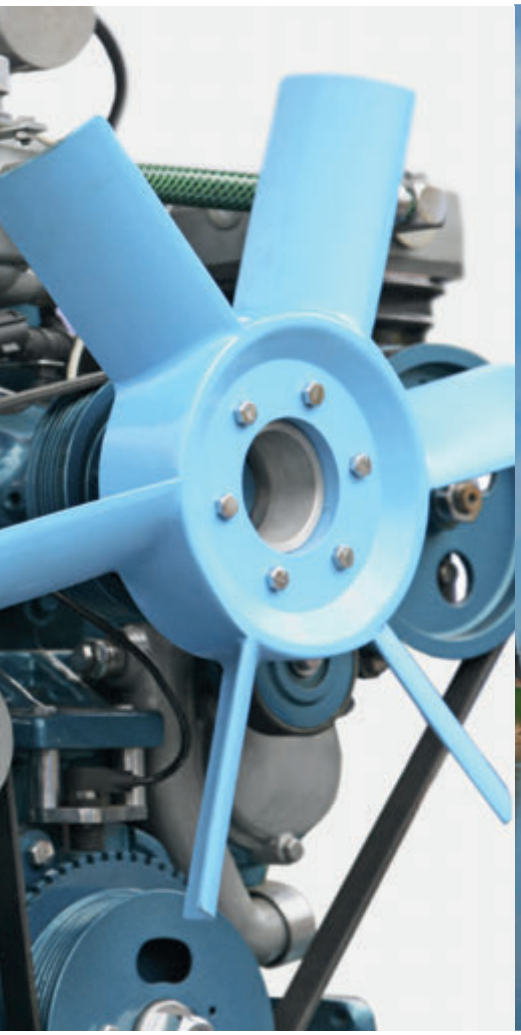
Nickel Cadmium Batteries

BLOCK TYPE



NICA

POWER BACK-UP WITH NICA

NICA your long term partner
for power back-up challenges

Nica has been a trusted battery for the world's leading industrial players for over 100 years, with a range of well proven solutions that deliver secure energy for stationary applications.

Nica's products are designed to meet the reliability, safety and security challenges of today's industrial landscape where they provide power back-up, starting power and bulk energy storage. Nica's commitment to Research and Development and innovative engineering ensures that our nickel-cadmium (Ni-Cd) batteries offer the very latest in design, quality and industrial process technology. They also come with comprehensive through-life global service support, from initial consultancy to volume delivery, including training, maintenance and expert technical back-up.

Reliable and robust batteries for a wide range of industrial applications

Stationary batteries are used in

- refineries,
- power plants,
- onshore & offshore oil and gas industries,
- substations,
- airports & building infrastructure

Locations where it is absolutely critical to have batteries that will work when they should, even under extreme operating conditions.

Power is absolutely vital to Uninterruptible Power Supply (UPS) systems, switching and transmission functions, emergency and security systems, industrial fire monitors and alarms, process control installations, substation switchgear, signaling systems and more.

If the primary power source for these applications is suddenly unavailable, a back-up system provides a temporary source of power until primary power re-engages or while systems operators perform a controlled shutdown. However, back-up power is only as good as the stationary battery that enables it!

NICA LE/M/H Block battery range

Built with the highest quality, safety and environmental standards

Electrical characteristics:

- Certified IEC 60623 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - vented nickel-cadmium prismatic rechargeable single cells.

Safety:

- Complies with EN 50272-2/ IEC 62485-2 - Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries - The protective covers for terminals and connectors, the insulated cables are compliant with IP2 level protection against electrical shocks according to safety standard.
- Complies with UL 1989 - Section 7 : Flame arrester vent cap tests - UL standard for safety for standby batteries.

Quality:

- ISO 9001 and ISO 14001
- Nica world class continuous programme

Environment & recycling

- Fully recyclable
- RoHS - Although batteries and accumulators are not within the scope of the RoHS directive, Nica has taken voluntary measures to make sure that the substances forbidden by RoHS are not present in the battery, with the exception of the electro- chemical core.
- REACH - Nica has adopted internal procedures to ensure conformity with the European REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances) Regulations.

Instant starting power

Cranking up an emergency generator or switching on heaters, pumps or other equipment requires batteries that are very reliable, offer high discharge capabilities and function properly in extreme temperatures. Nica batteries recover their voltage instantaneously, making them the ideal choice for starting applications.

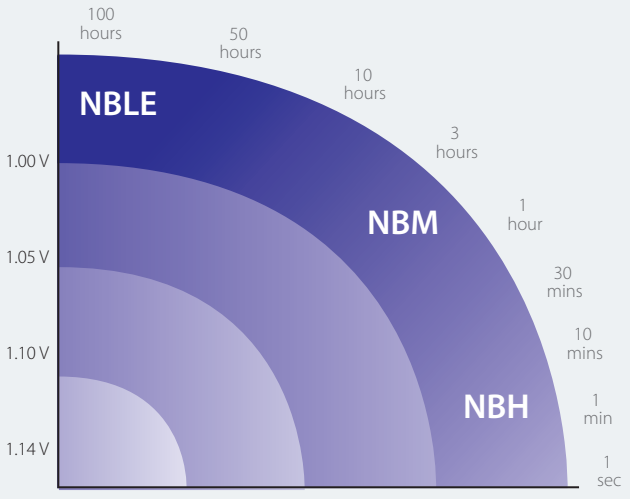
A wide choice of capacity and performance

Nica has developed the NBLE, NBM and MBH ranges of block batteries to offer the optimum, flexible solution for all stationary applications. The choice of low, medium and high capacity types makes it easy to select the ideal battery, based on required discharge time and end of discharge voltage. Thanks to the robust and reliable Nica pocket plate technology they resist electrical abuse, shock and vibrations.

Furthermore, a generous reserves for electrolyte means that the block batteries need only basic maintenance, while operating across a wide range of fluctuating temperatures. This ensures an optimized Total Cost of Ownership (TCO) over a life cycle that can last 20 years or more.

From seconds to hours - every discharge need is covered

Nica has a Block battery range to suit every discharge profile from 1 second to 100 hours



	LE Type	M Type	H Type
Capacity steps	58	68	51
Capacity	7.5 - 1690 Ah	11 - 1445 Ah	8.3 - 920 Ah
Performance	For low rate discharge over long periods between 1 and 100 hours	For varied loads with low and high discharge rates between 30 minutes and 3 hours	For high rate discharge over short periods less than 30 minutes
Applications	Power back-up applications		Power back-up and starting applications

NICA Ni-Cd Technology

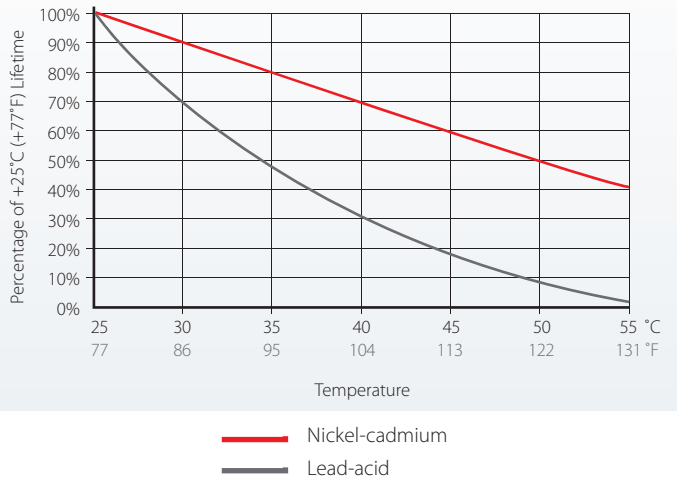
the proven advantages of a safe and robust design

Ni-Cd means proven reliability

Nica's robust Ni-Cd technology sets the benchmark for industrial batteries operating in difficult and demanding conditions.

- Delivers performance, reliability, and a long, totally predictable, service life - with no risk of sudden death failure.
- Ensures a 20-year plus service life at +25˚C (+77˚F).
- Even at +35˚C (+95˚F), lifetime falls by just 20% compared with a 50% reduction for a lead-acid battery.

Effect of temperature on lifetime



NICA Block battery construction

The ideal battery for every application

- Performance optimized for each application according to plate thickness.

  : **LE type**
  - Thicker plates
  - High energy
  - Low cost per Amp at low rates.

  : **M type**
  - Thinner plates
  - Medium power
  - Optimized between H and L design for mixed loads

  : **H type**
  - Thinnest plate
  - High power
  - Low cost per Amp at high rates

- Optimized design boost electrical performance by up to 10% depending on discharge time.

- Twice the number of capacity steps compared with previous designs enables accurate matching with calculated amp-hour requirements.

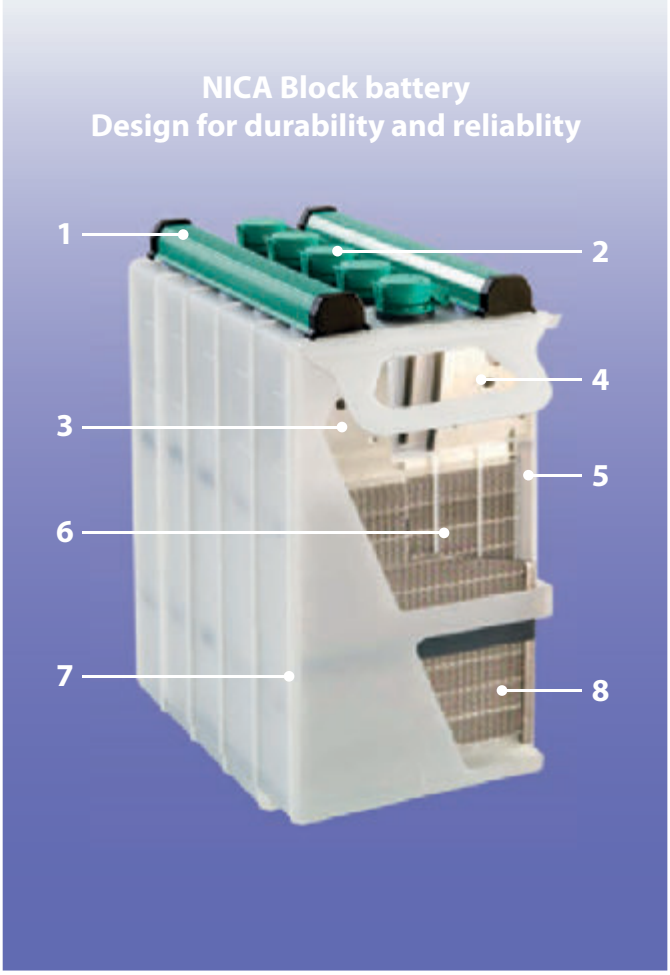
Improved performance and more capacity steps allow you to select the best, cost-effective battery for your application.

