC	Rad. NC
Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
—	—	—	11	11	13	19	16
—	—	—	13	12	15	20	19
—	—	15	19	18	21	23	24
—	—	19	24	22	24	27	27
—	10	22	27	24	28	29	30
—	—	—	—	—	—	16	12
—	—	12	12	15	13	20	18
—	—	17	18	19	19	25	22
—	—	21	23	24	24	29	27
—	11	24	27	27	28	33	32
—	—	—	—	—	10	16	14
—	—	10	10	12	13	19	16
—	—	18	19	22	22	28	24
—	12	24	27	28	30	34	32
—	15	27	31	30	32	35	36
—	—	—	—	—	—	14	12
—	—	11	11	15	14	21	19
—	—	17	20	19	22	24	26
—	11	19	27	22	28	27	31
—	15	22	31	25	33	30	36
—	—	—	—	13	10	20	14
—	—	12	12	16	14	23	19
—	—	15	15	19	19	26	22
—	13	19	23	23	24	28	28
—	18	22	27	25	30	30	32
—	—	—	14	13	16	19	22
—	—	13	18	16	21	23	25
—	11	15	20	19	23	25	28
—	21	18	26	21	27	28	31
—	26	20	30	23	31	29	35
—	—	11	12	16	14	23	19
—	—	14	15	18	19	25	23
—	10	17	20	21	22	28	26
—	20	21	23	23	26	30	30
—	26	23	27	27	30	31	33
—	—	—	16	13	19	19	24
—	—	15	21	17	23	24	28
—	15	19	23	22	25	28	31
10	26	23	26	27	28	33	33
15	31	25	28	29	30	34	35

- NOTES:**
1. Δ P_s static pressure difference from inlet to discharge.
 2. Δ P_s is the minimum pressure required to deliver CFM shown with the primary damper in wide open position.
 3. Δ P_t is the total pressure difference from inlet to discharge.
 4. Dash (—) indicates NC level less than 10.

NC levels are derived from tests conducted in accordance with AHRI Standard 880-2008 and are calculated in accordance with AHRI Standard 885-2008 as application data based on the following:

- Discharge NC levels are based on —
- a) 5 foot rectangular duct lined with 1" fiberglass insulation.
 - b) 5 foot lined flex duct (8" diameter).
 - c) Flow division.
 - d) Space effect factor (2400 ft³) at 5 feet from outlet.
 - e) End reflection.
 - f) Environmental adjustment factor.

- Radiated NC levels are based on—
- a) Plenum / ceiling effect - 5/8" mineral fiber tile, 35 lb / ft³ - 3 foot plenum.
 - b) Environmental adjustment factor.

NC is not part of the AHRI 880 Certification Program.

Sound Data (Sound Power by Octave Band)

