

# MicroGenius<sup>®</sup> S2/S4

**Industrial Reserve Power Battery Chargers**  
12, 24, 36, 48 & 120 Volts, 6 to 100 Amps



## Small. Powerful. Rugged.

AC & DC circuit breakers. Standard J1939 and Modbus communications.

**Hardened switchmode  
powertrain**

**UL Listed and  
NFPA 110 approved**

**Designed & tested for  
industrial applications**

### Contact

Stored Energy Systems LLC  
Longmont, Colorado, USA

[www.sens-usa.com](http://www.sens-usa.com)  
(303) 678-7500  
[info@sens-usa.com](mailto:info@sens-usa.com)

CAD drawings, firmware,  
certifications, and technical  
documentation are available  
on our website.



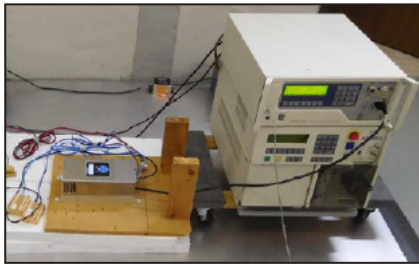
# Robust reliability. More power in less space.

## State-of-the-art features

MicroGenius is a family of advanced technology 12 to 120 volt nominal stationary battery chargers that deliver more power in less space. Ruggedized switchmode power conversion technology enables a rich set of standard features that are either unavailable in, or add significant cost to, competing legacy technology chargers. MicroGenius is designed and tested to survive extreme electrical transients, temperature and vibration.

## Mission-critical dependability

SENS' comprehensive approach to reliability includes worst-case design, repeated stress testing and highly automated assembly, test and burn-in of every unit. The result? A lower rate of field failure than even the best legacy SCR designs – proven over six years and thousands produced.

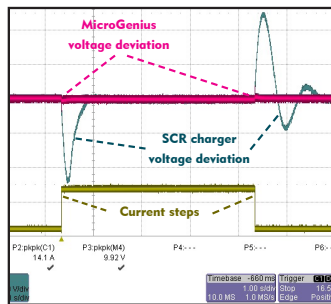


Electrical transient testing MicroGenius 2

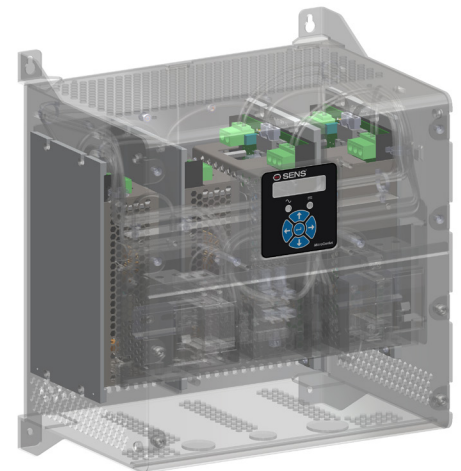


## Rich standard feature set

Standard with every charger: ripple-free output, fast dynamic response, Modbus communications, multiple alarm and communications choices, battery health check systems and global standards compliance.



Extremely fast dynamic response



## State-of-the-art digital control

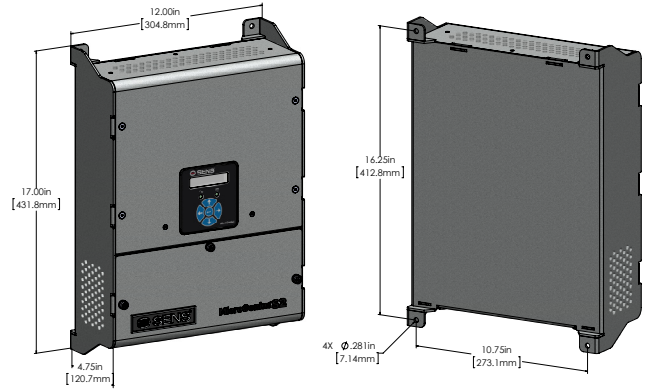
- Patented algorithms charge batteries faster & more safely
- Superb energy efficiency exceeds state-mandated regulations
- Comms, load sharing & other features “built-in” to every unit

## Dependable modular architecture

MicroGenius S2 and S4 employ multiple MicroGenius chargers that enable either higher current output, internal redundancy or multiple outputs.

