

ZETA4-240

High-Power
Microstepping
Drive



ZETA4-240

The Global, Microstepping Drive

The ZETA4-240 drive meets the need for global solutions:

- CE (LVD and EMC) or low-noise applications
- High-power applications (@ 240VAC)
- Low-power applications (@120VAC)

The ZETA4-240 complies 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 also meets North America's FCC Class B emissions test making it the solution for low-noise applications. The ZETA4-240 has 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 [torque from 43 oz-in (0.3 Nm) to 383 oz-in (2.7 Nm), speed/torque curves on page C32]. For high-power applications, the ZETA4-240 runs off 240VAC to provide the same performance of an 8A drive [torque from 171 oz-in (1.21 Nm) to 1991 oz-in (14.1 Nm), speed/torque curves on page C39]. C winding motors are required when running the ZETA4-240 from 240VAC.

Features

Performance

- CE marked with full EMC and LVD compliance
- Standard step-and-direction input or CW/CCW input
- Torque from 171 oz-in (1.21 N-m) to 1991 oz-in (14.1 N-m)
- Active Damping (patent pending) benefits:
 - Damping ratios of up to 0.5
 - Higher acceleration than conventional step systems
 - Decrease motor vibration
 - Increase shaft power
 - Higher performance
- Electronic Viscosity (patent pending) benefits:
 - Reduce settling time
 - Increase slow-speed smoothness (reduce velocity ripple)
 - Reduce audible noise
- Anti-resonance eliminates mid-range instability and provides damping ratios of up to 0.2.

Protection Circuit

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

Physical

- For 120VAC operation, six motors available in size 23 and 34 frame sizes. For 240VAC operation, six motors available in size 34 and 42 frame sizes.
- Drive status indicators: power, step input, over temperature and motor fault
- 120VAC (170VDC bus voltage)
- 240VAC (340VDC bus voltage)
- Removable connectors for easy installation
- Selectable damping for optimized performance
- Optional EMC drive kit consisting of AC mains filter and cabling to allow complete system compliance

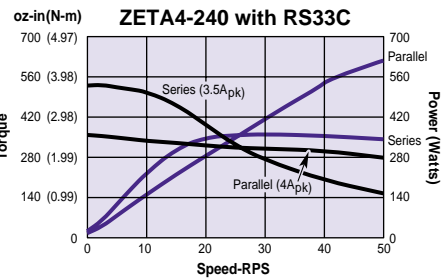
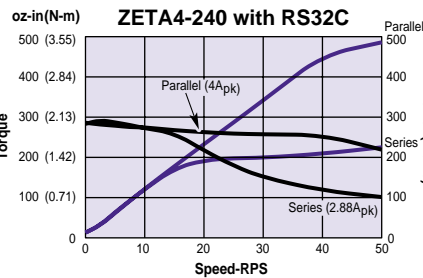
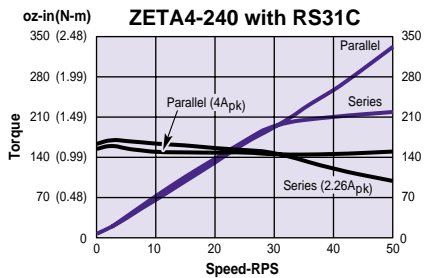
Parameter	Value
Power Input	95–264VAC, 50/60 Hz
Performance	
Accuracy	±5 arc min (0.0833°) typical. Unloaded-bidirectional with Compumotor supplied motors. Other motors may exhibit different absolute accuracy. ±1 arc min (0.0167°) Loaded-in addition to unloaded accuracy, per each frictional load equal 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.
Speed/Torque	Refer to speed-torque curves on page C39.
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
Dimensions	Refer to dimensional drawings on page C39.
Amplifier	
Type	20 kHz fixed frequency, variable duty cycle PWM (pulse width modulated). Current controlled, bipolar type. MOSFET construction.
Number of Phases	2
Dimensions	Refer to dimensional drawings on inside back cover of this brochure.
Protection*	
Short Circuit	Phase-to-phase, phase-to-ground.
Brownout	If AC supply drops below 85VAC.
Over-temperature	Over-temperature shutdown fault at 131 °F (55°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.
Drive Bus Voltage	170VDC @ 120VAC input; 340VDC @ 240VAC input
Environmental	
Operating Drive	32°F to 122°F (0°C to 50°C) Maximum allowable ambient temperature is 122°F (50°C). Fan cooling may be required if airflow restricted.
Motor	212°F (100°C) maximum motor case temperature. Actual temperature rise is duty-cycle dependent.
Storage	-40°F to 185°F (-40°C to 85°C)
Humidity	0-95%, non-condensing

