saft

Sunica.plus Ni-Cd batteries

The robust daily cycling solution for off-grid solar PV systems

TotalEnergies

Sunica.plus

is the ideal energy storage choice for off-grid solar PV systems

The most reliable battery under the sun – now even better

The new and enhanced Sunica.plus is a perfect example of Saft's commitment to supporting sustainability through innovative approaches to effective and reliable renewable energy schemes. We have now taken Sunica.plus to the next level with four important improvements:

- The number of capacity steps is extended to 36, so it now covers the range from 50 Ah up to 1830 Ah.
- The interval for topping-up with water is increased to 6 years (at 1.50 V).
- Higher cycling capability, up to 10000 cycles at 15% of Depth Of Discharge during the 20-year service life.
- There is a significant improvement in charge efficiency that makes more capacity available for each daily cycle – now up to 95% when the capacity is stabilized.

Thousands of Sunica.plus nickel-cadmium batteries are currently installed in demanding solar photovoltaic (PV) applications worldwide, where they continue to prove their exceptional efficiency and reliability, even when subjected to extreme temperatures, unpredictable demands and frequent daily cycling at variable depths of discharge. It's a tough role for any battery, yet Sunica.plus has risen to the challenge to demonstrate a completely predictable 20-year service life combined with the low maintenance requirements that make it the first choice for remote installations.

(1) Sunica.plus batteries keep solar-powered travel information displays running year-round for Germany's railways.

Effective energy storage for stand-alone installations

A wide variety of remote safety-critical installations worldwide rely increasingly on solar PV systems for cost-effective and environmentally responsible power.

Navigational aids

- Offshore and remote lighthouses
- Fairway beacons and GPS (Global Positioning Systems)

Oil and gas pipelines

- Cathodic protection

Offshore platforms

- Emergency lighting and communications

Transport infrastructure

- Crossing guards, lighting, signalling, information displays

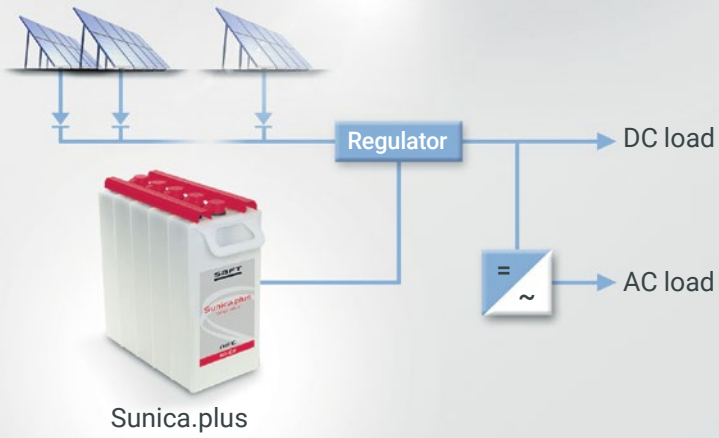
Utilities

- Off-grid rural electrification schemes in remote areas, especially in the developing world

Telecommunications

- Base stations where grid supplies are unreliable or unavailable
- Innovative hybrid power systems working in combination with diesel gensets

Typical off-grid PV application



Sunica.plus

Battery requirements for PV installation

The key requirements for batteries in PV (photovoltaic) applications include:

- capacity to withstand cycling, daily and seasonal, i. e. at variable DOD (Depth Of Discharge) and SOC (State Of Charge),
- ability to operate under the fluctuating charging conditions (voltage, current) created by the intermittent nature of solar power,
- ability to operate at high and low temperatures,
- minimal maintenance and ease of installation for remote sites,
- total reliability and availability throughout the service life.

The perfectly adapted battery for off-grid solar PV installations

Sunica.plus is purpose-designed and fully adapted for optimum performance in PV applications

Sunica.plus is fully engineered and tested to meet the specific performance and reliability needs of solar PV applications.

• Provides a range of capacities from 50 Ah up to 1830 Ah in 36 steps.

• Ensures up to 95% charging efficiency in typical conditions.

• Supports daily and seasonal cycling at variable DOD (Depth Of Discharge) and SOC (State Of Charge).

• Provides excellent cycling capability, up to 10 000 cycles at 15% of daily DOD for a 20-year service life.

• Performs under fluctuating voltage and current charging conditions

• The Sunica.plus delivers 1800 cycles according to IEC 61427-1. The test results demonstrate its superior cycling ability after being subjected to continuous cycling at a partial state of charge (low and high) and at a fixed + 40°C (+ 104°F).

Sunica.plus ensures total reliability in remote installations

Sunica.plus is ideally suited for remote, hard to access installations where routine maintenance is time-consuming and expensive.

• Low maintenance thanks to internal gas recombination that exceeds IEC 62259 requirements.

• Topping-up intervals can be more than 6 years due to the improved charge efficiency.

