

[Patent 5,486,140]

Model AHW

The **Carnes Model AHW** is available as a basic control unit with hot water reheat and open end discharge.

This offers low pressure drop, low sound levels, and valve characteristics which create stable control

conditions within the conditioned space.

This product is ideal for Hospitals, Labs, Schools, Government Buildings, i.e., any 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).
- Open-end discharge units are provided with slip and drive connections for easy installation.
- One or two row hot water coil come factory attached with slip and drive connections.
- External thermally and acoustically insulated casing meets **UL** and **NFPA** standards. (Water coil casing is uninsulated.)
- Low leakage damper design.
- No Insulation comes in contact with the air stream.
- Shell insulation is 1" thick and has a continuous density of 4.25 lbs./cu. ft. with a 4.5 R-value.
- Pneumatic, electric, electronic, or manual control options available.
- Averaging type air flow sensor at inlet of unit.
- Optional cross flow averaging type velocity sensor at inlet of unit.
- Optional pressure independent and pressure dependent controls.
- Optional controls enclosure.
- Optional access panel for water coil inspection.

Available Modules:

- Basic Control Unit with hot water coil — **Model AHW**



External Insulation
Standard



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1 Row

2 Row

AHW

Discharge and Radiated (NC) Noise Criteria

Inlet Size (Inches)	CFM	Minimum Pressure Drop (Damper Full Open)		Minimum Pressure Drop (Damper Full Open)		Min. ΔP_s (Damper Full Open)			1.0" ΔP_s			1.5" ΔP_s			3.0" ΔP_s		
		Min. ΔP_s	Min. ΔP_t	Min. ΔP_s	Min. ΔP_t	ΔP_t	Discharge NC	Rad. NC	ΔP_t	Discharge NC	Rad. NC	ΔP_t	Discharge NC	Rad. NC	ΔP_t	Discharge NC	Rad. NC
		Basic Unit	Basic Unit	Basic Unit	Basic Unit												
5	75	.02	.03	.03	.05	.03	—	—	1.02	18	15	1.52	21	20	3.02	27	26
	100	.03	.05	.04	.08	.07	—	—	1.03	21	18	1.53	22	22	3.03	29	29
	200	.13	.25	.16	.30	.27	13	12	1.14	28	23	1.64	31	26	3.14	35	34
	300	.32	.62	.35	.66	.62	19	14	1.31	31	26	1.81	35	30	3.31	40	36
	350	.45	.86	.47	.89	.86	19	16	1.42	30	27	1.92	33	31	3.42	41	37
