

MicroGenius®

Industrial Reserve Power Battery Chargers

12, 24, 36, 48 & 120 Volts, 6 to 100 Amps



Small. Powerful. Rugged.

Hardened switchmode powertrain - delivers first-class abuse resistance and energy efficiency

Advanced microprocessor control - allows advanced digital controls and communications

Power supply or battery charger - perfect for sensitive electronics or applications with/without battery

Two standard battery check systems - work with both constant and intermittent loads

Standard Modbus communications - enable easy integration with building and supervisory systems

Small, lightweight packages - enable installation in smaller spaces

Robust reliability. More power in less space.

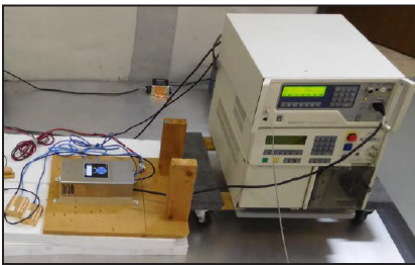
MicroGenius is a family of advanced technology 12 to 120 volt nominal stationary battery chargers that deliver more power in less space. Ruggedized switchmode power conversion technology enables a rich set of standard features that are either unavailable in, or add significant cost to, competing legacy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

MicroGenius is designed and tested to survive extreme electrical transients, temperature and vibration. Employing the field-proven MicroGenius 2 power conversion platform, dependability of S2 and S4 chargers can be further enhanced by specifying internal power converter redundancy.

State-of-the-art features

Mission-critical dependability

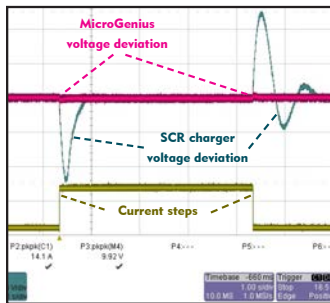
SENS' comprehensive approach to reliability includes worst-case design, repeated stress testing and highly automated assembly, test and burn-in of every unit. The result? A lower rate of field failure than even the best legacy SCR designs – proven over six years and thousands produced.



Electrical transient testing MicroGenius 2

Rich standard feature set

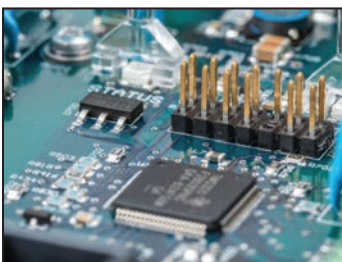
Standard with every charger: ripple-free output, fast dynamic response, Modbus communications, multiple alarm and communications choices, battery health check systems and global standards compliance.



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



State-of-the-art digital signal processor control

Dependable modular architecture

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

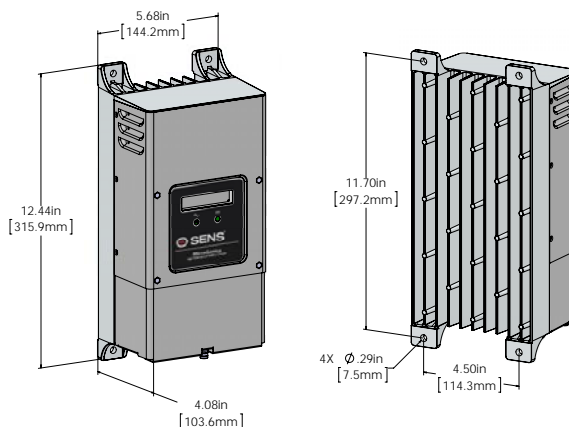


MicroGenius 2

7.2 lbs. (3.3 kg) maximum

Choose **MicroGenius 2** if your DC current requirement is:

DC Volts	DC Current
12/24 volt nom.	≤ 25A
36/48 volt nom.	≤ 12A
120 volt nom.	≤ 6A



