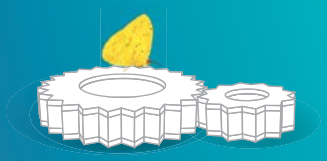
6-GFMJ

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;**
- **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;**
- **Street lamp, CATV, oil and gas;**
- **Situation with high environmental protection and energy-saving.**

Structure features of Shoto 6-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:**
  Both positive plate and negative plate adopt pasted plate, the distance is shorter, the strong current discharging capability is strong; the grid is composed of complex alloy whose hydrogen evolution potential is higher, the corrosion resistance is fine and service life is long; the utilization rate of active substance is high and charge receptivity is strong.

- **Battery case lid:**
  Made of ABS material, with good corrosion prevention, high strength. The case lid is sealed by hot-melting, reliability is high and potential leakage risk can be prevented.

- **Separator:**
  Adopt special micro-pore PVC-SiO_2 sparator from Europe AMER-SIL Company, the porosity of sparator 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

IEC60896-21/22
BS EN 61427-2002
YD/T 1360
Q/321284KCC 03-2006

Features of application performance:

- **Designed service life of 15 years**
- **High cycle service life**
- **Wider temperature range**
- **Excellent deep cycle performance**
- **Excellent high rate discharge performance**
- **Stronger constant power discharge capability**
- **Better charge reception capability**
- **Better safety performance and reliability**
- **High performance price ratio and low yearly operating cost**
- **Eco-friendly, cycle application**

Environmental requirement:

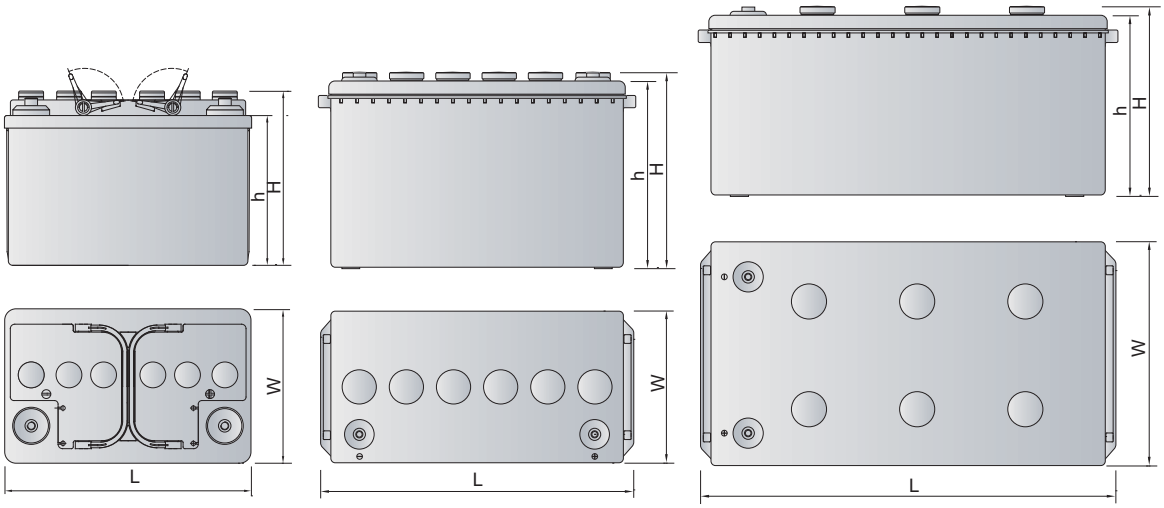
- Temperature: available for -20~50℃ (-4~122F), relative humidity≤90%; the ambient temperature for batteries in the same pack shall be unified; ambient temperature is recommended for 20~25℃ (68~77F), storage temperature is 0~20℃ (32~68F); general storage period is 3~6 months, if it's exceeded, battery 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 ≥2Ω;

- Anti-freezing measures shall be taken for the battery installed in high and cold area.



