



SINCE 1995

Your CLEAN-GREEN Energy Solution

HGL SERIES

AGM Batteries for General
Purpose Service



Product Development...

A Brief History of Fullriver Battery Mfg. Co., Ltd. Product Development...

Fullriver Battery Manufacture Co., Ltd. was founded in **1995** and launched the **HGL series**. The HGL series batteries are mainly for general use purposes, i.e. low power UPS, Security & Alarm Systems, Emergency Lighting, Office machines, etc.

The normal voltages for the HGL series are 6V and 12V; the capacity is ranged from 0.8Ah to 260Ah.

In 2001, the **HGXL series** was launched. This series is a 2V stationary maintenance-free battery, designed as high capacity, long life and high power batteries. These are mainly used for high capacity UPS systems, telecommunications and solar battery systems applications. The capacity of this series is ranged from 50 AH to 3000 AH.

In 2003, the **HGHL series** was launched. This series performs well in both high rate discharge and float service applications. This series was specially designed for UPS standby power supply. It is also available for other float service applications, such as emergency power supply, communication power supply, etc. the power of this series is ranged from 35W to 910W.

In 2004, the **FAT series** and the **DC series** were launched. The **FAT series** also has the characteristics of high rate discharge. They are widely used in UPS systems and telecommunications. The FAT series features front terminal connections for fast and easy installation and maintenance. The monobloc's compact design is suitable for 19", 23" and ETSI racking. The capacity of FAT series is ranged from 55Ah to 175Ah.

The **DC series** is specially designed and used for deep cycle applications, which may require many more cycles. This series also has excellent recovery from deep discharge. The DC series is mainly used in golf trolley, golf caddy, forklift, electric wheelchairs, floor cleaning machines, marine, photovoltaic systems, and more.

In 2006, the **SPV series** was launched. This series has a much higher current discharge at lower temperatures and offers a surprisingly high current capability. These models can also be fitted with a protective steel case and TP brass terminals. They are mainly used for car audio accessories or as an engine start power source.

In 2008, we started research, development, and manufacturing of the **HC series**. This series is especially used for engine starting, which requires superior cranking performance at lower temperatures, for high current discharge. These batteries can also be fitted with the protective steel case and TP brass terminals.

Fullriver Batteries Qualifications, Approvals, and Certifications



- **Network Access License for Telecommunications Equipment**
(Ministry of information Industry.PRC)
- **DOT 49CFR173.159 (d) (i) and (ii)** (Non-hazardous shipping)
- **IEC 61056-1; 2004** (General purpose lead-acid batteries, valve regulated types)
- **IEC 60896-2: 2004** (Stationary lead-acid batteries, valve regulated types)
- **JIS C8704-2: 2006** (Stationary lead-acid batteries, valve regulated types)
- **JIS C8702-1: 2003** (Small-sized valve regulated lead-acid batteries)



Key Features

- Sealed construction, no electrolyte leakage from the terminals or the case of any battery, efficient operation in any orientation
- Maintenance free operation, no need to add water.
- Low impurity electrolyte
- Low self discharge, the self discharge rate below 3% per month
- Special lead calcium alloy, good corrosion resistance and high recovery capacity
- Reliable valve control system, ensure the safe operation of batteries
- ABS case and cover-V0 on request.
- FAA and IATA approved as non-hazardous

Specifications

- | | |
|-------------------------|--|
| ■ Nominal Voltage | 6 & 12Volts |
| ■ Design Life | 22Ah and down: 4-6 years @25°C
24Ah and up: 6-8 years @25°C |
| ■ Operating Temperature | -15°C to 50 °C |
| ■ Grid Alloy | Calcium/Tin lead alloy |
| ■ Plates | Flat pasted |
| ■ Separator | AGM (Absorbent Glass Mat) |
| ■ Active Material | Very high purity lead (>99.99) |
| ■ Case and Cover | ABS(V0 on request) |
| ■ Charge Voltage | Float use: 2.27-2.30 VPC@25°C
Cycle use:2.40-2.49VPC@25°C
Max. charge current: 0.25C20 |
| ■ Electrolyte | Sulphuric acid (A/R.) |

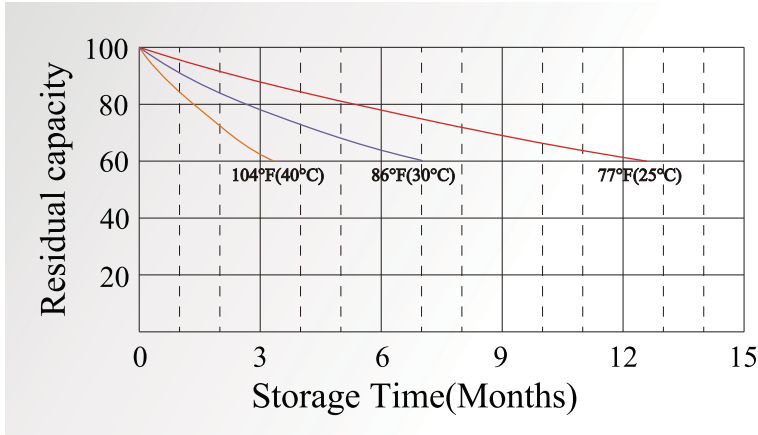
Application

A list of some of the more common applications for standby or principal power is given below:

