

# AEROVENT

INDUSTRIAL VENTILATION SYSTEMS



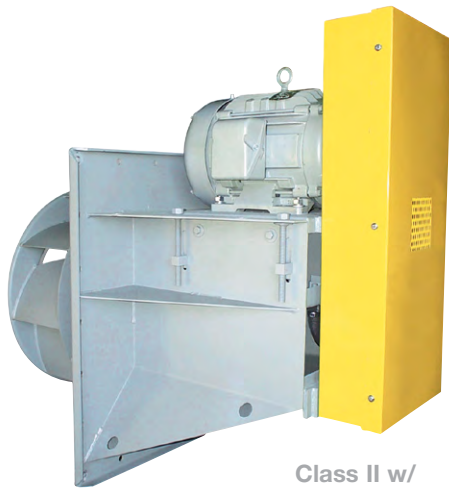
## HIGH EFFICIENCY PLUG FANS

Model CPG

# High Efficiency Plug Fans



Class III w/4\"/>



Class II w/  
OSHA Belt Guard

## Model CPG

CPG plug fans from Aerovent are compact, versatile and offer the highest efficiency in the industry. Their versatility allows them to be used for air circulation in a variety of commercial and industrial applications including air curtains, air heaters, ceiling, wall, and floor panel plenums, degreasers, dryers, dust collectors, evaporators, freezers, kilns, ovens, packaged air handlers, parts washers, penthouses, smoke houses, space heaters, spray booths, and other high temperature applications.

Plug fans are housed in the customer's enclosure in applications where the system plenum acts as the fan housing. This configuration saves space since connecting ductwork and motor support pedestals are generally not needed. More space savings can be obtained by utilizing the wheel compartment as a pressurized chamber in lieu of a fan scroll. The use of multiple discharges from the pressurized chamber allows for additional savings by reducing ducting requirements.

CPG plug fans feature SWSI backward curved, non-overloading, single thickness airfoil type wheels. The unique wheel offers increased efficiency over competitor's airfoil blade designs yet can handle airstreams not conducive to traditional hollow airfoil shapes.

The plug fan's motor and drive are protected from high temperatures by the customer's chamber wall or the optional 4" or 6" insulated plug. The motor and drive are mounted to the plug panel which may be bolted or welded in place. The plug assembly may be mounted with the shaft in either the vertical or horizontal position for maximum flexibility. Horizontal construction is standard. Vertical mounting can be provided when specified. An all welded housing and an integral inlet cone are available as options.

## Performance Comparison

Model CPG Plug Fans are designed to maximize efficiency. This is illustrated by the following chart which compares the new CPG Plug Fan and other manufacturers' airfoil (AF) and backward inclined (BI) fans.

### Nominal 36" Wheel Diameter

CFM	SP	MANUFACTURER	RPM	BHP	SE%
23000	3.5"	Aerovent CPG	1057	16.39	77.3
		Manufacturer "A" AF	1107	16.60	76.3
		Manufacturer "A" BI	1005	17.50	72.4
		Manufacturer "B" AF	971	17.94	70.6
33000	5"	Aerovent CPG	1409	35.28	73.6
		Manufacturer "A" AF	1475	36.50	71.1
		Manufacturer "A" BI	1324	38.30	67.8
		Manufacturer "B" AF	1295	40.81	63.6

### Nominal 44" Wheel Diameter

CFM	SP	MANUFACTURER	RPM	BHP	SE%
30000	2.5"	Aerovent CPG	717	15.28	77.2
		Manufacturer "A" AF	783	15.60	75.6
		Manufacturer "A" BI	713	16.50	71.5
		Manufacturer "B" AF	725	17.46	67.6
47000	4"	Aerovent CPG	1032	40.64	72.8
		Manufacturer "A" AF	1132	43.30	68.3
		Manufacturer "A" BI	1015	45.20	65.4
		Manufacturer "B" AF	1054	50.00	59.2

## Construction Features

### Plug Panel

Constructed of minimum 7-gauge steel with formed flanges to maintain flatness and rigidity. Panel is prepunched for bolt mounting. Panel assembly may also be welded in place. The “cross frame” bearing support is designed for maximum stability and load spreading. Bearings are serviceable without disassembly of panel or frame.

### Plug Assembly

Available for both horizontal and vertical applications. Horizontal construction is standard. Vertical construction will be provided when specified.

### Adjustable Motor Base

The motor base is standard with leveling and tension adjustment to ensure proper drive belt alignment. The motor base is heavy-gauge steel and prepunched to accept the standard motor frame specified.

### Wheels

Wheels are assembled of die-formed, matched components, continuously welded to both back plate and rim. Wheels are statically and dynamically balanced.

### Inlet Cones

Heavy-gauge and spun to match the wheel intake rim to insure smooth airflow. Inlet cone flange is prepunched for mounting. Inlet cones are shipped loose as standard. An integral inlet cone is optional.



Class III Adjustable Motor Base

### Shafts

Standard shaft diameters are sized for plug thicknesses to 6 inches and 1000°F operation.

### Bearings

Either ball or spherical roller, heavy duty, self-aligning, pillow block type bearings are provided. Bearing selection is based on L-10 minimum life of 40,000 hours or average life of 200,000 hours. Split roller bearings are not recommended.

## Typical Installations

Mounting is accomplished by providing a hole larger than the wheel diameter through the chamber wall. The wheel, shaft, motor, and drive assembly is then positioned to the inlet cone (mounted in opposite wall) and secured in place. See Figure A.

Another method is to provide a hole sized only for the wheel drive shaft. The wheel is then positioned through the opening for the inlet cone after the drive and panel assembly has been securely mounted. See Figure B.

Plug fans may be applied with open wheel (unhoused) or with a housing as shown in Figure C. Performance data in this catalog is for unhoused wheel application.

**Walls must be designed to support the dynamic loads of the fan without resonance to eliminate vibration and bearing failure.**

### Plenum System

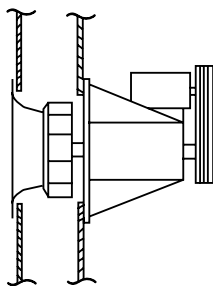
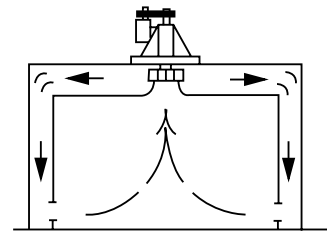


Figure A

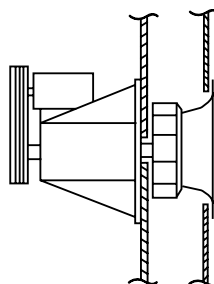


Figure B

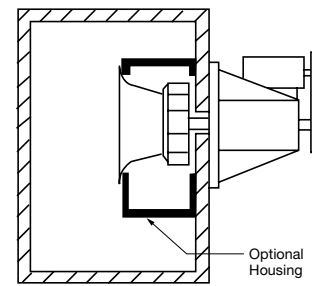


Figure C

## Optional Construction

### Variable Inlet Vanes

Vane blades are cantilever design or center supported, equipped with permanently lubricated bearings and ball joints for smooth and easy operation. Vane assemblies are external type for sizes 121 through 161 and nested for sizes 181 through 491. Standard inlet vanes are applicable to 300°F. Consult factory for higher temperatures.