6-GFMJ-50~80 6-GFMJ-65~85 6-GFMJ-100~200

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	
6-GFMJ-50	12	50	1	276	175	170	197	21.0
6-GFMJ-65	12	65	1	353	175	214	224	30.5
6-GFMJ-80	12	80	1	335	175	206	234	35.0
6-GFMJ-85	12	85	1	418	175	214	224	38.0
6-GFMJ-100	12	100	1	513	164	214	224	45.0
6-GFMJ-120	12	120	1	513	229	214	224	53.5
6-GFMJ-150	12	150	1	513	229	214	224	63.0
6-GFMJ-200	12	200	1	513	294	214	224	82.5

Note: Output terminal is the M8 screw hole

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
6-GFMJ-50	840	6.38	1881	8	197	44	352
6-GFMJ-65	1070	4.48	2679	8	277	36	288
6-GFMJ-80	1210	4.33	2771	8	313	36	288
6-GFMJ-85	1258	4.3	2791	8	340	36	288
6-GFMJ-100	1544	3.26	3681	8	400	26	208
6-GFMJ-120	1710	2.98	4027	6	361	32	192
6-GFMJ-150	1980	2.63	4563	6	417	32	192
6-GFMJ-200	2464	2.17	5530	4	365	36	144

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 specificationdel	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
6-GFMJ-50	11.40	102.6	64.0	59.9	34.6	30.4	24.0	17.5	14.5	10.4	8.1	6.8	4.9	4.4	2.37	0.58	0.49
	11.10	114.0	71.1	66.5	38.5	33.7	26.7	19.5	16.2	11.6	9.0	7.6	5.4	4.8	2.60	0.62	0.52
	10.80	120.0	74.8	70.0	40.5	35.5	28.1	20.5	17.0	12.2	9.5	8.0	5.7	5.1	2.73	0.64	0.54
	10.50	126.0	78.5	73.5	42.5	37.3	29.5	21.5	17.9	12.8	10.0	8.4	6.0	5.4	2.83	0.66	0.55
6-GFMJ-65	11.40	133.4	81.6	77.8	44.9	39.5	31.5	22.8	18.9	14.4	10.6	9.7	6.5	5.6	3.08	0.79	0.66
	11.10	148.2	90.6	86.5	49.9	43.8	35.1	25.3	21.0	16.0	11.7	10.7	7.2	6.2	3.38	0.84	0.70
	10.80	156.0	95.4	91.0	52.5	46.2	36.9	26.7	22.1	16.8	12.4	11.3	7.6	6.5	3.54	0.87	0.72
	10.50	163.8	100.2	95.6	55.1	48.5	38.7	28.0	23.2	17.6	13.0	11.9	8.0	6.8	3.68	0.89	0.74
6-GFMJ-80	11.40	157.3	100.5	95.8	54.7	48.6	36.1	28.0	23.3	17.1	13.0	11.6	8.2	6.8	3.87	0.95	0.81
	11.10	174.8	111.7	106.4	60.8	54.0	40.1	31.2	25.8	19.0	14.4	12.9	9.1	7.6	4.25	1	0.86
	10.80	184.0	117.6	112.0	64.0	56.8	42.2	32.8	27.2	20.0	15.2	13.6	9.6	8.0	4.46	1.03	0.89
