

Block battery Ni-Cd range

SBLE, SBM, SBH types for 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. Upon receipt of the goods, any transportation damage, electrolyte spillage or irregularities must be reported to the carrier and to Saft.

- If the cells are shipped field and charged, the cells are ready for assembly.
- Storage of cells must not exceed the maximum storage time indicated on the packing case

2. Storage

- The battery must be stored in a dry and clean indoor location, on open, well ventilated shelves away from direct sunlight between 0°C and +30°C (+32°F and 86°F).

If stored in the shipping crates, the lid and top packing must be removed to allow ventilation.

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.

Cells empty and discharged

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

Storage 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.

To ensure maximum protection of the cells always store the product in its original packaging.

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

For cells with handles, both must be used when lifting and moving. To prevent electrolyte spillage, do not tip cells.

Verify that cells are correctly interconnected with the appropriate polarity and that the connectors are correctly torqued.

Connections between the battery and the load shall be made with nickel plated cable lugs. Tightening torque for the terminals must be:

- 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, grease (NO-OX) or approved equal.

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

Cells delivered filled and charged:

- If electrolyte is ever spilled from a cell and the level is 30 mm below the minimum mark (lower), then refilling with E22 electrolyte is required. Contact your local Saft representative for more details.



- Do not top up with deionized or distilled water prior to initial charge to avoid overfilling a cell. After commissioning, when the level is stabilized, the electrolyte level should be between approximately 5 mm below maximum mark (Upper).

• 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.

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.

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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, charge for a proportionally longer time.

• For cells filled and charged by the factory up to 6 months:

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

• 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

(see Table A)

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

c) Charge for 10 h at 0.2 C₅ A

(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.

4.2. Constant voltage charge

• For cells filled and charged by the factory and stored up to 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 Table A).

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

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)

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

• After commissioning, when the level is stabilized, the electrolyte level should be

between approximately 5 mm below maximum mark (Upper).

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):

• Single level charge:

1.43 - 1.50 V/cell.

• Two level charge:

1.42 ± 0.01 V/cell for L cells

1.40 ± 0.01 V/cell for M and H cells

• High rate (boost) 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.

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

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. Additionally, follow your standard preventative maintenance procedures.

• 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. This should be checked and recorded at least once yearly. For individual cells with voltages measured below 1.35 V during float charge, a high-rate charge is recommended to be applied to the cell concerned.

• High water consumption is usually caused by an improper voltage setting or voltage drift that is above the recommended in-service charging voltages. To maximize the topping-up interval check the charging voltage and adjust as required.

• Visually check the electrolyte level. Never let the level fall below the minimum level mark. Use only distilled or deionized water to top-up. Topping up of the battery **shall be carried out when battery is fully charged**. 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. Electrolyte density measurements do not indicate state of charge or state of health.

• Ensure all terminals and connectors are coated with a thin layer of anti-corrosion oil, anti-corrosion grease (NO-OX) or approved equal.

• 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.

