

University of Illinois Department of Agricultural and Biological Engineering
 Bioenvironmental and Structural Systems Lab
 Final Report

Project Number: 20385
 Test Date: October 6, 2020

Fan:	Motor:	Shutter: <i>Butterfly damper</i>
Make- <i>Ya Suh Dar</i>	Make- <i>Ya Suh Dar</i>	Material- <i>fiberglass</i>
Model- <i>57" N-K300DL</i>	Model- <i>PMSM2.2kW</i>	# Doors- <i>2</i>
Blade dia.- <i>56.5"</i>	Hp- <i>2.2 kW</i>	# Columns- <i>-</i>
Orifice dia.- <i>57"</i>	RPM- <i>750</i>	Door length- <i>-</i>
	Volts- <i>220</i>	Location- <i>exhaust</i>
Blade:	Amps- <i>-</i>	
Number- <i>3</i>	Hz- <i>60</i>	Guards:
Shape- <i>propeller</i>	Phase- <i>1</i>	Description- <i>wire</i>
Material- <i>fiberglass</i>	S. F.- <i>-</i>	Spacing- <i>5.8" x 5.8" / 7.1" concentric</i>
Pitch- <i>30</i>		Location- <i>intake / exhaust</i>
Clearance- <i>0.3"</i>	Housing:	
	Material- <i>Fiberglass</i>	Discharge Cone:
Drive Sheaves:	Intake area- <i>63" x 63"</i>	Depth- <i>36.1"</i>
Drive dia.- <i>direct</i>	Discharge- <i>57" dia.</i>	Minor dia.- <i>57"</i>
Axle dia.- <i>drive</i>	Depth- <i>27.5"</i>	Major dia.- <i>67.5"</i>

Notes: *230 VAC, single phase input to ADT8850DRV speed controller*
0 - 10 VDC speed control signal

Test Conditions:
 T(wb) F: 60 Barometric pressure, recorded 29.27
 T(db) F: 75 Barometric Pressure, corrected 29.15 (In. Hg)

Static Pressure (in.H2O)	Airflow (cfm)	rpm	Volts	Amps	Watts	cfm/Watt	SI Units			
							Static Pressure (Pa)	Airflow (m ³ /hr.)	(m ³ /hr)/W	W/1000m ³ /hr
10 VDC										
0.00	36600	750	230.7	9.99	1440	25.4	0	62100	43.1	23
0.05	34800	750	231.1	10.52	1526	22.8	12	59100	38.7	26
0.10	32900	750	230.6	10.96	1607	20.5	25	56000	34.8	29
0.15	31000	750	230.4	11.47	1692	18.3	37	52700	31.1	32
0.20	28700	750	230.4	11.95	1771	16.2	50	48700	27.5	36
0.25	26100	750	230.2	12.36	1839	14.2	62	44400	24.1	41
0.30	23900	750	229.7	12.53	1864	12.8	75	40600	21.8	46
0.40	16300	750	229.3	11.67	1717	9.5	100	27700	16.1	62
9 VDC										
0.00	33100	690	231.0	8.07	1133	29.2	0	56200	49.6	20
0.05	31400	692	230.8	8.76	1245	25.2	12	53300	42.8	23
0.10	29700	690	230.6	8.85	1257	23.6	25	50500	40.2	25
0.15	27100	692	230.9	9.67	1392	19.5	37	46100	33.1	30
0.20	24800	691	231.0	9.63	1385	17.9	50	42200	30.5	33
0.25	21800	690	230.8	9.98	1443	15.1	62	37100	25.7	39
0.30	18900	690	230.8	9.79	1412	13.4	75	32200	22.8	44
0.40	12600	691	230.9	8.65	1229	10.2	100	21400	17.4	58
8 VDC										
0.00	29800	627	231.4	6.23	846	35.2	0	50600	59.8	17
0.05	28100	625	230.9	6.65	906	31.0	12	47700	52.6	19
0.10	25700	627	230.9	7.07	970	26.5	25	43700	45	22
0.15	23000	626	230.7	7.54	1041	22.1	37	39000	37.5	27
0.20	19900	625	230.8	7.74	1075	18.5	50	33900	31.5	32
0.25	16700	628	230.8	7.71	1071	15.6	62	28400	26.5	38
0.30	11100	625	230.6	6.96	954	11.6	75	18800	19.7	51
0.40	4800	626	230.6	7.04	966	5.0	100	8200	8.5	118
7 VDC										
0.00	25900	554	229.6	4.81	617	42.0	0	44100	71.4	14
0.05	24000	554	229.7	5.13	664	36.1	12	40800	61.4	16
0.10	21200	554	229.5	5.45	712	29.8	25	36100	50.6	20
0.15	18000	554	229.4	5.65	742	24.3	37	30600	41.3	24
0.20	13700	554	229.5	5.44	713	19.2	50	23300	32.6	31
0.25	8000	554	229.1	5.03	651	12.3	62	13600	20.9	48
0.30	5000	554	229.5	5.21	679	7.4	75	8600	12.6	79
0.35	2000	554	229.0	4.63	593	3.3	87	3300	5.6	178
6 VDC										
0.00	22400	486	229.5	3.54	432	51.9	0	38100	88.2	11
0.05	20000	486	229.4	3.83	475	42.1	12	34000	71.6	14
0.10	16900	486	229.3	4.04	505	33.4	25	28600	56.7	18
0.15	12200	486	229.0	3.94	492	24.9	37	20800	42.3	24
0.20	6000	486	229.7	3.69	456	13.1	50	10200	22.3	45
0.25	2700	486	229.9	3.59	444	6.1	62	4600	10.4	96
5 VDC										
0.00	18700	414	229.9	2.60	300	62.4	0	31800	106.1	9
0.05	15700	412	230.0	2.68	313	50.2	12	26700	85.3	12
0.10	11200	412	229.8	2.72	319	35.1	25	19000	59.6	17
0.15	4300	411	229.9	2.52	293	14.6	37	7300	24.8	40
0.18	1400	412	230.6	2.26	258	5.4	45	2400	9.2	109
4 VDC										
0.00	15200	344	230.1	1.69	180	84.4	0	25800	143.3	7
0.05	11200	344	230.1	1.82	198	56.8	12	19100	96.5	10
0.10	3400	344	230.2	1.69	181	19.1	25	5900	32.4	31
0.12	1100	344	230.6	1.50	157	6.9	30	1800	11.7	86
3 VDC										
0.00	11700	276	230.7	1.08	108	108.3	0	19900	184	5
0.05	3900	276	230.3	1.05	105	37.5	12	6700	63.6	16
0.07	1000	276	230.6	0.96	94	10.9	17	1700	18.5	54
2 VDC										
0.00	7700	209	230.7	0.65	62	123.5	0	13000	209.9	5
0.03	1000	209	230.4	0.58	53	18.9	7	1700	32.1	31