

Single cells Ni-Cd range

Type SCL, SCM, SCH, plastic case 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 cells immediately upon arrival. Do not overturn the package. Transport seals are located under the cover of the vent plug.

- **If the cells are shipped filled and charged,** the cells are ready for assembly. Remove the plastic transport seals only before use.
- **If the cells are shipped empty and discharged,** do not remove the plastic transport seals until ready to fill the cells.

The cells must never be charged with the transport seals 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) and well ventilated space on open shelves.

Do not store in direct sunlight or expose to excessive heat.

■ Cells filled and charged

- If cells are stored filled, they must be fully charged prior to storage.
- Cells may be stored filled and charged for a period not exceeding 12 months from date of dispatch from factory.

Storage of a filled battery at temperatures above +30°C (+86°F) can result in loss of capacity. This can be as much 5% per 10°C (18°F) above +30°C (+86°F) per year.

■ Cells empty and discharged

- Saft recommends to store cells empty and discharged. This ensures compliance with IEC 60623 section 4.9 (storage).
- Cells can be stored like this for many years.
- When deliveries are made in cardboard boxes, store without opening the boxes.
- **When deliveries are made in plywood boxes, open the boxes before the storage. The lid and the packing material on top of the cells must be removed.**

3. Electrolyte / cell oil

■ Cells delivered filled and charged:

Check the level of electrolyte. It should not be more than 20 mm below the maximum level mark (upper). If this is not the case, adjust the level with distilled or deionized water. Cells delivered filled have already the cell oil in place.

In case of spillage of electrolyte during the transport, the cells have to be topped-up with E22 electrolyte. Fill the cells about 20 mm above the minimum level mark (lower) with electrolyte. Wait 4 hours and adjust if necessary before commissioning.

■ Cells delivered empty and discharged:

If the electrolyte is supplied dry, prepare it according to its separate instructions sheet. The electrolyte to be used is E22. Remove the transport seals just before filling.

Fill the cells about 20 mm above the minimum level mark (lower) with electrolyte. Wait 4 to 24 hours and adjust if necessary before commissioning.

It is recommended to add the cell oil after the commissioning charge, with the syringe, according to the quantity indicated in the Table A.

4. Installation

4.1. 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).

4.2. Ventilation

During the last part of charging, the battery is emitting gases (oxygen and hydrogen mixture). At normal float-charge the gas evolution is very small but some ventilation is necessary.

Note that special regulations for ventilation may be valid in your area depending on the application.



4.3. Mounting

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

Recommended torques for terminal bolts are:

- M 6 = 5 ± 0.5 N.m (44.3 ± 4.4 lbf.in)
- M 10 = 18 ± 2 N.m (159.3 ± 17.7 lbf.in)
- M 20 = 70 ± 7 N.m (619.6 ± 62.0 lbf.in)

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

Remove the transport seals and close the vent plugs.

5. Commissioning

Verify that the transport seals are removed, the vents are closed and the ventilation is adequate 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.

■ For cells filled and charged by the factory and stored less than 6 months:

• Constant current charge:

Charge for 10 h at 0.2 C₅ A recommended (see Table A).

Note: At the end of the charge, the cell voltage may reach the level of 1.85 V per 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 into two parts to be charged individually.

• Constant voltage charge:

Charge for 24 h at 1.65 V/cell, current limited to 0.2 C₅ A or charge for 48 h at 1.55 V/cell, current limited to 0.2 C₅ A (see Table A).

■ For cells filled on location or for filled cells which have been stored more than 6 months:

• Constant current charge:

a) Charge for 10 h at 0.2 C₅ A recommended (see Table A)

b) Discharge at 0.2 C₅ A to 1.0 V/cell

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c) Charge for 10 h at 0.2 C₅ A recommended (see Table A)

Note: At the end of the charge, the cell voltage may reach the level of 1.85 V per 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 into two parts to be charged individually.

• **Constant voltage charge:**

a) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C₅ A (see Table A)

b) Discharge at 0.2 C₅ A to 1.0 V/cell

c) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C₅ A or charge for 48 h at 1.55 V/cell current limited to 0.2 C₅ A (see Table A).

■ **Cell oil & electrolyte after**

commissioning: wait for 4 hours after commissioning.

• **For cells delivered filled by the factory:**

- Cell oil is already in place.
- Check the electrolyte level and adjust it to the maximum level mark (upper) by adding distilled or deionized water.

• **For cells filled on location:**

- Add the cell oil with the syringe, according to the quantity indicated in the Table A.
- Check the electrolyte level and adjust it to the maximum level mark (upper) by adding: electrolyte.

The battery is ready for use.

For capacity test purposes, the battery has to be charged in accordance with IEC 60623 section 4.

6. Charging in service

■ **Continuous parallel operation**, with occasional battery discharge.

Recommended charging voltage (+20°C to +25°C / +68°F to +77°F):

For two level charge:

- float level
= 1.42 ± 0.01 V/cell for SCL
= 1.40 ± 0.01 V/cell for SCM and SCH

- high level
= 1.47 - 1.70 V/cell for SCL
= 1.45 - 1.70 V/cell for SCM and SCH.

A high voltage will increase the speed and efficiency of the recharging.

For single level charge:

- float level: 1.43 - 1.50 V/cell.

■ **Buffer operation**, where the load exceeds the charger rating.

Recommended charging voltage (+20°C to +25°C / +68°F to +77°F):
1.50 - 1.60 V/cell.

