

FAN CONTROL WITH VARIABLE FREQUENCY DRIVES

Variable frequency drives (VFD's) are becoming more common as fans are increasingly being specified and selected for direct drive applications. The characteristics of each component must be taken into consideration when designing a fan system that incorporates a direct drive motor accompanied by a VFD. For instance, as outlined in the below set of equations, fan horsepower is influenced by the speed of the fan cubed, whereas torque is influenced by the speed of the fan squared:

$$BHP_{NEW} = (RPM_{NEW} / RPM_{ORIGINAL})^3 \times BHP_{ORIGINAL}$$

$$T_{NEW} = (RPM_{NEW} / RPM_{ORIGINAL})^2 \times T_{ORIGINAL}$$

However, the horsepower output of the motor is influenced directly with respect to motor speed, but remains constant when it reaches the design speed:

$$BHP_{MOTOR} = (T \times RPM) / 5250, \text{ if } RPM \leq RPM_{RATED, MOTOR}$$

$$BHP_{MAX, MOTOR} = (T_{MAX} \times RPM_{RATED, MOTOR}) / 5250,$$

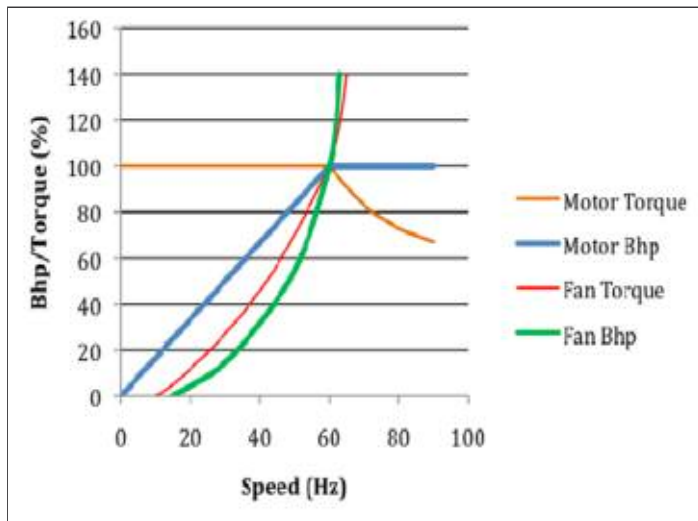
if $RPM > RPM_{RATED, MOTOR}$

Conversely, the torque output of the motor is constant until the design speed is reached; thereafter the torque is reduced in direct proportion relative to motor speed:

$$T_{ACTUAL} = T_{RATED, MOTOR}, \text{ if } RPM_{ACTUAL} \leq RPM_{RATED, MOTOR}$$

$$T_{ACTUAL} = (5250 \times BHP_{MAX, ELEC. MOTOR}) / RPM_{ACTUAL},$$

if $RPM_{ACTUAL} > RPM_{RATED, MOTOR}$



The figure below illustrates the relationship between the fan's horsepower and torque requirements compared to the operational horsepower and torque limitations of the motor. The motor must be able to meet the performance requirements of the fan throughout its performance range.

Specific limitations apply to the individual components of these systems. Most importantly, the fans are designed to run no higher than their maximum safe speed. The motor also has mechanical speed limitations, as well as electrical limitations.

As a practical matter, when a fan system is "turned down" the horsepower required to operate the fan decreases at a greater rate than the horsepower generation of the motor. The torque required to operate the fan also decreases, while the motor's torque remains constant. When a fan system is "sped up" the motor horsepower and torque increase until it reaches its design speed. Beyond that point the horsepower and torque required to operate the fan may exceed the limitations of the motor unless the motor is originally sized for maximum speed up conditions.

Example:

A system is controlled by a building management system that varies the volume of air delivered based on building load. The "peak load" point of operation is 18,000 CFM at 7.0" WG while the "part load" point of operation is 12,000 CFM at 3.2" WG.

Using MVP, first select a fan/motor that will meet the "peak load" requirement. A Size 30 ECF-9 in Class 2 operating at 26.2 BHP and 1688 RPM is selected. The motor selected will be ... 30HP at the synchronous speed of 1800 RPM.

Next, the design is checked using the "part load" conditions and the same Size 30 fan. At "part load" the fan requires 7.96 BHP at 1135 RPM. This is a good point on the operating curve and is a reasonable turn down.

Finally we compare the fan's maximum safe speed (MSS) with the operating speed of the motor. A Size 30 ECF-9, Class 2 has a MSS of 1770 RPM. The nominal speed of a 30HP 1800 RPM motor is approximately 1770 RPM as well. A simple by-pass in the VFD may be used if necessary.

FA/EZ Full-Width Aluminum Wheels with Steel Hubs

Size	EcF-8/9 Wheel				EcF-11 Wheel			
	Weight		WR ²		Weight		WR ²	
	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3
10	5	-	1	-	-	-	-	-
12	11	-	1	-	-	-	-	-
13	14	-	2	-	-	-	-	-
15	15	-	3	-	-	-	-	-
16	16	19	4	5	-	21	-	5
18	19	23	6	8	21	25	6	9
20	22	26	8	11	24	29	9	12
22	26	31	12	17	29	34	14	19
24	56	62	25	32	59	66	27	35
27	61	67	34	43	65	71	38	47
30	71	78	52	64	76	82	58	70
33	81	89	76	91	88	94	85	100
36	98	108	119	144	107	114	133	158

WR² in lb-ft². Weights in lbs. FA Plenum Fans are Class 2 only. EZ Plenum Fans are Class 2 and 3.

