

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

Project Number: 20393
 Test Date: October 14, 2020

Fan:		Motor:		Shutter:	
Make- <i>Ya Suh Dar</i>		Make- <i>Ya Suh Dar</i>		Material- <i>plastic w/ alum. Frame</i>	
Model- <i>50" N-C300DL-PMSM 1.1 30 730</i>		Model- <i>PMSM1.1kW</i>		# Doors- <i>14 per column</i>	
Blade dia.- <i>50"</i>		Hp- <i>1.1 kW</i>		# Columns- <i>2</i>	
Orifice dia.- <i>50.3"</i>		RPM- <i>730</i>		Door length <i>25.3"</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>2.9" concentric</i>	
Material- <i>fiberglass</i>				Location- <i>exhaust</i>	
Pitch- <i>30</i>					
Clearance- <i>0.2"</i>		Housing:		Discharge Cone:	
		Material- <i>Fiberglass</i>		Depth- <i>25.6"</i>	
Drive Sheaves:		Intake area- <i>50.7" x 50.9"</i>		Minor dia.- <i>50.3"</i>	
Drive dia.- <i>direct</i>		Discharge- <i>50.3"</i>		Major dia.- <i>55"</i>	
Axle dia.- <i>drive</i>		Depth- <i>32.5"</i>			

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

Test Conditions:

T(wb) F: 58 Barometric pressure, recorded 29.09
 T(db) F: 78 Barometric Pressure, corrected 28.96 (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	25300	731	229.9	5.82	1177	21.5	0	43100	36.6	27
0.05	24200	731	229.4	5.98	1224	19.8	12	41200	33.7	30
0.10	23000	731	229.9	6.09	1263	18.2	25	39000	30.9	32
0.15	21600	731	229.8	6.19	1300	16.6	37	36800	28.3	35
0.20	20100	731	230.4	6.25	1322	15.2	50	34200	25.9	39
0.25	17700	731	230.9	6.31	1345	13.2	62	30100	22.4	45
0.30	15300	731	231.4	6.35	1358	11.3	75	26000	19.2	52
0.35	12600	731	231.7	6.37	1367	9.2	87	21300	15.6	64
0.40	9800	731	231.0	6.33	1351	7.2	100	16600	12.3	81
9 VDC										
0.00	23600	681	230.7	5.13	962	24.6	0	40200	41.8	24
0.05	22400	681	231.1	5.27	1001	22.4	12	38000	38	26
0.10	20900	680	231.2	5.40	1041	20.0	25	35400	34	29
0.15	19000	679	231.0	5.54	1083	17.6	37	32300	29.8	34
0.20	16700	679	230.3	5.56	1087	15.3	50	28300	26	38
0.25	14100	676	230.1	5.49	1067	13.2	62	23900	22.4	45
0.30	11400	678	229.9	5.57	1092	10.5	75	19400	17.8	56
0.35	8200	681	231.6	5.49	1075	7.6	87	14000	13	77
0.40	3500	681	230.1	5.31	1015	3.5	100	6000	5.9	170
8 VDC										
0.00	20900	607	230.9	3.58	689	30.4	0	35600	51.6	19
0.05	19300	606	229.9	3.74	727	26.5	12	32700	45	22
0.10	16800	606	230.0	3.93	751	22.4	25	28600	38.1	26
0.15	14500	606	230.2	4.03	767	18.8	37	24600	32	31
0.20	11600	606	230.2	4.08	780	14.9	50	19700	25.3	40
0.25	8400	605	230.4	3.97	767	10.9	62	14200	18.5	54
0.30	3400	606	230.5	3.66	722	4.7	75	5800	8.1	124
0.33	1000	607	230.8	3.43	681	1.5	82	1700	2.5	394
7 VDC										
0.00	17700	541	230.8	2.50	510	34.8	0	30200	59.1	17
0.05	15500	540	230.3	2.62	529	29.2	12	26300	49.7	20
0.10	13100	539	230.2	2.74	552	23.8	25	22300	40.4	25
0.15	10000	539	230.8	2.78	566	17.6	37	17000	30	33
0.20	6000	541	231.3	2.69	548	10.9	50	10100	18.5	54
0.25	1100	541	230.4	2.40	481	2.2	62	1800	3.8	265
6 VDC										
0.00	14400	471	230.8	1.71	356	40.3	0	24400	68.5	15
0.05	11800	471	229.5	1.83	368	32.1	12	20100	54.5	18
0.10	8600	471	230.0	1.83	378	22.7	25	14600	38.5	26
0.15	3200	471	230.1	1.75	367	8.6	37	5400	14.6	68
0.18	1000	471	230.8	1.60	337	3.0	45	1700	5.1	198
5 VDC										
0.00	11100	403	230.4	1.11	235	47.1	0	18800	80	13
0.05	7700	403	230.5	1.15	247	31.0	12	13000	52.6	19
0.10	2400	403	230.2	1.14	243	9.7	25	4000	16.5	61
0.11	1500	403	231.4	1.10	234	6.3	27	2500	10.7	93
4 VDC										
0.00	7400	336	231.6	0.72	149	49.8	0	12600	84.6	12
0.05	2000	336	231.1	0.75	155	13.1	12	3400	22.2	45
0.06	1300	336	231.0	0.72	150	8.5	15	2200	14.4	69
3 VDC										
0.00	2600	268	231.3	0.47	94	27.7	0	4400	47.1	21
0.02	1400	268	231.3	0.47	92	14.7	5	2300	25	40