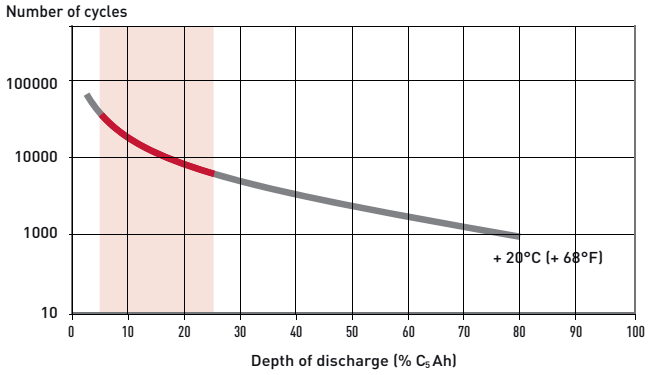
• Reliable operation eliminates interim maintenance.

• Rugged construction facilitates transportation to remote sites.

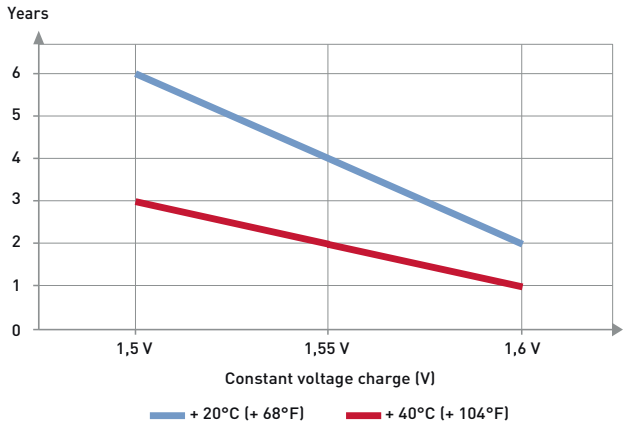
• Optional water-filling system provides safe, easy and efficient topping up.

• Installation is easy with limited handling equipment.

Sunica.plus cycling curve



Typical topping up



Sunica.plus performs in even the harshest operating conditions

Sunica.plus features a robust construction that ensures total continuity of backup power anywhere in the world.

• Operates in extreme temperatures from - 50°C (- 58°F) to + 70°C (+ 158°F).

• Even at – 40°C (- 40°F), the battery still provides 80 percent of its capacity under a typical 120 hour discharge, with no risk of cell freezing when fully discharged.

• Robust pocket plate construction and shock-resistant polypropylene casing material survives the shocks and knocks experienced when transporting batteries over difficult terrain to remote locations.

• Long shelf-life means it can be stored (under normal storage conditions) «ready for use» (i.e. filled and charged) for 24 months without refreshing charge or maintenance.

Sunica.plus drives down the TCO of both the batteries and the entire PV system due to its durability and robustness

Sunica.plus is based on Saft Nife® Ni-Cd technology that delivers excellent performance over a long, predictable Total Cost of Ownership (TCO).

• Eliminates the risk of premature failure or degradation associated with lead-acid batteries.

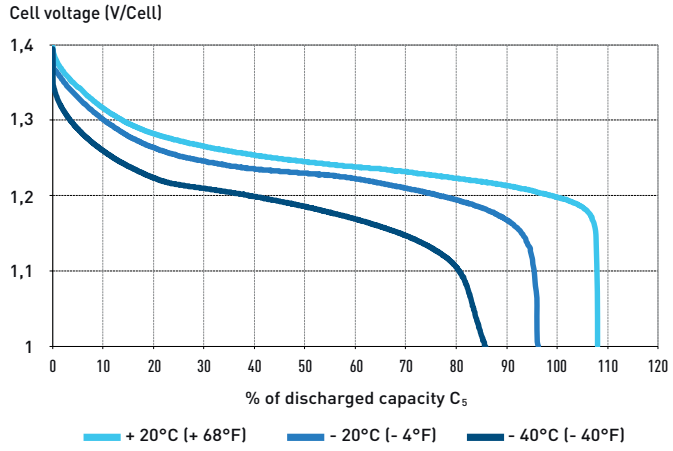
• Resists electrical abuse, including 100% discharge. So there is no need for a low voltage disconnect.

The full battery capacity can be utilized without over-sizing.

• Remains unaffected by accidental overcharge, such as during a charge regulator failure, as well as deep discharge or inversion.

• Prevents: premature capacity loss when cycling at low State Of Charge (SOC), with insufficient recharging; corrosion, when cycling at high SOC and/or high temperature; shedding of active mass when submitted to deep cycles.

Discharge curves at 1/120 C_{120} A according to temperature Battery fully charged



The reliable and sustainable battery Solution for off-grid solar PV

Sunica.plus batteries are designed in full compliance with the highest quality, safety and environmental standards.

Electrical characteristics:

- **Certified IEC 62259 -** Secondary cells and batteries containing alkaline or other non-acid electrolytes - Nickel-cadmium prismatic secondary single cells with partial gas recombination.
- **Certified IEC 60623** - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells.
- **Complies with IEC 61427-1** - Secondary cells and batteries for renewable energy storage
- General requirements and methods of test - Part 1: Photovoltaic off-grid application.

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.

Quality

- **ISO 9001** und **ISO 14001**
- Saft world class continuous programme

Environment & Recycling:

- **Fully recyclable**
- **RoHS** – Although batteries and accumulators are not within the scope of the RoHS directive, Saft 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** - The Saft Group has adopted internal procedures to ensure conformity with the European REACH (Registration, Evaluation, Authorisation and Restriction of Chemical Substances) Regulation.Substances) Regulations.