### Spark Resistant Construction

Fan applications may involve the handling of potentially explosive or flammable particles, fumes or vapors. Such applications require careful consideration by the system designer to insure the safe handling of such gases. Aerovent offers the following classifications of spark resistant construction per AMCA Standard 99-0401-86. It is the specifier or the user's responsibility to specify the type of spark resistant construction with full recognition of the potential hazards and the degree of protection required.

**Type C** - The fan shall be so constructed that a shift of the wheel or shaft will not permit two ferrous parts of the fan to rub or strike.

### Shallow Depth Inlet Cone

The shallow inlet cone can shorten the overall length of the plug fan, providing extra space where needed. See dimensional data on page 14 for comparison between standard inlet cone and the shallow depth cone. Fan performance in smaller sizes must be derated for the modification. See Table 3 on page 5 for performance derates.

### High Temperature Construction

**301-500°F:** Includes high temperature grease, expansion and non-expansion bearings, ceramic shaft seal and shaft cooler.

**501-800°F:** Includes the modifications above with the addition of high temperature aluminum paint. Minimum 4" insulation is required and is available as an optional item from Aerovent. Be sure to apply derating factors for high temperature construction.

**801-1000°F:** Includes the modifications above with the addition of 316 stainless steel wheel and shaft. Also includes shaft extension for the required 6" insulation. 6" insulated plug is available as an optional item. Be sure to apply stainless steel derating factors for temperature.

### Insulated Plug

Protects motor and drive components from heat. An insulated plug is recommended for temperatures above 300°F. Available in 2", 4" and 6" thicknesses. Special thicknesses to match customer's insulated wall are available. Plug is assembled to mounting panel when ordered. See Table 1 on page 5 for maximum RPMs.

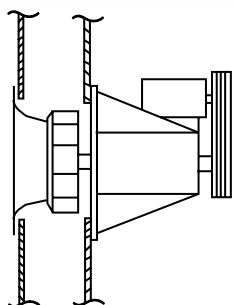
### All Welded Housing

Heavy-gauge steel housing is provided with wheel opening on each side and weld studs on the inlet side for cone mounting. Specify rotation and discharge as viewed from drive side to insure proper stud placement. Housing supports and attachments for wall mounting to be provided by others. See page 14 for dimensions.

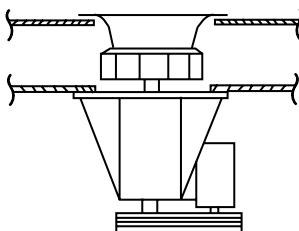
### Integral Inlet Cone Assembly

Includes four pieces of angle, welded to the insulated plug or mounting panel, which serve to pre-align the inlet funnel within the wheel. The entire unit can be installed or removed through the same hole in the customer's enclosure, without the need for additional mounting or alignment of the inlet cone.

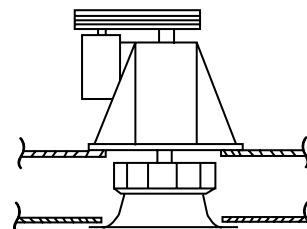
## Mounting Arrangements



Horizontal



Vertical Down



Vertical Up



To ensure proper motor selection, consideration must be given to starting torque requirements (fan wheel inertia  $WR^2$ ) along with the operating BHP. Table 1 lists the  $WR^2$  factors for different wheel sizes to be used in evaluating the capability of a selected motor.

In some cases it may be necessary to provide a larger horsepower motor, even though it may not be dictated by the operating BHP, to bring the fan to speed.

Table 1. Maximum Fan RPMs, Wheel Weights and  $WR^2$

FAN SIZE	CLASS II					CLASS III				
	MAXIMUM RPM			WHEEL WT. (LBS.)	$WR^2$ (LBS-FT <sup>2</sup> )	MAXIMUM RPM			WHEEL WT. (LBS.)	$WR^2$ (LBS-FT <sup>2</sup> )
	NO PLUG	4" PLUG	6" PLUG			NO PLUG	4" PLUG	6" PLUG		
121	3778	3000	3000	21	3	-	-	-	-	-
141	3352	3000	2875	24	4	-	-	-	-	-
161	2975	2975	2425	32	7	-	-	-	-	-
181	2644	2644	2275	52	13	3557	3000	3000	62	14
201	2380	2380	2200	58	18	3202	3000	2900	70	20
221	2125	2125	1850	75	31	2859	2859	2650	84	33
251	1889	1889	1700	96	50	2541	2541	2303	111	51
281	1676	1676	1676	140	94	2255	2255	1936	156	104
321	1487	1487	1487	173	152	2001	2001	1729	195	167
351	1322	1322	1322	211	241	1779	1779	1483	236	266
391	1190	1190	1190	254	376	1601	1601	1578	283	413
441	1062	1062	1062	361	613	1429	1429	1429	482	880
491	952	952	952	465	1025	1281	1281	1281	613	1450

Table 2. Bare Fan and Accessory Weights

FAN SIZE	APPROXIMATE WEIGHTS (LBS.)				
	BARE FAN		INSULATED PLUG	HOUSING	INLET VANES
	CLASS II	CLASS III			
121	140	-	25	24	45
141	145	-	25	30	52
161	185	-	32	44	58
181	208	444	32	65	29
201	221	470	32	79	33
221	235	513	35	97	38
251	240	594	35	117	40
281	323	756	40	143	45
321	388	990	55	287	50
351	430	1118	55	350	50
391	575	1467	75	428	55
441	639	1745	75	522	60
491	950	1900	95	634	65

Table 3. Shallow Inlet Cone Derates

FAN SIZE	INCREASE DESIGN SPEED BY	INCREASE DESIGN BHP BY
121 - 141	Not Available	Not Available
161 - 201	2%	4%
221 - 491	0%	0%

NOTE: Maximum RPMs in Table 1 cannot be exceeded.