	10.50	193.2	123.5	117.6	67.2	59.6	44.3	34.4	28.6	21.0	16.0	14.3	10.1	8.4	4.63	1.06	0.91
6-GFMJ-85	11.40	161.9	103.4	95.0	62.5	50.0	39.9	28.9	23.9	18.5	13.4	12.3	8.3	7.0	4.04	1.03	0.86
	11.10	179.9	114.9	105.6	69.5	55.5	44.3	32.1	26.6	20.6	14.9	13.6	9.2	7.8	4.44	1.09	0.91
	10.80	195.5	124.9	114.8	75.5	60.4	48.2	34.9	28.9	22.4	16.2	14.8	10.0	8.5	4.66	1.12	0.94
	10.50	205.3	131.1	120.5	79.3	63.4	50.6	36.6	30.3	23.5	17.0	15.5	10.5	8.9	4.85	1.15	0.96
6-GFMJ-100	11.40	188.1	128.7	119.7	69.6	60.7	48.3	35.1	29.1	20.7	16.2	13.7	9.8	8.6	4.54	1.19	1.02
	11.10	209.0	143.0	133.0	77.3	67.5	53.7	39.0	32.3	23.0	18.1	15.2	10.9	9.6	4.99	1.26	1.08
	10.80	220.0	150.5	140.0	81.4	71.0	56.5	41.0	34.0	24.2	19.0	16.0	11.5	10.1	5.23	1.30	1.11
	10.50	231.0	158.0	147.0	85.5	74.6	59.3	43.1	35.7	25.4	20.0	16.8	12.1	10.6	5.43	1.33	1.14
6-GFMJ-120	11.40	225.7	132.7	143.6	87.6	72.8	57.1	42.1	34.9	24.6	19.5	16.7	11.4	10.3	5.45	1.42	1.23
	11.10	250.8	147.4	159.6	97.4	80.9	63.5	46.7	38.8	27.4	21.7	18.5	12.6	11.4	5.99	1.50	1.30
	10.80	264.0	155.2	168.0	102.5	85.2	66.8	49.2	40.8	28.8	22.8	19.5	13.3	12.0	6.29	1.55	1.34
	10.50	277.2	163.0	176.4	107.6	89.5	70.1	51.7	42.8	30.2	23.9	20.5	14.0	12.6	6.54	1.59	1.37
6-GFMJ-150	11.40	260.1	190.9	171.3	103.2	86.3	70.6	52.0	43.1	30.7	24.1	20.5	14.6	12.8	6.83	1.79	1.85
	11.10	289.1	212.2	190.4	114.7	95.9	78.5	57.8	47.9	34.1	26.8	22.7	16.3	14.2	7.51	1.89	1.95
	10.80	307.5	225.7	202.5	122.0	102.0	83.5	61.5	51.0	36.3	28.5	24.2	17.3	15.1	7.88	1.95	2.01
	10.50	322.9	237.0	212.6	128.1	107.1	87.7	64.6	53.6	38.1	29.9	25.4	18.2	15.9	8.20	2.00	2.06
6-GFMJ-200	11.40	335.8	246.5	221.1	133.4	111.4	92.5	67.2	55.7	39.7	31.1	26.2	18.8	16.5	9.12	2.43	2.05
	11.10	373.1	273.9	245.7	148.2	123.8	102.7	74.6	61.9	44.1	34.6	29.1	20.9	18.4	10.03	2.56	2.16
	10.80	410.0	301.0	270.0	162.9	136.0	112.9	82.0	68.0	48.5	38.0	32.0	23.0	20.2	10.53	2.64	2.23
	10.50	430.5	316.1	283.5	171.0	142.8	118.5	86.1	71.4	50.9	39.9	33.6	24.2	21.2	10.95	2.71	2.29

