

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

Project Number: 20403
 Test Date: October 21, 2020

Fan:	Motor:	Shutter: <i>Butterfly damper</i>
Make- <i>Yah Suh Dar</i>	Make- <i>Yah Suh Dar</i>	Material- <i>fiberglass</i>
Model- <i>57" N-K300DL-PMSM 1.1 30 700</i>	Model- <i>PMSM1.1kW</i>	# Doors- <i>2</i>
Blade dia.- <i>56.5"</i>	Hp- <i>1.1 kW</i>	# Columns- <i>-</i>
Orifice dia.- <i>57"</i>	RPM- <i>700</i>	Door length - <i>-</i>
	Volts- <i>220</i>	Location- <i>exhaust</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>5.8" x 5.8" / 7.1" concentric</i>
Material- <i>fiberglass</i>		Location- <i>intake / exhaust</i>
Pitch- <i>30</i>		
Clearance- <i>0.3"</i>	Housing:	Discharge Cone:
	Material- <i>Fiberglass</i>	Depth- <i>36.1"</i>
Drive Shaives:	Intake area- <i>63" x 63"</i>	Minor dia.- <i>57"</i>
Drive dia.- <i>direct</i>	Discharge- <i>57" dia.</i>	Major dia.- <i>67.5"</i>
Axle dia.- <i>drive</i>	Depth- <i>27.5"</i>	

Notes: 230 VAC, single phase input to ADT8700PFC speed controller
 0 - 10 VDC speed control signal

Test Conditions:
 T(wb) F: 57 Barometric pressure, recorded 29.50
 T(db) F: 73.5 Barometric Pressure, corrected 29.38 (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	33900	700	229.8	6.03	1234	27.5	0	57600	46.6	21
0.05	31900	700	229.5	6.29	1326	24.1	12	54300	40.9	24
0.10	30000	700	230.0	6.48	1402	21.4	25	51000	36.4	27
0.15	27800	700	229.9	6.70	1477	18.8	37	47300	32	31
0.20	25400	700	229.8	6.89	1539	16.5	50	43100	28	36
0.25	22800	700	229.5	7.01	1571	14.5	62	38800	24.7	41
0.30	20100	700	229.7	6.99	1566	12.8	75	34200	21.8	46
0.35	16000	700	229.9	6.76	1495	10.7	87	27100	18.1	55
0.40	11300	700	230.4	6.45	1389	8.1	100	19200	13.8	72
9 VDC										
0.00	30700	643	231.3	5.16	982	31.3	0	52200	53.1	19
0.05	28700	643	231.0	5.44	1048	27.4	12	48700	46.5	22
0.10	26400	643	231.1	5.64	1112	23.8	25	44900	40.4	25
0.15	24100	643	230.5	5.81	1168	20.7	37	41000	35.1	28
0.20	21700	643	230.4	5.91	1202	18.1	50	36900	30.7	33
0.25	18600	643	230.3	5.92	1200	15.5	62	31600	26.3	38
0.30	13100	643	230.6	5.63	1111	11.8	75	22200	20	50
0.35	9400	643	231.2	5.50	1072	8.8	87	16000	14.9	67
0.40	6600	643	229.0	5.61	1096	6.0	100	11200	10.2	98
8 VDC										
0.00	27300	577	230.3	3.77	730	37.4	0	46400	63.6	16
0.05	25100	576	230.0	4.04	778	32.3	12	42700	54.9	18
0.10	22500	574	229.8	4.30	818	27.4	25	38200	46.6	21
0.15	19200	572	229.6	4.49	846	22.7	37	32600	38.6	26
0.20	15500	574	229.6	4.48	845	18.3	50	26300	31.2	32
0.25	11200	577	229.7	4.21	809	13.8	62	19000	23.4	43
0.30	6800	577	229.6	4.02	765	8.9	75	11600	15.1	66
0.35	4200	576	229.6	4.11	783	5.3	87	7100	9.1	110
0.40	1000	577	229.9	3.15	618	1.7	100	1800	2.8	351
7 VDC										
0.00	24200	516	230.2	2.61	529	45.8	0	41100	77.7	13
0.05	21700	516	230.3	2.86	578	37.5	12	36800	63.7	16
0.10	18600	516	230.0	3.05	617	30.2	25	31600	51.2	20
0.15	15100	516	230.0	3.14	625	24.2	37	25700	41.2	24
0.20	9300	516	230.3	2.76	564	16.5	50	15800	28	36
0.25	5300	516	230.8	2.83	572	9.3	62	9100	15.8	63
0.30	2100	516	230.9	2.52	514	4.1	75	3600	7	143
0.31	1200	516	231.0	2.28	465	2.5	77	2000	4.3	234
6 VDC										
0.00	20700	448	230.9	1.81	366	56.7	0	35200	96.3	10
0.05	17900	448	230.9	1.98	402	44.5	12	30400	75.6	13
0.10	14100	448	230.7	2.08	423	33.4	25	24000	56.7	18
0.15	8100	448	231.0	1.88	382	21.2	37	13700	36	28
0.20	3700	448	230.8	1.93	384	9.7	50	6300	16.5	61
0.23	1000	448	231.0	1.56	314	3.1	57	1700	5.3	188
5 VDC										
0.00	17500	381	230.8	1.21	234	74.7	0	29700	126.9	8
0.05	13900	381	230.7	1.40	272	51.1	12	23600	86.9	12
0.10	7900	381	230.8	1.32	255	31.0	25	13400	52.6	19
0.15	2600	382	230.7	1.28	249	10.3	37	4300	17.4	57
0.16	1000	382	230.8	1.10	213	4.7	40	1700	8	126
4 VDC										
0.00	14400	321	231.3	0.85	159	90.7	0	24500	154.1	6
0.05	9700	321	231.2	0.92	175	55.7	12	16600	94.6	11
0.10	1900	321	231.4	0.82	154	12.6	25	3300	21.3	47
3 VDC										
0.00	11100	261	231.1	0.55	101	109.6	0	18800	186.2	5
0.05	3100	261	230.9	0.53	100	30.7	12	5200	52.2	19
0.06	1400	261	231.1	0.50	93	14.8	15	2300	25.2	40
2 VDC										
0.00	8000	193	230.7	0.31	57	139.5	0	13500	237.1	4
0.02	1400	193	230.8	0.30	54	25.2	5	2300	42.9	23