EnerGenius® IQ

Automatic DC Power Supply/Charger With Intelligent Battery Monitoring and Data Logging

FAULT-TOLERANT DUAL MICROPROCESSOR TECHNOLOGY

Built-in intelligence makes it easy to correctly configure charger for battery and site conditions
Battery check system automatically tests battery to reduce risk of unexpected application shutdown
Black box data recorder helps spot previously hidden problems and direct preventive maintenance
Advanced user interface provides easy to understand system status and control
Dual microprocessors minimize risk of single point failure

ISO 9000 · c UL us LISTED · CE · FC · NEMA · ZONE 4 TESTED

SENS® STORED ENERGY SYSTEMS

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On-Board Information Technologies Take System Reliability To A New Level

The batteries most often used to provide standby power have limited lifetimes and can fail without warning, causing unexpected and costly application shutdown. Most users are forced to take the chance that their battery will remain healthy between maintenance visits because existing technologies to automatically monitor their batteries are too costly and complex.

Now, the *Energenius IQ* delivers *integrated* battery checking and data logging, making automatic battery assessment both affordable and easy to use. Optional enhanced battery assessment functions and network communications can easily be added in the field at any time.

EnerGenius IQ Technology

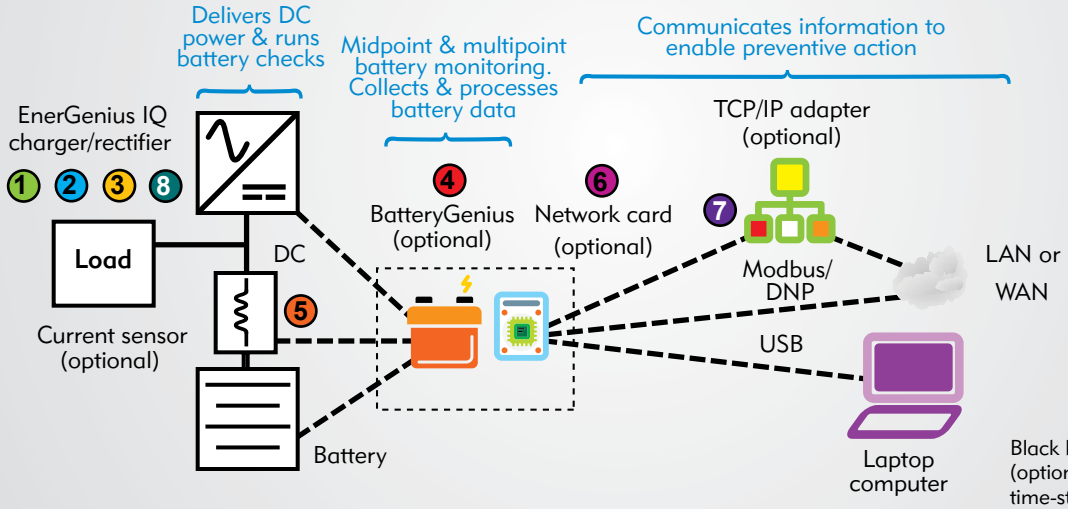
1 As with conventional charger/rectifiers, EnerGenius IQ delivers regulated DC to drive critical loads while recharging and maintaining the standby battery.

Unlike other charger/rectifiers, 2 an on-board battery check system verifies the battery's ability to power your load while 3 an optional black box records relevant data about your site. Together they give users information to act earlier than previously possible to avert catastrophic battery failure.

4 The optional BatteryGenius™ module collects and processes data on battery temperature, discharge duration and voltage. It also offers 24/7 battery midpoint monitoring. Depth of discharge information plus warning of excessive float current indicating battery end of life, is available with the addition of 5 a battery current sensor.

6 Adding a SENS network card to the BatteryGenius™ allows electronic download of real-time charger and battery data, plus history stored in the black box. 7 TCP/IP networking is available over an external TCP/IP adapter module.