6	110	.02	.04	.04	.05	.04	—	—	1.02	14	16	1.52	15	21	3.02	22	26
	200	.07	.13	.10	.15	.13	11	11	1.06	19	23	1.56	22	26	3.06	27	33
	300	.15	.28	.19	.32	.28	13	12	1.13	23	26	1.63	27	31	3.13	31	36
	400	.26	.49	.30	.53	.49	13	14	1.23	23	30	1.73	27	33	3.23	31	39
	500	.39	.75	.43	.79	.75	15	18	1.36	25	32	1.86	29	35	3.36	34	41
7	140	.02	.03	.02	.03	.03	—	—	1.01	19	16	1.51	22	21	3.01	27	29
	200	.03	.07	.04	.06	.07	—	—	1.03	21	19	1.53	24	23	3.03	30	31
	400	.11	.21	.14	.24	.21	12	11	1.10	23	22	1.60	27	27	3.10	33	35
	600	.22	.45	.32	.54	.45	14	13	1.23	27	24	1.73	30	30	3.23	35	37
	700	.29	.60	.43	.74	.60	14	14	1.31	27	25	1.81	30	30	3.31	35	38
8	185	.02	.03	.03	.04	.03	—	—	1.01	20	19	1.51	23	23	3.01	29	31
	400	.07	.11	.12	.16	.11	11	11	1.04	22	23	1.54	25	27	3.04	31	35
	600	.14	.23	.25	.33	.23	13	12	1.08	24	25	1.58	28	30	3.08	34	36
	800	.23	.38	.40	.55	.38	13	14	1.15	24	26	1.65	27	31	3.15	34	36
	1000	.35	.58	.58	.81	.58	15	18	1.23	24	27	1.73	28	32	3.23	34	39
10	300	.02	.02	.05	.05	.02	—	—	1.00	23	18	1.50	27	29	3.00	33	36
	500	.05	.06	.12	.11	.06	10	—	1.01	23	26	1.51	27	31	3.01	33	38
	800	.10	.13	.21	.24	.13	11	13	1.03	22	29	1.53	25	33	3.03	34	40
	1200	.20	.27	.40	.47	.27	13	18	1.07	24	30	1.57	28	34	3.07	34	41
	1500	.30	.42	.57	.68	.41	14	22	1.11	24	31	1.61	28	25	3.11	35	42
12	430	.02	.03	.04	.04	.03	—	—	1.01	23	20	1.51	27	27	3.01	34	35
	800	.06	.08	.10	.12	.08	10	11	1.02	23	26	1.52	27	31	3.02	34	38
	1200	.12	.16	.21	.25	.16	12	13	1.04	25	29	1.54	29	33	3.04	35	39
	1800	.24	.34	.43	.52	.34	13	18	1.09	25	31	1.59	29	34	3.09	35	41
	2300	.37	.52	.65	.80	.52	15	23	1.15	25	32	1.65	29	35	3.15	35	42
14	600	.02	.03	.04	.05	.03	—	—	1.01	23	23	1.51	27	27	3.01	34	35
	1000	.05	.07	.09	.11	.07	—	11	1.02	23	26	1.52	27	31	3.02	34	38
	1600	.10	.15	.18	.23	.15	11	14	1.05	22	30	1.55	27	33	3.05	34	40
	2400	.20	.32	.33	.45	.32	13	23	1.12	24	32	1.62	29	36	3.12	35	42
	3100	.31	.51	.50	.69	.51	14	31	1.20	24	33	1.70	29	37	3.20	35	45
16	780	.02	.02	.04	.04	.02	—	—	1.00	20	25	1.50	24	30	3.00	33	37
	1600	.08	.10	.13	.15	.10	10	12	1.02	21	26	1.52	25	31	3.02	34	39
	2400	.15	.20	.27	.31	.20	12	20	1.05	24	27	1.55	29	32	3.05	35	39
	3600	.31	.42	.53	.63	.42	14	31	1.11	24	29	1.61	29	33	3.11	35	40
	4200	.40	.54	.68	.83	.54	16	35	1.14	24	29	1.64	29	33	3.14	35	40