# MicroGenius S2

15.4lbs (7kg) maximum



## Specifications for MicroGenius S2: 12A to 50A Output

		12/24V	36/48V <sup>2</sup>	120V <sup>3</sup>
AC input	VAC, Hz	90-265 <sup>1</sup> VAC, 47-63Hz		
	Protection	Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4. Optional AC circuit breaker.		
	Power factor & efficiency	PF >.95 typical; efficiency to 93-95%; meets CEC Title 20 Appliance Efficiency Regulations		
DC output	Volts, amps	12V/24V nom. at 20A, 30A, 40A, and 50A	36V/48V nom. at 12A and 25A	120V nom. at 6A and 12A
	Charging modes	Multi-stage, including float, boost and commissioning charge modes		
	Current limit	Factory set at 100% of rating. Field adjustable with keypad or from PC. <sup>4</sup>		
	Charging characteristic	Constant voltage, current limited; patented Dynamic Boost control		
	Line & load regulation	±0.5%		
	Output ripple	< 30 mVrms with or without battery. Delivers fast-responding, stable, well-filtered DC without battery.		
	Battery temp. compensation	Standard. Optional remote battery temperature probe. <sup>5</sup>		
	Output protection	Current limit, supplementary overcurrent protection fuse, transient protected. Optional DC circuit breaker.		
	Dead battery charge	Starts into, and recharges zero volt battery without user intervention		
	Parallel operation	Two or more chargers operate with all modes synchronized for increased current or fault tolerance <sup>6</sup>		
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system. Manual boost & battery commissioning available from keypad.		
	Adjustments	Nominal voltage range; battery type program; fine voltage setting; alarm setpoints; alarm relay mapping		
	Battery type programs	Flooded lead-acid, Ni-Cd, VRLA, ultracapacitor, lithium <sup>7</sup>		
	Field voltage adjustment	2 methods: from front panel keypad or from PC <sup>4</sup>		
Status display	LEDs	Two multi-color front panel status LEDs		
	Metering & status display	Voltmeter accurate to +1%; ammeter to +1%. 20-character display of status & alarm messages.		
Alarms	Alarms	Factory set, field reconfigurable, latching or non-latching. Alarm functions announced on the Modbus port and on the LCD include summary, AC fail, charger fail, high DC volts, low DC volts, low cranking volts, overvoltage shutdown, reverse polarity battery, incompatible battery, invalid settings, I/O bus inactive, thermal fold back, no temperature probe, current limiting, ground fault and low current. Any alarm is assignable to Form C contacts.		
	Alarms: Form C contacts	Five Form C contacts, each rated 30V, 2A resistive, assignable. Standard configuration includes summary, AC fail, charger fail, high DC volts, low DC volts and discharging battery.		
Network-ing	J1939 communications	CAN 2.0 extended ID on RJ45 port		
	Modbus communications	Modbus RS-485 on RJ45 port; Modbus TCP/IP (optional) on RJ45 port		
	SENSbus/USB	Proprietary bus for connection of paralleled chargers and SENS accessories and SENS Setup Utility		
Environ-mental	Operating temperature	-40C to +70C; full spec from -40C to +40C (convection cooled) <sup>8</sup>		
	Humidity	5% to 95%, non-condensing		
	Ingress protection	IP 20; NEMA 1. Optional drip shield for IP 22/NEMA 2 rating. <sup>9</sup>		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500Hz, 3 axes. Random: 20-500Hz, .01G <sup>2</sup> /Hz. Shock: EN 60068-2-27 (15G)		
Abuse protec-tion	Reverse polarity	Charger self-protects without fuse clearing. Indication via LED & LCD.		
	Wrong voltage battery	Charger-battery voltage mismatch shuts down charger. Indication via LED & LCD.		
	Overvoltage shutdown	Selective; shutdown only operates if charger causes the overvoltage condition		
	Overtemperature protection	Gradual output power reduction if heatsink temperature becomes excessive		
Regula-tory compli-ance	North America	C-UL Listed for US & Canada: UL 1012 category QQJ, CSA 22.2, No. 107.2		
		IEEE 2405		
		FCC Part 15, Class A		
	European Union (CE)	Seismic: Rigid & non-structure wall mount; max S <sub>05</sub> of 2.5G. IBC 2000-2022, Calif. BC 2007-2022		
		American Bureau of Shipping, type approved, 12 - 24V only		
		EMC: 2014/30/EU (EN 61000-6-2 & EN 61000-6-4) LVD: 2014/35/EU (EN 60335-1 & EN 60335-2-29) RoHS: 2015/863 (EN 63000)		
Construc-tion	Housing/configuration	Aluminum with powder coated finish		
	Connections	AC & DC terminal blocks: 20 to 2AWG. J1939 and Modbus: RJ45. Form C alarms: 28 to 16AWG		

