

**SURIA DELTA POWER TECHNOLOGY SDN. BHD.**

*(Authorized Sole Distributor for SHOTO in Asean & East Asia region)*

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*Shuangdeng Science & Industrial Zone in Taizhou, Jiangsu*

**DIN STANDARD OPzV**  
**2V GEL Battery Series**

# Executive Summary

## 2V Top Terminal Gel Battery Series (From 200Ah – 3000Ah)

Shoto GFMJ Series Battery (2v Gel VRLA Battery) fully complies with the German DIN 40742 and EUROBAT (draft IEC 896-2) standards. Some of the performance parameters have even exceeded the mentioned standards.

This model of battery uses the most advance material and produced under the company's state of the art manufacturing facility located in Shuangdeng Science and Technology Park in Taizhou. It is zero-maintenance throughout the life-cycle, it's safe and reliable. The design life for the battery is at 20 years.



The Battery electrolyte contains fumed silica, and there is no flow, no leakage or no graduation of acid liquor. European manufactured PVC-SiO<sub>2</sub> separator is used for the optimum performance in its class. The ABS casing is especially manufactured from Italy to meet the highest DIN Standard requirement and the resin used to seal the battery is especially imported from Germany. The gas recombination rate exceeds 99%, way better than the stipulated standards.

Shoto GFMJ Series Battery has been widely used in the area of Telecommunication, Power Utility, Military and Solar Application. It's highly recommended for applications that required a very high deep cycling during the life cycling.

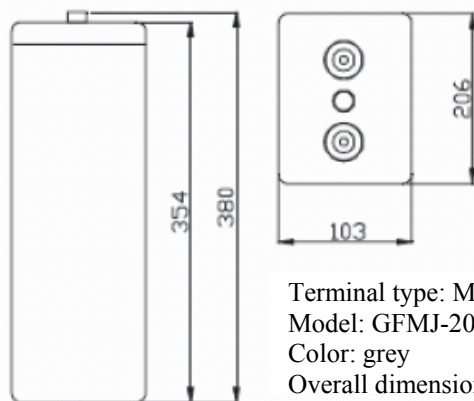
## DIN Standard OPzV GEL VRLA Battery (2V200AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-200  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	200Ah	
Dimension	Length	103mm
	Width	206mm
	Height	354mm
	Total	380mm
Approx. mass	20.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

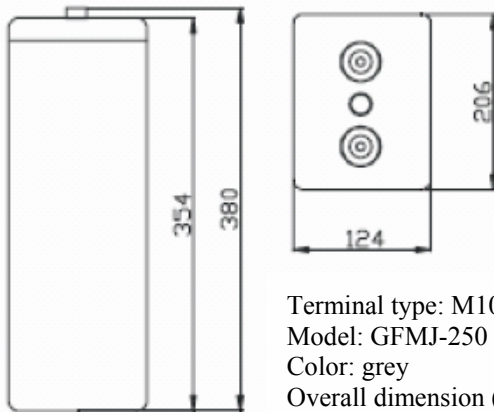
## DIN Standard OPzV GEL VRLA Battery (2V250AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-250  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	250Ah	
Dimension	Length	124mm
	Width	206mm
	Height	354mm
	Total	380mm
Approx. mass	24.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

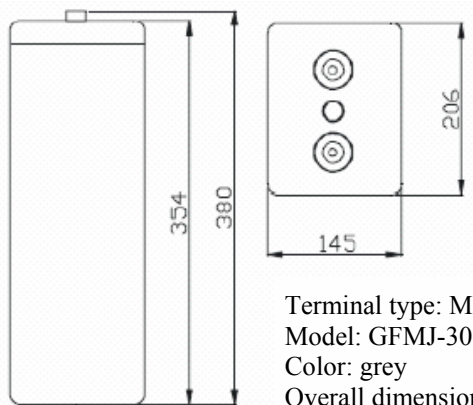
## DIN Standard OPzV GEL VRLA Battery (2V300AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-300  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	300Ah	
Dimension	Length	145mm
	Width	206mm
	Height	354mm
	Total	380mm
Approx. mass	29Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

