Sunica.plus Ni-Cd batteries

Installation and operating instructions

Important recommendations

- **WARNING: Risk of fire, explosion, or burns. Do not disassemble, heat above 70°C, or incinerate..**
- **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.**
- **Ventilation, in accordance with the IEC 62485-2 standard, is mandatory during commissioning and operation.**

1. Receiving the shipment

Check the packages and cells for transport damage.

The cells are shipped filled and charged, and are ready for assembly.

2. Storage

Store the cells 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 filled cells at temperatures above +30°C (+86°F) can result in loss of capacity. This 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.

Sunica.plus batteries are supplied filled with electrolyte and charged, **they can be stored in this condition for maximum 2 years from date of shipment.**

Never drain the electrolyte from the cells.

3. Installation

3.1. Location

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

3.2. Mounting

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

Recommended torques for terminal bolts are:

- M6 = 11 ± 1.1 N.m (97.4 ± 9.8 lbf.in)
- M8 = 20 ± 2.0 N.m (177.0 ± 17.7 lbf.in)
- M10 = 30 ± 3.0 N.m (265.0 ± 26.6 lbf.in)

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil.

If a central water filling system is used as an option, refer to the corresponding installation and operating instructions sheet.

3.3. Ventilation

During operation the battery emits an amount of gas mixture (oxygen and hydrogen). Ventilation inside the battery room must be adequately managed, comply with IEC 62485-2 and local regulations.

3.4. Electrolyte

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 separators of each cell. The level should be at least 15 mm above the minimum level mark and there is normally no need to adjust it.

Do not top-up prior to initial charge. After commissioning, when the level is stabilized, it should be not less than 5 mm below the maximum level mark.

4. Commissioning

Verify that ventilation, in accordance with the IEC 62485-2 standard, is provided during this operation.

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

After commissioning, the battery shall be charged permanently according to section 5.

Prior and during commissioning charge, record all data requested in the commissioning report available on www.saftbatteries.com.

4.1. Cells stored up to 6 months:

A commissioning charge is normally not required and the cells are ready for immediate use. If full performance is required immediately, a commissioning charge as mentioned in section 4.2. is necessary.

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

A commissioning charge is necessary.

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

  - Constant current charge:
  20 h at 0.1 C_5 A recommended (see table A)

  Note: *At the end of the charge, the cell voltage will reach the level of 1.75V/cell, thus the charger shall be able to supply such voltage.*

  When the charger maximum voltage setting is too low to supply constant current charging, divide the battery in two parts to be charged individually.

  - Constant potential charge:
  1.55 V/cell for a minimum of 24 hours with current limited to 0.1 C_5 A (see the current in Table A).

- **Commissioning at ambient temperature above +30°C (+86°F)**

  - Only constant current charge:
  20 h at 0.1 C_5 recommended.
  The battery container temperature is to be monitored during charge. If the temperature exceeds +45°C (+113°F) during charging, then it must be stopped to reduce the temperature. The charging can be resumed when battery container temperature drops below +40°C (+104°F).

In the case of remote areas, where the only charger available is the photovoltaic array, the battery should be connected to the system with no connected load and no voltage limit.
The battery should then be charged in good sunshine conditions. During this operation, the Ah charged shall be in the magnitude of 1.6 time the rated capacity, and, in order to limit the risk of electrolyte overflow, it is recommended not to exceed the charge current value specified in the Table A.

Sunica.plus Ni-Cd batteries

4.3. Cell electrolyte after prolonged float charge:

Check the electrolyte level and adjust it to the upper level mark by adding distilled or deionized water.

Note: When full battery performance is required for capacity test purposes, the battery has to be charged in accordance with IEC 62259 section 7 (7.1 & 7.2).

5. Charging in service

The photovoltaic array converts solar irradiance into DC electrical power at a predetermined range of voltages whenever sufficient solar radiation is available. Unlike a mains connected system, the output from a photovoltaic array is variable and, to obtain the best efficiency from the system, it is mandatory to have some form of charge control.

Two main techniques for charging the batteries are generally used in photovoltaic systems.

These are those which have a constant voltage limitation based on the PWM technics and those with several voltage steps charging where the battery, by switching means, is charging up to a high pre-set voltage (boost or float threshold), then drops to a lower voltage level (battery reconnect threshold) and then back to the high pre-set voltage and so on.