Constant power discharge table

unit: W

Model and specificationdel	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
6-GFMJ-50	11.40	849	693	482	429	340	271	224	186	134	104	88	62	56	28.44	6.96	5.88
	11.10	1067	872	605	540	427	340	245	203	146	114	96	68	61	30.89	7.37	6.18
	10.80	1286	1050	729	650	515	410	254	211	151	118	99	71	63	32.10	7.53	6.35
	10.50	1520	1125	783	680	535	420	267	221	159	124	104	74	66	32.77	7.64	6.37
6-GFMJ-65	11.40	1078	854	572	532	393	310	292	242	184	135	124	83	71	36.96	9.48	7.92
	11.10	1352	1070	716	667	493	388	319	265	201	148	135	91	78	40.15	9.98	8.32
	10.80	1609	1274	853	794	587	462	330	274	208	153	140	94	81	41.63	10.23	8.47
	10.50	1882	1465	922	835	623	493	347	288	219	161	147	99	85	42.61	10.31	8.57
6-GFMJ-80	11.40	1079	898	565	556	428	337	359	298	219	166	149	105	88	46.44	11.40	9.72
	11.10	1357	1129	711	699	538	424	393	326	239	182	163	115	96	50.49	11.88	10.22
	10.80	1635	1360	857	842	648	511	407	337	248	188	169	119	99	52.45	12.11	10.47
	10.50	1912	1604	1022	924	692	566	427	354	260	198	177	125	104	53.62	12.27	10.54
6-GFMJ-85	11.40	1087	912	639	584	463	377	369	306	237	171	157	106	90	48.48	12.36	10.32
	11.10	1389	1164	815	745	592	481	404	335	260	187	172	116	99	52.75	12.95	10.81
	10.80	1673	1403	983	898	713	580	432	358	278	200	184	124	105	54.80	13.17	11.05
	10.50	1941	1763	1113	1012	758	629	454	376	292	210	193	130	111	56.16	13.32	11.12
6-GFMJ-100	11.40	1431	1104	716	686	524	427	449	372	265	208	175	126	111	54.48	14.28	12.24
	11.10	1828	1410	914	876	669	545	491	407	290	227	192	138	121	59.28	14.97	12.83
	10.80	2202	1699	1101	1056	806	657	508	422	300	236	198	143	125	61.50	15.29	13.05
	10.50	2678	1819	1210	1089	816	674	534	443	315	247	208	150	132	62.88	15.40	13.20
6-GFMJ-120	11.40	1632	1287	878	819	702	572	538	447	315	250	213	146	131	65.40	17.04	14.76
	11.10	2083	1643	1121	1046	896	730	589	488	345	273	233	159	144	71.16	17.82	15.44
	10.80	2510	1980	1350	1260	1080	880	610	506	357	283	242	165	149	73.97	18.23	15.76
	10.50	2852	2134	1373	1294	1097	912	641	531	375	297	254	173	156	75.73	18.41	15.86
6-GFMJ-150	11.40	1980	1570	1106	1015	851	694	666	552	393	309	262	187	164	81.96	21.48	22.20
	11.10	2546	2019	1422	1305	1094	893	728	604	430	338	287	205	179	89.22	22.45	23.17
	10.80	3143	2492	1755	1611	1351	1102	763	632	450	353	300	215	187	92.67	22.93	23.64
	10.50	3565	2696	1716	1618	1371	1140	801	664	473	371	315	225	197	94.96	23.16	23.85
6-GFMJ-200	11.40	2724	2107	1444	1365	1157	956	860	713	508	398	335	241	212	109.4	29.16	24.60
	11.10	3478	2690	1843	1743	1477	1220	940	780	556	436	367	264	232	119.2	30.41	25.66
	10.80	4190	3241	2220	2100	1780	1470	1017	843	601	471	397	285	250	123.8	31.05	26.22
	10.50	4553	3584	2289	2157	1828	1520	1068	885	631	495	417	299	263	126.8	31.38	26.52

Model selection table for various power demands and standby power time of 6-GFMJ series battery 48V system

Final voltage is 1.90V/cell.

Battery Capacity / Time / Power KW	5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	72h	100h	120h	240h
0.01	50	50	50	50	50	50	50	50	50	50	100	150	200	240	400
0.02	50	50	50	50	50	50	50	50	50	100	200	300	400	600	800
0.03	50	50	50	50	50	50	50	50	50	150	300	450	600	800	-
0.04	50	50	50	50	50	50	50	50	50	200	400	600	800	-	-
0.05	50	50	50	50	50	50	50	50	50	300	600	800	-	-	-
0.1	50	50	50	50	50	50	50	50	50	600	-	-	-	-	-
0.2	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-
0.5	50	50	50	50	50	50	80	100	120	-	-	-	-	-	-
1	50	50	50	50	50	100	150	200	240	-	-	-	-	-	-
3	50	120	120	200	200	300	450	600	800	-	-	-	-	-	-
5	100	200	200	300	400	600	800	-	-	-	-	-	-	-	-

