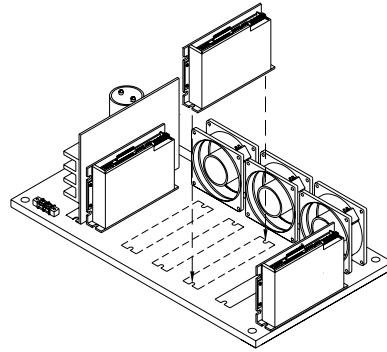
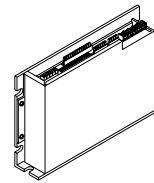


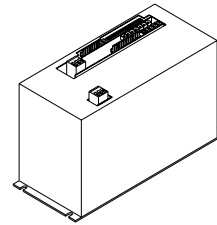
**High Performance
Single and Multi-Axis PWM
Trapezoidal, Sinusoidal or
2-Phase/3-Phase Current Mode
Brushless Servo Amplifiers
2-20 Amps, 24-340 Volts**



Multi-Axis Chassis Assembly



Single Amplifier Module



Single Axis Stand-Alone Module

Model SMA8100/8200/8300 Series

Model	Rated VDC	Rated Amps	Peak Amps	Carrier KHz	Axes Capacity
SMA81/82/8305	24-80	5/10	10/20	20	2 & 4
SMA81/82/8305	80-170	3/6	6/12	20	2 & 4
SMA81/82/8305	170-340	2/4	6/12	20	2 & 4
SMA81/82/8315	70-240	15/20	25/40	20	1 to 6
SMA81/82/8315	240-340	10/15	25/35	20	1 to 6

Description

Models SMA8105/8115 are PWM Trapezoidal brushless servo amplifiers, models SMA8205/8215 are PWM Sinusoidal brushless servo amplifiers and models SMA8305/8315 are PWM 2-Phase/3-Phase Current Mode brushless servo amplifiers. Trapezoidal configurations permit the use of Hall Effect sensors and a conventional DC Tachometer feedback while the Sinusoidal configuration utilizes Resolver feedback and the 2-Phase/3-Phase Current configuration utilizes two or three phase current input commands. All three types of amplifiers use modular construction for ease of installation and service.

For multi-axis applications 2, 4 and 6 axis baseplates are available utilizing smaller modular plug-in amplifiers and by omitting modules any number of axes may be accommodated.

A stand-alone amplifier module is available for single axis applications and offers economic advantages as well as installation simplicity and space savings.

All systems utilize Glentek's unique TORQUE-SWITCH™ technology and are the result of our more than 30 years of design and manufacturing experience.

PWM & Linear DC Servo Amplifiers

Brushless Servo Amplifiers

DC Brush Servo Motors

Brushless Servo Motors

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Features

Ergonomic design

Easy access to connections, adjustments, and test points.

Silent operation

Due to the use of a carrier frequency of 20 KHz, audible noise is eliminated.

Complete isolation

Complete isolation from input to output.

Power supply

Fused single or three-phase AC input with zero-crossing inrush current protection at turn-on. No power transformer is required.

Zero-crossing option

Optional zero-crossing detector limits inrush current at turn-on. Recommended for direct line operation (no power isolation transformer required).

Isolated or line operated AC power operation

Glentek offers a complete line of isolation power transformers to match any source. An option allows operation directly from 120VAC single or three phase, or 240VAC three-phase sources.

Regen-clamp option

Optional regeneration clamp (shunt regulator) and absorption resistor bleeds off excess DC Bus voltage when decelerating a large load inertia. Additional regeneration energy absorbing resistors can be added externally for high inertia loads. An LED indicator is provided for indication.

Trapezoidal mode operation (8100 series)

Commonly referred to as six-step, the brushless motor is commutated by hall sensors or an encoder with commutation tracks, this mode is optimum for low cost point-to-point applications where slight torque ripple is acceptable.

Sinusoidal mode operation (8200 series)

This mode requires a motor with an integrally mounted resolver. This mode is optimum when an application requires smooth low torque ripple at all speeds of operation.

2-Phase/3-phase current mode (8300 series)

Allows for either 2 or 3 phase current commands to commutate a brushless motor.

Current limit

Peak motor current is adjustable.

High-speed electronic circuit breaker

Instantly shuts down the amplifier in the event of a short across the motor leads or from a ground fault condition.