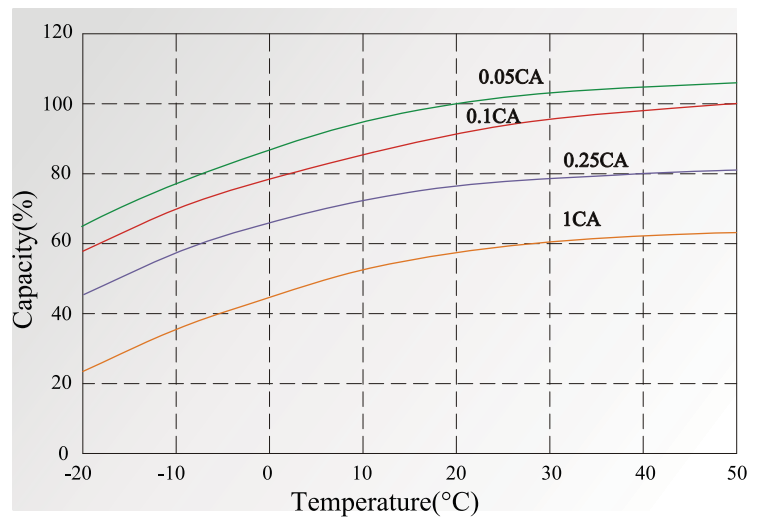
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|------------------------------|--|
| ■ Alarm Systems | ■ Microprocessor Based Office machines |
| ■ Cable Television | ■ Portable Cine & Video Lights |
| ■ Communications Equipment | ■ Fire & Security Systems |
| ■ Computers | ■ Geophysical Equipment |
| ■ Control Equipment | ■ Telecommunication Systems |
| ■ Electronic Cash Registers | ■ Television & Video Recorders |
| ■ Electronic Test Equipment | ■ Uninterruptible Power Supplies |
| ■ Emergency Lighting Systems | ■ Vending Machines |

Characteristics

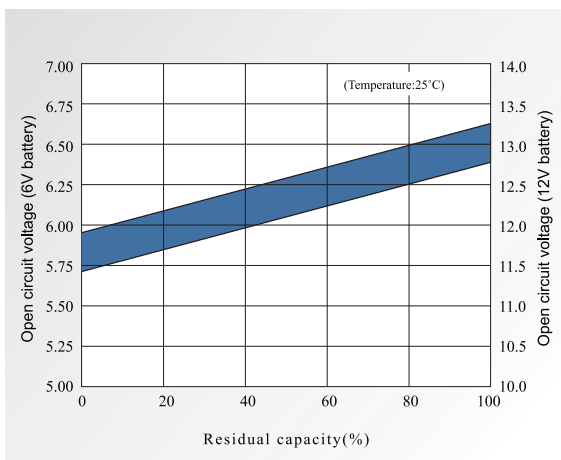
Residual capacity test result



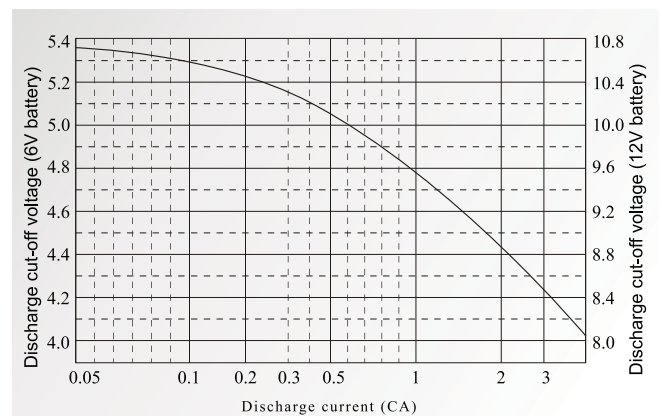
Capacity Vs. Ambient Temperature



Open circuit voltage vs. Residual capacity 77°F (25°C)



