MSX 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 battery immediately upon arrival. Do not overturn the package. MSX batteries are shipped filled with electrolyte and no topping-up of the electrolyte has to be performed upon reception of the battery.

- Make sure all items have been received by comparing with the packing list.
- Check for damage or electrolyte spillage. Report any irregularities to the carrier and Saft.
- Never operate the battery with colored transport seals inserted on the outlet and inlet of each module as this will damage permanently the battery.

2. Storage

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

- Make sure that the plastic strapping and front plates remain in place during storage (for blocks delivered without metallic frames).
- Do not expose to direct sunlight or excessive heat.
- A battery delivered charged (80%) must not be stored more than 3 months up to 30°C, or more than 6 months up to +20°C (including transport). If a charged battery has to be stored for more than the durations and associated temperatures mentioned above, discharge the block battery at 0.2 C_5 A down to 1V per cell or less.
- A battery delivered discharged and filled may be stored for many years before it is installed.
- If storage is required prior to commercial service, clean and coat the metallic parts with a thin layer of Rustilo DW330 or neutral vaseline or neutral petroleum jelly grease approved by Saft. Leave the battery in its transport case to protect from dust, moisture and short circuits.

3. Installation

Remove the transport seals.

3.1. Battery configuration varies depending on the requirement.

- Block battery directly fitted inside a battery box.
- Block battery to be installed by customer in battery box designed by Saft. In this case, the block battery is delivered with two front plates and plastic strapping used for shipment and handling. Front plates and plastic strapping must be removed just before battery installation. Don't remove the front plates and plastic strapping if the battery is stored.
- Block battery to be managed directly by the customer. In this case the block batteries are delivered in light self-keeping cradles. Never remove this assembly.

3.2. Verify that cells are correctly inter-connected and battery is correctly connected to the load.

3.3. Check torque of terminal connecting screws.
Torque must be: 10 ± 2 N.m.

Connections and terminal screws must be protected against corrosion by coating with a thin layer of Rustilo DW330 or neutral vaseline or neutral petroleum jelly anti-corrosion greasy film.

4. Water filling system installation

Remove transport seals and connect hydraulic tubing between block battery according to the battery drawing delivered by Saft.

Saft's water filling systems follows specific rules, please respect carefully Saft's battery drawing for installation.

Make sure that the pipes are completely inserted to ensure a good tightness.

Hydraulic connection of cells is in parallel to the electrical connection in order to avoid voltage differences of more than 1.2V between two cells connected by this method.



The hydraulic connection must be horizontal in order to avoid any siphon.

The water filling circuit outlet must not be located close to electrical equipment and electrical circuit or metallic structure.

Water filling circuit input must be connected to the self-closing inlet.

When installed, check the water filling circuit for continuity (no obstruction) and tightness (no leaks) using a pressure test (a kit may be supplied by SAFT).

5. Commissioning

Caution: during constant current charging operations, the battery box must be open.

5.1. The batteries are delivered 80% charged.
Charging and discharging should be done at constant current.

- For a battery stored less than 3 months at T < +30°C, or less than 6 months at T < +20°C, no charge/discharge operation is required before use.

TotalEnergies

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MSX Ni-Cd batteries

- For a battery stored for more than 3 months or at T > +30°C, or more than 6 months at T > +20°C:
  - Discharge the battery at 0.2 C_5 A down to an average 1V per cell.
  - Maintain the battery in open circuit for 8 hours or until the battery temperature is between +10°C and +30°C.
  - Charge the battery at 0.2 C_5 A for 8 hours.

5.2. The batteries are delivered discharged
Caution: even if the battery is discharged, there remains a residual charge that may cause an electric shock.

Charging and discharging should be done at constant current.

- For a battery placed into service immediately after delivery or after less than one year of storage:
  - Preferred solution: constant current charge; charge the battery at 0.2 C_5 A for 8 hours. Caution: during constant current charging the battery box must be open.

- Other solution: Constant voltage charge: 1.55V/cell for 20 hours with the current limited at 0.2 C_5 A.

Cell Type	Rated capacity (Ah)	Charging current (Amp)
MSX 70	70	14
MSX 80	80	16
MSX 90	90	18
MSX 100	100	20
MSX 115	115	23
MSX 130	130	26
MSX 145	145	29
MSX 160	160	32
MSX 180	180	36
MSX 200	200	40
MSX 230	230	46
MSX 260	260	52

Table A

- For a battery stored more than 1 year:
  - Charge the battery at 0.2 C_5 A for 8 hours.
  - Discharge the battery at 0.2 C_5 A down to an average 1V per cell.
  - Maintain the battery in open circuit for 8 hours or until the battery temperature is between +10°C and +30°C.
  - Charge the battery at 0.2 C_5 A for 8 hours. The battery is ready for use.

6. Charging in service

- 1.47 V/cell at +20°C (+68°F) with voltage compensation:
  -3 mV/°C/cell (-1.7 mV/°F/cell).
  For higher charging voltages consult your local Saft representative.
- Boost charge according to IEC62973-2.

7. Topping-up

Before topping-up operation, the water filling circuit of the battery must be checked for tightness (no leaks) using a pressure test (a kit may be supplied by SAFT).

Use only distilled and deionized water for topping-up.

Connect distilled water tank to the self-closing inlet. Topping-up is completed when an excess of 1 litre of water is measured at the outlet of the water filling circuit.

Topping-up can be performed by Saft's gravity kit or by using Saft's water filling stations.

If charge at constant current: operation must be carried on charged cells with a rest time of minimum of 2 hours.

If charge at constant voltage on the train, the topping-up can be carried out at any time.

Topping-up can be performed every 6 years (if the annual average cell temperature is below +30°C and the battery is used as a back-up battery) by gravity or using adapted pump with a flow rate of 0.7 l/min at a relative pressure of 0.3 bar maximum.

Topping-up frequencies need to be confirmed with real application conditions (Temperature, number of cycles, DOD, real charger dispersion).

8. Preventive maintenance

In addition to the topping-up, a periodic maintenance shall be carried out up to every 10 years if the annual average cell temperature is below +30°C and the battery is used as a back-up battery.

For detailed maintenance, please refer to the maintenance manual of the battery.

- Keep the battery clean using only water. Do not use a wire brush or solvents of any kind.
- Check torque of all terminal screws. Coat with DW33 anti-corrosion greasy film all terminal screws and connections.
- Check charger settings. It is very important that the recommended charging voltage remains unchanged. High water consumption by the battery is usually caused by improper voltage setting of the charger.

It depends on the charging voltage and actual use of the battery. Refer to section 7 concerning topping-up.

9. Electrolyte

Do not change the electrolyte during the life-time of the cells.

10. Environment

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

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