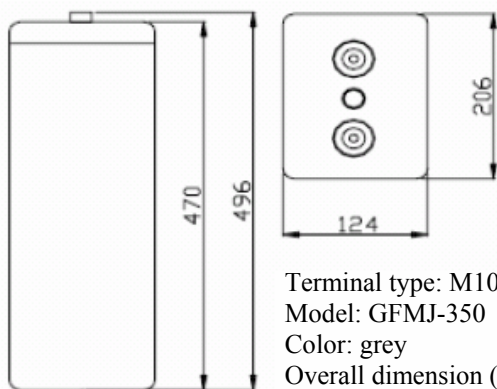
## DIN Standard OPzV GEL VRLA Battery (2V350AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-350  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	350Ah	
Dimension	Length	124mm
	Width	206mm
	Height	470mm
	Total	496mm
Approx. mass	31.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

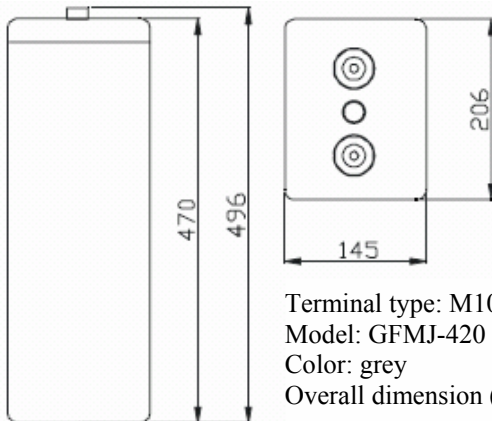
## DIN Standard OPzV GEL VRLA Battery (2V420AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-420  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	420Ah	
Dimension	Length	145mm
	Width	206mm
	Height	470mm
	Total	496mm
Approx. mass	36.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

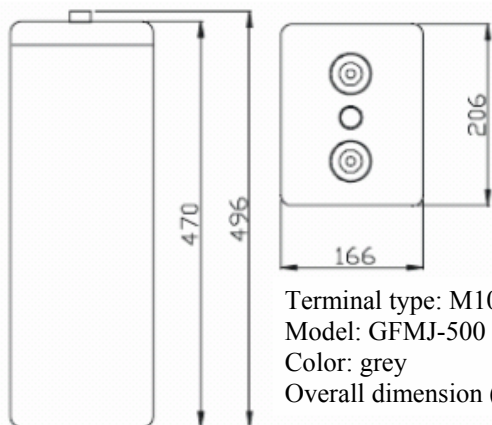
## DIN Standard OPzV GEL VRLA Battery (2V500AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-500  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	500Ah	
Dimension	Length	166mm
	Width	206mm
	Height	470mm
	Total	496mm
Approx. mass	42.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge



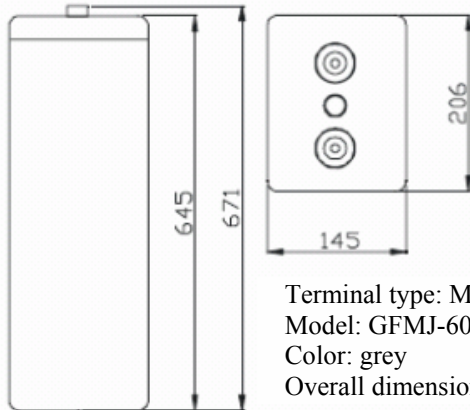
## DIN Standard OPzV GEL VRLA Battery (2V600AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-600  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	600Ah	
Dimension	Length	145mm
	Width	206mm
	Height	645mm
	Total	671mm
Approx. mass	50.0Kg	