8 Dual-microprocessor control ensures that high reliability, uninterrupted operation accompanies the rich feature set.



8 Control co-processor maintains routine output regulation and implements changes commanded by main processor.

3 Black box data recorder (optional) keeps permanent time-stamped record of DC voltages, alarms, user adjustments, temperatures, battery check outcomes, input supply, and discharge durations.

8 Main processor handles all alarm, user interface, data logging, and communications tasks, plus provides redundant overvoltage protection.

* BatteryGenius™ available in 2007, and can be added to the EnerGenius IQ system at any time without special tools.

Delivers Reliable DC Power To Critical Loads

Refineries and chemical plants
DC control systems
Engine starting

Oil and gas pipelines
Offshore platforms

Electric utility substations
Switchgear

Information technologies in SENS EnerGenius IQ bring revolutionary capabilities to the utility-grade DC power supply/charger.

EnerGenius IQ is programmed with battery and DC system knowledge from industry experts to cut the risk and cost of unexpected application shutdown. EnerGenius IQ checks your battery, records all relevant site data for analysis and clearly communicates results.

On-site battery intelligence maximizes battery life and performance

On-board battery intelligence makes easily understood recommendations to increase battery performance and life that are based on your site environment.

Integrated battery check system cuts risk of undetected battery failure

Batteries have limited lifetimes, and can fail without warning. The on-board battery check system tells if your battery can support a connected continuous load without taking the load offline. Additional battery diagnostics, including battery midpoint voltage and float current monitoring systems, are available as options.

Black box data recorder discovers hidden battery and site data to direct preventive action

Data recorder captures and logs previously unavailable system and site data. Data helps to perform failure analyses and to demonstrate if site conditions are conducive to long battery life. Users can leverage this knowledge to make performance-boosting improvements throughout their networks.

Remote status monitoring with available network communications keeps you informed

Offers a choice of Form C contact(s) or network communications to deliver system alarms and information. Network communications can be retrofitted in the field at any time.

Dual microprocessors minimize risk of single point failure

Dual microprocessors provide state-of-the-art internal redundancy, giving control system reliability superior to either conventional analog or single microprocessor controlled chargers.

Minimizes risk of unexpected battery failure

Intelligent User Interface Makes Battery System Easy To Understand

- Presents previously obscure battery and power system information clearly to both experienced and novice personnel
- Multicolor LEDs in the system mimic panel show exactly where system status is normal and where there is a problem
- LCD display presents clear messages and makes adjustments simple
- Lockable keypad allows user-definable degrees of control over adjustments and functions

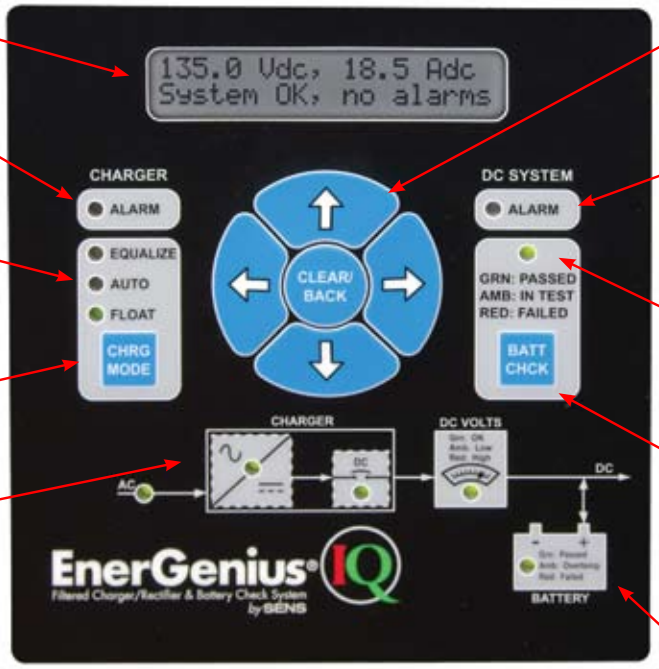
2 x 20 Backlit LCD displays all normal and alarm messages.