- NOTES: 1. ΔP_s static pressure difference from inlet to discharge.
 2. ΔP_s is the minimum pressure required to deliver CFM shown with the primary damper in wide open position.
 3. ΔP_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 ARI Standard 880-98 and are calculated in accordance with ARI Standard 885-98 as application data based on the following:

- 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 ft³) at 5 feet from outlet.
 - f) End reflection.
 - g) 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) Space effect factor (5000 ft³) at 10 feet from source.
 - c) Environmental adjustment factor.

NC is not part of the ARI 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						
		Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band						
		ΔP_s	(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	.02	36	25	18	17	16	17	51	53	52	50	50	48	52	56	56	55	54	52	54	61	63	61	61	59			
	100	.03	40	31	25	24	23	23	54	56	55	53	52	49	55	59	59	57	56	54	57	63	66	64	63	61			
	200	.13	50	46	43	41	39	37	62	62	61	58	57	54	63	65	65	62	61	58	65	69	72	69	67	65			
	300	.32	55	54	53	51	49	45	66	65	65	61	59	56	68	68	69	65	63	61	70	73	76	72	70	68			
	350	.45	58	57	57	55	53	48	68	67	67	62	60	57	69	69	71	66	64	62	71	74	77	73	71	69			
6	110	.02	37	26	17	17	15	18	48	48	51	53	53	51	50	51	55	57	57	55	53	55	61	64	63	62			
	200	.07	43	37	32	31	30	31	55	54	56	57	56	54	57	57	60	61	60	58	59	61	66	68	66	65			
	300	.15	47	44	42	42	40	39	60	58	60	59	58	56	61	61	63	63	62	60	64	65	69	70	68	67			
	400	.26	50	49	49	49	47	45	63	61	62	61	59	58	65	64	66	65	63	62	67	68	72	72	70	69			
	500	.39	52	53	55	54	53	49	65	63	64	63	60	59	67	66	68	66	64	63	70	70	74	73	71	70			
7	140	.02	33	27	16	16	17	16	52	54	52	54	53	51	53	57	56	58	57	55	56	61	62	65	64	63			
	200	.03	38	33	25	25	24	23	55	56	55	56	55	53	57	59	58	60	59	57	60	64	64	67	66	64			
	400	.11	48	45	41	42	39	36	63	61	60	61	58	56	65	64	63	65	63	60	67	69	69	72	70	68			
	600	.22	54	52	51	51	48	44	67	64	63	64	61	58	69	67	66	68	65	62	72	71	72	74	72	70			
	700	.29	56	55	55	55	51	47	9	65	64	65	62	59	71	68	67	69	66	63	73	73	73	75	73	71			
8	185	.02	36	28	19	22	21	21	53	55	55	55	54	53	54	58	59	59	58	57	57	63	65	66	65	64			
	400	.07	46	41	36	38	36	35	59	60	59	60	58	57	60	63	63	64	62	61	63	68	70	71	69	68			
	600	.14	51	47	45	46	44	43	62	62	62	62	60	59	63	65	65	66	64	63	66	70	72	73	71	70			
	800	.23	54	52	52	52	50	48	64	64	63	64	62	61	66	67	67	68	66	64	68	72	74	75	73	71			
	1000	.35	57	56	54	56	54	52	66	65	65	65	63	62	67	68	68	69	67	66	70	73	75	76	74	72			
10	300	.02	42	29	19	19	18	19	55	58	59	59	57	55	57	61	63	63	61	59	61	66	69	70	68	66			
	500	.05	46	38	32	32	30	30	58	61	61	61	59	57	60	64	65	65	63	61	64	69	71	72	70	68			
	800	.10	49	46	43	44	41	40	60	63	63	64	61	60	63	66	67	68	65	64	66	71	73	74	72	71			
	1200	.20	51	52	53	54	51	49	63	65	65	66	63	62	65	68	69	70	67	66	69	73	75	76	74	73			
	1500	.30	53	56	59	60	56	54	64	66	66	67	64	63	67	69	70	71	68	67	70	74	76	77	75	74			
12	430	.02	34	28	20	20	19	19	61	61	59	61	58	56	62	64	64	65	62	60	65	70	71	72	69	67			
	800	.06	43	39	36	35	34	34	63	64	63	63	61	59	65	67	67	67	65	63	68	73	74	74	72	70			
	1200	.12	49	47	47	45	44	43	65	66	65	65	63	61	67	69	69	69	67	65	70	74	76	76	74	72			
	1800	.24	55	54	58	55	54	53	67	67	67	67	65	63	69	70	71	71	69	67	72	76	78	78	75	74			
	2300	.37	58	59	64	61	61	59	68	68	69	68	66	64	70	72	73	72	70	68	73	77	80	79	77	75			
14	600	.02	37	27	19	18	19	19	61	61	61	61	59	57	64	64	65	66	63	61	68	70	72	74	70	68			
	1000	.05	43	37	34	33	33	33	64	64	63	64	61	60	66	67	67	68	65	64	71	73	74	76	73	71			
	1600	.10	49	46	47	47	47	45	66	66	66	66	63	63	68	70	70	71	68	67	73	76	76	79	75	73			
	2400	.20	54	54	59	59	58	56	68	68	68	68	65	65	70	72	72	73	70	69	75	78	78	81	77	76			
	3100	.31	57	59	66	66	65	63	69	70	69	70	67	67	72	73	73	74	71	70	76	79	80	82	78	77			
16	780	.02	37	29	20	19	18	20	63	61	61	62	61	59	66	65	65	67	65	63	71	72	72	74	72	70			
	1600	.08	49	44	42	39	37	38	67	65	65	65	64	63	70	69	69	69	67	67	75	76	76	77	74	74			
	2400	.15	56	52	55	49	48	48	69	68	67	67	65	64	72	72	71	71	69	68	77	78	78	78	76	75			
	3600	.31	63	60	68	60	59	59	71	70	70	68	67	66	74	74	73	73	70	70	79	80	80	80	77	77			
	4200	.40	65	64	73	64	63	62	72	71	70	69	67	67	75	75	74	73	71	71	80	81	81	80	78	78			

- NOTES:**
1. Based on tests conducted in accordance with ARI Standard 880-98.
 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.



