

# EnerGenius® DC

## Ruggedized Battery Charger & DC Supply

120 & 240 Volts Nominal, 12 to 400+ Amps



### More Power. Less Space. Environmentally Hardened.

**Hardened powertrain:** Small, energy efficient and rugged

**Fast responding, pure DC:** Delivers ripple-free output even without battery

**Small size & light weight:** Saves floor space and money

**Dirt and dust protected:** Electronics stay cool and clean even in dirty environments

**Industrial electrical ratings:** 480 VAC 3-phase input; transient & surge protected

**Remote communications:** Optional Modbus, DNP3 & IEC 61850

**PIP specification compliant:** Includes optional high current alarm relays

# Reliable, high power DC in less space.

EnerGenius DC is a family of modular, high-powered chargers that are purpose-built for industrial and utility environments. Standard configurations range from 25 to 400 amps at 120 or 240 volts DC nominal. Larger custom systems are also available.

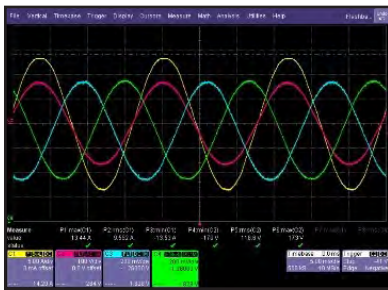
EnerGenius DC outperforms line frequency chargers such as SCR: smaller size, lighter weight, higher efficiency, easier field service, lower ripple and faster-responding DC output.

Unlike other switchmode chargers derived from telecommunications power supplies, EnerGenius DC features innovative layered defenses against dirt and electrical transients that enable operation in harsh industrial and utility environments.

## State-of-the-art features

### Native 3-phase, 380-480 VAC input

Native 3-phase, 3-wire input enables operation on common 380-480 VAC without the stepdown transformer other switchmode chargers need. Operation down to 188 volts or on a single phase continues at reduced output. 95% efficiency and unity power factor consume up to 30% less AC current than conventional chargers of similar output.



### Flexible Configurations

EnerGenius DC employs multiple rectifier modules that enable higher current output or internal redundancy.

- 7 kW compact/portable charger employs one rectifier
- 14 kW wallbox employs either one or two rectifiers. Field power upgrade is possible.
- 56 kW cabinet system accommodates up to eight hot-swappable rectifiers. Dual AC and/or DC buses are available for increased redundancy and fault tolerance.
- Systems >56 kW are also available. Contact factory.

### Protected from electromagnetic threats & dirt

Charger electronics are fully sealed in Faraday cages, providing protection from electromagnetic fields and dirt. Innovative Forced Conduction™ cooling employs redundant fans and easily serviced air filtration to eliminate the problems of dirt-induced failures common to all prior forced cooled designs.



### Modular Design and Redundancy

N+1 redundancy is possible in either the 14 kW or 56 kW systems by installing one more rectifier than is required to meet the base load. Rectifiers are isolated from each other.

Output voltage control is maintained by the rectifiers. If communication to the control panel is lost, voltage output is still maintained.

Additional redundancy in the 56 kW cabinet is obtained by specifying independent, dual, 3-phase AC feeds. Dual A/B DC bus output is optional.

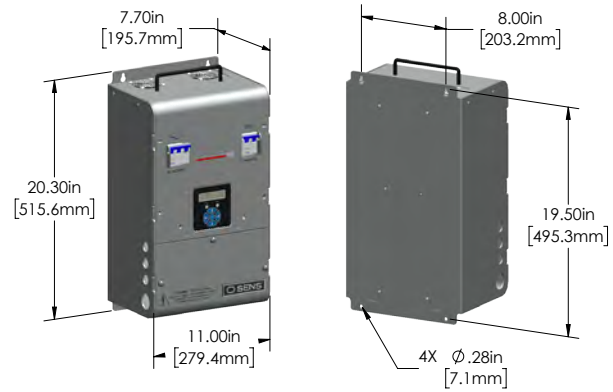


Optional dual AC feeds and dual DC bus.

