

Block battery Ni-Cd range

SBLE, SBM, SBH types for standard

SBL, SBM, SBH types for non standard

Installation & operating instructions for Block battery range

Safety precautions

- **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 measurements 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

Do not overturn the package. Inspect cells for any damage and report any to the freight company immediately.

- **If the cells are shipped filled and charged**, the cells are ready for assembly.

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.

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 permanent change and loss of product performance, depending on the duration of the storage above the maximum recommended temperature.

■ Cells empty and discharged

- Saft recommends to store cells empty and discharged.
- Cells can be stored like this for many years.

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 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 connecting lugs to the battery terminals should be nickel plated.

Recommended torques values 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)
- M10 = 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 or NO-OX-ID™A"

3.3. Ventilation

During charging, the battery is emitting gases (oxygen and hydrogen mixture).

Ventilation of the battery room, in accordance with the IEC 62485-2 standard, must be provided.

3.4. Electrolyte

Cells delivered filled and charged: Check for spilling. If spilling is noticed, the spilled cells must be refilled with E22 electrolyte, only after assembly (see 3.2 Mounting), to the same level as the other cells in the string.



■ Cells delivered empty and discharged:

Important: The commissioning charge must start within 24 hours but not before 4 hours after the electrolyte has been filled.

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

If the electrolyte is supplied dry, prepare it according to its separate instructions sheet. The electrolyte to be used is E22. Fill the cells about 20 mm above the minimum level mark (lower) with electrolyte. Start the commissioning charge within 24 hours but not before 4 hours

4. Commissioning

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

A good commissioning is important and mandatory. Charge at constant current is preferable.

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. Constant current charge

If the current limit is lower than indicated in the Table A or B, charge for a proportionally longer time.

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

Charge for 10 h at 0.2 C5 A recommended (see Tables A or B).

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

- a) Charge for 10 h at 0.2 C5 A recommended (see Tables A or B)
- b) Discharge at 0.2 C5 A to 1.0 V/cell
- c) Charge for 10 h at 0.2 C5 A recommended (see Tables A or B).

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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.

4.2. Constant voltage charge

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

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 Tables A or B).

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

- Charge for 30 h at 1.65 V/cell with current limited to 0.2 C5 A (see Tables A or B)
- Discharge at 0.2 C5 A to 1.0 V/cell
- 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 Tables A or B)

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).

4.3. Electrolyte adjustment after commissioning

- For cells delivered filled by the factory:
 - Check the electrolyte level and adjust it to the maximum level mark (upper) by adding distilled or deionized water.
- For cells filled on location:
 - Check the electrolyte level and adjust it to the maximum level mark (upper) by adding: electrolyte.

The battery is ready for use.

Note: When full battery performance is required for capacity test purposes, the battery has to be charged in accordance with IEC 60623.

5. Charging in service

Maintaining the recommended battery charging voltage is very important to insure long life to the battery. The battery charger must be set to the recommended charging values.

5.1. 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 (Boost)
 - = 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 and Boost charge are not available):

1.43 - 1.50 V/cell.

5.2. 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.

6. Preventive 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 charging voltage. 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 visually 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.

- The connectors and terminal bolts should be corrosion protected by coating with a thin layer of anti-corrosion oil or NO-OX-ID™A"

- High water consumption is usually caused by high improper voltage setting of the charger.

Note that all these maintenance recommendations followed the IEEE 1106 standard 'Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications'.

6.1. 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".