Low-speed electronic circuit breaker

Shuts down the amplifier if operated above the maximum continuous current rating for a predetermined period of time (typically 2 seconds), such as would occur when the motor is stalled.

Encoder emulation (8200 series)

Quadrature (A, B and Zero index) line driver shaft position encoder outputs are provided. These outputs can be field programmed for up to 4096 counts per revolution.

Pseudo velocity mode (8100 series)

For medium and high speed (unidirectional or bidirectional) applications, the hall effect sensor option can be used to generate a simulated tachometer voltage.

Dual signal inputs

Both inputs may be used simultaneously. One input may be configured for differential operation.

Complete LED diagnostics

Red LED's illuminate to display various fault conditions and a green LED illuminates to indicate normal operating conditions.

Multi-mode operation

The amplifier may be configured for velocity (RPM) control or current (TORQUE) control.

Programmable digital inputs

Separate logic inputs can stop the motor in either or both directions, inhibit amplifier, or reset shutdown faults. Logic inputs may be configured for active high or active low and pull-up or pull-down termination and either a +5VDC or +15VDC voltage.

Fault input/output

Open-collector output goes low in the event of a fault. This input is configured so that by externally forcing it low the amplifier will be inhibited. This allows all fault outputs in a multi-axis system to be connected together (wire-OR'd) to shut down all amplifiers should any amplifier have a fault.

Manual and external fault reset

An input is provided to reset the amplifier in the event of a fault, as well as a push button on the amplifier module itself.

Over/under voltage and over temperature

These circuits constantly monitor the amplifier power supply voltages and the motor and amplifier heat sink temperature. They will shut down the amplifier in the event of any out-of-specification condition.

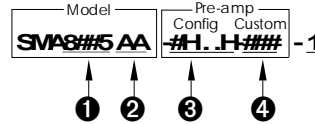
Multi-axis chassis

Up to six amplifiers (four for 8X05 series) may be mounted on a multi-axis baseplate. Baseplates include a DC power supply, cooling fan(s) and wiring for each respective amplifier module.

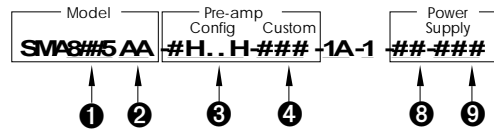
Model Numbering and Ordering Information

Most amplifier configurations are jumper or software programmable by the user, however, it is recommended that the amplifier be configured at Glentek to insure that the part number correctly reflects the actual configuration of the amplifier. The following examples show the method of constructing model numbers:

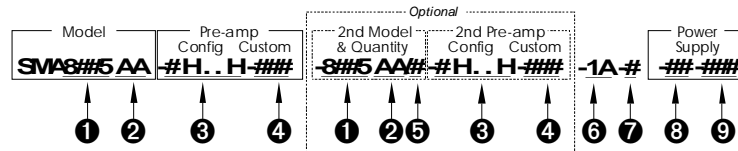
Single Amplifier Module Model Number



Stand Alone Amplifier (with Power Supply) Model Number



Multi-Axis Amplifier (and Baseplate/Power Supply) Model Number



Model Number Components

Amplifier Modules:

- Model number:
 - SMA81#5 Trapezoidal mode.
 - SMA82#5 Sinusoidal mode.
 - SMA83#5 2-Ph/3-Ph Current mode.
- Amplifier power (standard or high).
- Pre-amplifier configuration (amplifier options).
- Custom pre-amplifier (factory assigned).

Multi-axis/Stand Alone Systems:

- Quantity of amplifiers which are a different configuration from the first axis.
- Multi-axis baseplate capacity (not used with amplifier module only and "-1A" used for stand-alone amplifiers).
- Total quantity of amplifiers installed ("-1" for other than multi-axis systems).
- Power supply rating
- Custom baseplate (factory assigned)

(For exact model number details and examples, see the pages that follow)

Model Number Code Information

The amplifier configuration codes are based on the tables that follow using various designations. Factory default values (if applicable) in the selection lists are indicated by boldface type:

“Binary-to-Hexadecimal” (□) designations:

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

Example: 0011 1100 1010 0010 = 3CA2 Example: 0011 1100 1010 0010 1011 1001 0100 = 3CA2B94

Options requiring Binary-to-Hexadecimal conversions are used for some parts of the model number to conserve number length. These model number parts are labeled “(-H...H)”, and the above table should be used to convert the bit “B” sequences after they are chosen.

