Compumotor's ZETA Microstepping Drive Family

These microstepping drives are stand-alone, packaged microstepping drives that incorporate breakthrough techniques know as Active Damping™ (patented) and Electronic Viscosity™ (patent pending).

The ZETA family of drives come in 4 different power versions: ZETA4, ZETA4-240, ZETA8 and ZETA12.

Designed for reliability, the ZETA drive family offers premier quality and performance while being easy to use and apply. The ZETA drive family meets the need for global solutions:

- CE (LVD), CE(LVD and EMC) or low-noise applications
- UL Recognized
- 120VAC and 240VAC versions

The ZETA4, ZETA8, and ZETA12 operate at 120VAC and provide 4A, 8A, and 12A respectively.

The ZETA4-240, ZETA8, and ZETA12 comply with the Low Voltage [LVD (EN61010)] and Electromagnetic Compatibility [EMC (CISPR22/EN55022 Class B)] directives making it an excellent choice for machines built in or shipped to the European community. By designing the drive to meet the EMC Class B's rigid standards, the ZETA4-240, ZETA8, and ZETA12 also meets North America's FCC Class B emissions test making it the solution for low-noise applications. The ZETA4-240, ZETA8, and ZETA12 have also received UL approval.

The ZETA4-240 can be used for low- and high-power applications. For low-power applications, the ZETA 4-240 operates at 120VAC to provide the same performance as the ZETA4. For high-power applications, the ZETA4-240 runs off 240VAC to provide the same performance of an 8 AMP drive operating at 120 VAC.

Features

Performance

- Standard step-and-direction input or CW/CCW input
- Torque from 43 oz-in (0.30 N-m) to 3480 oz-in (24.4 N-m)

Performance (continued)

- Active Damping™ benefits:
  - Damping ratios of up to 0.5
  - Higher acceleration than conventional step systems
  - Decrease motor vibration
  - Increase shaft power
  - Higher performance
- Electronic Viscosity™ benefits:
  - Reduce settling time
  - Increase slow speed smoothness (reduce velocity ripple)
  - Reduce audible noise

Protection Circuit

- Motor short circuits (phase-to-phase and phase-to-ground)
- Overtemperature
- Undervoltage
- Power dump (dissipates excess energy caused by load regeneration)

Physical

- A wide selection of motors is available for both 120 VAC and 240 VAC operation
- Drive status indicators: power, step input, over temperature and motor fault
- 120VAC (170VDC bus voltage) for ZETA4, ZETA4-240, ZETA8, and ZETA12
- 240VAC (340VDC bus voltage) for ZETA4-240
- Removable connectors for easy installation
- Selectable damping for optimized performance
- Optional EMC drive kit and EMC Cable kit consisting of AC mains filter and cabling to allow complete EMC or low noise system compliance for ZETA4-240, ZETA8, and ZETA 12.

Specifications – ZETA4, ZETA8, ZETA12, and ZETA4-240

	Parameter	Value
Power		**ZETA4** / **ZETA8** / **ZETA12** / **ZETA4-240**
	AC Power Input	---- 95-132VAC Single Phase, 50/60Hz ---- 95-264VAC Single Phase, 50/60Hz
	Motor Current (Apk)	0-4 Amps / 0-8 Amps / 0-12 Amps / 0-4 Amps
	Bus Voltage	---------- 170 VDC nominal ---------- @120VAC: 170VDC nominal, @240VAC: 340VDC nominal
Performance	Accuracy	±5 arc min (0.0833°) typical. Unloaded-bidirectional with Compumotor supplied motors. Other motors may exhibit different absolute accuracy. ±1 arc min (0.0167°) Loaded-in addition to unloaded accuracy, per each frictional load equal to 1% rated torque.
	Repeatability	±5 arc sec (0.0014°) typical. Unloaded-one revolution returning to start point from same direction.
	Hysteresis	Less than 2 arc min (0.0334°) unloaded-bidirectional.
	Resolution	16 selectable choices: 200, 400, 1000, 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800
	Waveform	Selectable. Allows waveform shaping for optimum smoothness or relative accuracy. Pure sine; -4%, -6%, -10% 3rd harmonic.
Motors	Type	2-phase hybrid permanent magnet, 1.8 degree.
	Breakdown Voltage (HIPOT)	1,150VDC @ 120VAC input; 1,900VDC @ 240VAC input
	Number of Leads	4, 6 or 8
	Accuracy Grade	3%
	Inductance	0.5 mH minimum; 5 to 50 mH recommended range; 100 mH max
Amplifiers	Type	20 kHz fixed frequency, variable duty cycle PWM (pulse width modulated). Current controlled, bipolar type.MOSFETconstruction.
	Number of Phases	2
	Protection*	
	• Short Circuit	Phase-to-phase, phase-to-ground.
	• Brownout	If AC supply drops below 85VAC.
	• Over-temperature	Over-temperature shutdown fault at 113°F (50°C)
	Auto Standby	If selected, motor current ramps to 50% of preset value if no step pulses are received for 1 second. Current levels are resumed upon receipt of next step pulse.
	Automatic Test Function	This feature (used primarily for testing and verification of correct wiring) rotates the motor at approximately 1 rps in the negative (CCW) direction.
	Step Input	High-going pulse, 200 nsec min. width; max. pulse rate is 2 MHz.
	Direction Input	Logic High = positive (CW) rotation. Logic Low = negative (CCW) rotation. Direction input may change polarity, coincident with first step pulse.
	CW/CCW Input	Dip switch selectable. High-going pulse, 200 nsec min width; max pulse rate is 2 MHz.
	Shutdown Input	Logic High = amplifier disable. Logic Low = normal operation.
	Reset Input	Logic High = drive held in reset. Logic Low = normal operation.
	Fault Output	Conducting = normal operation. Not Conducting = drive fault
Environmental	Operating drive	32°F to 113°F (0°C to 45°C) Fan cooling may be required if airflow restricted.
	Storage drive	-40°F to 185°F (-30°C to 85°C)
	Motor	212°F (100°C) maximum motor case temperature. Actual temperature rise is duty-cycle dependent.
	Humidity	0-95%, non-condensing
Certifications	UL Recognized	ZETA4, ZETA4-240, ZETA8, ZETA12
	CE (LVD)	ZETA4, ZETA4-240, ZETA8, ZETA12
	CE(LVD & EMC) (EMC for CISPR22/ EN55022 Class B)**	ZETA4-420, ZETA8, ZETA12 provided the following items are used and installed properly: • CE(LVD) motor. Compumotor recommends a terminal board (NPS) motor construction for easier installation • C10 (C10H) motor cable accessory (LVD/EMC cable kit) • ZETA EMC KIT
	Low Noise (FCC Class B)**	ZETA4-240, ZETA8, ZETA12 provided the following items are used and installed properly: • CE(LVD) motor. Compumotor recommends a terminal board (NPS) motor construction for easier installation • C10 (C10H) motor cable accessory (LVD/EMC cable kit) • ZETA EMC KIT

* Drive shuts down in conditions listed

** System compliance

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ZETA6000 Series

Packaged Drive/Controller Systems

Compumotor's ZETA6000 Series products are stand-alone, single-axis drive/controller systems. The ZETA6000 Series products come in 4 different power versions: ZETA6104, ZETA6104-240, ZETA6108 and ZETA6112. These ZETA6000 products pack all the power and reliability of the 6000 family of controllers and ZETA drives into one convenient package. All of the I/O points, RS-232C/RS485 control, operator interface options, and following capabilities for single-axis applications are included. The following package can perform phase shifts, electronic gearbox, and flying cutoff functionality with ease.

The ZETA6000 Series package was made for easy and reliable installation. The connections are on removable screw terminals and a standard 50-pin header allowing simple installation and cable routing without having to cut off and reattach a connector.

The ZETA6000 Series is designed to solve single-axis applications cleanly, completely, and for a low cost. For multiple-axis applications, up to 99 ZETA6000 Series can be daisy chained (32 ZETA6000 Series can be multi-dropped using RS-485) to work together.

In order to speed your application development, the ZETA6000 Series comes standard with Motion Architect™, a Microsoft® Windows™-based development package. Motion Architect™ contains many tools which allow you to easily create and implement motion programs. The ZETA6000 Series is also compatible with the DDE6000 Server software package.

The ZETA6000 Series uses the 6000 Series command language. This popular language is powerful enough to implement complex motion control applications and simple enough to not overwhelm the novice programmer. The ZETA6000 Series is your single-axis solution.