# 7 kW Compact/Portable charger

38 lbs. (17.2 kg)

Choose **7 kW compact/portable charger** if your DC requirement is 120 V and  $\leq 50$  A or 240 V and  $\leq 25$  A

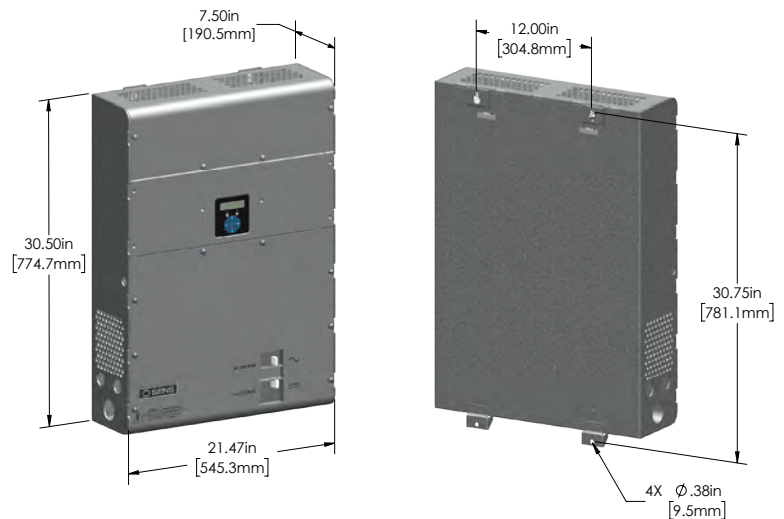


Employs one rectifier rated up to 120 V, 50 A or 240 V, 25 A nominal output. Output voltage is keypad adjustable from zero volts up to the charger's maximum, making it ideal for temporary charging. Carrying handle is optional.

# 14 kW Wallbox

85 lbs. (38.6 kg) maximum

Choose **14 kW wallbox** if your DC requirement is 120 V and  $\leq 100$  A or 240 V and  $\leq 50$  A

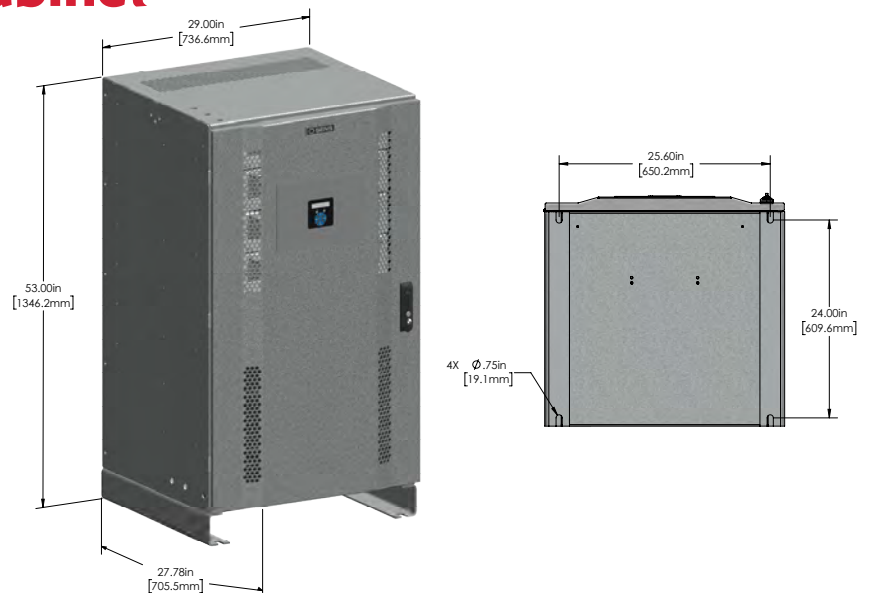


Employs either one or two rectifiers for output up to 120 V, 100 A or 240 V, 50 A nominal. Field power upgrade is possible.

# 56 kW Standard Cabinet

284 lbs. (128.8 kg) cabinet + 25 lbs. (11.3 kg) per installed rectifier module maximum

Choose **56 kW standard cabinet** if your DC requirement is 120 V and  $\leq 400$  A or 240 V and  $\leq 200$  A



Accommodates up to eight hot-swappable rectifiers rated 120 V, 400 A or 240 V, 200 A nominal. Purchase to system capacity and add power modules as needed. Dual AC and/or DC buses available for increased redundancy and fault tolerance.

