



VALVE-REGULATED
SEALED LEAD
ACID BATTERY



Powerline **SGP Series**

General purpose

Product Guide

Advanced Battery Technology

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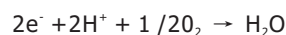
General Specifications

Battery Type	Nominal Voltage (V)	Nominal Capacity (20°C)		Length mm	Width mm	Height mm	Overall Height with Poles mm	Weight kg	Maximum Current (20°C)		Internal Impedance (20°C) mOhm	Terminal Types	Terminal Layout
		C ₂₀ (Ah) 1.75Vpc	C ₁₀ (Ah) 1.75Vpc						In 1 min (A)	In 1 sec (A)			
SGP12-40	12	40	37.00	198	166	170	170	14.19	360	640	7.24	M6x φ 16	B
SGP12-45	12	45	41.63	198	166	170	170	15.10	405	720	7.20	M6x φ 16	B
SGP12-50	12	50	46.25	228	138	208	213	16.77	450	750	6.71	M6x φ 16	A
SGP12-60	12	60	55.50	228	138	208	213	18.75	480	780	5.08	M6x φ 16	A
SGP12-80	12	80	74.01	261	173	220	224	27.50	640	960	4.62	M6x φ 16	A
SGP12-90	12	90	83.25	305	168	208	213	29.00	675	990	3.98	M6x φ 16	A
SGP12-100	12	100	92.50	329	172	216	223	33.37	700	1000	3.94	M8x φ 18	A
SGP12-120	12	120	111.00	407	173	222	231	40.51	720	1200	3.18	M8x φ 18	A
SGP12-150	12	150	138.80	497	203	228	237.5	54.97	900	1500	3.11	M8x φ 18	D
SGP12-180	12	180	166.50	532	206	214	219	60.50	1080	1620	3.10	M8x φ 17	C
SGP12-200	12	200	185.00	532	206	214	219	64.30	1200	1800	2.57	M8x φ 17	C
SGP12-260	12	260	240.50	521	269	220	225	81.30	1300	2080	2.11	M8x φ 18	C
SGP6-225	6	225	208.90	320	176	225	231	34.9	1125	2025	2.27	M8x φ 18	F

Technology

Principle of VRLA batteries

During charging of conventional lead acid battery, electrolyte is turned into water at the final stage and hydrogen generates from the negative plates and oxygen from the positive plates. This causes water loss and periodic watering is needed. However, evolution of oxygen and hydrogen gases does not occur simultaneously, because the recharge of the positive plates is not as efficient as the negative ones. This means that oxygen is evolved from the positive plate before hydrogen is evolved from the negative plate. At the same time, oxygen is evolved from the positive plate, a substantial amount of highly active spongy lead exists on the negative plate before it commences hydrogen evolution. Therefore, providing oxygen can be transported to the negative plates, conditions are ideal for a rapid reaction between lead and oxygen, for i.e., oxygen is electrochemically reduced on the negative plate according to the following formula,



and the final product is water.

The current flowing through the negative plate drives this reaction instead of hydrogen evolution, which occurs, in a conventional battery.

This process is called gas recombination. If this process were 100% efficient no water would be lost from the battery. By careful design and selection of battery components, gas recombination efficiency is from 95% to 99%.

Introduction

ABT Powerline SGP Series is a general purpose battery according to Eurobat Classification with 10 years design life for standby application. As with all ABT batteries, all are rechargeable, highly efficient, leakage proof and maintenance free.

Applications

- General Electronics
- Power supply
- Control Equipment
- Telecommunication Systems
- UPS
- CATV
- Communications Equipment
- Emergency Lighting Systems
- Fire & Security Systems
- Microprocessor Based Office machines
- Marine equipment