Charger master alarm LED lights in case of charger malfunction.

Charge mode LED shows which charge mode is active.

Charge mode button switches between modes.

LED mimic panel gives color-coded view of charger and system status at a glance.



Menu buttons navigate through straightforward LCD menus.

DC system master alarm LED lights in case of DC system problem such as ground fault, low or high voltage, or battery check failure.

Battery check status LED shows result of last battery check.

Manual battery check start button starts battery check cycle. Check can be set to run automatically at user-programmed intervals.

Battery status LED shows battery status. Battery overtemp indication available with optional BatteryGenius module.

Examples of clear display messages

Critical battery data is available both from black box recorder and front panel display

```
Batt chk fail cause:
Midpoint imbalance
```

```
9 Total hours
batt temp > 25C
```

Adjustment screen displays both volts/cell and absolute voltage. Up/down arrows show value being adjusted, and confirm which menu keys to use

```
2.343 VPC↑↓, 140.5 V
Eqlz V setting
```

Normal status display

```
135.0 Vdc, 18.5 Adc
System OK, no alarms
```

Expert System recommends user action to increase battery life

```
Recommend using
  chgr temp comp
```

Clear status messages

```
Battery Check FAIL
```

```
*** ALARM ***
AC fail/out of spec
```

```
Battery Check PASSED
```

```
125.2 V  00:00:19
Batt check running
```

Hours: Minutes: Seconds equalize countdown display

```
140.5 Vdc, 18.5 Adc
11:59:56 Eqlz to go
```

On-Site Battery Intelligence

Microprocessor based Battery Expert System reduces site risk and simplifies installation and maintenance tasks.

- **Temperature compensation expert** recommends when to activate the charger's temperature compensation system to increase battery life.
- **Backstop battery check** algorithm prevents your load from being dropped should the battery fail during a check by monitoring multiple battery parameters.
- **Battery type expert** loads safe charging, alarm and over voltage protection values should you need to change battery type to flooded lead, VRLA or nickel cadmium.
- **Dynamic automatic equalize** adapts to site conditions, battery size and discharge depth, to deliver correct equalize charge
- **"Remove cells for maintenance" function** takes a simple key press–rather than fiddling with battery voltage calculations and adjustments–to ensure the exact per cell charge voltage for the remaining cells.

