

# SRM Ni-Cd batteries

## Type plastic and steel containers 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 battery immediately upon arrival. Do not overturn the package. Transport seals are located under the cover of the vent plug.

The battery is normally shipped filled and ready for installation. Remove the plastic transport seals. The battery is then ready for installation.

The battery must never be used electrically with the plastic transport seal in place as this can cause permanent damage.

### 2. Storage

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

- Make sure that the transport seals remain in place during storage.
- Do not store in direct sunlight or exposed to excessive heat.
- A battery delivered discharged and filled may be stored for many years before it is installed.
- A battery delivered charged (80%) must not be stored more than 3 months (including transport).

### 3. Installation

Remove the transport seals and close the vent plugs.

3.1. Verify that cells are correctly interconnected and that battery connection to the load is also correct.

3.2. Check tightness of terminal connecting nuts. Torque applied should be:

- 10 ± 2 N.m for cells SRM 46 to 80 and SRM 25 P/FR to 105 P/FR
- 30 ± 3 N.m for cells SRM 105 to 440 and SRM 125 P/FR to 270 P/FR

The connectors and terminal nuts should be corrosion-protected by coating with a thin layer of neutral vaseline or anti-corrosion oil agreed by Saft.

### 3.3. Electrolyte

The electrolyte to be used is E13.

### Cells delivered filled:

Check the level of electrolyte. The cells must have a level of electrolyte above the plates. If it is not the case, adjust the level of electrolyte to 5 mm above the plate tops with distilled or deionized water.

## 4. Commissioning

4.1. Discharged cells placed into service immediately after delivery or after less than one year of storage:

### ■ Constant current charge:

- 8 h at 0.2 C<sub>5</sub> A
- Caution: during charging, the battery box must be open.

### ■ Constant potential charge:

- 1.55 V/cell for 20 h, with the current limited to 0.2 C<sub>5</sub> A

Charge at constant current is recommended. The battery is ready for use.

4.2. Cells stored more than 1 year:

- a) charge 10 h 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) charge 8 h at 0.2 C<sub>5</sub> A

The battery is ready for use.

4.3. Charged cells (80%) shipped and/or stored at temperatures > +30°C (> +86°F), and/or ≥ 3 months from date of charge:

- a) charge 10 h 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) charge 8 h at 0.2 C<sub>5</sub> A

The battery is ready for use.

## 5. Charging in service

### 5.1. Cycling application

The battery is cycled up to 20% DOD (Depth Of Discharge) per day.



### ■ Single level charge:

- 1.45 - 1.55 V/cell at +20°C (+68°F)
- 1.47 V/cell is recommended.

### ■ Two level charge:

- High level: 1.45 - 1.60 V/cell at +20°C (+68°F)
- Float level: 1.38 - 1.40 V/cell at +20°C (+68°F)

## 5.2. Stand-by application

Battery is on float and discharged only in emergency situation.

### ■ Single level charge:

- 1.41 - 1.43 V/cell at +20°C (+68°F)

### ■ Two level charge:

- High level: 1.43 - 1.50 V/cell at +20°C (+68°F)
- Float level: 1.38 - 1.40 V/cell at +20°C (+68°F)

For use at temperature outside +10°C to +30°C (+50°F to +86°F), the charge voltage correcting factor is:

- -2 mV/°C/cell (-1.1 mV/°F/cell) if charging voltage < 1.45 V/cell at +20°C (+68°F)
- -3 mV/°C/cell (-1.7 mV/°F/cell) if charging voltage between 1.45 and 1.55 V/cell at +20°C (+68°F)

For higher charging voltages, consult Saft.

To minimise the water usage, Saft recommends the use of low charging voltages.

## 6. Topping-up

### ■ Batteries not equipped with water filling system:

No electrolyte level measurement is necessary if you use a Saft cell-topper, which allows the correct level to be obtained by a simple nozzle setting. See nozzle lengths in Table A.

If a cell-topper is not available, the electrolyte level must be measured. 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 it from the cell. The height of the liquid in the tube indicates the electrolyte level.