Discharge Sound Power

Inlet Size (Inches)	CFM	Minimum ΔP_s							1.0" ΔP_s							1.5" ΔP_s							3.0" ΔP_s							
		ΔP_s	Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band						
			(2)	(3)	(4)	(5)	(6)	(7)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(7)
5	75	.05	37	23	19	19	18	18	46	46	47	49	45	43	48	48	49	52	49	48	51	52	53	58	56	56	56			
	100	.06	38	28	24	23	22	20	50	50	49	50	47	44	52	52	51	53	51	49	55	55	55	59	58	57	57			
	200	.11	43	38	35	32	32	26	60	57	54	54	50	47	61	60	57	57	54	52	64	63	61	63	61	60	60			
	300	.20	45	44	42	37	38	30	65	62	57	56	52	49	67	64	60	60	56	54	70	68	64	65	63	62	62			
	350	.26	46	46	45	39	40	31	67	64	59	57	53	49	69	66	61	60	57	54	72	70	65	66	64	63	63			
6	110	.02	35	22	15	13	12	14	48	48	48	49	45	41	50	50	51	53	49	45	54	54	56	58	56	53	53			
	200	.06	39	33	28	25	25	22	56	55	53	53	50	46	58	57	56	56	54	50	62	61	60	62	60	57	57			
	300	.10	43	40	36	33	34	28	61	60	56	56	53	49	63	62	59	59	57	53	67	66	63	65	63	61	61			
	400	.16	45	45	43	38	40	32	65	63	58	58	55	51	67	66	61	61	59	55	71	70	65	67	65	63	63			
	500	.23	47	49	47	43	45	35	68	66	60	59	57	53	70	68	62	62	60	57	74	73	67	68	67	65	65			
7	140	.01	36	20	13	13	—	12	48	48	48	49	46	42	50	51	51	52	50	46	55	56	57	57	56	53	53			
	200	.02	39	26	20	20	17	17	53	53	51	52	49	45	55	55	54	55	52	49	60	60	59	60	58	56	56			
	400	.08	43	39	36	34	33	29	62	61	57	57	53	49	65	64	60	60	57	53	69	69	65	65	63	60	60			
	600	.18	46	47	45	42	42	36	68	66	60	60	56	52	70	69	63	62	60	56	75	74	68	67	66	63	63			
	700	.25	47	50	48	45	46	38	70	68	61	61	57	53	72	71	64	64	61	57	77	75	70	68	67	64	64			
8	185	.01	34	17	11	11	—	12	45	47	48	47	44	40	46	49	51	50	47	44	49	53	56	55	53	51	51			
	400	.04	42	33	29	28	27	25	57	55	53	53	50	46	59	58	56	56	54	50	62	62	61	61	59	57	57			
	600	.08	46	42	38	37	36	31	63	60	56	56	53	50	65	62	59	59	57	54	68	66	64	64	63	60	60			
	800	.14	49	48	45	43	43	36	68	63	58	59	56	52	70	65	61	62	59	56	73	69	66	67	65	63	63			
	1000	.21	52	52	50	48	48	39	71	65	60	60	58	54	73	68	63	63	61	58	76	72	68	68	67	65	65			
10	300	.01	37	21	13	13	11	13	47	50	49	48	48	45	49	52	52	51	51	49	53	56	57	57	57	56	56			
	500	.02	40	29	24	24	22	20	55	55	54	51	51	48	57	57	56	54	55	52	60	61	61	60	60	59	59			
	800	.04	43	37	34	35	32	28	61	59	57	54	54	50	63	62	60	57	58	55	67	66	65	63	63	62	62			
	1200	.09	45	44	43	44	41	34	67	63	61	57	57	53	69	66	64	60	60	57	72	70	68	66	66	64	64			
	1500	.14	47	48	48	49	46	37	70	65	63	58	58	54	72	68	65	62	62	58	76	72	70	67	67	65	65			
12	430	.01	38	19	14	15	14	14	49	47	49	49	48	45	50	50	52	52	49	54	54	56	58	57	55	55				
	800	.03	42	29	27	29	25	22	57	53	54	53	52	49	59	56	57	56	56	52	62	60	61	62	61	59	59			
	1200	.05	45	36	36	38	33	26	62	57	57	55	55	51	64	60	60	58	58	55	67	64	65	64	64	61	61			
	1800	.09	48	43	45	47	40	31	67	61	61	57	58	54	69	64	63	61	61	57	73	68	68	67	67	64	64			
	2300	.12	49	47	50	53	45	34	70	63	63	59	59	55	72	66	65	62	63	59	76	70	70	68	68	65	65			
14	600	.01	32	21	14	16	12	13	49	50	48	45	49	47	51	53	51	49	53	52	55	58	56	55	59	59				
	1000	.02	38	30	27	27	24	21	55	55	53	50	52	50	57	58	56	54	56	54	61	63	61	60	62	61	61			
	1600	.04	44	39	39	38	34	29	60	60	57	55	55	53	63	62	60	59	58	57	67	67	65	65	65	64	64			
	2400	.08	48	46	49	47	43	36	65	64	61	59	57	55	67	66	64	63	61	59	71	71	69	69	67	66	66			
	3100	.13	51	50	55	53	49	40	68	66	63	61	59	56	70	69	66	65	62	60	74	73	71	72	68	67	67			
16	780	.00	35	24	16	17	16	14	50	52	48	50	50	45	53	55	51	53	49	57	59	55	58	60	55	55				
	1600	.02	44	38	36	33	31	25	59	59	55	55	54	50	61	61	57	58	58	53	65	66	62	63	64	60	60			
	2400	.04	50	45	47	43	39	32	63	63	59	58	56	52	66	65	61	61	60	56	70	70	66	66	66	63	63			
	3600	.08	55	53	58	52	47	38	68	66	63	61	59	55	70	69	65	64	63	59	75	74	70	69	69	65	65			
	4200	.10	57	56	63	55	50	41	70	68	64	62	60	56	72	71	67	65	64	60	76	75	71	70	70	66	66			