“Numeric” (□, □, □, □, □), “Alpha” (□), and “Alpha-numeric” (□) value designations:

Numeric model number values to be selected are indicated by “#”, and Alpha values are indicated by “A”.

Programmable Digital input (□) configuration designations:

Type “A”, normally high (pulled up), ground to disable. Type “C”, normally high (pulled up), ground to enable.
 Type “B”, normally low (pulled down), + voltage disables. Type “D”, normally low (pulled down), + voltage enables.

* For a complete description of input types “A” through “D”, see Appendix D.

Trapezoidal Mode Model Numbers	
1 Model Number:	8105 8115
2 Power rating:	AA
3 Amplifier options (Binary-to-Hex):	# --H- --H- --H-
DC bus voltage (VDC)	# - - - - -
Motor temp input	- B - - - - -
Pull up voltage	- - B - - - - -
Reset Input	- - - B B - - - - -
Inhibit input	- - - - - B B - - - - -
± limit input	- - - - - - - B B - - - - -
Analog input command	- - - - - - - - B - - - - -
Control mode	- - - - - - - - - B - - - - -
Sensor select	- - - - - - - - - - B - - - - -
Motor Reverse	- - - - - - - - - - - B
4 Custom pre-amp designation (factory set)	###
5 Quantity of amplifiers of a different configuration from the first axis:	#
6 Baseplate Capacity (Stand-alone = “-1A”) (-2A=2 axes baseplate, -4A=4 axes baseplate, -6A=6 axes baseplate)	- #A
7 Quantity of Axes installed (Stand-alone = -1)	- #
8 Power supply configuration code:	##
Stand Alone Amplifier:	##
00=110-130VAC/1ph, 01=208-240VAC/1ph	
02=110-130VAC/3ph, 03=208-240VAC/3ph, 04=Special	
Multi-axis baseplate:	##
00=110-130VAC, 01=208-240VAC, 02=Special	
9 Baseplate power supply/regen custom configuration (factory set):	-###

Sinusoidal Mode Amplifier Model Numbers

1 Model Number:	SMA8205 SMA8215	8205 8215																																
2 Power rating:	Omit = Standard, HP = High Power	AA																																
3 Amplifier options (Binary-to-Hex):	<p>DC bus voltage (VDC) 0=70-240, 1=240-340, 2=Special</p> <p>Tach reverse 1=On, 0=Off</p> <p>Motor Reverse 0=Off, 1=On</p> <p>Control mode 0=Velocity, 1=Current (torque)</p> <p>Analog input command 0=Single-ended, 1=Differential</p> <p>Motor temp input 0=A, 1=C</p> <p>Pull up voltage 0=+15VDC, 1=+5VDC</p> <p>Reset Input 00=A, 11=B, 01=C, 10=D</p> <p>Inhibit input 00=A, 11=B, 01=C, 10=D</p> <p>± limit input 00=A, 11=B, 01=C, 10=D</p> <p>Resolver options: Motor type:</p> <p>2 pole</p> <p>4 pole</p> <p>6 pole</p> <p>8 pole</p> <p>10 pole</p> <p>12 pole</p> <p>PLD device code (line count/rev):</p> <table border="0"> <tr> <td>256</td> <td>250</td> <td>128</td> <td>125</td> </tr> <tr> <td>1024</td> <td>1000</td> <td>512</td> <td>500</td> </tr> <tr> <td>4096</td> <td>4000</td> <td>2048</td> <td>2000</td> </tr> <tr> <td>3600</td> <td>2160</td> <td>720</td> <td>360</td> </tr> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> <td>625</td> </tr> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> <td>1250</td> </tr> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> <td>2500</td> </tr> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> <td>Special</td> </tr> </table> <p>Column bits: 00 01 10 11</p> <p>R/D (Resolver-to-Digital) resolution:</p> <p>10 bit</p> <p>12 bit</p> <p>14 bit</p>	256	250	128	125	1024	1000	512	500	4096	4000	2048	2000	3600	2160	720	360	N/A	N/A	N/A	625	N/A	N/A	N/A	1250	N/A	N/A	N/A	2500	N/A	N/A	N/A	Special	<p># --H- --H- --H- --H- --H- --H-</p> <p># - - - - -</p> <p>- B - - - - -</p> <p>- B - - - - -</p> <p>- B - - - - -</p> <p>- B - - - - -</p> <p>- B - - - - -</p> <p>- B B - - - - -</p> <p>- B B - - - - -</p> <p>- B B - - - - -</p> <p>- - - - - 1 1 1 1</p> <p>- - - - - 1 1 1 0</p> <p>- - - - - 1 1 0 1</p> <p>- - - - - 1 1 0 0</p> <p>- - - - - 1 0 1 1</p> <p>- - - - - 1 0 1 0</p> <p>- - - - - 0 0 0 0</p> <p>- - - - - 0 0 0 1</p> <p>- - - - - 0 0 1 0</p> <p>- - - - - 0 0 1 1</p> <p>- - - - - 0 1 0 0</p> <p>- - - - - 0 1 0 1</p> <p>- - - - - 0 1 1 0</p> <p>- - - - - 0 1 1 1</p> <p>- - - - - B B - -</p> <p>- - - - - - 0 0</p> <p>- - - - - - 0 1</p> <p>- - - - - - 1 0</p>
256	250	128	125																															
1024	1000	512	500																															
4096	4000	2048	2000																															
3600	2160	720	360																															
N/A	N/A	N/A	625																															
N/A	N/A	N/A	1250																															
N/A	N/A	N/A	2500																															
N/A	N/A	N/A	Special																															
4 Custom pre-amp designation (factory set):		###																																
5 Quantity of amplifiers of a different configuration from the first axis:		#																																
6 Baseplate Capacity (Stand-alone = "-1A"): (-2A=2 axes baseplate, -4A=4 axes baseplate, -6A=6 axes baseplate)		- #A																																
7 Quantity of Axes installed (Stand-alone = -1):		- #																																
8 Power supply configuration code:																																		
Stand Alone Amplifier:	00=110-130VAC/1ph, 01=208-240VAC/1ph 02=110-130VAC/3ph, 03=208-240VAC/3ph, 04=Special	##																																
Multi-axis baseplate:	00=110-130VAC, 01=208-240VAC, 02=Special	##																																
9 Baseplate power supply/regen custom configuration:		-###																																