Discharge current vs. Cut-off voltage



General Specifications

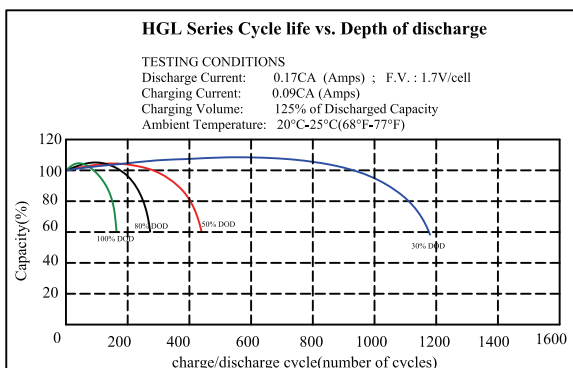
Type	Nominal Capacity	Nominal Capacity	Nominal Capacity	Length		Width		Height		Total Height		Weight (Approx.)		Terminal Type ^A	Pallet QTY
	C20	C5	C1	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs		
	1.75V/C	1.70V/C	1.60V/C												
	25°C	25°C	25°C												
Ah	Ah	Ah													
HGL1.2-6	1.2	1	0.72	97	3.82	24	0.94	52	2.05	58	2.28	0.31	0.68	F1	2420
HGL3.2-6	3.2	2.72	1.92	134	5.28	34	1.34	61	2.40	67	2.64	0.59	1.30	F1	1260
HGL4-6A	4	3.4	2.4	70	2.76	47	1.85	101	3.98	107	4.21	0.71	1.57	F1	1200
HGL4-6B	4	3.4	2.4	70	2.76	47	1.85	106	4.17	106	4.17	0.71	1.57	RB	1200
HGL4-6C	4	3.4	2.4	70	2.76	47	1.85	98	3.86	104	4.09	0.71	1.57	F1	1200
HGL5-6A	5	4.25	3	70	2.76	47	1.85	101	3.98	107	4.21	0.77	1.70	F1	1200
HGL5-6B	5	4.25	3	67	2.64	67	2.64	97	3.82	115	4.53	0.92	2.03	S01	900
HGL7-6	7	5.95	4.2	151	5.94	34	1.34	95	3.74	101	3.98	1.18	2.60	F1	770
HGL8-6	8	6.8	4.8	99	3.90	57	2.24	115	4.53	115	4.53	1.69	3.73	F1	660
HGL10-6	10	8.5	6	151	5.94	50	1.97	95	3.74	101	3.98	1.58	3.48	F1	680
HGL12-6	12	10.2	7.2	151	5.94	50	1.97	95	3.74	101	3.98	1.84	4.06	F1	680
HGL14-6CQ	14	11.9	8.4	108	4.25	71	2.80	140	5.51	140	5.51	2.38	5.25	CQ	320
HGL14-6TS	14	11.9	8.4	108	4.25	71	2.80	140	5.51	140	5.51	2.38	5.25	TS	320
HGL14-6TH	14	11.9	8.4	108	4.25	71	2.80	140	5.51	140	5.51	2.38	5.25	TH	320
HGL14-6PL	14	11.9	8.4	108	4.25	71	2.80	140	5.51	140	5.51	2.38	5.25	PL	320
HGL20-6	20	17.0	12.0	157	6.18	83	3.27	125	4.92	125	4.92	4.45	9.81	M5	280
HGL42-6	42	35.7	25.2	162	6.38	88	3.46	163	6.42	170	6.69	6.20	13.67	F2	144
HGL180-6	180	153	108	306	12.05	169	6.65	220	8.66	226	8.90	28.10	61.95	M8	36
HGL240-6	240	204	144	244	9.61	190	7.48	275	10.83	275	10.83	31.00	68.34	AP	30
HGL0.8-12	0.8	0.68	0.48	96	3.78	25	0.98	61	2.40	61	2.40	0.34	0.75	C01	2200
HGL1.2-12	1.2	1.02	0.72	97	3.82	43	1.69	52	2.05	58	2.28	0.59	1.30	F1	1800
HGL2.0-12	2	1.70	1.20	177	6.97	35	1.38	61	2.40	67	2.64	0.90	1.98	F1	1100
HGL2.3-12	2.3	1.96	1.38	177	6.97	35	1.38	61	2.40	67	2.64	0.92	2.03	F1	1100
HGL2.6-12	2.6	2.21	1.56	178	7.01	35	1.38	60	2.36	66	2.60	1.02	2.25	F1	990
HGL2.9-12	2.9	2.47	1.74	80	3.15	55.5	2.19	98	3.86	104	4.09	1.20	2.65	F1	900
HGL3.2-12	3.2	2.72	1.92	134	5.28	67	2.64	61	2.40	67	2.64	1.15	2.54	F1	720
HGL4-12	4	3.40	2.40	90	3.54	70	2.76	101	3.98	107	4.21	1.39	3.06	F1	600
HGL5-12	5	4.25	3.00	90	3.54	70	2.76	101	3.98	107	4.21	1.48	3.26	F1	600
HGL7.2-12	7.2	6.12	4.32	151	5.94	65	2.56	95	3.74	101	3.98	2.30	5.07	F1	480
HGL8.5-12	8.5	7.22	5.10	151	5.94	65	2.56	95	3.74	101	3.98	2.60	5.73	F1	450
HGL10-12	10	8.5	6	151	5.94	65	2.56	111	4.37	117	4.61	3.30	7.28	F1	336
HGL12-12	12	10.2	7.2	151	5.94	99	3.90	95	3.74	101	3.98	3.75	8.27	F1	264
HGL18-12	18	15.3	10.8	181	7.13	77	3.03	167	6.57	167	6.57	5.50	12.13	M5	192
HGL22-12	22	18.7	13.2	181	7.13	77	3.03	167	6.57	167	6.57	6.05	13.34	M5	192
HGL24-12	24	20.4	14.4	165	6.50	176	6.93	125	4.92	125	4.92	7.70	16.98	M5	120
HGL26-12A	26	22.1	15.6	166	6.54	126	4.96	174	6.85	174	6.85	8.50	18.74	M5	114
HGL26-12B	26	22.1	15.6	165	6.50	176	6.93	125	4.92	125	4.92	7.80	17.20	M6	120
HGL28-12	28	23.8	16.8	166	6.54	126	4.96	174	6.85	174	6.85	8.60	18.96	M5	114
HGL33-12	33	28.1	19.8	196	7.72	131	5.16	155	6.10	167	6.57	10.20	22.49	M6	100