Table 4. High Temperature Applications

TEMP. RANGE	BEARING TYPE	LUBRICATION	OTHER REQUIREMENTS
TO 300°F	BALL OR ROLLER	GREASE	STANDARD CONSTRUCTION
301 TO 500°F	EXPANSION AND NON-EXPANSION	HIGH TEMPERATURE GREASE	CERAMIC SHAFT SEAL, SHAFT COOLER
501 TO 800°F	EXPANSION AND NON-EXPANSION	HIGH TEMPERATURE GREASE	HIGH TEMPERATURE ALUMINUM PAINT 4" MINIMUM INSULATION REQUIRED BY AEROVENT OR CUSTOMER CERAMIC SHAFT SEAL, SHAFT COOLER
801 TO 1000°F	EXPANSION AND NON-EXPANSION	HIGH TEMPERATURE GREASE	316 STAINLESS STEEL WHEEL AND SHAFT 6" MINIMUM INSULATION REQUIRED BY AEROVENT OR CUSTOMER HIGH TEMPERATURE ALUMINUM PAINT CERAMIC SHAFT SEAL, SHAFT COOLER

Figure 1. Wheel and Plenum Arrangement

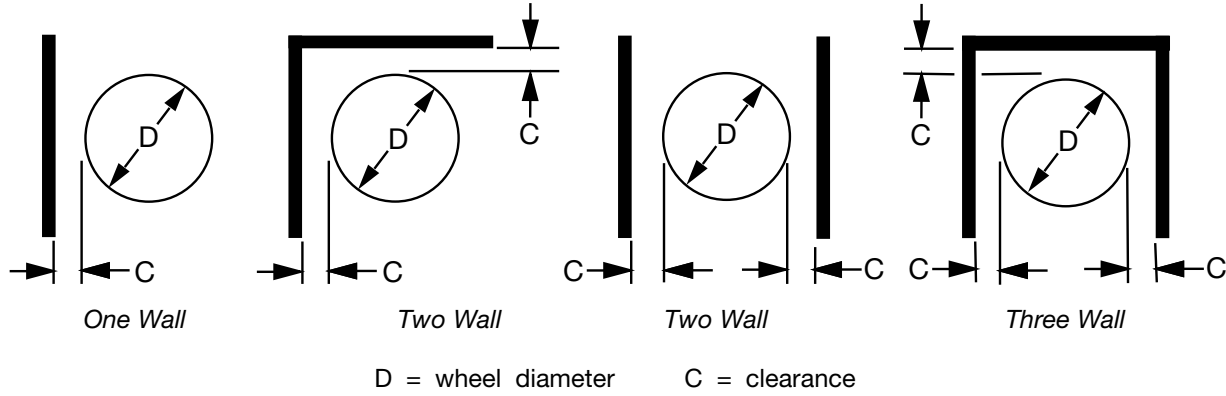


Table 5. Wall Proximity Factors

% WOV	FACTOR	C = D/8			C = D/4			C = D/2		
		ONE WALL	TWO WALL	THREE WALL	ONE WALL	TWO WALL	THREE WALL	ONE WALL	TWO WALL	THREE WALL
95	RPM	1.02	1.03	1.09	1.01	1.02	1.06	1.01	1.01	1.03
	BHP	1.06	1.08	1.29	1.04	1.06	1.20	1.02	1.02	1.08
85	RPM	1.02	1.02	1.08	1.01	1.02	1.06	1.01	1.01	1.03
	BHP	1.05	1.07	1.26	1.03	1.05	1.18	1.02	1.02	1.08
75	RPM	1.01	1.02	1.07	1.01	1.02	1.05	1.00	1.01	1.02
	BHP	1.04	1.06	1.23	1.03	1.05	1.16	1.01	1.02	1.07
65	RPM	1.01	1.02	1.06	1.01	1.01	1.04	1.00	1.01	1.02
	BHP	1.04	1.06	1.19	1.03	1.04	1.14	1.01	1.02	1.06
55	RPM	1.01	1.02	1.05	1.01	1.01	1.04	1.00	1.01	1.02
	BHP	1.03	1.05	1.16	1.02	1.03	1.12	1.01	1.02	1.05
45	RPM	1.01	1.01	1.04	1.01	1.01	1.03	1.00	1.00	1.01
	BHP	1.02	1.04	1.13	1.02	1.03	1.09	1.01	1.01	1.04

Table 6. WOV Factors

SIZE	WOV FACTOR	D
121	1.08	12.40
141	1.55	13.98
161	2.22	15.75
181	3.42	17.72
201	4.68	19.68
221	6.58	22.05
251	9.37	24.80
281	14.31	27.95
321	20.47	31.50
351	31.51	35.43
391	43.24	39.37
441	60.73	44.09
491	84.44	49.21

Table 7. Temperature and Altitude Correction Factors

AIR TEMP °F	ALTITUDE IN FEET ABOVE SEA LEVEL											
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	15000
	BAROMETRIC PRESSURE IN INCHES OF MERCURY											
	29.92	28.86	27.82	26.82	25.84	24.90	23.98	23.09	22.22	21.39	20.58	16.89
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.714	0.688	0.564
100	0.946	0.912	0.880	0.848	0.818	0.787	0.758	0.730	0.703	0.676	0.651	0.534
150	0.869	0.838	0.808	0.770	0.751	0.723	0.696	0.671	0.646	0.620	0.598	0.490
200	0.803	0.774	0.747	0.720	0.694	0.668	0.643	0.620	0.596	0.573	0.552	0.453
250	0.747	0.720	0.694	0.669	0.645	0.622	0.598	0.576	0.555	0.533	0.514	0.421
300	0.697	0.672	0.648	0.624	0.604	0.580	0.558	0.538	0.518	0.498	0.480	0.393
400	0.616	0.594	0.573	0.552	0.532	0.513	0.493	0.476	0.458	0.440	0.424	0.347
500	0.552	0.532	0.513	0.495	0.477	0.459	0.442	0.426	0.410	0.394	0.380	0.311
600	0.500	0.482	0.469	0.448	0.432	0.416	0.400	0.386	0.372	0.352	0.344	0.282
700	0.457	0.441	0.425	0.410	0.395	0.380	0.366	0.353	0.340	0.326	0.315	0.258
800	0.420	0.404	0.389	0.375	0.362	0.350	0.336	0.323	0.311	0.300	0.290	0.237
900	0.389	0.376	0.363	0.349	0.336	0.324	0.312	0.300	0.289	0.279	0.268	0.220
1000	0.363	0.350	0.338	0.325	0.314	0.302	0.291	0.280	0.270	0.259	0.250	0.205

Table 8. Derating Factors For High Temperature

TEMP. (°F)	STEEL			STAINLESS STEEL	
	CLASS II		CLASS III	CLASS II	CLASS III
	121-281	321-491			
70	1.00	1.00	1.00	1.00	1.00
200	0.99	0.97	0.97	1.00	0.98
250	0.98	0.96	0.96	1.00	0.96
300	0.97	0.95	0.95	1.00	0.94
400	0.96	0.93	0.93	1.00	0.91
500	0.93	0.90	0.90	0.97	0.87
600	0.90	0.87	0.87	0.94	0.84
700	0.88	0.84	0.84	0.90	0.80
800	0.83	0.81	0.81	0.87	0.78
1000	N/A	N/A	N/A	0.81	0.75

When operating fans at elevated temperatures, the maximum RPMs of the fan from Table 1 on page 5 must be corrected to the safe operating RPM limit for the application using the factors listed in the Table 8.

The performance tables in this catalog are based on fans handling standard air at a density of 0.075 pounds per cubic foot. This is equivalent to air at 70°F at sea level (29.92 Hg barometric pressure). When specified performance is at a density different than standard, it must be converted to the equivalent standard conditions before the fan can be selected from the performance tables. The performance data and examples in this catalog are for unhooded CPG plug fans.

$$\% \text{ WOV} = \frac{17000 \times 100}{1478 \times 15.19} = 75.7$$

**Step 4.** By interpolation from Table 5 on page 6, for the two wall column of  $D \div 4$  at 75.7% WOV, we find the RPM factor of 1.02 and the BHP factor of 1.05.