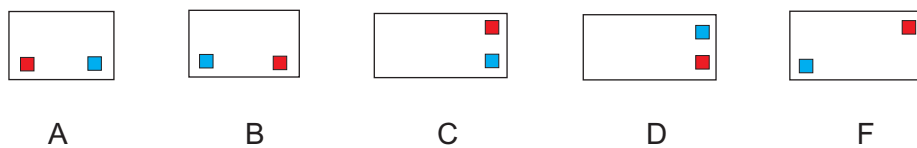
Standards

- IEC61056-1/2 2002
- JIS C8702-1/2 2009

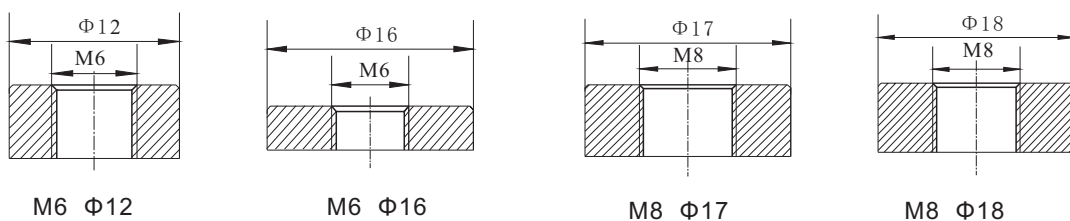
Certification

- CE
- UL
- GOST
- ISO9001
- ISO14001
- OHSAS18001

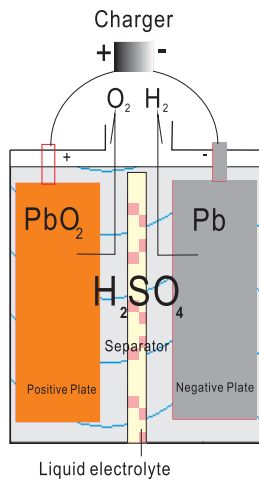
Terminal Layout



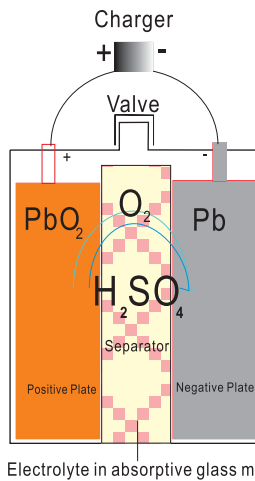
Terminals



Principle of the oxygen reduction cycle



Conventional Cell
Oxygen and hydrogen escape to the atmosphere.



ABT SGP
Oxygen from the positive plate transfers to the negative Liquid Electrolyte in absorptive glass mat and recombines with lead to form water.

Recombination efficiency

Recombination efficiency is determined under specific conditions by measuring the volume of hydrogen emitted from the battery and converting this into its ampere-hour equivalent. This equivalent value is then subtracted from the total ampere-hours taken by the battery during the test period, and the remainder is the battery's recombination efficiency and is usually expressed as a percentage.

As recombination is never 100%, some hydrogen gas is emitted from batteries through the safety valve. The volume of gas emitted is very small and typical average values on constant potential float at 20°C are as follows:

Float voltage (V)	Volume of gas emitted (ml/cell/C ₂₀ /month)
2.27~2.30	3.8
2.40~2.45	25.0

Technical Features

• **Sealed Construction**

ABT unique construction and sealing technique ensures no electrolyte leakage from case or terminals

• **AGM Separator Design**

Low resistance microporous glassfibre separator .The electrolyte is absorbed within this material.

• **Gas Recombination Efficiency**

ABT Powerline SGP batteries incorporate a built-in design that controls gas generation and provides recombination of more than 99% of gasses generation during float usages.

• **Low Pressure Valve Regulated System**

All ABT Powerline SGP batteries are equipped with safety release valves , designated to operate between 2 and 5 psi and automatically reseal . Hence , there is never an excessive accumulation of gas within the battery .

• **Maintenance Free Operation**

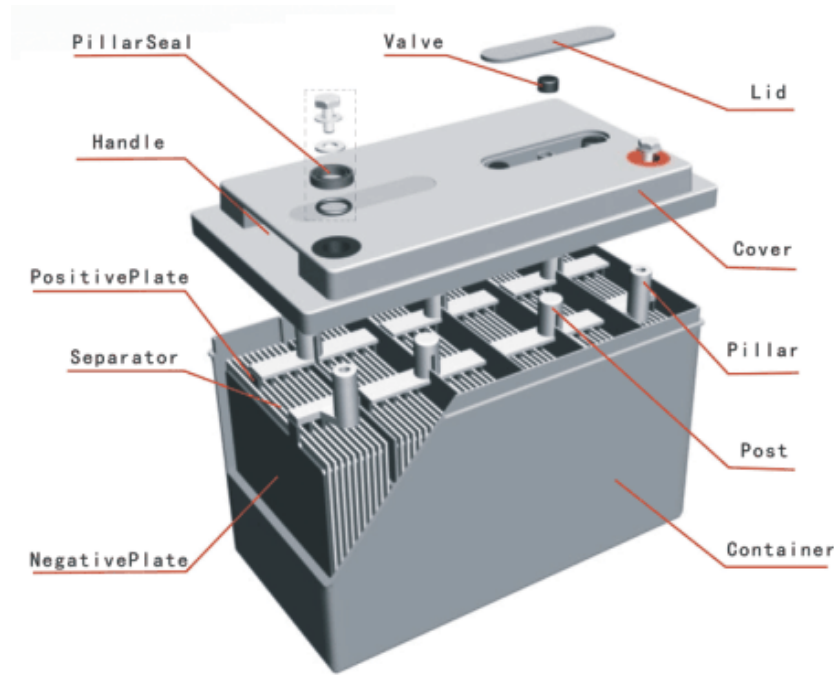
There is no need to check specific gravity of the electrolyte or add water to ABT Powerline SGP batteries during float service life.

• **Terminals**

Powerline SGP batteries are manufactured using a range of terminals which vary in size and type.

• **Construction**

The construction and sealing technique of the ABT Powerline SGP batteries guarantee leakproof operation in any position with no adverse effect to capacity or service life.



- Grids**
 The heavy duty lead calcium alloy grids provide an extra margin of performance and long life in floating applications and give unparalleled recovery from deep discharge.
- Floating Service Life**
 Depending on the DOD, the expected service life is ten years in float standby applications.
- Long shelf Life**
 The extremely low shelf discharge rate allows the battery to be stored for extended periods up to one year at normal ambient temperatures with no permanent loss of capacity.
- Operating Temperature Range**
 The batteries can be used over a broad temperature range permitting considerable flexibility in system design and location

 Discharge -20~60°C;
 Charge -10~60°C;
 Storage -20~60°C
- Deep Discharge Recovery**
 ABT Powerline SGP batteries recover their capacities even after repeated deep discharge.

