

## 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.

#### Handling

DataSafe 16HX-FT 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.

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.

**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 16HX-FT batteries in a dry, clean and preferably cool location.

Although batteries are supplied charged, their storage time is limited. The maximum storage intervals prior to a required refreshing charge, based on the battery's date code label, are as follows:

- 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)

A refreshing charge shall be performed at 2.27 Volts Per Cell (Vpc) or 18.08 Volts Per Battery (Vpb) 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 (16.56 Vpb).

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 16HX-FT 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 local, state and federal 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 inadvertent overcharge, enabling DataSafe 16HX-FT 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 Installation, Operation and Maintenance Manual for DataSafe Front Terminal Battery Cabinets (US-HXFT-CAB).

Intercell connector covers (provided) should be installed after completing the intercell connections.

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

▪ **Torque**

Tighten the M8 connector bolts between 100 and 110 in-lbs (11.3 to 12.5 N•m). A loose connector can cause problems in charger adjustment, erratic battery performance, possible damage to the battery and/or personal injury.

**NOTE:** Top terminal connections are secured with Nord-Lock® washers. These washers provide an effective terminal connection over the life of the battery. If loosened, this connection should be tightened between of 80 and 90 in-lbs (9 to 10 N•m).

**4. Cells in Parallel Strings**

When utilizing a constant voltage charger, ensure that the connections from the charger and 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.

▪ **Float Voltage**

The float/charge voltage is 2.27 Vpc (18.08 Vpb) 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 (18.64 to 18.88 Vpb) at 32°F (0°C)
- 2.30 to 2.33 Vpc (18.40 to 18.64 Vpb) at 50°F (10°C)
- 2.27 to 2.30 Vpc (18.16 to 18.40 Vpb) at 68°F (20°C)
- 2.25 to 2.28 Vpc (18.00 to 18.24 Vpb) at 77°F (25°C) (reference)
- 2.23 to 2.26 Vpc (17.84 to 18.08 Vpb) at 86°F (30°C)
- 2.22 to 2.25 Vpc (17.76 to 18.00 Vpb) at 95°F (35°C)

▪ **Equalize Charge**

The battery can be charged at an elevated voltage of 2.40 Vpc (19.2 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).

▪ **Charging Current**

The recommended charging method for DataSafe® 16HX-FT batteries is constant voltage charging. Follow the maximum charge current values in Table 1.

▪ **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). Refer to Table 2 for these approximations.

**Table 1**

DataSafe® 16HX-FT Battery Model	Max Charging Current (Amps)	Maximum Allowable Ripple Current (Amps RMS)
16HX550F	31.0	6.0
16HX800F	51.0	10.0
16HX925F	55.0	11.5

**Table 2**

State of Charge	Voltage per Cell	Voltage per Battery
100%	2.12 to 2.14	16.96 to 17.12
80%	2.09 to 2.11	12.54 to 16.88
60%	2.05 to 2.08	16.40 to 16.64
40%	2.01 to 2.04	16.08 to 16.32
20%	1.97 to 2.00	15.76 to 16.00

**6. Discharging**

▪ **End of Discharge Voltage**

The end of discharge voltage must be limited to a minimum value of 1.60 Vpc (12.8 Vpb). A protecting system must be installed to prevent deep discharges.

▪ **Discharged Cells**

DataSafe 16HX-FT batteries must not be left in a discharged condition after supplying the load, and 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.

▪ **The Effect of Temperature on Capacity**

The optimum operating temperature for DataSafe 16HX-FT batteries is 77°F (25°C). The capacity of a battery operated above this optimal temperature generally increases at the expense of battery life while operating below this optimal temperature extends life but at the expense of capacity. Please refer to the recommended practices outlined in IEEE 1188 when determining the effect of temperature on battery capacity.

