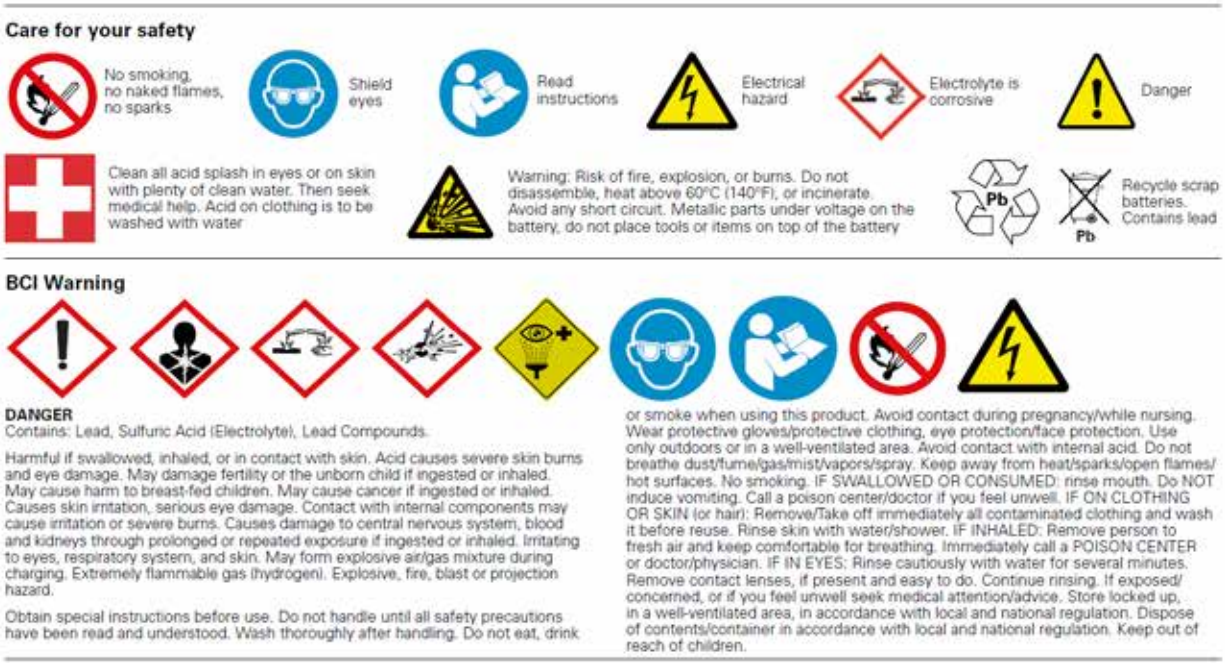
TRIVENI
Electric

Battery Installation, Operation and Maintenance Manual

Important

Please read this manual immediately upon receipt of battery before unpacking and installing. Failure to comply with these instructions will render any warranties null and void. The term battery within this literature pertains to (1) 12-Volt battery unit consisting of (6) individual cells.



Handling
12MQ batteries are supplied in a charged condition and are capable of extremely high short circuit currents. Take care to avoid short-circuiting terminals of opposite polarity.

Keep flames away
In case of accidental overcharge a flammable gas can leak off the safety vent.
Discharge any possible static electricity from clothes by touching an earth connected part.

Tools
Use tools with insulated handles.
Do not place or drop metal objects on the battery.
Remove rings, wristwatch and articles of clothing with metal parts that may come into contact with the battery terminals.

California Proposition 65 Warning - Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Receiving the Shipment

Carefully examine the battery shipment upon arrival for any signs of transit damage and that it agrees with the materials list or packing slip. Be very careful not to inadvertently discard any accessories contained in the packing material.

Batteries contain immobilized dilute sulfuric acid absorbed in the glass- mat separators.

Use gloves appropriate for the electrical and chemical hazards when handling broken or damaged containers in case of acid leakage.

Storage

Store 12MQ batteries in a dry, clean and preferably cool location.

Since the batteries are supplied charged, storage time is limited. In order to easily charge the batteries after prolonged storage, it is advised not to store it more than:

- 6 months at ambient temperature no warmer than 77° F (25° C)
- 4 months at 86° F (30° C)
- 2 months at 104° F (40° C)

Give the battery a freshening charge before the end of the recommended storage interval.

A refreshing charge shall be performed at 2.26 Volts per cell (VPC) at 77° F (25° C) for 96 hours or until the charge current does not vary for a 3-hour period.

The necessity of a charge can also be determined by measuring the open circuit voltage of a stored battery. (See Table 2)

Charging is advised if the voltage drops below 2.07 VPC.

