

Catalog 8000-4/USA

ZETA Drives

ZETA



Compumotor's ZETA Microstepping Drive Family

These microstepping drives are stand-alone, packaged microstepping drives that incorporate breakthrough techniques known 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.

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

Parameter	Value			
	ZETA4	ZETA8	ZETA12	ZETA4-240
Power				
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*	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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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ZETA Drive/Controllers

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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

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ZETA Drive/Controllers

ZETA

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			
	ZETA6104	ZETA6108	ZETA6112	ZETA6104-240
Power				
AC Power Input	----- 95-132VAC	Single Phase, 50/60Hz	-----	95-264VAC Single Phase, 50/60Hz
Motor Current (Apk)				
Bus Voltage	0-4Amps	0-8 Amps	0-12 Amps	0-4 Amps
	-----	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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ZETA Drive/Controllers

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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: $\leq 1/3$ of V_I/O voltage = low, $\geq 2/3$ of V_I/O voltage = high). V_I/O can handle 5–24V with max current of 100 mA. Internal 6.8 K Ω 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 sink 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 $\leq 0.4V$, High $\geq 2.4V$. Maximum frequency = 1.6 MHz. Minimum time between transitions = 625 ns.
16 General Purpose Programmable	HCMOS compatible* with internal 6.8 K Ω 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 k Ω 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 $\leq 1.0V$, high $\geq 3.25V$; TTL-compatible switching voltage levels: low $\leq 0.4V$; high $\geq 2.4V$

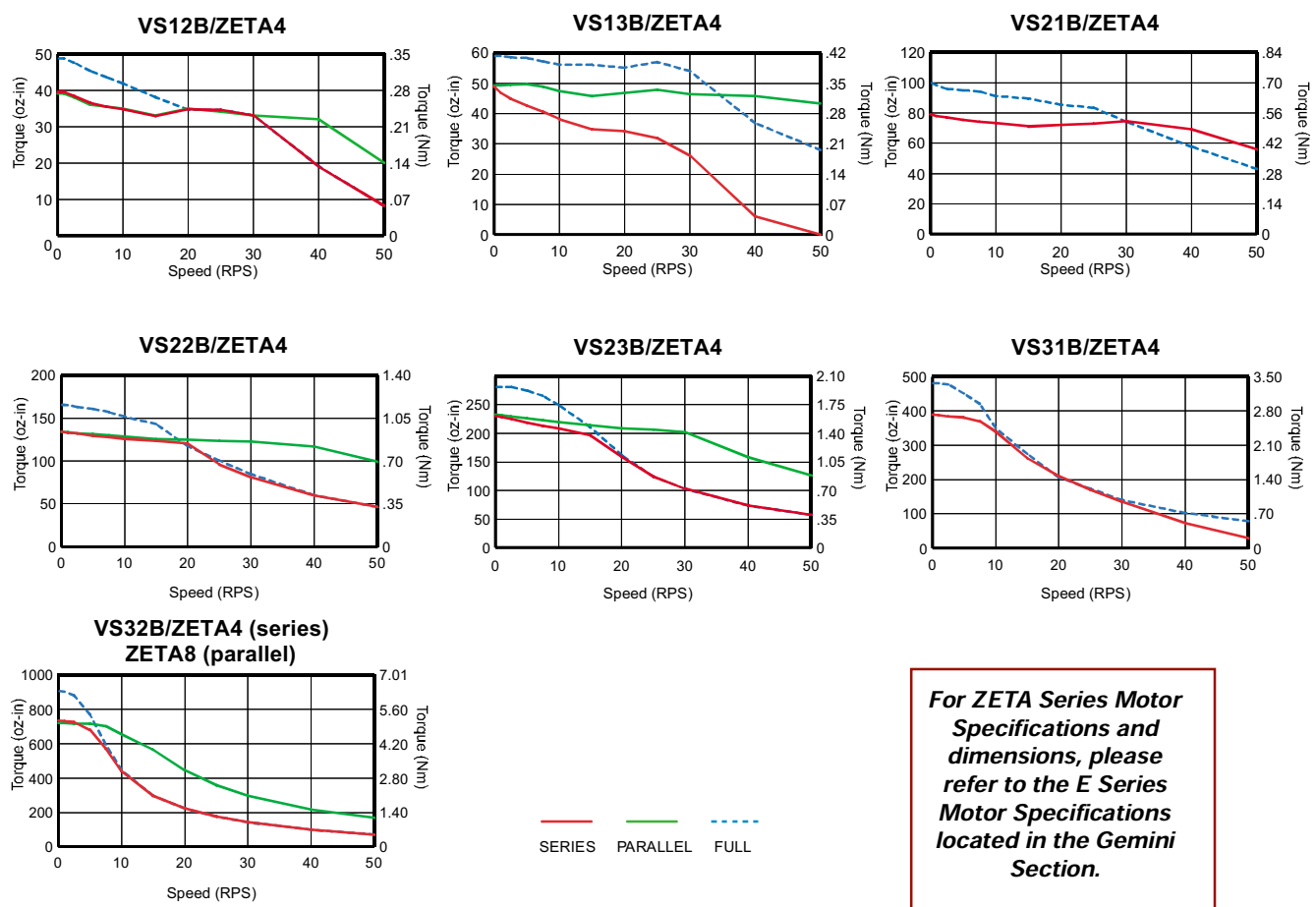
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Performance Curves