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	Level (mm)	high	low
SRM 46 to 80		60	5
SRM 105 to 440		105	5
SRM 25 P/FR to 66 P/FR		60	5
SRM 80 P/FR		55	5
SRM 105 P/FR		55	5
SRM 125 P/FR to 270 P/FR		60	5

## ■ Batteries equipped with water filling system:

- Remove transport seals and connect hydraulic tubing between cells up to a maximum of 50 cells.
- Make sure that the tubes are completely inserted for a good seal.
- The hydraulic connection of cells must be in parallel to the electrical connection, in order to avoid voltage differences of more than 1.2 V between two hydraulically connected cells.
- The hydraulic connection must be horizontal in order to avoid siphoning.
- The water filling circuit output must not be too close to electrical equipment, electrical circuit, and metallic structure.
- Water filling circuit input must be connected to the self closing inlet.
- Topping-up can be performed by gravity or using adapted pump with a flow rate of 0.7 l/min at a relative pressure of 0.3 bar maximum.

## 7. Periodic maintenance

### ■ Maintenance operations (not including the topping-up operation):

Periodic maintenance should be carried out every two years.

- Keep the battery clean using only water. Do not use a wire brush or solvents of any kind. Vent plugs can be rinsed in clean water when dirty.
- Check that all connectors are tight. Coat with grease or neutral vaseline all terminal nuts and cell connectors.
- Check charger settings. It is of great importance that the recommended charging voltage remains unchanged. High water consumption of the battery is usually caused by improper voltage setting of the charger.

Table A:

Cell type	Capacity C <sub>5</sub> Ah (Ah)	Charge current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Length of cell topper nozzle (mm)
			Solid (kg)	Liquid (l)	
SRM 46	46	9.2	0.15	0.55	50
SRM 62	62	12.4	0.25	0.92	50
SRM 80	80	16.0	0.22	0.80	50
SRM 105	105	21.0	0.37	1.24	80
SRM 125	125	25.0	0.47	1.51	80
SRM 140	135	27.0	0.49	1.51	80
SRM 155	155	31.0	0.50	1.65	80
SRM 170	170	34.0	0.60	1.95	80
SRM 200	200	40.0	0.65	2.14	80
SRM 220	220	44.0	0.70	2.28	80
SRM 250	250	50.0	0.84	2.73	80
SRM 300	300	60.0	0.95	3.10	80
SRM 375	375	75.0	1.19	3.94	80
SRM 440	440	88.0	1.50	4.80	80
SRM 25 P/FR	25	5.0	0.13	0.41	60
SRM 37 P/FR	37	7.4	0.30	0.93	60
SRM 43 P/FR	43	8.6	0.29	0.89	60
SRM 56 P/FR	56	11.2	0.26	0.80	60
SRM 66 P/FR	66	13.2	0.23	0.72	60
SRM 80 P/FR	80	16.0	0.25	0.77	65
SRM 105 P/FR	105	21.0	0.37	0.85	65
SRM 125 P/FR	125	25.0	0.37	1.35	70
SRM 140 P/FR	140	28.0	0.34	1.23	70
SRM 155 P/FR	155	31.0	0.40	1.44	70
SRM 185 P/FR	185	37.0	0.49	1.76	70
SRM 220 P/FR	220	44.0	0.56	2.01	70
SRM 250 P/FR	250	50.0	0.69	2.48	70
SRM 270 P/FR	270	54.0	0.65	2.35	70

### ■ Topping-up operation:

Check the electrolyte level. Never let the level fall below the minimum level mark. Use only distilled or deionized water to top-up.

Frequency of topping-up must be determined for each battery. It depends on charging voltage and real utilization of the battery. Refer to section 6 concerning topping-up.

## 8. Changing electrolyte

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

## 9. Environment

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

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Doc N° 21122.2 - 0604

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Société anonyme au capital de 31 944 000 €  
RCS Bobigny B 383 703 873

Pragma - Printed in France - 2k



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