Features

Performance

- One axis package drive/controller
- Active Damping™ benefits:
  - Damping ratios of up to 0.5
  - Higher acceleration than conventional step systems
  - Decrease motor vibration
  - Increase shaft power
  - Higher performance
- Electronic Viscosity™ benefits:
  - Reduce settling time
  - Increase slower speed smoothness (reduce velocity ripple)
  - Reduce audible noise

Protection Circuit

- Motor short circuits (phase-to-phase and phase-to-ground)
- Overtemperature of internal drives and power supply
- Overvoltage (protects against overvoltage from regeneration)
- Power dump (dissipates excess voltage caused by load regeneration)

I/O

- Encoder channel configurable as hardware up/down counter
- Incremental encoder input
- Home and end-of-travel limit inputs

Features (continued)

- Two fast (trigger) inputs for position capture, registration, etc.
- 16 programmable inputs (Opto-22 compatible)
- 8 programmable outputs (Opto-22 compatible)
- One auxiliary programmable output

Language

- 150,000 bytes of non-volatile memory for storing programs and paths
- Interrupts program execution on error conditions
- Encoder and motor position capture (using the trigger inputs)
- Registration (using the trigger inputs)
- Selectable damping (programmable) to optimize performance for changing loads
- Variable storage, conditional branching and math capability
- Program debug tools – single-step and trace modes, breakpoints, error messages and simulation of I/O

Software Provided

- Motion Architect™, Microsoft® Windows™-based application development software
- Dynamic Link Library (DLL) provided for use with Microsoft® Windows™ and Microsoft® Windows™ NT software development kits

Optional Software

- Dynamic Data Exchange (DDE) server available allowing data exchange between different Windows™ software applications

Interface Capabilities

- Direct interface to RP240 Remote Operator Panel
- Operates stand-alone or interfaces to PCs, PLCs, and thumbwheels
- One RS-232C communication port
- One RS232C/485 configurable port

Physical

- Stand-alone drive/controller package
- Status/fault LEDs to confirm proper operation (four diagnostic LEDs)
- Removable connectors for easy installation
- 120VAC (170VDC bus voltage) for ZETA6104, ZETA6104-240, ZETA6108, ZETA6112
- 240VAC (340VDC bus voltage) for ZETA6104-240

Specifications – ZETA6104, ZETA6108, ZETA6112, and ZETA6104-240

	Parameter	Value			
Power		**ZETA6104**	**ZETA6108**	**ZETA6112**	**ZETA6104-240**
	AC Power Input	---------- 95-132VAC Single Phase, 50/60Hz ----------			95-264VAC Single Phase, 50/60Hz
Motor Curent (Apk)		0-4Amps	0-8 Amps	0-12 Amps	0-4 Amps
	Bus Voltage	---------- 170 VDC nominal ----------			@120VAC: 170VDC nominal, @240VAC: 340VDC nominal
Performance	Position range	±2,147,483,648 steps			
	Velocity range	1 to 2,000,000 steps/sec			
	Acceleration range	1 to 24,999,975 steps/sec^2			
	Motion Algorithm Update Rate	2 ms			
RS-232C Interface	Connections	3-wire (Rx, Tx, and GND) connection to the COM1 and/or COM2 connectors.			
	Max number of daisy chained	Up to 99 units			
	Address settings	Selectable			
	Communication parameters	9,600 baud (auto-baud option); 8 data bits, 1 stop bit, no parity bit, full duplex.			
RS-485 Interface	Connections	2-wire or 4-wire (Rx+, Rx-, Tx+, Tx-) connection to the COM2 connector (COM2 needs to be configured to RS-485 Interface).			
	Max number of multi-dropped	Up to 99 units			
	Address settings	Selectable (see optional DIP switch setting and ADDR command).			
	Communication parameters	9,600 baud, 8 data bits, 1 stop bit, no parity bit, half duplex.			
Protection	Short Circuit	Phase-to-phase, phase-to-ground			
	Brownout	AC supply drops below 85VAC			
	Over-temperature	Over-temperature shutdown fault at 113°F (55°C)			

Additional Specifications Continued on Following Page

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Specifications – ZETA6104, ZETA6108, ZETA6112, and ZETA6104-240 (Continued)

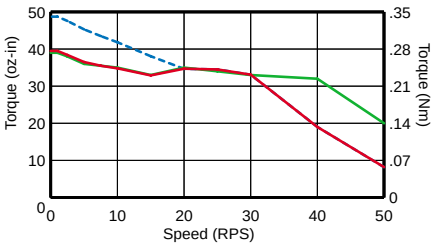
Inputs (see also I/O pinouts & circuit)	HOM, POS, NEG, TRG-A TRG-B, P-CUT	Powered by voltage applied to V_I/O terminal (switching levels: ≤ 1/3 of V_I/O voltage = low, ≥ 2/3 of V_I/O voltage = high). V_I/O can handle 5–24V with max current of 100 mA. Internal 6.8 KΩ pull-ups to AUX-P terminal—connect AUX-P to power source (+5V terminal or an external 5–24V supply) to source current or connect AUX-P to power source (+5V terminal or an external 5–24V supply) to source current or connect AUX-P to GND to sink current; AUX-P can handle 0–24V with max current of 50 mA. Voltage range for these inputs is 0–24V.
	Encoder	Differential comparator accepts two-phase quadrature incremental encoders with differential (recommended) or single-ended outputs. Max voltage = 5VDC. Switching levels (TTL-compatible); Low ≤0.4V, High ≥ 2.4V. Maximum frequency = 1.6 MHz. Minimum time between transitions = 625 ns.
	16 General Purpose Programmable	HCMOS compatible* with internal 6.8 KΩ pull-up to IN-P terminal—connect IN-P to power (+5V pin #49 or an external 5-24V supply) to source current or connect IN-P to GND to sink current; IN-P can handle 0-24V with max current of 100 mA. Voltage range = 0–24V.
Outputs	All outputs are optically isolated from the microprocessor (not from the other outputs).	
	9 Programmable (includes OUT-A)	Open collector output with 4.7 kΩ pull-ups. Can be pulled up by connecting OUT-P to power source (+5V terminal or an external 5-24V supply); OUT-P can handle 0-24V with max current of 50 mA. Outputs will sink up to 300 mA or source up to 5 mA at 5-24VDC. 8 general purpose outputs on the Programmable I/O connector, OUT-A on the I/O connector.
	+5V Output	Internally supplied +5VDC. +5V terminals are available on the COM2, ENCODER and I/O connectors. Load limit (total load for all I/O connections) is 0.5A.
Environmental	Operating drive	32°F to 113°F (0°C to 45°C) Fan cooling may be required if airflow restricted.
	Storage drive	-40°F to 185°F (-30°C to 85°C)
	Motor	212°F (100°C) maximum motor case temperature. Actual temperature rise is duty-cycle dependent.
	Humidity	0-95%, non-condensing
Diagnostic LEDs		Power/drive on, step pulses, drive over-temperature, and motor short circuit
Certification	UL Recognized	ZETA6104, ZETA6104-240, ZETA6108, ZETA6112
	CE (LVD)	ZETA6104, ZETA6104-240, ZETA6108, ZETA6112

* *HCMOS-compatible switching voltage levels: low ≤ 1.0V, high ≥ 3.25V; TTL-compatible switching voltage levels: low ≤ 0.4V; high ≥ 2.4V*

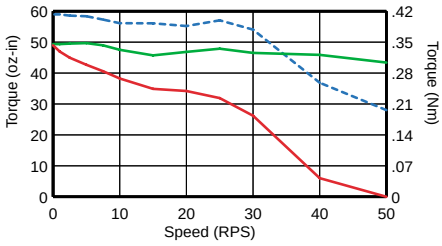
Speed-Torque Curves (@120VAC)