### Main technical parameters and Environment requirements

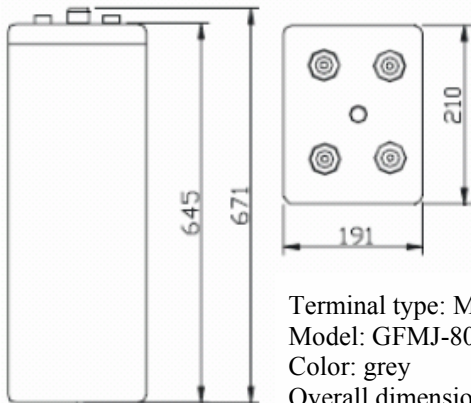
Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

## DIN Standard OPzV GEL VRLA Battery (2V800AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.

### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	800Ah	
Dimension	Length	191mm
	Width	210mm
	Height	645mm
	Total	671mm
Approx. mass	68.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

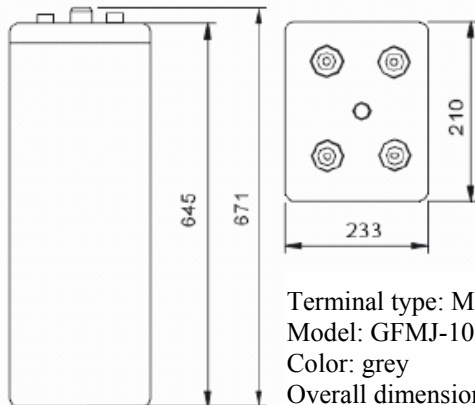
## DIN Standard OPzV GEL VRLA Battery (2V1000AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt  
Model: GFMJ-1000  
Color: grey  
Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	1000Ah	
Dimension	Length	233mm
	Width	210mm
	Height	645mm
	Total	671mm
Approx. mass	82.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

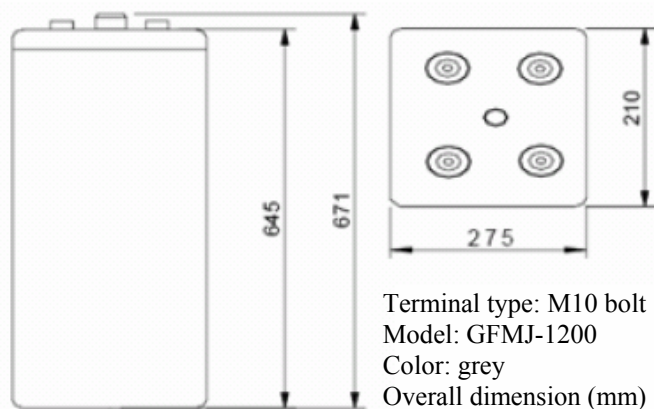
## DIN Standard OPzV GEL VRLA Battery (2V1200AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	1200Ah	
Dimension	Length	275mm
	Width	210mm
	Height	645mm
	Total	671mm
Approx. mass	97.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

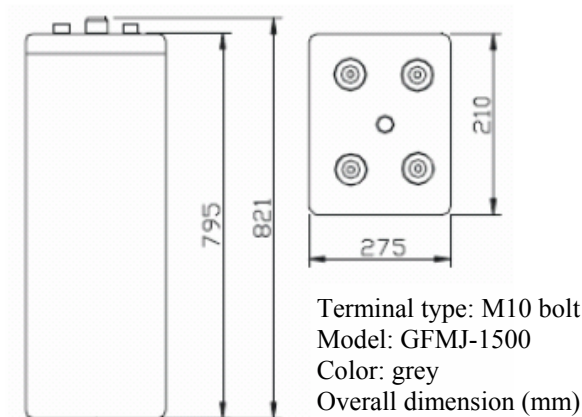
## DIN Standard OPzV GEL VRLA Battery (2V1500AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	1500Ah	
Dimension	Length	275mm
	Width	210mm
	Height	795mm
	Total	821mm
Approx. mass	120.0Kg	

### Main technical parameters and Environment requirements

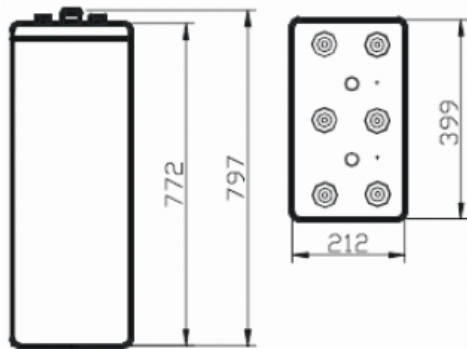
Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