Charge Characteristics

The cells in the ABT Powerline SGP product range must be charged at a constant voltage at an ambient temperature of 20°C, the batteries should be charged at 2.27-2.30 volts per cell. It is not necessary to limit the current, as this will be governed by the maximum output available from the charger until the voltage limit is reached. The charging voltage of 2.27-2.30 volts should also be used for float charging. To achieve nominal performance characteristics, it is recommended to adjust this value to suit the ambient temperature, as indicated in the following table:

Temperature (°C)	Float voltage range per cell
0	2.33-2.36V
10	2.30-2.33V
20	2.27-2.30V
25	2.25-2.28V
30	2.24-2.27V
35	2.22-2.25V

Under these conditions a full recharge will be completed in approximately 48 hours.

Fast recharge:

Increasing the charge voltage to 2.40 Volts per cell can reduce recharge time and it is possible, depending on the depth of discharge, to half the recharge time. Under these conditions, however, the charge must be monitored and must be terminated when the charge current remains reasonably steady for 3 hours after the voltage limit has been reached. At the beginning of charge the current must be limited to $0.3C_{20}$ (A).

Ripple current:

The ripple content of the charging current affects the life of the battery. It is recommended to limit the continuous ripple current to $0.05 C_{20}$ (in amperes) as recommended value (never exceed $0.10C_{20}$). Transient and other ripple type voltage excursions can be accommodated provided that, with the battery disconnected, the system peak to peak voltage including regulation limits falls within 2.5% of the recommended float voltage of the battery.

Tables of performance ABT Powerline SGP Constant Current Discharge

Amperes

Battery Type	Constant Current Discharge (Amperes) at 20°C to 1.60 volts per cell													
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h	
SGP12-40	120.3	92.80	68.90	43.24	25.00	15.66	11.10	8.730	7.200	4.914	3.920	2.107	1.767	
SGP12-45	135.3	97.70	77.37	47.41	28.13	19.25	12.58	9.991	8.155	5.670	4.413	2.358	1.990	
SGP12-50	150.4	116.0	86.20	51.62	31.25	19.57	14.16	10.94	9.073	6.446	5.135	2.831	2.319	
SGP12-60	180.4	139.2	110.3	67.53	37.50	24.47	17.53	13.57	11.22	7.347	5.789	3.212	2.678	
SGP12-80	240.6	185.6	137.9	82.8	50.08	30.00	21.53	16.94	14.19	9.59	7.52	4.16	3.50	
SGP12-90	270.7	208.8	155.1	95.59	56.25	35.42	24.90	19.20	16.13	11.02	8.780	4.749	3.940	
SGP12-100	300.7	232.0	174.2	106.7	62.50	39.14	28.30	21.48	17.73	11.99	9.798	5.300	4.446	
SGP12-120	360.9	278.4	211.1	130.9	75.00	48.17	33.60	25.41	21.28	14.39	11.76	6.300	5.400	
SGP12-150	451.1	351.5	264.8	165.5	93.75	63.00	42.30	32.40	26.79	17.99	14.62	8.000	6.650	
SGP12-180	541.3	417.6	310.2	198.0	112.5	80.20	53.40	40.12	32.40	21.58	17.55	9.540	8.072	
SGP12-200	601.5	464.0	344.7	218.0	125.0	89.70	55.60	43.68	36.00	23.98	19.60	10.60	9.000	
SGP12-260	782.0	603.0	457.1	289.9	162.5	104.1	72.40	56.28	46.85	32.56	25.23	13.90	11.58	
SGP6-225	677.0	522.0	387.8	232.9	140.9	84.4	60.6	47.65	39.90	26.98	21.15	11.70	9.86	

Battery Type	Constant Current Discharge (Amperes) at 20°C to 1.65 volts per cell													
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h	
SGP12-40	111.1	87.80	66.10	42.01	24.38	15.26	10.85	8.504	6.972	4.839	3.837	2.079	1.749	
SGP12-45	125.7	94.70	74.26	46.11	27.63	18.77	12.30	9.753	8.000	5.510	4.330	2.322	1.972	
SGP12-50	139.0	109.7	82.60	50.48	30.81	19.14	13.92	10.75	8.890	6.300	4.974	2.729	2.275	
SGP12-60	167.2	131.6	104.6	65.49	36.78	23.69	17.04	13.21	10.82	7.166	5.701	3.161	2.649	
SGP12-80	221.6	175.5	138.5	87.60	48.20	32.80	23.50	17.38	14.49	9.956	7.781	4.205	3.626	
SGP12-90	248.0	197.5	148.8	92.57	55.60	34.51	24.40	18.85	15.83	10.80	8.637	4.674	3.910	
SGP12-100	277.8	219.4	167.4	104.0	60.56	37.90	27.30	20.97	17.34	11.79	9.625	5.205	4.394	
SGP12-120	335.7	263.3	201.7	127.7	73.21	47.06	32.40	24.99	20.92	14.15	11.53	6.230	5.310	
SGP12-150	416.9	330.7	254.4	158.9	91.10	61.50	40.90	31.54	26.09	17.69	14.34	7.854	6.520	
SGP12-180	500.3	394.9	298.8	191.5	109.6	78.30	51.70	39.03	31.66	21.22	17.24	9.374	7.903	
SGP12-200	552.4	438.8	330.6	210.9	123.2	86.20	54.30	42.64	35.09	23.58	19.21	10.41	8.860	
SGP12-260	719.0	570.0	437.5	280.6	158.5	100.9	70.60	55.11	45.99	31.80	24.79	13.55	11.41	
SGP6-225	612.0	493.7	371.9	224.6	139.1	82.9	59.6	46.85	39.23	26.53	21.07	11.60	9.77	

