g HFO/*i* System Main Disconnect Panel

Theory, Installation, Operation & Troubleshooting Manual

GEMS-2276547-R4503ET 480V/60HZ or 400V/50HZ
GEMS-2276548-R4503FT 200V/ 50/60HZ

Caution: *Trouble shooting and servicing should only be attempted by a qualified electrician.*

Warning: *Control power is present when the breakers are in the open position. Power may originate from two separate sources. De-energize both prior to servicing this panel.*

THEORY OF OPERATION

This panel incorporates a number of features desirable by MR installations to minimize down time, protect PDU electronics, reduce operating costs, and reduce delays after a power outage. The panel comes wired for a common feed for both the PDU and the system Cooling Cabinet and can easily be re-configured for dual feeds. Dual feeds consist of normal power feed for the PDU and a separate essential power source feed for the system cooling cabinet.

PDU branch circuits are controlled by electrically held contactors, which opens on any loss of power and reclose with restoration of power after a 30 cycle (0.5 second) adjustable time delay. This time delay protects the sensitive electronic, computer equipment and system cooling cabinet from sags and surges which immediately follow power loss from black outs, storms, utility reclosure operations and out of phase automatic transfer switch operations. The PDU, system CoolingCabinet and auxillary equipment contactors are controlled by an autostart DC control circuit. DC battery control circuit protection time is based upon the condition of the battery but is expected to hold for 48 hours.

UPS Power and UPS Emergency Off disconnection is also provided by this panel. Two remote emergency off pushbuttons and the cover mounted emergency off pushbuttons provide immediate shutdown for the entire system. Restoration of power after an emergency off operation is accomplished by pressing the Main Power ON pushbutton on the cover of the panel.

The DC Battery has a life of 5 years at which time it must be replaced to assure auto-restart capability.
Circuit breaker CB5 provides power for the UPS, MUX BOX, Magnet Monitor, and the modem as indicated on the attached wiring diagrams.

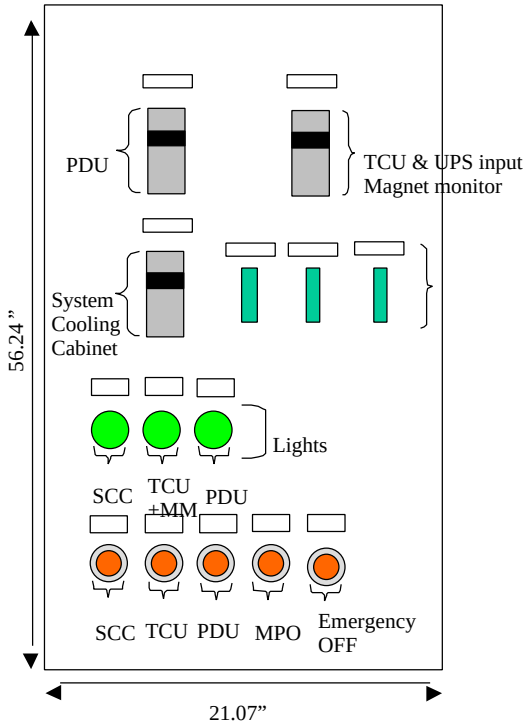
PANEL DIMENSIONS

Approximately 6.95 inches may be recessed into the wall for semi-flush installations.
Box is taller and wider than cover.

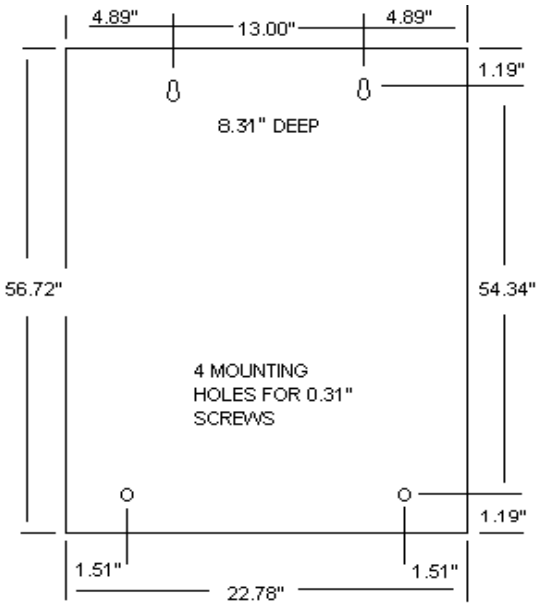
Physical Specifications

Height: 56.24” inches (1445.3 mm)
Width: 21.07” inches (583.2 mm)
Depth: 7.13 inches (181.1 mm)
Weight: 260 pounds (117.5 Kg)
Door Swing Radius : 21.75 inches (552.5mm)

Main Disconnect Panel
Front cover view



Depth : 7.13”



For warranty parts or technical assistance contact

GE Supply - Milwaukee, WI.

