

GFMJ (OPzV)

VRLA gel battery



shoto[®]

power the future





Primary application



- > Standby power supply for various communication and signal systems such as telecommunication, mobile, network, railway and airport and so on;
- > Standby power supply for power system and nuclear power station;
- > Solar energy, wind energy, hydroelectric generation power storage and wind & solar hybrid project;
- > Standby power supply for ship and maritime affairs;
- > Standby power supply for petrochemical system;
- > Marine signal and navigation mark;
- > Information industry;
- > Standby power supply for UPS, medical facilities and emergency lighting and so on;
- > Situation with high environmental protection and energy-saving.

Structure features of Shoto GFMJ VRLA gel battery

> Electrolyte:

Primary material adopts Germany gas silicon dioxide, the material will be the thin collosol state when it's injected initially, and it can fill the whole plate space of battery, and each part of plate can react evenly. The flooded electrolyte design can avoid dry up of battery when it's in high temperature and over charged, the thermal capacity is big and heat-elimination is fine, accordingly, thermal runaway can be avoided. The electrolyte is in the gel state in finished battery without flowing, accordingly, leakage and lamination can be avoided.

> Plate:

Positive plate adopts tubular type plate which can effectively prevent active substance falling, the positive plate frame is molded with complex alloy, the crystal particle of alloy structure is tiny and dense, the corrosion-resisting performance is fine and service life is long. Negative plate adopts pasted plate, the grid adopts radiated structure which enhances utilization ratio of active substance and discharge capability of strong current, and the charge reception capability is strong.

> Battery case:

Made of ABS material, with good corrosion prevention, high strength, it can be sealed with lid reliably which can prevent potential leakage risk.

› **Separator:**

Adopt special micro-pore PVC-SiO₂ separator from Europe AMER-SIL Company, the porosity of separator is big and resistance is low. It has bigger electrolyte storage space.

› **Terminal sealing:**

The built-in copper core lead-base terminal post has stronger current carrying capacity and corrosion resistance. The unique double sealing structure of terminal post can effectively avoid leakage, to guarantee reliability of terminal post sealing.

› **Safety valve:**

Adopt Germany technology, constant opening and closing valve pressure, high reliability, the accumulator case expansion, damage and electrolyte dry up can be avoided.

Standard

Q/321284KCC 01-2006

BS EN 61427-2002

YD/T 1360-2005

IEC60896-21/22 DIN40742

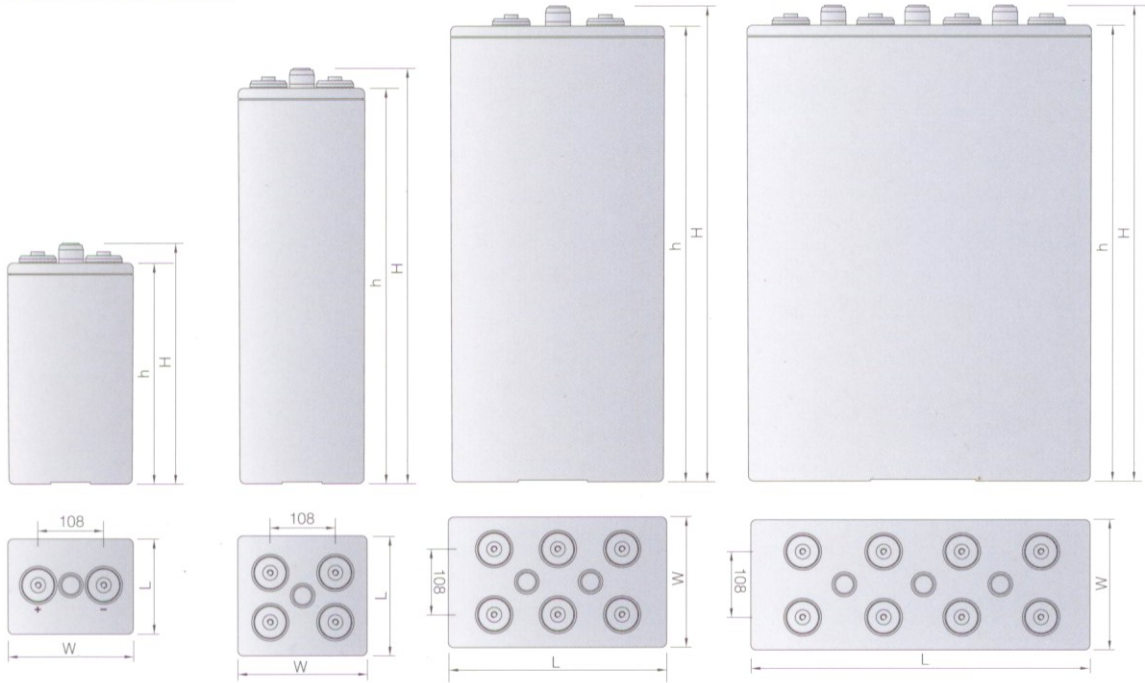
Features of application performance:

- › Designed service life of 20 years
- › High cycle service life
- › Better temperature resistance performance
- › Excellent deep cycle performance
- › Superior low current discharge performance
- › Better high temperature performance
- › Stronger constant power discharge capability
- › Better charge reception capability
- › Better safety performance and reliability
- › Modular and personified installation design
- › High Performance price ratio and low yearly operating cost
- › Eco-friendly, cycle application

Environmental requirement:

- › Temperature: available for -20°C-50°C (-4~122F), relative humidity ≤90%; the ambient temperature for batteries in the same pack shall be unified; ambient temperature is recommended for 20~25°C (68~77F), storage temperature is 0~20°C (32~68F); general storage period is 3~6 months, if exceeded, battery shall be charged.
- › Sea level height can't exceed 4000m (if 4000m is exceeded, it shall be specified in order);
- › The operating environment shall be kept from ignition source, dry, clean and ventilated without radial ray, ultra-red radiation, organic solvent and corrosive gas, and it shall be kept out of the sun and ultraviolet ray level can't exceed level 2;
- › Avoided being buried by sand, rained and watered; lightning stroke, small animal and electric shock shall be prevented, and insulation resistance ≥2 Ω;
- › Anti-freezing measures shall be taken for the battery installed in high and cold area.

Model introduction:



GFMJ-200~GFMJ-600

GFMJ-800~GFMJ-1500

GFMJ-2000

GFMJ-2500~GFMJ-3000

Table of product specification and main parameters

Model	Rated Voltage (V)	Rated capacity (Ah)	Number of terminal post with like polarity	Dimension (mm)				Weight (Kg)
				Length L	Width W	Height h	Total height H	
GFMJ-200	2	200	1	103	206	354	386	18.5
GFMJ-250	2	250	1	124	206	354	386	23.0
GFMJ-300	2	300	1	145	206	354	386	27.0
GFMJ-350	2	350	1	124	206	470	502	29.0
GFMJ-420	2	420	1	145	206	470	502	34.5
GFMJ-500	2	500	1	166	206	470	502	39.5
GFMJ-600	2	600	1	145	206	645	677	48.0
GFMJ-800	2	800	2	191	210	645	677	64.5
GFMJ-1000	2	1000	2	233	210	645	677	80.0
GFMJ-1200	2	1200	2	275	210	645	677	94.0
GFMJ-1500	2	1500	2	340	210	645	677	115
*GFMJ-1500B	2	1500	2	275	210	795	827	115
GFMJ-2000	2	2000	3	399	214	772	804	156
GFMJ-2500	2	2500	4	487	212	772	804	194
GFMJ-3000	2	3000	4	576	212	772	804	230

Note: Output terminal is the M10 screw hole.* Product must be ordered in advance.

List of product internal resistance, electric conduction, short-circuit current, packing and transportation data

Model	Electric conduction (S)	Internal resistance (mΩ)	Short-circuit current (A)	Battery number Cell/case	Whole case weight (kg)	20' Cabinet case number	20' Cabinet battery number
GFMJ-200	1527	0.6	3417	12	255.0	54	648
GFMJ-250	1835	0.51	4020	12	317.0	42	504
GFMJ-300	2129	0.45	4556	12	360.0	42	504
GFMJ-350	2220	0.42	4879	12	391.0	28	336
GFMJ-420	2407	0.38	5395	12	452.0	28	336
GFMJ-500	2728	0.34	6029	12	514.0	28	336
GFMJ-600	2910	0.33	6212	12	616.0	28	336
GFMJ-800	3218	0.3	6833	8	554.0	31	248
GFMJ-1000	3679	0.26	7885	8	682.0	25	200
GFMJ-1200	3990	0.25	8200	8	799.0	21	168
GFMJ-1500	4170	0.24	8542	8	974.0	17	136
GFMJ-1500B	4170	0.24	8542	8	970.0	12	96
GFMJ-2000	4541	0.22	9318	6	989.0	12	72
GFMJ-2500	5050	0.2	10250	6	1223.0	11	66
GFMJ-3000	5270	0.19	10789	3	732.0	15	45

Note: The packing and transportation data in the Table are only for reference, and specific requirements shall be specified in the contract.