Tables of performance ABT Powerline SGP

Constant Current Discharge

Constant Current Discharge (Amperes) at 20°C to 1.70 volts per cell													
Battery Type	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h
SGP12-40	103.8	82.40	63.33	40.72	23.73	14.82	10.60	8.271	6.796	4.760	3.767	2.049	1.731
SGP12-45	117.4	90.60	71.56	44.98	27.09	18.14	12.00	9.480	7.799	5.340	4.253	2.293	1.948
SGP12-50	129.8	102.9	79.28	49.02	30.13	18.71	13.63	10.54	8.707	6.154	4.792	2.619	2.224
SGP12-60	155.8	123.5	99.45	63.29	36.00	22.98	16.60	12.82	10.51	6.994	5.626	3.086	2.615
SGP12-80	207.7	164.7	132.5	83.90	46.30	31.60	22.50	16.84	14.08	9.699	7.595	4.097	3.562
SGP12-90	233.6	185.3	143.3	89.80	54.50	33.51	23.90	18.46	15.52	10.54	8.480	4.590	3.870
SGP12-100	259.6	205.9	160.2	100.8	58.53	36.85	26.62	20.51	17.00	11.53	9.435	5.100	4.342
SGP12-120	311.5	249.6	194.1	124.2	72.00	45.68	31.50	24.48	20.45	13.88	11.31	6.120	5.220
SGP12-150	388.6	314.0	243.4	153.1	87.50	59.40	39.70	30.77	25.38	17.36	14.13	7.696	6.450
SGP12-180	467.3	373.9	287.8	185.3	106.6	75.50	49.60	38.02	30.98	20.81	16.96	9.205	7.813
SGP12-200	519.2	411.8	316.2	203.8	119.9	83.50	52.80	41.57	34.33	23.17	18.85	10.20	8.700
SGP12-260	675.0	535.0	419.5	270.6	153.9	97.90	68.80	53.90	45.16	30.89	24.47	13.26	11.27
SGP6-225	584.0	463.2	364.0	221.6	136.3	80.5	58.2	45.79	38.35	25.93	20.92	11.48	9.67

Constant Current Discharge (Amperes) at 20°C to 1.75 volts per cell													
Battery Type	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h
SGP12-40	95.70	78.00	60.97	39.49	23.01	14.36	10.34	8.056	6.575	4.657	3.700	2.011	1.716
SGP12-45	108.6	87.80	69.06	43.61	26.53	17.68	11.66	9.189	7.597	5.191	4.163	2.250	1.924
SGP12-50	119.7	97.50	76.56	48.10	29.43	18.21	13.35	10.35	8.451	5.985	4.625	2.500	2.173
SGP12-60	143.6	117.0	95.06	61.02	35.17	22.04	16.14	12.39	10.15	6.826	5.550	3.000	2.582
SGP12-80	191.5	156.0	126.6	80.50	44.30	30.10	21.60	16.31	13.69	9.377	7.401	4.000	3.511
SGP12-90	215.4	175.5	138.2	87.20	53.30	32.50	23.39	17.99	15.20	10.26	8.325	4.500	3.836
SGP12-100	239.3	195.0	153.9	97.81	56.71	35.60	26.05	20.00	16.60	11.28	9.250	5.000	4.299
SGP12-120	287.2	235.1	186.2	120.6	69.91	44.12	30.70	23.99	20.06	13.60	11.10	6.000	5.160
SGP12-150	361.0	296.1	233.3	146.5	84.50	57.80	38.30	29.84	24.72	16.99	13.88	7.500	6.320
SGP12-180	432.9	352.7	275.8	177.6	102.8	72.90	47.20	36.84	30.22	20.39	16.65	9.000	7.684
SGP12-200	480.6	390.0	304.6	196.0	116.8	80.80	51.20	40.49	33.51	22.71	18.50	10.00	8.530
SGP12-260	622.0	507.0	403.8	261.2	149.4	94.50	66.90	52.77	44.22	30.00	24.05	13.00	11.12
SGP6-225	538.0	438.8	349.0	218.0	133.1	78.1	56.7	44.60	37.35	25.26	20.89	11.25	9.48

Tables of performance ABT Powerline SGP

Constant Current Discharge

Amperes

Battery Type	Constant Current Discharge (Amperes) at 20°C to 1.80 volts per cell															
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h			
SGP12-40	87.70	73.60	58.60	38.23	22.36	13.90	10.00	7.810	6.411	4.545	3.604	1.977	1.700			
SGP12-45	98.60	82.90	65.90	42.35	25.94	17.18	11.26	8.874	7.389	5.025	4.051	2.210	1.889			
SGP12-50	109.6	92.10	73.20	47.06	28.82	17.60	13.05	10.09	8.180	5.722	4.477	2.392	2.107			
SGP12-60	131.5	110.5	89.80	58.43	34.20	21.18	15.61	11.98	9.810	6.640	5.474	2.918	2.552			
SGP12-80	175.4	147.3	119.9	76.70	42.00	28.70	20.60	15.88	13.28	9.119	7.200	3.911	3.450			
SGP12-90	197.3	165.7	131.8	84.70	51.90	31.24	22.84	17.58	14.84	9.969	8.114	4.427	3.790			
SGP12-100	219.2	184.1	146.5	94.56	55.50	34.41	25.00	19.53	16.20	11.06	9.000	4.877	4.239			
SGP12-120	263.0	221.7	177.9	116.7	67.20	42.55	29.40	23.44	19.62	13.27	10.82	5.820	5.030			
SGP12-150	328.7	278.1	222.1	141.2	81.10	55.00	36.70	28.92	24.00	16.59	13.58	7.305	6.198			
SGP12-180	394.5	331.4	263.6	169.4	98.70	70.70	44.68	35.85	29.44	19.91	16.20	8.700	7.584			
SGP12-200	438.4	368.2	292.9	188.2	111.3	78.00	49.60	39.26	32.50	22.12	18.00	9.800	8.350			
SGP12-260	570.0	479.0	385.8	251.4	144.2	91.30	65.10	51.68	43.29	29.11	23.41	12.66	10.98			
SGP6-225	493.0	414.3	329.6	211.8	129.7	77.4	55.9	43.94	36.79	24.88	20.81	11.25	9.48			