Saft – end-to-end service and support

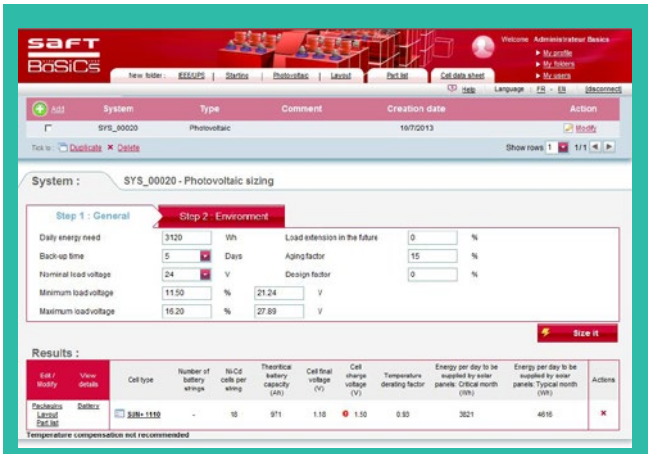
Saft's comprehensive global service provides expert support throughout every stage of your battery's life from initial concept through volume supply, installation and training to end of life recycling. Courses cover basic and advanced skills, with a specific focus on installation, maintenance guidelines and standards to ensure maximum performance and reliability from your PV power systems.

Recommanded charge voltage

Battery system	Number of cells	Daily Depth Of Discharge (% of C_{120})		
		5 to 10%	10 to 15%	15 to 25%
12 V	9	13.5 V	13.95 V	14.4 V
24 V	18	27 V	27.9 V	28.8 V
48 V	36	54 V	55.8 V	57.6 V

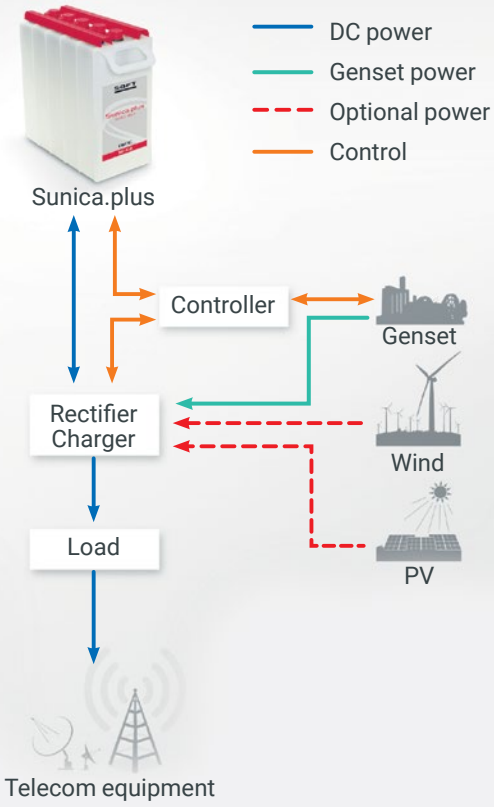
Photovoltaic battery sizing

Our Battery Sizing and Configuration System, known as BaSiCs, helps customers to quickly size the Sunica.plus solution for their photovoltaic applications in taking into account all paremeters (temperature, charge derating factors, design margin) affected the battery size.



To download BaSiCs or access to our service pages, connect to our website:
www.saftbatteries.com

Off-grid hybrid telecom power system operation



Off-grid hybrid telecom power systems

Sunica.plus batteries are the ideal choice for the new generation of hybrid off-grid power systems where they operate in combination with a single diesel generator, and possibly renewable energy sources. Hybrid system advantages include:

- diesel genset runs for only a few hours a day, reducing fuel and maintenance costs by up to 65%, while also cutting CO2 emissions in the same range,
- total continuity of supply for critical telecom applications such as wireless base stations,
- quieter and cleaner operating site.

Sunica.plus
Physical properties and performance

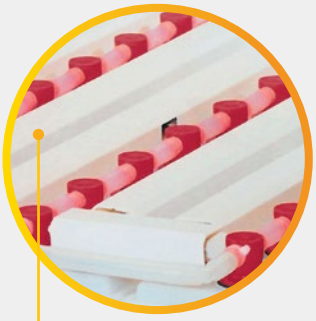
Protective cover
- to prevent external short-circuits
- in line with EN 50272-2 / IEC 62485-2 (safety) with IP2 level

Flame arresting vent plug

Handles

Block concept
up to 6 cells

Cell container
made of tough polypropylene



Automated integral water filling system
Saft's automated integral water filling system is available as an option for Sunica.plus cell range

Sunica.plus installed on an off-grid telecom installation in Africa.