(For 2-phase/3-phase current mode and model number examples, see next page)

2-Phase/3-Phase Current Mode Amplifier Model Numbers		
1	Model Number: SMA8305 SMA8315	8305 8315
2	Power rating; Omit = Standard, HP = High Power	AA
3	Amplifier options (Binary-to-Hex): DC bus voltage (VDC) 0=70-240V, 1=240-340V, 2=Special Motor Temperature 0=A, 1=C Pull up voltage 0=+15VDC, 1=+5VDC Reset Input 00=A, 11=B, 01=C, 10=D Inhibit input 00=A, 11=B, 01=C, 10=D 2/3 phase input current 0=2 phase, 1=3 phase	# --H- --H- - B - - - - - B - - - - - - B B - - - - - - - B B - - - - - - - B 0
4	Custom pre-amp designation (factory set):	###
5	Quantity of amplifiers of a different configuration from the first axis:	#
6	Baseplate Capacity (Stand alone = "-1A"): (-2A=2 axes baseplate, -4A=4 axes baseplate, -6A=6 axes baseplate)	- # A
7	Quantity of Axes installed (Stand alone = -1):	- #
8	Power supply configuration code: Stand Alone Amplifier: 00=110-130VAC/1ph, 01=208-240VAC/1ph 02=110-130VAC/3ph, 03=208-240VAC/3ph, 04=Special Multi-axis baseplate: 00=110-130VAC, 01=208-240VAC, 02=Special	## ##
9	Baseplate power supply/regen custom configuration (factory set):	###

Single Amplifier Module example: SMA8115-0000-1
 Trapezoidal mode, 70-240VDC bus, single amplifier module, standard power, and all other configurations set to default.

Stand Alone Amplifier example: SMA8215HP-1000E22-1A-1-01
 208-240VAC single phase stand-alone module, high power, tach reverse on, 4-pole motor, 4096 line count, 14 bit resolution, and all other amplifier configurations set as defaults.

