

SPH Ni-Cd batteries

Installation and operating instructions

Important recommendations

- Never allow an exposed flame or spark near the batteries, particularly while charging.
- 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.

1. Receiving the shipment

Unpack the cells immediately upon arrival. Do not overturn the package. Transport seals are located under the cover of the vent plug.

The cells are normally shipped filled, discharged and ready for assembly.

The cells must never be charged with the plastic transport seal in place as this can cause permanent damage.

2. Storage

Store the cells indoors in a dry, clean and cool location (0°C to +30°C / +32°F to +86°F).

- Do not store in unopened packing crates. The lid and the packing material on top of the cells must be removed.
- Make sure that the transport seals remain in place during storage.
- Do not store in direct sunlight or exposed to excessive heat.
- Cells delivered discharged and filled may be stored for many years before it is installed.
- Cells delivered exceptionally 80% charged (for starting application) must not be stored **more than 3 months (including transport)**.

3. Electrolyte

The electrolyte to be used is: E4
When checking the electrolyte levels, a fluctuation in level between cells is not abnormal and is due to the different amounts of gas held in the separator of each cell. The level should be at least 15 mm above the minimum mark (lower) and there is normally no need to adjust it.

When the cells are charged, the electrolyte level can be above the maximum level mark (upper).

4. Installation

4.1. 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).

4.2. Ventilation

At normal float charge the gas evolution is very small but some ventilation is necessary.

Note that special regulations for ventilation may be valid in your area depending on the application.

4.3. Mounting

Verify that cells are correctly interconnected with the appropriate polarity. The battery connection to load should be with nickel plated cable lugs.

Recommended torques for connecting nuts are:

- M 10 = 10 ± 2 N.m
- M 12 = 15 ± 2 N.m

The connectors and terminal nuts should be corrosion-protected by coating with a film of neutral vaseline.

Remove the transport seals and close the vent plugs.

Install the IP2X protections according to the assembly instructions in Appendix A to have the battery compliant to IEC 62485-2/EN 50272-2 standards for IP2 level protection against electrical shocks.

5. Commissioning

Verify that the transport seals are removed, the vents are closed and the ventilation is adequate during this operation.

A good commissioning is important. Charge at constant current is preferable. If the current is limit lower than indicated in the table A, charge for a proportionally longer time.



- **For filled and discharged cells stored up to 1 year,** a commissioning charge is normally not required and the cells are ready for immediate use.
A commissioning charge as described in the following section is only recommended if full performances are necessary immediately.
 - **For cells stored more than 1 year or for charged cells stored more than 3 months,** a commissioning charge is necessary:
 - **Constant current charge:** charge for 8 h at 0.2 C₅ 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 C₅ A, or for 48 h with current limited to 0.1 C₅ A.
- Please note: if cells have been stored in charged conditions 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) 15 h charge at 0.2 C₅ A
 - b) Discharge at 0.2 C₅ A down to 1.0 V/cell
 - c) 8 h charge at 0.2 C₅ A
 - d) The battery is ready for use.

For capacity test purposes, the battery has to be charged in accordance with IEC 60623 section 4.

6. Charging in service

At continuous parallel operation, the battery is on continuous charge and has only occasional discharges.

Recommended charging voltage (+20°C to +25°C / +68°F to +77°F):

- **for dual charge level:**
 - Float level: 1.40 ± 0.01 V/cell
 - High level: 1.45 ± 0.01 V/cell

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■ for single charge level:

1.41 ± 0.01 V/cell.

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

For use at temperature outside +10°C to +30°C (+50°F to +86°F), the correcting factor for charge voltage is -2 mV/°C/cell (-1.1 mV/°F/cell).

7. Topping-up

No electrolyte level measurement is necessary if you use a Saft 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 transparency 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
SPH 16 B to SPH 47 B	25	5
SPH 11	25	5
SPH/F 16 to SPH/F 52	55	5
SPH/F 60 to SPH/F 80	70	5
SPH/F 90 to SPH/F 190	65	5
SPH/F 220 to SPH/F 320	55	5

8. Periodic maintenance

- 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 visually the electrolyte level. Never let the level fall below the minimum level mark. Use only distilled or deionized water to top-up. Experience will tell the time interval between topping-up.

