ENGINEERING DATA

LPC Discharge Sound

.5" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	28	31	49	53	62	57	21	49	47	52	53	62	57	21
		400	0.071	40	42	55	59	66	63	27	54	53	58	59	66	63	27
		500	0.111	49	51	60	63	70	68	32	59	58	62	63	70	68	32
		600	0.160	56	58	64	66	73	72	35	63	63	66	66	73	72	35
		700	0.218	62	64	67	69	76	75	38	67	67	69	69	76	75	38
308	8	500	0.110	70	66	63	62	62	58	25	70	68	63	64	64	59	27
		625	0.174	72	69	66	65	65	62	28	72	69	66	67	67	63	28
		750	0.250	74	72	68	67	67	65	29	76	72	68	69	69	67	31
		875	0.340	75	74	70	69	70	68	32	77	74	70	71	71	68	32
		1000	0.444	77	76	71	71	71	70	34	79	76	73	71	71	70	34
424	24	800	0.055	54	57	59	60	55	49	-	54	54	57	57	59	55	-
		1000	0.087	57	60	62	64	60	54	-	57	56	59	61	61	57	20
		1200	0.125	59	61	64	67	64	59	23	60	58	61	63	63	60	24
		1400	0.170	61	64	67	68	67	62	25	62	59	62	64	64	62	25
		1600	0.221	62	65	69	70	70	65	29	64	61	64	66	66	63	26

See page 67 for notes

1" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	28	31	49	53	62	57	21	50	51	53	53	62	57	21
		400	0.071	40	42	55	59	66	63	27	56	57	59	59	66	63	27
		500	0.111	49	51	60	63	70	68	32	60	62	63	63	70	68	32
		600	0.160	56	58	64	66	73	72	35	64	66	67	66	73	72	35
		700	0.218	62	64	67	69	76	75	38	68	70	70	69	76	75	38
308	8	500	0.110	70	66	63	62	62	58	25	70	68	63	64	64	59	27
		625	0.174	72	69	66	65	65	62	28	72	71	66	67	67	63	31
		750	0.250	74	72	68	67	67	65	29	74	74	68	69	69	67	32
		875	0.340	75	74	70	69	70	68	32	75	76	72	69	70	68	34
		1000	0.444	77	76	71	71	71	70	34	77	78	73	71	71	70	37
424	24	800	0.055	54	57	59	60	55	49	-	56	57	60	61	62	58	21
		1000	0.087	57	60	62	64	60	54	-	59	59	62	63	65	62	25
		1200	0.125	59	61	64	67	64	59	23	62	63	65	66	68	64	28
		1400	0.170	61	64	67	68	67	62	25	63	63	66	67	68	66	30
		1600	0.221	62	65	69	70	70	65	29	66	66	68	68	70	68	31

See page 67 for notes

ENGINEERING DATA

LPC Discharge Sound

2" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	28	31	49	53	62	57	21	52	55	54	53	62	57	21
		400	0.071	40	42	55	59	66	63	27	58	61	60	59	66	63	27
		500	0.111	49	51	60	63	70	68	32	62	66	64	63	70	68	32
		600	0.160	56	58	64	66	73	72	35	66	70	68	66	73	72	35
		700	0.218	62	64	67	69	76	75	38	69	73	71	69	76	75	38
308	8	500	0.110	70	66	63	62	62	58	25	70	68	63	64	63	59	27
		625	0.174	72	69	66	65	65	62	28	72	71	66	65	67	63	31
		750	0.250	74	72	68	67	67	65	29	74	74	70	67	67	67	32
		875	0.340	75	74	70	69	70	68	32	75	76	72	69	70	68	34
		1000	0.444	77	76	71	71	71	70	34	77	78	73	71	71	70	37
424	24	800	0.055	54	57	59	60	55	49	-	57	59	61	63	64	60	24
		1000	0.087	57	60	62	64	60	54	-	60	62	63	65	66	63	27
		1200	0.125	59	61	64	67	64	59	23	64	64	65	68	68	66	29
		1400	0.170	61	64	67	68	67	62	25	66	66	68	68	70	67	31
		1600	0.221	62	65	69	70	70	65	29	68	68	69	70	71	69	33

