OEM 750 Series

Compact, Low-Cost Drives

With technology enhancements and field experience, Compumotor offers the OEM750 Series, a compact microstepping drive that provides big performance in a small package.

Electronic Damping

All step motors are subject to mid-range instability, also referred to as parametric oscillations. Several problems are associated with these oscillations. They can cause the motor to stall, and thus cause the user to include a margin (typically at least 50%) of extra torque to overcome the oscillation. The OEM750 Series incorporates a subset of the patented electronic damping circuitry developed by Compumotor. This feature suppresses these oscillations, allowing the torque formerly reserved for safety margin to be used to do useful work, thus taking advantage of the full capabilities of the step motor.

- Minimizes stall condition
- Increases usable torque
- Higher accelerations
- Optimizes motor performance
- Reduces audible noise
- Reduces motor heating

Current Loop Adjustment

Since the OEM750 Series is capable of operating from 24 to 75 VDC, while operating motors with a wide range of winding inductances, Compumotor incorporated current loop gain techniques to optimize motor performance. The loop gain adjustment is designed to maximize your system's (drive, motor,and voltage) performance. Control over the current loop gain allows customers to take advantage of the motor's capable torque and reduces audible noise and excessive heating of the motor. This gives users more choices when selecting a motor and the opportunity to pick the best motor for their application.

Packaging

The OEM750 Series combines ASIC and surface mount technologies to minimize the product's footprint, minimize overall package size, and increase product reliability.

Reliability

At Compumotor, producing reliable, quality products is our number one priority. Our OEM750 Series is designed with high-quality standards and manufactured with state-of-the-art equipment and production methods. Before any product reaches our customers, it must pass a rigorous set of hardware and software tests. Today, Compumotor uses Highly Accelerated Life Testing (HALT) to uncover the product's vulnerabilities, in order to produce a robust and reliable product. JIT (Just-In-Time) manufacturing and DFM (Design-For-Manufacturability) methods lend themselves well in creating the necessary flexibility to readily accommodate your special needs.

See the OEM Servo Drive Products in the Servo Drive and Drive/Controller section.

Compact, Low-Cost Drives

Compumotor's OEM750 microstepping drive is designed with performance, power, packaging, and reliability in mind — everything that is necessary to meet your high-volume microstepping application needs.

Features

Performance

- Designed for use with motor inductance range of 0.2 mH–80 mH
- Three-state current control allows the drive and motor to run cooler and more efficiently than two-state drives
- Selectable resolution up to 50,800 steps/rev
- Auto standby reduces motor current (and heating) at rest
- Provides 0.2 Amps to 7.5 Amps (peak)
- Single 24-75 VDC power supply input
- Compatible with a variety of motors
- Six predefined current waveforms to optimize smoothness

Protection

- Optically isolated step and direction inputs
- Short circuit protected—phase-to-phase, and phase-to-ground
- Power dump circuitry to protect drive from regeneration caused by large inertial loads
- Self-test feature to verify proper system operation
- Overtemperature circuitry protects the drive from thermal damage

Physical

- Status/fault LED indicators to confirm proper operation
- ASIC and surface-mount technologies minimize product footprint, overall package size, and increase product reliability
- Removable snap-on molded cover for convenient configuration and protection against contaminants
- Optically isolated fault output for embedded applications
- Heat plate design allows thermal dissipation through a suitable heat dissipating mounting surface
- Simplified, two-screw mounting
- Right-angle screw terminal allows side-to-side mounting or Eurorack compatibility
- Built-in controller version for complete application solutions—OEM750X
- Overall dimensions 5.0 x 3.6 x 1.6 in. (127 x 91 x 41 mm)
- Convenient configuration DIP switches
- Certified as UL-recognized component
- CE (LVD & EMC)*