ZETA with VS Motors

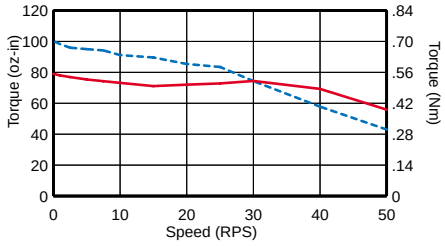
VS12B/ZETA4



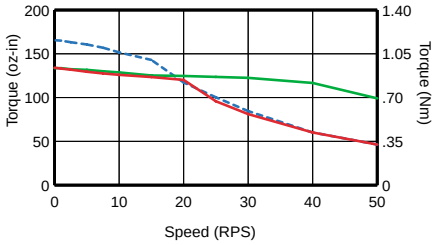
VS13B/ZETA4



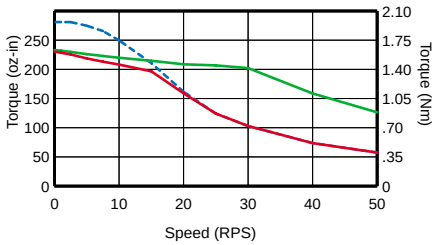
VS21B/ZETA4



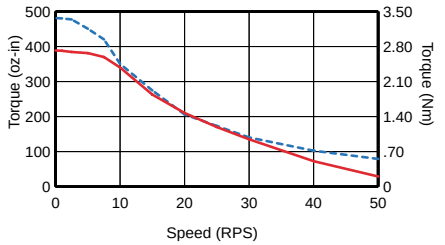
VS22B/ZETA4



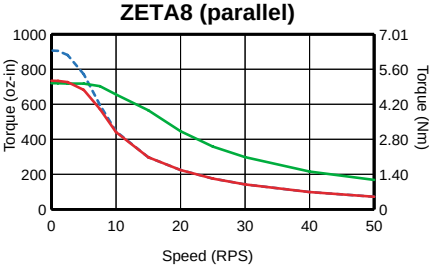
VS23B/ZETA4



VS31B/ZETA4



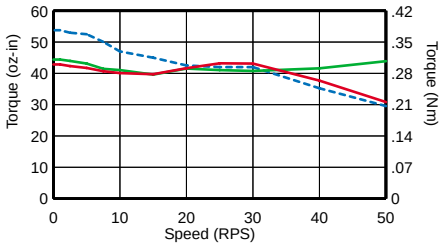
VS32B/ZETA4 (series)
ZETA8 (parallel)



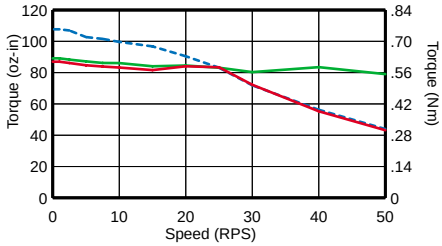
For ZETA Series Motor Specifications and dimensions, please refer to the E Series Motor Specifications located in the Gemini Section.

ZETA with OS Motors

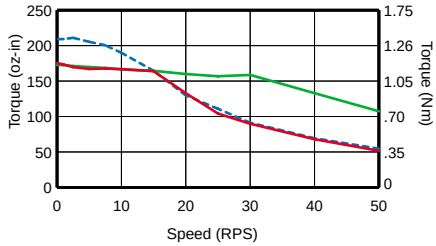
OS2HB/ZETA4



OS21B/ZETA4



OS22B/ZETA4



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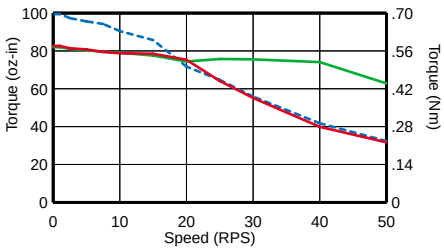
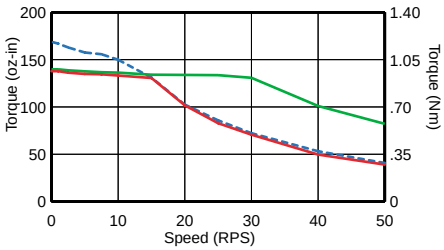
Speed-Torque Curves (@120VAC) (cont'd)

ZETA with ES Motors

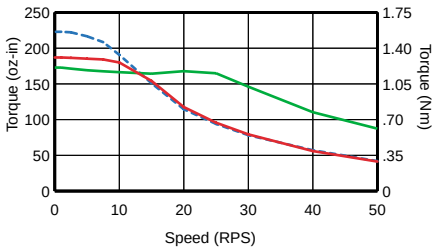
ES21B/ZETA



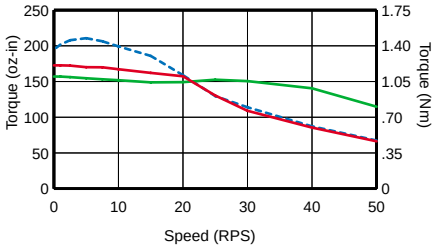
ES22B/ZETA



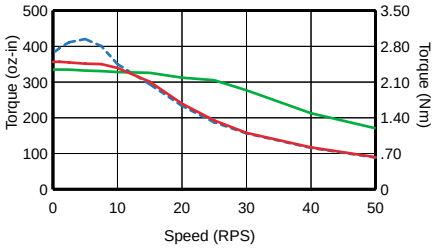
ES23B/ZETA



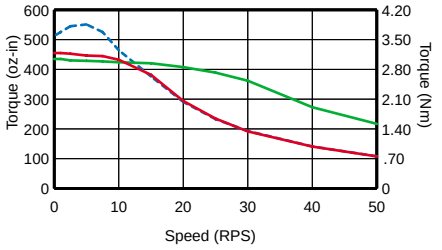
ES31B/ZETA



ES32B/ZETA

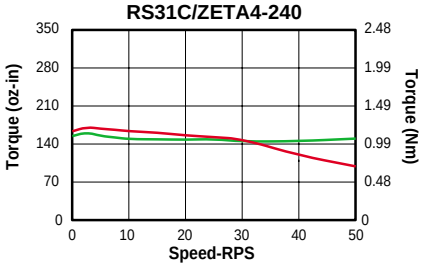


ES33B/ZETA

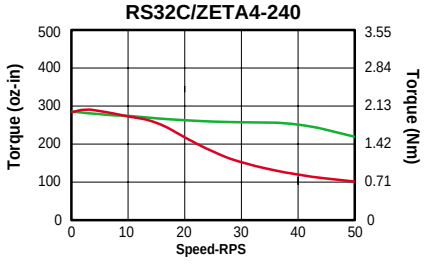


ZETA with RS Motors

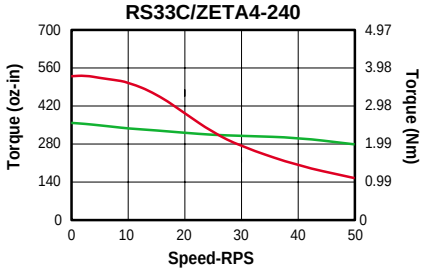
RS31C/ZETA4-240



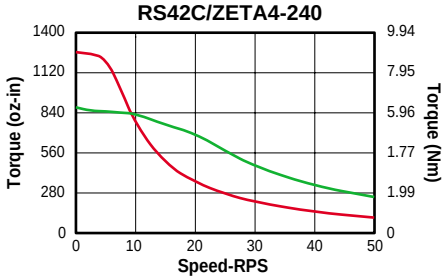
RS32C/ZETA4-240



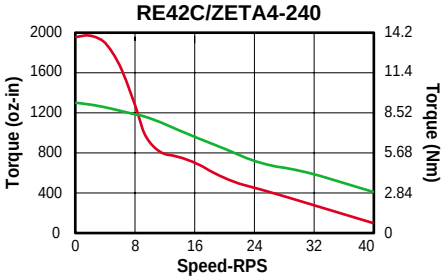
RS33C/ZETA4-240



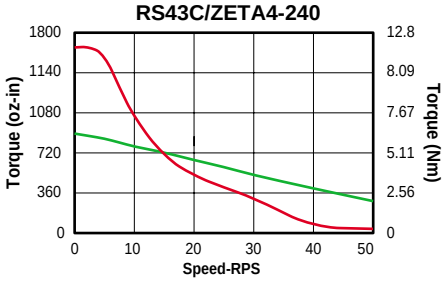
RS42C/ZETA4-240



RE42C/ZETA4-240



RS43C/ZETA4-240



Parallel connected motors are limited to 50% duty cycle when operated above 5 rps. For greater than 50% duty cycle above 5 rps, connection must be made to the motor in series. Fan cooling the motor will increase duty cycles above 5 rps.

Viscous damper is not required to achieve speed-torque curves.