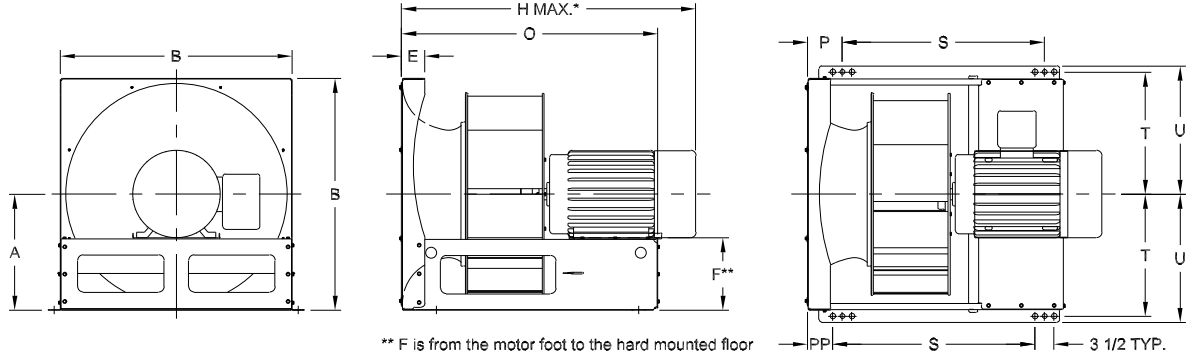
EZ Full-Width Plenum Fan Wheels

Size	AcF Wheel				AcFq Wheel				EcF-9 Wheel				EcF-11 Wheel			
	Weight		WR ²		Weight		WR ²		Weight		WR ²		Weight		WR ²	
	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3	Class 2	Class 3
10	5	-	1	-	-	-	-	-	5	-	1	-	-	-	-	-
12	8	-	2	-	-	-	-	-	11	-	1	-	-	-	-	-
13	10	-	3	-	-	-	-	-	14	-	2	-	-	-	-	-
15	13	-	3	-	-	-	-	-	15	-	3	-	-	-	-	-
16	27	32	8	10	-	-	-	-	27	29	7	8	-	-	-	-
18	32	47	11	13	35	50	12	17	31	34	10	12	34	37	11	13
20	38	56	17	21	41	59	18	26	37	46	15	17	40	50	17	20
22	46	63	24	29	50	67	34	38	44	54	23	25	48	58	25	28
24	62	100	38	54	66	105	40	64	73	77	39	42	78	83	42	46
27	72	115	55	78	77	120	58	92	84	89	55	59	89	95	60	65
30	91	151	87	120	97	157	93	150	105	120	83	104	112	130	90	116
33	119	173	130	172	127	181	139	197	120	145	118	150	128	157	129	166
36	159	260	219	301	171	272	236	374	190	233	235	257	202	248	257	282

Sizes 10-15 are Aluminum as standard. Sizes 16-36 are Steel as standard. WR in lb-ft². Weights in lbs.

FA ARR. 4 DIMENSIONS

Dimensions not to be used for construction unless certified. [All dimensions in inches]

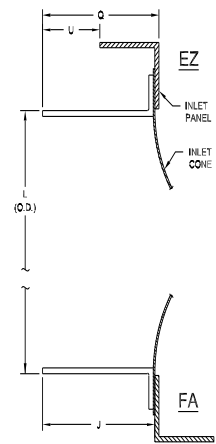


** F is from the motor foot to the hard mounted floor

DIMENSIONS [INCHES]

Size	A	B	E	P	PP	T	U	Base Holes	Bare Fan Weight**
10	6 ¹⁵ / ₁₆	13 ⁷ / ₈	3 ⁵ / ₈	4 ³ / ₄	3	8 ³ / ₃₂	9 ¹ / ₄	9 ⁹ / ₁₆	21
12	8 ⁵ / ₁₆	16 ⁵ / ₈	3 ⁵ / ₈	4 ³ / ₄	3	9 ¹⁵ / ₃₂	10 ⁵ / ₈	9 ⁹ / ₁₆	26
13	9 ¹ / ₈	18 ¹ / ₄	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	10 ⁹ / ₃₂	11 ⁷ / ₁₆	9 ⁹ / ₁₆	31
15	9 ¹⁵ / ₁₆	19 ⁷ / ₈	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	11 ³ / ₃₂	12 ¹ / ₄	9 ⁹ / ₁₆	36
16	10 ⁷ / ₈	21 ³ / ₄	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	12 ¹ / ₃₂	13 ⁵ / ₃₂	9 ⁹ / ₁₆	45
18	12	24	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	13 ⁵ / ₃₂	14 ⁹ / ₃₂	9 ⁹ / ₁₆	51
20	13 ¹ / ₈	26 ¹ / ₄	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	14 ¹ / ₄	15 ³ / ₈	9 ⁹ / ₁₆	67
22	14 ¹ / ₂	29	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	15 ⁵ / ₈	16 ³ / ₄	9 ⁹ / ₁₆	78
24	14 ¹³ / ₁₆	29 ⁵ / ₈	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	15 ¹⁵ / ₁₆	17 ¹ / ₃₂	3 ³ / ₄	86
27	16 ⁷ / ₁₆	32 ⁷ / ₈	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	17 ⁹ / ₁₆	18 ¹¹ / ₁₆	3 ³ / ₄	101
30	17 ⁷ / ₈	35 ³ / ₄	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	19	20 ¹ / ₈	3 ³ / ₄	119
33	19 ¹ / ₂	39	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	20 ⁵ / ₈	21 ³ / ₄	3 ³ / ₄	141
36	21 ¹ / ₄	42 ¹ / ₂	4 ¹ / ₈	5 ¹ / ₄	3 ¹ / ₂	22 ³ / ₈	23 ¹ / ₂	7 ⁸ / ₈	168

FA/EZ OPTIONAL INLET COLLAR DIMENSIONS



DIMENSIONS [INCHES]