ZETA

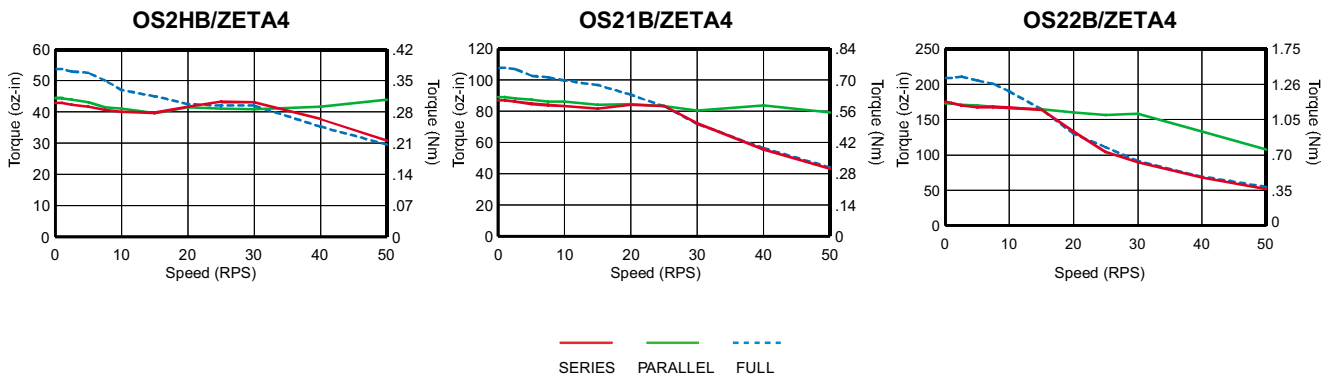
Speed-Torque Curves (@120VAC)

ZETA with VS Motors



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

ZETA with OS Motors



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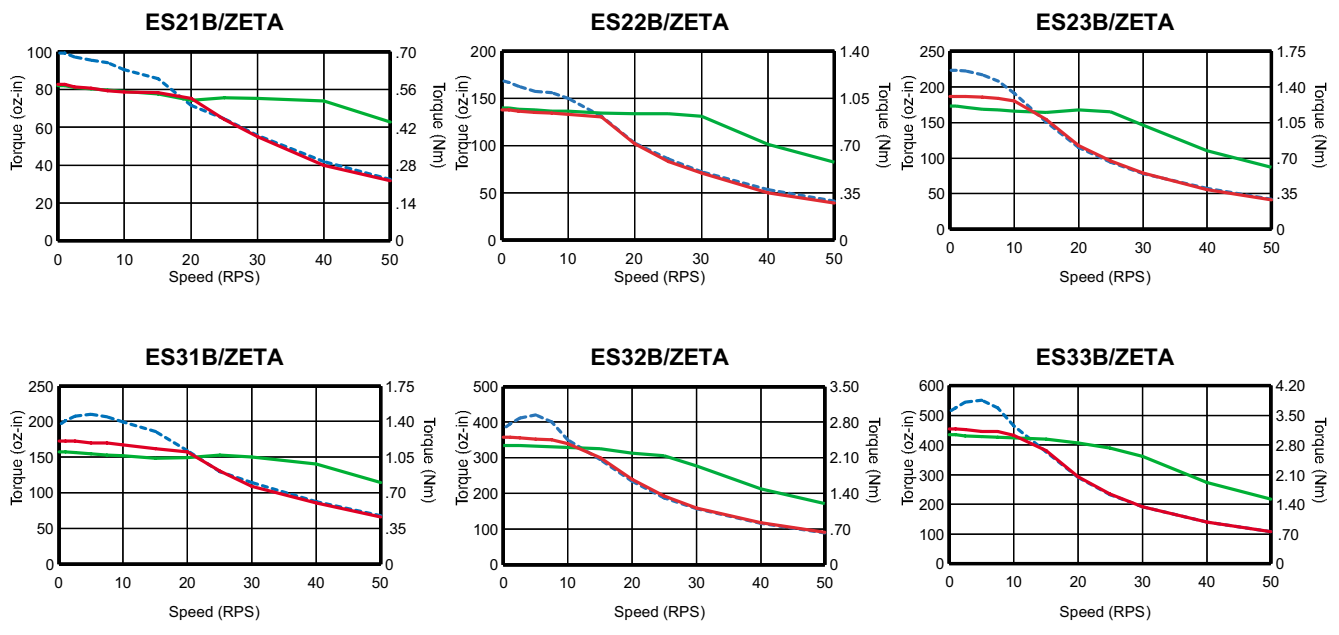
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Performance Curves

