

GLENTEK INC.



Servo & Spindle Drives



Servo Motors

Introduction

Welcome to Glentek! Glentek has been designing and manufacturing high performance servo drives and servo motors since 1964. Our products are always on the cutting edge of technology and incorporate the latest generation of DSP & micro-processor control, high-efficiency/performance control algorithms, magnetic technology, and special heat transfer techniques. By incorporating these technologies into our designs, it enables us to provide ultra high performance, unsurpassed reliability and one of the highest power density products in the world.

Servo drives are offered in both PWM (Pulse Width Modulated) and Linear and can drive brush type, brushless, rotary, linear, voice coil and AC induction motors. Rotary servo motors are offered in both brush type and brushless with industry standard mounting, lead termination and feedback options.

Although Glentek has a wide product offering, we also specialize in custom servo drive and servo motor designs for OEM's. Often times your unique system requirements can be achieved with a simple electrical, mechanical, or software modification which leads to an extremely short development cycle.

Our modern factory is located in El Segundo, California and houses our administrative, engineering, manufacturing, sales, test, and research facilities. Unlike many other servo drive manufacturers, the large majority of our products are produced in-house (i.e. no third party manufacturers) which enable us to offer one of the most cost effective and best overall value products in the world. Additionally, all products undergo 100% testing prior to shipping from our factory. Glentek is a registered ISO9001:2015 company, which is an assurance to our customers that Glentek is 100% committed to producing quality products with unsurpassed service.

Mission Statement

Glentek designs and manufactures motor control electronics and motors—both standard and custom—for the world wide motion control market place.

We partner with original equipment manufacturers and provide superior value by delivering quality products on time with unsurpassed service.

We consider the customer the most important person in our business.

Our commitment is to ensure outstanding financial performance and long lasting relationships benefiting customers, employees, shareholders and suppliers, now and into the future.

Vision Statement

To be recognized as a premier supplier of motor control electronics and motors for the world wide motion control market place.

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PWM SERVO DRIVES OVERVIEW

Gamma Series Digital PWM Servo Drives

Glentek's Gamma Series Digital PWM Servo Drives represents Glentek's latest offering of higher performance multi-core DSP control of brushless (standard servo and high-speed spindle), brush type, rotary, linear, voice coil, and AC induction motors. Two versions of the drive are offered, 9G16 and 9GE. Refer to the selection table on [pg. 6](#) for more details. They offer expanded command and control modes including CANopen, EtherCAT (9GE models only) and indexing/point-to-point. For EtherCAT, the drive device profile is based on IEC 61800-7-201 (CiA 402). The minimum sync cycle time is 125 µs (8 kHz). A UL Recognized Component option is available for 9G16 models. The drives also accept feedback from a wider range of devices and protocols, namely absolute serial encoders (Biss, EnDat and T-Format), and analog Sin/Cos encoders. Additional programmable I/O includes 5 optically isolated inputs, 6 Schmitt triggers, 2 differential inputs, 3 MOSFET outputs, 2 optically isolated programmable outputs, and a general purpose relay. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. These drives incorporate Field Oriented Control (FOC) and Space Vector Modulation (SVM) algorithms which provide optimum control that enable motors to run cooler and at higher velocities. Set-up, tuning, and system diagnostics are accomplished using MotionMaestro (Glentek's Windows-based software).

Alpha Series Digital PWM Servo Drives

Glentek's Alpha Series Digital PWM Servo Drives offer high performance DSP control of brushless (standard servo and high-speed spindle), brush type, rotary, linear, voice coil and AC induction motors. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. These drives incorporate Field Oriented Control (FOC) and Space Vector Modulation (SVM) algorithms which provide optimum control that enable motors to run cooler and at higher velocities. Set-up, tuning and system diagnostics is accomplished using MotionMaestro (Glentek's Windows-based software).

Analog Brush Series PWM Servo Drives

Glentek's Analog Brush PWM Servo Drives offer high performance analog control of brush type rotary and voice coil motors. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. Glentek has been designing and producing analog brush PWM servo drives for over 40 years and continually updates each product as advances in technology become available so that customers are assured of optimal performance and reliability. These drives offer a cost effective, simple (tuning is accomplished by the adjustment of potentiometers), and high performance solution.



PWM SERVO DRIVE COMPARISON

Command/Control Modes	Gamma Series Digital PWM Servo Drives	Alpha Series Digital PWM Servo Drives	Analog Brush Series PWM Servo Drives
+/-10 VDC for current (torque) or velocity (RPM)	•	•	•
Pulse (step) and direction	•	•	
Encoder follower	•	•	
CW/CCW (up/down mode)	•		
External sine commutation (2-phase current mode)	•	•	
RS-232	•	•	
RS-485	•		
PWM for current (torque) or velocity (RPM)	•	•	
Camming/Gearing	•	•	
Indexer/Point-to-Point	•		
CANopen	•		
EtherCAT (9GE only)	•		
Feedback			
Incremental (TTL) quadrature encoder	•	•	
Digital Hall sensors or commutation tracks from encoder	•	•	
Resolver	•	•	
Analog tachometer	•	•	•
Absolute serial encoder (Biss, EnDat, and SSI)	•		
Analog Sin/Cos encoder	•		
I/O			
Dedicated I/O: Analog signal command, tachometer, +/- limits, inhibit/enable, fault, reset, motor temperature	•	•	•
Encoder and step & direction	•	•	
Dedicated Output: Motor current, low-speed electronic circuit breaker, high-speed electronic circuit breaker, over-voltage, and over-temperature			•
Programmable analog out	•	•	
General purpose relay	•	•	
Programmable digital inputs: 5 optically isolated inputs, 6 Schmitt triggers, 2 differential inputs	•		
Programmable digital outputs: 3 MOSFET outputs, 2 optically isolated outputs	•		
Brake: maximum 2 amps @ 24VDC	•		
Master/slave	•	•	•
Safety Disable			
Safe Torque Off (STO) in accordance with IEC61800-5-2 (optional)	•		
Regulatory			
UL Recognized Component for the US and Canada (9G16 only)	•		

GAMMA SERIES DIGITAL PWM SERVO DRIVES

Glentek's Gamma Series Digital PWM Servo Drives represents Glentek's latest offering of higher performance multi-core DSP control of brushless (standard servo and high-speed spindle), brush type, rotary, linear, voice coil, and AC induction motors. They offer expanded command and control modes, accept feedback from a wide range of devices and protocols, and include a programmable I/O. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. These drives incorporate Field Oriented Control (FOC) and Space Vector Modulation (SVM) algorithms which provide optimum control that enable motors to run cooler and at higher velocities. Set-up, tuning, and system diagnostics are accomplished using MotionMaestro (Glentek's Windows-based software). There are two versions of this drive available, SMx9G16 models and SMx9GExx models (x's are model number placeholders). Refer to the selection table below to select the version that best suits your application.

Model	9G16	9GE15	9GE30	9GE45	9GE75
Input Voltage (VDC)	24-710	24-565	-	-	-
Input Voltage (VAC)	110-500	110-400	110-240	110-240	110-240
Cont. Output Current (A)	5, 10, 15, 20, 25, 30, or 45	5, 10, 15, 20, 25, 30, or 45	30	45	75
Current Loop Bandwidth (kHz)	5	5	3 ⁽¹⁾	3 ⁽¹⁾	3 ⁽¹⁾
CANopen	•	•	•	•	•
EtherCAT (125 µs / 8 kHz minimum sync cycle time)		•	•	•	•
Safe Torque Off (STO)	•	•	• ⁽²⁾	• ⁽²⁾	• ⁽²⁾
UL ⁽³⁾	•				

Note:

⁽¹⁾ Higher current loop bandwidths may be available depending on the application.

⁽²⁾ Safe Torque Off (STO) is available as an option for the indicated drives by special request only, and will have longer than normal lead times.

⁽³⁾ The UL Recognized Component option is not available for every drive. Refer to the electrical ratings table for more details.

Command/Control Modes	I/O
+/-10 VDC for current (torque) or velocity (RPM)	Dedicated digital inputs: 2 STO optically isolated
Pulse (step) and direction	Dedicated digital output: Brake (max 2 A @ 24 VDC)
Encoder follower	Programmable digital inputs: 5 optically isolated, 6 Schmitt trigger, 2 differential
CW/CCW (up/down mode)	Programmable digital outputs: 3 MOSFETS (max 1.5A, 24 VDC), 2 optically isolated (max 10 mA, 24 VDC), relay (max 2 A, 30 VDC)
External sine commutation (2-phase current mode)	Analog Inputs: 2 differential (16 bit A/D)
RS-232 & RS-485	Analog Outputs: 2 single ended, programmable (12 bit A/D)
PWM for current (torque) or velocity (RPM) in 50% duty cycle format (one-wire) or 100% duty cycle format (two-wire)	Safety Disable
Indexer/Point-to-Point	Safe Torque Off (STO) in accordance with IEC61800-5-2 (available upon request only)
Camming/Gearing	Environmental Conditions
CANopen	Storage Temperature: -40°C to 80°C
EtherCAT (SMx9GE models only) (125 µs / 8 kHz minimum sync cycle time)	Ambient Operating Temperature: For operating temperature and deratings, see the electrical ratings table
Feedback	Humidity: 5% to 95% relative humidity, non-condensing
Incremental (TTL) quadrature encoder	Altitude: Up to 1000m without derating, derate current 10% per 1000m above 1000m
Digital Hall sensors or commutation tracks from encoder	
Absolute serial encoder (BiSS, EnDat, and T-Format)	
Analog Sin/Cos encoder	
Resolver	
Analog tachometer	

Performance	
FOC	All Gamma Series employ Field Oriented Control method which allows accurate control in both steady state or transient operation, and optimal orientation of the magnetic field.
Space Vector Modulation	Glentek's advanced algorithms allow for maximum utilization of the DC bus voltage while generating minimum harmonic distortion of the currents in the winding of 3-phase AC motor.
Digital current loops	Current loop bandwidths up to 5 kHz.
Digitally tuned	All parameters set digitally. No potentiometers to adjust. DSP control for the ultimate in high performance.
Parametric filtering	Provides control engineers advanced filtering to eliminate unwanted system mechanical resonance.
Smart-Comm Initialization	Eliminates the need for Hall sensor or commutation tracks for many applications.
Auto Phase Finding	Plug and Play for all types of three phase brushless motors. The drives algorithm will automatically find and align the motor phases.
Auto Phase Advance	Glentek's advanced algorithms incorporated in the Gamma Series drives, automatically provide phase advance, insuring that the current is delivered at the appropriate time, and provides the most efficient operation.
Sinusoidal commutation	For the ultimate in efficiency and smooth motion. Commutes from almost any resolution linear or rotary encoder or Hall sensors only.
Fault protection	Short from output to output, short from output to ground, drive RMS over current, drive under/over voltage, drive over temperature, motor over temperature.
On-the-fly mode switching	This feature allows the drive to switch between any mode of operation on-the-fly.
Software configurable	Glentek's Windows™ based MotionMaestro© software provides ease of set-up, monitoring and tuning with no previous programming experience required. This software is Windows™ 95/98/2000/XP, NT, Vista, 7, 8, and 10 compatible.
Silent operation	25 kHz PWM standard.
Command/control Modes	+/-10 V for current (torque) or velocity (RPM), pulse (step) and direction, encoder follower, external sine commutation (2-phase current mode), RS-232, RS-485, CANopen, EtherCAT (SMx9GE only), PWM for current (torque) or velocity (RPM), camming/gearing, Indexer/Point-to-Point.
Regulatory	
UL Recognized	Servo drives that are UL Recognized Components for the US and Canada in accordance with UL61800-5-1 are available as an option (SMx9G16 models only).
CE marked	All servo drives are CE marked in accordance with EN60204-1 (IEC204-1).
RoHS compliant	All servo drives are RoHS compliant.
Connectivity	
CANopen	High-speed (up to 1 Mbits/s) CAN interface for communications between nodes in real-time control applications. The drive device profile is based on IEC 61800-7-301/201 (CiA 402).
EtherCAT (9GE only)	CANopen over EtherCAT, the drive device profile is based on IEC 61800-7-201 (CiA 402). The minimum sync cycle time is 125 µs (8 kHz).
RS-232 or RS-485	High speed (115.2K baud) serial communication interface for setup and tuning and diagnostics. Note: RS-485 is optional.
Feedback	
Encoder feedback	Accepts quadrature feedback up to 40 MHz (10 MHz per channel). By special request only, quadrature feedback up to 100 MHz (25 MHz per channel) may be possible. Absolute serial encoder (BiSS, EnDat, and T-Format). Analog Sin/Cos encoder.
Encoder Output Divider	The encoder input signal can be divided by a user selectable integer for the encoder output signal. Note: Available upon request only.
Tachometer feedback	Accepts analog signals from all types of tachometer feedback.
Resolver feedback	For resolver feedback the drive creates a simulated encoder output with a typical resolution of 12 bits.
I/O	
Programmable Functions	Analog signal command, +/- limits, inhibit/enable, fault, reset, motor temperature, encoder and step & direction.
Input	
Wide operating voltage	24-710 VDC for drive modules. Stand alone and multi axis versions can be ordered for operation from either 110-130 VAC, 208-240 VAC, 360-400 VAC, and 460-500 VAC main lines (single or 3-phase, 50/60 Hz). Note: Non-standard voltages can be ordered upon request.
Direct AC operation	The stand-alone units and multi-axis chassis include DC bus power supplies, cooling fans and a regen clamp with dissipation resistor.
External logic supply	24-48 VDC, 600mA max @ 24 VDC powers all logic & encoder. This works as a "keep alive" for drives.
Build	
Complete isolation	Complete isolation between signal and power stage.
Non-volatile memory	All parameters are stored in non-volatile memory for reliable start up. Note: Available upon request, up to 16 different configurations can be stored in the drives's non-volatile memory.
Relay outputs	Two pins provide an interface for the relay. They turn on when a desired condition occurs.
Status indicator	8-segment display (9G16) or dual 8-segment display (9GE) indicates drive status and diagnostics.
SMT construction	Provides ultra compact size, cost competitive package and high reliability.

GAMMA SERIES (9G16) ELECTRICAL RATINGS

Input Voltage			Output Current ⁽¹⁾			Available Package Configurations			UL ⁽⁴⁾	Heatsink Type (Derating Factor) ⁽²⁾	
VDC	VAC	Model Code ⁽³⁾	Cont. A (A _{RMS})	Peak A (A _{RMS})	Model Code ⁽³⁾	Module	Stand Alone	Multi-Axis		Module	Stand Alone
24-60	N/A	0	5 (3.5)	10 (7.1)	1	•			•	L-Bracket (1)	N/A
24-60	N/A	0	10 (7.1)	20 (14.1)	3	•			•	L-Bracket (1)	N/A
24-60	N/A	0	15 (10.6)	30 (21.2)	4	•			•	L-Bracket (1)	N/A
24-60	N/A	0	20 (14.1)	40 (28.3)	5	•			•	L-Bracket (1)	N/A
24-60	N/A	0	25 (17.7)	50 (35.4)	6	•			•	L-Bracket (1)	N/A
24-60	N/A	0	30 (21.2)	60 (42.4)	7	•			•	L-Bracket (1)	N/A
24-60	N/A	0	45 (31.8)	80 (56.6)	8	•			•	L-Bracket (2)	N/A
60-190	110-130	1	5 (3.5)	10 (7.1)	1	•	•	•	•	L-Bracket (1)	LB (1)/ SF (1)*
60-190	110-130	1	10 (7.1)	20 (14.1)	3	•	•	•	•	L-Bracket (1)	LB (1)/ SF (1)*
60-190	110-130	1	15 (10.6)	30 (21.2)	4	•	•	•	•	L-Bracket (2)	LB (2)/ SF (1)*
60-190	110-130	1	20 (14.1)	40 (28.3)	5	•	•	•	•	Short Fin (1)	Short Fin (1)
60-190	110-130	1	25 (17.7)	50 (35.4)	6	•	•	•	•	Short Fin (2)	Short Fin (2)
60-190	110-130	1	30 (21.2)	60 (42.4)	7	•	•	•	•	Long Fin (1)	Long Fin (1)
60-190	110-130	1	45 (31.8)	80 (56.6)	8	•	•	•	•	Long Fin (2)	Long Fin (2)
190-370	208-240	2	5 (3.5)	10 (7.1)	1	•	•	•	•	L-Bracket (1)	LB (1)/ SF (1)*
190-370	208-240	2	10 (7.1)	20 (14.1)	3	•	•	•	•	L-Bracket (2)	LB (2)/ SF (1)*
190-370	208-240	2	15 (10.6)	30 (21.2)	4	•	•	•	•	L-Bracket (3)	LB (3)/ SF (2)*
190-370	208-240	2	20 (14.1)	40 (28.3)	5	•	•	•	•	Short Fin (2)	Short Fin (2)
190-370	208-240	2	25 (17.7)	50 (35.4)	6	•	•	•	•	Short Fin (3)	Short Fin (3)
190-370	208-240	2	30 (21.2)	60 (42.4)	7	•	•	•	•	Long Fin (2)	Long Fin (2)
190-370	208-240	2	45 (31.8)	80 (56.6)	8	•	•	•	•	Long Fin (3)	Long Fin (3)
370-565	360-400	3	5 (3.5)	10 (7.1)	1	•	•	•	•	L-Bracket (2)	LB (2)/ SF (1)*
370-565	360-400	3	10 (7.1)	20 (14.1)	3	•	•	•	•	Short Fin (2)	Short Fin (2)
370-565	360-400	3	15 (10.6)	30 (21.2)	4	•	•	•	•	Short Fin (3)	Short Fin (3)
370-565	360-400	3	20 (14.1)	40 (28.3)	5	•	•	•	•	Long Fin (2)	Long Fin (2)
370-565	360-400	3	25 (17.7)	50 (35.4)	6	•	•	•	•	Long Fin (3)	Long Fin (3)
370-565	360-400	3	30 (21.2)	60 (42.4)	7	•	•	•	•	Long Fin (4)	Long Fin (4)
565-710	460-500	4	5 (3.5)	10 (7.1)	1	•	•	•	•	L-Bracket (3)	LB (3)/ SF (2)*
565-710	460-500	4	10 (7.1)	20 (14.1)	3	•	•	•	•	Short Fin (3)	Short Fin (3)
565-710	460-500	4	15 (10.6)	30 (21.2)	4	•	•	•	•	Long Fin (3)	Long Fin (3)
565-710	460-500	4	20 (14.1)	40 (28.3)	5	•	•	•	•	Long Fin (4)	Long Fin (4)

Notes:

⁽¹⁾ The column Cont. Output Current is the continuous current and the column Peak Output Current is the intermittent peak current. For output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs or VDC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽²⁾ Three heatsink types, L-Bracket (LB), Short Fin (SF), and Long Fin (LF) are available depending on the input voltage and output current. For certain Stand Alone units the customer must choose the heatsink type based on their application. These models are marked with an asterisk, ex. LB (1) / SF (2)*. For dimensions, refer to pg. 10. There are 4 standard categories for ambient operating temperature and current derating denoted by the number following the heatsink type. All categories require forced air cooling.

Category 1: 0 to 60 °C without derating. Derate current 10% per °C over 60 °C.

Category 2: 0 to 50 °C without derating. Derate current 5% per °C over 50 °C.

Category 3: 0 to 40 °C without derating. Derate current 3% per °C over 40 °C.

Category 4: 0 to 30 °C without derating. Derate current 2.5% per °C over 30 °C.

Special: Contact Glentek for models with a lower operating temperature limit of -40 °C.

⁽³⁾ Model Codes are used on pgs. 12-17 for model numbering

⁽⁴⁾ UL Recognized Components are available as an option for the selected drives.

⁽⁵⁾ Bus power logic (SMB models) not available for input voltages of greater than 370 VDC (Module) or 360 VAC (Stand Alone and Multi-Axis).

GAMMA SERIES (9GE) ELECTRICAL RATINGS

Model Number Code ⁽³⁾	Input Voltage			Output Current ⁽¹⁾			Available Package Configurations			Heatsink Type (Derating Factor) ⁽²⁾
	VDC	VAC	Model Number Code ⁽³⁾	Cont. A (A _{RMS})	Peak A (A _{RMS})	Model Number Code ⁽³⁾	Module	Stand Alone	Multi-Axis	
15	24-60	N/A	0	5 (3.5)	10 (7.1)	1	•			L-Bracket (1)
15	24-60	N/A	0	10 (7.1)	20 (14.1)	3	•			L-Bracket (1)
15	24-60	N/A	0	15 (10.6)	30 (21.2)	4	•			L-Bracket (1)
15	24-60	N/A	0	20 (14.1)	40 (28.3)	5	•			L-Bracket (1)
15	24-60	N/A	0	25 (17.7)	50 (35.4)	6	•			L-Bracket (1)
15	24-60	N/A	0	30 (21.2)	60 (42.4)	7	•			L-Bracket (2)
15	24-60	N/A	0	45 (31.8)	80 (56.6)	8	•			L-Bracket (3)
15	60-190	110-130	1	5 (3.5)	10 (7.1)	1	•	•	•	L-Bracket (1)
15	60-190	110-130	1	10 (7.1)	20 (14.1)	3	•	•	•	L-Bracket (1)
15	60-190	110-130	1	15 (10.6)	30 (21.2)	4	•	•	•	L-Bracket (2)
15	60-190	110-130	1	20 (14.1)	40 (28.3)	5	•	•	•	Short Fin (2)
15	60-190	110-130	1	25 (17.7)	50 (35.4)	6	•	•	•	Short Fin (3)
15	190-370	208-240	2	5 (3.5)	10 (7.1)	1	•	•	•	L-Bracket (1)
15	190-370	208-240	2	10 (7.1)	20 (14.1)	3	•	•	•	L-Bracket (2)
15	190-370	208-240	2	15 (10.6)	30 (21.2)	4	•	•	•	L-Bracket (3)
15	190-370	208-240	2	20 (14.1)	40 (28.3)	5	•	•	•	Short Fin (3)
15	190-370	208-240	2	25 (17.7)	50 (35.4)	6	•	•	•	Short Fin (4)
15	370-565	360-400	3	5 (3.5)	10 (7.1)	1	•	•	•	L-Bracket (2)
15	370-565	360-400	3	10 (7.1)	20 (14.1)	3	•	•	•	Short Fin (2)
15	370-565	360-400	3	15 (10.6)	30 (21.2)	4	•	•	•	Short Fin (3)
15	370-565	360-400	3	20 (14.1)	40 (28.3)	5	•	•	•	Long Fin (3)
15	370-565	360-400	3	25 (17.7)	50 (35.4)	6	•	•	•	Long Fin (4)
30	N/A	110-130	1	30 (21.2)	60 (42.4)	7		•		Long Fin (2)
30	N/A	208-240	2	30 (21.2)	60 (42.4)	7		•		Long Fin (3)
45	N/A	110-130	1	45 (31.8)	80 (56.6)	8		•		Long Fin (2)
45	N/A	208-240	2	45 (31.8)	80 (56.6)	8		•		Long Fin (3)
75	N/A	110-130	1	75 (53)	120 (84.9)	9		•		Long Fin (3)
75	N/A	208-240	2	75 (53)	120 (84.9)	9		•		Long Fin (4)

Notes:

⁽¹⁾ The column Cont. Output Current is the continuous current and the column Peak Output Current is the intermittent peak current. For output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs or VDC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽²⁾ Three heatsink types (L-Bracket, Short Fin, and Long Fin) are available depending on the input voltage and output current. For dimensions, refer to [pgs. 10-11](#). There are 4 standard categories for ambient operating temperature and current derating denoted by the number following the heatsink type. All categories require forced air cooling.

Category 1: 0 to 60 °C without derating. Derate current 10% per °C over 60 °C.

Category 2: 0 to 50 °C without derating. Derate current 5% per °C over 50 °C.

Category 3: 0 to 40 °C without derating. Derate current 3% per °C over 40 °C.

Category 4: 0 to 30 °C without derating. Derate current 2.5% per °C over 30 °C.

Special: Contact Glentek for models with a lower operating temperature limit of -40 °C.

⁽³⁾ Model Codes are used on [pgs. 12-17](#) for model numbering

⁽⁴⁾ Bus power logic (SMB models) not available for input voltages of greater than 370 VDC (Module) or 360 VAC (Stand Alone and Multi-Axis).

GAMMA SERIES DIGITAL PWM SERVO DRIVE DIMENSIONS

Package Configuration Selection Table

Glentek offers three different types of packages: stand alone, module, and multi-axis. Stand alone and multi-axis packages require an AC input and are available in three configurations: A, B, and F. These codes are used in the model numbering. Modules require a DC input. The table below specifies the differences between the various package configurations. Custom configurations are available upon request. **Note: Heatsink type: LB = L-Bracket, SF = Short Fin, LF = Long Fin.**

Feature	Stand Alone: A	Stand Alone: B	Stand Alone: F	Module	Multi-Axis: A	Multi-Axis: B
Drive(s)	1	1	1	1	1-5	1-5
DC Bus Power Supply	•	•	•		•	•
In-rush current limiting at power on	•	•	•		•	•
Regen Clamp	•		•		•	
Dissipation Resistor	•				•	
Fan(s)	•	•			•	•
Heatsink type	SF or LF	SF or LF	LB	LB, SF, or LF	LB, SF, or LF	LB, SF, or LF
Fuses					•	•

Stand Alone

This type of package is typically used for one or multi-axis applications. Refer to the electrical ratings on [pgs. 8-9](#) to determine heatsink type based on the input voltage and output current.

