

ENGINEERED WITH THIN PLATE PURE LEAD (TPPL) TECHNOLOGY

EXTREME POWER ***AND ENDURANCE***



ODYSSEY[®]
Extreme
SERIES™

DRIVE IT TO EXTREMES

Twice the overall power as conventional batteries!

Doing double duty

Some batteries offer enormous cranking power. Others, deep cycle reserve power. Unbeatable ODYSSEY® Extreme Series™ batteries do both.

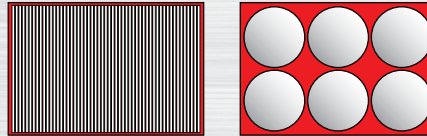
Even at very low temperatures, ODYSSEY Extreme Series batteries have the power to provide engine-cranking pulses in excess of 2250 amps for 5 seconds – double to triple that of equally sized conventional batteries. And they can handle 400 charge-discharge cycles to 80% depth of discharge.†

How so much power is possible

ODYSSEY Extreme Series batteries are made with flat plates made of 99.99% pure lead – not lead alloy. Pure lead plates can be made thinner, so we can fit more of them in the battery. More ODYSSEY battery plates mean more plate surface area. And that means more power – twice as much as conventional batteries.

Packed with more power

Like many popular spiral-wound batteries, ODYSSEY Extreme Series batteries employ dry cell Absorbed Glass Mat (AGM) technology to contain acid, allowing the battery to be installed even on its side. But the densely packed flat plates in an ODYSSEY Extreme Series battery avoid the “dead space” between cylinders in a “six pack” design. The result is 15% more plate surface area — and that translates to more power!



Unused battery space

ODYSSEY® Extreme Series™ batteries vs. spiral-wound designs: 15% more plate surface area!

ODYSSEY® batteries have a new name and new look!

While we have evolved the name to ODYSSEY® Extreme Series™ batteries, and we've updated the look, rest assured that the Extreme Series batteries are packed with the same power and technology you've been depending on for years.

ODYSSEY®
Extreme
SERIES™



Shipped fully charged. Get it and go!

ODYSSEY Extreme Series batteries are ready for use right out of the box. If the ODYSSEY Extreme Series battery's voltage is 12.65V or greater, simply install the battery in your vehicle and you are ready to go! If below 12.65V, boost charge following the instructions in the ODYSSEY Extreme Series battery Owner's Manual and/or Technical Manual. Putting a boost on the battery will not damage it, even if its voltage reads higher than 12.65V.

†PC370, PC950 and PC1100 are engine start only. No cycling.

RUN STRONGER LONGER

Designed and built to last up to 3 times as long as conventional batteries!

Boasting rugged construction and AGM design, ODYSSEY® Extreme Series™ batteries have an 8-12 year design life and a 3-10 year service life.

- Select ODYSSEY Extreme Series batteries are available with metal casing for high heat applications.
- AGM design holds acid in place to prevent spills, even when installed on its side.
- ODYSSEY Extreme Series batteries can be stored for up to 2 years and still be returned to full power.*

Tin Alloy Coated Brass Terminals

To ensure secure, corrosion-free cable connections, our brass terminals are coated with a high-quality tin alloy♦

Robust Intercell Connections

To resist vibration and eliminate internal sparking, cell connectors are casted to the plates and bonded.

Compressed AGM Plate Separators

For extreme vibration resistance, the AGM plate separators are compressed before being inserted into the case.

Pure Lead Plates

To provide more power, the plates in our batteries are constructed from 99.99% pure lead. The plates are extremely thin, so more of them can fit into the battery. More lead plates means more power.



Optional height adapter may be used on 34-PC1500 models for installations where a group 24 or group 27 is required. Snap the adapter securely into place on the bottom of the 34-PC1500 battery. In some installations, the 34-PC1500 model with this adapter may be used to replace a group 24F or 27F depending on required cable length.

* At 25°C (77°F). Storage times will be even longer at lower temperatures. ♦Some models excluded. See table for details.

SUPERIOR STARTING POWER AND VIBRATION RESISTANCE

The ODYSSEY® Extreme Series™ battery's incredible combination of power and endurance makes these batteries ideal for just about anything, just about anywhere.



Emergency Response

ODYSSEY® Extreme Series™ batteries are always on call with maintenance-free starting power plus massive deep cycle reserve power for on-board accessories.

- Police cruisers
- Fire trucks
- Ambulances



4X4 & Off-Road

Rugged construction and non-spillable, dry cell design ensure extreme shock and vibration resistance for the toughest off-road applications.

- SUVs
- Light trucks
- Off-road vehicles



Heavy Duty/Commercial

Superior cranking power and deep cycle ability mean ODYSSEY Extreme Series batteries get the job done.

- Farm, lawn and garden equipment
- Tractor trailers
- Earth-moving/construction equipment





Classic & Antique Cars

The deep cycle reserve power of ODYSSEY® Extreme Series™ batteries ensures that classic and antique cars will start reliably, even after two years of sitting idle.

- Antique vehicles
- Classic trucks
- Muscle cars



Motorcycles & Powersports

The ODYSSEY Extreme Series battery delivers the power and durability that powersports vehicles demand. Rugged construction and non-spillable, dry cell design provides extreme shock and vibration resistance.

- Motorcycles and ATVs
- Personal watercraft
- Snowmobiles
- Ultralight and Gyrocopter™ aircraft



High Performance & Modified Vehicles

From starting high-compression engines to powering high-intensity discharge lights, ODYSSEY Extreme Series batteries can handle any upgrade, and can be mounted in almost any position.

- Tuner cars
- Race cars
- Dragsters

Sound and Video Packages

ODYSSEY Extreme Series batteries provide the power and mounting flexibility that today's high-wattage, in-car sound and video systems demand.

- Audio systems
- Video systems
- Auxiliary amplifiers



ODYSSEY® EXTREME SERIES™ BATTERY

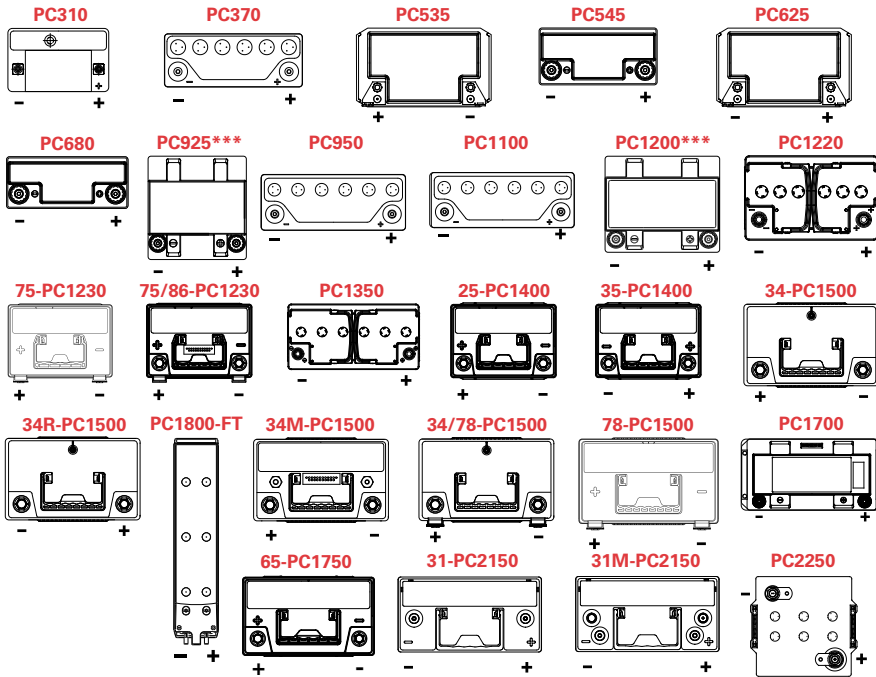
* Cold Start Performance S.A.E. J537 JUNE 82 ** Pulse Current † Can be fitted with brass automotive terminal
 Optional metal jackets available on PC545, PC680, PC925, PC1200, PC1700 and 31-PC2150
 Operating Temperature Range: PC310 and PC1800-FT: -40°F (-40°C) to 122°F (50°C), PC370, PC950 and PC1100: -40°F (-40°C) to 122°F (50°C),
 PC535 and PC625: -40°F (-40°C) to 113°F (45°C), PC545, PC680, PC925, PC1200 and PC1700 without metal jacket: -40°F (-40°C) to 113°F (45°C),
 PC545, PC680, PC925, PC1200 and PC1700 with metal jacket: -40°F (-40°C) to 176°F (80°C), PC1220, PC1350 and PC2250: -40°F (-40°C) to 104°F (40°C),
 All other models: -40°F (-40°C) to 176°F (80°C)



| Model | Voltage | PHCA** (5 sec) | CCA* | HCA | MCA | Nominal Capacity | | Reserve Capacity Minutes | Length inches (mm) | Width inches (mm) | Height inches (mm) | Weight lbs (kg) | Terminal | Torque Specs in-lbs (Nm max) | Internal Resistance (mΩ) | Short Circuit Current |
|---------------|---------|-------------------|------|------|------|--------------------|--------------------|--------------------------------|--------------------------|-------------------------|--------------------------|-----------------------|---|---|--------------------------------|-----------------------------|
| | | | | | | (20 Hr Rate-Ah) | (10 Hr Rate-Ah) | | | | | | | | | |
| PC310 | 12 | 310 | 100 | 200 | 155 | 8 | 7 | 9 | 5.43 (138.0) | 3.39 (86.0) | 3.90 (99.0) | 5.9 (2.7) | M4 Receptacle | 8.9 (1.0) | 27.1 | 455A |
| PC370 (ER15) | 12 | 425 | 200 | 315 | 270 | 15 | 14 | 25 | 7.9 (200.0) | 3.0 (77.0) | 5.5 (140.0) | 12.5 (5.7) | M6 Stud | 35 (3.9) | 13.5 | 891A |
| PC535 | 12 | 535 | 200 | 300 | 265 | 14 | 13 | 21 | 6.70 (170.2) | 3.90 (99.1) | 6.24 (158.5) | 12.0 (5.4) | M6 Receptacle | 40 (4.5) | 8 | 1000A |
| PC545 | 12 | 460 | 150 | 280 | 220 | 13 | 12 | 18 | 7.01 (178.1) | 3.38 (85.9) | 5.16 (131.1) | 11.4 (5.2) | M6 Receptacle | 50 (5.6) | 10 | 1200A |
| PC625 | 12 | 540 | 220 | 400 | 330 | 18 | 17 | 26 | 6.70 (170.2) | 3.90 (99.1) | 6.95 (176.5) | 13.2 (6.0) | M6 Receptacle | 40 (4.5) | 7 | 1800A |
| PC680 | 12 | 520 | 170 | 350 | 280 | 16 | 16 | 24 | 7.27 (184.7) | 3.11 (79.0) | 7.55 (191.8) | 15.4 (7.0) | M6 Receptacle† or SAE 3/8-16" Receptacle | 50 (5.6) | 7 | 1800A |
| PC925 | 12 | 900 | 330 | 610 | 480 | 28 | 27 | 48 | 6.64 (168.6) | 7.05 (179.0) | 5.83 (148.1) | 26.0 (11.8) | M6 Receptacle† or SAE 3/8-16" Receptacle | 60 (6.8) | 5 | 2400A |
| PC950 (ER30) | 12 | 950 | 400 | 600 | 500 | 34 | 32 | 60 | 9.8 (250.0) | 3.8 (97.0) | 6.1 (156.0) | 20.0 (9.0) | M6 Stud | 35 (3.9) | 7.1 | 1700A |
| PC1100 (ER40) | 12 | 1100 | 500 | 800 | 650 | 45 | 43 | 87 | 9.8 (250.0) | 3.8 (97.0) | 8.1 (206.0) | 27.5 (12.5) | M6 Stud | 35 (3.9) | 5.1 | 2450A |
| PC1200 | 12 | 1200 | 540 | 860 | 725 | 42 | 40 | 78 | 7.87 (199.9) | 6.66 (169.1) | 7.60 (193.0) | 38.2 (17.4) | M6 Receptacle† or SAE 3/8-16" Receptacle | 60 (6.8) | 4.5 | 2600A |
| PC1220 | 12 | 1220 | 680 | 960 | 860 | 70 | 64.8 | 135 | 10.94 (278.0) | 6.88 (175.0) | 7.48 (190.0) | 45.6 (20.7) | DIN Lead Post | N/A | 5.7 | 2200A |
| 75-PC1230 | 12 | 1230 | 760 | 1050 | 815 | 55 | 50 | 110 | 9.47 (240.5) | 7.08 (179.8) | 7.44 (189.0) | 45.5 (20.6) | SIDE 3/8" Receptacle | 60 (6.8) | 2.5 | 3100A |
| 75/86-PC1230 | 12 | 1230 | 760 | 1050 | 815 | 55 | 50 | 110 | 9.47 (240.5) | 7.08 (179.8) | 7.98 (202.7) | 45.5 (20.6) | TOP SAE SIDE 3/8-16" Receptacle | 60 (6.8) side terminal only | 2.5 | 3100A |
| PC1350 | 12 | 1350 | 850 | 1080 | 960 | 95 | 88.5 | 195 | 13.90 (353.0) | 6.88 (175.0) | 7.48 (190.0) | 60.4 (27.4) | DIN Lead Post | N/A | 4.2 | 2900A |
| 25-PC1400 | 12 | 1400 | 850 | 1150 | 950 | 65 | 55 | 130 | 9.47 (240.5) | 6.85 (174.0) | 8.75 (222.3) | 50.0 (22.7) | SAE | N/A | 2.5 | 3100A |
| 35-PC1400 | 12 | 1400 | 850 | 1150 | 950 | 65 | 55 | 130 | 9.47 (240.5) | 6.85 (174.0) | 8.75 (222.3) | 50.0 (22.7) | SAE | N/A | 2.5 | 3100A |
| 34-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.88 (200.2) | 49.5 (22.4) | SAE | N/A | 2.5 | 3100A |
| 34R-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.88 (200.2) | 49.5 (22.4) | SAE | N/A | 2.5 | 3100A |
| 34M-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.95 (201.9) | 49.5 (22.4) | SAE and 3/8-16" Stud (Pos.), 5/16-18" Stud (Neg.) | 60 (6.8) stud only | 2.5 | 3100A |
| 34/78-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 7.08 (179.8) | 7.88 (200.1) | 49.5 (22.4) | TOP SAE SIDE 3/8-16" Receptacle | 60 (6.8) side terminal only | 2.5 | 3100A |
| 78-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 7.08 (179.8) | 7.34 (186.4) | 49.5 (22.4) | SIDE 3/8-16" Receptacle | 60 (6.8) | 2.5 | 3100A |
| PC1700 | 12 | 1550 | 810 | 1325 | 1175 | 68 | 65 | 142 | 13.03 (331.0) | 6.63 (168.4) | 7.78 (197.6) | 60.9 (27.6) | M6 Receptacle† or SAE 3/8-16" Receptacle | 60 (6.8) | 3.5 | 3500A |
| 65-PC1750 | 12 | 1750 | 950 | 1350 | 1070 | 74 | 65 | 145 | 11.84 (300.7) | 7.19 (182.6) | 7.49 (190.2) | 58.0 (26.3) | SAE | N/A | 2.0 | 5000A |
| PC1800-FT | 12 | 1800 | 1300 | 1600 | 1450 | 214 | 190 | 475 | 22.87 (581.0) | 4.92 (125.0) | 12.46 (316.5) | 132.3 (60.0) | 3/8" Stud | 80 (9.0) | 3.3 | 3800A |
| 31-PC2150 | 12 | 2150 | 1150 | 1545 | 1370 | 100 | 92 | 205 | 13.07 (332.0) | 6.91 (175.5) | 9.59 (243.6) | 77.8 (35.3) | 3/8" Stud or SAE† | 200 (22.6) max stud only | 2.2 | 5000A |
| 31M-PC2150 | 12 | 2150 | 1150 | 1545 | 1370 | 100 | 92 | 205 | 13.00 (330.2) | 6.80 (172.7) | 9.39 (238.5) | 77.8 (35.3) | SAE and 3/8-16" Stud (Pos.), 5/16-18" Stud (Neg.) | 200 (22.6) max stud only | 2.2 | 5000A |
| PC2250 | 12 | 2250 | 1225 | 1730 | 1550 | 126 | 114 | 240 | 11.26 (286.0) | 10.59 (269.0) | 9.17 (233.0) | 86.0 (39.0) | SAE Terminal and 3/8-16" Stud | 100 (11.0) For 3/8-16" stud only | 2.1 | 5000A |

POWER FOR EVERY APPLICATION.

TERMINAL LAYOUTS



Drawing sizes are for terminal position reference only; diagrams are not proportionate to each other.
 ***Optional Reversed Polarity (L)

WHAT IS COVERED BY THIS WARRANTY:

EnerSys Energy Products Inc. ("Manufacturer") warrants its ODYSSEY® batteries (hereafter referred to as "Battery") to be free of defects in material and workmanship for the following Applicable Warranty Periods:

- 2 years for Auxiliary Power (APU) and other non engine start cycling applications.
- 2 years for power sports applications.
- 3 years for commercial, industrial, marine and automotive applications in non-BCI sizes.
- 4 years for an engine starting application for PC1220, PC1350, PC2250 and all BCI sizes.

Register your ODYSSEY® battery

This warranty may vary from country to country; contact your authorized ODYSSEY Battery wholesaler or dealer for the applicable warranty.

WHEN DOES THE WARRANTY PERIOD BEGIN?

The Applicable Warranty Period begins from the date of first purchase with original receipt, or, if no receipt is available, from Manufacturer's shipping date as stated on the battery.

WHAT WILL ENERSYS DO?

Batteries determined to meet the conditions of this warranty will be replaced free of charge if, at the sole discretion of Manufacturer, adjustment is necessary due to defect in material or workmanship.

Batteries replaced under the warranty provisions will be shipped with a yellow replacement warranty sticker and carry only the remainder of the original Applicable Warranty Period.

WHAT IS NOT COVERED BY THIS WARRANTY:

A. The warranty does not cover a Battery reaching its normal end of life which may occur prior to the warranty periods stated above. Depending on the application a Battery can reach its normal end of life before the end of the Applicable Warranty Period.

• A Battery can deliver only a fixed number of usable amp-hours over its lifetime and is considered to have reached its normal end of life if the application uses up all of these amp-hours, regardless of the time the Battery has been in service. Therefore Manufacturer reserves the right to deny a warranty claim if it determines the Battery to be at its normal end of life, even if the claim is lodged within the Applicable Warranty Period.

B. This warranty does not cover used, pre-owned and/or ODYSSEY battery products purchased through unauthorized Internet channels (for example: auction sites and unauthorized mass e-commerce sellers/resellers).

C. The warranty does not cover a Battery that is damaged or destroyed as a result of one or more of the following:

- Willful abuse, misuse, physical damage, neglect or if the top decorative cover has been removed.
- Natural forces such as wind, lightning, hail; damage due to fire, collision, explosion, vandalism, theft, penetration or opening of the Battery case in any manner.
- Overcharging, undercharging, charging or installing in reverse polarity, improper maintenance, allowing the Battery to be deeply discharged via a parasitic load or mishandling of the Battery such as but not limited to using the terminals for lifting or carrying the Battery. Trickle chargers that do not have a regulated trickle charge voltage between 13.5V and 13.8V (no lower than 13.5V and no higher than 13.8V) will cause early failure of the Battery. Use of such chargers with the Battery will also void the Battery's warranty. For applications where an alternator is present, the alternator must deliver between 14.0V and 14.7V when measured at the Battery's terminals. Alternators that do not have a regulated charge between 14.0V and 14.7V (no lower than 14.0V and no higher than 14.7V) will cause early failure of the Battery. Use of such alternators with the Battery will also void the Battery's warranty.
- Failure to properly install the Battery or lack of metal jacket for high temperature or vibration applications.
- Repair or attempted repair of the Battery by anyone other than an authorized Manufacturer's representative shall void this warranty.

ODYSSEY® EXTREME SERIES™ BATTERY TECHNOLOGY COMPARISON

| | ODYSSEY® EXTREME SERIES™ BATTERIES | CONVENTIONAL BATTERIES |
|--------------|--|--|
| DESIGN LIFE | 8-12 years (Float) @ 77°F (25°C) | 5 years |
| SERVICE LIFE | 3 to 10 years | 1 to 5 years |
| ELECTROLYTE | Drycell ("starved electrolyte") no external leakage or corrosion | Most are acid flooded (causing acid burns and spills); some wet sealed or "gelled" |
| STORAGE LIFE | 2 years before needing charge @ 77°F (25°C) | 6-12 weeks before needing charge |
| SHIPPING | Air transportable; US Department of Transportation classified non-spillable (less expensive) | Ground transport; classified as hazardous material (more expensive) |
| END OF LIFE | Battery slowly loses power at end of life; no catastrophic failure | Immediate and catastrophic loss of power (can leave you stranded) |

- Normal or accelerated deterioration in the electrical qualities due to operating or application conditions.
- If the Battery is used for an application that requires higher cranking power or a greater reserve rating than the Battery is designed to deliver, or the Battery capacity is less than the Battery capacity specified by the vehicle manufacturer, or the Battery is otherwise used in applications for which it was not designed.
- Prolonged storage of vehicles with fuel injection computers, alarms, GPS and other electrical devices that require continuous battery power to support active memories; this power drain must be offset with a maintenance-float charger, periodic charging or disconnecting the Battery to prevent irreversible damage. A Battery with an open circuit voltage (OCV) of equal to or less than 10.0V will be deemed as over discharged and void warranty due to misuse and/or neglect.

ODYSSEY® EXTREME SERIES™ BATTERY WARNING – DO NOT USE ANY TYPE OF OIL, ORGANIC SOLVENT, ALCOHOL, DETERGENT, STRONG ACIDS, STRONG ALKALIS, PETROLEUM-BASED SOLVENT OR AMMONIA SOLUTION TO CLEAN THE BATTERY COVERS AND BATTERY TOPS. THESE MATERIALS MAY CAUSE PERMANENT DAMAGE TO THE BATTERY COVERS AND BATTERY TOPS AND WILL VOID THE WARRANTY.