EnerGenius IQ Features and Equipment Packages

	Feature	PE-5 Package [1]	EE Plus Package [2]	EE Extreme Package [3]
OUTPUT	12, 24, 48, 110/120 or 220/240 VDC nominal	Lead or nickel battery	Lead or nickel battery	Lead or nickel battery
	Line and load voltage regulation	± 0.25%	± 0.25%	± 0.25%
	Batt temp comp w/adjustable slope & expert system	Std	Std	Std
	Adjustable current limit: 33% to 110%	Std	Std	Std
	Output filter performance	2% rms[4]	30 mV rms[5]	30 mV rms[5]
INPUT	120/208/240 field selectable[6] or 480 VAC, 60 Hz	50/60 Hz optional	50/60 Hz optional	50/60 Hz optional
USER INTERFACE	2 x 20 backlit LCD and LED mimic panel	Std	Std	Std
	Float, auto, equalize, commission modes & LEDs	Std	Std	Std
	All parameters keypad adjustable, with keypad lock	Std	Std	Std
BATTERY CHECK & MONITOR	Manual battery check button	Std	Std	Std
	Adjustable automatic battery check system	Std	Std	Std
	Midpoint or multipoint battery monitor	Optional	Optional	Optional
	Battery float current monitor and alarm	Optional	Optional	Optional
ALARMS & COMMUNICATIONS	Alarm package with summary Form C contact	Std	Std	Std
	Individual Form C contacts for each alarm[7]	Optional	Optional	Optional
	Audible alarm	Std	Std	Std
	Network communications option[8]	Optional	Optional	Optional
SAFETY & RELIABILITY FEATURES	NEMA PE-5 compliant & high efficiency[9]	Standard	Standard	Standard
	2-pole AC circuit breaker, 10 KAIC	Std	Std	
	2-pole AC circuit breaker 18-25 KAIC, w/ inrush limiter	--	--	Std
	2-pole AC circuit breaker 65 KAIC, w/ inrush limiter	--	--	Factory option[10]
	2-pole UL listed DC circuit breaker	Std	Std	Std
	Electronic soft start & programmable start delay	Std	Std	Std
	Backwards battery protection	Siren	Siren & diode	Siren & diode
	Fault tolerant dual microprocessor architecture	Std	Std	Std
	All-digital design – no potentiometers	Std	Std	Std
	Conformal coated SMT circuit card	Std	Std	Std
	Redundant and selective high voltage shutdown	Std	Std	Std
	-40C to +50C operating temp with overtemp protection	Std	Std	Std
	Seismic zone 4 tested and compliant	Std	Std	Std
	ANSI C62.41 surge withstand	Std	Std	Plus ANSI C37-90[11]
	Blocking diode	--	Std	Std
HISTORY & EVENT LOGGING	Short term event, environment & settings change record	Std	Std	Std
	128 MB long-term black box memory	Optional	Optional	Optional
	Ambient temperature sensor and record	Std	Std	Std
	Battery temperature sensor and record[8]	Optional	Optional	Optional
METERS	1% accuracy digital DC volts & amps; AC input meters	Std	Std	Std
INDUSTRY STANDARD & AGENCY COMPLIANCE	Voltage displays in both v/c and absolute volts	Std	Std	Std
	C-UL listed (60 Hz) & CE marked (50/60 Hz)	Std	Std	Std
	Exceeds FCC, EN RF emissions & industrial immunity	Std	Std	Std
	NEMA PE-5 compliant	Std	Std[12]	Std[12]
	RoHS compliant	Std	Std	Std
MECHANICAL	NEMA 1, IP20 protection rating	IP22, NEMA 4 option	IP22, NEMA 4 option	IP22, NEMA 4 option
	Rugged steel housing & tough polyester finish	Lock optional	Lock optional	Lock optional

"Std" = standard feature. "- -" = not available. "Factory option": factory installed option only. "Optional": Feature can be installed in the system at any time. (1) Lowest cost package. (2) Specify for lowest ripple output or to include blocking diode (3) Specify for sites with heavier electrical transients or where the AC supply is of low impedance. (4) Ripple with or without battery attached (5) 30 mV on battery, 100 mV off battery. 240V units: 100 mV on battery and 200 mV off battery. (6) Units rated < 3.4 KW. Higher power units single input voltage only. (7) Includes AC fail, low DC volts, battery end of discharge, high DC volts, charger fail, overvoltage shutdown, ground fault. (8) Requires BatteryGenius module. (9) Meets full output spec on wider ranges of cell quantities than standard package. Reduces energy consumption nearly 2% below other units. (10) 65 KAIC AC breaker only available in larger Q2 housing. (11) Includes supplemental surge suppressor. (12) Blocking diode slightly reduces maximum available output current under extreme low AC line voltage and maximum battery cell count.