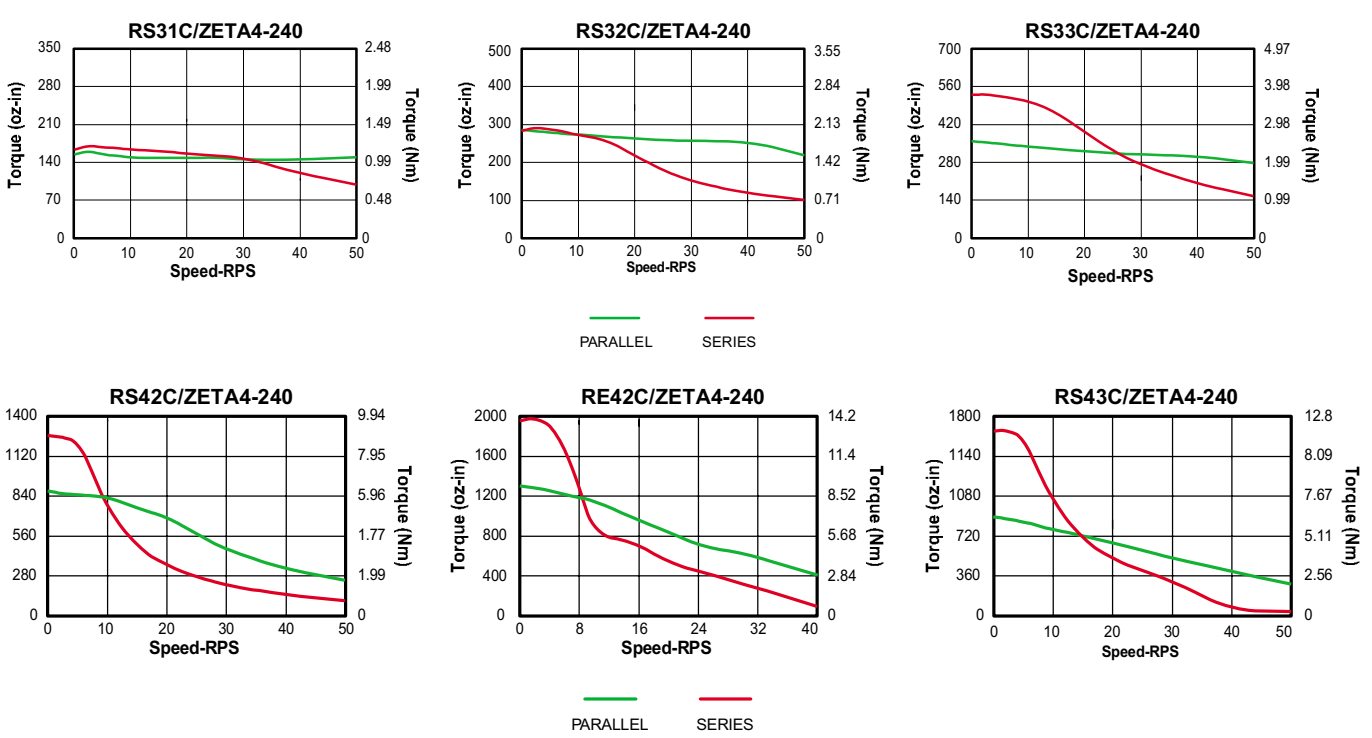
ZETA

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

ZETA with ES Motors



ZETA with RS Motors



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

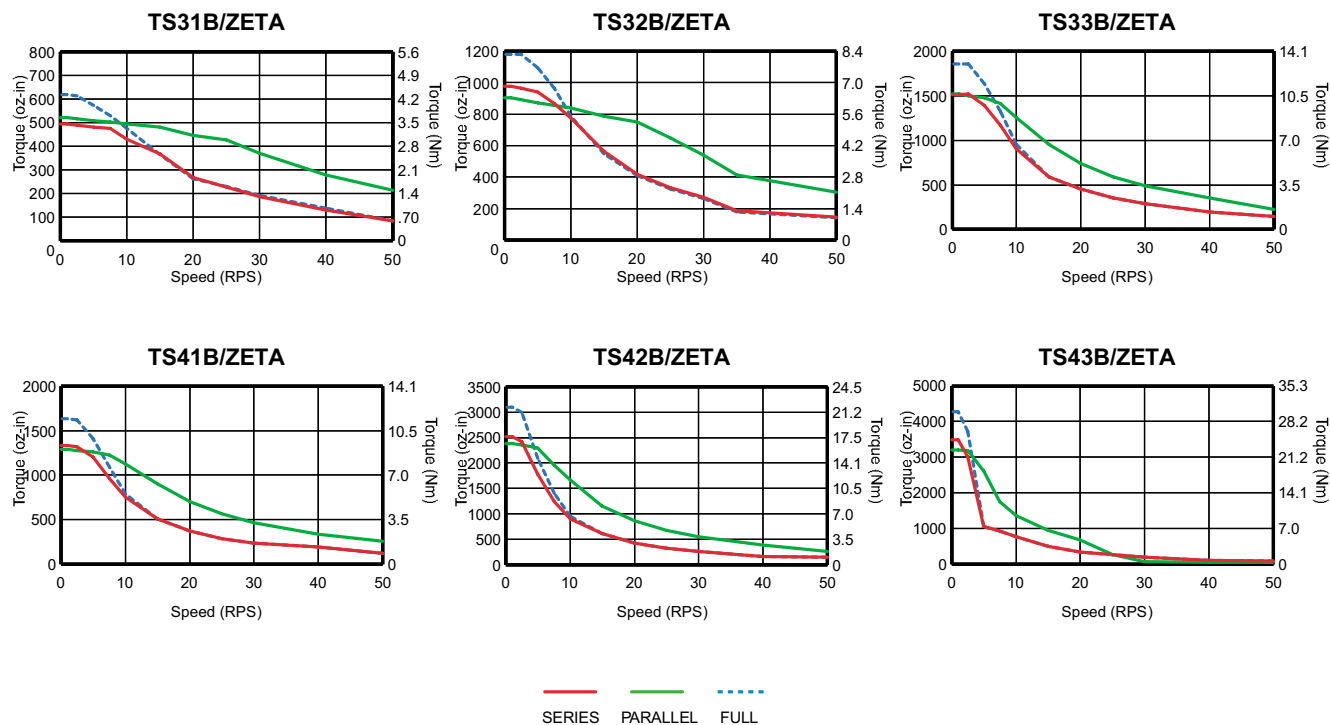
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Performance Curves

