

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

Project Number: 20391
 Test Date: October 13, 2020

Fan:		Motor:		Shutter:	
Make- <i>Ya Suh Dar</i>		Make- <i>Yah Suh Dar</i>		Material- <i>plastic w/ alum. Frame</i>	
Model- <i>57" K300DL-PMSM 2.2 30 750</i>		Model- <i>PMSM2.2kW</i>		# Doors- <i>16 per column</i>	
Blade dia.- <i>56.5"</i>		Hp- <i>2.2 kW</i>		# Columns- <i>3</i>	
Orifice dia.- <i>57"</i>		RPM- <i>750</i>		Door length- <i>19.6", 18", 19.6"</i>	
		Volts- <i>220</i>		Location- <i>intake</i>	
		Amps- <i>-</i>			
Blade:		Hz- <i>60</i>		Guards:	
Number- <i>3</i>		Phase- <i>1</i>		Description- <i>wire</i>	
Shape- <i>propeller</i>		S. F.- <i>-</i>		Spacing- <i>7.1" concentric</i>	
Material- <i>fiberglass</i>				Location- <i>exhaust</i>	
Pitch- <i>30</i>					
Clearance- <i>0.3"</i>		Housing:		Discharge Cone:	
		Material- <i>Fiberglass</i>		Depth- <i>36.5"</i>	
Drive Sheaves:		Intake area- <i>58.8" x 58.8"</i>		Minor dia.- <i>57"</i>	
Drive dia.- <i>direct</i>		Discharge- <i>57" dia.</i>		Major dia.- <i>67.3"</i>	
Axle dia.- <i>drive</i>		Depth- <i>25"</i>			

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

Test Conditions:
 T(wb) F: 57 Barometric pressure, recorded 29.37
 T(db) F: 78 Barometric Pressure, corrected 29.24 (In. Hg)

SI Units

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	33500	750	230.4	11.14	1627	20.6	0	57000	35	29
0.05	32100	750	230.3	11.48	1682	19.1	12	54500	32.4	31
0.10	30700	750	229.9	11.82	1735	17.7	25	52200	30.1	33
0.15	29400	750	229.7	12.08	1779	16.5	37	49900	28	36
0.20	27700	750	229.6	12.32	1818	15.3	50	47100	25.9	39
0.25	25900	750	229.1	12.52	1846	14.0	62	44000	23.8	42
0.30	23300	750	229.2	12.66	1870	12.5	75	39600	21.2	47
0.35	19600	750	229.4	12.50	1845	10.6	87	33400	18.1	55
0.40	15000	750	229.4	12.22	1803	8.3	100	25400	14.1	71
9 VDC										
0.00	30500	685	230.6	8.72	1235	24.7	0	51900	42	24
0.05	29200	685	230.1	9.00	1279	22.8	12	49700	38.8	26
0.10	27500	686	230.0	9.42	1343	20.5	25	46800	34.8	29
0.15	25700	687	229.8	9.64	1379	18.6	37	43700	31.7	32
0.20	23300	687	229.6	9.92	1423	16.4	50	39600	27.8	36
0.25	19700	687	230.3	9.82	1409	14.0	62	33500	23.7	42
0.30	16300	685	230.7	9.54	1370	11.9	75	27800	20.3	49
0.35	11300	686	228.3	9.52	1344	8.4	87	19300	14.3	70
0.40	6800	692	231.3	9.06	1296	5.2	100	11500	8.9	113
8 VDC										
0.00	27400	621	230.5	6.74	919	29.9	0	46600	50.7	20
0.05	25600	620	230.6	7.12	978	26.2	12	43500	44.5	22
0.10	23200	620	230.5	7.40	1021	22.7	25	39400	38.6	26
0.15	20200	620	230.5	7.54	1045	19.3	37	34300	32.8	31
0.20	16800	617	230.6	7.26	1002	16.8	50	28600	28.6	35
0.25	11700	619	230.6	7.32	1010	11.6	62	19900	19.7	51
0.30	7400	621	231.5	6.92	953	7.7	75	12500	13.1	76
0.34	1000	621	231.6	5.90	797	1.2	85	1700	2.1	472
7 VDC										
0.00	23800	549	228.9	4.96	646	36.8	0	40400	62.6	16
0.05	20800	546	230.0	5.18	685	30.3	12	35300	51.5	19
0.10	17600	546	229.6	5.34	702	25.1	25	29900	42.6	23
0.15	13500	546	230.5	5.32	707	19.1	37	23000	32.5	31
0.20	8500	546	231.2	5.08	677	12.6	50	14400	21.3	47
0.25	1900	546	230.7	4.36	566	3.3	62	3200	5.6	179
0.26	1000	550	231.5	4.42	574	1.7	65	1700	2.9	342
6 VDC										
0.00	19100	479	230.3	3.66	456	42.0	0	32500	71.3	14
0.05	16000	479	230.4	3.80	476	33.5	12	27100	56.9	18
0.10	11000	479	230.9	3.80	480	23.0	25	18700	39	26
0.15	5100	479	230.6	3.50	437	11.7	37	8700	19.8	51
0.18	1300	479	231.4	3.12	382	3.4	45	2200	5.7	174
5 VDC										
0.00	13900	411	231.7	2.56	304	45.7	0	23600	77.6	13
0.05	10500	411	231.6	2.58	306	34.2	12	17800	58.1	17
0.10	3200	411	230.0	2.38	275	11.6	25	5400	19.7	51
0.13	1100	411	231.2	2.20	254	4.3	31	1800	7.3	137
4 VDC										
0.00	9100	344	229.9	1.62	174	52.0	0	15400	88.4	11
0.05	3100	344	230.1	1.62	174	17.9	12	5300	30.5	33
0.08	1000	344	230.8	1.48	158	6.3	19	1700	10.8	93
3 VDC										
0.00	4200	276	230.9	1.02	104	40.5	0	7200	68.8	15
0.03	1100	276	231.0	0.94	95	11.7	7	1900	19.9	50
2 VDC										
0.00	1200	209	231.4	0.56	51	22.5	0	2000	38.3	26