Powered by **EnerSys**[®]

ODYSSEY[®] *Extreme* SERIES[™]

POWERSPORTS APPLICATION GUIDE



Motorcycles and Scooters

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|----------------|---------------------------|-------|---------------------|
| APRILIA | | | |
| 500 | Scarbeo | 04-05 | PC545 |
| BENELLI | | | |
| 150 | Velvet | 99 | PC310 |
| 250 | Velvet | 99 | PC310 |
| 900 | 900 Sei | ALL | PC680 |
| 900 | 900 (6 cylinder) | ALL | PC925 |
| ATK™ | | | |
| | All Electric Start Models | 91-95 | PC 310*1 |
| BIG DOG | | | |
| 1750 | Boxer | ALL | PC545 |
| 1750 | Bulldog | ALL | PC545 |
| 1750 | Husky | ALL | PC545 |
| 1750 | Husky/Husky XT | ALL | PC545 |
| 1750 | Mastiff | ALL | PC545 |
| 1750 | Pitbull | ALL | PC545 |
| 1750 | Pro Sport | ALL | PC545 |
| 1750 | Pro Sport 18 | ALL | PC545 |
| 1750 | Vintage Classic | ALL | PC545 |
| 1750 | Vintage Sport | ALL | PC545 |
| 1750 | Woft | ALL | PC545 |
| 1570 | Vintage Classic/Light | ALL | PC545 |
| 1442 | Aerosport | ALL | PC545 |
| 1442 | Bulldog | ALL | PC545 |
| 1442 | Pitbull | ALL | PC545 |
| 1442 | Pro Sport | ALL | PC545 |
| 1442 | Vintage Classic/Light | ALL | PC545 |
| 1340 | Aeroglide | ALL | PC545 |
| 1340 | Aerosport | ALL | PC545 |
| 1340 | Coyote | ALL | PC545 |
| 1340 | Proglide | ALL | PC545 |
| 1340 | Vintage | ALL | PC545 |
| 1340 | Vintage Classic/Light | ALL | PC545 |
| BMW® | | | |
| 1300 | K1300GT | 09-11 | PC680 |
| 1200 | K1200RS | 97-05 | PC680 |
| 1200 | K1200LT | 05-10 | PC680 |
| 1200 | KL1200LT, GT, RS, S | 99-05 | PC680 |
| 1200 | R1200RT | 05-11 | PC680 |
| 1200 | R1200C | 98-05 | PC680 |
| 1150 | R1150GS, R | 00-05 | PC680 |
| 1100 | R1100GS | 94-00 | PC680 |
| 1100 | R1100R | 94-00 | PC680 |
| 1100 | R1100RS, RT | 93-00 | PC680 |
| 1100 | R1100S | 99-00 | PC680 |
| 1100 | K1100LT/RS | 90-96 | PC680 |
| 1000 | All "K" Models | 83-93 | PC925L |
| 1000 | R100/7 | 80-84 | PC925L |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|---------------------------|------------------------------------|-------|---------------------|
| BMW® continued | | | |
| 1000 | 100RS | 80-84 | PC925L |
| 1000 | R100GS, PD, R, RS, RT | 87-95 | PC925L |
| 1000 | R100CS | 80-84 | PC925L |
| 1000 | All "R" Models | 80-94 | PC925L |
| 1000 | K100S/RT | 83 | PC925L |
| 1000 | R100GS/PD | 87-95 | PC925L |
| 900 | R90/6, R90S | 69-76 | PC925L |
| 850 | R850R | 95-97 | PC680 |
| 800 | R80GS, R80ST | 80-96 | PC680 |
| 800 | R80, R80RT | 84-95 | PC925L |
| 800 | R80/7, R80RT | 80-84 | PC925L |
| 750 | K75, RT | 85-95 | PC925L |
| 750 | K75C, S | 85-95 | PC680 |
| 750 | R75/5 | 70-73 | PC680 |
| 750 | R75/7 | 80-84 | PC925L |
| 750 | R75/6 | 69-76 | PC925L |
| 650 | R65 | 84-95 | PC925L |
| 650 | R65LS | 78-84 | PC680 |
| 600 | R60/5 | 70-73 | PC680 |
| 600 | R60/6, R60/7 | 80-84 | PC925L |
| 500 | R50/5 | 70-73 | PC680 |
| BOURGET BIKE WORKS | | | |
| ALL | Chopper, Magnum | ALL | PC545 |
| ALL | Fatso, Auto-Motorcycle, Retro | ALL | PC545 |
| ALL | Joker, Black Jack Ace, Kruzer | ALL | PC545 |
| ALL | Low-Blow, Beach Crusier, Fat Daddy | ALL | PC545 |
| BUELL® | | | |
| 1200 | X1, S3, S3T, M2 | ALL | PC545MJ |
| 1200 | S2, S2T, RR1200, RS1200, RSS1200 | ALL | PC535MJ |
| 1000 | RR1000 | 87 | PC535MJ |
| CAGIVA | | | |
| 900 | Canyon i.e. | 97-09 | PC535 |
| 650 | Raptor | 01 | PC310 |
| 750 | Elefant | 80-97 | PC535 |
| CCM™ | | | |
| 600 | All Electric Start Models | 96-01 | PC310*1 |
| DUCATI® | | | |
| 1098 | 1098 | 07 | PC545MJ*2 |
| 1000 | Replica II | 84 | PC535 |
| 907 | I.E. Paso | 90-94 | PC535 |
| 906 | Paso | 90-92 | PC535 |
| 900 | Replica II | 84 | PC535 |
| 900 | SD Darman, Sport | ALL | PC925L |
| 900 | SD Super Sport, SSD | 81-83 | PC925L |
| 860 | GT, GTS (electric start) | ALL | PC925L |
| 800 | ALL | 83 | PC535 |

*1 Battery installation requires rerouting of battery cables

*2 Requires shim pad in lower battery tray

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|----|-------|------|---------------------|
|----|-------|------|---------------------|

DUCATI® continued

| | | | |
|-----|-----------------------|-----|--------|
| 750 | GT, Laguna Seca | ALL | PC925L |
| 500 | GTL, GTV, Sport, Twin | ALL | PC680 |
| 350 | Sport, GTV, Twin | ALL | PC680 |

E-TON

| | | | |
|-----|---------------|-------|-------|
| 150 | Beamer R4-150 | 10-12 | PC310 |
| 150 | Matrix R4-150 | 10-12 | PC310 |

EXCELSIOR-HENDERSON

| | | | |
|------|---------|-------|-------|
| 1386 | Super X | 99-00 | PC545 |
|------|---------|-------|-------|

HARLEY DAVIDSON®

| | | | |
|------|------------------------------------|-------|----------|
| 1803 | CVO FLH (Touring) | 10-12 | PC925LMJ |
| 1803 | CVO FLST (Softail) | 10-12 | PC545 |
| 1803 | CVO FXD Fat Bob (Dyna) | 10-12 | PC545 |
| 1690 | FLHTK (Touring) | 10-12 | PC925LMJ |
| 1690 | FLST, FXST Series (Softail) | 11-12 | PC545 |
| 1690 | FXD Fat Bob (Dyna) | 11-12 | PC545 |
| 1584 | FL/FLH Series (Touring) | 07-11 | PC925LMJ |
| 1584 | FLST, FXST Series (Softail) | 07-12 | PC545 |
| 1584 | FXD Series (Dyna) | 07-11 | PC545 |
| 1450 | FXD | 99-06 | PC545 |
| 1450 | FXST, FLST | 00-06 | PC545MJ |
| 1450 | FL, FLH | 99-06 | PC925LMJ |
| 1340 | FXD, FXST Series | 97-99 | PC545 |
| 1340 | FXR | 99-00 | PC535 |
| 1340 | FXLR | 94 | PC535 |
| 1340 | FX/FXR | 80-94 | PC535 |
| 1340 | FLST Series (S,F & C) Softail | 97-99 | PC545MJ |
| 1340 | FXST, FLST Series Series (Softail) | 84-90 | PC535 |
| 1340 | FL, FLH | 97-98 | PC925LMJ |
| 1340 | FL, FLH Series (Touring) | 80-96 | PC680MJ |
| 1340 | FLHR Road King | 80-97 | PC680MJ |
| 1250 | VRSC V-Rod | 08-12 | PC545 |
| 1200 | XL XLH (Sportster) | 97-03 | PC545*2 |
| 1200 | XL XLH (Sportster) | 87-96 | PC535 |
| 1200 | FX Series (Electric Start) | 71-78 | PC535 |
| 1100 | XL Series (Sportster) | 87-93 | PC535 |
| 1000 | XL/XLH Series (Sportster) | 79-85 | PC535 |
| 1000 | XLX-61, XR1000 | 83-85 | PC535 |
| 883 | XL, XLH (Sportster) | 97-03 | PC545*2 |
| 883 | XLH (Sportster) | 86-96 | PC535 |

HONDA® MOTORCYCLES

| | | | |
|------|--------------------------|-------|-----------|
| 1800 | GL 1800, Gold Wing | 01-08 | PC545*3 |
| 1800 | VTX1800C, VTX1800R Retro | 02-11 | PC545*3 |
| 1500 | GL1500 Gold Wing | 88-00 | PC680MJ*1 |
| 1200 | GL1200 Gold Wing | 84-87 | PC680MJ*1 |
| 1100 | GL1100 Gold Wing | 80-83 | PC680MJ*1 |
| 1000 | CBX1000, SS opt. | 82 | PC680MJ*1 |
| 1000 | GL1000 Gold Wing | 75-79 | PC680MJ*1 |

*1 Battery installation requires rerouting of battery cables

*2 Requires shim pad in lower battery tray

*3 PC545 is 15/16 inch lower in height than OEM battery

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|----|-------|------|---------------------|
|----|-------|------|---------------------|

HONDA® MOTORCYCLES continued

| | | | |
|-----|-------------------------------|-------|-----------|
| 900 | CBR900R, RR | 93-99 | PC310*1 |
| 750 | CB750A Hondamatic | 76-78 | PC680MJ*1 |
| 750 | RVF750R (RC45) | 94 | PC310*1 |
| 750 | VFR750R (RC30) | 90 | PC310*1 |
| 650 | NT650 Hawk GT, NX650 | 88-91 | PC310*1 |
| 650 | NT650V, Vigor 650 | ALL | PC310*1 |
| 650 | NX650 | 88-91 | PC310*1 |
| 650 | SLR650 | ALL | PC310*1 |
| 650 | XR650L | 94-11 | PC310*1 |
| 600 | VT600C, CD Shadow Deluxe, VLX | 88-03 | PC310*1 |
| 600 | CBR600 | 87-00 | PC310*1 |
| 400 | CB400F CB-1 | 89-90 | PC310*1 |
| 200 | TR200 Fat Cat | 86 | PC310*1 |
| 150 | CH150 Elite | 87 | PC310*1 |
| 150 | FES150 | ALL | PC310*1 |
| 125 | FES125 | ALL | PC310*1 |
| 125 | Pantheon 125 | ALL | PC310*1 |

HONDA® SCOOTERS

| | | | |
|-----|--------------|-----|-------|
| 150 | CH150 Elite | 87 | PC310 |
| 150 | FE150 | 03 | PC310 |
| 125 | FE125 | ALL | PC310 |
| 125 | Pantheon 125 | ALL | PC310 |

HUSABERG®

| | | | |
|--|---------------------------|-------|---------|
| | All Electric Start Models | 97-00 | PC310*1 |
|--|---------------------------|-------|---------|

HYOSUNG

| | | | |
|-----|---------|-------|-------|
| 250 | GV250 | 09-11 | PC310 |
| 250 | NS3-250 | 09-12 | PC310 |

INNOCENTI

| | | | |
|-----|--------|-----|-------|
| 600 | Lambro | ALL | PC680 |
| 550 | Lambro | ALL | PC680 |
| 500 | Lambro | ALL | PC680 |
| 450 | Lambro | ALL | PC680 |
| 200 | Lambro | ALL | PC680 |
| 175 | Lambro | ALL | PC680 |

IRONHORSE

| | | | |
|-----|------------|-----|-------|
| ALL | All Models | ALL | PC545 |
|-----|------------|-----|-------|

KAWASAKI®

| | | | |
|------|--------------------------|-------|---------|
| 1500 | VN 1500-A Vulcan 88, SE | 87-98 | PC680MJ |
| 1500 | VN 1500-C Vulcan, 1500L | 96-97 | PC680MJ |
| 1300 | KZ 1300 Touring | 79-82 | PC680MJ |
| 1200 | ZG1200 Voyager XII | 86-03 | PC680MJ |
| 1100 | ZR1100 | 92-95 | PC535 |
| 1100 | ZX1100A GPz | 83-84 | PC535 |
| 1000 | KZ 1000-P Police | 82-03 | PC545MJ |
| 1000 | Z1000 | 03-12 | PC310*1 |
| 900 | ZX900-C, Ninja (ZX-9R) | 98-99 | PC310*1 |
| 900 | ZX900-E, F Ninja (ZX-9R) | 00-03 | PC310*1 |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|----------------------------|---|-------|---------------------|
| KAWASAKI® continued | | | |
| 900 | ZX990-C Ninja (ZX-9R) | 98-99 | PC310*1 |
| 750 | KZ750-L Ninja | 93 | PC310*1 |
| 750 | ZX750-K Ninja ZX-7R, 7RR | 91-97 | PC310*1 |
| 750 | ZR750 | 05-06 | PC310*1 |
| 750 | ZX750-L ZX-7 | 93-94 | PC310*1 |
| 750 | ZX750-M Ninja | 93-95 | PC310*1 |
| 650 | KLX650C, R | 93-96 | PC310*1 |
| 636 | ZX636-B, C Ninja ZX-6R | 03-05 | PC310*1 |
| 600 | ZX600-G, J Ninja | 98-08 | PC310*1 |
| 600 | ZX600-FA Ninja ZX-6R | 08-12 | PC310*1 |
| 600 | ZX6R-ZZR | 05 | PC310*1 |
| 600 | ZZR600 | 05-09 | PC310*1 |
| 600 | ZX600-K, M, N Ninja ZX-6RR | 03-06 | PC310*1 |
| 250 | EX250, Ninja 250R | 09-12 | PC310*1 |
| KTM® | | | |
| 640 | Adventurer, Duke, RXC LC4 Super Moto | 99-02 | PC310*1 |
| 620 | Adventure, Duke, E, LC4, Competition | 96-98 | PC310*1 |
| 400 | LC4 LC4-E/XC, LS-E | 96-98 | PC310*1 |
| 400 | RXC LC4 | 96-01 | PC310*1 |
| KYMCO | | | |
| 250 | Venox 250 | 09-10 | PC310 |
| MOTO GUZZI™ | | | |
| 1100 | 1100 Calif, Special, Jackel, Stone, EV | 94-05 | PC925L |
| 1100 | Quota 1100 ES | 99-02 | PC545 |
| 1100 | Sport 1100I | 97-99 | PC545 |
| 1100 | VII EV | 98-99 | PC925L |
| 1100 | VII Bassa | 99-00 | PC925L |
| 1100 | VII Le Mans, Sport | 99-05 | PC545 |
| 1100 | Stone, EV | 94-05 | PC925L |
| 1064 | California Classic, Vintage | 10-11 | PC545 |
| 1000 | California III | 89-93 | PC925L |
| 1000 | Convert, Daytona, LeMans, Millie, 1000NT, Quota | ALL | PC925L |
| 1000 | V10 Centauro Sport, GT | 99-09 | PC545 |
| 936 | Bellagio | 10 | PC545 |
| 850 | LeMans | ALL | PC925L |
| 850 | T3, T4, T5 | ALL | PC925L |
| 750 | Nevada, NTX, Strada | ALL | PC680 |
| 750 | V7 | ALL | PC925L |
| 750 | V75 | ALL | PC680 |
| 750 | Breva | 04-10 | PC545 |
| 750 | Nevada 750 Classic | 10 | PC545 |
| 750 | V7 Classic | 09-11 | PC545 |
| 650 | NTX | ALL | PC680 |
| 650 | V65 | ALL | PC925L |
| 650 | V65 Florida | ALL | PC680 |
| 500 | V50 | ALL | PC925L |
| 350 | V35 | ALL | PC925L |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|-------------------------|-------------------------------|-------|---------------------|
| MV AUGUSTA™ | | | |
| 750 | F4, Brutale | 00-08 | PC310*1 |
| 750 | Avivamento (Electric Start) | ALL | PC680 |
| 750 | GT | ALL | PC680 |
| PANZAR | | | |
| ALL | All Models | ALL | PC545 |
| POLARIS VICTORY™ | | | |
| 1731 | Vegas Jackpot, Hammer, Ness | 08-12 | PC545 |
| 1634 | Vegas Kingpin, Hammer (08) | 06-10 | PC545 |
| 1507 | All Models | 98-06 | PC545 |
| SUZUKI® | | | |
| 1400 | GV 1400GC, D, T Cavalcade | 86-88 | PC680MJ |
| 900 | RF900, R, S, ZS | 94-97 | PC310*1 |
| 750 | GSX-750F Katana | 98-06 | PC310*1 |
| 750 | GSX-R750 | 96-99 | PC310*1 |
| 750 | GSX-R750W | 94-95 | PC310*1 |
| 650 | DR650SE | 98-12 | PC310*1 |
| 650 | DR650SE (CN) | 96-97 | PC310*1 |
| 650 | GSX-650F | 08-11 | PC310*1 |
| 620 | QUV620F | 05 | PC545 |
| 600 | GSF600S Bandit | 96-03 | PC310*1 |
| 600 | GSX-600F Katana | 98-06 | PC310*1 |
| 600 | GSX-R600 | 97-12 | PC310*1 |
| 600 | GSX-R600W | 92-93 | PC310*1 |
| 600 | RF600R, S | 94-96 | PC310*1 |
| 400 | GSF400 Bandit | 91-93 | PC310*1 |
| SYM | | | |
| 200 | HD200 | 04-12 | PC310 |
| 200 | HD | 09 | PC310 |
| 125 | HD125 | 04-11 | PC310 |
| TITAN | | | |
| ALL | All Models | ALL | PC545 |
| TRIUMPH™ | | | |
| 2300 | Rocket III | 04-11 | PC545 |
| 1600 | Thunderbird | 11 | PC545 |
| 675 | Street Triple | 09-10 | PC310*1 |
| 600 | Daytona 600/650, Speed Four | 03-05 | PC310*1 |
| YAMAHA™ | | | |
| 1700 | XV1700A Road Star, Silverado | 04-09 | PC545 |
| 1600 | XV1600 Road Star | 99-03 | PC545*3 |
| 1300 | 1300 Royal Star | 96-07 | PC545*3 |
| 1300 | XVS13AY V Start 1300, Stryker | 09-12 | PC545*3 |
| 1300 | XVZ13 Royal Star/Venture | 99-12 | PC545*3 |
| 1300 | XVZ13 Venture/Royale | 86-93 | PC680MJ |
| 1200 | XVZ12 Venture/Royal | 83-85 | PC680MJ |

*1 Battery installation requires rerouting of battery cables

*3 PC545 is 15/16 inch lower in height than OEM battery

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|--------------------------|------------------------|-------|---------------------|
| YAMAHA™ continued | | | |
| 1100 | XJ1100 Maxim | 82 | PC680MJ |
| 1100 | XS1100 (All) | 78-81 | PC680MJ |
| 1100 | XV 1100, S | 86-99 | PC680MJ |
| 1100 | XV1100 Virago (All) | 86-99 | PC680MJ |
| 1000 | XV1000 Virago | 84-85 | PC680MJ |
| 920 | XV920 Virago | 82 | PC680MJ |
| 920 | XV920M Midnight Virago | 83 | PC680MJ |
| 920 | XV920R Virago | 81-83 | PC680MJ |
| 600 | XJ600S All | 92-98 | PC310*1 |
| 600 | XY600SD Seca II | 92-94 | PC310*1 |
| 600 | XT600E, F, G | 90-95 | PC310*1 |
| 50 | T10 | All | PC680 |

Utility Vehicles

| | | | |
|-------------------|--------------|-------|----------|
| ARTIC CAT® | | | |
| 1000 | Wildcat | 12 | PC925LMJ |
| 1000 | Prowler 1000 | 10-12 | PC925L |
| 700 | Prowler 700 | 10-12 | PC925L |
| 650 | Prowler 650 | 06-09 | PC680 |
| 550 | Prowler 550 | 10-12 | PC925L |
| 150 | All Models | 00-10 | PC310 |

| | | | |
|--------------------|----------------|----|-------|
| BOMBARDIER™ | | | |
| 1000 | Commander 1000 | 11 | PC545 |
| 800 | Commander 800 | 11 | PC545 |

| | | | |
|----------------|-----------------------------|-----|------------|
| CUSHMAN | | | |
| N/A | Front Liner, Turf Truckster | All | 34-PC1500T |

| | | | |
|-------------------|---------------------------------|-------|-------|
| JOHN DEERE | | | |
| N/A | 1800 Series, 6x4 Gator, Diesel | All | PC925 |
| N/A | Trail Gator, 4x2, 6x2 & 6x4 Gas | 88-04 | PC925 |

| | | | |
|------------------|-------------------------------|-------|-------|
| KAWASAKI® | | | |
| 750 | Teryx All Models | 08-11 | PC925 |
| 620 | KAF620, Mule 3000, 3010, 3020 | 03-07 | PC545 |
| 620 | KAF620R, Mule 4010 4x4 (CN) | 09-12 | PC545 |
| 620 | KAF620 Mule 2500, 2510, 2520 | ALL | PC625 |
| 620 | KAF620F, Mule 4010 4x4 (US) | 09-12 | PC925 |
| 540 | KAF540, Mule 2010, 2020, 2030 | ALL | PC625 |
| 450 | KAF450, Mule 1000 | ALL | PC625 |
| 360 | Advantage Classic | 03-07 | PC545 |

| | | | |
|--------------|--------|-------|-------|
| KYMCO | | | |
| 500 | UXV500 | 10-12 | PC545 |

| | | | |
|----------------|---|-----|-------|
| PLAGGIO | | | |
| N/A | Ape Car, Ape P50FL, Ape P602, Ape Poler | All | PC680 |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|-----------------|-----------------|-------|---------------------|
| POLARIS™ | | | |
| 900 | Ranger RZR | 11-12 | PC925LMJ |
| 800 | Ranger RZR | 09-12 | PC545 |
| 800 | Ranger RZR 4 | 10-12 | PC925LMJ |
| 800 | Ranger | 10-12 | PC925L |
| 700 | Ranger 6x6 | 06-10 | PC925LMJ |
| 500 | Ranger 6x6, 4x4 | 98-04 | PC925L |
| 500 | Ranger 4x4 | 04-10 | PC925LMJ |
| 425 | Ranger 2x4 | 02-03 | PC925L |

| | | | |
|----------------|-----------------|-------|-----------|
| SNAPPER | | | |
| N/A | Grounds Cruiser | 02-04 | PC925LMJT |

| | | | |
|----------------|---------|----|-------|
| SUZUKI® | | | |
| 620 | QUV620F | 05 | PC545 |

| | | | |
|-------------|--|-----|-----------|
| TORO | | | |
| N/A | Twister 1400, Twister 1600, Workman 1100 | All | PC925LMJT |

| | | | |
|----------------|-----------|-------|-------|
| YAMAHA™ | | | |
| N/A | All Rhino | 04-13 | PC925 |

All Terrain Vehicles

| | | | |
|-------------------|--------|-----|-------|
| ARTIC CAT® | | | |
| 400 | DVX400 | All | PC310 |
| 150 | 150 | 11 | PC310 |

| | | | |
|--------------------|-----------------------------------|-------|---------|
| BOMBARDIER™ | | | |
| 800 | Outlander 800EFI, Renegade | 06-11 | PC545 |
| 660 | Outlander 660EFI | 06 | PC545 |
| 650 | Outlander, MAX | 10-11 | PC545 |
| 650 | DS650 | 00-03 | PC545 |
| 650 | Quest | 02-05 | PC625 |
| 650 | Quest (Opt) | 02-05 | PC680 |
| 500 | Traxter (All Models), Quest | 99-05 | PC625 |
| 500 | Traxter (All Models), Quest (Opt) | 02-05 | PC680 |
| 500 | Outlander, MAX, Renegade | 10-11 | PC545 |
| 400 | Outlander 400XT, Max | 04-11 | PC545*3 |
| 400 | Outlander 400 | 03 | PC545 |
| 330 | Outlander 330 | 04 | PC545 |

| | | | |
|--------------------|--------------------------------------|-------|---------|
| CANNONDALE® | | | |
| 440 | Blaze, Cannibal, Moto, Glamis, Speed | 02-03 | PC310*1 |
| 400 | FX400 | 01 | PC310*1 |