Tables of performance ABT Powerline SGP

Constant Power Discharge

Watts per cell

Battery Type	Constant Power Discharge (Watts per cell) at 20 °C to 1.60 volts per cell													
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h	
SGP12-40	198.0	153.0	115.3	73.84	42.35	27.13	19.39	15.27	12.53	8.580	6.788	3.771	3.180	
SGP12-45	221.0	162.8	128.5	82.70	49.54	33.28	22.21	17.60	14.38	9.898	7.725	4.260	3.605	
SGP12-50	247.5	194.2	148.6	90.58	55.32	34.04	25.10	19.44	15.89	11.30	9.070	5.120	4.210	
SGP12-60	297.0	233.0	184.6	116.6	67.30	43.26	31.14	24.13	19.90	12.95	10.39	5.773	4.818	
SGP12-80	396.0	309.0	244.2	154.6	84.70	57.68	41.70	31.03	25.69	17.91	14.00	7.634	6.669	
SGP12-90	445.5	347.6	264.0	185.4	99.23	60.92	43.76	33.83	28.27	19.67	15.58	8.476	7.168	
SGP12-100	495.0	385.3	296.8	186.7	109.8	68.40	49.00	38.13	31.06	21.37	17.30	9.520	8.090	
SGP12-120	594.0	460.0	351.2	226.4	131.9	84.40	58.70	44.84	37.48	25.40	20.52	11.08	9.410	
SGP12-150	742.5	582.6	439.3	275.2	159.1	105.1	71.60	55.60	45.96	31.36	25.74	14.15	11.82	
SGP12-180	886.4	688.1	517.8	328.5	188.9	133.5	88.60	69.01	56.28	37.71	30.58	16.92	14.29	
SGP12-200	982.2	761.8	570.7	362.4	210.3	146.3	94.70	75.31	62.04	42.04	34.46	18.70	15.78	
SGP12-260	1270	1004	762.8	489.1	272.3	179.8	125.9	98.48	82.49	57.18	44.67	24.59	20.73	
SGP6-225	1114	873.9	692.2	437.2	270.2	162.2	117.9	91.54	76.04	52.94	43.83	22.50	18.96	

Battery Type	Constant Power Discharge (Watts per cell) at 20 °C to 1.65 volts per cell													
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h	
SGP12-40	187.9	148.8	113.2	72.95	41.91	26.68	19.09	15.08	12.36	8.509	6.726	3.728	3.168	
SGP12-45	211.2	160.7	126.4	81.33	48.94	32.73	21.81	17.27	14.20	9.788	7.640	4.220	3.586	
SGP12-50	234.9	189.7	145.0	89.50	54.69	33.45	24.83	19.16	15.65	11.02	8.880	5.000	4.160	
SGP12-60	283.1	227.6	179.0	114.8	65.90	42.53	30.66	23.78	19.55	12.86	10.30	5.685	4.786	
SGP12-80	374.5	300.0	237.4	151.6	82.70	56.71	40.90	30.60	25.43	17.70	13.88	7.533	6.621	
SGP12-90	419.4	337.8	258.7	162.9	98.11	60.00	43.36	33.49	27.98	19.40	15.43	8.381	7.130	
SGP12-100	468.8	372.5	290.5	183.3	107.6	66.90	48.20	37.54	30.65	21.06	17.06	9.420	8.010	
SGP12-120	565.7	446.5	345.3	223.2	129.8	82.70	57.50	44.38	37.16	25.13	20.35	10.98	9.340	
SGP12-150	703.2	565.0	429.8	270.4	156.3	103.5	70.20	55.13	45.54	31.12	25.55	14.01	11.74	
SGP12-180	840.2	666.8	509.2	323.2	186.5	132.0	86.90	68.38	55.83	37.35	30.25	16.71	14.20	
SGP12-200	938.6	741.4	562.4	359.5	208.3	145.2	93.40	74.68	61.46	41.68	34.25	18.58	15.69	
SGP12-260	1194	973.7	749.4	482.3	267.4	176.6	124.2	97.51	81.68	56.27	44.30	24.26	20.60	
SGP6-225	1035	853.7	671.4	430.7	266.0	159.5	115.9	90.00	74.76	52.05	43.09	22.25	18.75	