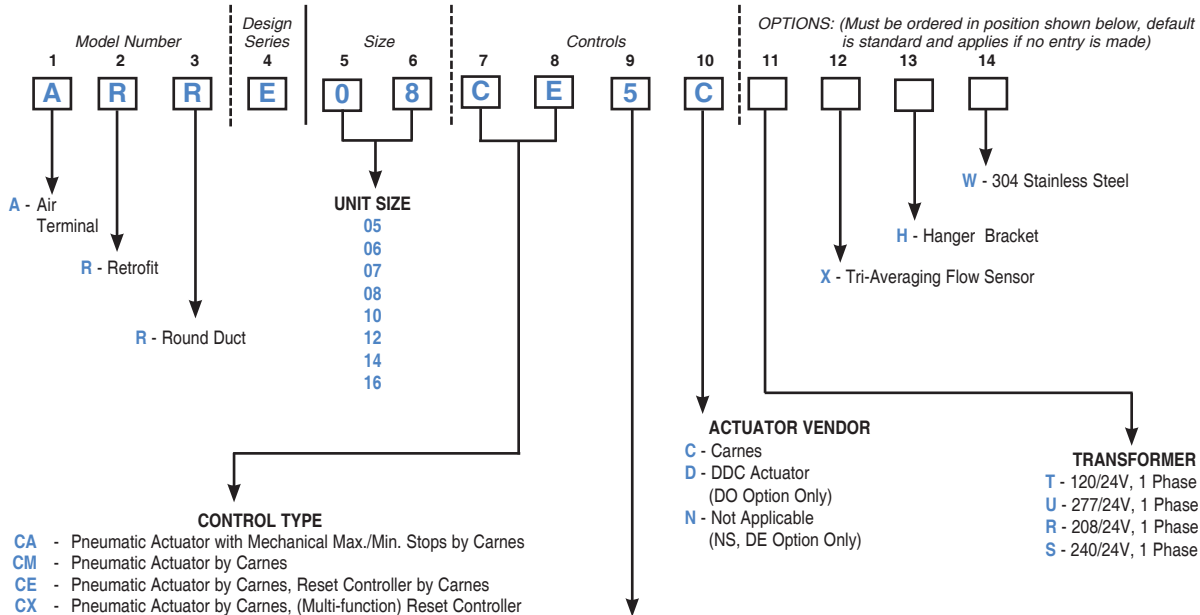
- NOTES:**
1. Based on tests conducted in accordance with AHRI Standard 880-2008.
 2. ΔP_s static pressure difference from inlet to discharge.
 3. ΔP_s is the minimum pressure required to deliver CFM shown with primary damper in wide open position.
 4. Dash (—) indicates db level less than 10.

Sound Data (Sound Power by Octave Band)

