

## Part Number Guide



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### Amplifier: SGDH - 15 A E - □

SGDH Amplifier

Rated Output\*

A3, A5, 01, 02, 04, 05, 08, 10,  
15, 20, 30, 50, 60, 75, 1A, 1E

Power Supply Voltage

A: 200V, B: 100V, D: 400V

Model

E: Speed, Torque, & Position Control

Single Phase Option

S: Single Phase Option (For sizes 08 and 15 only)



\* Power rating of the amplifier should match the motor power rating. An amplifier with power rating one step up or down may also be used. Use of the smaller amplifier will decrease motor performance.

**NOTES**

- Sizes A3, A5, 01, 02 available in 1-phase: 100V or 200V only.
- Size 04 available in 1-phase: 200V only.
- Sizes 08 and 15 available in 1-phase or 3-phase: 200V only.
- Sizes 05, 10, 20, 30, 50, 60, 75, 1A, 1E available in 3-phase: 200V or 400V.

### Motor: SGMGH - 09 A C A 6 C

Sigma II Servomotor type

**SGMAH:** 30W-750W  
3000/5000rpm  
IP55

**SGMGH:** 0.5kW-15kW  
1500/3000rpm  
IP67

**SGMPH:** 100W-1500W  
3000/5000rpm  
IP67

**SGMSH:** 1.0kW-5.0kW  
3000/5000rpm  
IP67

**SGMUH:** 1.0kW-3.0kW  
3000/6000rpm  
IP67

Power Rating

**A3:** 30W (0.04 hp) -AH  
**A5:** 50W (0.07 hp) -AH  
**01:** 100W (0.13 hp) -AH, -PH  
**02:** 200W (0.25 hp) -AH, -PH  
**04:** 400W (0.5 hp) -AH, -PH  
**05:** 500W (0.7 hp) -GH  
**08:** 750W (1.0 hp) -AH, -PH  
**09:** 850W (1.14 hp) -GH  
**10:** 1.0 kW (1.3 hp) -SH, -UH  
**13:** 1.3kW (1.7 hp) -GH

**15:** 1.5kW (2.0 hp) -PH, -SH  
**20:** 2.0kW (2.7 hp) -GH, -SH  
**30:** 3.0kW (4.0 hp) -GH, -SH, -UH  
**40:** 4.0 kW (5.4 hp) -SH  
**44:** 4.4kW (6.0 hp) -GH  
**50:** 5.0kW (6.7 hp) -SH  
**55:** 5.5kW (7.5 hp) -GH  
**75:** 7.5kW (10 hp) -GH  
**1A:** 11kW (15 hp) -GH  
**1E:** 15kW (20 hp) -GH

Accessories

**1:** Standard -AH, -GH, -SH, -UH  
**C:** 24VDC Brake -AH, -GH, -SH, -UH  
**S:** Shaft Seal -AH, -GH, -SH, -UH  
**E:** Brake & Shaft Seal -AH, -GH, -SH, -UH  
**1D:** Standard, -PH  
**CD:** 24VDC Brake, -PH  
**SD:** Shaft Seal, -PH  
**ED:** Brake & Shaft Seal, -PH

Shaft

**2:** Straight Shaft w/o keyway -AH  
**4:** Straight Shaft w/ keyway -AH, -PH  
**6:** Straight Shaft w/ keyway -GH, -SH, -UH

Encoder

**A:** 13-Bit (2048x4) Incremental -AH, -PH  
**C:** 17-Bit (32,768x4) Incremental -GH, -SH, -UH  
**1:** 16-Bit (16,384x4) Absolute -AH, -PH  
**2:** 17-Bit (32,768x4) Absolute -GH, -SH, -UH