# EnerGenius DC Chargers and Systems

## Specifications: EnerGenius DC

		Compact/Portable	Wallbox	Standard Cabinet	
AC Input	Voltage, frequency	Full output power: 358-528 VAC 3-phase line to line, 50% power limit from 188-357 VAC. AC line to ground voltage limited to 277VAC. 47-63 Hz.	Full output power: 358-528 VAC 3-phase line to line connected, 50% power limit from 188-357 VAC. 47-63 Hz.	Full output power: 358-528 VAC 3-phase line to line connected, 50% power limit from 188-357 VAC. 47-63 Hz.	
	Input current	12 A max (at 358 VAC) per no. of modules + 1A			
	Overcurrent protection	3-pole UL 489 listed circuit breaker		25 kAIC standard, 65 kAIC optional, lockable	25 kAIC standard, 65 kAIC optional, lockable. Two breakers optional for dual AC feed.
		10 kAIC standard, lockable			
AC transient protection	Layered electrical transient defenses. Optional UL1449 Open Type 1 Listed supplemental surge protection, alarmed and with field replaceable elements, surge capacity rated 75kA 8/20 $\mu$ s; visual and remote indications.				
DC Output	Voltage	120 VDC nominal: output adjustable from 0-150V. 240 VDC nominal: output adjustable from 0-315V.			
	Current	Output limit: 7kW or 50A for 120VDC models or 25A for 240VDC models, whichever is less	Output limit: 14kW or 100A for 120VDC models or 50A for 240VDC models, whichever is less	Output limit: 56kW or 400A for 120VDC models or 200A for 240VDC models, whichever is less	
	Output protection	Electronic current limit. 2-pole UL 489 listed circuit breaker.			
		10 kAIC standard, lockable	10 kAIC standard, 25 kAIC optional, lockable	Output $\leq$ 200A: 10 kAIC standard, 25 kAIC optional. Output >200A: 50 kAIC standard, 100 kAIC optional. Lockable.	
	DC surge protection	Layered electrical transient defenses. Optional UL1449 Open Type 2 Listed supplemental surge protection, alarmed and with field replaceable elements, surge capacity rated 75kA 8/20 $\mu$ s; visual and remote indications.			
	Battery types	Flooded lead-acid, AGM, Ni-Cd, VRLA, and lithium			
	DC power supply operation	Delivers fast-responding, stable, well-filtered DC without battery			
	Battery temp. compensation	Standard. On-board sensor modifies output voltage when temperature is between 0°C and +40°C. Slope adjustable, factory set to -0.18% per degree C. Optional remote battery monitor provides battery temperature probe.			
	Dead battery charge	Starts into and recharges zero-volt battery			
	Parallel/load share operation	Two or more independent chargers actively current share and synchronize all modes for increased current or fault tolerance when standard RJ-45 network cable is connected to each charger's paralleling bus			
	Output blocking protection	Prevents sparking during battery connection or during hot swap operation			
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system. Manual boost & battery commissioning available from keypad.			
	Front panel control	Change all parameters including voltages, current limits, alarm parameters, relay assignments, network configurations, time-outs, and more			
	Local computer	Change all parameters, troubleshoot, create/save configuration files for quick download to chargers			
Status Reporting	LEDs	Two multi-color front panel status LEDs			
	Metering	AC & DC Voltmeter accurate to $\pm$ 2%; AC frequency meter to $\pm$ 1.5%; AC & DC ammeter to $\pm$ 5%; DC output watts			
	Status display	20-character display of status & alarm messages.			
	Data logging	Data logging to internal memory, based on events and at fixed times. Logs retrieved using computer network connection.			
Alarms	Alarm Outputs	Factory set, field reconfigurable, latching and non-latching. Alarms available via comm port, alarm relays, and on LCD.			
	Alarm Inputs	Two optional input contacts (via battery monitor) to monitor status of external devices such as fan or hydrogen monitor			
	Alarm Form C contacts	Five Form C contacts, rated 30V, 2A resistive, assignable. Two optional Form C contacts, 120VAC, 5A resistive, assignable	Five Form C contacts, rated 30V, 2A resistive, assignable. Two optional-120VAC, 5A or two 150VDC, 3A / 240VAC, 10A assignable	Nine Form C contacts, rated 30V, 2A resistive, assignable. Up to four optional 120V, 5A resistive or 150VDC, 3A / 240VAC, 10A assignable	
	Optional Pilot relay functions	Form C contacts configurable as pilot relays to switch external loads based on user-configurable conditions			
Networking	Modbus communications	Optional Modbus RS-485 or TCP/IP on RJ-45 port	Optional Modbus RS-485 or TCP/IP on RJ-45 port	Optional Modbus RS-485 on terminal blocks or TCP/IP on RJ-45 port	
	DNP3	Optional DNP3 RS-485 or TCP/IP on RJ-45 port	Optional DNP3 RS-485 or TCP/IP on RJ-45 port	Optional DNP3 RS-485 on terminal blocks or TCP/IP on RJ-45 port	
	IEC 61850	Optional IEC 61850 TCP/IP on RJ-45 port			
	SENSbus	Proprietary bus for connection of paralleled chargers and SENS accessories			
	Operating temperature	-40C to +70C; full spec from -40C to +50C. Display may be unreadable and suffer reduced life above 65°C. Cold starts down to -40°C.			
Environmental	Ingress protection	IP 20; NEMA 1			
	Humidity	5% to 95%, non-condensing			
	Altitude	0-6,500 ft (2,000 meters). Above this altitude, output is derated 0.012% per additional meter at rated ambient temp.			
	Vibration & shock resistance	EN60068-2-6, EN 60068-2-64 & EN 60068-2-27			
	Electrical transient	ANSI/IEEE C62.41, EN 61000-4-12 on power terminals, IEC 61000-6-5 and ANSI/IEEE C37.90			
	Abuse Protection	Reverse polarity	Charger self-protects without output protective device clearing. Indication via LED & LCD.		
Wrong battery voltage		Charger-battery voltage mismatch shuts down charger after 5 minutes. 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; recovery is automatic.			
Regulatory Compliance (pending)	North America	C-UL Listed for US & Canada: CSA 22.2, No. 107.2, UL 1012, UL 508A			
		NFPA-70, NEMA PE-5, PIP (optional)			
		FCC Part 15, Class A commercial use and ICES-003 (Canada)			
	European Union (CE)	Seismic: Rigid & non-structure wall and floor mount; max $S_{DS}$ of 2.5G. IBC 2000-2018, Calif. BC 2007-2016			
		EMC: 2014/30/EU (EN 61000-6-2 & EN 61000-6-4) LVD: 2014/35/EU (EN 60335-1 & EN 60335-2-29) RoHS 2: 2017/2102/EU (EN 50581)			
Construction	Housing	Wall mount or portable	Wall mount	Floor mount; integrated key lock and padlockable	
	Housing material	Aluminum with powder coated finish			
	Cable entry	Side entry with one 1 inch opening for DC and three 1/2 inch openings for AC and alarms/comms	Side entry with one 1-1/2 inch opening for DC and two 1 inch openings for AC and alarms/comms	Top, bottom or side with dedicated wiring trough and installer-determined conduit hole sizes using 3/4 inch pilot	
	Network/Alarm connections	Modbus: RJ-45 or terminal blocks 28 to 16 AWG. Form C alarms: 28 to 16 AWG.			
	Power connections	AC/DC terminal blocks: 14 - 3AWG	AC breaker: 14 - 1/0AWG DC breaker: 1AWG - 350kcmil	AC breaker: 14 - 1/0AWG DC breaker: $\leq$ 200A: 1AWG - 350kcmil. >200A: two 3/0AWG - 350kcmil.	