## DIN Standard OPzV GEL VRLA Battery (2V2000AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.

### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt Model: GFMJ-2000  
Color: grey Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	2000Ah	
Dimension	Length	399mm
	Width	212mm
	Height	772mm
	Total	797mm
Approx. mass	160.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

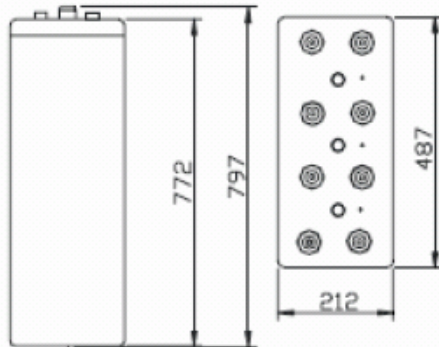
## DIN Standard OPzV GEL VRLA Battery (2V2500AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt      Model: GFMJ-2500  
Color: grey                      Overall dimension (mm)

### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	2500Ah	
Dimension	Length	487mm
	Width	212mm
	Height	772mm
	Total	797mm
Approx. mass	200.0Kg	

### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge

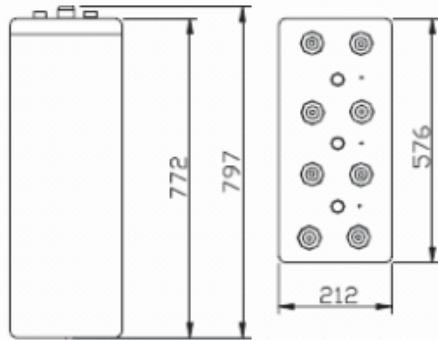
## DIN Standard OPzV GEL VRLA Battery (2V3000AH)

The rechargeable batteries are lead-lead dioxide systems. The dilute sulfuric acid electrolyte is absorbed by separators and plates and thus immobilized. Should the battery be accidentally overcharged producing hydrogen and oxygen, special one-way valves allow the gases to escape thus avoiding excessive pressure build-up. Otherwise, the battery is completely sealed and is, therefore, maintenance-free, leak proof and usable in any position.



### Dimensions and Weight

Product Standard: German DIN 40742  
& EUROBAT (draft IEC 896-2) standards



Terminal type: M10 bolt    Model: GFMJ-3000  
Color: grey                      Overall dimension (mm)

