

Appendix A. Specifications of PFC and Buck Converters

	Converter Type		
	300W PFC	2kW PFC	2kW Buck
Input Voltage, V	120 (ac)	120 (ac)	230 (dc)
Output Voltage, V dc	190	230	130
Output Current, A peak	1.58	8.70	15.38
Switch Device	IRF740	1MBH60-100	1MBH60-100
Diode	10CTF40	DSEI60-10A	DSEI60-10A
Inductor, mH	1.7	0.57	0.3
Output Capacitor, μF	820	3,200	3,000
Switching Frequency, kHz	57	18.33	11.53

Appendix B. Motor Parameters

1. SRM-Based VSD

(1) Motor: 250W SRM

No. of Poles :	8/6 ($N_s=8, N_r=6$)
Pole Arcs :	$\beta_s=16^\circ, \beta_r=18^\circ$
Rated Voltage :	160V dc
Current :	2.21A (peak), 1.56A (rms)
Rated Speed :	1,800 r/min
Rated Output :	75W @ rated speed
Peak Output :	250W @ 4,200 r/min
Resistance / Phase :	1.6 Ω
J :	3×10^{-4} Kg-m ²
B :	10^{-8} N·m/(rad/s)

(2) Generator: Pittman DC Servo Motor 14106 WDG#4

No Load Speed :	3216 r/min
Full Load Speed :	2800 r/min @12A
Max. Winding Voltage :	30.3 V dc
Terminal Resistance :	1.32 Ω
K_b :	0.00934 V/(r/min)

2. PMBDC-Based VSD for Controller Verification

(1) Motor: A.O. Smith

Rated Output :	1 hp @ 4000 r/min
Rated Current :	8.5 A
Rated Voltage :	100 V dc
Rated Speed :	4000 r/min
Number of Poles :	4
R_p :	0.7 Ω
L_p - M :	5.21 mH
K_b :	0.0143 V/(r/min)
J :	0.0022 Kg-m ²

(2) Generator: Electro Craft E-723

Max. Output :	1hp @ 4000 r/min
Max. Current :	24 A
Max. Terminal Voltage :	120 V dc
Max. Operating Speed :	4000 r/min
R_a :	2.1 Ω
L_a :	18.4 mH
K_b :	0.0621 V/(r/min)
K_t :	6.04 Kg-cm/A
J :	0.0014 Kg-m ²

3. PMBDC-Based VSD for Input PFC Study

(1) Motor: Kollmorgen M-207C

Rated Output :	4 hp @ 4900 r/min
Rated Current :	10 A
Rated Voltage :	230 V (line-to-line)
Rated Speed :	4900 r/min
Number of Poles :	4
R_p :	0.82 Ω (line-to-line)
L_p :	11 mH (line-to-line)
K_b :	0.0377 V/(r/min)
K_t :	0.624 N·m/A

(2) Generator: Integrated Electric Separately Excited DCM

Rated Output :	1hp @ 1500 r/min
Max. Current :	5.5 A
Max. Terminal Voltage :	180 V
Max. Operating Speed :	1500 r/min
Field Voltage :	220V dc
Field current :	0.6 A
R_a :	3.85 Ω
L_a :	45 mH
R_f :	385 Ω
L_f :	44 H
K_b :	0.1024 V/(r/min)
K_t :	0.0885 Kg-m/A
J :	0.024 Kg-m ²

4. DCM-Based VSD

(1) Motor: Integrated Electric Separately Excited DCM

Same as 3. (2) Generator

(2) Generator: Kollmorgen M-207C

Same as 3. (1) Motor

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