1. **Protective cover**
   In line with IEC 60485-2 / EN 50272-2 (safety) with IP2 level.
2. **Flame-arresting vents**
   Compliant with UL 1989 - Section 7 - Flame arrester vent cap tests.
3. **Plate group bus**
4. **Plate tab**
5. **Plate frame**
6. **Separating grids**
7. **Cell container**
8. **Nica pocket plate technology**

Note : The cells are welded together to form rugged blocks of 1-6 cells depending on the cell size and type. Nica cells fully comply with the requirements of the IEC 60623 standard.

The essential features

- The steel pocket plate structure does not suffer from "sudden death" or internal corrosion since there is no interaction between the active material and electrolyte.
- Tough polypropylene casing ensures structural integrity throughout a long life.
- An engineered electrolyte solution delivers optimum performance without causing degradation of plate materials.
- Plenty of space is allowed for a good reserve of electrolyte.
- A special electrolyte is available for extremely low temperature applications.
- A specially designed flame arresting flip top vent ensures the battery does not produce corrosive emissions.
- The Black battery offers a long shelf life when stored under Nica's recommended conditions and it is easy to install.

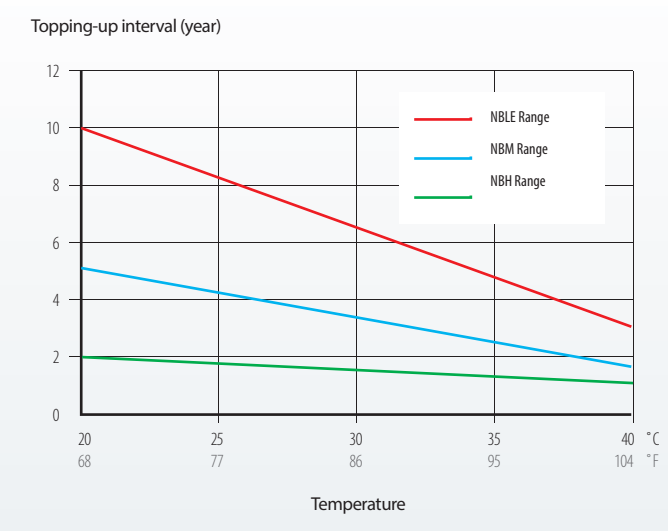


NICA the benchmark
for industrial batteries

Low maintenance means lower lifetime costs

- Topping-up intervals are now up to two times longer under standard conditions at +20˚C (+68˚F) and at float voltage.
- A simple annual maintenance exercise is recommended to check correct functioning of the charging system, battery and the auxilliary electronics.
- Easy maintenance thanks to :
  - Visible electrolyte level
  - Simple bolted connector for fast installation and allowing the battery to be quickly commissioned

Typical topping up intervals at recommended charge voltage



Higher chargeability
minimizes down time

Faster recharge time enables at least 80% recovery of capacity from fully discharged conditions in 15 hours at float voltage level.

Constant voltage charging (+20˚C to +25˚C or +68˚F to +77˚F)

Continuous parallel operation, with occasional battery discharge. Recommended charging voltages:

a) **For two levels charge**:

- Float level :
  1.42 ± 0.01 V/cell for NBLE
  1.40 ± 0.01 V/cell for NBM and NBH

- High level :
  1.47 - 1.70 V/cell for NBLE
  1.45 - 1.70 V/cell for NBM and NBH
  A high voltage will increase the speed and efficiency of the recharging.

b) **For single level charge** :

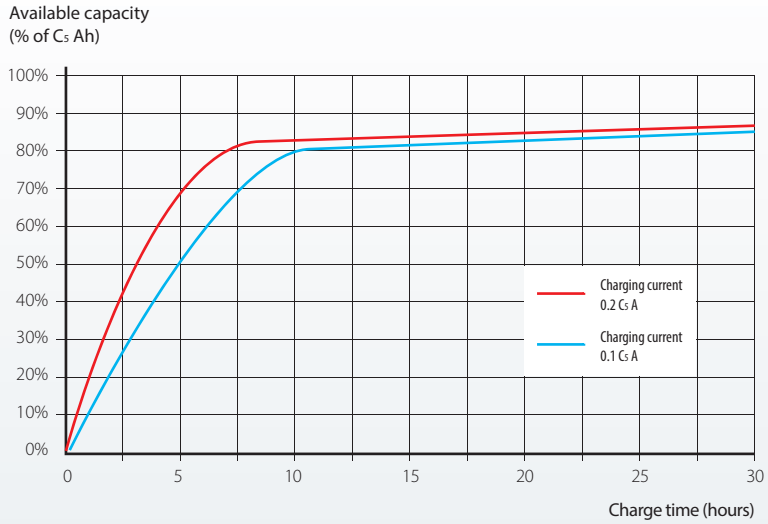
- 1.43 - 1.50 V/cell

Buffer operation, where the load exceeds the charger rating. Recommended charging voltage: 1.50 - 1.60 V/cell.

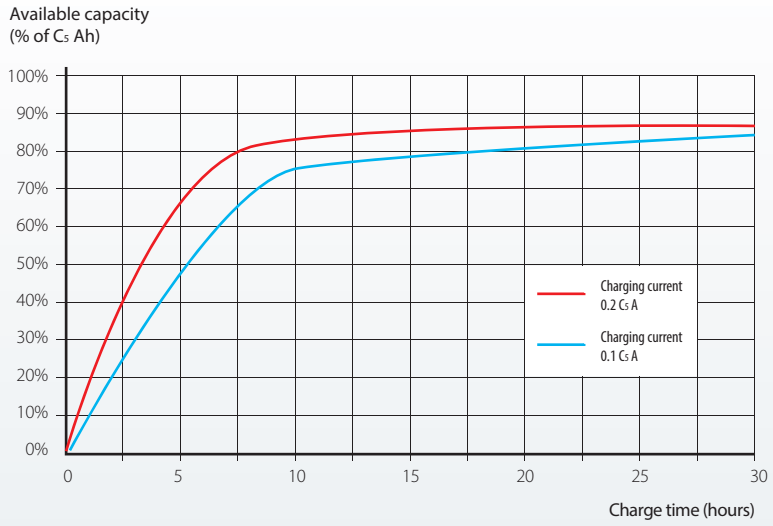
Constant current charging

- Normal charging: 0.2 C_5A for 10 hrs.

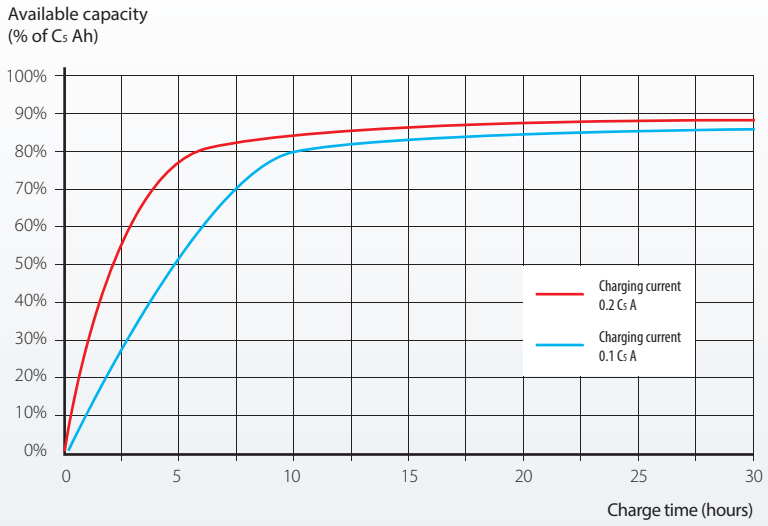
NBLE Range - Available capacity after constant voltage charge at 1,42 V at +20˚C (+ 68˚F)



NBM Range - Available capacity after constant voltage charge at 1,40 V at +20˚C (+ 68˚F)



NBH Range - Available capacity after constant voltage charge at 1,40 V at +20˚C (+ 68˚F)



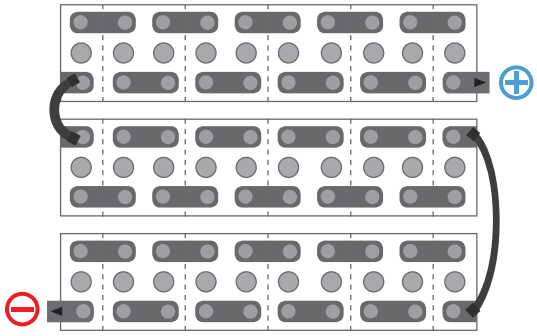
NICA Battery Layout
for optimum efficiency

Standard layouts

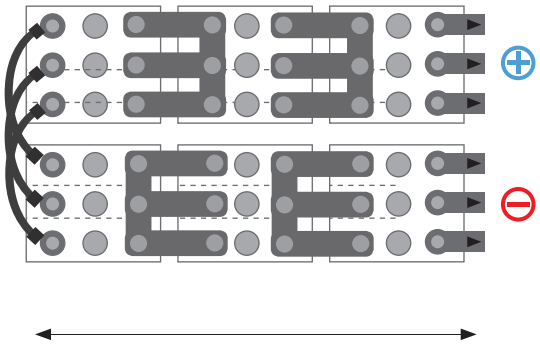
Nica has developed a series of standard layouts for ordering a battery. Whether the battery is being installed on a rack, in a cabinet or is simply freestanding, the same configuration principals can be applied.

Two ways to configure the battery

	Normal connection	Crosswise connection
NBLE	7.5 → 510	550 → 1690
NBM	11 → 392	415 → 1445
NBH	8.3 → 157	177 → 920



Length-to-Length connection



Width-to-Width connection

The cell is turned through 90° and then connected width-to-width. This is referrred to as "crosswise" mounted and its purpose is to minimize the installation's over-all length. The cell's width is used to calculate the row length.

Dimensions

The dimensions of all available cell types are listed in the tables. The block length is determined by the cell length and the number of cells in the block.

Notes :

- All the tabulated dimensions are maximum values.
- All block types with a cell weight exceeding 8.4 kg (18.5 lbs) have handles.
  The tabulated block length includes 6mm for handles for these types.
- All the cell heights given in the tables include the height of the IP2X terminal cover.