Tables of performance ABT Powerline SGP

Constant Power Discharge

Watts per cell

Battery Type	Constant Power Discharge (Watts per cell) at 20 °C to 1.70 volts per cell														
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h		
SGP12-40	179.8	144.7	111.2	71.96	41.41	26.33	18.75	14.88	12.17	8.438	6.670	3.681	3.152		
SGP12-45	202.2	158.0	124.4	80.13	48.45	32.14	21.36	16.88	14.00	9.613	7.566	4.180	3.561		
SGP12-50	224.7	183.3	141.7	88.46	54.03	33.07	24.55	18.95	15.40	10.78	8.690	4.890	4.110		
SGP12-60	269.7	219.4	174.4	112.3	64.80	41.77	30.17	23.38	19.24	12.77	10.22	5.606	4.744		
SGP12-80	359.5	290.3	231.7	148.6	81.00	55.20	40.10	30.25	25.18	17.44	13.74	7.437	6.580		
SGP12-90	404.5	327.2	254.0	160.2	96.99	59.23	42.80	33.08	27.73	19.02	15.28	8.305	7.092		
SGP12-100	447.7	361.7	283.9	179.7	105.6	65.60	47.50	37.05	30.24	20.76	16.87	9.300	7.960		
SGP12-120	539.3	433.2	339.3	219.7	128.0	81.10	56.10	43.91	36.76	24.83	20.19	10.88	9.280		
SGP12-150	668.3	546.2	420.7	266.1	153.6	102.5	68.80	54.57	45.13	30.85	25.40	13.89	11.67		
SGP12-180	804.9	645.1	500.3	318.0	184.3	130.4	85.50	67.72	55.35	36.99	29.98	16.50	14.11		
SGP12-200	898.9	721.3	554.9	354.3	206.1	143.9	92.50	74.08	60.97	41.35	34.05	18.47	15.62		
SGP12-260	1144	947.0	737.3	474.7	262.5	172.6	122.6	96.76	80.88	55.24	43.93	23.93	20.46		
SGP6-225	1011	819.3	654.1	421.2	258.1	157.5	114.5	88.88	73.83	51.40	42.55	21.97	18.51		

Battery Type	Constant Power Discharge (Watts per cell) at 20 °C to 1.75 volts per cell														
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h		
SGP12-40	172.1	140.3	109.2	70.77	40.96	25.94	18.50	14.66	11.96	8.351	6.611	3.633	3.137		
SGP12-45	193.1	155.2	122.1	78.93	47.65	31.54	21.07	16.55	13.76	9.463	7.491	4.145	3.541		
SGP12-50	216.8	177.6	137.9	87.27	53.44	32.58	24.27	18.71	15.19	10.57	8.500	4.750	4.090		
SGP12-60	258.1	211.4	170.1	109.8	63.70	40.76	29.59	22.98	18.87	12.67	10.12	5.518	4.703		
SGP12-80	342.0	280.2	225.7	145.4	79.00	54.20	39.20	29.87	24.90	17.19	13.61	7.354	6.532		
SGP12-90	387.3	315.7	248.2	157.6	95.70	58.19	42.40	32.65	27.49	18.68	15.13	8.229	7.063		
SGP12-100	423.6	350.1	275.9	176.2	103.5	64.20	46.80	36.57	29.81	20.43	16.69	9.180	7.910		
SGP12-120	513.9	418.8	333.6	215.8	125.6	79.20	54.70	43.45	36.39	24.52	20.01	10.77	9.210		
SGP12-150	627.6	525.3	411.2	261.8	151.1	101.3	67.40	54.01	44.74	30.60	25.24	13.73	11.57		
SGP12-180	764.4	624.9	491.1	312.1	182.2	128.9	84.00	67.06	54.78	36.60	29.68	16.32	14.00		
SGP12-200	859.2	699.1	547.4	349.0	204.1	142.5	91.40	73.44	60.45	40.99	33.87	18.32	15.55		
SGP12-260	1094	915.8	724.5	467.9	256.0	169.7	120.6	95.74	79.96	54.18	43.48	23.53	20.33		
SGP6-225	976.0	799.0	637.9	411.6	251.5	153.5	111.5	86.59	71.93	50.08	41.46	21.83	18.39		

Tables of Performance

Tables of performance ABT Powerline SGP

Constant Power Discharge

Watts per cell

Battery Type	Constant Power Discharge (Watts per cell) at 20 °C to 1.80 volts per cell														
	5min	10min	15min	30min	1h	2h	3h	4h	5h	8h	10h	20h	24h		
SGP12-40	160.9	134.8	107.0	69.33	40.37	25.44	18.15	14.44	11.75	8.265	6.549	3.586	3.121		
SGP12-45	180.6	152.5	119.5	77.57	46.78	30.95	20.32	16.16	13.57	9.293	7.406	4.100	3.521		
SGP12-50	201.3	169.5	134.2	85.78	52.83	32.06	24.00	18.48	14.99	10.36	8.260	4.600	4.050		
SGP12-60	239.7	203.3	164.1	105.9	62.10	39.53	28.84	22.46	18.53	12.55	10.02	5.423	4.683		
SGP12-80	322.6	270.5	218.8	141.2	76.40	52.71	38.31	29.52	24.62	16.94	13.47	7.282	6.480		
SGP12-90	359.5	303.5	241.0	154.6	94.26	56.99	41.76	32.27	27.20	18.28	14.99	8.154	7.035		
SGP12-100	400.4	336.3	269.0	173.2	101.1	62.60	45.70	35.87	29.35	20.08	16.48	9.020	7.860		
SGP12-120	479.4	404.4	327.6	212.5	122.7	77.80	53.00	42.97	35.97	24.20	19.86	10.65	9.160		
SGP12-150	596.5	508.4	400.0	255.7	148.2	99.90	66.30	53.32	44.32	30.37	25.09	13.57	11.48		
SGP12-180	720.0	605.1	481.9	307.1	180.0	127.3	82.90	66.28	54.24	36.12	29.35	16.02	13.87		
SGP12-200	799.0	675.8	538.4	343.1	201.7	141.6	90.10	72.61	59.78	40.56	33.65	18.18	15.46		
SGP12-260	1038	881.0	711.2	458.8	249.1	166.1	118.7	94.44	79.05	53.12	43.04	23.20	20.18		
SGP6-225	899.0	762.5	615.4	397.1	244.9	148.2	107.7	83.65	69.49	48.38	40.05	21.63	18.22		