Power Supply

**A:** 200V -AH, -PH, -GH, -SH  
**B:** 100V -AH (200W and under), -PH (200W and under)  
**D:** 400V -GH, -SH, -UH

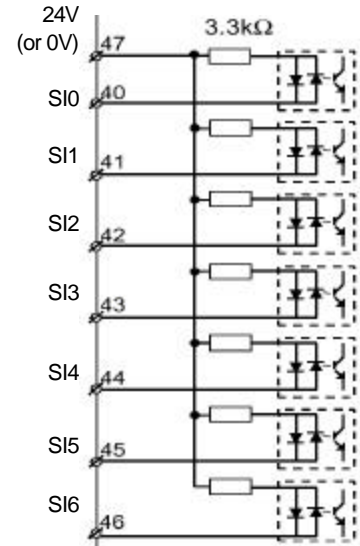
Rated Speed

**A:** 1500rpm -GH  
**A:** 3000rpm -SH, -UH  
**F:** Standard Revision Level -AH  
**H:** Standard Revision Level -PH

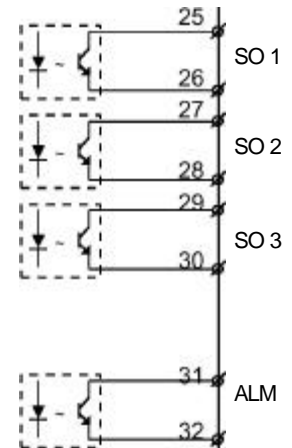
## I/O: CN1 Terminal Layout

Terminal	Symbol	Description	Reference
CN1-1	SG	Signal Ground	-
CN1-2	SG	Signal Ground for SEN input (CN1-4)	-
CN1-3	PL1	+12V supply for open collector input PULS (CN1-7)	5.2.2
CN1-4	SEN	Initial data request input signal for absolute encoder	5.7.1
CN1-5	V-REF	Speed Reference Input. Range: ±12V. Scale: <b>Pn300</b> . Usage: <b>Pn002.1, Pn207.1</b>	5.2.1
CN1-6	SG	Signal Ground for Speed Reference Input V-REF (CN1-5)	-
CN1-7	PULS	Position Reference Input "Pulse"	5.2.2
CN1-8	/PULS		
CN1-9	T-REF	Torque Reference Input. Range: ±12V Scale: <b>Pn400</b> . Usage: <b>Pn002.0</b>	5.2.1
CN1-10	SG	Signal Ground for Torque Reference Input T-REF (CN1-9)	-
CN1-11	SIGN	Position Reference Input "Sign"	5.2.2
CN1-12	/SIGN		
CN1-13	PL2	+12V supply for open collector input SIGN (CN1-11)	5.2.2
CN1-14	/CLR	Clear error counter in position control. Options: <b>Pn200.1,2</b>	5.2.2
CN1-15	CLR		
CN1-16	-	Not Used	-
CN1-17	-	Not Used	-
CN1-18	PL3	+12V supply for open collector input CLR (CN1-14)	5.2.2
CN1-19	PCO	Phase C Encoder Output	5.2.3
CN1-20	/PCO		
CN1-21	BAT (+)	Absolute Encoder Battery Terminals	5.7.3
CN1-22	BAT (-)		
CN1-23	-	Not Used	-
CN1-24	-	Not Used	-
CN1-25	SO1 (+)	Selectable Output 1. Default: /COIN (Pn50E.0) <i>in position control</i> Default /V-CMP (Pn50E.1) <i>velocity control</i>	5.3.4
CN1-26	SO1 (-)		
CN1-27	SO2 (+)	Selectable Output 2. Default: /TGON (Pn50E.2)	5.3.4
CN1-28	SO2(-)		
CN1-29	SO3 (+)	Selectable Output 3. Default: /S-RDY (Pn50E.3)	5.3.4
CN1-30	SO3 (-)		
CN1-31	ALM (+)	Alarm Output. Normally ON (Closed). Configure: <b>Pn001.3</b>	5.5.1
CN1-32	ALM (-)		
CN1-33	PAO	Phase-A Encoder Output. Scale: <b>Pn201</b> (PG Dividing Ratio)	5.2.3
CN1-34	/PAO		
CN1-35	PBO	Phase-B Encoder Output. Scale: <b>Pn201</b> (PG Dividing Ratio)	5.2.3
CN1-36	/PBO		
CN1-37	AL01	3-bit Alarm Code Output. Configure: <b>Pn001.3</b> (Warning Code Output Selection)	5.5.1
CN1-38	AL02		
CN1-39	AL03		
CN1-40	SI0	Selectable Input 0. Default: /S-ON (Pn50A.1) Selectable Input 1. Default: /P-CON (Pn50A.2) Selectable Input 2. Default: /P-OT (Pn50A.3) Selectable Input 3. Default: /N-OT (Pn50B.0) Selectable Input 4. Default: /ALM-RST (Pn50B.1) Selectable Input 5. Default: /P-CL (Pn50B.2) Selectable Input 6. Default: /N-CL (Pn50B.3)	5.3.3
CN1-41	SI1		
CN1-42	SI2		
CN1-43	SI3		
CN1-44	SI4		
CN1-45	SI5		
CN1-46	SI6		
CN1-47	+24V IN	Selectable Input Common (24V or 0V)	5.2.4
CN1-48	PSO	Phase S Output; absolute encoder serial output	5.2.3
CN1-49	/PSO		
CN1-50	-	Not Used	-

### Selectable Inputs



### Outputs



7-15 mA max through each input.  
50 mA max through each output.  
I/O circuits shown in sec 3.4 (p.3-13)

If *current is flowing* through an input or output, the logic state is **LOW**.

\* Names of I/O signals that are "ACTIVE LOW" are preceded by a '/'.  
ex. P-OT, N-OT

If *no current is flowing*, or the I/O is not connected, the logic state is **HIGH**.

\* Names of I/O signals that are "ACTIVE HIGH" are not preceded by a '/'.  
ex. P-OT, N-OT

### Analog Output Monitor (Terminals under battery cover)

Configure using **Pn003.0, Pn003.1, Fn00C, Fn00D**

Input Signal Allocation Mode						
Parameter	Nibble	Name	Default Setting	Ref.	Setting	Description
Pn50A	0	Input Signal Allocation Mode <b>*Pn50A.0=1</b> <b>MUST be set for user-defined inputs to take effect*</b>	0	5.3.3	0	Allocate input signals according to SDGB defaults.
					1	Allocate input signals according to user-defined parameter settings.

Input Signal Selection						
Parameter	Nibble	Name	Default Setting	Ref.	Setting	Description
Pn50A	1	<b>/S-ON</b> (Servo On) Servo Off Mode: <b>Pn001.0</b>	<b>0:</b> SI0	5.5.2	0	Assign to <b>SI0</b> at CN1-40
	2	<b>/P-CON</b> (Proportional Control) Also See <b>Pn10B.0</b>	<b>1:</b> SI1	5.2.1	1	Assign to <b>SI1</b> at CN1-41
	3	<b>P-OT</b> (Positive Overtravel prohibited) <b>Normally ON.</b> Overtravel Stop Mode set in <b>Pn001.1</b>	<b>2:</b> SI2	5.1.2	2	Assign to <b>SI2</b> at CN1-42
Pn50B	0	<b>N-OT</b> (Negative Overtravel prohibited) <b>Normally ON.</b> Overtravel Stop Mode set in <b>Pn001.1</b>	<b>3:</b> SI3	5.1.2	3	Assign to <b>SI3</b> at CN1-43
	1	<b>/ALM-RST</b> (Alarm Reset)	<b>4:</b> SI4	5.5.1	4	Assign to <b>SI4</b> at CN1-44
	2	<b>/P-CL</b> (Positive Current Limit) Set in <b>Pn404</b>	<b>5:</b> SI5	5.1.3	5	Assign to <b>SI5</b> at CN1-45
	3	<b>/N-CL</b> (Negative Current Limit) Set in <b>Pn405</b>	<b>6:</b> SI6	5.1.3	6	Assign to <b>SI6</b> at CN1-46
Pn50C	0	<b>/SPD-D</b> (Contact Speed DIRECTION)	<b>8:</b> OFF	5.2.6	7	Mask <b>ON</b>
	1	<b>/SPD-A</b> (Contact Speed SWITCH A) Speeds Set In <b>Pn301, Pn302, Pn303</b>	<b>8:</b> OFF	5.2.6	8	Mask <b>OFF</b>
	2	<b>/SPD-B</b> (Contact Speed SWITCH B) Speeds Set In <b>Pn301, Pn302, Pn303</b>	<b>8:</b> OFF	5.2.6	9	Assign to <b>SI0</b> at CN1-40 INVERTED
	3	<b>/C-SEL</b> (Control Mode Select) Set in <b>Pn000.1</b> Select secondary mode when ON	<b>8:</b> OFF	-	A	Assign to <b>SI1</b> at CN1-41 INVERTED
Pn50D	0	<b>/ZCLAMP</b> (Zero Clamp) Hold position when commanded below RPM level set in <b>Pn501</b>	<b>8:</b> OFF	5.4.3	B	Assign to <b>SI2</b> at CN1-42 INVERTED
	1	<b>/INHIBIT</b> (Ignore Pulse Reference Input)	<b>8:</b> OFF	5.2.10	C	Assign to <b>SI3</b> at CN1-43 INVERTED
	2	<b>/G-SEL</b> (Gain Select) Set: <b>Pn104, Pn105, Pn106</b>	<b>8:</b> OFF	-	D	Assign to <b>SI4</b> at CN1-44 INVERTED
	3	(Reserved)	<b>8:</b> OFF	-	E	Assign to <b>SI5</b> at CN1-45 INVERTED
					F	Assign to <b>SI6</b> at CN1-46 INVERTED