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Sound Data (Sound Power by Octave Band)

Radiated Sound Power

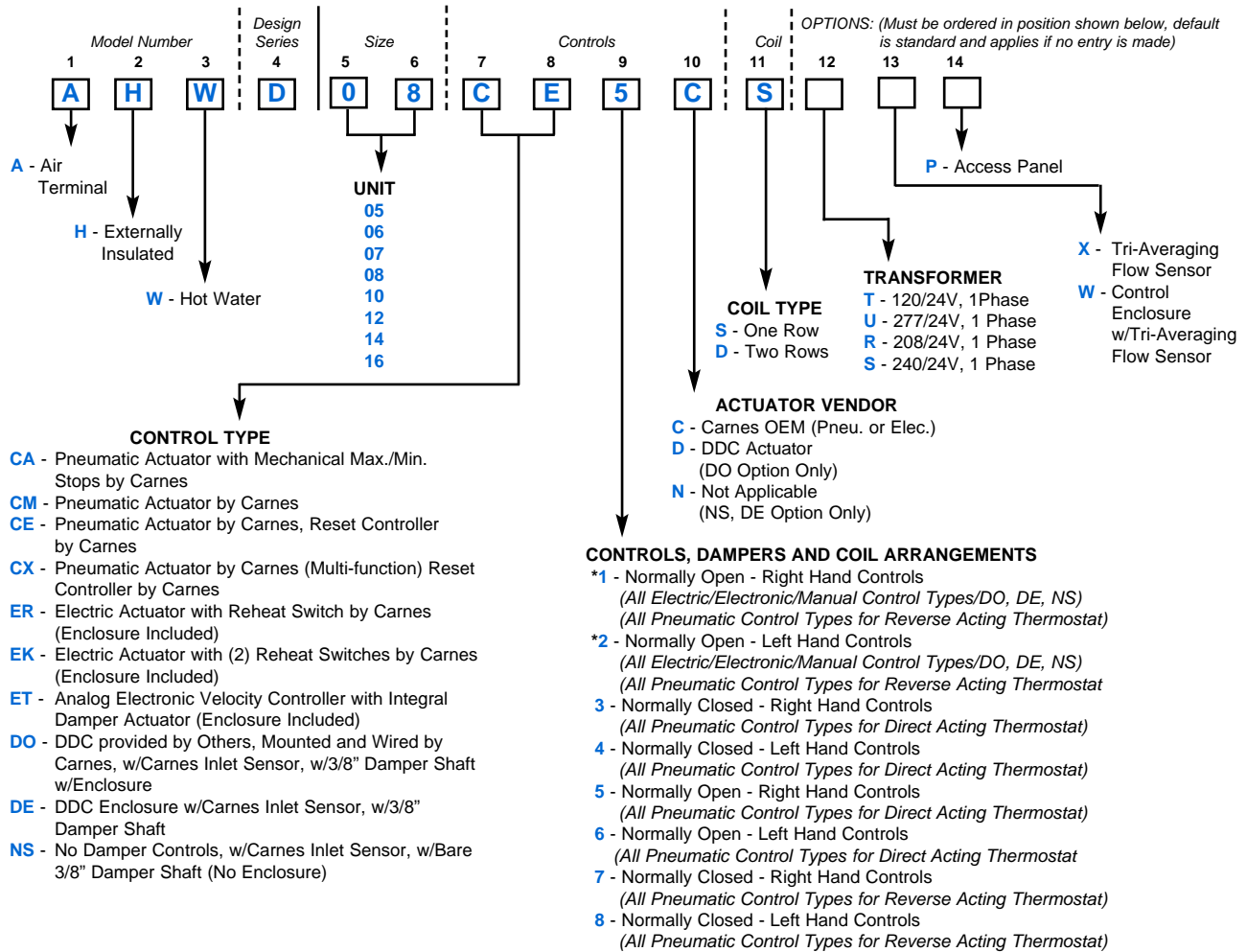
Inlet Size (Inches)	CFM	Minimum ΔP_s							1.0" ΔP_s							1.5" ΔP_s							3.0" ΔP_s						
		Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band							Sound Power (db) by Octave Band						
		ΔP_s	(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)	(2)	(3)	(4)	(5)	(6)	(7)			
5	75	.02	40	30	20	18	16	19	42	47	47	36	36	29	43	49	51	39	39	33	45	53	57	45	45	41			
	100	.03	41	33	25	21	20	20	46	49	49	38	37	30	47	51	53	41	41	35	48	54	59	47	47	42			
	200	.13	45	41	38	29	28	24	54	53	54	42	41	34	54	56	57	45	45	38	56	59	64	51	51	46			
	300	.32	47	46	45	33	32	26	58	56	57	44	43	36	59	58	60	48	47	40	61	62	66	53	53	48			
	350	.45	48	47	48	35	34	27	60	57	58	45	44	37	61	59	61	48	48	41	62	63	67	54	54	48			
6	110	.02	34	29	20	18	16	18	44	47	48	42	40	37	45	49	52	45	44	41	47	43	57	50	50	47			
	200	.07	40	38	32	28	25	25	51	53	54	47	45	41	52	56	57	50	48	45	54	59	63	55	54	51			
	300	.15	44	44	39	34	32	29	56	58	57	50	48	44	57	60	61	53	51	48	59	64	66	59	57	54			
	400	.26	47	49	44	39	36	32	59	61	60	53	50	46	60	63	63	56	53	50	62	67	69	61	59	56			
	500	.39	50	52	49	43	40	34	62	63	62	55	52	48	63	65	65	58	55	52	65	69	71	63	61	58			
7	140	.02	38	28	18	18	14	19	46	48	48	42	38	33	47	51	52	46	42	38	48	56	59	54	50	45			
	200	.03	40	32	24	22	18	21	49	50	50	43	39	35	50	53	54	48	43	39	51	58	61	55	51	47			
	400	.11	44	39	35	29	26	25	54	55	53	45	41	38	55	57	58	50	46	42	57	62	65	57	53	50			
	600	.22	46	43	42	34	30	27	57	57	55	46	43	39	58	60	60	51	47	44	60	65	67	59	55	51			
	700	.29	47	45	44	35	32	28	59	58	56	47	43	40	60	61	60	51	48	44	61	66	68	59	55	52			
8	185	.02	38	32	18	16	15	19	45	50	50	42	37	32	46	53	54	45	41	36	48	57	61	52	47	42			
	400	.07	44	39	32	27	23	23	51	53	54	45	40	35	52	56	58	49	44	39	54	60	65	55	50	46			
