

Technical Specification for Valve Regulated Lead-Acid Batteries (VRLA-GEL)

1. Application

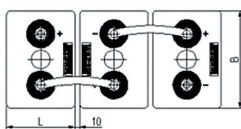
Maintenance-free OPzV.solar batteries are used to store electrical energy in medium-sized and large solar photovoltaic installations. Due to the robust tubular plate design OPzV.solar batteries are excellently suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

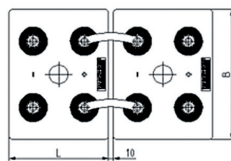
mOLL Type	C _{1h} Ah	C _{10h} Ah	C _{20h} Ah	C _{72h} Ah	C ₁₀₀ Ah	C _{120h} Ah	C _{240h} Ah	R _i ¹⁾ mΩ	I _k ²⁾ kA	Length mm	Width mm	Height mm	Weight kg
U ₀ [V/cell]	1,67	1,80	1,80	1,80	1,80	1,80	1,80						
2 OPzV.solar 160	71	121	134	153	157	158	165	1,65	1,30	105	208	420	13
3 OPzV.solar 240	107	182	202	229	236	238	247	1,15	1,86	105	208	420	17
4 OPzV.solar 310	143	243	268	306	314	318	331	0,89	2,40	105	208	420	20
5 OPzV.solar 390	179	304	336	383	393	397	412	0,73	2,91	126	208	420	23
6 OPzV.solar 470	215	364	404	460	472	477	496	0,63	3,39	147	208	420	28
5 OPzV.solar 580	254	447	506	570	583	589	609	0,68	3,14	126	208	535	32
6 OPzV.solar 690	302	529	598	671	686	693	715	0,58	3,64	147	208	535	37
7 OPzV.solar 790	350	610	688	770	788	795	820	0,52	4,12	168	208	535	42
6 OPzV.solar 970	417	729	834	943	968	978	1.012	0,46	4,63	147	208	710	51
7 OPzV.solar 1140	492	858	980	1.116	1.140	1.154	1.195	0,36	5,81	215	193	710	62
8 OPzV.solar 1280	559	970	1.106	1.252	1.280	1.296	1.344	0,32	6,54	215	193	710	69
9 OPzV.solar 1450	616	1.090	1.252	1.418	1.450	1.464	1.524	0,34	6,29	215	235	710	77
10 OPzV.solar 1600	691	1.200	1.382	1.562	1.600	1.620	1.675	0,28	7,50	215	235	710	84
11 OPzV.solar 1750	748	1.320	1.512	1.713	1.750	1.764	1.836	0,28	7,56	215	277	710	92
12 OPzV.solar 1900	822	1.440	1.644	1.857	1.900	1.920	1.989	0,24	8,63	215	277	710	99
11 OPzV.solar 2070	839	1.570	1.772	2.023	2.070	2.088	2.169	0,27	7,86	215	277	855	108
12 OPzV.solar 2230	927	1.710	1.918	2.181	2.230	2.256	2.337	0,23	9,18	215	277	855	117
13 OPzV.solar 2490	1.040	1.890	2.120	2.426	2.490	2.508	2.592	0,18	11,91	215	400	815	132
14 OPzV.solar 2740	1.125	2.070	2.320	2.678	2.740	2.772	2.880	0,17	12,63	215	400	815	141
15 OPzV.solar 2840	1.191	2.170	2.420	2.772	2.840	2.868	2.976	0,16	13,25	215	400	815	148
16 OPzV.solar 3000	1.265	2.300	2.580	2.937	3.000	3.036	3.144	0,15	13,94	215	400	815	156
17 OPzV.solar 3260	1.358	2.480	2.780	3.182	3.260	3.300	3.408	0,14	15,32	215	490	815	174
18 OPzV.solar 3420	1.433	2.610	2.920	3.348	3.420	3.468	3.576	0,13	16,03	215	490	815	182
19 OPzV.solar 3590	1.507	2.740	3.080	3.506	3.590	3.624	3.744	0,12	16,70	215	490	815	190
20 OPzV.solar 3750	1.581	2.870	3.220	3.664	3.750	3.792	3.912	0,12	17,37	215	490	815	198
22 OPzV.solar 4220	1.740	3.210	3.600	4.118	4.220	4.272	4.416	0,11	18,43	215	580	815	206
24 OPzV.solar 4550	1.887	3.470	3.900	4.442	4.550	4.596	4.752	0,10	19,76	215	580	815	222
26 OPzV.solar 4710	2.014	3.650	4.060	4.608	4.710	4.764	4.920	0,10	21,02	215	580	815	235

1, 2) Internal resistance R_i and short circuit current I_k according to IEC 60896-21. 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.