Note: ±10% torque variance due to motor tolerance

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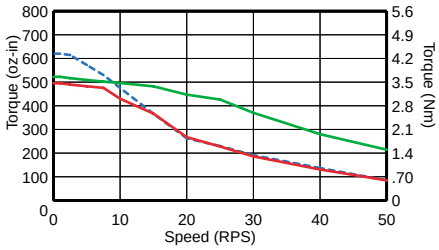
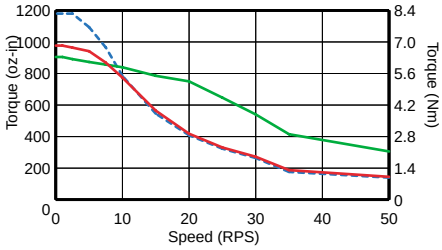
Speed-Torque Curves (@120VAC) (cont'd)

ZETA with TS Motors

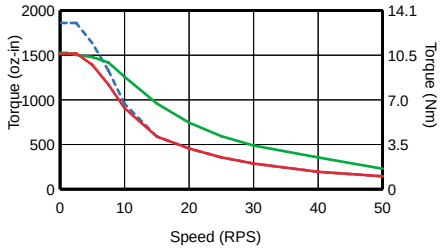
TS31B/ZETA



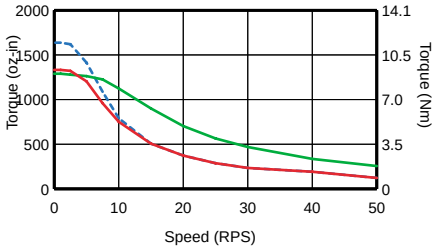
TS32B/ZETA



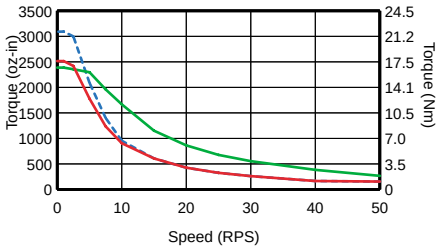
TS33B/ZETA



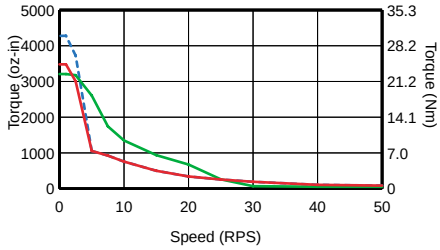
TS41B/ZETA



TS42B/ZETA



TS43B/ZETA



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ES Series Stepper Motor Specifications Size 23 & 34 Frame Sizes

Parameters		Size 23 Frame			Size 34 Frame		
		ES21B	ES22B	ES23B	ES31B	ES32B	ES33B
Static torque	oz-in	65	100	125	160	300	400
	(N-m)	(0.46)	(0.71)	(0.89)	(1.14)	(2.14)	(2.80)
Rotor inertia	$oz\text{-}in^2$	0.546	1.1	1.69	3.47	6.76	10.47
	($kg\text{-}m^2 \times 10^{-6}$)	(9.998)	(20.1)	(30.9)	(63.4)	(124)	(191)
Drive Current	Series	1.76 (1.24)	2.01 (1.42)	2.63 (1.86)	2.76 (1.95)	3.63 (2.57)	4.0 (2.83)
Apk (Arms)	Parallel	3.5 (2.47)	4.0 (2.83)	5.16 (3.65)	5.42 (3.83)	7.23 (5.11)	8.0 (5.66)
Phase Inductance	Series	17.37	18.5	17	10	10.5	9.2
	Parallel	4.34	4.62	4.25	2.5	2.62	2.3
Bearings							
Thrust load	lb	25	25	25	50	50	50
	(kg)	(11.3)	(11.3)	(11.3)	(22.6)	(22.6)	(22.6)
Radial load	lb	15	15	15	25	25	25
	(kg)	(6.8)	(6.8)	(6.8)	(11.3)	(11.3)	(11.3)
End play	in	0.005	0.005	0.005	0.005	0.005	0.005
Reversing load	(cm)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Equal to 1 lb							
Radial play	in	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
Per 0.5 lb load	(cm)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Weight (net)							
Motor+Cable	lb	1.6	2.4	3.2	3.8	5.1	8.3
+Connector	(kg)	(0.7)	(1.1)	(1.5)	(1.7)	(2.3)	(3.8)
Motor Cable							
Wire size	AWG	24	24	24	22	22	22
	(mm^2)	(0.25)	(0.25)	(0.25)	(0.34)	(0.34)	(0.34)

All motors: Cable length = 10 feet (3 m); attached connector is prewired for series current.

OS & VS Series Stepper Motor Specifications
Size 17, 23 & 34 Frame Sizes

Parameters		Size 23 Frame OS2HB	Size 23 Frame OS21B	Size 23 Frame OS22B	Size 17 Frame VS12B	Size 17 Frame VS13B	Size 23 Frame VS21B	Size 23 Frame VS22B	Size 23 Frame VS23B	Size 34 Frame VS31B	Size 34 Frame VS32B
Static torque	oz-in	61	127	238	57	73	116	195	335	552	1270
	(Nm)	(0.4)	(0.9)	(1.7)	(0.4)	(0.5)	(0.8)	(1.4)	(2.4)	(3.9)	(9.0)
Rotor inertia	oz-in^2	0.39	0.66	1.39	0.3	0.37	0.66	1.64	2.62	7.65	14.8
	(kg-cm^2)	(0.07)	(0.12)	(0.25)	(0.054)	(0.068)	(0.12)	(0.3)	(0.48)	(1.4)	(2.7)
Drive Current Apk (Arms)	Series	1.8 (1.3)	1.9 (1.3)	2.4 (1.7)	1.0 (0.7)	1.0 (0.7)	2.3 (1.6)	2.0 (1.4)	2.0 (1.4)	3.0 (2.1)	3.1 (2.2)
	Parallel	3.6 (2.6)	3.8 (2.6)	4.8 (3.4)	2.0 (1.4)	2.0 (1.4)	4.6 (3.2)	4.0 (2.8)	4.0 (2.8)	6.0 (4.2)	6.2 (4.4)
Phase Inductance (mH)	Series	8.6	12	16.6	3.2	2.8	5	12.0	15.4	15.8	25.0
	Parallel	2.2	3	4.2	(0.85)	(0.7)	(1.25)	(3.0)	(3.85)	(3.95)	(6.25)
Drive Bus Voltage	(VDC)	170	170	170	170	170	170	170	170	170	170
Detent Torque	oz-in	2.5	4.0	7.0	2.7	3.0	2.7	3.3	6.0	14.0	28.0
	(N-m)	(0.02)	(0.03)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.1)	(0.2)
Bearings Information											
Thrust Load	lb	13	13	13	11	11	17.6	17.6	17.6	35.3	35.3
	(kg)	(5.9)	(5.9)	(5.9)	(5)	(5)	(8)	(8)	(8)	(16)	(16)
Radial Load	lb	20	20	20	7.7	7.7	15.0	15.0	15.0	30.9	30.9
	(kg)	(9.1)	(9.1)	(9.1)	(3.5)	(3.5)	(6.8)	(6.8)	(6.8)	(14)	(14)
End Play	in	0.001	0.001	0.001	0.003	0.003	0.003	0.003	0.003	0.0032	0.0032
	(mm)	(0.025)	(0.025)	(0.025)	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.080)	(0.080)
Radial Play (Per 0.5 lb load)	in	0.0008	0.0008	0.0008	0.001	0.001	0.001	0.001	0.001	0.0008	0.0008
	(mm)	(0.02)	(0.02)	(0.02)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.020)	(0.020)
Motor Weight	lb	1	1.5	2.5	0.55	0.77	1.03	1.54	2.2	3.86	6.18
	(kg)	(0.5)	(0.7)	(1.1)	(0.25)	(0.35)	(0.47)	(0.7)	(1.0)	(1.75)	(2.8)
Certifications	UL recognized	Pending	Pending	Pending	No	No	No	No	No	No	No
	CE (LVD)	Yes	Yes	Yes	No	No	No	No	No	No	No
	CE (EMC & LVD)*	No	No	No	No	No	No	No	No	No	No

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Motor Specifications - 170 VDC Motor

Parameters		Size 23 Frame OS2HB	OS21B	OS22B
Static torque**	oz-in (Nm)	43 (0.30)	82 (0.58)	155 (1.09)
Rotor inertia	oz-in^2 (kg-cm^2)	0.39 (0.07)	0.66 (0.12)	1.39 (0.25)
Drive Current (Apk)(Arms)**	Series Parallel	1.5 (1.0) 3.0 (2.1)	1.8 (1.3) 4.0 (2.8)	2.2 (1.5) 4.0 (2.8)
Phase Inductance (mH)***	Series Parallel	8.6 2.2	12 3	16.6 4.2
Drive Bus Voltage	(VDC)	170	170	170
Detent Torque	oz-in (N-m)	2.5 (0.02)	4.0 (0.03)	7.0 (0.05)
Bearings Information				
Thrust Load	lb (kg)	13 (5.9)	13 (5.9)	13 (5.9)
Radial Load	lb (kg)	20 (9.1)	20 (9.1)	20 (9.1)
End Play (Reversing load equal to 1 lb)	in (mm)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)
Radial Play (Per 0.5 lb load)	in (mm)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)
Motor Weight	lb (kg)	1 (0.5)	1.5 (0.7)	2.5 (1.1)
Certifications	UL recognized CE (LVD) CE (EMC & LVD)*	Pending Yes No	Pending Yes No	Pending Yes No

For ZETA Series Motor Specifications and dimensions, please refer to the E Series Motor Specifications located in the Gemini Section.

