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Sunica.plus Ni-Cd batteries

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

TotalEnergies

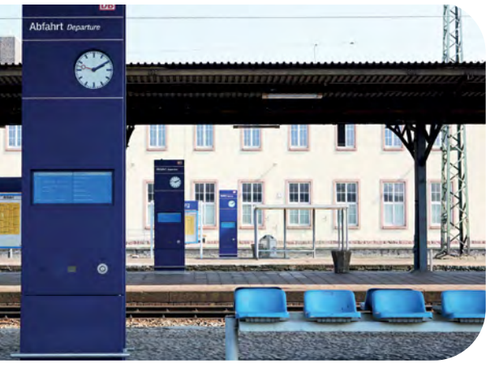
Sunica.plus

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.
- Enabling energy savings and reducing carbon footprint.



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.

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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

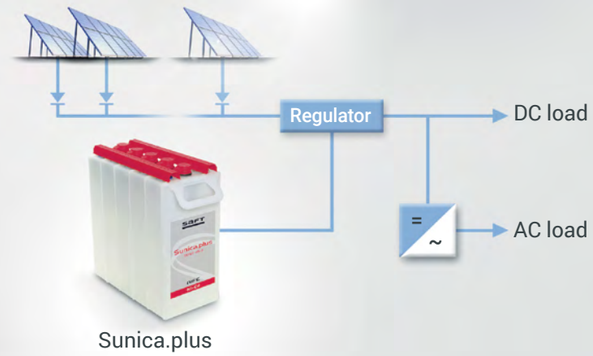
Offshore platforms
- Emergency lighting and communications

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



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.

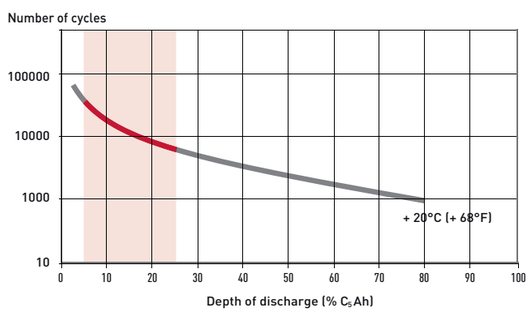
• Reliable operation eliminates interim maintenance.

• Rugged construction facilitates transportation to remote sites.

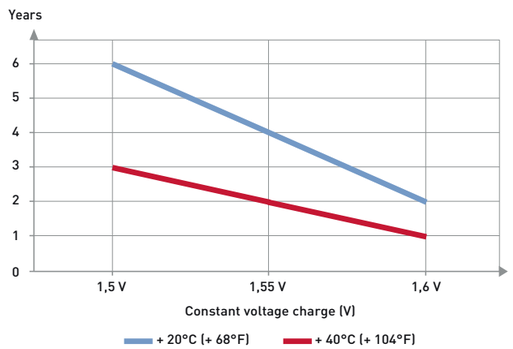
• Optional water-filling system provides safe, easy and efficient topping up.

• 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 (-8°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.

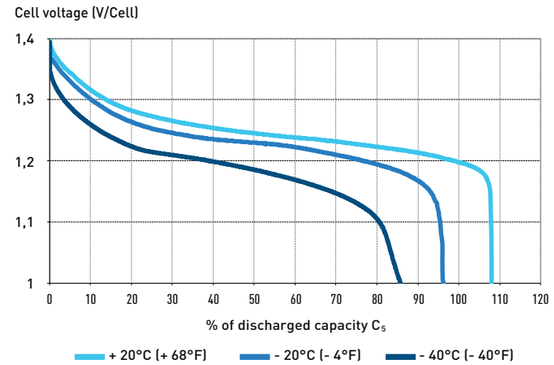
• Resists electrical abuse, including 100% discharge. So there is no need for a low voltage disconnect.

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
- Stationary batteries - The protective covers for terminals and connectors, the insulated cables are compliant with IP2 level protection against electrical shocks according to safety standards.

Quality

- **ISO 9001** und **ISO 14001**
- **Saft Excellence System**

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 operates the only plant in the world that produces nickelcadmium batteries incorporating metals that have been reclaimed on site from spent batteries, reducing their ecofootprint. The recycling of Ni-Cd batteries is a complex process that involves separating the nickel, cobalt and cadmium from the electrodes, a process perfected by Saft's plant in Oskarshamn, Sweden. This plant in Sweden is the only one in the world which combines the recycling of used batteries and the manufacturing of new ones, hence facilitating the incorporation of recycled materials into new products.

