

Battery Installation, Operation and
Maintenance Instructions



Important

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

Care for your safety



No smoking, no naked flames, no sparks



Shield eyes



Read instructions



Electrical hazard



Electrolyte is corrosive



Danger



Clean all acid splash in eyes or on skin with plenty of clean water. Then seek medical help. Acid on clothing is to be washed with water



Warning: Risk of fire, explosion, or burns. Do not disassemble, heat above 60°C (140°F), or incinerate. Avoid any short circuit. Metallic parts under voltage on the battery, do not place tools or items on top of the battery



Recycle scrap batteries. Contains lead

BCI Warning



DANGER

Contains: Lead, Sulfuric Acid (Electrolyte), Lead Compounds.

Harmful if swallowed, inhaled, or in contact with skin. Acid causes severe skin burns and eye damage. May damage fertility or the unborn child if ingested or inhaled. May cause harm to breast-fed children. May cause cancer if ingested or inhaled. Causes skin irritation, serious eye damage. Contact with internal components may cause irritation or severe burns. Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure if ingested or inhaled. Irritating to eyes, respiratory system, and skin. May form explosive air/gas mixture during charging. Extremely flammable gas (hydrogen). Explosive, fire, blast or projection hazard.

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid contact during pregnancy/while nursing.

Wear protective gloves/protective clothing, eye protection/face protection. Use only outdoors or in a well-ventilated area. Avoid contact with internal acid. Do not breathe dust/fume/gas/mist/vapors/spray. Keep away from heat/sparks/open flames/hot surfaces. No smoking. IF SWALLOWED OR CONSUMED: rinse mouth. Do NOT induce vomiting. Call a poison center/doctor if you feel unwell. IF ON CLOTHING OR SKIN (or hair): Remove/Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water/shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed/concerned, or if you feel unwell seek medical attention/advice. Store locked up, in a well-ventilated area, in accordance with local and national regulation. Dispose of contents/container in accordance with local and national regulation. Keep out of reach of children.

Handling

DataSafe® HX 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.

1. 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 sulfuric acid in glass fiber separators.

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

2. Storage

Store DataSafe® 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 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 2.27 Volts per cell (Vpc) at 77°F (25°C) for 96 hours or until the charge current does not vary for a three 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 Vpc.

Maximum total storage prior to installation is two 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.

3. Installation

Install in clean, dry area. DataSafe HX 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, the manufacturer's instructions and in accordance with Article 480 or 706 of NFPA 70 or section 64 of CSA C22.1

■ Temperature

Avoid placing batteries in areas of high temperature or in direct sunlight. The batteries will give their optimum 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 inadvertent overcharge, enabling DataSafe 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.

■ Stowing

For proper installation, EnerSys® battery racks and cabinets are recommended.

For rack installations, reference Assembly Instructions for DataSafe HX and HX Front Terminal UBC Battery Racks (US-HXRACK-IM).

For cabinet installations, reference DataSafe® HX Battery Cabinet Systems Range Summary (AM-DSCAB-RS).

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**

Tighten the M6 connector bolts between 60 to 88 in-lbs (6.8 to 10 N•m). A loose connector can cause problems in charger adjustment, erratic battery performance, possible damage to the battery and/or personal injury.

■ **Installation of High Voltage Batteries**

A battery consisting of 10 or more blocs connected in series presents additional hazards and the following notes on installation should be employed.

- During installation process, limit the battery voltage by omitting interbloc connectors to give a maximum section voltage of 120V or 10 blocs.
- The omitted inter-bloc 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.

4. Cells in Parallel Strings

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

To reduce the risk of current imbalance, the number of parallel strings in any system should be limited to six.

5. Charging

■ **Commissioning Charge**

Upon installation, perform a Commissioning Charge on the battery with a constant voltage charger by either:

- Charging at 2.40 Vpc at 77°F (25°C) for 24 hours or
- Charging at 2.35 Vpc at 77°F (25°C) for 72 hours.

Follow the Maximum Charging Current values shown in Table 1. After completion of the Commissioning Charge at either level, reduce the charger to the appropriate Float Charge level for the battery temperature shown in the Float Charge Section. A discharge test can be given after float charging for 24 hours.

Chargers shall comply with UL1012, UL 1741, UL 60335-2-29/CSA C22.2 No. 60335-2-29, CAN/CSA C22.2 No. 107.2, or UL 62368-1/CSA C22.2 No. 62368-1.

■ **Float Voltage**

The float/charge voltage is 2.27 Vpc at 77°F (25°C).

When the average ambient temperature deviates ± 9°F (5°C) or more 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)

■ **Equalize Charge**

The battery can be charged at an elevated voltage of 2.40 Vpc (14.4 Volts for the battery) for the purpose of an equalize charge or as part of a 2-step recharge profile to reduce charge time. Charge time at 2.40V should not exceed 16 hours and the current limits in Table 1 must be followed.

■ **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).