See page 67 for notes

.5" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	60	48	49	44	37	28	23	62	52	49	47	39	31	25
		400	0.071	63	52	52	47	40	31	30	65	56	54	50	43	34	29
		500	0.111	66	55	54	50	43	34	32	68	59	56	52	45	36	32
		600	0.160	68	57	56	52	45	37	35	70	62	58	54	47	39	35
		700	0.218	70	59	57	54	47	39	31	70	65	59	56	47	39	35
308	8	500	0.110	60	55	57	45	36	23	32	65	60	57	52	43	32	32
		625	0.174	64	58	58	49	41	29	33	67	63	60	54	46	35	35
		750	0.250	67	60	59	52	45	34	34	69	66	62	56	48	37	37
		875	0.340	69	62	61	54	48	38	36	71	68	63	58	51	40	39
		1000	0.444	72	64	62	57	51	42	38	72	70	64	60	53	42	41
424	24	800	0.055	55	55	54	49	41	36	28	56	55	54	51	46	39	28
		1000	0.087	58	57	56	53	45	41	31	59	57	55	52	47	41	30
		1200	0.125	61	59	58	56	48	45	33	61	59	57	54	48	44	32
		1400	0.170	63	61	60	58	51	49	35	63	60	58	55	49	45	33
		1600	0.221	65	62	61	60	53	52	36	65	61	59	56	50	47	34

See page 67 for notes

ENGINEERING DATA

LPC Radiated Sound

1" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	60	48	49	44	37	28	23.26	63	56	53	49	42	35	27
		400	0.071	63	52	52	47	40	31	30	66	60	56	52	46	38	31
		500	0.111	66	55	54	50	43	34	32	69	63	58	54	48	40	34
		600	0.160	68	57	56	52	45	37	35	71	65	60	56	50	42	36
		700	0.218	70	59	57	54	47	39	31	72	67	62	58	52	44	38
308	8	500	0.110	60	55	57	45	36	23	32	67	64	60	55	48	39	35
		625	0.174	64	58	58	49	41	29	33	70	67	62	57	50	41	38
		750	0.250	67	60	59	52	45	34	34	72	70	64	59	52	42	41
		875	0.340	69	62	61	54	48	38	36	73	72	66	61	54	44	44
		1000	0.444	72	64	62	57	51	42	38	75	74	67	63	56	46	46
424	24	800	0.055	55	55	54	49	41	36	28	58	59	58	56	52	46	33
		1000	0.087	58	57	56	53	45	41	31	61	61	60	57	53	49	35
		1200	0.125	61	59	58	56	48	45	33	63	63	61	59	54	51	36
		1400	0.170	63	61	60	58	51	49	35	65	64	62	60	55	53	38
		1600	0.221	65	62	61	60	53	52	36	67	65	63	61	56	54	39

See page 67 for notes

2" Inlet Static Pressure

Case	Inlet Size	CFM	MIN OP. Press (in. wc)	Fan Only Octave Bands						Fan NC Level	Fan w/ 100% Primary Octave Bands						Pri. NC Level
				2	3	4	5	6	7		2	3	4	5	6	7	
208	8	300	0.040	60	48	49	44	37	28	23	64	61	56	52	47	40	31
		400	0.071	63	52	52	47	40	31	30	67	65	59	55	50	43	35
		500	0.111	66	55	54	50	43	34	32	70	68	62	58	53	45	39
		600	0.160	68	57	56	52	45	37	35	72	70	64	60	54	47	41
		700	0.218	70	59	57	54	47	39	31	73	72	66	61	56	49	44
308	8	500	0.110	60	55	57	45	36	23	32	71	68	63	59	54	46	39
		625	0.174	64	58	58	49	41	29	33	73	71	65	61	56	48	42
		750	0.250	67	60	59	52	45	34	34	75	74	67	63	59	49	46
		875	0.340	69	62	61	54	48	38	36	76	76	69	64	59	50	48
		1000	0.444	72	64	62	57	51	42	38	77	78	70	66	60	51	51
424	24	800	0.055	55	55	54	49	41	36	28	60	63	62	60	57	53	38
		1000	0.087	58	57	56	53	45	41	31	62	65	64	62	59	56	39
		1200	0.125	61	59	58	56	48	45	33	65	66	65	64	60	58	41
		1400	0.170	63	61	60	58	51	49	35	67	68	67	65	61	60	42
		1600	0.221	65	62	61	60	53	52	36	68	69	68	66	62	61	44

See page 67 for notes

ARI CERTIFICATION DATA

Model or Size	Primary CFM	Fan CFM	Elecric Power Input (Watts)	Min. Operating Pressure (in WC)
LPC 208	700	700	299	0.22
LPC 308	700	1000	418	0.22
LPC 424	1600	1600	716	0.70

Radiated (dB)

	Fan Only						Fan and 100% Primary					
	0.125	0.25	0.5	1	2	4	0.125	0.25	0.5	1	2	4
LPC 208	70	59	57	54	47	39	73	70	64	60	54	46
LPC 308	72	64	62	57	51	42	76	76	69	64	58	49
LPC 424	75	64	61	58	50	43	80	74	70	66	60	55

Model or Size	Primary CFM	Fan CFM	Elecric Power Input (Watts)	Min. Operating Pressure (in WC)
LPC 208	700	700	299	0.22
LPC 308	700	1000	418	0.22
LPC 424	1600	1600	716	0.70

Discharge (dB)