**NOTES:**

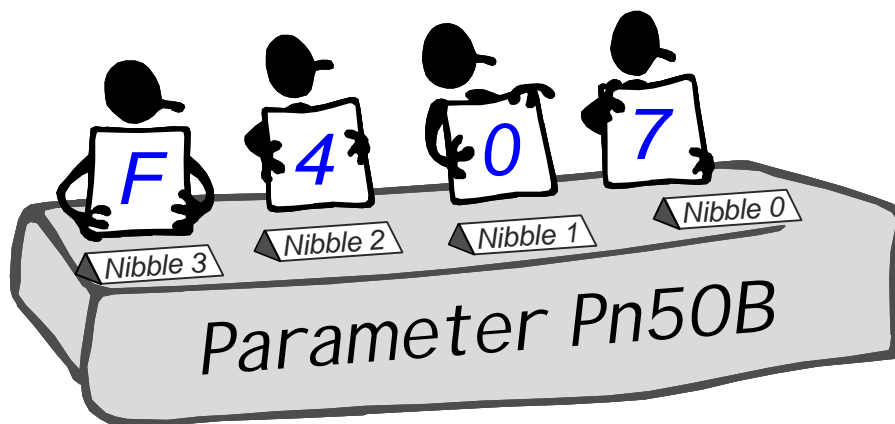
- Pn50A.0=1 MUST be set for user-defined inputs to take effect.  
*Exception: /S-ON may be masked on (Pn50A.1=7) and P-OT and N-OT may be disabled (Pn50A.3=8, Pn50B.0=8) without setting Pn50A.0=1.*
- Cycle control power for input changes to take effect
- Mask OFF the default input signal mapping when assigning new inputs.  
*Multiple input signal selections can be assigned to the same input terminals (Uses AND logic).*
- To disable overtravel inputs, set Pn50A.3=8 (P-OT off), Pn50B.0=8 (N-OT off).
- An amplifier alarm may be reset (1) using /ALM-RST input, (2) through software, (3) by pressing the UP and DOWN arrows simultaneously on built-in digital operator (4) by cycling control power.

Output Signal Selection						
Parameter	Nibble	Name	Default	Ref.	Setting	Description
Pn50E	0	<b>/COIN</b> (Position Coincidence) Motor position within range set in <b>Pn500</b> . Active only in Position Control	1: SO1	5.5.3	0	Disabled
	1	<b>/V-CMP</b> (Velocity Comparison) Motor speed within range set in <b>Pn50E</b> . Active only in Speed Control	1: SO1	5.5.4	1	Assign to SO1 at CN1-25,26
	2	<b>/TGON</b> (Tach Generator On) Motor speed above level set in <b>Pn502</b>	2: SO2	5.5.5		
	3	<b>/S-RDY</b> Servo Ready (Drive ready to receive /S-ON signal)	3: SO3	5.5.6		
Pn50F	0	<b>/CLT</b> (Current Limit reached) Limits Set In <b>Pn402, Pn403, Pn404, Pn405, Pn002.0</b>	0	5.1.3	2	Assign to SO2 at CN1-27,28
	1	<b>/VLT</b> (Velocity Limit reached) Limit Set In <b>Pn407</b>	0	5.2.7		
	2	<b>/BK</b> (Brake) Activate brake relay. Configure: <b>Pn506, Pn507, Pn508</b>	0	5.4.4		
	3	<b>/WARN</b> (Warning) Current approaching overload level	0	5.5.7		
Pn510	0	<b>/NEAR</b> (Near Position) Motor position within range set in <b>Pn504</b>	0	5.5.8	3	Assign to SO3 at CN1-29,30
	1	Reserved	0	-		
	2	Not Used	0	-		
	3	Not Used	0	-		

Output Signal Inversion						
Parameter	Nibble	Name	Default	Ref.	Setting	Description
Pn512	0	<b>Invert Output Signal on SO-1</b>	0: Not Inverted	5.3.4	0	Not Inverted
	1	<b>Invert Output Signal on SO-2</b>				
	2	<b>Invert Output Signal on SO-3</b>				
	3	Not Used	0	-	1	Inverted

**NOTES:**

1. Cycle control power for output changes to take effect
2. Mask OFF the default output signal mapping for when assigning new outputs  
*Multiple output signal selections can be assigned to the same output terminals (Uses OR logic).*