Size	Motor frame	F	H*	O	S
10	56	3 ⁷ / ₁₆	18 ¹ / ₂	15 ¹ / ₂	9
	143/5T	3 ⁷ / ₁₆	20 ⁷ / ₁₆	16 ¹ / ₈	9 ⁹ / ₁₆
12	56	4 ¹³ / ₁₆	20 ¹ / ₄	17 ¹ / ₄	9 ¹ / ₁₆
	143/5T	4 ¹³ / ₁₆	22 ³ / ₁₆	17 ⁷ / ₈	9 ¹¹ / ₁₆
	182/4T	3 ¹³ / ₁₆	23 ³ / ₈	20 ⁵ / ₈	12 ⁷ / ₁₆
13	143/5T	5 ⁵ / ₈	22 ⁷ / ₈	18 ⁹ / ₁₆	9 ¹³ / ₁₆
	182/4T	4 ⁵ / ₈	23 ³ / ₈	21	12 ³ / ₁₆
15	143/5T	6 ⁷ / ₁₆	23 ⁹ / ₁₆	19 ¹ / ₄	10 ⁷ / ₁₆
	182/4T	5 ⁷ / ₁₆	23 ¹³ / ₁₆	21 ³ / ₈	12 ⁵ / ₈
16	213/5T	4 ¹¹ / ₁₆	28	23 ⁵ / ₈	14 ⁷ / ₈
	254/6T	4 ⁵ / ₈	32 ¹ / ₈	27 ⁷ / ₈	19 ¹ / ₈
18	143/5T	7 ³ / ₈	24 ⁵ / ₈	20 ³ / ₈	11 ³ / ₈
	182/4T	6 ³ / ₈	25 ¹ / ₈	22 ⁵ / ₈	13 ¹⁵ / ₁₆
	213/5T	5 ⁵ / ₈	29 ⁹ / ₁₆	24 ⁷ / ₈	16 ¹ / ₈
	254/6T	4 ⁵ / ₈	32 ¹ / ₈	27 ⁷ / ₈	19 ¹ / ₈
20	143/5T	8 ¹ / ₂	26 ³ / ₈	22 ¹ / ₈	13 ³ / ₄
	182/4T	7 ¹ / ₂	27 ³ / ₁₆	24 ³ / ₄	16
	213/5T	6 ³ / ₄	30 ¹⁵ / ₁₆	26 ¹ / ₂	17 ³ / ₄
	254/6T	5 ³ / ₄	35 ¹ / ₄	29 ¹ / ₂	20 ³ / ₄
22	143/5T	11	28 ¹⁵ / ₁₆	24 ⁵ / ₈	15 ¹³ / ₁₆
	182/4T	10	29 ⁷ / ₁₆	27	18 ¹ / ₄
	213/5T	9 ¹ / ₄	33 ⁷ / ₁₆	29	20 ⁵ / ₁₆
	254/6T	8 ¹ / ₄	38 ¹⁵ / ₁₆	32 ¹ / ₁₆	23 ³ / ₄
24	284/6T	7 ¹ / ₂	40 ¹¹ / ₁₆	33 ¹ / ₁₆	24 ¹⁵ / ₁₆
	182/4T	10 ⁹ / ₁₆	31 ⁵ / ₈	28 ⁷ / ₈	20 ¹ / ₁₆
	213/5T	9 ⁹ / ₁₆	35 ¹ / ₈	30 ¹¹ / ₁₆	21 ⁷ / ₈
27	254/6T	8 ¹ / ₄	40 ³ / ₈	34 ¹ / ₈	25 ³ / ₈
	284/6T	7 ¹³ / ₁₆	42 ¹³ / ₁₆	35 ¹³ / ₁₆	27 ¹ / ₁₆
	182/4T	11 ¹⁵ / ₁₆	33 ³ / ₈	30 ⁹ / ₄	22
	213/5T	11 ¹ / ₁₆	36 ³ / ₄	32 ⁵ / ₁₆	23 ⁹ / ₁₆
30	254/6T	10 ³ / ₁₆	41 ⁹ / ₁₆	35 ³ / ₈	26 ⁹ / ₁₆
	284/6T	9 ⁷ / ₁₆	44 ⁷ / ₁₆	36 ¹⁵ / ₁₆	28 ³ / ₁₆
	324/6T	9 ⁷ / ₈	49 ⁹ / ₁₆	41 ¹ / ₁₆	32 ³ / ₁₆
33	213/5T	12 ⁵ / ₈	38 ⁷ / ₈	34 ³ / ₈	25 ⁵ / ₈
	254/6T	11 ⁵ / ₈	44 ³ / ₁₆	37 ⁷ / ₁₆	28 ¹ / ₁₆
	324/6T	10 ⁷ / ₈	46 ⁹ / ₁₆	39 ¹ / ₁₆	30 ⁵ / ₁₆
36	254/6T	13 ¹ / ₄	46 ³ / ₈	39 ¹ / ₂	30 ¹³ / ₁₆
	284/6T	12 ¹ / ₂	48 ³ / ₄	41 ¹ / ₈	32 ⁵ / ₁₆
	364/5T	12 ¹ / ₄	51 ¹ / ₂	43 ¹ / ₈	34 ³ / ₁₆
36	284/6T	14 ¹ / ₄	51 ¹³ / ₁₆	43 ¹³ / ₁₆	35
	324/6T	13 ³ / ₄	54 ⁹ / ₁₆	45 ¹³ / ₁₆	37
	364/5T	12 ¹ / ₄	56 ³ / ₁₆	46 ¹³ / ₁₆	38

Size	FA&EZ	FA	EZ	
	L (OD)	J	Q	U
10	10 ¹ / ₂	2 ¹ / ₁₆	2 ¹ / ₄	1 ¹ / ₄
12	13 ¹ / ₂	2 ¹ / ₁₆	2 ¹ / ₄	1 ¹ / ₄
13	14 ⁷ / ₈	2 ¹ / ₁₆	2 ¹ / ₄	1 ¹ / ₄
15	16 ¹ / ₂	3 ¹ / ₁₆	3 ¹ / ₄	1 ¹ / ₄
16	18 ⁵ / ₈	3 ¹ / ₁₆	3 ¹ / ₄	1 ¹ / ₄
18	20	3 ¹ / ₁₆	3 ¹ / ₄	1 ¹ / ₄
20	22 ³ / ₈	3 ¹ / ₁₆	3 ¹ / ₄	1 ¹ / ₄
22	24 ¹ / ₂	3 ¹ / ₁₆	3 ¹ / ₄	1 ¹ / ₄
24	27	4 ¹ / ₁₆	4 ¹ / ₄	2 ¹ / ₄
27	30	4 ¹ / ₁₆	4 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
30	33	4 ¹ / ₁₆	4 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
33	36 ¹ / ₂	4 ¹ / ₁₆	4 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
36	40	4 ¹⁵ / ₁₆	5 ³ / ₁₆	3 ³ / ₁₆

* Use H dimension as a guide only, as motor length varies by manufacturer.

All dimensions are for full-width ECF wheels. Fans with narrow-width wheels require custom drawings and dimensions.

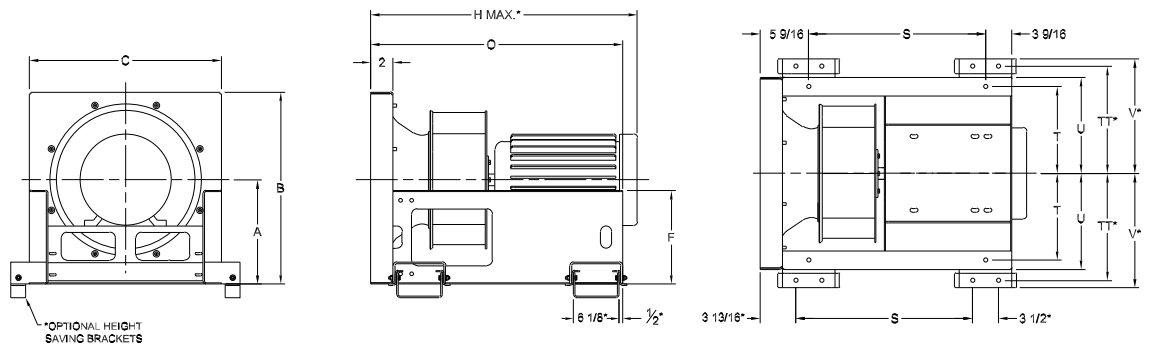
** Bare fan weight in pounds less wheel and motor. Weight based on design for largest available motor frame size. For complete fan weight, add wheel weight from page six and specific motor weight.

Optional isolation adds from 4-7/8" to fan height depending on type selected.

The New York Blower Company has a policy of continual product improvement and reserves the right to change designs and specifications without notice.