Table A:

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

Compact range:

SPH 16 B	16	3.2	0.06	0.20	M 10	45
SPH 21 B	21	4.2	0.04	0.15	M 10	45
SPH 28 B	28	5.6	0.14	0.47	M 10	45
SPH 36 B	36	7.2	0.11	0.39	M 10	45
SPH 47 B	47	9.4	0.08	0.28	M 10	45

Note: *Once the battery has been filled with the correct electrolyte at the battery factory, there is no need to check the electrolyte density periodically. Interpretation of density measurements is difficult and could be misleading.*

- Check the charging voltage. It is of great importance 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.
- Check every two years that all connectors are tight.

The connectors and terminal nuts should be corrosion-protected by coating with neutral vaseline.

- High water consumption of the battery is usually caused by improper voltage setting of the charger.

9. Changing electrolyte

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

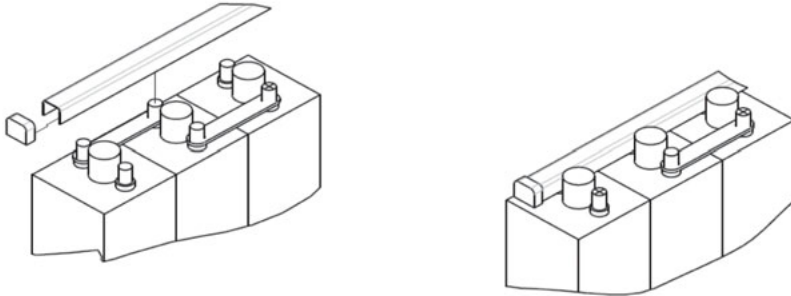
10. Environment

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

Appendix A: IP2X protection assembly instructions

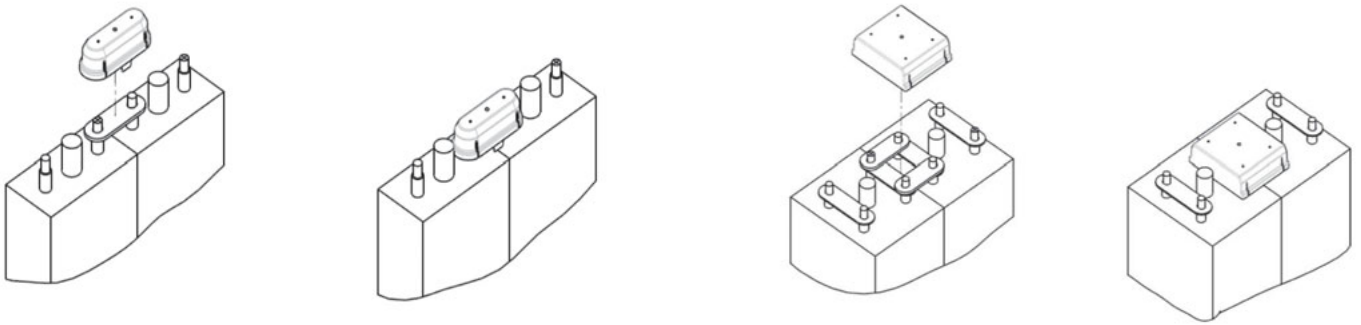
- Linear terminal cover

P/N	208783 + 225051	224823 + 225052
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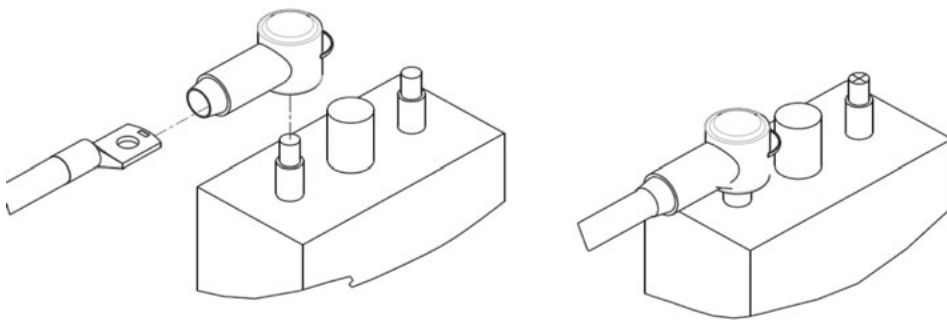
- Terminal cover

P/N	225740	225741	P/N	225742	225824
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- End-Lug cover

P/N	224887	224888	224889	224890
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Saft
Industrial Battery Group

12, rue Sadi Carnot
93170 Bagnolet - France
Tel: +33 1 49 93 19 18
Fax: +33 1 49 93 19 64

www.saftbatteries.com

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