	Fan Only						Fan and 100% Primary					
	0.125	0.25	0.5	1	2	4	0.125	0.25	0.5	1	2	4
LPC 208	72	68	66	66	67	64	-	-	-	-	-	-
LPC 308	77	76	71	71	71	70	-	-	-	-	-	-
LPC 424	72	67	69	68	68	65	-	-	-	-	-	-

ARI PERFORMANCE CERTIFIED ™
ARI Standard 880
VAV Terminal
www.aridirectory.org

TUTTLE & BAILEY®
The First Name In Air Distribution

Performance Data Notes:

1. Test were conducted in accordance with standard ARI 880-94.
2. Sound power levels are referenced to 10-12 watt.
3. Octave bands 2-7 correspond to 125 Hz to 4000 Hz.
4. For ARI Certification data:
   a. The “Fan Only” test is conducted with the fan operating at the specified airflow and no primary inlet airflow (100% delivered through the induction inlet) with 0.25 in. WC downstream static pressure.

   b. The “Fan & 100% Primary” test is conducted with the fan operating at the specified airflow with 100% of the airflow being supplied through the primary inlet with 0.25 in. WC downstream static pressure.
5. At ARI Certification test points:
   a. The “Fan Only” test is conducted at the maximum fan airflow capacity (high tap/speed control set at high) with no primary inlet airflow and 0.25 in. WC. downstream static pressure.

   b. The “Fan & 100% Primary” test is conducted with the fan operating at the maximum fan airflow capacity (high tap/speed control set at high) with a primary inlet airflow corresponding to the max fan airflow or 2000 fpm air velocity, whichever is less. The operating pressure is 1.5 in. WC. with a downstream static pressure of 0.25 in. WC.

   c. The electric power is measured during the “Fan Only” test.

   d. The minimum operating pressure test is conducted with the fan operating at the maximum fan airflow capacity (high tap/speed control set at high) with a primary inlet airflow corresponding to the max fan airflow or 2000 fpm air velocity, whichever is less. The downstream static pressure is 0.25 in. WC.

Noise Criteria (NC) Notes:

1. A hyphen (-) indicates the NC is lower than 15.

2. Noise Criteria (NC) were found using standard ARI 885-98 Appendix E (2002 Addendum):

   a. Radiated NC were found using the type 2 ceiling (mineral fiber) condition.
   b. Discharge NC were found using the large terminal condition due to the multitude of possible dischargeduct sizes.

3. Standard ARI 885-98 Appendix E, Table E1. Typical Sound Attenuation Values, dB:

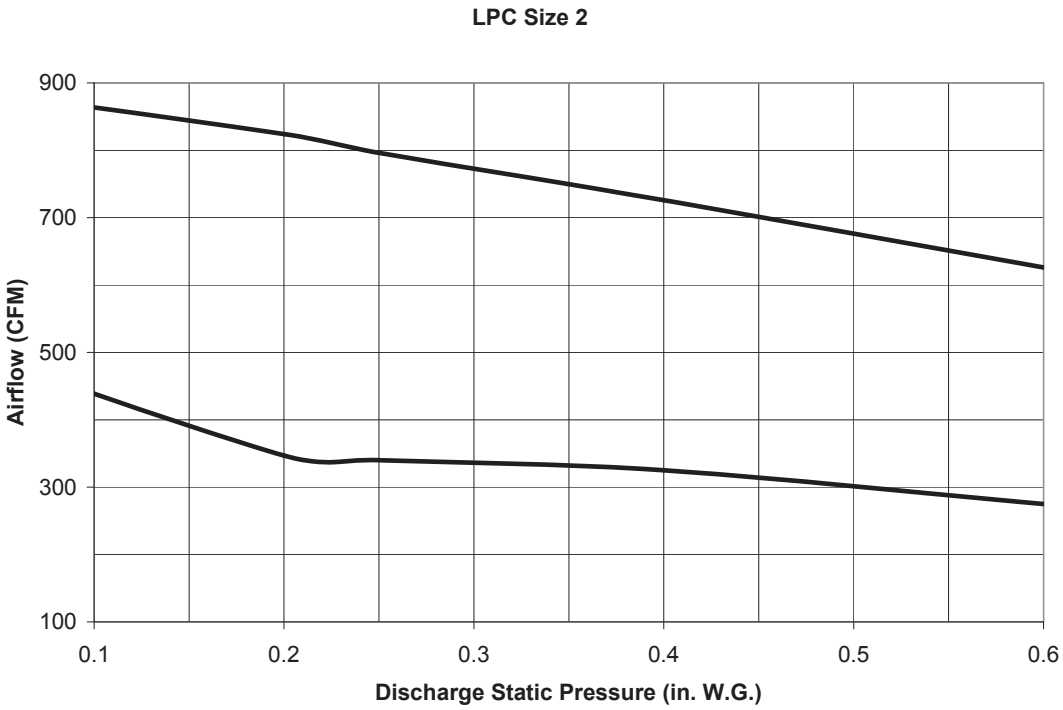
RADIATED	Octave Bands					
	2	3	4	5	6	7
Environmental Effect	2	1	0	0	0	0
Ceiling/Space Effect	16	18	20	26	31	36
Total dB Reduction	18	19	20	26	31	36

