

Sorensen SGe Series

4–150 kW

Programmable High Power DC Power Supply

10–1000 V

Economical, programmable, FET based high power DC power supplies featuring:

- Up to 15KW in 3U, up to 30KW in 6U
- Easily parallel chassis for up to 150KW +
- Automatic Constant Voltage/Constant Current Cross Over
- Fast load transient response: Protection from undesired voltage excursions
- Optional Power Factor correction available at no charge: Power factor >0.9 typical
- Optional Isolated Analog I/O available at no charge
- Low audible noise: Temperature controlled variable speed fans



The SGe is an economical, FET based, high switching speed, programmable, dc power supply alternative to SCR and IGBT based dc supplies.

Available in two control versions, the SGe has basic analog controls, while the SGI provides intelligent control features.

Benefits of using a MosFET versus IGBT approach?

Most topologies use either a MosFET or IGBT approach within their power stage to execute their power conversion topology. At the same time end users value low output ripple and noise in conjunction with achieving high slew rates. Both IGBT and SCR based designs typically run at much lower switching speeds requiring a larger LC output filter design for similar performance or require degrading ripple and noise performance in order to maintain competitive power densities. The filter design in this case may be balanced to trade off performance of response time with output ripple and noise and densities.

SGe: Real Value - The SGe, with its outstanding FET based power electronics, is available for customers requiring simple front panel analog controls or external control. With high performance power electronics the SGe provides essential features like 10- turn potentiometers for setting voltage and current, 3½ digit LED readout plus front panel over-voltage protection (OVP) preview/adjustment and reset.

SGI: Advanced Intelligent Control - The SGI combines onboard intelligent controls with the outstanding power electronics common to all SG family supplies. These controls enable sophisticated sequencing, constant power mode and save/recall of instrument settings. Looping of sequences makes the SGI ideal for repetitive testing. An impressive vacuum fluorescent graphical display in eight languages, context sensitive "soft" keys and front panel keyboard simplify programming of the SGI. For more information on the SGI please go to <http://www.programmablepower.com/> Keyword "SGI."

In contrast, our SGe line leverages the benefits of using high switching speed Mosfets requiring a much smaller output stage LC filter in order to provide competitive output ripple and noise performance and response time without compromising power densities.

5–6000 A



208

400

480

ETHERNET



LXI RS232

Applications Include:

- Rack Mount ATE
- Product Validation
- Process Control
- Burn In
- Material Research
- Battery Charging
- Water Treatment
- Electrolysis
- Accelerator Magnet Drive
- Power Electronics Testing

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PROGRAMMABLE POWER

SGe Series: Product Specifications

Common					
Remote Sense	Terminals are provided to sense output voltage at point of load. Maximum line drop 5% of rated voltage per line for 40-100V models, line drop 1V of rated voltage per line for 10-20V models, 1.5V for 30V models, 2% of rated voltage per line for models 160V and greater. (Greater line drop is allowed, but output regulation specifications no longer apply).				
Parallel Operation	Up to 5 units may be paralleled for additional current within the power supply single-unit specifications, with exception of the DC output current set accuracy. Additional paralleled SG units will add 0.3% inaccuracy per unit. To parallel more than 5 units, contact factory.				
Series Operation	Up to 2 units (see Output Float Voltage)				
Input					
Nominal Voltage 3 phase, 3 wire+ ground	208/230 VAC (operating range 187 - 253 VAC) 380/400 VAC (operating range 342 - 440 VAC) 440/480 VAC (operating range 396 - 528 VAC)				
Frequency	47 – 63Hz, 400Hz (400Hz @ 208VAC, for 6U units is optional modification and does not carry CE, UL or CSA markings)				
Power Factor	>0.9 typical with no charge "PF" option.				
Protection (typical)	½ cycle ride-through, typical, on all three phases, 3 cycle ride through on single phase; missing phase shutdown (800V model 6.4 msec on all 3 phases)				
Programming & Read-back Specifications (with sense wires used)					
	Programming		Read-Back / Monitoring		
	Accuracy	Resolution	Accuracy	Resolution	
Front panel Display	SGe: +/- (0.5%fs + 1 digit)	SGe: 3.5 digits	SGe: +/- (0.5%fs + 1 digit)	SGe: 3.5 digits	Knob control & Display read-back
Remote Analog Interface	Voltage +/-0.75% of full scale Current 1.0% of full of full scale	NA	+/-1.0% of full scale	NA	25-pinD-subconnector(0-5V or 0-10V programming; 0-10V monitor)
Remote Digital Interface	Voltage: +/- 0.1% of full scale, Current: +/- 0.4% of full scale	+/-0.01% of full scale	Voltage: +/- 0.2% of full scale Current: +/- 0.4% of full scale	+/-0.01% of full scale	Optional RS-232C, IEEE-488.2 and LXI Compliant 10/100 base-T Ethernet (see Options)
OVP	+/- 3.0% of full scale	+/-0.01% of full scale			Programming range: 5-110% Configured from front panel, remote analog or via optional digital inputs
User I/O	Disconnect & Polarity-reversal relay control (Only available with Ethernet Option)				Digital 10-pin Molex type connector See www.programmablepower.com
Software	IVI & CVI drivers available under SUPPORT at: www.ProgrammablePower.com				
Physical	3U Models (10V-30V)		3U Models (40V-1000V)		6U Models (60V-600V)
Width	19.00 in. (48.3)		19.00 in. (48.3)		19.00 in. (48.3)
Depth	28.09 in. (71.35)		26.4 in. (67.1)		27.18 in. (69.04)
Height	5.25 in. (13.3)		5.25 in. (13.3)		10.5 in. (26.7)
Weight	(4kW, 10V 15V) ≈<65 lbs (29 kg) (5kW, 20V 30V) ≈<65 lbs (29 kg) (8kW, 10V 15V) ≈<85 lbs (39 kg) (10kW, 20V 30V) ≈<85 lbs (39 kg) (12kW, 10V 15V) ≈<110 lbs (50 kg) (15kW, 20V 30V) ≈<110 lbs (50 kg)		(5kW) ≈ ≤60 lbs (27 kg) (10kW) ≈ ≤75 lbs (34 kg) (15kW) ≈ ≤90 lbs (41 kg)		(20kW) ≈ ≤140 lbs (64 kg) (25kW) ≈ ≤155 lbs (71 kg) (30kW) ≈ ≤170 lbs (78 kg)
Shipping Weight	Contact factory for more product & shipping weights				