Sunica.plus

Physical properties

Cell type	Capacity C_{120} 120 h 1.0 V Ah	Capacity C_5 5 h 1.0 V Ah	Height		Width		Length per block												Approx. weight per cell		Internal resistance	Cell connection bolt per pole
							1 cell		2 cells		3 cells		4 cells		5 cells		6 cells					
			mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb	mOhm	
SUN+ 50	50	45	405	15,9	195	7,7	-	-	63	2,5	88	3,5	112	4,4	137	5,4	162	6,4	3,2	7,1	5,04	M6
SUN+ 100	100	95	405	15,9	195	7,7	-	-	85	3,9	121	4,8	156	6,1	192	7,6	228	9,0	4,9	10,8	2,55	M8
SUN+ 150	150	140	405	15,9	195	7,7	-	-	109	4,3	157	6,2	204	8,0	252	9,9	300	11,8	6,7	14,7	1,73	M10
SUN+ 200	200	185	405	15,9	195	7,7	-	-	133	5,2	193	7,6	252	9,9	312	12,2	372	14,6	8,4	18,5	1,31	M10
SUN+ 250	250	235	405	15,9	195	7,7	-	-	159	6,3	232	9,1	304	11,9	377	14,8	450	17,7	9,9	21,8	1,03	M10
SUN+ 305	305	280	405	15,9	195	7,7	-	-	183	7,2	268	10,6	352	13,8	437	17,2	522	20,5	11,5	25,3	0,86	M10
SUN+ 355	355	325	405	15,9	195	7,7	-	-	228	9,0	336	13,2	-	-	-	-	-	-	15,1	33,2	0,74	2xM10
SUN+ 405	405	375	405	15,9	195	7,7	-	-	252	9,9	372	14,6	-	-	-	-	-	-	16,8	37,0	0,65	2xM10
SUN+ 455	455	420	405	15,9	195	7,7	-	-	278	10,9	411	16,1	-	-	-	-	-	-	18,3	40,3	0,58	2xM10
SUN+ 505	505	470	405	15,9	195	7,7	-	-	304	11,9	450	17,7	-	-	-	-	-	-	19,8	43,6	0,51	2xM10
SUN+ 555	555	515	405	15,9	195	7,7	171	6,7	-	-	-	-	-	-	-	-	-	-	21,4	47,1	0,47	2xM10
SUN+ 610	610	560	405	15,9	195	7,7	183	7,2	-	-	-	-	-	-	-	-	-	-	23,0	50,7	0,43	2xM10
SUN+ 660	660	610	405	15,9	195	7,7	207	8,1	-	-	-	-	-	-	-	-	-	-	26,5	58,4	0,40	3xM10
SUN+ 710	710	650	405	15,9	195	7,7	219	8,6	-	-	-	-	-	-	-	-	-	-	28,2	62,1	0,37	3xM10
SUN+ 760	760	700	405	15,9	195	7,7	232	9,1	-	-	-	-	-	-	-	-	-	-	29,7	65,4	0,35	3xM10
SUN+ 810	810	750	405	15,9	195	7,7	243	9,6	-	-	-	-	-	-	-	-	-	-	31,4	69,2	0,32	3xM10
SUN+ 860	860	800	405	15,9	195	7,7	256	10,0	-	-	-	-	-	-	-	-	-	-	32,9	72,5	0,30	3xM10
SUN+ 910	910	840	405	15,9	195	7,7	268	10,5	-	-	-	-	-	-	-	-	-	-	34,5	76,0	0,29	3xM10
SUN+ 960	960	890	405	15,9	195	7,7	291	11,4	-	-	-	-	-	-	-	-	-	-	38,1	83,9	0,27	4xM10
SUN+ 1015	1015	940	405	15,9	195	7,7	304	11,9	-	-	-	-	-	-	-	-	-	-	39,6	87,3	0,26	4xM10
SUN+ 1065	1065	980	405	15,9	195	7,7	315	12,4	-	-	-	-	-	-	-	-	-	-	41,2	90,8	0,25	4xM10
SUN+ 1115	1115	1030	405	15,9	195	7,7	327	12,8	-	-	-	-	-	-	-	-	-	-	42,9	94,5	0,23	4xM10
SUN+ 1170	1170	1080	405	15,9	195	7,7	352	13,8	-	-	-	-	-	-	-	-	-	-	46,3	102,0	0,22	4xM10
SUN+ 1215	1215	1120	405	15,9	195	7,7	352	13,8	-	-	-	-	-	-	-	-	-	-	46,0	101,0	0,22	4xM10
SUN+ 1270	1270	1170	405	15,9	195	7,7	352	13,8	-	-	-	-	-	-	-	-	-	-	49,5	109,0	0,21	5xM10
SUN+ 1320	1320	1220	405	15,9	195	7,7	387	15,2	-	-	-	-	-	-	-	-	-	-	51,3	113,0	0,20	5xM10
SUN+ 1370	1370	1260	405	15,9	195	7,7	400	15,7	-	-	-	-	-	-	-	-	-	-	52,7	116,0	0,19	5xM10
SUN+ 1420	1420	1300	405	15,9	195	7,7	412	16,2	-	-	-	-	-	-	-	-	-	-	54,4	119,9	0,19	5xM10
SUN+ 1470	1470	1350	405	15,9	195	7,7	425	16,7	-	-	-	-	-	-	-	-	-	-	55,9	123,0	0,18	5xM10
SUN+ 1520	1520	1400	405	15,9	195	7,7	437	17,2	-	-	-	-	-	-	-	-	-	-	57,5	126,7	0,17	5xM10
SUN+ 1570	1570	1450	405	15,9	195	7,7	462	18,2	-	-	-	-	-	-	-	-	-	-	61,0	134,0	0,17	5xM10
SUN+ 1620	1620	1500	405	15,9	195	7,7	472	18,5	-	-	-	-	-	-	-	-	-	-	62,8	138,4	0,16	6xM10
SUN+ 1670	1670	1550	405	15,9	195	7,7	485	19,1	-	-	-	-	-	-	-	-	-	-	64,2	142,0	0,16	6xM10
SUN+ 1720	1720	1600	405	15,9	195	7,7	497	19,5	-	-	-	-	-	-	-	-	-	-	65,9	145,2	0,15	6xM10
SUN+ 1775	1775	1650	405	15,9	195	7,7	510	20,1	-	-	-	-	-	-	-	-	-	-	67,4	149,0	0,15	6xM10
SUN+ 1830	1830	1700	405	15,9	195	7,7	522	20,5	-	-	-	-	-	-	-	-	-	-	69,0	152,1	0,14	6xM10