* *For compliance, user must follow procedure set in the OEM750 User Guide.*

OEM750 Specifications

	Parameter	Value
Power Input		
	DC	24–75 VDC @ 2.0 Arms (motor dependent)
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°) typical/per each frictional load equal to 1% rated torque. Loaded-in addition to unloaded accuracy.
	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%, -8%, -10% 3rd harmonic.
Amplifier		
	Type	20 kHz fixed frequency, variable duty cycle pulse width modulated (PWM) Current Controlled, bipolar chopper
	Number of Phases	2
	Output Current	0.2–7.5 amps current per phase peak (selectable)
	Drive Supply Voltage	24–75 VDC (dependent on external power supply)
	Standby Current Reduction	25%, 50%, or 75% of selected motor current
	Nominal Chopping Frequency	20 kHz
	Max Stepping Rate	2 MHz max pulse rate; 50 rps max speed
	Step Input	High-going pulse, 200 nsec min width; max pulse rate is 2 MHz; User-supplied driver for the step and direction inputs should be capable of providing a minimum of 6.5 mA to maximum of 15 mA
	Direction Input	Logic High = positive (CW) rotation—3.5–5.0V Logic Low = negative (CCW) rotation—0–0.4V User-supplied driver for the step and direction inputs should be capable of providing a minimum of 6.5 mA to a maximum of 15 mA. The direction input must be stable for at least 200 µsec before the drive receives the first pulse
	Fault Output	Open-Collector/Emitter, Vce = 70 VDC, Vce sat = 0.3 VDC, Ic = 10 mA (max) Maximum dissipation = 55 mW Conducting = normal operation Non conduction = drive fault
Protective Circuts		
	Short Circuit*	Phase-to-phase, phase-to-ground
	Undervoltage	If DC supply drops below 24 VDC
	Overtemperature*	The drive will fault if heat plate exceeds 55°C
Environmental		
	Drive Temp	Max allowable ambient temperature is 122°F (50°C). Fan cooling may be required if airflow is restricted. Max allowable heatplate temperature is 55°C.
	Humidity	0 to 95%, Non-condensing
Physical		
	Drive Dimensions	5.0 x 3.6 x 1.6 in (127 x 91 x 41 mm)
	Weight	12 oz
Motor		
	Type	Two-phase hybrid permanent magnet, 1.8°
	Number of Leads	4, 6, or 8
	Inductance Range	0.2 mH–80 mH

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

Compact, Low-Cost Microstepping Drives with Integrated Controller

Compumotor's OEM750X microstepping drive/controller combines the power, performance, packaging, and reliability of the OEM750 with the simple programmability of a built-in, RS-232C based controller. The "X" version is a cost-effective, single-axis control system to meet your high-volume application needs.

Features

Performance

All of the high performance found in the OEM750 plus:

- Built-in stand-alone controller

I/O

- Standard RS-232C serial communications interface
- Incremental encoder support for position tracking, stall detection, and position maintenance
- Three sequence select inputs for program initiation by an external device
- End of Travel and Home inputs

Language

- Simple Compumotor X Language
- Optional 2K bytes of battery-backed RAM to store up to 7 command sequences (-M2 option)
- Address selectable for daisy chaining up to 8 units

Protection

- Short circuit protected—phase-to-phase, and phase-to-ground
- Status/fault LED indicators to confirm proper operation

Protection (continued)

- Power dump circuitry to protect drive from regeneration caused by large inertial loads
- Self-test feature to verify proper system operation
- Overtemperature circuitry protects the drive from thermal damage
- Certified as UL-recognized component
- CE marked with LVD compliance

Physical

- ASIC and surface-mount technology minimize product footprint, overall package size, and increase product reliability
- Removable snap-on molded cover for convenient configuration and protection against contaminants
- Optically isolated fault output for imbedded applications
- Heat plate design allows thermal dissipation through a suitable heat dissipating mounting surface
- Simplified, two-screw mounting
- Right-angle screw terminal allows side-to-side mounting, or Eurorack compatibility
- Overall dimensions 5.0 x 3.6 x 1.6 in. (127 x 91 x 41 mm)
- Convenient configuration DIP switches

OEM750X Specifications

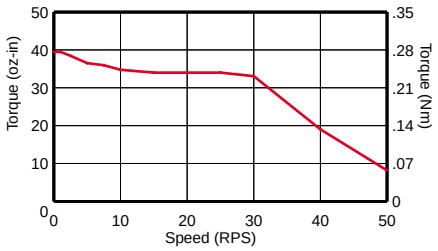
	Parameter	Value
Power Input	DC	24–75 VDC @ 2.0 Arms (motor dependent)
Performance	Accuracy	±5 arc min (0.0833°) typical. Unloaded-bidirectional with Compumotor supplied motors. Other motors may exhibit different absolute accuracy. ±1 arc min (0.0167°) typical. Loaded-in addition to unloaded accuracy, 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%, -8%, -10% 3rd harmonic.
RS-232C Interface	Connection	3-wire implementation (Tx, Rx, Gnd)
	Parameters	9,600 baud rate, 8 data bits, 1 stop bit, no parity
	Configurations	Up to 8 OEM750X units can be controlled from a single host RS-232C port in a daisy chain configuration
Inputs	Sequence Select Inputs	Three inputs to be used to select and run motion programs and for interactive machine control; Logic High = 2.0–5.0V; Logic Low = 0–0.8V
	Trigger Inputs	Logic High = 2.0–5.0V; Logic Low = 0–0.8V
	Limits and Home	Logic High = 2.0–5.0V; Logic Low = 0–0.8V
Encoder	A, B and Z Channel	Single-ended, active high; Logic Low = 0–0.8V; Logic High = 2.0–5.0V
	Max Frequency	160 kHz (pre-quadrature)
	Min Pulse Width (Z)	500 nsecs
Outputs	2 Programmable Outputs	Logic Low = maximum of 0.44 V (sinks to 24 mA)
	Fault Output	Logic high = 5V, Logic low = .8V (output can sink up to 50mA from the load)
Amplifier	Type	20 kHz fixed frequency, variable duty cycle pulse width modulated (PWM) Current controlled, bipolar chopper
	Number of Phases	2
	Output Current	0.2–7.5 amps current per phase peak (selectable)
	Drive Supply Voltage	24–75 VDC (dependent on external power supply)
	Standby Current Reduction	25%, 50%, or 75% of selected motor current
	Nominal Chopping Frequency	20 kHz
	Maximum Stepping Rate	2 MHz maximum pulse rate; 50 rps maximum speed
Protective Circuits	Short Circuit*	Phase-to-phase, phase-to-ground
	Brownout	If DC supply drops below 24 VDC
	Overtemperature*	Drive will fault if heat plate exceeds 55°C
Environmental	Drive	Max allowable ambient temperature is 122°F (50°C). Fan cooling may be required if airflow is restricted Max allowable heatplate temperature is 55°C.
	Humidity	0 to 95%, Non-condensing
Physical	Drive Dimensions	5.0 x 3.6 x 1.6 in (127 x 91 x 41 mm)
	Weight	14 oz
Motor	Type	Two-phase hybrid permanent magnet, 1.8°
	Number of Leads	4, 6, or 8
	Inductance Range	0.2 mH–80 mH