SGe Series: Product Specifications

4-150 kW

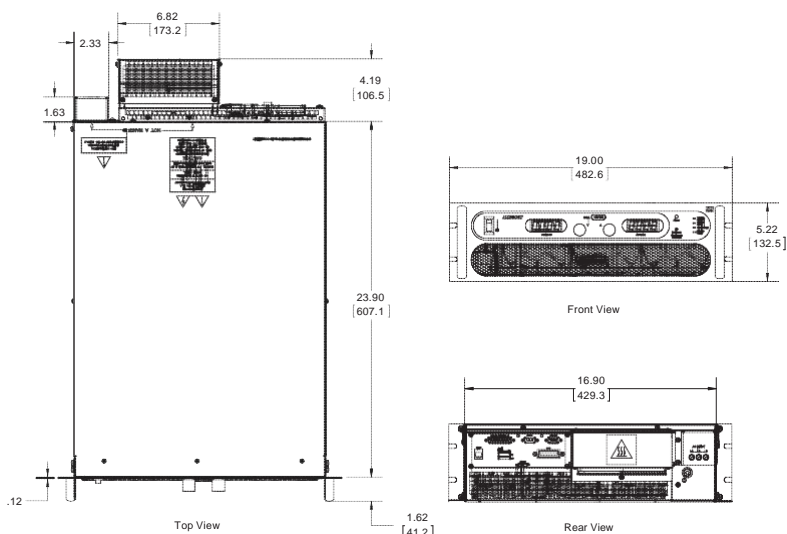
Output			
Ripple & Noise (Voltage Mode, Typical)	See Output: Voltage & Current Ranges Chart below. Ripple and noise specified at full load, nominal AC input. Noise measured with 6 ft. cable, 1µf at load		
Ripple (Current Mode)	<+/- 0.04% of full scale rms current		
Output Rise Time (40-1000V)	≈< 100 ms 10-90% of full scale typical - full resistive load (Contact factory for model specific slew rates)		
Output Voltage Rise Time (10-30V)	Rise Time, ms, max	Condition	
	10	Measured from 10% to 90% of the output voltage change - resistive load, typical	
Output Voltage Fall Time (10-30V)	Fall Time, ms max	Condition	
	No Load 1	100% CC Load	100% CR Load
	50	10	10
Output Current Rise Time (10-30V)	Rise Time, ms max	Condition	
	20	Measured from 10% to 90% of the output current change - resistive load, typical	
Output Current Fall Time (10-30V)	Fall Time, ms max	Condition	
	10	Measured from 90% to 10% of the output current change - resistive load, typical	
Line Regulation (with sense wires used)	(±10% of nominal AC input, constant load) Voltage Mode: +/- 0.01% of full scale (40-1000V) Current Mode: +/- 0.05% of full scale (40-1000V) Voltage Mode and Current Mode: +/- 0.05% of full scale (10-30V)		
Load Regulation (with sense wires used)	(no load to full load, nominal AC input) Voltage Mode: +/- 0.02% of full scale (40-1000V) Current Mode: +/- 0.1% of full scale, Voltage Mode: +/- 0.05% of full scale (10-30V)		
Load Transient Response	Recovers within 2ms to +/-0.75% of full-scale of steady state output for a 50% to 100% or 100% to 50% load		
Efficiency	87% typical at nominal line and max load		
Stability	±0.05% of set point after 30 minute warm-up and over 8 hours at fixed line, load and temperature, typical		
Temperature Coefficient	0.02%/ C of maximum output voltage rating for voltage set point, typical 0.03%/ C of maximum output current rating for current set point, typical		
Output Float Voltage			