	600	.14	47	43	40	33	28	25	55	55	56	47	42	37	56	57	60	51	46	41	57	62	66	57	52	48			
	800	.23	49	46	45	37	31	27	57	56	57	48	43	38	58	58	61	52	47	42	60	63	68	58	53	49			
	1000	.35	50	48	49	40	34	28	59	57	58	49	44	39	60	59	62	53	48	43	61	64	69	59	54	50			
10	300	.02	33	27	21	18	15	17	51	54	55	48	44	39	53	57	59	52	48	42	56	63	66	59	54	48			
	500	.05	39	35	31	27	23	23	54	55	57	50	46	42	56	58	61	54	50	46	59	64	68	61	56	51			
	800	.10	44	41	41	35	30	28	57	57	59	52	48	45	59	60	63	56	52	49	62	66	70	62	58	55			
	1200	.20	49	47	49	42	37	33	60	58	60	53	50	48	61	61	64	57	53	51	64	67	71	64	60	57			
	1500	.30	51	51	53	45	40	35	61	59	61	54	51	50	60	63	62	65	58	54	65	68	72	65	60	59			
12	430	.02	37	31	20	20	19	19	54	56	55	49	43	35	55	59	58	53	47	38	58	64	65	59	53	45			
	800	.06	43	39	32	29	27	24	57	58	57	51	46	38	59	61	61	55	49	42	61	66	68	62	55	48			
	1200	.12	47	44	41	36	32	28	60	59	59	53	47	41	61	62	63	57	51	44	64	68	69	63	57	51			
	1800	.24	50	50	49	42	37	32	62	60	61	54	49	43	64	64	64	58	53	47	66	69	71	65	59	53			
	2300	.37	53	53	54	45	41	34	64	61	62	55	50	45	65	64	65	59	54	48	68	70	72	66	60	55			
14	600	.02	40	29	19	19	19	19	54	57	54	48	44	37	56	61	58	52	48	41	60	68	65	59	55	48			
	1000	.05	44	38	32	28	26	24	57	60	57	50	46	39	59	64	61	54	50	43	63	70	68	62	57	50			
	1600	.10	47	46	44	36	34	29	59	62	60	52	48	41	62	66	63	56	52	45	66	72	70	64	58	52			
	2400	.20	50	52	54	43	40	33	61	64	62	54	50	43	64	68	66	58	53	47	68	74	72	65	60	54			
	3100	.31	52	57	61	47	43	36	63	65	63	55	51	44	65	69	67	59	54	48	69	75	74	67	61	55			
16	780	.02	41	30	21	17	16	17	55	58	56	54	47	38	57	62	60	58	51	42	62	69	67	65	57	49			
	1600	.08	47	44	40	31	29	26	58	60	57	53	48	40	60	64	61	57	52	44	65	71	69	64	59	51			
	2400	.15	50	51	51	38	36	31	59	61	58	52	49	41	62	65	62	56	52	46	66	72	69	64	59	53			
	3600	.31	53	58	61	45	43	36	61	62	59	51	49	43	63	66	63	56	53	47	68	73	70	63	60	54			
	4200	.40	55	61	65	48	45	38	61	62	59	51	49	43	64	67	63	55	53	47	69	74	70	63	60	55			