Specifications for MicroGenius 2: 6A to 25A Output

		12/24V	36/48V ²	120V ³
AC input	VAC, Hz	90-265 ¹ single-phase VAC, 47-63 Hz DC voltage applied at AC terminals: 100-375 VDC, 0Hz (≥500W models only, output limited to 2/3 rated power)		
	Protection	Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4		
	Power factor & efficiency	PF > .95 typical; max efficiency 93-95%; meets CEC Title 20 Efficiency Regulations; standby AC draw <3W for 180-450W and <7W for 500-750W		
DC output	Volts, amps	12V/24V nom. at 10A/6A, 12A/10A, 15A/15A, 20A/20A, or 25A/25A	36V/48V nom. at 6A/6A or 12A/12A	120V nom. at 6A
	Charging modes	Multi-stage, including float, boost and commissioning charge modes		
	Current limit	Factory set at 100% of rating. Field adjustable w/optional keypad or from PC. ⁴		
	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. ⁵		
	Output protection	Current limit, supplementary overcurrent protection fuse, transient protected		
	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 ⁶		
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system. Manually initiated timed boost & commissioning modes available with keypad option		
	Adjustments	Nominal voltage range; fine voltage setting; alarm setpoints; alarm relay mapping		
	Battery type programs	Flooded lead-acid, NiZn, NaCl (salt), NiCd, VRLA, ultracapacitor, lithium ⁷		
	Field voltage adjustment	3 methods: jumper pins ⁸ , from front panel keypad or from PC ⁴		
Status display	LEDs	Two multi-color front panel status LEDs		
	Metering & status display	Optional. Voltmeter accurate to +1%; ammeter to +1%; 20-character display of status & alarm messages. ⁹		
Alarms	Alarms	Factory set, field reconfigurable, latching or non-latching. Alarm functions announced on the Modbus port and on the optional 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	Optional. Two ¹⁰ or five ¹¹ 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.		
Networking	J-1939 communications	CAN 2.0 extended ID on RJ-45 port		
	Modbus communications	Modbus RS-485 on RJ-45 port		
	SENSbus/USB	Proprietary bus for connection of paralleled chargers and SENS accessories and SENS Setup Utility		
Environmental	Operating temperature ¹²	Convection cooled; -40C to +70C; full spec from -40C to +50C ¹³		
	Humidity	5% to 95%, non-condensing		
	Ingress protection	NEMA2/IP22; NEMA3R/IP34; UL Listed "Rainproof"		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G ² /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 fuse clearing. Indication via LED & optional LCD.		
	Wrong voltage battery	Charger-battery voltage mismatch shuts down charger. Indication via LED & optional 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 categories BBGQ, BBHH, BBJY and QWIR ¹⁴ , CSA 22.2, No. 107.2. Certified to UL 1236 supplements SB (marine), SC (fire pump) and SE (emergency generator).		
		IEEE 2405		
		FCC Part 15, Class B, ≥ 600W models Class A		
		Seismic: Rigid & non-structure wall mount; max S _{DS} 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	Die-cast aluminum heatsink base with stainless steel covers & fasteners		
	Connections	AC & DC terminal blocks: 20 to 10 AWG. J-1939 and Modbus-485: RJ-45. Form C alarms: 28 to 16 AWG		

¹ When set for 24-volt output, full 15A output of 450W available above 170 VAC input, 12A output current max between 100 VAC and 170 VAC input ² Output voltage & alarms adjustable down to 32V nominal battery ³ Output voltage & alarms adjustable down to 72 or 96V nominal battery ⁴ Requires optional computer to charger adapter SENS p/n 209254 plus free SENS software available at www.sens-usa.com ⁵ Remote battery temp sensor is optional. Order SENS p/n 209481 ⁶ Requires standard RJ-45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) ⁷ Contact factory to determine compatibility with the battery management system (BMS) of your lithium battery. ⁸ 120V model excluded ⁹ Requires that digit 12 of the model number be D, E, or F ¹⁰ Models with E as digit 12 of the model number include 2 ea. Form C alarm contacts ¹¹ Models with D or F as digit 12 of the model number include 5 ea. Form C alarm contacts ¹² At 65 deg. C and above the LCD display may be unreadable and display life will be reduced ¹³ Full spec to +55C for 180W and +40C for 450W ¹⁴ 300W and 450W models only.

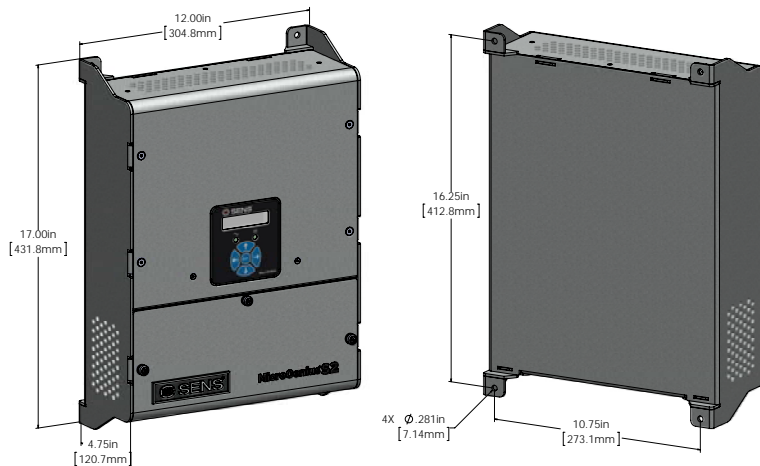
MicroGenius S2

15.4 lbs. (7 kg) maximum

Choose **S2** if your DC current requirement is in the table below OR if these capabilities are needed:

- AC and DC circuit breakers
- Redundant DC output
- Dual independent DC outputs

DC Volts	DC Current
12/24 volt nom.	>25A, ≤ 50A
36/48 volt nom.	>12A, ≤ 25A
120 volt nom.	>6A, ≤ 12A



Specifications for MicroGenius S2: 12A to 50A Output

		12/24V	36/48V ²	120V ³
AC input	VAC, Hz	90-265 ¹ VAC, 47-63 Hz		
	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. ⁴		
	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. ⁵		
	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 ⁶		
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 ⁷		
	Field voltage adjustment	2 methods: from front panel keypad or from PC ⁴		
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.		
Networking	J-1939 communications	CAN 2.0 extended ID on RJ-45 port		
	Modbus communications	Modbus RS-485 on RJ-45 port; Modbus TCP/IP (optional) on RJ-45 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) ⁸		
	Humidity	5% to 95%, non-condensing		
	Ingress protection	IP 20; NEMA 1. Optional drip shield for IP 22/NEMA 3R rating. ⁹		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G ² /Hz. Shock: EN 60068-2-27 (15G)		
Abuse protection	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		
	Electrical transient	ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals		
Regulatory compliance	North America	C-UL Listed for US & Canada: UL 1012 category QQU, CSA 22.2, No. 107.2		
		IEEE 2405		
		FCC Part 15, Class A		
	European Union (CE)	Seismic: Rigid & non-structure wall mount; max S _{DS} 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)		
Construction	Housing/configuration	Aluminum with powder coated finish		
	Connections	AC & DC terminal blocks: 20 to 2 AWG. J-1939 and Modbus: RJ-45. Form C alarms: 28 to 16 AWG		

¹ Below 170 VAC input, 24V-30A model limited to 24A output and 24V-40A model limited to 37A output ² Output voltage & alarms adjustable down to 32V nominal battery ³ Output voltage & alarms adjustable down to 72 or 96V nominal battery ⁴ Requires free SENS software available at www.sens-usa.com ⁵ Remote battery temp sensor is optional. Order SENS p/n 209481 ⁶ Requires standard RJ-45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) ⁷ Contact factory to determine compatibility with the battery management system (BMS) of your lithium battery. ⁸ At 65 deg. C and above the LCD display may be unreadable and display life will be reduced ⁹ Drip shield is optional. Order SENS p/n 209291.

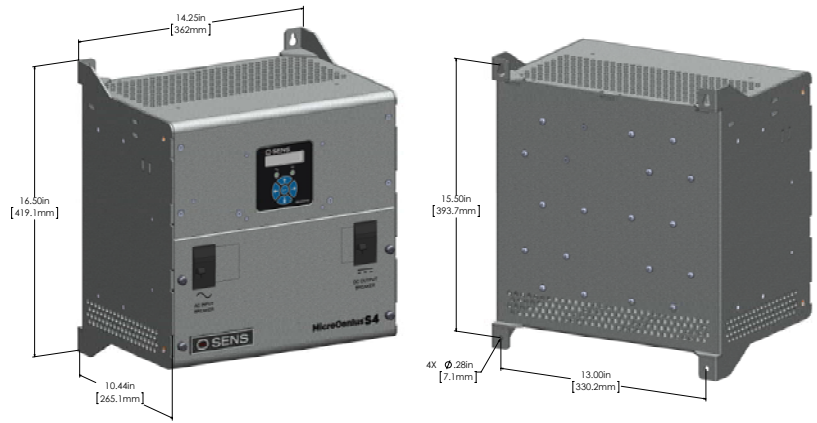
MicroGenius S4

36.8 lbs (16.7 kg) maximum

Choose **S4** if your DC current requirement is in the table below OR if these capabilities are needed:

- AC and DC circuit breakers
- Redundant DC output
- Dual independent DC outputs

DC Volts	DC Current
12/24 volt nom.	>50A
36/48 volt nom.	>25A
120 volt nom.	>12A



19 or 23 inch rack mount brackets optional

Specifications for MicroGenius S4: 6A to 100A Output

		12/24V	36/48V ²	120V ³
AC input	VAC, Hz	90-265 ¹ VAC, 47-63 Hz		
	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. ⁴		
	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. ⁵		
	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 ⁶		
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 ⁷		
	Field voltage adjustment	2 methods: from front panel keypad or from PC ⁴		
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.		
Networking	J-1939 communications	CAN 2.0 extended ID on RJ-45 port		
	Modbus communications	Modbus RS-485 on RJ-45 port; Modbus TCP/IP (optional) on RJ-45 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) ⁸		
	Humidity	5% to 95%, non-condensing		
	Ingress protection	IP 20; NEMA 1. Optional drip shield for IP 22/NEMA 3R rating. ⁹		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G ² /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 QOIJ, CSA 22.2, No. 107.2		
		IEEE 2405		
		FCC Part 15, Class A		
	European Union (CE)	Seismic: Rigid & non-structure wall mount; max S _{ps} of 2.5G. IBC 2000-2022, Calif. BC 2007-2022		
		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: 14 AWG to 2/0. AC & DC breakers, <50A (optional): 14 to 2 AWG. AC & DC breakers, ≥50A (optional): 12 AWG to 2/0. J-1939 and Modbus: RJ-45. Form C alarms: 28 to 16 AWG		

¹ 120VAC minimum for 12/24V-100A, 36/48V-48A and 120V-25A units ² Output voltage & alarms adjustable down to 32V nominal battery ³ Output voltage & alarms adjustable down to 72 or 96V nominal battery ⁴ Requires free SENS software available at www.sens-usa.com ⁵ Remote battery temp sensor is optional. Order SENS p/n 209481 ⁶ Requires standard RJ-45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) ⁷ Contact factory to determine compatibility with the battery management system (BMS) of your lithium battery. ⁸ At 65 deg. C and above the LCD display may be unreadable and display life will be reduced ⁹ Drip shield is optional. Order SENS p/n 209287.

How To Order **MicroGenius 2**

Product Type	Power	Output Volts	Output Current	Alms & Comms	Adapter & RTS
M	4	22	1515	F	N
(A)	(B)	(C)	(D)	(E)	(F)

	Parameter	Code	Value
(A)	Product Family	M	MicroGenius 2
(B)	Output Power Rating	1 3 4 5 6 7	180W 300W 450W 500W 600W 750W
(C)	Output Voltage	22 34 20	12/24V 36/48V 120V
(D)	Output Current	1006 1210 1515 2020 2525 0606 1212 0006	10A @ 12V; 6A @ 24V (180W only) 12A @ 12V; 10A @ 24V (300W only) 15A @ 12/24V (450W only) 20A @ 12/24V (600W only) 25A @ 12/24V (750W only) 6A @ 36/48V (500W only) 12A @ 36/48V (750W only) 6A @ 120V (750W only)
(E)	Alarm & Communication Options	A D E F G	Base model; includes J-1939 & Modbus RS-485 communications Base model + LCD display + 5 ea. Form C alarm relays Base model + LCD display + 2 ea. Form C alarm relays Base model + LCD + USB-C + 5 ea. Form C relays + keypad control Base model + LCD + USB-C + 5 ea. Form C relays + keypad control + Modbus TCP/IP
(F)	Adapter Plate & Remote Temperature Sensor Options	F G L N T	FC to MicroGenius 2 adapter plate (enclosed charger only) MicroGenius 150 to MicroGenius 2 adapter plate (enclosed charger only) LC to MicroGenius 2 adapter plate (enclosed charger only) NRG10 to MicroGenius 2 adapter plate (enclosed charger only) Remote Temperature Sensor shipped with charger

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.
S	4	-	C	1	0	-	H	0	0	0	0	0

A
B
C
D
E
F
 Contact the factory to configure chargers with multiple outputs or internal redundancy.

	Parameter	Code	Value
A	Product Family	S	MicroGenius S
B	Enclosure	2 4	S2 chassis S4 chassis
C	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)
D	Communications	0 1 2 3	J-1939 and Modbus RS-485 J-1939 and Modbus TCP/IP J-1939 and Modbus RS-485 with RJ-45 to terminal block adapter J-1939 and Modbus TCP/IP with RJ-45 to terminal block adapter
E	Configuration	0 R T	Standard 19" rack mount ears (S4 only) 23" rack mount ears (S4 only)
F	Output Current	S2: B D E 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
		S4: C G J K N P 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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Contact Information

Sales 1.866.736.7872 • 303.678.7500 • Fax 303.678.7504 • info@sens-usa.com • www.sens-usa.com

Stored Energy Systems, LLC 1840 Industrial Circle, Longmont, CO 80501 USA

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