Output: Voltage and Current Ranges

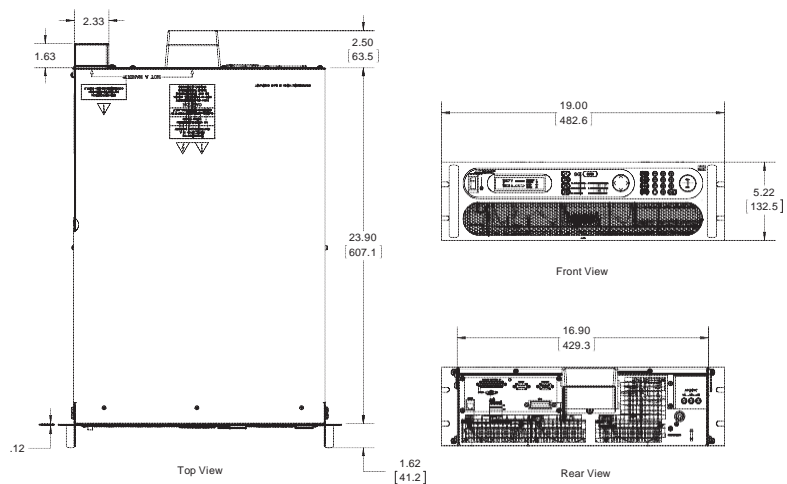
Power	3U			6U			Ripple & Noise	
	4/5 kW	8/10 kW	12/15 kW	16/20 kW	20/25 kW	24/30 kW	rms (20 Hz-300 kHz)	p-p (20 Hz-20 MHz)
Voltage	Current							
10	400	800	1200	1600*	2000*	2400*	20 mV	60 mV
15	267	534	801	1068*	1335*	1602*	20 mV	60 mV
20	250	500	750	1000*	1250*	1500*	20 mV	60 mV
30	167	334	501	668*	835*	1002*	20 mV	60 mV
40	125	250	375	500*	625*	750*	20 mV	75 mV
50	100	200	300	400*	500*	600*	20 mV	75 mV
60	83	167	250	333	417	500	20 mV	75 mV
75	67	133	200	267	333	400	20 mV	100 mV
80	63	125	188	250	313	375	25 mV	100 mV
100	50	100	150	200	250	300	25 mV	100 mV
160	31	63	94	125	156	188	25 mV	150 mV
200	25	50	75	100	125	150	25 mV	175 mV
250	20	40	60	80	100	120	35 mV	200 mV
300	17	33	50	67	83	100	60 mV	200 mV
330	15	30	45	61	76	91	60 mV	200 mV
400	12	25	38	50	63	75	60 mV	300 mV
500	10	20	30	40	50	60	60mV	350mV
600	8	17	25	33	42	50	60 mV	350 mV
800	6.2	12.5	18.7	25*	31.2*	37.5*	80 mV	650 mV
1000	5	10	15	20*	25*	30*	100 mV	750 mV

* By way of paralleling 3U supplies

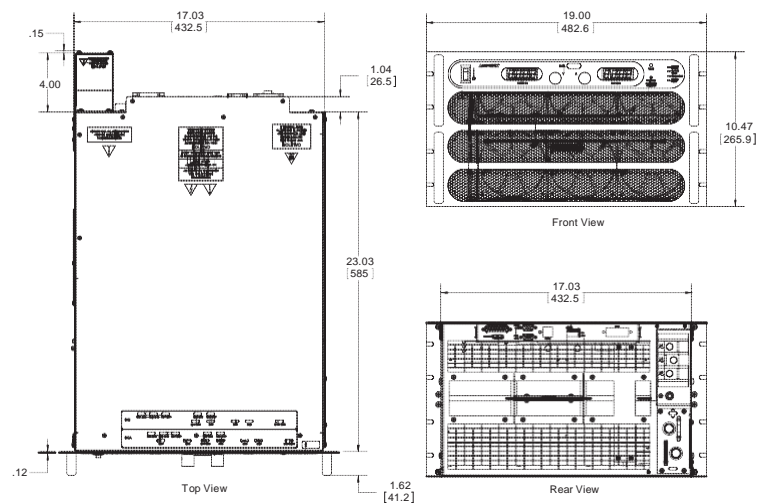
SGe Series: Product Diagram



3U Case (10-30V)



