

## SMRX-F3 Ni-Cd batteries

### Transparent flame retardant plastic 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.

Make sure all items on the packing list are included with the shipment. **SMRX-F3 batteries are usually shipped discharged and filled with electrolyte.** Check for damage or electrolyte spillage. Report any irregularities to the carrier and Saft. Remove the plastic transport seals immediately prior to installation on the car or any charge/discharge. The battery must never be used electrically while the plastic transport seal is in place as this can cause permanent damage.

A charged battery can be installed immediately. Refer to **Section 4** for applicable **Commissioning**. Always refer to **Section 2** for **Storage** conditions.

#### 2. Storage

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

- Make sure that the transport seals remain in place during storage.

- Do not expose the batteries to direct sunlight or 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) or at a temperature >+30°C (>+86°F). The battery is ready for immediate use within this 3-month period. Refer to **Section 4** if stored beyond 3 months or at a temperature >+30°C (>+86°F).
- A battery delivered fully charged must not be stored more than 6 weeks (including transport) or at a temperature >+30°C (>+86°F). If beyond 6 weeks or >+30°C (+86°F), contact Saft.

#### 3. Installation

Remove the transport seals and close the vent plug.

**3.1.** Verify that cells are correctly interconnected and that the battery is properly connected to the load.

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

- Top terminal nut (M12 terminal post; 12 mm / 19 mm (1/2") Top Nut) : 15 ± 2 N.m (11 ± 1.5 ft.lb)

The connectors, terminal nuts, (if supplied) must be corrosion-protected by coating with a thin layer of neutral vaseline or anti-corrosion oil (contact Saft for more information).

#### 3.3. Electrolyte

The electrolyte to be used is E10.

#### ■ 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 (0.2 in) above the plate tops with distilled or deionized water.

#### 4. Commissioning

Refer to Table A for 0.2 C<sub>5</sub> A charge or discharge currents.

**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. Discharged 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 stored at temperatures <+30°C (+86°F), less than 3 months from date of charge:**

The battery is ready for use.

**4.4. 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)

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## ■ 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 charged voltage < 1.45 V/cell at +20°C (+68°F)
- -3 mV/°C/cell (-1.7 mV/°F/cell) if charged 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

No electrolyte level measurement is required if a Saft Celltopper Plus is used which allows the correct level to be obtained by a simple nozzle setting when fitted with the correct spacer tube. Refer to Table B for cell type and corresponding spacer tube type.

If a filling pistol is not available, a clean plastic filling bottle can be used for topping-up. Do not fill above the maximum (upper line) level. All topping-up equipment shall be dedicated to Ni-Cd batteries.

## 7. Periodic maintenance

Periodic maintenance should be carried out every two years or as required.

- 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 the electrolyte level. Never let the level fall below the minimum (lower line) level. Use only distilled or deionized water for topping-up.

Table A: Cell Data

Cell type	Capacity C <sub>5</sub> Ah (Ah)	Charge current 0.2 C <sub>5</sub> A (A)	Electrolyte reserve (cm <sup>3</sup> )
SMRX160 F3	160	32	668
SMRX180 F3	180	36	668
SMRX200 F3	200	40	792
SMRX230 F3	230	46	792
SMRX260 F3	260	52	1041
SMRX290 F3	290	58	1040
SMRX320 F3	320	64	1206
SMRX360 F3	360	72	1187

Table B: Topping-up equipment (Celltopper Plus)\*

Cell type	Spacer tube type
SMRX160 F3	B
SMRX180 F3	B
SMRX200 F3	B
SMRX230 F3	B
SMRX260 F3	B
SMRX290 F3	B
SMRX320 F3	A
SMRX360 F3	A

\* Refer to separate instructions for further information on Celltopper Plus.

- Frequency of topping-up must be determined for each battery. It depends on charging voltage, temperature and actual utilization of the battery. Refer to Section 6 concerning topping-up.
- Check torque of all upper nuts (if supplied).
- Apply a thin layer of neutral Vaseline or anti-corrosion coating agreed by Saft to all connectors and terminal nuts (if applicable).
- Check charger settings. It is very important that the recommended charging voltage remains unchanged. High water consumption of the battery is usually caused by improper voltage setting of the charger

## 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 cell(s).

## 9. Battery service and recycling

Contact your Saft representative concerning battery testing. Saft America Inc. is licensed to receive and recycle spent batteries. To protect the environment all used batteries must be recycled.

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