* Drive shuts down in conditions listed. Power must be cycled or drive reset to resume operations.

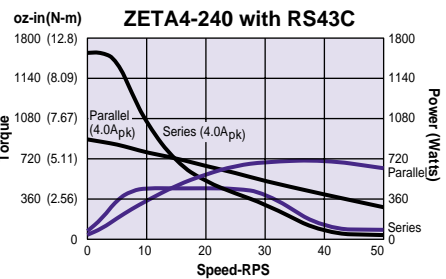
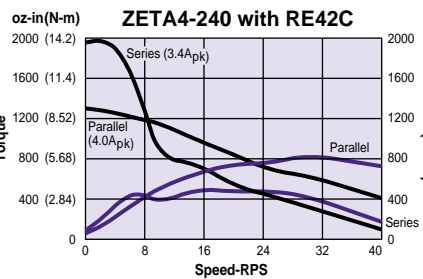
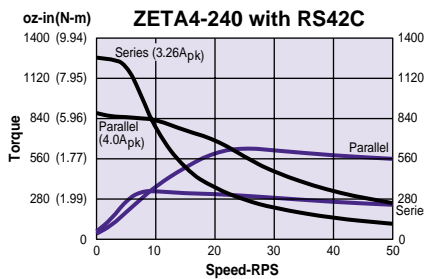
ZETA4-240 Speed/Torque Curves* (@ 240VAC)

(Power curve is shown in the second color)

Size 34 Frame



Size 42 Frame



Parallel connected motors are limited to 50% duty cycle when operated above 5 rps. For greater than 50% duty cycle above 5 rps, you must connect 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.

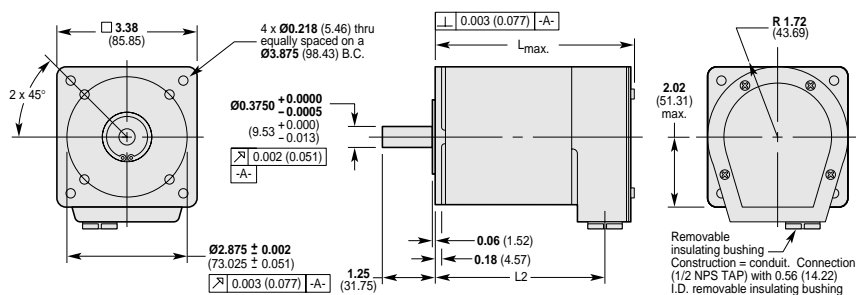
Note: ±10% torque variance due to motor tolerance.

* For performance of the ZETA4-240 at 120VAC operation, use *B* winding motors to obtain the same performance of the speed/torque curves on page C32.