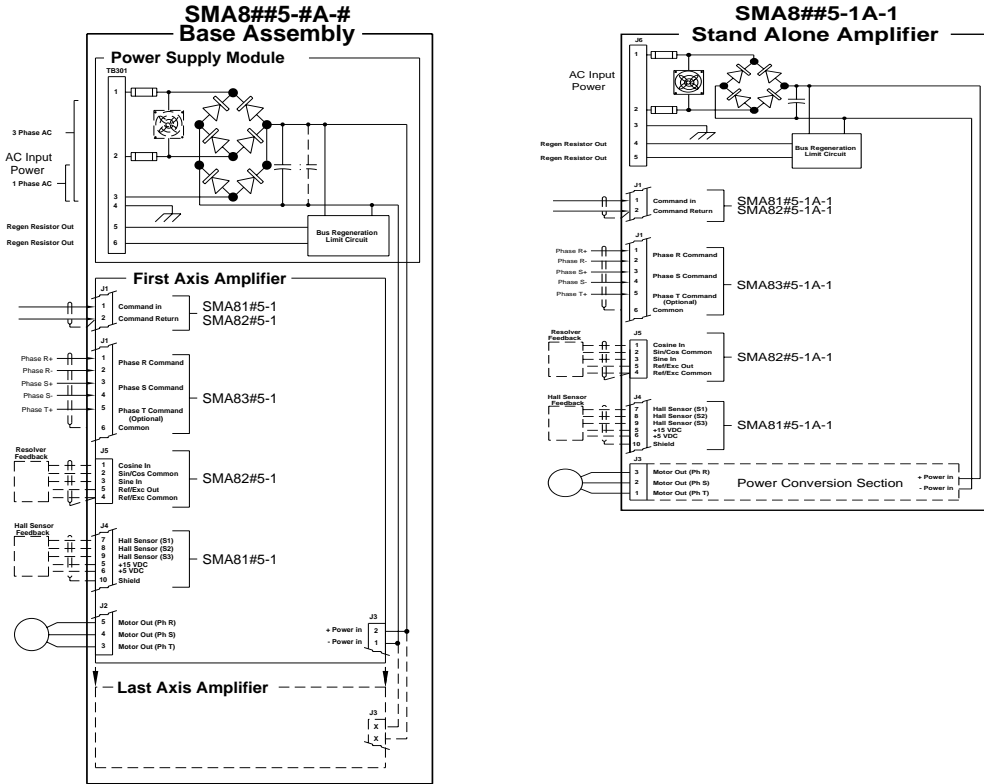
Three Axis System example: SMA8215HP-1000E22-2A-2-01
 208-240VAC single phase 2 axis baseplate with two amplifier modules installed. Both amplifiers are high power, tach reverse on, 4-pole motor, 4096 line count, 14 bit resolution, and all other amplifier configurations set as defaults.

Notes:

1. See configuration table above and on preceding pages for model number coding.
2. When only one type of amplifier is used on the multi-axis baseplate, the "Optional" part of the model number is omitted. If there are more than two types of amplifier modules on the baseplate, the "Optional" part of the model number will be repeated for each amplifier type.

Baseplate and basic wiring details

Note: These circuits are functional equivalent descriptions to the actual circuits and are only provided to demonstrate typical interface methods. For a more detailed schematic, the Operation and Service Manual should be used or factory assistance requested.



Baseplate/Module Assembly Specifications				
Output power (Amps, RMS):	Standard Power	High Power		
SMA8#05 series:	Rated	(Peak)	Rated	(Peak)
24-80 VDC input voltage	5	10	10	20
80-170 VDC input voltage	3	6	6	12
170-340 VDC input voltage	2	6	4	12
SMA8#15 series:				
70-240 VDC input voltage	15	25	20	40
240-340 VDC input voltage	10	25	15	35
Form factor				1.01
Carrier frequency				20 KHz
Mechanical Specifications				
Operating Temperature:	32°-122°F (0°-50°C)			
Storage Temperature:	-40°-176°F (-40°-80°C)			
Relative Humidity:	5-95% noncondensing.			