SUN+ 50 to SUN+ 505: standard mounted on racks – SUN+ 555 to SUN+ 1830: crosswise mounted on racks

Performance for fully charged cells by a constant current charge according to IEC 62259 standard. Available Amperes at + 20°C ± 5°C (+ 68°F ± 9°F)

Final voltage: 1.14 V/cell

Cell type	Capacity C_{120} 120 h 1.0 V Ah	2 days 48 hours	3 days 72 hours	4 days 96 hours	5 days 120 hours	6 days 144 hours	7 days 168 hours	8 days 192 hours	9 days 216 hours	10 days 240 hours
SUN+ 50	50	1,01	0,69	0,52	0,42	0,36	0,31	0,27	0,24	0,22
SUN+ 100	100	2,03	1,38	1,04	0,84	0,71	0,61	0,54	0,48	0,43
SUN+ 150	150	3,05	2,08	1,55	1,26	1,07	0,92	0,81	0,72	0,65
SUN+ 200	200	4,07	2,77	2,07	1,68	1,42	1,23	1,08	0,96	0,87
SUN+ 250	250	5,09	3,46	2,59	2,09	1,78	1,53	1,34	1,20	1,09
SUN+ 305	305	6,20	4,22	3,16	2,55	2,17	1,87	1,64	1,47	1,32
SUN+ 355	355	7,22	4,91	3,68	2,97	2,52	2,18	1,91	1,71	1,54
SUN+ 405	405	8,24	5,60	4,20	3,39	2,88	2,49	2,18	1,95	1,76
SUN+ 455	455	9,26	6,30	4,72	3,81	3,23	2,79	2,45	2,19	1,98
SUN+ 505	505	10,3	6,99	5,23	4,23	3,59	3,10	2,72	2,43	2,19
SUN+ 555	555	11,3	7,68	5,75	4,65	3,94	3,41	2,98	2,67	2,41
SUN+ 610	610	12,4	8,44	6,32	5,11	4,33	3,74	3,28	2,94	2,65
SUN+ 660	660	13,4	9,13	6,84	5,53	4,69	4,05	3,55	3,18	2,87
SUN+ 710	710	14,4	9,82	7,36	5,95	5,04	4,36	3,82	3,42	3,08
SUN+ 760	760	15,5	10,5	7,88	6,37	5,40	4,67	4,09	3,66	3,30
SUN+ 810	810	16,5	11,2	8,40	6,78	5,76	4,97	4,35	3,90	3,52
SUN+ 860	860	17,5	11,9	8,91	7,20	6,11	5,28	4,62	4,14	3,73
SUN+ 910	910	18,5	12,6	9,43	7,62	6,47	5,59	4,89	4,38	3,95
SUN+ 960	960	19,5	13,3	9,95	8,04	6,82	5,89	5,16	4,62	4,17
SUN+ 1015	1015	20,6	14,0	10,5	8,50	7,21	6,23	5,46	4,89	4,41
SUN+ 1065	1065	21,7	14,7	11,0	8,92	7,57	6,54	5,73	5,13	4,62
SUN+ 1115	1115	22,7	15,4	11,6	9,34	7,92	6,85	5,99	5,37	4,84
SUN+ 1170	1170	23,8	16,2	12,1	9,80	8,31	7,18	6,29	5,64	5,08
SUN+ 1215	1215	24,7	16,8	12,6	10,2	8,63	7,46	6,53	5,85	5,27
SUN+ 1270	1270	25,8	17,6	13,2	10,6	9,02	7,80	6,83	6,12	5,51
SUN+ 1320	1320	26,9	18,3	13,7	11,1	9,38	8,10	7,10	6,36	5,73
SUN+ 1370	1370	27,9	19,0	14,2	11,5	9,73	8,41	7,37	6,60	5,95
SUN+ 1420	1420	28,9	19,6	14,7	11,9	10,1	8,72	7,63	6,84	6,16
SUN+ 1470	1470	29,9	20,3	15,2	12,3	10,4	9,02	7,90	7,08	6,38
SUN+ 1520	1520	30,9	21,0	15,8	12,7	10,8	9,33	8,17	7,32	6,60
SUN+ 1570	1570	31,9	21,7	16,3	13,1	11,2	9,64	8,44	7,56	6,82
SUN+ 1620	1620	33,0	22,4	16,8	13,6	11,5	9,95	8,71	7,80	7,03
SUN+ 1670	1670	34,0	23,1	17,3	14,0	11,9	10,3	8,98	8,05	7,25
SUN+ 1720	1720	35,0	23,8	17,8	14,4	12,2	10,6	9,25	8,29	7,47
SUN+ 1775	1775	36,1	24,6	18,4	14,9	12,6	10,9	9,54	8,55	7,71
SUN+ 1830	1830	37,2	25,3	19,0	15,3	13,0	11,2	9,84	8,82	7,94