Motor Specifications - 170 VDC Motor

Parameters		Size 34 Frame TS31B	TS32B	TS33B	Size 42 Frame TS41B	TS42B	TS43B
Static torque**	oz-in (N-m)	455 (3.19)	647 (4.53)	1525 (10.68)	1332 (9.32)	2515 (17.61)	3479 (24.35)
Rotor inertia	oz-in^2 (kg-cm^2)	7.80 (1.43)	14.67 (2.68)	21.89 (4.01)	30.22 (5.53)	59.68 (10.92)	88.51 (16.20)
Drive Current (Apk)(Arms)**	Series Parallel	3.3 (2.3) 6.7 (4.7)	3.1 (2.2) 6.2 (4.4)	5.6 (4.0) 12.0 (8.5)	6.4 (4.5) 12.0 (8.5)	6.7 (4.7) 12.0 (8.5)	6.9 (4.9) 12.0 (8.5)
Drive Bus Voltage	(VDC)	170	170	170	170	170	170
Phase Inductance (mH)***	Series Parallel	10.3 2.6	10.3 2.6	13.6 3.4	15.8 3.9	22.0 5.5	30.7 7.7
Detent Torque	oz-in (Nm)	18 (0.13)	36 (0.25)	54 (0.38)	42 (0.30)	84 (0.59)	106 (0.75)

Motor Specifications - 170 VDC Motor (cont'd)

Parameters		Size 34 Frame TS31B	TS32B	TS33B	Size 42 Frame TS41B	TS42B	TS43B
Bearings Information							
Thrust Load	lb (kg)	305 (139)	305 (139)	305 (139)	404 (184)	404 (184)	404 (184)
Radial Load	lb (kg)	65 (30)	65 (30)	110 (50)	125 (57)	110 (50)	110 (50)
End Play (Reversing load equal to 1 lb)	in (mm)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)
Radial Play (Per 0.5 lb load)	in (mm)	0.0008 (0.020)	0.0008 (0.020)	0.0008 (0.020)	0.0008 (0.020)	0.0008 (0.020)	0.0008 (0.020)
Motor Weight	lb (kg)	5.0 (2.3)	8.4 (3.8)	11.9 (5.4)	11.0 (5.0)	18.4 (8.4)	25.7 (11.7)
Certifications	UL recognized CE (LVD) CE (EMC & LVD)*	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *

For ZETA Series Motor Specifications and dimensions, please refer to the E Series Motor Specifications located in the Gemini Section.

Motor Specifications - 340VDC Motor

Parameters		Size 34 Frame RS31C	RS32C	RS33C	Size 42 Frame RS42C	RE42C	RS43C
Static torque**	oz-in (N-m)	171 (1.21)	292 (2.06)	532 (3.76)	1.266 (8.94)	1,959 (13.8)	1,671 (11.8)
Rotor inertia	oz-in^2 (kg-cm^2)	3.20 (0.59)	6.56 (1.20)	9.65 (1.77)	61.76 (11.30)	61.76 (11.30)	92.64 (16.95)
Drive Current (Apk)(Arms)**	Series Parallel	2.2 (1.6) 4.0 (2.8)	2.8 (2.0) 4.0 (2.8)	3.5 (2.5) 4.0 (2.8)	3.2 (2.3) 4.0 (2.8)	3.4 (2.4) 4.0 (2.8)	4.0 (2.8) 4.0 (2.8)
Phase Inductance (mH)***	Series Parallel	17.4 4.4	26.2 6.6	23.3 5.8	65.4 16.4	55.6 13.9	42.9 10.7
Drive Bus Voltage	(VDC)	340	340	340	340	340	340
Detent Torque	oz-in (N-m)	8.8 0.062	18.0 0.130	27.0 0.190	50.0 (0.350)	81.0 (0.570)	71.0 (0.500)
Bearings Information Thrust Load	lb (kg)	180 (81.6)	180 (81.6)	180 (81.6)	400 (182)	400 (182)	400 (182)
Radial Load	lb (kg)	35 (15.9)	35 (15.9)	35 (15.9)	140 (63.6)	140 (63.6)	140 (63.6)
End Play (Reversing load equal to 1 lb)	in (mm)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)
Radial Play (Per 0.5 lb load)	in (mm)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)
Motor Weight	lb (kg)	3.2 (1.5)	5.3 (2.4)	7.6 (3.5)	18.2 (8.3)	18.2 (8.3)	25.7 (11.7)
Certifications	UL recognized CE (LVD) CE (EMC & LVD)*	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *	Yes Yes *

* *EMC is a system compliance. To comply with EMC and low-noise (C15PR22/EN55022 Class B or FCC Class B emissions) standards, the following items are required:*
- *ZETA4-240, ZETA8, or ZETA12 Drive • ZETA EMC KIT • C10 motor accessory (LVD/EMC cable kit)*
- *CE(LVD) motor for LVD. Compumotor recommends a terminal board (NPS) motor construction for easier EMC installation*

** *Values shown in speed-torque curves*

*** *Small signal values*

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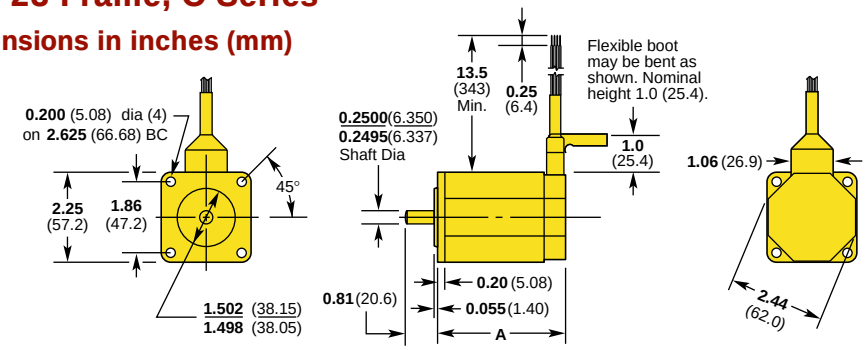
ZETA Series CE Motor Dimensional Drawings

Size 23 Frame, O Series

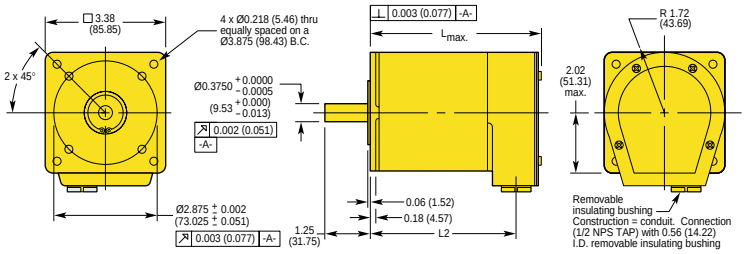
Dimensions in inches (mm)

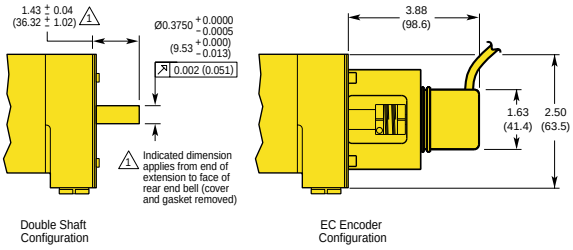


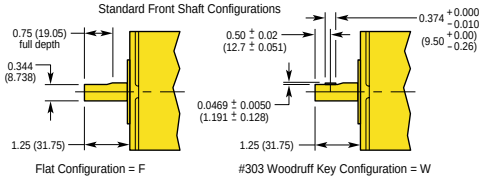
Model		A	
OS2HA	(OEM57-40)	1.60	(40.6)
OS21A	(OEM57-51)	2.06	(52.3)
OS22A	(OEM57-83)	3.10	(87.7)