Adjustment-Type Parameters						
Category	Pn No.	Description	Unit	Setting Range	Factory Default	Manual Ref.
Gain	Pn100	Speed Loop Gain	Hz	1-2000	40	6.2.1
	Pn101	Speed Loop Integral Time Constant	0.01 ms	15-51200	2000	6.2.1
	Pn102	Position Loop Gain	1/s	1-2000	40	6.2.1
	Pn103	Inertia Ratio. See <b>Fn007, Pn110.0</b>	%	0-10000	0	6.2.1, 6.3.3
	Pn104	2nd Speed Loop Gain	Hz	1-2000	40	-
	Pn105	2nd Speed Loop Integral Time Constant	0.01 ms	15-51200	2000	-
	Pn106	2nd Position Loop Gain	1/s	1-2000	40	-
	Pn107	Position Bias Gain	rpm	0-450	0	6.2.4
	Pn108	Position Bias Gain Activation Level	ref units	0-250	7	6.2.4
	Pn109	Position Feed-Forward Gain	%	0-100	0	6.2.2, 6.4.3
	Pn10A	Feed-Forward Delay Filter Time Constant	0.01 ms	0-6400	0	5.2.5, 6.4.3
	Pn10C	Mode Switch Torque Reference Level	%	0-800	200	6.2.5
	Pn10D	Mode Switch Speed Reference Level	rpm	0-10000	0	6.2.5
	Pn10E	Mode Switch Acceleration Level	10 rpm/s	0-3000	0	6.2.5
Pn10F	Mode Switch Error Pulse Level	ref units	0-10000	0	6.2.5	
Pn111	Speed Feedback Compensation. Activate: <b>Pn110.1=1</b>	%	1-500	100	6.2.6	
Position*	Pn201	PG Divider: Number of PRE-QUAD pulses/rev on encoder outputs PAO and PBO (CN1-33,34 and CN1-35,36)	p/r	16-16384	16384	5.2.3
	Pn202	Electronic Gear Ratio (encoder feedback pulses)	-	1-65535	4	5.2.5
	Pn203	Electronic Gear Ratio (command pulses)	-	1-65535	1	5.2.5
	Pn204	Accel/Decel Filter Time Constant. Select: <b>Pn207.0=0</b>	0.01 ms	0-6400	0	6.1.2
	Pn205	Multi-turn Limit Setting ** see NOTE 2	rev	0-65535	65535	5.7.2
	Pn208	Average Movement Filter Time Constant. Select: <b>Pn207.0=1</b>	0.01 ms	6-6400	0	6.1.2
Speed	Pn300	Speed Reference Input Scaling (V-REF: CN1-5,6)	0.01V / rated speed	150-3000	600	5.2.1
	Pn301	Contact Speed 1	rpm	0-10000	100	5.2.6
	Pn302	Contact Speed 2	rpm	0-10000	200	5.2.6
	Pn303	Contact Speed 3	rpm	0-10000	300	5.2.6
	Pn304	Jog Speed. Jog: <b>Fn002</b>	rpm	0-10000	500	5.3.2
	Pn305	Soft Start Acceleration Time (0 to specified max motor rpm)	ms	0-10000	0	6.1.1
	Pn306	Soft Start Deceleration Time (specified max motor rpm to 0)	ms	0-10000	0	6.1.1
	Pn307	Speed Reference Filter Time Constant	0.01 ms	0-65535	40	-
	Pn308	Speed Feedback Filter Time Constant	0.01 ms	0-65535	0	6.2.6
Torque	Pn400	Torque Reference Input Scaling (T-REF: CN1-9,10)	0.1 V / rated torque	10-100	30	5.2.7
	Pn401	Torque Reference Filter Time Constant	0.01 ms	0-65535	100	6.1.5
	Pn402	Forward Internal Torque Limit (always active)	%	0-800	800	5.1.3
	Pn403	Reverse Internal Torque Limit (always active)	%	0-800	800	5.1.3
	Pn404	Forward External Torque Limit. Activate with /P-CL: <b>Pn50B.2</b>	%	0-800	100	5.1.3
	Pn405	Reverse External Torque Limit. Activate with /N-CL: <b>Pn50B.3</b>	%	0-800	100	5.1.3
	Pn406	Overtravel Stop Torque. See <b>Pn001.1</b>	%	0-800	800	5.1.2
	Pn407	Speed Limit during Torque Control	rpm	0-10000	10000	5.2.7
	Pn409	Notch Filter Frequency. Select: <b>Pn408</b>	Hz	50-2000	2000	6.1.6
I/O	Pn500	Width for /COIN ( <b>Pn50E.1</b> ) Output Signal	ref units	0-250	7	5.5.3
	Pn501	Threshold for /ZCLAMP ( <b>Pn50D.0</b> ) Input Signal	rpm	0-10000	10	5.4.3
	Pn502	Level for /TGON ( <b>Pn50E.2</b> ) Output Signal	rpm	1-10000	20	5.5.5
	Pn503	Level for /V-CMP ( <b>Pn50E.1</b> ) Output Signal	rpm	0-100	10	5.5.4
	Pn504	Width for NEAR ( <b>Pn510.0</b> ) Output Signal	ref units	1-250	7	5.5.8
	Pn505	Position Error Overflow Level	256 pulses	1-32767	1024	6.2.1
	Pn506	Brake Output Delay Time at servo off	10 ms	0-50	0	5.4.4
	Pn507	Brake Output Speed Threshold (Servo off when moving)	rpm	0-10000	100	5.4.4
	Pn508	Brake Output Max Delay Time (Servo off when moving)	10 ms	10-100	50	5.4.4
Pn509	Momentary Hold Time During Power Loss	ms	20-1000	20	5.5.9	
Regen	Pn600	Regeneration Power Produced ** See NOTE 3	10 W	0-capacity	0	5.6.1

## NOTES

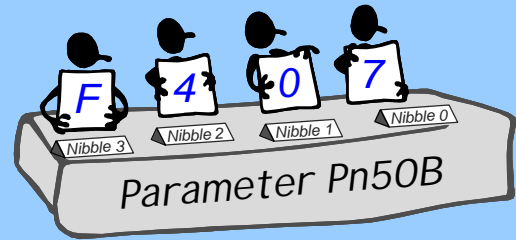
- Cycle power for position parameter changes to take effect.
- Pn205: multi-turn limit.
  - The default value (Pn205=65535) means the limit is +32767 to -32768 turns before it rolls over to 0.
  - The multi-turn limit is valid only when Pn002.2=2 (Absolute Encoder Usage set to use multi-turn limit setting in Pn205).
  - If Pn002.2 is not set to 2, the default multi-turn limit value will be used (Pn205=65535), even if Pn205 is changed.
  - There is no need to change Pn205 except in special cases, so do not change it unless necessary.
  - If Pn205 is changed, use Fn013 to send the new multi-turn limit to the encoder.
- Pn600: Regen Power Produced. The maximum regen capacity is the same as the maximum power output capacity of the amplifier.