Maximum total storage prior to installation is 2 years from date of shipment from the factory to the customer. Freshening charges are required before the end of the storage time period or more frequently, as noted above.

Failure to observe these conditions may result in greatly reduced capacity and service life.

FAILURE TO CHARGE AS NOTED VOIDS THE BATTERY'S WARRANTY.

Installation

Install in clean, dry area. 12 MQ batteries release minimal amounts of gas during normal operation (gas recombination efficiency ≥ 97%). The batteries can be installed near the main equipment. Batteries must be installed in accordance with federal, state and local law regulations and the manufacturer's instructions.

Temperature

Avoid placing batteries in areas of high temperature or in direct sunlight. The batteries will give their best performance and service life when operating at a temperature between 68° F (20° C) and 77° F (25° C), however they are capable of operating in a temperature range of -22° F (-30° C) to 122° F (50° C). Please reference the charging float voltage section for more information regarding float voltage adjustments for temperature variations. Reasonable precautions should be taken to prevent continuous operation below -22° F (-30° C) or above 122° F (50° C).

Ventilation

Under normal conditions gas release is very low and natural ventilation is sufficient for cooling purposes and the possibility of out-gassing. This enables Interstate MQ batteries to be used safely in close proximity to electronic equipment.

However, care must be taken to ensure adequate ventilation when placed in cabinets. Batteries must not be placed in sealed cabinets.

Stowing

For proper installation, Interstate battery racks and cabinets are recommended.

If provided, intercell connector covers should be installed after completing the intercell connections.

Attention: Unless otherwise noted, battery racks and cabinets should not be transported with rigid intercell connectors in place.

Torque

The maximum torque load of intercell connector bolts (M6) is 60 in-lbs (6.8 N•m +/- 5%). A loose connector can cause problems in charger adjustment, erratic battery performance, possible damage to the battery and/or personal injury.

Cells in Parallel Strings

When using a constant voltage charger, ensure that the connections from the charger at the end of each string have the same electrical resistance.

There is no theoretical limit on the number of strings that can be used in parallel. However, there might be practical limits on the number of parallel strings such as short circuit current limits, cable resistances and charger current limitations.

Charging

Float Voltage

The float/charge voltage is 2.265 VPC (+/- 0.015 V) at 77° F (25° C).

When the average ambient temperature deviates more than ± 9° F (5° C) from the reference, it is necessary to adjust the float voltage as follows:

2.33 to 2.36 VPC at 32° F (0° C)

2.30 to 2.33 VPC at 50° F (10° C)

2.27 to 2.30 VPC at 68° F (20° C)

2.25 to 2.28 VPC at 77° F (25° C) (reference)

2.23 to 2.26 VPC at 86° F (30° C)

2.22 to 2.25 VPC at 95° F (35° C)

Due to the phenomena of gas recombination, a difference of ± 2% (earlier in float life ± 5% is common) for an individual cell voltage can be observed. However, the total voltage of the battery shall be within the limits stated above.

Equalization Change

Periodic equalizing is not normally required to correct cell/unit imbalance. Equalize charging should not be performed unless specifically recommended by Power Storage Solutions. Please consult Power Storage Solutions before applying and equalization change.

Ripple Current

Unacceptable levels of ripple current from the charger or the load can cause permanent damage and a reduction in service life. It is recommended to limit the continuous ripple current to the values of the Table 1 (in amperes).

Charging Current

The recommended charging method for 12 MQ batteries is current limited, constant voltage charging. Refer to Table 1 for the current limits for each battery model.

State of Charge

The battery state of charge can be determined approximately by measuring the open circuit voltage after the battery has been at rest (off charge) for a minimum of 24 hours at 77° F (25° C).

Discharging

End of Discharge Voltage

The end of discharge voltage must be limited to 1.60 VPC.

A protective system should be installed to prevent deep discharge.

Discharged Cells

MQ batteries must not be left in a depleted state after discharge. They should be immediately recharged to a fully charged condition.

Failure to observe these conditions may result in greatly reduced service life and unreliability.

Accidental Deep Discharge

When the battery is completely discharged, the sulfur from the dilute sulfuric acid is completely absorbed in the plates and the remaining electrolyte consists only of water.

At this point, the sulfation of the plates is at its maximum, considerably increasing the cell's internal resistance.

Important notice: This type of deep discharge will provoke a premature deterioration of the battery and a noticeable effect on life expectancy.

The Effect of Temperature on Capacity

Correction factor of the capacity, according to temperature.

For temperature correction factors for use when load testing a battery, please refer to the Temperature Correction factor tables published in IEEE Standard 1188, latest version.