414-527-6600, Central Time Zone

INSTALLATION SINGLE FEED

Incoming power is connected to the main lugs located at the top of the panel. PDU and system cooling cabinet are connected directly to the load side of the contactors. TCU connections are made at CB4 and the 3 KVA 120V grounded terminal.
Receptacles are provided for the UPS input, UPS output, Magnet Monitor, modem and MUX box.

Complete the label on the cover of the panel indicating the location and circuit of the power source providing power to this panel.

Four labels are supplied indicating a "warning of the automatic restart" must be installed on the front cover near each on-off switch, and on the rear of system cooling cabinet.

Two Labels are supplied indicating "Warning of automatic restart OF THE TCU" must be installed on the TEMPERATURE CONTROL UNIT.

The control circuit must be completed by installing the two remote emergency off pushbuttons as shown on the wiring diagram on the inside of the door. The system cooling cabinet contactors, UPS contactor, UPS output contactor and PDU will not close unless the remote emergency off pushbuttons are installed or temporarily jumpered.

INSTALLATION DUAL FEED

Re-configuring the panel for a normal feed for the PDU and an essential feed for the system cooling cabinet is accomplished by removing the cables between main power distribution block and the CB1, the PDU breaker. These wires are identified on the wiring diagram located inside panel cover. The incoming normal power feed is connected directly to CB1, PDU breaker line side lugs.

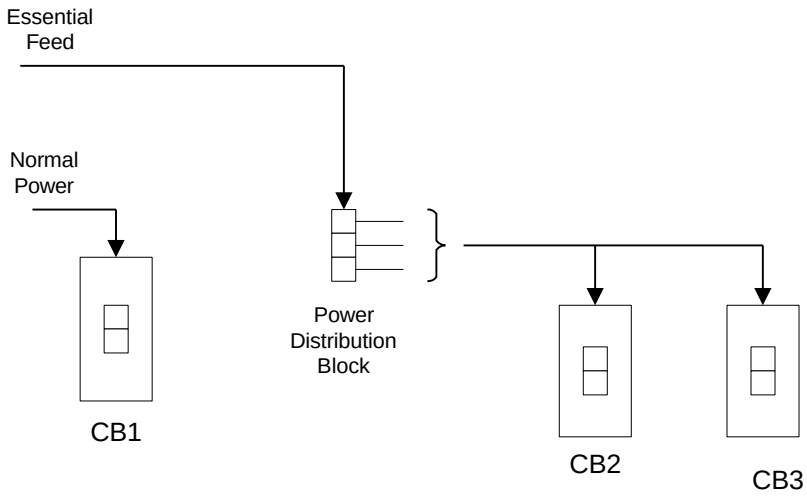
The system cooling cabinet incoming power is terminated on the power distribution terminal block, which feeds power to the system cooling cabinet and the control circuit. The primary of the control transformer control circuit must be fed from the same source as the system cooling cabinet to provide power for emergency shut down.

Receptacles are provided for the UPS input, UPS output, Magnet Monitor, modem and MUX box.

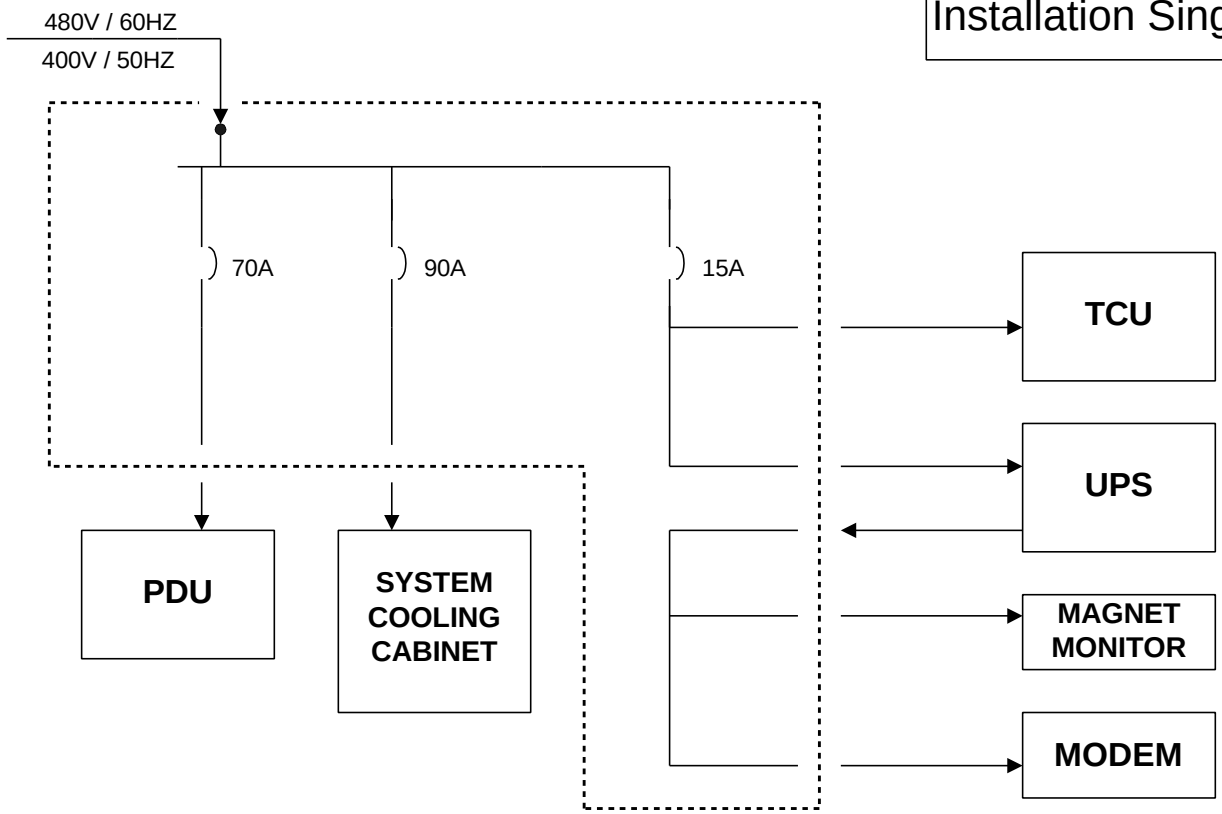
Complete the label on the cover of the panel indicating the location and circuit of each power source providing power to this panel.