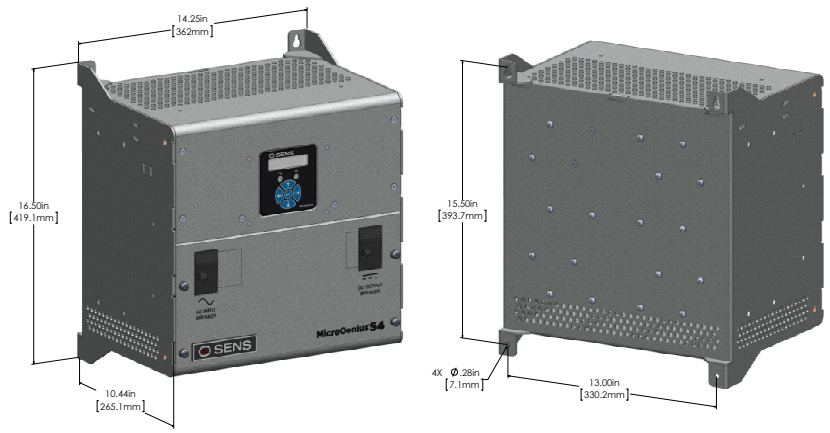
<sup>1</sup> Below 170 VAC input, 24V-30A model limited to 24A output and 24V-40A model limited to 37A output <sup>2</sup> Output voltage & alarms adjustable down to 32V nominal battery <sup>3</sup> Output voltage & alarms adjustable down to 72 or 96V nominal battery <sup>4</sup> Requires free SENS software available at [www.sens-usa.com](http://www.sens-usa.com) <sup>5</sup> Remote battery temp sensor is optional. Order SENS p/n 209481 <sup>6</sup> Requires standard RJ45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) <sup>7</sup> Contact factory to determine compatibility with the battery management system (BMS) of your lithium battery. <sup>8</sup> At 65 deg. C and above the LCD display may be unreadable and display life will be reduced <sup>9</sup> Drip shield is optional. Order SENS p/n 209291.

# MicroGenius S4

36.8lbs (16.7kg) maximum

Choose S4 for max DC current >50A and added surge suppression

19 or 23 inch rack mount brackets optional



## Specifications for MicroGenius S4: 6A to 100A Output

		12/24V	36/48V <sup>2</sup>	120V <sup>3</sup>
AC input	VAC, Hz	90-265 <sup>1</sup> VAC, 47-63Hz		
	Protection	Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4. Optional AC circuit breaker. Optional AC input surge protector with indicator.		
	Power factor & efficiency	PF >.95 typical; efficiency to 93-95%; meets CEC Title 20 Appliance Efficiency Regulations		
DC output	Volts, amps	12V/24V nom. at 25A, 50A, 75A and 100A	36V/48V nom. at 12A, 25A, 37A and 50A	120V nom. at 6A, 12A, 18A, and 24A
	Charging modes	Multi-stage, including float, boost and commissioning charge modes		
	Current limit	Factory set at 100% of rating. Field adjustable with keypad or from PC. <sup>4</sup>		
	Charging characteristic	Constant voltage, current limited; patented Dynamic Boost control		
	Line & load regulation	±0.5%		
	Output ripple	< 30 mVrms with or without battery. Delivers fast-responding, stable, well-filtered DC without battery.		
	Battery temp. compensation	Standard. Optional remote battery temperature probe. <sup>5</sup>		
	Output protection	Current limit, supplementary overcurrent protection fuse, transient protected. Optional DC circuit breaker. Optional DC output surge protector with indicator.		
	Dead battery charge	Starts into, and recharges zero volt battery without user intervention		
Parallel operation	Two or more chargers operate with all modes synchronized for increased current or fault tolerance <sup>6</sup>			
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system. Manual boost & battery commissioning available from keypad.		
	Adjustments	Nominal voltage range; battery type program; fine voltage setting; alarm setpoints; alarm relay mapping		
	Battery type programs	Flooded lead-acid, NiCd, VRLA, ultracapacitor, lithium <sup>7</sup>		
	Field voltage adjustment	2 methods: from front panel keypad or from PC <sup>4</sup>		
Status display	LEDs	Two multi-color front panel status LEDs		
	Metering & status display	Voltmeter accurate to +1%; ammeter to +1%. 20-character display of status & alarm messages.		
Alarms	Alarms	Factory set, field reconfigurable, latching or non-latching. Alarm functions announced on the Modbus port and on the LCD include summary, AC fail, charger fail, high DC volts, low DC volts, low cranking volts, overvoltage shutdown, reverse polarity battery, invalid settings, I/O bus inactive, thermal fold back, no temperature probe, current limiting, ground fault and low current. Any alarm is assignable to Form C contacts.		
	Alarms: Form C contacts	Five Form C contacts, each rated 30V, 2A resistive, assignable. Standard configuration includes summary, AC fail, charger fail, high DC volts, low DC volts and discharging battery.		
Net-working	J1939 communications	CAN 2.0 extended ID on RJ45 port		
	Modbus communications	Modbus RS-485 on RJ45 port; Modbus TCP/IP (optional) on RJ45 port		
	SENSbus/USB	Proprietary bus for connection of paralleled chargers and SENS accessories and SENS Setup Utility		
Environmental	Operating temperature	-40C to +70C; full spec from -40C to +40C (convection cooled) <sup>8</sup>		
	Humidity	5% to 95%, non-condensing		
	Ingress protection	IP 20; NEMA 1. Optional drip shield for IP 22/NEMA 2 rating. <sup>9</sup>		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500Hz, 3 axes. Random: 20-500Hz, .01G <sup>2</sup> /Hz. Shock: EN 60068-2-27 (15G)		
	Electrical transient	ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals		
Abuse protection	Reverse polarity	Charger self-protects without output protective device clearing. Indication via LED & LCD.		
	Wrong voltage battery	Charger-battery voltage mismatch shuts down charger. Indication via LED & LCD.		
	Overvoltage shutdown	Selective; shutdown only operates if charger causes the overvoltage condition		
	Overtemperature protection	Gradual output power reduction if heatsink temperature becomes excessive		
Regulatory compliance	North America	C-UL Listed for US & Canada: UL 1012 category QQI, CSA 22.2, No. 107.2		
		IEEE 2405		
		FCC Part 15, Class A		
		Seismic: Rigid & non-structure wall mount; max S <sub>05</sub> of 2.5G. IBC 2000-2022, Calif. BC 2007-2022		
	European Union (CE)	American Bureau of Shipping, type approved		
		EMC: 2014/30/EU (EN 61000-6-2 & EN 61000-6-4) LVD: 2014/35/EU (EN 60335-1 & EN 60335-2-29) RoHS: 2015/863 (EN 63000)		
Construction	Housing/configuration	Aluminum with powder coated finish. Rack mount brackets for 19 and 23 inch rack optional.		
	Connections	AC & DC terminal blocks: 14AWG to 2/0. AC & DC breakers, <50A (optional): 14 to 2AWG. AC & DC breakers, ≥50A (optional): 12AWG to 2/0. J1939 and Modbus: RJ45. Form C alarms: 28 to 16AWG		