Final voltage: 1.16 V/cell

Cell type	Capacity C_{120} 120 h 1.0 V Ah	2 days 48 hours	3 days 72 hours	4 days 96 hours	5 days 120 hours	6 days 144 hours	7 days 168 hours	8 days 192 hours	9 days 216 hours	10 days 240 hours
SUN+ 50	50	1,00	0,68	0,51	0,42	0,35	0,30	0,27	0,24	0,22
SUN+ 100	100	2,00	1,37	1,03	0,84	0,70	0,61	0,54	0,48	0,43
SUN+ 150	150	2,99	2,05	1,54	1,26	1,06	0,91	0,81	0,72	0,65
SUN+ 200	200	3,99	2,74	2,05	1,68	1,41	1,22	1,08	0,96	0,87
SUN+ 250	250	4,99	3,42	2,56	2,09	1,76	1,52	1,34	1,20	1,09
SUN+ 305	305	6,09	4,17	3,13	2,55	2,15	1,86	1,64	1,47	1,32
SUN+ 355	355	7,08	4,86	3,64	2,97	2,50	2,16	1,91	1,71	1,54
SUN+ 405	405	8,08	5,54	4,16	3,39	2,85	2,46	2,18	1,95	1,76
SUN+ 455	455	9,08	6,23	4,67	3,81	3,20	2,77	2,45	2,19	1,98
SUN+ 505	505	10,1	6,91	5,18	4,23	3,56	3,07	2,72	2,43	2,19
SUN+ 555	555	11,1	7,60	5,69	4,65	3,91	3,38	2,98	2,67	2,41
SUN+ 610	610	12,2	8,35	6,26	5,11	4,30	3,71	3,28	2,94	2,65
SUN+ 660	660	13,2	9,03	6,77	5,53	4,65	4,02	3,55	3,18	2,87
SUN+ 710	710	14,2	9,72	7,28	5,95	5,00	4,32	3,82	3,42	3,08
SUN+ 760	760	15,2	10,4	7,80	6,37	5,35	4,63	4,09	3,66	3,30
SUN+ 810	810	16,2	11,1	8,31	6,78	5,70	4,93	4,35	3,90	3,52
SUN+ 860	860	17,2	11,8	8,82	7,20	6,06	5,23	4,62	4,14	3,73
SUN+ 910	910	18,2	12,5	9,34	7,62	6,41	5,54	4,89	4,38	3,95
SUN+ 960	960	19,2	13,1	9,85	8,04	6,76	5,84	5,16	4,62	4,17
SUN+ 1015	1015	20,3	13,9	10,4	8,50	7,15	6,18	5,46	4,89	4,41
SUN+ 1065	1065	21,2	14,6	10,9	8,92	7,50	6,48	5,73	5,13	4,62
SUN+ 1115	1115	22,2	15,3	11,4	9,34	7,85	6,79	5,99	5,37	4,84
SUN+ 1170	1170	23,3	16,0	12,0	9,80	8,24	7,12	6,29	5,64	5,08
SUN+ 1215	1215	24,2	16,6	12,5	10,2	8,56	7,39	6,53	5,85	5,27
SUN+ 1270	1270	25,3	17,4	13,0	10,6	8,94	7,73	6,83	6,12	5,51
SUN+ 1320	1320	26,3	18,1	13,5	11,1	9,30	8,03	7,10	6,36	5,73
SUN+ 1370	1370	27,3	18,7	14,1	11,5	9,65	8,34	7,37	6,60	5,95
SUN+ 1420	1420	28,3	19,4	14,6	11,9	10,0	8,64	7,63	6,84	6,16
SUN+ 1470	1470	29,3	20,1	15,1	12,3	10,4	8,95	7,90	7,08	6,38
SUN+ 1520	1520	30,3	20,8	15,6	12,7	10,7	9,25	8,17	7,32	6,60
SUN+ 1570	1570	31,3	21,5	16,1	13,1	11,1	9,56	8,44	7,56	6,82
SUN+ 1620	1620	32,3	22,2	16,6	13,6	11,4	9,86	8,71	7,80	7,03
SUN+ 1670	1670	33,3	22,9	17,1	14,0	11,8	10,2	8,98	8,05	7,25
SUN+ 1720	1720	34,3	23,5	17,6	14,4	12,1	10,5	9,25	8,29	7,47
SUN+ 1775	1775	35,4	24,3	18,2	14,9	12,5	10,8	9,54	8,55	7,71
SUN+ 1830	1830	36,5	25,0	18,8	15,3	12,9	11,1	9,84	8,82	7,94