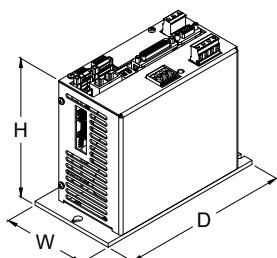
Version/Model Numbers: 9G16

Heatsink Type	Regen Option	Dimensions, Inches (mm)			Weight lbs. (kg)	Fan
		Width	Height	Depth		
L-Bracket	1F	3.5 (90)	8.6 (217)	8.7 (220)	8.3 (3.8)	No
Short Fin	1A / 1B	5.2 (132)	8.2 (208)	10.9 (276)	9.0 (4.1)	Yes
Long Fin	1A / 1B	6.6 (168)	8.2 (208)	10.9 (276)	9.5 (4.3)	Yes

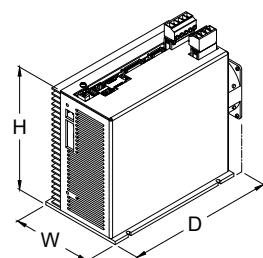
Version/Model Numbers: 9GE

Model Number ⁽¹⁾	Heatsink Type	Regen Option	Dimensions, Inches (mm)			Weight lbs. (kg)	Fan
			Width	Height	Depth		
SMx9GE15	L-Bracket	1F	4.0 (102)	6.2 (156)	7.9 (220)	4.0 (1.8)	No
	Short Fin	1A	4.0 (102)	6.2 (156)	9.0 (229)	4.7 (2.1)	Yes
	Short Fin	1B	4.0 (102)	6.2 (156)	9.0 (229)	4.7 (2.1)	Yes
	Short Fin	1F	4.0 (102)	6.2 (156)	7.9 (220)	4.7 (2.1)	No
	Long Fin	1A	5.4 (138)	6.2 (156)	9.0 (229)	6.0 (2.7)	Yes
	Long Fin	1B	5.4 (138)	6.2 (156)	9.0 (229)	6.0 (2.7)	Yes
	Long Fin	1F	5.4 (138)	6.2 (156)	7.9 (220)	6.0 (2.7)	No
SMx9GE30	Long Fin	1A	5.3 (135)	9.3 (237)	12.5 (317)	11.0 (4.9)	Yes
SMx9GE45	Long Fin	1A	5.3 (135)	9.4 (238)	14.4 (366)	11.8 (5.4)	Yes
SMx9GE75	Long Fin	1A	5.9 (149)	12.6 (320)	17.6 (448)	25.5 (11.3)	Yes

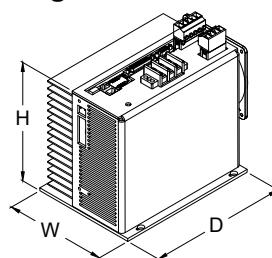
L-Bracket Stand Alone



Short Fin Stand Alone



Long Fin Stand Alone



GAMMA SERIES DIGITAL PWM SERVO DRIVE DIMENSIONS

Module

This type of package is typically used for cost sensitive applications where the customer provides DC bus power supply, forced-air cooling, and regen clamp. **Refer to the electrical ratings on [pgs. 8-9](#) to determine heatsink type based on the input voltage and output current.**

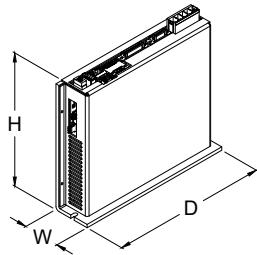
Version/Model Numbers: 9G16

Heatsink Type	Dimensions, Inches (mm)			Weight lbs. (kg)
	Width	Height	Depth	
L-Bracket	2.0 (51)	7.6 (193)	8.8 (224)	2.6 (1.2)
Short Fin	2.5 (64)	7.6 (193)	8.8 (224)	4.0 (1.8)
Long Fin	3.8 (95)	7.6 (193)	8.8 (224)	4.5 (2.0)

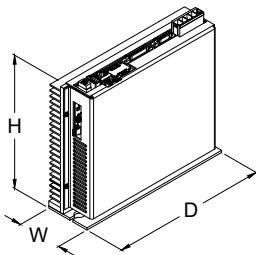
Version/Model Numbers: 9GE15

Heatsink Type	Dimensions, Inches (mm)			Weight lbs. (kg)
	Width	Height	Depth	
L-Bracket	1.6 (41)	5.1 (130)	7.1 (181)	1.8 (.8)
Short Fin	2.4 (60)	5.1 (130)	7.1 (181)	2.8 (1.3)
Long Fin	3.7 (94)	5.1 (130)	7.1 (181)	4.0 (1.8)

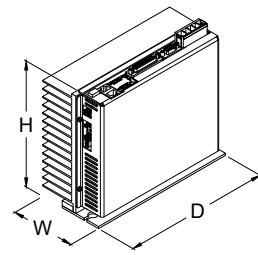
L-Bracket Module



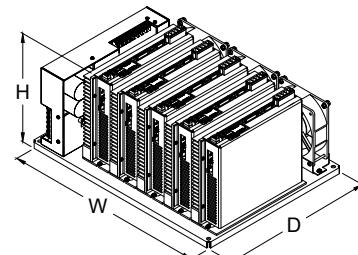
Short Fin Module



Long Fin Module



Multi-Axis



Multi-Axis

This package consists of an open frame base plate chassis. Available in a 2, 4, and 5 axis package. **Refer to the electrical ratings on [pgs. 8-9](#) to determine heatsink type based on the input voltage and output current.**

Version/Model Numbers: 9G16

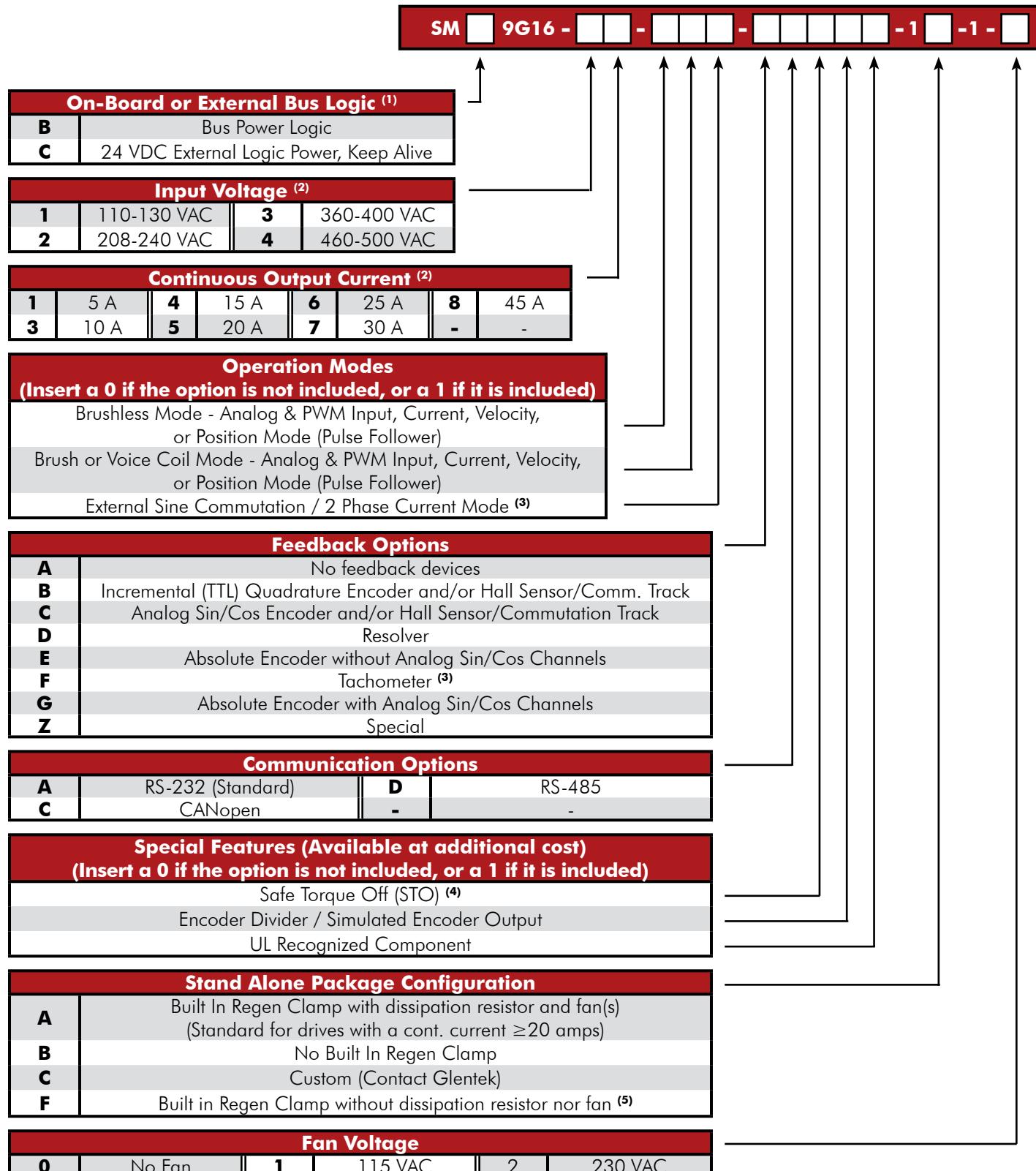
Axes	Heatsink Type	Dimensions, Inches (mm)			Weight lbs. (kg)
		Width	Height	Depth	
2	L-Bracket	9.8 (248)	8.1 (205)	11.8 (298)	13.0 (5.9)
2	Small Fin	9.8 (248)	8.1 (205)	11.8 (298)	16.0 (7.3)
2	Long Fin	14.9 (378)	8.1 (205)	11.8 (298)	18.5 (8.4)
4	L-Bracket	14.9 (378)	8.1 (205)	11.8 (298)	20.0 (9.1)
4	Small Fin	14.9 (378)	8.1 (205)	11.8 (298)	24.0 (10.9)
5	L-Bracket	18.8 (476)	8.1 (205)	11.8 (298)	23.0 (10.4)
5	Small Fin	18.8 (476)	8.1 (205)	11.8 (298)	30.0 (13.6)

Version/Model Numbers: 9GE15

Axes	Heatsink Type	Dimensions, Inches (mm)			Weight lbs. (kg)
		Width	Height	Depth	
2	L-Bracket	9.0 (229)	7.7 (197)	10.8 (273)	13.0 (5.9)
2	Small Fin	9.8 (248)	7.7 (197)	10.8 (273)	16.0 (7.3)
2	Long Fin	14.9 (378)	7.7 (197)	10.8 (273)	18.5 (8.4)
4	L-Bracket	13.0 (330)	7.7 (197)	10.8 (273)	20.0 (9.1)
4	Small Fin	14.9 (378)	7.7 (197)	10.8 (273)	24.0 (10.9)
5	L-Bracket	18.8 (476)	7.7 (197)	11.8 (298)	23.0 (10.4)
5	Small Fin	18.8 (476)	7.7 (197)	11.8 (298)	30.0 (13.6)

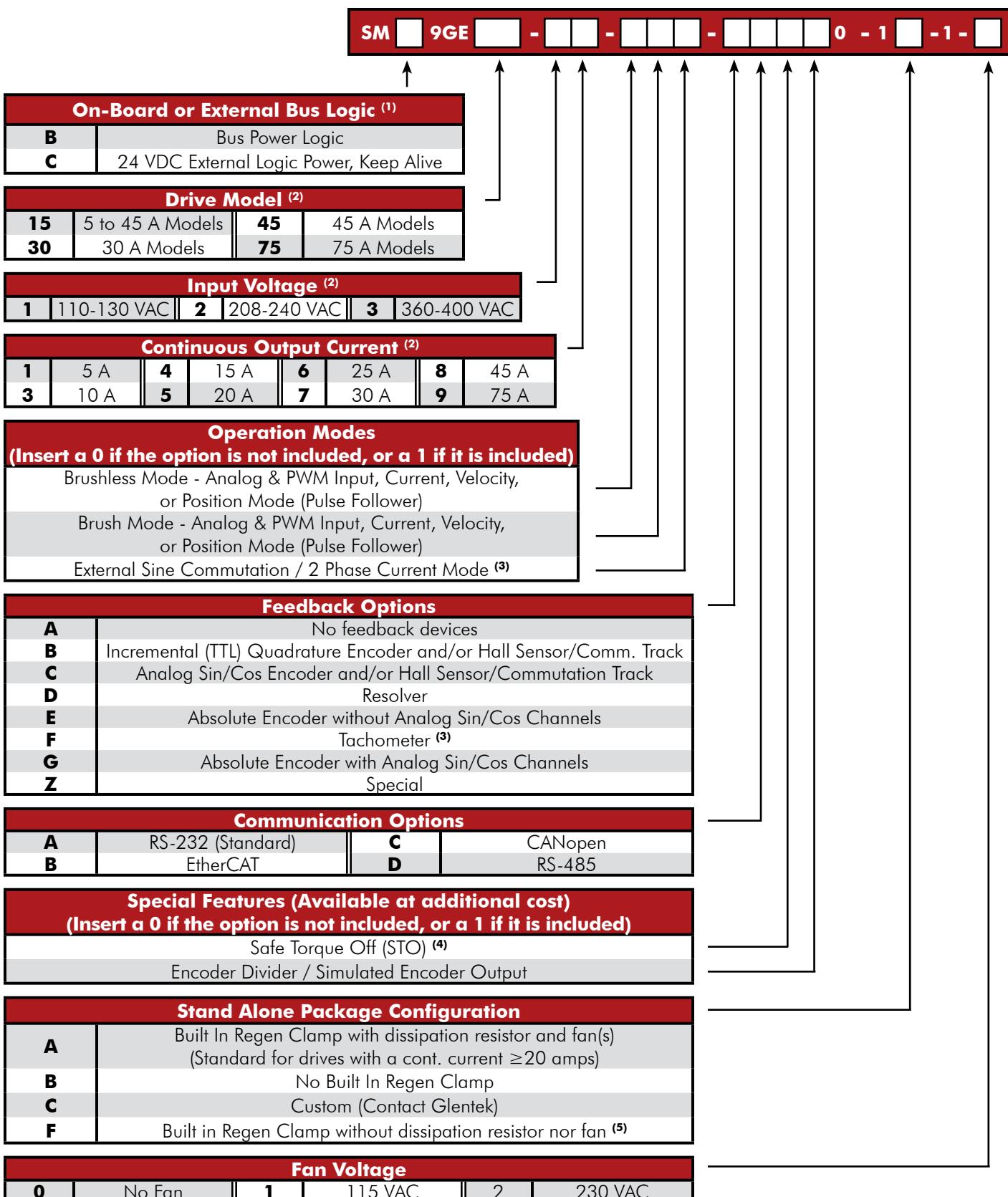
GAMMA SERIES (9G16) STAND ALONE MODEL NUMBERING

This section explains the model numbering system for Glentek's Gamma Series Digital PWM Brushless Servo Drives. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the drive that best suits your requirements. **Please choose the model and package configuration you require from the "Electrical Ratings" table on pg. 8-9.** Then complete the drive configuration code you require using the information on this page. After completing your model number, please contact a Glentek Sales Engineer to confirm that the model number you have created is correct.



For notes, refer to pg. 13.

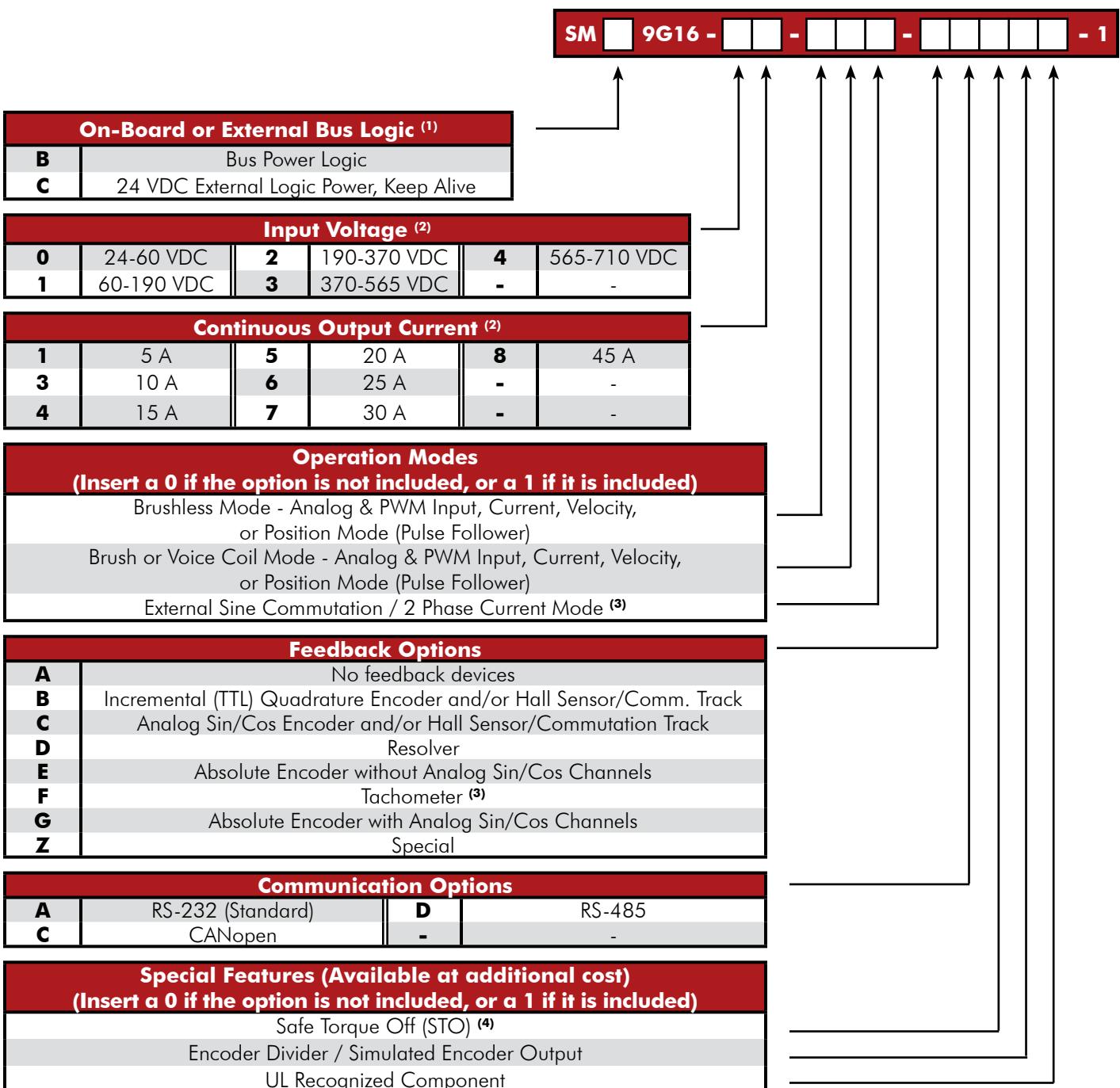
GAMMA SERIES (9GE) STAND ALONE MODEL NUMBERING



Notes (For 9G16 and 9GE Stand Alone models):

- ⁽¹⁾ Bus power logic (SMB models) not available for input voltages of greater than 360 VAC.
- ⁽²⁾ Refer to the Electrical Ratings on [pgs. 8-9](#) for available combinations of voltage and current.
- ⁽³⁾ External sine commutation and tachometer may not both be selected.
- ⁽⁴⁾ Safe Torque Off (STO) option might require longer lead times, depending on the model.
- ⁽⁵⁾ External forced air cooling must be supplied for rated current.

GAMMA SERIES (9G16) MODULE MODEL NUMBERING



Notes (For 9G16 and 9GE Stand Alone, Module, and Multi-Axis models):

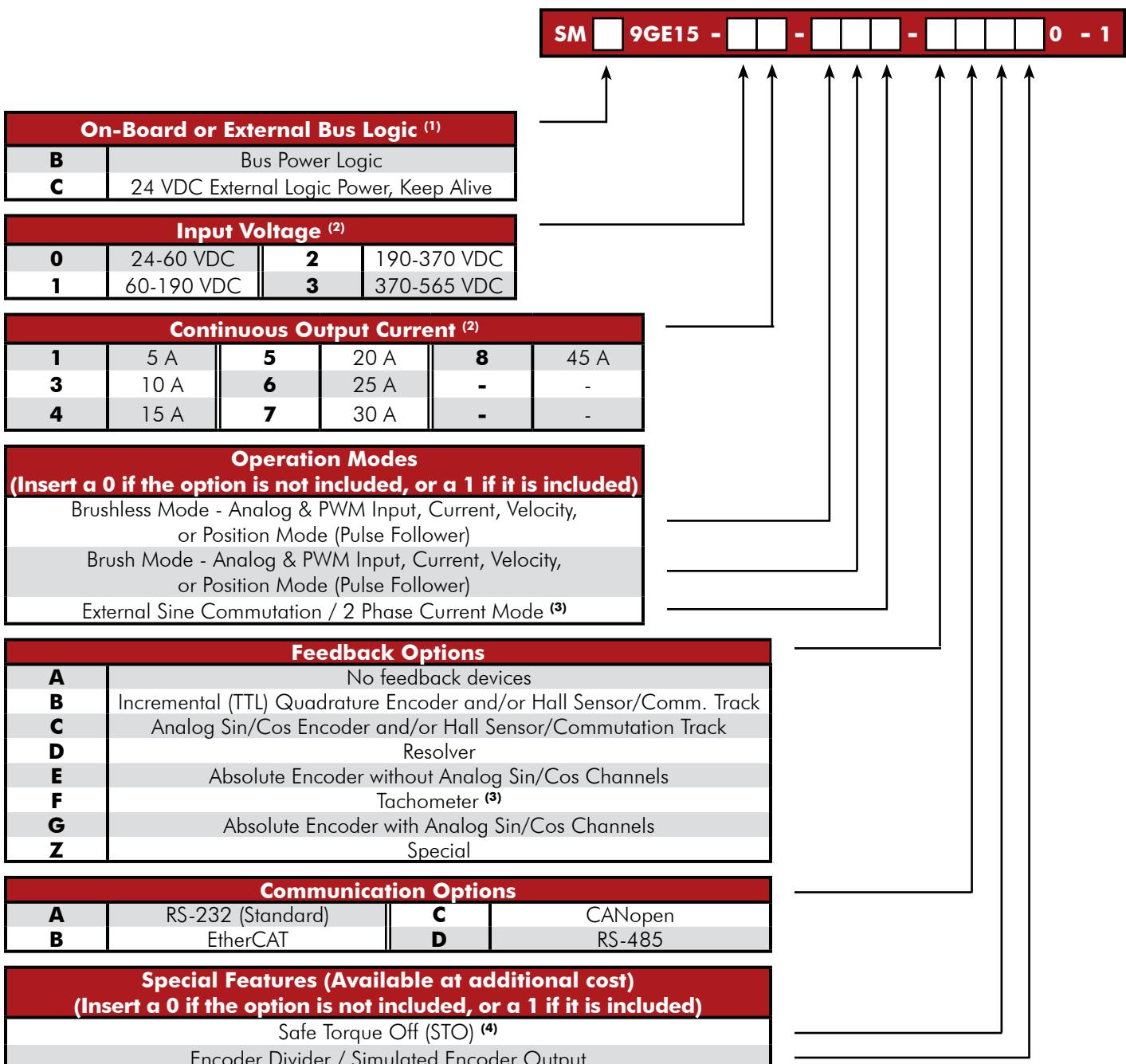
⁽¹⁾ Bus power logic (SMB models) not available for input voltages of greater than 370 VDC (Module) or 360 VAC (Stand Alone and Multi-Axis).

⁽²⁾ Refer to the Electrical Ratings on [pgs. 8-9](#) for available combinations of voltage and current.

⁽³⁾ External sine commutation and tachometer may not both be selected.

⁽⁴⁾ Safe Torque Off (STO) option might require longer lead times, depending on the model.