General Specifications

Type	Nominal Capacity	Nominal Capacity	Nominal Capacity	Length		Width		Height		Total Height		Weight (Approx.)		Terminal Type ^A	Pallet QTY
	C20	C5	C1												
	1.75V/C	1.70V/C	1.60V/C	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs		
	25°C	25°C	25°C												
	Ah	Ah	Ah												
HGL35-12	35	29.8	21.0	196	7.72	131	5.16	155	6.10	167	6.57	10.30	22.71	M6	100
HGL38-12	38	32.3	22.8	198	7.80	166	6.54	170	6.69	170	6.69	13.30	29.32	M6	72
HGL40-12	40	34.0	24.0	198	7.80	166	6.54	174	6.85	174	6.85	13.40	29.54	M6	72
HGL45-12	45	38.3	27.0	198	7.80	166	6.54	174	6.85	174	6.85	13.50	29.76	M6	72
HGL50-12	50	43.0	31.2	229	9.02	138	5.43	208	8.19	212	8.35	17.10	37.70	M6	63
HGL55-12	55	47.3	34.5	229	9.02	138	5.43	208	8.19	212	8.35	17.20	37.92	M6	63
HGL60-12	60	51.0	36.0	229	9.02	138	5.43	208	8.19	212	8.35	17.30	38.14	M6	63
HGL65-12	65	57.0	40.3	351	13.82	167	6.57	176	6.93	176	6.93	21.20	46.74	M6	48
HGL70-12A	70	59.5	41.5	351	13.82	167	6.57	176	6.93	176	6.93	21.30	46.96	M6	48
HGL70-12B	70	61.0	43.0	260	10.24	169	6.65	211	8.31	215	8.46	23.00	50.71	M6	48
HGL75-12	75	63.8	45.0	260	10.24	169	6.65	211	8.31	215	8.46	23.10	50.93	M6	48
HGL80-12A	80	68	46.4	260	10.24	169	6.65	211	8.31	215	8.46	23.20	51.15	M6	48
HGL80-12B	80	68	48	351	13.82	167	6.57	179	7.05	183	7.20	26.00	57.32	M6	36
HGL90-12	90	76.5	54	307	12.09	169	6.65	211	8.31	215	8.46	28.20	62.17	M6	36
HGL100-12A	100	85	60	328	12.91	172	6.77	214	8.43	220	8.66	30.40	67.02	M8	36
HGL100-12B	100	85	60	331	13.03	175	6.89	214	8.43	218	8.58	30.50	67.24	M8	36
HGL100-12C	100	85	60	307	12.09	169	6.65	211	8.31	215	8.46	30.60	67.46	M6	36
HGL120-12A	120	102	72	407	16.02	174	6.85	210	8.27	240	9.45	37.60	82.89	M8	27
HGL120-12B	120	102	72	331	13.03	175	6.89	214	8.43	218	8.58	32.00	70.55	M8	36
HGL140-12	140	119	84	341	13.43	173	6.81	281	11.06	287	11.30	42.50	93.70	M8	24
HGL160-12	160	136	96	484	19.06	171	6.73	241	9.49	241	9.49	45.70	100.75	M8	24
HGL180-12	180	153	108	530	20.87	209	8.23	214	8.43	218	8.58	55.30	121.92	M8	21
HGL200-12	200	170	120	530	20.87	209	8.23	214	8.43	218	8.58	57.60	126.99	M8	21
HGL210-12	210	178.5	126	522	20.55	242	9.53	218	8.58	222	8.74	61.00	134.48	M8	18
HGL230-12	230	195.5	138	522	20.55	242	9.53	218	8.58	222	8.74	64.50	142.20	M8	18
HGL240-12	240	204	144	520	20.47	269	10.59	204	8.03	208	8.19	70.20	154.76	M8	18
HGL260-12	260	221	156	521	20.51	269	10.59	220	8.66	224	8.82	75.50	166.45	M8	12

