

XHP

Ni-Cd  
BatteriesInstallation and  
operating  
instructions

## Important recommendations

- **WARNING: Risk of fire, explosion, or burns. Do not disassemble, heat above +70°C, or incinerate**
- **Never smoke while performing any operation on the battery.**
- **For protection, wear rubber gloves, long sleeves, and appropriate splash goggles or face shield.**
- **The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water, and obtain immediate medical attention.**
- **Remove all rings, watches and other items with metal parts before working on the battery.**
- **Use insulated tools.**
- **Avoid static electricity and take measures for protection against electric shocks.**
- **Discharge any possible static electricity from clothing and/or tools by touching an earth-connected part "ground" before working on the battery.**
- **Ventilation, in accordance with the IEC 62485-2 standard, is mandatory during commissioning and operation.**

## 1. Receiving the shipment

Do not overturn the package. Upon receipt of the goods, any transportation damage, electrolyte spillage or irregularities must be reported to the carrier and to Saft. Storage of cells must not exceed the maximum storage time indicated on the packing case.

## 2. Storage

The battery must be stored in a dry and clean indoor location, on open, well ventilated shelves away from direct sunlight between 0°C and +30°C (+32°F and 86°F). If stored in the shipping crates, the lid and top packing must be removed to allow ventilation.

- **Do not store in unopened packing crates. The lid and the packing material on top of the cells must be removed.**
- Do not store in direct sunlight or exposed to excessive heat.
- Cells delivered discharged and filled may be stored for many years before they are installed.
- Cells delivered charged must not be stored more than 3 months (including transport).

Storage of a filled battery at temperatures above +30°C (+86°F) can result in permanent change and loss of product performance, depending on the duration of the storage above the maximum recommended temperature. Never drain the electrolyte from the cells. To ensure maximum protection of the cells always store the product in its original packaging.

## 3. Installation

## 3.1. Location

Install the battery in a dry and clean room. Avoid direct sunlight, strong daylight and heat. The battery will give the best performances and maximum service life when the ambient temperature is between +10°C to +30°C (+50°F to +86°F).

## 3.2. Mounting

For cells with handles, both must be used when lifting and moving. To prevent electrolyte spillage, do not tip cells. Verify that cells are correctly interconnected with the appropriate polarity and that the connectors are correctly torqued. Connections between the battery and the load shall be made with nickel plated cable lugs. Tightening torque for the terminals must be:  
M 10 = 10 ± 2 N.m (88 ± 16 lbf.in)  
M 12 = 15 ± 2 N.m (133 ± 16 lbf.in)

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.

## 3.3. Ventilation

During operation the battery emits an amount of gas mixture (oxygen and hydrogen). Ventilation inside the battery room must be adequately managed, comply with IEC 62485-2 and local regulations.

## 3.4. Electrolyte

When checking electrolyte levels, a fluctuation in level between cells is normal. This is caused by a small difference in internal pressure in each cell and due to the varying amounts of gas held in the separators of each cell. The level is normally at least 15 mm above the minimum (5/8") above the minimum level mark (lower) and there should be no need to adjust it.

If electrolyte is ever spilled from a cell and the level is 30 mm below the minimum mark (lower), then refilling with E4 electrolyte is required. Contact your local Saft representative for more details.

Do not top up with deionized or distilled water prior to initial charge to avoid overfilling a cell. After commissioning, when the level is stabilized, the electrolyte level should be between approximately 5 mm below maximum mark (Upper).

## 4. Commissioning

**Verify that ventilation, in accordance with the IEC 62485-2 standard, is provided during this operation.**

A good commissioning is important.

Charge at constant current is preferable. **If the current limit is lower than indicated in Table A, charge for a proportionally longer time.** A good commissioning is important. After commissioning, the battery shall be charged permanently according to section 5.

Charge at constant current is preferable. Prior and during commissioning charge, record all data requested in the commissioning report available on

- **For filled and discharged cells stored up to 1 year,** a commissioning charge is not required and the cells are ready for immediate use. 90% state of charge is reached within 10 hours after placed in service.
- **For filled and discharged cells stored for more than 1 year, a commissioning charge is necessary:**
  - **Constant current charge:**  
Charge for 8 h at 0.2 C<sub>5</sub> A.  
When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually.

• **Constant voltage charge:**

1.50 V/cell minimum for 24 h with current limited to 0.2 C<sub>5</sub> A, or for 48 h with current limited to 0.1 C<sub>5</sub> A.

- **For filled and charged cells stored for more than 3 months (including transport),** or if cells have been stored for a few years or show difficulties in recovering performance, constant current charging becomes necessary and the following values are recommended:
  - a) 8 h charge at 0.2 C<sub>5</sub> A
  - b) discharge at 0.2 C<sub>5</sub> A down to 1.0 V/cell
  - c) 8 h charge at 0.2 C<sub>5</sub> A
  - d) the battery is ready for use.