Radiated Sound Power

Inlet Size (Inches)	CFM	Minimum ΔP_s							1.0" ΔP_s							1.5" ΔP_s							3.0" ΔP_s							
		ΔP_s	Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band						
			(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)				
5	75	.05	22	29	24	16	15	17	42	35	38	34	32	26	42	37	40	37	36	31	44	40	43	42	43	40				
	100	.06	27	31	26	19	16	17	46	39	40	36	33	27	47	40	42	39	37	32	48	43	45	44	44	41				
	200	.11	40	36	32	25	18	17	56	46	45	40	35	29	57	48	47	43	39	34	58	51	50	48	47	43				
	300	.20	48	40	35	28	20	18	62	51	48	43	36	30	62	52	50	46	41	35	64	55	52	51	48	44				
	350	.26	51	41	36	29	20	18	64	52	49	44	37	31	65	54	51	47	41	36	66	57	54	51	49	44				
6	110	.02	38	23	15	13	13	17	42	34	34	28	27	24	43	36	35	31	32	28	45	40	39	35	39	36				
	200	.06	39	31	24	21	17	17	51	42	39	33	31	26	52	44	40	36	35	31	54	48	44	40	42	39				
	300	.10	40	35	30	26	20	18	57	47	42	37	33	28	58	50	44	39	37	32	60	54	47	43	44	40				
	400	.16	41	39	34	30	22	18	61	51	44	39	34	29	62	54	46	42	38	34	64	57	50	46	46	42				
	500	.23	41	41	38	33	23	18	64	54	46	41	35	30	65	57	48	43	40	34	68	60	51	48	47	43				
7	140	.01	33	17	11	—	11	16	42	35	35	30	28	25	43	37	37	32	32	30	46	42	41	37	39	38				
	200	.02	36	22	18	15	14	17	48	40	37	32	30	26	49	42	40	35	34	31	51	47	43	39	41	39				
	400	.08	41	33	31	27	21	18	58	49	42	37	33	29	60	52	45	39	37	33	62	56	48	44	44	41				
	600	.18	44	39	39	33	24	19	64	54	45	39	35	30	66	57	48	42	39	35	68	62	51	46	46	42				
	700	.25	45	41	42	36	26	20	67	56	46	40	36	30	68	59	49	43	40	35	71	64	53	47	47	43				
8	185	.01	39	24	13	10	10	15	44	36	34	30	30	29	46	39	36	33	34	33	49	43	41	38	41	41				
	400	.04	44	33	26	22	19	19	53	43	38	34	33	30	54	45	41	37	37	35	57	49	45	42	44	43				
	600	.08	47	37	33	29	24	20	57	46	40	36	34	31	59	48	43	39	39	36	62	53	47	44	46	44				
	800	.14	48	40	38	33	27	22	60	48	42	37	35	32	62	51	44	40	40	36	65	55	49	45	47	45				
	1000	.21	50	43	42	37	30	23	63	50	43	39	36	32	64	52	45	41	40	37	67	57	50	47	47	45				
10	300	.01	33	21	13	12	11	15	41	36	35	33	31	29	43	38	37	36	35	33	46	41	41	41	41	40				
	500	.02	38	27	23	19	17	18	48	41	39	37	35	32	50	43	41	40	39	36	53	46	45	45	45	43				
	800	.04	42	32	32	26	22	20	55	46	42	39	38	34	57	48	45	42	42	38	60	51	48	48	48	46				
	1200	.09	46	37	40	33	26	22	61	50	46	42	41	36	62	52	48	45	45	40	65	55	51	50	51	48				
	1500	.14	48	40	44	36	29	23	64	52	47	43	43	37	66	54	49	46	47	42	68	58	53	51	53	49				
12	430	.01	38	21	15	12	12	15	44	39	41	38	34	31	46	42	43	42	39	35	49	47	48	47	46	43				
	800	.03	42	29	29	21	18	18	52	43	44	41	37	34	54	46	47	45	41	39	57	52	51	50	49	46				
	1200	.05	44	34	38	27	23	20	57	46	46	43	39	36	59	49	49	47	43	41	62	55	54	52	51	48				
	1800	.09	47	39	47	33	27	21	63	49	48	46	41	38	64	52	51	49	45	43	67	58	56	54	52	50				
	2300	.12	49	42	52	36	29	22	66	51	50	47	42	40	67	54	52	50	46	44	70	59	57	56	54	52				
14	600	.01	39	24	15	10	10	14	43	38	39	39	36	32	45	40	41	42	40	36	48	45	45	47	46	43				
	1000	.02	42	30	26	19	17	18	50	42	42	42	38	34	51	45	45	45	42	39	55	49	49	50	49	45				
	1600	.04	46	36	37	27	23	21	56	46	46	45	40	37	57	49	48	48	44	41	61	53	52	52	51	48				
	2400	.08	49	42	46	33	28	23	61	50	48	47	42	38	63	52	50	50	46	42	66	57	54	55	52	49				
	3100	.13	51	45	52	37	31	25	64	52	50	48	43	39	66	55	52	51	47	44	69	59	56	56	54	50				
16	780	.00	14	21	12	10	—	14	43	42	43	40	34	29	45	45	43	37	33	48	49	50	48	43	39					
	1600	.02	34	33	31	23	20	19	52	47	47	44	38	33	54	50	49	47	42	37	57	54	54	52	48	44				
	2400	.04	45	40	42	30	26	22	57	50	49	46	41	36	59	52	51	49	44	40	62	57	56	54	50	46				
	3600	.08	56	46	52	37	32	25	63	52	51	48	43	38	64	55	54	51	47	42	68	60	58	56	53	49				
	4200	.10	60	49	56	40	34	26	65	53	52	49	44	39	66	56	54	52	48	43	70	61	59	57	54	50				

- NOTES:**
1. Based on tests conducted in accordance with AHRI Standard 880-2008.
 2. ΔP_s static pressure difference from inlet to discharge.
 3. ΔP_s is the minimum pressure required to deliver CFM shown with primary damper in wide open position.
 4. Dash (—) indicates db level less than 10.