GAMMA SERIES (9GE) MODULE MODEL NUMBERING



Notes (For 9G16 and 9GE Stand Alone, Module, and Multi-Axis models):

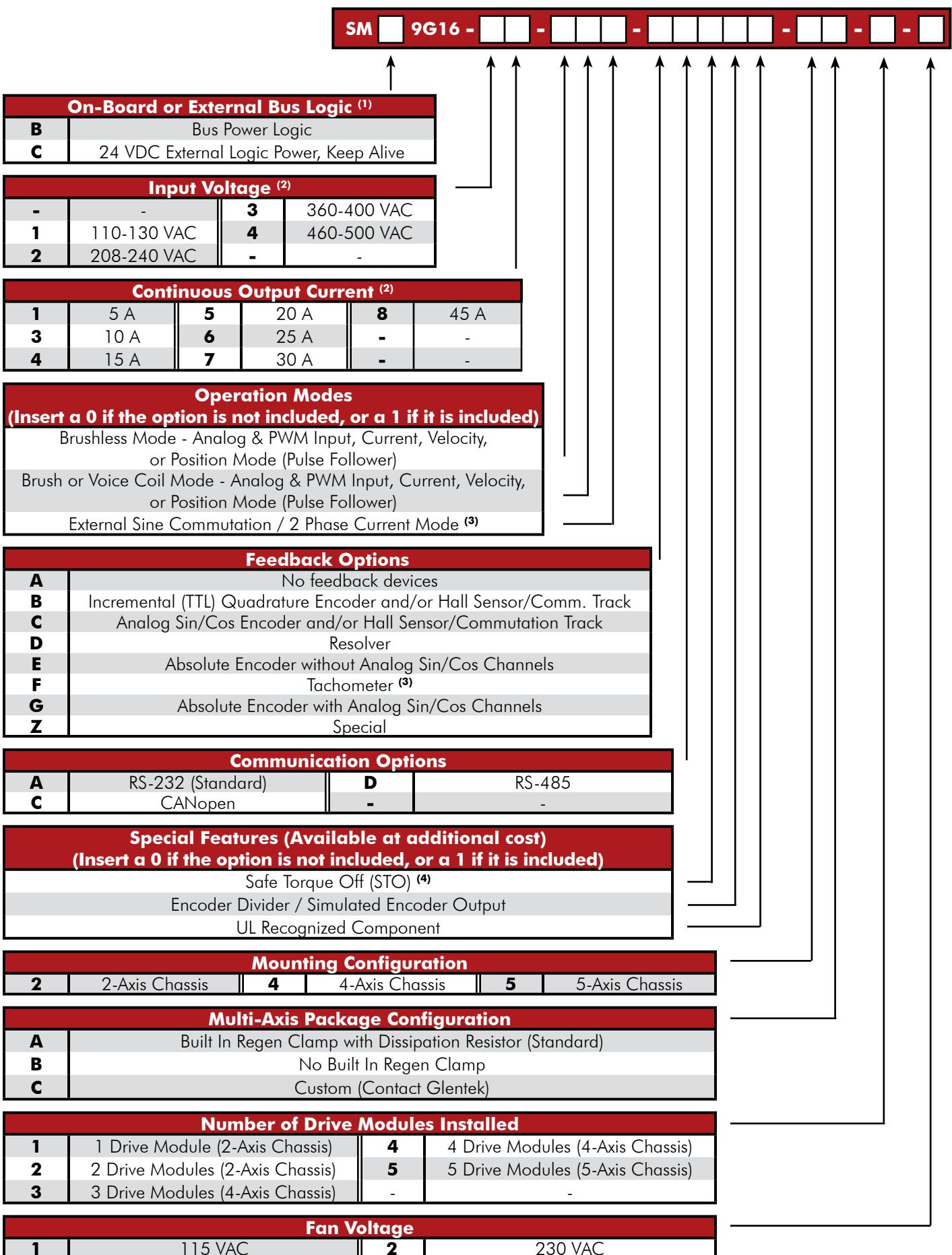
⁽¹⁾ Bus power logic (SMB models) not available for input voltages of greater than 370 VDC (Module) or 360 VAC (Stand Alone and Multi-Axis).

⁽²⁾ Refer to the Electrical Ratings on [pgs. 8-9](#) for available combinations of voltage and current.

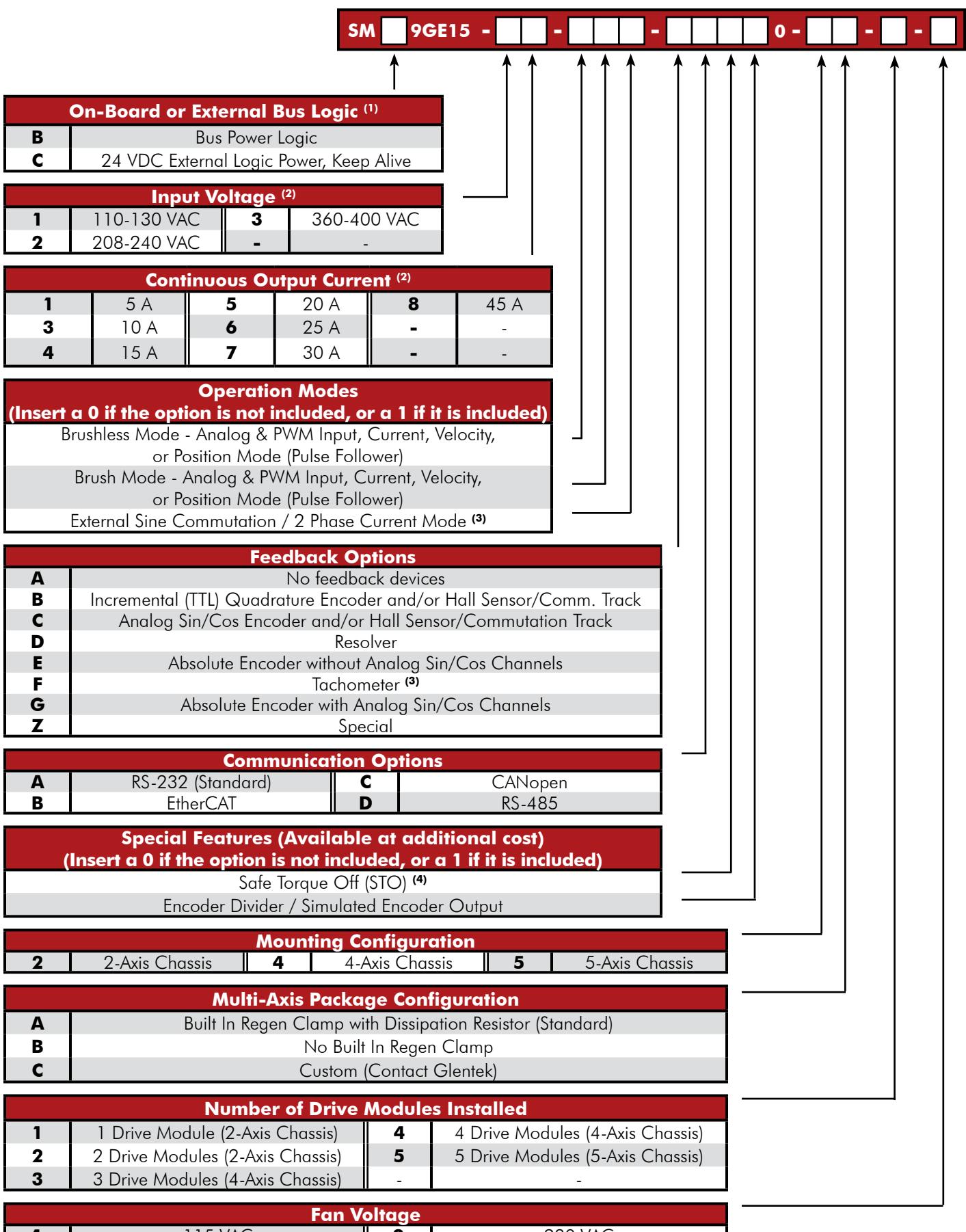
⁽³⁾ External sine commutation and tachometer may not both be selected.

⁽⁴⁾ Safe Torque Off (STO) option might require longer lead times, depending on the model.

GAMMA SERIES (9G16) MULTI-AXIS MODEL NUMBERING



GAMMA SERIES (9GE) MULTI-AXIS MODEL NUMBERING



For notes, refer to pg. 14.

DC BUS POWER SUPPLY (RECTIFIER) ASSEMBLIES

Model Numbering

This section explains the model numbering system for Glentek's GP8600-76 DC bus power supply (rectifier) assemblies. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the DC bus power supply (rectifier) assembly that best suits your requirements. Complete the configuration code you require using the information on this page. After completing your model number, please contact a Glentek Sales Engineer to confirm that the model number you have created is correct.

GP8600 - 76 - 	
Input Voltage	
1	110-130 VAC
2	208-240 VAC
3	360-400 VAC
4	460-500 VAC
Continuous Output Current A (A_{RMS}) per axis ⁽¹⁾	
1	5 (4)
3	10 (7)
4	15 (11)
5	20 (14)
6	25 (18)
7	30 (22)
8	45 (32)
Package Configuration	
A	Built in Regen Clamp with Dumping Resistor
B	No Built in Regen Clamp
C	Custom
Number of Axes Utilized	
1	1 Axis
2	2 Axis
3	3 Axis
4	4 Axis
5	5 Axis
UL Recognized Component ⁽²⁾	
0	not UL Recognized
1	UL Recognized

NOTES:

⁽¹⁾ For continuous output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽²⁾ See [pg. 19](#) for non-UL and UL Recognized Component combinations of input voltage, output current, and number of axes for SMB/SMC9G16 Gamma series drives.

⁽³⁾ See [pg. 20](#) for combinations of input voltage, output current, and number of axes for SMB/SMC9GE15 Gamma series drives.

DC BUS POWER SUPPLY (RECTIFIER) ASSEMBLIES

Electrical Ratings for use with SMB/SMC9G16 Gamma Series Drives

Input Voltage		Output Current, per axis ⁽¹⁾			UL Recognized Component ⁽⁴⁾	Max. No. of Axes		Module Heatsink Type (Derating Factor) ⁽²⁾
VAC	Model Code ⁽³⁾	Cont. A (A_{RMS})	Peak A (A_{RMS})	Model Code ⁽³⁾		Non-UL	UL	
110-130	1	5 (3.5)	10 (7.1)	1	•	5	5	L-Bracket (1)
110-130	1	10 (7.1)	20 (14.1)	3	•	5	5	L-Bracket (1)
110-130	1	15 (10.6)	30 (21.2)	4	•	5	5	L-Bracket (2)
110-130	1	20 (14.1)	40 (28.3)	5	•	5	5	Short Fin (1)
110-130	1	25 (17.7)	50 (35.4)	6	•	5	2	Short Fin (2)
110-130	1	30 (21.2)	60 (42.4)	7	•	2	2	Long Fin (1)
110-130	1	45 (31.8)	80 (56.6)	8	•	2	2	Long Fin (2)
208-240	2	5 (3.5)	10 (7.1)	1	•	5	5	L-Bracket (1)
208-240	2	10 (7.1)	20 (14.1)	3	•	5	5	L-Bracket (2)
208-240	2	15 (10.6)	30 (21.2)	4	•	5	5	L-Bracket (3)
208-240	2	20 (14.1)	40 (28.3)	5	•	5	5	Short Fin (2)
208-240	2	25 (17.7)	50 (35.4)	6	•	5	2	Short Fin (3)
208-240	2	30 (21.2)	60 (42.4)	7	•	2	2	Long Fin (2)
208-240	2	45 (31.8)	80 (56.6)	8	•	2	2	Long Fin (3)
360-400	3	5 (3.5)	10 (7.1)	1	•	5	5	L-Bracket (2)
360-400	3	10 (7.1)	20 (14.1)	3	•	5	5	Short Fin (2)
360-400	3	15 (10.6)	30 (21.2)	4	•	5	2	Short Fin (3)
360-400	3	20 (14.1)	40 (28.3)	5	N/A	2	N/A	Long Fin (2)
360-400	3	25 (17.7)	50 (35.4)	6	N/A	2	N/A	Long Fin (3)
360-400	3	30 (21.2)	60 (42.4)	7	N/A	2	N/A	Long Fin (4)
460-500	4	5 (3.5)	10 (7.1)	1	•	5	5	L-Bracket (3)
460-500	4	10 (7.1)	20 (14.1)	3	•	5	5	Short Fin (3)
460-500	4	15 (10.6)	30 (21.2)	4	•	2	2	Long Fin (3)
460-500	4	20 (14.1)	40 (28.3)	5	N/A	2	N/A	Long Fin (4)

Notes:

⁽¹⁾ The column Cont. Output Current is the continuous current and the column Peak Output Current is the intermittent peak current for a single module. For output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽²⁾ Three module heatsink types, L-Bracket (LB), Short Fin (SF), and Long Fin (LF) are available depending on the input voltage and output current. There are 4 standard categories for ambient operating temperature and current derating denoted by the number following the heatsink type. All categories require forced air cooling.

Category 1: 0 to 60 °C without derating. Derate current 10% per °C over 60 °C.

Category 2: 0 to 50 °C without derating. Derate current 5% per °C over 50 °C.

Category 3: 0 to 40 °C without derating. Derate current 3% per °C over 40 °C.

Category 4: 0 to 30 °C without derating. Derate current 2.5% per °C over 30 °C.

Special: Contact Glentek for models with a lower operating temperature limit of -40 °C.

⁽³⁾ Model Codes are used on pg. 18 for model numbering

⁽⁴⁾ UL Recognized Components are available as an option for the DC bus power supply (rectifier) assembly. For input voltages of 110-240 VAC the maximum input current is 33 A_{RMS} . For input voltages of 360-500 VAC the maximum input current is 16 A_{RMS} .

⁽⁵⁾ Bus power logic (SMB models) not available for input voltages of greater than 360 VAC.

DC BUS POWER SUPPLY (RECTIFIER) ASSEMBLIES

Electrical Ratings for use with SMB/SMC9GE15 Gamma Series Drives

Input Voltage		Output Current, per axis ⁽¹⁾			Max. No. of Axes	Module Heatsink Type (Derating Factor) ⁽²⁾
VAC	Model Code ⁽³⁾	Cont. A (A _{RMS})	Peak A (A _{RMS})	Model Code ⁽³⁾		
110-130	1	5 (3.5)	10 (7.1)	1	5	L-Bracket (1)
110-130	1	10 (7.1)	20 (14.1)	3	5	L-Bracket (1)
110-130	1	15 (10.6)	30 (21.2)	4	5	L-Bracket (2)
110-130	1	20 (14.1)	40 (28.3)	5	5	Short Fin (1)
110-130	1	25 (17.7)	50 (35.4)	6	5	Short Fin (2)
208-240	2	5 (3.5)	10 (7.1)	1	5	L-Bracket (1)
208-240	2	10 (7.1)	20 (14.1)	3	5	L-Bracket (2)
208-240	2	15 (10.6)	30 (21.2)	4	5	L-Bracket (3)
208-240	2	20 (14.1)	40 (28.3)	5	5	Short Fin (2)
208-240	2	25 (17.7)	50 (35.4)	6	5	Short Fin (3)
360-400	3	5 (3.5)	10 (7.1)	1	5	L-Bracket (2)
360-400	3	10 (7.1)	20 (14.1)	3	5	Short Fin (2)
360-400	3	15 (10.6)	30 (21.2)	4	5	Short Fin (3)
360-400	3	20 (14.1)	40 (28.3)	5	2	Long Fin (2)
360-400	3	25 (17.7)	50 (35.4)	6	2	Long Fin (3)

Notes:

⁽¹⁾ The column Cont. Output Current is the continuous current and the column Peak Output Current is the intermittent peak current for a single module. For output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽²⁾ Three module heatsink types, L-Bracket (LB), Short Fin (SF), and Long Fin (LF) are available depending on the input voltage and output current. There are 4 standard categories for ambient operating temperature and current derating denoted by the number following the heatsink type. All categories require forced air cooling.

Category 1: 0 to 60 °C without derating. Derate current 10% per °C over 60 °C.

Category 2: 0 to 50 °C without derating. Derate current 5% per °C over 50 °C.

Category 3: 0 to 40 °C without derating. Derate current 3% per °C over 40 °C.

Category 4: 0 to 30 °C without derating. Derate current 2.5% per °C over 30 °C.

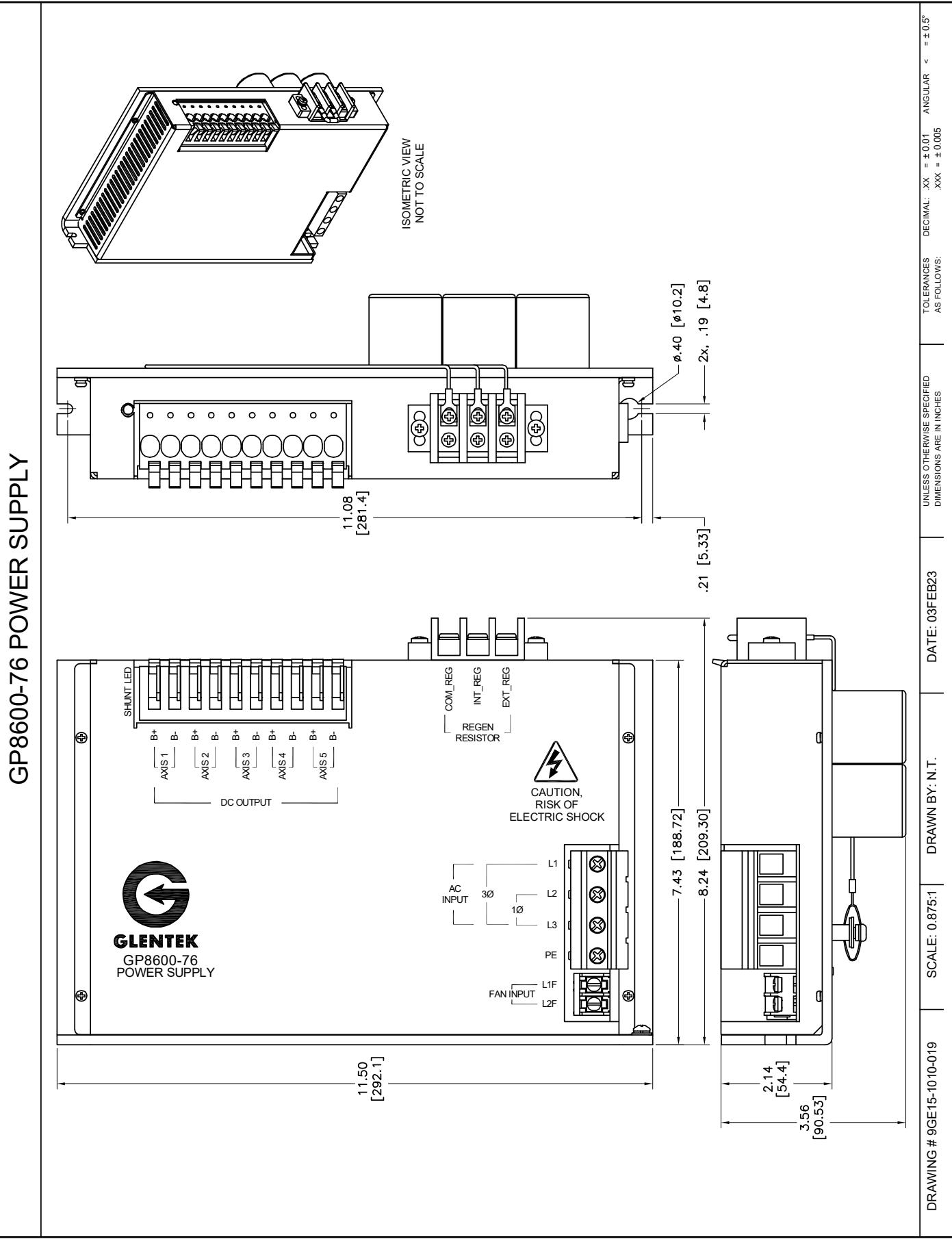
Special: Contact Glentek for models with a lower operating temperature limit of -40 °C.

⁽³⁾ Model Codes are used on pg. 18 for model numbering

⁽⁴⁾ Bus power logic (SMB models) not available for input voltages of greater than 360 VAC.

DC BUS POWER SUPPLY (RECTIFIER) ASSEMBLIES

Dimensions



ALPHA SERIES DIGITAL PWM SERVO DRIVES



Glentek's Alpha Series Digital PWM Servo Drives offer high performance DSP control of brushless (standard servo and high-speed spindle), brush type, rotary, linear, voice coil and AC induction motors. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. These drives incorporate Field Oriented Control (FOC) and Space Vector Modulation (SVM) algorithms which provide optimum control that enable motors to run cooler and at higher velocities. Set-up, tuning and system diagnostics is accomplished using MotionMaestro (Glentek's Windows-based software). There are four versions of this drive available, SMx92xx, SMx94xx, SMx9515, and SMx9A15 (x's are model number placeholders). Refer to the selection table below to select the version that best suits your application.

Command/Control Modes	SMx92xx	SMx94xx	SMx9515	SMx9A15
+/-10 VDC typical for current (torque) or velocity (RPM)	•	•	•	•
Pulse (step) and direction	•	•	•	
Encoder follower	•	•	•	
External sine commutation (2-phase current mode)	•	•	•	
RS-232 or RS-485	•	•	•	•
PWM for current (torque) or velocity (RPM)	•	•	•	•
Camming/Gearing	•	•	•	
Feedback				
Incremental (TTL) quadrature encoder	•	•	•	•
Digital Hall sensors or commutation tracks from encoder	•	•	•	•
Resolver	•			
Analog tachometer	•	•	•	
Logic Power				
Bus Power Logic	•	•	•	•
24 VDC External Logic Power, Keep Alive	•	•	•	
5 VDC External Logic Power, Keep Alive			•	•
Available Package Configurations				
Stand Alone	•	•		
Module	•	•	•	•
Multi-Axis	•	•	•	•
I/O				
Dedicated I/O: Analog signal command, +/- limits, inhibit/enable, fault, reset, motor temp, encoder and step & direction				
Programmable analog out: 1 12-bit or optional 2 16-bit				
General purpose relay: maximum 2 amps @ 30 VDC. Nais P/N: TQSA-5V				
Environmental Conditions				
Storage Temperature: -40°C to 80°C				
Ambient Operating Standard: 0°C to 25°C without derating, for 25°C to 50°C derate current 2.5% per °C above 25°C				
Temperature: Special: -40°C to 25°C without derating, for 25°C to 50°C derate current 2.5% per °C above 25°C				
Humidity: 5% to 95% relative humidity, non-condensing				
Altitude: Up to 1000m without derating, derate current 10% per 1000m above 1000m				

Performance	
FOC	All Alpha Series employ Field Oriented Control method which allows accurate control in both steady state or transient operation, and optimal orientation of the magnetic field.
Space Vector Modulation	Glentek's advanced algorithms allow for maximum utilization of the DC bus voltage while generating minimum harmonic distortion of the currents in the winding of 3-phase AC motor.
Digital current loops	Current loop bandwidths up to 3 kHz.
Digitally tuned Parametric filtering	All parameters set digitally. No potentiometers to adjust. DSP control for the ultimate in high performance. Provides control engineers advanced filtering to eliminate unwanted system mechanical resonance.
Smart-Comm Initialization	Eliminates the need for Hall sensor or commutation tracks for many applications.
Auto Phase Advance	Plug and Play for all types of three phase brushless motors. Provides control engineers the ability to connect any motor to the drive's motor outputs. The drives smart algorithm will automatically find and align the motor phases to allow for the most optimized smoothness and efficient commutation.
Sinusoidal commutation	For the ultimate in efficiency and smooth motion, commutes from almost any resolution linear, rotary encoder, or Hall sensors only.
Fault protection	Short from output to output, short from output to ground, drive RMS over current, drive under/over voltage, drive over temperature, motor over temperature.
On-the-fly mode switching	This feature allows the drive to switch between any mode of operation on-the-fly. That is, the drive can switch between current to velocity (or velocity to current), current to position (or position to current), and velocity to position (or position to velocity) while the motor is in motion. This feature is available upon request. Please contact Glentek application engineers for assistance.
Software configurable	Glentek's Windows™ based MotionMaestro® software provides ease of set-up, monitoring and tuning with no previous programming experience required. This software is Windows™ 95/98/2000/XP, NT, Vista, 7, and 8 compatible.
Silent operation	25 kHz PWM standard.
Command/control Modes	+/-10V for current (torque) or velocity (RPM), pulse (step) and direction, encoder follower, external sine commutation (2-phase current mode), RS-232, RS-485, PWM for current (torque or velocity (RPM), and camming/gearing.
Regulatory	
CE marked	All servo drives are CE marked in accordance with EN60204-1 (IEC204-1).
RoHS compliant	RoHS compliance optional.
Connectivity	
RS-232 or RS-485	High speed (115.2K baud) serial communication interface for setup and tuning and diagnostics. Note: RS-485 is optional.
Feedback	
Encoder feedback	Accepts nominal encoder signals up to 5 MHz (maximum frequency of up to 10 MHz is possible, but is system dependent).
Resolver feedback	Accepts analog signals from all types of resolver feedback. Note: SMx92xx models only.
Tachometer feedback	Accepts analog signals from all types of tachometer feedback.
I/O	
Dedicated I/O	Analog signal command, +/- limits, inhibit/enable, fault, reset, motor temp, encoder and step & direction. Programmable analog out: 1 12-bit or optional 2 16-bit. General purpose relay: maximum 2 amps @ 30 VDC. Nais P/N: TQSA-5V.
Input	
Wide operating voltage	24-340 VDC for drive modules. All stand-alone and multi axis versions can be ordered for operation from either 110-130 VAC or 208-240 VAC (single or 3-phase, 50/60 Hz). Note: Non-standard input voltages available on request.
Direct AC operation	The stand-alone units and multi-axis chassis include DC bus power supplies, cooling fans and a regen clamp with dissipation resistor. Note: SMX9415-1D-1 Stand Alone does not have a regen clamp.
External logic supply	24-48 VDC, 600mA min @ 24 VDC powers all logic & encoder. This works as a "keep alive" for the SMC9415 drives.
Build	
Complete isolation	Complete isolation between signal and power stage.
Non-volatile memory	All parameters are stored in non-volatile memory for reliable start up. In addition, up to four different configurations can be stored in the drive's non-volatile memory.
Relay outputs	Two pins provide an interface for the relay. They turn on when a desired condition occurs.
Status indicator	7-segment display indicates drive status and diagnostics.
SMT construction	Provides ultra compact size, cost competitive package and high reliability.