EZ ARR. 4 DIMENSIONS

Dimensions not to be used for construction unless certified. [All dimensions in inches]



DIMENSIONS [INCHES]

Size	A	B	C	F	T	TT	U	V	Base Holes	Bare Fan Weight**
10	8	14 ³ / ₄	14 ³ / ₄	6 ⁷ / ₈	6 ³ / ₈	7 ⁷ / ₈	7 ⁷ / ₈	9 ⁷ / ₈	9/16	68
12	9 ¹³ / ₁₆	18	18	8 ³ / ₈	8	10 ¹ / ₂	9	11 ¹ / ₂	9/16	76
13	10 ¹³ / ₁₆	19 ³ / ₄	19	9 ³ / ₈	8 ¹ / ₂	11	9 ¹ / ₂	12	9/16	80
15	12	22 ¹ / ₁₆	21	10 ⁹ / ₁₆	9 ¹ / ₂	12	10 ¹ / ₂	13	9/16	95
16	13 ¹ / ₄	24 ⁵ / ₁₆	23	11 ¹³ / ₁₆	10 ¹ / ₂	13	11 ¹ / ₂	14	9/16	121
18	14 ¹ / ₈	26	26	12 ¹¹ / ₁₆	11 ³ / ₄	14 ¹ / ₂	13	15 ¹ / ₂	9/16	143
20	15 ¹ / ₂	28 ⁷ / ₁₆	27	13 ¹³ / ₁₆	12 ¹ / ₂	15	13 ¹ / ₂	16	9/16	148
22	17 ¹ / ₄	31 ⁵ / ₁₆	30	15 ³ / ₈	13 ³ / ₄	16 ¹ / ₂	15	17 ¹ / ₂	9/16	171
24	19	34 ³ / ₄	33	17 ¹ / ₈	15 ¹ / ₄	18	16 ¹ / ₂	19	3/4	199
27	20 ³ / ₄	37 ³ / ₄	36	18 ⁷ / ₈	16 ³ / ₄	19 ¹ / ₂	18	20 ¹ / ₂	3/4	210
30	21 ¹ / ₄	40	40	19 ³ / ₈	18 ¹ / ₂	21 ¹ / ₂	20	22 ¹ / ₂	3/4	262
33	23 ¹ / ₄	43	44	21	20 ¹ / ₂	23 ¹ / ₂	22	24 ¹ / ₂	3/4	289
36	25 ⁷ / ₁₆	48	48	23 ⁵ / ₁₆	22 ¹ / ₂	25 ¹ / ₂	24	26 ¹ / ₂	7/8	333

DIMENSIONS [INCHES]

Size	Motor frame	H*		O		S	
		ACF	ECF	ACF	ECF	ACF	ECF
10	56	21 ¹ / ₄	21 ³ / ₄	18 ⁵ / ₈	19 ¹ / ₈	9 ¹ / ₂	10
	143/5T	21 ¹³ / ₁₆	22 ⁹ / ₁₆	20 ¹ / ₈	20 ⁵ / ₈	11	11 ¹ / ₂
12	56	20 ¹ / ₂	20 ¹³ / ₁₆	20 ¹ / ₄	20 ⁹ / ₁₆	11 ¹ / ₈	11 ⁷ / ₁₆
	143/5T	21 ¹³ / ₁₆	22 ¹ / ₈	21 ³ / ₄	22 ¹ / ₁₆	12 ⁵ / ₈	12 ¹⁵ / ₁₆
182/4T	24	24 ⁵ / ₁₆	22 ³ / ₄	23 ¹ / ₁₆	23 ¹ / ₁₆	13 ⁵ / ₈	13 ¹⁵ / ₁₆
13	143/5T	22 ⁵ / ₁₆	22 ⁵ / ₈	22 ¹ / ₄	22 ⁹ / ₁₆	13 ¹ / ₈	13 ⁷ / ₁₆
	182/4T	24 ¹ / ₂	24 ¹³ / ₁₆	23 ¹ / ₄	23 ⁹ / ₁₆	14 ¹ / ₈	14 ⁷ / ₁₆
15	143/5T	22 ¹⁵ / ₁₆	23 ⁵ / ₁₆	22 ⁷ / ₈	23 ¹ / ₄	13 ³ / ₄	14 ¹ / ₈
	182/4T	25 ¹ / ₈	25 ¹ / ₂	23 ¹ / ₈	24 ¹ / ₄	14 ³ / ₄	15 ¹ / ₈
213/5T	27 ³ / ₄	28 ¹ / ₈	26 ¹ / ₈	26 ¹ / ₂	17	17 ³ / ₈	
16	143/5T	26 ⁹ / ₁₆	26 ⁵ / ₈	24 ⁷ / ₈	24 ¹⁵ / ₁₆	15 ⁵ / ₈	15 ¹³ / ₁₆
	182/4T	26 ³ / ₄	27 ³ / ₁₆	25 ¹ / ₂	25 ¹⁵ / ₁₆	16 ³ / ₈	16 ¹³ / ₁₆
	213/5T	29 ³ / ₈	29 ¹³ / ₁₆	27 ³ / ₄	28 ³ / ₁₆	18 ⁵ / ₈	19 ¹ / ₁₆
	254/6T	33 ⁷ / ₁₆	33 ⁷ / ₈	31 ¹ / ₂	31 ¹⁵ / ₁₆	22 ³ / ₈	22 ¹³ / ₁₆
18	143/5T	27 ⁵ / ₁₆	27 ³ / ₄	25 ⁵ / ₈	26 ¹ / ₁₆	16 ¹ / ₂	17 ¹⁵ / ₁₆
	182/4T	27 ⁷ / ₈	28 ⁵ / ₁₆	26 ⁵ / ₈	27 ¹ / ₁₆	17 ¹ / ₂	17 ¹⁵ / ₁₆
	213/5T	30 ¹ / ₂	30 ¹⁵ / ₁₆	28 ¹ / ₈	29 ¹ / ₁₆	19 ³ / ₄	20 ³ / ₁₆
	254/6T	34 ⁹ / ₁₆	35	32 ⁵ / ₈	33 ¹ / ₁₆	23 ¹ / ₂	23 ¹⁵ / ₁₆
284/6TS	36 ³ / ₄	37 ³ / ₁₆	34 ¹ / ₈	34 ⁹ / ₁₆	25	25 ⁷ / ₁₆	
20	143/5T	26 ¹¹ / ₁₆	27 ³ / ₁₆	26 ⁵ / ₈	27 ¹ / ₈	17 ¹ / ₂	18
	182/4T	28 ¹ / ₈	29 ³ / ₈	27 ⁵ / ₈	28 ¹ / ₈	18 ¹ / ₂	19
	213/5T	31 ¹ / ₂	32	29 ¹ / ₈	30 ³ / ₈	20 ³ / ₄	21 ¹ / ₄
	254/5T	35 ⁹ / ₁₆	36 ¹ / ₁₆	33 ⁵ / ₈	34 ¹ / ₈	24 ¹ / ₂	25
284/6TS	37 ³ / ₄	38 ¹ / ₄	35 ¹ / ₈	35 ⁵ / ₈	26	26 ¹ / ₂	
22	143/5T	28 ¹ / ₈	28 ¹ / ₁₆	28 ¹ / ₁₆	28 ⁵ / ₈	18 ¹⁵ / ₁₆	19 ¹ / ₂
	182/4T	30 ⁵ / ₁₆	30 ⁷ / ₈	29 ¹ / ₁₆	29 ⁵ / ₈	19 ¹⁵ / ₁₆	20 ¹ / ₂
	213/5T	32 ¹⁵ / ₁₆	33 ¹ / ₂	31 ⁵ / ₁₆	31 ⁷ / ₈	22 ³ / ₁₆	22 ³ / ₄
	254/6T	37	37 ⁹ / ₁₆	35 ¹ / ₁₆	35 ⁵ / ₈	25 ¹⁵ / ₁₆	26 ¹ / ₂
	284/6T	41	41 ⁹ / ₁₆	36 ⁹ / ₁₆	37 ¹ / ₈	27 ⁷ / ₁₆	28
	284/6TS	39 ³ / ₁₆	39 ³ / ₄	36 ⁹ / ₁₆	37 ¹ / ₈	27 ⁷ / ₁₆	28

