

## Block battery Ni-Cd range

### SBLE, SBM, SBH types for standard SBL, SBM, SBH types for non standard 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 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 Tables A or B.

#### 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 = 11 ± 1.1 N.m (97.4 ± 9.8 lbf.in)
- M 8 = 20 ± 2 N.m (177.0 ± 17.7 lbf.in)
- M 10 = 30 ± 3 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.

**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 Tables A or B, charge for a proportionally longer time.

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- **For cells filled and charged by the factory and stored less than 6 months:**
  - **Constant current charge:**

Charge for 10 h at 0.2 C<sub>5</sub> A recommended (see Tables A or B).

**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 C<sub>5</sub> A or charge for 48 h at 1.55 V/cell, current limited to 0.2 C<sub>5</sub> A (see Tables A or B).
- **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 C<sub>5</sub> A recommended (see Tables A or B)
    - b) Discharge at 0.2 C<sub>5</sub> A to 1.0 V/cell
    - c) Charge for 10 h at 0.2 C<sub>5</sub> A recommended (see Tables A or B).

**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 C<sub>5</sub> A (see Tables A or B)
    - b) Discharge at 0.2 C<sub>5</sub> A to 1.0 V/cell
    - c) Charge for **30 h** at 1.65 V/cell with current limited to 0.2 C<sub>5</sub> A or charge for 48 h at 1.55 V/cell current limited to 0.2 C<sub>5</sub> A (see Tables A or B)
- **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 Tables A or B.
  - Check the electrolyte level and adjust it 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 L cells  
= 1.40 ± 0.01 V/cell for M and H cells
- high level  
= 1.47 - 1.70 V/cell for L cells  
= 1.45 - 1.70 V/cell for M and H cells.

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.

### 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 voltage 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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Table A: Standard range

Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml /vent	Cell connect. bolt per pole	Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml /vent	Cell connect. bolt per pole	Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml /vent	Cell connect. bolt per pole
		Solid* (kg)	Liquid* (l)					Solid* (kg)	Liquid* (l)					Solid* (kg)	Liquid* (l)		
SBLE 7.5	1.5	0.08	0.24	10	M 6	SBM 11	2.2	0.10	0.30	15	M 6	SBH 8.3	1.7	0.12	0.36	10	M 6
SBLE 15	3.0	0.11	0.35	10	M 6	SBM 15	3.0	0.11	0.33	15	M 6	SBH 12	2.4	0.14	0.44	15	M 6
SBLE 22	4.4	0.17	0.53	15	M 6	SBM 22	4.4	0.15	0.46	15	M 6	SBH 16	3.2	0.16	0.48	15	M 6
SBLE 30	6.0	0.15	0.46	15	M 6	SBM 30	6.0	0.15	0.46	15	M 6	SBH 19	3.8	0.25	0.77	15	M 6
SBLE 40	8.0	0.29	0.90	30	M 6	SBM 43	8.6	0.31	0.95	20	M 6	SBH 29	5.8	0.31	0.95	20	M 6
SBLE 47	9.4	0.19	0.59	20	M 6	SBM 56	11	0.36	1.1	20	M 6	SBH 39	7.8	0.36	1.1	25	M 8
SBLE 62	12	0.23	0.70	30	M 6	SBM 65	13	0.32	1.0	25	M 8	SBH 49	9.8	0.42	1.3	30	M 8
SBLE 75	15	0.32	1.0	25	M 8	SBM 84	17	0.39	1.2	25	M 8	SBH 59	12	0.49	1.5	30	M 10
SBLE 95	19	0.39	1.2	25	M 8	SBM 112	22	0.45	1.4	30	M 8	SBH 69	14	0.58	1.8	40	M 10
SBLE 110	22	0.39	1.2	30	M 10	SBM 138	28	0.55	1.7	40	M 10	SBH 79	16	0.58	1.8	40	M 10
SBLE 140	28	0.49	1.5	30	M 10	SBM 161	32	0.61	1.9	40	M 10	SBH 88	18	0.74	2.3	50	M 10
SBLE 185	37	0.65	2.0	40	M 10	SBM 184	37	0.78	2.4	50	M 10	SBH 98	20	0.71	2.2	50	M 10
SBLE 230	46	0.74	2.3	50	M 10	SBM 208	42	0.94	2.9	60	M 10	SBH 118	24	0.87	2.7	60	M 10
SBLE 275	55	0.94	2.9	60	M 10	SBM 231	46	0.94	2.9	60	M 10	SBH 137	28	1.20	3.7	40	2 x M 10
SBLE 325	65	1.13	3.5	35	2 x M 10	SBM 277	55	1.13	3.5	40	2 x M 10	SBH 157	31	1.20	3.7	40	2 x M 10
SBLE 375	75	1.29	4.0	40	2 x M 10	SBM 300	60	1.20	3.7	40	2 x M 10	SBH 177	35	1.46	4.5	50	2 x M 10
SBLE 415	83	1.39	4.3	45	2 x M 10	SBM 323	65	1.26	3.9	40	2 x M 10	SBH 196	39	1.42	4.4	50	2 x M 10
SBLE 460	92	1.49	4.6	50	2 x M 10	SBM 346	69	1.42	4.4	50	2 x M 10	SBH 236	47	1.84	5.7	60	2 x M 10
SBLE 510	102	1.68	5.2	55	2 x M 10	SBM 369	74	1.55	4.8	50	2 x M 10	SBH 265	53	2.20	6.8	50	3 x M 10
SBLE 550	110	1.88	5.8	60	2 x M 10	SBM 392	78	1.72	5.3	60	2 x M 10	SBH 294	59	2.10	6.5	50	3 x M 10
SBLE 600	120	2.04	6.3	43	3 x M 10	SBM 415	83	1.88	5.8	60	2 x M 10	SBH 353	71	2.78	8.6	60	3 x M 10
SBLE 650	130	2.14	6.6	47	3 x M 10	SBM 438	88	1.88	5.8	60	2 x M 10	SBH 393	79	2.82	8.7	50	4 x M 10
SBLE 700	140	2.23	6.9	50	3 x M 10	SBM 461	92	1.84	5.7	60	2 x M 10	SBH 471	94	3.69	11.4	60	4 x M 10
SBLE 750	150	2.43	7.5	53	3 x M 10	SBM 505	101	2.10	6.5	50	3 x M 10	SBH 491	98	3.53	10.9	50	5 x M 10
SBLE 830	166	2.81	8.7	60	3 x M 10	SBM 555	111	2.33	7.2	50	3 x M 10	SBH 590	118	4.63	14.3	60	5 x M 10
SBLE 925	185	2.98	9.2	50	4 x M 10	SBM 625	125	2.82	8.7	60	3 x M 10	SBH 640	128	4.21	13.0	50	5 x M 10
SBLE 1020	204	3.36	10.4	55	4 x M 10	SBM 690	138	2.78	8.6	60	3 x M 10	SBH 705	141	5.31	16.4	60	5 x M 10
SBLE 1100	220	3.75	11.6	60	4 x M 10	SBM 740	148	3.11	9.6	50	4 x M 10	SBH 765	153	5.24	16.2	60	5 x M 10
SBLE 1200	240	3.91	12.1	52	5 x M 10	SBM 830	166	3.79	11.7	60	4 x M 10	SBH 865	173	5.92	18.3	57	6 x M 10
SBLE 1300	260	4.30	13.3	56	5 x M 10	SBM 920	184	3.82	11.8	60	4 x M 10	SBH 920	184	6.28	19.4	60	6 x M 10
SBLE 1400	280	4.69	14.5	60	5 x M 10	SBM 965	193	3.69	11.4	40	6 x M 10						
SBLE 1500	300	5.05	15.6	55	6 x M 10	SBM 1040	208	4.72	14.6	60	5 x M 10						
SBLE 1600	320	5.44	16.8	58	6 x M 10	SBM 1150	230	4.66	14.4	60	5 x M 10						
SBLE 1660	332	5.63	17.4	60	6 x M 10	SBM 1220	244	5.50	17.0	60	6 x M 10						
						SBM 1390	278	5.60	17.3	60	6 x M 10						

\* Value for initial filling (E22).  
The cell type shows the rated capacity in ampere hours (Ah).

# Block battery Ni-Cd range

SBLE, SBM, SBH types for standard  
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Table B: Non standard range

Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml / vent	Cell connect. bolt per pole	Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml / vent	Cell connect. bolt per pole	Cell type	Charging current 0.2 C <sub>5</sub> A (A)	Electrolyte per cell		Quantity of oil ml / vent	Cell connect. bolt per pole
		Solid* (kg)	Liquid* (l)					Solid* (kg)	Liquid* (l)					Solid* (kg)	Liquid* (l)		
SBL 7.5	1.5	0.08	0.24	10	M 6	SBM 86	17	0.42	1.3	30	M 8	SBH 25	5.0	0.30	0.92	15	M 6
SBL 16	3.2	0.11	0.35	10	M 6	SBM 287	57	1.39	4.3	50	2 x M 10	SBH 38	7.6	0.39	1.2	20	M 6
SBL 30	6.0	0.15	0.46	15	M 6	SBM 359	72	1.62	5.0	60	2 x M 10	SBH 51	10	0.42	1.3	25	M 8
SBL 37	7.4	0.22	0.69	15	M 6	SBM 431	86	2.07	6.4	50	3 x M 10	SBH 64	13	0.52	1.6	30	M 8
SBL 45	9.0	0.19	0.59	20	M 6	SBM 540	108	2.43	7.5	60	3 x M 10	SBH 77	15	0.52	1.6	30	M 10
SBL 48	9.6	0.28	0.86	15	M 6	SBM 575	115	2.78	8.6	50	4 x M 10	SBH 89	18	0.61	1.9	40	M 10
SBL 59	12	0.23	0.7	30	M 6	SBM 720	144	3.24	10.0	60	4 x M 10	SBH 102	20	0.68	2.1	40	M 10
SBL 70	14	0.32	1.0	25	M 8	SBM 900	180	4.05	12.5	60	5 x M 10	SBH 115	23	0.91	2.8	50	M 10
SBL 90	18	0.39	1.2	25	M 8							SBH 128	26	0.84	2.6	50	M 10
SBL 102	21	0.39	1.2	30	M 10							SBH 141	28	1.07	3.3	60	M 10
SBL 131	27	0.49	1.5	30	M 10							SBH 153	31	1.04	3.2	60	M 10
SBL 135	27	0.55	1.7	40	M 10							SBH 179	36	1.23	3.8	40	2 x M 10
SBL 167	34	0.65	2.0	50	M 10							SBH 204	41	1.36	4.2	40	2 x M 10
SBL 173	35	0.65	2.0	40	M 10							SBH 230	46	1.81	5.6	50	2 x M 10
SBL 199	40	0.78	2.4	60	M 10							SBH 256	51	1.68	5.2	50	2 x M 10
SBL 214	43	0.74	2.3	50	M 10							SBH 281	56	2.14	6.6	60	2 x M 10
SBL 237	48	0.97	3.0	40	2 x M 10							SBH 307	61	2.10	6.5	60	2 x M 10
SBL 256	52	0.94	2.9	60	M 10							SBH 345	69	2.72	8.4	50	3 x M 10
SBL 269	54	1.13	3.5	40	2 x M 10							SBH 383	77	2.52	7.8	50	3 x M 10
SBL 301	61	1.20	3.7	50	2 x M 10							SBH 422	84	3.17	9.8	60	3 x M 10
SBL 304	61	1.13	3.5	40	2 x M 10							SBH 460	92	3.14	9.7	60	3 x M 10
SBL 334	67	1.26	3.9	50	2 x M 10							SBH 510	102	3.37	10.4	50	4 x M 10
SBL 346	70	1.26	3.9	40	2 x M 10							SBH 560	112	4.24	13.1	60	4 x M 10
SBL 366	74	1.42	4.4	60	2 x M 10							SBH 615	123	4.21	13.0	60	4 x M 10
SBL 387	78	1.36	4.2	50	2 x M 10												
SBL 398	80	1.55	4.8	60	2 x M 10												
SBL 429	86	1.49	4.6	50	2 x M 10												
SBL 470	94	1.68	5.2	60	2 x M 10												
SBL 500	100	1.91	5.9	50	3 x M 10												
SBL 510	102	1.88	5.8	60	2 x M 10												
SBL 595	119	2.33	7.2	60	3 x M 10												
SBL 600	120	2.14	6.6	47	3 x M 10												
SBL 645	129	2.23	6.9	50	3 x M 10												
SBL 665	133	2.56	7.9	50	4 x M 10												
SBL 770	154	2.78	8.6	60	3 x M 10												
SBL 795	159	3.11	9.6	60	4 x M 10												
SBL 835	167	3.11	9.6	50	5 x M 10												
SBL 860	172	2.98	9.2	50	4 x M 10												
SBL 995	199	3.88	12.0	60	5 x M 10												
SBL 1020	204	3.72	11.5	60	4 x M 10												
SBL 1070	214	3.72	11.5	50	5 x M 10												
SBL 1280	256	4.66	14.4	60	5 x M 10												
SBL 1450	290	5.31	16.4	57	6 x M 10												
SBL 1540	308	5.60	17.3	60	6 x M 10												

\* Value for initial filling (E22).  
The cell type shows the rated capacity in ampere hours (Ah).