A) Terminal type--please see our terminal configurations

Cycle life Vs. Depth of discharge



Temperature conditions

Recommended temperature ranges for charging, discharging and storing the battery are tabulated below.

Charge	32°F (0°C) ~ 104°F (40°C)
Discharge	5°F (-15°C) ~ 122°F (50°C)
Storage	5°F (-15°C) ~ 104°F (40°C)

Terminal Configurations



M Terminal
(M5, M6 or M8)



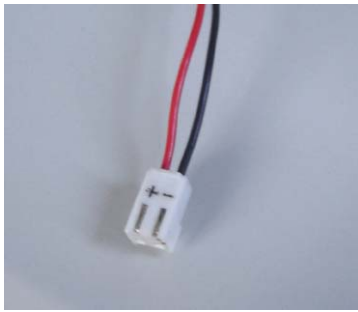
Automotive Post
(AP)



Faston Tab 250&187
(F27F1)



F Terminal
(F7&F25)



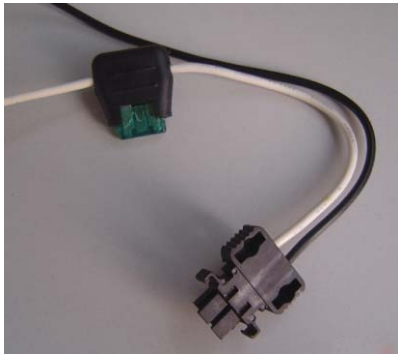
C01 Terminal



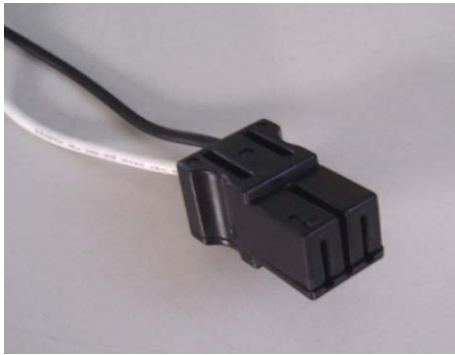
Marine Dual Terminal
(APW)



S01 Terminal



TH Terminal



CQ Terminal



RB Terminal



PL Terminal



TS Terminal

Charging Instructions

To maximize the life of your Fullriver battery, it is important that it is properly charged. As with all lead-acid batteries, both over-and under-charging a Fullriver battery will result in shortened service life. **The best protection from improper charging is the use of a quality charger and routinely checking that the charger current and voltage settings are maintained.**

Please read the following instructions before using your battery.

Charger Inspection

The charger cabling should be insulated and free of breaks or cuts. The cable connectors should be clean and properly mate with the battery terminals to ensure a snug connection. The charger's AC cord should be free of breaks or cuts and the wall plug should be clean.

Charging Guidelines

- Fully charge batteries after each use.
- Charge in a ventilated area as gasses may be released through the pressure relief valve if the batteries are excessively over-charged.
- Never charge a frozen battery.
- Ideal charging temperatures: 32°F-104°F (0°C-40°C).