Constant current discharge table

unit: A

Model and specification	Final voltage (V/unit)	Discharge time (min)					Discharge time (h)											
		5	10	15	30	45	1	1.5	2	3	4	5	8	10	20	100	120	
GFMJ-200	1.90	182	155	148	118	104	89	68	58	42	35	30	21	18	9.38	2.45	2.07	
	1.85	245	199	180	139	111	101	75	60	46	37	32	22	19	10.1	2.57	2.18	
	1.80	254	228	212	162	131	112	95	65	51	40	34	24	21	11.0	2.77	2.35	
	1.75	271	253	238	173	144	115	97	73	53	42	36	25	22	11.8	2.94	2.49	
GFMJ-250	1.90	228	193	184	147	130	111	86	72	54	43	38	26	22	11.71	3.07	2.59	
	1.85	306	248	224	173	139	125	94	74	57	47	39	27	23	12.88	3.24	2.73	
	1.80	315	285	266	202	164	131	119	81	65	49	42	29	26	13.52	3.36	2.83	
	1.75	338	317	298	216	179	138	120	90	68	50	43	32	27	14.06	3.47	2.92	
GFMJ-300	1.90	273	232	221	176	156	134	102	87	64	52	45	31	27	14.04	3.64	3.09	
	1.85	367	299	270	208	167	141	112	89	68	55	48	33	28	15.44	3.84	3.26	
	1.80	376	342	318	243	197	158	142	97	77	59	50	35	31	16.21	3.99	3.39	
	1.75	406	380	358	259	216	166	145	108	79	60	52	37	33	16.85	4.11	3.49	
GFMJ-350	1.90	303	261	208	191	175	152	120	103	76	63	53	39	33	16.38	4.24	3.61	
	1.85	360	336	275	227	188	174	131	107	81	66	57	41	34	18.01	4.47	3.81	
	1.80	362	344	320	265	204	185	151	117	88	72	62	43	37	18.91	4.64	3.96	
	1.75	375	371	368	290	215	198	166	122	91	74	63	44	38	19.85	4.78	4.08	