7. 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 ₅ A (A)	Electrolyte per cell		Cell connect. bolt per pole	Cell type	Charging current 0.2 C ₅ A (A)	Electrolyte per cell		Cell connect. bolt per pole	Cell type	Charging current 0.2 C ₅ A (A)	Electrolyte per cell		Cell connect. bolt per pole
		Solid* (kg)	Liquid* (l)				Solid* (kg)	Liquid* (l)				Solid* (kg)	Liquid* (l)	
SBLE 7.5	1.5	0.08	0.2	M 6	SBM 11	2.2	0.10	0.3	M 6	SBH 8.3	1.7	0.1	0.4	M 6
SBLE 15	3.0	0.11	0.4	M 6	SBM 15	3.0	0.11	0.3	M 6	SBH 12	2.4	0.1	0.4	M 6
SBLE 22	4.4	0.17	0.5	M 6	SBM 22	4.4	0.15	0.5	M 6	SBH 16	3.2	0.2	0.5	M 6
SBLE 30	6.0	0.15	0.5	M 6	SBM 30	6.0	0.15	0.5	M 6	SBH 19	3.8	0.3	0.9	M 6
SBLE 40	8.0	0.29	0.9	M 6	SBM 43	8.6	0.32	1.0	M 6	SBH 29	5.8	0.4	1.1	M 6
SBLE 47	9.4	0.19	0.6	M 6	SBM 50	10	0.32	1.0	M 6	SBH 39	7.8	0.4	1.2	M 8
SBLE 62	12	0.23	0.7	M 6	SBM 56	11	0.39	1.2	M 6	SBH 49	9.8	0.5	1.5	M 8
SBLE 75	15	0.32	1.0	M 8	SBM 65	13	0.36	1.1	M 8	SBH 59	12	0.5	1.6	M 10
SBLE 85	17	0.45	1.4	M 8	SBM 72	14	0.36	1.1	M 8	SBH 69	14	0.7	2.1	M 10
SBLE 95	19	0.45	1.4	M 8	SBM 84	17	0.42	1.3	M 8	SBH 79	16	0.6	2.0	M 10
SBLE 110	22	0.49	1.5	M 10	SBM 93	19	0.42	1.3	M 8	SBH 88	18	0.8	2.5	M 10
SBLE 125	25	0.58	1.8	M 10	SBM 100	20	0.52	1.6	M 8	SBH 98	20	0.8	2.4	M 10
SBLE 140	28	0.58	1.8	M 10	SBM 112	22	0.52	1.6	M 8	SBH 110	22	0.9	2.9	M 10
SBLE 165	33	0.71	2.2	M 10	SBM 118	24	0.52	1.6	M 8	SBH 118	24	0.9	2.7	M 10
SBLE 185	37	0.71	2.2	M 10	SBM 130	26	0.58	1.8	M 10	SBH 137	27	1.3	4.1	2 x M 10
SBLE 200	40	0.84	2.6	M 10	SBM 138	28	0.65	2.0	M 10	SBH 157	31	1.3	3.9	2 x M 10
SBLE 215	43	0.84	2.6	M 10	SBM 150	30	0.75	2.3	M 10	SBH 177	35	1.6	4.9	2 x M 10
SBLE 230	46	0.84	2.6	M 10	SBM 161	32	0.68	2.1	M 10	SBH 196	39	1.5	4.7	2 x M 10
SBLE 255	51	0.97	3.0	M 10	SBM 168	34	0.87	2.7	M 10	SBH 204	41	1.5	4.6	2 x M 10
SBLE 275	55	0.97	3.0	M 10	SBM 184	37	0.87	2.7	M 10	SBH 236	47	1.7	5.4	2 x M 10
SBLE 300	60	1.26	3.9	2 x M 10	SBM 192	38	0.87	2.7	M 10	SBH 256	51	1.8	5.5	2 x M 10
SBLE 325	65	1.26	3.9	2 x M 10	SBM 200	40	1.04	3.2	M 10	SBH 265	53	2.4	7.4	3 x M 10
SBLE 355	71	1.39	4.3	2 x M 10	SBM 208	42	1.04	3.2	M 10	SBH 270	54	2.0	6.1	2 x M 10
SBLE 365	73	1.39	4.3	2 x M 10	SBM 216	43	1.04	3.2	M 10	SBH 281	56	2.2	6.7	2 x M 10
SBLE 375	75	1.39	4.3	2 x M 10	SBM 231	46	0.97	3.0	M 10	SBH 294	59	2.3	7.0	3 x M 10
SBLE 395	79	1.52	4.7	2 x M 10	SBM 241	48	0.97	3.0	M 10	SBH 307	61	2.1	6.4	2 x M 10
SBLE 415	83	1.52	4.7	2 x M 10	SBM 250	50	1.26	3.9	2 x M 10	SBH 323	65	2.4	7.5	3 x M 10
SBLE 435	87	1.68	5.2	2 x M 10	SBM 260	52	1.26	3.9	2 x M 10	SBH 345	69	2.9	8.8	3 x M 10
SBLE 460	92	1.68	5.2	2 x M 10	SBM 277	55	1.26	3.9	2 x M 10	SBH 353	71	2.6	8.1	3 x M 10
SBLE 480	96	1.81	5.6	2 x M 10	SBM 300	60	1.30	4.0	2 x M 10	SBH 363	73	2.8	8.6	3 x M 10
SBLE 500	100	1.81	5.6	2 x M 10	SBM 323	65	1.36	4.2	2 x M 10	SBH 383	77	2.7	8.3	3 x M 10
SBLE 510	102	1.81	5.6	2 x M 10	SBM 346	70	1.56	4.8	2 x M 10	SBH 393	79	3.0	9.3	4 x M 10