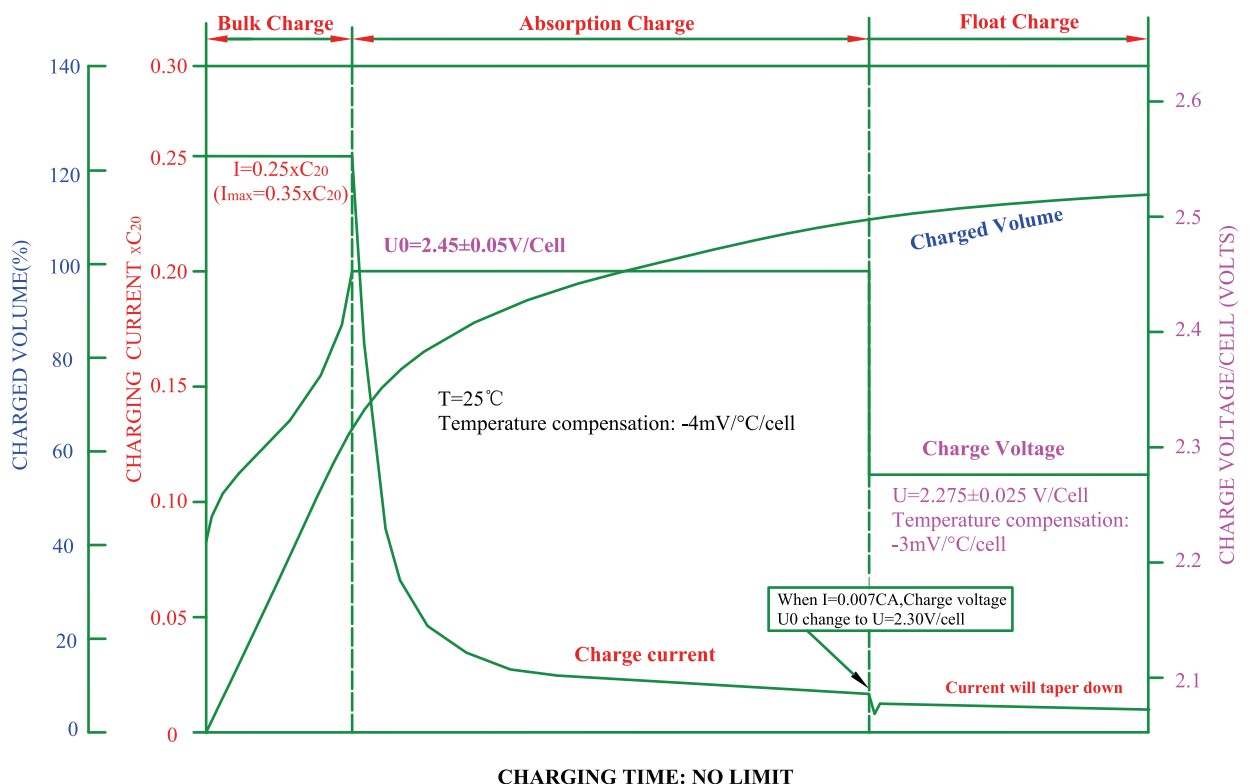
Charging Characteristics

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If the charger has a setting for AGM, use this setting to charge your Fullriver battery. **To maximize your battery life a voltage regulated charger with temperature compensation is strongly recommended.** See Figure 1 for the recommended voltage regulated charge profile.

Voltage Regulated Charger-IUU

Figure 1



The initial charge current is recommended to be set at $I = 0.25 \times C$ ($I_{max} = 0.35 \times C$) in order to fully charge the batteries within a reasonable amount of time. It can be set lower, however please be aware that charge time will increase so make sure the batteries have enough time to fully charge before being put back into service. Fullriver batteries have a low internal resistance allowing them to be charged at a higher current, therefore faster, than conventional flooded/wet batteries.

Bulk stage - Set the charger to the initial current I until the maximum voltage U_0 is reached.

Absorption stage - Set the charger to the maximum voltage U_0 until the current tapers to I .

Float stage and termination – Set the charger to the float voltage U indefinitely or until the charger is shut off or unplugged. This stage is ideal to maintain battery state of charge.

Make sure the temperature compensation is programmed as specified in Figure 1 ($-4\text{mV}/^\circ\text{C}/\text{cell}$ or $-2\text{mV}/^\circ\text{F}/\text{cell}$) or manually adjust the voltage setting for temperatures varying from 25°C (77°F). As the temperature decreases, the voltage should be increased and as the temperature increases the voltage should be decreased.

The profile in Figure 1 can be used with or without the float stage. Without the float stage, recharge can be terminated based on time (this will need to be determined as it will vary with depth of discharge and charge current) or percentage recharge ($\sim 105\% - 110\%$).

Charge Voltage Quick Reference

12V Battery	32°F (0°C)	50°F (10°C)	68°F (20°C)	77°F (25°C)	86°F (30°C)	104°F (40°C)
Charge Voltage	15.30	15.06	14.82	14.70	14.58	14.34
Float Voltage	14.25	14.01	13.77	13.65	13.53	13.29

For a 6V battery divide the voltage by 2.

Refresh Charge

If Fullriver batteries are properly charged they should never require an equalizing charge. If they were not properly charged and there is a decrease in capacity, recharge the batteries and make sure they complete the entire charge cycle. If the batteries are stored for extended periods of time, recharge them as follows:

Storage Temperature	Refresh Charge Interval
Below 68°F (20°C)	9 Months
68°F (20°C) - 86°F (30°C)	6 Months
Higher than 86°F (30°C)	3 Months