- CONTROL TYPE**
- CA - Pneumatic Actuator with Mechanical Max./Min. Stops by Carnes
 - CM - Pneumatic Actuator by Carnes
 - CE - Pneumatic Actuator by Carnes, Reset Controller by Carnes
 - CX - Pneumatic Actuator by Carnes, (Multi-function) Reset Controller by Carnes
 - EA - Electric Actuator by Carnes (Enclosure Included)
 - EB - Electric Actuator by Carnes, Changeover Thermostat by Carnes (Enclosure Included)
 - ET - Analog Electronic Velocity Controller with Integral Damper Actuator (Enclosure Included)
 - EL - Analog Electronic Velocity Controller with Integral Damper Actuator and Cooling/Heating Changeover (Enclosure Included)
 - DD - SimplyVAV, DDC by Carnes
 - DC - SimplyVAV, DDC by Carnes with Heat/Cool Changeover
 - DO - DDC Provided by Others, Mounted and Wired by Carnes, w/Carnes Inlet Sensor, w/3/8" Damper Shaft, w/Enclosure
 - DE - DDC Enclosure w/Carnes Inlet Sensor, w/Bare 3/8" Damper Shaft
 - MA - Manual Damper by Carnes

**EL control sequence requires the AXWCB wall stat in lieu of the standard AXWCA.
 • Minimum setting cannot be zero with these controls. Duct sensor needs at least 20% of maximum rated CFM to sense duct air temperature.

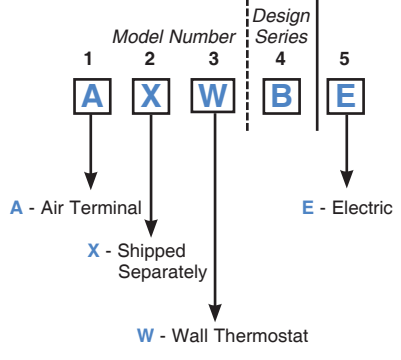
- ACTUATOR VENDOR**
- C - Carnes
 - D - DDC Actuator (DO Option Only)
 - N - Not Applicable (NS, DE Option Only)
- TRANSFORMER**
- T - 120/24V, 1 Phase
 - U - 277/24V, 1 Phase
 - R - 208/24V, 1 Phase
 - S - 240/24V, 1 Phase

- CONTROLS, DAMPERS AND COIL ARRANGEMENTS**
- *1 - Normally Open - Right Hand Controls (All Electric/Electronic/Manual Control Types/DO, DE, NS) (All Pneumatic Control Types for Reverse Acting Thermostat)
 - *2 - Normally Open - Left Hand Controls (All Electric/Electronic/Manual Control Types/DO, DE, NS) (All Pneumatic Control Types for Reverse Acting Thermostat)
 - 3 - Normally Closed - Right Hand Controls (All Pneumatic Control Types for Direct Acting Thermostat)
 - 4 - Normally Closed - Left Hand Controls (All Pneumatic Control Types for Direct Acting Thermostat)
 - 5 - Normally Open - Right Hand Controls (All Pneumatic Control Types for Direct Acting Thermostat)
 - 6 - Normally Open - Left Hand Controls (All Pneumatic Control Types for Direct Acting Thermostat)
 - 7 - Normally Closed - Right Hand Controls (All Pneumatic Control Types for Reverse Acting Thermostat)
 - 8 - Normally Closed - Left Hand Controls (All Pneumatic Control Types for Reverse Acting Thermostat)

* Electric, Electronic and DDC Units **DO NOT** fail open. '1' or '2' is used for Right or Left Hand Only. Electric/Electronic Units are shipped with the Damper in the Open Position.