Final voltage: 1.18 V/cell

Cell type	Capacity C_{120} 120 h 1.0 V Ah	2 days 48 hours	3 days 72 hours	4 days 96 hours	5 days 120 hours	6 days 144 hours	7 days 168 hours	8 days 192 hours	9 days 216 hours	10 days 240 hours
SUN+ 50	50	0.96	0.67	0.51	0.41	0.35	0,30	0,26	0,24	0,21
SUN+ 100	100	1,92	1,33	1,02	0,83	0,70	0,60	0,53	0,47	0,43
SUN+ 150	150	2,88	2,00	1,53	1,24	1,05	0,90	0,79	0,71	0,64
SUN+ 200	200	3,84	2,66	2,03	1,66	1,39	1,21	1,05	0,95	0,85
SUN+ 250	250	4,79	3,33	2,54	2,07	1,74	1,51	1,32	1,18	1,07
SUN+ 305	305	5,85	4,06	3,10	2,53	2,13	1,84	1,61	1,44	1,30
SUN+ 355	355	6,81	4,73	3,61	2,94	2,48	2,14	1,87	1,68	1,52
SUN+ 405	405	7,77	5,39	4,12	3,36	2,82	2,44	2,14	1,92	1,73
SUN+ 455	455	8,73	6,06	4,63	3,77	3,17	2,74	2,40	2,15	1,94
SUN+ 505	505	9,7	6,72	5,14	4,18	3,52	3,05	2,66	2,39	2,16
SUN+ 555	555	10,6	7,39	5,64	4,60	3,87	3,35	2,93	2,63	2,37
SUN+ 610	610	11,7	8,12	6,20	5,05	4,25	3,68	3,22	2,89	2,60
SUN+ 660	660	12,7	8,79	6,71	5,47	4,60	3,98	3,48	3,12	2,82
SUN+ 710	710	13,6	9,45	7,22	5,88	4,95	4,28	3,74	3,36	3,03
SUN+ 760	760	14,6	10,1	7,73	6,30	5,30	4,58	4,01	3,60	3,24
SUN+ 810	810	15,5	10,8	8,24	6,71	5,65	4,89	4,27	3,83	3,46
SUN+ 860	860	16,5	11,4	8,75	7,13	6,00	5,19	4,54	4,07	3,67
SUN+ 910	910	17,5	12,1	9,25	7,54	6,35	5,49	4,80	4,31	3,88
SUN+ 960	960	18,4	12,8	9,76	7,95	6,69	5,79	5,06	4,54	4,10
SUN+ 1015	1015	19,5	13,5	10,3	8,41	7,08	6,12	5,35	4,80	4,33
SUN+ 1065	1065	20,4	14,2	10,8	8,83	7,43	6,42	5,62	5,04	4,55
SUN+ 1115	1115	21,4	14,8	11,3	9,24	7,78	6,73	5,88	5,28	4,76
SUN+ 1170	1170	22,4	15,6	11,9	9,70	8,16	7,06	6,17	5,54	4,99
SUN+ 1215	1215	23,3	16,2	12,4	10,1	8,47	7,33	6,41	5,75	5,19
SUN+ 1270	1270	24,4	16,9	12,9	10,5	8,86	7,66	6,70	6,01	5,42
SUN+ 1320	1320	25,3	17,6	13,4	10,9	9,21	7,96	6,96	6,25	5,63
SUN+ 1370	1370	26,3	18,2	13,9	11,4	9,55	8,26	7,23	6,48	5,85
SUN+ 1420	1420	27,2	18,9	14,4	11,8	9,9	8,56	7,49	6,72	6,06
SUN+ 1470	1470	28,2	19,6	14,9	12,2	10,3	8,87	7,75	6,96	6,27
SUN+ 1520	1520	29,2	20,2	15,5	12,6	10,6	9,17	8,02	7,19	6,49
SUN+ 1570	1570	30,1	20,9	16,0	13,0	10,9	9,47	8,28	7,43	6,70
SUN+ 1620	1620	31,1	21,6	16,5	13,4	11,3	9,77	8,54	7,67	6,92
SUN+ 1670	1670	32,0	22,2	17,0	13,8	11,6	10,1	8,81	7,90	7,13
SUN+ 1720	1720	33,0	22,9	17,5	14,3	12,0	10,4	9,07	8,14	7,34
SUN+ 1775	1775	34,0	23,6	18,0	14,7	12,4	10,7	9,36	8,40	7,58
SUN+ 1830	1830	35,1	24,4	18,6	15,2	12,8	11,0	9,65	8,66	7,81