Operating

Battery calculations

A) Floating applications

A battery application is characterized by:

- A voltage which must be held within certain limits,
- A power level which must be delivered
- A set capacity to maintain the load in terms of time.

By the use of these three parameters, calculations can be effected as follows:

- A situation requires: a maximum voltage of 490 volts a minimum voltage of 378 volts
- The ambient temperature is 20°C
- The float voltage is to be 2.27 volts per cell.

Preliminary calculation:

- The maximum number of cells: $490 \text{ V} / 2.27 \text{ V} = 216$ cells
- The minimum voltage per cell at the end of discharge: $378 \text{ V} / 216 = 1.75$ volts.

Case 1: discharge with a surge at the start of discharge.

The surge power is to be 50 kW for 10 minutes, followed by 10 kW for 2 hours.

Discharge current:

During the surge: $50000 \text{ W} / 378 \text{ V} = 132$ amps

And then: $10000 \text{ W} / 378 \text{ V} = 26$ amps

Determining the cell required for the current required

Current flow during surge: $(132 \text{ A} \times 10 \text{ min}) / 60 \text{ min} = 22 \text{ Ah}$

Current flow for 4 hours: $26 \text{ A} \times 2 \text{ h} = 52 \text{ Ah}$

Total capacity drawn: $22 \text{ Ah} + 52 \text{ Ah} = 74 \text{ Ah}$.

Equivalent discharge time at 26 amps to supply 74 Ah: $74 / 26 = 2.8$ hours

From the table of performance characteristics, expressed in terms of the discharge current in amps for 1.75V end voltage, the cell to give a current of 26 amps for 2.8 hours is the SGP12-100

Conclusion :

In this example; it is the total number of Ah required which determines the battery to be used, i.e. 216 cells/36 Batteries of type SGP12-100.

Case 2: discharge with a surge at the end of discharge (here again, it is the surge which dictates the battery to be used). The continuous power is to be 10 kW for one hour, followed by a surge of 50 kW for 20 minutes.

Discharge current:

During the surge: $50000 \text{ W} / 378 \text{ V} = 132$ amps

Before the surge: $10000 \text{ W} / 378 \text{ V} = 26$ amps

Capacity drawn in 1 hour: $26 \text{ A} \times 1 \text{ h} = 26 \text{ Ah}$

Capacity drawn during surge (20 min) $(132 \text{ amps} \times 20 \text{ min}) / 60 \text{ min} = 43.5 \text{ Ah}$

Total capacity drawn: 69.5 Ah

Equivalent discharge time at 360 amps to supply 26 Ah $(69.5 / 132) \times 60 \text{ min} = 32 \text{ min}$

From the table of performance characteristics, expressed in terms of the discharge current in amps for 1.75V end voltage, the cell to give a current of 132 amps for 32 minutes is the SGP12-150. The battery to be used will consist of 216 cells/36 Batteries of type SGP12-150.

B) Accidental deep discharge

This may involve discharge of the battery into indicator lamps, a lower load on the battery than that initially planned, a failure of the charging system, a discharged battery not recharged immediately, etc...

On a fully discharged battery:

All of the sulphuric acid has been consumed, and the electrolyte is now nearly water. Sulphation of the plates is at a maximum, thus increasing greatly the internal resistance of the battery. The aqueous solution in which the battery now finds itself can give rise to the development of lead dendrites on the separator during recharging, and this may cause the cell to short-circuit internally.

Important note:

This type of deep discharge will still result in the premature deterioration of the battery, and a significant effect on its life expectancy.

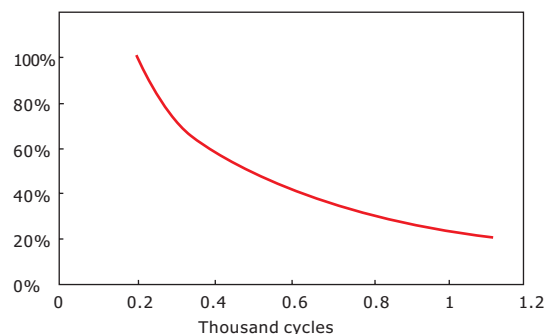
C) Effect of temperature on capacity

Temperature affects capacity of batteries. The following table gives the correction factor according to temperature, where the reference temperature is 20°C.