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

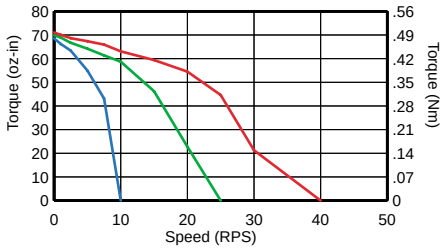
Motor Speed-Torque Performance Curves

OEM750/OEM750X with VS Motos, 17 and 23 frame sizes, 75 VDC

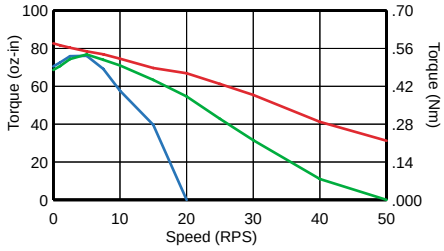
VS12B/OEM750



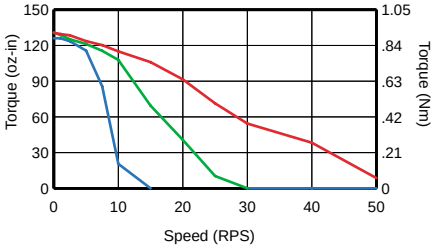
VS13B/OEM750



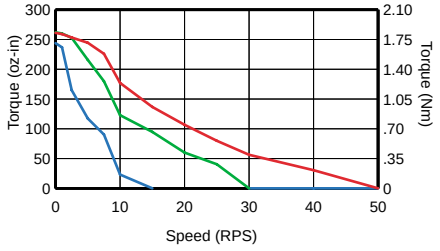
VS21B/OEM750



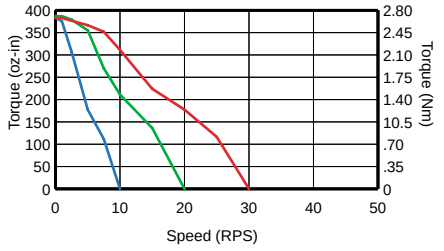
VS22B/OEM750



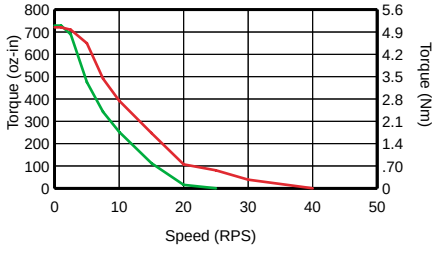
VS23B/OEM750



VS31B/OEM750



VS32B/OEM750



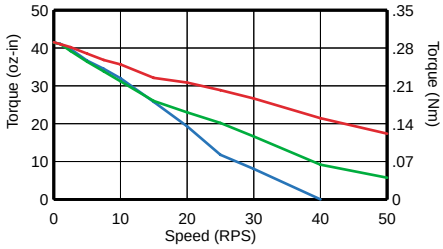
* *Parallel connection consideration: For greater than 50% duty cycle above 5 rps, fan cooling the motor may be required.*

