

Compact Ni-Cd batteries

Type CPM and CPL

Installation 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 measurements 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, is mandatory during commissioning and operation.**

1. Receiving the shipment

Upon receipt of the goods, any transportation damage, electrolyte spillage or irregularities must be reported to the carrier and to Saft.

The battery is shipped filled and charged, and is ready for immediate use. Storage of cells must not exceed the maximum storage time indicated on the packing case (first in, first out).

2. Storage

The battery must be stored in a dry indoor location, on open, well ventilated shelves away from direct sunlight between -20°C and +35°C (-4°F and +95°F).

Compact batteries are supplied filled with electrolyte and 10% state of charge. They can be stored in this condition for maximum 12 months from date of shipment in accordance with the recommendations set forth in this I&O.

■ If fully charge

the battery should not be stored for more than 2 months. (if long storage is required, discharge the string to 10% state of charge).

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. General

Compact batteries are delivered filled with electrolyte.

- Do not top up batteries with water before, during or after initial installation.
- Batteries can be charged according to "In Service Charging" prior to installation. See chapter 3.6.
- In case of abnormal events or operating outside recommended procedures, measuring the cell Open Circuit Voltage (OCV) is recommended to check for normal cell condition before installation. See paragraph "Troubleshooting and abnormal operation".

3.2 Operating environment

- For tight spaces and to use a front accessible connection, make sure to install all back cable connections, first, while blocks are staged outside. To prevent, inadvertent short circuit, make sure the loose cable end is insulated.
- Compact should never be installed in a sealed space without ventilation.
- To prevent inadvertent short circuit, make sure the connector ends are insulated.

3.3. Recommended tools

The following tools will facilitate installation:

- Insulated 10 mm socket
- Insulated torque wrench capable of 10 ± 1 N.m (96 ± 9 in.lbs)
- Digital Multi Meter (DMM), with an accuracy of ± 10 mVDC
- Clamp-on current meter, with an accuracy of ± 25 mA (optional)
- Heat shrink gun (optional)

3.4. String assembly

Battery configurations vary depending on the application. A battery string layout is provided with each string.



The step by step procedures will vary with application and layout, but the following should be observed:

- Measuring the cell Open Circuit Voltage (OCV) is recommended to check for normal cell condition (according to chapter 5). Before installation, measure the OCV of each battery cell and note the values. The sum of the individual cell voltages will be used to compare with the assembled battery string voltage.
- Where applicable, place trays in position to allow installation with battery modules.
- Temporarily position the battery modules in final position in accordance with the provided layout diagram. Make sure to orient the positive and negative terminals correctly.
- Use only the accessory kit parts provided.
- When a string barcode label is used, orient the module that has the affixed label so it can be accessed in its final position in the application.
- When installing a cable, torque the terminal bolts to 10 ± 1 N.m (96 ± 9 in.lbs).
- Apply generous amounts of corrosion inhibitor, supplied with the accessory kit, to all terminal connections made before and after applying torque.
- The modules can then be slid into place (in their trays if provided) and all front connections, cabled from the back, can subsequently be made.
- Do not at this stage connect the system's power cables.
- Connect each battery module using the accessory kit parts in accordance with the string layout diagram.
- After completing terminal connections and corrosion inhibitor application, make sure to install the battery top covers.
- Battery module handles should remain in place unless it is obstructing module placement or connection. In that case remove them.

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3.5. Connecting power

- Use lugs and sealable heat shrink provided in the installation kit, when necessary, for connecting power cables to the battery terminals.
- Make sure that the cables are properly secured and supported.
- Measure the battery string overall voltage and compare this with the sum of all the module OCV's measured previously. If values show a discrepancy of 1.0V or more, verify the polarity, position and connection of each module. Reassemble as required.
- Temperature compensated voltage control is not recommended. Disengage temperature compensation circuit if activated.
- Make sure the output of the rectifier is adjusted between 1.39 to 1.45 VPC.
- Note the polarity of the battery terminals and verify the polarity of the power cables before connecting these to the battery.
- Using standard practice and rectifier manufacturers recommendations as a guideline, connect the power cables to the string terminals and secure hardware: M6 Terminal Torque 10 ± 1 N·m (96 ± 9 in·lbs).
- Apply approved corrosion preventative compound on string terminals.
- If a battery must be connected to a live system (adding additional capacity), it must be necessary to charge the batteries prior to the installation to minimize the inrush current.

3.6. In Service Charging

- Constant voltage charging is recommended and should be done at 1.39 to 1.45 VPC per cell.
- In order to re-charge fully in 24 hours, the minimum current available for each battery string should be $0.2 C_5$ A. See Table A for values.
- Temperature compensated voltage control is not recommended. Check with rectifier manufacturer for instructions.
- In case we need to check the IEC capacity (IEC 60623) the following procedure must be applied:
 - Make sure that the string is discharged fully and each cell is at the same SOC.

- Charge at constant voltage with a maximum voltage set point of 1.65 V per cell and current limit of $0.2 C_5$ A as mentioned in the table A:

Table A

Cell Type	Capacity C_5 Ah (Ah)	Charging current $0.2 C_5$ A (A)
CPL 80	83	16.6
CPL 100	103	20.6
CPL 150	152	30.4
CPL 180	185	37.0
CPM 80	76	15.2
CPM 100	98	19.6
CPM 150	147	29.4
CPM 180	180	36.0

- Continue charging for a minimum of 30 hours.
- Maximum 30 minute pause is allowed.
- Apply the load mentioned in the Table A and discharge to a cut-off of 1.0 V per cell (measured at the string terminals) and verify that the 5 hours of runtime are delivered.

4. Maintenance and Inspection

4.1. Topping-Up

Topping-up is not required over the operational life of the Compact.

4.2. Cleaning

It is good practice to visually inspect the string during periodic site visits. Vacuuming or dusting with a soft brush is adequate if the string is dirty. A wet rag may be used, but do not use any detergent, chemicals or cleaning aids, only water. Do not use metal brushes or hard bristles risk of static electricity

4.3. Periodic inspection and control

- Measure rectifier output voltage and make sure it is adjusted correctly. See paragraph "In Service Charging".
- *Re-torquing the terminal bolts is not recommended. The hardware is constructed from nickel plated steel and stainless steel which requires no torquing maintenance.*

4.4. Floating current monitoring

- When the battery is ageing, it is advisable to check the float charging current. The battery requires action if the float current is higher than **5 mA/Ah** when charging at 1.39 V/cell. See Table A for values.
A current clamp with an accuracy of ± 0.025 Amps is a way to measure the floating charge current.

5. Troubleshooting and abnormal operation

It is recommended to measure the cell open circuit voltage if:

- Stored at too high or too low of temperature.
- Stored for too long of time.
- Batteries visibly OK but shipping crate excessively damaged.

To measure the cell OCV:

- Gain access to the cell terminals by removing the battery top covers. Set aside for re-use.
- Using a multimeter measure each cell and check that each is **greater than or equal to 1.10 VPC per cell**.
- If a cell is below 1.10 VDC per cell, set the battery module aside and call Saft for further instructions.

6. Removal and recycling

- Make sure appropriate packing materials are available.
- Make sure each cell cap is installed to prevent spillage.
- All local laws and regulations must be respected when removing, transporting and storing used batteries.
- Contact your local Saft representative for instructions on recycling.

Saft Industrial Standby Division

26, quai Charles Pasqua
92300 Levallois-Perret - France

Tel: +33 1 58 63 16 00

Fax: +33 1 58 63 16 18 / +33 1 58 63 16 19

www.saftbatteries.com

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