Duration of discharge	Battery temperature											
	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C
15min	0.46	0.52	0.58	0.65	0.71	0.78	0.85	1.00	1.04	1.07	1.15	1.22
1 hour	0.59	0.64	0.69	0.74	0.80	0.85	0.90	1.00	1.03	1.05	1.09	1.14
10hour	0.71	0.75	0.79	0.82	0.86	0.90	0.95	1.00	1.02	1.04	1.06	1.08

Cycle life vs depth of discharge

D.O. D. in%



Warning:

- The batteries are already charged when delivered, and are fitted with a protective cap on each terminal. They should be unpacked with care.
- Avoid short-circuiting terminals of opposite polarity, because these units are capable of discharging at a very high current especially if the lid or the container is damaged.

Unpacking the battery

- Each shipment of ABT Powerline SGP is accompanied by a packing list.
- The packing list should be checked, and the Sales Department should be told immediately of any missing items.

Setting up the battery racks

The structure should be assembled in accordance with instructions supplied with the equipment.

Racks

- Ensure that the stretchers and cross-members are correctly interlinked.
- Take up any irregularity in floor surface using shims
- Ensure that all frame members are correctly interlinked
- Use the adjustable feet to take up irregularities in the floor surface
- Metal racks should always be connected to the building earth in accordance with current regulations.

Mounting in a cabinet

Ensure that the cabinet:

- Is sufficiently strong to cope with the weight of the battery
- Is covered with a layer of insulation
- Is naturally ventilated.

Connection of cells

All connections should be insulated

In series:

The number of cells in series will determine the total float of voltage:

$$U = V \times N$$

Total float Voltage Float voltage for one cell Number of cells

In parallel:

Powerline SGP of the same Ah rating may be connected in parallel to give higher current capability. This connection in parallel will be preferably carried out through an equipotential wiring for an equal current distribution in each string.

There is no technical reason for limiting the number of strings, but for practical installation reasons, it is recommended not to exceed 4 strings in parallel especially if the battery is used in high discharge rates (Standby time lower than 1 hour).

General recommendations

- Do not wear clothing of synthetic material, to avoid the generation of static potentials.
- Use insulated tools.
- Place the cells beginning with the least accessible rows, spacing the cells as shown on the drawing.
- Consult the drawing for the correct position of the battery poles (positive=red color, negative = Black color).
- Before attaching the inter-cell flexible cables, check that all terminals are in the correct position.
- The battery cells are connected in series, which is with a positive pole connected to a negative pole.
- Use only a damp cotton cloth for cleaning purposes
- Tighten the nuts or bolts to the recommended levels of torque indicated on the product label. Always use insulated tools for fitting and torque up battery connections.

Safety:

All installations must comply with the current

Storage conditions

The battery should be stored away from any moisture or source of heat.

Don't put battery into a completely closed container.

Storage times :

The self-discharge of Powerline SGP as a function of temperature is as follows :

3 % per month at 20°C

6 % per month at 30°C

10 % per month at 40°C

In order to ensure that the battery can be charged easily after a long period of storage, it is recommended that batteries should not be stored for more than the following periods without recharging :

6 months at 20°C

4 months at 30°C

2 months at 40°C

Failure to comply with these recommendations may compromise the life expectancy of the battery.

Determining the state of charge of the battery

The state of charge of the battery can be determined by measuring the open circuit voltage after the battery has been allowed to rest for 24 hours.

% of capacity at 20°C	Voltage per cell at different temperatures				
	0°C	10°C	20°C	30°C	40°C
100%	2,16	2,15	2,14	2,13	2,13
80%	2,09	2,09	2,09	2,09	2,09
60%	2,06	2,06	2,06	2,06	2,06
40%	2,02	2,02	2,02	2,02	2,02
20%	1,97	1,97	1,97	1,97	1,97

Recharging stored batteries

A refreshing charge shall be performed after this time at 2.27~2.30Vpc at 20°C for 48 to 96 hours. The battery will be charged when the charging current has remained constant for a period of 3 hours. A current limit is not essential, but for optimum charge efficiency the current output of the charger can be limited to 0.2C₂₀A.

The necessity of a refreshing charge can also be determined by measuring the open circuit voltage of a stored battery. Refreshing charge is advised if the voltage drops below 2.10 volts per cell.

Failure to observe these conditions may result in greatly reduced capacity and service life.

Commissioning

- Ensure that batteries are kept at all times in clean and dry conditions.
- Before commissioning, the batteries must be charged at a constant regulated voltage to match the prevailing temperature for a minimum period of 48 hours.

Maintenance

- Check the tightening of connections.
- Every month, it is recommended that the total voltage at the battery terminals be measured. It should be [NX(2.27~2.30)]V at a temperature of 20 °C, where N is the number of cells in the battery.
- A difference of plus or minus 2.0% between these individual voltages and the average voltage may be observed. This is due to the gas- recombination process.
- A check on capacity (independent operation on load) can be performed once or twice per year.
- New and old batteries cannot be used together. The batteries of various specifications and from different manufacturers cannot be used together.

Safety: When carrying out any work on the battery, the applicable safety standards should be followed.

Note: It is recommended that a battery log be maintained, and that records should be kept of the total voltage measurements, any mains failures, major battery discharges (current and time) etc. The main factors causing reduction in the life expectancy of Powerline SGP :

- Deep discharges
- Poor regulation on the float voltage
- Cycling or micro
- Cycling- poor quality (smoothing) of the charging current
- High ambient temperature.
- High voltage of charge
- Overcharge

ABT VRLA Battery:

PowerLine/Thunder/Enduro/Sunwind/e-Trek

ABT World Wide

Our sales growth is due to a complete Global Network with Master distributors and Country managers who apply ABT commercial strategy and through Global Key Account, in



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