Four labels are supplied indicating a "warning of the automatic restart" must be installed on the front cover near each on-off switch, and on the rear of system cooling cabinet

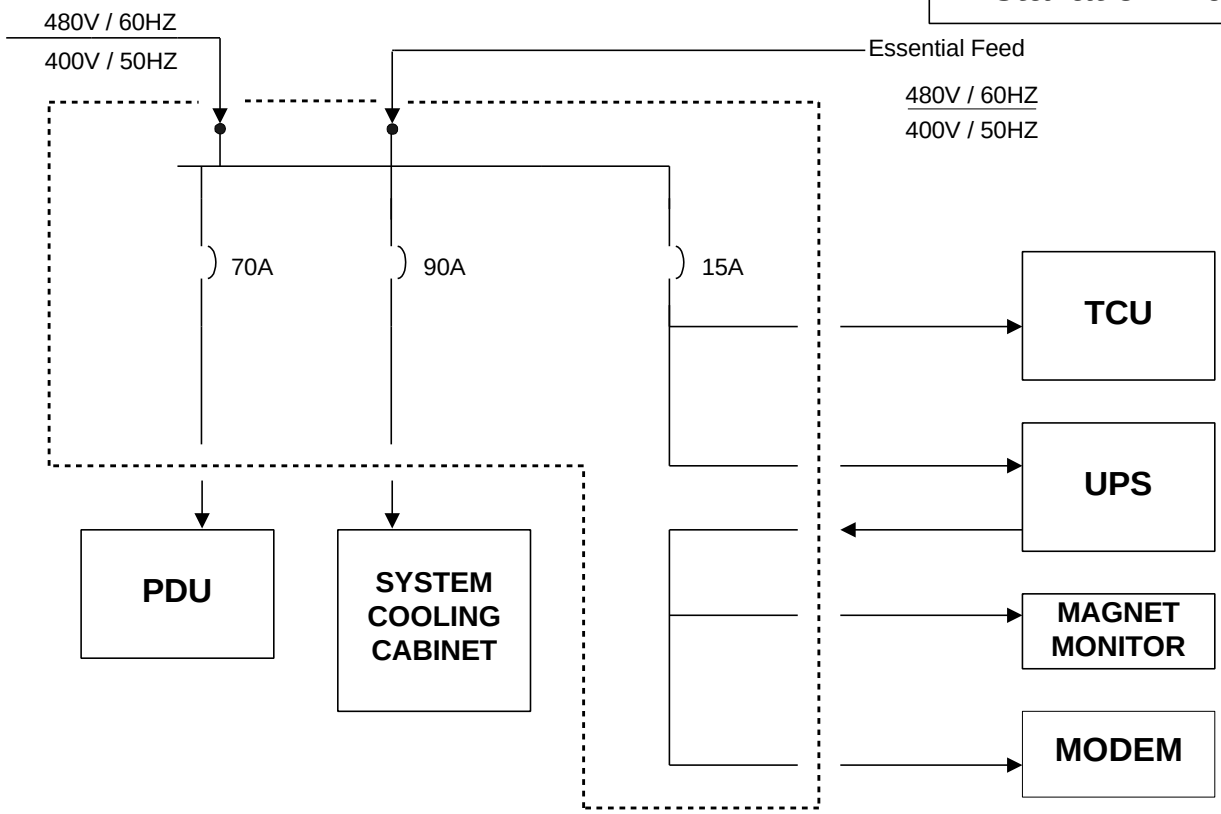
The control circuit must be completed by installing the two remote emergency off pushbuttons as shown on the wiring diagram on the inside of the door. The system cooling cabinet contactors, UPS contactor, UPS output contactor and PDU will not close unless the remote emergency off pushbuttons are installed or temporarily jumpered.