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

ZETA with TS Motors



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Motor Specifications

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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-in ²	0.546	1.1	1.69	3.47	6.76	10.47
	(kg-m ² x 10 ⁻⁶)	(9.998)	(20.1)	(30.9)	(63.4)	(124)	(191)
Drive Current Apk (Arms)	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)
	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 Reversing load Equal to 1 lb	in	0.005	0.005	0.005	0.005	0.005	0.005
	(cm)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Radial play Per 0.5 lb load	in	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
	(cm)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Weight (net) Motor+Cable +Connector	lb	1.6	2.4	3.2	3.8	5.1	8.3
	(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.

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Motor Specifications

ZETA

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

Parameters		Size 23 Frame			Size 17 Frame		Size 23 Frame			Size 34 Frame	
		OS2HB	OS21B	OS22B	VS12B	VS13B	VS21B	VS22B	VS23B	VS31B	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)	NA	NA
Drive Bus Voltage	(VDC)	170	170	170	170	170	170	170	170	170	170
Detent Torque	oz-in (N-m)	2.5 (0.02)	4.0 (0.03)	7.0 (0.05)	2.7 (0.02)	3.0 (0.02)	2.7 (0.02)	3.3 (0.02)	6.0 (0.04)	14.0 (0.1)	28.0 (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

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Motor Specifications - 170 VDC Motor

Size 23 Frame

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

Size 34 Frame

Size 42 Frame

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

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Motor Specifications

ZETA

Motor Specifications - 170 VDC Motor (cont'd)

Parameters		Size 34 Frame			Size 42 Frame		
		TS31B	TS32B	TS33B	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			Size 42 Frame		
		RS31C	RS32C	RS33C	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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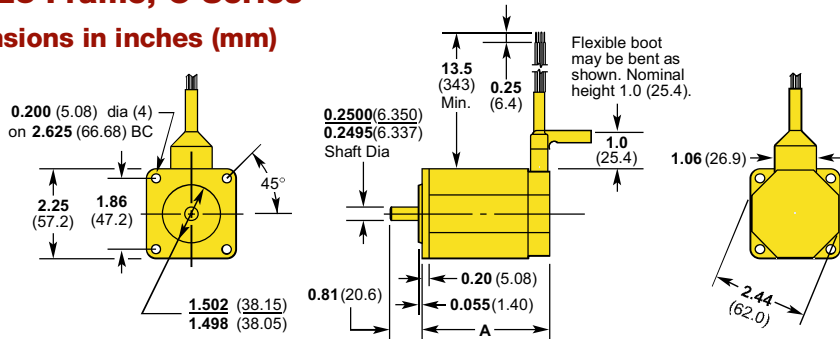
Dimensions

ZETA

ZETA Series CE Motor Dimensional Drawings

Size 23 Frame, O Series

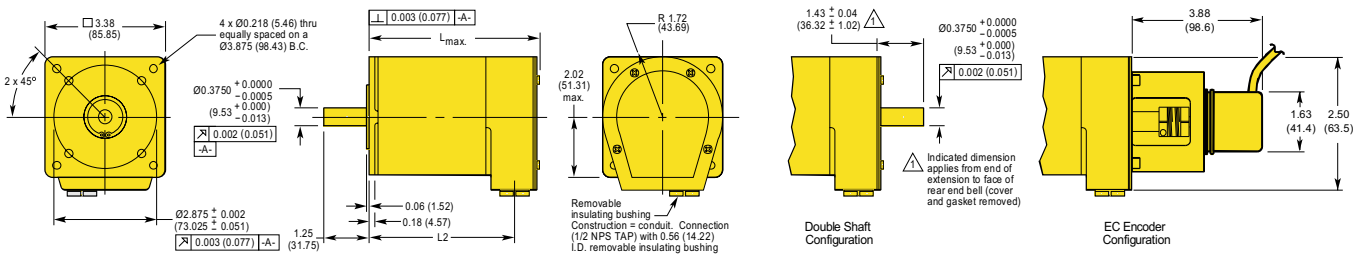
Dimensions in inches (mm)



