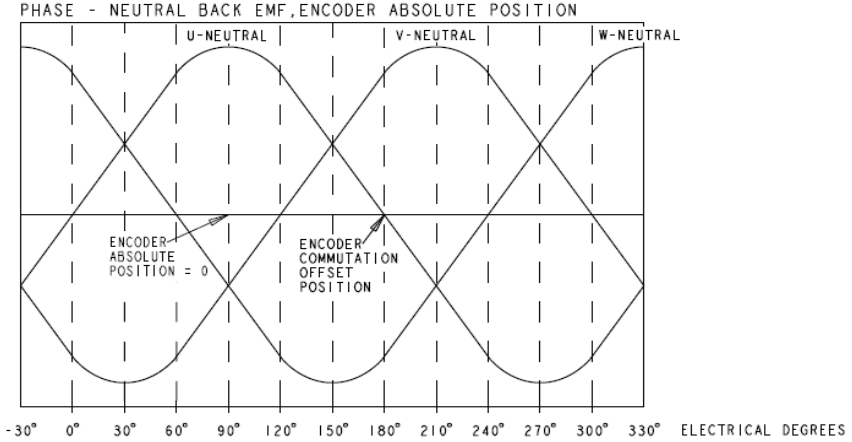
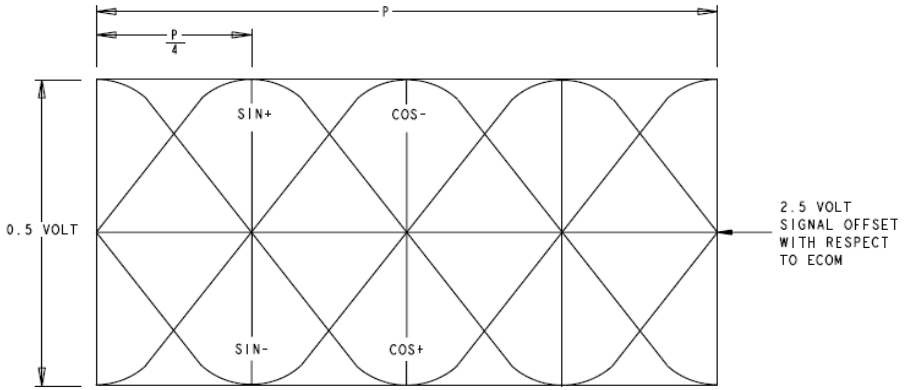
PHASE - NEUTRAL BACK EMF, ENCODER ABSOLUTE POSITION



SIN+, SIN-, COS+, COS- ENCODER OUTPUT WAVEFORMS



WAVEFORMS PER CW SHAFT ROTATION VIEWING MOTOR MOUNTING FACE

NOTES:

Rockwell Automation	CONFIDENTIAL AND PROPRIETARY INFORMATION THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF ROCKWELL AUTOMATION, INC. AND MAY NOT BE USED, COPIED OR DISCLOSED TO OTHERS, EXCEPT WITH THE AUTHORIZED WRITTEN PERMISSION OF ROCKWELL AUTOMATION, INC.	Engineering Specification Electrical **RDB-B29024-7B72AA** Dr. S. Johnson Date 10-13-09	Sheet 1 of 4 Size **A**	**10000065580**	Ver **00**

General Specifications:

1. Motor type: 3 phase, wye winding, permanent magnet rotor, totally enclosed, non-ventilated.
2. Motor poles: 38
3. Operating Speed, max: 435 RPM
4. Base speed (max speed at peak torque), Ref, at 440 VAC RMS operating voltage: 201 RPM
5. Continuous stall torque, max, at max winding temperature in a 40C ambient: 98 Nm (867 lb-in)
6. Winding temperature, max, in a 40C ambient: 150 degrees C
7. Continuous stall current, max: 10.7 Amps 0 to peak
8. Heatsink size, aluminum, attached to front mounting flange for continuous torque specifications: 407 x 407 x 19.1mm (16 x 16 x 0.75 inch)
9. Peak stall torque, max: 214 Nm (1894 lb-in)
10. Peak stall current, max: 33.0 Amps 0 to peak
11. Rated Speed (UL file and motor nameplate Rated RPM): 400 RPM
12. Continuous power rating, max: 3.33 kW (4.47 hp)
13. Speed at continuous power rating: 413 RPM
14. Continuous torque, max, at continuous power rating: 77.1 Nm (682 lb-in)
15. Continuous current, Ref, at continuous power rating: 8.4 Amps 0 to peak
16. Operating voltage, Ref (Not for direct connection to AC line): 480 VAC RMS
17. Insulation class: 155C (Class F)
18. Housing temperature, max: 125C (257F)
19. Ke, +/-10%, phase to phase at 25C +/- 5C: 1233 V/kRPM 0 to peak
20. Kt (sine), Ref, at 25C +/- 5C: 10.20 Nm/Amp (90.28 lb-in/Amp) 0 to peak
21. Winding resistance, +/- 10%, phase to phase at 25C +/- 5C: 3.48 ohms
22. Winding inductance, Ref, phase to phase: 38.8 mH
23. Dielectric rating of motor power connections (U,V,W), to ground for 1 second: 2352 VAC RMS 50/60 Hz
24. Audible noise, Ref, at 1 meter distance: 65 dbA
25. Rotor inertia, +/- 10%: 0.047 kg-m² (0.42 lb-in-sec²)
26. Friction torque, Ref: 2.7 Nm (23.9 lb-in)
27. Cogging torque, Ref: 1.58 Nm (14.0 lb-in) peak to peak
28. Thermal resistance, Ref, winding to ambient: 0.236 degrees C/watt
29. Thermal time constant, Ref, winding to ambient: 86 minutes
30. Product weight, Ref: 42.7 kg (94 lb)
31. Shipping weight, Ref: 50.8 kg (112 lb)
32. Operating ambient temperature: 0C to 40C (32F to 104F)
33. Storage ambient temperature: -30C to 70C (-22F to 158F)

Notes:

1. "Ref" denotes untoleranced specifications, provided for reference only.
2. Speed, torque and current specifications are for operation with Allen Bradley drives.

General Specifications, continued:

34. Relative humidity, non-condensing:	5% to 95%
35. Liquid / dust protection:	IP65
36. Shock, max, 6 msec duration:	20 g peak
37. Vibration, max, 30 to 2000 Hz:	2.5 g peak
38. Bearing arrangement: None internal to motor. Shaft is supported by customer's shaft / bearing system.	
39. Shaft material:	Steel
40. Paint color, gloss level, except rear cover:	Black, 20 to 35 gloss units
41. Rear cover color (Pantone color code), painted or exposed material color:	Cool gray # 5, 0 to 20 gloss units
42. Shaft, key (if provided), front mounting surface, and connectors are not painted.	

Feedback Specifications:

1. Feedback interface type (encoder supplier proprietary), order designation:	Endat, 2.2/01
2. SIN, COS waveform output signals/rev:	2048 sinusoids/rev
3. SIN, COS waveform amplitude, measured differentially from SIN+ to SIN-, or COS+ to COS-:	0.75 to 1.2 VAC peak to peak
4. SIN, COS voltage offset with respect to ECOM, +/- 0.5 VDC:	2.5 VDC
5. DATA+, DATA-, CLK+, CLK- signals applicable standard, signals type:	RS 485, Synchronous
6. CLK+, CLK- clock frequency, Ref, when operating with Kinetix Endat adapter kit:	468.75 kHz
7. Communication hierarchy: Encoder is slave, communication is externally initiated.	
8. Single turn absolute position value range:	0 to 8191 (13 bit)
9. Mulit-turn absolute shaft revolution value range:	0 to 4095 revolutions (12 bit)
10. Absolute position data: Binary, value increases with CW shaft rotation viewing motor mounting face.	
11. Memory storage capacity available for Rockwell parameters, EEPROM, min:	64 words, 16 bits/word
12. EPWR 5V (encoder power) input voltage:	3.6 to 14 VDC
13. EPWR 5V continuous input current,max, at 5.0 VDC:	TBD mADC
14. EPWR 5V inrush input current, max, when connected to Kinetix6000 drive:	TBD ADC
15. TS+, TS- PTC Thermistor transition temperature, +/-5C:	160 degrees C
16. TS+, TS- PTC thermistor circuit resistance, Ref, at thermistor transition temperature:	1100 ohms
17. TS+, TS- PTC thermistor circuit resistance, Ref, at 25 C +/- 5C:	160 ohms
18. TS+, TS- PTC thermistor resistance vs temperature curves applicable standards:	DIN 44081 / 44082
19. TS+, TS- PTC thermistor circuit configuration (number of thermistors):	2 in series