Table A:

Cell type	Charging current (A)	Electrolyte per cell		Cell oil ml/vent	Terminal per pole	Cell type	Charging current (A)	Electrolyte per cell		Cell oil ml/vent	Terminal per pole	Cell type	Charging current (A)	Electrolyte per cell		Cell oil ml/vent	Terminal per pole
		Liquid (l)	Solid* (kg)					Liquid (l)	Solid* (kg)					Liquid (l)	Solid* (kg)		
SCL 10 P	2.0	0.30	0.10	15	M 6	SCM 11	2.2	0.52	0.17	15	M 10	SCH 11	2.2	0.39	0.13	15	M 10
SCL 20 P	4.0	0.20	0.06	15	M 6	SCM 18	3.6	0.46	0.15	15	M 10	SCH 14	2.8	0.46	0.15	15	M 10
SCL 30 P	6.0	0.52	0.17	20	M 6	SCM 25	5.0	0.40	0.13	15	M 10	SCH 18	3.6	0.41	0.13	15	M 10
SCL 40 P	8.0	0.35	0.11	20	M 6	SCM 32	6.4	1.0	0.32	25	M 10	SCH 22	4.4	0.36	0.12	15	M 10
SCL 55 P	11.0	0.64	0.21	25	M 10	SCM 38	7.6	0.94	0.30	25	M 10	SCH 26	5.2	1.01	0.33	25	M 10
SCL 70 P	14.0	0.49	0.16	25	M 10	SCM 45	9.0	0.87	0.28	25	M 10	SCH 34	6.8	0.88	0.28	25	M 10
SCL 76	15.2	1.5	0.49	25	M 20	SCM 53	10.6	0.81	0.26	25	M 10	SCH 38	7.6	0.83	0.27	25	M 10
SCL 89	17.8	1.4	0.45	25	M 20	SCM 59	11.8	0.75	0.24	25	M 10	SCH 46	9.2	0.73	0.24	25	M 10
SCL 102	20.4	1.3	0.42	25	M 20	SCM 65	13.0	1.5	0.49	25	M 20	SCH 50	10.0	0.69	0.22	25	M 10
SCL 128	25.6	1.8	0.58	35	M 20	SCM 83	16.6	1.3	0.42	25	M 20	SCH 58	11.8	1.2	0.39	25	M 20
SCL 157	31.4	3.5	1.13	60	M 20	SCM 101	20.2	1.9	0.61	35	M 20	SCH 67	13.4	1.1	0.36	25	M 20
SCL 189	37.8	3.3	1.07	60	M 20	SCM 118	23.6	1.7	0.55	35	M 20	SCH 85	17.0	1.5	0.49	35	M 20
SCL 221	44.2	3.1	1.00	60	M 20	SCM 145	29.0	3.5	1.13	60	M 20	SCH 93	18.6	1.4	0.45	35	M 20
SCL 252	50.4	2.9	0.94	60	M 20	SCM 167	33.4	3.4	1.10	60	M 20	SCH 102	20.4	2.4	0.78	50	M 20
SCL 284	56.8	3.9	1.26	75	2 x M 20	SCM 189	37.8	3.2	1.04	60	M 20	SCH 111	22.2	2.3	0.74	50	M 20
SCL 316	63.2	3.7	1.20	75	2 x M 20	SCM 211	42.2	3.0	0.97	60	M 20	SCH 128	25.6	2.1	0.68	50	M 20
SCL 347	69.4	4.8	1.55	90	2 x M 20	SCM 232	46.4	4.1	1.33	75	2 x M 20	SCH 137	27.4	2.0	0.65	50	M 20
SCL 379	75.8	4.6	1.49	90	2 x M 20	SCM 254	50.8	3.9	1.26	75	2 x M 20	SCH 147	29.4	3.7	1.20	75	2 x M 20
SCL 411	82.2	4.4	1.42	90	2 x M 20	SCM 276	55.2	3.7	1.20	75	2 x M 20	SCH 168	33.6	3.4	1.10	75	2 x M 20
						SCM 298	59.6	4.9	1.59	90	2 x M 20	SCH 190	38.0	3.2	1.04	75	2 x M 20
						SCM 319	63.8	4.7	1.52	90	2 x M 20	SCH 211	42.2	3.0	0.97	75	2 x M 20
						SCM 341	68.2	4.5	1.46	90	2 x M 20	SCH 244	48.8	3.8	1.23	90	2 x M 20
												SCH 254	50.8	3.7	1.20	90	2 x M 20
												SCH 265	53.0	3.6	1.17	90	2 x M 20

* Value for initial filling (E22).

The cell type shows the rated capacity in ampere hours (Ah).

7. Periodic Maintenance

- 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 the electrolyte level. Never let the level fall below the minimum level mark (lower). Use only distilled or deionized water to top-up. Experience will tell the time interval between topping-up.

Note: *Once the battery has been filled with the correct electrolyte either at the battery factory or during the battery commissioning, there is no need to check the electrolyte density periodically. Interpretation of density measurements is difficult and could be misleading.*

- Check the charging voltage. If a battery is parallel connected, it is important that the recommended charging voltage remains unchanged. The charging voltage should be checked and recorded at least once yearly. If a cell float is found below 1.35 V, high-rate charge is recommended to apply to the cell concerned.

- Check every two years that all connectors are tight. 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 high improper voltage setting of the charger.

8. Changing electrolyte

In most stationary battery applications, the electrolyte will retain its effectiveness for the life of the battery. However, under special battery operating conditions, if the electrolyte is found to be carbonated, the battery performance can be restored by replacing the electrolyte. The electrolyte type to be used for replacement in these cells is: E13. Refer to "Electrolyte Instructions".

9. Environment

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

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