ALPHA SERIES ELECTRICAL RATINGS

Model Number ⁽¹⁾	Power Rating	Input Voltage		Output Current ⁽²⁾		Available Package Configurations					
		VDC	VAC	Cont. A (A _{RMS})	Peak A (A _{RMS})	Module	Stand Alone	Multi-Axis			
SMx9208	Standard	-	110-130	4 (2.8)	8 (5.7)		•				
SMx9408	High	-	110-130	8 (5.7) ⁽³⁾	16 (11.3) ⁽³⁾						
SMx9210 SMx9410	Standard	-	110-130	5 (3.5)	10 (7.1)		•				
		-	208-240								
	High	-	110-130	10 (7.1) ⁽³⁾	20 (14.1) ⁽³⁾						
		-	208-240								
SMx9215 SMx9415 SMx9515 SMx9A15	Low	24-70	-	10 (7.1)	20 (14.1)		• (SMx9215 and SMx9415 only)	•			
		70-190	110-130								
		190-370	208-240								
	Standard	24-70	-	15 (10.6)	30 (21.2)						
		70-190	110-130								
		190-370	208-240								
	High	24-70	-	20 (14.1)	40 (28.3)						
		70-190	110-130								
		190-370	208-240								
SMx9225 SMx9425	Standard	-	110-130	25 (17.7)	50 (35.4)		•				
		-	208-240								
SMx9230 SMx9430	Standard	-	110-130	30 (21.2)	60 (42.4)		•				
		-	208-240								
SMx9245 SMx9445	Standard	-	110-130	45 (31.8)	80 (56.6)		•				
		-	208-240								
SMx9275 SMx9475	Standard	-	110-130	75 (53.0)	120 (84.9)		•				
		-	208-240								

Notes:

⁽¹⁾ x = B, C, or D and represents the on-board or external bus logic option. Refer to model numbering on [pgs. 26-29](#) for more information.

⁽²⁾ The column Cont. Output Current is the continuous current and the column Peak Output Current Peak is the intermittent peak current. For output current ratings in brushless mode, ratings for each model are listed as peak of the sine wave phase current values followed by the equivalent RMS phase current values (in parentheses). In brush or voicecoil mode, A is the current, and the RMS values (in parentheses) can be ignored. All output current ratings are for three-phase VAC inputs or VDC inputs. If a single-phase VAC input is used, the total output current for all axes is limited to a maximum of 15 A cont. / 30 A peak.

⁽³⁾ Forced air cooling required.

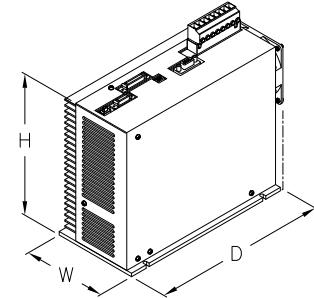
Non-standard input voltages available upon request.

ALPHA SERIES DIMENSIONS

Stand Alone

This package consists of a drive module, DC bus power supply, regen clamp with dissipation resistor, in-rush current limiting protection at power-on, fuses and optional cooling fans. Refer to the stand alone package configuration in the model numbering on pg. 26 for regen options.

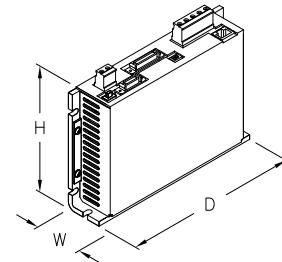
Model Number ⁽¹⁾	Regen Option	Dimensions, Inches (mm)			Weight lbs. (kg)	Fan
		Width	Height	Depth		
SMx9208, SMx9408	1A	2.9 (74)	5.5 (140)	6.5 (165)	2.3 (1.0)	No
	1F	4.0 (102)	5.5 (140)	6.5 (165)	2.7 (1.2)	
SMx9210, SMx9410	1D	3.1 (79)	4.8 (122)	7.2 (182)	2.5 (1.1)	No
	1F	4.2 (106)	4.8 (122)	7.2 (182)	2.9 (1.3)	
SMx9215, SMx9415	1A	4.0 (102)	5.9 (149)	9.0 (229)	4.7 (2.1)	Yes
	1D	4.0 (102)	5.7 (145)	8.6 (218)	4.7 (2.1)	
SMx9225, SMx9425	1A	4.5 (114)	8.1 (206)	11.0 (279)	6.2 (2.8)	Yes
SMx9230, SMx9430	1B	5.3 (135)	9.3 (236)	12.5 (318)	11.0 (4.9)	Yes
SMx9245, SMx9445	1B	5.3 (135)	9.4 (239)	14.5 (368)	11.8 (5.4)	Yes
SMx9275, SMx9475	1B	5.9 (150)	12.5 (318)	17.6 (448)	25.5 (11.3)	Yes



Module

This package consists of a drive module, without a DC bus power supply. This type of package is typically used for cost sensitive applications where the customer provides DC bus power supply, forced-air cooling and regen clamp or it can be integrated into a Glentek multi-axis package.

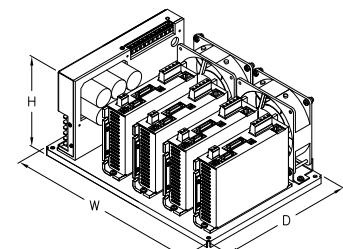
Model Number ⁽¹⁾	Cont. Current	Dimensions, Inches (mm)			Weight lbs. (kg)
		Width	Height	Depth	
SMx9215, SMx9415	10, 15	1.6 (41)	4.8 (123)	7.1 (181)	1.8 (.8)
	20	2.3 (59)	4.8 (123)	7.1 (181)	2.8 (1.3)
SMx9515	10, 15	2.0 (51)	6.7 (170)	8.0 (203)	2.1 (1.0)
	20	2.5 (63)	7.2 (183)	8.2 (208)	3.3 (1.5)
SMx9A15	10, 15	1.4 (35)	6.1 (155)	7.1 (181)	1.7 (.8)
	20	2.1 (53)	6.1 (155)	7.1 (181)	2.5 (1.1)



Multi-Axis

This package consists of an open frame base plate chassis with DC bus power supply, regen clamp with dissipation resistor, in-rush current limiting protection at power-on, fuses and cooling fans. Available in 2, 4 & 5 axis packages. This type of package is typically used for multi-axis applications. The DC bus power supply has a continuous output current rating of 40 A total.

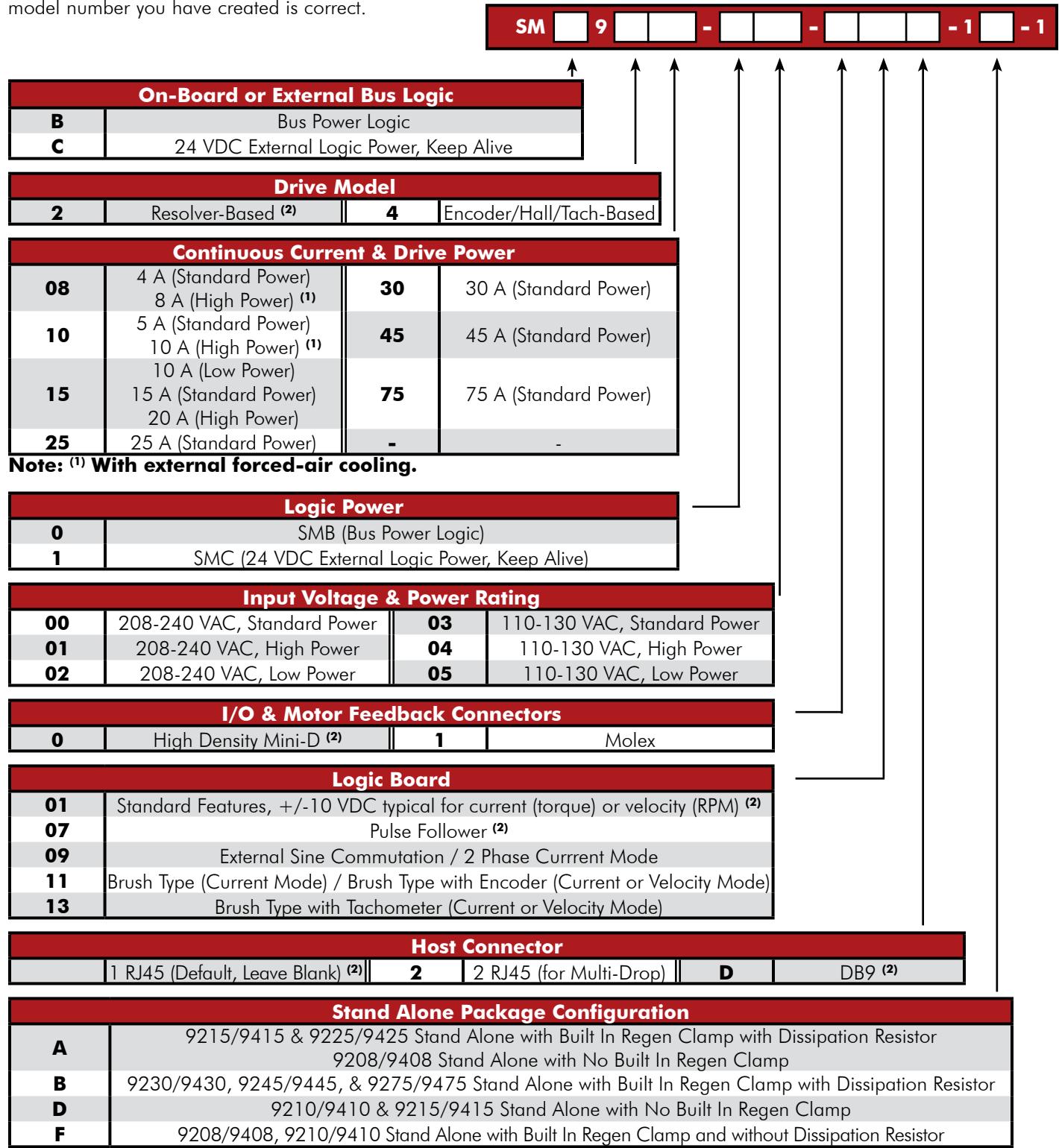
Model Number ⁽¹⁾	Axes	Cont. Current	Dimensions, Inches (mm)			Weight lbs. (kg)
			Width	Height	Depth	
SMx9215, SMx9415	2	10, 15	9.0 (229)	6.9 (176)	10.8 (273)	9.5 (4.3)
		20	9.8 (248)	6.9 (176)	10.8 (273)	11.5 (5.2)
	4	10, 15	13.0 (330)	6.9 (176)	10.8 (273)	15.1 (6.7)
		20	14.9 (378)	6.9 (176)	10.8 (273)	19.1 (8.7)
SMx9515	2	10, 15	18.8 (476)	6.9 (176)	11.8 (298)	17.9 (8.1)
		20	18.8 (476)	6.9 (176)	11.8 (298)	22.9 (10.4)
	4	10, 15	9.8 (249)	7.2 (183)	10.8 (273)	9.8 (4.4)
		20	9.8 (249)	7.7 (196)	10.8 (273)	12.5 (5.7)
SMx9A15	4	10, 15	13.0 (330)	7.2 (183)	10.8 (273)	16.3 (7.4)
		20	14.9 (378)	7.7 (196)	10.8 (273)	21.1 (9.6)
	5	10, 15	18.8 (476)	7.2 (183)	11.8 (298)	19.4 (8.8)
		20	18.8 (476)	7.7 (196)	11.8 (298)	25.4 (11.5)
	2	10, 15	9.8 (249)	7.2 (183)	10.8 (273)	9.8 (4.4)
		20	9.8 (249)	7.7 (196)	10.8 (273)	12.5 (5.7)
	4	10, 15	13.0 (330)	7.2 (183)	10.8 (273)	16.3 (7.4)
		20	14.9 (378)	7.7 (196)	10.8 (273)	21.1 (9.6)
	5	10, 15	18.8 (476)	7.2 (183)	11.8 (298)	19.4 (8.8)
		20	18.8 (476)	7.7 (196)	11.8 (298)	25.4 (11.5)



Note: ⁽¹⁾ x = B (bus power logic), C (24 VDC external logic power), or D (5 VDC external logic power). Refer to model numbering on pgs. 26-29 for more information.

ALPHA SERIES STAND ALONE MODEL NUMBERING

This section explains the model numbering system for Glentek's Alpha Series Digital PWM Brushless Servo Drives. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the drive that best suits your requirements. **Please choose the model and package configuration you require from the "Electrical Ratings" table on pg. 24.** Then complete the drive configuration code you require using the information on this page. After completing your model number, please contact a Glentek Sales Engineer to confirm that the model number you have created is correct.



Notes:

⁽¹⁾ With external forced-air cooling.

⁽²⁾ Resolver-based drives may only use these options.

ALPHA SERIES MODULE MODEL NUMBERING

SMx9215: Pick this model if you will use resolver feedback. This drive uses High Density Mini-D connectors for I/O and motor feedback.

SM		9	2	15	-			-	0			-	1
----	--	---	---	----	---	--	--	---	---	--	--	---	---

On-Board or External Bus Logic												
B	0	Bus Power Logic										
C	1	24 VDC External Logic Power, Keep Alive										
Input Voltage & Continuous Current Rating												
00	190-370 VDC, 15 A	03	70-190 VDC, 15 A	06	24-70 VDC, 15 A							
01	190-370 VDC, 20 A	04	70-190 VDC, 20 A	07	24-70 VDC, 20 A							
02	190-370 VDC, 10 A	05	70-190 VDC, 10 A	08	24-70 VDC, 10 A							
I/O & Motor Feedback Connectors												
0	High Density Mini-D											
Logic Board												
01	Standard Features, +/-10 VDC typical for current (torque) or velocity (RPM)											
07	Pulse Follower											
Host Connector												
D	1 RJ45 (Default, Leave Blank)											
	DB9											

SMx9415: Pick this model if you will use encoder, Hall, and/or tachometer feedback. The main difference between this model and the 9515 is physical size. This model is smaller.

SM		9	4	15	-			-	0			-	1
----	--	---	---	----	---	--	--	---	---	--	--	---	---

On-Board or External Bus Logic												
B	0	Bus Power Logic										
C	1	24 VDC External Logic Power, Keep Alive										
Input Voltage & Continuous Current Rating												
00	190-370 VDC, 15 A	03	70-190 VDC, 15 A	06	24-70 VDC, 15 A							
01	190-370 VDC, 20 A	04	70-190 VDC, 20 A	07	24-70 VDC, 20 A							
02	190-370 VDC, 10 A	05	70-190 VDC, 10 A	08	24-70 VDC, 10 A							
I/O & Motor Feedback Connectors												
0	High Density Mini-D											
1	Molex (2 Double-Row)											
Logic Board												
01	Standard Features, +/-10 VDC typical for current (torque) or velocity (RPM)											
07	Pulse Follower											
09	External Sine Commutation / 2 Phase Current Mode											
11	Brush Type (Current Mode) / Brush Type with Encoder (Current or Velocity Mode)											
13	Brush Type with Tachometer (Current or Velocity Mode)											
Host Connector												
2	1 RJ45 (Default, Leave Blank)	D	-	DB9								
	2 RJ45 (for Multi-Drop)		-									

Note: The DB9 host connector option requires High Density Mini-D I/O & motor feedback connectors.

The 2 RJ45 host connector option requires Molex I/O & motor feedback connectors.

The 1 RJ45 host connector option can use either I/O & motor feedback connector options.

ALPHA SERIES MODULE MODEL NUMBERING

SMx9515: Pick this model if you will use encoder, Hall, and/or tachometer feedback. The main difference between this model and the 9415 is physical size. This model is larger.

SM **9 5 15 -** **1** **1** **- 1**

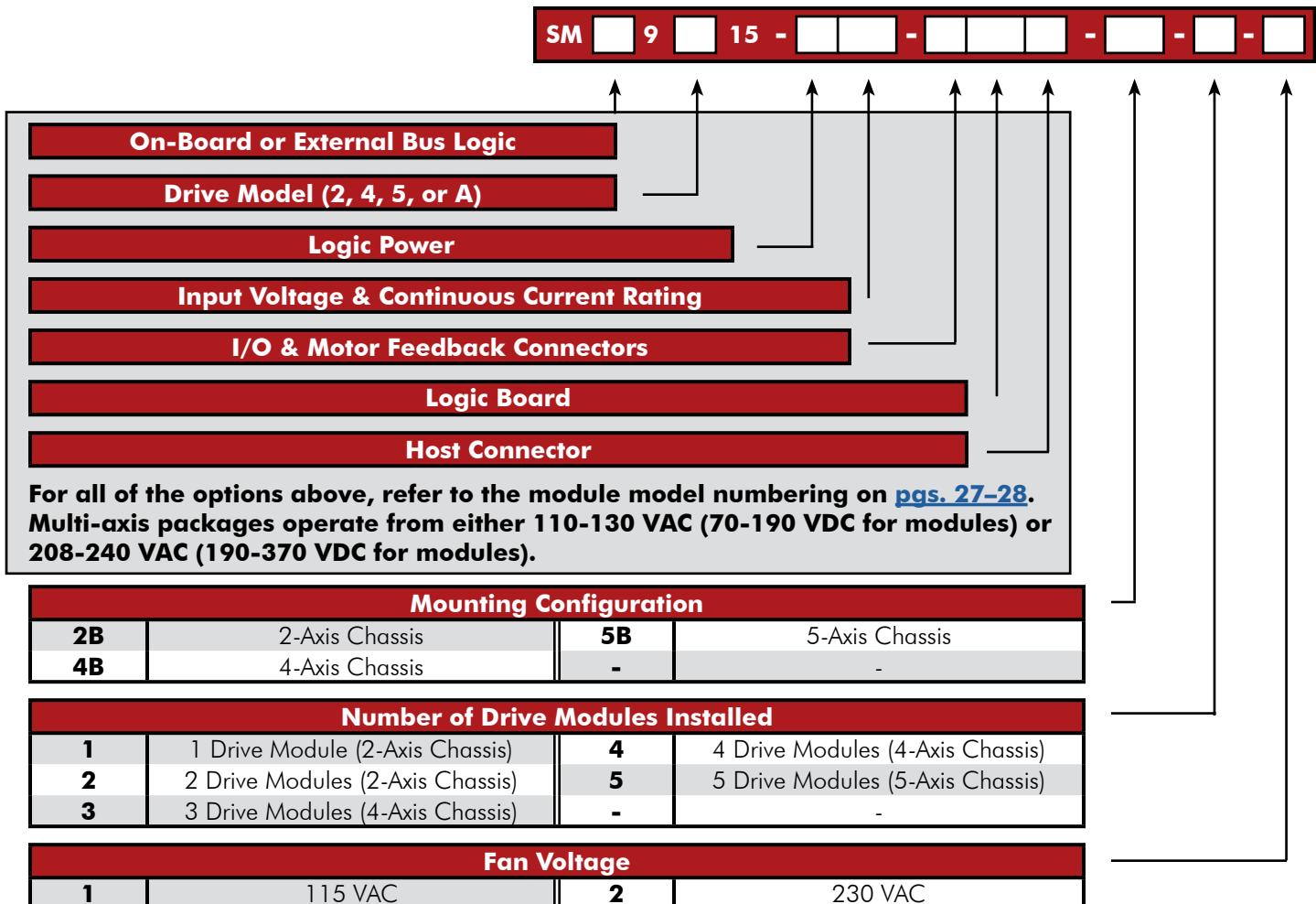
On-Board or External Bus Logic	
B	0
C	1
D	2
Bus Power Logic	
24 VDC External Logic Power, Keep Alive	
5 VDC External Logic Power, Keep Alive	
Input Voltage & Continuous Current Rating	
00	190-370 VDC, 15 A
01	190-370 VDC, 20 A
02	190-370 VDC, 10 A
03	70-190 VDC, 15 A
04	70-190 VDC, 20 A
05	70-190 VDC, 10 A
06	24-70 VDC, 15 A
07	24-70 VDC, 20 A
08	24-70 VDC, 10 A
I/O & Motor Feedback Connectors	
1	Molex (2 Double-Row)
Logic Board	
01	Standard Features, +/-10 VDC typical for current (torque) or velocity (RPM)
07	Pulse Follower
09	External Sine Commutation / 2 Phase Current Mode
11	Brush Type (Current Mode) / Brush Type with Encoder (Current or Velocity Mode)
13	Brush Type with Tachometer (Current or Velocity Mode)
Host Connector	
2	1 RJ45 (Default, Leave Blank)
	2 RJ45 (for Multi-Drop)

SMx9A15: Pick this model if you will use encoder and/or Hall feedback. This model has fewer logic boards options than the SMx9415 or SMx9515.

SM **9 A 15 -** **2** **1** **- 1**

On-Board or External Bus Logic	
B	0
D	2
Bus Power Logic	
5 VDC External Logic Power, Keep Alive	
Input Voltage & Current Rating	
00	190-370 VDC, 15 A
01	190-370 VDC, 20 A
02	190-370 VDC, 10 A
03	70-190 VDC, 15 A
04	70-190 VDC, 20 A
05	70-190 VDC, 10 A
06	24-70 VDC, 15 A
07	24-70 VDC, 20 A
08	24-70 VDC, 10 A
I/O & Motor Feedback Connectors	
2	Molex (1 Double-Row & 1 Single-Row)
Logic Board	
01	Standard Features, +/-10 VDC typical for current (torque) or velocity (RPM)
11	Brush Type and Encoder
Host Connector	
2	1 RJ45 (Default, Leave Blank)
M	2 RJ45 (for Multi-Drop)
	Molex

ALPHA SERIES MULTI-AXIS MODEL NUMBERING



Note:

Restrictions may apply to on-board or external bus logic, drive model, logic power, I/O and motor feedback connectors, logic board, and host connector. Refer to module model numbering for details.

ANALOG BRUSH PWM SERVO DRIVES

Glentek's Analog Brush PWM Servo Drives offer high performance analog control of brush type rotary and voice coil motors. Both AC powered (stand alone and multi-axis) and DC powered (module) packages are available. Glentek has been designing and producing analog brush PWM servo drives for over 40 years and continually updates each product as advances in technology become available so that customers are assured of optimal performance and reliability. These drives offer a cost effective, simple (tuning is accomplished by the adjustment of potentiometers), and high performance solution.

Command	
+/-10 VDC for current (torque)	
+/-10 VDC for velocity (RPM)	
Feedback	
Analog tachometer (required for velocity control)	
Dedicated Inputs	
Single-ended or differential signal command, tachometer, +/- limits, inhibit/enable, fault, reset	
Motor temperature and master slave (SMB7200 series only)	
Dedicated Outputs	
Motor current, fault, low-speed electronic circuit breaker, high-speed electronic circuit breaker, over-voltage, and over-temperature	
Features	
RoHS compliant	RoHS compliance optional.
Dual signal inputs	One single-ended and one differential. Both inputs may be used simultaneously. Both have up to 15,000A/V gain (velocity mode), and inputs will accept the typical ± 10 VDC analog signal.
Ergonomic design	Easy access to connections, adjustments, and test points.
Silent operation	18 kHz PWM standard.
Wide operating voltage	30-220 VDC for SMA7110 and SMA7115 drive modules. All stand alone and multi axis versions can be ordered for operation from either 110-130 VAC (single or 3-phase, 50/60 Hz). 60-120 VAC for all SMB7200 series drives. Note: A separate 120 VAC source is required to power cooling fans for stand alone and multi-axis chassis.
Direct AC operation	The stand alone units and multi axis chassis include DC bus power supplies, cooling fans, and a regen clamp with dissipation resistor.
Tri-mode operation	Can be configured for current (torque), velocity (RPM) or voltage mode with IR compensation.
Voltage mode with IR compensation	This mode uses a pseudo-velocity loop. The drive estimates the motor velocity using the motor parameters and internal measurements. It is not as accurate as a true closed velocity loop with tachometer feedback, but it provides a great low cost alternative for less demanding applications. Note: SMA7115 only.
Current limit	Peak motor current is adjustable.
+/- Limits & Inhibit	Three separate logic inputs can stop the motor in either or both directions. Inputs may be configured for active-high or active-low, pull-up or pull down termination, and a 0 to +5 VDC or 0 to +15 VDC range.
Fault input/output	Open-collector output goes low in the event of a fault. Forcing the fault terminal low will inhibit the drive. The fault terminals outputs in a multi-axis system may be connected together to shut down all drives should any drive have a fault.
Short circuit protection	Complete short circuit and ground fault protection.
Tachometer	Required for velocity feedback.
Frequency response	2 kHz minimum for current loop and 750 Hertz minimum for velocity loop.
LED diagnostics	Displays various faults and operating conditions.
External fault reset	Can reset drive externally in the event of a fault condition.
Complete isolation	Complete optical isolation between signal and power stage.
Fault protection	Short from output to output, short from output to ground, drive RMS over current, drive under/over voltage, and drive over temperature.
SMT construction	Provides ultra compact size, cost competitive package and high reliability.
CE marked	All servo drives are CE marked in accordance with EN60204-1 (IEC204-1).
Environmental Conditions	
Storage Temperature	-40°C to 80°C
Operating Temperature	Standard: 0°C to 40°C without current derating, up to 50°C with 25% current derating Special: -40°C to 40°C without current derating, up to 50°C with 25% current derating
Humidity	5% to 95% relative humidity, non-condensing
Altitude	Up to 1000m without derating, derate current 10% per 1000m above 1000m

ANALOG BRUSH PWM ELECTRICAL RATINGS

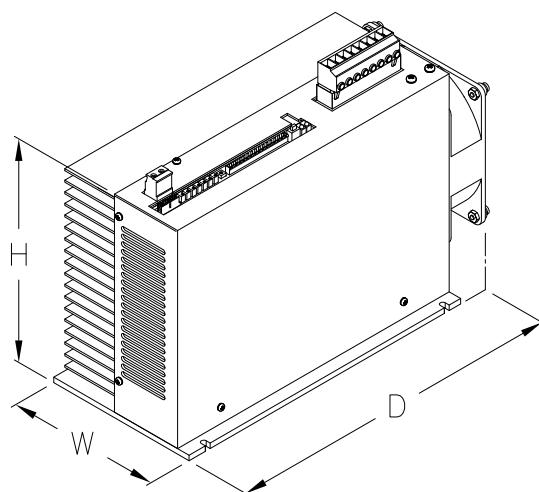
Model Number	Input Voltage		Continuous Current (A)	Peak Current (A)	Available Packaging Configurations		
	VDC	VAC			Module	Stand Alone	Multi Axis
SMA7110LP	30-220	N/A	6	12	•		•
SMA7110	30-220	N/A	10	20	•		•
SMA7115	30-220	110-130	15	25	•	•	•
SMA7115HP	30-220	110-130	20	40	•	•	•
SMB7230	N/A	60-120	30	60		•	
SMB7245	N/A	60-120	45	80		•	
SMB7275	N/A	60-120	75	120		•	
SMB72100	N/A	60-120	100	120		•	

ANALOG BRUSH PWM DIMENSIONS

Stand Alone

This package consists of an drive module, DC bus power supply, regen clamp with dissipation resistor, in-rush current limiting protection at power-on, fuses and one or more cooling fans. This type of package is typically used for one or multi-axis applications.