# EnerGenius DC Rectifier Modules

Rectifier modules are employed in all EnerGenius DC configurations.

Specifications: Rectifier Modules			
		120 VDC nominal	240 VDC nominal
AC input	Voltage, frequency	Full output power: 358-528 VAC 3-phase line to line connected, 47-63 Hz. 50% power limit from 188-357 VAC.	
	Input current	12 A maximum (at 358 VAC)	
	AC protection	Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4	
	Loss of phase	Continues operating with current limit reduced to 50%	
	Efficiency	Up to 95%	
	Power factor & Total Harmonic Distortion	PF to 0.98 typical at maximum rated load current and boost voltage. Total Harmonic Distortion <3%	
DC output	Voltage, current	Output adjustable from 8-160V. Max power and current limited to 7kW or 50A, whichever is less.	Output adjustable from 16-320V. Max power and current limited to 7kW or 25A, whichever is less.
	Soft start	System gradually increases current with a maximum of 5 seconds to full-required output	
	Charging modes	Multi-stage, including float, boost, HELIX and commissioning charge modes	
	Current limit	100% current capability subject to temperature limits and AC voltage limits; field adjustable from 25% to 100%	
	Charging characteristic	Constant voltage, current limited; patented Dynamic Boost and HELIX control	
	Line & load regulation	±0.5%	
	Output ripple	<30mV on-battery, <100mV off-battery. Delivers fast-responding, stable, well-filtered DC w/o batt	<30mV on-battery. <200mV off-battery. Delivers fast-responding, stable, well-filtered DC w/o batt
	Step response	8ms typical, to recover within 1% of rated output voltage from load step change of 50% rated output current	
	Parallel/load share operation	Active load sharing between rectifier modules within each charger	
	Output blocking protection	Serves as an "OR" diode to isolate non-functioning modules from other operating modules	
Environmental	Operating temperature	-40C to +70C; full spec from -40C to +50C.	
	Rectifier module cooling	Forced conduction™ system with metal to air heat exchanger to isolate electronics from airborne contamination. Redundant, adjustable speed fans with failure alarm, field replaceable. Field-cleanable air filters.	