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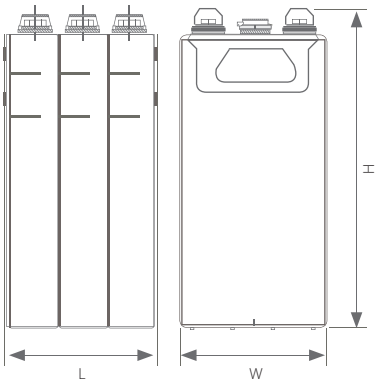

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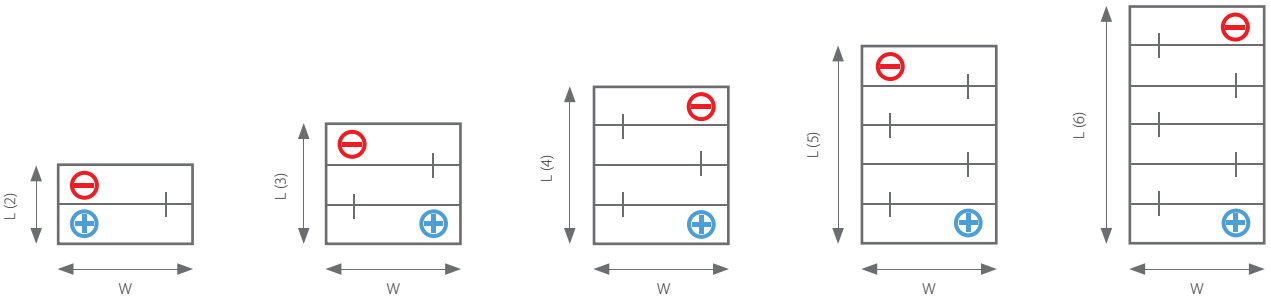
Position of terminals

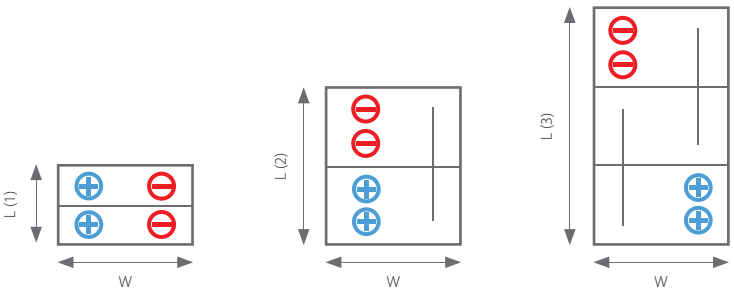
Block of cells with single pole bolt



NBLE 7.5 → 62

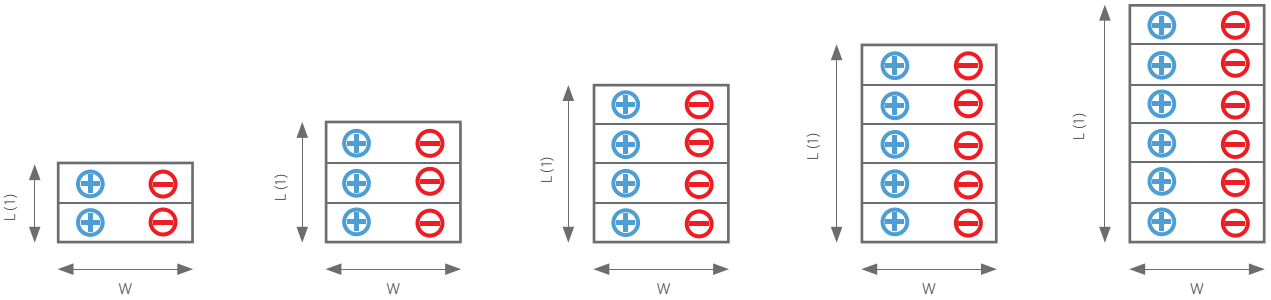
NBLE 75 → 275
NBM 11 → 241
NBH 8.3 → 118

Block of cells with 2 pole bolt per poles



NBLE 300 → 510
NBM 250 → 392
NBH 137 → 157

Block of cells with 2 - 6 poles bolt per poles



NBLE 550
NBM 415 → 482
NBH 177 → 256
NBH 270 → 281
NBH 307

NBLE 600 → 830
NBM 505 → 723
NBH 265 / 294
NBH 323 → 383
NBH 400 → 460

NBLE 890 → 1100
NBM 740 → 940
NBH 393 / 471
NBH 510 → 560
NBH 600 → 615

NBLE 1150 → 1400
NBM 1009 → 1181
NBH 471 / 590NBH
640 → 765

NBLE 1450 → 1690
NBM 965
NBH 1220 →1445
NBH 800 → 920

NBM Capacities and dimensions - **International System of units**

Connection	Cell type	Capacity (C_5Ah)	Height* (mm)	Width (mm)	Length per bock (mm)			Approx. weight per cell (kg)	Approx. electrolyte volume between level marks (cm^3)	Electrolyte per cell		Internal resistance (mOhm)	Cell connection bolt per pole
					1 cell	2 cells	3 cells			Solid (kg)	Liquid (L)		
NORMAL CONNECTION	NBM 11	11	190	123	-	64,0	93,5	0,90	110	0,10	0,30	5,00	M 6
	NBM 15	15	190	123	-	74,0	109	1,20	120	0,11	0,33	3,67	M 6
	NBM 22	22	260	123	-	64,0	93,5	1,50	110	0,15	0,46	2,82	M 6
	NBM 30	30	260	123	-	74,0	109	1,80	120	0,15	0,46	2,07	M 6
	NBM 43	43	344	195	-	69,0	100	3,60	240	0,32	1,00	1,81	M 6
	NBM 50	50	344	195	-	69,0	100	3,60	240	0,32	1,00	1,56	M 6
	NBM 56	56	400	195	-	69,0	100	4,30	240	0,39	1,20	1,54	M 6
	NBM 65	65	350	195	-	79,0	115	4,40	280	0,36	1,10	1,20	M 8
	NBM 72	72	350	195	-	79,0	115	4,40	280	0,36	1,10	1,08	M 8
	NBM 84	84	406	195	-	79,0	115	5,10	280	0,42	1,30	1,02	M 8
	NBM 93	93	406	195	-	79,0	115	5,10	280	0,42	1,30	0,92	M 8
	NBM 100	100	406	195	-	94,0	138	6,40	340	0,52	1,60	0,86	M 8
	NBM 112	112	406	195	-	94,0	138	6,40	340	0,52	1,60	0,77	M 8
	NBM 118	118	406	195	-	94,0	138	6,40	340	0,52	1,60	0,73	M 8
	NBM 130	130	350	195	-	127	187	7,50	480	0,58	1,80	0,60	M 10
	NBM 138	138	406	195	-	115	169	7,80	430	0,65	2,00	0,62	M 10
	NBM 150	150	350	195	-	159	232	8,90	590	0,75	2,30	0,52	M 10
	NBM 161	161	406	195	-	127	187	8,80	480	0,68	2,10	0,53	M 10
	NBM 168	168	406	195	-	183	268	10,1	700	0,87	2,70	0,46	M 10
	NBM 184	184	406	195	-	159	232	10,5	590	0,87	2,70	0,47	M 10
	NBM 192	192	406	195	-	159	232	10,5	590	0,87	2,70	0,45	M 10
	NBM 200	200	406	195	-	183	268	12,0	700	1,04	3,20	0,43	M 10
	NBM 208	208	406	195	-	183	268	12,0	700	1,04	3,20	0,41	M 10
	NBM 216	216	406	195	-	183	268	12,0	700	1,04	3,20	0,40	M 10
	NBM 231	231	406	195	-	183	268	12,5	690	0,97	3,00	0,37	M 10
	NBM 241	241	406	195	-	183	268	12,5	690	0,97	3,00	0,36	M 10
	NBM 250	250	406	195	-	229	337	15,5	870	1,26	3,90	0,34	2 × M 10
	NBM 260	260	406	195	-	229	337	15,5	870	1,26	3,90	0,33	2 × M 10
	NBM 277	277	406	195	-	229	337	15,5	870	1,26	3,90	0,31	2 × M 10
	NBM 300	300	406	195	-	241	355	16,5	920	1,30	4,00	0,29	2 × M 10
	NBM 323	323	406	195	-	253	373	17,5	970	1,36	4,20	0,27	2 × M 10
	NBM 346	346	406	195	146	279	-	18,8	1 080	1,56	4,80	0,25	2 × M 10
	NBM 369	369	406	195	159	305	-	20,4	1 190	1,72	5,30	0,23	2 × M 10
	NBM 392	392	406	195	171	329	-	22,2	1 300	1,91	5,90	0,22	2 × M 10
CROSSWISE CONNECTION	NBM 415	415	410	195	183	-	-	23,7	1 400	2,07	6,40	0,21	2 × M 10
	NBM 438	438	410	195	183	-	-	24,2	1 390	1,98	6,10	0,20	2 × M 10
	NBM 461	461	410	195	183	-	-	24,7	1 390	1,91	5,90	0,19	2 × M 10
	NBM 482	482	410	195	183	-	-	24,7	1 390	1,91	5,90	0,18	2 × M 10
	NBM 505	505	410	195	213	-	-	27,6	1 630	2,37	7,30	0,17	3 × M 10
	NBM 526	526	410	195	213	-	-	27,6	1 630	2,37	7,30	0,16	3 × M 10
	NBM 555	555	410	195	232	-	-	30,3	1 790	2,59	8,00	0,15	3 × M 10
	NBM 576	576	410	195	232	-	-	30,3	1 790	2,59	8,00	0,15	3 × M 10
	NBM 600	600	410	195	244	-	-	32,1	1 890	2,75	8,50	0,14	3 × M 10
	NBM 625	625	410	195	268	-	-	35,4	2 100	3,08	9,50	0,14	3 × M 10
	NBM 649	649	410	195	268	-	-	35,4	2 100	3,08	9,50	0,13	3 × M 10
	NBM 674	674	410	195	268	-	-	35,9	2 100	3,01	9,30	0,13	3 × M 10
	NBM 690	690	410	195	268	-	-	37,0	2 080	2,88	8,90	0,12	3 × M 10
	NBM 723	723	410	195	268	-	-	37,0	2 080	2,88	8,90	0,12	3 × M 10
	NBM 740	740	410	195	305	-	-	40,2	2 390	3,43	10,6	0,12	4 × M 10
	NBM 768	768	410	195	305	-	-	40,2	2 390	3,43	10,6	0,11	4 × M 10
	NBM 792	792	410	195	317	-	-	42,0	2 490	3,63	11,2	0,11	4 × M 10
	NBM 830	830	410	195	353	-	-	47,1	2 800	4,11	12,7	0,10	4 × M 10
	NBM 866	866	410	195	353	-	-	47,1	2 800	4,11	12,7	0,10	4 × M 10
	NBM 890	890	410	195	353	-	-	47,6	2 800	4,05	12,5	0,10	4 × M 10
	NBM 920	920	410	195	353	-	-	49,2	2 780	3,82	11,8	0,09	4 × M 10
	NBM 940	940	410	195	353	-	-	48,7	2 780	3,89	12,0	0,09	4 × M 10
	NBM 965	965	410	195	373	-	-	51,9	2 910	4,05	12,5	0,09	6 × M 10
	NBM 1009	1009	410	195	402	-	-	53,7	3 200	4,63	14,3	0,09	5 × M 10
	NBM 1040	1040	410	195	438	-	-	58,8	3 510	5,15	15,9	0,08	5 × M 10
	NBM 1082	1082	410	195	438	-	-	58,8	3 510	5,15	15,9	0,08	5 × M 10
	NBM 1107	1107	410	195	438	-	-	59,3	3 500	5,05	15,6	0,08	5 × M 10
	NBM 1150	1150	410	195	438	-	-	61,4	3 470	4,76	14,7	0,07	5 × M 10
	NBM 1181	1181	410	195	438	-	-	60,9	3 480	4,86	15,0	0,07	5 × M 10
	NBM 1220	1220	410	195	511	-	-	69,0	4 110	5,99	18,5	0,07	6 × M 10
	NBM 1274	1274	410	195	511	-	-	69,0	4 110	5,99	18,5	0,07	6 × M 10
	NBM 1324	1324	410	195	523	-	-	71,0	4 200	6,09	18,8	0,06	6 × M 10
	NBM 1390	1390	410	195	523	-	-	73,7	4 170	5,73	17,7	0,06	6 × M 10
	NBM 1445	1445	410	195	523	-	-	73,7	4 170	5,73	17,7	0,06	6 × M 10