*1 Battery installation requires rerouting of battery cables

*3 PC545 is 15/16 inch lower in height than OEM battery

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|------------------|---|-------|---------------------|
| DAZON | | | |
| 150 | Raider - Classic (Kart) | 04 | PC310 |
| 150 | Raider - Max (Kart) | 04 | PC310 |
| E-TON™ | | | |
| 150 | Viper 150R | 01-11 | PC310*1 |
| 150 | CXL 150 Yukon II | 02-03 | PC310*1 |
| 150 | YXL 150 Yukon | 00-01 | PC310*1 |
| HONDA® | | | |
| 700 | TRX700XX | 08-11 | PC310*1 |
| 680 | TRX680 Four Trax Rincon | 06-10 | PC545*3 |
| 650 | TRX650 FourTrax Rincon – Optional Cold Starting | 03-04 | PC545*3 |
| 400 | TRX400EX, FourTrax, Sportrax | 99-11 | PC310*1 |
| 300 | TRX300EX, FourTrax 300, SportTrax | 93-11 | PC310*1 |
| 250 | TRX250EX, Sportrax, TE, TM | 01-11 | PC310*1 |
| 125 | TRX125 FourTrax | 87-88 | PC310*1 |
| HYOSUNG | | | |
| 450 | TE450S | 08-11 | PC310 |
| KAWASAKI® | | | |
| 400 | KLF400-B Bayou 400 4x4 | 93-00 | PC625 |
| 400 | KVF400-A Prairie 400 4x4 (CN) | 97-00 | PC625 |
| 400 | KVF400-B Prairie 400 4X4 (CN) | 98-00 | PC625 |
| 400 | KSF400-A (KFX400) | 03-06 | PC310*1 |
| 300 | KLF300-A Bayou | 86-87 | PC625 |
| 300 | KLF300-B Bayou (CN) | 92-99 | PC625 |
| 300 | KLF300-C Bayou 300 4x4 (CN) | 92-05 | PC625 |
| 300 | KVF300-A Prairie 300, 4x4 (CN) | 99-01 | PC625 |
| 300 | KVF300-B Prairie 300, 4x4 (CN) | 99-02 | PC625 |
| KYMCO | | | |
| 500 | MXU500 | 10 | PC545 |
| 150 | MXU500 | All | PC310 |
| POLARIS™ | | | |
| 850 | Sportsman | 09 | PC925LMJ |
| 800 | Sportsman | 05-11 | PC925L |
| 700 | Sportsman, Military | 02-10 | PC925L |
| 600 | Sportsman | 04-05 | PC925L |
| 550 | Sportsman | 09 | PC545 |
| 550 | Sportsman EPS, XP | 10-11 | PC545 |
| 550 | Sportsman X2 | 10-11 | PC545 |
| 525 | Outlaw 525 | 08-11 | PC310 |
| 500 | Predator, Outlaw | 03-06 | PC310*1 |
| 500 | Sportsman HO | 96-11 | PC545 |
| 500 | Sportsman EFI | 06-10 | PC925LMJ |
| 500 | Ranger 6x6 | 98-00 | PC925L |
| 500 | Sportsman | 09 | PC925L |
| 450 | Diesel .445 Liter (primary) | 99-03 | PC925L |
| 450 | Outlaw 450 | 07-10 | PC310*1 |

*1 Battery installation requires rerouting of battery cables

*3 PC545 is 15/16 inch lower in height than OEM battery

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|------------------------------|-------------------------------|-------|---------------------|
| POLARIS™ continued | | | |
| 400 | Sportsman | 09-11 | PC545 |
| 335 | Sportsman | 98-01 | PC545 |
| 330 | Magnum, Trail Boss | 03-11 | PC545 |
| SUZUKI® | | | |
| 500 | LT-F500F Vinson Manual 4WD | 03 | PC535 |
| 400 | LT-Z400 QuadSport | 03-11 | PC310*1 |
| 300 | LT-F300F KingQuad (CN, Opt) | 99-02 | PC680 |
| 280 | LT-F4WDX KingQuad (CN, Opt) | 91-99 | PC680 |
| 250 | LT-Z250 QuadSport | 04-11 | PC310*1 |
| 250 | LT-4WD QuadRunner (Opt) | 87-99 | PC680 |
| 250 | LT-F250 QuadRunner (Opt) | 88-01 | PC680 |
| 250 | LT-F250F QuadRunner (CN, Opt) | 99-02 | PC680 |
| 250 | LT250EF QuadRunner | 85-86 | PC680 |
| YAMAHA™ | | | |
| 700 | YFM700FG Grizzly | 07-13 | PC545*3 |
| 660 | YFM660FA Grizzly | 02-08 | PC545*3 |
| 600 | YFM600FW Grizzly | 98-01 | PC545*3 |
| 550 | YMF550FG Grizzly | 10-13 | PC545*3 |
| 450 | YFM450FW Kodiak/Automatic | 03-09 | PC545*3 |
| 450 | YFM450FX Wolverine | 03-10 | PC545*3 |
| 450 | YFM45FG Grizzly | 07-13 | PC545*3 |
| 400 | YFK400FW Kodiak/Automatic | 96-02 | PC545*3 |
| 400 | YFM400FB Big Bear | 00-11 | PC545*3 |
| 400 | YFM400FVN Big Bear 4WD | 00-03 | PC545*3 |
| 400 | YFM400FG Grizzly | 07-08 | PC545*3 |
| 400 | YFM400FW Kodiak/Automatic | 03-06 | PC545*3 |
| 350 | YFM350FX Wolverine | 06-10 | PC545*3 |
| 350 | YFM350FG Grizzly, FG | 07-13 | PC545*3 |
| 350 | Bruin | 04-06 | PC545*3 |
| Personal Watercrafts | | | |
| AQUA-JET | | | |
| 432 | Aqua-Jet SX1 | 89-90 | PC535 |
| 430 | Aqua-Jet SX1 | 91 | PC535 |
| ARCTIC CAT® | | | |
| | Tiger Shark (All Models) | 93-01 | PC535 |
| BOMBARDIER™ - SEADOO® | | | |
| 1500 | GTI, GTX, RXP, RXT, Wake | 10-12 | PC925L |
| 1500 | GTX 4-Tez, RXP | 03-07 | PC925L |
| 1500 | GTI, RXT | 09 | PC925L |
| All | All Other Models | 94-07 | PC625 |
| All | All Models | 88-93 | PC535 |
| FAZER | | | |
| 430 | All Models | 88-89 | PC535 |
| HONDA® | | | |
| 1470 | Aqua Trax F-15, F-15X | 03-12 | PC545*3 |
| 1235 | Aqua Trax F/R-12, F/R-12X | 03-07 | PC545*3 |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|------------------|---|-------|---------------------|
| KAWASAKI® | | | |
| 1500 | JT1500-A STX-15F | 04-12 | PC545*3 |
| 1500 | JT1500B, C, 250X, Ultra LX, 260(L) X, 300(L)X | 07-12 | PC545*3 |
| 1200 | JH1200-A, Ultra 150 | 99-05 | PC545*3 |
| 1200 | JH1200-A, B, C, STX-R, STX-12F | 02-07 | PC545*3 |
| 1100 | JH1100-B Ultra 130 | 01-04 | PC545*3 |
| 1100 | JH1100 Zxi | 96-03 | PC545*3 |
| 1100 | JT1100-A1 STX | 97-03 | PC545*3 |
| 900 | JH900 Zxi | 95-97 | PC545*3 |
| 900 | JT900-A1, A2 STS, STX | 97-05 | PC545*3 |
| 800 | JS800 SX-R | 03-12 | PC545*3 |
| 750 | JH750 SS, ST, Xi, XiR | 92-99 | PC625 |
| 750 | JH750 ST, Zxi | 95-97 | PC545*3 |
| 750 | JS750 SX, ZX | 92-95 | PC625 |
| 750 | JS750 Sxi, Sxi Pro | 95-02 | PC545*3 |
| 750 | JT750 XiR, ST, STS | 94-95 | PC625 |
| 750 | JT750 STS, STX | 96-98 | PC545*3 |
| 650 | JF650 X2 | 86-95 | PC625 |
| 650 | JF650 TS | 89-96 | PC625 |
| 650 | JL650 SC | 91-95 | PC625 |
| 650 | JS650 SX | 87-95 | PC625 |
| 550 | JS550 SX | 86-95 | PC625 |
| 550 | JS550 | 82-85 | PC535 |
| 440 | JS440 | 87-92 | PC625 |
| 440 | JS440 | 80-86 | PC535 |
| 400 | JS400 | 76 | PC625 |
| 300 | JS300 TS, SX | 86-91 | PC625 |

| POLARIS™ | | | |
|-----------------|------------|-----|-------|
| All Sizes | All Models | ALL | PC625 |

| S.O.S Marine Mfg™ | | | |
|--------------------------|------------|-----|-------|
| All Sizes | All Models | ALL | PC535 |

| SCRAM JET, INC | | | |
|-----------------------|------------------|-------|-----------|
| 440 | Scram Jet Magnum | 89-94 | PC925LMJT |
| 440 | SideWinder | ALL | PC925LMJT |

| ULTRANAUTICS™ | | | |
|----------------------|----------------------|-------|--------|
| 800 | Sea Flash | 89-92 | PC680 |
| All Sizes | Jet Star 1250 (BOAT) | 88-90 | PC680 |
| All Sizes | Jet Star 1260 (BOAT) | 91 | PC680 |
| All Sizes | Wet Bike | 87-92 | PC680 |
| All Sizes | Wet Bike | 85-86 | PC925L |

| WET JET™ | | | |
|-----------------|------------|-----|-------|
| All Sizes | All Models | ALL | PC535 |

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|----------------|------------------------|-------|---------------------|
| YAMAHA™ | | | |
| All Sizes | All Wave Runner Models | 87-09 | PC625 |
| 1800 | FX,FZ | 09-12 | PC625 |
| 1100 | VX | 09-12 | PC625 |
| 700 | Superjet | 09-12 | PC625 |

Snowmobiles

| ARCTIC CAT® | | | |
|--------------------|----------------------------|-------|---------|
| | Cheetah | 86-90 | PC535MJ |
| | Cougar | 85-90 | PC535MJ |
| | EXT | 89-91 | PC535MJ |
| | Pantera | 80-85 | PC535MJ |
| | Panther | 80-88 | PC535MJ |
| | Super Jag | 87-88 | PC535MJ |
| | Wildcat (EFI) | 93 | PC535MJ |
| | 4 Stroke Trail, Touring | 02-03 | PC680MJ |
| | Bearcat 570 | 04-07 | PC680MJ |
| | Bearcat WT | 03-04 | PC680MJ |
| | EXT Dix (EFI) | 97-98 | PC680MJ |
| | Firecat | 03-06 | PC680MJ |
| | King Cat 900 | 04-06 | PC680MJ |
| | Mountain Cat 570, 800, 900 | 02-04 | PC680MJ |
| | Pantera | 95-98 | PC680MJ |
| | Pantera 800 | 02-04 | PC680MJ |
| | Panther 570 | 02-07 | PC680MJ |
| | Panther 660 | 06-07 | PC680MJ |
| | Sabercat 600, 700 | 04-06 | PC680MJ |
| | T660 Touring | 04-06 | PC680MJ |
| | Z 570 | 02-07 | PC680MJ |
| | ZL 800 | 02-03 | PC680MJ |
| | ZR 800 | 02-03 | PC680MJ |
| | ZR 900 | 03-06 | PC680MJ |

| BOMBARDIER™ – SKI DOO® | | | |
|-------------------------------|--------------------------------|---------|----------|
| | Elite | 04-06 | PC925LMJ |
| | ZX types | 02-03 | PC545MJ |
| | All Models | thru 98 | PC680MJ |
| | CK3 Types | 99-03 | PC680MJ |
| 800 | GSX, MX Z | 10-11 | PC545MJ |
| 800 | Renegade, Summit | 10-11 | PC545MJ |
| 600 | Expedition, Skandic, Summit | 10-11 | PC545MJ |
| 600 | GSX, GTX | 10-11 | PC545MJ |
| 600 | Grand Touring, Renegade | 10-11 | PC545MJ |
| 550 | Expedition, Skandic, Freestyle | 10-11 | PC545MJ |
| 550 | GSX, GTX, MX Z | 07-10 | PC545MJ |
| 550 | Grand Touring, Renegade | 10-11 | PC545MJ |
| 300 | Skandic | 10 | PC545MJ |

*3 PC545 is 15/16 inch lower in height than OEM battery

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

| CC | MODEL | YEAR | REPLACEMENT BATTERY |
|------------------|--------------------------------|-------|---------------------|
| KAWASAKI® | | | |
| | Snowmobile | ALL | PC680MJ |
| POLARIS | | | |
| | All Electric Start Kits | 85-93 | PC680MJ |
| | Indy, Indy Trail | 84-91 | PC680MJ |
| | Sprint (Electric Start) | 86-90 | PC680MJ |
| | FS/FST | 06-10 | PC545MJ |
| 800 | Rush, RMK, Pro, Assault, SWBK | 11 | PC545MJ |
| 750 | FS Wide Track | 10-11 | PC925LMJ |
| 750 | Turbo Switchback, Turbo Dragon | 06-10 | PC545MJ |
| 750 | Turbo, LX, IQ | 08-11 | PC545MJ |
| 600 | Wide Track | 10-11 | PC925LMJ |
| 600 | IQ Touring | 09-11 | PC545MJ |
| 600 | Rush, IQ, Shift, Switchback | 09-11 | PC545MJ |
| 600 | Turbo LX | 10 | PC545MJ |
| 550 | IQ, LXT, Shift | 11 | PC545MJ |
| 500 | Wide Track | 89-11 | PC680MJ |
| YAMAHA | | | |
| 1049 | Nitro | 09-13 | PC545MJ |
| 1049 | RS Vector | 10-11 | PC545MJ |
| 1049 | RS Venture | 09-11 | PC545MJ |
| 1049 | RS Viking Professional | 09-11 | PC545MJ |
| 1000 | RS1000S, GT, RS | 09 | PC545MJ |
| 1000 | RX1000R Rx (All models) | 03 | PC545MJ |
| 973 | Vector | 09 | PC545MJ |
| 973 | Viking | 09 | PC545MJ |
| 700 | VX700XTCD Vmax 700 XTC Deluxe | 98 | PC680MJ |
| 700 | VX700DX Vmax700 Deluxe | 99-00 | PC680MJ |
| 700 | VT700 Venture 700 | 98-03 | PC680MJ |
| 700 | SXV700ER Viper SXViper ER | 02-05 | PC680MJ |
| 700 | VX700ER Vmax 700ER | 01-02 | PC680MJ |
| 600 | VX600ER Vmax 600 ER | 02-03 | PC680MJ |
| 600 | VX600DX Vmax 600 Deluxe | 99-01 | PC680MJ |
| 600 | VT600 Venture | 99-03 | PC680MJ |
| 540 | EC540 Excel | 79-80 | PC680MJ |
| 500 | VX500 All ER & Deluxe | 99-01 | PC680MJ |
| 340 | ET E Enticer | 79 | PC680MJ |
| | Electric Start Kit 8DS Triple | ALL | PC680MJ |

Note: In personal watercraft PC625 can replace the PC545 as an upgrade provided an additional 1/2" in width and 1 3/4" height is acceptable.

PC625 can also replace YTX20-L-BS provided an additional 3/4" height is acceptable.

Please note that the recommended ODYSSEY® batteries for your powersport application may not be a direct replacement for your OE battery therefore modifications may need to be made to the hold down and/or cables to accommodate your ODYSSEY battery.

ODYSSEY[®]

BATTERY



Technical Manual

EIGHTH EDITION



Preface to the Eighth Edition

As with previous manuals, this latest edition of the ODYSSEY® Battery technical manual includes detailed performance data for the complete line of ODYSSEY® batteries. Updated test data will help ensure selection of the correct battery for every application.

In addition, this manual includes an expanded section on charging requirements for ODYSSEY batteries. This includes detailed information about the three-step charge profile that will restore a fully discharged battery to optimum power in about 6 to 8 hours.

You may notice that we've updated the look of ODYSSEY batteries to differentiate this premium line in the marketplace. You'll be pleased to know that beneath the surface is the same industry-leading technology, including Thin Plate Pure Lead (TPPL) construction, that has made ODYSSEY batteries the choice of knowledgeable automotive technicians and consumers nationwide.

INTRODUCTION

The ODYSSEY® battery ingeniously uses Absorbed Glass Mat (AGM) Valve Regulated Lead Acid (VRLA) technology to offer, in one package, the characteristics of two separate batteries. It can deep cycle as well as deliver serious cranking power. Traditional battery designs allow them to either deep cycle or provide high amperage discharges for applications such as engine starting. The ODYSSEY battery can support applications in either category. ODYSSEY batteries are capable of providing engine cranking pulses of up to 2,250A (PC2250) for 5 seconds at 77°F (25°C) as well as deliver 400 charge/discharge cycles to 80% depth of discharge (DOD) when properly charged. A typical starting, lighting and ignition (SLI) battery, for example, is designed to provide short-duration, high-amperage pulses; it performs poorly when repeatedly taken down to deep depths of discharge or if they are placed on a continuous trickle charge, such as when they are used to crank a backup generator. A traditional battery resembles either a sprinter or a long distance runner; an ODYSSEY battery will do both – provide short duration high amperage pulses or low rate, long duration drains.

WHY USE ODYSSEY® BATTERIES?

■ Guaranteed longer service life

With an 8- to 12-year design life in float (emergency power) applications at 77°F (25°C) and a 3- to 10-year service life depending on the nature of the non-float applications, ODYSSEY batteries save you time and money because you do not have to replace them as often. Unlike other AGM VRLA batteries, the ODYSSEY battery is capable of delivering up to 400 cycles when discharged to 80% DOD and properly charged.

■ Longer storage life

Unlike conventional batteries that need a recharge every 6 to 12 weeks, a fully charged ODYSSEY battery can be stored for up to 2 years at 77°F (25°C) from a full state of charge. At lower temperatures, storage times will be even longer.

■ Deep discharge recovery

The ease with which an ODYSSEY battery can recover from a deep discharge is extraordinary. A later section on storage and recharge criteria discusses test data on this important topic.

■ Superior cranking and fast charge capability

The cranking power of ODYSSEY batteries is superior to that of equally sized conventional batteries, even when the temperature is as low as -40°F (-40°C). In addition, with simple constant voltage charging there is no need to limit the inrush current, allowing the battery to be rapidly charged. Please see the section titled *Rapid charging of ODYSSEY batteries* for more details on this feature.

■ Easy shipping

The AGM valve-regulated design of the ODYSSEY battery eliminates the need for vent tubes; further, no battery watering is required and there is no fear of acid burns or damage to expensive chrome or paint. Because of the starved electrolyte design, the ODYSSEY battery has been proven to meet the US Department of Transportation (USDOT) criteria for a non-spillable battery.

■ Tough construction

The rugged construction of the ODYSSEY battery makes it suitable for use in a variety of environments ranging from vacuum to 2 atmospheres (29.4 PSI).

■ Mounting flexibility

Installing the ODYSSEY battery in any orientation other than inverted does not affect any performance attribute. There is also no fear of acid spillage.

■ Superior vibration resistance

ODYSSEY batteries have passed a variety of rigorous tests that demonstrate their ruggedness and exceptional tolerance of mechanical abuse. Please see the section titled *Shock, Impact and Vibration testing* for more details on these tests.

■ Ready out of the box

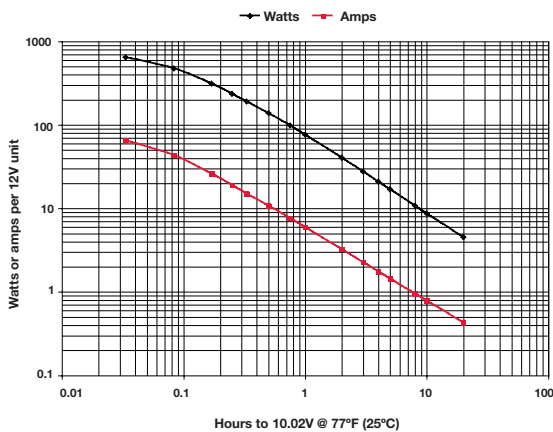
ODYSSEY batteries ship from the factory fully charged. If the battery's open circuit voltage is higher than 12.65V, simply install it in your vehicle and you are ready to go; if below 12.65V boost charge the battery following the instructions in this manual or the owner's manual. For optimum reliability, a boost charge prior to installation is recommended, regardless of the battery's open circuit voltage (OCV).

EXTENDED DISCHARGE CHARACTERISTICS

In addition to its excellent pulse discharge capabilities, the ODYSSEY® battery can deliver many deep discharge cycles, yet another area where the ODYSSEY battery outperforms a conventional SLI battery, which can deliver only a few deep discharge cycles.

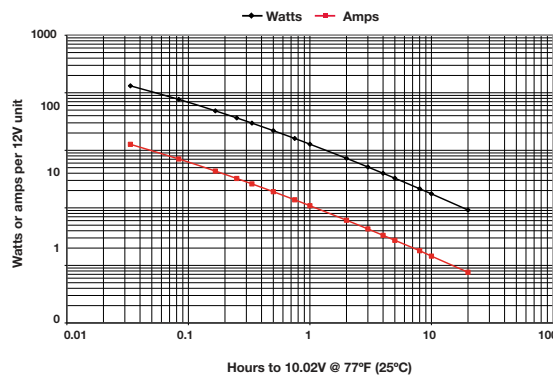
The following twenty graphs show detailed discharge characteristics of the entire ODYSSEY battery line. The end of discharge voltage in each case is 10.02V per battery or 1.67 volts per cell (VPC). Each graph shows both constant current (CC) and constant power (CP) discharge curves at 77°F (25°C). The table next to each graph shows the corresponding energy and power densities. The battery run times extend from 2 minutes to 20 hours.