Installation Single Feed



Installation Dual Feed



TESTING SINGLE FEED PANELS

Warning: *Control power is present when the breakers are in the open position.*

Make sure there is no one working on the equipment which this panel feeds prior to testing the panel. Turn off the PDU. Testing is best accomplished prior to connection of PDU and system cooling cabinet wires.

TEST	CHECK
1. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches to ON.	1. All three green pilot lights should be on indicating proper contactor operation.
2. Press any emergency off pushbutton.	2. All contactors must de-energize and stay de-energized. All three pilot lights must be OFF. The UPS output is disconnected from magnet monitor and modem.
3. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON and repeat for the other emergency off pushbuttons.	3. All contactors must de-energize and stay de-energized after an emergency OFF operation. All three pilot lights must be OFF.
4. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON.	4. All three green pilot lights should be on indicating proper contactor operation.
5. Press any emergency off pushbutton.	5. All contactors must de-energize and stay de-energized. All three pilot lights must be OFF.
6. Turn off incoming power from the breaker feeding power to this panel. .	6. All three lights must be OFF indicating loss of power
7. Restore incoming power to panel.	7. Upon restoration of power all contactors must remain off. All pilot lights must be OFF. This demonstrates emergency off function.
8. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON.	8. All three green pilot lights should be on.
9. Individually rotate each on-off selector switch for the PDU, system cooling cabinet, TCU/magnet monitor OFF then ON.	9. Each green indicating light should turn off and the respective contactor should turn OFF in OFF and return to ON when the selector switch is ON.
10. Turn off incoming power from the breaker feeding power to this panel and restore power to the panel.	

TESTING DUAL FEED PANELS

***Warning*:** *Control power is present when the breakers are in the open position. Power originates from two separate sources. De-energize both prior to servicing this panel.*

Make sure there is no one working on the equipment which this panel feeds prior to testing the panel. Turn off the PDU. Testing is best accomplished prior to connection of PDU and system cooling cabinet.

TEST	CHECK
1. Press the main power ON pushbutton and rotate the system cooling cabinet, TCU and PDU selector switches to ON.	1. All three green pilot lights should be ON indicating proper contactor operation.
2. Press any emergency off pushbutton.	2. All contactors must de-energize and stay de-energized. All three pilot lights must be OFF.
3. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON and repeat for the other emergency off pushbuttons.	3. All contactors must de-energize and stay de-energized. All three pilot lights must be OFF.
4. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON. Individually rotate each on-off selector switch for the PDU, system cooling cabinet and TCU/Magnet Monitor <u>off</u> then <u>on</u>.	4. All three green pilot lights should be ON indicating proper contactor operation. Each green indicating light should turn off and the respective contactor should turn OFF in OFF and return to ON when the selector switch is ON.
5. Press any emergency off pushbutton.	5. All contactors must de-energize and stay de-energized. All three pilot lights must be OFF.
6. Starting with the <u>de-energized</u> state of #5, turn off both incoming power feeds from the normal power breaker and essential power breaker feeding power to this panel.	6. All three pilot lights must be OFF indicating system is de-energized.
7. Restore both the normal and essential power feeds to the panel.	7. Upon restoration of power all pilot lights and contactors <u>must remain off</u>. This demonstrates emergency off functions.
8. Press the main power ON pushbutton and verify the system cooling cabinet, TCU and PDU selector switches are ON.	8. All three green pilot lights should be on.
9. De-energize power to the PDU breaker only from its source breaker.	9. PDU light and contactor C1 will turn OFF as it indicates system actual state. TCU and system cooling cabinet lights will remain ON.

TESTING DUAL FEED PANELS (CONTINUED)

Warning: *Control power is present when the breakers are in the open position. Power originates from two separate sources. De-energize both prior to servicing this panel.*

Make sure there is no one working on the equipment which this panel feeds prior to testing the panel. Turn off the PDU. Testing is best accomplished prior to connection of PDU and Shield cooler wires.

TEST	CHECK
10. Restore power to PDU breaker from source breaker.	10. PDU breaker green pilot light turns ON and contactor C1 closes. TCU / UPS and system cooling cabinet green pilot lights should remain ON.
11. Press system ON push button.	11. PDU breaker pilot light remains ON. TCU / UPS and system cooling cabinet green pilot lights should be ON.
12. De-energize TCU and system cooling cabinet source breaker feeding this panel.	12. All pilot lights should be OFF and all contactors open as the AC control power is obtained from the essential power feed. UPS output is still energized.
13. Restore TCU and system cooling cabinet source breaker power.	13. All pilot lights should turn on and all contactors C1, C2, C3 should close.
14. De-energize both normal PDU source power and essential source power to the panel and restore power to the panel.	14. The three green pilot lights should be OFF during the power outage. The three green pilot lights should turn on with restoration of power demonstrating the DC supervisory circuit is operating properly and the auto restart feature is operational.