Corrected unhooded performance for 17000 CFM at 3" SP standard air is:

$$\begin{aligned} \text{RPM} &= 1478 \times 1.02 = 1508 \\ \text{BHP} &= 11.33 \times 1.05 = 11.90 \end{aligned}$$

### Example 1. Standard Density

**Given:** 17000 CFM at 3" TSP (system). Installation is a two-wall arrangement with a wheel-to-wall clearance of 7".

**Step 1.** Entering the performance tables we find that a 281 CPG plug fan will deliver 17000 CFM at 3" SP operating at 1478 RPM with 11.33 BHP.

**Step 2.** Catalog performance must be corrected for wheel-to-wall arrangement. Determine the wheel and plenum type from the arrangements shown in Figure 1 on page 6. Determine the clearance "C" based upon the closest wall. Performance will not be affected by any additional walls spaced greater than  $C \times 3$  from the wheel.

The selected 281 CPG fan has a wheel diameter of 27.95" ("D"). Application is two walls with 7" clearance ("C"). Therefore,  $C \div D = 7 \div 27.95 = 0.25$  or  $\frac{1}{4}$ " which is equivalent to  $D \div 4$ .

**Step 3.** Next, determine the Percent of Wide Open Volume (% WOV) at which the fan is to operate. From Table 6 on page 6 find that the WOV factor is 15.19 for a 281 CPG fan.

### Example 2. Nonstandard Density

**Given:** 17000 CFM at 3" TSP (system), 300°F, 4000 ft. altitude. Installation is a two-wall arrangement with a wheel-to-wall clearance of 7".

**Step 1.** To enter the performance tables the operating SP must be corrected to equivalent standard conditions. From Table 7 on page 6 find the correction factor of 0.604 for 300°F and 4000 feet altitude. The corrected equivalent static pressure is equal to:

$$\text{SP (Catalog)} = \frac{3" \text{ TSP (system)}}{0.604} = 5.0$$

Fan selection is then made for 17000 CFM at 5" SP. Entering the performance tables, we find that a 281 CPG fan will deliver 17000 CFM at 1638 RPM with 17.29 BHP. It must be remembered that this BHP is cataloged at standard 70°F air at sea level.

**Steps 2, 3, & 4.** Continue the correction procedure with Steps 2, 3 and 4 as shown in Example 1. Wall arrangement =  $D \div 4$ , % WOV = 60.0, RPM = 1654, and BHP = 17.90.

## PerformanceData

### CPG | Size 121

Wheel Dia.: 12.40"

Max. BHP =  $0.07 \times (\text{RPM} \div 1000)^3$

CFM	0.5" SP		1" SP		1.5" SP		2" SP		2.5" SP		3" SP		3.5" SP		4" SP		4.5" SP		5" SP		5.5" SP		6" SP		
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	
700	1155	0.09	1522	0.21																					
800	<u>1201</u>	<u>0.10</u>	1563	0.23	1842	0.36																			
900	<u>1261</u>	<u>0.11</u>	1602	0.24	1881	0.39	2119	0.55																	
1000	<u>1327</u>	<u>0.13</u>	1637	0.26	1923	0.42	2156	0.59	2367	0.77															
1200	1473	0.17	<u>1738</u>	<u>0.30</u>	1996	0.47	2239	0.66	2444	0.86	2631	1.07	2807	1.29	2972	1.51									
1400	1627	0.22	1868	0.35	<u>2087</u>	<u>0.52</u>	2309	0.72	2525	0.95	2713	1.18	2884	1.42	3044	1.66	3196	1.91	3343	2.16	3482	2.42			
1600	1784	0.29	2010	0.43	2211	0.60	<u>2401</u>	<u>0.79</u>	2595	1.02	2789	1.28	2966	1.54	3126	1.81	3275	2.08	3417	2.35	3553	2.63	3685	2.92	
1800	1945	0.38	2161	0.53	2346	0.70	<u>2522</u>	<u>0.89</u>	2691	1.11	2862	1.36	3037	1.64	3205	1.94	3358	2.24	3500	2.54	3634	2.84	3762	3.14	
2000	2109	0.48	2316	0.64	2492	0.82	2655	1.02	<u>2812</u>	<u>1.24</u>	<u>2964</u>	<u>1.48</u>	3116	1.75	3273	2.05	3430	2.37	3578	2.70	3716	3.03			
2200	2276	0.60	2473	0.78	2643	0.97	2796	1.17	2944	1.39	3086	1.64	3224	1.90	3362	2.19	3503	2.50	3647	2.84					
2400	2444	0.74	2633	0.93	2798	1.14	2945	1.35	3083	1.57	3218	1.82	<u>3348</u>	<u>2.08</u>	<u>3476</u>	<u>2.37</u>	<u>3602</u>	<u>2.68</u>	3729	3.00					
2600	2615	0.91	2795	1.12	2954	1.33	3098	1.55	3230	1.78	3356	2.03	3481	2.30	<u>3602</u>	<u>2.59</u>	<u>3720</u>	<u>2.89</u>							
2800	2787	1.09	2959	1.32	3113	1.55	3253	1.78	3382	2.03	3502	2.28	3619	2.55	3735	2.84									
3000	2960	1.31	3125	1.55	3273	1.79	3410	2.04	3536	2.30	3653	2.56	3765	2.84											
3200	3134	1.55	3293	1.81	3436	2.07	3568	2.33	3692	2.60															
3400	3310	1.83	3462	2.11	3600	2.38	3728	2.65																	
3600	3486	2.13	3632	2.43	3766	2.72																			
3800	3663	2.47																							
4000																									

Maximum RPM @ 70°F: Class II — 3778

Must derate for temperature and plug wall thickness.

Underlined figures indicate maximum static efficiency.

Power rating (BHP) does not include transmission losses.







## CPG | Size 281

Wheel Dia.: 27.95" Max. BHP = 4.26 x (RPM ÷ 1000)<sup>3</sup>

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		11" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	664	1.24																						
7000	704	1.42																						
8000	753	1.64																						
9000	807	1.92	958	3.67																				
10000	864	2.25	1000	4.04																				
11000	925	2.64	1049	4.50	1138	6.27																		
12000	987	3.10	1101	5.00	1172	6.73																		
13000	1051	3.62	1157	5.60	1214	7.29	1328	9.92																
14000	1115	4.21	1214	6.26	1261	7.93	1365	10.57	1472	13.57														
15000	1179	4.85	1274	7.02	1311	8.64	1408	11.33	1505	14.30	1606	17.65												
16000	1243	5.56	1335	7.85	1455	12.19	1546	15.21	1637	18.50	1732	22.15												
17000	1308	6.36	1398	8.79	1590	16.19	1675	19.50	1761	23.09	1798	24.23	1879	28.08	1964	32.29								
18000	1373	7.23	1461	9.81	1728	17.97	1798	21.28	1865	24.75	1933	28.49	2001	32.41	2069	36.52	2137	40.84	2176	43.89				
19000	1438	8.18	1525	10.93	1854	22.82	1919	26.38	1983	30.13	2047	34.07	2113	38.29	2177	42.59	2242	47.15	2206	45.41				
20000	1504	9.23	1589	12.13	1974	28.12	2031	28.28	2088	31.98	2146	35.95	2202	40.04										
21000	1570	10.37	1653	13.42	2043	25.24	2101	28.94	2155	32.66														
22000	1636	11.60	1718	14.83	1787	17.97	1849	21.12	1911	24.47	1974	28.10	2036	31.94	2097	35.94	2159	40.17	2221	44.56				
24000	1769	14.39	1847	17.91	1914	21.36	1974	24.78	2031	28.28	2088	31.98	2146	35.95										
26000	1903	17.63	1977	21.45																				

Maximum RPM @ 70°F:

Class II — 1676

Class III — 2255

Must derate for temperature and plug wall thickness.