PC310 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 738 | 80.8 | 2.7 | 24.6 | 613.2 | 20.4 | 273.3 | 9.1 |
| 5 min | 473 | 43.2 | 3.6 | 39.4 | 393.3 | 32.8 | 175.3 | 14.6 |
| 10 min | 312 | 26.0 | 4.4 | 53.1 | 259.4 | 44.1 | 115.6 | 19.7 |
| 15 min | 236 | 19.0 | 4.8 | 59.0 | 196.0 | 49.0 | 87.4 | 21.8 |
| 20 min | 191 | 15.0 | 5.0 | 62.9 | 158.4 | 52.3 | 70.6 | 23.3 |
| 30 min | 139 | 10.8 | 5.4 | 69.3 | 115.1 | 57.6 | 51.3 | 25.7 |
| 45 min | 98 | 7.6 | 5.7 | 73.9 | 81.8 | 61.4 | 36.5 | 27.4 |
| 1 hr | 76 | 6.0 | 6.0 | 76.4 | 63.5 | 63.5 | 28.3 | 28.3 |
| 2 hr | 41 | 3.2 | 6.5 | 81.0 | 33.7 | 67.3 | 15.0 | 30.0 |
| 3 hr | 28 | 2.3 | 6.8 | 82.8 | 22.9 | 68.8 | 10.2 | 30.7 |
| 4 hr | 21 | 1.8 | 7.0 | 83.7 | 17.4 | 69.6 | 7.8 | 31.0 |
| 5 hr | 17 | 1.4 | 7.2 | 84.5 | 14.0 | 70.2 | 6.3 | 31.3 |
| 8 hr | 11 | 0.9 | 7.6 | 86.1 | 8.9 | 71.5 | 4.0 | 31.9 |
| 10 hr | 9 | 0.8 | 7.8 | 86.8 | 7.2 | 72.1 | 3.2 | 32.2 |
| 20 hr | 5 | 0.4 | 8.6 | 90.5 | 3.8 | 75.2 | 1.7 | 33.5 |

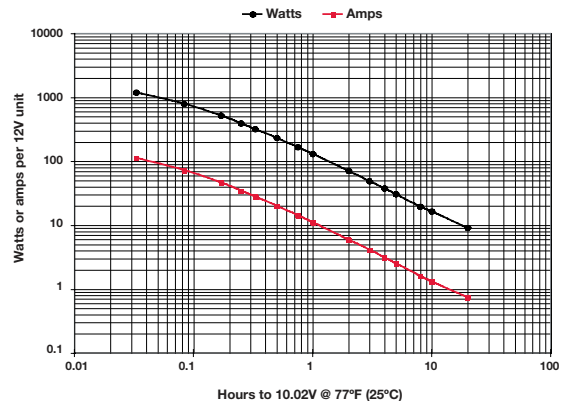
PC370 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 1320 | 127.1 | 4.2 | 44.0 | 612.2 | 20.4 | 231.6 | 7.7 |
| 5 min | 768 | 70.7 | 5.9 | 64.0 | 356.2 | 29.7 | 134.7 | 11.2 |
| 10 min | 485 | 43.6 | 7.3 | 80.9 | 225.1 | 37.5 | 85.2 | 14.2 |
| 15 min | 365 | 32.4 | 8.1 | 91.4 | 169.5 | 42.4 | 64.1 | 16.0 |
| 20 min | 297 | 26.1 | 8.7 | 99.0 | 137.8 | 45.9 | 52.1 | 17.4 |
| 30 min | 220 | 19.1 | 9.6 | 109.8 | 101.9 | 50.9 | 38.5 | 19.3 |
| 45 min | 161 | 13.8 | 10.4 | 120.6 | 74.6 | 55.9 | 28.2 | 21.2 |
| 1 hr | 128 | 10.9 | 10.9 | 127.8 | 59.3 | 59.3 | 22.4 | 22.4 |
| 2 hr | 73 | 6.1 | 12.2 | 145.2 | 33.7 | 67.3 | 12.7 | 25.5 |
| 3 hr | 51 | 4.3 | 12.9 | 153.7 | 23.8 | 71.3 | 9.0 | 27.0 |
| 4 hr | 40 | 3.3 | 13.3 | 159.6 | 18.5 | 74.0 | 7.0 | 28.0 |
| 5 hr | 33 | 2.7 | 13.7 | 163.8 | 15.2 | 76.0 | 5.7 | 28.7 |
| 8 hr | 21 | 1.8 | 14.4 | 171.8 | 10.0 | 79.7 | 3.8 | 30.1 |
| 10 hr | 18 | 1.5 | 14.5 | 175.2 | 8.1 | 81.3 | 3.1 | 30.7 |
| 20 hr | 9 | 0.8 | 15.2 | 183.6 | 4.3 | 85.2 | 1.6 | 32.2 |

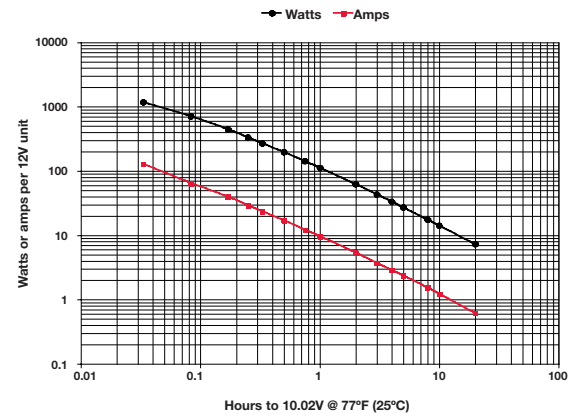
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 1182 | 112.0 | 3.40 | 35.5 | 450.7 | 13.5 | 218.9 | 6.6 |
| 5 min | 786 | 71.9 | 5.75 | 62.9 | 299.7 | 24.0 | 145.6 | 11.6 |
| 10 min | 517 | 46.3 | 7.90 | 87.9 | 197.2 | 33.5 | 98.8 | 16.3 |
| 15 min | 391 | 34.5 | 8.60 | 97.7 | 148.9 | 37.2 | 72.3 | 18.1 |
| 20 min | 316 | 27.7 | 9.10 | 104.4 | 120.6 | 39.8 | 58.6 | 19.3 |
| 30 min | 230 | 20.0 | 10.0 | 115.2 | 87.9 | 43.9 | 42.7 | 21.3 |
| 45 min | 165 | 14.2 | 10.7 | 123.8 | 62.9 | 47.2 | 30.6 | 22.9 |
| 1 hr | 129 | 11.0 | 11.0 | 129.0 | 49.2 | 49.2 | 23.9 | 23.9 |
| 2 hr | 70 | 5.9 | 11.8 | 140.4 | 26.8 | 53.5 | 13.0 | 26.0 |
| 3 hr | 49 | 4.1 | 12.3 | 145.4 | 18.5 | 55.5 | 9.0 | 26.9 |
| 4 hr | 37 | 3.1 | 12.4 | 149.3 | 14.2 | 56.9 | 6.9 | 27.6 |
| 5 hr | 31 | 2.5 | 12.5 | 152.4 | 11.6 | 58.1 | 5.6 | 28.2 |
| 8 hr | 19 | 1.7 | 13.6 | 159.4 | 7.6 | 60.8 | 3.7 | 29.5 |
| 10 hr | 16 | 1.3 | 13.0 | 163.2 | 6.2 | 62.2 | 3.0 | 30.2 |
| 20 hr | 9 | 0.74 | 14.8 | 178.8 | 3.4 | 68.2 | 1.7 | 33.1 |

PC535 performance data at 77°F, per 12V module



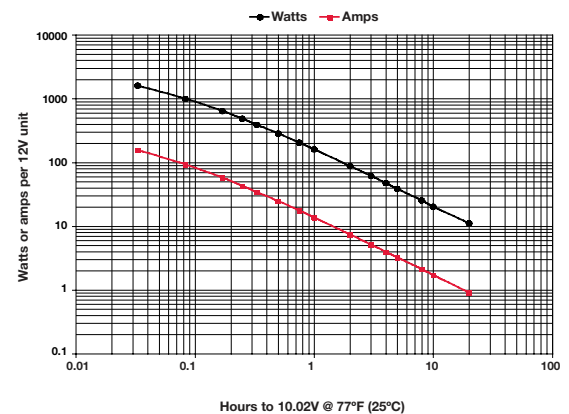
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 1361 | 128.1 | 4.3 | 45.3 | 680.8 | 22.7 | 238.7 | 8.0 |
| 5 min | 648 | 64.4 | 5.4 | 54.0 | 324.2 | 27.0 | 113.7 | 9.5 |
| 10 min | 415 | 39.6 | 6.7 | 70.6 | 207.8 | 35.3 | 72.8 | 12.4 |
| 15 min | 313 | 29.2 | 7.3 | 78.2 | 156.4 | 39.1 | 54.8 | 13.7 |
| 20 min | 254 | 23.5 | 7.8 | 83.8 | 127.0 | 41.9 | 44.5 | 14.7 |
| 30 min | 187 | 16.9 | 8.5 | 93.3 | 93.4 | 46.7 | 32.7 | 16.4 |
| 45 min | 136 | 12.2 | 9.2 | 101.7 | 67.9 | 50.9 | 23.8 | 17.8 |
| 1 hr | 107 | 9.6 | 9.6 | 107.4 | 53.7 | 53.7 | 18.8 | 18.8 |
| 2 hr | 60 | 5.3 | 10.6 | 120.0 | 30.0 | 60.0 | 10.5 | 21.1 |
| 3 hr | 42 | 3.7 | 11.1 | 126.0 | 21.0 | 63.1 | 7.4 | 22.1 |
| 4 hr | 32 | 2.9 | 11.6 | 129.6 | 16.2 | 64.9 | 5.7 | 22.7 |
| 5 hr | 26 | 2.3 | 11.5 | 132.0 | 13.2 | 66.1 | 4.6 | 23.2 |
| 8 hr | 17 | 1.5 | 12.0 | 134.4 | 8.4 | 67.3 | 3.0 | 23.6 |
| 10 hr | 14 | 1.2 | 12.0 | 138.0 | 6.9 | 69.1 | 2.4 | 24.2 |
| 20 hr | 7 | 0.7 | 14.0 | 144.0 | 3.6 | 72.1 | 1.3 | 25.3 |

PC545 performance data at 77°F, per 12V module

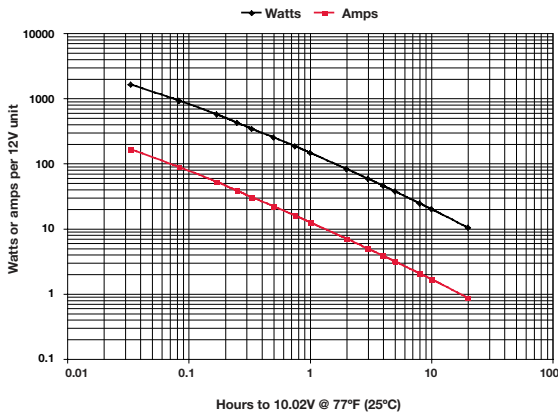


| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 1582 | 154.7 | 5.2 | 52.7 | 536.1 | 17.9 | 255.1 | 8.5 |
| 5 min | 986 | 91.6 | 7.6 | 82.2 | 334.4 | 27.9 | 159.1 | 13.3 |
| 10 min | 635 | 57.1 | 9.5 | 105.9 | 215.4 | 35.9 | 102.5 | 17.1 |
| 15 min | 478 | 42.3 | 10.6 | 119.4 | 161.9 | 40.5 | 77.0 | 19.3 |
| 20 min | 385 | 33.8 | 11.3 | 128.4 | 130.6 | 43.5 | 62.1 | 20.7 |
| 30 min | 281 | 24.4 | 12.2 | 140.7 | 95.4 | 47.7 | 45.4 | 22.7 |
| 45 min | 202 | 17.4 | 13.1 | 151.7 | 68.5 | 51.4 | 32.6 | 24.5 |
| 1 hr | 159 | 13.6 | 13.6 | 159.0 | 53.9 | 53.9 | 25.7 | 25.7 |
| 2 hr | 87 | 7.3 | 14.6 | 174.0 | 29.5 | 59.0 | 14.0 | 28.1 |
| 3 hr | 61 | 5.1 | 15.3 | 181.8 | 20.5 | 61.6 | 9.8 | 29.3 |
| 4 hr | 47 | 3.9 | 15.6 | 187.2 | 15.9 | 63.5 | 7.6 | 30.2 |
| 5 hr | 38 | 3.2 | 16.0 | 192.0 | 13.0 | 65.1 | 6.2 | 31.0 |
| 8 hr | 25 | 2.1 | 16.8 | 201.6 | 8.5 | 68.3 | 4.1 | 32.5 |
| 10 hr | 20 | 1.7 | 17.0 | 204.0 | 6.9 | 69.2 | 3.3 | 32.9 |
| 20 hr | 11 | 0.9 | 18.0 | 216.0 | 3.7 | 73.2 | 1.7 | 34.8 |

PC625 performance data at 77°F, per 12V module

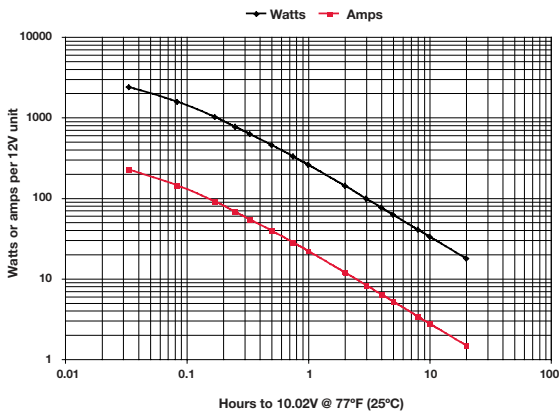


PC680 performance data at 77°F, per 12V module



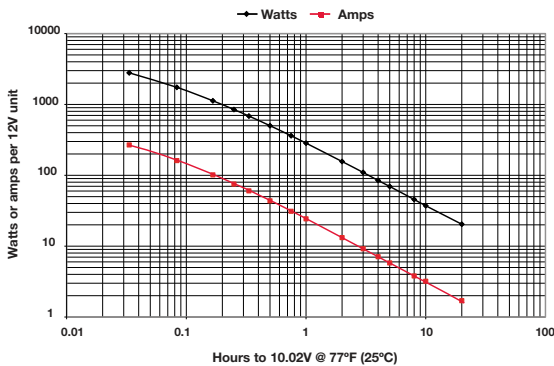
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 1486 | 143.0 | 4.8 | 49.5 | 601.4 | 20.0 | 212.3 | 7.1 |
| 5 min | 792 | 78.8 | 6.6 | 66.0 | 320.5 | 26.7 | 113.1 | 9.4 |
| 10 min | 512 | 49.3 | 8.4 | 87.1 | 207.3 | 35.3 | 73.2 | 12.4 |
| 15 min | 389 | 36.7 | 9.2 | 97.4 | 157.6 | 39.4 | 55.6 | 13.9 |
| 20 min | 318 | 29.6 | 9.8 | 104.9 | 128.7 | 42.5 | 45.4 | 15.0 |
| 30 min | 236 | 21.6 | 10.8 | 118.2 | 95.7 | 47.8 | 33.8 | 16.9 |
| 45 min | 173 | 15.6 | 11.7 | 130.1 | 70.2 | 52.6 | 24.8 | 18.6 |
| 1 hr | 138 | 12.3 | 12.3 | 138.0 | 55.8 | 55.8 | 19.7 | 19.7 |
| 2 hr | 79 | 6.9 | 13.8 | 157.2 | 31.8 | 63.6 | 11.2 | 22.5 |
| 3 hr | 56 | 4.8 | 14.4 | 166.5 | 22.5 | 67.4 | 7.9 | 23.8 |
| 4 hr | 43 | 3.7 | 14.8 | 172.8 | 17.5 | 69.9 | 6.2 | 24.7 |
| 5 hr | 35 | 3.0 | 15.0 | 177.0 | 14.3 | 71.6 | 5.1 | 25.3 |
| 8 hr | 23 | 2.0 | 16.0 | 187.2 | 9.5 | 75.8 | 3.3 | 26.7 |
| 10 hr | 19 | 1.6 | 16.0 | 192.0 | 7.8 | 77.7 | 2.7 | 27.4 |
| 20 hr | 10 | 0.8 | 16.0 | 204.0 | 4.1 | 82.6 | 1.5 | 29.1 |

PC925 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 2381 | 224.8 | 7.5 | 79.3 | 615.8 | 20.5 | 201.8 | 6.7 |
| 5 min | 1446 | 142.8 | 11.9 | 120.5 | 374.0 | 31.2 | 122.5 | 10.2 |
| 10 min | 954 | 90.6 | 15.4 | 162.2 | 246.8 | 42.0 | 80.9 | 13.7 |
| 15 min | 726 | 67.4 | 16.9 | 181.5 | 187.8 | 46.9 | 61.5 | 15.4 |
| 20 min | 592 | 54.2 | 17.9 | 195.2 | 153.0 | 50.5 | 50.1 | 16.5 |
| 30 min | 436 | 39.2 | 19.6 | 217.8 | 112.7 | 56.3 | 36.9 | 18.5 |
| 45 min | 316 | 28.1 | 21.1 | 236.7 | 81.6 | 61.2 | 26.8 | 20.1 |
| 1 hr | 250 | 21.9 | 21.9 | 249.6 | 64.6 | 64.6 | 21.2 | 21.2 |
| 2 hr | 138 | 11.9 | 23.8 | 276.0 | 35.7 | 71.4 | 11.7 | 23.4 |
| 3 hr | 96 | 8.3 | 24.9 | 288.0 | 24.8 | 74.5 | 8.1 | 24.4 |
| 4 hr | 74 | 6.4 | 25.6 | 297.6 | 19.2 | 77.0 | 6.3 | 25.2 |
| 5 hr | 61 | 5.2 | 26.0 | 303.0 | 15.7 | 78.4 | 5.1 | 25.7 |
| 8 hr | 40 | 3.4 | 27.2 | 316.8 | 10.2 | 81.9 | 3.4 | 26.9 |
| 10 hr | 32 | 2.8 | 27.5 | 324.0 | 8.4 | 83.8 | 2.8 | 27.5 |
| 20 hr | 17 | 1.5 | 30.0 | 348.0 | 4.5 | 90.0 | 1.5 | 29.5 |

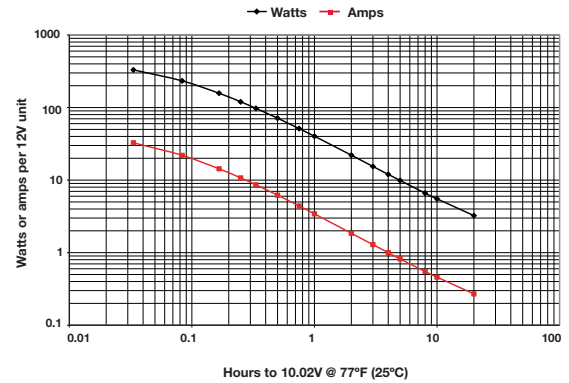
PC950 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 2794 | 268.3 | 8.9 | 93.1 | 755.0 | 25.2 | 310.4 | 10.3 |
| 5 min | 1745 | 161.3 | 13.4 | 145.4 | 471.6 | 39.3 | 193.9 | 16.2 |
| 10 min | 1126 | 101.4 | 16.9 | 187.7 | 304.4 | 50.7 | 125.1 | 20.9 |
| 15 min | 848 | 75.3 | 18.8 | 212.0 | 229.1 | 57.3 | 94.2 | 23.6 |
| 20 min | 686 | 60.3 | 20.1 | 228.6 | 185.4 | 61.8 | 76.2 | 25.4 |
| 30 min | 502 | 43.6 | 21.8 | 250.8 | 135.6 | 67.8 | 55.7 | 27.9 |
| 45 min | 362 | 31.1 | 23.3 | 271.4 | 97.8 | 73.3 | 40.2 | 30.2 |
| 1 hr | 284 | 24.3 | 24.3 | 284.4 | 76.9 | 76.9 | 31.6 | 31.6 |
| 2 hr | 157 | 13.2 | 26.4 | 313.2 | 42.3 | 84.6 | 17.4 | 34.8 |
| 3 hr | 110 | 9.2 | 27.6 | 329.4 | 29.7 | 89.0 | 12.2 | 36.6 |
| 4 hr | 85 | 7.1 | 28.4 | 338.4 | 22.9 | 91.5 | 9.4 | 37.6 |
| 5 hr | 70 | 5.8 | 29.0 | 348.0 | 18.8 | 94.1 | 7.7 | 38.7 |
| 8 hr | 46 | 3.8 | 30.4 | 364.8 | 12.3 | 98.6 | 5.1 | 40.5 |
| 10 hr | 37 | 3.2 | 32.0 | 372.0 | 10.1 | 100.5 | 4.1 | 41.3 |
| 20 hr | 20 | 1.7 | 34.0 | 408.0 | 5.5 | 110.3 | 2.3 | 45.3 |

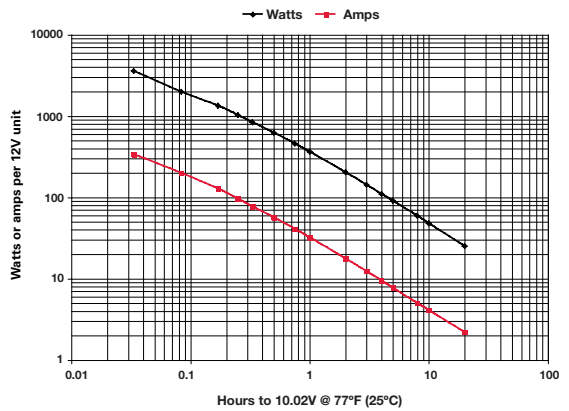
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 3307 | 326.8 | 10.9 | 110.2 | 668.1 | 22.3 | 264.6 | 8.8 |
| 5 min | 2333 | 219.5 | 18.3 | 194.4 | 471.3 | 39.3 | 186.6 | 15.6 |
| 10 min | 1575 | 143.2 | 23.9 | 262.5 | 318.2 | 53.0 | 126.0 | 21.0 |
| 15 min | 1200 | 107.2 | 26.8 | 300.0 | 242.4 | 60.6 | 96.0 | 24.0 |
| 20 min | 974 | 86.1 | 28.7 | 324.8 | 196.8 | 65.6 | 78.0 | 26.0 |
| 30 min | 713 | 62.0 | 31.0 | 356.7 | 144.1 | 72.1 | 57.1 | 28.5 |
| 45 min | 513 | 44.0 | 33.0 | 384.8 | 103.6 | 77.7 | 41.0 | 30.8 |
| 1 hr | 403 | 34.3 | 34.3 | 402.6 | 81.3 | 81.3 | 32.2 | 32.2 |
| 2 hr | 221 | 18.5 | 37.0 | 441.6 | 44.6 | 89.2 | 17.7 | 35.3 |
| 3 hr | 154 | 12.9 | 38.7 | 462.6 | 31.2 | 93.5 | 12.3 | 37.0 |
| 4 hr | 120 | 10.0 | 40.0 | 480.0 | 24.2 | 97.0 | 9.6 | 38.4 |
| 5 hr | 99 | 8.2 | 41.0 | 495.0 | 20.0 | 100.0 | 7.9 | 39.6 |
| 8 hr | 66 | 5.5 | 44.0 | 528.0 | 13.3 | 106.7 | 5.3 | 42.2 |
| 10 hr | 55 | 4.6 | 46.0 | 552.0 | 11.2 | 111.5 | 4.4 | 44.2 |
| 20 hr | 32 | 2.7 | 54.0 | 648.0 | 6.5 | 130.9 | 2.6 | 51.8 |

PC1100 performance data at 77°F, per 12V module



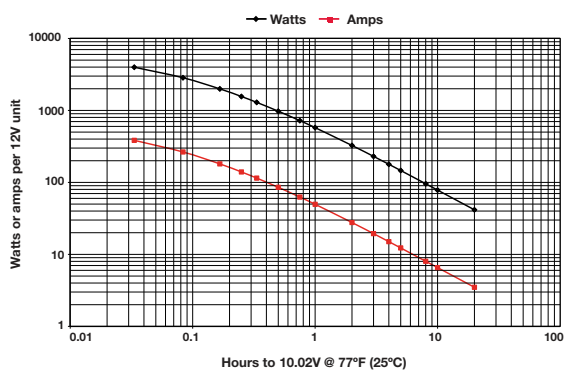
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 3580 | 337.9 | 11.3 | 119.2 | 613.0 | 20.4 | 205.8 | 6.9 |
| 5 min | 1992 | 199.1 | 16.6 | 165.9 | 341.1 | 28.4 | 114.5 | 9.5 |
| 10 min | 1338 | 127.9 | 21.7 | 227.5 | 229.1 | 38.9 | 76.9 | 13.1 |
| 15 min | 1026 | 96.0 | 24.0 | 256.5 | 175.7 | 43.9 | 59.0 | 14.7 |
| 20 min | 840 | 77.5 | 25.6 | 277.2 | 143.8 | 47.5 | 48.3 | 15.9 |
| 30 min | 624 | 56.6 | 28.3 | 312.0 | 106.8 | 53.4 | 35.9 | 17.9 |
| 45 min | 458 | 40.8 | 30.6 | 343.4 | 78.4 | 58.8 | 26.3 | 19.7 |
| 1 hr | 364 | 32.1 | 32.1 | 363.6 | 62.3 | 62.3 | 20.9 | 20.9 |
| 2 hr | 203 | 17.7 | 35.4 | 406.8 | 34.8 | 69.7 | 11.7 | 23.4 |
| 3 hr | 143 | 12.3 | 36.9 | 428.4 | 24.5 | 73.4 | 8.2 | 24.6 |
| 4 hr | 110 | 9.5 | 38.0 | 441.6 | 18.9 | 75.6 | 6.3 | 25.4 |
| 5 hr | 91 | 7.7 | 38.5 | 453.0 | 15.5 | 77.6 | 5.2 | 26.0 |
| 8 hr | 59 | 5.0 | 40.0 | 475.2 | 10.2 | 81.4 | 3.4 | 27.3 |
| 10 hr | 48 | 4.1 | 41.0 | 480.0 | 8.2 | 82.2 | 2.8 | 27.6 |
| 20 hr | 25 | 2.2 | 44.0 | 504.0 | 4.3 | 86.3 | 1.5 | 29.0 |