Final voltage: 1.20 V/cell

Cell type	Capacity C_{120} 120 h 1.0 V Ah	2 days 48 hours	3 days 72 hours	4 days 96 hours	5 days 120 hours	6 days 144 hours	7 days 168 hours	8 days 192 hours	9 days 216 hours	10 days 240 hours
SUN+ 50	50	0.88	0.62	0,47	0,39	0,33	0,29	0,25	0,23	0,21
SUN+ 100	100	1,76	1,24	0,94	0,78	0,67	0,58	0,51	0,46	0,41
SUN+ 150	150	2,65	1,86	1,41	1,16	1,00	0,86	0,76	0,68	0,62
SUN+ 200	200	3,53	2,48	1,88	1,55	1,33	1,15	1,02	0,91	0,82
SUN+ 250	250	4,41	3,10	2,35	1,94	1,66	1,44	1,27	1,14	1,03
SUN+ 305	305	5,38	3,78	2,86	2,37	2,03	1,76	1,55	1,39	1,25
SUN+ 355	355	6,26	4,40	3,33	2,75	2,36	2,05	1,81	1,62	1,46
SUN+ 405	405	7,14	5,02	3,80	3,14	2,70	2,33	2,06	1,85	1,67
SUN+ 455	455	8,02	5,64	4,27	3,53	3,03	2,62	2,32	2,08	1,87
SUN+ 505	505	8,9	6,26	4,74	3,92	3,36	2,91	2,57	2,31	2,08
SUN+ 555	555	9,8	6,88	5,21	4,30	3,69	3,20	2,82	2,53	2,28
SUN+ 610	610	10,8	7,56	5,73	4,73	4,06	3,52	3,10	2,79	2,51
SUN+ 660	660	11,6	8,18	6,20	5,12	4,39	3,80	3,36	3,01	2,72
SUN+ 710	710	12,5	8,80	6,67	5,51	4,73	4,09	3,61	3,24	2,92
SUN+ 760	760	13,4	9,4	7,14	5,89	5,06	4,38	3,87	3,47	3,13
SUN+ 810	810	14,3	10,0	7,61	6,28	5,39	4,67	4,12	3,70	3,33
SUN+ 860	860	15,2	10,7	8,08	6,67	5,73	4,96	4,38	3,93	3,54
SUN+ 910	910	16,0	11,3	8,55	7,06	6,06	5,24	4,63	4,15	3,74
SUN+ 960	960	16,9	11,9	9,01	7,44	6,39	5,53	4,88	4,38	3,95
SUN+ 1015	1015	17,9	12,6	9,5	7,87	6,76	5,85	5,16	4,63	4,18
SUN+ 1065	1065	18,8	13,2	10,0	8,26	7,09	6,14	5,42	4,86	4,38
SUN+ 1115	1115	19,7	13,8	10,5	8,65	7,42	6,43	5,67	5,09	4,59
SUN+ 1170	1170	20,6	14,5	11,0	9,07	7,79	6,74	5,95	5,34	4,81
SUN+ 1215	1215	21,4	15,1	11,4	9,4	8,09	7,00	6,18	5,55	5,00
SUN+ 1270	1270	22,4	15,7	11,9	9,8	8,45	7,32	6,46	5,80	5,23
SUN+ 1320	1320	23,3	16,4	12,4	10,2	8,79	7,61	6,72	6,03	5,43
SUN+ 1370	1370	24,2	17,0	12,9	10,6	9,12	7,89	6,97	6,26	5,64
SUN+ 1420	1420	25,0	17,6	13,3	11,0	9,5	8,18	7,23	6,48	5,84
SUN+ 1470	1470	25,9	18,2	13,8	11,4	9,8	8,47	7,48	6,71	6,05
SUN+ 1520	1520	26,8	18,8	14,3	11,8	10,1	8,76	7,73	6,94	6,25
SUN+ 1570	1570	27,7	19,5	14,7	12,2	10,5	9,05	7,99	7,17	6,46
SUN+ 1620	1620	28,6	20,1	15,2	12,6	10,8	9,34	8,24	7,40	6,67
SUN+ 1670	1670	29,5	20,7	15,7	12,9	11,1	9,6	8,50	7,63	6,87
SUN+ 1720	1720	30,3	21,3	16,2	13,3	11,5	9,9	8,75	7,85	7,08
SUN+ 1775	1775	31,3	22,0	16,7	13,8	11,8	10,2	9,03	8,10	7,30
SUN+ 1830	1830	32,3	22,7	17,2	14,2	12,2	10,5	9,31	8,36	7,53

Saft is committed to protecting and preserving the environment. We are engaged in a sustained effort to use resources responsibly and to act in a way that clearly demonstrates our great respect for the planet.

As part of its environmental commitment, Saft gives priority to recycled raw materials over virgin raw materials, reduces its plants'air and water releases year after year, minimizes water usage, reduces fossil energy consumption and associated CO_2 emissions, and ensures that its customers have recycling solutions for their spent batteries.

Regarding industrial batteries, Saft has set up a network of Bring Back Points (BBPs) which receive end-of-life nickel-based batteries from end users free of charge. These batteries are then shipped by these BBPs to our recycling facility in Sweden or to fully permitted recycling companies, in compliance with the laws governing trans-boundary waste shipments.

The recycling efficiency of these recyclers exceeds 75% of the nickel-based battery weight (a level which exceeds the mandated recycling efficiency of 65% applicable to lead-acid batteries), and recycled materials are reused as secondary raw material for industry.

This network of Bring Back Points comprises over 30 entities and provides services in all of our major markets in Europe, North America, Asia and Africa. The list of BBPs and their contact details are available on the Saft website.

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