

Technical Specification for Vented Lead-Acid Batteries (VLA)

1. Application

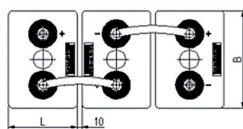
Low-maintenance OPzS.solar batteries are used to store electrical energy in medium-sized and large solar photovoltaic installations. Due to the robust tubular plate design OPzS.solar batteries are excellently suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

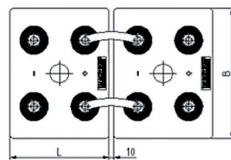
MOLL Type	C _{1h} Ah	C _{10h} Ah	C _{20h} Ah	C _{72h} Ah	C ₁₀₀ Ah	C _{120h} Ah	C _{240h} Ah	R _i ¹⁾ mΩ	I _k ²⁾ kA	Length mm	Width mm	Height mm	Weight (dry) kg	Weight (filled) kg
U _e [V/cell]	1,67	1,80	1,80	1,80	1,80	1,80	1,80							
2 OPzS.solar 140	63	111	127	141	143	144	148	1,52	1,37	105	208	420	9,1	14,5
3 OPzS.solar 220	95	167	191	211	215	217	222	1,06	1,96	105	208	420	11,2	16,4
4 OPzS.solar 290	127	223	254	282	287	289	295	0,84	2,46	105	208	420	12,8	18,0
5 OPzS.solar 360	159	279	318	352	359	361	369	0,70	2,98	126	208	420	15,3	21,7
6 OPzS.solar 430	191	334	382	424	431	434	444	0,60	3,47	147	208	420	18,1	25,7
5 OPzS.solar 500	223	389	432	486	496	500	513	0,57	3,61	126	208	535	20,0	28,8
6 OPzS.solar 600	267	467	518	583	595	601	616	0,49	4,18	147	208	535	23,5	34,0
7 OPzS.solar 690	310	544	604	681	694	700	720	0,44	4,69	168	208	535	26,8	39,1
6 OPzS.solar 880	352	665	748	856	877	888	916	0,47	4,41	147	208	710	33,0	47,4
7 OPzS.solar 1020	415	777	872	993	1.020	1.033	1.065	0,36	5,66	215	193	710	42,1	61,5
8 OPzS.solar 1160	473	886	996	1.137	1.160	1.178	1.216	0,32	6,36	215	193	710	46,6	65,4
9 OPzS.solar 1300	522	992	1.116	1.274	1.300	1.320	1.365	0,33	6,20	215	235	710	51,4	75,4
10 OPzS.solar 1450	585	1.100	1.240	1.418	1.450	1.464	1.516	0,28	7,25	215	235	710	56,0	79,4
11 OPzS.solar 1590	635	1.210	1.362	1.555	1.590	1.608	1.665	0,28	7,36	215	277	710	61,0	89,6
12 OPzS.solar 1740	698	1.320	1.486	1.699	1.740	1.752	1.816	0,24	8,41	215	277	710	65,4	93,4
11 OPzS.solar 1870	790	1.470	1.636	1.836	1.870	1.884	1.941	0,24	8,38	215	277	855	72,7	105,9
12 OPzS.solar 2040	869	1.600	1.784	2.001	2.040	2.052	2.116	0,22	9,48	215	277	855	77,4	110,4
13 OPzS.solar 2210	978	1.740	1.938	2.174	2.210	2.232	2.292	0,16	13,03	215	400	815	90,8	137,8
14 OPzS.solar 2380	1.051	1.880	2.080	2.332	2.380	2.400	2.448	0,15	13,82	215	400	815	95,3	142,4
15 OPzS.solar 2550	1.123	2.010	2.220	2.498	2.550	2.568	2.640	0,14	14,43	215	400	815	100,2	146,9
16 OPzS.solar 2710	1.195	2.140	2.380	2.664	2.710	2.736	2.808	0,13	15,20	215	400	815	105,4	151,6
17 OPzS.solar 2910	1.280	2.290	2.540	2.858	2.910	2.940	3.000	0,12	16,91	215	490	815	117,7	175,1
18 OPzS.solar 3080	1.352	2.420	2.680	3.024	3.080	3.108	3.192	0,11	17,55	215	490	815	121,9	179,1
19 OPzS.solar 3250	1.425	2.560	2.840	3.189	3.250	3.276	3.360	0,11	18,36	215	490	815	126,8	183,6
20 OPzS.solar 3420	1.496	2.690	2.980	3.355	3.420	3.444	3.528	0,11	18,92	215	490	815	132,0	188,3
22 OPzS.solar 3750	1.635	2.950	3.280	3.686	3.750	3.780	3.888	0,10	19,92	215	580	815	145,4	213,9
24 OPzS.solar 4090	1.777	3.220	3.560	4.010	4.090	4.128	4.224	0,09	21,26	215	580	815	155,2	223,0
26 OPzS.solar 4420	1.917	3.480	3.860	4.341	4.420	4.464	4.584	0,09	22,49	215	580	815	165,0	232,0

1, 2) Internal resistance R_i and short circuit current I_k according to IEC 60896-11. Height is the maximum height between container bottom and top of the bolt in assembled condition. All values given in the table represent maximum values without voltage loss of connectors on the basis of 100 % DOD.
Please consider item 7.