Table A

Cell type	Charging current 0.2 C5A (A)	Electrolyte per cell		Cell connection bolt per pole
		Solid* (kg)	Liquid* (l)	
SBLE 7,5	1,5	0,2	0,08	M 6
SBLE 15	3,0	0,4	0,11	M 6
SBLE 22	4,4	0,5	0,17	M 6
SBLE 30	6,0	0,5	0,15	M 6
SBLE 40	8,0	0,5	0,29	M 6
SBLE 47	9,4	0,6	0,19	M 6
SBLE 62	12,0	0,7	0,23	M 6
SBLE 75	15,0	1,0	0,32	M 8
SBLE 85	17,0	1,4	0,45	M 8
SBLE 95	19,0	1,4	0,45	M 8
SBLE 110	22,0	1,5	0,49	M 8
SBLE 125	25,0	1,8	0,58	M 8
SBLE 140	28,0	1,8	0,58	M 8
SBLE 165	33,0	2,2	0,71	M 10
SBLE 185	37,0	2,2	0,71	M 10
SBLE 200	40,0	2,6	0,84	M 10
SBLE 215	43,0	2,6	0,84	M 10
SBLE 230	46,0	2,6	0,84	M 10
SBLE 255	51,0	3,0	0,97	M 10
SBLE 275	55,0	3,0	0,97	M 10
SBLE 300	60,0	3,9	1,26	2 x M 10
SBLE 325	65,0	3,9	1,26	2 x M 10
SBLE 355	71,0	4,3	1,39	2 x M 10
SBLE 365	73,0	4,3	1,39	2 x M 10
SBLE 375	74,0	4,2	1,39	2 x M 10
SBLE 395	79,0	4,7	1,52	2 x M 10
SBLE 415	83,0	4,7	1,52	2 x M 10
SBLE 435	87,0	5,2	1,68	2 x M 10
SBLE 460	92,0	5,2	1,68	2 x M 10
SBLE 480	96,0	5,6	1,81	2 x M 10
SBLE 500	100,0	5,6	1,81	2 x M 10
SBLE 510	102,0	5,6	1,81	2 x M 10
SBLE 550	110,0	6,0	1,94	2 x M 10
SBLE 600	120,0	6,8	2,2	3 x M 10
SBLE 650	130,0	7,3	2,37	3 x M 10
SBLE 700	140,0	7,7	2,49	3 x M 10
SBLE 750	150,0	8,1	2,62	3 x M 10
SBLE 790	158,0	8,5	2,75	3 x M 10
SBLE 830	166,0	8,9	2,88	3 x M 10
SBLE 890	178,0	9,8	3,18	4 x M 10
SBLE 925	185,5	10,3	3,34	4 x M 10
SBLE 980	196,0	10,7	3,47	4 x M 10
SBLE 1000	200,0	11,1	3,6	4 x M 10
SBLE 1020	204,0	11,1	3,6	4 x M 10
SBLE 1070	214,0	11,5	3,73	4 x M 10
SBLE 1100	220,0	11,9	3,86	4 x M 10
SBLE 1150	230,0	12,9	4,18	5 x M 10
SBLE 1200	240,0	13,3	4,31	5 x M 10
SBLE 1250	250,0	13,6	4,41	5 x M 10
SBLE 1300	260,0	14,0	4,54	5 x M 10
SBLE 1350	270,0	14,4	4,67	5 x M 10
SBLE 1400	280,0	14,8	4,8	5 x M 10
SBLE 1450	290,0	15,8	5,12	6 x M 10
SBLE 1500	300,0	16,6	5,38	6 x M 10
SBLE 1560	312,0	17,0	5,51	6 x M 10
SBLE 1600	320,0	17,4	5,64	6 x M 10
SBLE 1660	332,0	17,4	5,77	6 x M 10
SBLE 1690	338,0	17,8	5,77	6 x M 10

Cell type	Charging current 0.2 C5A (A)	Electrolyte per cell		Cell connection bolt per pole
		Solid* (kg)	Liquid* (l)	
SBM 11	2,2	0,10	0,3	M 6
SBM 15	3	0,11	0,3	M 6
SBM 22	4,4	0,15	0,5	M 6
SBM 30	6	0,15	0,5	M 6
SBM 43	8,6	0,32	1,0	M 6
SBM 50	10	0,32	1,0	M 6
SBM 56	11	0,39	1,2	M 6
SBM 65	13	0,36	1,1	M 8
SBM 72	14	0,36	1,1	M 8
SBM 84	17	0,42	1,3	M 8
SBM 93	19	0,42	1,3	M 8
SBM 100	20	0,52	1,6	M 8
SBM 112	22	0,52	1,6	M 8
SBM 118	24	0,52	1,6	M 8
SBM 130	26	0,58	1,8	M 10
SBM 138	28	0,65	2,0	M 10
SBM 150	30	0,75	2,3	M 10
SBM 161	32	0,68	2,1	M 10
SBM 168	34	0,87	2,7	M 10
SBM 184	37	0,87	2,7	M 10
SBM 192	38	0,87	2,7	M 10
SBM 200	40	1,04	3,2	M 10
SBM 208	42	1,04	3,2	M 10
SBM 216	43	1,04	3,2	M 10
SBM 231	46	0,97	3,0	M 10
SBM 241	48	0,97	3,0	M 10
SBM 250	50	1,26	3,9	2 x M 10
SBM 260	52	1,26	3,9	2 x M 10
SBM 277	55	1,26	3,9	2 x M 10
SBM 300	60	1,30	4,0	2 x M 10
SBM 323	65	1,36	4,2	2 x M 10
SBM 346	70	1,56	4,8	2 x M 10
SBM 369	74	1,72	5,3	2 x M 10
SBM 392	78	1,91	5,9	2 x M 10
SBM 415	83	2,07	6,4	2 x M 10
SBM 438	88	1,98	6,1	2 x M 10
SBM 461	92	1,91	5,9	2 x M 10
SBM 482	96	1,91	5,9	2 x M 10
SBM 505	101	2,37	7,3	3 x M 10
SBM 526	105	2,37	7,3	3 x M 10
SBM 555	111	2,59	8,0	3 x M 10
SBM 576	115	2,59	8,0	3 x M 10
SBM 600	120	2,75	8,5	3 x M 10
SBM 625	125	3,08	9,5	3 x M 10
SBM 649	130	3,08	9,5	3 x M 10
SBM 674	135	3,01	9,3	3 x M 10
SBM 690	138	2,88	8,9	3 x M 10
SBM 723	145	2,88	8,9	3 x M 10
SBM 740	148	3,43	10,6	4 x M 10
SBM 768	154	3,43	10,6	4 x M 10
SBM 792	158	3,63	11,2	4 x M 10
SBM 830	166	4,11	12,7	4 x M 10
SBM 866	173	4,11	12,7	4 x M 10
SBM 890	178	4,05	12,5	4 x M 10
SBM 920	184	3,82	11,8	4 x M 10
SBM 940	188	3,89	12,0	4 x M 10
SBM 965	193	4,05	12,5	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