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

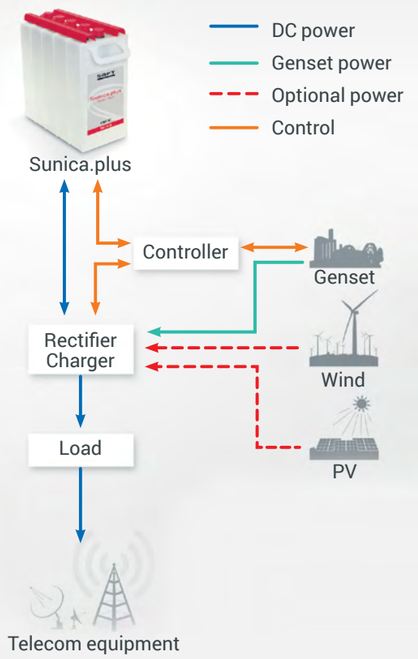
Battery system	Number of cells	Daily Depth Of Discharge (% of C_{120})		
		5 to 10%	10 to 15%	15 to 25%
12 V	9	13.5 V	13.95 V	14.4 V
24 V	18	27 V	27.9 V	28.8 V
48 V	36	54 V	55.8 V	57.6 V

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 CO_2 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		Height		Width		Lenght per block												Approx. Weight per cell		Internal Resistance	Cell
							1 cell		2 cells		3 cells		4 cells		5 cells		6 cells					
	C120 Ah	C5 Ah	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb	mOhm	
SUN+ 50	50	45	411	16.2	195	7.7			63	2.5	88	3.5	113	4.4	138	5.4	163	6.4	3.2	7.1	5.38	M6
SUN+ 100	100	95	411	16.2	195	7.7			85	3.3	121	4.8	157	6.2	193	7.6	229	9.0	4.9	10.8	2.55	M8
SUN+ 136	136	126	411	16.2	195	7.7			109	4.3	157	6.2	205	8.1	253	10.0	301	11.9	6.6	14.6	1.92	M10
SUN+ 150	150	140	411	16.2	195	7.7			109	4.3	157	6.2	205	8.1	253	10.0	301	11.9	6.7	14.8	1.73	M10
SUN+ 175	175	163	411	16.2	195	7.7			133	5.2	193	7.6	253	10.0	313	12.3	373	14.7	8.3	18.3	1.48	M10
SUN+ 200	200	185	411	16.2	195	7.7			133	5.2	193	7.6	253	10.0	313	12.3	373	14.7	8.4	18.5	1.31	M10
SUN+ 235	235	218	411	16.2	195	7.7			159	6.3	232	9.1	305	12.0	378	14.9	451	17.8	9.8	21.6	1.11	M10
SUN+ 250	250	235	411	16.2	195	7.7			159	6.3	232	9.1	305	12.0	378	14.9	451	17.8	9.9	21.8	1.03	M10
SUN+ 275	275	253	411	16.2	195	7.7			183	7.2	268	10.6	353	13.9	438	17.2	523	20.6	11.4	25.1	0.96	M10
SUN+ 305	305	280	411	16.2	195	7.7			183	7.2	268	10.6	353	13.9	438	17.2	523	20.6	11.5	25.4	0.86	M10
SUN+ 320	320	294	411	16.2	195	7.7	121	4.8	229	9.0	337	13.3							15.0	33.1	0.82	2xM10
SUN+ 355	355	325	411	16.2	195	7.7	121	4.8	229	9.0	337	13.3							15.1	33.3	0.74	2xM10
SUN+ 370	370	338	411	16.2	195	7.7	133	5.2	253	10.0	373	14.7							16.7	36.8	0.72	2xM10
SUN+ 405	405	375	411	16.2	195	7.7	133	5.2	253	10.0	373	14.7							16.8	37.0	0.65	2xM10
SUN+ 415	415	380	411	16.2	195	7.7	146	5.7	279	11.0	412	16.2							18.1	39.9	0.64	2xM10
SUN+ 455	455	420	411	16.2	195	7.7	146	5.7	279	11.0	412	16.2							18.3	40.3	0.58	2xM10
SUN+ 485	485	450	411	16.2	195	7.7	159	6.3	305	12.0	451	17.8							19.6	43.2	0.54	2xM10
SUN+ 505	505	470	411	16.2	195	7.7	159	6.3	305	12.0	451	17.8							19.8	43.7	0.51	2xM10
SUN+ 555	555	515	411	16.2	195	7.7	171	6.7											21.4	47.2	0.47	2xM10
SUN+ 596	596	547	411	16.2	195	7.7	207	8.1											25.8	56.9	0.44	3xM10
SUN+ 610	610	560	411	16.2	195	7.7	183	7.2											23.0	50.7	0.43	2xM10
SUN+ 645	645	595	411	16.2	195	7.7	207	8.1											26.3	58.0	0.41	3xM10
SUN+ 660	660	610	411	16.2	195	7.7	207	8.1											26.5	58.4	0.40	3xM10
SUN+ 710	710	650	411	16.2	195	7.7	219	8.6											28.2	62.2	0.37	3xM10
SUN+ 760	760	700	411	16.2	195	7.7	232	9.1											29.7	65.5	0.35	3xM10
SUN+ 790	790	729	411	16.2	195	7.7	244	9.6											30.6	67.5	0.33	3xM10
SUN+ 810	810	750	411	16.2	195	7.7	243	9.6											31.4	69.2	0.32	3xM10
SUN+ 835	835	774	411	16.2	195	7.7	256	10.1											32.1	70.8	0.31	3xM10
SUN+ 860	860	800	411	16.2	195	7.7	256	10.1											32.9	72.5	0.30	3xM10
SUN+ 910	910	840	411	16.2	195	7.7	268	10.6											34.5	76.1	0.29	3xM10
SUN+ 930	930	862	411	16.2	195	7.7	292	11.5											37.6	82.9	0.28	4xM10
SUN+ 960	960	890	411	16.2	195	7.7	292	11.5											38.1	84.0	0.27	4xM10