TROUBLESHOOTING

System cooling cabinet contactors will close unless the control circuit emergency off pushbuttons are wired as indicated on the wiring diagram.

Make sure the emergency off pushbuttons are wired through normally closed contacts. Operation of any emergency off pushbutton should de-energize relay CR1, shutting the entire system down.

Check LED lamps for burnt out or broken in shipment.

NOTES:

For warranty parts or technical assistance contact

GE Supply - Milwaukee, WI.

414-527-6600, Central Time Zone

MAINTENANCE

The auto restart circuit requires the 7 Ah DC battery to be functional. Periodically verify that the 12V DC charging circuit is operational.

Normal operation of DC circuit is from DC charger with battery fully charged in float stage.

Battery life is 5 years at which time it must be replaced.

Power Sonic dealers can be located at: www.power-sonic.com

POWER SONIC

Rechargeable Sealed Lead Acid Battery

PS-1270

Power-Sonic rechargeable batteries are lead-lead dioxide systems. The dilute sulphuric acid electrolyte is suspended and thus immobilized. Should the battery be accidently overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free and leak proof.

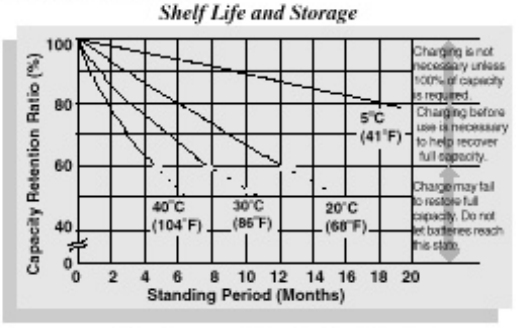
PS-1270 is air transport approved, and meets all current requirements set forth by the C.A.B., F.A.A., I.A.T.A. and D.O.T.

U.L. recognizes model PS-1270 under file number MH 14328.

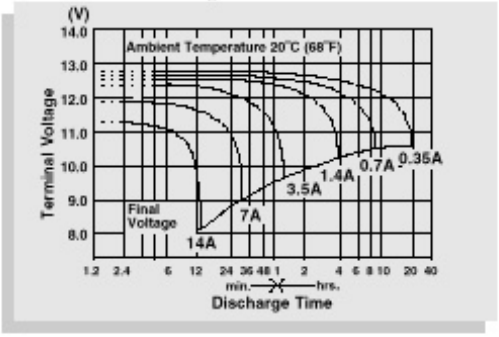
PERFORMANCE SPECIFICATIONS

Nominal Voltage	12 volts (6 cells in series)
Nominal Capacity	
20 hour rate (350mA to 10.50 volts)	7.0 A.H.
10 hour rate (650mA to 10.50 volts)	6.5 A.H.
5 hour rate (1100mA to 10.20 volts)	5.5 A.H.
1 hour rate (4200mA to 9.00 volts)	4.2 A.H.
Approximate Weight	5.75 pounds (2.6 kg)
Energy Density (20 hour rate)	1.49 Watt-hours/cubic inch (91.0 Watt-hours/l)
Specific Energy (20 hour rate)	14.6 Watt-hours/pound (32.2 Watt-hours/kg)
Internal Resistance (Fully Charged Battery)	22 milliohms (approximately)
Maximum Discharge Current (≤ 7 Min.)	21 amperes
Maximum Short-Duration Discharge Current (≤ 10 Sec.)	70 amperes
Terminals	Quick disconnect tabs, 0.187" x 0.032" Mate with AMP, INC. FASTON "187" series.
Vibration Test (2000 cycles/minute, 0.10 inch excursion, 2 hours)	No loss in capacity or performance
Shelf Life — % of nominal capacity at 68° F (20° C)	
1 Month	97%
3 Months	91%
6 Months	83%
Operating Temperature Range	
Charge	-4°F (-20°C) to 122°F (50°C)
Discharge	-4°F (-20°C) to 140°F (60°C)
Case/Cover (Meets UL94V-O flammability rating)	ABS Plastic