Constant current discharge table-continued

unit: A

Model and specification	Final voltage (V/unit)	Discharge time (min)					Discharge time (h)										
		5	10	15	30	45	1	1.5	2	3	4	5	8	10	20	100	120
GFMJ-420	1.90	363	313	250	234	210	174	130	117	91	75	64	47	39	19.67	5.13	4.35
	1.85	420	368	303	260	223	191	143	128	97	80	68	49	41	21.63	5.4	4.58
	1.80	432	412	384	318	245	222	181	141	105	86	74	52	43	22.71	5.61	4.76
	1.75	450	445	442	348	258	236	199	146	109	89	76	53	45	23.61	5.78	4.90
GFMJ-500	1.90	466	397	292	273	245	203	152	137	106	88	75	55	46	23	5.92	5.08
	1.85	480	409	350	303	260	237	167	159	121	99	85	61	44	25.30	6.24	5.35
	1.80	504	481	448	371	286	259	211	164	123	101	87	61	51	26.56	6.45	5.53
	1.75	525	519	515	406	301	275	232	171	127	104	88	62	52	27.62	6.61	5.61
GFMJ-600	1.90	513	449	303	294	282	234	186	165	129	108	93	65	54	28.08	7.41	6.21
	1.85	541	472	353	330	299	258	204	177	137	114	98	67	56	30.88	7.80	6.54
	1.80	580	572	487	420	336	312	258	199	150	123	104	72	61	32.42	8.07	6.76
	1.75	603	583	558	468	373	338	284	208	156	126	106	73	62	33.71	8.27	6.93
GFMJ-800	1.90	684	599	404	392	376	312	248	220	172	144	124	86	72	37.08	9.67	8.20
	1.85	721	630	470	440	399	344	272	236	183	152	130	90	75	40.78	10.18	8.64
	1.80	773	762	649	560	448	416	344	266	200	164	139	96	82	42.81	10.53	8.94
	1.75	804	778	744	624	497	448	378	278	208	168	141	98	83	44.52	10.79	9.16
GFMJ-1000	1.90	855	749	504	490	470	390	310	275	215	180	154	107	89	46.38	12.10	10.26
	1.85	902	787	588	550	498	430	340	295	228	190	162	112	93	51.01	12.74	10.80
	1.80	966	953	812	700	560	520	430	332	250	204	173	120	102	53.56	13.18	11.17
	1.75	1005	972	931	780	621	560	473	347	260	210	176	122	103	55.70	13.51	11.45
GFMJ-1200	1.90	1026	899	605	588	564	468	372	330	258	216	185	129	107	55.54	14.51	12.31
	1.85	1082	945	706	660	598	516	408	354	274	228	195	134	112	61.09	15.28	12.96
	1.80	1159	1144	974	840	672	624	516	399	300	245	208	144	125	64.14	15.81	13.41
	1.75	1206	1167	1117	936	746	672	568	417	312	252	211	146	128	66.70	16.21	13.74
GFMJ-1500	1.90	1112	950	631	600	585	522	465	390	308	249	212	154	128	68.29	17.76	15.10
	1.85	1205	1000	764	720	620	594	510	432	340	274	233	163	136	75.11	18.70	15.9
	1.80	1260	1210	998	924	762	738	645	507	390	314	263	180	155	78.86	19.35	16.45
	1.75	1311	1296	1188	1056	900	825	710	540	403	326	272	185	158	82.01	19.83	16.86
GFMJ-2000	1.90	1387	1229	873	800	780	696	620	520	410	331	282	205	170	91.04	23.65	20.14
	1.85	1509	1284	1000	960	827	792	680	576	453	365	311	218	181	100.1	24.90	21.21
	1.80	1681	1614	1331	1232	1017	984	860	676	520	418	351	240	210	104.4	25.77	21.95
	1.75	1748	1729	1584	1408	1200	1100	946	720	544	435	363	246	214	108.3	26.41	22.50
GFMJ-2500	1.90	1758	1584	1048	1000	975	870	775	650	512	414	352	257	212	113.8	29.73	25.18
	1.85	1911	1666	1254	1200	1034	990	850	720	566	457	388	272	226	125.1	31.30	26.51
	1.80	2101	2017	1663	1540	1271	1230	1075	844	625	523	438	300	260	131.4	32.39	27.43
	1.75	2185	2160	1980	1760	1500	1375	1183	900	630	544	454	309	264	136.6	33.20	28.12
GFMJ-3000	1.90	2033	1805	1319	1200	1170	1044	930	780	614	497	423	308	255	136.6	35.62	30.21
	1.85	2313	1900	1558	1440	1240	1188	1020	864	680	548	466	326	272	150.2	37.50	31.81
	1.80	2423	2322	1996	1848	1525	1476	1290	1012	780	627	526	360	310	157.7	38.81	32.92
	1.75	2623	2592	2376	2112	1799	1650	1419	1080	816	653	544	370	315	164.0	39.78	33.74