Discharge Sound	Octave Bands					
	2	3	4	5	6	7
Environmnetal Effect	2	1	0	0	0	0
Duct Lining	2	6	12	25	29	18
End Relfection	9	5	2	0	0	0
Flex Duct	6	10	18	20	21	12
Space Effect	5	6	7	8	9	10
Total dB Reduction	24	28	39	53	59	40

dB Adjustments	Octave Bands					
	2	3	4	5	6	7
300-700 cfm	2	1	1	-2	-5	-1
Over 700 cfm	4	3	2	-2	-7	-1

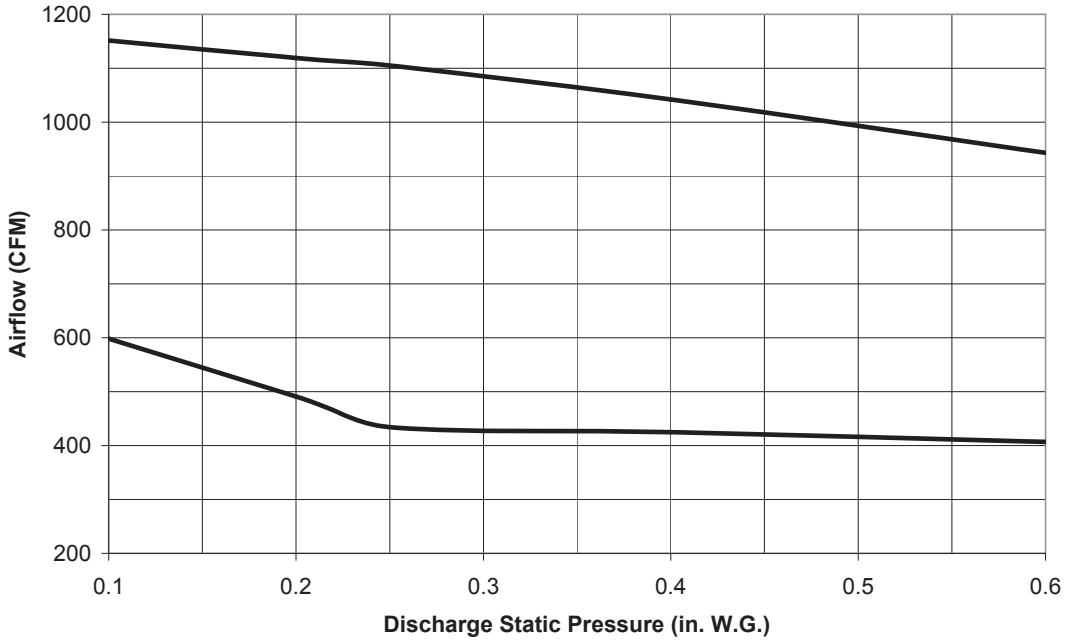