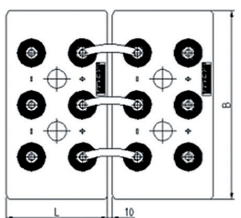
3. Terminal positions



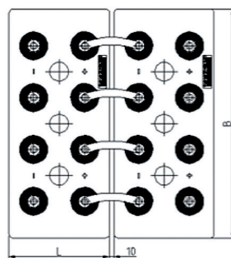
2 OPzV.solar 160 to 6 OPzV.solar 970



7 OPzV.solar 1140 to 12 OPzV.solar 2230



13 OPzV.solar 2490 to 16 OPzV.solar 3000



17 OPzV.solar 3260 to 26 OPzV.solar 4710

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 cross-section 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 PbCaSn-alloy
Negative electrode	grid-plate made of PbCaSn-alloy with long-life expander material
Separation	microporous separator
Electrolyte	sulphuric acid with a density of 1.24 kg/l (20 °C), fixed as GEL by fumed silica
Container and lid	high impact ABS (Acrylonitrile butadienestyrene), grey coloured, UL-94 rating: HB, on request also in UL-94 rating: V-0
Valve	one valve per cell with flame arrestor, opening pressure approx. 120 mbar
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

OPzV.solar batteries are designed for indoor applications.
For outdoor applications please contact the battery manufacturer.

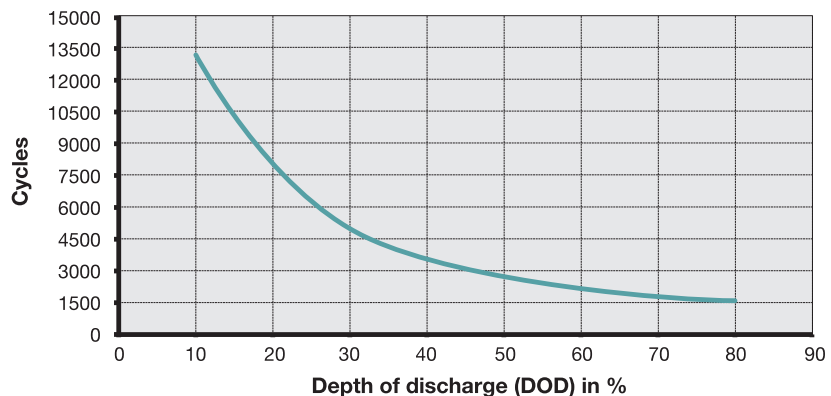
6. Maintenance

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 % ($U_g = 1.91$ V/cell for discharge times >10 h; 1.80 V/cell for 1 h), deep discharges of more than 80 % DOD have to be avoided
Charge current	minimum charge current should be I_{10} ; the charge current can reach $5 \times I_{10}$
Charge voltage at cyclic operation	
DOD per Day < 40 % C_{10}	2.30 V – 2.35 V/cell
DOD per Day > 40 % - 60 % C_{10}	2.35 V – 2.40 V/cell
Floating voltage/ non cyclic voltage	2.25 V/cell
Adjustment of charge voltage	no adjustment necessary if battery temperature is between 10 °C und 45 °C in the monthly average, $\Delta U/\Delta T = -0.003$ V/cell per °C below 10 °C
Recharge to 100 %	within a period of 1 up to 4 weeks
IEC 61427 cycles	>3000 (A+B)
Battery temperature	-20 °C to 45 °C, recommended temperature range: 10 °C to 30 °C
Self-discharge	approx. 2 % per month at 20 °C

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 Provisions 598 and 238 (Chapter 3.3) are observed. The cells/batteries conform to the IMDG-Code; therefore these products are no dangerous goods on sea transport.

10. Standards

Test Standards	IEC 60896-21, IEC 61427
Safety standard, ventilation	EN 50272-2