## CPG | Size 321

Wheel Dia.: 31.50" Max. BHP = 7.75 x (RPM ÷ 1000)<sup>3</sup>

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		11" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	599	1.63																						
9000	629	1.83																						
10000	663	2.05																						
11000	700	2.31	839	4.52																				
12000	739	2.62	867	4.87																				
13000	780	2.97	898	5.27	1017	8.10																		
14000	822	3.36	932	5.72	1041	8.56																		
15000	866	3.82	969	6.24	1070	9.10	1174	12.47																
16000	910	4.32	1007	6.80	1102	9.73	1198	13.07																
17000	955	4.88	1046	7.41	1136	10.40	1226	13.78	1317	17.56														
18000	1000	5.48	1087	8.11	1172	11.14	1257	14.57	1342	18.35	1430	22.59												
20000	1090	6.85	1172	9.71	1249	12.85	1325	16.37	1402	20.26	1478	24.42	1556	28.99										
22000	1180	8.42	1259	11.57	1329	14.83	1400	18.50	1469	22.46	1538	26.71	1608	31.29	1678	36.16	1750	41.41						
24000	1271	10.26	1348	13.73	1414	17.20	1478	20.92	1542	25.00	1605	29.35	1669	34.01	1733	38.93	1797	44.13	1862	49.64	1929	55.52		
26000	1363	12.39	1438	16.18	1501	19.89	1560	23.75	1619	27.90	1678	32.38	1737	37.15	1796	42.18	1855	47.42	1914	52.93	1973	58.68		
28000	1456	14.84	1528	18.92	1589	22.91	1645	26.96	1699	31.19	1755	35.81	1810	40.69	1864	45.77	1918	51.08	1973	56.66				
30000	1549	17.59	1618	21.97	1678	26.27	1732	30.57	1783	34.97	1834	39.61	1886	44.61	1937	49.82	1988	55.28						
32000	1642	20.68	1709	25.38	1768	30.02	1820	34.56	1869	39.18	1917	43.97	1965	49.00										
34000	1736	24.17	1801	29.19	1858	34.12	1909	38.96	1956	43.79														

Maximum RPM @ 70°F:

Class II — 1487

Class III — 2001

Must derate for temperature and plug wall thickness.

## CPG | Size 351

Wheel Dia.: 35.43" Max. BHP = 14.21 x (RPM ÷ 1000)<sup>3</sup>

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		11" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
9000	507	1.85																						
10000	521	2.00																						
12000	559	2.44	709	5.06																				
14000	609	2.94	735	5.61																				
16000	666	3.54	770	6.44	883	9.76																		
18000	724	4.23	814	7.39	914	10.79	1014	14.80																
20000	779	5.00	867	8.44	951	12.10	1042	15.99	1132	20.60														
22000	834	5.92	923	9.59	995	13.51	1076	17.60	1159	22.01	1241	27.14	1322	32.77										
24000	888	6.93	981	10.89	1048	15.10	1117	19.47	1193	24.00	1269	28.89	1343	34.38	1417	40.40								
26000	943	8.08	1039	12.36	1104	16.79	1164	21.41	1231	26.22	1301	31.12	1371	36.43	1440	42.36	1509	48.81						
28000	999	9.36	1094	13.92	1162	18.66	1218	23.55	1276	28.66	1339	33.82	1404	39.12	1469	44.81	1533	51.07	1597	57.85	1661	65.06		
30000	1056	10.77	1149	15.68	1219	20.65	1274	25.81	1326	31.15	1382	36.67	1441	42.19	1502	47.89	1563	53.96	1623	60.55	1683	67.67	1742	75.10
32000	1114	12.33	1203	17.59	1277	22.89	1332	28.30	1381	33.87	1430	39.61	1483	45.48	1539	51.40	1597	57.57	1654	63.94	1710	70.75	1766	78.11
34000	1172	14.04	1257	19.66	1332	25.22	1390	30.96	1438	36.79	1483	42.73	1530	48.89	1581	55.18	1634	61.51	1688	67.98	1742	74.70		
36000	1231	15.94	1312	21.92	1387	27.80	1447	33.77	1495	39.85	1539	46.10	1582	52.48	1627	59.03	1676	65.77	1726	72.47	1776	79.16		
38000	1290	18.01	1367	24.34	1441	30.55	1504	36.86	1553	43.19	1596	49.66	1637	56.29	1679	63.18	1722	70.13	1767	77.05				
40000	1350	20.29	1424	27.00	1496	33.58	1559	40.11	1611	46.77	1654	53.48	1694	60.37	1733	67.43	1772	74.58						
42000	1410	22.77	1481	29.81	1550	36.75	1614	43.63	1668	50.57	1712	57.54	1752	64.72										
44000	1470	25.44	1538	32.80	1604	40.09	1668	47.34	1723	54.53														

Maximum RPM @ 70°F:

Class II — 1322

Class III — 1779

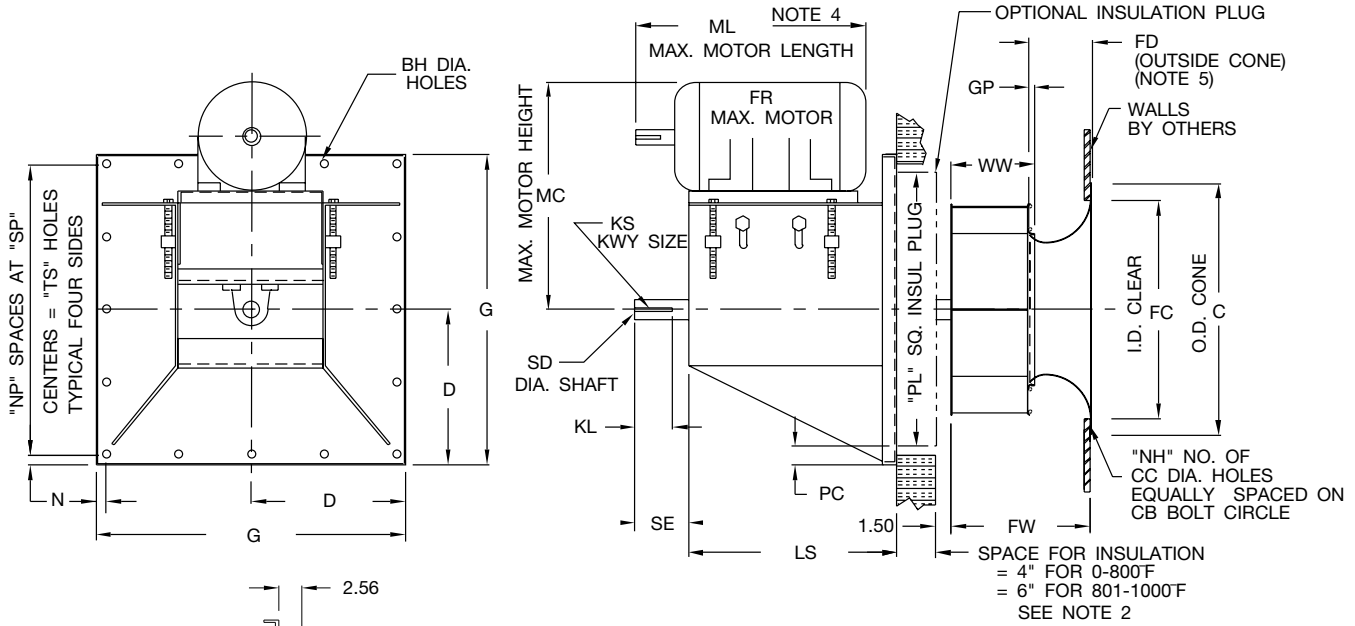
Must derate for temperature and plug wall thickness.