FAN CURVES

Size 2



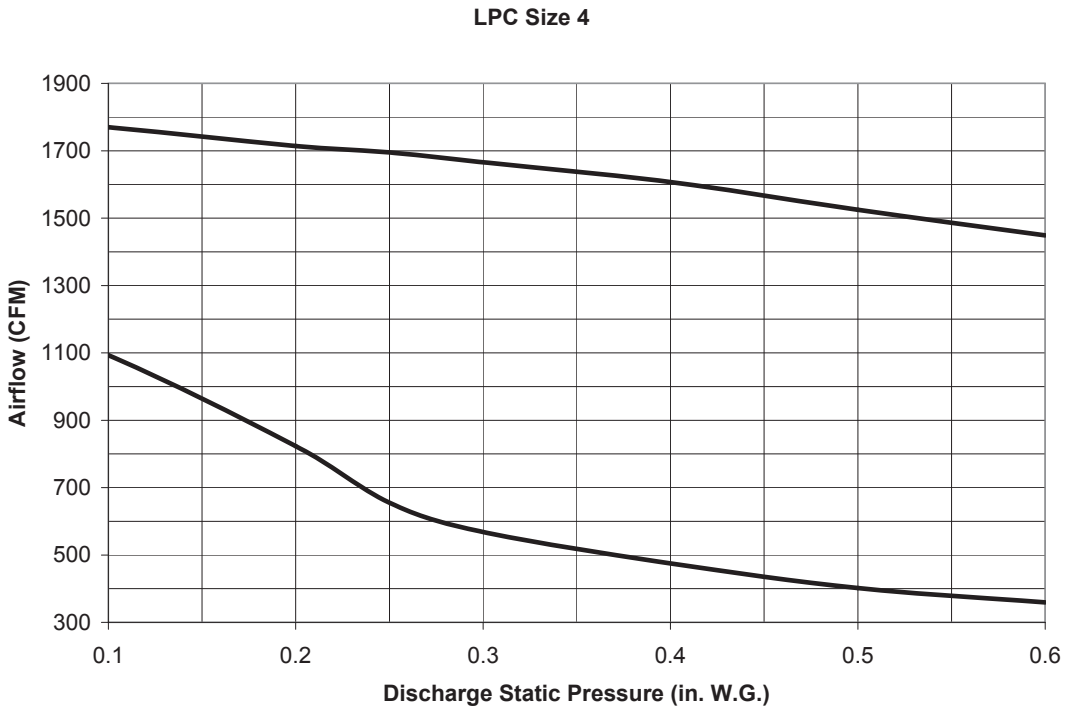
FC

LPC Size 3


1200
1000
800
600
400
200
Airflow (CFM)
0.1
0.2
0.3
0.4
0.5
0.6
Discharge Static Pressure (in. W.G.)

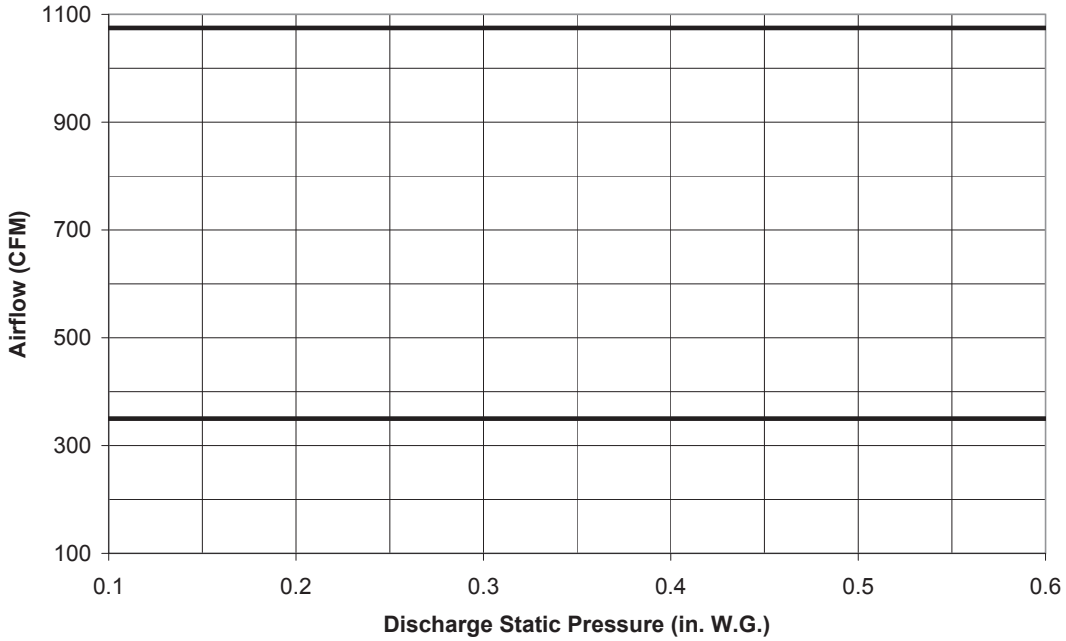
FAN CURVES

Size 4



FC

LPC Size 3 ECM



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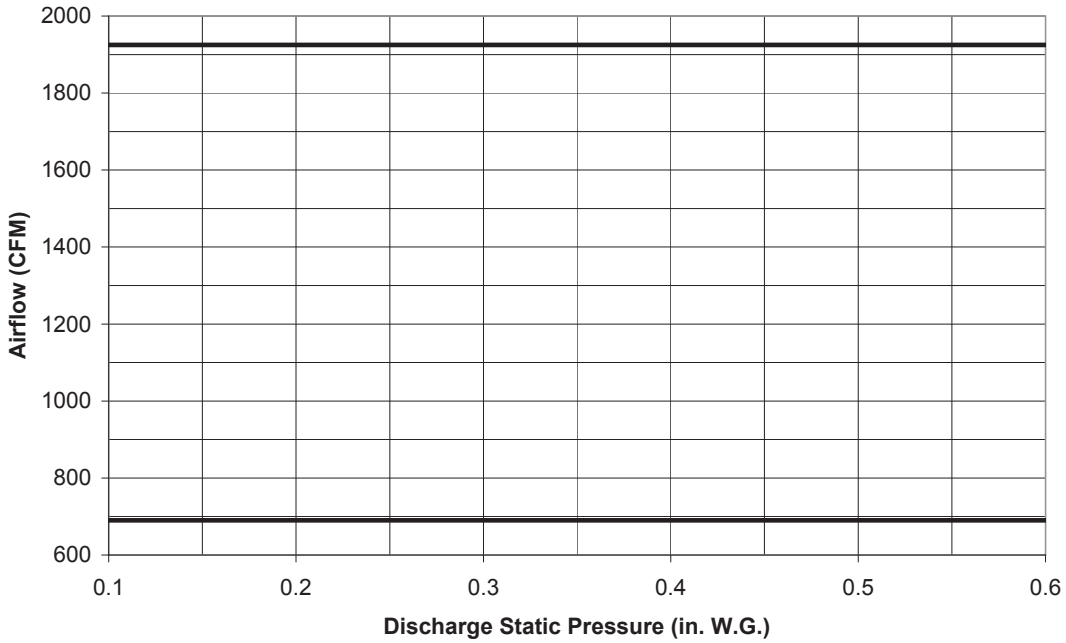