Sunica.plus

Physical properties

Cell Type	Capacity		Height		Width		Lenght per block 1 cell		Approx. Weight per cell		Internal Resistance	Cell
	C120 Ah	C5 Ah										
SUN+ 1015	1015	940	411	16.2	195	7.7	305	12.0	39.6	87.3	0.26	4xM10
SUN+ 1065	1065	980	411	16.2	195	7.7	316	12.4	41.2	90.8	0.25	4xM10
SUN+ 1115	1115	1030	411	16.2	195	7.7	328	12.9	42.9	94.6	0.23	4xM10
SUN+ 1170	1170	1080	411	16.2	195	7.7	353	13.9	46.3	102.1	0.22	4xM10
SUN+ 1215	1215	1120	411	16.2	195	7.7	353	13.9	46.0	101.4	0.22	4xM10
SUN+ 1245	1245	1150	411	16.2	195	7.7	378	14.9	49.0	108.0	0.21	5xM10
SUN+ 1270	1270	1170	411	16.2	195	7.7	378	14.9	49.5	109.1	0.21	5xM10
SUN+ 1320	1320	1220	411	16.2	195	7.7	388	15.3	51.3	113.1	0.20	5xM10
SUN+ 1370	1370	1260	411	16.2	195	7.7	401	15.8	52.7	116.2	0.19	5xM10
SUN+ 1385	1385	1279	411	16.2	195	7.7	401	15.8	54.0	119.0	0.19	5xM10
SUN+ 1420	1420	1300	411	16.2	195	7.7	413	16.3	54.4	119.9	0.19	5xM10
SUN+ 1470	1470	1350	411	16.2	195	7.7	426	16.8	55.9	123.2	0.18	5xM10
SUN+ 1520	1520	1400	411	16.2	195	7.7	438	17.2	57.5	126.8	0.17	5xM10
SUN+ 1570	1570	1450	411	16.2	195	7.7	463	18.2	61.0	134.5	0.17	6xM10
SUN+ 1620	1620	1500	411	16.2	195	7.7	473	18.6	62.8	138.4	0.16	6xM10
SUN+ 1670	1670	1550	411	16.2	195	7.7	486	19.1	64.2	141.5	0.16	6xM10
SUN+ 1720	1720	1600	411	16.2	195	7.7	498	19.6	65.9	145.3	0.15	6xM10
SUN+ 1775	1775	1650	411	16.2	195	7.7	511	20.1	67.4	148.6	0.15	6xM10
SUN+ 1830	1830	1700	411	16.2	195	7.7	523	20.6	69.0	152.1	0.14	6xM10

Ni-Cd benefits:

▶ Sustainable

- Saft manufacturing process and recycling capability ensure lowest CO_2 footprint
- Saft Ni-Cd wide operating temperature range makes AC and heating redundant, hence saving energy

▶ Reliable

- Long operational life of over 20 years, at least 3 times longer than lead-acid batteries
- No risk of sudden death failure

▶ Economical

- Lowest total cost of ownership

3. Using natural resources sustainably and implementing circular economy principles throughout our operations.

4. Prioritizing suppliers with strong environmental, social, and human rights records.

5. Working to always ensure compliance with environmental regulations and best practices in all locations.

Batteries facilitate the shift towards clean energy, but there is much work to do to achieve Net Zero. Therefore, Saft is committed to reducing its impact while respecting social and human rights all along the value chain.

In 2022, the sustainability performance of Saft was evaluated by Ecovadis, a leading Environment and Social Responsibility rating agency. This evaluation focuses on the following matters: environment, labor and human rights, ethics as well as sustainable procurement.

Saft is ranked within the top 1% of companies involved in the manufacture of batteries and accumulators.

26, quai Charles Pasqua
92300 Levallois-Perret - France
T. : +33 (0)1 58 63 16 00
F. : +33 (0)1 58 63 16 18

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S.A.S. with a capital of 26 724 876 €
R.C.S. Nanterre 481 480 465
VAT FR 51 481 480 465
www.saftbatteries.com

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