<sup>1</sup> 120VAC minimum for 12/24V-100A, 36/48V-48A and 120V-25A units <sup>2</sup> Output voltage & alarms adjustable down to 32V nominal battery <sup>3</sup> Output voltage & alarms adjustable down to 72 or 96V nominal battery <sup>4</sup> Requires free SENS software available at [www.sens-usa.com](http://www.sens-usa.com) <sup>5</sup> Remote battery temp sensor is optional. Order SENS p/n 209481 <sup>6</sup> Requires standard RJ45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) <sup>7</sup> Contact factory to determine compatibility with the battery management system (BMS) of your lithium battery. <sup>8</sup> At 65 deg. C and above the LCD display may be unreadable and display life will be reduced <sup>9</sup> Drip shield is optional. Order SENS p/n 209287.

# How To Order **MicroGenius S2 & S4**

Product Type	Enclosure	-	Protect. Options	Comms	Config	-	Port A Code	Port A Redun.	Port B Code	Port B Redun.	Port C Code	Port C Redun.	Port D Code	Port D Redun.
<b>S</b>	<b>4</b>	<b>-</b>	<b>C</b>	<b>1</b>	<b>0</b>	<b>-</b>	<b>H</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>(A)</b>	<b>(B)</b>		<b>(C)</b>	<b>(D)</b>	<b>(E)</b>		<b>(F)</b>	Contact the factory to configure chargers with multiple outputs or internal redundancy.						

	Parameter	Code	Value
<b>(A)</b>	Product Family	S	MicroGenius S
<b>(B)</b>	Enclosure	2 4	S2 chassis S4 chassis
<b>(C)</b>	AC & DC protection configuration	A B C	Standard, no circuit breakers AC and DC circuit breakers AC and DC breakers plus supplementary surge protection (S4 only)
<b>(D)</b>	Communications	0 1 2 3	J1939 and Modbus RS485 J1939 and Modbus TCP/IP J1939 and Modbus RS-485 with RJ45 to terminal block adapter J1939 and Modbus TCP/IP with RJ45 to terminal block adapter
<b>(E)</b>	Configuration	0 R T	Standard 19" rack mount ears (S4 only) 23" rack mount ears (S4 only)
<b>(F)</b>	Output Current	B D E S2: G N P S T	20A @ 12/24V 30A @ 12/24V 40A @ 12/24V 50A @ 12/24V 12A @ 36/48V 25A @ 36/48V 6A @ 120V 12A @ 120V
		C G J K N P S4: Q R S T U V	25A @ 12/24V 50A @ 12/24V 75A @ 12/24V 100A @ 12/24V 12A @ 36/48V 25A @ 36/48V 37A @ 36/48V 50A @ 36/48V 6A @ 120V 12A @ 120V 18A @ 120V 24A @ 120V

Contact SENS or your local sales representative for additional specification, engineering and installation information, or visit SENS' website for latest available data. Specification subject to change without notice.

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