Constant power discharge table

unit: W

Model and specification del	Final voltage (V/unit)	Discharge time (min)					Discharge time (h)										
		5	10	15	30	45	1	1.5	2	3	4	5	8	10	20	100	120
GFMJ-200	1.90	360	302	241	214	190	166	137	107	83	68	58	40	33	18.76	4.90	4.14
	1.85	371	315	270	237	212	186	152	118	90	74	64	44	37	20.00	5.09	4.32
	1.80	386	378	343	279	244	208	173	137	106	85	72	49	41	21.56	5.43	4.61
	1.75	426	417	389	310	268	226	186	145	109	87	73	50	42	22.77	5.67	4.81
GFMJ-250	1.90	450	378	301	267	238	208	171	134	104	84	73	51	43	23.42	6.14	5.18
	1.85	464	394	337	296	265	233	190	147	113	93	79	56	47	25.50	6.42	5.41
	1.80	483	472	429	349	305	261	217	172	131	107	90	63	52	26.50	6.59	5.55
	1.75	533	521	487	388	335	282	232	181	135	110	91	65	53	27.14	6.70	5.64
GFMJ-300	1.90	540	454	343	304	271	237	199	160	125	102	87	62	53	28.08	7.28	6.18
	1.85	557	472	384	337	301	265	221	177	135	113	95	67	57	30.57	7.60	6.45
	1.80	579	566	516	420	367	314	260	205	157	128	108	75	63	31.77	7.82	6.64
	1.75	640	625	585	464	402	340	279	217	162	131	109	76	65	32.52	7.93	6.74
GFMJ-350	1.90	599	510	362	319	284	249	216	182	142	119	102	74	64	32.76	8.48	7.22
	1.85	624	531	405	354	317	279	241	202	158	131	112	80	69	35.66	8.85	7.54
	1.80	656	625	523	450	401	351	295	239	187	152	128	90	75	37.06	9.09	7.76
	1.75	678	672	595	499	445	391	324	257	196	158	132	95	78	38.31	9.23	7.87
GFMJ-420	1.90	718	612	393	358	317	275	246	217	171	142	122	89	77	39.34	10.26	8.70
	1.85	749	638	429	382	348	313	278	242	190	157	135	96	83	42.83	10.69	9.07
	1.80	787	750	626	539	480	420	353	286	223	183	154	108	90	44.51	11.00	9.33
	1.75	814	806	715	599	534	469	389	308	234	191	159	110	93	45.57	11.16	9.46
GFMJ-500	1.90	838	714	458	418	370	321	288	255	199	166	143	104	89	46.00	11.84	10.16
	1.85	874	744	499	445	405	365	324	282	221	184	158	112	97	50.09	12.36	10.59
	1.80	918	875	731	628	560	492	413	334	262	214	180	126	105	52.06	12.64	10.84
	1.75	950	940	833	698	623	547	453	358	274	222	185	128	107	53.31	12.76	10.83
GFMJ-600	1.90	972	842	480	421	378	335	318	300	247	208	180	130	113	56.16	14.82	12.42
	1.85	1005	877	538	488	460	432	386	339	277	230	199	142	122	61.14	15.44	12.95
	1.80	1066	1052	771	683	624	564	488	411	328	269	227	161	136	63.54	15.82	13.25
	1.75	1102	1067	888	772	706	639	543	447	347	284	237	163	137	65.06	15.96	13.37
GFMJ-800	1.90	1296	1123	740	654	616	578	489	400	329	278	239	174	150	74.16	19.34	16.40
	1.85	1340	1170	852	739	675	611	531	451	368	308	265	190	164	80.74	20.16	17.11
	1.80	1421	1402	1028	911	832	753	651	549	437	358	304	213	182	83.91	20.64	17.52
	1.75	1470	1422	1185	1030	942	853	724	595	464	380	317	217	184	85.92	20.82	17.68
GFMJ-1000	1.90	1620	1404	776	696	661	626	563	500	411	347	298	217	188	92.76	24.20	20.52
	1.85	1674	1462	895	781	721	661	613	565	430	386	331	237	204	101.0	25.23	21.38
	1.80	1776	1753	1284	1138	1039	940	813	685	547	447	378	267	227	105.0	25.83	21.89
	1.75	1837	1778	1480	1288	1177	1065	905	745	579	473	395	271	229	107.5	26.07	22.10
GFMJ-1200	1.90	1944	1685	812	740	707	674	637	600	493	417	359	261	225	111.1	29.02	24.62
	1.85	2009	1755	938	824	768	711	694	677	553	463	397	284	245	121.0	30.25	25.66
	1.80	2132	2103	1542	1366	1247	1128	976	823	656	537	455	320	274	125.7	30.99	26.28
	1.75	2205	2134	1776	1546	1412	1278	1086	894	694	568	475	326	276	128.7	31.29	26.52