ENGINEERING DATA

Hot Water Reheat Coil Size 2 & 3

1 Row Coil

GPM	CFM								Water Side Head Loss
	300	350	400	450	500	550	600	650	
	Heating Capacity (MBH)								
1.0	9.2	9.7	10.3	10.8	11.2	11.7	12.1	12.4	1.0
2.0	10.3	11	11.7	12.4	13	13.6	14.1	14.6	2.0
4.0	11	11.8	12.7	13.5	14.2	14.9	15.6	16.2	4.0
6.0	11.2	12.1	13.0	13.9	14.7	15.4	16.1	16.8	6.0
Air Side Pressure Drop (in W.G.)									
	0.06	0.08	0.1	0.12	0.15	0.17	0.2	0.23	

2 Row Coil

GPM	CFM								Water Side Head Loss
	300	350	400	450	500	550	600	650	
	Heating Capacity (MBH)								
1.0	15.9	17.1	18.1	19.1	19.9	20.7	21.3	21.9	0.23
2.0	18.1	19.7	21.2	22.6	23.8	24.9	26	26.9	0.77
4.0	19.4	21.4	23.2	24.9	26.4	27.8	29.1	30.4	2.63
6.0	20.0	22.1	24.0	25.8	27.4	29	30.4	31.8	5.4
Air Side Pressure Drop (in W.G.)									
	0.06	0.08	0.10	0.12	0.15	0.17	0.20	0.23	

- Hot water capacities are in MBH.
- Data are based upon 180°F entering water and 65°F entering air.
- HD (head) loss is in feet of water.
- Tables are based upon a temperature difference of 115°F between entering air and entering water.
- For other temperature differences, multiply MBH values by factors below.
- Air temperature rise = 927 x MBH/cfm.
- Water temperature drop = 2.04 x MBH/GPM.
- Connections: All coils are ½-inch O.D. male solder.
- Coils are not for steam application. Contact your Tuttle & Bailey representative for steam coil data.
- Water enters at lower coil connection to prevent air entrapment.

FC

Correction factors for other entering conditions:

ΔT	50	60	70	80	90	100	115	125	140	150
Factor	0.44	0.52	0.61	0.7	0.79	0.88	0.1	1.07	1.2	1.3

1 Row Coil

GPM	CFM								Water Side Head Loss
	450	500	550	600	650	700	750	800	
	Heating Capacity (MBH)								
1.0	10.8	11.2	11.7	12.1	12.4	12.8	13.1	13.6	0.00
2.0	12.4	13.0	13.6	14.1	16.6	15.1	15.5	16.0	0.35
4.0	12.5	14.2	14.9	15.6	16.2	16.7	17.3	17.8	1.15
6.0	13.9	14.7	15.4	16.1	16.8	17.4	18.0	18.6	2.42
Air Side Pressure Drop (in W.G.)									
	0.06	0.08	0.09	0.11	0.12	0.14	0.16	0.18	

2 Row Coil

GPM	CFM								Water Side Head Loss
	450	500	550	600	650	700	750	800	
	Heating Capacity (MBH)								
1.0	19.1	19.9	20.7	21.3	21.9	22.5	23.0	23.6	0.23
2.0	22.6	23.8	24.9	26.0	26.9	27.8	28.7	29.4	0.77
4.0	24.9	26.4	27.8	29.1	30.4	31.8	33.1	34.3	35.5
6.0	25.8	27.4	29.0	30.4	31.8	33.1	34.3	35.5	5.40
Air Side Pressure Drop (in W.G.)									
	0.12	0.15	0.17	0.20	0.23	0.26	0.30	0.34	

- Hot water capacities are in MBH.
- Data are based upon 180°F entering water and 65°F entering air.
- HD (head) loss is in feet of water.
- Tables are based upon a temperature difference of 115°F between entering air and entering water.
- For other temperature differences, multiply MBH values by factors below.
- Air temperature rise = 927 x MBH/cfm.
- Water temperature drop = 2.04 x MBH/GPM.
- Connections: All coils are ½-inch O.D. male solder.
- Coils are not for steam application. Contact your Tuttle & Bailey representative for steam coil data.
- Water enters at lower coil connection to prevent air entrapment.