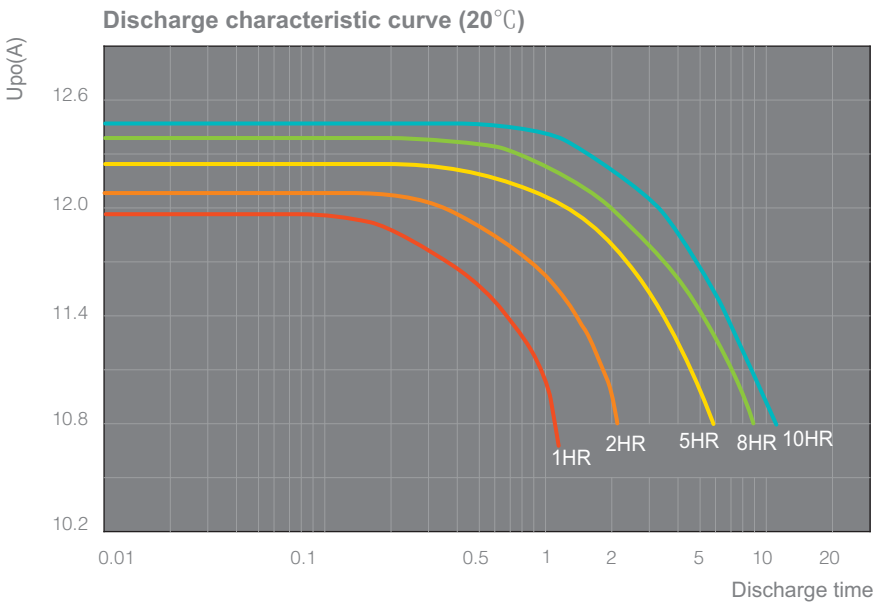
Final voltage is 1.80V/cel

Battery Capacity / Time / Power KW	5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	72h	100h	120h	240h
0.01	50	50	50	50	50	50	50	50	50	50	85	150	200	240	360
0.02	50	50	50	50	50	50	50	50	50	85	200	300	360	600	800
0.03	50	50	50	50	50	50	50	50	50	150	300	400	600	800	-
0.04	50	50	50	50	50	50	50	50	50	200	360	600	800	-	-
0.05	50	50	50	50	50	50	50	50	50	300	600	800	-	-	-
0.1	50	50	50	50	50	50	50	50	50	600	-	-	-	-	-
0.2	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-
0.5	50	50	50	50	50	50	65	100	100	-	-	-	-	-	-
1	50	50	50	50	50	85	150	200	200	-	-	-	-	-	-
3	50	65	65	120	200	300	400	600	600	-	-	-	-	-	-
5	50	120	120	200	300	450	800	-	-	-	-	-	-	-	-

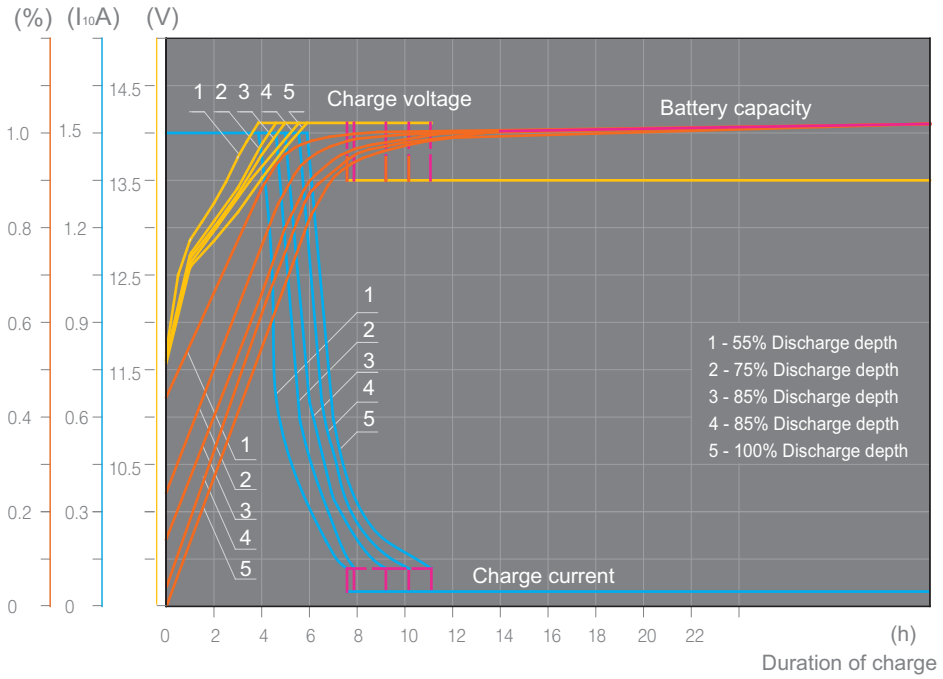
Final voltage is 1.75V/cell.