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

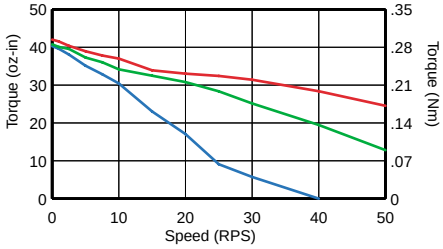
Motor Speed-Torque Performance Curves

OEM750/OEM750X with OS Motors, 23 frame size, 75 VDC

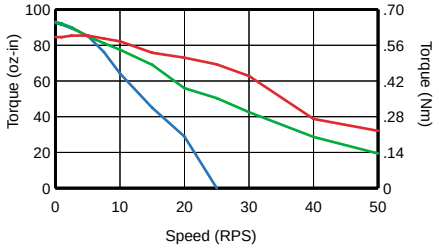
OS2HA/OEM750 (Series)



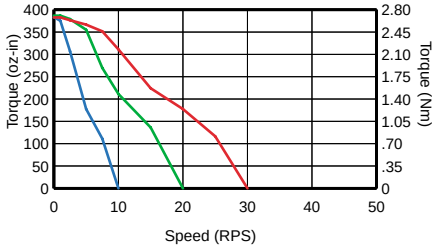
OS2HA/OEM750 (Parallel)

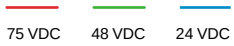


OS21A/OEM750 (Series)



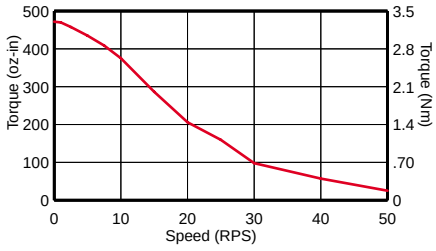
OS22A/OEM750 (Series)



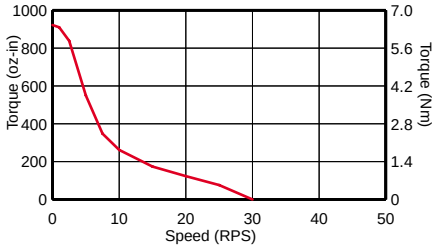


OEM750X with TS Motors

TS31B/OEM750



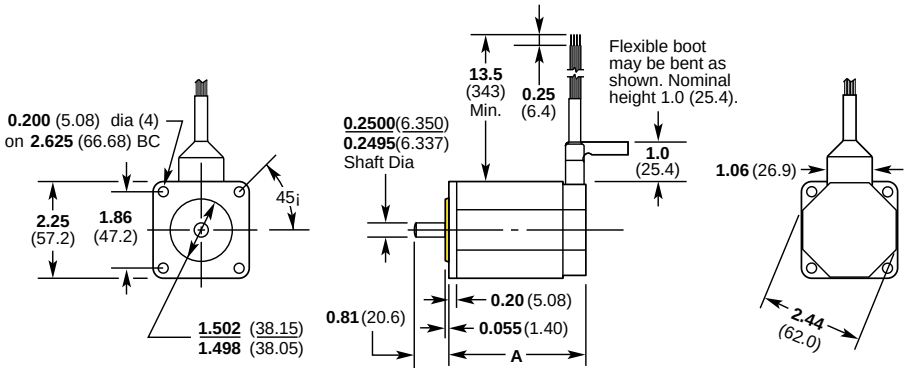
TS32B/OEM750



OEM750/OEM750X Motor Dimensional Drawings

Dimensions in inches (mm)

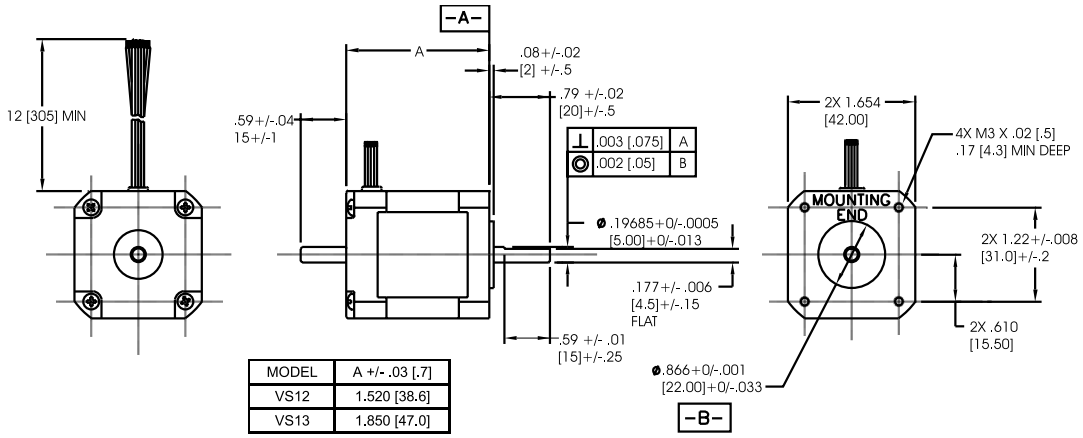
O Series and OEM57 Motors, Size 23 Frame