Maintenance and Records

12 MQ batteries are absorbed electrolyte, lead-acid type and need no water addition. These batteries are equipped with self-resealing, flame-arresting safety vents.

The containers and lids shall be kept dry and free from dust. Cleaning must be done only with a damp cotton cloth. Check monthly that total voltage at battery terminals, while on float, is (N x 2.25 to 2.28 V) for a temperature of 77° F (25° C), (where N is the number of cells in the battery). Upon initial installation, the battery unit date codes and installation date should be recorded. In addition, individual battery unit and string voltages, as well as, unit ohmic values (if practical) should be taken and retained.

Every 12 months, read, measure and record the following:

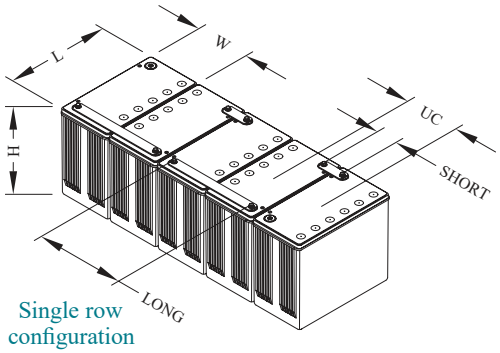
- Individual battery unit and string voltages
- Battery unit internal ohmic values
- Intercell connection resistance
- Ambient temperature in the vicinity of the battery and the temperature, take at the battery string negative post.

Keep a record (both hard and soft copy) of all measured values, load test and any maintenance issues.

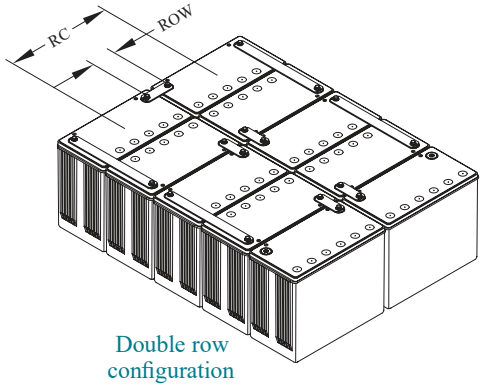
An autonomy check can be carried out once or twice a year.

The above record taking is the absolute minimum to protect the warranty. This data will be required for all warranty claims.

Intercell Connector Layout



Single row configuration (MQ models)



Double row configuration (MQ models)

Note: End terminal position will depend upon number of units in row, ie., whether ODD or EVEN number.
UC: Unit center to center
RC: Row unit center to center

12MQ Battery Model	Short			Long			Row			L
	Connector*	Cover Black	Cover Clear	Connector*	Cover Black	Cover Clear	Connector*	Cover Black	Cover Clear	Connecto
12MQ1200	866881TP	HRD2328	827564	866885TP	HRD2329	827567	866880TP	HRD2328	827564	882044TP
12MQ1800	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866881TP	HRD2328	827564	882044TP
12MQ2100	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866882TP	HRD2327	827565	882043TP
12MQ2400	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882043TP
12MQ3000	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882042TP
12MQ3300	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882042TP

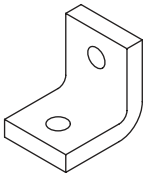
Batteries come standard with a stainless steel hardware package; p/n 867500 (one package per battery). The hardware package includes (2) each M6 x 1 x 16mm long bolts, flat washers and lock washers. Longer bolts are available but must be specified at the time of order placement.

Optional Extras

12MQ Battery Model	Number of cells	Length		Width		Height		UC		RC		Short		Long		Row		Weight	
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lb	kg
12MQ1200	6	8.9	226	5.5	140	8.1	206	5.6	142	9.1	231	2.2	56	9	229	1.9	48	43	20
12MQ1800	6	10.2	259	6.9	175	8.2	208	6.9	175	10.3	262	2.7	69	11.2	284	2.2	56	60	27
12MQ2100	6	11.8	300	6.8	173	8.4	213	6.9	175	12.1	307	2.7	69	11.2	284	2.5	64	71	32
12MQ2400	6	13.3	338	6.8	173	8.3	211	6.9	175	13.4	340	2.7	69	11.2	284	3	76	80	36
12MQ3000	6	13.3	338	6.8	173	10.7	272	6.9	175	13.4	340	2.7	69	11.2	284	3	76	103	47
12MQ3300	6	13.3	338	6.8	173	10.7	272	6.9	175	13.4	340	2.7	69	11.2	284	3	76	106	48

* For run times under 15 minutes or end voltages less than 1.67, consult technical support for assistance.
Connectors and L-Terminals are RoHS compliant.

L-Terminal for multiple cables



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