Table 1

Battery Model	Maximum Charging Current (Amps)	Maximum Allowable Ripple Current (Amps RMS)
12HX205-FR	11.0	2.1
12HX300-FR	18.0	3.5
12HX330-FR	21.0	4.1
12HX400-FR	24.0	4.7
12HX505-FR	30.0	5.9
12HX540-FR	31.0	6.1

■ **Charging Current**

The recommended charging method for DataSafe HX 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 for a minimum of 24 hours at 77°F (25°C). See Table 2.

Table 2

State of Charge	Voltage per Cell	Voltage per Battery
100%	2.12 to 2.14	12.72 to 12.84
80%	2.09 to 2.11	12.54 to 12.66
60%	2.05 to 2.08	12.30 to 12.48
40%	2.01 to 2.04	12.06 to 12.24
20%	1.97 to 2.00	11.82 to 12.00

6. Discharging

■ **End of Discharge Voltage**

The end of discharge voltage must be limited to a minimum value of 1.60 Vpc.

A protecting system shall have to be installed to prevent deep discharge.

■ **Discharged Cells**

DataSafe 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 sulfuric acid is completely absorbed 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.

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.

7. Maintenance and Records

DataSafe HX batteries are virtually maintenance-free, sealed, lead acid batteries 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 with a cotton cloth dampened with water only. Check monthly that total voltage at battery terminals, while on float, is (N x 2.25 to 2.28 Vpc) for a temperature of 77°F (25°C), (where N is the number of cells in the battery).

Every 12 months, read and record the following:

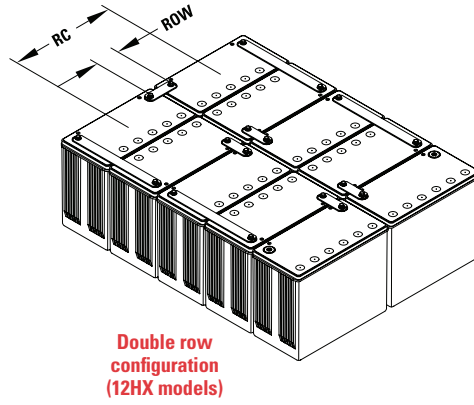
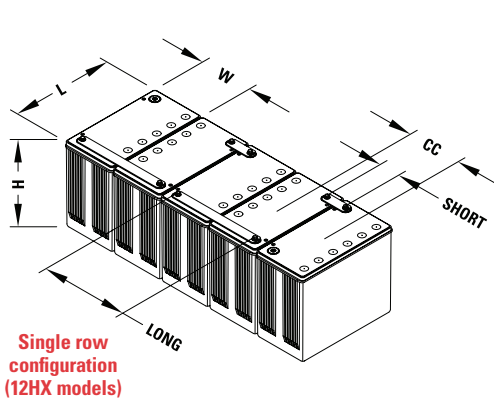
- Individual battery voltages (in volts)
- Cell-to-cell connection resistance (in ohms)
- Terminal connection resistance (in ohms)
- Ambient temperature in the immediate battery environment

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.

Intercell Connector Layout



Note: End terminal position will depend upon number of units in row, ie. whether "ODD" or "EVEN" number.

Battery Model	Number of Cells	Length		Width		Height		CC		RC		Short		Long		Row		Weight	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
12HX205-FR	6	8.9	226	5.5	140	8.1	206	5.6	142	9.1	231	2.2	56	9.0	229	1.9	48	43	20
12HX300-FR	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
12HX330-FR	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
12HX400-FR	6	13.3	338	6.8	173	8.3	211	6.9	175	13.4	340	2.7	69	11.2	284	3.0	76	80	36
12HX505-FR	6	13.3	338	6.8	173	10.7	272	6.9	175	13.4	340	2.7	69	11.2	284	3.0	76	103	47
12HX540-FR	6	13.3	338	6.8	173	10.7	272	6.9	175	13.4	340	2.7	69	11.2	284	3.0	76	106	48

Batteries come standard with a stainless steel hardware package; p/n 867500 (one package per battery).

The hardware package includes two (2) each M6x1 x 16mm long bolts, flat washers and lock washers.

Longer bolts are available but must be specified at the time of order placement.

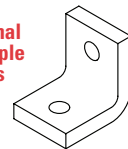
Optional Extras

Battery Model	Short			Long			Row			L-TERMINAL
	Connector*	Cover Black	Cover Clear	Connector*	Cover Black	Cover Clear	Connector*	Cover Black	Cover Clear	
12HX205-FR	866881TP	HRD2328	827564	866885TP	HRD2329	827567	866880TP	HRD2328	827564	882044TP
12HX300-FR	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866881TP	HRD2328	827564	882044TP
12HX330-FR	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866882TP	HRD2327	827565	882043TP
12HX400-FR	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882043TP
12HX505-FR	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882042TP
12HX540-FR	866883TP	HRD2327	827565	866886TP	HRD2330	827568	866884TP	HRD2327	827566	882042TP

* 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



EnerSys World Headquarters
2366 Bernville Road
Reading, PA 19605, USA
Tel: +1-610-208-1991 /
+1-800-538-3627

EnerSys EMEA
EH Europe GmbH
Baarerstrasse 18
6300 Zug, Switzerland

EnerSys Asia
152 Beach Road
Gateway East Building #11-03,
Singapore 189721
Tel: +65 6508 1780