

SPL+ 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

Do not overturn the package. The SPL+ cells are shipped filled and charged, and ready for immediate use.

2. Installation

2.1. Location

Install the battery in a dry and clean room. Avoid direct sunlight and heat. The battery gives the best performance and maximum service life when the ambient operating temperature is between +10°C to +30°C (+50°F to +86°F).

2.2. Assembly

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. The battery connection to load should be with nickel plated cable lugs. Before torquing connections, apply a thin coating of anti-corrosion grease (NO-OX) or anti-corrosion oil to all the terminals and connectors.

Torque the terminal bolts to 30 ± 3 N.m (22 +/- 2 ft./lbs). If the transport seals are present, remove them from underneath the vent caps and re-close.

2.3. Ventilation

During the last part of charging, the battery emits gases (oxygen and hydrogen). At normal float charge the gas evolution is very small but some ventilation is necessary.

Note that depending on the application and local regulations, specific ventilation practices may be necessary.

2.4. Electrolyte

When checking the electrolyte of new cells, a variation in electrolyte levels between cells is normal. This is due to the varying amounts of gas held in the separators of each cell. With this variation, the minimum level observed should be at least 15 mm (5/8") above the minimum level mark (lower).

Top-up with deionized or distilled water prior to initial charge to avoid over-filling a cell.

If electrolyte is ever spilled from a cell and the level is 30 mm below the minimum mark (lower), then refilling with E23 electrolyte is required. Contact your local Saft representative for more details.

3. Commissioning

IMPORTANT: During commissioning charge hydrogen and oxygen gas is vented from the cells.

Verify that the ventilation is adequate during this operation.

■ Cells stored up to 6 months:

A commissioning charge is optional and the cells are ready for immediate use. If full performance is required immediately after installation, conduct a commissioning charge.

■ Cells stored more than 6 months and up to 2 years:

Always conduct a commissioning charge before use.

■ Commissioning charge procedure

There is 3 recommended methods, depending on equipment voltage limits.

• Commissioning at ambient temperature between + 10°C to + 30°C (+ 50°F to + 86°F)

- Constant current charge:

Charge for 20 h at 0.1 C₅ A maximum (see Table A) with at least 1.80V/cell at the end of charge.

- Constant voltage charge:

Charge at 1.55 V/cell for a minimum of 24 h with current limited to 0.1 C₅ A (see the current in Table A). Or charge at 1.50 V/cell for a minimum of 36 h with current limited to 0.1 C₅ A (see the current in Table A).



• Commissioning at ambient temperature above + 30°C (+ 50°F)

- Only constant current charge:

Charge for 20 h at 0.1 C₅ A maximum (see Table A).

The electrolyte temperature should be monitored. If the electrolyte temperature ever exceeds + 45°C (+ 113°F) during commissioning charge, stop the charge and rest the cells until the electrolyte temperature drops below +40°C (+104°F) before continuing the commissioning charge.

Following the commissioning charge and after placing the battery in service, check the electrolyte levels as topping-up may be necessary.

Note: To evaluate the full battery performance, it is required to charge and discharge the SPL+ in accordance with IEC62259 section 7 (7.1 & 7.2).

4. Charging in service

It is recommended to charge the SPL+ using a Single level voltage or a Dual level voltage method.

■ Single level voltage:

- 1.42 ± 0.01 V/cell

■ Dual level voltage:

- float level:
1.42 ± 0.01 V/cell
- high rate (boost) level:
1.45 ± 0.01 V/cell

For use at temperatures outside the range of +15°C to +25°C (+59°F to +77°F), Temperature Compensated Voltage (TCV) is recommended. This minimizes the need for topping-up maintenance at high temperatures and increases the charge acceptance at low temperatures.

The recommended TCV control value is -3 mV/°C/cell (-1.7 mV/°F/cell).

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5. Preventive maintenance

SPL+ is an ultra-low maintenance battery which requires little to no maintenance. For preventative maintenance, the following is recommended. All recommendations mentioned are in accordance with IEEE 1106 "Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications". Additionally, follow your standard preventative maintenance procedures.

- Keep the battery clean.
The battery can be wiped using only water. Do not use solvents of any kind. Soft non-metallic brushes and cloths can be used. Vent plugs can be soaked and rinsed in clean water if necessary.
- Check the charging voltage.
This should be checked and recorded at least once yearly.
High water consumption is usually caused by an improper voltage setting or voltage drift that is above the recommended in service charging voltages.
- Visually check the electrolyte levels.
If the levels are at or below the minimum level mark (lower), topping-up is required using only deionized or distilled water. Experience will tell the time interval between topping-up.

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

CAUTION: *Topping-up should be done only when the SPL+ is in float charge operation mode.*
- Check the terminal bolt torque every two years.
Ensure all terminals and connectors are coated with a thin layer of anti-corrosion grease (NO-OX) or anti-corrosion oil.

Table A:

Cell type	Capacity (Ah)	Charge current 0.2 C ₅ A (A)	Cell connection bolt per pole
SPL+ 80	80	8	M 10
SPL+ 100	100	10	M 10
SPL+ 130	130	13	M 10
SPL+ 165	165	16.5	M 10
SPL+ 200	200	20	M 10
SPL+ 250	250	25	M 10
SPL+ 290	290	29	2 x M 10
SPL+ 340	340	34	2 x M 10
SPL+ 380	380	38	2 x M 10
SPL+ 420	420	42	2 x M 10
SPL+ 470	470	47	2 x M 10
SPL+ 510	510	51	2 x M 10

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. Storage

Store the battery indoors in a dry, clean, cool location 0°C to +30°C (+32°F to +86°F) and well ventilated space on open shelves.
Storage of a filled battery at temperatures above +30°C (+86°F) can result in loss of capacity. The capacity loss can be as much as 5% per 10°C (18°F) above +30°C (+86°F) per year.
Do not store in direct sunlight or expose to excessive heat.
SPL+ cells are supplied filled with electrolyte and charged and in that state, **they can be stored for maximum 24 months.**
Never drain the electrolyte from the cells.

7. Environment

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

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Doc N° 21935-0915-2

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Société par Actions Simplifiée
au capital de 31 944 000 €
RCS Bobigny B 383 703 873

Le Révérend Imprimeur - Printed in France - 2k



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