Model Number	Dimensions, Inches (mm)			Weight lbs. (kg)
	Width	Height	Depth	
SMA7115-1A-1	4.0 (102)	5.0 (126)	9.0 (229)	5.3 (2.4)
SMB7230-1A-1	5.3 (135)	9.4 (239)	12.5 (318)	11.0 (4.9)
SMB7245-1A-1	5.3 (135)	12.5 (318)	14.5 (368)	11.8 (5.4)
SMB7275-1A-1	5.9 (150)	12.5 (318)	17.6 (448)	25.5 (11.3)
SMB72100-1A-1	5.9 (150)	12.6 (320)	17.6 (448)	25.5 (11.3)

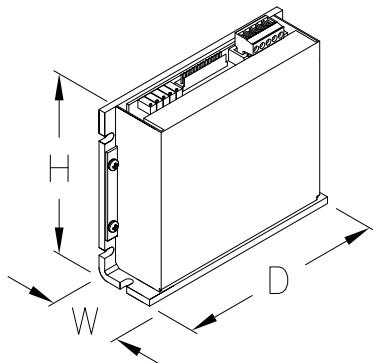


ANALOG BRUSH PWM DIMENSIONS

Module

This package consists of a drive module, without a DC bus power supply. This type of package is typically used for cost sensitive applications where the customer provides DC bus power supply, forced-air cooling and regen clamp.

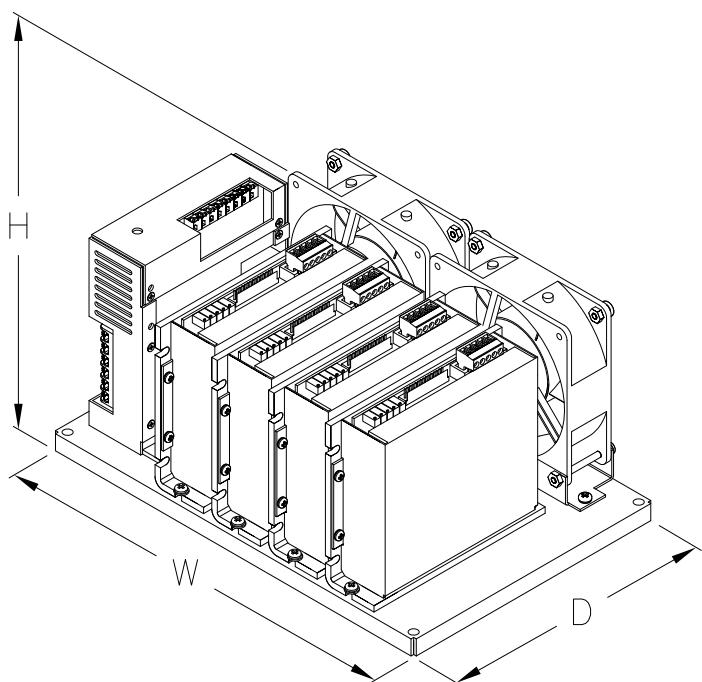
Model Number	Dimensions, Inches (mm)			Weight lbs. (kg)
	Width	Height	Depth	
SMA7110-1	1.4 (35)	4.5 (116)	5.1 (130)	0.9 (.4)
SMA7115-1	1.4 (35)	4.7 (120)	7.1 (181)	1.3 (.6)



Multi-Axis

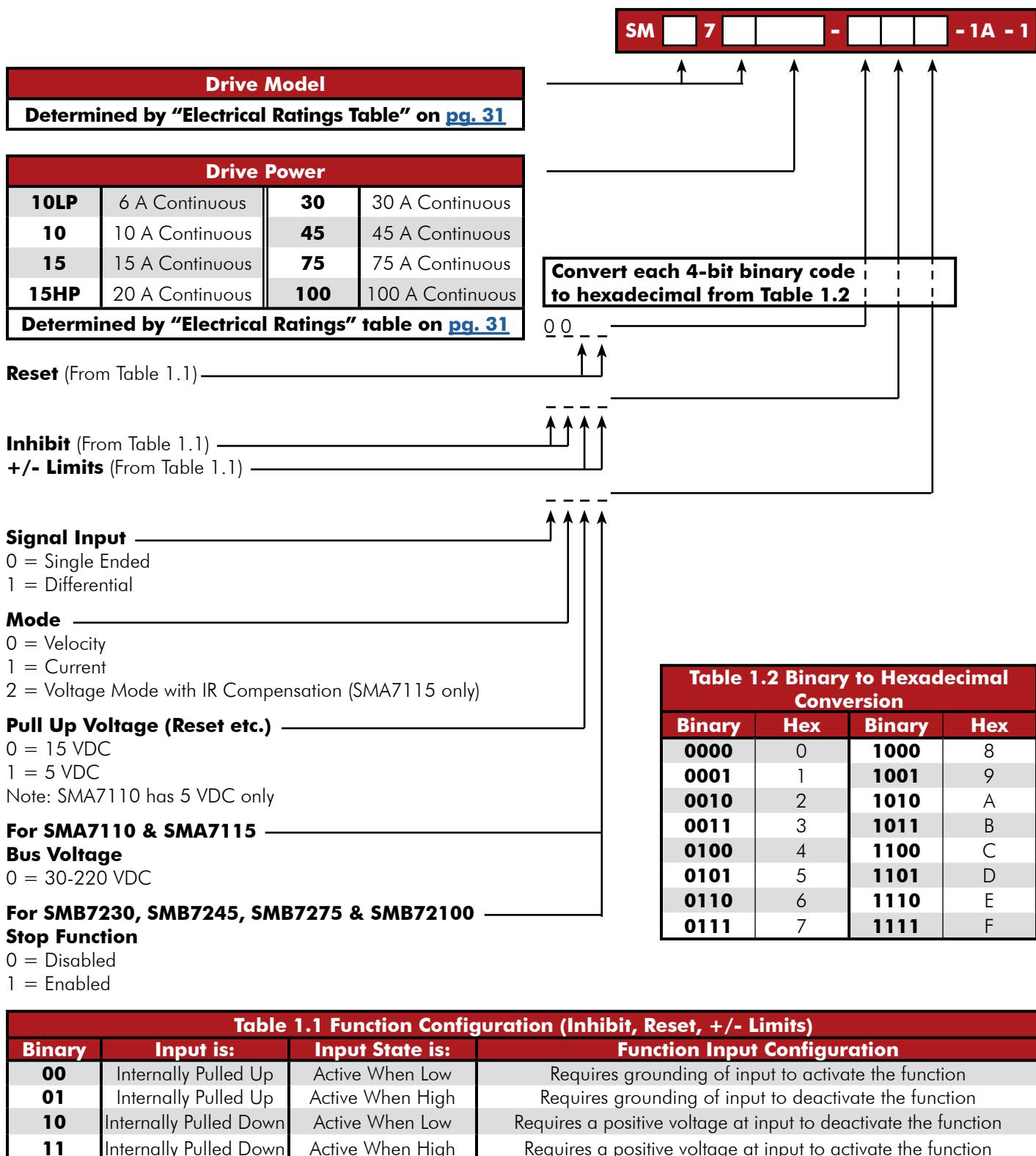
This package consists of an open frame base plate chassis with DC bus power supply, regen clamp with dissipation resistor, in-rush current limiting protection at power-on, fuses and cooling fans. Available in 2 & 4 axis packages. This type of package is typically used for multi-axis applications.

Model Number	Axes	Dimensions, Inches (mm)			Weight lbs. (kg)
		Width	Height	Depth	
SMA7110-2A-2	2	7.25 (184)	6.0 (152)	7.5 (191)	6.0 (2.7)
SMA7110-4A-4	4	11.0 (279)	6.0 (152)	7.5 (191)	9.0 (4.1)
SMA7115-2A-2	2	9.0 (229)	6.93 (176)	10.75 (273)	8.5 (3.9)
SMA7115-4A-4	4	13.0 (330)	6.93 (176)	10.75 (273)	13.3 (6.0)



ANALOG BRUSH PWM STAND ALONE MODEL NUMBERING

This section explains the model numbering system for Glentek's Analog Brush PWM servo drives. The model numbering system is designed so that you, our customer, will be able to create the model number for the drive that best suits your needs. **In order to accurately select a complete model number, please choose the model and package configuration you require from the "Electrical Ratings" table on pg. 31.** Then complete the drive configuration code you require using the information on this page. After completing your model number, be sure to contact a Glentek Sales Engineer to confirm that the model number you have created is correct.



Example: Function: Reset, Binary Code: **00**. The default state of the input is high, because the input is internally pulled up. Because the function (reset) is active when low, the function (reset) will not be activated. Activating the function (reset) requires grounding the input (externally pulling it down to low).

ANALOG BRUSH PWM MODULE MODEL NUMBERING

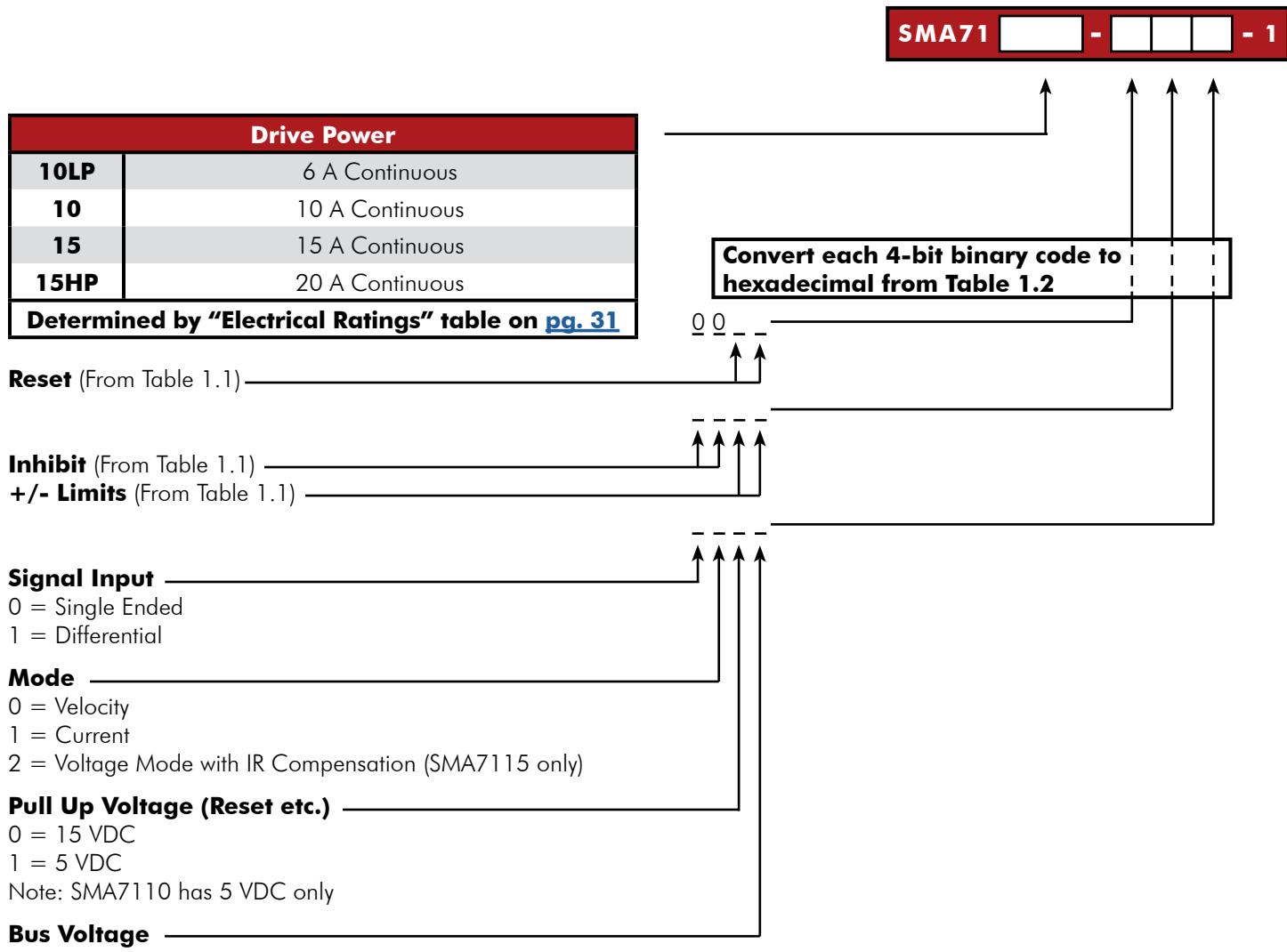


Table 1.1 Function Configuration (Inhibit, Reset, +/- Limits)

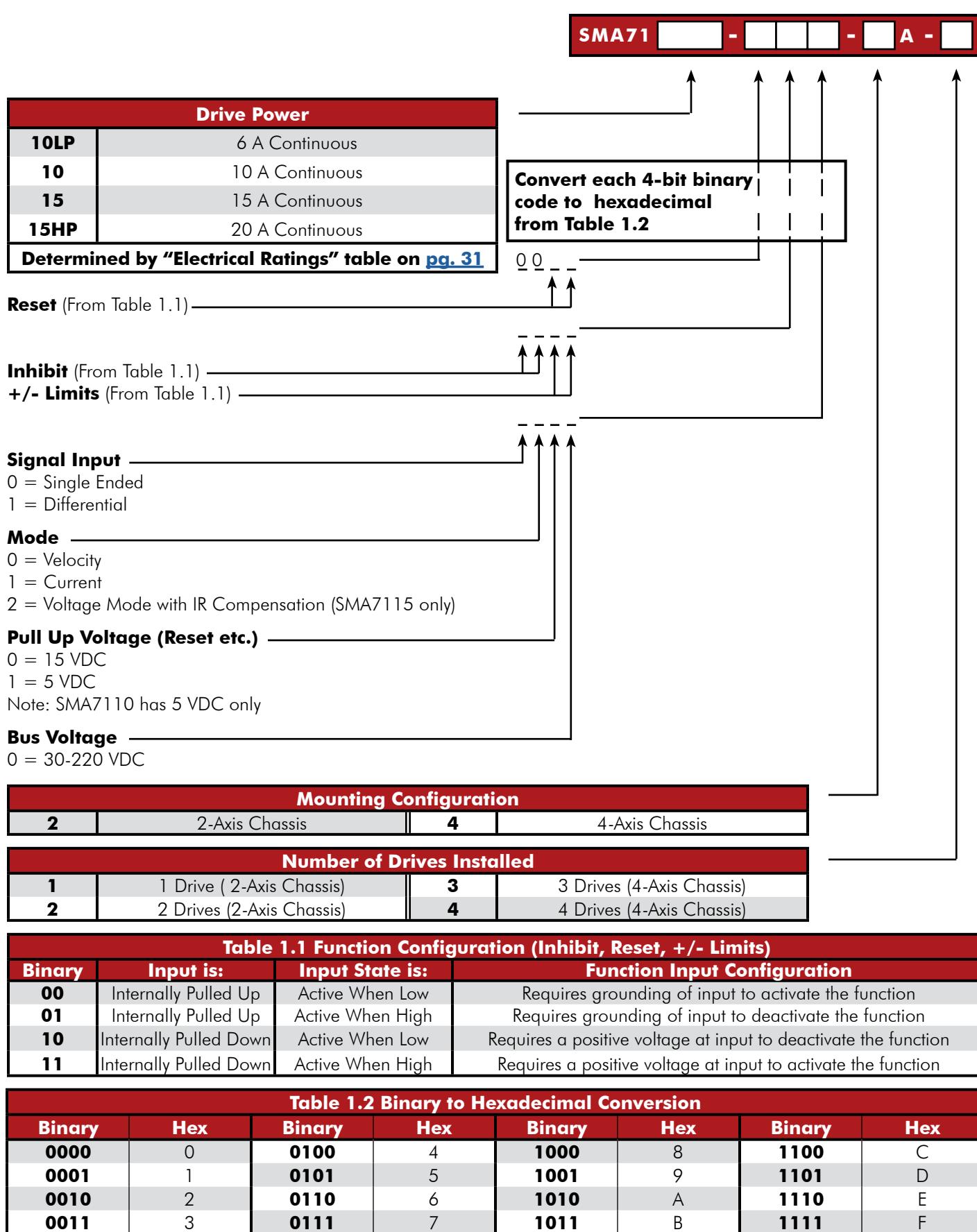
Binary	Input is:	Input State is:	Function Input Configuration
00	Internally Pulled Up	Active When Low	Requires grounding of input to activate the function
01	Internally Pulled Up	Active When High	Requires grounding of input to deactivate the function
10	Internally Pulled Down	Active When Low	Requires a positive voltage at input to deactivate the function
11	Internally Pulled Down	Active When High	Requires a positive voltage at input to activate the function

Example: Function: Reset, Binary Code: **00**. The default state of the input is high, because the input is internally pulled up. Because the function (reset) is active when low, the function (reset) will not be activated. Activating the function (reset) requires grounding the input (externally pulling it down to low).

Table 1.2 Binary to Hexadecimal Conversion

Binary	Hex	Binary	Hex	Binary	Hex	Binary	Hex
0000	0	0100	4	1000	8	1100	C
0001	1	0101	5	1001	9	1101	D
0010	2	0110	6	1010	A	1110	E
0011	3	0111	7	1011	B	1111	F

ANALOG BRUSH PWM MULTI-AXIS MODEL NUMBERING



LINEAR BRUSHLESS SERVO DRIVES



Glentek's SMA6520 series linear servo drives provide the optimum solution for applications which require high current loop bandwidth, low radiated electrical noise, and zero crossover distortion. These drives incorporate our latest generation ISO-BIAS current sense technology, which results in one of the lowest drift linear drives on the market today. These drives are constructed using surface mount technology and incorporate the latest in heat transfer technology which make them one of the most powerful drives for a given form factor.

Typical applications which are ideal for the SMA6520 series linear drives include low inductance/resistance brushless motors (linear or rotary) and high resolution air bearing linear brushless motor stages.

The SMA6520 series is highly configurable and can operate in the following commutation modes:

Commutation Modes	
External sine commutation (2-phase current mode) (-11 plug-in board)	In this mode, the drive accepts two +/-10 VDC analog inputs as a current command reference for two of the motor phases. The third phase is derived within the drive from the two reference phases. This drive does not require any feedback devices and is used with controllers that provide the commutation.
Trapezoidal commutation (-12 plug-in board)	In this mode, the drive accepts a +/-10 VDC analog input as a current command reference and utilizes the Hall Sensors which are mounted on the motor for commutation of the motor in current (torque) mode.
Encoder-based sinusoidal commutation (-24 plug-in board)	In this mode, the drive accepts a +/-10 VDC analog input as a current (torque) or velocity (RPM) command reference and sinusoidally commutes the motor by Hall Sensors or encoder commutation tracks and an incremental encoder. Note: This version can operate without Hall Sensors or encoder commutation tracks by using Glentek's "twang mode" initialization.

Note: Voice coil and DC brush modes are also available upon request.

LINEAR BRUSHLESS SERVO DRIVES

Features	
Bandwidth	All servo drives have a nominal 10kHz current loop bandwidth which varies with the motor inductance.
Linear output stage	Provides high bandwidth, low noise, and zero crossover distortion.
Multimode operation	The 2-phase sinusoidal current mode servo drive can drive 3-phase brushless servo motors in current (torque) mode. The Trapezoidal servo drive can drive 3-phase brushless servo motors in current (torque) mode and can close the velocity loop via feedback of a DC tachometer. The encoder-based sinusoidal servo drive can drive 3-phase brushless servo motors in current (torque) or velocity (RPM) mode.
Wide operating voltage	Operating voltages range from either +/-20 to +/-55 VDC for standard voltage versions or +/-25 to +/-75 VDC for high power versions.
Industry standard mounting	Available in a standard heatsink module, large heatsink module w/fan and cover or a 2-axis chassis version. Note: Glentek offers custom mounting configurations to meet virtually any requirement.
Ergonomic Design	Easy access to connections, adjustments and test points.
Fault protection	Fault protection: Short from output to output, short from output to ground, drive RMS over current, drive under/over voltage and drive over temperature.
Motor over temp	An input is provided for a motor over temperature switch and will shutdown the drive and display a fault.
Status indicator	7-segment LED display indicates drive status and diagnostics.
Dedicated inputs	+/- limits, enable, fault, motor over temperature and reset for Trapezoidal and Encoder-based versions. Enable, fault, motor over temperature and reset for 2-phase sinusoidal versions.
External fault reset	An input is provided to reset the drive in the event of a fault.
Manual reset	A push button reset is available to reset a fault.
Current limit	Peak motor current is adjustable.
RoHS compliant	RoHS compliance optional.
CE marked	All servo drives are CE marked in accordance with EN60204-1 (IEC204-1).

Environmental Conditions	
Storage Temperature	-40°C to 80°C
Operating Temperature	Standard: 0°C to 40°C without current derating, up to 50°C with 25% current derating Special: -40°C to 40°C without current derating, up to 50°C with 25% current derating
Humidity	5% to 95% relative humidity, non-condensing
Altitude	Up to 1000m without derating, derate current 10% per 1000m above 1000m

LINEAR BRUSHLESS ELECTRICAL RATINGS

Model	Power Output (Continuous)*	Power Output (Peak)*	Current (Stall)	Current (Continuous)	Current (Peak)
SMA6520-50LB	200	1000	2.5	5	12.5
SMA6520-50HS	400	2000	5	10	25
SMA6520-50HF	500	2000	5	10	25

Note 1: * Heatsink dissipation power @ 25°C

Note 2: Current trip time and peak current is adjustable.

Note 3: Output power ratings based on Glentek or customer supplied airflow.

Note 4: If the motor is not rotating, stall current is used. If the motor is rotating, continuous current is used.

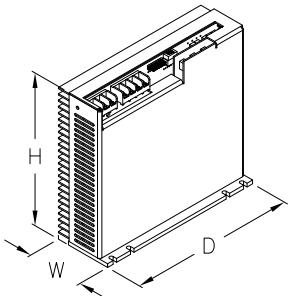
Input Power Connections and Voltages	
Bipolar Supply Voltage	Standard Voltage: +/-20 to +/- 55 VDC High Voltage: +/-25 to +/-75 VDC
VAC input (for stand alone and multi-axis packages)	17-53 VAC
Auxiliary Bias Supply Voltage	+/-15 VDC regulated +/-400 mA.
Command A & B Analog Signals	+/-20 VDC maximum (differential)
Fan Power	Fan power for module model (SMA6520-50HF): 24 VDC Fan power for 2-axis chassis: 115 VAC, single phase, or 230 VAC, single-phase

LINEAR BRUSHLESS SERIES DIMENSIONS

Module

Glentek's SMA6520 series linear servo drives are offered in three module styles: the low power 50LB, the standard 50HS, and the high power 50HF which includes a fan. All modules accept any of the three available plug in boards (2-phase sinusoidal current mode, trapezoidal, or encoder-based commutation).