**7. Maintenance and Records**

DataSafe 16HX-FT batteries are virtually maintenance free, sealed, lead acid batteries and need no water addition. These batteries are equipped with self-sealing, 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 V) 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:

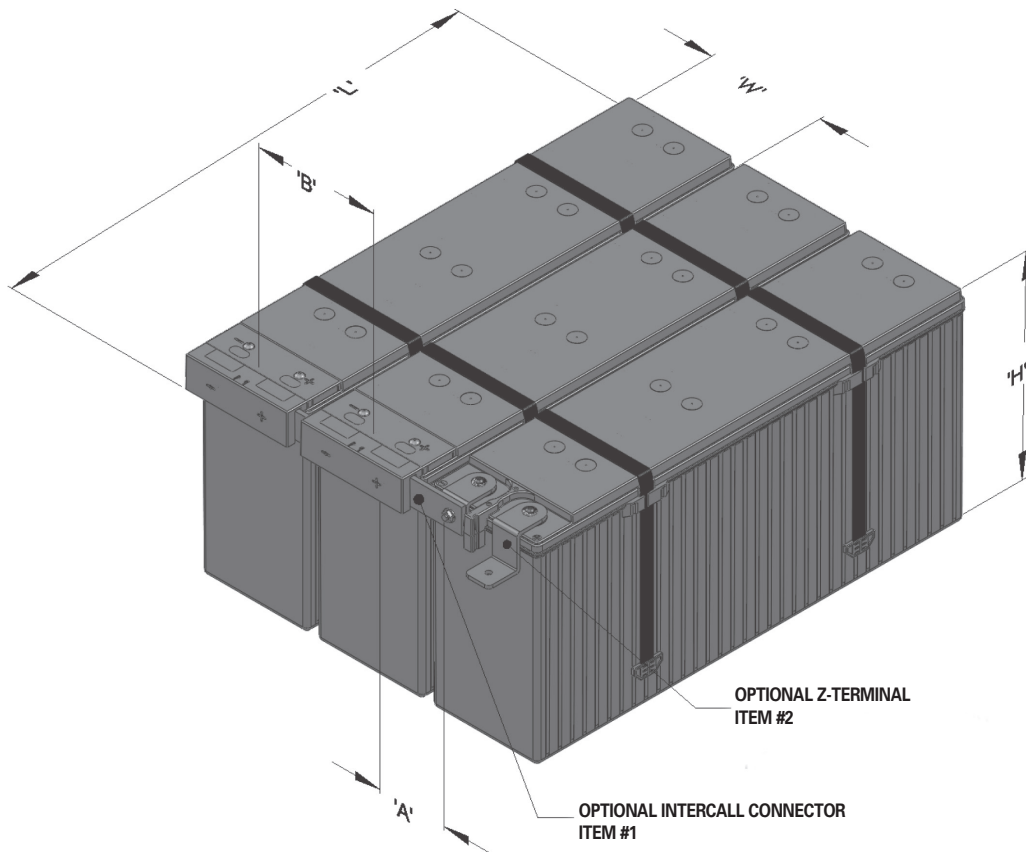
- Individual battery voltages (in volts)
- Cell-to-cell connection resistance (in ohms)
- Terminal connection resistance (in ohms)
- Ambient temperature in the immediate battery environment

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.

## 8. Intercell Connector Layout



**Table 3**

DataSafe® 16HX-FT Battery Model	Number of Cells	A		B		Length		Width		Height		Weight		Item 1*	Item 2*
		in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg		
16HX550F	8	2.7	69	4.6	117	27.2	692	4.6	117	12.3	313	151	68	827500TP	882040TP
16HX800F	8	3.9	99	7.0	178	27.2	692	7.0	178	12.3	313	232	105	827502TP	882041TP
16HX925F	8	3.9	99	7.0	178	27.2	692	7.0	178	12.3	313	248	112	827502TP	882041TP

\* Connectors and Z-Terminals are RoHS compliant.  
 Batteries come standard with a stainless steel hardware package; p/n NUTPKG16V-STD (one package per battery).  
 An optional stainless steel hardware package with brass, dual tab washers is available (p/n NUTPKG16V-DTW).



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