Size	Motor frame	H*		O		S	
		ACF	ECF	ACF	ECF	ACF	ECF
24	182/4T	33 ¹ / ₈	33 ³ / ₄	31 ⁷ / ₈	32 ¹ / ₂	22 ³ / ₄	23 ³ / ₈
	213/5T	35 ³ / ₄	36 ³ / ₈	34 ¹ / ₈	34 ³ / ₄	25	25 ⁵ / ₈
	254/6T	39 ¹³ / ₁₆	40 ⁷ / ₁₆	37 ⁷ / ₈	38 ¹ / ₂	28 ³ / ₄	29 ³ / ₈
	284/6T	43 ¹³ / ₁₆	44 ⁷ / ₁₆	39 ³ / ₈	40	30 ³ / ₄	30 ⁷ / ₈
	324/6T	45 ¹ / ₁₆	46 ⁵ / ₁₆	40 ⁷ / ₈	41 ¹ / ₂	31 ³ / ₄	32 ³ / ₈
27	182/4T	34 ³ / ₄	35 ⁷ / ₁₆	33 ¹ / ₂	34 ³ / ₁₆	24 ³ / ₈	25 ¹ / ₁₆
	213/5T	37 ³ / ₈	38 ¹ / ₁₆	35 ³ / ₄	36 ⁷ / ₁₆	26 ⁵ / ₈	27 ⁵ / ₁₆
	254/6T	41 ⁷ / ₁₆	42 ¹ / ₈	39 ¹ / ₂	40 ³ / ₁₆	30 ³ / ₈	31 ¹ / ₁₆
	284/6T	45 ¹ / ₁₆	46 ¹ / ₈	41	41 ¹ / ₁₆	31 ⁷ / ₈	32 ⁹ / ₁₆
324/6T	47 ⁵ / ₁₆	48	42 ¹ / ₂	43 ³ / ₁₆	33 ³ / ₈	34 ¹ / ₁₆	
30	213/5T	39 ⁷ / ₈	40 ⁵ / ₈	38 ¹ / ₄	39	29 ¹ / ₈	29 ⁷ / ₈
	254/6T	43 ¹⁵ / ₁₆	44 ¹ / ₁₆	42	42 ³ / ₄	32 ⁷ / ₈	33 ⁵ / ₈
	284/6T	47 ¹⁵ / ₁₆	48 ¹ / ₁₆	43 ¹ / ₂	44 ¹ / ₄	34 ³ / ₈	35 ¹ / ₈
	324/6T	49 ¹³ / ₁₆	50 ⁹ / ₁₆	45	45 ³ / ₄	35 ⁷ / ₈	36 ⁵ / ₈
	364/5T	51 ³ / ₄	52 ¹ / ₂	45 ⁷ / ₈	46 ⁵ / ₈	36 ³ / ₄	37 ¹ / ₂
33	254/6T	46 ⁷ / ₁₆	47 ¹ / ₄	44 ¹ / ₂	45 ⁵ / ₁₆	35 ⁵ / ₈	36 ³ / ₁₆
	284/6T	50 ¹ / ₁₆	51 ¹ / ₄	46	46 ¹³ / ₁₆	36 ⁷ / ₈	37 ¹¹ / ₁₆
	324/6T	52 ⁵ / ₁₆	53 ¹ / ₈	47 ¹ / ₂	48 ⁵ / ₁₆	38 ³ / ₈	39 ³ / ₁₆
	364/5T	54 ¹ / ₄	55 ¹ / ₁₆	48 ³ / ₈	49 ³ / ₁₆	39 ¹ / ₄	40 ¹ / ₁₆
36	284/6T	51 ¹⁵ / ₁₆	52 ³ / ₄	47 ¹ / ₂	48 ⁵ / ₁₆	38 ³ / ₈	39 ¹ / ₁₆
	324/6T	53 ¹³ / ₁₆	54 ⁵ / ₈	49	49 ¹³ / ₁₆	39 ⁷ / ₈	40 ¹¹ / ₁₆
	364/5T	55 ³ / ₄	56 ⁹ / ₁₆	49 ⁷ / ₈	50 ¹ / ₁₆	40 ³ / ₄	41 ⁹ / ₁₆

* Use H dimension as a guide only, as motor length varies by manufacturer.

All dimensions are for full-width ECF wheels. Fans with AcF, AcFq, and all narrow-width wheels require custom drawings and dimensions.

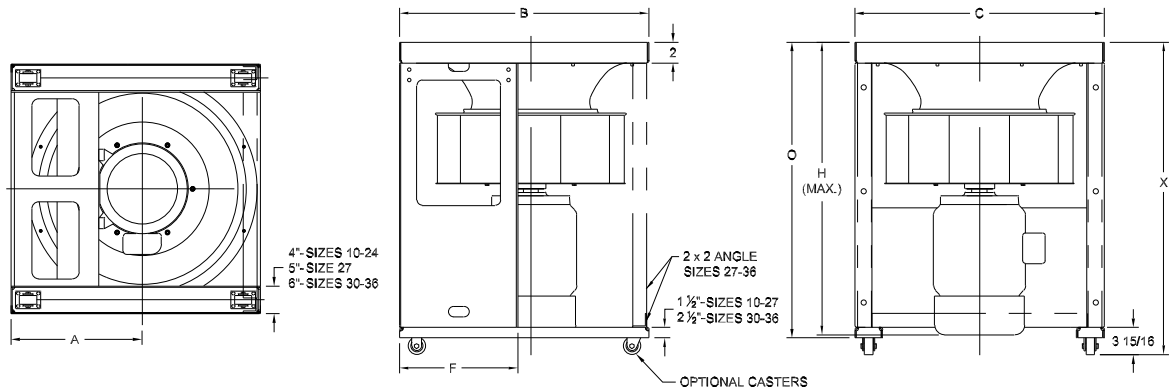
** Bare fan weight in pounds less wheel and motor. Weight based on design for largest available motor frame size. For complete fan weight, add wheel weight from page six and specific motor weight.