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

NBM Capacities and dimensions - **Imperial units**

Connection	Cell type	Capacity (C_5 Ah)	Height* (in)	Width (in)	Length per bock (in)			Approx. weight per cell (lbs)	Approx. electrolyte volume between level marks (in^3)	Electrolyte per cell		Internal resistance (mOhm)	Cell connection bolt per pole
					1 cell	2 cells	3 cells			Solid (lbs)	Liquid (US Gal)		
NORMAL CONNECTION	NBM 11	11	7,48	4,84	-	2,52	3,68	1,98	6,71	0,22	0,08	5,00	M 6
	NBM 15	15	7.48	4,84	-	2,91	4,27	2,65	7,31	0,24	0,09	3,67	M 6
	NBM 22	22	10.2	4,84	-	2,52	3,68	3,31	6,71	0,33	0,12	2,82	M 6
	NBM 30	30	10.2	4,84	-	2,91	4,27	3,97	7,32	0,33	0,12	2,07	M 6
	NBM 43	43	13,5	7,68	-	2,72	3,94	7,94	14,6	0,71	0,26	1,81	M 6
	NBM 50	50	13,5	7,68	-	2,72	3,94	7,94	14,6	0,71	0,26	1,56	M 6
	NBM 56	56	15,7	7,68	-	2,72	3,94	9,48	14,6	0,86	0,32	1,54	M 6
	NBM 65	65	13,8	7,68	-	3,11	4,53	9,70	17,1	0,79	0,29	1,20	M 8
	NBM 72	72	13,8	7,68	-	3,11	4,53	9,70	17,1	0,79	0,29	1,08	M 8
	NBM 84	84	16,0	7,68	-	3,11	4,53	11,2	17,1	0,93	0,34	1,02	M 8
	NBM 93	93	16,0	7,68	-	3,11	4,53	11,2	17,1	0,93	0,34	0,92	M 8
	NBM 100	100	16,0	7,68	-	3,70	5,41	14,1	20.7	1,14	0,42	0,86	M 8
	NBM 112	112	16,0	7,68	-	3,70	5,41	14,1	20,7	1,14	0,42	0,77	M 8
	NBM 118	118	16,0	7,68	-	3,70	5,41	14,1	20,7	1,14	0,42	0,73	M 8
	NBM 130	130	13,8	7,68	-	5,00	7,36	16,5	29,3	1,29	0,48	0,60	M 10
	NBM 138	138	16,0	7,68	-	4,53	6,65	17,2	26,2	1,43	0,53	0,62	M 10
	NBM 150	150	13,8	7,68	-	6,26	9,13	19,6	36,0	1,64	0,61	0,52	M 10
	NBM 161	161	16,0	7,68	-	5,00	7,36	19,4	29,3	1,50	0,55	0,53	M 10
	NBM 168	168	16,0	7,68	-	7,20	10,55	22,3	42,7	1,93	0,71	0,46	M 10
	NBM 184	184	16,0	7,68	-	6,26	9,13	23,1	36,0	1,93	0,71	0,47	M 10
	NBM 192	192	16,0	7,68	-	6,26	9,13	23,1	36,0	1,93	0,71	0,45	M 10
	NBM 200	200	16,0	7,68	-	7,20	10,6	26,5	42,7	2,29	0,85	0,43	M 10
	NBM 208	208	16,0	7,68	-	7,20	10,6	26,5	42,7	2,29	0,85	0,41	M 10
	NBM 216	216	16,0	7,68	-	7,20	10,6	26,5	42,7	2,29	0,85	0,40	M 10
	NBM 231	231	16,0	7,68	-	7,20	10,6	27,6	42,1	2,14	0,79	0,37	M 10
	NBM 241	241	16,0	7,68	-	7,20	10,6	27,6	42,1	2,14	0,79	0,36	M 10
	NBM 250	250	16,0	7,68	-	9,02	13,3	34,2	53,1	2,79	1,03	0,34	2 × M 10
	NBM 260	260	16,0	7,68	-	9,02	13,3	34,2	53,1	2,79	1,03	0,33	2 × M 10
	NBM 277	277	16,0	7,68	-	9,02	13,3	34,2	53,1	2,79	1,03	0,31	2 × M 10
	NBM 300	300	16,0	7,68	-	9,49	14,0	36,4	56,1	2,86	1,06	0,29	2 × M 10
	NBM 323	323	16,0	7,68	-	9,96	14,7	38,6	59,2	3,00	1,11	0,27	2 × M 10
	NBM 346	346	16,0	7,68	5,75	11,0	-	41,4	65,9	3,43	1,27	0,25	2 × M 10
	NBM 369	369	16,0	7,68	6,26	12,0	-	45,0	72,6	3,79	1,40	0,23	2 × M 10
	NBM 392	392	16,0	7,68	6,73	13,0	-	48,9	79,3	4,21	1,56	0,22	2 × M 10
CROSSWISE CONNECTION	NBM 415	415	16,1	7,68	7,20	-	-	52,2	85,4	4,57	1,69	0,21	2 × M 10
	NBM 438	438	16,1	7,68	7,20	-	-	53,4	84,8	4,36	1,61	0,20	2 × M 10
	NBM 461	461	16,1	7,68	7,20	-	-	54,5	84,8	4,21	1,56	0,19	2 × M 10
	NBM 482	482	16,1	7,68	7,20	-	-	54,5	84,8	4,21	1,56	0,18	2 × M 10
	NBM 505	505	16,1	7,68	8,39	-	-	60,8	99,5	5,21	1,93	0,17	3 × M 10
	NBM 526	526	16,1	7,68	8,39	-	-	60,8	99,5	5,21	1,93	0,16	3 × M 10
	NBM 555	555	16,1	7,68	9,13	-	-	66,8	109	5,71	2,11	0,15	3 × M 10
	NBM 576	576	16,1	7,68	9,13	-	-	66,8	109	5,71	2,11	0,15	3 × M 10
	NBM 600	600	16,1	7,68	9,61	-	-	70,8	115	6,07	2,25	0,14	3 × M 10
	NBM 625	625	16,1	7,68	10,6	-	-	78,0	128	6,79	2,51	0,14	3 × M 10
	NBM 649	649	16,1	7,68	10,6	-	-	78,0	128	6,79	2,51	0,13	3 × M 10
	NBM 674	674	16,1	7,68	10,6	-	-	79,1	128	6,64	2,46	0,13	3 × M 10
	NBM 690	690	16,1	7,68	10,6	-	-	81,6	127	6,36	2,35	0,12	3 × M 10
	NBM 723	723	16,1	7,68	10,6	-	-	81,6	127	6,36	2,35	0,12	3 × M 10
	NBM 740	740	16,1	7,68	12,0	-	-	88,6	146	7,57	2,80	0,12	4 × M 10
	NBM 768	768	16,1	7,68	12,0	-	-	88,6	146	7,57	2,80	0,11	4 × M 10
	NBM 792	792	16,1	7,68	12,5	-	-	92,6	152	8,00	2,96	0,11	4 × M 10
	NBM 830	830	16,1	7,68	13,9	-	-	104	171	9,07	3,35	0,10	4 × M 10
	NBM 866	866	16,1	7,68	13,9	-	-	104	171	9,07	3,35	0,10	4 × M 10
	NBM 890	890	16,1	7,68	13,9	-	-	105	171	8,93	3,30	0,10	4 × M 10
	NBM 920	920	16,1	7,68	13,9	-	-	108	170	8,43	3,12	0,09	4 × M 10
	NBM 940	940	16,1	7,68	13,9	-	-	107	170	8,57	3,17	0,09	4 × M 10
	NBM 965	965	16,1	7,68	14,7	-	-	114	178	8,93	3,30	0,09	6 × M 10
	NBM 1009	1009	16,1	7,68	15,8	-	-	118	195	10,2	3,78	0,09	5 × M 10
	NBM 1040	1040	16,1	7,68	17,2	-	-	130	214	11,4	4,20	0,08	5 × M 10
	NBM 1082	1082	16,1	7,68	17,2	-	-	130	214	11,4	4,20	0,08	5 × M 10
	NBM 1107	1107	16,1	7,68	17,2	-	-	131	214	11,1	4,12	0,08	5 × M 10
	NBM 1150	1150	16,1	7,68	17,2	-	-	135	212	10,5	3,88	0,07	5 × M 10
	NBM 1181	1181	16,1	7,68	17,2	-	-	134	212	10,7	3,96	0,07	5 × M 10
	NBM 1220	1220	16,1	7,68	20,1	-	-	152	251	13,2	4,89	0,07	6 × M 10
	NBM 1274	1274	16,1	7,68	20,1	-	-	152	251	13,2	4,89	0,07	6 × M 10
	NBM 1324	1324	16,1	7,68	20,6	-	-	157	256	13,4	4,97	0,06	6 × M 10
	NBM 1390	1390	16,1	7,68	20,6	-	-	162	254	12,6	4,68	0,06	6 × M 10
	NBM 1445	1445	16,1	7,68	20,6	-	-	162	254	12,6	4,68	0,06	6 × M 10

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

NBM Performance after prolonged float charge of fully charged cells

Available Amperes at + 20°C ± 5°C (+ 68°F ± 9°F)