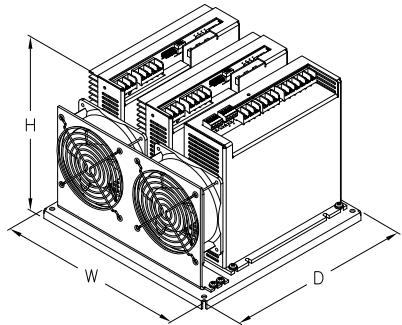
Model Number	Dimensions, Inches (mm)			Weight lbs. (kg)
	Width	Height	Depth	
SMA6520-50LB-1	2.2 (56)	7.7 (196)	8.8 (224)	3.2 (1.5)
SMA6520-50HS-1	2.9 (74)	7.7 (196)	8.8 (224)	4.2 (1.9)
SMA6520-50HF-1	5.3 (135)	8.0 (203)	10.4 (264)	7.4 (3.4)



Multi-Axis

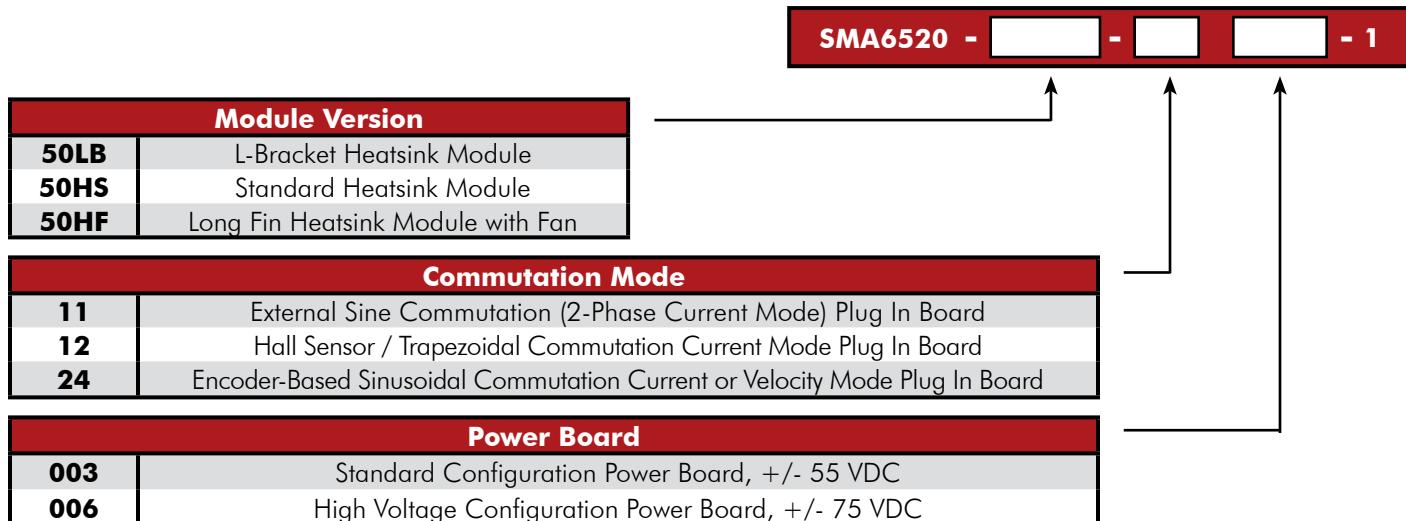
A 2-axis baseplate design with 2 slots available for modules has a bridge rectifier, cooling fan and filter capacitors for the required bipolar DC voltage for the modules along with the +/-15 VDC logic supply needed for the bias voltages.

Model Number	Axes	Dimensions, Inches (mm)			Weight lbs. (kg)
		Width	Height	Depth	
SMA6520-50LB	2	12.5 (318)	8.6 (218)	11.3 (286)	13.4 (6.1)
SMA6520-50HS	2	12.5 (318)	8.6 (218)	11.3 (286)	15.4 (7.0)



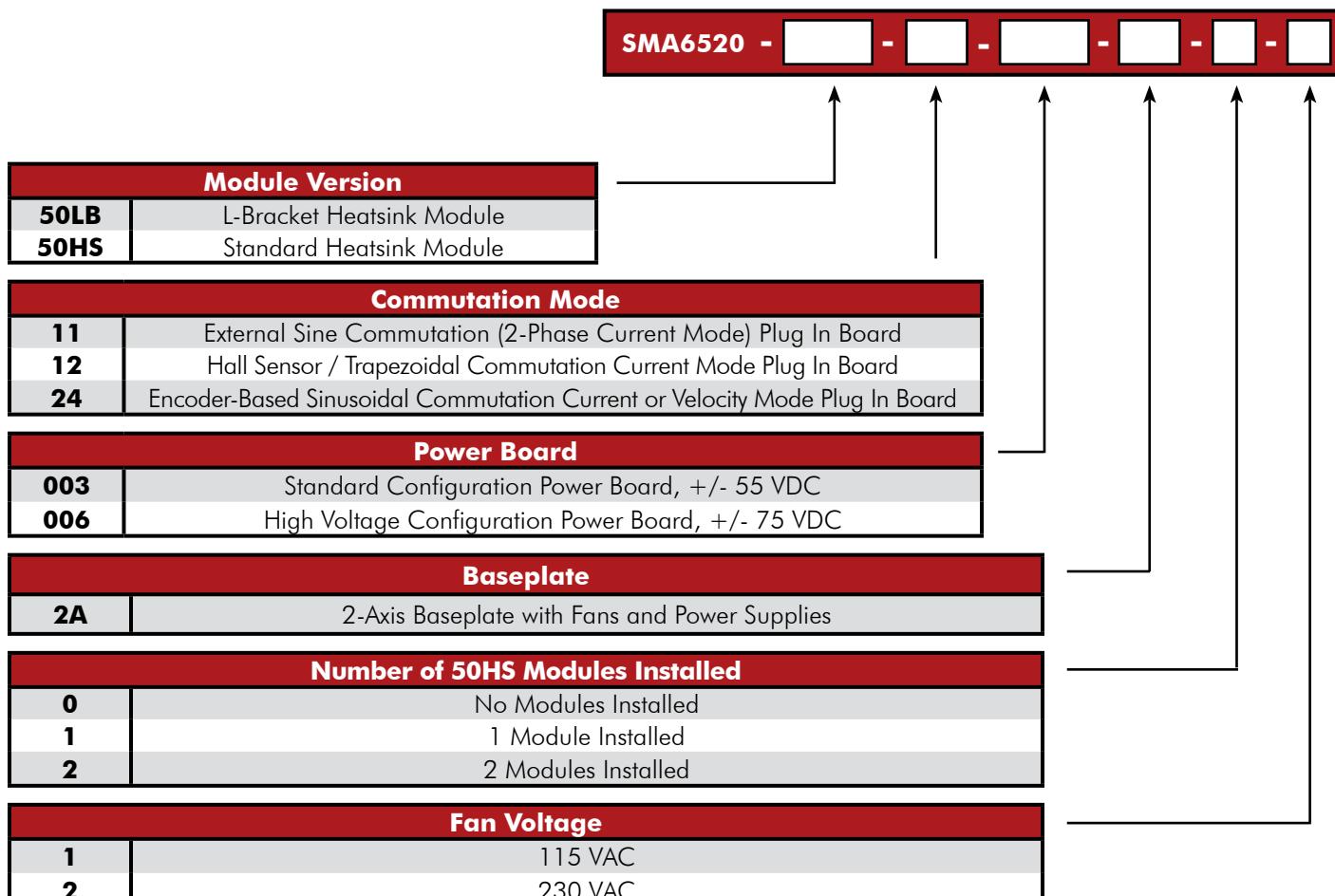
LINEAR BRUSHLESS SERIES MODULE MODEL NUMBERING

This section explains the model numbering system for Glentek's Linear Servo Drives. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the drive that best suits your requirements.



Note: Voice coil and DC brush modes are also available upon request.

LINEAR BRUSHLESS SERIES MULTI-AXIS MODEL NUMBERING



Note: Voice coil and DC brush modes are also available upon request.

LINEAR BRUSH SERVO DRIVES



Glentek offers the latest in high performance Linear Brush Servo Drives for the control of both DC brush servo motors and voice coil motors. With extensive utilization of surface mount technology and special heat transfer techniques, Glentek's Linear Brush Servo Drives offer one of the world's most powerful products for a given form factor. These drives are best suited for low inertia applications that require high bandwidth, low noise, and zero crossover distortion and motors or voice coils which require high current loop bandwidths.

Features	
Linear output stage	Provides high bandwidth, low noise, and zero crossover distortion.
Bandwidth	Standard servo drives have a nominal 10 kHz current loop bandwidth which varies with the motor inductance. High performance SMA5005-4 models (current mode only) have a nominal 15 kHz current loop bandwidth. Note: high performance models have fixed digital inputs. See model numbering on pgs. 42-45 .
Multimode operation	All models can operate in current (torque) or velocity (RPM) mode and accept a +/-10 VDC analog input as a command reference. Note: SMA5005-4 is current mode only.
Feedback	Models can close the velocity loop via a DC tachometer.
Wide operating voltage	Operating voltage ranges are 24-75 VDC for the SMA5005 Module configuration and 17-39 VAC (from transformer with center tap) for the SMA5015 Stand Alone configuration.
Internal heat dissipation	(@ 25°C): 100 Watts continuous for SMA5005-xLB, 250 Watts continuous for the SMA5005-xSF, and 300 Watts continuous for the SMA5015.
Ergonomic design	Easy access to connections, adjustments, and test points.
SMT Construction	Provides ultra compact size, cost competitive package, and high reliability.
Industry standard mounting	Available in a Module, Multi-Axis, and Stand Alone configuration. Optional custom mounting configurations are available to meet virtually any requirement.
Fault protection	Short from output to output, short from output to ground, drive RMS over current, drive under/over voltage (SMA5015 only), and drive over temperature.
Status indicator	7-segment LED display (SMA5015) or LEDs (5005) indicates drive status.
Dedicated inputs	+/- limits, inhibit, fault and reset. Note: high performance SMA5005-4 models only have reset and inhibit digital inputs and the logic type and pull-up voltage is fixed. See model numbering.
External fault reset	An input is provided to reset the drive in the event of a fault.
Manual fault reset	A push button reset is available on the SMA5015.
Current limit	Peak motor current is adjustable.
Compliance	All servo drives are CE marked in accordance with EN60204-1 (IEC204-1), and RoHS compliant

Environmental Conditions	
Storage Temperature	-40°C to 80°C
Operating Temperature	Standard: 0°C to 40°C without current derating, up to 50°C with 25% current derating Special: -40°C to 40°C without current derating, up to 50°C with 25% current derating
Humidity	5% to 95% relative humidity, non-condensing
Altitude	Up to 1000m without derating, derate current 10% per 1000m above 1000m

LINEAR BRUSH SERIES ELECTRICAL RATINGS

Module

Model Number ⁽¹⁾	Input Voltage (VDC)	Continuous Current (A) ⁽²⁾	Peak Current (A) ⁽²⁾	Rated Internal Power Dissipation (W) ⁽³⁾
SMA5005-xLB	24-75	5	15	100
SMA5005-xSF	24-75	5	15	250

Multi-Axis

Model Number ⁽¹⁾	Input Voltage (VAC)	Continuous Current (A)	Peak Current (A)	Rated Internal Power Dissipation (W) ⁽³⁾
SMA5005-xLB	17-53	5	15	100
SMA5005-xSF	17-53	5	15	250

Stand Alone

Model Number	Input Voltage (VAC from transformer with center tap)	Continuous Current (A)	Peak Current (A)	Rated Internal Power Dissipation (W) ⁽³⁾
SMA5015	17-39	10	25	300

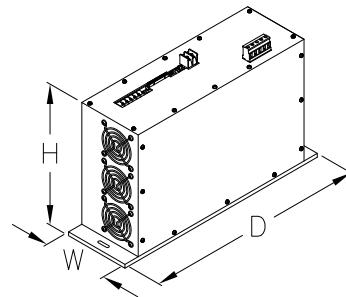
Notes: ⁽¹⁾The x in the model number is a placeholder. ⁽²⁾With external forced-air cooling. ⁽³⁾At ambient temperature (25°C). Current ratings are for reference only because they are highly system dependent, varying based on input voltage and motor resistance. Power dissipation is a more accurate rating. Please contact Glentek with your system requirements and we will help assist you with product selection.

LINEAR BRUSH SERIES DIMENSIONS

Stand Alone

The Stand Alone mounting configuration consists of a servo drive, DC bus power supply, external bias voltage supply, and cooling fans. This package is used for single and multi-axis applications.

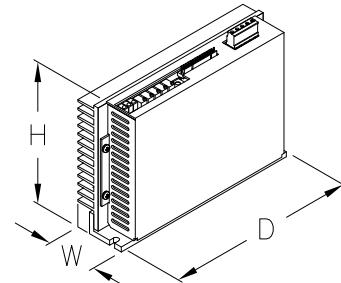
Model Number	Dimensions, Inches (mm)			Weight, lbs. (kg)
	Width	Height	Depth	
SMA5015	4.3 (109)	9.0 (229)	14.5 (368)	10.2 (4.6)



Module

The Module mounting configuration consists of a servo drive only and does not include the DC bus power supply. This package offers the smallest mechanical form factor and is a very cost effective solution for single and multi-axis applications where the customer provides the DC bus supply and forced air cooling.

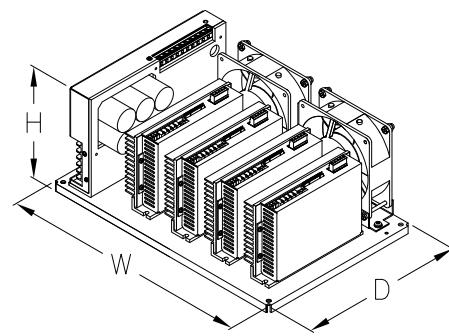
Model Number	Dimensions, Inches (mm)			Weight, lbs. (kg)
	Width	Height	Depth	
SMA5005-xLB	1.2 (30)	5.0 (127)	7.1 (180)	1.1 (0.5)
SMA5005-xSF	1.9 (48)	5.0 (127)	7.1 (180)	1.5 (0.7)



Multi-Axis

The Multi-Axis mounting configuration consists of an open frame base plate chassis with DC bus power supply, in-rush current limiting protection at power-on, fuses, and cooling fans. Available in 2 & 4 axis packages.

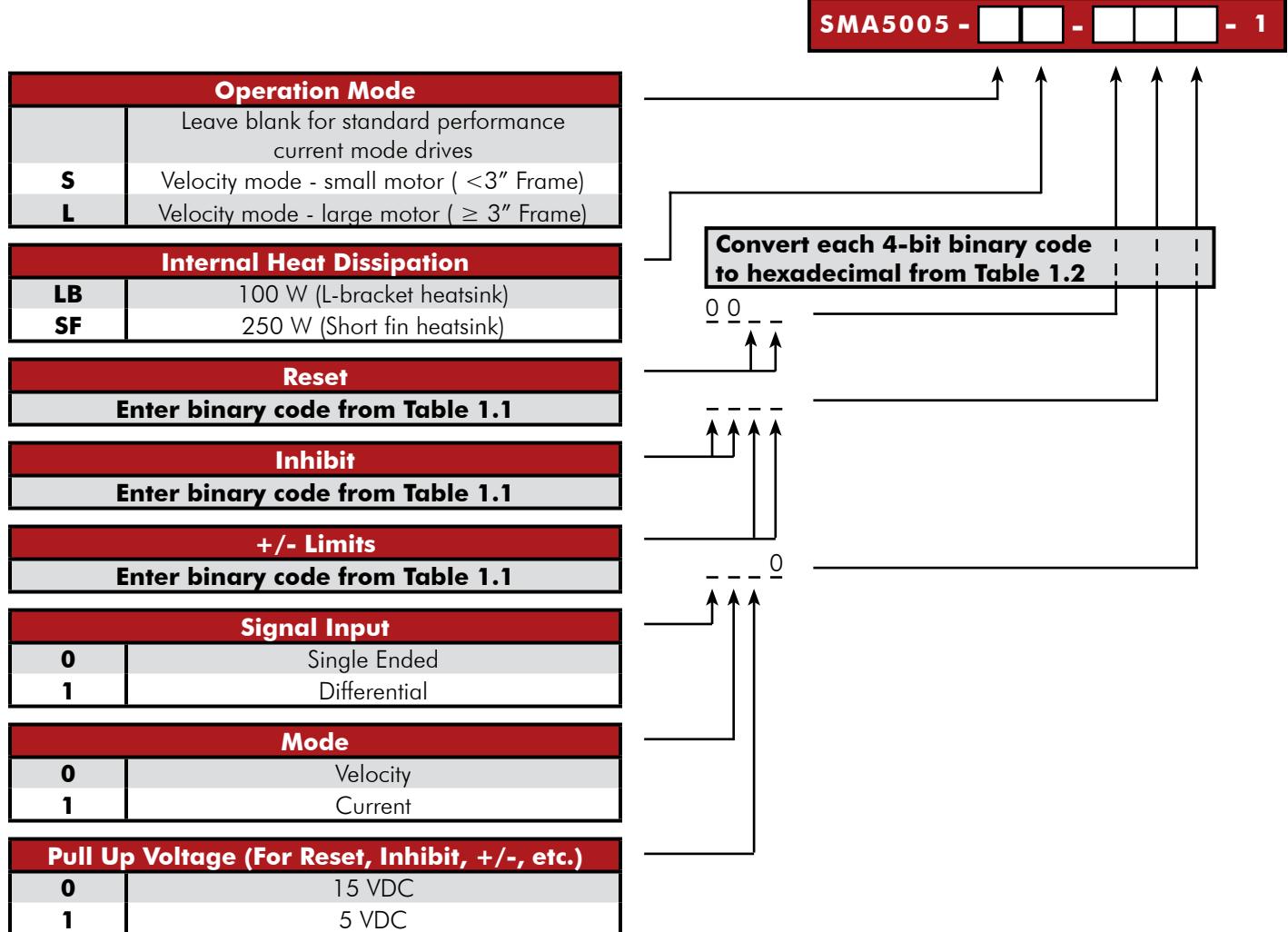
Model Number	Axes	Dimensions, Inches (mm)			Weight, lbs. (kg)
		Width	Height	Depth	
SMA5005	2	9.8 (249)	6.9 (175)	10.8 (274)	9.5 (4.3)
SMA5005	4	14.9 (378)	6.9 (175)	10.8 (274)	15.1 (6.7)



LINEAR BRUSH SERIES MODEL NUMBERING

This section explains the model numbering system for Glentek's SMA5005 and SMA5015 Series High Performance Linear Brush servo drives. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the drive that best suits your requirements. **Please choose the model and package configuration you require from the "Electrical Ratings" table on pg. 41.** Then complete the drive configuration code you require using the information on this page.

LINEAR BRUSH SERIES MODULE MODEL NUMBERING (STANDARD PERFORMANCE MODELS ONLY)



LINEAR BRUSH SERIES STANDALONE MODEL NUMBERING (STANDARD PERFORMANCE MODELS ONLY)

SMA5015 - [] - [] - 1A - 1

Drive Configuration (Reset, Inhibit, +/- Limits, Signal Input, Mode, Pull Up Voltage) —
Same as Module and Multi-Axis, see above

LINEAR BRUSH SERIES MULTI-AXIS MODEL NUMBERING (STANDARD PERFORMANCE MODELS ONLY)

SMA5005 - - - A -

Operation Mode	
	Leave blank for standard performance current mode drives
S	Velocity mode - small motor ($< 3"$ Frame)
L	Velocity mode - large motor ($\geq 3"$ Frame)
Internal Heat Dissipation (per axis)	
LB	100 W (L-bracket heatsink)
SF	250 W (Short fin heatsink)
Reset	
Enter binary code from Table 1.1	
Inhibit	
Enter binary code from Table 1.1	
+/- Limits	
Enter binary code from Table 1.1	
Signal Input	
0	Single Ended
1	Differential
Mode	
0	Velocity
1	Current
Pull Up Voltage (For Reset, Inhibit, etc.)	
0	15 VDC
1	5 VDC
Mounting Configuration	
2	2-Axis Chassis
4	4-Axis Chassis
Number of Drive Modules Installed	
1	1 Drive Module (2-Axis Chassis)
2	2 Drive Module (2-Axis Chassis)
3	3 Drive Module (4-Axis Chassis)
4	4 Drive Module (4-Axis Chassis)

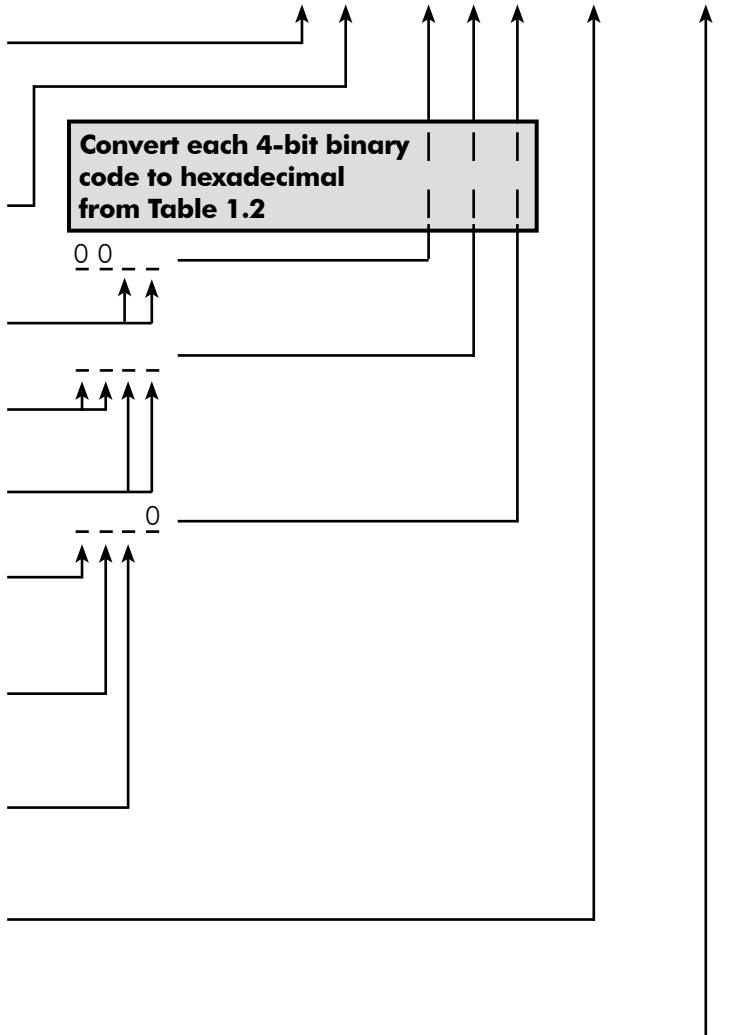


Table 1.1 Function Configuration (Inhibit, Reset, +/- Limits)

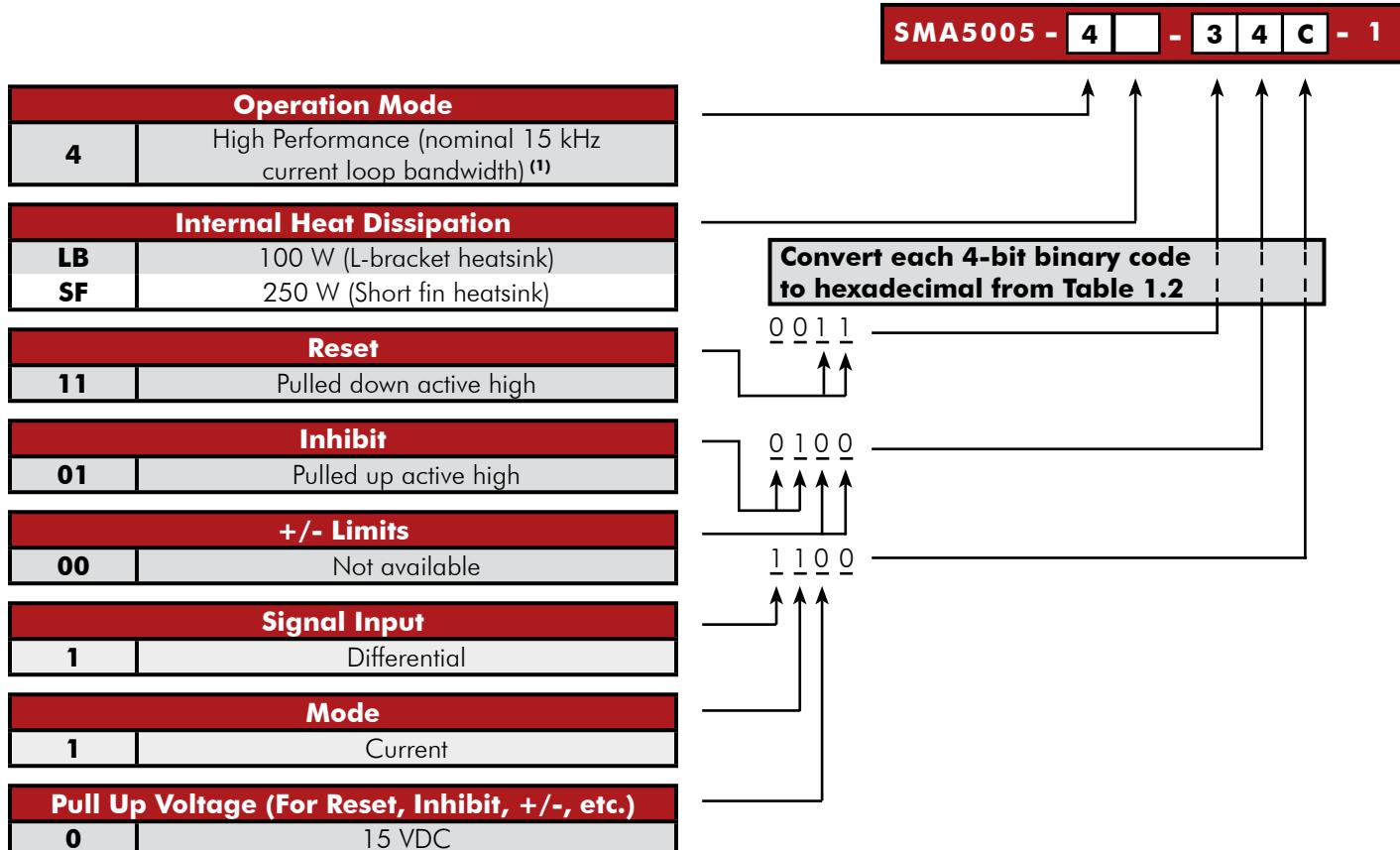
Binary	Input is:	Input State is:	Function Input Configuration
00	Internally Pulled Up	Active When Low	Requires grounding of input to activate the function
01	Internally Pulled Up	Active When High	Requires grounding of input to deactivate the function
10	Internally Pulled Down	Active When Low	Requires a positive voltage at input to deactivate the function
11	Internally Pulled Down	Active When High	Requires a positive voltage at input to activate the function

Example: Function: Reset, Binary Code: **00**. The default state of the input is high, because the input is internally pulled up. Because the function (reset) is active when low, the function (reset) will not be activated. Activating the function (reset) requires grounding the input (externally pulling it down to low).