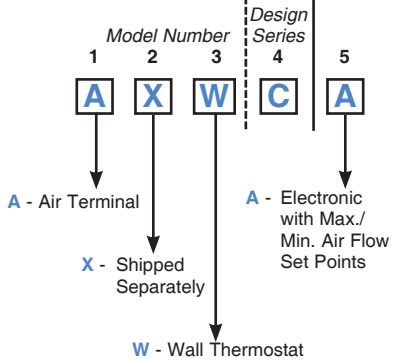
NOTE: Hand of controls is determined by facing the averaging flow sensor (inlet of the unit) with the supply air hitting the back of your head.

▼ Electric Thermostat



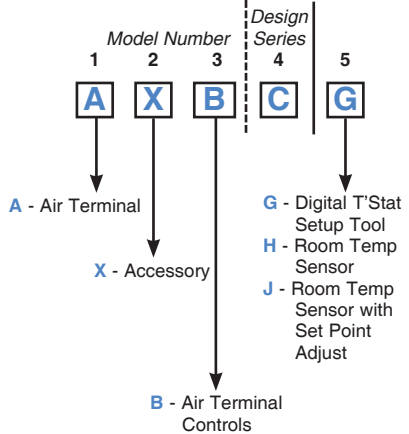
A Carnes Electric Thermostat **must be ordered** with the Electric EA and EB Control Options.

▼ Electronic Thermostat

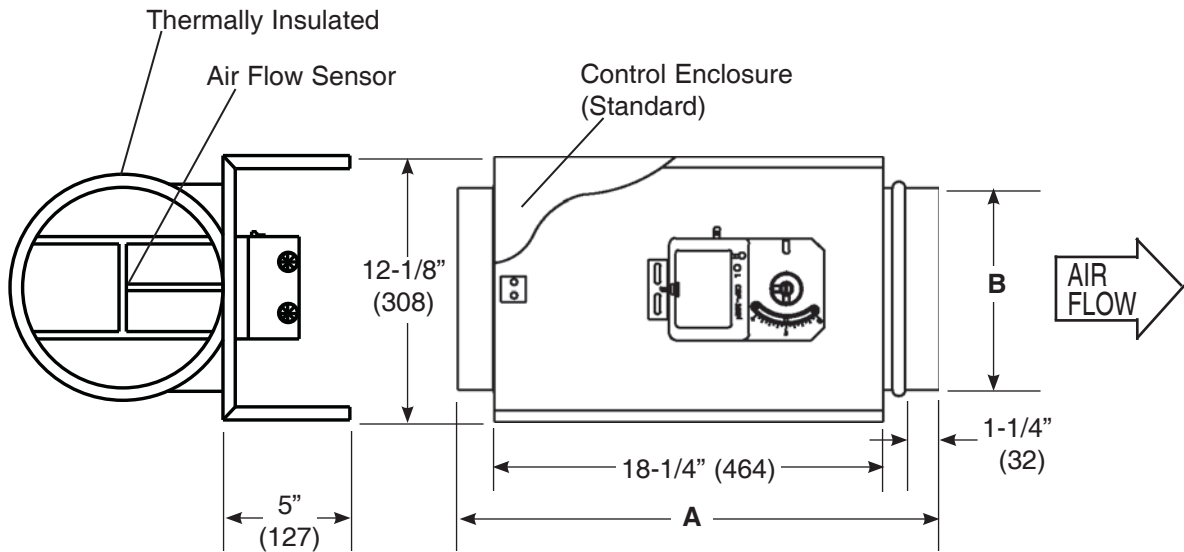


A Carnes Electronic Thermostat **must be ordered** with the ET Electronic Control Option.

▼ Direct Digital Control (DD/DC/DM)



RIGHT HAND UNIT SHOWN
LEFT HAND AVAILABLE



Dimensions Listed In Inches (Millimeters)		
Unit Size	A	B
05	19 (482)	4-7/8 (124)
06	19 (482)	5-7/8 (149)
07	19 (482)	6-7/8 (175)
08	19 (482)	7-7/8 (200)
10	19 (482)	9-7/8 (251)
12	21 (533)	11-7/8 (302)
14	22 (558)	13-7/8 (352)
16	23 (584)	15-7/8 (403)