Hot swap rectifiers in 56 kW systems.



## How To Order Rectifier Modules\*

Product Type	Cabinet Type	AC Volts	DC Volts	Output Current	Factory Option
<b>D</b>	<b>M</b>	<b>F</b>	<b>120</b>	<b>050</b>	<b>00</b>
(A)	(B)	(C)	(D)	(E)	(F)

	Parameter	Code	Value
(A)	Product Type	D	EnerGenius DC
(B)	Enclosure	M	Rectifier module
(C)	AC Input Voltage	F	Three Phase - 380-480 VAC nominal, 50/60 Hz
(D)	DC Output Voltage	120 240	120 VDC nom. 240 VDC nom.
(E)	Output Current	025 050	25 A at 240 VDC 50 A at 120 VDC
(F)	Configuration	00 XX	Standard Factory specified custom configuration

\*Rectifier modules are included with and shipped installed inside all systems. Ordering individual rectifier modules is only necessary to provision on-site spares or to add power/redundancy to chargers in the field.

## How To Order 7 kW Compact/Portable Charger

Product Type	Cabinet Type	-	AC Volts	-	DC Volts	-	Output Current	-	Display/Comms	Accy H/W	Surge Protect	-	Mount	Factory Option
D	S	-	F	-	120	-	050	-	A	0	A	-	0	00
(A)	(B)		(C)		(D)		(E)		(F)	(G)	(H)		(I)	(J)

	Parameter	Code	Value
(A)	Product Type	D	EnerGenius DC
(B)	Enclosure	S	7 kW compact/portable charger
(C)	AC Input Voltage	F	Three Phase - 380-480 VAC nominal, 50/60 Hz
(D)	DC Output Voltage	120 240	120 VDC nom. 240 VDC nom.
(E)	Output Current	006 012 025 035 050	6 A at 240 VDC 12 A at 120 or 240 VDC 25 A at 120 or 240 VDC 35 A at 120 VDC 50 A at 120 VDC
(F)	Display and Communications**	A	LCD, keypad control, 5 Form C relays
(G)	Accessory Hardware	0 A	None High Current AC Alarm Relays (2x 120 VAC, 5A)
(H)	Surge Protection	A B	Standard AC/DC surge protection Supplementary surge protection (UL1449 Open Type 2 Listed)
(I)	Mounting	0 1	Wallmount Portable
(J)	Configuration	00 01 XX	Standard PIP compliant (requires Accessory Hardware selection A above) Factory specified custom configuration

\*\*Networking hardware is standard. Software to enable communication protocols is optional. See *How to Order Communications Software Kits*.

## How To Order Communications Software Kits

EnerGenius DC chargers include communications hardware as standard. Order software kits separately.

- Modbus: p/n 209445-01
- DNP3: p/n 209445-02
- IEC 61850: p/n 209445-03

# How To Order 14 kW Wallbox

Product Type	Cabinet Type	AC Volts	AC Inter.	DC Volts	DC Inter.	Output Current	Redun./Term.	Display/Comms	Accy H/W	Surge Protect	Mount	Factory Option
D	W	F	S	120	S	100	0	A	0	A	0	00
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)