Size 34 Frame, R Series

Dimensions in inches (mm)



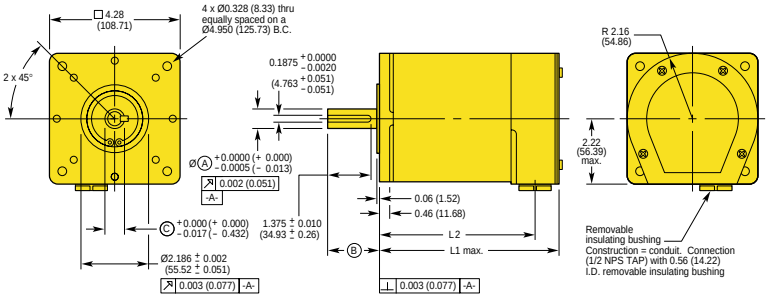


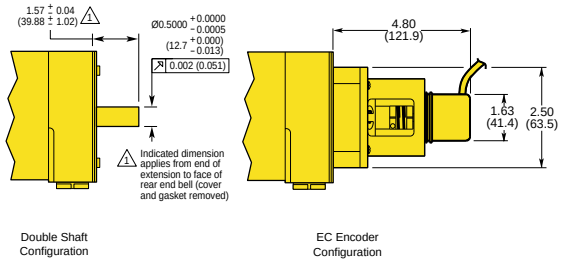


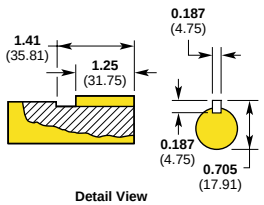
Model	Lmax		L2	
RS31□–□□□NPS	3.62	(91.95)	2.87	(72.9)
RS32□–□□□NPS	4.77	(121.16)	4.02	(102.11)
RS33□–□□□NPS	6.05	(153.67)	5.30	(134.62)

Size 42 Frame, R Series

Dimensions in inches (mm)





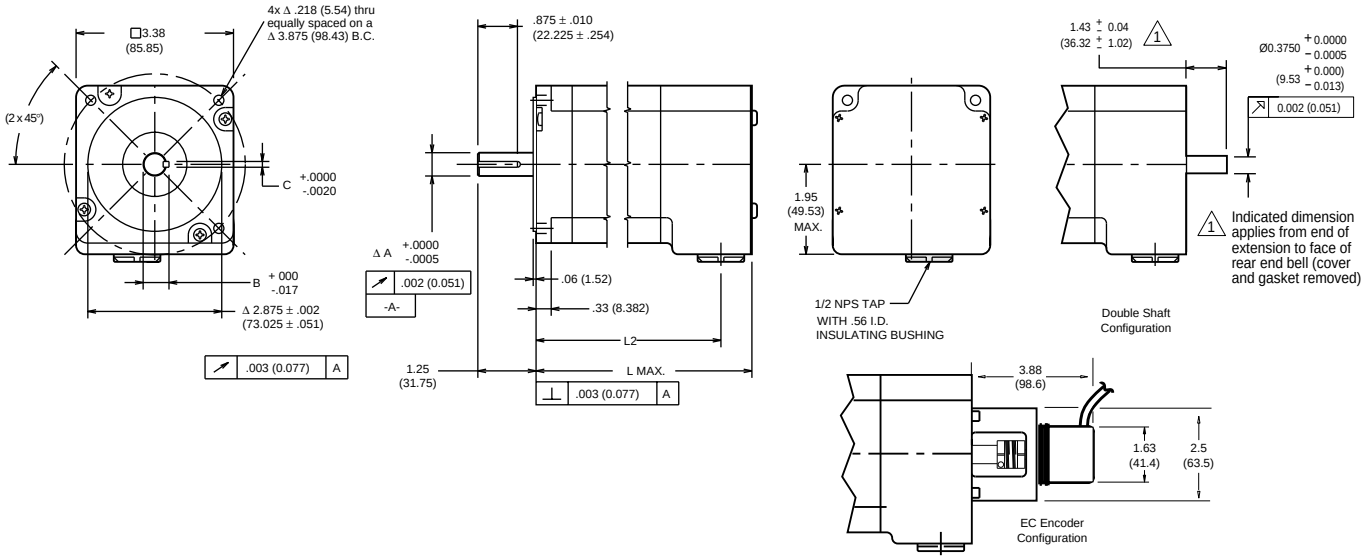


Model	Lmax		L2		A		B		C	
RS42□–□□□NPS	8.04	(204.22)	7.29	(185.17)	0.625	(15.87)	2.19	(55.63)	0.705	(17.91)
RE42□–□□□NPS	8.04	(204.22)	7.29	(185.17)	0.625	(15.87)	2.19	(55.63)	0.705	(17.91)
RS43C–□□□NPS	10.56	(268.23)	9.81	(249.18)	0.75	(19.05)	2.19	(55.63)	0.83	(21.09)

ZETA Series CE Motor Dimensional Drawings

Size 34 Frame, T Series

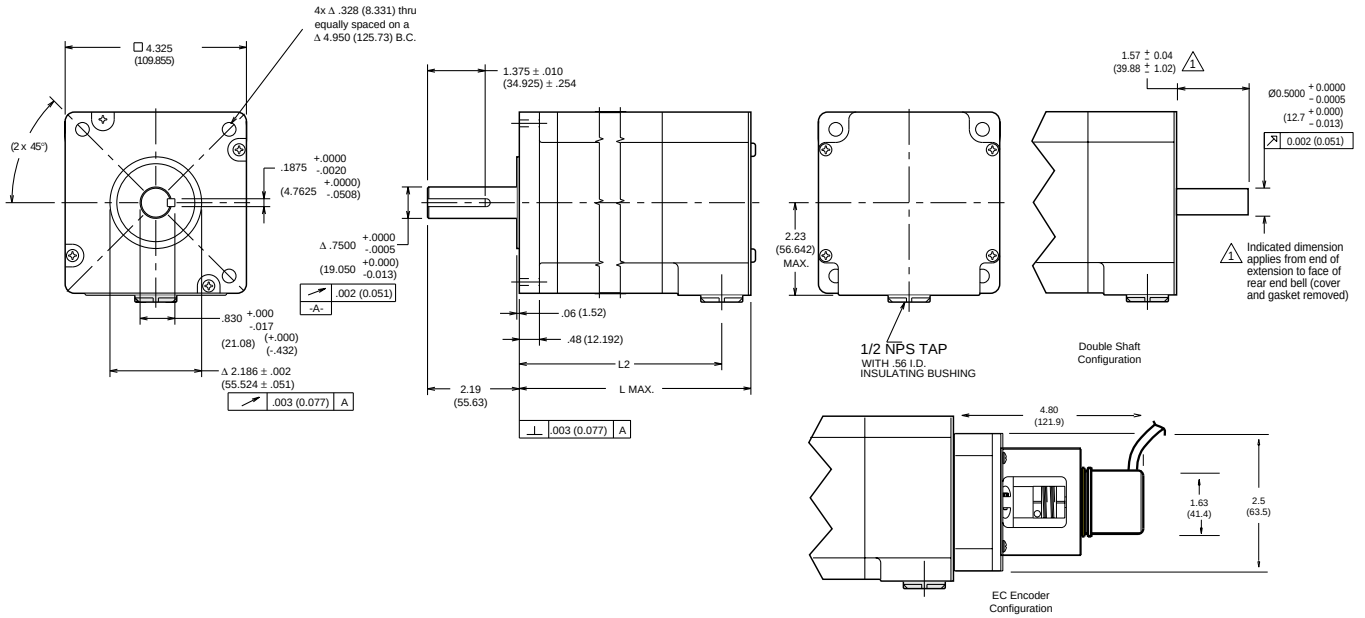
Dimensions in inches (mm)



Model	Lmax	L2	A	B	C
TS31B-□K□NPS	4.44 (112.78)	3.70 (93.98)	0.5000 (12.70)	.555 (14.097)	.1250 (3.175)
TS32B-□K□NPS	5.96 (151.38)	5.22 (132.59)	0.5000 (12.70)	.555(14.097)	.1250 (3.175)
TS33B–□K□NPS	7.48 (189.99)	6.74 (171.20)	0.6250 (15.88)	.705 (17.907)	.1875 (4.763)

Size 42 Frame, T Series

Dimensions in inches (mm)