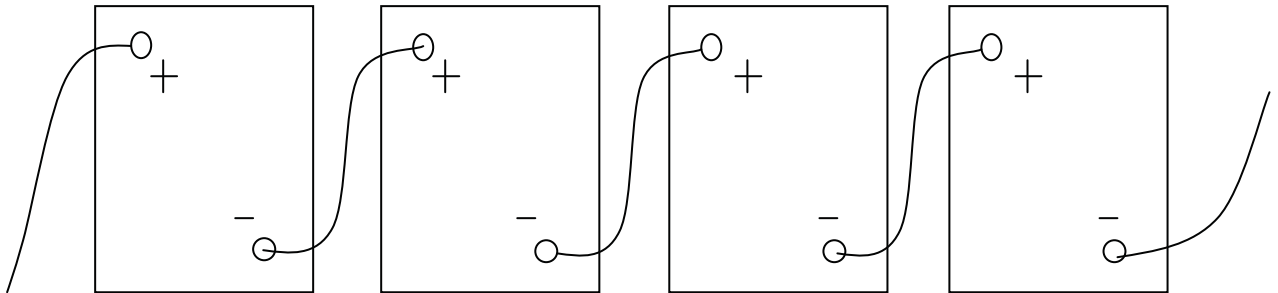
Other Chargers

There are many types of chargers and inverters available for charging lead-acid batteries. If you are not sure if your charger meets the recommended charging characteristics or if you need help programming your charger, please contact your local Fullriver Battery distributor for assistance.

How to Increase system power

Two or more batteries can be easily connected to boost your system's voltage and/or capacity. There are three methods to obtain additional voltage and/or capacity, as described below:

To increase voltage, connect batteries in series.

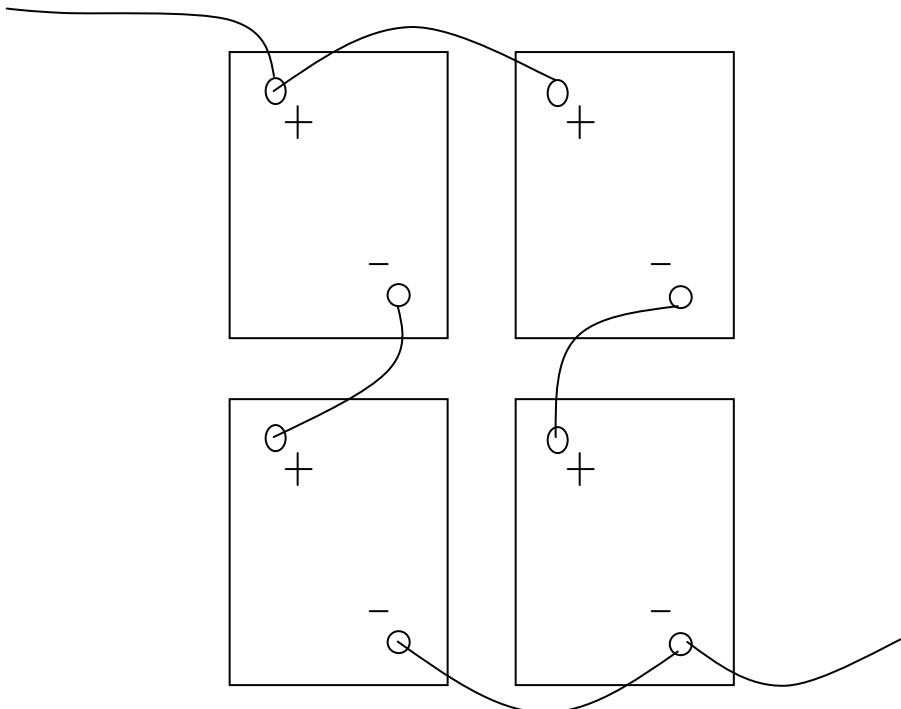


Battery System: 24 Volt, 240AH
Using Four HGL240-6 Batteries

To increase both voltage and amp-hour capacity, connect batteries in series/ parallel.

The numbers of plates that are connected in parallel determine the capacity of a cell. For example, if one set of positive and negative plates is capable of providing 5 ampere hour capacity at the 20-hour rate, 10 sets of plates connected in parallel will provide 50 ampere hours capacity.

Just as plates can be connected in parallel to increase the capacity of a cell, completed cells and series connected strings of cells can be connected in parallel to increase the capacity of the battery system.