Optional casters add approximately 3-15/16" to fan height.

EZ ARR. 4V WITH LEGS DIMENSIONS

(INLET UP ONLY)

Dimensions not to be used for construction unless certified. [All dimensions in inches]



DIMENSIONS [INCHES]

Size	Motor Frame	A	B	C	F	H*	O	X	Bare Fan Weight**
10	56 143/5T	8	14 ³ / ₄	14 ³ / ₄	6 ⁷ / ₈	21 ³ / ₄ 22 ⁵ / ₁₆	20 ⁵ / ₈ 22 ¹ / ₈	23 ¹ / ₁₆ 24 ⁹ / ₁₆	66
12	56 143/5T 182/4T	9 ¹³ / ₁₆	18	18	8 ³ / ₈	23 ³ / ₁₆ 23 ³ / ₄ 25 ⁵ / ₈	22 ¹ / ₁₆ 23 ⁹ / ₁₆ 24 ⁹ / ₁₆	24 ⁹ / ₁₆ 26 27	88
13	143/5T 182/4T	10 ¹³ / ₁₆	19 ³ / ₄	19	9 ³ / ₈	24 ¹ / ₄ 26 ¹ / ₈	24 ¹ / ₁₆ 25 ¹ / ₁₆	26 ¹ / ₂ 27 ¹ / ₂	93
15	143/5T 182/4T 213/5T	12	22 ¹ / ₁₆	21	10 ⁹ / ₁₆	24 ¹⁵ / ₁₆ 26 ¹³ / ₁₆ 28 ⁵ / ₈	24 ³ / ₄ 25 ³ / ₄ 28	27 ³ / ₁₆ 28 ³ / ₁₆ 30 ⁷ / ₁₆	109
16	143/5T 182/4T 213/5T 254/6T	13 ¹ / ₄	24 ⁵ / ₁₆	23	11 ¹³ / ₁₆	26 ⁵ / ₈ 28 ¹ / ₂ 30 ⁵ / ₁₆ 33 ¹⁵ / ₁₆	26 ⁷ / ₁₆ 27 ⁷ / ₁₆ 29 ¹¹ / ₁₆ 33 ⁷ / ₁₆	28 ⁷ / ₈ 29 ⁷ / ₈ 32 ¹ / ₈ 35 ⁷ / ₈	137
18	143/5T 182/4T 213/5T 254/6T 284/6TS	14 ¹ / ₈	26	26	12 ¹¹ / ₁₆	27 ³ / ₄ 29 ⁵ / ₈ 31 ⁷ / ₁₆ 35 ¹ / ₁₆ 37 ¹ / ₄	27 ⁹ / ₁₆ 28 ⁹ / ₁₆ 30 ¹³ / ₁₆ 34 ⁹ / ₁₆ 36 ¹ / ₁₆	30 31 33 ¹ / ₄ 37 38 ¹ / ₂	160
20	143/5T 182/4T 213/5T 254/6T 284/6TS	15 ¹ / ₂	28 ⁷ / ₁₆	27	13 ¹³ / ₁₆	28 ¹³ / ₁₆ 30 ¹¹ / ₁₆ 32 ¹ / ₂ 36 ¹ / ₈ 38 ⁵ / ₁₆	28 ⁵ / ₈ 29 ⁵ / ₈ 31 ⁷ / ₈ 35 ⁵ / ₈ 37 ¹ / ₈	31 ¹ / ₁₆ 32 ¹ / ₁₆ 34 ⁵ / ₁₆ 38 ¹ / ₁₆ 39 ⁹ / ₁₆	166
22	143/5T 182/4T 213/5T 254/6T 284/6T 284/6TS	17 ¹ / ₄	31 ⁵ / ₁₆	30	15 ³ / ₈	30 ⁵ / ₁₆ 32 ³ / ₁₆ 34 37 ⁵ / ₈ 40 ¹ / ₂ 39 ¹³ / ₁₆	30 ¹ / ₈ 31 ¹ / ₈ 33 ³ / ₈ 37 ¹ / ₈ 38 ⁵ / ₈ 38 ⁵ / ₈	32 ⁹ / ₁₆ 33 ⁹ / ₁₆ 35 ¹³ / ₁₆ 39 ⁹ / ₁₆ 41 ¹ / ₁₆ 41 ¹ / ₁₆	191
24	182/4T 213/5T 254/6T 284/6TS	19	34 ³ / ₄	33	17 ¹ / ₈	35 ¹ / ₁₆ 36 ⁷ / ₈ 40 ¹ / ₂ 42 ¹¹ / ₁₆	34 36 ¹ / ₄ 40 41 ¹ / ₂	36 ⁷ / ₁₆ 38 ¹¹ / ₁₆ 42 ⁷ / ₁₆ 43 ¹⁵ / ₁₆	221
27	182/4T 213/5T 254/6T 284/6TS	20 ³ / ₄	37 ³ / ₄	36	18 ⁷ / ₈	36 ³ / ₄ 38 ⁹ / ₁₆ 42 ³ / ₁₆ 44 ³ / ₈	35 ¹¹ / ₁₆ 37 ¹⁵ / ₁₆ 41 ¹¹ / ₁₆ 43 ³ / ₁₆	38 ³ / ₁₆ 40 ⁷ / ₁₆ 44 ³ / ₁₆ 45 ¹ / ₁₆	270
30	213/5T 254/6T 284/6TS	21 ¹ / ₄	40	40	19 ³ / ₈	41 ¹ / ₈ 44 ³ / ₄ 46 ¹⁵ / ₁₆	41 ¹ / ₂ 45 ¹ / ₄ 46 ³ / ₄	43 46 ³ / ₄ 48 ¹ / ₄	346
33	254/6T 284/6TS	23 ¹ / ₄	43	44	21	47 ⁵ / ₁₆ 49 ¹ / ₂	47 ¹³ / ₁₆ 49 ⁵ / ₁₆	49 ⁵ / ₁₆ 50 ¹³ / ₁₆	381
36	284/6TS	25 ⁷ / ₁₆	48	48	23 ⁵ / ₁₆	51	50 ¹³ / ₁₆	52 ⁵ / ₁₆	432

* Use H dimension as a guide only, as motor length varies by manufacturer.