PC1200 performance data at 77°F, per 12V module

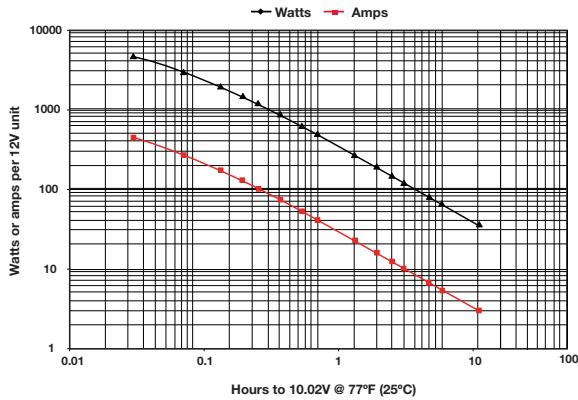


| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 3982 | 384.3 | 12.8 | 132.7 | 396.6 | 13.2 | 192.4 | 6.4 |
| 5 min | 2846 | 264.8 | 22.1 | 237.2 | 283.5 | 23.6 | 137.5 | 11.5 |
| 10 min | 1993 | 180.8 | 30.1 | 332.1 | 198.5 | 33.1 | 96.3 | 16.0 |
| 15 min | 1561 | 139.7 | 34.9 | 390.3 | 155.5 | 38.9 | 75.4 | 18.9 |
| 20 min | 1294 | 114.8 | 38.3 | 431.4 | 128.9 | 43.0 | 62.5 | 20.8 |
| 30 min | 976 | 85.5 | 42.8 | 487.9 | 97.2 | 48.6 | 47.1 | 23.6 |
| 45 min | 722 | 62.6 | 46.9 | 541.2 | 71.9 | 53.9 | 34.9 | 26.1 |
| 1 hr | 577 | 49.7 | 49.7 | 576.6 | 57.4 | 57.4 | 27.9 | 27.9 |
| 2 hr | 326 | 27.7 | 55.4 | 652.1 | 32.5 | 64.9 | 15.8 | 31.5 |
| 3 hr | 230 | 19.4 | 58.3 | 689.8 | 22.9 | 68.7 | 11.1 | 33.3 |
| 4 hr | 179 | 15.0 | 60.1 | 714.0 | 17.8 | 71.1 | 8.6 | 34.5 |
| 5 hr | 146 | 12.3 | 61.5 | 731.6 | 14.6 | 72.9 | 7.1 | 35.3 |
| 8 hr | 96 | 8.0 | 64.2 | 766.2 | 9.5 | 76.3 | 4.6 | 37.0 |
| 10 hr | 78 | 6.5 | 65.5 | 782.0 | 7.8 | 77.9 | 3.8 | 37.8 |
| 20 hr | 42 | 3.5 | 69.9 | 832.1 | 4.1 | 82.9 | 2.0 | 40.2 |

PC1220 performance data at 77°F, per 12V module

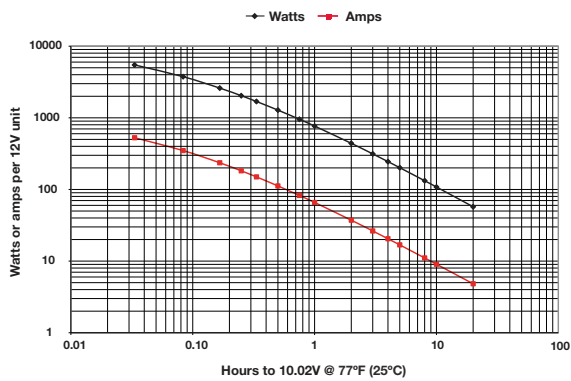


75-PC1230 & 75/86-PC1230 performance data at 77°F, per 12V module



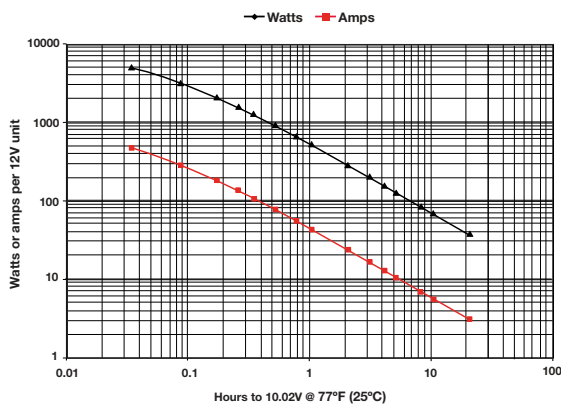
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 4562 | 432.9 | 14.3 | 150.5 | 531.5 | 17.5 | 221.4 | 7.3 |
| 5 min | 2936 | 266.5 | 22.1 | 243.7 | 342.1 | 28.4 | 142.5 | 11.8 |
| 10 min | 1919 | 169.6 | 28.3 | 320.5 | 223.6 | 37.3 | 93.2 | 15.6 |
| 15 min | 1451 | 126.6 | 31.7 | 362.8 | 169.1 | 42.3 | 70.4 | 17.6 |
| 20 min | 1176 | 101.8 | 33.9 | 391.6 | 137.0 | 45.6 | 57.1 | 19.0 |
| 30 min | 862 | 73.8 | 36.9 | 430.8 | 100.4 | 50.2 | 41.8 | 20.9 |
| 45 min | 622 | 52.8 | 39.6 | 466.4 | 72.5 | 54.3 | 30.2 | 22.6 |
| 1 hr | 490 | 41.4 | 41.4 | 489.8 | 57.1 | 57.1 | 23.8 | 23.8 |
| 2 hr | 270 | 22.6 | 45.3 | 540.2 | 31.5 | 62.9 | 13.1 | 26.2 |
| 3 hr | 189 | 15.8 | 47.4 | 567.1 | 22.0 | 66.1 | 9.2 | 27.5 |
| 4 hr | 146 | 12.2 | 48.8 | 585.7 | 17.1 | 68.2 | 7.1 | 28.4 |
| 5 hr | 120 | 10.0 | 50.0 | 600.6 | 14.0 | 70.0 | 5.8 | 29.2 |
| 8 hr | 79 | 6.6 | 52.7 | 633.2 | 9.2 | 73.8 | 3.8 | 30.7 |
| 10 hr | 65 | 5.4 | 54.1 | 650.1 | 7.6 | 75.7 | 3.2 | 31.6 |
| 20 hr | 36 | 3.0 | 59.4 | 713.5 | 4.2 | 83.1 | 1.7 | 34.6 |

PC1350 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 5477 | 527.2 | 17.6 | 182.6 | 438.2 | 14.6 | 199.9 | 6.7 |
| 5 min | 3758 | 349.4 | 29.1 | 313.2 | 300.7 | 25.1 | 137.2 | 11.4 |
| 10 min | 2602 | 235.8 | 39.3 | 433.6 | 208.1 | 34.7 | 94.9 | 15.8 |
| 15 min | 2037 | 182.0 | 45.5 | 509.3 | 163.0 | 40.7 | 74.3 | 18.6 |
| 20 min | 1692 | 149.8 | 49.9 | 564.0 | 135.4 | 45.1 | 61.7 | 20.6 |
| 30 min | 1282 | 112.1 | 56.0 | 641.0 | 102.6 | 51.3 | 46.8 | 23.4 |
| 45 min | 955 | 82.5 | 61.9 | 716.2 | 76.4 | 57.3 | 34.9 | 26.1 |
| 1 hr | 768 | 65.8 | 65.8 | 767.6 | 61.4 | 61.4 | 28.0 | 28.0 |
| 2 hr | 441 | 37.3 | 74.5 | 881.7 | 35.3 | 70.5 | 16.1 | 32.2 |
| 3 hr | 314 | 26.4 | 79.1 | 940.8 | 25.1 | 75.3 | 11.4 | 34.3 |
| 4 hr | 245 | 20.5 | 82.0 | 979.2 | 19.6 | 78.3 | 8.9 | 35.7 |
| 5 hr | 201 | 16.8 | 84.2 | 1006.9 | 16.1 | 80.5 | 7.3 | 36.7 |
| 8 hr | 133 | 11.1 | 88.5 | 1059.8 | 10.6 | 84.8 | 4.8 | 38.7 |
| 10 hr | 108 | 9.0 | 90.5 | 1082.7 | 8.7 | 86.6 | 4.0 | 39.5 |
| 20 hr | 57 | 4.8 | 96.5 | 1146.8 | 4.6 | 91.7 | 2.1 | 41.9 |

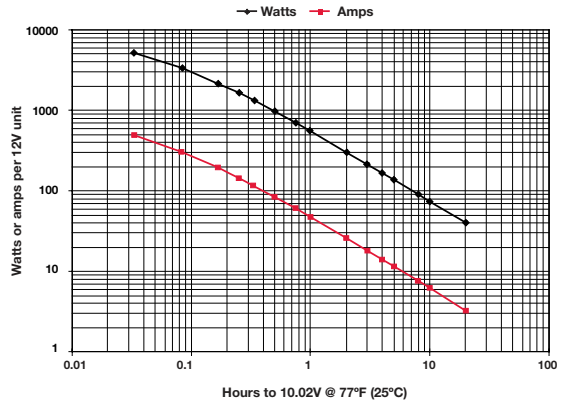
25-PC1400 & 35-PC1400 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 5308 | 499.5 | 16.5 | 175.2 | 576.1 | 19.0 | 233.8 | 7.7 |
| 5 min | 3440 | 315.8 | 26.2 | 285.5 | 373.3 | 31.0 | 151.5 | 12.6 |
| 10 min | 2261 | 203.0 | 33.9 | 377.7 | 245.4 | 41.0 | 99.6 | 16.6 |
| 15 min | 1716 | 151.9 | 38.0 | 428.9 | 186.2 | 46.5 | 75.6 | 18.9 |
| 20 min | 1393 | 122.2 | 40.7 | 463.9 | 151.2 | 50.3 | 61.4 | 20.4 |
| 30 min | 1023 | 88.6 | 44.3 | 511.5 | 111.0 | 55.5 | 45.1 | 22.5 |
| 45 min | 739 | 63.3 | 47.4 | 554.5 | 80.2 | 60.2 | 32.6 | 24.4 |
| 1 hr | 583 | 49.4 | 49.4 | 582.5 | 63.2 | 63.2 | 25.7 | 25.7 |
| 2 hr | 321 | 26.8 | 53.6 | 641.2 | 34.8 | 69.6 | 14.1 | 28.2 |
| 3 hr | 224 | 18.6 | 55.7 | 671.0 | 24.3 | 72.8 | 9.9 | 29.6 |
| 4 hr | 173 | 14.3 | 57.2 | 690.5 | 18.7 | 74.9 | 7.6 | 30.4 |
| 5 hr | 141 | 11.7 | 58.4 | 705.4 | 15.3 | 76.5 | 6.2 | 31.1 |
| 8 hr | 92 | 7.6 | 61.0 | 736.6 | 10.0 | 79.9 | 4.1 | 32.4 |
| 10 hr | 75 | 6.2 | 62.5 | 751.9 | 8.2 | 81.6 | 3.3 | 33.1 |
| 20 hr | 40 | 3.4 | 67.9 | 805.5 | 4.4 | 87.4 | 1.8 | 35.5 |

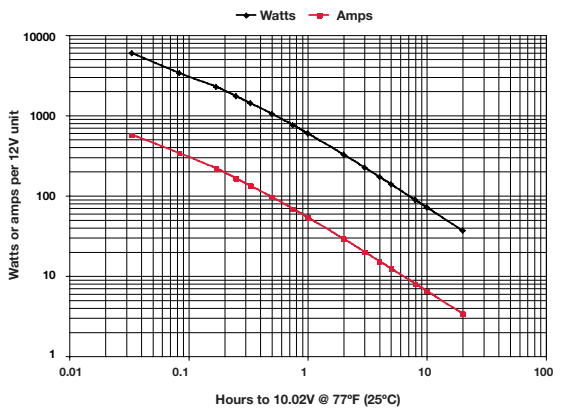
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 5228 | 494.8 | 16.3 | 172.5 | 538.1 | 17.8 | 209.9 | 6.9 |
| 5 min | 3337 | 304.4 | 25.3 | 277.0 | 343.5 | 28.5 | 134.0 | 11.1 |
| 10 min | 2175 | 193.6 | 32.3 | 363.3 | 223.9 | 37.4 | 87.4 | 14.6 |
| 15 min | 1644 | 144.5 | 36.1 | 411.0 | 169.2 | 42.3 | 66.0 | 16.5 |
| 20 min | 1332 | 116.1 | 38.7 | 443.7 | 137.2 | 45.7 | 53.5 | 17.8 |
| 30 min | 977 | 84.2 | 42.1 | 488.4 | 100.5 | 50.3 | 39.2 | 19.6 |
| 45 min | 706 | 60.3 | 45.2 | 529.3 | 72.6 | 54.5 | 28.3 | 21.3 |
| 1 hr | 556 | 47.3 | 47.3 | 556.2 | 57.3 | 57.3 | 22.3 | 22.3 |
| 2 hr | 307 | 25.9 | 51.7 | 615.0 | 31.7 | 63.3 | 12.3 | 24.7 |
| 3 hr | 215 | 18.1 | 54.2 | 646.5 | 22.2 | 66.5 | 8.7 | 26.0 |
| 4 hr | 167 | 14.0 | 56.0 | 668.4 | 17.2 | 68.8 | 6.7 | 26.8 |
| 5 hr | 137 | 11.5 | 57.4 | 685.4 | 14.1 | 70.6 | 5.5 | 27.5 |
| 8 hr | 90 | 7.6 | 60.6 | 723.1 | 9.3 | 74.4 | 3.6 | 29.0 |
| 10 hr | 74 | 6.2 | 62.3 | 742.5 | 7.6 | 76.4 | 3.0 | 29.8 |
| 20 hr | 41 | 3.3 | 65.0 | 814.0 | 4.2 | 83.8 | 1.6 | 32.7 |

34-PC1500, 34R-PC1500, 34M-PC1500, 34/78-PC1500 & 78-PC1500 performance data at 77°F, per 12V module



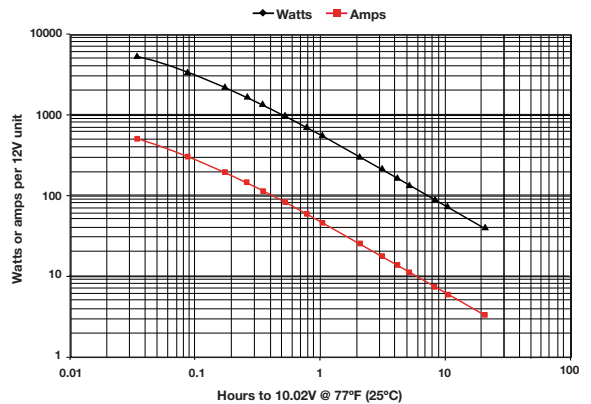
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/kg |
| 2 min | 5942 | 569.8 | 19.0 | 197.9 | 607.0 | 20.2 | 215.3 | 7.2 |
| 5 min | 3636 | 337.6 | 28.1 | 279.9 | 343.3 | 28.6 | 121.7 | 10.1 |
| 10 min | 2411 | 218.5 | 37.2 | 384.5 | 231.1 | 39.3 | 82.0 | 13.9 |
| 15 min | 1833 | 163.8 | 41.0 | 433.5 | 177.2 | 44.3 | 62.8 | 15.7 |
| 20 min | 1490 | 132.6 | 43.7 | 467.3 | 144.7 | 47.7 | 51.3 | 16.9 |
| 30 min | 1091 | 96.0 | 48.0 | 522.0 | 106.7 | 53.3 | 37.8 | 18.9 |
| 45 min | 786 | 68.6 | 51.4 | 567.0 | 77.2 | 57.9 | 27.4 | 20.5 |
| 1 hr | 615 | 53.6 | 53.6 | 594.6 | 60.8 | 60.8 | 21.5 | 21.5 |
| 2 hr | 333 | 28.9 | 57.8 | 648.0 | 33.1 | 66.2 | 11.7 | 23.5 |
| 3 hr | 229 | 19.9 | 59.6 | 671.4 | 22.9 | 68.6 | 8.1 | 24.3 |
| 4 hr | 175 | 15.2 | 61.0 | 684.0 | 17.5 | 69.9 | 6.2 | 24.8 |
| 5 hr | 142 | 12.4 | 61.8 | 693.0 | 14.2 | 70.8 | 5.0 | 25.1 |
| 8 hr | 90 | 8.0 | 63.6 | 705.6 | 9.0 | 72.1 | 3.2 | 25.6 |
| 10 hr | 73 | 6.5 | 64.5 | 714.0 | 7.3 | 72.9 | 2.6 | 25.9 |
| 20 hr | 37 | 3.4 | 67.9 | 732.0 | 3.7 | 74.8 | 1.3 | 26.5 |

PC1700 performance data at 77°F, per 12V module

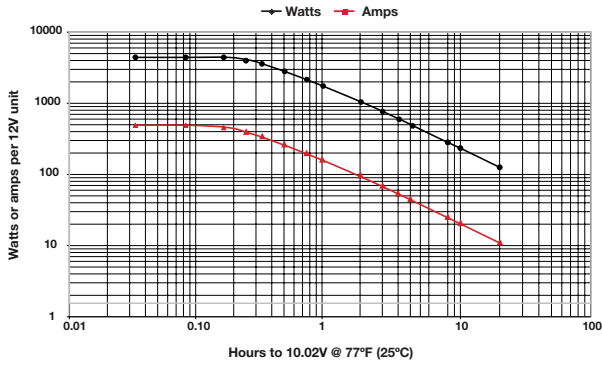


| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/litre | Wh/litre | W/kg | Wh/kg |
| 2 min | 5890 | 565.9 | 18.7 | 194.4 | 567.9 | 18.7 | 224.0 | 7.4 |
| 5 min | 3770 | 334.2 | 27.7 | 312.9 | 363.5 | 30.2 | 143.3 | 11.9 |
| 10 min | 2440 | 210.9 | 35.2 | 407.4 | 235.2 | 39.3 | 92.8 | 15.5 |
| 15 min | 1832 | 157.7 | 39.4 | 458.0 | 176.6 | 44.2 | 69.7 | 17.4 |
| 20 min | 1477 | 127.2 | 42.4 | 491.9 | 142.4 | 47.4 | 56.2 | 18.7 |
| 30 min | 1076 | 93.0 | 46.5 | 537.9 | 103.7 | 51.9 | 40.9 | 20.5 |
| 45 min | 771 | 67.2 | 50.4 | 578.1 | 74.3 | 55.7 | 29.3 | 22.0 |
| 1 hr | 605 | 53.0 | 53.0 | 604.6 | 58.2 | 58.3 | 23.0 | 23.0 |
| 2 hr | 355 | 29.4 | 58.9 | 709.2 | 34.2 | 68.4 | 13.5 | 27.0 |
| 3 hr | 252 | 20.7 | 62.0 | 756.0 | 24.3 | 72.9 | 9.6 | 28.7 |
| 4 hr | 196 | 16.0 | 64.1 | 785.0 | 18.9 | 75.7 | 7.5 | 29.8 |
| 5 hr | 161 | 13.1 | 65.7 | 804.6 | 15.5 | 77.6 | 6.1 | 30.6 |
| 8 hr | 105 | 8.6 | 69.1 | 838.5 | 10.1 | 80.9 | 4.0 | 31.9 |
| 10 hr | 85 | 7.1 | 70.6 | 850.3 | 8.2 | 82.0 | 3.2 | 32.3 |
| 20 hr | 46 | 3.8 | 75.7 | 912.6 | 4.4 | 88.0 | 1.7 | 34.7 |

65-PC1750 performance data at 77°F, per 12V module

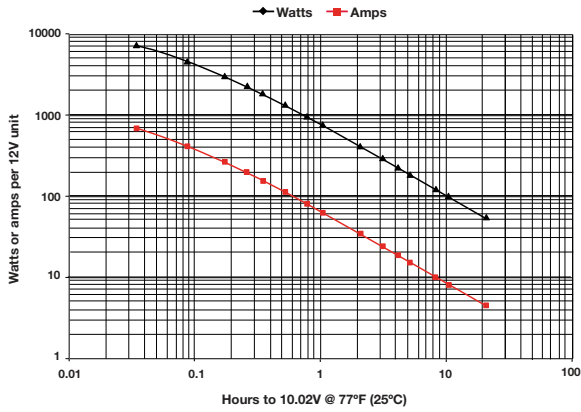


PC1800-FT performance data at 77°F, per 12V module



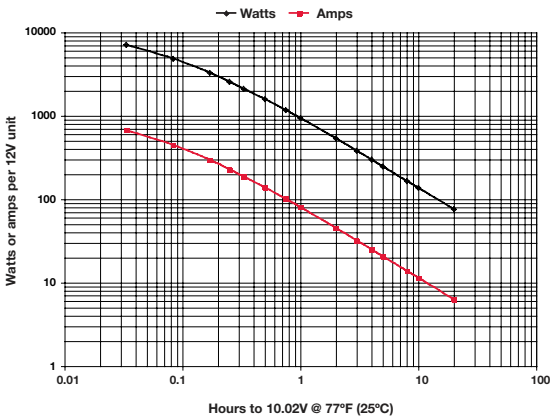
| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/Kg |
| 2 min | 4422 | 491.4 | 16.4 | 147.4 | 199.6 | 6.7 | 73.7 | 2.5 |
| 5 min | 4422 | 491.2 | 40.9 | 368.5 | 199.6 | 16.6 | 73.7 | 6.1 |
| 10 min | 4422 | 454.7 | 75.8 | 737.0 | 199.6 | 33.3 | 73.7 | 12.3 |
| 15 min | 3984 | 373.3 | 93.3 | 996.0 | 179.8 | 44.9 | 66.4 | 16.6 |
| 20 min | 3384 | 312.7 | 104.2 | 1128.0 | 152.7 | 50.9 | 56.4 | 18.8 |
| 30 min | 2610 | 238.3 | 119.2 | 1305.0 | 117.8 | 58.9 | 43.5 | 21.8 |
| 45 min | 1968 | 177.8 | 133.4 | 1476.0 | 88.8 | 66.6 | 32.8 | 24.6 |
| 1 hr | 1590 | 143.1 | 143.1 | 1590.0 | 71.8 | 71.8 | 26.5 | 26.5 |
| 2 hr | 936 | 82.2 | 164.4 | 1872.0 | 42.2 | 84.5 | 15.6 | 31.2 |
| 3 hr | 666 | 58.3 | 174.9 | 1998.0 | 30.1 | 90.2 | 11.1 | 33.3 |
| 4 hr | 522 | 45.4 | 181.6 | 2088.0 | 23.6 | 94.2 | 8.7 | 34.8 |
| 5 hr | 426 | 37.3 | 186.5 | 2130.0 | 19.2 | 96.1 | 7.1 | 35.5 |
| 8 hr | 282 | 24.6 | 196.8 | 2256.0 | 12.7 | 101.8 | 4.7 | 37.6 |
| 10 hr | 234 | 20.2 | 202.0 | 2340.0 | 10.6 | 105.6 | 3.9 | 39.0 |
| 20 hr | 126 | 10.9 | 218.0 | 2520.0 | 5.7 | 113.7 | 2.1 | 42.0 |

31-PC2150 & 31M-PC2150 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/Kg |
| 2 min | 7025 | 678.5 | 22.4 | 231.8 | 515.3 | 17.0 | 199.0 | 6.6 |
| 5 min | 4740 | 438.5 | 36.4 | 393.4 | 347.7 | 28.9 | 134.3 | 11.1 |
| 10 min | 3176 | 285.9 | 47.7 | 530.4 | 233.0 | 38.9 | 90.0 | 15.0 |
| 15 min | 2428 | 215.5 | 53.9 | 607.0 | 178.1 | 44.5 | 68.8 | 17.2 |
| 20 min | 1980 | 174.1 | 58.0 | 659.2 | 145.2 | 48.4 | 56.1 | 18.7 |
| 30 min | 1460 | 127.0 | 63.5 | 730.0 | 107.1 | 53.5 | 41.4 | 20.7 |
| 45 min | 1059 | 91.2 | 68.4 | 793.9 | 77.6 | 58.2 | 30.0 | 22.5 |
| 1 hr | 835 | 71.5 | 71.5 | 835.2 | 61.3 | 61.3 | 23.7 | 23.7 |
| 2 hr | 461 | 39.0 | 78.0 | 922.2 | 33.8 | 67.7 | 13.1 | 26.1 |
| 3 hr | 322 | 27.1 | 81.4 | 966.8 | 23.6 | 70.9 | 9.1 | 27.4 |
| 4 hr | 249 | 20.9 | 83.8 | 996.8 | 18.3 | 73.1 | 7.1 | 28.2 |
| 5 hr | 204 | 17.1 | 85.6 | 1020.0 | 15.0 | 74.8 | 5.8 | 28.9 |
| 8 hr | 134 | 11.2 | 89.7 | 1070.4 | 9.8 | 78.5 | 3.8 | 30.3 |
| 10 hr | 110 | 9.2 | 91.9 | 1095.9 | 8.0 | 80.4 | 3.1 | 31.0 |
| 20 hr | 60 | 5.0 | 100.3 | 1191.9 | 4.4 | 87.4 | 1.7 | 33.8 |

PC2250 performance data at 77°F, per 12V module



| Time | Watts (W) | Amps (A) | Capacity (Ah) | Energy (Wh) | ENERGY AND POWER DENSITIES | | | |
|--------|-----------|----------|---------------|-------------|----------------------------|----------|-------|-------|
| | | | | | W/liter | Wh/liter | W/kg | Wh/Kg |
| 2 min | 7090 | 671.6 | 22.4 | 236.1 | 1143.0 | 14.8 | 181.8 | 6.1 |
| 5 min | 4820 | 443.8 | 37.0 | 401.5 | 301.2 | 25.1 | 123.6 | 10.3 |
| 10 min | 3291 | 296.4 | 50.4 | 559.5 | 205.6 | 35.0 | 84.4 | 14.4 |
| 15 min | 2553 | 227.1 | 56.8 | 638.3 | 159.5 | 39.9 | 65.5 | 16.4 |
| 20 min | 2107 | 185.8 | 61.3 | 695.3 | 131.7 | 43.5 | 54.0 | 17.8 |
| 30 min | 1583 | 137.9 | 69.0 | 791.5 | 98.9 | 49.5 | 40.6 | 20.3 |
| 45 min | 1170 | 100.9 | 75.7 | 877.5 | 73.1 | 54.8 | 30.0 | 22.5 |
| 1 hr | 937 | 80.2 | 80.2 | 937.0 | 58.6 | 58.6 | 24.0 | 24.0 |
| 2 hr | 536 | 45.2 | 90.4 | 1072.0 | 33.5 | 67.0 | 13.7 | 27.5 |
| 3 hr | 382 | 32.0 | 96.0 | 1146.0 | 23.9 | 71.6 | 9.8 | 29.4 |
| 4 hr | 299 | 25.0 | 100.0 | 1196.0 | 18.7 | 74.7 | 7.7 | 30.7 |
| 5 hr | 247 | 20.6 | 103.0 | 1235.0 | 15.4 | 77.2 | 6.3 | 31.7 |
| 8 hr | 165 | 13.8 | 110.4 | 1320.0 | 10.3 | 82.5 | 4.2 | 33.9 |
| 10 hr | 137 | 11.4 | 114.0 | 1370.0 | 8.6 | 85.6 | 3.5 | 35.1 |
| 20 hr | 76 | 6.3 | 126.0 | 1520.0 | 4.75 | 95.0 | 2.0 | 39.0 |

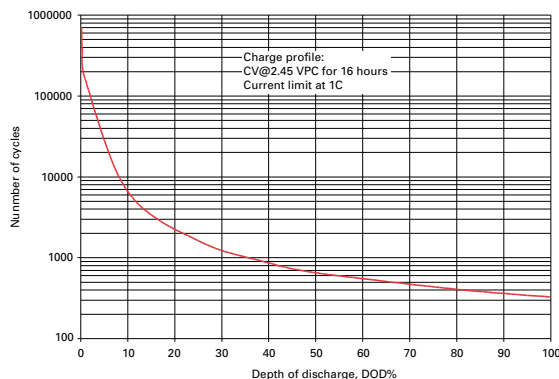
CYCLE LIFE AND DEPTH OF DISCHARGE (DOD)

Applications in which the battery is frequently discharged and recharged are called cyclic. A complete cycle starts with a charged battery that is discharged and then brought back to a full charge. Battery life in these applications is stated as the number of cycles the battery will deliver before its capacity drops to 80% of its rated value. For example, suppose a battery is rated at 100 amp-hours (Ah) and has a published cycle life of 400. This means that the battery can be cycled 400 times before its delivered capacity drops to 80Ah.