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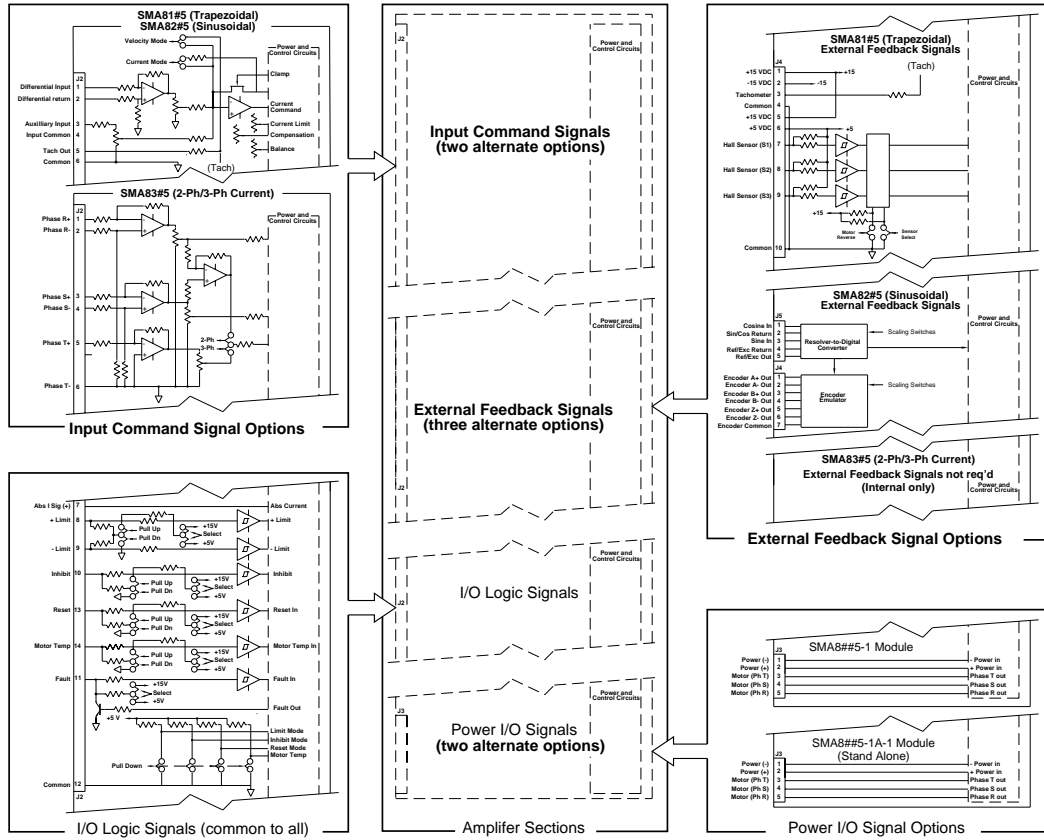
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Appendix

SMA8000 SERIES

Amplifier module schematics (typical)

Note: These circuits are functional equivalent descriptions to the actual circuits and are only provided to demonstrate typical interface methods. For a more detailed schematic, the Operation and Service Manual should be used or factory assistance requested.



Signal Inputs	Volts	Impedance	Gain
Signal Input:	+ 13V max.	10K ohms min.	5KAV
Tachometer Input:	90V max.	10K ohms min.	7KAV
Drift (referenced to input):		0.01mV/°C max.	
Frequency response:		750Hz min.	
Dead band:		None.	
Limits:		± 50V maximum. Terminated by 10K ohms.	
Fault (as input):		± 40V/-5V maximum. Terminated by 10K ohms.	
Reset:		± 25V/-10V maximum. Terminated by 10K ohms.	
Typical for all digital inputs		Input thresholds are + 10V.	
Signal Outputs			
SMA8#05 Current Sense		1 volt per 5 amps of motor current	
SMA8#15 Current Sense		1 volt per 10 amps of motor current	
Fault (as output):		Open-collector output sink, 150mA maximum (10 ohms minimum load)	