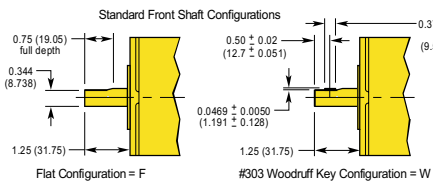
Model		A
OS2HA	(OEM57-40)	1.60 (40.6)
OS21A	(OEM57-51)	2.06 (52.3)
OS22A	(OEM57-83)	3.10 (87.7)

Size 34 Frame, R Series

Dimensions in inches (mm)

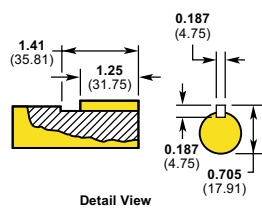
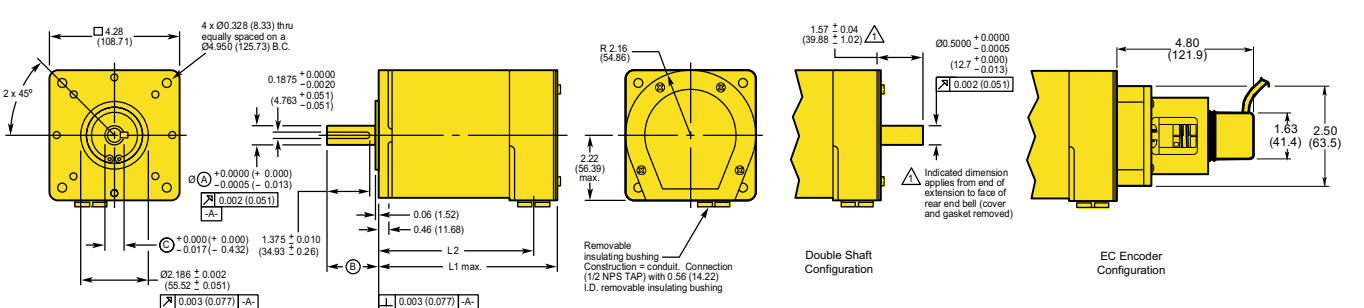


Model	Lmax	L2
RS31□-□□□NPS	3.62 (91.95)	2.87 (72.9)
RS32□-□□□NPS	4.77 (121.16)	4.02 (102.11)
RS33□-□□□NPS	6.05 (153.67)	5.30 (134.62)



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)

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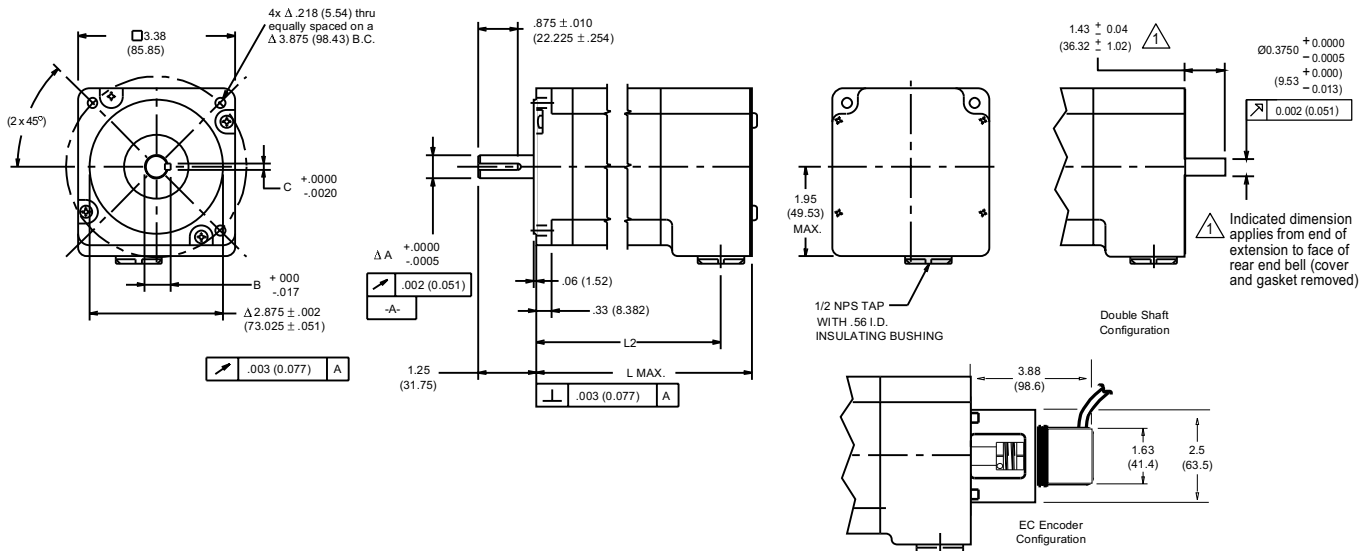
Dimensions