Table 1.2 Binary to Hexadecimal Conversion

Binary	Hex	Binary	Hex
0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	B
0100	4	1100	C
0101	5	1101	D
0110	6	1110	E
0111	7	1111	F

LINEAR BRUSH SERIES MODULE MODEL NUMBERING (HIGH PERFORMANCE SMA5005-4 MODELS ONLY)



Note: ⁽¹⁾ High Performance SMA5005-4 servo drives have fixed digital inputs. Reset is pulled down active high, inhibit is pulled up active high, and there are no +/- limits. Signal input is set for differential, but can be configured for single ended input by externally grounding one of the two signal input lines. Due to the high performance and high current loop bandwidth, voice coil/motor parameters, operating voltage, and desired current loop bandwidth are required upon ordering.

Table 1.1 Function Configuration (Inhibit, Reset, +/- Limits)

Binary	Input is:	Input State is:	Function Input Configuration
00	Internally Pulled Up	Active When Low	Requires grounding of input to activate the function
01	Internally Pulled Up	Active When High	Requires grounding of input to deactivate the function
10	Internally Pulled Down	Active When Low	Requires a positive voltage at input to deactivate the function
11	Internally Pulled Down	Active When High	Requires a positive voltage at input to activate the function

Example: Function: Reset, Binary Code: **00**. The default state of the input is high, because the input is internally pulled up. Because the function (reset) is active when low, the function (reset) will not be activated. Activating the function (reset) requires grounding the input (externally pulling it down to low).

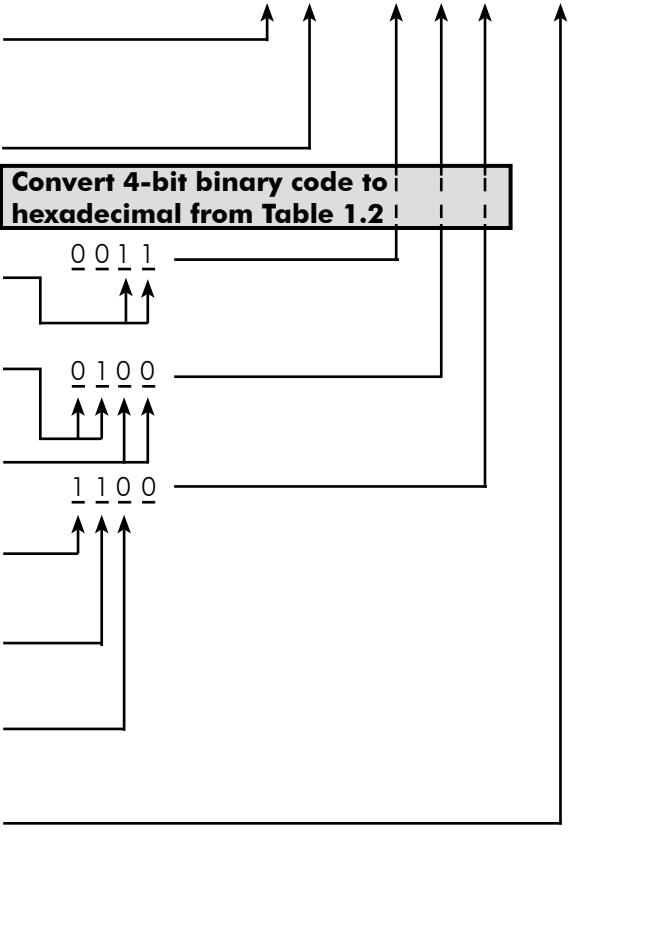
Table 1.2 Binary to Hexadecimal Conversion

Binary	Hex	Binary	Hex
0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	B
0100	4	1100	C
0101	5	1101	D
0110	6	1110	E
0111	7	1111	F

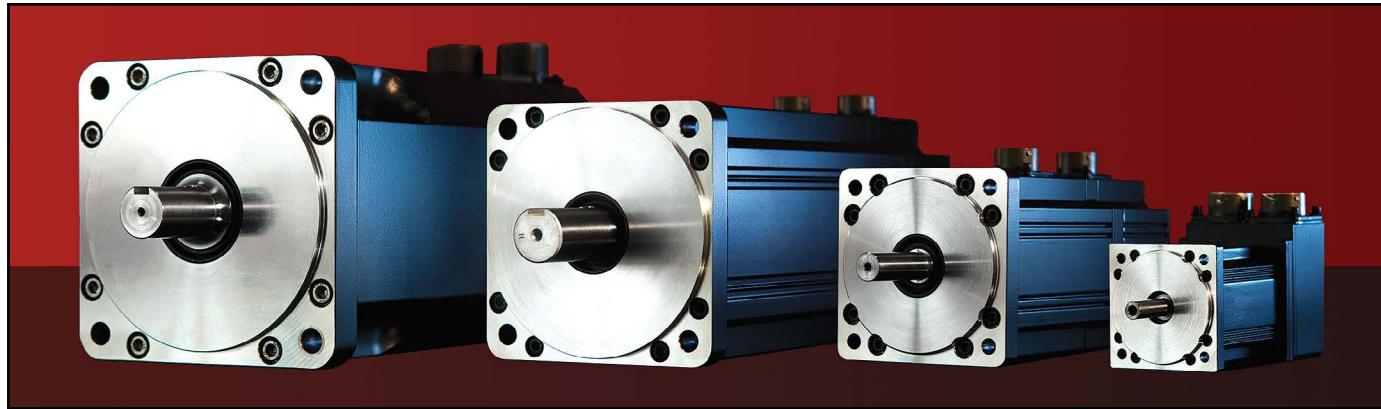
LINEAR BRUSH SERIES MULTI-AXIS MODEL NUMBERING (HIGH PERFORMANCE SMA5005-4 MODELS ONLY)

Operation Mode	
4	High Performance (nominal 15 kHz current loop bandwidth) ⁽¹⁾
Internal Heat Dissipation	
LB	100 W (L-bracket heatsink)
SF	250 W (Short fin heatsink)
Reset	
11	Pulled down active high
Inhibit	
01	Pulled up active high
+/- Limits	
00	Not available
Signal Input	
1	Differential
Mode	
1	Current
Pull Up Voltage (For Reset, Inhibit, +/-, etc.)	
0	15 VDC
Mounting Configuration	
2	2-Axis Chassis
4	4-Axis Chassis
Number of Drive Modules Installed	
1	1 Drive Module (2-Axis Chassis)
2	2 Drive Module (2-Axis Chassis)
3	3 Drive Module (4-Axis Chassis)
4	4 Drive Module (4-Axis Chassis)

SMA5005 - **4** - **3** **4** **C** - **A** -



Note: ⁽¹⁾ High Performance SMA5005-4 servo drives have fixed digital inputs. Reset is pulled down active high, inhibit is pulled up active high, and there are no +/- limits. Signal input is set for differential, but can be configured for single ended input by externally grounding one of the two signal input lines. Due to the high performance and high current loop bandwidth, voice coil/motor parameters, operating voltage, and desired current loop bandwidth are required upon ordering.



BRUSHLESS SERVO MOTORS

To accommodate your complete servo system requirements, Glentek manufactures two complete series (GMB and GMBF) of high performance, permanent magnet brushless servo motors. Following is a general description of each series:

GMB SERIES

The GMB series utilize high-energy Neodymium-Iron-Boron (NdFeB) magnets which when combined with low inertia rotors, provide high dynamic performance. Due to the high torque to inertia ratio of these motors, they are ideal for applications which require high acceleration and deceleration characteristics. In addition, all frame sizes incorporate skewed stators which provide ultra smooth operation (i.e. low cogging torque) at all speeds. Motors are available in industry standard English, Metric and NEMA mounting configurations.

- Continuous Torque Range:
2.4 Lb-in (0.27 Nm) to 1,092 Lb-in (123.4 Nm)
- Peak Torque Range:
7 Lb-in (0.81 Nm) to 3,276 Lb-in
(370.2 Nm)

GMBF SERIES

The GMBF series utilize traditional ferrite magnets which are ideal for cost sensitive applications. In addition, the higher inertia rotors provide improved motor to load inertia matching for medium to high inertia loads. This helps to reduce the mechanical shaft resonance which allows higher servo gains with increased stability. In addition, all frame sizes incorporate skewed stators which provide ultra smooth operation (i.e. low cogging torque) at all speeds. Motors are available in industry standard English, Metric and NEMA mounting configurations.

- Continuous Torque Range:
22.0 Lb-in (2.49 Nm) to 75.0 Lb-in (8.47 Nm)
- Peak Torque Range:
66.0 Lb-in (7.46 Nm) to 225 Lb-in
(25.42 Nm)

Feature	GMB	GMBF
X = Standard, O = Optional		
High-energy Neodymium-Iron-Boron (NdFeB) magnet design with low inertia rotors provides a high dynamic performance, high torque to inertia ratio and one of the world's most powerful motors for a given mechanical form factor.	X	
Traditional ferrite magnet design, which are ideal for cost sensitive applications. In addition, the higher inertia rotors provide improved motor to load inertia matching for medium to high inertia loads.		X
Special design provides ultra smooth operation (i.e. low cogging torque) at all speeds.	X	X
Constructed to withstand the toughest industrial environment with rugged, high performance bearings and TENV construction with IP65 sealing standard.	X	X
Normally closed thermal switch provides over temperature protection.	X	X
Various electrical windings are available as standard to suit both low (120 VAC) and high (230 VAC) voltage drives in order to provide optimum speed and torque characteristics. Optional custom electrical windings are available to meet virtually any requirement as well as 380 and 460 VAC line voltages.	X	X
Worldwide standard mounting configurations (i.e. English, Metric and NEMA). Optional custom mounting configurations are available to meet virtually any requirement.	X	X
Encoder with commutation tracks, brushless resolvers or Hall sensors are the standard feedback devices offered	X	X
Absolute serial encoders (both single and multi-turn).	O	O
Analog Sin/Cos encoder.	O	O
Shaft keyway.	X	X
Class H insulation.	X	X
24 VDC holding brake.	O	O
UL Recognized Component for the US and Canada in accordance with UL 1004-1.	X	X
CE marked in accordance with EN61000-6-4:2007/A1:2011.	X	X
RoHS compliant.	X	X

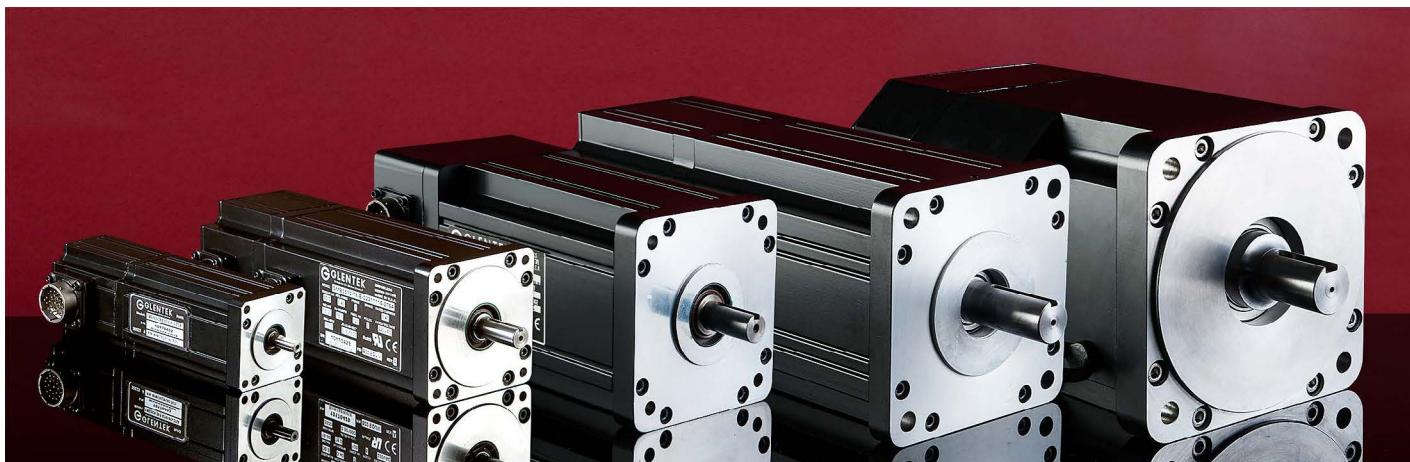
Environmental Conditions

Storage Temperature: -20°C to 70°C

Operating Temperature: Standard: -20°C to 40°C without derating, derate torque 10% per 10°C above 40°C
Special: -40°C to 40°C without derating, derate torque 10% per 10°C above 40°C

Humidity: 5% to 95% relative humidity, non-condensing

Altitude: Up to 1000m without derating, derate torque 10% per 1000m above 1000m



GMB & GMBF SERIES SELECTION TABLE

Model Number	Power @ Rated Speed		Speed, RPM		Cont. Stall Rating			Peak Stall Rating			K _T		K _V	R _A	L _A	Rotor Inertia	
	HP	KW	Max	Rated	Lb-in	Nm	A	Lb-in	Nm	A	Lb-in/A	Nm/A	V _{RMS} /kRPM	Ω	mH	Lb-in-sec ²	Kg-m ²
GMB4560-50	4.06	3.03	4000	3200	100	11.30	17.7	300	33.90	53.1	5.65	0.64	50	0.4	2.8	0.0064	0.000727
GMB4560-90	2.16	1.61	2100	1700	100	11.30	9.8	300	33.90	29.4	10.17	1.15	90	1.1	9.7	0.0064	0.000727
GMB4575-35	5.89	4.39	5000	4000	116	13.11	29.3	348	39.33	87.9	3.95	0.45	35	0.1	1.1	0.0074	0.000836
GMB4575-55	4.12	3.07	3500	2800	116	13.11	18.7	348	39.33	56.1	6.21	0.70	55	0.3	2.5	0.0074	0.000836
GMB4575-70	3.24	2.42	2700	2200	116	13.11	14.7	348	39.33	44.1	7.91	0.89	70	0.5	4.4	0.0074	0.000836
GMB4575-110	2.06	1.54	1800	1400	116	13.11	9.3	348	39.33	27.9	12.43	1.40	110	1.7	13.4	0.0074	0.000836
GMBF5030-25	1.17	0.87	3500	2800	33	3.68	11.5	98	11.04	34.5	2.82	0.32	25	0.7	3.1	0.014	0.001582
GMBF5030-50	1.17	0.87	3500	2800	33	3.68	5.8	98	11.04	17.4	5.65	0.64	50	2.3	10.2	0.014	0.001582
GMBF5030-61	1.01	0.75	3000	2400	33	3.68	4.4	98	11.04	13.2	7.46	0.84	66	4.6	19.9	0.014	0.001582
GMBF5030-75	0.84	0.62	2500	2000	33	3.68	3.8	98	11.04	11.4	8.47	0.96	75	4.8	23.0	0.014	0.001582
GMBF5040-25	1.42	1.06	3500	2800	40	4.52	14.2	120	13.56	42.6	2.82	0.32	25	0.3	3.0	0.019	0.002147
GMBF5040-50	1.42	1.06	3500	2800	40	4.52	7.1	120	13.56	21.3	5.65	0.64	50	1.4	12.0	0.019	0.002147
GMBF5040-75	1.02	0.76	2500	2000	40	4.52	4.7	120	13.56	14.1	8.47	0.96	75	3.5	28.0	0.019	0.002147
GMBF5060-25	2.67	1.99	3500	2800	75	8.47	26.6	225	25.41	79.8	2.82	0.32	25	0.2	2.0	0.028	0.003164
GMBF5060-50	2.67	1.99	3500	2800	75	8.47	13.3	225	25.41	39.9	5.65	0.64	50	0.9	7.0	0.028	0.003164
GMBF5060-75	1.90	1.42	2500	2000	75	8.47	8.9	225	25.41	26.7	8.47	0.96	75	2.1	11.0	0.028	0.003164
GMB5627-70	3.63	2.71	2700	2200	130	14.7	16	390	44.1	49	7.93	0.90	70	0.54	3.5	0.0111	0.00125
GMB5627-115	2.31	1.72	1700	1400	130	14.7	10	390	44.1	30	13.03	1.47	115	1.5	10.0	0.0111	0.00125
GMB5654-70	5.86	4.37	2700	2200	210	23.7	26	630	71.1	79	7.93	0.90	70	0.20	1.6	0.0197	0.00223
GMB5654-115	3.73	2.78	1700	1400	210	23.7	16	630	71.1	48	13.03	1.47	115	0.50	4.1	0.0197	0.00223
GMB5681-80	6.75	5.04	2400	1900	280	31.6	31	840	94.8	93	9.06	1.02	80	0.17	1.5	0.0287	0.00324
GMB5681-115	4.98	3.71	1700	1400	280	31.6	21	840	94.8	64	13.03	1.47	115	0.34	2.9	0.0287	0.00324
GMB56108-80	8.68	6.47	2400	1900	360	40.7	40	1080	122	119	9.06	1.02	80	0.12	1.1	0.0370	0.00418
GMB56108-115	6.40	4.77	1700	1400	360	40.7	28	1080	122	83	13.03	1.47	115	0.22	1.9	0.0370	0.00418
GMB7530-80	9.65	7.19	2400	1900	400	45	44	1200	135	132	9.06	1.02	80	0.25	2.3	0.0432	0.00488
GMB7530-162	5.08	3.79	1200	1000	400	45	22	1200	135	65	18.35	2.07	162	0.95	9.0	0.0432	0.00488
GMB7560-80	15.44	11.51	2400	1900	640	72	71	1920	216	212	9.06	1.02	80	0.09	1.0	0.0750	0.00848
GMB7560-162	8.12	6.06	1200	1000	640	72	35	1920	216	105	18.35	2.07	162	0.36	4.0	0.0750	0.00848
GMB7590-80	21.22	15.83	2400	1900	880	99	97	2640	298	291	9.06	1.02	80	0.05	0.7	0.1082	0.01223
GMB7590-162	11.17	8.33	1200	1000	880	99	48	2640	298	144	18.35	2.07	162	0.19	2.6	0.1082	0.01223
GMB75120-108	19.41	14.47	1800	1400	1092	123	89	3276	370	268	12.24	1.38	108	0.06	0.8	0.1397	0.01579
GMB75120-162	13.86	10.34	1200	1000	1092	123	60	3276	370	179	18.35	2.07	162	0.14	1.9	0.1397	0.01579
GMB75120-248	8.32	6.20	800	600	1092	123	39	3276	370	117	28.10	3.17	248	0.37	4.4	0.1397	0.01579

Note: * Higher speeds may be attainable depending on the application, contact Glentek for more info. The values for Max and Rated Speed are for motors operated with a 230 VAC power supply, except for the GMB75120-248, which are for 460 VAC. All ratings are based on a 25°C ambient temperature and with the motor face mounted to a 14" x 14" x 3/4" aluminum heatsink. A = Peak Phase Current • K_T = Torque Constant • K_V = B_{EMF} = V_{RMS} Phase-to-Phase/1000 RPM • R_A = Phase-to-Phase Resistance • L_A = Phase-to-Phase Inductance • Please visit our website at www.gilentek.com for performance curves and more detailed information.

GMB & GMBF CONNECTORS & PINOUT INFORMATION

4-Pin MS Connector (Motor Power)

For GMB5600 motors:

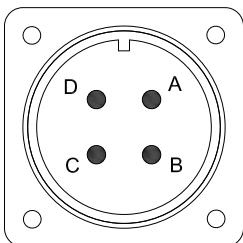
Connector PN: MS-3102R22-22P

Straight Mating Connector PN: MS3106F22-22S

For GMB7500 motors:

Connector PN: MS-3102R32-17P

Straight Mating Connector PN: MS3106F32-17S



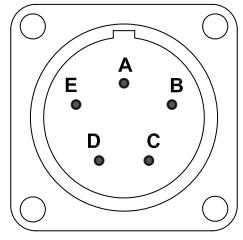
Pin #	Function
A	Phase R
B	Phase S
C	Phase T
D	Case Ground

5-Pin MS Connector (Motor Power)

For GMB2000, GMB3500, GMB4500, GMBF4300, and GMBF5000 motors:

Connector PN: MS-3112E14-5P

Straight Mating Connector PN: MS3116F14-5S



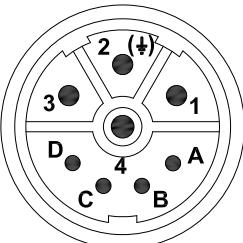
Pin #	Function
A	Phase R
B	Phase S
C	Phase T
D	Case Ground
E	N/C

8-Pin Euro-Style Connector (Motor Power and Brake)

For GMB2000, GMB3500, GMBF4300, GMB4500, and GMBF5000 motors. Contact Glentek for larger frame sizes.

TE Connector PN: BEDC110MR11001216 000

TE Mating Connector PN (fully threaded): BSTA078FR05480235000



Pin #	Function
1	Phase R
2	Case Ground
3	Phase S
4	Phase T
A	Brake +
B	Brake -
C	N/C
D	N/C

Note: Non-standard connectors and pinouts are available upon request. Contact Glentek for more information.

GMB & GMBF CONNECTORS & PINOUT INFORMATION

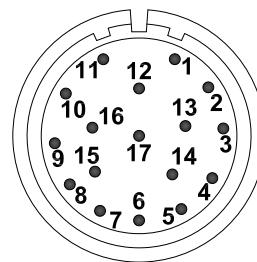
17-Pin Euro-Style Connector (Feedback)

Available for all GMB and GMBF motors.

TE Connector PN: AEDC139MR04001215000

TE Mating Connector PN (fully threaded):

ASTA014FR1590038000



Pin #	Resolver	Incremental (TTL) Quadrature Encoder	Sin/Cos Encoder	Absolute Encoder w/ Sin/Cos Tracks	Absolute Encoder w/o Sin/Cos Tracks
1	Cosine+	Channel B+	Cosine+	B+ / Cosine+	N/C
2	Cosine-	Channel B-	Cosine-	B- / Cosine-	N/C
3	Sine+	Channel A+	Sine+	A+/ Sine+	N/C
4	Sine-	Channel A-	Sine-	A- / Sine-	N/C
5	Excitation	Channel Z+	Channel Z+	Battery Common	Battery Common
6	Excitation Common	Channel Z-	Channel Z-	Battery +5 VDC	Battery +5 VDC
7	N/C	Common	Common	Common	Common
8	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch
9	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch
10	N/C	+5 VDC	+5 VDC	+5 VDC	+5 VDC
11	N/C	Hall U-	Hall U-	Data-	Data-
12	N/C	Hall V-	Hall V-	Clock-	N/C
13	N/C	Hall W-	Hall W-	N/C	N/C
14	N/C	N/C	N/C	N/C	N/C
15	N/C	Hall U+	Hall U+	Data+	Data+
16	N/C	Hall V+	Hall V+	Clock+	N/C
17	N/C	Hall W+	Hall W+	N/C	N/C

Note: Pin functionality may vary due to the features available on the feedback device.

Note: Non-standard connectors and pinouts are available upon request. Contact Glentek for more information.

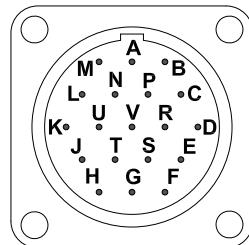
GMB & GMBF CONNECTORS, PIN-OUT, & BRAKE INFO

19-Pin MS Connector (Feedback and Brake)

Available for all GMB and GMBF motors.