Frame Size 23 Dimensions in inches (millimeters)

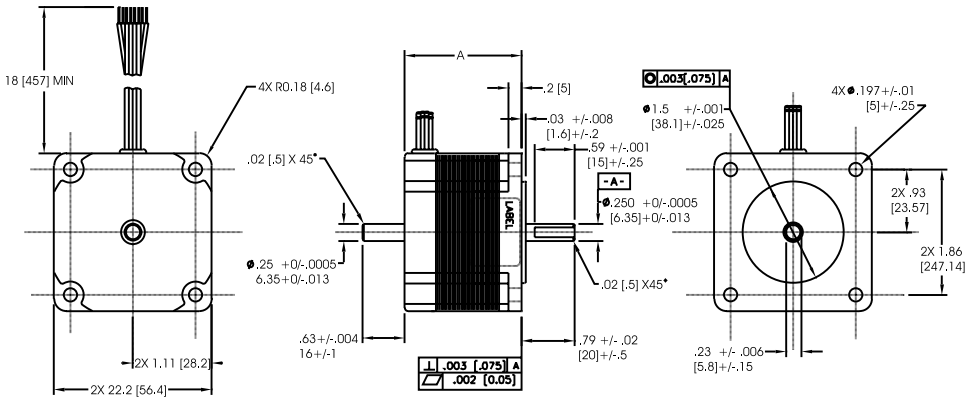
Model	Lmax A
OS2HA (OEM57-40)	1.60 (40.7)
OS21A (OEM57-51)	2.06 (52.4)
OS22A (OEM57-83)	3.10 (78.8)

VS Motors, Size 17 Frame



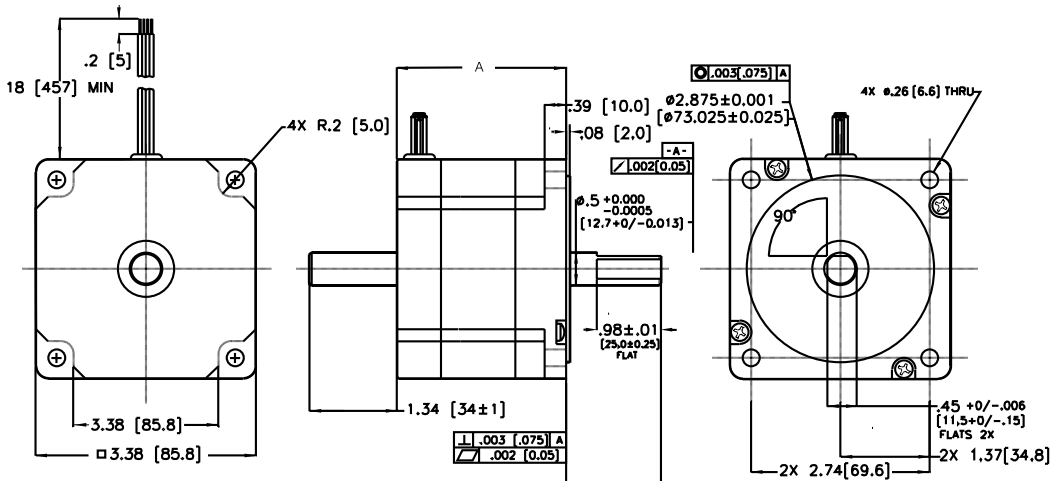
MODEL	A +/- .03 [.7]
VS12	1.520 [38.6]
VS13	1.850 [47.0]

Size 23 Frame



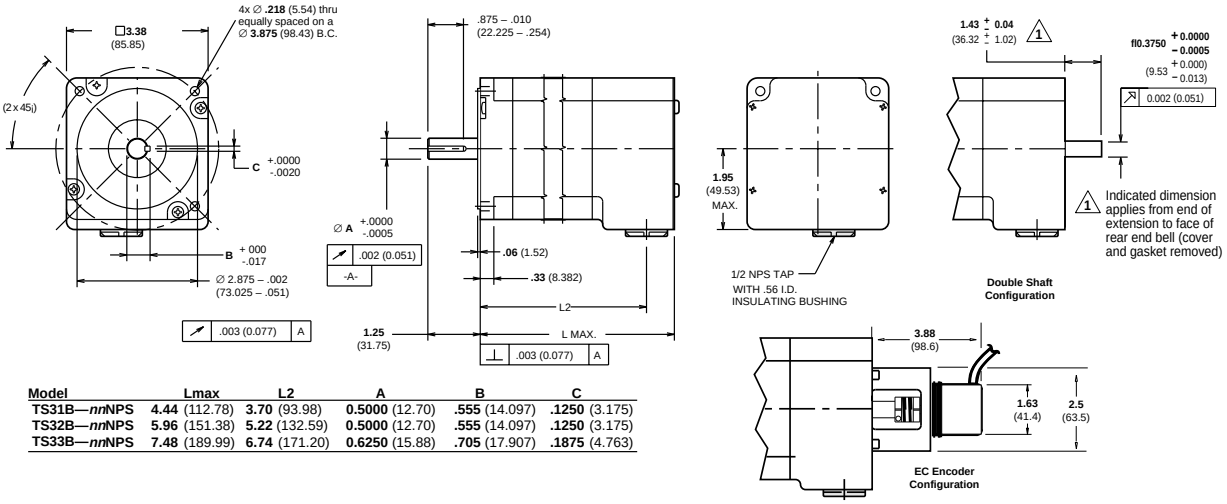
MODEL	A +/- .03 [.7]
VS21	1.732 [44.0]
VS22	2.165 [55.0]
VS23	3.051 [77.5]