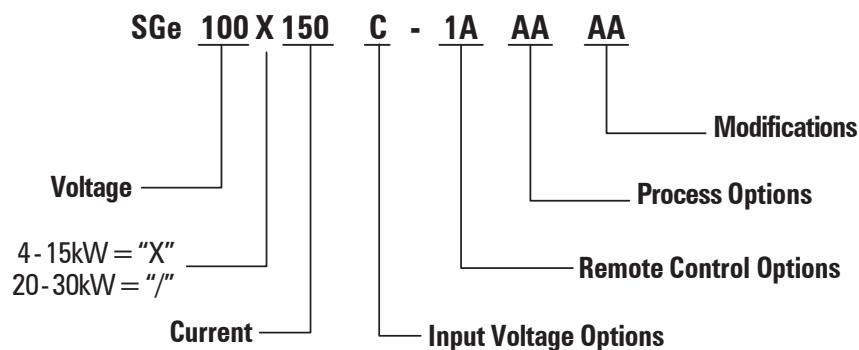
3U Case (40-1000V)



6U Case (60-600V)

Environmental	
Operating Temperature	0 to 50° C
Storage Temperature	-25° C to 65° C
Humidity Range	Relative humidity up to 95% non-condensing, 0° C – 50° C
Altitude	Operating full power available up to 5,000 ft. (~1,500 m), derate 10% of full power for every 1,000 feet higher; non-operating to 40,000 ft. (~12,000 m)
Cooling	Front and side air inlet, rear exhaust. Temperature controlled, variable speed fans. Units may be stacked without spacing.
Regulatory	Certified to UL/CSA 61010 and IEC/EN 61010-1 by a NRTL, CE Compliant, Semi-F47 Compliant. LVD Categories: Installation Category II: Pollution Degree 2; Class II Equipment: for Indoor Use Only, back panel not user accessible (see user manual for installation instructions) EMC Directive, EN 61326:1998
Front Panel Dust Filter	30 PPI (Pores Per Inch) - must ensure adequate airflow and / or derate max temperature. Option on 3U unit only.

SGe Series: Ordering



(In the above example "100" represents 100V and "150" represents 150A. For units with voltage or current > = 1000, the values are represented by the format "XKX", e.g. 1K2 = 1200 and 1K0 = 1000)

Options and Accessories

Input Options	C: Input Voltage 187 / 242VAC, 3 Phase D: Input Voltage 342 / 440VAC, 3 Phase E: Input Voltage 396 / 528VAC, 3 Phase
Remote Control Options	0A: No Option 1A: IEEE-488.2 + RS-232C 1C: Ethernet + RS-232C 1D: Isolated Analog Control 1E: Shaft Locks (SGe only) 2A: Combined Options 1A+1D 2C: Combined Options 1A+1E (SGe Only) 2G: Combined Options 1C+1D 2H: Combined Options 1C+1E (SGe Only) 2J: Combined Options 1D+1E (SGe Only) 3C: Combined Options 1A+1D+1E (SGe Only) 3G: Combined Options 1C+1D+1E (SGe Only)
Process Options	AA: No option AB: Certificate of Calibration to ANSI / NCSL Z540-1 (includes Test Data)
Modifications	AJ: Front panel dust filter - factory installed - 3U unit only CV: 400Hz AC input @ 208 VAC (does not carry CE, CSA, or UL marks) (6U only) STD on 3U PF: Passive power factor correction to 0.9 (Only applicable to 40V, 60V to 800V. Included in 10V-30V, 50V and 1000V.)
Accessories	890-453-03: Paralleling Cable (for up to 5 units, requires one cable per unit placed in parallel) K550212-01: 3U Rack Slides (for 5kW, 10kW and 15kW models) K550213-01: 6U Rack Slides (for 20kW, 25kW and 30kW models) K550532-01: Front panel dust filter - field installation kit - 3U unit only 5551082-01: Optional AC input cover kit - 3U unit only
Contact factory for other combinations	