All dimensions are for full-width ECF wheels. Fans with AcF, AcFq, and all narrow-width wheels require custom drawings and dimensions.

** Bare fan weight in pounds less wheel and motor. Weight based on design for largest available motor frame size. For complete fan weight, add wheel weight from page six and specific motor weight.

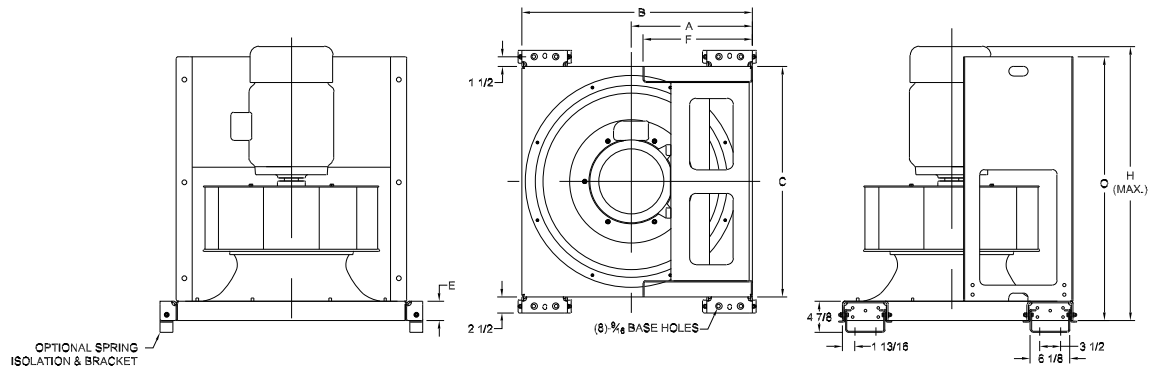
Optional standard isolation adds approximately 4-7/8" to fan height.

Optional casters add approximately 3-15/16" to fan height.

EZ ARR. 4V SPRING/BRACKET ISOLATION DIMENSIONS

(INLET DOWN ONLY)

Dimensions not to be used for construction unless certified. [All dimensions in inches]



DIMENSIONS [INCHES]

Size	Motor Frame	A	B	C	E	F	H	O	Bare Fan Weight**
10	56 143/5T	8	14 ³ / ₄	14 ³ / ₄	2	6 ⁷ / ₈	21 ³ / ₄ 22 ⁹ / ₁₆	19 ¹ / ₈ 20 ⁵ / ₈	68
12	56 143/5T 182/4T	9 ¹ / ₁₆	18	18	2	8 ³ / ₈	23 ³ / ₁₆ 23 ³ / ₄ 25 ⁵ / ₈	20 ⁹ / ₁₆ 22 ¹ / ₁₆ 23 ¹ / ₁₆	76
13	143/5T 182/4T	10 ¹ / ₁₆	19 ³ / ₄	19	2	9 ³ / ₈	24 ¹ / ₄ 26 ¹ / ₈	22 ⁹ / ₁₆ 23 ⁹ / ₁₆	80
15	143/5T 182/4T 213/5T	12	22 ¹ / ₁₆	21	2	10 ⁹ / ₁₆	24 ¹⁵ / ₁₆ 26 ¹ / ₁₆ 28 ⁵ / ₈	23 ¹ / ₄ 24 ¹ / ₄ 26 ¹ / ₂	95
16	143/5T 182/4T 213/5T 254/6T	13 ³ / ₄	24 ⁵ / ₁₆	23	3	11 ¹ / ₁₆	27 ⁵ / ₈ 29 ¹ / ₂ 31 ⁵ / ₁₆ 34 ¹⁵ / ₁₆	25 ¹⁵ / ₁₆ 26 ¹⁵ / ₁₆ 29 ⁹ / ₁₆ 32 ¹⁵ / ₁₆	121
18	143/5T 182/4T 213/5T 254/6T 284/6TS	14 ¹ / ₈	26	26	3	12 ¹¹ / ₁₆	28 ³ / ₄ 30 ³ / ₈ 32 ⁷ / ₁₆ 36 ¹ / ₁₆ 38 ¹ / ₄	27 ¹ / ₁₆ 28 ¹ / ₁₆ 30 ⁵ / ₁₆ 34 ¹ / ₁₆ 35 ⁹ / ₁₆	143
20	143/5T 182/4T 213/5T 254/6T 284/6TS	15 ¹ / ₂	28 ⁷ / ₁₆	27	3	13 ¹ / ₁₆	29 ¹ / ₁₆ 31 ¹¹ / ₁₆ 33 ¹ / ₂ 37 ¹ / ₈ 39 ⁵ / ₁₆	28 ¹ / ₈ 29 ¹ / ₈ 31 ³ / ₈ 35 ¹ / ₈ 36 ⁵ / ₈	148
22	143/5T 182/4T 213/5T 254/6T 284/6T 284/6TS	17 ¹ / ₄	31 ⁵ / ₁₆	30	3	15 ³ / ₈	31 ⁵ / ₁₆ 33 ³ / ₁₆ 35 38 ⁵ / ₈ 42 ¹ / ₂ 40 ¹ / ₁₆	29 ⁵ / ₈ 30 ⁵ / ₈ 32 ⁷ / ₈ 36 ⁵ / ₈ 38 ¹ / ₈ 38 ¹ / ₈	171
24	182/4T 213/5T 254/6T 284/6T 324/6T	19	34 ³ / ₄	33	3	17 ¹ / ₈	36 ¹ / ₁₆ 37 ⁷ / ₈ 41 ¹ / ₂ 45 ³ / ₈ 47 ³ / ₈	33 ¹ / ₂ 35 ³ / ₄ 39 ¹ / ₂ 41 42 ¹ / ₂	199
27	182/4T 213/5T 254/6T 284/6T 324/6T	20 ³ / ₄	37 ³ / ₄	36	3	18 ⁷ / ₈	37 ³ / ₄ 39 ⁹ / ₁₆ 43 ³ / ₁₆ 47 ¹ / ₁₆ 49 ¹ / ₁₆	35 ³ / ₁₆ 37 ⁷ / ₁₆ 41 ³ / ₁₆ 42 ¹¹ / ₁₆ 44 ³ / ₁₆	210
30	213/5T 254/6T 284/6T 324/6T 364/5T	21 ¹ / ₄	40	40	4	19 ³ / ₈	43 ¹ / ₈ 46 50 ⁵ / ₈ 52 ⁵ / ₈ 54 ⁷ / ₁₆	41 44 ³ / ₄ 46 ¹ / ₄ 47 ³ / ₄ 48 ⁵ / ₈	262
33	254/6T 284/6T 324/6T 364/5T	23 ¹ / ₄	43	44	4	21	49 ⁵ / ₁₆ 53 ³ / ₁₆ 55 ³ / ₁₆ 57	47 ⁵ / ₁₆ 48 ¹³ / ₁₆ 50 ⁹ / ₁₆ 51 ³ / ₁₆	289
36	284/6T 324/6T 364/5T	25 ⁷ / ₁₆	48	48	5 ¹ / ₄	23 ⁵ / ₁₆	55 ¹⁵ / ₁₆ 57 ¹⁵ / ₁₆ 59 ³ / ₄	51 ⁹ / ₁₆ 53 ¹ / ₁₆ 53 ¹⁵ / ₁₆	333

* Use H dimension as a guide only, as motor length varies by manufacturer.