## Selection-Type Parameters (Switches)

Parameter	Nibble	Setting	Description
<b>Pn000</b> Function Selection Basic Switches	0	<b>Direction Selection default=0 sec 5.1.1</b>	
		0	Sets CCW as forward
	1	1	Sets CW as forward
		<b>Control Method Selection default=0 sec 5.3.5</b>	
		0	Speed Control (analog reference)
		1	Position Control (pulse train reference)
		2	Torque Control (analog reference)
		3	Contact Speed Control (contact reference)
		4	Contact Speed Control / Speed Control
		5	Contact Speed Control/ Position Control
		6	Contact Speed Control / Torque Control
		7	Position Control / Speed Control
8	Position Control / Torque Control		
9	Torque Control / Speed Control		
A	Speed Control with /ZCLAMP input		
B	Position Control with /INHIBIT input		
<div style="border: 1px solid black; padding: 5px;"> <b>Automatic input mapping when using SGDB defaults (Pn50A.0=0 default)</b>                      * For Pn000.1=3-6: (Contact Speed Control)                      SI1=/SPD-D, SI5=/SPD-A, SI6=/SPD-B (Control mode automatically switches when /SPD-A and /SPD-B are both OFF)                      * For Pn000.1=7-9: SI1=/C-SEL                      * For Pn000.1=A: SI1=/ZCLAMP                      * For Pn000.1=B: SI1=/INHIBIT                 </div>			
2	<b>Axis Address default=0</b>		
	0-F	Sets servo amplifier axis address.	
3	-	Reserved. Default setting =0	
<b>Pn001</b> Function Selection Application Switches	0	<b>Servo OFF or Alarm Stop Mode default=0 sec 5.4.2</b>	
		0	Stops the motor by applying DB (DB = Dynamic Brake)
		1	Stops the motor by applying DB and then releases DB (coasting state).
	1	2	Coasts to a stop without using DB
		<b>Overtravel Stop Mode default=0 sec 5.1.2</b> Overtravel Inputs: P-OT (Pn50A.3), N-OT (Pn50B.0)	
		0	Stops the motor by applying DB and then releases DB (When Pn001.0=0,1) or Coasts to a stop without using DB (When Pn001.0=2).
	2	1	Decelerates the motor to a stop using the torque set in Pn406, and then holds position.
		2	Decelerates the motor to a stop using the torque set in Pn406, and then sets it to coasting state.
	3	<b>AC/DC Power Input Selection default=0</b>	
		0	Not applicable to DC power input: Input AC power supply through L1, L2 (and L3) terminals
1		Applicable to DC power input: Input DC power supply through (+) and (-) terminals.	
<b>Warning Code Output Selection default=0 sec 5.5.7</b> Alarm Code Outputs: CN1-37,38,39			
0	AL01, AL02, and AL03 output only alarm codes.		
1	AL01, AL02, and AL03 output both alarm codes and warning codes. While warning codes are output, ALM signal output remains ON (normal state)		
<b>Pn002</b> Function Selection Application Switches	0	<b>T-REF Terminal Allocation default=0 sec 5.2.8, 5.2.9</b>	
		0	None. (Torque Reference in torque control)
		1	Uses T-REF as an external torque limit input.
	1	2	Uses T-REF as a torque feed-forward input
		<b>V-REF Terminal Allocation default=0</b>	
	2	0	None. (Speed Reference in speed control)
		1	Uses V-REF as an external speed limit input.
	3	<b>Absolute Encoder Usage default=0 sec 5.7.2</b>	
		0	Uses absolute encoder as an absolute encoder (with default multi-turn limit)
		1	Uses absolute encoder as an incremental encoder
2	2	Uses absolute encoder as an absolute encoder with multi-turn limit set in Pn205.	
	Execute Fn013 to send new multi-turn limit to encoder.		
3	0	Not Used	
<b>Pn003</b> Function Selection Application Switches	0	<b>Analog Monitor 1: Torque Ref. Monitor default=2 sec 6.5</b>	
		0	Motor Speed: 1V/1000rpm
		1	Speed reference: 1V/1000rpm
		2	Torque reference: 1V/100%
		3	Position error: 0.05/1 reference unit
		4	Position error: 0.05V/100 reference units
		5	Reference pulse frequency converted to rpm: 1V/1000rpm
		6	Motor speed X 4: 1V/250rpm
	7	Motor speed X 8: 1V/125rpm	
	8-F	Reserved parameters (Do Not Change).	
	1	<b>Analog Monitor 2: Speed Reference Monitor default=0 sec 6.5</b>	
		0-F	Same as above
	2-3	-	Not Used