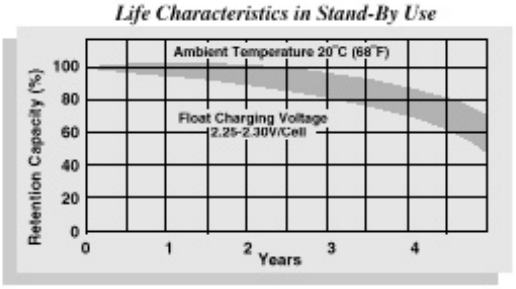
Shelf Life and Storage



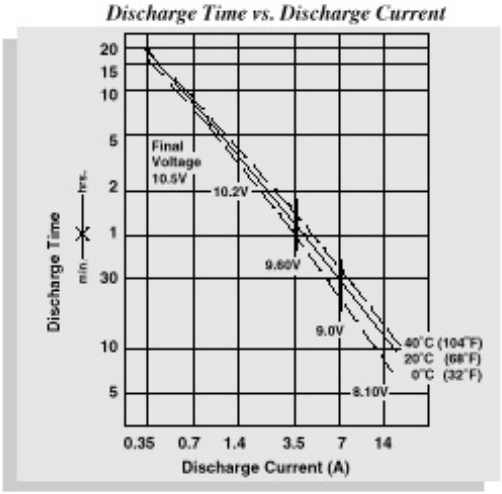
Discharge Characteristics



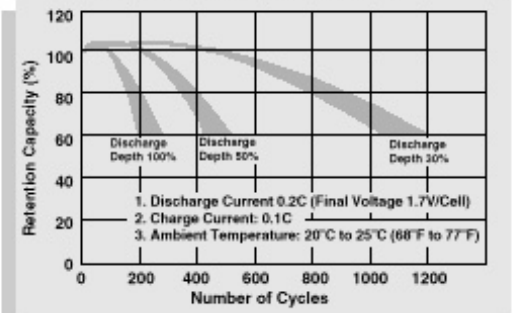
Life Characteristics in Stand-By Use



Discharge Time vs. Discharge Current



Life Characteristics in Cyclic Use



Physical Dimensions: in. (mm)

Tolerances are +/- 0.04 in. (+/- 1mm) and +/- 0.08 in. (+/- 2mm) for height dimensions.

CHARGING

Cycle Applications: Limit initial current to 1500mA. Charge until battery voltage (under charge) reaches 14.40 to 14.70 volts at 68°F (20°C). Hold at 14.40 to 14.70 volts until current drops to approximately 70mA. Battery is fully charged under these conditions, and charger should either be disconnected or switched to "float" voltage.

"Float" or "Stand-By" Service: Hold battery across constant voltage source of 13.50 to 13.80 volts continuously. When held at this voltage, the battery will seek its own current level and maintain itself in a fully charged condition.

NOTE: Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged after 6-9 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

SALES & MARKETING
3106 Spring Street
Redwood City, CA 94063 USA
Tel: 650-306-1200 Fax: 650-366-3662
rwcsales@power-sonic.com

www.power-sonic.com

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9163 Siempre Viva Road
San Diego, CA 92173 USA
Tel: 619-661-2030 Fax: 619-661-3648
battery@power-sonic.com

POWER SONIC

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Sealed Maintenance Free Lead-Acid Battery

DATE: 7/31/99	ISSUED BY: Engineering	Telephone Number: (619) 661-2030

Hazardous Components

COMPONENTS	%WEIGHT	TLV	LD50 ORAL	LC50 Inhalation	LC50 Contact
Lead (Pb, PbO_2, $PbSO_4$)	70%	N/A	500 mg/kg	N/A	N/A
Sulfuric Acid	20%	1mg/m2	2140 mg/kg	N/A	N/A
Fiberglass Separator	5%	N/A	N/A	N/A	N/A
Polystyrene 478	5%	N/A	N/A	N/A	N/A

Physical Data

COMPONENTS	DENSITY	MELTING POINTS	Solubility (H_20)	ODOR	APPEARANCE
Lead	11.34	327.4º C (Boiling)	None	None	Silver-Gray Metal
Lead Sulfate	6.2	1070º C(Boiling)	40mg/L	None	White Powder
Lead Dioxide	9.4	290º C (Boiling)	None	None	Brown Powder
Sulfuric Acid	1.3	114º C (Boiling)	100%	Acidic	Clear Colorless Liquid
Fiberglass Sep.	N/A	N/A	Slight	Toxic	White Fibrous Glass
Polystyrene 478	N/A	N/A	None	No Odor	Solid

Flammability Data

COMPONENTS	FLASH POINT	EXPLOSIVE LIMITS	COMMENTS
Lead	None	None	
Sulfuric Acid	None	None	
Hydrogen		4% - 72%	Sealed batteries can emit hydrogen only if overcharged (float voltage >2.40 VPC)
Fiberglass Sep.	N/A	N/A	Toxic vapors may be released.In case of fire: wear self contained breathing apparatus.
478 Polystyrene	None	N/A	Temp. over 300ºC (572ºF) may release combustible gases. In case of fire: wear positive pressure self contained breathing apparatus.

First Aid

Sulfuric Acid Precautions	
Skin Contact	Flush with water, see physician if contact area is large or blisters form.
Eye Contact	Call physician immediately and flush with water until physician arrives.
Ingestion	Call physician. If patient is conscious, flush mouth with water, have patient drink milk or sodium bicarbonate solution.

POWER SONIC

MATERIAL SAFETY DATA SHEET

Sealed Maintenance Free Lead-Acid Battery

REACTIVITY DATA

COMPONENT	Sulfuric Acid
STABILITY	Stable at all temperatures
POLYMERIZATION	Will not polymerize
INCOMPATIBILITY	Reactive metals, strong bases, most organic compounds
DECOMP. PRODUCTS	Sulfuric dioxide, trioxide, hydrogen sulfide, hydrogen
CONDITIONS TO AVOID	Prohibit smoking, sparks, etc. from battery charging area. Avoid mixing acid with other chemicals.