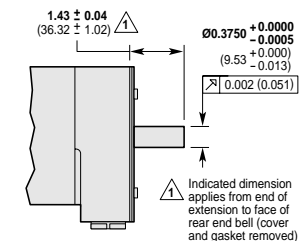
ZETA4-240 CE Motor Dimensions

(—) denotes millimeters

Size 34 Frame, R Series



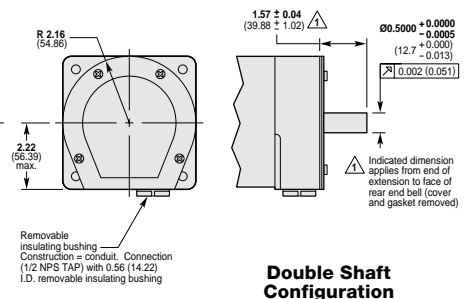
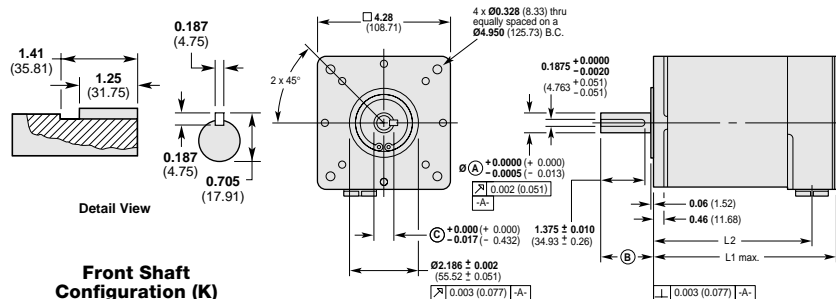
Model	Lmax	L2
RS31C-□□NPS	3.62/91.95	(2.87/72.9)
RS32C-□□NPS	4.77/121.16	(4.02/102.11)
RS33C-□□NPS	8.05/153.67	(5.30/134.62)



Double Shaft Configuration

Model	Lmax	L2	A	B	C
RS42C-□□NPS	8.04 (204.22)	7.29 (185.17)	0.625 (15.87)	2.19 (55.63)	0.705 (17.91)
RE42C-□□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)

Size 42 Frame, R Series

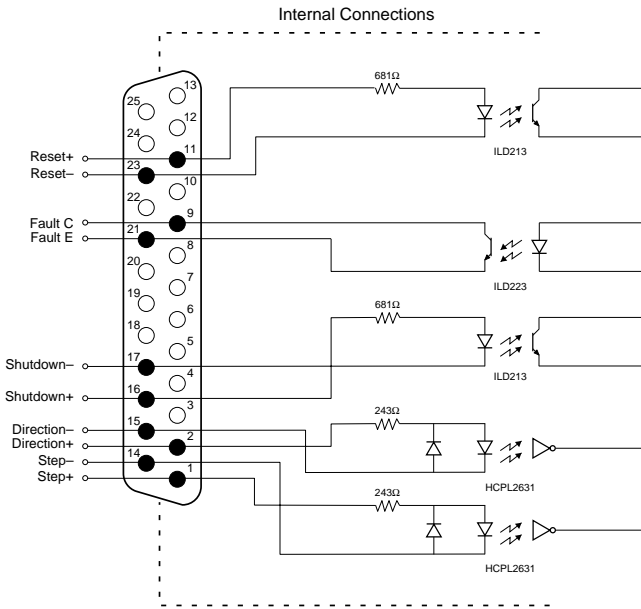


Double Shaft Configuration

ZETA4-240 CE Motor Data

	Size 34 Frame			Size 42 Frame		
	RS31C	RS32C	RS33C	RS42C	RE42C	RS43C
Static torque						
oz-in (Nm)	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)	3.204 (0.59)	6.563 (1.2)	9.652 (1.8)	61.76 (11.30)	61.76 (11.30)	92.64 (16.95)
Drive Current (Apk)(Arms)						
Series	2.26 (1.6)	2.88 (2.0)	3.5 (2.5)	3.26 (2.3)	3.4 (2.4)	4.0 (2.8)
Parallel	4.0 (2.8)	4.0 (2.8)	4.0 (2.8)	4.0 (2.8)	4.0 (2.8)	4.0 (2.8)
Phase Inductance (mH)						
Series	17.4	26.2	23.3	65.4	55.6	42.9
Parallel	4.4	6.6	5.8	16.4	13.9	10.7
Detent Torque						
oz-in (Nm)	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 (1.45)	5.3 (2.41)	7.6 (3.45)	18.2 (8.26)	18.2 (8.26)	25.7 (11.66)
Certifications						
UL recognized	Yes	Yes	Yes	Yes	Yes	Yes
CE (LVD)	Yes	Yes	Yes	Yes	Yes	Yes
CE (EMC& LVD)	w/ C10	w/ C10	w/ C10	w/ C10	w/ C10	w/ C10