## Selection-Type Parameters (Switches)

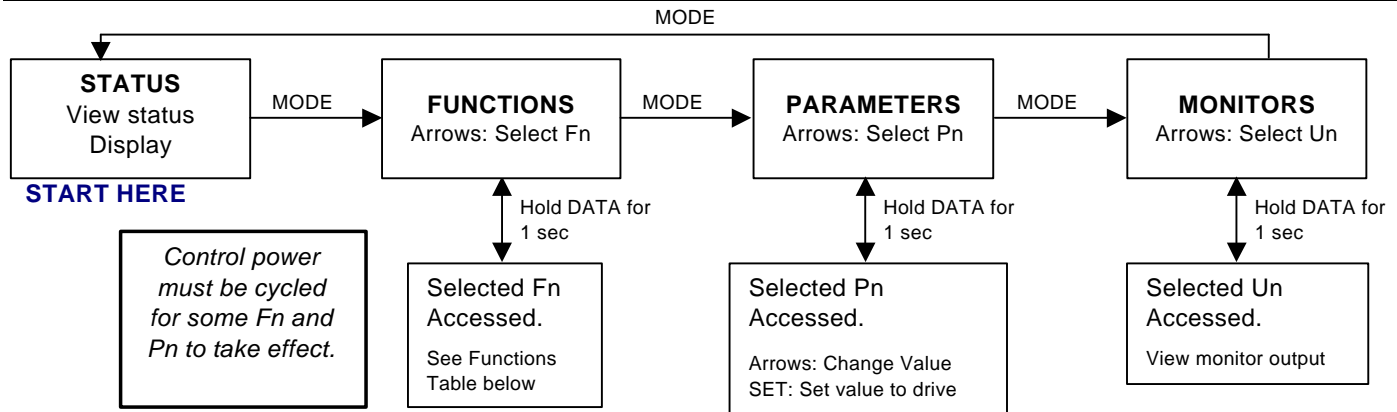
Parameter	Nibble	Setting	Description
<b>Pn10B</b> Gain Application Switches	0	<b>Mode Switch Selection (Switch off Integral Gain) default=0 sec 6.2.5</b>	
		0	Uses internal torque reference as the condition (Level setting: <b>Pn10C</b> ).
		1	Uses speed reference as the condition (Level setting: <b>Pn10D</b> ).
		2	Uses acceleration as the condition (Level setting: <b>Pn10E</b> )
		3	Uses error pulse as the condition (Level setting: <b>Pn10F</b> ).
	4	Do not use Mode Switch	
	1	<b>Speed Loop Control Method default=0</b>	
	0	PI control	
	1	IP control	
	2	0	Not Used
	3	0-2	Reserved parameters (Do Not Change).
<b>Pn110</b> Online Autotuning Switches	0	<b>Online Autotuning Method default=0</b>	
		0	Autotunes only at the beginning of operation.
		1	Always autotunes
		2	Does not perform autotuning
	1	<b>Speed Feedback Compensation Selection (Speed Observer) default=1</b>	
		0	Enabled. Set level in <b>Pn111</b>
		1	Disabled
2	<b>Friction Compensation Selection default=0 sec 6.3.4</b>		
	0	Friction compensation: DISABLED	
	1	Friction compensation: SMALL	
	2	Friction compensation: LARGE	
	3	0-3	Reserved parameters (Do Not Change).
<b>Pn200</b> Position Control References Selection Switches	0	<b>Reference Pulse Form default=0 sec 6.2.6, 6.3.4</b>	
		0	Sign + pulse, positive logic.
		1	CW + CCW, positive logic.
		2	A-B phase (x1) positive logic.
		3	A-B phase (x2) positive logic.
		4	A-B phase (x4) positive logic.
		5	Sign + pulse, negative logic
		6	CW + CCW, negative logic
		7	A-B phase (x1) negative logic.
	8	A-B phase (x2) negative logic.	
	9	A-B phase (x4) negative logic.	
	1	<b>Error Counter Clear Signal Form default=0</b>	
		0	Clears error counter when the signal goes high.
		1	Clears error counter at the rising edge of the signal.
		2	Clears error counter when the signal goes low.
	3	Clears error counter at the falling edge of the signal.	
2	<b>Clear Operation default=0</b>		
	0	Clears error counter at the baseblock	
	1	Does not clear error counter (clear error counter only with CLR signal)	
	2	Clears error counter when an alarm occurs.	
3	<b>Filter Selection default=0</b>		
	0	Reference input filter for line driver signals. (500kHz)	
	1	Reference input filter for open collector signals. (200kHz)	
<b>Pn207</b> Position Control Function Switches	0	<b>Position Reference Filter Selection default=0</b>	
		0	Acceleration/deceleration filter. Time constant set in <b>Pn204</b>
		1	Average movement filter. Time constant set in <b>Pn208</b>
	1	<b>Position Control Option default=0</b>	
		0	Disabled
	1	Uses V-REF as a speed feed-forward input. Scale with <b>Pn300</b>	
	2-3	-	Not Used
<b>Pn408</b> Torque Control Switches	0	<b>Notch Filter Selection default=0</b>	
		0	Disabled
		1	Use a notch filter on the torque reference. Frequency set in <b>Pn409</b>
	1-3	-	Not Used



### NOTES

1. Cycle power for selection-type parameters (switches) to take effect.
2. Use /C-SEL input (Pn50C.3) to switch between the two control methods when Pn000.1=4-9. Use /ZCLAMP (Pn50D.0) when Pn000.1=A and /INHIBIT (Pn50D.1) when Pn000.1=B. These inputs are automatically assigned to S11 in place of the default, /P-CON (Pn50A.2), as long as Pn50A.0=0 (part of SGDB default input mapping).