Correction factors for other entering conditions:

ΔT	50	60	70	80	90	100	115	125	140	150
Factor	0.44	0.52	0.61	0.7	0.79	0.88	0.1	1.07	1.2	1.3

SPECIFICATION

LPC Hot Water Reheat Coil

General Notes for All Hot Water Coils:

1. All coils are 10 FPI (fins per inch).
2. All coils are copper tubes with aluminum fins.
3. All fins have a thickness of 0.0045”.
4. Copper tubing has a thickness of 0.016”.
5. Copper tubing is 0.5” O.D.
6. Entering air is 65º F. For other temperature values, refer to ToolBox selection software.
7. Entering water is 180º F. For other temperature values, refer to ToolBox selection software.
8. Altitude is 0 feet.
9. Coils with 1 or 2 rows have 2 circuits.

SPECIFICATION

Electric Reheat Coil

Standard Features

- 80/20 NiCr element wire
- Flanged duct connection
- Airflow switch
- Automatic reset thermal cutout switch
- Magnetic contactor (1 per stage)
- Control transformer (except pneumatic controls)
- NEMA 1 enclosure for electric heat controls
- Single point power connection

Optional Features

- Mercury contactors
- Fused door interlocking disconnect
- Fusing
- Non-fused door interlocking disconnect
- Manual reset thermal cutout
- Up to three stages of control

120V/1Φ

Unit Size	kW Min	kW Max
2	1	6
3	1	8
4	1	8

208V/1Φ

Unit Size	kW Min	kW Max
2	1	6
3	1	8
4	1	8

240V/1Φ

Unit Size	kW Min	kW Max
2	1	6
3	1	9
4	1	9

277V/1Φ

Unit Size	kW Min	kW Max
2	1	6
3	1	9
4	1	12

208V/3Φ

Unit Size	kW Min	kW Max
2	1.5	6
3	1.5	9
4	1.5	14

480V/3Φ

Unit Size	kW Min	kW Max
2	2.5	6
3	2.5	9
4	2.5	14

General Notes on Electric Heat Availability:

1. Minimum 1/2 kW per step
2. Maximum 100°F leaving air temperature
3. For single phase heaters, the motor voltage is equal to the heater voltage
4. For 208V / 3ϕ heaters, the motor voltage is 208V / 1ϕ
5. For 480V / 3ϕ heaters, the motor voltage is 277V / 1ϕ

FC

SPECIFICATION

Electric Reheat Coil

Selection Guidelines

Electric heat kW ranges are shown in Table 1. In all cases, the leaving air temperature of the unit must not exceed 100°F.

Validate Leaving Air Temperature (LAT) - Leaving air must not exceed 100°F

$$LAT = \frac{kW \times 3160}{CFM} + EAT$$

LAT = Leaving air temperature in °F
kW = Electric heat capacity in kW
CFM = Fan airflow in CFM
EAT = Entering air temperature in °F (Note: this is mixture of plenum and primary air)

Determining Mixed Air Temperature

$$EAT_{Total} = EAT_{Primary} \times (CFM_{Primary} / CFM_{Fan}) + EAT_{Plen} \times ((CFM_{Fan} - CFM_{Primary}) / CFM_{Fan})$$

LAT = leaving air temp in °F
$CFM_{Primary}$ = Airflow from inlet in heating mode in CFM
CFM_{Fan} = Airflow from fan in CFM - for FPC this is also the total CFM
EAT_{Total} = Entering air to the heater in °F
$EAT_{Primary}$ = Primary entering air temperature for the heating mode in °F
EAT_{Plen} = Plenum entering air temperature in °F

Minimum Circuit Ampacity (MCA)*

MCA = (Motor Current + Heater Current) x 1.25

Maximum Overcurrent Protection (MOP)*

MOP = (2.25 x Motor Current of largest motor) + Sum of other motor current + Heater current

MOP Rules

1. If MOP is less than 15, MOP shall be set to 15
2. If MOP is greater than the MCA and is between standard fuse sizes, round down to the next standard fuse size
   a. Exception - If the next lower fuse size is less than 125% of the current rating of the electric heater load, round up to next standard fuse size
3. If MOP is less than the MCA, the MOP shall be set equal to MCA and then rounded up to the next standard fuse size.