SPILL OR LEAK PROCEDURES

Steps to take in case of leak or spill.	If sulfuric acid is spilled from a battery, neutalize acid with bicarbonate (baking soda), sodium carbon (soda ash) or calcium oxide (lime). Flush area with water and discard to the sewage system. Do not allow un-neutralized acid into sewage system.
Waste disposal method.	Neutralized acid may be thrown down sewer. Spent batteries must be treated as hazardous waste and disposed to local, state, and federal guidelines. A copy of this MSDS must be supplied to any scrap dealer or secondary lead smelter with battery.

PROTECTION

EXPOSURE SITE	PROTECTION	COMMENTS
SKIN	Rubber gloves, Apron	Protective equipment must be worn if the battery is cracked or otherwise damaged. A respirator should be worn during reclaim operations if TLV is exceeded.
RESPIRATORY	Respirator (for lead)	
EYES	Safety goggles, Face Shield	

ELECTRICAL SAFETY

Due to the battery's low internal resistance and high power density, high levels of short circuit current can be developed across the battery terminals. Do not rest tools or cables on the battery. Use insulated tools only. Follow all instructions and diagrams when installing or mounting battery systems.

HEALTH HAZARD DATA

LEAD: The toxic effects of lead are accumulative and slow to appear. It affects the kidneys, reproductive, and central nervous systems. The symptoms of lead overexposure are anemia, vomiting, headache, stomach pain, dizziness, loss of appetite, and muscle and joint pain. Exposure from a battery occurs most often during lead reclaim operations through the breathing or ingestion of lead dust or fumes.

SULFURIC ACID: Sulfuric acid is a strong corrosive. Contact with acid can cause severe burns on the skin and in eyes. Ingestion of sulfuric acid will cause GI tract burns. Acid can be released if the battery case is damaged or if vents are tampered with.

FIBERGLASS SEPARATOR: Fibrous glass is an irritant of the upper respiratory tract, skin, and eyes. For exposure up to 10F/CC use MSA Comfoll with type H filter. Above 10F/CC up to use Ultra-Twin with type H filter. This product is not considered carcinogenic by NTP or OSHA.

ALL DATA MUST BE PASSED TO ANY SCRAP DEALER OR SMELTER WHEN BATTERY IS RESOLD.

Power-Sonic has always strived to deliver the highest quality products to its over 3,000 customers. Stringent process controls govern all manufacturing activities. Quality engineers are highly involved in evaluating the quality and reliability of all products manufactured both in the design and production stages. Our quality controls are emphasized throughout our manufacturing process to maximize customer satisfaction. The following is a list of tests our products go through to ensure quality.

CAPACITY TEST

Batteries are discharged at the 0.3C rate. After 120 minutes of continuous discharge the battery voltage under load must be 1.75 volt/cell to pass(C = rated capacity of a battery; eg, PS-610 (6V, 1 AH) C = 1 amp.

HIGH LOAD TEST

A load of 2 C amps is applied for 5 seconds while the terminal voltage is monitored. To pass, the voltage must be 1.75 volt/cell or higher.

VISUAL INSPECTION

Batteries are inspected for proper appearance of battery case, terminals, seals, markings, and the absence of electrolyte leakage. Several samples each day are checked for compliance with specified dimensions and tolerances.

CAPACITY TEST - MEDIUM LOAD

Samples are fully charged, then discharged at room temperature at the 0.2C rate to a final voltage of 1.7 volt/cell. The discharge time must be no less than 4 hours.

CAPACITY TEST - HIGH LOAD

Fully charged batteries are discharged at 77 ºF (25 ºC) at the 2C rate to an end voltage of 1.35V/cell. The expected discharge time is 12 minutes.

SHELF LIFE TEST

Fully charged batteries are stored for 2 1/2 weeks at 131 ºF (55ºC). A discharge test performed at room temperature applying a load of 0.2C rate to 1.7V/cell must yield a run time of at least 2 hours, i.e. the capacity loss resulting from self discharge must not exceed 50%.

VIBRATION TEST

Sample batteries are subjected to vibrations in any direction at the rate of 2000 cycles per minute and an amplitude of 0.1 in (2.5mm) for 2 hours. No signs of damage, leakage, or change in electrical characteristics are expected.

OVERCHARGE TEST

Fully charged batteries are overcharged at the rate of 0.1C amps for 48 hours and then allowed to rest for 2 hours. Discharging the batteries at the 0.1C rate to 1.75 volt/cell is expected to produce a run time of 8.5 hours, or at least 95% of initial

capacity, and an absence of problem signs.

RELIEF VALVE TEST (UL924)

A fully charged battery is submerged in a tank filled with mineral oil and charged at 0.4C amps. This overcharge is to demonstrate the proper functioning of the safety relief valve. The release of excess gasses through the vent is demonstrated by bubbles rising from the battery.