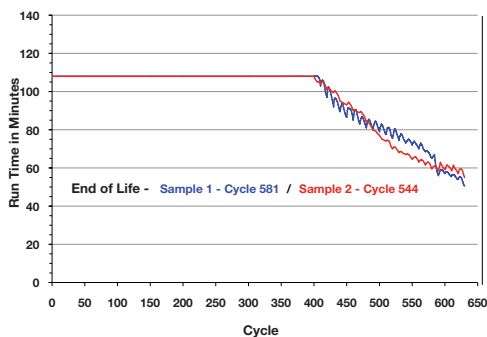
Proper charging and DOD are the two key factors that determine how many cycles a battery will deliver before it reaches end of life. The DOD is simply the ratio of capacity extracted from the battery to its rated capacity expressed as a percentage. If a 100Ah battery delivers 65Ah and is then recharged, it is said to have delivered a 65% DOD cycle.

The relationship between DOD and cycle life for ODYSSEY batteries, excluding PC370, PC950 and PC1100, is shown in Figure 1. The lower the DOD the higher the number of cycles the battery will deliver before reaching end of life.

Figure 1



The true dual purpose design of ODYSSEY batteries is reflected in the cycle life results shown in the graph below. This graph is from an 80% DOD cycle test completed on two ODYSSEY 65-PC1750 battery samples. Both samples gave over 410 cycles before failing to give 80% capacity (this is classified as end of life.)



FLOAT LIFE

Float life refers to the life expectancy of a battery that is used primarily as a source of backup or emergency power. Emergency lighting, security alarm and Uninterruptible Power Systems (UPS) are good examples of batteries in float applications. In each of these applications the battery is discharged only if the main utility power is lost; otherwise the battery remains on continuous trickle charge (also called float charge).

Since ODYSSEY® batteries are dual purpose by design, they offer a long-life battery option in float applications. At room temperature (77°F or 25°C) these batteries have a design life of 10+ years in float applications; at end of life an ODYSSEY battery will still deliver 80% of its rated capacity.

Heat is a killer of Valve Regulated Lead Acid (VRLA) Absorbed Glass Mat (AGM) batteries such as ODYSSEY batteries and the rule of thumb that relates battery temperature to battery life is that for every 46°F rise in battery temperature, the float life is cut in half. This means that an ODYSSEY battery that has a 10-year float life at 77°F (25°C) will have only a 5-year life at 91°F (33°C) and a 2-1/2 year float life at 106°F (41°C). Therefore if your float application requires batteries to be in an uncontrolled temperature environment you should account for battery life that will be shorter than its design life at 77°F (25°C).

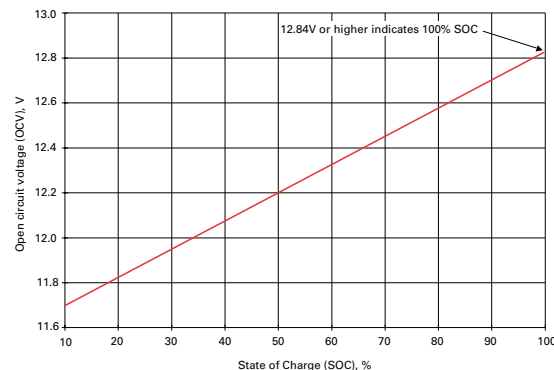
ODYSSEY® BATTERY STORAGE AND DEEP DISCHARGE RECOVERY

For any rechargeable battery, storage and recharge are important criteria. This section provides some guidelines that will help you get the most from your ODYSSEY battery.

(A) How do I know the state of charge (SOC) of the battery?

Use Figure 2 to determine the SOC of the ODYSSEY battery, as long as the battery has not been charged or discharged for six or more hours. The only tool needed is a good quality digital voltmeter to measure its open circuit voltage (OCV)¹. The graph shows that a healthy, fully charged ODYSSEY battery will have an OCV of 12.84V or higher at 77°F (25°C).

Figure 2: Open circuit voltage and state of charge



¹The OCV of a battery is the voltage measured between its positive and negative terminals without the battery connected to an external circuit (load). It is very important to take OCV reading only when the battery has been off charge for at least 6-8 hours, preferably overnight.

(B) How long can the battery be stored?

ODYSSEY batteries should be fully charged prior to storage. Fully charged ODYSSEY batteries can be stored for up to 24 months at 77°F (25°C). Battery voltage naturally decreases with time and with increased temperature. The battery voltage should be checked periodically. If the battery voltage drops to 12.0 volts (35% state of charge) it should be recharged immediately to avoid permanent battery damage. The following can be used as a rough approximation for the potential storage times at different temperatures.

Figure 3: ODYSSEY® battery storage time at temperatures

| Storage Temperature (°F/°C) | Storage Time (Months) |
|-----------------------------|-----------------------|
| 41/5 | 48 |
| 59/15 | 36 |
| 77/25 | 24 |
| 95/35 | 12 |
| 113/45 | 6 |

(C) Can the battery recover from deep discharge conditions?

Yes, the ODYSSEY battery can recover from extremely deep discharges as the following test results demonstrate.

(1) German DIN standard test for overdischarge recovery

In this test, a PC925 was discharged over 20 hours (0.05C₁₀ rate)² to 10.20V. After the discharge² a 5Ω resistor was placed across the battery terminals and the battery kept in storage for 28 days.

At the end of the storage period, the battery was charged at 13.5V for only 48 hours. A second 0.05C₁₀ discharge yielded 97% of rated capacity, indicating that a low rate 48-hour charge after such a deep discharge was insufficient; however, the intent of the test is to determine if the battery is recoverable from extremely deep discharges using only a standby float charger. A standard automotive charger at 14.4V would have allowed the battery to recover greater than 97% of its capacity.

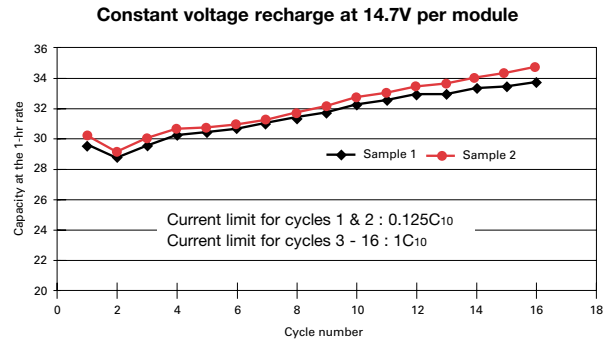
These test results prove that ODYSSEY batteries can recover from deep discharge conditions. Reinforcing this conclusion is the next test, which is even harsher than the DIN standard test, because in this test the battery was stored in a discharged state at a temperature of 122°F (50°C).

(2) High temperature discharged storage test

Two PC1200 samples were discharged in this test at the 1-hour rate to 9V per module, and then placed in storage at 122°F (50°C) in a *discharged condition* for 4 weeks.

At the end of 4 weeks, the two batteries were recharged using a constant voltage (CV) charge at 14.7V per battery. As Figure 4 below shows, both samples recovered from this extreme case of abusive storage.

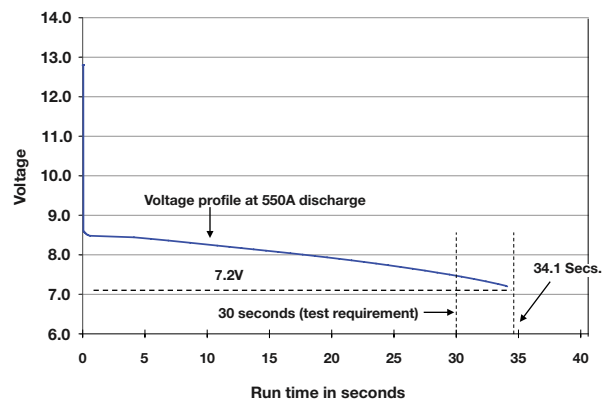
Figure 4: Recovery from high temperature discharged storage



Extreme cold temperature performance

High discharge rate performance in extremely cold conditions is another area in which ODYSSEY® batteries excel. An example of this is shown in Figure 5. Even at -40°F (-40°C) the battery was able to support a 550A load for over 30 seconds before its terminal voltage dropped to 7.2V.

Figure 5: CCA test @ -40°F (-40°C) on 31-PC2150



Since all ODYSSEY batteries are designed similarly, one can expect similar outstanding cold temperature performance from any of the other ODYSSEY batteries.

²The C10 rate of charge or discharge current in amperes is numerically equal to the 10 hour rated capacity of a battery in ampere-hours divided by 10. Thus, a 26Ah battery at the 10-hour rate, such as the PC925, would have a C10 rate of 2.6A.

PARASITIC LOADS

With the proliferation of more and more electronic equipment in cars, trucks, motorcycles and powersports equipment, the phenomenon of parasitic loads is becoming a serious problem.

Parasitic loads are small currents, typically of the order of a few milliamps (mA) that the battery has to deliver continuously. Retaining memories and operating security systems are common examples of parasitic drains on batteries in modern systems.

On the surface it would seem that such small loads would not be a factor in the overall scheme of things. However, since parasitic loads can be applied on a long-term basis (weeks or months is not uncommon), the cumulative amp-hours (Ah) extracted from the battery can be significant. For example, a 10mA draw on a motorcycle battery will discharge it by 0.24Ah per day. If left unchecked for 30 days, that small 10mA parasitic load will discharge a 20Ah battery by 7.2Ah – a 36% depth of discharge (DOD).

Regardless of the application, it is important to make sure your battery does not have a parasitic load; if there is a slow drain, connect the battery to a float (trickle) charger that puts out between 13.5V and 13.8V at the battery terminals. Physically disconnecting one of the battery cables is an alternate method to eliminate the drain.

SHOCK, IMPACT AND VIBRATION TESTING

(A) Caterpillar™ 100-hour vibration test

In this test, a fully charged battery was vibrated at 34 ± 1 Hz and 0.075" (1.9mm) total amplitude in a vertical direction, corresponding to an acceleration of 4.4g. The test was conducted for a total of 100 hours. The battery is considered to have passed the test if (a) it does not lose any electrolyte, (b) it is able to support a load test and (c) it does not leak when subjected to a pressure test.

The ODYSSEY battery successfully completed this arduous test.

(B) Shock and vibration test per IEC 61373, Sections 8-10

An independent test laboratory tested an ODYSSEY 31-PC2150 battery for compliance to IEC standard 61373, Category 1, Class B, and Sections 8 through 10. Section 8 calls for a functional random vibration test, Section 9 requires a long-life random vibration test and Section 10 is for a shock test. Table 2, on the next page summarizes the test results.

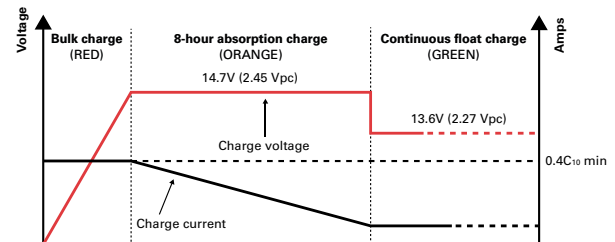
Table 2: Shock and vibration test results per IEC 61373

| Test | Standard | Requirement | Result |
|------------------------------------|--|---|-----------|
| Functional random vibration | IEC 61373, Section 8, Category 1, Class B | 5-150Hz, 0.1g _{rms} vertical, 0.071g _{rms} longitudinal, 0.046g _{rms} transverse; 10 minutes in each axis | Compliant |
| Long-life random vibration | IEC 61373, Section 9, Category 1, Class B | 5-150Hz, 0.8g _{rms} vertical, 0.56g _{rms} longitudinal, 0.36g _{rms} transverse; 5 hours in each axis | Compliant |
| Shock | IEC 61373, Section 10, Category 1, Class B | 30msec. pulses in each axis (3 positive, 3 negative); 3.06g _{peak} vertical, 5.1g _{peak} longitudinal, 3.06g _{peak} transverse | Compliant |

CHARGING ODYSSEY® BATTERIES

Charging is a key factor in the proper use of a rechargeable battery. Inadequate or improper charging is a common cause of premature failure of rechargeable lead acid batteries. To properly charge your premium ODYSSEY® battery, EnerSys® has developed a special charge algorithm. It is designed to rapidly and safely charge these batteries. Called the IUU profile (a constant current mode followed by two stages of constant voltage charge), Figure 6 shows it in a graphical format. No manual intervention is necessary with chargers having this profile.

Figure 6: Recommended three-step charge profile



NOTES:

1. Charger LED stays RED in bulk charge phase (DO NOT TAKE BATTERY OFF CHARGE)
2. LED changes to ORANGE in absorption charge phase (BATTERY AT 80% STATE OF CHARGE)
3. LED changes to GREEN in float charge phase (BATTERY FULLY CHARGED)
4. Charge voltage is temperature compensated at ± 24 mV per battery per °C variation from 25°C

If the charger has a timer, then it can switch from absorption mode to float mode when the current drops to $0.001C_{10}$ amps. If the current fails to drop to $0.001C_{10}$ amps, then the timer will force the transition to a float charge after no more than 8 hours. As an example, for a PC1200 battery, the threshold current should be 4mA. Another option is to let the battery stay in the absorption phase (14.7V or 2.45 VPC) for a fixed time, such as 6-8 hours, then switch to the continuous float charge.

Table 3 shows the minimum charge currents for the full range of ODYSSEY batteries when they are used in deep cycling application. When using a charger with the IUU profile, we suggest the following ratings for your ODYSSEY battery. *Note the charger current in the bulk charge mode must be 0.4C₁₀ or more.* A list of chargers approved by EnerSys for use with ODYSSEY batteries under FAQs.

Table 3: Battery size and minimum three-step charger current

| Charger rating, amps | Recommended ODYSSEY® Battery Model |
|----------------------|---|
| 6A | PC310 / PC370 / PC535 / PC545 / PC625 / PC680 |
| 10A | PC925 or smaller battery |
| 15A | PC1200 or smaller battery |
| 25A | PC1500 or smaller battery |
| 25A | PC1700 or smaller battery |
| 40A | PC2150 or smaller battery |
| 50A | PC2250 or smaller battery |

Small, portable automotive and powersport chargers may also be used to charge your ODYSSEY battery. These chargers are generally designed to bring a discharged battery to a state of charge (SOC) that is high enough to crank an engine. Once the engine is successfully cranked, its alternator should fully charge the battery. It is important to keep in mind the design limitations of these small chargers when using them.

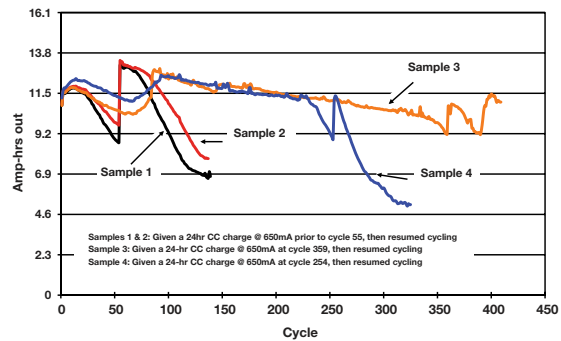
Another class of chargers is designed specifically to maintain a battery in a high SOC. These chargers, normally in the 3/4 amp to 1 1/2 amp range, are not big enough to charge a deeply discharged ODYSSEY® battery. They must only be used either to continuously compensate for parasitic losses or to maintain a trickle charge on a stored battery, as long as the correct voltages are applied. It is very important, therefore, to ensure that the ODYSSEY battery is fully charged before this type of charger is connected to it.

Effect of undercharge in cycling applications

Proper and adequate charging is necessary to ensure that ODYSSEY batteries deliver their full design life. Generally speaking, a full recharge requires about 5% more amp-hours (Ah) must be put back in than was taken out. In other words, for each amp-hour extracted from the battery, about 1.05Ah must be put back to complete the recharge.

Cycling tests conducted on an ODYSSEY PC545 battery demonstrated the impact raising the charge voltage from 14.2V to 14.7V has on the cycle life of the battery. The results are shown in the graph at right.

Samples 1 and 2 were charged at 14.2V while Samples 3 and 4 were charged at 14.7V. All batteries were discharged



at 2.3A until the terminal voltage dropped to 10.02V and charged for 16 hours. In this particular test, a capacity of 11.5Ah corresponds to 100% capacity and 9.2Ah is 80% of rated capacity and the battery is considered to have reached end of life at that point.

The message to be taken from this graph is clear – in deep cycling applications it is important to have the charge voltage set at 14.4 – 15.0V. A nominal setting of 14.7V is a good choice, as shown by the test results.

(A) Selecting the right charger for your battery

Qualifying portable automotive and powersport chargers for your ODYSSEY battery is a simple two-step process.

Step 1 Charger output voltage

Determining the charger output voltage is the most important step in the charger qualification process. *If the voltage output from the charger is less than 14.2V or more than 15V for a 12V battery, then do not use the charger.* For 24V battery systems, the charger output voltage should be between 28.4V and 30V. If the charger output voltage falls within these voltage limits when the battery approaches a fully charged state, proceed to Step 2, otherwise pick another charger.

Step 2 Charger type - automatic or manual

The two broad types of small, portable chargers available today are classified as either automatic or manual. Automatic chargers can be further classified as those that charge the battery up to a certain voltage and then shut off and those that charge the battery up to a certain voltage and then switch to a lower float (trickle) voltage.

An example of the first type of automatic charger is one that charges a battery up to 14.7V, then immediately shuts off. An example of the second type of automatic charger would bring the battery up to 14.7V, then switches to a float (trickle) voltage of 13.6V; it will stay at that level indefinitely. The second type of automatic charger is preferred, because the first type of charger will undercharge the battery.

A manual charger typically puts out either a single voltage or single current level continuously and must be switched off manually to prevent battery overcharge. *Should you choose to use a manual charger with your ODYSSEY battery, do not exceed charge times suggested in Table 5 below. It is extremely important to ensure the charge voltage does not exceed 15V.*

(B) Selecting battery type on your charger

Although it is not possible to cover every type of battery charger available today, this section gives the ODYSSEY battery user some general charger usage guidelines to follow, after the charger has been qualified for use with this battery.

In general, do not use either the gel cell or maintenance free setting, if provided on your charger. Choose the deep cycle or AGM option, should there be one on your charger. Table 5 below gives suggested charge times based on charger currents. As previously indicated, deep cycling applications require a minimum 0.4C10 current available from the charger so the values shown in Table 5 do not apply to all products in all applications. To achieve maximum life from your ODYSSEY battery after completing the charge time in Table 5, we recommend that you switch your charger to the 2A trickle charge position and leave the battery connected to the charger for an additional 6-8 hours. The trickle charge voltage should be 13.5V to 13.8V.

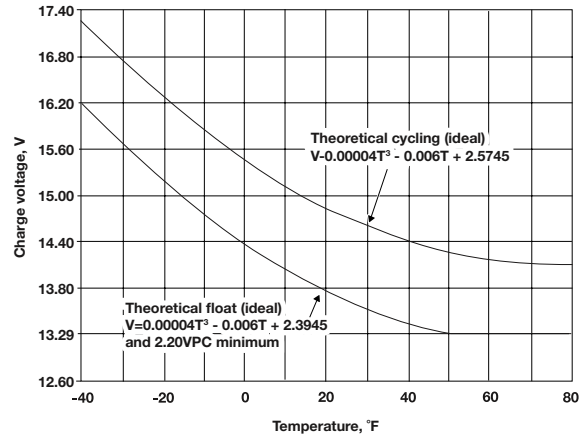
Table 5: Suggested charge times (excludes cycling applications)

| ODYSSEY® Battery Model | Charge time for 100% discharged battery | |
|---|---|----------------|
| | 10-amp charger | 20-amp charger |
| PC310 | 1.28 hours | 40 minutes |
| PC370 & PC535 | 2.25 hours | 1.25 hours |
| PC545 | 2 hours | 1 hour |
| PC625 | 3 hours | 1.5 hours |
| PC680 | 2.7 hours | 1.5 hours |
| PC925 | 4.5 hours | 2.25 hours |
| PC950 | 5.25 hours | 3 hours |
| PC1100 | 7 hours | 3.75 hours |
| PC1200 | 6.75 hours | 3.5 hours |
| 75-PC1230 & 75/86-PC1230 | 9 hours | 4.5 hours |
| 25-PC1400 & 35-PC1400 | 10.5 hours | 5.25 hours |
| 34-PC1500, 34R-PC1500, 34M-PC1500, 34/78-PC1500 & 78-PC1500 | 11 hours | 5.5 hours |
| PC1700 | 11 hours | 5.5 hours |
| PC1220 & 65-PC1750 | 11 hours | 5.5 hours |
| PC1800-FT | Not Recommended | 17 hours |
| PC1350, 31-PC2150 & 31M-PC2150 | 16 hours | 8 hours |
| PC2250 | 20 hours | 10 hours |

The charge times recommended in Table 5 assume that the ODYSSEY® battery is fully discharged and these charge times will only achieve about a 80% state of charge. For partially discharged batteries, the charge times should be appropriately reduced. The graph in Figure 2, showing OCV and SOC, must be used to determine the battery's SOC. The battery should be trickle charged (2A setting) after high rate charging, regardless of its initial SOC.