**The battery container temperature is to be monitored during charge. If the temperature exceeds +45°C (+113°F) during charging, then it must be stopped to reduce the temperature. The charging can be resumed when battery container temperature drops below +40°C (+104°F). For capacity test purposes, the battery has to be charged in accordance with IEC 60623 section 5.**

## 5. Charging in service

The recommended charging voltages for continuous parallel operation, with occasional battery discharges, are: Recommended charging voltage (+ 20°C to + 25°C/+ 68°F to + 77°F):

- **Single level charge**
  - 1.41 ± 0.01 V/cell
- **Two level charge**
  - Float level : 1.40 ± 0.01 V/cell
  - High level : 1.45 ± 0.01 V/cell

In case of frequent deep discharges (cycling), the charging voltage values should be increased. Contact Alcad for more details.

To minimize the need for topping-up maintenance at high temperatures and to increase the charge acceptance at low temperatures. Temperature Compensated Voltage (TCV) charging is generally mandatory. The conditions to apply TCV charging depend on ambient operating temperature.

## Reliability inside

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Table A: Standard range

Cell Type	Capacity C <sub>5</sub> Ah (Ah)	Charge current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Terminal per pole	Length of cell topper nozzle (mm)
			Solid (kg)	Liquid (l)		
XHP 11	11	2.2	0.07	0.25	M 10	45
XHP/F 16	16	3.2	0.13	0.44	M 10	65
XHP/F 21	21	4.2	0.11	0.38	M 10	65
XHP/F 24	24	4.8	0.10	0.35	M 10	65
XHP/F 28	28	5.6	0.16	0.54	M 10	65
XHP/F 36	36	7.2	0.24	0.84	M 10	65
XHP/F 45	45	9.0	0.22	0.76	M 10	65
XHP/F 52	52	10.4	0.20	0.70	M 10	65
XHP/F 60	60	12.0	0.26	0.89	M 10	50
XHP/F 70	70	14.0	0.24	0.82	M 10	50
XHP/F 80	80	16.0	0.21	0.71	M 10	50
XHP/F 90	90	18.0	0.46	1.60	M 12	45
XHP/F 100	100	20.0	0.44	1.50	M 12	45
XHP/F 115	115	23.0	0.38	1.30	M 12	45
XHP/F 130	130	26.0	0.44	1.50	M 12	45
XHP/F 150	150	30.0	0.55	1.90	M 12	45
XHP/F 170	170	34.0	0.64	2.20	2 x M 12	45
XHP/F 190	190	38.0	0.61	2.10	2 x M 12	45
XHP/F 220	220	44.0	1.39	4.80	2 x M 12	55
XHP/F 250	250	50.0	1.31	4.50	2 x M 12	55
XHP/F 280	280	56.0	1.21	4.20	2 x M 12	55
XHP/F 300	300	60.0	1.16	4.00	2 x M 12	55
XHP/F 320	320	64.0	1.10	3.80	2 x M 12	55

Compact range

Cell Type	Capacity C <sub>5</sub> Ah (Ah)	Charge current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Terminal per pole	Length of cell topper nozzle (mm)
			Solid (kg)	Liquid (l)		
XHP 16 B	16	3.2	0.06	0.20	M 10	45
XHP 21 B	21	4.2	0.04	0.15	M 10	45
XHP 28 B	28	5.6	0.14	0.47	M 10	45
XHP 36 B	36	7.2	0.11	0.39	M 10	45
XHP 47 B	47	9.4	0.08	0.28	M 10	45

For optimum charging, TCV charging is mandatory from from +10°C to +30°C (+50°F to +86°F). The TCV control value is -2 mV/°C/cell (-1.1 mV/°F/cell), starting from + 20°C (+ 68°F)."

6. Preventive maintenance

XPH is an ultra-low maintenance battery which requires little to no maintenance. However, it is good practice with any system to carry out an inspection of the system once per year or at the recommended topping-up interval period to ensure that the charging system, the battery and the ancillary electronics are all functioning correctly. Additionally, follow your standard preventative maintenance procedures.

- Keep the battery clean using only water. Do not use a wire brush or solvents of any kind. Vent caps can be rinsed in clean water if necessary.
- Check the charging voltage. It is important that the recommended charging voltage remains unchanged. The charger should be checked and recorded at least once yearly. If a cell float is found below 1.30 V, high rate charge is recommended to apply to the cell concerned.
- Visually check the electrolyte level. Never let the level fall below the minimum level mark. Use only distilled or deionized water to top-up. Topping up of the battery shall be carried out when battery is fully charged. Experience will tell the time interval between topping-up.

**Note:** There is no need to check the electrolyte density. Electrolyte density emasurements do not indicate state of charge or state of health.

- Ensure all terminals and connectors are coated with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.
- High water consumption is usually caused by an improper voltage setting or voltage drift that is above the recommended in-service charging voltages. To maximize the topping-up interval check the charging voltage and adjust as required.