Battery Capacity / Time / Power KW	5min	15min	30min	1h	2h	3h	5h	8h	10h	24h	48h	72h	100h	120h	240h
0.01	50	50	50	50	50	50	50	50	50	50	80	120	150	200	300
0.02	50	50	50	50	50	50	50	50	50	80	150	240	300	450	600
0.03	50	50	50	50	50	50	50	50	50	120	240	360	450	600	-
0.04	50	50	50	50	50	50	50	50	50	150	300	450	600	-	-
0.05	50	50	50	50	50	50	50	50	50	240	450	600	-	-	-
0.1	50	50	50	50	50	50	50	50	50	450	-	-	-	-	-
0.2	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-
0.5	50	50	50	50	50	50	65	80	100	-	-	-	-	-	-
1	50	50	50	50	50	80	120	200	200	-	-	-	-	-	-
3	50	50	65	120	200	240	400	600	600	-	-	-	-	-	-
5	50	120	120	200	300	450	600	-	-	-	-	-	-	-	-

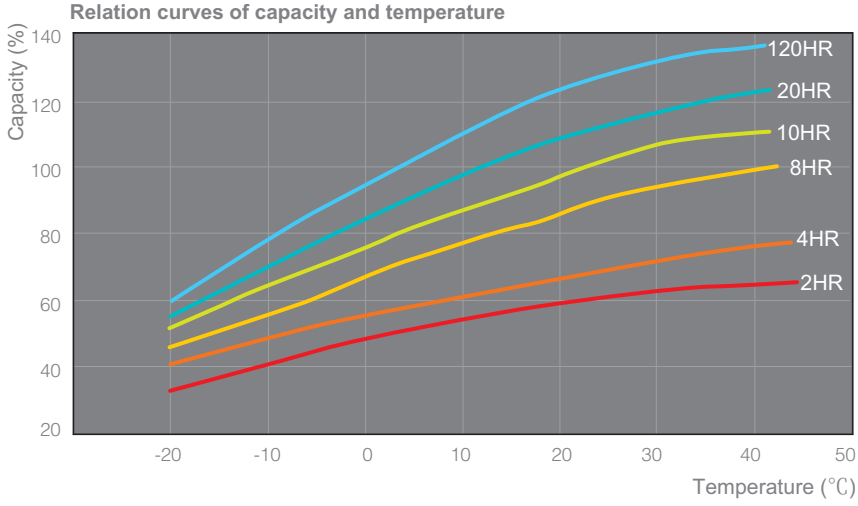
Performance curve of 6-GFMJ series gel battery



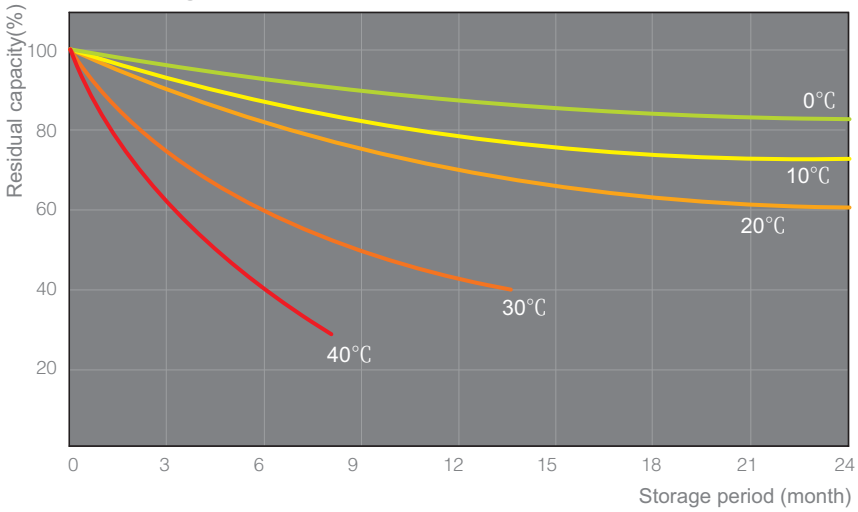
Constant voltage charge characteristic curve