Temperature compensation

Proper charging of all Valve Regulated Lead Acid (VRLA) batteries requires temperature compensation of the charge voltage – the higher the ambient temperature the lower the charge voltage. This is particularly true in float applications in which the batteries can stay on trickle charge for weeks or months at a time.



The temperature compensation graphs for ODYSSEY batteries in float and cyclic applications are shown for ambient (battery) temperatures ranging from -40°F (-40°C) to 176°F (80°C). The compensation coefficient is approximately

+/-24mV per 12V battery per °C variation from 77°F (25°C). Since the charge voltage and ambient (battery) temperature are inversely related, the voltage must be reduced as the temperature rises; conversely, the charge voltage must be increased when the temperature drops.

Note, however, that the charge voltage should not be dropped below 13.2V as that will cause the battery grids to corrode faster, thereby shortening the battery life.

RAPID CHARGING OF ODYSSEY® BATTERIES

All ODYSSEY batteries can be quickly charged. Figure 7 below shows their exceptional fast charge characteristics at a constant 14.7V for three levels of inrush current. These current levels are similar to the output currents of modern automotive alternators. Table 6 and Figure 7 show the capacity returned as a function of the magnitude of the inrush³ current.

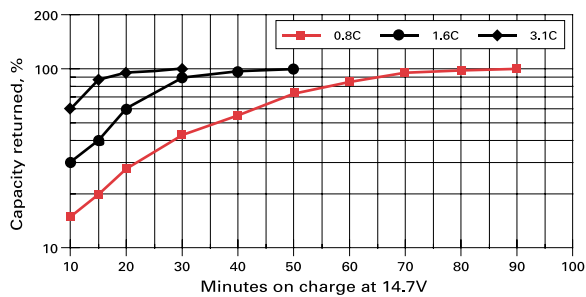
Standard internal combustion engine alternators with an output voltage of 14.2V can also charge these batteries. The inrush current does not need to be limited under constant voltage charge. However, because the typical alternator voltage is only 14.2V instead of 14.7V, the charge times will be longer than those shown in Table 5.

Table 6: Fast charge capability

| Capacity returned | Inrush current magnitude | | |
|-------------------|--------------------------|--------------------|--------------------|
| | 0.8C ₁₀ | 1.6C ₁₀ | 3.1C ₁₀ |
| 60% | 44 min. | 20 min. | 10 min. |
| 80% | 57 min. | 28 min. | 14 min. |
| 100% | 90 min. | 50 min. | 30 min. |

Table 6 shows that with a 0.8C₁₀ inrush current, a 100% discharged battery can have 80% of its capacity returned in 57 minutes; doubling the inrush to 1.6C₁₀ cuts the time taken to reach 80% capacity to only 28 minutes.

Figure 7: Quick charging ODYSSEY® batteries



LOAD TEST PROCEDURE

This procedure should help determine whether the battery returned by the customer has reached its end of life or simply needs a full recharge. Depending on the time available one may choose to perform either the longer load test (Step 4) or the shorter ½CCA load test (Step 5).

The ½CCA test is quicker but less reliable than the longer test. This is also the test that is performed when a battery is taken to an auto store for testing.

1. Measure the open circuit voltage (OCV) of the battery. Proceed to Step 4 or Step 5 if the OCV is equal to or more than 12.80V; if not go to Step 2.
2. Charge the battery until the device indicates the charge is complete.
3. Unplug the charger and disconnect the battery from the charger. Let the battery rest of at least 10-12 hours and measure the OCV. If it is equal to or more than 12.80V proceed to the next step; otherwise reject the battery.
4. Long Test: Discharge the battery using a resistor or other suitable load until the voltage drops to 10.00V and record the time taken to reach this voltage. Let the battery rest for an hour and repeat Steps 1 through 4. If the time taken by the battery to drop to 10.00V is longer in the second discharge than in the first discharge, the battery may be returned to service after a full recharge; if not the battery should be rejected as having reached end of life.

5. ½CCA Test: Battery OCV must be at least 12.60V to proceed with this test. Connect the load tester cables and the voltage leads of a separate digital voltmeter (if the tester does not have a built-in digital voltmeter) to the battery terminals.

6. Adjust the tester load current to load the battery to half its rated CCA and apply the load for 15 seconds. Table 7 shows the ½CCA values for all ODYSSEY® battery models. Use Table 8 to adjust the battery end of test voltage temperature.

Table 7

| ODYSSEY® Battery Model | ½CCA Test Value (A) | ODYSSEY® Battery Model | ½CCA Test Value (A) | ODYSSEY® Battery Model | ½CCA Test Value (A) |
|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| PC310 | 50 | PC1100 | 250 | PC1700 | 405 |
| PC370 | 100 | PC1200 | 270 | PC1750 | 475 |
| PC535 | 100 | PC1220 | 340 | PC1800 | 650 |
| PC545 | 75 | PC1230 | 380 | PC2150 | 575 |
| PC625 | 100 | PC1350 | 385 | PC2250 | 613 |
| PC680 | 85 | PC1400 | 425 | | |
| PC925 | 165 | PC1500 | 425 | | |
| PC950 | 200 | | | | |

Table 8

| Temperature | End of Test Voltage |
|-------------|---------------------|
| 70°F | 9.60V |
| 60°F | 9.50V |
| 50°F | 9.40V |
| 40°F | 9.30V |
| 30°F | 9.10V |
| 20°F | 8.90V |
| 10°F | 8.70V |
| 0°F | 8.50V |

7. At the end of 15 seconds note the battery voltage on the voltmeter and discontinue the test. If the temperature is 70°F (21°C) or warmer the battery voltage should be at or above 9.60V. If so the battery can be returned to service; if below 9.60V the battery should be rejected.

ODYSSEY® BATTERIES IN NO-IDLE APPLICATIONS

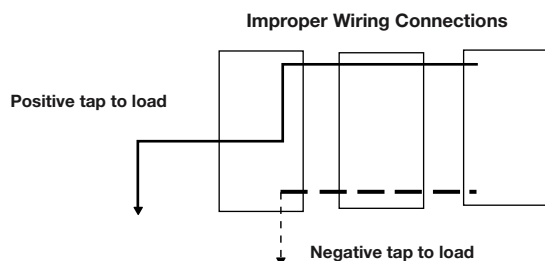
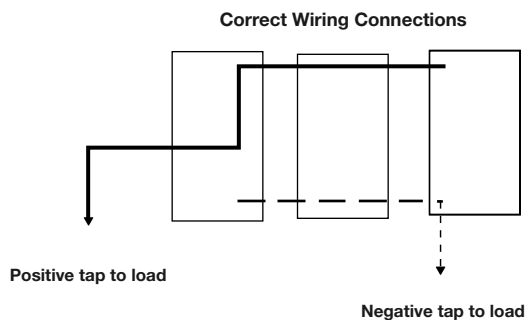
Since these batteries are dual purpose in nature they can be used for both engine starting and deep cycling applications. This makes them particularly well suited for fleets such as police vehicles that would like to power their computers and communications equipment without having to idle their engines. Auxiliary power units (APU) on trucks provide another example of a no-idling application.

All of these require energy sources to power loads such as computers and refrigerators with the engines shut off to reduce their carbon footprints and lower gas consumption.

As discussed in a previous section, properly charged ODYSSEY batteries are capable of delivering as many as 400 cycles to a 75% depth of discharge (DOD). A shallower discharge will yield higher cycles, as noted in the cycle life vs. DOD graph shown earlier. This is the reason why ODYSSEY batteries are becoming increasingly popular in APU and police fleet applications that require batteries to have both high cycling and excellent engine cranking capabilities in the same package.

PARALLEL CONNECTIONS

It is common to have batteries connected in parallel to achieve a desired amp-hour capacity. This is done by connecting all the positives to each other and all the negatives to each other.



Typically the positive and negative leads to the load are taken from the same battery; usually the leads from the first battery are used. This is not a good practice. Instead, a better technique to connect the load is to take the positive lead from one end of the pack (the first or last battery) and the negative lead from the other end of the pack. The two methods are illustrated above. Solid lines and arrows indicate positive terminals and leads; broken lines and arrows indicate negative terminals and leads.

In both illustrations, the positive leads are connected to each other; similarly the negative leads are connected to each other. The only difference is that in the first illustration the positive and negative leads to the load come from the first and last batteries. In the second case, both leads to the load are tapped from the same battery.

The first schematic is recommended whenever batteries are hooked up in parallel to increase battery capacity. With this wiring, all batteries are forced to share both charge and discharge currents. In contrast, a closer inspection of the second schematic shows that it is possible for only the battery whose terminals are tapped to support the load. Implementing the first schematic eliminates this possibility and is therefore a better one.

VENTILATION

Valve Regulated Lead Acid (VRLA) batteries like the ODYSSEY® battery depend on the internal recombination of the gases for proper operation. This is also why these batteries do not require periodic addition of water.

The high recombination efficiency of ODYSSEY batteries make them safe for installation in human environments. It is not uncommon to see these batteries in aircraft, hospital operating rooms and computer rooms. The only requirement is that these batteries must not be installed in a sealed or gastight enclosure; however, local regulations with respect to ventilation requirements must be followed.

CONCLUDING REMARKS

We believe that there is no other sealed-lead acid battery currently available commercially that can match the ODYSSEY battery for sheer performance and reliability. We hope that the preceding material will help the reader arrive at the same conclusion.

³ Inrush is defined in terms of the rated capacity (C_{10}) of the battery. A $0.8C_{10}$ inrush on a 100Ah battery is 80A.

FREQUENTLY ASKED SLI BATTERY QUESTIONS

What is the CCA rating?

The cold cranking ampere (CCA) rating refers to the number of amperes a battery can deliver for 30 seconds at a temperature of 0°F (-18°C) before the voltage drops to 1.20 volts per cell, or 7.20 volts for a 12V battery. A 12V battery that has a rating of 550 CCA means that the battery will provide 550 amps for 30 seconds at 0°F (-18°C) before the voltage falls to 7.20V.

What is the MCA rating?

The marine cranking ampere (MCA) rating refers to the number of amperes a battery can deliver for 30 seconds at a temperature of 32°F (0°C) until the battery voltage drops to 7.20 volts for a 12V battery. A 12V battery that has a MCA rating of 725 MCA means that the battery will give 725 amperes for 30 seconds at 32°F (0°C) before the voltage falls to 7.20V.

The MCA is sometimes called the cranking amperes or CA.

What is a HCA rating?

The abbreviation HCA stands for hot cranking amps. It is the same as MCA, CA or CCA, except that the temperature at which the test is conducted is 80°F (26.7°C).

What is the PHCA rating?

Unlike CCA and MCA the pulse hot cranking amp (PHCA) rating does not have an "official" definition; however, we believe that for true SLI purposes, a 30-second discharge is unrealistic. The PHCA, a short duration (about 3-5 seconds) high rate discharge, is more realistic. Because the discharge is for such a short time, it is more like a pulse.

Are these gel cells?

No, the ODYSSEY® battery is NOT a gel cell. It is an absorbed electrolyte type battery, meaning there is no free acid inside the battery; all the acid is kept absorbed in the glass mat separators. These separators serve to keep the positive and negative plates apart.

What is the difference between gel cell and AGM?

The key difference between the gel cell and the absorbed glass mat (AGM) is that in the AGM cell all the electrolyte is in the separator, whereas in the gel cell the acid is in the cells in a gel form. If the ODYSSEY battery were to split open, there would be no acid spillage! That is why we call the ODYSSEY battery a Drycell battery.

What is the Ah rating?

The ampere-hour (Ah) rating defines the capacity of a battery. A battery rated at 100Ah at the 10-hour rate of discharge will deliver 10A for 10 hours before the terminal voltage drops to a standard value such as 10.02 volts for a 12V battery. The PC1200 battery, rated at 40Ah will deliver 4A for 10 hours.

What is reserve capacity rating?

The reserve capacity of a battery is the number of minutes it can support a 25-ampere load at 80°F (27°C) before its voltage drops to 10.50 volts for a 12V battery. A 12V battery with a reserve capacity rating of 100 will deliver 25 amps for 100 minutes at 80°F before its voltage drops to 10.5V.

Is the ODYSSEY® battery a dry battery?

Because the ODYSSEY® battery has no free acid inside, it is exempted from the requirements of 49 CFR § 173.159 of the US Department of Transportation (USDOT). The battery also enjoys a “nonspillable” classification and falls under the International Air Transport Association (IATA) “unrestricted” air shipment category. These batteries may be shipped completely worry-free. Supporting documentation is available.

What is impedance?

The impedance of a battery is a measure of how easily it can be discharged. The lower the impedance the easier it is to discharge the battery. The impedance of the ODYSSEY battery is considerably less than that of a conventional SLI battery, so its high rate discharge capability is significantly higher than that of a conventional SLI battery.

What is the short-circuit current of these batteries?

As mentioned before, this battery has very low impedance, meaning that the short circuit current is very high. For a PC925 battery, the short circuit current can be as high as 2,500 amperes.

Do I ruin the battery if I accidentally drop it?

Not necessarily, but it is possible to damage the internal connections sufficiently to damage the battery.

Does mishandling the battery void the warranty?

Our warranty applies only to manufacturing defects and workmanship issues; the policy does not cover damages suffered due to product mishandling.

What is so special about thin plate pure lead technology? Is it a new technology?

The answer lies in the very high purity (99.99%) of our raw lead materials, making our product very special. The technology is not new; the sealed lead recombinant technology was invented and patented by us back in 1973.

Why don't you have to winterize your batteries? What's so special about them?

In general, winterizing refers to a special maintenance procedure conducted on an automotive engine to ensure its reliability during the winter season. The procedure essentially checks the engine's charging system; in addition, the battery is load tested according to a specific method defined by the Battery Council International (BCI). Although ODYSSEY batteries do not specifically require this test to be conducted on them, the final decision whether or not to conduct this test is left to the user's discretion.

Are these Ni-Cd batteries? Why doesn't somebody make these in Ni-Cd? Wouldn't they charge faster as a Ni-Cd?

No, the ODYSSEY battery is NOT a Ni-Cd battery. It is a valve regulated lead acid (VRLA) battery. In general, Ni-Cd batteries are much more expensive to manufacture and recycle, so they are less cost effective than a lead acid product.

A Ni-Cd battery would charge faster than a conventional lead acid battery; however, the ODYSSEY battery is NOT a conventional battery and its charge characteristics are somewhat similar to nickel cadmium batteries. In fact, with a powerful enough charger, it is possible to bring ODYSSEY batteries to better than 95% state of charge in less than 20 minutes! That is very comparable to the fast charge capabilities of a nickel cadmium product.

ENGINEERED WITH THIN PLATE PURE LEAD (TPPL) TECHNOLOGY

STARTS STRONGER. STAYS STRONGER.



***2X the overall power
and 3X the life***
of conventional marine batteries

ODYSSEY[®]
Trolling Thunder / Marine Dual Purpose
Extreme
SERIES™

Longer service life

Forget replacing batteries every year. With 3-10 years of service life, ODYSSEY® Extreme Series™ Trolling Thunder®/Marine Dual Purpose batteries save consumers time, money, and aggravation.

Longer cycle life

70% longer cycle life compared to conventional deep cycle batteries — up to 400 cycles at 80% depth of discharge — high stable voltage for longer periods of time.

Longer shelf life

Can be stored on open circuit (nothing connected to the terminals) without the need for recharging up to 2 years or 12.00V, whichever occurs first.

Faster recharge

The highest recharge efficiency of any sealed lead battery on the market — capable of 100% recharge in 4 - 6 hours.

Mounting flexibility

Non-spillable design — can be mounted on any side in any position except inverted. Takes up less space in the boat than competitors.

Vibration resistance

Design protects against high impact shock and mechanical vibration — a common cause of premature battery failure.

Extreme temperature tolerant

Operating temperatures from -40°F (-40°C) to 176°F (80°C) for the 34M-PC1500 and 31M-PC2150. No need to winterize this unit — leave it in the boat!

Totally maintenance free

No need to add water, ever!

Improved safety

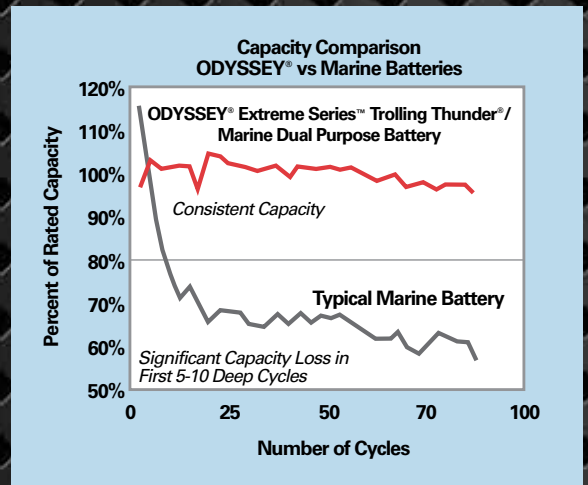
US Department of Transportation classified as a 'non-spillable' battery. No acid spills, no escaping gases. Drycell design with resealable venting system.

Superior to spirals

Compressed flat plates eliminate wasted space — 15% more plate surface area and up to 40% more reserve capacity than popular "six-pack" AGM batteries.

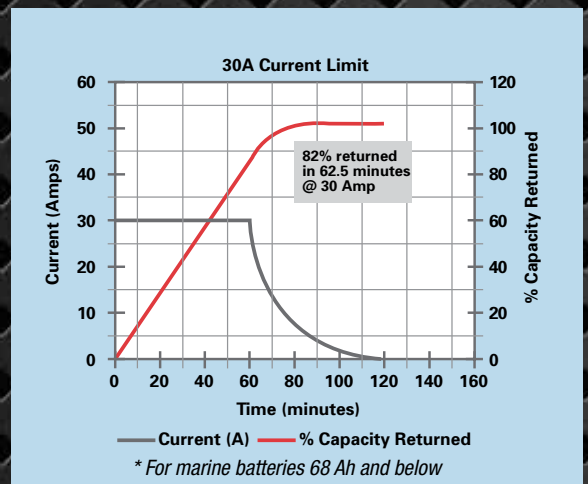
Better warranty

Limited 3- and 4-year full replacement warranty — not pro rata.



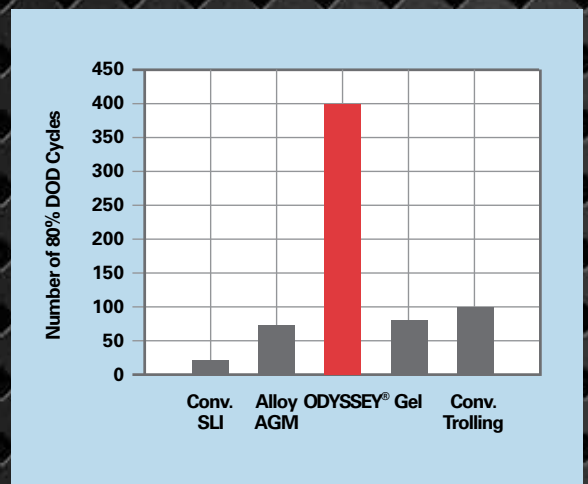
Consistent Power

ODYSSEY® Extreme Series™ batteries maintain consistently high voltage over a long cycle life.



Fast Recovery

ODYSSEY® Extreme Series™ batteries recharge faster and more fully than conventional marine batteries.



Long Cycle Life

ODYSSEY® Extreme Series™ batteries routinely deliver up to 400 deep cycle (80%) discharges.

UNCOMPROMISING POWER ON THE WATER

Boat owners have traditionally had to make a choice between starting power or deep cycle power when replacing a marine battery. But most boaters want both — a marine battery that delivers robust starting power when they need it, yet also withstands deep and frequent depths of discharge (DOD) without significant power loss. Now they can have it all.



The ODYSSEY® Extreme Series™ Trolling Thunder®/Marine Dual Purpose battery has both massive starting power and amazing deep cycling capability — **up to 400 cycles at 80% depth of discharge** when charged appropriately.

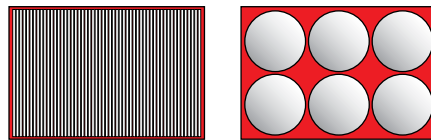
With twice the overall power and three times the life of conventional marine batteries, the ODYSSEY Extreme Series Trolling Thunder/Marine Dual Purpose battery is ideal for trolling, starting, and for powering the many on-board electronic accessories common in today's boats and recreational vehicles.

ODYSSEY® Extreme Series™ Trolling Thunder/ Marine Dual Purpose batteries for powersports

The ODYSSEY Extreme Series also includes a full range of batteries ideal for marine powersports applications. These batteries incorporate the same rugged design and deep cycling capability as ODYSSEY Extreme Series Trolling Thunder/Marine Dual Purpose batteries. This allows them to withstand the constant pounding and frequent discharges common in water powersports applications.

ODYSSEY® Extreme Series™ batteries outperform spiral-wound

Compared to spiral-wound batteries of equal size, ODYSSEY Extreme Series batteries pack 15% more plate surface area into the case. Avoiding the “dead space” between cylinders in “six-pack” designs means ODYSSEY Extreme Series batteries deliver more power and 40% more reserve capacity.



Unused battery space

**ODYSSEY® Extreme Series™ Trolling Thunder®/
Marine Dual Purpose batteries vs. spiral-wound
designs: 15% more plate surface area!**

*Incredible deep cycling capacity and massive-
cranking power — all in one revolutionary battery.*



*Endorsed by legendary bass
fisherman, author, and TV host,
Shaw Grigsby, inducted into
Legends of the Outdoors™
Hall of Fame, 2004.*

ODYSSEY

Trolling Thunder®/Marine Dual Purpose

Extreme

SERIES™

DESIGNED FOR EXTREME POWER AND ENDURANCE

99.99% pure lead plates for maximum surface area, optimized recycling

AGM (absorbed glass mat) design eliminates acid spills

Robust intercell connections prevents vibration damage

High conductivity, corrosion-resistant tin-plated brass terminals

Sealed design – gases recycled internally during operation or charging

High integrity terminal seal

Safety relief valve per cell (not shown)





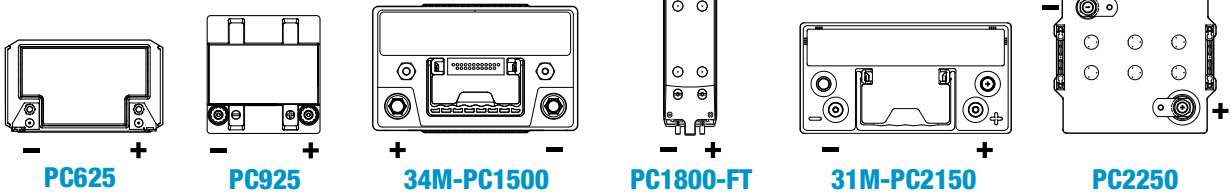
Optional height adapter may be used on the 34M-PC1500 for installations where a group 24 or group 27 is required. Snap the adapter securely into place on the bottom of the 34M-PC1500 battery. In some installations, a 34M-PC1500 with this adapter may be used to replace a group 24F or 27F depending on required cable length.