Final voltage: 1.00 V/cell

Cell type	Capacity (C5 Ah)	Hours							Minutes						Seconds		
		10	8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBM 11	11	1,11	1,39	2,20	3,60	5,24	6,47	9,02	11,6	13,6	14,8	17,0	20,5	29,5	33,8	42,5	46,8
NBM 15	15	1,52	1,89	3,00	4,91	7,14	8,82	12,3	15,9	18,5	20,20	23,13	28,0	40,2	46,1	58,0	63,8
NBM 22	22	2,23	2,77	4,40	7,19	10,5	13,0	18,2	23,7	27,6	29,8	34,0	40,4	55,7	63,1	75,5	80,2
NBM 30	30	3,04	3,78	6,00	9,81	14,3	17,7	24,9	32,3	37,6	40,6	46,3	55,0	76,0	86,0	103	109
NBM 43	43	4,37	5,42	8,60	14,1	20,6	25,5	36,1	49,3	57,3	62,3	71,1	84,6	116	131	160	170
NBM 50	50	5,08	6,3	10,0	16,4	23,9	29,7	42,0	57,3	66,6	72,4	82,7	98,4	135	153	186	198
NBM 56	56	5,70	7,1	11,2	18,3	26,8	33,3	47,0	63,9	74,0	80,0	91,3	108	145	162	193	205
NBM 65	65	6,60	8,2	13,0	21,3	31,1	38,6	54,5	74,5	86,6	94	108	128	175	199	241	257
NBM 72	72	7,31	9,1	14,4	23,6	34,4	42,8	60,4	82,5	95,9	104	119	142	194	220	267	285
NBM 84	84	8,55	10,6	16,8	27,5	40,1	50,0	70,5	95,8	111	120	137	161	218	243	290	307
NBM 93	93	9,47	11,7	18,6	30,4	44,4	55,3	78,0	106	123	133	152	179	241	269	321	340
NBM 100	100	10,2	12,6	20,0	32,7	47,8	59,5	83,9	114	132	143	163	192	259	289	345	365
NBM 112	112	11,4	14,1	22,4	36,6	53,5	66,6	94,0	128	148	160	183	215	290	324	387	409
NBM 118	118	12,0	14,9	23,6	38,6	56,4	70,2	99,0	135	156	169	192	227	306	341	407	431
NBM 130	130	13,2	16,4	26,0	42,6	62,2	77,2	109,1	149	173	188	215	256	351	397	482	515
NBM 138	138	14,0	17,4	27,6	45,1	65,9	82,1	115,8	157	182	197	225	265	358	399	476	504
NBM 150	150	15,2	18,9	30,0	49,2	71,8	89,1	126	172	200	217	248	295	404	458	557	594
NBM 161	161	16,4	20,3	32,2	52,6	76,9	95,7	135	184	213	230	263	309	417	466	556	588
NBM 168	168	17,1	21,2	33,6	55,1	80,4	100	141	192	224	243	278	330	453	513	623	665
NBM 184	184	18,7	23,2	36,8	60,1	87,9	109	154	210	243	263	300	353	477	532	635	672
NBM 192	192	19,5	24,2	38,4	62,7	91,7	114	161	219	254	274	313	369	498	555	663	702
NBM 200	200	20,4	25,2	40,0	65,4	95,5	119	168	228	264	286	326	384	518	579	691	731
NBM 208	208	21,2	26,2	41,6	68,0	99,4	124	175	237	275	297	339	399	539	602	718	760
NBM 216	216	22,0	27,2	43,2	70,6	103	128	181	246	286	309	352	415	560	625	746	789
NBM 231	231	23,5	29,1	46,2	75,5	110	137	194	264	305	330	377	444	599	668	798	844
NBM 241	241	24,5	30,3	48,2	78,8	115	143	202	275	319	344	393	463	625	697	832	881
NBM 250	250	25,4	31,5	50,0	81,7	119	149	210	285	331	357	408	480	648	723	863	913
NBM 260	260	26,5	32,7	52,0	85,0	124	155	218	297	344	372	424	499	674	752	898	950
NBM 277	277	28,2	34,9	55,4	90,5	132	165	232	316	366	396	452	532	718	801	956	1 012
NBM 300	300	30,5	37,8	60,0	98,0	143	178	252	342	397	429	489	576	777	868	1036	1 096
NBM 323	323	32,9	40,7	64,6	106	154	192	271	368	427	462	527	620	837	934	1115	1 180
NBM 346	346	35,2	43,6	69,2	113	165	206	290	395	457	495	564	664	897	1001	1195	1 264
NBM 369	369	37,6	46,5	73,8	121	176	219	310	421	488	527	602	708	956	1068	1274	1 348
NBM 392	392	39,9	49,4	78,4	128	187	233	329	447	518	560	639	753	1016	1134	1354	1 432
NBM 415	415	42,2	52,2	83,0	136	198	247	348	473	549	593	677	797	1075	1201	1433	1 516
NBM 438	438	44,6	55,1	87,6	143	209	260	367	500	579	626	714	841	1135	1267	1512	1 600
NBM 461	461	46,9	58,0	92,2	151	220	274	387	526	610	659	752	885	1195	1334	1592	1 684
NBM 482	482	49,1	60,7	96,4	158	230	287	404	550	637	689	786	925	1249	1394	1664	1 761
NBM 505	505	51,4	64	101	165	241	300	424	576	668	722	823	970	1309	1461	1744	1 845
NBM 526	526	53,5	66	105	172	251	313	441	600	695	752	858	1010	1363	1522	1816	1 922
NBM 555	555	56,5	70	111	181	265	330	466	633	734	793	905	1066	1438	1606	1916	2 028
NBM 576	576	58,6	73	115	188	275	343	483	657	762	823	939	1106	1493	1666	1989	2 105
NBM 600	600	61,1	76	120	196	287	357	503	685	793	858	978	1152	1555	1736	2072	2 192
NBM 625	625	63,6	79	125	204	299	372	524	713	826	893	1019	1200	1620	1808	2158	2 284
NBM 649	649	66,1	82	130	212	310	386	545	740	858	928	1058	1246	1682	1878	2241	2,371
NBM 674	674	68,6	85	135	220	322	401	565	769	891	963	1099	1294	1747	1950	2327	2 463
NBM 690	690	70,2	87	138	225	330	410	579	787	912	986	1125	1325	1788	1996	2382	2 521
NBM 723	723	73,6	91	145	236	345	430	607	825	956	1033	1179	1388	1874	2092	2496	2 642
NBM 740	740	75,3	93	148	242	353	440	621	844	978	1058	1207	1421	1918	2141	2555	2 704
NBM 768	768	78,2	97	154	251	367	457	644	876	1015	1098	1252	1475	1990	2222	2652	2 806
NBM 792	792	80,6	100	158	259	378	471	664	904	1047	1132	1291	1521	2052	2291	2735	2 894
NBM 830	830	84,5	104	166	271	396	494	696	947	1097	1186	1353	1594	2151	2401	2866	3 033
NBM 866	866	87,5	108	172	281	411	511	722	981	1137	1229	1402	1651	2229	2488	2969	3 142
NBM 890	890	90,6	112	178	291	425	529	747	1015	1177	1272	1451	1709	2306	2575	3073	3 252
NBM 920	920	93,6	116	184	301	439	547	772	1050	1216	1315	1500	1766	2384	2662	3177	3 362
NBM 940	940	95,7	118	188	307	449	559	789	1072	1243	1344	1533	1805	2436	2719	3246	3 435
NBM 965	965	98,2	121	193	315	461	574	810	1101	1276	1379	1574	1853	2501	2792	3332	3 526
NBM 1009	1009	103	127	202	330	482	600	847	1151	1334	1442	1645	1937	2615	2919	3484	3 687
NBM 1040	1040	106	131	208	340	497	618	873	1187	1375	1487	1696	1997	2695	3009	3591	3 800
NBM 1082	1082	110	136	216	354	517	643	908	1234	1431	1547	1764	2077	2804	3130	3736	3 954
NBM 1107	1107	113	139	221	362	529	658	929	1263	1464	1582	1805	2125	2869	3203	3822	4 045
NBM 1150	1150	117	145	230	376	549	684	965	1312	1520	1644	1875	2208	2980	3327	3971	4 202
NBM 1181	1181	120	149	236	386	564	702	991	1347	1561	1688	1926	2267	3061	3417	4078	4 315
NBM 1220	1220	124	154	244	399	583	725	1024	1392	1613	1744	1989	2342	3162	3529	4213	4 458
NBM 1274	1274	130	160	255	416	609	758	1069	1453	1684	1821	2077	2446	3302	3686	4399	4 655
NBM 1324	1324	135	167	265	433	632	787	1111	1511	1751	1893	2159	2542	3431	3830	4572	4 838
NBM 1390	1390	141	175	278	454	664	827	1166	1586	1838	1987	2267	2669	3602	4021	4800	5 079
NBM 1445	1445	147	182	289	472	690	859	1212	1649	1911	2066	2356	2774	3745	4180	4989	5 280

** Height including the IP2X terminal cover*

NBM Performance after prolonged float charge of fully charged cells

Available Amperes at + 20°C ± 5°C (+ 68°F ± 9°F)