Model	Lmax	L2
TS41B-□K□NPS	5.20 (132.08)	4.46 (113.28)
TS42B-□K□NPS	7.22 (183.39)	6.48 (164.59)
TS43B–□K□NPS	9.23(1234.44)	8.49 (215.65)

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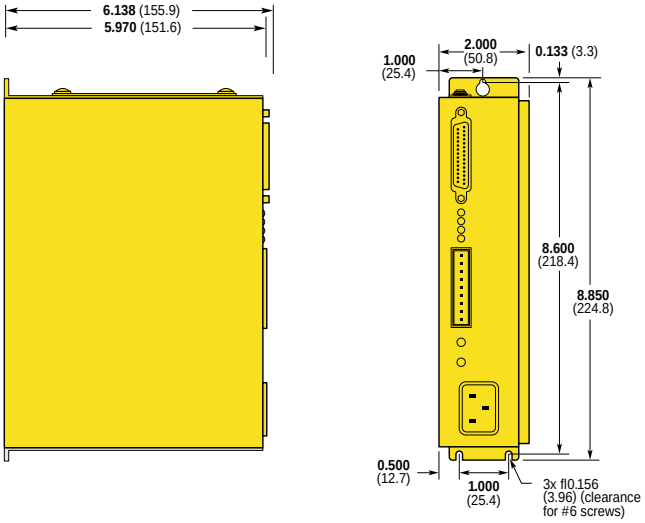
ZETA Dimensional Drawings

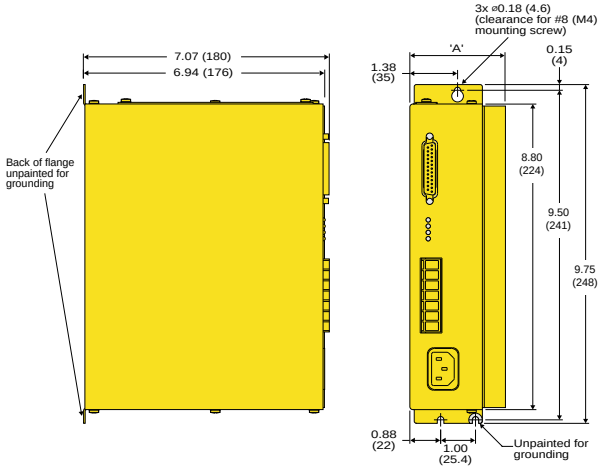
ZETA4 Dimensions

Dimensions in inches (mm)



ZETA4-240, ZETA8, ZETA12 Dimensions

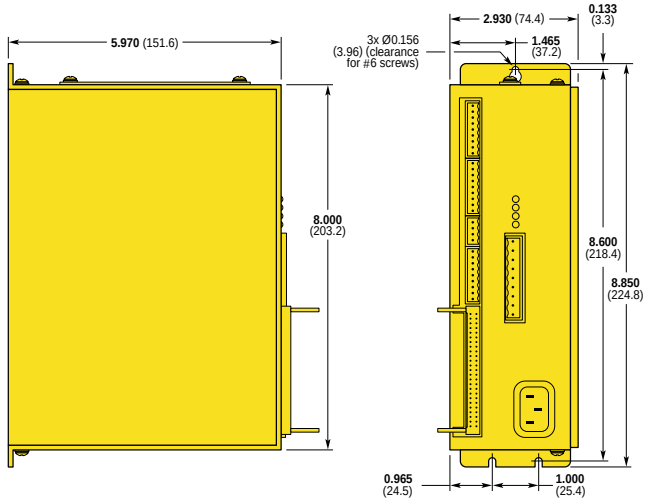
Dimensions in inches (mm)



Product	'A'
ZETA8 & ZETA4-240	2.75 (70)
ZETA12	3.75 (96)

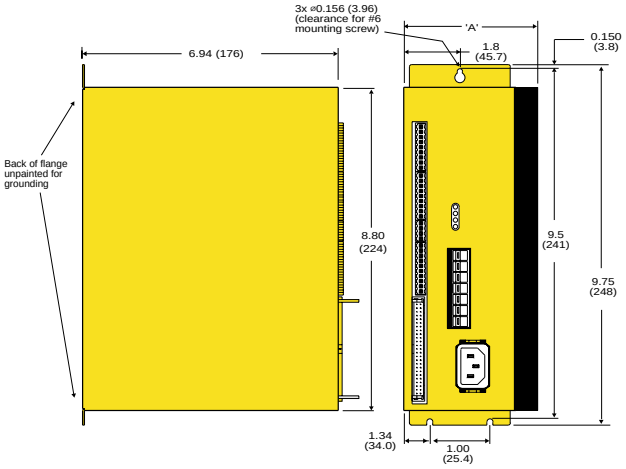
ZETA6104 Dimensions

Dimensions in inches (mm)



ZETA6104-240, ZETA6108, ZETA6112

Dimensions in inches (mm)



Product	'A'
ZETA6104-240	3.69 (93.7)
ZETA6108	3.69 (93.7)
ZETA6112	4.69 (119.2)

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ZETA6000 Series Connection Pin-Out List

(ZETA6104, ZETA6104-240, ZETA6108 & ZETA6112)

COM1 4-Pin Screw Terminal

Pin No	Signal
1	Rx
2	Tx
3	Ground
4	Shield

COM2 5-Pin Screw Terminal

Pin No	Signal
1	+5VDC (out)/Rx+
2	Ground/RX-
3	Rx/Tx+
4	Tx/Tx-
5	Shield/Ground

Encoder 9-Pin Screw Terminal

Pin No	Signal
1	Shield
2	Ground
3	Z-
4	Z+
5	B-
6	B+
7	A-
8	A+
9	+5VDC (out)

I/O 10-Pin Screw Terminal

Pin No	Signal
1	Trigger A
2	Trigger B
3	Output A-
4	Ground
5	Pulse cut-off
6	+5VDC (out)
7	Output pull-up
8	Input pull-up
9	Auxiliary pull-up
10	Voltage Reference (V_I/O)

Motor 9-Pin Screw Terminal

Pin No	Signal
1	Interlock
2	A- Center tap
3	A+
4	A-
5	Earth
6	B+
7	B-
8	B- Center tap
9	Interlock

Limits 4-Pin Screw Terminal

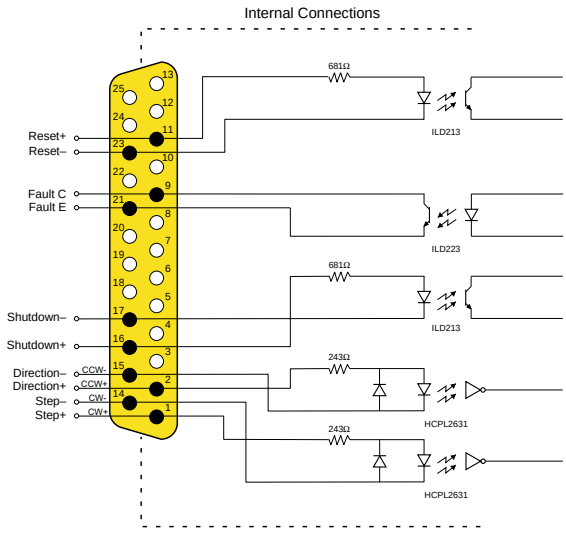
Pin No	Signal
1	Ground
2	Home
3	Neg
4	Pos

Programmable I/O Pin Outs 50-Pin Screw Terminal

Pin No	I/O Connector		
1	Input #16	27	Input #7
3	Input #15	29	Input #6
5	Input #14	31	Input #5
7	Input #13	33	Output #4
9	Input #12	35	Output #3
11	Input #11	37	Output #2
13	Input #10	39	Output #1
15	Input #9	41	Input #4
17	Output #8	43	Input #3
19	Output #7	45	Input #2
21	Output #6	47	Input #1
23	Output #5	49	+5VDC
25	Input #8	Even-numbered pins connected to common logic ground.	