All dimensions are for full width ECF wheels. Fans with AcF, AcFq, BC, BCq and all narrow-width wheels require custom drawings and dimensions.

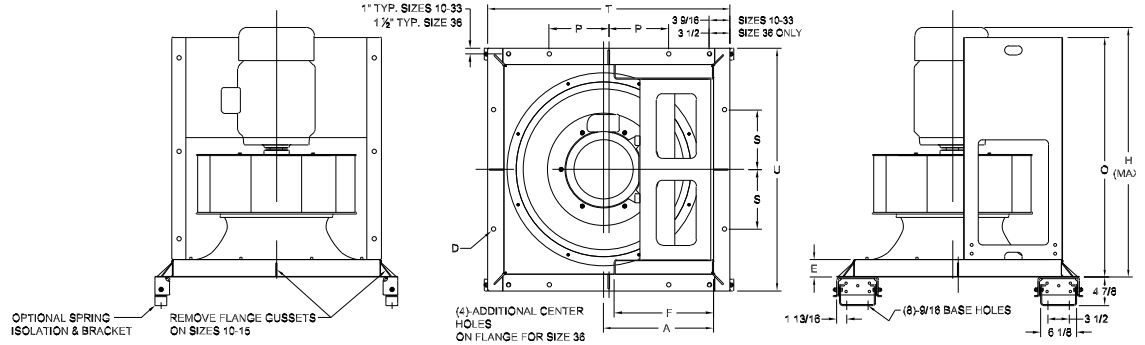
** Bare fan weight in pounds less wheel and motor. Weight based on design for largest available motor frame size. For complete fan weight, add wheel weight from page six and specific motor weight.

Optional standard isolation adds approximately 1-7/8" to fan height.

EZ ARR. 4V FLANGED INLET DIMENSIONS

(INLET UP OR INLET DOWN ONLY)

Dimensions not to be used for construction unless certified. [All dimensions in inches]



DIMENSIONS [INCHES]

Size	Motor Frame	A	D	E	F	H	O	P	S	T	U	Bare Fan Weight**
10	56 143/5T	8	1/2	2	6 7/8	21 3/4 22 5/16	19 1/8 20 5/8	6	6	20 13/32	20 13/32	68
12	56 143/5T 182/4T	9 13/16	1/2	2	8 3/8	23 3/16 23 3/4 25 5/8	20 9/16 22 1/16 23 1/16	7	7	23 5/8	23 5/8	88
13	143/5T 182/4T	10 13/16	1/2	2	9 3/8	24 1/4 26 1/8	22 9/16 23 9/16	7 1/4	7 1/4	25 5/8	24 5/8	93
15	143/5T 182/4T 213/5T	12	1/2	2	10 9/16	24 15/16 26 13/16 28 5/8	23 1/4 24 1/4 20 1/2	8	8	27 3/4	26 5/8	109
16	143/5T 182/4T 213/5T 254/6T	13 1/4	9/16	3	11 13/16	27 5/8 29 1/2 31 1/16 34 15/16	25 15/16 26 15/16 29 3/16 32 15/16	8 5/16	8 5/16	29 15/16	28 5/8	136
18	143/5T 182/4T 213/5T 254/6T 284/6TS	14 1/8	9/16	3	12 11/16	28 3/4 30 5/8 32 7/16 36 1/16 38 1/4	27 1/16 28 1/16 30 5/16 34 1/16 35 9/16	7 13/16	7 13/16	31 5/8	31 5/8	159
20	143/5T 182/4T 213/5T 254/6T 284/6TS	15 1/2	9/16	3	13 13/16	29 13/16 31 1/16 33 1/2 37 1/8 39 5/16	28 1/8 29 1/8 31 3/8 35 5/8 36 5/8	8 5/16	8 5/16	34 1/16	32 5/8	165
22	143/5T 182/4T 213/5T 254/6T 284/6T 284/6TS	17 1/4	9/16	3	15 3/8	31 5/16 33 3/16 35 38 5/8 42 1/2 40 13/16	29 5/8 30 5/8 32 7/8 36 5/8 38 1/8 38 1/8	9 13/16	9 13/16	36 15/16	35 5/8	190
24	182/4T 213/5T 254/6T 284/6T 324/6T	19	3/4	3	17 1/8	36 1/16 37 7/8 41 1/2 45 3/8 47 3/8	33 1/2 35 3/4 39 1/2 41 42 1/2	9 5/16	9 5/16	40 3/8	38 5/8	220
27	182/4T 213/5T 254/6T 284/6T 324/6T	20 3/4	3/4	3	18 7/8	37 3/4 39 9/16 43 3/16 47 1/16 49 1/16	35 3/16 37 7/16 41 3/16 42 1/16 44 3/16	10 1/4	10 1/4	41 5/8	43 3/8	232
30	213/5T 254/6T 284/6T 324/6T 364/5T	21 1/4	3/4	4	19 3/8	43 1/8 46 3/4 50 5/8 52 5/8 54 7/16	41 44 3/4 46 1/4 47 3/4 48 5/8	10 13/16	10 13/16	45 5/8	45 5/8	286
33	254/6T 284/6T 324/6T 364/5T	23 1/4	3/4	4	21	49 5/16 53 3/16 55 3/16 57	47 5/16 48 13/16 50 5/16 51 3/16	12 13/16	12 13/16	49 1/8	49 5/8	316
36	284/6T 324/6T 364/5T	25 1/16	7/8	5 1/4	23 5/16	55 15/16 57 15/16 59 3/4	51 9/16 53 1/16 53 15/16	17 13/16	17 13/16	53 5/8	53 5/8	362

* Use H dimension as a guide only, as motor length varies by manufacturer.

All dimensions are for full width ECF wheels. Fans with AcF, AcFq, BC, BCq and all narrow-width wheels require custom drawings and dimensions.

** Bare fan weight in pounds less wheel and motor. Weight based on design for largest available motor frame size. For complete fan weight, add wheel weight from page six and specific motor weight.

Optional standard isolation adds approximately 4-7/8" to fan height.