Final voltage: 1.05 V/cell

Cell type	Capacity (C5 Ah)	Hours							Minutes						Seconds		
		10	8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBM 11	11	1,11	1,38	2,18	3,54	4,90	6,18	7,91	9,91	11,8	12,9	14,3	17,1	25,4	29,2	36,0	38,9
NBM 15	15	1,51	1,88	2,97	4,83	6,68	8,43	10,8	13,5	16,1	17,6	19,6	23,3	34,6	39,9	49,1	53,1
NBM 22	22	2,21	2,75	4,36	7,08	9,85	12,5	16,0	20,1	23,8	26,0	28,6	33,4	47,5	53,9	63,9	69,1
NBM 30	30	3,02	3,75	5,94	9,66	13,4	17,0	21,8	27,4	32,4	35,4	39,1	45,6	64,8	73,6	87,1	94,2
NBM 43	43	4,33	5,38	8,53	13,9	19,3	24,7	32,5	41,9	49,4	53,7	59,9	70,1	100	113	136	145
NBM 50	50	5,04	6,25	9,92	16,2	22,4	28,7	37,8	48,7	57,4	62,4	69,7	81,6	116	131	158	169
NBM 56	56	5,65	7,00	11,1	18,1	25,1	32,1	42,3	54,1	63,8	69,5	76,0	88	123	139	163	176
NBM 65	65	6,55	8,13	12,9	21,0	29,2	37,3	49,1	63,3	74,6	81,2	90,6	106	151	170	206	220
NBM 72	72	7,26	9,01	14,3	23,3	32,3	41,3	54,4	70,1	82,7	89,9	100	117	167	189	228	243
NBM 84	84	8,48	10,5	16,6	27,2	37,7	48,2	63,5	81,2	95,7	104	114	132	185	208	245	264
NBM 93	93	9,38	11,6	18,4	30,1	41,8	53,3	70,3	89,9	106	115	126	146	205	230	271	292
NBM 100	100	10,1	12,5	19,8	32,3	44,9	57,3	75,6	96,7	114	124	136	157	220	247	292	314
NBM 112	112	11,3	14,0	22,2	36,2	50,3	64,2	84,7	108	128	139	152	176	246	277	327	352
NBM 118	118	11,9	14,8	23,4	38,1	53,0	67,7	89,2	114	134	147	160	186	260	292	344	371
NBM 130	130	13,1	16,3	25,8	42,0	58,3	74,5	98	127	149	162	181	212	301	341	411	440
NBM 138	138	13,9	17,3	27,4	44,6	62,0	79,1	104	133	157	171	187	217	304	341	402	433
NBM 150	150	15,1	18,8	29,8	48,5	67,3	86,0	113	146	172	187	209	245	348	393	475	507
NBM 161	161	16,2	20,1	31,9	52,0	72,3	92,3	122	156	183	200	219	253	354	398	469	506
NBM 168	168	16,9	21,0	33,3	54,3	75,4	96,3	127	164	193	210	234	274	390	440	532	568
NBM 184	184	18,6	23,0	36,5	59,5	82,6	105	139	178	210	228	250	289	405	455	536	578
NBM 192	192	19,4	24,0	38,1	62,1	86,2	110	145	186	219	238	261	302	423	475	560	603
NBM 200	200	20,2	25,0	39,6	64,6	89,8	115	151	193	228	248	271	315	440	495	583	628
NBM 208	208	21,0	26,0	41,2	67,2	93,4	119	157	201	237	258	282	327	458	515	606	653
NBM 216	216	21,8	27,0	42,8	69,8	97,0	124	163	209	246	268	293	340	475	534	630	678
NBM 231	231	23,3	28,9	45,8	74,7	104	132	175	223	263	287	314	363	508	572	674	725
NBM 241	241	24,3	30,1	47,8	77,9	108	138	182	233	275	299	327	379	530	596	703	757
NBM 250	250	25,2	31,3	49,6	80,8	112	143	189	242	285	310	339	393	550	619	729	785
NBM 260	260	26,2	32,5	51,5	84,0	117	149	197	251	296	323	353	409	572	643	758	816
NBM 277	277	27,9	34,6	54,9	89,5	124	159	209	268	316	344	376	436	610	685	808	870
NBM 300	300	30,3	37,5	59,5	97,0	135	172	227	290	342	372	407	472	660	742	875	942
NBM 323	323	32,6	40,4	64,0	104	145	185	244	312	368	401	438	508	711	799	942	1014
NBM 346	346	34,9	43,3	68,6	112	155	198	262	334	394	430	470	544	761	856	1009	1086
NBM 369	369	37,2	46,1	73,1	119	166	212	279	357	420	458	501	580	812	913	1076	1159
NBM 392	392	39,6	49,0	77,7	127	176	225	296	379	447	487	532	617	863	970	1143	1231
NBM 415	415	41,9	51,9	82,3	134	186	238	314	401	473	515	563	653	913	1027	1210	1303
NBM 438	438	44,2	54,8	86,8	142	197	251	331	423	499	544	594	689	964	1084	1277	1375
NBM 461	461	46,5	57,6	91,4	149	207	264	349	446	525	572	626	725	1015	1141	1344	1448
NBM 482	482	48,6	60,3	95,5	156	216	276	364	466	549	598	654	758	1061	1193	1405	1513
NBM 505	505	51,0	63,1	100	163	227	290	382	488	575	627	685	794	1111	1249	1472	1586
NBM 526	526	53,1	65,8	104	170	236	302	398	509	599	653	714	827	1158	1301	1534	1652
NBM 555	555	56,0	69,4	110	179	249	318	420	537	632	689	753	873	1221	1373	1618	1743
NBM 576	576	58,1	72,0	114	186	259	330	436	557	656	715	782	906	1268	1425	1679	1809
NBM 600	600	60,5	75,0	119	194	269	344	454	580	684	745	814	944	1320	1484	1749	1884
NBM 625	625	63,1	78,1	124	202	281	358	473	604	712	776	848	983	1376	1546	1822	1963
NBM 649	649	65,5	81,1	129	210	291	372	491	627	740	806	881	1021	1428	1606	1892	2038
NBM 674	674	68,0	84,3	134	218	303	386	510	652	768	837	915	1060	1483	1668	1965	2116
NBM 690	690	69,6	86,3	137	223	310	396	522	667	786	857	937	1085	1519	1707	2012	2167
NBM 723	723	72,9	90,4	143	234	325	415	547	699	824	898	981	1137	1591	1789	2108	2270
NBM 740	740	74,7	92,5	147	239	332	424	560	715	843	919	1004	1164	1629	1831	2158	2324
NBM 768	768	77,5	96,0	152	248	345	440	581	742	875	954	1042	1208	1690	1900	2239	2412
NBM 792	792	79,9	99,0	157	256	356	454	599	766	902	983	1075	1246	1743	1960	2309	2487
NBM 830	830	83,7	104	165	268	373	476	628	802	946	1031	1127	1306	1827	2054	2420	2606
NBM 866	866	86,8	108	170	278	386	493	650	831	980	1068	1167	1353	1893	2128	2508	2700
NBM 890	890	89,8	111	176	288	400	510	673	860	1014	1105	1208	1400	1959	2202	2595	2795
NBM 920	920	92,8	115	182	297	413	527	696	889	1048	1142	1249	1447	2025	2276	2682	2889
NBM 940	940	94,8	118	186	304	422	539	711	909	1071	1167	1276	1479	2069	2326	2741	2952
NBM 965	965	97,4	121	191	312	433	553	730	933	1100	1198	1310	1518	2124	2388	2814	3030
NBM 1009	1009	102	126	200	326	453	578	763	975	1150	1253	1370	1587	2221	2496	2942	3168
NBM 1040	1040	105	130	206	336	467	596	786	1005	1185	1291	1412	1636	2289	2573	3032	3266
NBM 1082	1082	109	135	214	350	486	620	818	1046	1233	1343	1469	1702	2381	2677	3155	3397
NBM 1107	1107	112	138	219	358	497	635	837	1070	1261	1374	1503	1741	2436	2739	3228	3476
NBM 1150	1150	116	144	228	372	516	659	870	1112	1310	1428	1561	1809	2531	2845	3353	3611
NBM 1181	1181	119	148	234	382	530	677	893	1142	1346	1466	1603	1858	2599	2922	3443	3708
NBM 1220	1220	123	153	242	394	548	699	923	1179	1390	1515	1656	1919	2685	3018	3557	3831
NBM 1274	1274	129	159	253	412	572	730	963	1232	1452	1582	1729	2004	2804	3152	3715	4000
NBM 1324	1324	134	166	262	428	594	759	1001	1280	1509	1644	1797	2083	2914	3276	3860	4157
NBM 1390	1390	140	174	275	449	624	797	1051	1344	1584	1726	1887	2187	3059	3439	4053	4365
NBM 1445	1445	146	181	286	467	649	828	1093	1397	1647	1794	1961	2273	3180	3575	4213	4 537

** Height including the IP2X terminal cover*

NBM Performance after prolonged float charge of fully charged cells

Available Amperes at + 20°C ± 5°C (+ 68°F ± 9°F)

Final voltage: 1.10 V/cell

Cell type	Capacity (C5 Ah)	Hours							Minutes						Seconds		
		10	8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBM 11	11	1,09	1,36	2,15	3,31	4,54	5,41	6,43	8,04	9,71	10,3	11,9	14,6	21,5	24,6	30,1	31,9
NBM 15	15	1,49	1,85	2,93	4,51	6,20	7,37	8,77	11,0	13,2	14,0	16,2	19,9	29,3	33,5	41,0	43,4
NBM 22	22	2,18	2,71	4,29	6,61	9,13	10,9	13,0	16,2	19,7	20,6	23,5	28,4	40,3	45,1	53,6	57,3
NBM 30	30	2,97	3,69	5,85	9,02	12,4	14,9	17,7	22,1	26,8	28,1	32,0	38,7	55,0	61,5	73,0	78,1
NBM 43	43	4,26	5,29	8,40	12,9	18,0	21,8	26,5	33,4	40,9	42,8	48,9	59,3	83,9	94,6	113	130
NBM 50	50	4,95	6,15	9,77	15,0	20,9	25,3	30,8	38,8	47,5	49,8	56,8	69,0	97,5	110	131	151
NBM 56	56	5,55	6,90	10,9	16,9	23,4	28,3	34,5	43,1	52,4	54,5	62,2	74,6	104	116	137	145
NBM 65	65	6,44	8,00	12,7	19,6	27,2	32,9	40,1	50,4	61,8	64,8	73,9	89,7	127	143	170	196
NBM 72	72	7,13	8,86	14,1	21,7	30,2	36,5	44,4	55,9	68,4	71,7	81,9	99,3	140	158	188	217
NBM 84	84	8,33	10,4	16,4	25,4	35,2	42,5	51,7	64,6	78,6	81,7	93,3	112	156	174	205	218
NBM 93	93	9,22	11,5	18,1	28,1	38,9	47,1	57,3	71,5	87,0	90,5	103	124	173	193	227	241
NBM 100	100	9,91	12,3	19,5	30,2	41,9	50,6	61,6	76,9	93,6	97,3	111	133	186	207	244	260
NBM 112	112	11,1	13,8	21,8	33,8	46,9	56,7	69,0	86,2	105	109	124	149	208	232	274	291
NBM 118	118	11,7	14,5	23,0	35,6	49,4	59,7	72,7	90,8	110	115	131	157	219	244	288	306
NBM 130	130	12,9	16,0	25,4	39,1	54,5	65,9	80,1	101	124	130	148	179	254	286	340	393
NBM 138	138	13,7	17,0	26,9	41,7	57,8	69,9	85,0	106	129	134	153	184	256	286	337	358
NBM 150	150	14,9	18,5	29,3	45,1	62,8	76,0	92,5	116	143	149	171	207	293	330	392	453
NBM 161	161	16,0	19,8	31,3	48,6	67,4	81,5	99,2	124	151	157	179	214	299	333	393	418
NBM 168	168	16,6	20,7	32,8	50,6	70,4	85,1	104	130	160	167	191	232	328	370	440	507
NBM 184	184	18,2	22,7	35,8	55,6	77,0	93,1	113	142	172	179	204	245	342	381	450	477
NBM 192	192	19,0	23,7	37,4	58,0	80,4	97,2	118	148	180	187	213	256	356	398	469	498
NBM 200	200	19,8	24,6	38,9	60,4	83,7	101	123	154	187	195	222	266	371	414	489	519
NBM 208	208	20,6	25,6	40,5	62,8	87,1	105	128	160	195	202	231	277	386	431	508	540
NBM 216	216	21,4	26,6	42,0	65,2	90,4	109	133	166	202	210	240	288	401	447	528	561
NBM 231	231	22,9	28,5	45,0	69,8	96,7	117	142	178	216	225	257	308	429	478	564	599
NBM 241	241	23,9	29,7	46,9	72,8	101	122	148	185	226	234	268	321	447	499	589	625
NBM 250	250	24,8	30,8	48,7	75,5	105	127	154	192	234	243	278	333	464	518	611	649
NBM 260	260	25,8	32,0	50,6	78,5	109	132	160	200	243	253	289	346	483	538	635	675
NBM 277	277	27,5	34,1	53,9	83,7	116	140	171	213	259	270	308	369	514	574	677	719
NBM 300	300	29,7	37,0	58,4	90,6	126	152	185	231	281	292	333	400	557	621	733	779
NBM 323	323	32,0	39,8	62,9	97,5	135	164	199	248	302	314	359	430	600	669	789	838
NBM 346	346	34,3	42,6	67,3	104	145	175	213	266	324	337	384	461	642	716	845	898
NBM 369	369	36,6	45,5	71,8	111	154	187	227	284	345	359	410	492	685	764	902	958
NBM 392	392	38,9	48,3	76,3	118	164	198	241	302	367	381	436	522	728	812	958	1017
NBM 415	415	41,1	51,1	80,8	125	174	210	256	319	388	404	461	553	770	859	1014	1077
NBM 438	438	43,4	54,0	85,3	132	183	222	270	337	410	426	487	583	813	907	1070	1137
NBM 461	461	45,7	56,8	89,7	139	193	233	284	355	431	449	512	614	856	955	1126	1196
NBM 482	482	47,8	59,4	93,8	146	202	244	297	371	451	469	536	642	895	998	1178	1251
NBM 505	505	50,0	62,2	98,3	153	211	256	311	388	473	491	561	673	938	1046	1234	1311
NBM 526	526	52,1	64,8	102	159	220	266	324	405	492	512	584	701	977	1089	1285	1365
NBM 555	555	55,0	68,4	108	168	232	281	342	427	519	540	617	739	1030	1149	1356	1440
NBM 576	576	57,1	71,0	112	174	241	292	355	443	539	560	640	767	1069	1193	1407	1495
NBM 600	600	59,5	73,9	117	181	251	304	370	462	562	584	667	799	1114	1242	1466	1557
NBM 625	625	61,9	77,0	122	189	262	316	385	481	585	608	694	833	1160	1294	1527	1622
NBM 649	649	64,3	80,0	126	196	272	329	400	499	607	631	721	864	1205	1344	1586	1684
NBM 674	674	66,8	83,0	131	204	282	341	415	519	631	656	749	898	1251	1396	1647	1749
NBM 690	690	68,4	85,0	134	208	289	349	425	531	646	671	767	919	1281	1429	1686	1791
NBM 723	723	71,7	89,1	141	218	303	366	445	556	677	703	803	963	1342	1497	1766	1876
NBM 740	740	73,3	91,2	144	223	310	375	456	569	693	720	822	986	1374	1532	1808	1920
NBM 768	768	76,1	94,6	149	232	322	389	473	591	719	747	853	1023	1426	1590	1876	1993
NBM 792	792	78,5	97,6	154	239	332	401	488	609	741	771	880	1055	1470	1640	1935	2055
NBM 830	830	82,3	102	162	251	347	420	511	639	777	808	922	1106	1541	1719	2028	2154
NBM 866	866	85,2	106	167	260	360	435	530	662	805	837	956	1146	1597	1781	2101	2232
NBM 890	890	88,2	110	173	269	373	451	548	685	833	866	989	1186	1652	1843	2174	2310
NBM 920	920	91,2	113	179	278	385	466	567	708	861	895	1022	1225	1708	1905	2248	2387
NBM 940	940	93,2	116	183	284	394	476	579	723	880	915	1045	1252	1745	1946	2297	2439
NBM 965	965	95,6	119	188	291	404	489	594	742	903	939	1072	1285	1792	1998	2358	2504
NBM 1009	1009	100	124	196	305	422	511	622	776	944	982	1121	1344	1873	2089	2465	2618
NBM 1040	1040	103	128	202	314	435	526	641	800	973	1012	1156	1385	1931	2153	2541	2699
NBM 1082	1082	107	133	211	327	453	548	667	832	1013	1053	1202	1441	2009	2240	2644	2808
NBM 1107	1107	110	136	215	334	463	560	682	852	1036	1077	1230	1475	2055	2292	2705	2873
NBM 1150	1150	114	142	224	347	481	582	708	885	1076	1119	1278	1532	2135	2381	2810	2984
NBM 1181	1181	117	146	230	357	494	598	727	909	1105	1149	1312	1573	2193	2445	2885	3065
NBM 1220	1220	121	150	237	368	511	618	752	939	1142	1187	1356	1625	2265	2526	2981	3166
NBM 1274	1274	126	157	248	385	533	645	785	980	1192	1240	1416	1697	2365	2638	3113	3306
NBM 1324	1324	131	163	258	400	554	670	816	1019	1239	1288	1471	1764	2458	2741	3235	3436
NBM 1390	1390	138	171	271	420	582	704	856	1069	1301	1352	1545	1852	2581	2878	3396	3607
NBM 1445	1445	143	178	281	436	605	732	890	1112	1352	1406	1606	1925	2683	2992	3530	3750