Specify the EnerGenius IQ System Best For Your Needs

Follow these simple steps to specify the correct charger model number:

A Choose the right output voltage to suit your battery

Nominal charger volts	Lead-acid battery	Nickel-Cadmium battery
12	6 cells	8-10 cells
24	12	18-20
48	23-24	36-38 (39-40)
110-120	53-60	81-93 (94-96)
220-240	104-120	162-184 (185-192)

Cells in (parentheses) indicate reduced low-line capability when in equalize mode

B Choose the correct output current rating

Use formula to solve for charger amp rating to simultaneously power your load and recharge your battery

FORMULA

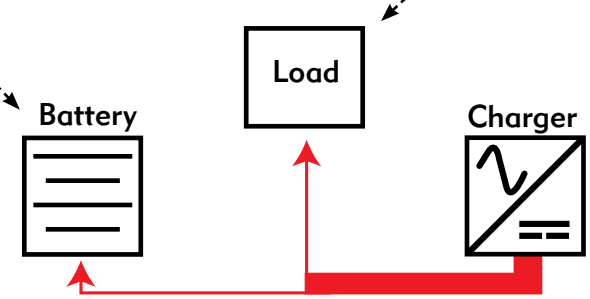
$$\left[\frac{AH \times K}{T}\right] + L = I$$

AH, or ampere hours capacity to be returned to the battery. Specify either duty cycle (amps x discharge hours) or AH rating of battery.

Constant K recharge inefficiency constant
- Lead battery 1.15
- Nickel battery.... 1.40

T is the time in hours you wish to allow for recharge.

+ **Amps load "L"** = **Charger amp rating "I"**



Example: Recharge a 220 AH lead-acid battery in 12 hours while powering a 10 amp load.

$$\frac{220 \times 1.15}{12} + 10 = 31.08 \text{ amps.}$$

Use 35A charger, which is next available rating.

C Specify your AC input supply

All chargers supplying output power less than 3.4 KW come standard with field selectable input.

D Safety agency marks

Factory specified – no decision needed

E Specify the IQ features package suited to your needs

F Specify alarm relay configuration

G Specify optional accessories as needed to complete your system

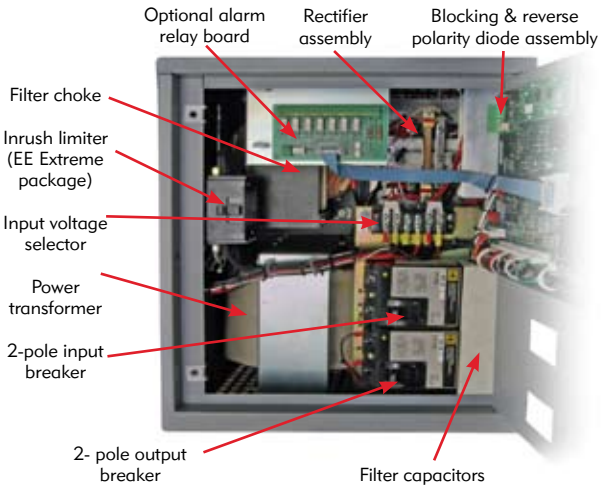
H Specify battery type and number of cells

How To Order

IQ	Nominal DC output voltage			Rated output current			AC	Agency	Feature package			Alarm	Factory config	
Q	0	4	8	0	3	5	T	L	5	1	4	A		
	Ⓐ			Ⓑ			Ⓒ	Ⓓ	Ⓔ			Ⓕ		