VS Motors, continued
Size 34 Frame



MODEL	A +/- 0.04 [1]
VS31	2.598 [66.0]
VS32	3.780 [96.0]

T Series, Size 34 Frame



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

OS and TS Series Motor Specifications Sizes 23 and 34 Frame

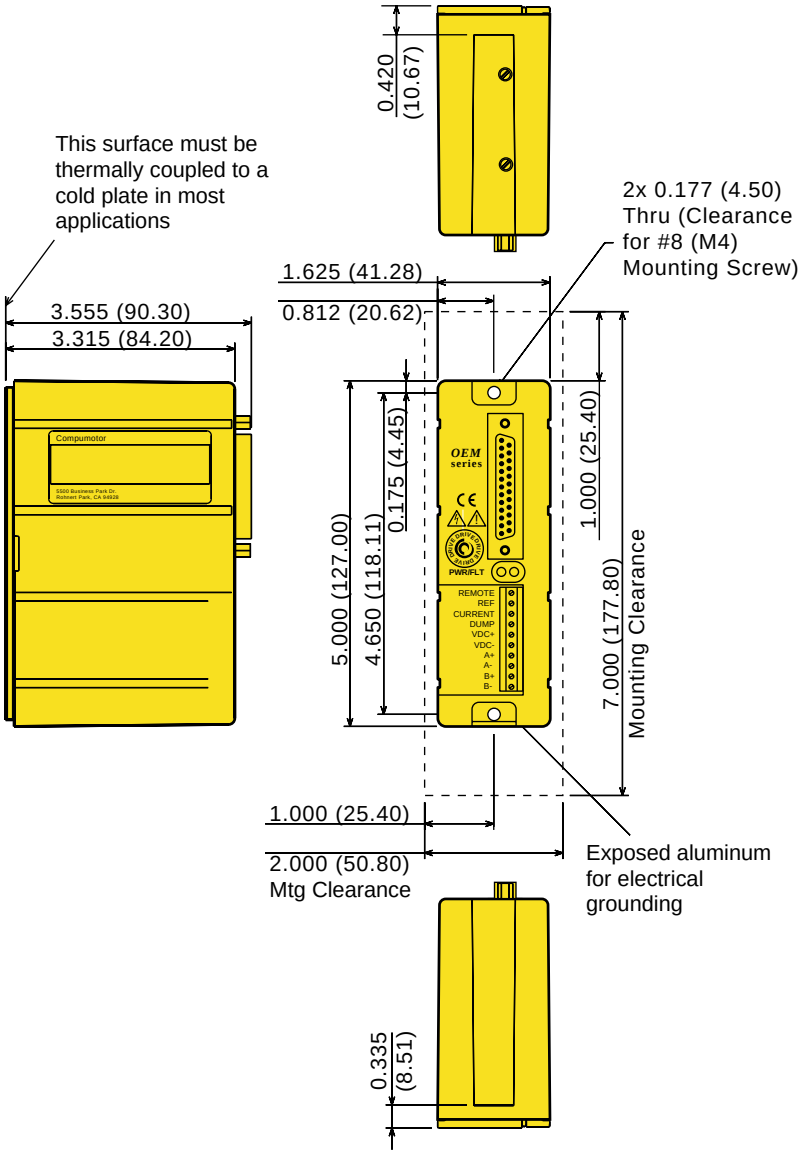
		Size 23 Frame			Size 34 Frame	
		OS2HA	**OS21A**	**OS22A**	**TS31B**	**TS32B**
Static torque	oz-in	37	66	133	455	647
	(Nm)	(0.26)	(0.47)	(0.94)	(3.19)	(4.53)
Rotor Inertia	oz-in^2	0.386	0.656	1.390	7.80	14.67
	(kg-cm^2)	(0.070)	(0.119)	(0.253)	(1.43)	(2.68)
Drive Current	Series	2.65 (1.9)	3.3 (2.3)	3.8 (2.7)	3.3 (2.3)	3.1 (2.2)
(Apk)(Arms)	Parallel	5.3 (3.7)	6.6 (4.7)	7.5 (5.3)	6.7 (4.7)	6.2 (4.4)
Phase Inductance	Series	1.7	1.8	2.8	10.3	10.3
(mH)	Parallel	0.4	0.4	0.7	2.6	2.6
Dentent Torque	oz-in	2.5	4.0	7.0	18.0	36.0
	(Nm)	(0.018)	(0.028)	(0.049)	(0.30)	(0.25)
Bearings Information						
Thrust Load	lb	13	13	13	305	305
	(kg)	(5.9)	(5.9)	(5.9)	(139)	(139)
Radial Load	lb	20	20	20	65	65
	(kg)	(9.1)	(9.1)	(9.1)	(30)	(30)
End Play	in	0.001	0.001	0.001	0.001	0.001
(Reversing Load Equal to 1 lb)	(mm)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Radial Play	in	0.0008	0.0008	0.0008	0.0008	0.0008
(Per 0.5 lb load)	(mm)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Motor Weight	lb	1	1.5	2.5	5.0	8.4
	(kg)	(0.45)	(0.68)	(1.14)	(2.3)	(3.8)
Certifications	UL recognized	Pending	Pending	Pending	Yes	Yes
	CE (LVD)	Yes	Yes	Yes	Yes	Yes
	CE (EMC)	No	No	No	w/C10 kit	w/C10 kit