## Using the Digital Operator



## Functions

Fn	Description / Notes	On the Digital Operator
Fn000	<b>Alarm Traceback Data DISPLAY:</b> Last 10 alarm states. Sec 7.2.1	(1) ARROWS: View Alarm Traceback Data
Fn001	<b>Rigidity Setting for Online Autotuning:</b> Range: 1-10, (10 most stiff). Sets Pn100, Pn101, Pn102, Pn401.	(1)ARROWS: Change Rigidity Setting, (2)SET: Set selected rigidity
Fn002	<b>JOG Mode Operation:</b> Run servo without external command. Over-travel inputs ignored. Jog Speed: Pn304. Sec 7.2.2	(1) SET: execute JOG mode, (2) hold ARROWS to jog motor (3) SET: deactivate JOG mode
Fn003	<b>Zero-Point Search Mode:</b> Jog to C-pulse and hold position	(1) SET: execute Z-SEARCH, (2) hold ARROWS to jog motor to c-pulse (3) SET: deactivate Z-SEARCH mode
Fn004	-	-
Fn005	<b>Parameter Setting Initialization:</b> Reset parameters to factory default	(1) SET: Initialize Parameters (2) Cycle control power
Fn006	<b>Alarm Traceback Data CLEAR:</b> Clear alarm history viewed in Fn000	(1) SET: Clear Alarm Traceback Data
Fn007	<b>Save Inertia Ratio Data Obtained from Autotuning:</b> Write autotuning inertia ratio value to Pn103	(1) SET: Save Inertia Ratio to Pn103
Fn008	<b>Absolute Encoder Multi-turn and Alarm Reset:</b> Reset an absolute encoder alarm and set multi-turn counter to zero	(1) SET: Reset absolute encoder alarm multi-turn counter
Fn009	<b>Automatic Offset Adjustment of Analog Speed/Torque References:</b> Automatically set zero-speed and zero-torque level (to remove drift). Sec 7.2.3	(1) SET: Set present V-REF and T-REF voltage as 0V. (Must have Servo Off. Max offset 1V)
Fn00A	<b>Manual Offset Adjustment of Analog SPEED Reference:</b> Adjust zero-speed input voltage level	(1) DATA: Access V-REF speed offset value (2) ARROWS: Change value, (3) Hold DATA: set value (4) Cycle control power
Fn00B	<b>Manual Offset Adjustment of Analog TORQUE Reference:</b> Adjust zero-torque input voltage level	(1) DATA: Access T-REF torque offset value (2) ARROWS: Change value, (3) Hold DATA: set value (4) Cycle control power
Fn00C	<b>Manual Zero Adjustment of Analog Monitor Output:</b> Adjust level of analog output (under battery cover)	(1) SET: Select monitor 1 or 2, (2) DATA: Access zero-output level, (3) ARROWS: Change value (4) Hold DATA: Set value, (5) Cycle control power
Fn00D	<b>Manual Gain Adjustment of Analog Monitor Output:</b> Adjust scaling of analog output (under battery cover)	(1) SET: Select monitor 1 or 2, (2) DATA: Access zero-output level, (3) ARROWS: Change value (4) Hold DATA: Set value, (5) Cycle control power
Fn00E	<b>Automatic Offset Adjustment of Motor Current Detection Signal:</b> Re-level/calibrate the current transformer automatically	(1) SET: Calibrate current transformer level.
Fn00F	<b>Manual Offset Adjustment of Motor Current Detection Signal:</b> Adjust level of current transformer	(1) SET: Select current xfmr 1 or 2, (2) DATA: Access zero-output level, (3) ARROWS: Change value (4) Hold DATA: Set value, (5) Cycle control power
Fn010	<b>Write Protection Setting:</b> 0=Write Enable. 1=Write Protect All Drive Parameters	(1) ARROWS: Change Write Protect Setting, (2) SET: Set selected setting
Fn011	<b>Motor Model Display:</b> Display motor connected to amp. Sec 7.2.6	(1) SET: Cycle through motor model data.
Fn012	<b>Software Version Display:</b> Display firmware level	(1) SET: Cycle through firmware display
Fn013	<b>Set Absolute Encoder Multi-turn Limit:</b> Write multi-turn limit setting (Pn205) to encoder. Max: 65,535. (Failure to do this may cause alarm A.22)	(1) SET: Send Pn205 to absolute encoder (2) Cycle control power
Fn014	<b>Reinitialize Option Board:</b> Set to run without option board (i.e. MP940)	(1) SET: Clear option board error (2) Cycle control power



## Monitors

Un	Description/Comment
Un000	<b>Motor Speed</b> (rpm): Measured motor speed
Un001	<b>Input Speed Reference</b> (rpm): Commanded motor speed
Un002	<b>Internal Torque Reference</b> (% of rated): Present torque applied to motor
Un003	<b>Number of Pulses from the Origin</b> (pulses): Used for commutation; not generally useful to user
Un004	<b>Electrical Angle from the Origin</b> (degrees): Used for commutation; not generally useful to user
Un005	<b>Input Signal Monitor:</b> On/Off status of inputs. From R to L: SI0 to SI6, SEN(CN1-4). <b>ON:</b> Bottom Segment is Lit. <b>OFF:</b> Top Segment is Lit.
Un006	<b>Output Signal Monitor:</b> On/Off status of outputs. From R to L: ALM, SO1 to SO3, ALO1 to ALO3. <b>ON:</b> Bottom Segment is Lit. <b>OFF:</b> Top Segment is Lit.
Un007	<b>Input Reference Pulse Speed</b> (rpm): Speed of input pulses
Un008	<b>Error Counter Value</b> (ref. unit): Error between commanded position and actual motor position
Un009	<b>Accumulated Load Rate</b> (% of rated torque): RMS torque over last 10 seconds
Un00A	<b>Regenerative Load Rate</b> (% of max. regen power): Average power dissipated by regen resistor
Un00B	<b>Power Consumed by DB Resistor</b> (% of max): Average power consumed by dynamic braking resistor
Un00C	<b>Input Reference Pulse Counter</b> (No. Pulses in HEX): Number of command pulses received by the amplifier. (Position control only)
Un00D	<b>Feedback Pulse Counter</b> (No. Pulses in HEX): Number of feedback pulses received by the amplifier. (Position control only).