ZETA Drives Connection

(ZETA4, ZETA4-240, ZETA8 & ZETA12)



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Ordering Information

Drives

Part No.	Description	
ZETA4	Packaged 4Apk, 170VDC bus microstepping drive	and CE (LVD)
ZETA4-240	@120VAC: Packaged 4Apk, 170VDC bus microstepping drive @ 240VAC: Packaged 4Apk, 340VDC bus microstepping drive	and CE (EMC & LVD)
ZETA8	Packaged 8Apk, 170VDC bus microstepping drive	and CE (EMC & LVD)
ZETA12	Packaged 12Apk, 170VDC bus microstepping drive	and CE (EMC & LVD)

Drive/Controller

ZETA6104	Packaged 4Apk, 170VDC bus microstepping indexer/drive	and CE (LVD)
ZETA6104-240	@120VAC: Packaged 4Apk, 170VDC bus microstepping indexer/drive @ 240VAC: Packaged 4Apk, 340VDC bus microstepping indexer/drive	and CE (LVD)
ZETA6108	Packaged 8Apk, 170VDC bus microstepping indexer/drive	and CE (LVD)
ZETA6112	Packaged 12Apk, 170VDC bus microstepping indexer/drive	and CE (LVD)

Drive/Controller Accessories CE (LVD)

VM24S	24V input/output module
VM50	50-pin header-to-screw terminal breakout board
RP240	Operator interface
RP240-NEMA 4	NEMA 4 rated operator interface

Drive/Controller Software

DDE6000	DDE server for 6000 Series

System

C10 (C10H)*	LVD/EMC step-motor cable kit (includes 10-ft cable, gland (360º shield connector), R-clamp, screw, and assembly instructions
ZETA EMC KIT	LVD/EMC Drive Kit (includes the AC power filter and EMC drive/indexer cable)

** C10H is a high-power verson of the C10 cable kit. IT should be used with motors operating above 10 amps of current (TS33, TS41, TS42, or TS43 in parallel)*

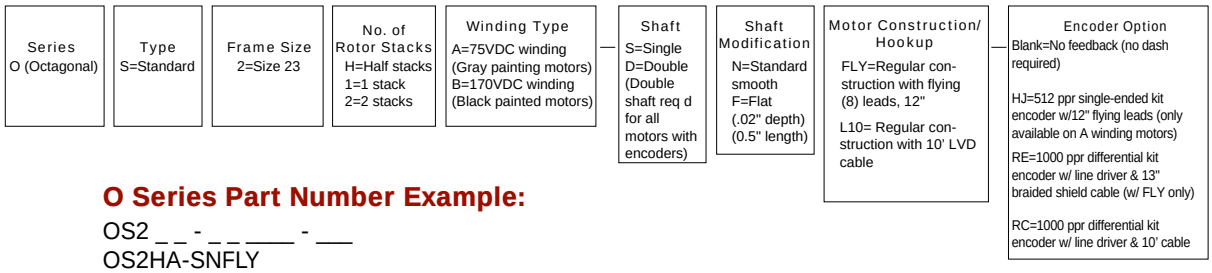
To comply with EMC and low-noise (CISPR 22/EN55022 Class B or FCC Class B emissions) standards, the following items are required:

- ZETA4-240, ZETA8, or ZETA12 drive
- CE(LVD) motor for LVD. Compumotor recommends a terminal board (NPS) motor construction for easier EMC installation
- C10 (C10H) motor accessory (LVD/EMC cable kit)
- ZETA EMC KIT

Motor Ordering Information

O Series (CE(LVD), UL Pending)

The O Series Size 23 Frame motors with A Winding (75VDC) are designed for use with the OEM750 Series, OEM230/330/530 Series, and the SD Series. The O Series Size 23 Frame motors with B Winding (170VDC) are designed for use with ZETA Series, ZETSA-240 Series (@120VAC), S Series, PD Series.

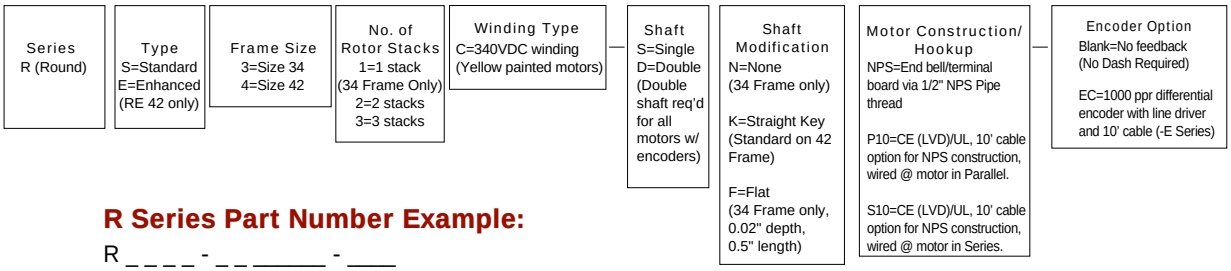


O Series Part Number Example:

OS2 _ _ - _ _ ____ - ___
OS2HA-SNFLY
OS22B-DNL10-RC

R Series (CE (EMC)*, CE(LVD), UL Recognized)

The R Series Size 34 and Size 42 Frame motors are available in a C Winding (340VDC). Motors with the C Winding are recommended for use with the ZETA240 Series (@240VAC).

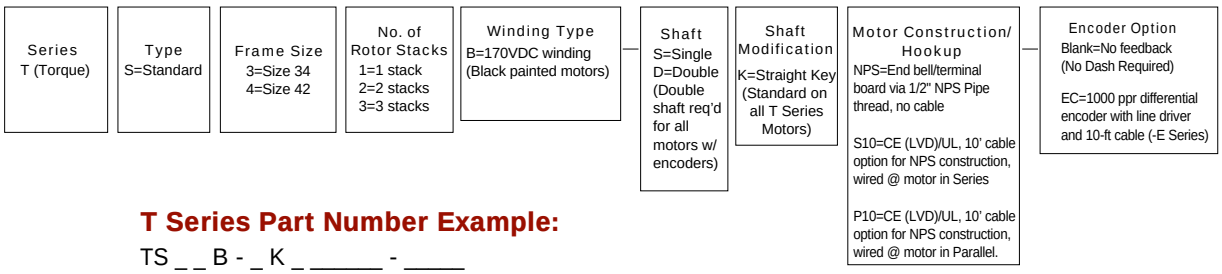


R Series Part Number Example:

R _ _ _ _ - _ _ _____ - ____
RS32-SNS10
RE42C-SKNPS
RS42-DKS10-EC

T Series (CE (EMC)*, CE (LVD), UL Recognized)

The T Series Size 34 and Size 42 Frame motors are available in a B Winding (170VDC). These motors are designed for use with the ZETA Series, ZETA-240 (@120VAC), PD Series, S Series.



T Series Part Number Example:

TS _ _ B - _ K _ _____ - _____
TS31B-SKNPS
TS43B-DKS10

** For CE(EMC) compliance, refer to the ZETA Installation Guide*

Motor Ordering Information, continued

E Series (also known as ZETA Series)

The E Series Size 23 and Size 34 Frame motors are available in a B Winding (170VDC). These motors are designed for use with Gemini GT-L5, Gemini GT-L8, the ZETA Series, ZETA4-240 (@120VAC), PD Series, S Series.

Series	Type	Frame Size	No. of Rotor Stacks	Winding Type	Shaft	Shaft Modification	Motor Construction/ Hookup	Encoder Option
E (Extra Smooth)	S=Standard	2=Size 23 (2.5") 3=Size 34 (3.38")	1= 1 stack 2= 2 stacks 3= 3 stacks	B=170VDC winding (Black painted motors)	S=Single D=Double Double shaft req d for all motors w/encoders	N=None (Standard) F=Flat (.02" depth) (0.5" length) K=Straight Key (34 Frame Only)	R10=Regular hookup w/ 10' Flying Leads	Blank=No feedback (no dash required) EC=1000 ppr differential line encoder w/ 10' cable

E Series Part Number Example

ES _ _ B - _ K _ _____ - _____
ES31B-SKNPS
ES43B-DKS10

V Series (UL Recognized)

The V Series Size 17, Size 23 and Size 34 Frame motors are available in a B Winding (170VDC). These motors are designed for use with the E-AC drive, the Gemini GT-L5, the Gemini GT-L8, the ZETA Series, the ZETA4-240 (@120VAC), the PD Series and the S Series.

Series	**Type**	**Frame Size**	**No. of Rotor Stacks**	**Winding Type**	**Shaft**	**Shaft Modification**	**Motor Construction/ Hookup**
V	S=Standard	1=Size 17 2=Size23 3=Size34	1=1 stack 2=2 stacks 3=3 stacks	B=170VDC winding (black painted motors)	S=Single D=Double	N=Standard (smooth) F=Flat (.02" depth) (.5" length)	FLY - 12" flying leads RIO - 10' cable to flying leads

V Series Part Number Example

VS _ _ B - _ K _ _ _ - _____
VS13B-DFRIO

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