VS Series Motor Specifications Size 17, 23 and 34 Frame

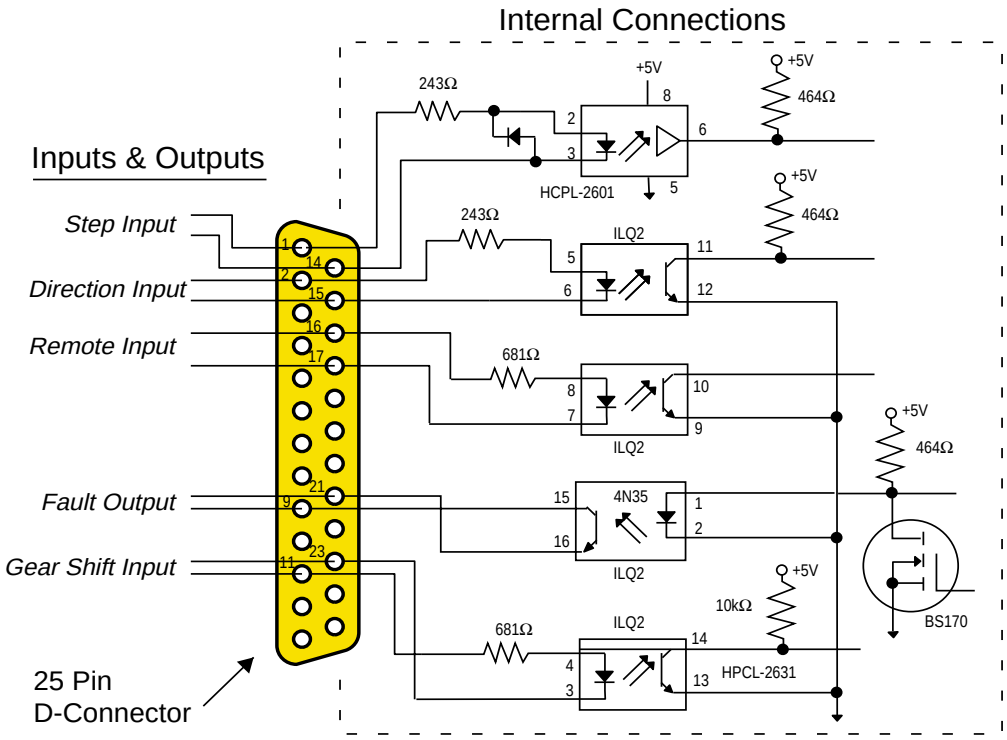
Parameters		Size 17 Frame		Size 23 Frame			Size 34 Frame	
		VS12B	VS13B	VS21B	VS22B	VS23B	VS31B	VS32B
Static torque	oz-in (Nm)	55.27 (0.39)	72.8 (0.51)	115.5 (0.82)	194.5 (1.37)	334.5 (2.36)	551.8 (3.90)	1269.67 (8.97)
Rotor inertia	$oz\text{-}in^2$ $(kg\text{-}cm^2)$	0.3 (0.054)	0.37 (0.068)	0.66 (0.12)	1.64 (0.3)	2.62 (0.48)	7.65 (1.4)	14.8 (2.7)
Drive Current (Apk)(Arms)	Series Parallel	1 (0.71) 2.0 (1.42)	1.01(0.71) 2.02 (1.43)	2.26 (1.6) 4.52 (3.2)	2.01 (1.42) 4.02 (2.84)	2.01 (1.42) 4.02 (2.84)	3.0 (2.12) 6.0 (4.24)	3.13 (2.21) 3.26 (4.42)
Phase Inductance (mH)	Series Parallel	12.8 (3.2)	11.2 (2.8)	5 (1.25)	12 (3.0)	15.4 (3.85)	15.8 (3.95)	25.0 (6.25)
Detent Torque	oz-in (N-m)	2.5 (0.02)	4.0 (0.03)	7.0 (0.05)	8.8 (0.06)	18.0 (0.13)	27.0 (0.19)	50 (0.35)
Bearings Information								
Thrust Load	lb (kg)	11.0 (5)	11.0 (5)	17.6 (8)	17.6 (8)	17.6 (8)	35.3 (16)	35.3 (16)
Radial Load	lb (kg)	7.7 (3.5)	7.7 (3.5)	15.0 (6.8)	15.0 (6.8)	15.0 (6.8)	30.9 (14)	30.9 (14)
End Play (with 2.2 lbs axial load)	in (mm)	0.003 (0.075)	0.003 (0.075)	0.003 (0.075)	0.003 (0.075)	0.003 (0.075)	0.0032 (0.080)	0.0032 (0.080)
Radial Play (with 1.1 lb radial load)	in (mm)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.001 (0.025)	0.0008 (0.020)	0.0008 (0.020)
Motor Weight	lb (kg)	0.55 (0.25)	0.77 (0.35)	1.03 (0.47)	1.54 (0.7)	2.2 (1.0)	3.86 (1.75)	6.18 (2.8)
Certifications								
	UL recognized	No	No	No	No	No	No	No