Constant power discharge table--continued

unit: W

Model and specification del	Final voltage (V/unit)	Discharge time (min)					Discharge time (h)											
		5	10	15	30	45	1	1.5	2	3	4	5	8	10	20	100	120	
GFMJ-1500	1.90	2106	1782	866	804	776	747	701	655	545	466	405	294	254	136.6	35.52	30.20	
	1.85	2239	1856	1003	887	837	786	765	744	612	517	447	320	275	148.7	37.03	31.48	
	1.80	2318	2225	1571	1450	1341	1232	1078	924	742	612	519	367	306	154.6	37.93	32.24	
	1.75	2397	2370	1840	1653	1515	1376	1201	1025	803	645	537	367	306	158.3	38.27	32.54	
GFMJ-2000	1.90	2808	2376	1132	1069	1040	1010	942	873	725	621	540	392	338	182.1	47.30	40.28	
	1.85	2985	2474	1556	1360	1274	1188	1090	992	816	688	595	426	367	198.2	49.30	42.00	
	1.80	3090	2966	2096	1935	1789	1643	1437	1231	990	815	691	488	409	204.6	50.51	43.02	
	1.75	3196	3160	2453	2205	2020	1835	1601	1367	1071	861	716	488	409	209.0	50.97	43.43	
GFMJ-2500	1.90	3510	2970	1415	1336	1299	1262	1177	1091	907	775	675	490	423	227.6	59.46	50.36	
	1.85	3731	3093	1944	1700	1593	1485	1363	1240	1020	861	744	533	459	247.7	61.97	52.49	
	1.80	3863	3708	2620	2419	2237	2054	1797	1539	1237	1019	865	610	512	257.5	63.48	53.76	
	1.75	3995	3949	3066	2755	2525	2294	2002	1709	1338	1076	894	610	512	263.6	64.08	54.27	
GFMJ-3000	1.90	4212	3564	1697	1603	1559	1515	1412	1309	1087	933	811	588	509	273.2	71.24	60.42	
	1.85	4477	3712	2332	2039	1911	1782	1635	1487	1223	1032	893	640	550	297.4	74.25	62.98	
	1.80	4635	4450	3144	2903	2684	2465	2156	1846	1485	1224	1036	731	615	309.1	76.07	64.52	
	1.75	4794	4739	3680	3308	3031	2753	2402	2050	1607	1292	1075	731	615	316.5	76.78	65.12	

Model selection table for various power demands and standby power time of GFMJ series battery 48V system

Final voltage is 1.90V/cell.

Battery Capacity Power KW	Time	Time													
		5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	120h	240h	
0.05		200	200	200	200	200	200	200	200	200	200	200	250	500	
0.1		200	200	200	200	200	200	200	200	200	200	200	500	1000	
0.2		200	200	200	200	200	200	200	200	200	200	400	1000	2000	
0.5		200	200	200	200	200	200	200	200	200	500	1000	2500	5000	
1		200	200	200	200	200	200	200	250	250	1000	2000	5000	10000	
3		200	200	200	200	250	300	500	600	800	3000	6000	-	-	
5		200	200	250	250	420	600	800	1000	1200	5000	10000	-	-	
10		250	500	500	800	1000	1200	2000	2500	2500	10000	-	-	-	
30		800	2500	2500	2500	3000	4000	5000	7500	7500	-	-	-	-	