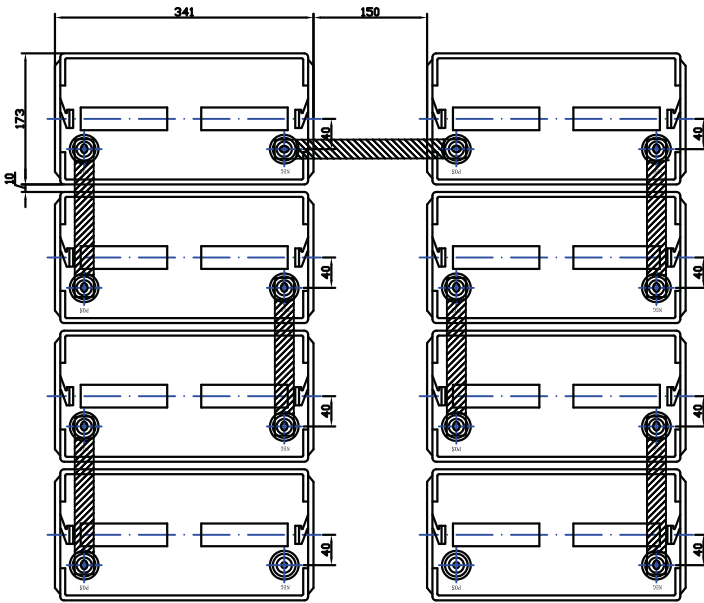


Battery System: 12 Volt, 480AH
Using Four HGL240-6 Batteries

NOTE: These systems can also be configured using 12-volt batteries. It is not recommended that you mix batteries of different voltages within the same system.

Typical Rack Layouts

Battery installations have many variables: space available, autonomy times, load carrying requirements etc. Fullriver engineering department is at the customer's disposal to find the best solution, provide dimensioned layout drawings and wiring diagrams.



HGL 140-12

A tailor made solution to meet the customer's requirements.

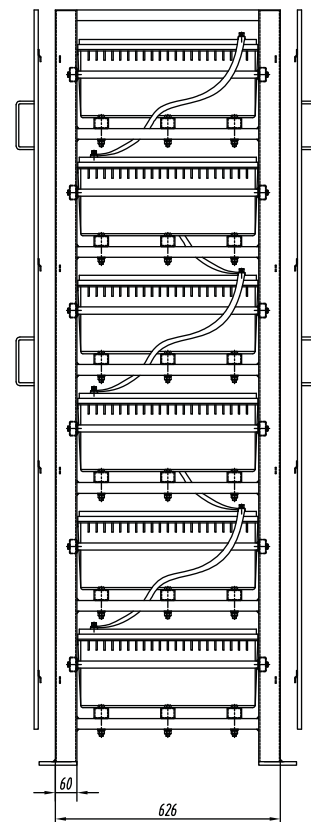
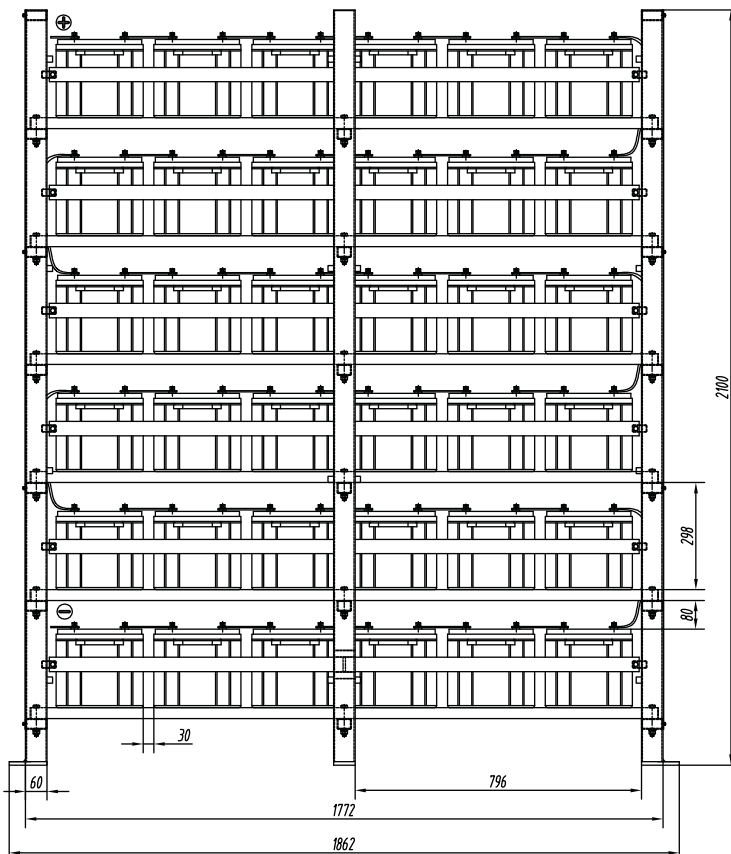
All drawings are submitted for customer approval to ensure trouble free installation.

Racking is available to suit available space and required configuration.

Special cables and/or standard connectors can be provided on request along with wiring diagrams.

A range of terminal covers are available to cover large and small batteries and cables or connectors.

The example rack shown is for **HGL210-12**.



[HTTP://WWW.FULLRIVER.COM](http://www.fullriver.com)



FULLRIVER BATTERY MANUFACTURE CO.,LTD.