## SDGH Alarm Codes

Alarm	Description	AL01	AL02	AL03
<b>A.-</b>	<b>NORMAL OPERATION</b> (ALM output ON)	0	0	0
A.02	Parameter Breakdown*	0	0	0
A.03	Main Circuit Encoder Error	0	0	0
A.04	Parameter Setting Error*	0	0	0
A.05	Servomotor and Amplifier Combination Error	0	0	0
A.10	Overcurrent or Heat Sink Overheated *	1	0	0
A.30	Regeneration Error Detected	1	1	0
A.32	Regenerative Overload	1	1	0
A.40	Overvoltage	0	0	1
A.41	Undervoltage	0	0	1
A.51	Overspeed	1	0	1
A.71	Overload: High Load	1	1	1
A.72	Overload: Low Load	1	1	1
A.73	Dynamic Brake Overload	1	1	1
A.74	Overload of Surge Current Limit Resistor	1	1	1
A.7A	Heat Sink Overheated**	1	1	1
A.81	Absolute Encoder Backup Error*	0	0	0
A.82	Encoder Checksum Error	0	0	0
A.83	Absolute Encoder Battery Error*	0	0	0
A.84	Absolute Encoder Data Error*	0	0	0
A.85	Absolute Encoder Overspeed	0	0	0
A.86	Encoder Overheated	0	0	0
A.b1	Reference Speed Input Read Error	0	0	0
A.b2	Reference Torque Input Read Error	0	0	0
A.bF	System Alarm*	0	0	0
A.C1	Servo Overrun Detected	1	0	1
A.C8	Absolute Encoder Clear Error and MultiTurn Limit Setting Error*	1	0	1
A.C9	Encoder Communications Error*	1	0	1
A.CA	Encoder Parameter Error*	1	0	1
A.Cb	Encoder Echoback Error	1	0	1
A.CC	Multiturn Limit Disagreement	1	0	1
A.d0	Position Error Pulse Overflow	1	1	0
A.F1	Power Line Open Phase	0	1	0
CPF00	Digital Operator Transmission Error	-	-	-
CPF01	Digital Operator Transmission Error	-	-	-
A.91	Overload Warning	1	0	0
A.92	Regenerative Overload Warning	0	1	0
A.E?	Option Board Error	-	-	-

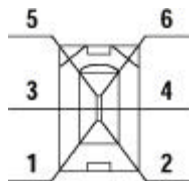
### NOTES:

- An amplifier alarm may be reset (1) using /ALM-RST input, (2) through software, (3) by pressing the UP and DOWN arrows simultaneously on built-in digital operator (4) by cycling control power.
  - Reference: Sec. 9.2
  - 0 = Output transistor is OFF. 1= Output transistor is ON
- \* Not reset by Alarm Reset (/ALM-RST). Eliminate the cause of the alarm and cycle control power to reset.
- \*\*A.7A: Appears only on 30W to 100W amplifiers

Please send Questions,  
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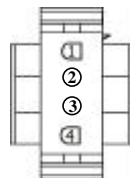
## SGMAH Power & Encoder Wiring

Encoder Connection

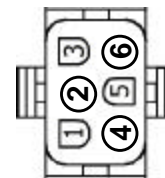


See Manual sec 3.5,  
Catalog p. 12, 14

Motor Power (no brake)



Motor Power (W/Brake)



Pin	Description (Color)	Amp Conn.
1	+5V DC (Red)	CN2-1
2	0V DC (Black)	CN2-2
3	Battery (+) (Orange)*	CN2-4
4	Battery (-) (White / Orange)*	CN2-3
5	Data (+) (Blue)	CN2-5
6	Data (-) (White / Blue)	CN2-6

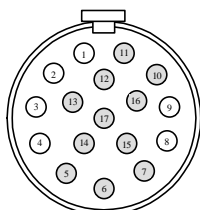
Pin	Connection
1	U Phase (Red)
2	V Phase (White)
3	W Phase (Blue)
4	Frame Ground (Green/Yellow)

\* For Absolute Encoder option only.

Pin	Connection
1	U Phase (Red)
2	V Phase (White)
3	W Phase (Blue)
4	Frame Ground (Green/Yellow)
5	Brake (Red)
6	Brake (Black)

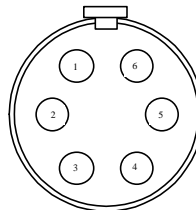
## SGMPH Power & Encoder Wiring

Encoder Connection



See Manual sec 3.5,  
Catalog p. 30, 32

Motor Power



Pin	Description/Color	Amp Conn.
1	Battery (-) (White / Orange)*	CN2-3
2	Battery (+) (Orange)*	CN2-4
3	Data (+) (Blue)	CN2-5
4	Data (-) (Blue/White)	CN2-6
5-7, 10-17	Not Used	-
8	+5V DC (Red)	CN2-1
9	0V DC (Black)	CN2-2
Case	Frame Ground (shield wire)	

Pin	Connection
1	U Phase (Red)
2	V Phase (White)
3	W Phase (Blue)
4	Holding Brake** (Black)
5	Holding Brake** (Black)
6	Frame Ground (Green/Yel)

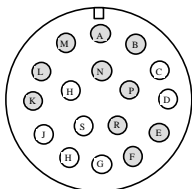
\* For Absolute Encoder option only.  
\*\* For Holding Brake option only

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and  
Corrections  
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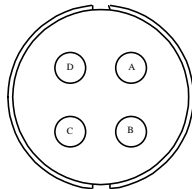
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## SGMGH, SGMSH, & SGMUH Power & Encoder Wiring

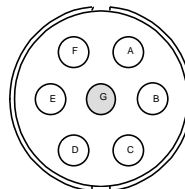
Encoder Connection



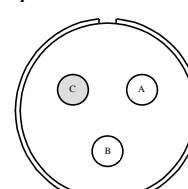
Motor Power (No Brake)



Motor Power (W / Brake)



SGMGH (5.5kW-15kW)  
Separate Brake Connector



Pin	Description	Amp Conn.
A,B	Not Used	-
C	Data (+)	CN2-5
D	Data (-)	CN2-6
E,F	Not Used	-
G	0V DC	CN2-2
H	+5V DC	CN2-1
J	Frame Ground	
K-R	Not Used	-
S	Battery (+)*	CN2-4
T	Battery (-)*	CN2-3

Pin	Description
A	U Phase (Red)
B	V Phase (White)
C	W Phase (Black)
D	Frame Ground (Green/Yellow)

\* For Absolute Encoder option only.

See Manual sec 3.5,  
Catalog p. 54-56

Pin	Description
A	U Phase (Red)
B	V Phase (White)
C	W Phase (Black)
D	Frame Ground (Green/Yellow)
E	Brake (Orange)
F	Brake (Blue)
G	Not Used

Pin	Description
A	Brake Terminal (Orange)
B	Brake Terminal (Blue)
C	Not Used

# Notes



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