- NOTES:**
1. Based on tests conducted in accordance with ARI Standard 880-98.
 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.



A Participating Member in the ARI 880 Certification Program

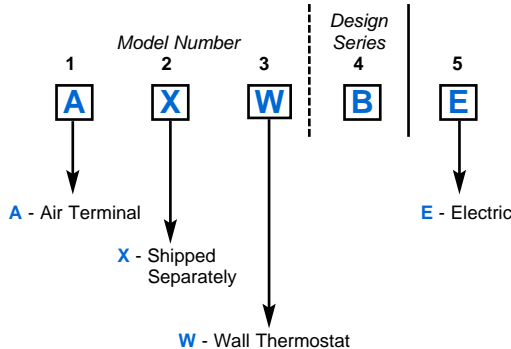
MODEL NUMBERING SYSTEM - Model AHW



* 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.

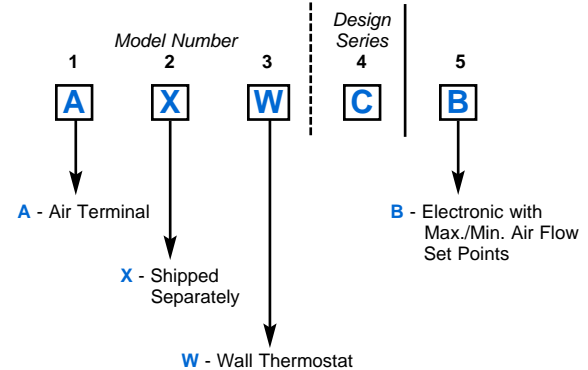
NOTE: Hand of controls is determined by facing the averaging flow sensor (inlet of the unit) with the supply air hitting the back of your head.

▼ Electric Thermostat



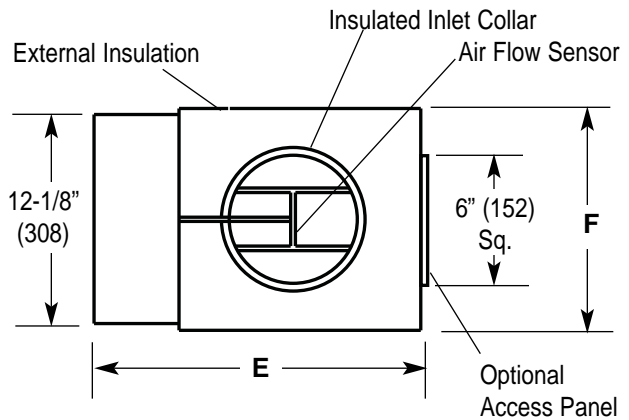
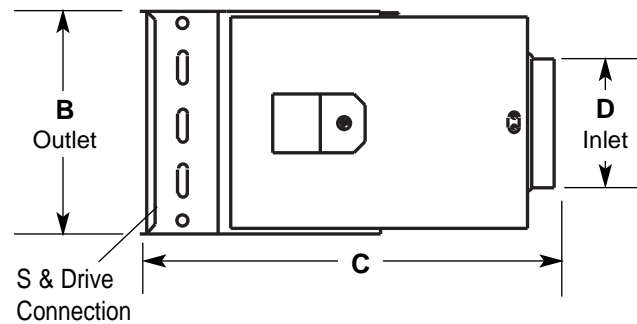
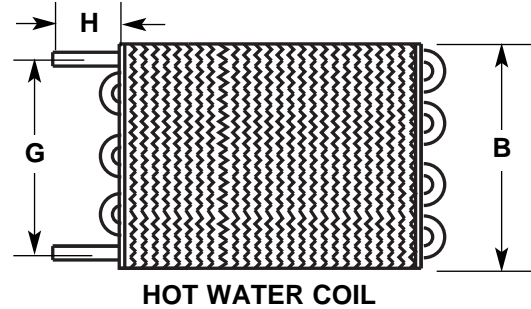
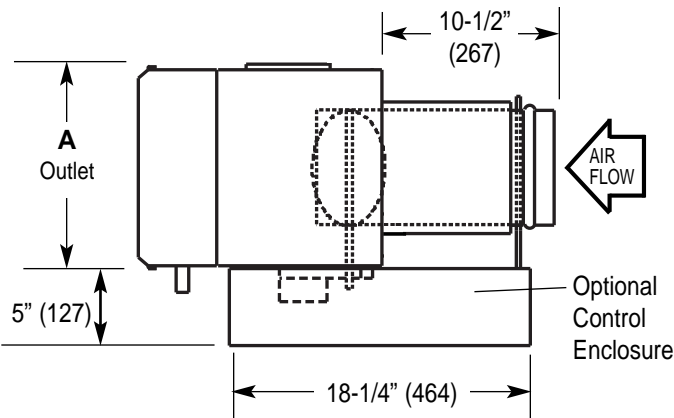
A Carnes Electric Thermostat **must be ordered** with the Electric ER and EK Control Options.