Cell type	Charging current 0.2 C5A (A)	Electrolyte per cell		Cell connection bolt per pole
		Solid* (kg)	Liquid* (l)	
SBH 8.3	71,7	0,1	0,4	M 6
SBH 12	2,4	0,1	0,4	M 6
SBH 16	3,2	0,2	0,5	M 6
SBH 19	3,8	0,3	0,9	M 6
SBH 29	5,8	0,4	1,1	M 6
SBH 39	7,8	0,4	1,2	M 8
SBH 49	9,8	0,5	1,5	M 8
SBH 59	12	0,5	1,6	M 10
SBH 69	14	0,7	2,1	M 10
SBH 79	16	0,6	2	M 10
SBH 88	18	0,8	2,5	M 10
SBH 98	20	0,8	2,4	M 10
SBH 110	22	0,9	2,9	M 10
SBH 118	24	0,9	2,7	M 10
SBH 137	27	1,3	4,1	2 x M 10
SBH 157	31	1,3	3,9	2 x M 10
SBH 177	35	1,6	4,9	2 x M 10
SBH 196	39	1,5	4,7	2 x M 10
SBH 204	41	1,5	4,6	2 x M 10
SBH 236	47	1,7	5,4	2 x M 10
SBH 256	51	1,8	5,5	2 x M 10
SBH 265	53	2,4	7,4	3 x M 10
SBH 270	54	2	6,1	2 x M 10
SBH 281	56	2,2	6,7	2 x M 10
SBH 294	59	2,3	7	3 x M 10
SBH 307	61	2,1	6,4	2 x M 10
SBH 323	65	2,4	7,5	3 x M 10
SBH 345	59	2,9	8,8	3 x M 10
SBH 353	71	2,6	8,1	3 x M 10
SBH 363	73	2,8	8,6	3 x M 10
SBH 383	77	2,7	8,3	3 x M 10
SBH 393	79	3	9,3	4 x M 10
SBH 400	80	2,9	8,9	3 x M 10
SBH 422	84	3,3	10,1	3 x M 10
SBH 440	88	3,2	9,9	3 x M 10
SBH 460	92	3,1	9,6	3 x M 10
SBH 471	94	3,5	10,8	4 x M 10
SBH 491	98	3,8	11,7	5 x M 10
SBH 510	102	3,6	11	4 x M 10
SBH 560	112	4,3	13,4	4 x M 10
SBH 590	118	4,4	13,5	5 x M 10
SBH 600	120	4,2	12,9	4 x M 10
SBH 615	123	4,1	12,8	4 x M 10
SBH 640	128	4,5	13,8	5 x M 10
SBH 655	131	4,7	14,4	5 x M 10
SBH 670	134	4,9	15	5 x M 10
SBH 705	141	5,4	16,7	5 x M 10
SBH 765	153	5,2	16	5 x M 10
SBH 800	160	5,5	17	6 x M 10
SBH 865	173	5,9	18,2	6 x M 10
SBH 920	184	6,2	19,1	6 x M 10

* Height including the IP2X terminal cover
- The grey line distinguishes the normal mounted cells from the crosswise cells.