** Height including the IP2X terminal cover*

NBM Performance after prolonged float charge of fully charged cells

Available Amperes at + 20°C ± 5°C (+ 68°F ± 9°F)

Final voltage: 1.14 V/cell

Cell type	Capacity (C_5 Ah)	Hours							Minutes						Seconds		
		10	8	5	3	2	1,5	1	30	20	15	10	5	1	30	5	1
NBM 11	11	1,06	1,32	2,07	3,11	3,97	4,51	5,20	6,40	7,27	7,92	9,12	11,4	16,1	18,1	21,1	21,8
NBM 15	15	1,45	1,80	2,82	4,25	5,41	6,15	7,09	8,72	9,92	10,8	12,4	15,6	22,0	24,7	28,7	29,7
NBM 22	22	2,13	2,64	4,14	6,23	7,93	9,03	10,4	12,8	14,5	15,8	18,2	22,9	32,3	36,2	42,2	43,6
NBM 30	30	2,90	3,60	5,64	8,49	10,8	12,3	14,2	17,4	19,8	21,6	24,9	31,2	44,0	49,4	57,5	59,5
NBM 43	43	4,16	5,16	8,08	12,2	15,5	17,6	20,3	25,0	28,4	31,0	35,7	44,7	63,1	70,8	82,4	85,2
NBM 50	50	4,83	6,00	9,40	14,2	18,0	20,5	23,6	29,1	33,1	36,0	41,5	52,0	73,3	82,3	95,8	99,1
NBM 56	56	5,40	6,70	10,6	15,9	20,5	23,6	27,8	33,8	38,7	41,9	48,1	60,0	83,9	92,9	107	111
NBM 65	65	6,28	7,80	12,2	18,4	23,4	26,7	30,7	37,8	43,0	46,8	53,9	67,6	95,3	107	125	129
NBM 72	72	6,96	8,64	13,5	20,4	26,0	29,5	34,0	41,9	47,6	51,9	59,7	74,9	106	118	138	143
NBM 84	84	8,10	10,1	15,8	23,9	30,7	35,4	41,6	50,7	58,0	62,9	72,1	90,0	126	139	161	166
NBM 93	93	8,97	11,1	17,5	26,4	34,0	39,2	46,1	56,1	64,2	69,6	79,8	100	139	154	178	184
NBM 100	100	9,64	12,0	18,8	28,4	36,6	42,2	49,6	60,3	69,1	74,8	85,9	107	150	166	192	198
NBM 112	112	10,8	13,4	21,1	31,8	41,0	47,3	55,5	67,6	77,4	83,8	96,2	120	168	186	215	221
NBM 118	118	11,4	14,1	22,2	33,5	43,2	49,8	58,5	71,2	81,5	88,3	101	126	177	196	226	233
NBM 130	130	12,6	15,6	24,4	36,8	46,9	53,3	61,4	76	86	94	108	135	191	214	249	258
NBM 138	138	13,3	16,5	26,0	39,2	50,5	58,2	68,4	83,2	95,3	103	118	148	207	229	265	273
NBM 150	150	14,5	18,0	28,2	42,5	54,1	61,5	70,9	87	99	108	124	156	220	247	287	297
NBM 161	161	15,5	19,3	30,3	45,7	58,9	67,9	79,8	97,1	111	120	138	173	241	267	309	318
NBM 168	168	16,2	20,2	31,6	47,6	60,6	68,9	79	98	111	121	139	175	246	276	322	333
NBM 184	184	17,7	22,0	34,7	52,3	67,3	77,6	91,2	111	127	138	158	197	276	305	353	364
NBM 192	192	18,5	23,0	36,2	54,5	70,3	81,0	95,2	116	133	144	165	206	287	319	368	380
NBM 200	200	19,3	23,9	37,7	56,8	73,2	84,4	99,2	121	138	150	172	214	299	332	384	395
NBM 208	208	20,1	24,9	39,2	59,1	76,1	87,8	103	125	144	156	179	223	311	345	399	411
NBM 216	216	20,8	25,8	40,7	61,3	79,1	91,2	107	130	149	162	185	231	323	358	414	427
NBM 231	231	22,3	27,6	43,5	65,6	84,5	97,5	115	139	160	173	198	248	346	383	443	457
NBM 241	241	23,2	28,8	45,4	68,4	88,2	102	119	145	166	180	207	258	361	400	462	476
NBM 250	250	24,1	29,9	47,1	71,0	91,5	106	124	151	173	187	215	268	374	415	480	494
NBM 260	260	25,1	31,1	49,0	73,8	95,2	110	129	157	180	195	223	279	389	431	499	514
NBM 277	277	26,7	33,1	52,2	78,7	101	117	137	167	191	207	238	297	415	460	531	548
NBM 300	300	28,9	35,9	56,5	85,2	110	127	149	181	207	224	258	321	449	498	576	593
NBM 323	323	31,1	38,6	60,9	91,7	118	136	160	195	223	242	277	346	484	536	620	639
NBM 346	346	33,4	41,4	65,2	98,3	127	146	172	209	239	259	297	371	518	574	664	684
NBM 369	369	35,6	44,1	69,5	105	135	156	183	223	255	276	317	395	553	612	708	730
NBM 392	392	37,8	46,9	73,9	111	143	165	194	236	271	293	337	420	587	650	752	775
NBM 415	415	40,0	49,7	78,2	118	152	175	206	250	287	311	356	445	621	689	796	820
NBM 438	438	42,2	52,4	82,5	124	160	185	217	264	303	328	376	469	656	727	840	866
NBM 461	461	44,5	55,2	86,8	131	169	195	229	278	318	345	396	494	690	765	885	911
NBM 482	482	46,5	57,7	90,8	137	176	203	239	291	333	361	414	516	722	800	925	953
NBM 505	505	48,7	60,4	95,1	143	185	213	250	305	349	378	434	541	756	838	969	998
NBM 526	526	50,7	62,9	99,1	149	193	222	261	317	363	394	452	564	788	873	1009	1040
NBM 555	555	53,5	66,4	105	158	203	234	275	335	383	415	476	595	831	921	1065	1097
NBM 576	576	55,5	68,9	109	164	211	243	286	347	398	431	494	617	862	956	1105	1139
NBM 600	600	57,9	71,8	113	170	220	253	297	362	415	449	515	643	898	996	1151	1186
NBM 625	625	60,3	74,8	118	178	229	264	310	377	432	468	537	670	936	1037	1199	1236
NBM 649	649	62,6	77,6	122	184	238	274	322	391	448	486	557	695	972	1077	1245	1283
NBM 674	674	65,0	80,6	127	191	247	284	334	407	466	504	579	722	1009	1118	1293	1333
NBM 690	690	66,5	82,6	130	196	253	291	342	416	477	516	592	739	1033	1145	1324	1364
NBM 723	723	69,7	86,5	136	205	265	305	358	436	499	541	621	775	1083	1200	1387	1429
NBM 740	740	71,4	88,5	139	210	271	312	367	446	511	554	635	793	1108	1228	1420	1463
NBM 768	768	74,1	91,9	145	218	281	324	381	463	531	575	659	823	1150	1274	1474	1518
NBM 792	792	76,4	94,8	149	225	290	334	393	478	547	593	680	849	1186	1314	1520	1566
NBM 830	830	80,0	99,3	156	236	304	350	412	501	573	621	713	889	1243	1377	1593	1641
NBM 866	866	82,9	103	162	244	315	363	426	519	594	644	738	922	1288	1427	1650	1700
NBM 890	890	85,8	106	168	253	326	376	441	537	615	666	764	954	1333	1477	1708	1760
NBM 920	920	88,7	110	173	261	337	388	456	555	636	688	790	986	1378	1527	1765	1819
NBM 940	940	90,6	112	177	267	344	397	466	567	649	703	807	1007	1408	1560	1804	1858
NBM 965	965	93,1	115	182	274	353	407	478	582	667	722	828	1034	1445	1601	1852	1908
NBM 1009	1009	97,3	121	190	287	369	426	500	609	697	755	866	1081	1511	1674	1936	1995
NBM 1040	1040	100	124	196	295	381	439	516	627	718	778	893	1114	1557	1726	1995	2056
NBM 1082	1082	104	129	204	307	396	457	536	653	747	810	929	1159	1620	1796	2076	2139
NBM 1107	1107	107	132	209	314	405	467	549	668	765	828	950	1186	1658	1837	2124	2189
NBM 1150	1150	111	138	217	327	421	485	570	694	794	861	987	1232	1722	1908	2207	2274
NBM 1181	1181	114	141	222	335	432	498	586	712	816	884	1014	1266	1768	1960	2266	2335
NBM 1220	1220	118	146	230	346	447	515	605	736	843	913	1047	1307	1827	2025	2341	2412
NBM 1274	1274	123	152	240	362	466	538	632	768	880	953	1094	1365	1908	2114	2444	2519
NBM 1324	1324	128	158	249	376	485	559	656	799	915	991	1137	1419	1983	2197	2540	2618
NBM 1390	1390	134	166	262	395	509	587	689	838	960	1040	1193	1489	2081	2307	2667	2748
NBM 1445	1445	139	173	272	410	529	610	716	872	998	1081	1241	1548	2164	2398	2773	2857