▼ Electronic Thermostat



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

LEFT HAND UNIT SHOWN
RIGHT HAND AVAILABLE



DIMENSIONAL LISTED IN INCHES (Millimeters)

Unit Size	CFM Range	Outlet		1-Row	2-Row	Inlet		1-Row		2-Row		O.D. Conn.		
		A	B	C	C	D	E	F	G	H Max.	G	H Max.	1-Row Coil	2-Row Coil
05	0-350 (0-165)	12 (305)	10 (254)	23-5/8 (600)	25 (635)	4-7/8 (124)	19 (482)	12 (305)	8-3/4 (222)	3 (76)	9-3/8 (238)	3 (76)	1/2 (13)	5/8 (16)
06	0-500 (0-236)	12 (305)	10 (254)	23-5/8 (600)	25 (635)	5-5/8 (149)	19 (482)	12 (305)	8-3/4 (222)	3 (76)	9-3/8 (238)	3 (76)	1/2 (13)	5/8 (16)
07	0-700 (0-330)	12 (305)	10 (254)	23-5/8 (600)	25 (635)	6-7/8 (175)	19 (482)	12 (305)	8-3/4 (222)	3 (76)	9-3/8 (238)	3 (76)	1/2 (13)	5/8 (16)
08	0-1000 (0-472)	12 (305)	10 (254)	23-5/8 (600)	25 (635)	7-7/8 (200)	19 (482)	12 (305)	8-3/4 (222)	3 (76)	9-3/8 (238)	3 (76)	1/2 (13)	5/8 (16)
10	0-1500 (0-708)	14 (356)	12-1/2 (318)	23-5/8 (600)	25 (635)	9-7/8 (251)	21 (533)	14-1/2 (368)	11-1/4 (286)	3 (76)	11-7/8 (302)	3 (76)	1/2 (13)	5/8 (16)
12	0-2300 (0-1085)	16 (406)	15 (381)	23-5/8 (600)	25 (635)	11-7/8 (302)	23 (584)	17 (432)	13-3/4 (349)	3-1/2 (89)	13-1/4 (337)	4 (102)	5/8 (16)	7/8 (22)
14	0-3100 (0-1463)	20 (508)	17-1/2 (445)	23-5/8 (600)	25 (635)	13-7/8 (352)	27 (685)	19-1/2 (495)	16-1/4 (412)	3-1/2 (89)	15-1/2 (393)	4 (102)	5/8 (16)	7/8 (22)
16	0-4200 (0-1982)	24 (610)	17-1/2 (445)	24-5/8 (625)	26 (660)	15-7/8 (403)	31 (787)	19-1/2 (495)	16-1/4 (412)	3-1/2 (89)	15-1/2 (393)	4 (102)	5/8 (16)	7/8 (22)