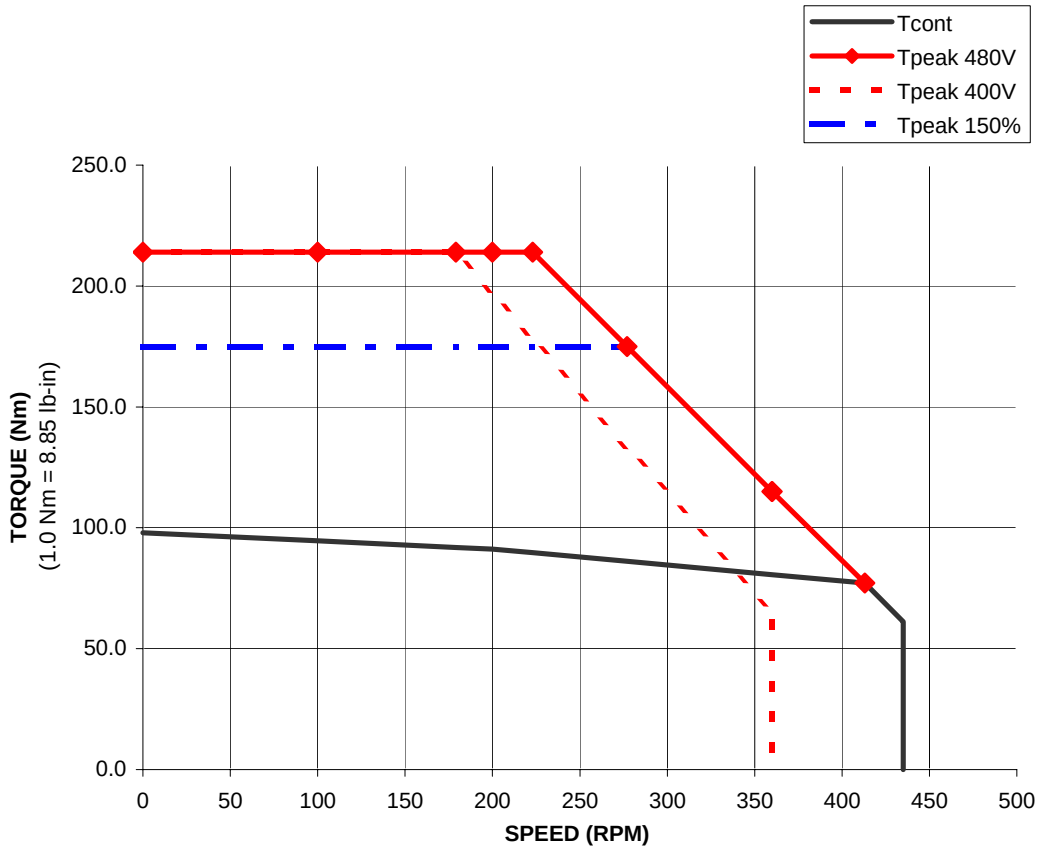
Notes:

1. "Ref" denotes untoleranced specifications, provided for reference only.

RDB-B29024-7B72AA Performance with 2094-BC02-M02S
at 480 and 400 VAC 3 phase Converter Input, 40C Motor Ambient

SPEED RPM	TORQUE			
	Tcont	Tpeak 480V	Tpeak 400V	Tpeak 150%
	Nm	Nm	Nm	Nm
0	98	214	214	175
100	94.6	214	214	175
179	91.9	214	214	175
200	91.2	214	197	175
223	89.7	214	178	175
277	86.1	175	133	175
360	80.6	115	65.6	#N/A
360	80.6	115	0	#N/A
413	77.1	77.1	#N/A	#N/A
435	61.2	#N/A	#N/A	#N/A
435	0	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A

SPEED RPM	TORQUE			
	Tcont	Tpeak 480V	Tpeak 400V	Tpeak 150%
	lb-in	lb-in	lb-in	lb-in
0	867	1894	1894	1549
100	837	1894	1894	1549
179	813	1894	1894	1549
200	807	1894	1744	1549
223	794	1894	1575	1549
277	762	1549	1177	1549
360	713	1018	581	#N/A
360	713	1018	0	#N/A
413	682	682	#N/A	#N/A
435	542	#N/A	#N/A	#N/A
435	0	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A



Notes:

1. Nm torque values shown are converted from tested lb-in data.
2. "Tpeak 150%" line shown applies when the drive peak current limit is set to 150% of the drive continuous current rating.

Rockwell Automation

CONFIDENTIAL AND PROPRIETARY INFORMATION

THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF ROCKWELL AUTOMATION, INC. AND MAY NOT BE USED, COPIED OR DISCLOSED TO OTHERS, EXCEPT WITH THE AUTHORIZED WRITTEN PERMISSION OF ROCKWELL AUTOMATION, INC.

Engineering Specification Electrical

RDB-B29024-7B72AA

Dr. S. Johnson | Date 10-13-09

Size **A** | **10000065580** | Ver **00**