** Height including the IP2X terminal cover*

Maintenance of Batteries

Cleanliness / Mechanical
Cells must be kept clean and dry at all times, as dust and damp cause current leakage. Terminal and connectors should be kept clean, and any spillage during maintenance should be wiped off with a clean cloth. The battery can be cleaned, using water. Do not use wire brush or a solvent of any kind. Vent caps can be rinsed in clean water, if necessary.

Check that the flame arresting vents are tightly sealed and that there are no deposits on the vent caps.

Terminals should be checked for tightness, and the terminals and connectors should be corrosion protected by coating with a thin layer of neutral grease or anti-corrosion oil.

Changing electrolyte
In most stationary operations, the electrolyte will retain its effectiveness for the life of the battery. Thus, normally it is not necessary to change the electrolyte.

However, under certain battery operating conditions involving high temperature and cycling, the electrolyte can become excessively carbonated. Under these circumstances, the battery performance can be improved by replacing the electrolyte. Please consult your representative under these conditions.

Topping up
Check the electrolyte level. Never let the level fall below the lower MIN mark. Use only approved distilled or deionized water to top up. Do not overfill the cells.

Excessive consumption of water indicates operation at too high a voltage or too high temperature. Negligible consumption of water, with batteries on continuous low current or float charge, could indicate undercharging. A reasonable consumption of water is the best indication that a battery is being operated under the correct conditions. Any marked change in the rate of water consumption should be investigated immediately.

Capacity check
Electrical battery testing is not part of normal routine maintenance, as the battery is required to have the back-up function and cannot be easily taken out-of-service.

However, if a capacity test of the battery is needed, the following procedure should be followed:

a) Discharge the battery at the rate of $0.1C_5$ to $0.2C_5$ amperes (10 to 20 amperes for a 100 Ah battery) to a final average voltage of 1.0 volts per cell. (i.e. 92 volts for a 92 cells battery)

b) Charge 200% (i.e. 200 Ah for 100 Ah battery at the same rate used as the above paragraph (a)

c) Discharge at the same rate used in (a), measuring and recording current, voltage and time every hour, and more frequently towards the end of the discharged. This should be continued until a final average voltage of 1.0 volts per cell is reached. The overall state of battery can then be seen, and if individually cell measurements are taken, the state of each cell can be observed.

Recommended maintenance procedure

In order to obtain the best from your battery, the following maintenance procedures are recommended.

Yearly
- Check charge voltage settings
- Check cell voltages
  (50 mV deviation from average is acceptable)
- Check floats current of the battery
- Check electrolyte level
- High voltage charge if agreed for application

Every 2 years
- Clean cell lids and battery area
- Check torque values
- Grease terminals and connectors

Every 5 years or as required
- Capacity check

As required
Top-up with water according to defined period (depend on float voltage, cycles and temperature)

It is also recommended that a maintenance record be kept which should include a record of the temperature of the battery room.

Installation and storage

Batteries on arrival
On receiving the battery, open the cases and check for any indication of damage in transit.

Remove the cells and any accessories from the packaging, and check that the contents are in order and inspect for any damage in transit.

Damage must be reported immediately to the carrier, and the company or its agent.

If batteries are not put into service immediately they should be stored in a clean, dry, cool and well ventilated storage space on open shelves. Plastic cells should not be exposed to direct sunlight.

Before storage, ensure that:
a) Cells are kept clean with adequate protective finish, such as neutral grease on post and connectors.

b) Electrolyte in cells are filled to the correct level.

c) Vents are correctly seated and vent plugs firmly in position. Keep the transit sealing tape in position.

Note that if excessive loss of electrolyte in transit is found in cells supplied filled, ensure that the cells are correctly filled before storage.

Cells after storage
All cells after storage must be prepared for service and fully commissioned.

Cell oil
On top of the electrolyte of filled cells which floats a layer of cell oil to reduce self- discharge and water loss due to evaporation. This layer is approximately 5mm thick, when the cells are delivered empty and must be added to the cells after they have been filled with electrolyte.

Filled Cells
Filled cells can be stored for up to a maximum of one year. The cells should be sealed with plastic transport seals, supplied with the cells. Check the transport seals upon receipt.

If for unavoidable reasons, filled cells have been stored for more than one year, they must be given maintenance cycles as follows:

a) Remove transport seals form the cells.

b) Discharged at the charging current in the Cell Data Tables to 1.0 Volts per cell.

c) Charge to 10 hours at the charging current in the Cell Data Tables, or equivalent.

d) Wait for 24 hours for all gassing to stop.

e) Replace plastic transport seals and return to store.

For batteries stored more than 12months, at least one discharged/charged cycle as above should be carried out before the commissioning change begins.

Discharge and empty
Cells discharge and empty can be stored for many years if kept under the correct conditions. They should be stored in a clean, dry, cool (+10˚C to 30˚C) and well ventilated storage space on open shelves. It is important that they are sealed with the transport seals firmly in place. These should be checked at least yearly, and if necessary replaced or refitted. Failure or the seal will result in ingress of carbon dioxide from the atmosphere, which will result in carbonation of plates. This can affect the capacity of the battery.

Storage of the battery at temperatures above +30˚C can result in loss of capacity. This can be as much as 5% per 10˚C above +30˚C per year. Discharged and empty cells should be filled with electrolyte, and then the procedure for filled cells stored more than 1 year must followed.

Emplacement
The battery should be installed in a dry and clean location, away from direct sunlight, strong daylight and heat.

Block batteries can be fitted on to stands, floor-mounted or fitted into cabinets. The battery will give the best performance and maximum service life when the ambient temperature is between +10°C and + 35°C.

Local standards or codes normally define the mounting arrangements of batteries, and these must be followed, if applicable. However, if this is not the case, the following comments should be used as a guide. When mounting the battery, it is desirable to maintain an easy access to all blocks; they should be situated in a readily available position.

Distance between stands, and between stands and walls, should be sufficient to give good access to the battery.

Example

A battery of 98 cells, type NBH 79 on a two step, two tier stand, is placed in a room of dimension 2m x 2m x 3m

The charging system is capable of charging at 0.1C_5 and so the charging current is 7.9 amperes.

The volume of hydrogen evolved per hour in this, the worst, case is:
= 98 x 7.9 x 0.00045 m^3
= 0.35 m^3

The total volume of room is 2 x 2 x 3 = 12 m^3

Approximate volume of battery and stand does not exceed 1 m^3, and so, the volume of free air in the room is 11 m^3.

Therefore, the concentration of hydrogen gas after charging for 1 hour at full gassing potential at 0.1 C_5 will be: = 0.35/11 = 3.2%

The overall weight of the battery must be considered and the load bearing on the floor taken into account in the selection of the battery accommodation. In case of doubt, please contact your representative for advice.

When mounting the battery, ensure that the cells are correctly interconnected with the appropriate polarity. The battery connection to load should be with nickel-plated cable lugs.

Recommended torque for connecting screws is:

* M6 11 ± 1.0 N.m
* M8 20 ± 2 N.m
* M10 30 ± 3 N.m

To avoid accelerated aging of the plastic due to UV-light, batteries with plastic cell containers should not be exposed to direct sunlight or strong daylight for a prolonged period.

If the battery is enclosed in a cabinet or other such enclosed space, it is important to provide sufficient space to disperse the gasses given off during charging, and also to minimize condensation. It is recommended that at least 200mm be allowed above cell tops, to ensure easy access during inspection and topping up, and that enough space is allowed between cabinet walls and the battery to avoid any risk of short circuits. Flip-top vents may be turned through 180' to achieve the most convenient position for topping-up.

Ventilation

When the battery is housed in a cubicle or enclosed compartment, it is necessary to provide adequate ventilation.

During the last part of high-rate charging, the battery is emitting gases (oxygen-hydrogen mixture).

It is required to establish that the ventilation of the battery room is adequate, and it is necessary to calculate the rate of evolution of hydrogen to ensure that the concentration of hydrogen gas in the room is kept within safe limits.

The normally accepted safe limit for hydrogen is 4%. However, some standards call for more severe levels than this, and levels as low as 1% are sometimes required.

To calculate the ventilation requirements of a battery room, the following method can be used:

1 Ah of overcharge breaks down 0.366 cm^3 of water, and 1 cm^3 of water produces 1.865 liters of gas in the proportion 2/3 hydrogen and 1/3 oxygen. Thus 1 Ah of overcharge produces 0.45 liters of hydrogen.

Therefore, the volume of hydrogen evolved from a battery per hour

= number of cells x charge current x 0.45 liters or

= number of cells x charge current x 0.00045 m^3

The volume of hydrogen found by this calculation can be expressed as a percentage of the total volume of the battery room, and from this, the number of air changes required to keep the concentration of hydrogen below a certain level can be calculated.

Thus, to maintain a maximum concentration of 2%, the air in the room will need changing 3.2 = 1.6 times per hour.

A typical figure for natural room ventilation is about 2.5 air changes per hour, and so, in this case, it would not be necessary to introduce any forced ventilation. In a floating situation, the current flowing is very much lower than when the cell is being charged, and the gas evolution is minimal; it may be calculated in the same way using typical floating currents.

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