ODYSSEY® EXTREME SERIES™ BATTERY TECHNOLOGY COMPARISON

| | ODYSSEY® EXTREME SERIES™ BATTERIES | CONVENTIONAL BATTERIES |
|---------------------|--|--|
| DESIGN LIFE | 8-12 years (Float) @ 77° F (25° C) | 5 years |
| SERVICE LIFE | 3 to 10 years | 1 to 5 years |
| ELECTROLYTE | Drycell ("starved electrolyte") no external leakage or corrosion | Most are acid flooded (causing acid burns and spills); some wet sealed or "gelled" |
| STORAGE LIFE | 2 years before needing charge @ 77° F (25° C) | 6-12 weeks before needing charge |
| SHIPPING | Air transportable; US Department of Transportation classified non-spillable (less expensive) | Ground transport; classified as hazardous material (more expensive) |
| END OF LIFE | Battery slowly loses power at end of life; no catastrophic failure | Immediate and catastrophic loss of power (can leave you stranded) |

TERMINAL LAYOUTS

Drawing sizes are for terminal position reference only; diagrams are not proportionate to each other.



| MODEL | Voltage | PHCA** (5 sec) | CCA* | HCA | MCA | Nominal Capacity | | Reserve Capacity Minutes | Length inches (mm) | Width inches (mm) | Height inches (mm) | Weight lbs (kg) | Terminal | Torque Specs in-lbs (Nm max) | Internal Resistance (m) | Short Circuit Current |
|------------|---------|-------------------|------|------|------|--------------------|--------------------|-----------------------------|--------------------------|-------------------------|--------------------------|-----------------------|--|-------------------------------------|----------------------------|--------------------------|
| | | | | | | (20 Hr Rate-Ah) | (10 Hr Rate-Ah) | | | | | | | | | |
| PC625 | 12 | 540 | 220 | 400 | 330 | 18 | 17 | 26 | 6.70 (170.2) | 3.90 (99.1) | 6.95 (176.5) | 13.2 (6.0) | M6 Receptacle | 40 (4.5) | 7 | 1800A |
| PC925 | 12 | 900 | 330 | 610 | 480 | 28 | 27 | 48 | 6.64 (168.6) | 7.05 (179.0) | 5.83 (148.1) | 26.0 (11.8) | M6 Receptacle† or SAE 3/8-16" Receptacle | 60 (6.8) | 5 | 2400A |
| 34M-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.95 (201.9) | 49.5 (22.4) | SAE and 3/8-16" Stud (Pos.) 5/16-18" Stud (Neg.) | 60 (6.8) stud only | 2.5 | 3100A |
| PC1800-FT | 12 | 1800 | 1300 | 1600 | 1450 | 214 | 190 | 475 | 22.87 (581.0) | 4.92 (125.0) | 12.46 (316.5) | 132.3 (60.0) | 3/8" Stud | 80 (9.0) | 3.3 | 3800A |
| 31M-PC2150 | 12 | 2150 | 1150 | 1545 | 1370 | 100 | 92 | 205 | 13.00 (330.2) | 6.80 (172.7) | 9.39 (238.5) | 77.8 (35.3) | SAE and 3/8-16" Stud (Pos.) 5/16-18" Stud (Neg.) | 200 (22.6) Max stud only | 2.2 | 5000A |
| PC2250 | 12 | 2250 | 1225 | 1730 | 1550 | 126 | 114 | 240 | 11.26 (286.0) | 10.59 (269.0) | 9.17 (233.0) | 86.0 (39.0) | SAE Terminal and 3/8-16" Stud | 100 (11.0) for 3/8" Stud Only | 2.1 | 5000A |

* Cold Start Performance S.A.E J537 JUNE 82

**Pulse Current

Operating temperature range:

-40°F (-40°C) to 113°F (45°C) for PC625 and PC925

-40°F (-40°C) to 176°F (80°C) for 34M-PC1500 and 31M-PC2150

-22°F (-30°C) to 104°F (40°C) for PC2250

-40°F (-40°C) to 122°F (50°C) for PC1800-FT

Constant voltage portable charger parameters:

Standby, per 12V battery

13.5-13.8V no current limit required

Cyclic, per 12V battery (16-hour recharge)

14.4-14.8V no current limit required

Typical deep-cycle life at 77°F (25°C) at a 5-hour rate

400 cycles at 80% DOD

Typical service life at 77°F (25°C)

Medium to heavy duty usage – 3+ years
Light duty usage – 5+ years

ODYSSEY[®] Ultimizer[™] CHARGERS

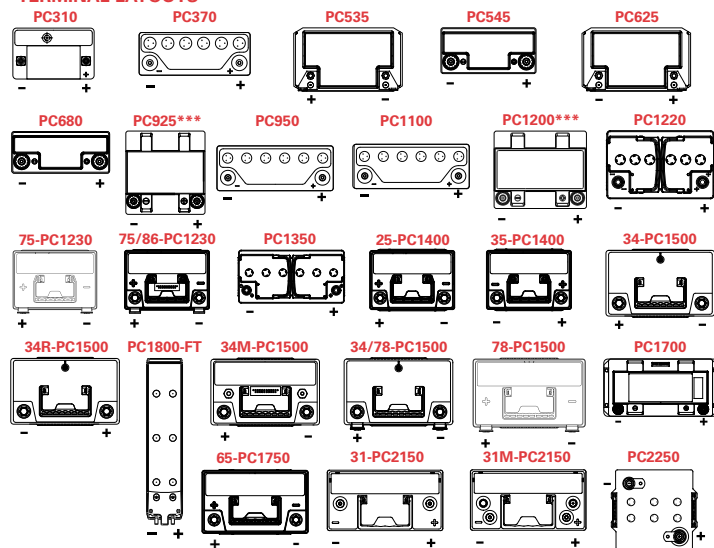


Lightweight, portable and fast

Designed to support the full line of ODYSSEY[®] Extreme Series[™] batteries, ODYSSEY[®] Ultimizer[™] 12V chargers deliver big power for quick recharging. Yet they're safe enough to stay connected to the batteries indefinitely without damage.

- Three-step charge profile ensures fast, full and safe charging
- Continuous trickle charge keeps batteries fully charged during extended periods of non-use
- Sophisticated sequential charging technology enables the lightweight, compact design

TERMINAL LAYOUTS



*Drawing sizes are for terminal position reference only;
diagrams are not proportionate to each other.
***Optional Reversed Polarity (L)*

About EnerSys[®]

EnerSys[®] is a global leader in stored energy solutions for automotive, military, and industrial applications. With manufacturing facilities in 18 countries, sales and service locations throughout the world, and over 100 years of battery experience, EnerSys is a powerful partner for automotive service and parts providers.



Powered by **EnerSys**
Power/Full Solutions

ENGINEERED WITH THIN PLATE PURE LEAD
(TPPL) TECHNOLOGY

DRIVE IT TO EXTREMES



ODYSSEY[®] Extreme SERIES[™]

2X THE POWER, 3X THE LIFE

ODYSSEY® Extreme Series™ batteries are designed and built to deliver twice the overall power and triple the service life of conventional batteries.

Doing double duty

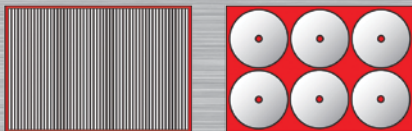
Some batteries offer enormous cranking power. Others, deep cycle reserve power. ODYSSEY Extreme Series batteries have both. Even at very low temperatures, they provide engine-cranking pulses in excess of 2250 amps for 5 seconds – double to triple the power of equally sized conventional batteries. And they can handle 400 charge-discharge cycles to 80% depth of discharge.†

How so much power is possible

ODYSSEY Extreme Series batteries are made with flat plates made of 99.99% pure lead – not lead alloy. Pure lead plates can be made thinner, so we can fit more of them in the battery. More plates mean more plate surface area. And that means more power – twice as much as conventional batteries.

Packed with more power

Like many popular spiral-wound batteries, ODYSSEY Extreme Series batteries employ dry cell Absorbed Glass Mat (AGM) technology to contain acid, allowing the battery to be installed even on its side. But the densely packed flat plates in an ODYSSEY Extreme Series battery avoid the “dead space” between cylinders in a “six pack” design. The result is 15% more plate surface area — and that translates to more power.



Unused battery space

ODYSSEY® Extreme Series™ batteries vs. spiral-wound designs: 15% more plate surface area!

Optional height adapter may be used on 34-PC1500 models for installations where a group 24 or group 27 is required. Snap the adapter securely into place on the bottom of the 34-PC1500 battery. In some installations, the 34-PC1500 model with this adapter may be used to replace a group 24F or 27F depending on required cable length.



†PC370, PC950 and PC1100 are engine start only. No cycling.

RUN STRONGER LONGER

Robust Intercell Connections
resist vibration and eliminate internal sparking

Tin Alloy Coated Brass Terminals
ensure corrosion-free cable connections*



Compressed AGM Plate Separators
help enable extreme vibration resistance

99.99% Pure Lead Plates
are extremely thin, so more of them fit inside for more power

*Some models excluded. See table for details.

ODYSSEY® EXTREME SERIES™ BATTERY TECHNOLOGY COMPARISON

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| STORAGE LIFE | 2 years before needing charge @ 77°F (25°C) | 6-12 weeks before needing charge |
| SHIPPING | Air transportable; US Department of Transportation classified non-spillable (less expensive) | Ground transport; classified as hazardous material (more expensive) |
| END OF LIFE | Battery slowly loses power at end of life; no catastrophic failure | Immediate and catastrophic loss of power (can leave you stranded) |

SUPERIOR STARTING POWER AND VIBRATION RESISTANCE

The ODYSSEY® Extreme Series™ battery's incredible combination of power and endurance makes these batteries ideal for just about anything, just about anywhere.



Emergency Response

ODYSSEY® Extreme Series™ batteries are always on call with maintenance-free starting power plus massive deep cycle reserve power for on-board accessories.

- Police cruisers
- Fire trucks
- Ambulances



Heavy Duty/Commercial

Superior cranking power and deep cycle ability mean ODYSSEY Extreme Series batteries get the job done.

- Farm, lawn and garden equipment
- Tractor trailers
- Earth-moving/
construction equipment



4X4 & Off-Road

Rugged construction and non-spillable, dry cell design ensure extreme shock and vibration resistance for the toughest off-road applications.

- SUVs
- Light trucks
- Off-road vehicles



Everyday Vehicles

The electronics in today's vehicles require heavy power. ODYSSEY Extreme Series batteries deliver it while providing reliable starting for up to 3X as long as conventional batteries.

- Luxury and sport sedans
- SUVs and light trucks
- Vans, minivans and taxis

EXTREME POWER AND ENDURANCE FOR EVEN MORE APPLICATIONS



Classic & Antique Cars

The deep cycle reserve power of ODYSSEY® Extreme Series™ batteries ensures that classic and antique cars will start reliably, even after two years of sitting idle.

- Antique vehicles
- Classic trucks
- Muscle cars



Motorcycles Extreme Series & Powersports

The ODYSSEY Extreme Series battery delivers the power and durability that powersports vehicles demand. Rugged construction and non-spillable, dry cell design provides extreme shock and vibration resistance.

- Motorcycles and ATVs
- Personal watercraft
- Snowmobiles
- Ultralight and Gyrocopter™ aircraft



High Performance & Modified Vehicles

From starting high-compression engines to powering high-intensity discharge lights, ODYSSEY Extreme Series batteries can handle any upgrade, and can be mounted in almost any position.

- Tuner cars
- Race cars
- Dragsters

Sound and Video Packages

ODYSSEY Extreme Series batteries provide the power and mounting flexibility that today's high-wattage, in-car sound and video systems demand.

- Audio systems
- Video systems
- Auxiliary amplifiers



ODYSSEY®

Trolling Thunder®/Marine Dual Purpose

Extreme

SERIES™

Big power on the water

Starting power or deep cycle power. Traditionally, boaters have been forced to choose between them. Now, with the ODYSSEY® Extreme Series™ Trolling Thunder®/Marine Dual Purpose battery they can have it all — a marine battery that delivers robust starting power when needed, yet withstands deep and frequent depths of discharge (DOD) without significant power loss.

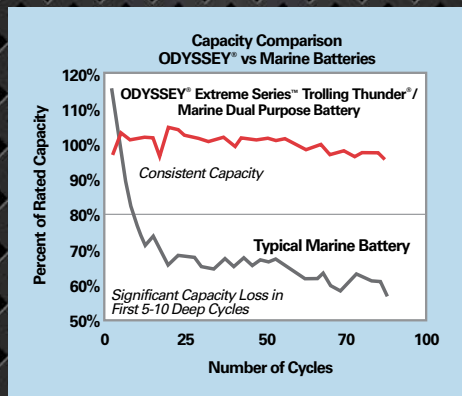
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With twice the overall power and three times the life of conventional marine batteries, the ODYSSEY Extreme Series battery is ideal for trolling, starting, and for powering the many on-board electronic accessories common in today's recreational boats.



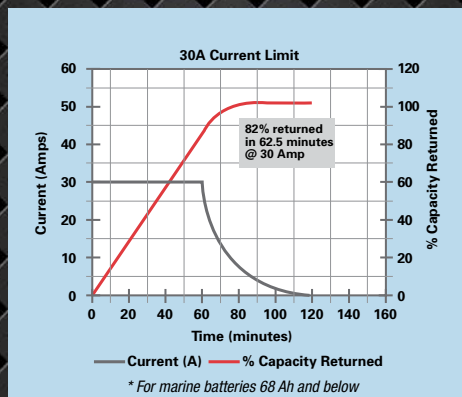
Endorsed by legendary bass fisherman, author, and TV host, Shaw Grigsby, inducted into Legends of the Outdoors™ Hall of Fame, 2004.

The ODYSSEY Extreme Series also includes a full range of batteries ideal for marine powersports applications.



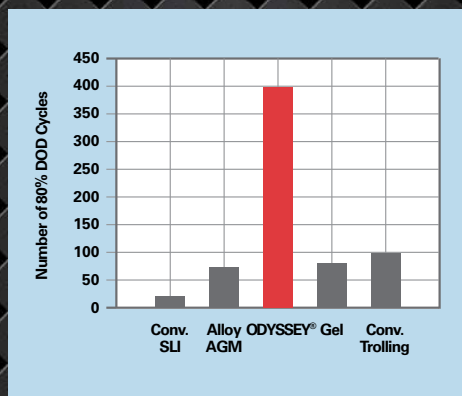
Consistent Power

ODYSSEY® Extreme Series™ batteries maintain consistently high voltage over a long cycle life.



Fast Recovery

ODYSSEY® Extreme Series™ batteries recharge faster and more fully than conventional marine batteries.



Long Cycle Life

ODYSSEY® Extreme Series™ batteries routinely deliver up to 400 deep cycle (80%) discharges.

ODYSSEY[®]

Extreme

SERIES™

Longer warranty – Limited 2-, 3- and 4-year full replacement warranty.

Longer service life – 3-10 years of service life.

Longer cycle life – 70% longer cycle life and up to 400 cycles at 80% depth of discharge.[†]

Longer shelf life – Storable with nothing connected to the terminals for up to 2 years, or down to 12.00V, whichever comes first.

Faster recharge – 100% recharge in 4-6 hours – the highest efficiency of any sealed lead battery.

More flexible mounting – Non-spillable design allows mounting on any side, in any position (except inverted).

Vibration resistance – Protection against the high impact shocks and vibration that often cause premature battery failure.

Extreme temperature tolerance – Operating temperatures from -40°F (-40°C) to 176°F (80°C).*

Maintenance free – No need to add water, ever!

Improved safety – Classified “non-spillable” by US Department of Transportation – no acid spills and virtually no escaping gases!

*Not all models are capable of 176°F (80°C)

†PC370, PC950 and PC1100 are engine start only. No cycling.

| Model | Voltage | PHCA** (5 sec) | CCA* | HCA | MCA | Nominal Capacity | | Reserve Capacity Minutes | Length inches (mm) | Width inches (mm) | Height inches (mm) | Weight lb (kg) | Terminal | Torque Specs in-lbs (Nm max) | Internal Resistance (mΩ) | Short Circuit Current |
|---------------|---------|-------------------|------|------|------|--------------------|--------------------|--------------------------------|--------------------------|-------------------------|--------------------------|----------------------|--|---|--------------------------------|-----------------------------|
| | | | | | | (20 Hr Rate-Ah) | (10 Hr Rate-Ah) | | | | | | | | | |
| PC310 | 12 | 310 | 100 | 200 | 155 | 8 | 7 | 9 | 5.43 (138.0) | 3.39 (86.0) | 3.90 (99.0) | 5.9 (2.7) | M4 Receptacle | 8.9 (1.0) | 27.1 | 455A |
| PC370 (ER15) | 12 | 425 | 200 | 315 | 270 | 15 | 14 | 25 | 7.9 (200.0) | 3.0 (77.0) | 5.5 (140.0) | 12.5 (5.7) | M6 Stud | 35 (3.9) | 13.5 | 891A |
| PC535 | 12 | 535 | 200 | 300 | 265 | 14 | 13 | 21 | 6.70 (170.2) | 3.90 (99.1) | 6.24 (158.5) | 12.0 (5.4) | M6 Receptacle | 40 (4.5) | 8 | 1000A |
| PC545 | 12 | 460 | 150 | 280 | 220 | 13 | 12 | 18 | 7.01 (178.1) | 3.38 (85.9) | 5.16 (131.1) | 11.4 (5.2) | M6 Receptacle | 50 (5.6) | 10 | 1200A |
| PC625 | 12 | 540 | 220 | 400 | 330 | 18 | 17 | 26 | 6.70 (170.2) | 3.90 (99.1) | 6.95 (176.5) | 13.2 (6.0) | M6 Receptacle | 40 (4.5) | 7 | 1800A |
| PC680 | 12 | 520 | 170 | 350 | 280 | 16 | 16 | 24 | 7.27 (184.7) | 3.11 (79.0) | 7.55 (191.8) | 15.4 (7.0) | M6 Receptacle [†] or SAE 3/8-16" Receptacle | 50 (5.6) | 7 | 1800A |
| PC925 | 12 | 900 | 330 | 610 | 480 | 28 | 27 | 48 | 6.64 (168.6) | 7.05 (179.0) | 5.83 (148.1) | 26.0 (11.8) | M6 Receptacle [†] or SAE 3/8-16" Receptacle | 60 (6.8) | 5 | 2400A |
| PC950 (ER30) | 12 | 950 | 400 | 600 | 500 | 34 | 32 | 60 | 9.8 (250.0) | 3.8 (97.0) | 6.1 (156.0) | 20.0 (9.0) | M6 Stud | 35 (3.9) | 7.1 | 1700A |
| PC1100 (ER40) | 12 | 1100 | 500 | 800 | 650 | 45 | 43 | 87 | 9.8 (250.0) | 3.8 (97.0) | 8.1 (206.0) | 27.5 (12.5) | M6 Stud | 35 (3.9) | 5.1 | 2450A |
| PC1200 | 12 | 1200 | 540 | 860 | 725 | 42 | 40 | 78 | 7.87 (199.9) | 6.66 (169.1) | 7.60 (193.0) | 38.2 (17.4) | M6 Receptacle [†] or SAE 3/8-16" Receptacle | 60 (6.8) | 4.5 | 2600A |
| PC1220 | 12 | 1220 | 680 | 960 | 860 | 70 | 64.8 | 135 | 10.94 (278.0) | 6.88 (175.0) | 7.48 (190.0) | 45.6 (20.7) | DIN Lead Post | N/A | 5.7 | 2200A |
| 75-PC1230 | 12 | 1230 | 760 | 1050 | 815 | 55 | 50 | 110 | 9.47 (240.5) | 7.08 (179.8) | 7.44 (189.0) | 45.5 (20.6) | SIDE 3/8" Receptacle | 60 (6.8) | 2.5 | 3100A |
| 75/86-PC1230 | 12 | 1230 | 760 | 1050 | 815 | 55 | 50 | 110 | 9.47 (240.5) | 7.08 (179.8) | 7.98 (202.7) | 45.5 (20.6) | TOP SAE SIDE 3/8-16" Receptacle | 60 (6.8) side terminal only | 2.5 | 3100A |
| PC1350 | 12 | 1350 | 850 | 1080 | 960 | 95 | 88.5 | 195 | 13.90 (353.0) | 6.88 (175.0) | 7.48 (190.0) | 60.4 (27.4) | DIN Lead Post | N/A | 4.2 | 2900A |
| 25-PC1400 | 12 | 1400 | 850 | 1150 | 950 | 65 | 55 | 130 | 9.47 (240.5) | 6.85 (174.0) | 8.75 (222.3) | 50.0 (22.7) | SAE | N/A | 2.5 | 3100A |
| 35-PC1400 | 12 | 1400 | 850 | 1150 | 950 | 65 | 55 | 130 | 9.47 (240.5) | 6.85 (174.0) | 8.75 (222.3) | 50.0 (22.7) | SAE | N/A | 2.5 | 3100A |
| 34-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.88 (200.2) | 49.5 (22.4) | SAE | N/A | 2.5 | 3100A |
| 34R-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.88 (200.2) | 49.5 (22.4) | SAE | N/A | 2.5 | 3100A |
| 34M-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 6.77 (172.0) | 7.95 (201.9) | 49.5 (22.4) | SAE and 3/8-16" Stud (Pos.), 5/16-18" Stud (Neg.) | 60 (6.8) stud only | 2.5 | 3100A |
| 34/78-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 7.08 (179.8) | 7.88 (200.1) | 49.5 (22.4) | TOP SAE SIDE 3/8-16" Receptacle | 60 (6.8) side terminal only | 2.5 | 3100A |
| 78-PC1500 | 12 | 1500 | 850 | 1250 | 1050 | 68 | 62 | 135 | 10.86 (275.8) | 7.08 (179.8) | 7.34 (186.4) | 49.5 (22.4) | SIDE 3/8-16" Receptacle | 60 (6.8) | 2.5 | 3100A |
| PC1700 | 12 | 1550 | 810 | 1325 | 1175 | 68 | 65 | 142 | 13.03 (331.0) | 6.63 (168.4) | 7.78 (197.6) | 60.9 (27.6) | M6 Receptacle [†] or SAE 3/8-16" Receptacle | 60 (6.8) | 3.5 | 3500A |
| 65-PC1750 | 12 | 1750 | 950 | 1350 | 1070 | 74 | 65 | 145 | 11.84 (300.7) | 7.19 (182.6) | 7.49 (190.2) | 58.0 (26.3) | SAE | N/A | 2.0 | 5000A |
| PC1800-FT | 12 | 1800 | 1300 | 1600 | 1450 | 214 | 190 | 475 | 22.87 (581.0) | 4.92 (125.0) | 12.46 (316.5) | 132.3 (60.0) | 3/8" Stud | 80 (9.0) | 3.3 | 3800A |
| 31-PC2150 | 12 | 2150 | 1150 | 1545 | 1370 | 100 | 92 | 205 | 13.07 (332.0) | 6.91 (175.5) | 9.59 (243.6) | 77.8 (35.3) | 3/8-16" Stud or SAE [†] | 200 (22.6) max stud only | 2.2 | 5000A |
| 31M-PC2150 | 12 | 2150 | 1150 | 1545 | 1370 | 100 | 92 | 205 | 13.00 (330.2) | 6.80 (172.7) | 9.39 (238.5) | 77.8 (35.3) | SAE and 3/8-16" Stud (Pos.), 5/16-18" Stud (Neg.) | 200 (22.6) max stud only | 2.2 | 5000A |
| PC2250 | 12 | 2250 | 1225 | 1730 | 1550 | 126 | 114 | 240 | 11.26 (286.0) | 10.59 (269.0) | 9.17 (233.0) | 86.0 (39.0) | SAE Terminal and 3/8-16" Stud | 100 (11.0) For 3/8-16" stud only | 2.1 | 5000A |

*Cold Start Performance S.A.E J537 JUNE 82 **Pulse Current † Can be fitted with brass automotive terminal

Optional metal jackets available on PC545, PC680, PC925, PC1200, PC1700 and 31-PC2150

Operating Temperature Range = PC310 and PC1800-FT: -40°F (-40°C) to 122°F (50°C), PC370, PC950 and PC1100:

-40°F (-40°C) to 122°F (50°C), PC535 and PC625: -40°F (-40°C) to 113°F (45°C), PC545, PC680, PC925, PC1200 and PC1700

without metal jacket: -40°F (-40°C) to 113°F (45°C), PC545, PC680, PC925, PC1200 and PC1700 with metal jacket:

-40°F (-40°C) to 176°F (80°C), PC1220, PC1350 and PC2250: -40°F (-40°C) to 104°F (40°C), All other models: -40°F (-40°C)

to 176°F (80°C)