Recommended charging voltages for a typical photovoltaic application sized for 5 days or more back up time:

a) case of constant voltage limitation (PWM regulator system or similar)
- float: 1.50 V/cell
- boost (not mandatory): 1.65 V/cell

b) case of regulators based on the switching principle:
- boost threshold (not mandatory): 1.65 V/cell
- float threshold: 1.55 V/cell
- battery reconnect threshold: 1.45 V/cell

For shorter back-up times, the values have to be increased depending of the load requirement.

For use in warm areas, a temperature compensation on the charge voltage is not recommended.

For use in cold areas, a temperature compensation is recommended to increase the charge acceptance.

Table A

Cell type	Rated Capacity 5 h - C_5h 1,00 V (Ah)	Nominal Charging 120 h - 1.00 V C_{120} Ah (Ah)	Charging Current 0.1 C_5 A (A)	Max. quantity of water Ah to be added in cc	Cell connection bolt per pole
SUN+ 100	95	100	9,5	280	M8
SUN+ 150	140	150	14,0	380	M10
SUN+ 200	185	200	19,0	500	M10
SUN+ 250	235	250	24,0	590	M10
SUN+ 305	280	305	28,0	700	M10
SUN+ 355	325	355	33,0	880	2xM10
SUN+ 405	375	405	38,0	1000	2xM10
SUN+ 455	420	455	42,0	1100	2xM10
SUN+ 505	470	505	47,0	1200	2xM10
SUN+ 555	515	555	52,0	1300	2xM10
SUN+ 610	560	610	56,0	1400	2xM10
SUN+ 660	610	660	61,0	1600	3xM10
SUN+ 710	650	710	65,0	1700	3xM10
SUN+ 760	700	760	70,0	1800	3xM10
SUN+ 810	750	810	75,0	1900	3xM10
SUN+ 860	800	860	80,0	2000	3xM10
SUN+ 910	840	910	84,0	2100	3xM10
SUN+ 960	890	960	89,0	2300	4xM10
SUN+ 1015	940	1015	94,0	2400	4xM10
SUN+ 1065	980	1065	98,0	2500	4xM10
SUN+ 1115	1030	1115	103	2600	4xM10
SUN+ 1170	1080	1170	108	2700	4xM10
SUN+ 1215	1120	1215	112	2800	4xM10
SUN+ 1270	1170	1270	117	3000	5xM10
SUN+ 1320	1220	1320	122	3100	5xM10
SUN+ 1370	1260	1370	126	3200	5xM10
SUN+ 1420	1300	1420	130	3300	5xM10
SUN+ 1470	1350	1470	135	3400	5xM10
SUN+ 1520	1400	1520	140	3500	5xM10
SUN+ 1570	1450	1570	145	3700	5xM10
SUN+ 1620	1500	1620	150	3800	6xM10
SUN+ 1670	1550	1670	155	3900	6xM10
SUN+ 1720	1600	1720	160	4000	6xM10
SUN+ 1775	1650	1775	165	4100	6xM10
SUN+ 1830	1700	1830	170	4200	6xM10

The recommended value is:
–3.0 mV/°C/cell (–1.68 mV/°F/cell) starting from 0°C (+32°F).

For more information regarding charging, see section 6 in the Technical Manual.

6. Preventive Maintenance

■ In a correctly designed standby application, Sunica.plus requires the minimum of attention.

However, it is good practice with any system to carry out an inspection of the system once per year or at the recommended topping-up interval period to ensure that the charging system, the battery and the ancillary electronics are all functioning correctly.

■ When this system service is carried out,it is recommended that the following actions should be taken:

- 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 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 (see Table A for the quantity of water per cell). Topping up of the Sunica. Plus battery **shall be carried out when battery is fully charged**. Experience will tell the time interval between topping-up.

Note: There is no need to check the electrolyte density periodically. Interpretation of density measurements is difficult and could be misleading.

- The connectors and terminal bolts should be corrosion-protected by coating with a thin layer of anti-corrosion oil.
- High water consumption is usually caused by improper voltage setting of the charger.

7. Environment

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

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