Note that all these maintenance recommendations followed the IEEE 1106 standard 'Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications'.

6.1. Changing electrolyte

Due to the sintered electrode plastic-bonded technology, it is not necessary to change the electrolyte during the lifetime of the cell.

6.2. Topping-up

No electrolyte level measurement is necessary if you use an Alcad filling-pistol, which allows the correct level to be obtained by a simple nozzle setting. See nozzle lengths in tables.

If a filling-pistol is not available, the electrolyte level can be checked by transparence or measured in the case of flame retardant containers.

Insert a transparent glass or plastic tube (alkali resistant, 5 to 6 mm in diameter) vertically into the cell vent until it touches the top of the plates. Close the top end of the tube by putting a finger on it and remove the tube from the cell.

The height of the liquid in the tube indicates the electrolyte level above the plates.

	Level (mm)	
	High	Low
XHP 16 B to XHP 47 B	25	5
XHP 11	25	5
XHP/F 16 to XHP/F 52	55	5
XHP/F 60 to XHP/F 80	70	5
XHP/F 90 to XHP/F 190	65	5
XHP/F 220 to XHP/F 320	55	5

7. Environment

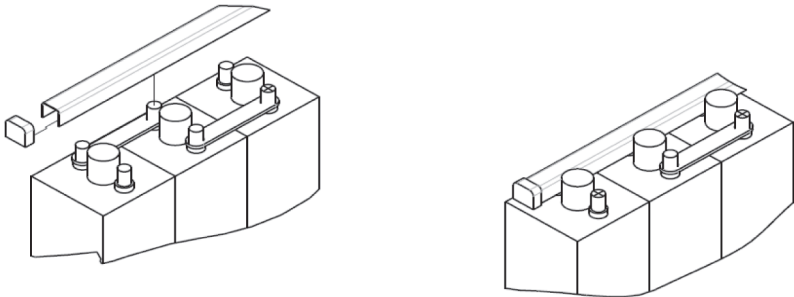
To protect the environment all used batteries must be recycled. Contact your local Alcad representative for information.

X 6.2 E - Edition : June 2022 - Final design - Printed in France.  
Data in this document are subject to change without notice and become contractual only after written confirmation by Alcad.

Appendix A: IP2X protection assembly instructions

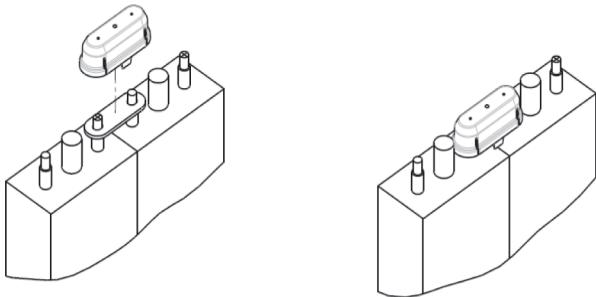
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P/N	208783 + 225051	224823 + 225052
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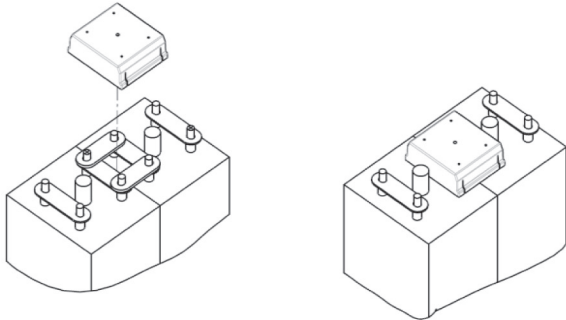


• Terminal cover

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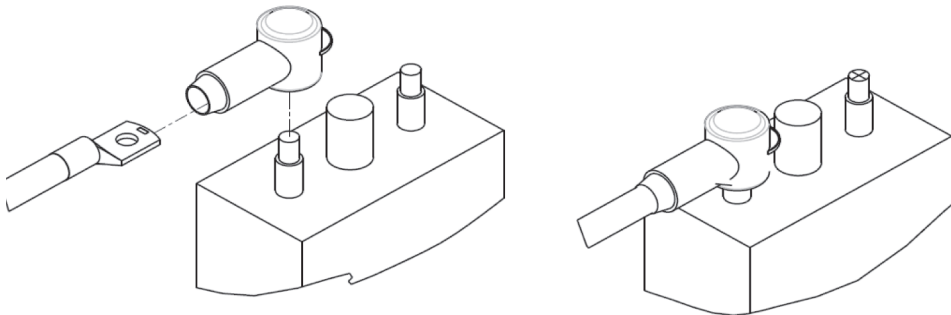


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• End-Lug cover

P/N	224887	224888	224889	224890
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Alcad Limited  
Sweden

Telephone : +46 491 68 100 Facsimile : +46 491 68 110  
Email: [alcad.sweden@alcad.com](mailto:alcad.sweden@alcad.com) [www.alcad.com](http://www.alcad.com)