Q														

	Parameter	Code	Value
Ⓐ	Nominal DC output voltage	012	12 volts nominal
		024	24 volts
		048	48 volts
		120	110-120 volts
		240	220-240 volts
Ⓑ	Rated output current	006	6 amps
		012	12
		016	16
		025	25
		035	35
		050	50 ≤ 120V nominal output volts
		075	75
		100	100 ≤ 48 V nominal output volts
		150	150 ≤ 24V nominal output volts
Ⓒ	AC input, single phase	T	120/208/240 V, 60 Hz
		P	120/208/220-240 V, 50/60 Hz
		3	208 V, 60 Hz (> 3.4 KW output power)
		S	240 V, 60 Hz (> 3.4 KW output power)
		8	480 V, 60 Hz
		4	230, 50/60 (> 3.4 KW output power)
		V	400 VAC, 50/60 Hz
Ⓓ	Agency marks	L	UL & C-UL listed (60 Hz input units)
		G	UL & C-UL listed + CE marked (50/60 Hz input units)
Ⓔ	Feature package	511	PE-5 package: Standard input breaker, and 2% ripple filter (with or without battery)
		514	EE Plus package: Adds 30 mV output filter, reverse polarity diode and blocking diode
		544	EE Extreme package: Adds 18-25K AIC input breaker, input inrush limiter & supplementary surge suppression to EE Plus package
		584	EE Extreme package: With 65K AIC input breaker instead of 18-25K AIC. Available only in size Q2 cabinet.
Ⓕ	Alarm relay package	A	Single Form C summary alarm relay
		B	Individual Form C relays (AC fail, charger fail, low battery volts, high battery volts, end of discharge, ground fault)
			Other relay indications available on special order



Ⓖ Optional features (field retrofit possible except where shown)

- ❑ 50/60 Hz input (field retrofit not possible)
- ❑ Individual alarm relay package
- ❑ 128 MB black box site data recorder
- ❑ BatteryGenius battery data collector module
- ❑ Network communication card including USB, Modbus, DNP
- ❑ Battery float current sensor and alarm
- ❑ Drip shield or NEMA 4 housing
- ❑ Front door lock

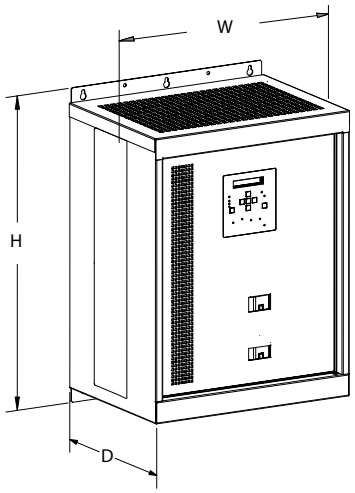
Ⓗ Specify battery type and number of cells