SBLE 550	110	1.94	6.0	2 x M 10	SBM 369	74	1.72	5.3	2 x M 10	SBH 400	80	2.9	8.9	3 x M 10
SBLE 600	120	2.20	6.8	3 x M 10	SBM 392	78	1.91	5.9	2 x M 10	SBH 422	84	3.3	10.1	3 x M 10
SBLE 650	130	2.37	7.3	3 x M 10	SBM 415	83	2.07	6.4	2 x M 10	SBH 440	88	3.2	9.9	3 x M 10
SBLE 700	140	2.49	7.7	3 x M 10	SBM 438	88	1.98	6.1	2 x M 10	SBH 460	92	3.1	9.6	3 x M 10
SBLE 750	150	2.62	8.1	3 x M 10	SBM 461	92	1.91	5.9	2 x M 10	SBH 471	94	3.5	10.8	4 x M 10
SBLE 790	158	2.75	8.5	3 x M 10	SBM 482	96	1.91	5.9	2 x M 10	SBH 491	98	3.8	11.7	5 x M 10
SBLE 830	166	2.88	8.9	3 x M 10	SBM 505	101	2.37	7.3	3 x M 10	SBH 510	102	3.6	11.0	4 x M 10
SBLE 890	178	3.18	9.8	4 x M 10	SBM 526	105	2.37	7.3	3 x M 10	SBH 560	112	4.3	13.4	4 x M 10
SBLE 925	185	3.34	10.3	4 x M 10	SBM 555	111	2.59	8.0	3 x M 10	SBH 590	118	4.4	13.5	5 x M 10
SBLE 980	196	3.47	10.7	4 x M 10	SBM 576	115	2.59	8.0	3 x M 10	SBH 600	120	4.2	12.9	4 x M 10
SBLE 1000	200	3.60	11.1	4 x M 10	SBM 600	120	2.75	8.5	3 x M 10	SBH 615	123	4.1	12.8	4 x M 10
SBLE 1020	204	3.60	11.1	4 x M 10	SBM 625	125	3.08	9.5	3 x M 10	SBH 640	128	4.5	13.8	5 x M 10
SBLE 1070	214	3.73	11.5	4 x M 10	SBM 649	130	3.08	9.5	3 x M 10	SBH 655	131	4.7	14.4	5 x M 10
SBLE 1100	220	3.86	11.9	4 x M 10	SBM 674	135	3.01	9.3	3 x M 10	SBH 670	134	4.9	15.0	5 x M 10
SBLE 1150	230	4.18	12.9	5 x M 10	SBM 690	138	2.88	8.9	3 x M 10	SBH 705	141	5.4	16.7	5 x M 10
SBLE 1200	240	4.31	13.3	5 x M 10	SBM 723	145	2.88	8.9	3 x M 10	SBH 765	153	5.2	16.0	5 x M 10
SBLE 1250	250	4.41	13.6	5 x M 10	SBM 740	148	3.43	10.6	4 x M 10	SBH 800	160	5.5	17.0	6 x M 10
SBLE 1300	260	4.54	14.0	5 x M 10	SBM 768	154	3.43	10.6	4 x M 10	SBH 865	173	5.9	18.2	6 x M 10
SBLE 1350	270	4.67	14.4	5 x M 10	SBM 792	158	3.63	11.2	4 x M 10	SBH 920	184	6.2	19.1	6 x M 10
SBLE 1400	280	4.80	14.8	5 x M 10	SBM 830	166	4.11	12.7	4 x M 10					
SBLE 1450	290	5.12	15.8	6 x M 10	SBM 866	173	4.11	12.7	4 x M 10					
SBLE 1500	300	5.38	16.6	6 x M 10	SBM 890	178	4.05	12.5	4 x M 10					
SBLE 1560	312	5.51	17.0	6 x M 10	SBM 920	184	3.82	11.8	4 x M 10					
SBLE 1600	320	5.64	17.4	6 x M 10	SBM 940	188	3.89	12.0	4 x M 10					
SBLE 1660	332	5.77	17.8	6 x M 10	SBM 965	193	4.05	12.5	6 x M 10					
SBLE 1690	338	5.77	17.8	6 x M 10	SBM 1009	202	4.63	14.3	5 x M 10					
					SBM 1040	208	5.15	15.9	5 x M 10					
					SBM 1082	216	5.15	15.9	5 x M 10					
					SBM 1107	221	5.05	15.6	5 x M 10					
					SBM 1150	230	4.76	14.7	5 x M 10					
					SBM 1181	236	4.86	15.0	5 x M 10					
					SBM 1220	244	5.99	18.5	6 x M 10					
					SBM 1274	254	5.99	18.5	6 x M 10					
					SBM 1324	264	6.09	18.8	6 x M 10					
					SBM 1390	278	5.73	17.7	6 x M 10					
					SBM 1445	289	5.73	17.7	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

Table B: Non standard range

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

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

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