ZETA

ZETA Series CE Motor Dimensional Drawings

Size 34 Frame, T Series

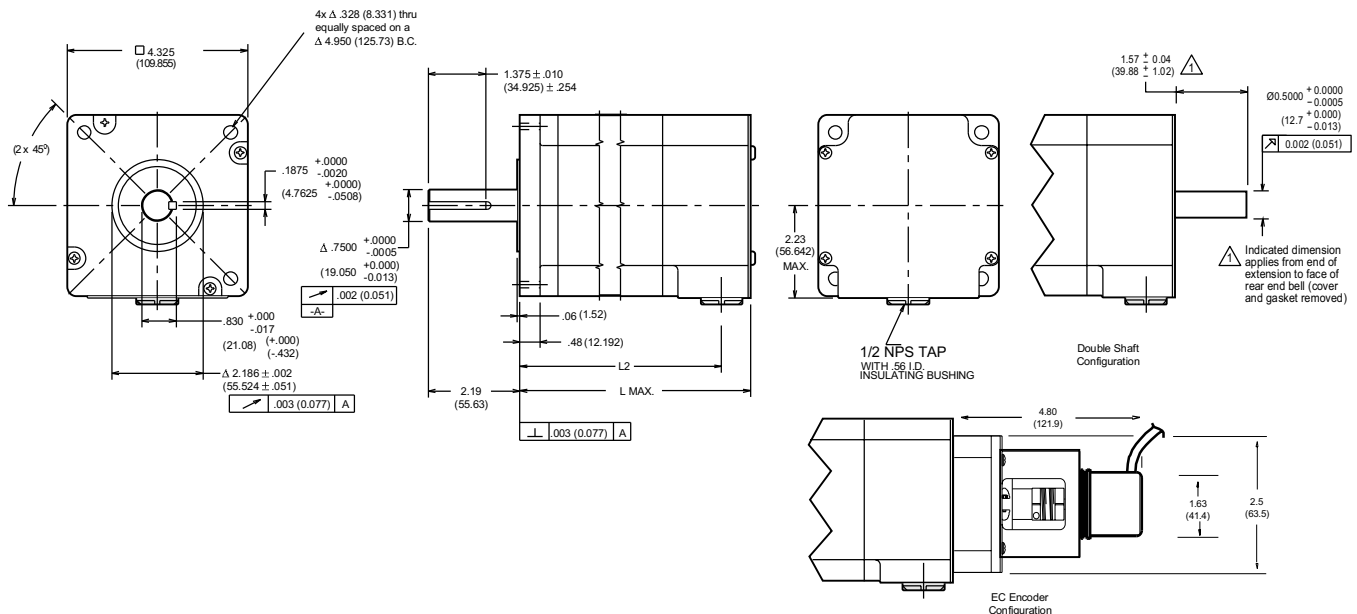
Dimensions in inches (mm)



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 (234.44)	8.49 (215.65)

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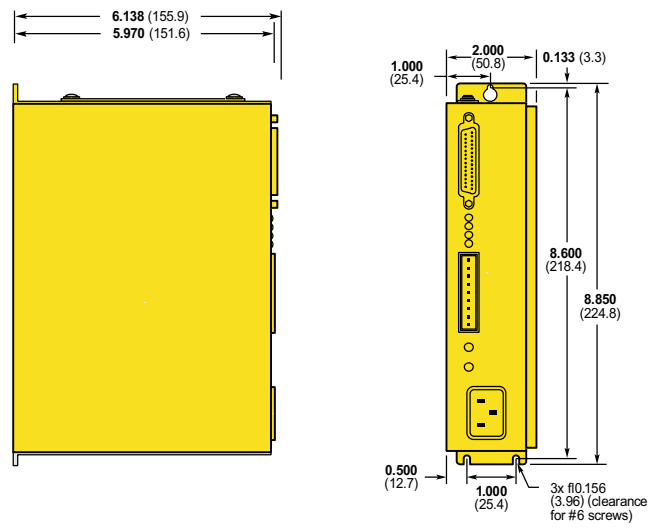
Catalog 8000-4/USA