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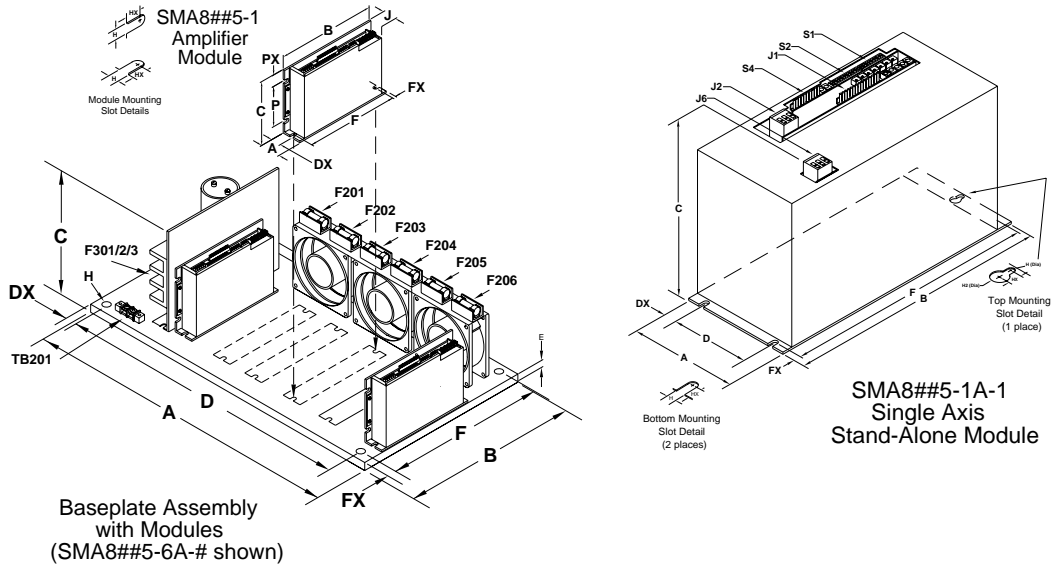
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Model	Amplifier Module Only								Lbs (Kg)
	Dimensions, Inches (Millimeters)								
	A	B	C	DX	H	HX	P	PX	
SMA8#15-1	1.38 (35.1)	7.13 (181.0)	4.53 (115.1)	0.69 (17.5)	0.19 (4.8)	0.19 (4.8)	3.25 (82.6)	0.546 (13.9)	1.28 (0.6)
SMA8#05-1	1.38 (34.9)	4.75 (120.7)	4.50 (114.3)	0.78 (19.7)	0.27 (6.8)	0.13 (3.2)	3.25 (82.6)	0.550 (14.0)	1.0 (0.5)



Model	Baseplate/Stand Alone Assemblies (Complete with Modules)									Lbs (Kg)
	Dimensions, Inches (Millimeters)									
	A	B	C	D	DX	E	F	FX	H	
SMA8#05-2A-1	6.25 (158.8)	6.75 (171.5)	6.50 (165.1)	5.50 (139.7)	0.38 (9.5)	0.50 (12.7)	6.00 (152.4)	0.38 (9.5)	0.213 (5.4)	CF
SMA8#05-2A-2	6.25 (158.8)	6.75 (171.5)	6.50 (165.1)	5.50 (139.7)	0.38 (9.5)	0.50 (12.7)	6.00 (152.4)	0.38 (9.5)	0.213 (5.4)	CF
SMA8#05-4A-3	11.00 (279.4)	6.75 (171.5)	6.50 (165.1)	10.25 (260.4)	0.38 (9.5)	0.50 (12.7)	6.00 (152.4)	0.38 (9.5)	0.213 (5.4)	CF
SMA8#05-4A-4	11.00 (279.4)	6.75 (171.5)	6.50 (165.1)	10.25 (260.4)	0.38 (9.5)	0.50 (12.7)	6.00 (152.4)	0.38 (9.5)	0.213 (5.4)	CF
SMA8#15-1A-1	3.73 (94.6)	9.03 (229.2)	4.96 (126.0)	2.73 (69.2)	0.50 (12.7)	0.10 (2.5)	8.70 (221.0)	0.19 (4.7)	0.19 (4.8)	5.3 (2.4)
SMA8#15-2A-1	9.00 (228.6)	10.50 (266.7)	7.70 (195.6)	8.25 (209.6)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.19 (4.8)	0.266 (6.8)	8.1 (3.7)
SMA8#15-2A-2	9.00 (228.6)	10.50 (266.7)	7.70 (195.6)	8.25 (209.6)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.38 (9.5)	0.266 (6.8)	9.4 (4.2)
SMA8#15-4A-3	13.00 (330.2)	10.50 (266.7)	7.70 (195.6)	12.26 (311.4)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.38 (9.5)	0.266 (6.8)	13.8 (6.3)
SMA8#15-4A-4	13.00 (330.2)	10.50 (266.7)	7.70 (195.6)	12.26 (311.4)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.38 (9.5)	0.266 (6.8)	15.1 (6.9)
SMA8#15-6A-5	16.50 (419.1)	10.50 (266.7)	7.70 (195.6)	15.76 (400.3)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.38 (9.5)	0.266 (6.8)	18.6 (8.4)
SMA8#15-6A-6	16.50 (419.1)	10.50 (266.7)	7.70 (195.6)	15.76 (400.3)	0.38 (9.5)	0.50 (12.7)	9.75 (247.7)	0.38 (9.5)	0.266 (6.8)	19.9 (9.0)

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