OEM750/OEM750X Dimensional Drawings

Dimensions in inches (mm)

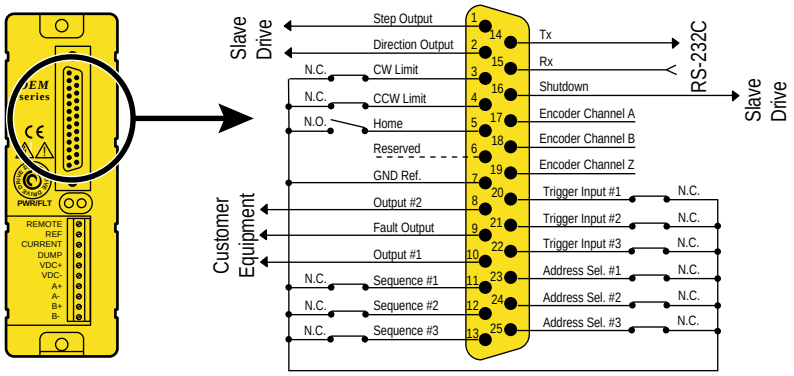


OEM750 Drive Connections



Motor Screw-Terminal	
Pin No	**Signal**
1	REMOTE
2	REF
3	CURRENT
4	DUMP
5	VDC+
6	VDC-
7	A+
8	A-
9	B+
10	B-

OEM750X Drive/Indexer Connections



Motor Screw-Terminal	
Pin No	**Signal**
1	REMOTE
2	REF
3	CURRENT
4	DUMP
5	VDC+
6	VDC-
7	A+
8	A-
9	B+
10	B-

Ordering Information

Drive cULus and CE (LVD)	Part No.	Description	**Drive/Controller** cULus and CE (LVD)	Part No.	Description
	OEM750	0.15–7.5 Apk, Microstepping Drive		OEM750X	0.15–7.5 Apk, Microstepping Drive/Controller
				OEM750X-M2	OEM750X w/ 2KBytes Battery-BAcked RAM Upgrade
Option	Part No.	Description			
	M2-KIT	Memory Upgrade Kit (2KBytes Battery-Backed RAM)			

Motor Ordering Information

O Series (CE(LVD), UL Pending)

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	H=Half stacks 1=1 stack 2=2 stacks	A=75VDC winding (Gray painting motors) B=170VDC winding (Black painted motors)	S=Single D=Double (Double shaft req d for all motors with encoders)	N=Standard smooth F=Flat (.02" depth) (0.5" length)	FLY=Regular con-struction with flying (8) leads, 12" L10= Regular con-struction with 10' LVD cable	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

V Series (UL)

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

T Series (CE(LVD), UL)

Series	Type	Frame Size	No. of Rotor Stacks	Winding Type	Shaft	Shaft Modification	Motor Construction/ Hookup	Encoder Option
T (Torque)	S=Standard	3=Size 34 4=Size 42	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)	K=Straight Key (Standard on all T Series Motors)	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.	Blank=No feedback (No Dash Required) EC=1000 ppr differential encoder with line driver and 10-ft cable (-E Series)