ZETA4-240 Drive Connector

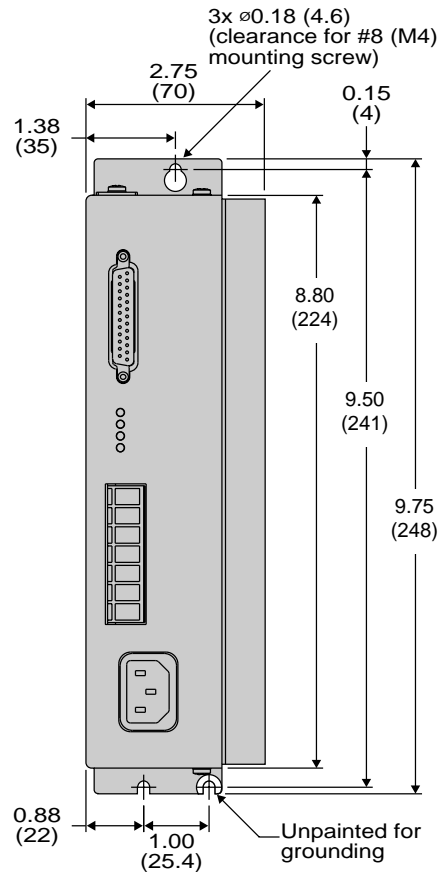
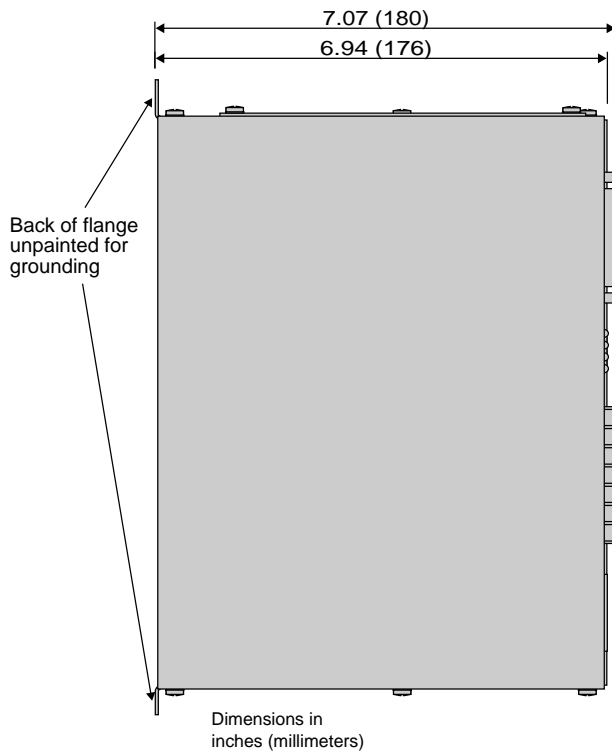


Motor-Screw Terminal

Pin No	Signal
1	Interlock
2	A +
3	A -
4	Ground
5	B +
6	B -
7	Interlock

ZETA4-240 Drive Dimensions


(—) denotes millimeters



C Step Motor Systems

Ordering Information

Drive

Part No.	Description  and CE (EMC & LVD)
ZETA4-240	The "Global" ZETA: @ 120VAC provides low-power, EMC ZETA4 (use B winding motors); @ 240VAC provides high-power, EMC, ZETA4 (use C winding motors).