Dimensions

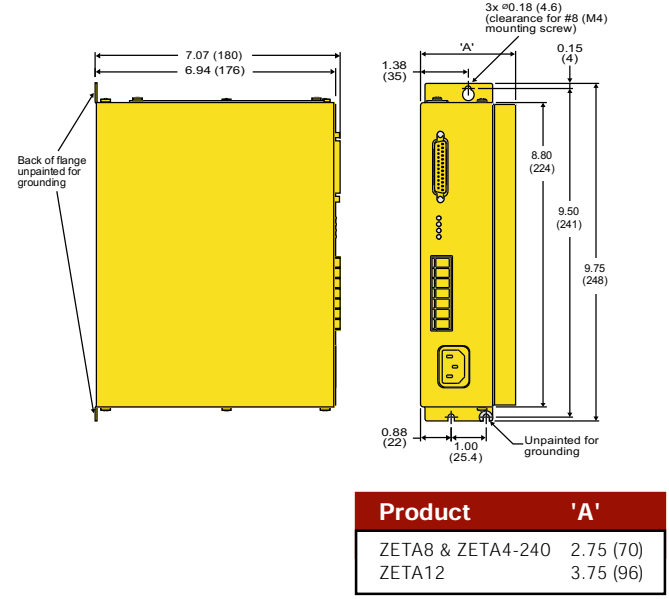
ZETA

ZETA Dimensional Drawings

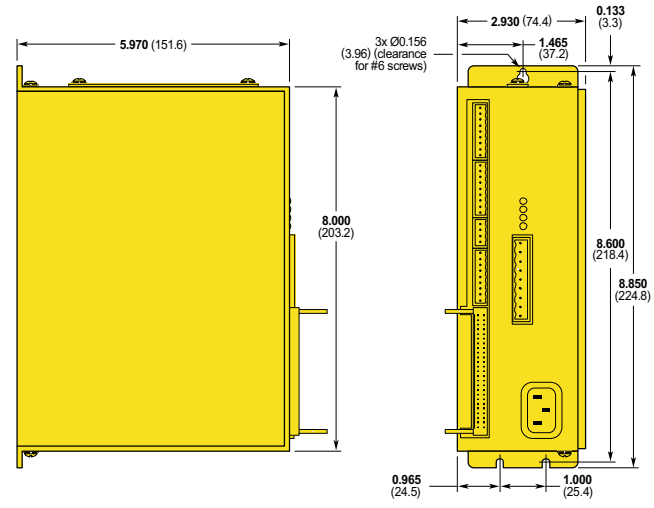
ZETA4 Dimensions
Dimensions in inches (mm)



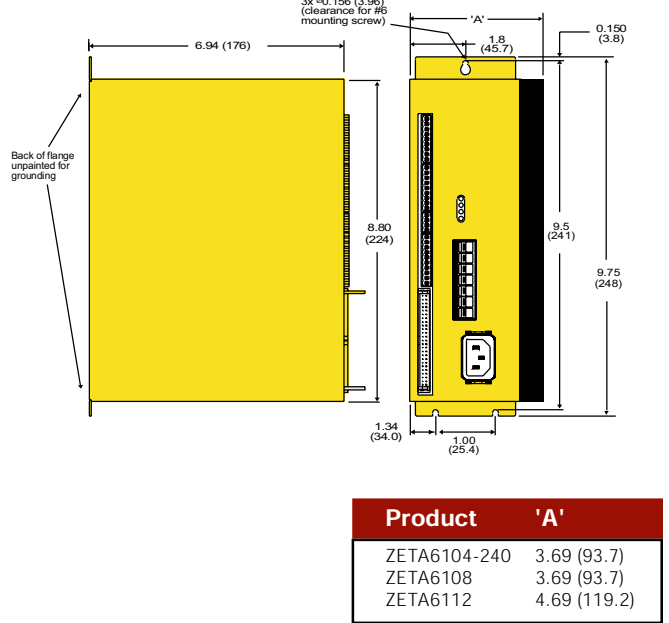
ZETA4-240, ZETA8, ZETA12 Dimensions
Dimensions in inches (mm)



ZETA6104 Dimensions
Dimensions in inches (mm)



ZETA6104-240, ZETA6108, ZETA6112 Dimensions
Dimensions in inches (mm)



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Connections

ZETA

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)

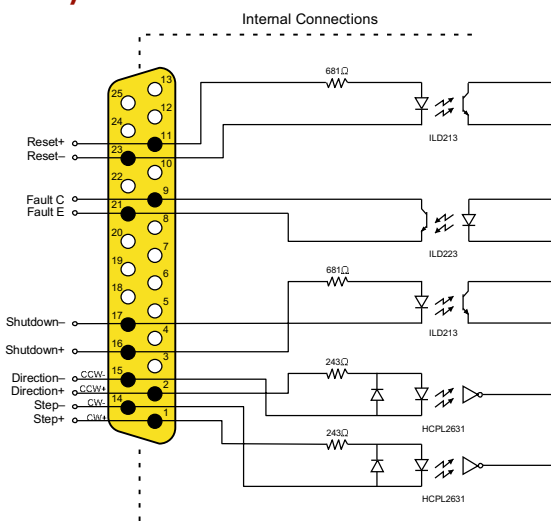
Motor 9-Pin Screw Terminal	
Pin No	Signal
1	Interlock
2	A- Center tap
3	A+
4	A-
5	Earth
6	B+
7	B-
8	B- Center tap
9	Interlock