	Parameter	Code	Value
(A)	Product Type	D	EnerGenius DC
(B)	Enclosure	W	14 kW wallbox charger
(C)	AC Input Voltage	F	Three Phase - 380-480 VAC nominal, 50/60 Hz
(D)	AC Interrupt	S H	Standard Interrupt Rating (25 kAIC) High Interrupt Rating (65 kAIC)
(E)	DC Output Voltage	120 240	120 VDC nom. 240 VDC nom.
(F)	DC Interrupt	S H	Standard Interrupt Rating (10 kAIC) High Interrupt Rating (25 kAIC), not available on 240 VDC units
(G)	Output Current <i>(rectifiers included in system part number and ship installed)</i>	025 035 050 075 100	25 A at 240 VDC 35 A at 240 VDC 50 A at 120 or 240 VDC 75 A at 120 VDC 100 A at 120 VDC
(H)	Redundancy/Termination	0 1	No redundancy N+1
(I)	Display and Communications**	A B	Standard; LCD, keypad control, 5 Form C relays Standard plus breaker status
(J)	Accessory Hardware	0 A B C D	None High Current AC Alarm Relays (2x 120 VAC, 5 A) High Current AC/DC Alarm Relays (2x 150 VDC, 3 A / 240 VAC, 10 A) AC Breaker Shunt Trip Options B and C
(K)	Surge Protection	A B	Standard AC/DC surge protection Supplementary surge protection (UL1449 Open Type 2 Listed)
(L)	Mounting	0	Wallmount
(M)	Configuration	00 01 XX	Standard PIP compliant (requires <i>Accessory Hardware</i> selection A, B or D above) Factory specified custom configuration

\*\*Networking hardware is standard. Software to enable communication protocols is optional. See *How to Order Communications Software Kits*.

## How To Order Communications Software Kits

EnerGenius DC chargers include communications hardware as standard. Order software kits separately.

- Modbus: p/n 209445-01
- DNP3: p/n 209445-02
- IEC 61850: p/n 209445-03

# How To Order 56 kW Standard Cabinet

Product Type	Cabinet Type	AC Volts	AC Inter.	DC Volts	DC Inter.	Output Current	Redun./Term.	Redun./Term.	Display/Comms	Accy H/W	Surge Protect	Mount	Factory Option
D	K	F	S	120	S	400	300	0	A	0	A	0	00
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)

	Parameter	Code	Value
(A)	Product Type	D	EnerGenius DC
(B)	Enclosure	K	Cabinet
(C)	AC Input Voltage	F	Three Phase - 380-480 VAC nominal, 50/60 Hz
(D)	AC Interrupt	S H	Standard Interrupt Rating (25 kAIC) High Interrupt Rating (65 kAIC)
(E)	DC Output Voltage	120 240	120 VDC nom. 240 VDC nom.
(F)	DC Interrupt	S H	Standard Interrupt Rating (10kAIC for ≤200A, 25kAIC for >200A) High Interrupt (50kAIC for ≤200A, 100kAIC for >200A), not available for 240VDC at 50A
(G)	Output Current Capacity (rectifiers included in system part number and ship installed)	050 100 150 200 300 400	50 A at 240 VDC 100 A at 120 or 240 VDC 150 A at 240 VDC 200 A at 120 or 240 VDC 300 A at 120 VDC 400 A at 120 VDC
(H)	Factory Installed Output Current	025 050 075 100 125 150 175 200 250 300 350 400	25 A at 240 VDC 50 A at 120 or 240 VDC 75 A at 240 VDC 100 A at 120 or 240 VDC 125 A at 240 VDC 150 A at 120 or 240 VDC 175 A at 240 VDC 200 A at 120 or 240 VDC 250 A at 120 VDC 300 A at 120 VDC 350 A at 120 VDC 400 A at 120 VDC
(I)	Redundancy/Termination	0 1 2 A B	No redundancy N+1 N+2 Dual AC with common DC Dual System (AC, DC, control and accessories)
(J)	Display and Communications**	A B	LCD, keypad control, 9 Form C relays Standard plus breaker status
(K)	Accessory Hardware	0 A B C D E F	None High Current AC Alarm Relays (2x 120 VAC, 5 A) High Current AC/DC Alarm Relays (2x 150 VDC, 3 A / 240 VAC, 10 A) AC Breaker Shunt Trip Options B and C 2x Option B 2x Options B and C
(L)	Surge Protection	A B	Standard AC/DC surge protection Supplementary surge protection (UL1449 Open Type 2 Listed)
(M)	Mounting	1 2	Floormount Floormount with toplift
(N)	Configuration	00 01 XX	Standard PIP compliant (requires Accessory Hardware selection A, B, D, E or F above) Factory specified custom configuration

\*\*Networking hardware is standard. Software to enable communication protocols is optional. See *How to Order Communications Software Kits*.

Contact factory for higher power and/or non-standard configurations.

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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