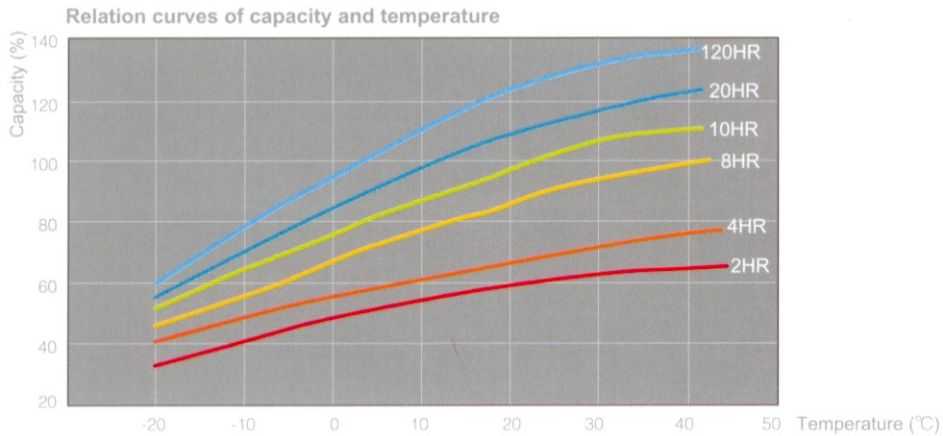
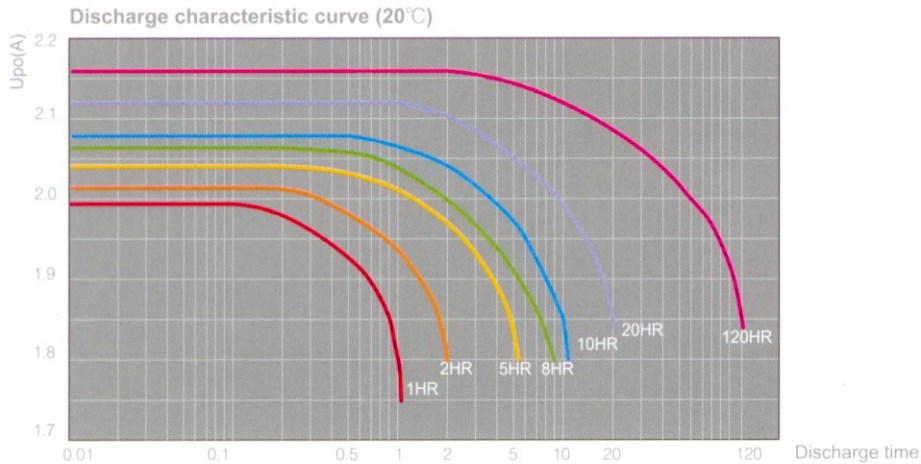
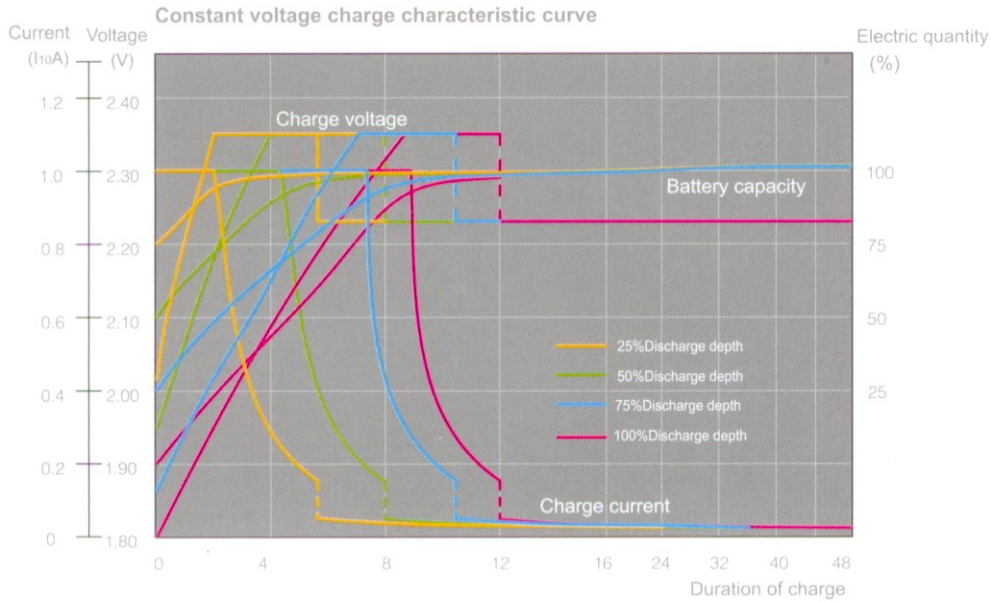
Final voltage is 1.80V/cell.

Battery Capacity Power KW	Time													
	5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	120h	240h	
0.05	200	200	200	200	200	200	200	200	200	200	200	200	420	
0.1	200	200	200	200	200	200	200	200	200	200	200	420	800	
0.2	200	200	200	200	200	200	200	200	200	200	320	800	1600	
0.5	200	200	200	200	200	200	200	200	200	420	800	2000	4000	
1	200	200	200	200	200	200	200	200	250	800	1600	4000	8000	
3	200	200	200	200	200	250	350	500	600	2500	4800	12000	-	
5	200	200	200	200	350	420	600	800	1000	4000	8000	-	-	
10	250	250	300	420	800	800	1200	2000	2500	8000	-	-	-	
30	800	1000	1200	2000	2500	3000	4000	6000	7500	-	-	-	-	

