ReGenSol Ni-Cd batteries

Type RGS-L
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. Transport seals are located under the lid of each vent. They must be removed prior to mounting.

The cells are shipped filled and charged, and are ready for assembly. The battery must never be charged with the plastic transport seals in place.

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.

ReGenSol batteries are supplied filled with electrolyte and charged, **they can be stored in this condition for maximum 12 months 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:

- M10 = 12 – 15 N.m (105 - 135 lbf.in)
- M20 = 31 – 34 N.m (275 - 305 lbf.in)

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

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.

If spilling is noticed, the spilled cells must be refilled with TYPE-5 or TYPE-6 Electrolyte only, as supplied as spare electrolyte, to the same level as the other cells in the string.

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 relevant battery data like, Individual Cell Voltage, Battery Voltage, Cell Temperature and Charging current is mandatory in the commissioning report.

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 with constant current as mentioned in section 4.2. is necessary.

4.2. Cells stored more than 6 months and up to 12 months:

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 30 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 minimum 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.

4.3. Cell electrolyte after prolonged float charge:

Check the electrolyte level and adjust it to the maximum 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).

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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.

The recommended value is:
–2.0 mV/°C/cell (–1.10 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, ReGenSol 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.

Table A

Cell type	Rated Capacity 5 h to 1.0 V C5 Ah (Ah)	Nominal Capacity 120 h to 1.0 V C120 Ah (Ah)	Charging Current 0.1 C_5 A (A)	Approx. Filled Cell Weight (kg)	Cell Connection bolt per pole
RGS-L 20	19	20	1.9	2.7	1xM10
RGS-L 30	28	30	2.8	2.9	1xM10
RGS-L 40	38	40	3.8	3.1	1xM10
RGS-L 55	50	55	5.0	3.3	1xM10
RGS-L 89	80	89	8.0	6.3	1xM20
RGS-L 105	100	105	10.0	6.7	1xM20
RGS-L 130	120	130	12.0	7.2	1xM20
RGS-L 150	137	150	13.7	9.7	1xM20
RGS-L 170	160	170	16.0	10.1	1xM20
RGS-L 185	170	185	17.0	10.3	1xM20
RGS-L 200	185	200	18.5	10.4	1xM20
RGS-L 210	195	210	19.5	10.6	1xM20
RGS-L 240	220	240	22.0	13.5	2xM20
RGS-L 265	245	265	24.5	13.8	2xM20
RGS-L 295	270	295	27.0	14.2	2xM20
RGS-L 325	300	325	30.0	16.4	2xM20
RGS-L 350	320	350	32.0	16.6	2xM20
RGS-L 360	330	360	33.0	19.6	2xM10F
RGS-L 380	350	380	35.0	20.1	2xM10F
RGS-L 400	370	400	37.0	20.5	2xM10F
RGS-L 420	385	420	38.5	20.4	2xM10F
RGS-L 440	407	440	40.7	21.0	2xM10F
RGS-L 470	435	470	43.5	21.3	2xM10F
RGS-L 500	460	500	46.0	29.3	3xM10F
RGS-L 530	490	530	49.0	29.4	3xM10F
RGS-L 570	525	570	52.5	30.1	3xM10F
RGS-L 590	540	590	54.0	30.5	3xM10F
RGS-L 610	560	610	56.0	30.6	3xM10F
RGS-L 625	575	625	57.5	30.6	3xM10F
RGS-L 660	610	660	61.0	31.4	3xM10F
RGS-L 710	650	710	65.0	32.0	3xM10F
RGS-L 725	660	725	66.0	38.9	4xM10F
RGS-L 760	700	760	70.0	39.9	4xM10F
RGS-L 800	740	800	74.0	40.6	4xM10F
RGS-L 835	765	835	76.5	40.5	4xM10F
RGS-L 890	815	890	81.5	41.7	4xM10F
RGS-L 940	865	940	86.5	42.5	4xM10F
RGS-L 960	880	960	88.0	50.0	5xM10F
RGS-L 1000	925	1000	92.5	50.8	5xM10F
RGS-L 1050	955	1050	95.5	50.7	5xM10F
RGS-L 1110	1020	1110	102.0	52.2	5xM10F
RGS-L 1170	1080	1170	108.0	53.0	5xM10F
RGS-L 1210	1115	1210	111.5	60.9	6xM10F
RGS-L 1250	1150	1250	115.0	60.8	6xM10F
RGS-L 1330	1225	1330	122.5	62.5	6xM10F
RGS-L 1420	1300	1420	130.0	63.7	6xM10F

■ 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).
- Use only distilled or deionized water to top-up (see Table A for the quantity of water per cell).

Topping up of the ReGenSol battery **shall be carried out when battery is fully charged**.

Experience specific to an application 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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