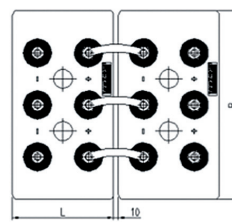
3. Terminal positions



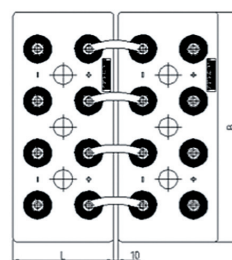
2 OPzS.solar 140 to 6 OPzS.solar 880



7 OPzS.solar 1020 to 12 OPzS.solar 2040

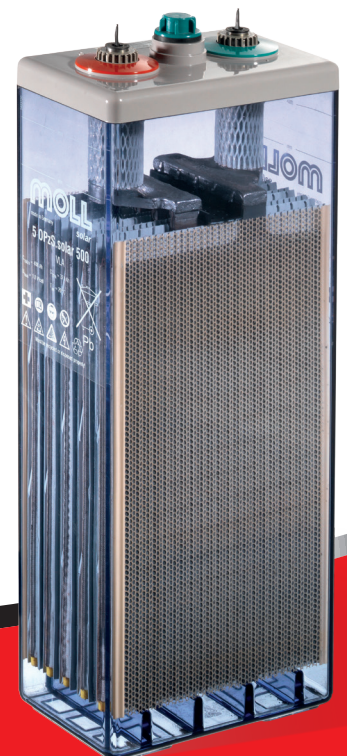


13 OPzS.solar 2210 to 16 OPzS.solar 2710



17 OPzS.solar 2910 to 26 OPzS.solar 4420

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or solid insulated copper connectors with a cross-section of 90, 150 or 300 mm².



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4. Design

Positive electrode	tubular plate with woven polyester gauntlet and solid grids made of a corrosion-resistant PbSbSnSe-low antimony alloy
Negative electrode	grid-plate made of low antimony alloy with long-life expander material
Separation	microporous separator
Electrolyte	sulphuric acid with a density of 1.24 kg/l (20 °C)
Container	high impact, translucent SAN (Styrene acrylonitrile), UL-94 rating: HB
Lid	high impact, grey coloured SAN (Styrene acrylonitrile), UL-94 rating: HB
Plugs	labyrinth plugs to arrest aerosols, optional ceramic plugs or ceramic funnel plugs according to DIN 40740
Pole-bushing	100 % gas- and electrolyte-proof, sliding plastic-coated "Panzerpol"
Protection class	IP 25 according to EN 60529, protected from contact according to VBG 4

5. Installation

OPzS.solar batteries are designed for indoor applications.

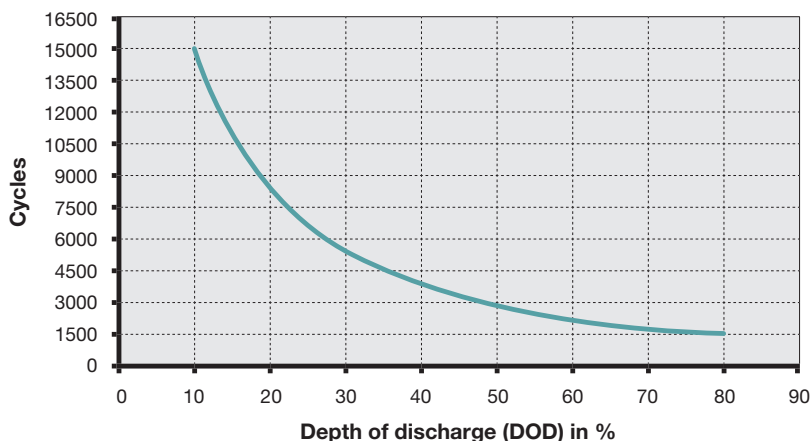
6. Maintenance

Every 6 months	check battery voltage, cell voltages and temperatures
Every 12 months	check connections, record battery voltage, cell voltages and temperatures (according to operation instructions)

7. Operational data

Depth of discharge (DOD)	max. 80 % ($U_e = 1.91V/\text{cell}$ for discharge times >10 h; 1.74V/cell for 1 h), deep discharges of more than 80 % DOD have to be avoided
Charge current	$5 \times I_{10}$ to $0.01 \times I_{10}$
Floating voltage	2.23V/cell
Charge voltage at cyclic operation	2.30V to 2.35V/cell
DOD per day < 20 % C_{10}	2.35V to 2.40V/cell
DOD per day > 20 % C_{10}	
Adjustment of charge voltage	no adjustment necessary if battery temperature is between 10 °C and 30 °C in the monthly average, otherwise $\Delta U/\Delta T = -0.003V/\text{cell per } ^\circ\text{C}$ within a period of 1 up to 4 weeks
Recharge to 100 %	3150 (A+B)
IEC 61427 cycles	-20 °C to 55 °C, recommended temperature range: 10 °C to 30 °C
Battery temperature	approx. 3 % per month at 20 °C
Self-discharge	

8. Number of cycles as function of depth of discharge



9. Transport

Batteries are not subject to ADR (road transport), if the conditions of Special Provision 598 (Chapter 3.3) are observed. These cells/batteries are dangerous goods on sea transport. Declaration and packaging must comply with the requirements of IMDG-Codes.

10. Standards

Test standards	IEC 60896-11, IEC 61427
Safety standard, ventilation	EN 50272-2