Underlined figures indicate maximum static efficiency.

Power rating (BHP) does not include transmission losses.



## Class II



### NOTES:

1. Dimensions apply to unhooused assembly only.
2. When specified, the shaft length can be extended an additional 2 inches for 6 inches of insulation, for operation to 800°F, without changes to the shaft diameter. See Detail "A" for shaft cooler recess cone and shaft seal on fans over 300°F with 4 inches or larger insulation plug.
3. CW rotation is standard. CCW rotation is optional.
4. To insure selected motor will fit standard assembly, compare the maximum motor length, dimension "ML," to overall motor length.
5. Dimensions are subject to change based on accessories. See page 14 for accessory options.
6. Dimensions shown are in inches unless otherwise indicated.

SIZE	BH	C	CB	CC	D	FC	FD	FW	G	GP	KL	KS	LS
121	0.56	17.13	15.88	0.69	11.38	13.75	3.72	8.48	22.75	0.25	4.00	.38x.19	17.50
141	0.56	18.91	17.63	0.69	11.38	15.50	4.19	9.55	22.75	0.25	4.00	.38x.19	18.50
161	0.56	20.88	19.59	0.88	14.81	17.75	4.72	10.75	29.63	0.25	4.00	.38x.19	18.50
181	0.56	22.84	21.56	0.88	14.81	20.00	5.31	12.16	29.63	0.31	4.50	.50x.25	21.00
201	0.56	25.19	23.94	0.88	14.81	22.00	5.88	13.39	29.63	0.31	4.50	.50x.25	21.00
221	0.56	27.97	26.69	0.88	16.00	24.50	6.59	15.01	32.00	0.31	4.50	.50x.25	22.50
251	0.56	31.13	29.84	1.00	16.00	27.50	7.44	16.93	32.00	0.50	4.50	.50x.25	22.50
281	0.69	34.66	33.38	1.00	18.31	30.75	8.38	19.06	36.63	0.50	5.00	.50x.25	23.00
321	0.69	39.59	37.84	1.00	21.81	35.00	9.44	21.40	43.63	0.56	5.00	.50x.25	24.50
351	0.69	43.53	41.78	1.00	21.81	39.25	10.63	24.08	43.63	0.63	5.50	.63x.31	24.50
391	0.69	48.31	46.53	1.00	27.50	43.50	11.75	26.77	55.00	0.63	5.50	.63x.31	27.50
441	0.69	53.41	51.66	1.00	27.50	48.50	13.19	29.96	55.00	0.75	5.50	.63x.31	27.50
491	0.69	59.31	57.56	1.00	28.50	54.25	14.63	33.40	57.00	0.78	5.50	.63x.31	27.50

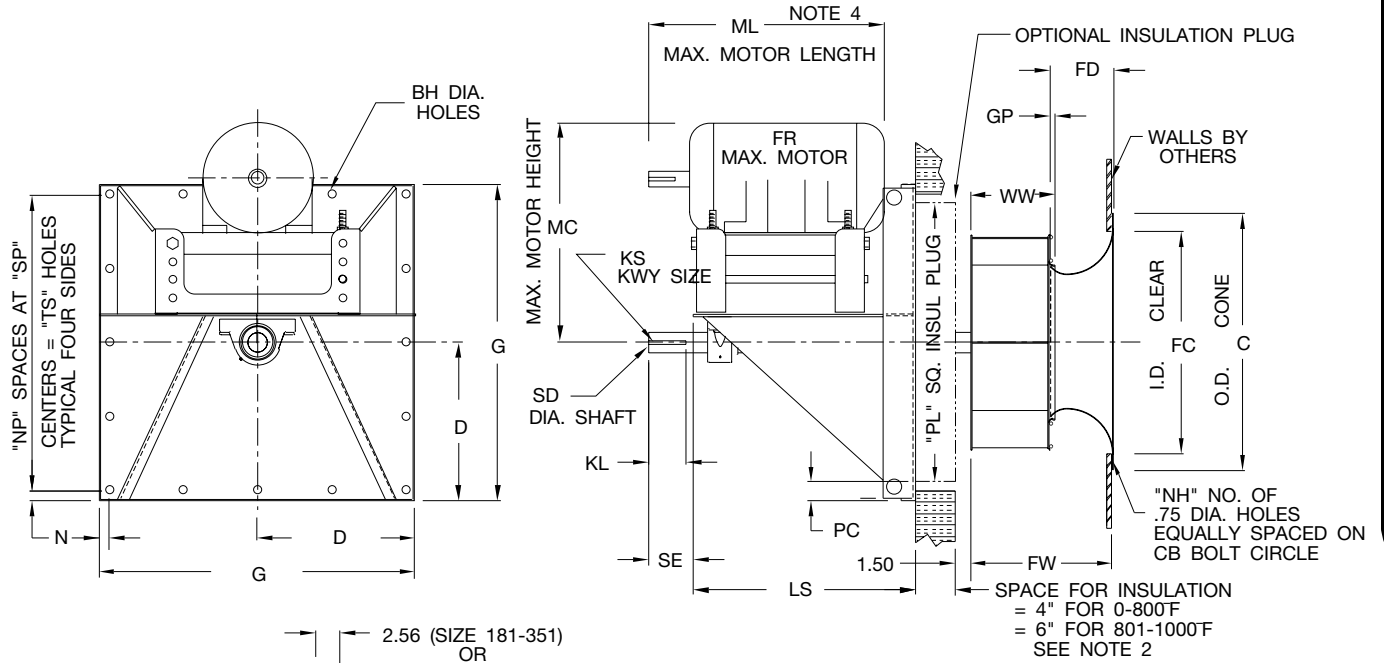
SIZE	MC	ML	N	NH	NP	PC	PL	SD	SE	SP	TS	WW	MAX. MTR. FRAME
121	24.75	19.13	1.00	8	4	1.75	19.25	1.687	5.00	5.19	20.75	5.07	213T
141	26.25	20.13	1.00	8	4	1.75	19.25	1.687	5.00	5.19	20.75	5.67	215T
161	26.25	20.13	1.06	8	4	1.81	26.00	1.687	5.00	6.88	27.50	6.34	215T
181	29.50	24.13	1.06	16	4	1.81	26.00	1.937	5.50	6.88	27.50	7.24	254T
201	29.50	24.13	1.06	16	4	1.81	26.00	1.937	5.50	6.88	27.50	7.90	254T
221	29.50	25.50	1.13	16	4	1.88	28.25	1.937	5.50	7.44	29.75	8.80	256T
251	29.50	25.50	1.13	16	4	1.88	28.25	1.937	5.50	7.44	29.75	10.06	256T
281	31.50	26.63	1.25	16	6	2.25	32.13	2.187	6.00	5.69	34.13	11.25	284T
321	33.50	28.13	1.38	16	6	2.38	38.88	2.187	6.00	6.81	40.88	12.63	286T
351	33.50	28.13	1.38	16	6	2.38	38.88	2.437	6.50	6.81	40.88	14.19	286T
391	34.00	31.25	1.25	24	6	3.38	48.25	2.437	6.50	8.75	52.50	15.75	326T
441	36.00	31.25	1.25	24	6	3.38	48.25	2.687	6.50	8.75	52.50	17.63	326T
491	36.00	31.25	1.31	24	6	2.50	52.00	2.687	6.50	9.06	54.38	19.66	326T