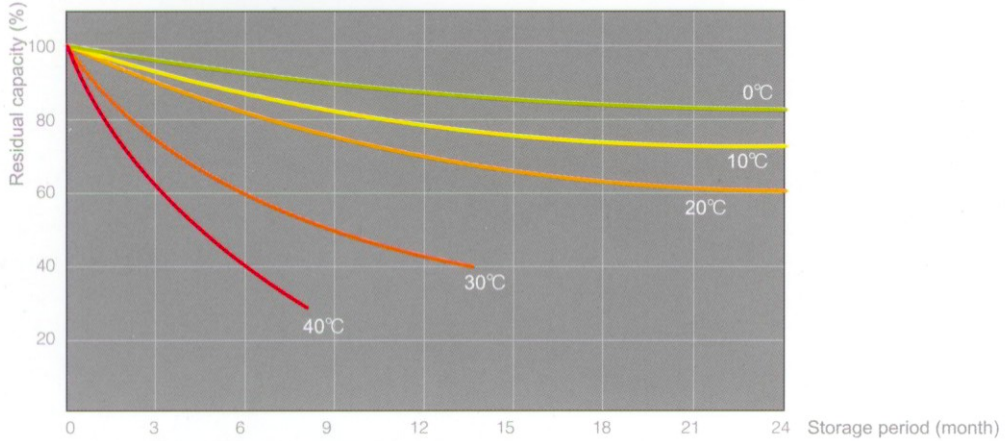
Final voltage is 1.75V/cell.

Battery Capacity Power KW	Time													
	5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	120h	240h	
0.05	200	200	200	200	200	200	200	200	200	200	200	200	350	
0.1	200	200	200	200	200	200	200	200	200	200	200	350	700	
0.2	200	200	200	200	200	200	200	200	200	200	300	700	1400	
0.5	200	200	200	200	200	200	200	200	200	350	800	2000	3500	
1	200	200	200	200	200	200	200	200	250	800	1500	4000	7500	
3	200	200	200	200	200	250	350	500	600	2500	5000	12000	-	
5	200	200	200	200	300	420	600	800	1000	4000	7500	-	-	
10	200	250	300	420	600	800	1200	2000	2500	7500	-	-	-	
30	800	1000	1000	1200	2000	3000	4000	5000	6000	-	-	-	-	

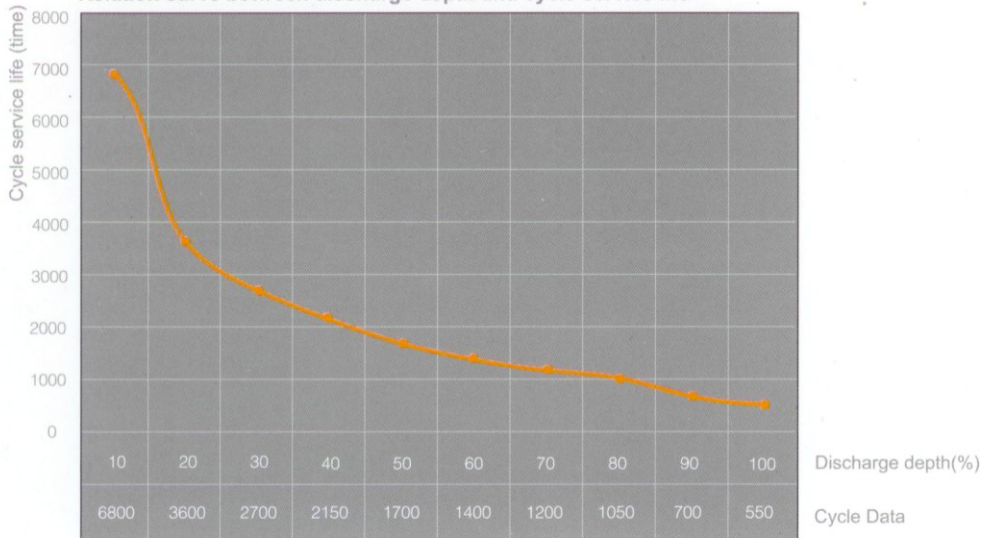
Performance curve of GFMJ series gel battery



Self-discharge characteristic curve



Relation curve between discharge depth and cycle service life



Remark: a) test circumstances: 20-30°C, relative humidity is 50-80 percent;
 b) charge mode: electricity of charge is equal to 105-115percent of discharge
 c) residual capacity is 80 percent C₁₀

Relation curve of float charge service life and residual capacity