CYCLE LIFE TEST

At an ambient temperature of 77 ºF (25 ºC) sample batteries are discharged at the 0.2C rate to 1.7V/cell and recharged at the 0.25 rate up to 2.5V/cell until charge current drops to 0.01C amps. At least 175 cycles must be obtained before the capacity drops below 60% of initial capacity.

PLATES (Electrodes)

Plate construction is the key to producing a good battery. Recognizing this, POWER-SONIC utilizes the latest technology and equipment to cast grids from a lead-calcium alloy free of antimony. The small amount of calcium and tin in the grid alloy imparts strength to the plate and guarantees durability even in extensive cycle service. Lead oxide paste is added to the grid to form the electrically active material. In the charged state, the negative plate paste is pure lead and that of the positive lead oxide. Both of these are in a porous or spongy form to optimize surface area and thereby maximize capacity.

SEPARATORS

POWER-SONIC separators are made of non-woven glass fiber cloth with high heat and oxidation resistance. The material further offers superior electrolyte absorption and retaining ability, as well as excellent ion conductivity.

ELECTROLYTE

Immobilized dilute sulfuric acid: H_2SO_4.

CONTAINER

Case material is ABS, high-impact plastic resin, styrene, or a polypropylene-polyethylene copolymer with high resistance to chemicals and flammability.

LEAKPROOF DESIGN & OPERATIONAL SAFETY

POWER-SONIC batteries have been approved for shipment by air, both by D.O.T. and I.A.T.A. U.L.'s component recognition program for emergency lighting and power batteries lists POWER-SONIC under file numbers MH14328 and MH14838.

TERMINALS

Depending on model, batteries come either with AMP Faston type terminals made of tin plated brass, post type terminals of the

same composition with threaded nut and bolt hardware, or heavy duty flag terminals made of lead alloy. A special epoxy is used as sealing material surrounding the terminals.

RELIEF VALVE

In case of excessive gas pressure build-up inside the battery (usually caused by abnormal charging) the relief valve will open and relieve the pressure. The one-way valve not only ensures that no air gets into the battery where the oxygen would react with the plates causing internal discharge, but also represents an important safety device in the event of excessive overcharge. Vent release pressure is between 2-6 psi; the seal ring material is neoprene rubber.

CASE SEALING

Depending on model the case sealing is ultrasonic welded, epoxy, or heat seal.

SEALED MAINTENANCE FREE

The valve regulated, spill-proof construction of the POWER-SONIC battery allows trouble-free, safe operation in any position. There is no need to add electrolyte, as gases generated during charging are recombined in a unique "oxygen cycle".

EASY HANDLING

No special handling precautions or shipping containers – surface or air - are required due to the leak-proof construction.

ECONOMICAL

The high watt-hour per dollar value is made possible by the materials used in a sealed lead-acid battery: they are readily available and low in cost.

LONG SERVICE LIFE

Under normal operating conditions, four or five years of dependable service life can be expected in stand-by applications, or between 200 and 1000 charge/discharge cycles depending on the average depth of discharge.

DESIGN FLEXIBILITY

Batteries may be used in series and/or parallel to obtain choice of voltage and capacity. Due to recent design breakthroughs, the same battery may be used in either cyclic or standby applications. Over 50 models are available to choose from.

RUGGED CONSTRUCTION

The high-impact resistant battery case is made either of non-conductive ABS plastic or styrene. Large capacity batteries frequently have polypropylene cases, all of these materials impart great resistance to shock, vibration, chemicals and heat.

COMPACT

Power-Sonic batteries use state of the art design, high grade materials, and a carefully controlled plate-making process to provide excellent output per cell. The high energy density provides superior power/volume and power/weight ratios.

HIGH DISCHARGE RATE

Low internal resistance allows discharge currents of up to ten times the rated capacity of the battery. Relatively small batteries may thus be specified in applications requiring high peak currents.

LONG SHELF LIFE

A low self-discharge rate may allow storage of fully charged batteries for up to a year at room temperature before charging is required. Lower storage temperatures enhance shelf life characteristics even further.

WIDE OPERATING TEMPERATURE RANGE

Power-Sonic batteries may be discharged over a temperature range of -40 ºC to +60 ºC (-40 ºF to +140 ºF), and charged at temperatures ranging from -20 ºC to +50 ºC (4 ºF to +122 ºF).

DEEP DISCHARGE RECOVERY

Special separators, advanced plate composition, and a carefully balanced electrolyte system have greatly improved the ability of recovering from excessively deep discharge.

P-S Model #	Nominal Voltage (V)	Nominal Capacity 20 hr rate (mA)	Discharge Current 20 hr rate (mA)	Dimensions								Approx. Weight		Standard Terminal Type
				Length		Width		Height		H.O.T.				
				in.	mm.	in.	mm.	in.	mm.	in.	mm.	lbs.	kg.	
PS-1270	12	7.0	350	5.95	151	2.56	65	3.7	94	3.86	98	5.7	2.6	F1