Dimensions are not to be used for construction. Certified drawings are available upon request.

R-1004964



# Class III



**NOTES:**

1. Dimensions apply to unboxed assembly only.
2. When specified, the shaft length can be extended an additional 2 inches for 6 inches of insulation, for operation to 800°F, without changes to the shaft diameter. See Detail 'A' for details of recess cone for shaft cooler and shaft seal on fans over 300°F with 4 inches or larger insulation plug.
3. CW rotation is standard. CCW rotation is optional.
4. To insure selected motor will fit standard assembly, compare the maximum motor length, dimension "ML," to overall motor length.
5. Dimensions are subject to change based on accessories. See page 14 for accessory options.
6. Dimensions shown are in inches unless otherwise indicated.

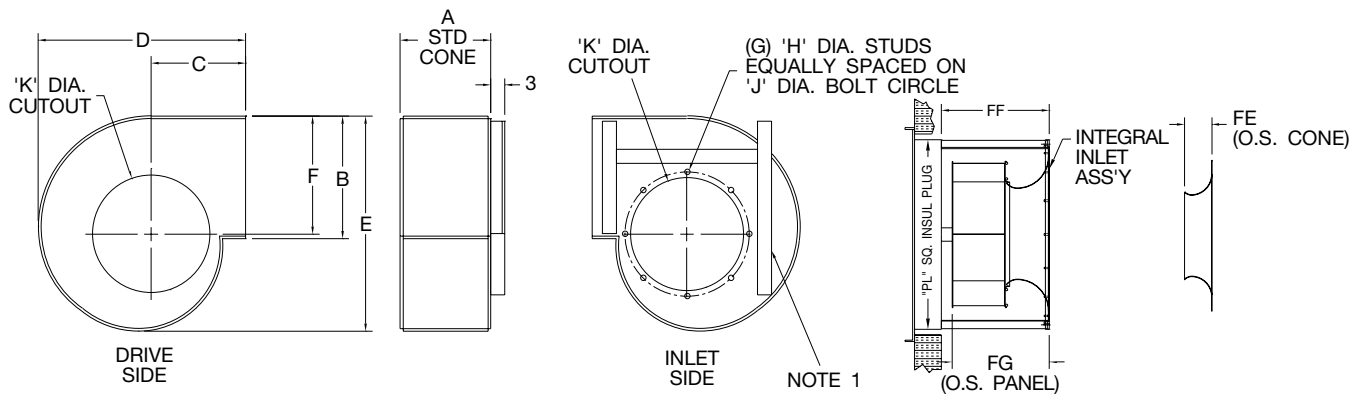
SIZE	BH	C	CB	CC	D	FC	FD	FW	G	GP	KL	KS	LS
181	0.56	22.84	21.56	0.88	14.81	20.00	5.31	12.24	29.63	0.31	4.50	.63x.31	25.00
201	0.56	25.19	23.94	0.88	14.81	22.00	5.88	13.46	29.63	0.31	5.50	.63x.31	27.50
221	0.56	27.97	26.69	0.88	16.00	24.50	6.59	15.08	32.00	0.31	5.50	.63x.31	27.50
251	0.56	31.13	29.84	1.00	16.00	27.50	7.44	16.93	32.00	0.50	6.00	.63x.31	30.50
281	0.69	34.66	33.38	1.00	18.31	30.75	8.38	19.12	36.63	0.50	6.00	.63x.31	30.63
321	0.69	39.59	37.84	1.00	21.81	35.00	9.44	21.46	43.63	0.56	6.50	.63x.31	32.38
351	0.69	43.53	41.78	1.00	21.81	39.25	10.63	24.15	43.63	0.63	8.00	.63x.31	37.88
391	0.69	48.31	46.53	1.00	27.50	43.50	11.75	26.83	55.00	0.63	8.00	.75x.38	38.38
441	0.69	53.41	51.66	1.00	27.50	48.50	13.19	30.09	55.00	0.75	8.00	.88x.44	38.38
491	0.69	59.31	57.56	1.00	28.50	54.25	14.63	33.46	57.00	0.78	8.00	.88x.44	38.38

SIZE	MC	ML	N	NH	NP	PC	PL	SD	SE	SP	TS	WW	MAX. MTR. FRAME
181	26.50	25.75	1.06	16	4	1.81	26.00	2.687	4.50	6.88	27.50	7.31	256T
201	28.00	28.88	1.06	16	4	1.81	26.00	2.687	5.50	6.88	27.50	7.97	284T
221	28.00	28.88	1.13	16	4	1.88	28.25	2.687	6.00	7.44	29.75	8.88	286T
251	32.00	32.00	1.13	16	4	1.88	28.25	2.687	6.00	7.44	29.75	10.06	324T
281	32.00	32.00	1.25	16	6	2.25	32.13	2.687	6.50	5.69	34.13	11.31	326T
321	34.00	34.38	1.38	16	6	2.38	38.88	2.687	8.00	6.81	40.88	12.69	365T
351	38.00	41.25	1.38	16	6	2.38	38.88	2.687	8.00	6.81	40.88	14.25	405T
391	38.00	41.25	1.25	24	6	3.38	48.25	2.937	8.00	8.75	52.50	15.81	405T
441	38.00	41.25	1.25	24	6	3.38	48.25	3.437	8.00	8.75	52.50	17.75	405T
491	38.00	41.25	1.31	24	6	2.50	52.00	3.437	8.00	8.75	54.38	19.72	405T

R-1004965

Dimensions are not to be used for construction. Certified drawings are available upon request.