•Flooded lead-acid VRLA Ni-Cd Number of series cells in battery

Table of Ratings, Inputs, Circuit Breakers, Weights and Dimensions

Output			Input ratings			Case size & shipping weight		
V	A	Model Number	Input voltage[a]	Input current, worst case[b]	AC, DC breaker amps[c]	Case	Lbs	Kg
12	12	Q012-012	120/208/240[a], 480	3.2, 1.8, 1,6, 0.8	15[a], 15, 15	Q1	92	42
12	25	Q012-025	120/208/240[a], 480	4.2, 2.4, 2.1, 1	15[a], 15, 35	Q1	96	44
12	50	Q012-050	120/208/240[a], 480	13, 7.2, 6.3, 3.1	20[a], 15, 70	Q1	120	55
12	100	Q012-100	120/208/240[a], 480	24, 14, 12, 6.1	30[a], 15, 125	Q1	298	135
24	6	Q024-006	120/208/240[a], 480	2.9, 1.5, 1.5, 0.7	15[a], 15, 15	Q1	92	42
24	12	Q024-012	120/208/240[a], 480	5.6, 3.2, 2.8, 1.4	15[a], 15, 15	Q1	96	44
24	16	Q024-016	120/208/240[a], 480	7.4, 4.3, 3.7, 1.8	15[a], 20	Q1	104	47
24	25	Q024-025	120/208/240[a], 480	12, 6.7, 5.8. 2.9	15[a], 15, 35	Q1	119	54
24	35	Q024-035	120/208/240[a], 480	16, 9.1, 7.9, 4	20[a], 15, 45	Q1	129	59
24	50	Q024-050	120/208/240[a], 480	23, 13, 11, 5.6	30[a], 15, 70	Q1	134	61
24	75	Q024-075	120/208/240[a], 480	33, 19, 17, 8.3	45[a], 15, 90	Q2	308	140
24	100	Q024-100	120/208/240[a], 480	44, 25, 22, 11	60[a], 15, 125	Q2	320	145
24	150	Q024-150	208, 240[a], 480	37, 32, 16	50, 40[a], 20, 200	Q2	354	161
48	6	Q048-006	120/208/240[a], 480	5.2, 3, 2.6, 1.3	15[a], 15, 15	Q1	96	44
48	12	Q048-012	120/208/240[a], 480	10, 5.9, 5.1, 2.6	15[a], 15, 15	Q1	108	49
48	16	Q048-016	120/208/240[a], 480	13, 7.7, 6.7, 3.3	20[a], 15, 20	Q1	122	55
48	25	Q048-025	120/208/240[a], 480	21, 12, 10, 5.2	30[a], 15, 35	Q1	148	67
48	35	Q048-035	120/208/240[a], 480	29, 16, 14, 7.1	40[a], 15, 45	Q1	167	76
48	50	Q048-050	120/208/240[a], 480	40, 23, 20, 10	50[a], 15, 70	Q1	190	86
48	75	Q048-075	208, 240[a], 480	34, 30, 15	45, 40[a], 20, 90	Q2	344	156
48	100	Q048-100	208, 240[a], 480	45, 39, 20	60, 50[a], 25, 125	Q2	340	155
120	6	Q120-006	120/208/240[a], 480	12, 7, 6.1, 3.1	15[a], 15, 15	Q1	130	59
120	12	Q120-012	120/208/240[a], 480	23, 14, 12, 5.9	30[a], 15, 15	Q1	152	69
120	16	Q120-016	120/208/240[a], 480	31, 18, 16, 7.8	40[a], 15, 20	Q1	186	85
120	25	Q120-025	120/208/240[a], 480	47, 27, 23, 12	60[a], 15, 35	Q1	210	95
120	35	Q120-035	208, 240[a], 480	38, 33, 16	50, 45[a], 20, 45	Q2	322	146
120	50	Q120-050	208, 240[a], 480	54, 46, 23	70, 60[a], 30, 70	Q2	375	170
240	6	Q240-006	120/208/240[a], 480	23, 14, 12, 5.9	30[a], 15, 15	Q1	150	68
240	12	Q240-012	120/208/240[a], 480	45, 26, 23, 11	60[a], 15, 15	Q1	210	95
240	16	Q240-016	208, 240[a], 480	35, 30, 15	45, 40[a], 20, 20	Q2	320	140
240	25	Q240-025	208, 240[a], 480	54, 46, 23	70, 60[a], 20, 35	Q2	375	170

[a] Indicates standard input voltage configuration. Standard input voltage configuration for 50/60 Hz units is either field selectable 120/208/220-240 VAC or 230 or 240 volts. All units with field selectable 60 Hz input also have field selectable 50/60 Hz voltage. Circuit breaker ratings are identical for field selectable units. 380-400 or 415 VAC, 50/60 Hz is available on request.
[b] Current ratings shown are for respective input voltages. Current consumption at nominal input voltage is 8-13% less than worst case value shown, depending on model. [c] Three ratings show standard AC breaker with footnote, 480V input breaker and DC output breaker in blue.



Housing Dimensions

	Width	Depth	Height
Q1 – wall mount	17.00" (432 mm)	12.95" (329 mm)	20.26" (514 mm)
Q1 – rack mount	19.25" (489 mm)	12.95" (329 mm)	20.26" (514 mm)
Q2 – wall mount	21.00" (534 mm)	16.06" (408 mm)	30.60" (777 mm)
Q2 – free standing	21.00" (534 mm)	16.06" (408 mm)	33.50" (851 mm)
Q2 – rack mount	23.00" (584 mm)	16.06" (408 mm)	30.60" (777 mm)

The future of reliable DC power

ISO 9000 · c UL us LISTED · CE · FC · NEMA · ZONE 4 TESTED

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