Connector PN: MS-3112E14-5P

Straight Mating Connector PN: MS3116F14-5S



Pin #	Resolver	Incremental (TTL) Quadrature Encoder	Sin/Cos Encoder	Absolute Encoder w/ Sin/Cos tracks	Absolute Encoder w/o Sin/Cos tracks
A	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch
B	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch	Temp. Switch
C	Resolver Shield	Encoder Shield	Encoder Shield	Encoder Shield	Encoder Shield
D	N/C	+5 VDC	+5 VDC	+5 VDC	+5 VDC
E	N/C	Common	Common	Common	Common
F	Cosine -	Channel A+	Sine+	Sine+	N/C
G	Cosine +	Channel A-	Sine-	Sine-	N/C
H	Sine -	Channel B+	Cosine+	Cosine+	N/C
J	Sine +	Channel B-	Cosine-	Cosine-	N/C
K	Excitation Common	Channel Z+	Channel Z+	Battery Common	Battery Common
L	Excitation	Channel Z-	Channel Z-	Battery +5 VDC	Battery +5 VDC
M	N/C	Hall U+	Hall U+	Data+	Data+
N	N/C	Hall U-	Hall U-	Data-	Data-
P	N/C	Hall V+	Hall V+	Clock+	N/C
R	N/C	Hall V-	Hall V-	Clock-	N/C
S	N/C	Hall W+	Hall W+	N/C	N/C
T	N/C	Hall W-	Hall W-	N/C	N/C
U	Brake +	Brake +	Brake +	Brake +	Brake +
V	Brake -	Brake -	Brake -	Brake -	Brake -

Note: Non-standard connectors and pinouts are available upon request. Contact Glentek for more information.

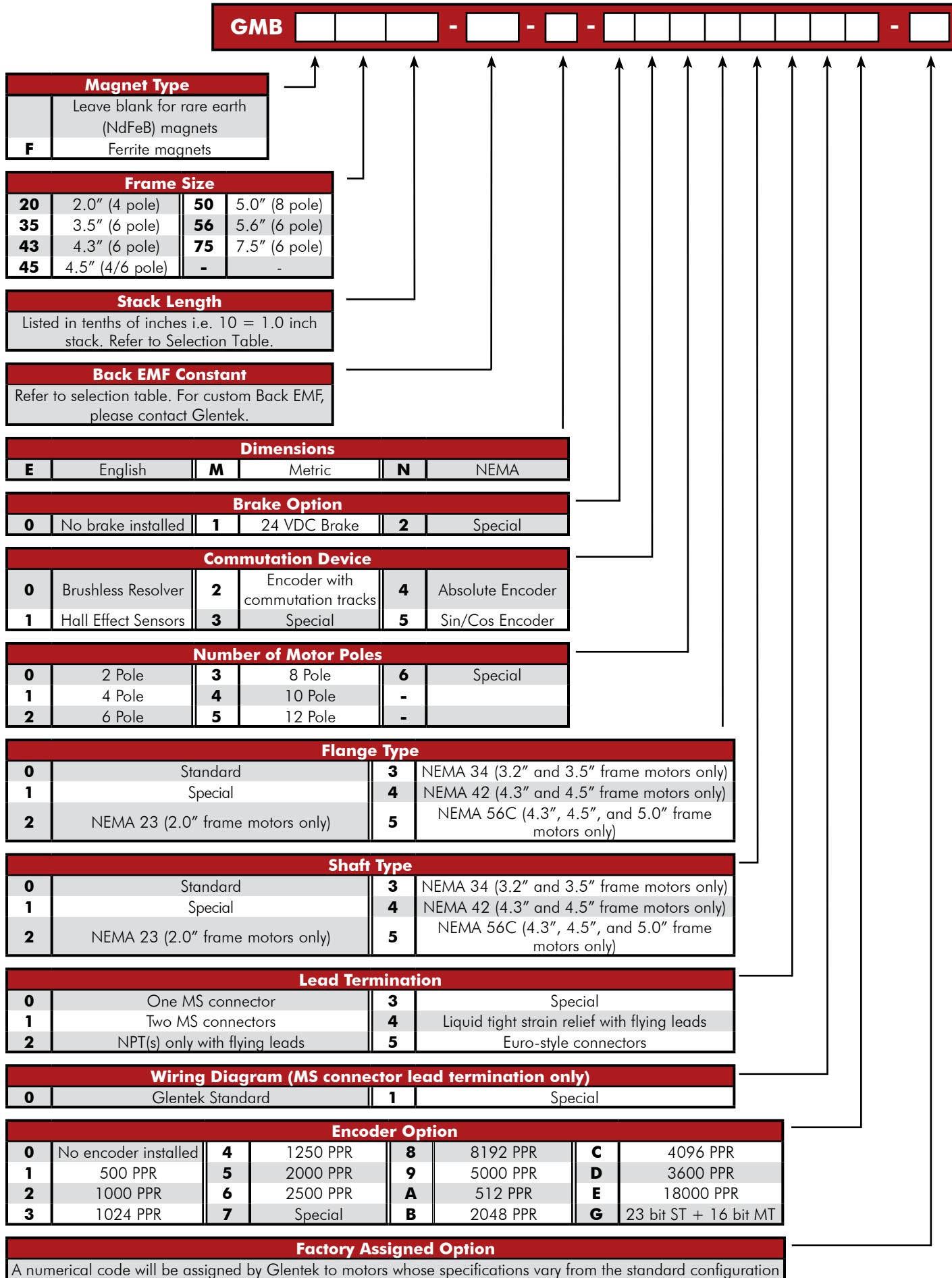
BRAKE INFORMATION

Model Number	Extension in. (mm)	Torque		Power Watts	Current A	Resistance Ω	Inductance mH
GMB2000	1.37 (35)	18	2	11	0.5	52	95
GMB3500	1.46 (37)	80	9	18	0.8	33	115
GMB4500	2.51 (64)	160	18	24	1.0	24	100
GMB5600	2.25 (57)	318	36	26	1.1	22	1200
GMB7500	3.00 (76)	1283	145	50	2.1	11	110
GMBF4300	1.63 (41)	80	9	18	0.8	33	115
GMBF5000	1.25 (32)	160	18	24	1.0	24	100

Note:

Brakes are optional. All brakes require 24 VDC voltage input. 95 VDC brakes available upon request. The values for "Extension" represent the nominal maximum length that the brake will add to the motor. For some models, the extension will be less. Please contact one of our sales engineers for the exact values.

GMB & GMBF SERIES MODEL NUMBERING



DC BRUSH SERVO MOTORS

To accommodate your complete servo system requirements, Glentek manufactures two complete series (GM and GMR) of high performance, permanent magnet DC brush servo motors. Following is a general description of each series:

GM SERIES

The GM series utilize traditional ferrite magnets, which are ideal for cost sensitive applications. In addition, the higher inertia armatures provide improved motor to load inertia matching for medium to high inertia loads. This helps to reduce the mechanical shaft resonance, which allows higher servo gains with increased stability. All frame sizes incorporate skewed armatures, which provide ultra smooth operation (i.e. low cogging torque) at all speeds.

- Continuous Torque Range:
1.9 Lb-in (0.21 Nm) to 113 Lb-in (12.8 Nm)
- Peak Torque Range:
12.0 Lb-in (1.4 Nm) to 338 Lb-in (38.1 Nm)

GMR SERIES

The GMR series utilize high-energy Neodymium-Iron-Boron (NdFeB) magnets, which provide more torque in a smaller package with higher dynamic performance than traditional ferrite magnet designs. Due to the high torque to inertia ratio of these motors, they are ideal for applications which require high acceleration and deceleration characteristics or where the physical size of the motor is a major concern.

- Continuous Torque Range:
16.0 Lb-in (1.81 Nm) to 65.0 Lb-in (7.34 Nm)
- Peak Torque Range:
80.0 Lb-in (9.04 Nm) to 325.0 Lb-in (36.72 Nm)

FEATURES

- High-energy Neodymium-Iron-Boron (NdFeB) magnet design provides more torque in a smaller package with higher dynamic performance. (GMR series)
- Skewed armature design provides ultra smooth operation (i.e. low cogging torque) at all speeds.
- Constructed to withstand the toughest industrial environment with rugged, high performance bearings and TENV construction with IP54 sealing standard. Optional IP65 sealing is available on 3.3", 4.0", 4.9" and 6.0" frame motors.
- Various electrical windings are available as standard to suit both low and high voltage drives in order to provide optimum speed and torque characteristics. Optional custom electrical windings are available to meet virtually any requirement.
- Worldwide standard mounting configurations are available. Optional custom mounting configurations are available to meet virtually any requirement.
- Industry standard lead termination configurations. (i.e. MS connectors, fluid tight strain relief cable exit, NPT hole with flying leads and terminal boxes)
- Optional industry standard feedback devices. (i.e. high performance silver commutator tachometers, encoders and resolvers)
- Shaft keyway standard. (Contact Glentek for more options)
- Class H insulation standard.
- Optional 24VDC holding brakes are available.
- UL Recognized Components for the US and Canada in accordance with UL 1004-1.
- CE marked in accordance with EN61000-6-4:2007/A1:2011.
- RoHS compliant.

Environmental Conditions

Storage Temperature: -20°C to 70°C

Operating Temperature: Standard: -20°C to 40°C without derating, derate torque 10% per 10°C above 40°C
Special: -40°C to 40°C without derating, derate torque 10% per 10°C above 40°C

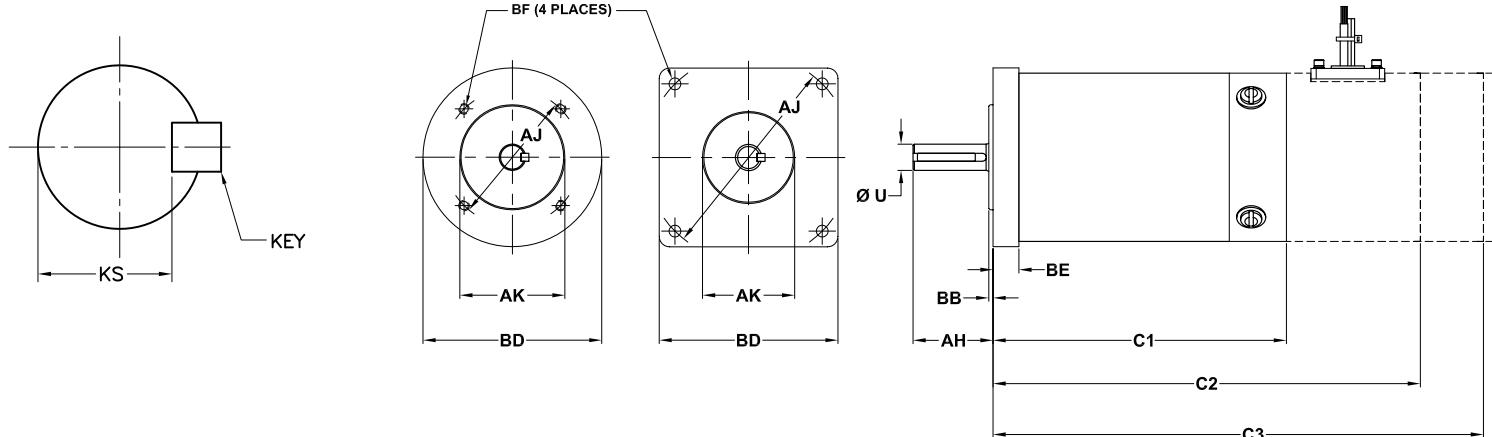
Humidity: 5% to 95% relative humidity, non-condensing

Altitude: Up to 1000m without derating, derate torque 10% per 1000m above 1000m



DC BRUSH SERVO MOTORS Dimensions

GM & GMR SERIES DIMENSIONS



Model Number	Lbs	C1		C2		C3		P	Shaft				Flange/Face				Mounting Hole		
	(Kg)	RND	SQR	RND	SQR	RND	SQR	(max)	AH	U (max)	KEY	KS	AJ	AK	BB	BD	BE (max)	BF Dia.	Tap
GM2320	3.0 (1.4)	3.69 (93.73)		5.68 (144.3)		7.04 (178.82)		2.25 (57.15)	1.00 (25.40)	0.2500 (6.35)			1.531 (38.89)	1.000 (25.40)	0.10 (2.54)	2.00 (50.80)	0.30 (7.62)	6-32 x.38	
GM2340	4.0 (1.8)	5.30 (134.62)		7.29 (185.2)		8.65 (219.71)		2.25 (57.15)	1.00 (25.40)	0.2500 (6.35)			1.531 (38.89)	1.000 (25.40)	0.10 (2.54)	2.00 (50.80)	0.30 (7.62)	6-32 x.38	
Square Flange								2.25 (57.15)	1.00 (25.40)	0.2500 (6.35)			2.625 (66.68)	1.500 (38.10)	0.10 (2.54)	2.25 (57.15)	0.30 (7.62)	0.213 (5.41)	THRU
NEMA 23								2.25 (57.15)	0.81 (20.57)	0.2500 (6.35)			2.625 (66.68)	1.500 (38.10)	0.10 (2.54)	2.25 (57.15)	0.30 (7.62)	0.213 (5.41)	THRU
GM3310	5.0 (2.3)	3.72 (94.49)	3.98 (101.09)	6.45 (163.83)	6.71 (170.43)	7.71 (195.83)	7.97 (202.44)	3.25 (82.55)	1.87 (47.50)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	2.500* (63.50)	3.000 (76.20)	0.37 (9.40)	3.25 (82.55)	0.22 (5.6)	10-32 x.50	
GM3320	7.0 (3.2)	4.34 (110.24)	4.61 (117.09)	7.07 (179.58)	7.34 (186.44)	8.33 (211.58)	8.60 (218.44)	3.25 (82.55)	1.87 (47.50)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	2.500* (63.50)	3.000 (76.20)	0.37 (9.40)	3.25 (82.55)	0.22 (5.6)	10-32 x.50	
GM3330	8.0 (3.6)	5.65 (143.51)	5.92 (150.37)	8.38 (212.85)	8.65 (219.71)	9.64 (244.86)	9.91 (251.71)	3.25 (82.55)	1.87 (47.50)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	2.500* (63.50)	3.000 (76.20)	0.37 (9.40)	3.25 (82.55)	0.22 (5.6)	10-32 x.50	
GM3340	10.0 (4.5)	6.31 (160.27)	6.57 (166.88)	9.04 (229.62)	9.30 (236.22)	10.30 (261.62)	10.56 (268.22)	3.25 (82.55)	1.87 (47.50)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	2.500* (63.50)	3.000 (76.20)	0.37 (9.40)	3.25 (82.55)	0.22 (5.6)	10-32 x.50	
GMR3340	10.0 (4.5)	5.98 (151.89)	5.88 (149.35)	8.71 (221.23)	8.61 (218.69)	9.97 (253.24)	9.87 (250.70)	3.25 (82.55)	1.87 (47.50)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	2.500* (63.50)	3.000 (76.20)	0.37 (9.40)	3.25 (82.55)	0.22 (5.6)	10-32 x.50	
Square Flange								3.25 (82.55)	1.60 (40.64)	0.5000 (12.70)	.125 SQ. X 1.00	.420- .430	3.875 (98.43)	2.875 (73.03)	0.10 (2.54)	3.25 (82.55)	0.48 (12.19)	0.220 (5.59)	THRU
NEMA 34								3.25 (82.55)	1.19 (30.23)	0.3750 (9.53)			3.875 (98.43)	2.875 (73.03)	0.10 (2.54)	3.38 (85.85)	0.48 (12.19)	0.220 (5.59)	THRU
GM4010	8.0 (3.6)	5.25 (133.35)		7.26 (184.40)		8.39 (213.11)		4.00 (101.60)	1.90 (48.26)	0.6250 (15.88)	.188 SQ. X 1.50	.507- .517	3.250 (82.55)	2.498 (63.45)	0.10 (2.54)	4.00 (101.60)	0.62 (15.7)	1/4-20 x.50	
GM4020	12.0 (5.5)	6.56 (166.62)		8.57 (217.68)		9.70 (246.38)		4.00 (101.60)	1.90 (48.26)	0.6250 (15.88)	.188 SQ. X 1.50	.507- .517	3.250 (82.55)	2.498 (63.45)	0.10 (2.54)	4.00 (101.60)	0.62 (15.7)	1/4-20 x.50	

Note: Dimensions are in **inches** (mm)

GM & GMR CONNECTORS & PINOUT INFORMATION

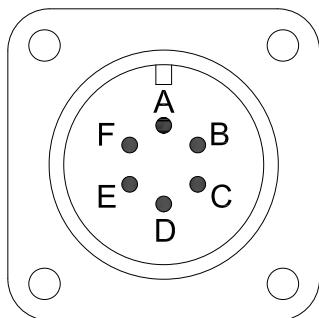
6-Pin MS Connector (Motor Power, Tachometer Feedback, Optional Brake)

For all GM and GMR motors:

6-Pin MS Connector PN: MS3102R-20-27P

Straight Mating Connector PN: MS3106F-20-27S

90 Degree Mating Connector PN: MS3108E-20-27S



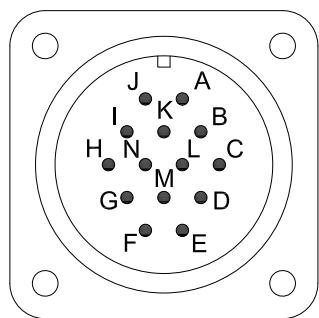
Pin #	Function - With Brake	Function - Without Brake
A	Motor +	Motor +
B	Motor -	Motor -
C	Tachometer +	Tachometer +
D	Tachometer -	Tachometer -
E	Brake +	Tachometer Cable Shield
F	Brake -	N/C

14-Pin MS Connector (Motor Power, Tachometer Feedback and Resolver or Encoder Feedback)

For all GM and GMR motors:

14-Pin MS Connector, MS3102R-20-27P

Straight Mating Connector, MS3106F-20-27S



Pin #	Function - Resolver	Function - Encoder
A	Sine +	Channel A+
B	Sine -	Channel A-
C	Cosine +	Channel B+
D	Cosine -	Channel B-
E	Excitation	Channel Z+
F	Excitation Common	Channel Z-
G	N/C	+5 VDC
H	N/C	Common
I	N/C	Cable Shield
J	Tachometer +	Tachometer +
K	Tachometer -	Tachometer -
L	Tachometer Cable Shield	Tachometer Cable Shield
M	Motor -	Motor -
N	Motor +	Motor +

Notes:

1. For all GM2300, GM3300, and GMR3300 motors:

With a positive voltage applied to the red motor lead (Pin N or A) with respect to the black motor lead (Pin P, M, or B), the motor drive shaft will turn in the clockwise direction as viewed from the shaft end.

2. For all GM4000, GMR4900, and GM6000 motors:

With a positive voltage applied to the red motor lead (Pin N or A) with respect to the black motor lead (Pin P, M, or B), the motor drive shaft will turn in the counter-clockwise direction as viewed from the shaft end.

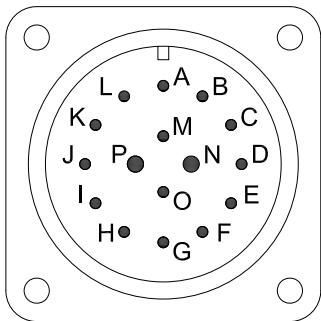
3. Non-standard connectors and pinouts available are upon request. Contact Glentek for more information.

GM & GMR CONNECTORS & PINOUT INFORMATION

16-Pin MS Connector (Motor Power, Tachometer Feedback, Brake, and Resolver or Encoder Feedback)

For all GM and GMR motors:

- 16-Pin MS Connector, MS3102R-24-07P
- Straight Mating Connector, MS3106F-24-07S
- 90 Degree Mating Connector, MS3108E-24-07S



Pin #	Function - Resolver	Function - Encoder
A	Sine +	Channel A+
B	Sine -	Channel A-
C	Cosine +	Channel B+
D	Cosine -	Channel B-
E	Excitation	Channel Z+
F	Excitation Common	Channel Z-
G	N/C	+5 VDC
H	N/C	Common
I	N/C	Cable Shield
J	Tachometer +	Tachometer +
K	Tachometer -	Tachometer -
L	Tachometer Cable Shield	Tachometer Cable Shield
M	Brake +	Brake +
N	Motor +	Motor +
O	Brake -	Brake -
P	Motor -	Motor -

Notes:

1. For all GM2300, GM3300, and GMR3300 motors:

With a positive voltage applied to the red motor lead (Pin N or A) with respect to the black motor lead (Pin P, M, or B), the motor drive shaft will turn in the clockwise direction as viewed from the shaft end.

2. For all GM4000, GMR4900, and GM6000 motors:

With a positive voltage applied to the red motor lead (Pin N or A) with respect to the black motor lead (Pin P, M, or B), the motor drive shaft will turn in the counter-clockwise direction as viewed from the shaft end.

3. Non-standard connectors and pinouts are available upon request. Contact Glentek for more information.

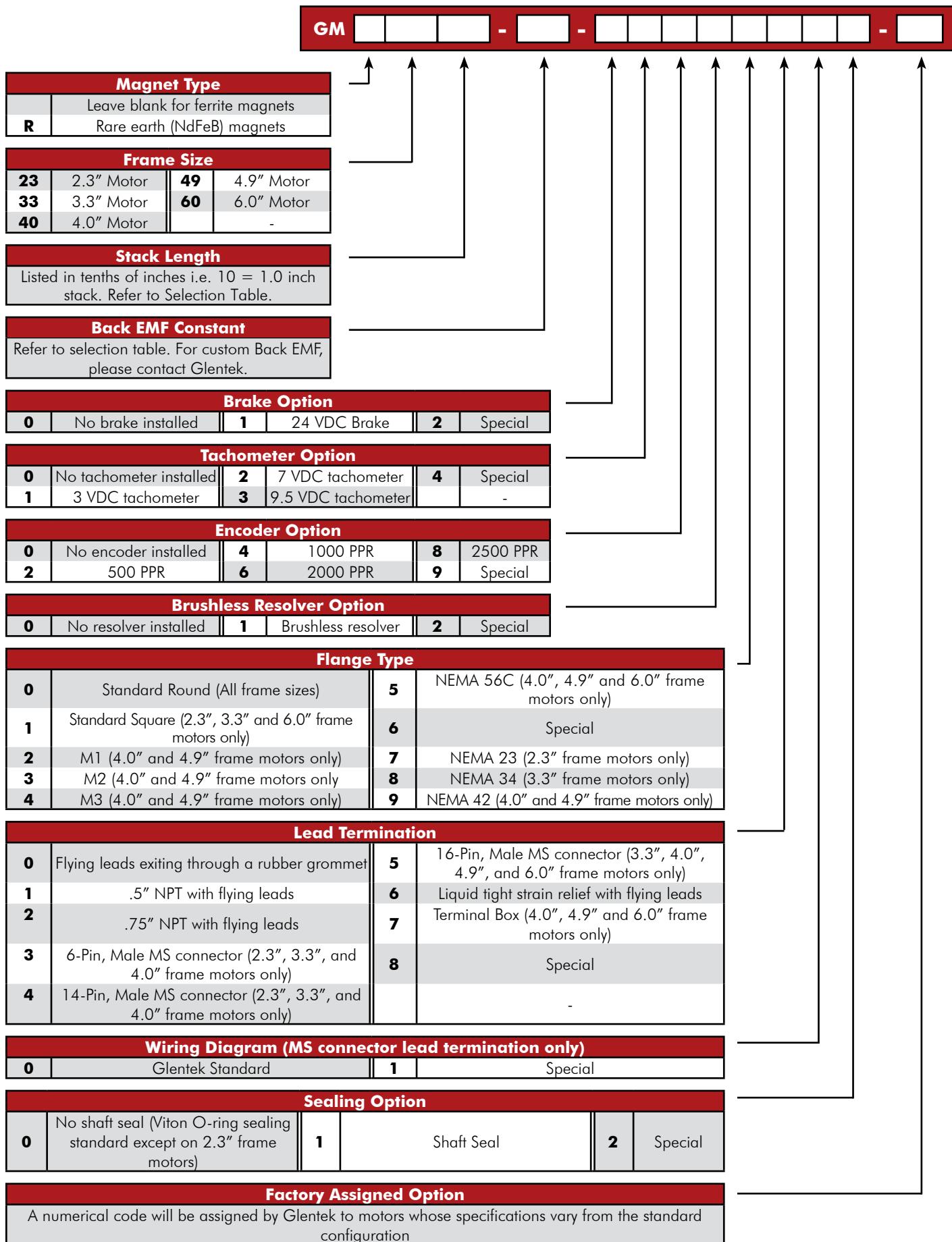
GM & GMR BRAKE INFORMATION

Model Number	Extension	Torque		Power	Current	Resistance	Inductance
	in. (mm)	Lb-in	Nm	Watts	A	Ω	mH
GM2300	1.70 (43)	18	2.0	11	0.5	52	95
GM3300	1.91 (49)	40	4.5	12	0.5	47	145
GM4000	2.44 (62)	160	18	24	1.0	24	100
GM6000	2.63 (67)	160	18	24	1.0	24	100
GMR3300	1.98 (50)	80	9.0	18	0.7	33	110
GMR4900	2.19 (56)	160	18	24	1.0	24	100

Note:

Brakes are optional. All brakes require 24 VDC input voltage. The values for "Extension" represent the nominal maximum length that the brake will add to the motor. For some models, the extension will be less. Please contact one of our sales engineers for the exact values.

GM & GMR SERIES MODEL NUMBERING





GLENTEK

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