# Accessories



**NOTES:**

1. Inlet side frame angle on sizes 391, 441, and 491 only.
2. Dimensions shown are in inches unless otherwise indicated.

SIZE	A	B	C	D	E	F	G	H
121	10.00	13.81	12.56	25.13	23.69	13.19	8	3/8-16
141	11.00	15.63	13.69	27.88	26.69	14.88	8	3/8-16
161	12.19	17.56	14.81	30.81	30.00	16.75	8	3/8-16
181	13.63	19.75	16.13	34.13	33.75	18.81	16	3/8-16
201	14.88	22.00	17.50	37.50	37.50	20.88	16	3/8-16
221	16.44	24.69	19.00	41.38	42.06	23.44	16	3/8-16
251	18.38	27.75	20.81	45.94	47.25	26.31	16	3/8-16
281	20.44	31.25	23.94	52.25	53.25	29.63	16	3/8-16
321	22.81	35.19	26.44	58.38	59.88	33.38	16	3/8-16
351	25.50	39.56	29.44	65.31	67.38	37.50	16	3/8-16
391	28.13	43.94	29.56	69.44	74.88	41.69	24	1/2-13
441	31.25	49.25	32.63	77.25	83.88	46.69	24	1/2-13
491	34.69	54.94	35.88	85.69	93.50	52.06	24	1/2-13

SIZE	J	K	FE		FF		FG	
			STANDARD INLET CONE	SHALLOW INLET CONE	STANDARD INLET CONE	SHALLOW INLET CONE	STANDARD INLET CONE	SHALLOW INLET CONE
121	15.88	14.13	3.75	-	10.19	-	8.69	-
141	17.63	15.94	4.19	-	11.19	-	9.69	-
161	19.59	17.88	4.75	3.44	12.38	11.06	10.88	9.56
181	21.56	19.88	5.31	3.75	13.81	12.25	12.31	10.75
201	23.94	22.19	5.88	4.13	15.06	13.31	13.56	11.81
221	26.69	25.00	6.63	4.50	16.63	14.56	15.13	13.06
251	29.84	28.13	7.44	4.88	18.56	15.94	17.06	14.44
281	33.38	31.69	8.38	5.19	20.63	17.44	19.13	15.94
321	37.84	35.63	9.44	5.50	23.06	19.13	21.56	17.63
351	41.78	39.56	10.63	6.50	25.69	21.56	24.19	20.06
391	46.53	44.31	11.75	7.25	28.38	23.88	26.88	22.38
441	51.66	49.44	13.19	8.25	31.44	26.50	29.94	25.00
491	57.56	55.31	14.63	9.25	34.94	29.56	33.44	28.06

Dimensions are not to be used for construction. Certified drawings are available upon request.

R-1004966

# BeltCenters

MOTOR FRAME SIZE	CLASS II								CLASS III											
	121-161		181-251		281-351		391-491		181		201-221		251-281		321		351-391		441-491	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
56	13	16.5	14	17.5	14.5	18	16	19.5	9.4	13.4	9.4	13.4	9.3	13.3	9.3	13.3	9.3	13.3	9.8	13.8
143-145	13	16.5	14	17.5	14.5	18	16	19.5	9.4	13.4	9.4	13.4	9.3	13.3	9.3	13.3	9.3	13.3	9.8	13.8
182-184	14	17.5	15	18.5	15.5	19	17	20.5	10.4	14.4	10.4	14.4	10.3	14.3	10.3	14.3	10.3	14.3	10.8	14.8
213-215	14.8	18.3	15.8	19.3	16.3	19.8	17.8	21.3	11.2	15.2	11.2	15.2	11	15	11.1	15.1	11.1	15.1	11.6	15.6
254-256	—	—	16.8	20.3	17.3	20.8	18.8	22.3	14.8	18.8	14.8	18.8	14.6	18.6	14.7	18.7	14.7	18.7	15.2	19.2
284-286	—	—	—	—	18	21.5	19.5	23	—	—	15.6	19.6	15.4	19.4	15.4	19.4	15.4	19.4	15.9	19.9
324-326	—	—	—	—	—	—	20.5	24	—	—	—	—	17.6	22.6	17.6	22.6	17.6	22.6	18.1	23.1
364-365	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18.6	23.6	18.6	23.6	19.1	24.1
404-405	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20.8	25.8	21.3	26.3	—

## Model CPG

Fans shall be Model CPG Single Thickness Airfoil, as manufactured by Aerovent, Minneapolis, Minnesota.

**PERFORMANCE** — Fans shall be tested and rated in accordance with industry accepted test codes and shall be guaranteed by the manufacturer to deliver rated published performance levels.

**PLUG PANEL** — Plug panel shall be of minimum 7 gauge steel with formed flanges to maintain flatness and rigidity. Panel shall be prepunched for bolt mounting. The "Cross Frame" bearing support shall be designed for maximum stability and load spreading. Bearings shall be serviceable without disassembly of panel or frame. Plug assembly is available for both horizontal and vertical application. Horizontal construction is standard. Vertical construction must be specified.

**WHEEL** — CPG wheels shall be backward curved, non-overloading, single thickness airfoil type, designed for maximum efficiency and quiet operation. Wheels shall be constructed of heavy gauge steel, continuously welded to a flat wheel cone and backplate. Partial welding will not be acceptable.

**SHAFT** — Shafts shall be AISI 1040 or 1045 hot rolled steel accurately turned, ground, polished, and ring gauged for accuracy. Shafts shall be sized for a first critical speed of at least 1.43 times the maximum speed for the class.

**BEARINGS** — Bearings shall be either ball or spherical roller, heavy duty, self-aligning, pillow block type. Bearing selection is based upon L-10 minimum life of 40,000 hours or L-50 minimum life of 200,000 hours.

**OPTIONAL ALL WELDED HOUSING** — Housing shall be of heavy gauge steel. Housing shall be provided with wheel opening on each side and weld studs on inlet side for cone mounting. Specify rotation and discharge as viewed from drive side to insure proper stud placement. Housing supports and attachments for wall mounting to be provided by others.

**ADJUSTABLE MOTOR BASE** — Adjustable motor base is standard and shall have a four point leveling and tension adjustment to insure proper drive belt alignment. The motor base shall be heavy gauge steel and prepunched to accept standard motor frame specified.

**OPTIONAL INLET VANES** — Inlet vane blades are cantilever design or with centered supports equipped with permanently lubricated needle bearings and ball joints for smooth and easy operation. Vane assemblies are external type for sizes 121 through 161 and nested for sizes 181 through 491. Standard inlet vanes are applicable to 300°F. Consult factory for higher temperatures.

**FACTORY RUN TEST** — All fans prior to shipment shall be completely assembled and test run as a unit at the specified operating speed or maximum RPM allowed for the particular construction type. Each wheel shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-96 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

**GUARANTEE** — The manufacturer shall guarantee the workmanship and materials for its CPG Single Blade Airfoil Plug Fans for at least one (1) year from startup or eighteen (18) months from shipment, whichever occurs first.



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