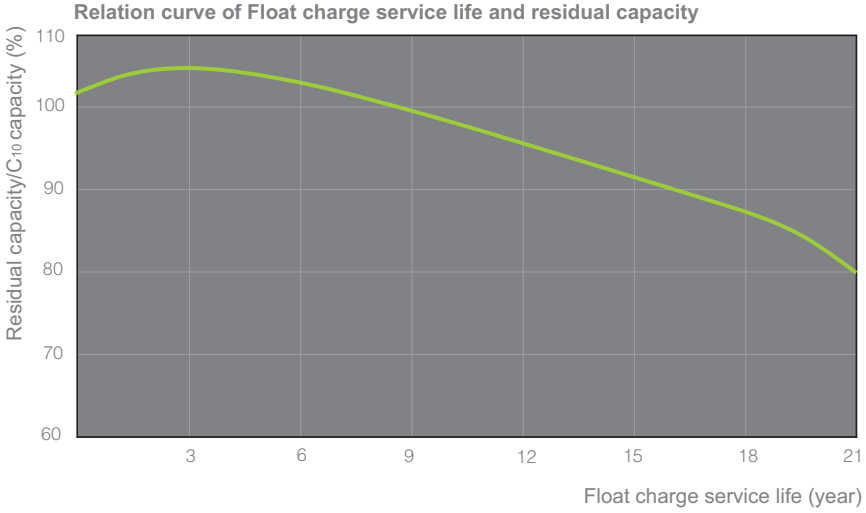
Relation curves of capacity and temperature



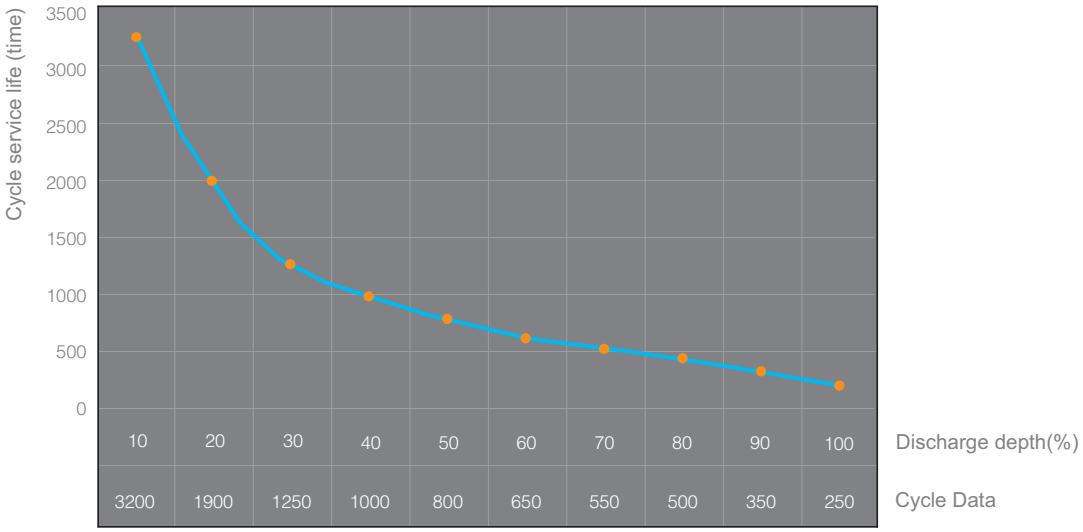
Self-discharge characteristic curve



Relation curve of Float charge service life and residual capacity



Relation curve between discharge depth and cycle service life



Remark: a) test circumstances: 20-30℃, relative humidity is 50~80percent;
b) charge mode: charge quantity is equal to 105~115percent of discharge quantity
c) residual capacity is 80 percent C_{10}

all data and specifications are subject to change without notice.

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