



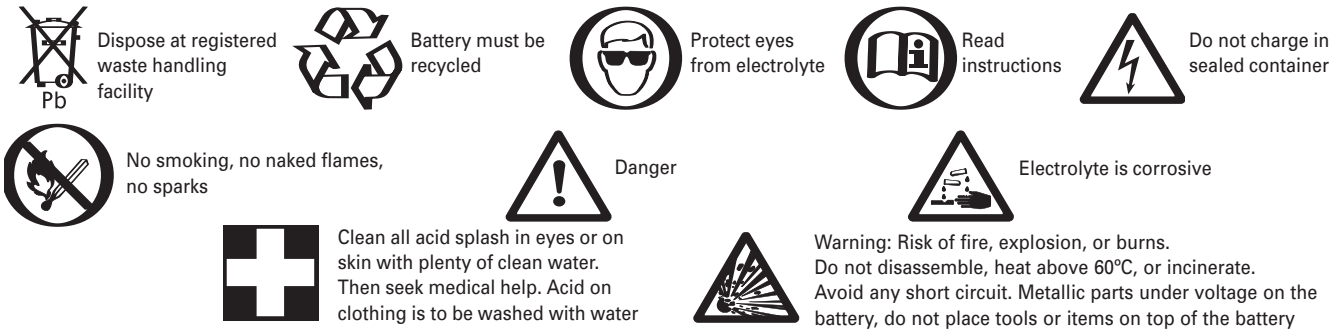
Installation, Operation
and Maintenance
Instructions



IMPORTANT

Please read this manual immediately on receipt of battery before unpacking and installing. Failure to comply with these instructions will render any warranties null and void.

CARE FOR YOUR SAFETY



Handling

DataSafe® HX+/HX batteries are supplied in a fully charged state and must be unpacked carefully to avoid very high short-circuit currents between terminals of opposite polarity. Use care when handling and moving batteries. Appropriate lifting equipment must be used.

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.

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 sulphuric acid in glass fibre separators.

Use rubber gloves when handling broken or damaged containers in case of acid leakage.

STORAGE

Store DataSafe® HX+/HX 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 them more than:

- 6 months at ambient temperature no warmer than 25°C
- 4 months at 30°C
- 2 months at 40°C

Give the batteries a freshening charge before the end of the recommended storage interval. A refreshing charge shall be performed using 2.26 V/cell at 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. Charging is advised if the voltage drops below 2.07 V/cell.

Maximum total storage prior to installation is 2 years from the 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 a clean and dry area. DataSafe HX+/HX batteries release minimal amounts of gas during normal operation (gas recombination efficiency ≥ 95%). They can be installed near the main equipment. Batteries must be installed in accordance with local, national and international regulations and manufacturers instructions.

■ Temperature

Avoid placing the battery in areas of high temperature or in direct sunlight. The battery will give the best performance and service life when working at a temperature between 20°C and 25°C. The maximum operating temperature range is -30°C to +45°C.

■ Ventilation

Under normal conditions gas release is very low and natural ventilation is sufficient for cooling purposes and inadvertent overcharge, enabling DataSafe HX+/HX batteries to be used safely in offices and with main equipment. However care must be taken to ensure adequate ventilation when placed in cabinets. Batteries must not be placed in sealed cabinets.

■ Security

All installation and ventilation must comply with the current local, national and international regulations.

■ Mounting

EnerSys® battery racks or cabinets are recommended for proper installation. Assemble the rack according to instructions. Place the monoblocs or cells on the rack and arrange the positive and the negative terminals for connection according to the wiring diagram. Check that all contact surfaces are clean and apply the bloc or cell connectors and the terminal screws. Tighten the screws securely. Follow the polarity to avoid short circuiting of cell groups. Finally connect the battery terminals. It is important that the battery is mounted firmly.

■ Installation of High Voltage Batteries

A battery consisting of 60 or more cells connected in series presents additional hazards and the following notes on installation should be employed.

- Limit the battery voltage by omitting inter-cell connectors to give a maximum section voltage of 120V or 60 cells.
- The omitted inter-cell connectors should be chosen such that they are in an easily accessible position. These connectors should only be fitted with the load and charger isolated and when the rest of the installation is complete.
- Never work alone on high voltage batteries.
- Always use insulated tools and wear approved high voltage insulating gloves.
- When supplied, fit the "high voltage battery" warning labels in a prominent position.

■ Torque

Tighten the nuts or bolts to the recommended levels of fastening torque indicated on the product label (if applicable). 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 constant voltage chargers, ensure that the connections between the charger and the end of each string within the battery have the same electrical resistance. Parallel strings must be limited to five strings.

CHARGING

■ Float Voltage

The float/charge voltage is 2.26 V per cell at 25°C. When the average ambient temperature deviates more than ± 5°C from the reference, it is necessary to adjust the float voltage as indicated in the following table :

Temperature	Float Voltage
0°C	2.33 to 2.36 Vpc
10°C	2.30 to 2.33 Vpc
20°C	2.27 to 2.30 Vpc
25°C (reference temperature)	2.24 to 2.27 Vpc
30°C	2.23 to 2.26 Vpc
35°C	2.21 to 2.24 Vpc

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

■ Charging Current

Utilising a constant voltage charger results in a charging current that is self limiting.

■ Fast Recharge

Occasionally (4 or 5 times a year) the battery may be recharged at 2.40Vpc with a current limit of 0.1C10A. Fast charging should be stopped after approximately 10 or 15 hours.

■ 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 0.05C10A.

■ 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 for a minimum of 24 hours at 25°C.

State of charge	Voltage
100%	2.12 to 2.14 V/Cell
80%	2.09 to 2.11 V/Cell
60%	2.05 to 2.08 V/Cell
40%	2.01 to 2.04 V/Cell
20%	1.97 to 2.00 V/Cell

DISCHARGING

■ End of Discharge Voltage

The end of discharge voltage must be limited to 1.60Vpc. A protecting system shall have to be installed to prevent deep discharge.

■ Discharged Cells/Monoblocs

DataSafe® HX+/HX batteries must not be left in a discharged condition after supplying the load, but must be immediately returned to float recharge mode. Failure to observe these conditions may result in greatly reduced service life and unreliability.

■ Accidental Deep Discharge

When the battery is completely discharged, the sulphuric acid is completely absorbed and the remaining electrolyte consists only of water. At this point, the sulphation 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.

■ Effect of temperature on capacity

Correction factor of the capacity, according to temperature.

MAINTENANCE/CHECKS

DataSafe HX+/HX batteries are maintenance free, sealed, lead acid batteries and need no water addition.

Warning: The cases and lids shall be kept dry and free from dust. Cleaning must be done only with a damp cotton cloth. Do NOT use any type of oil,

solvent, detergent, petroleum-based solvent or ammonia solution to clean the battery containers or lids. These materials will cause permanent damage to the battery container and lid and will invalidate the warranty.

Check monthly that the total voltage at battery terminals is $(N \times 2.24 \text{ to } 2.27 \text{ V})$ for a temperature of 25°C (N being the number of cells in the battery).

Every 12 months, read and record the following:

- Individual cell or unit voltages (volts)
- Cell-to-cell connection resistance (ohms)
- Terminal connection resistance (ohms)
- Ambient temperature in the immediate battery environment

Keep a logbook to record values, power outages, discharge tests, etc.

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 any warranty claim made on the battery.

Temperature	Correction Factor
5°C	0.84
10°C	0.88
15°C	0.93
20°C	0.97
25°C	1.00
30°C	1.03
35°C	1.05
40°C	1.07



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