CE 170VDC Size 23 Frame Motors **CE (LVD)**

Part No.	Description
OS2HB-□□□□□	Standard, Size 23, half-stack (57-40), B winding motor
OS21B-□□□□□	Standard, Size 23, single-stack (57-51), B winding motor
OS22B-□□□□□	Standard, Size 23, double-stack (57-83), B winding motor

CE 170VDC Size 34 Frame Motors **CE (LVD)**

Part No.	Description
RS31B-□□□□□	Standard, Size 34, single-stack (83-62), B winding motor
RS32B-□□□□□	Standard, Size 34, double-stack (83-93), B winding motor
RS33B-□□□□□	Standard, Size 34, triple-stack (83-135), B winding motor

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 drive
- CE (LVD) step motor
- C10 option (LVD/EMC cable kit) and
- ZETA240 EMC kit.

CE 340VDC Size 34 Frame Motors **CE (LVD)**

Part No.	Description
RS31C-□□□□□	Standard, Size 34, single stack (83-62), C winding motor
RS32C-□□□□□	Standard, Size 34, double stack (83-93), C winding motor
RS33C-□□□□□	Standard, Size 34, triple stack (83-135), C winding motor

CE 340VDC Size 42 Frame Motors **CE (LVD)**

Part No.	Description
RS42C-□□□□□	Standard, Size 42, double stack (106-178), C winding motor
RE42C-□□□□□	Enhanced, Size 42, double stack (106-205), C winding motor
RS43C-□□□□□	Standard, Size 42, triple stack (106-250), C winding motor

Accessories **CE (EMC and LVD)**

Part No.	Description
C10	LVD/EMC step-motor cable kit (includes 10-ft cable, gland (360° shield connector), R-clamp, screw, and assembly instructions)
ZETA240 EMC KIT	LVD/EMC Drive Kit (includes the AC power filter and EMC drive/indexer cable)

How to Order CE Motors

Size 23 Frame

Series	Type	Frame Size	No. of Rotor Stacks	Winding Type	Shaft	Shaft Modification	Motor Construction/ Hookup	Encoder Option
O (Octagonal)	S=Standard	2=Size 23 (2.5")	H=Half stacks 1=1 stack 2=2 stacks	B=170VDC winding (black painted motors)	S=Single D=Double	N=Standard (smooth)	FLY=Regular construction with flying (8) leads L10=Regular construction with 10-ft cables (call for availability)	Blank=No feedback RE=1000 ppr differential kit encoder w/ line driver & 12" flying leads (call for availability) RC=1000 ppr differential kit encoder w/ line driver & 10-ft cable (call for availability)

Size 34 Frame

Series	Type	Frame Size	No. of Rotor Stacks	Winding Type	Shaft	Shaft Modification	Motor Construction/ Hookup	Encoder Option
R (Round)	S=Standard	3=Size 34 (3.38")	1=1 stack 2=2 stacks 3=3 stacks	B = 170VDC winding (black painted motors) C=340VDC winding (yellow painted motors)	S=Single D=Double	N=Standard (smooth)	NPS=End bell/terminal board via 1/2" NPS Pipe thread C10=NPS option with (C10) LVD/EMC cable kit	Blank=No feedback EC=1000 ppr differential encoder with line driver and 10-ft cable (-E Series)

Size 42 Frame

Series	Type	Frame Size	No. of Rotor Stacks	Winding Type	Shaft	Shaft Modification	Motor Construction/ Hookup	Encoder Option
R (Round)	S=Standard E=Enhanced	4=Size 42 (4.33")	2=2 stacks 3=3 stacks	C=340VDC winding (yellow painted motors)	S=Single D=Double	K=Straight Key	NPS=End bell/terminal board via 1/2" NPS Pipe thread C10=NPS option with (C10) LVD/EMC cable kit	Blank=No feedback EC=1000 ppr differential encoder with line driver and 10-ft cable (-E Series)