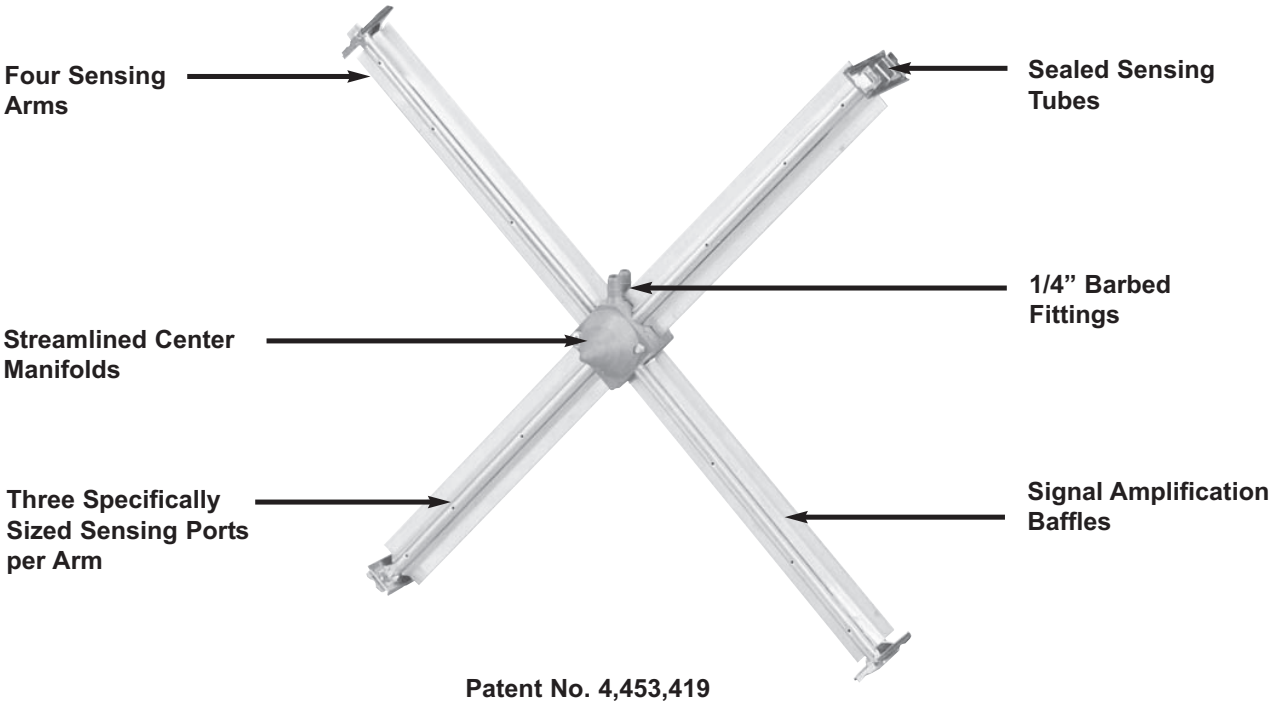
Helpful Equations

$$kW = \frac{MBH}{3.414}$$

$$\text{Single Phase Amperage Draw} = \frac{kW \times 1000}{Voltage}$$

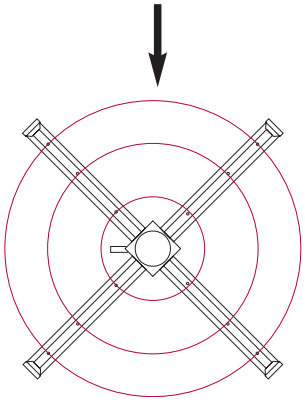
$$\text{Three Phase Amperage Draw} = \frac{kW \times 1000}{Voltage \times 1.732}$$

*MCA and MOP equations and rules are intended as an aid in design. See UL 1995 for Heating and Cooling Equipment for complete requirements.



Patent No. 4,453,419

Upstream and Downstream Concentric Ring Sensing Port Configuration



- Patented Flo-Cross® (Patent No. 4,453,419) is accurate to ±5% throughout the cataloged operating range
- Sensing arms sample the inlet cross section mitigating turbulent flow effects
- Barbed fittings positively lock plastic tubing
- 24 total sensing ports provide a differential pressure (ΔP) output proportional to the average duct velocity
- Amplification baffles strengthen ΔP signals to levels three times higher than standard Pitot tube readings
- Center manifolds average velocity profiles and reduce pulsations from dynamic ΔP signals
- Sensing tube constructions eliminates signal loss due to leakage
- Concentric ring sensing port configuration imitates major flow testing standards by locating them at the center of equal areas
- Corrosion resistant aluminum construction

FC

Flo-Cross® Sensor Performance Parameters/Formulas

Size	Area (ft^2)	CV
08	0.3382	817
24	0.8889	2047

- Flow (CFM) = $C_v \times \sqrt{\Delta P}$
- FPM = $\frac{CFM}{Area\ (sq.ft)}$
- 500 to 3000 FPM Nominal Velocity Range