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

ZETA

Ordering Information			
Drives	Part No.	Description	
	ZETA4	Packaged 4Apk, 170VDC bus microstepping drive	UL and CE (LVD)
	ZETA4-240	@120VAC: Packaged 4Apk, 170VDC bus microstepping drive @ 240VAC: Packaged 4Apk, 340VDC bus microstepping drive	UL and CE (EMC & LVD)
	ZETA8	Packaged 8Apk, 170VDC bus microstepping drive	UL and CE (EMC & LVD)
	ZETA12	Packaged 12Apk, 170VDC bus microstepping drive	UL and CE (EMC & LVD)
Drive/Controller	ZETA6104	Packaged 4Apk, 170VDC bus microstepping indexer/drive	UL and CE (LVD)
	ZETA6104-240	@120VAC: Packaged 4Apk, 170VDC bus microstepping indexer/drive @ 240VAC: Packaged 4Apk, 340VDC bus microstepping indexer/drive	UL and CE (LVD)
	ZETA6108	Packaged 8Apk, 170VDC bus microstepping indexer/drive	UL and CE (LVD)
	ZETA6112	Packaged 12Apk, 170VDC bus microstepping indexer/drive	UL 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 (360° 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 version 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

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Ordering Information

ZETA

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.

Series O (Octagonal)	Type S=Standard	Frame Size 2=Size 23	No. of Rotor Stacks H=Half stacks 1=1 stack 2=2 stacks	Winding Type A=75VDC winding (Gray painting motors) B=170VDC winding (Black painted motors)	Shaft S=Single D=Double (Double shaft req'd for all motors with encoders)	Shaft Modification N=Standard smooth F=Flat (.02" depth) (0.5" length)	Motor Construction/ Hookup FLY=Regular construction with flying (8) leads, 12" L10= Regular construction with 10' LVD cable	Encoder Option Blank=No feedback (no dash required) HJ=512 ppr single-ended kit encoder w/12' flying leads (only available on A winding motors) RE=1000 ppr differential kit encoder w/ line driver & 13' braided shield cable (w/ FLY only) RC=1000 ppr differential kit encoder w/ line driver & 10' cable
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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).

Series R (Round)	Type S=Standard E=Enhanced (RE 42 only)	Frame Size 3=Size 34 4=Size 42	No. of Rotor Stacks 1=1 stack (34 Frame Only) 2=2 stacks 3=3 stacks	Winding Type C=340VDC winding (Yellow painted motors)	Shaft S=Single D=Double (Double shaft req'd for all motors w/ encoders)	Shaft Modification N=None (34 Frame only) K=Straight Key (Standard on 42 Frame) F=Flat (34 Frame only, 0.02" depth, 0.5" length)	Motor Construction/ Hookup NPS=End bell/terminal board via 1/2" NPS Pipe thread P10=CE (LVD)/UL, 10' cable option for NPS construction, wired @ motor in Parallel. S10=CE (LVD)/UL, 10' cable option for NPS construction, wired @ motor in Series.	Encoder Option Blank=No feedback (No Dash Required) EC=1000 ppr differential encoder with line driver and 10' cable (-E Series)
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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.

Series T (Torque)	Type S=Standard	Frame Size 3=Size 34 4=Size 42	No. of Rotor Stacks 1=1 stack 2=2 stacks 3=3 stacks	Winding Type B=170VDC winding (Black painted motors)	Shaft S=Single D=Double (Double shaft req'd for all motors w/ encoders)	Shaft Modification K=Straight Key (Standard on all T Series Motors)	Motor Construction/ Hookup NPS=End bell/terminal board via 1/2" NPS Pipe thread, no cable S10=CE (LVD)/UL, 10' cable option for NPS construction, wired @ motor in Series P10=CE (LVD)/UL, 10' cable option for NPS construction, wired @ motor in Parallel.	Encoder Option Blank=No feedback (No Dash Required) EC=1000 ppr differential encoder with line driver and 10-ft cable (-E Series)
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T Series Part Number Example:

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

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

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Ordering Information

ZETA

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 E (Extra Smooth)	Type S=Standard	Frame Size 2=Size 23 (2.5") 3=Size 34 (3.38")	No. of Rotor Stacks 1= 1 stack 2= 2 stacks 3= 3 stacks	Winding Type B=170VDC winding (Black painted motors)	Shaft S=Single D=Double Double shaft req d for all motors w/encoders	Shaft Modification N=None (Standard) F=Flat (.02" depth) (0.5" length) K=Straight Key (34Frame Only)	Motor Construction/ Hookup R10=Regular hookup w/ 10' Flying Leads	Encoder Option Blank=No feedback (no dash required) EC=1000 ppr differential line encoder w/ 10' cable
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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 V	Type S=Standard	Frame Size 1=Size 17 2=Size23 3=Size34	No. of Rotor Stacks 1=1 stack 2=2 stacks 3=3 stacks	Winding Type B=170VDC winding (black painted motors)	Shaft S=Single D=Double	Shaft Modification N=Standard (smooth) F=Flat (.02" depth) (.5" length)	Motor Construction/ Hookup FLY - 12" flying leads R10 - 10' cable to flying leads
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V Series Part Number Example

VS __ B - _ K _ - - - -
VS13B-DFRIO