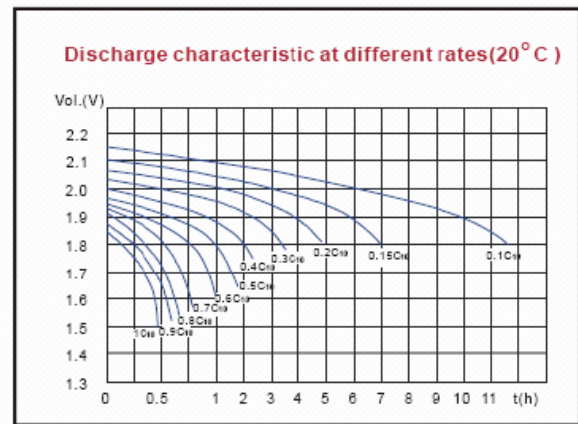
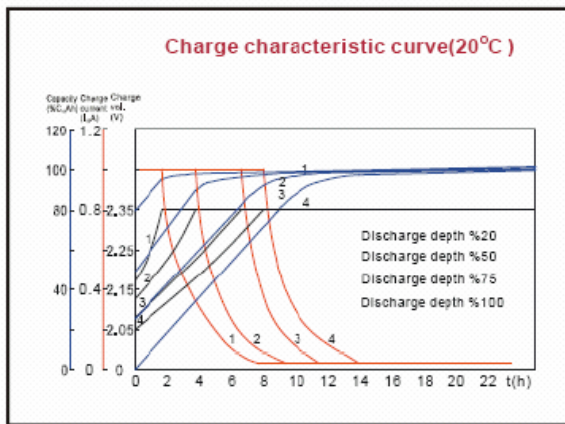
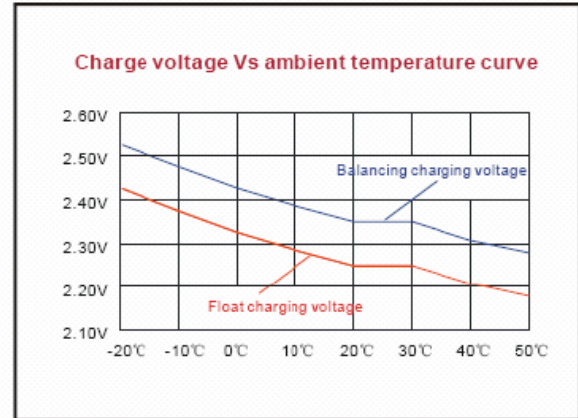
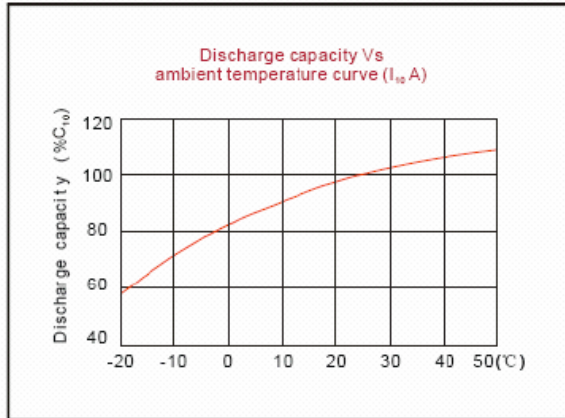
### Specifications

Normal voltage	2V	
Rated capacity (10 hours rate)	3000Ah	
Dimension	Length	576mm
	Width	212mm
	Height	772mm
	Total	797mm
Approx. mass	240.0Kg	

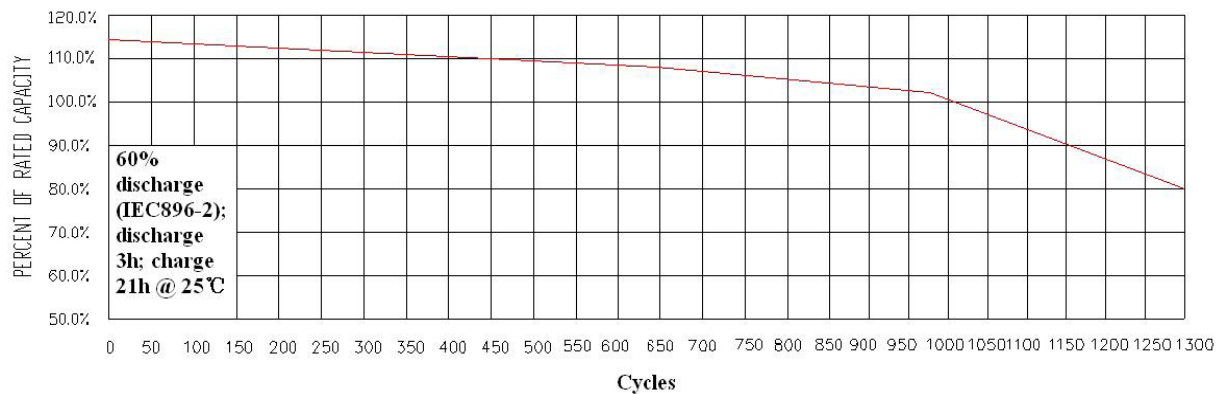
### Main technical parameters and Environment requirements

Environment temperature	-20°C ~ 50°C
Environmental temperature for best utilization	20°C
Float charging voltage	2.23-2.25V/unit
Balancing charging coefficient	-2.35V/unit
Temperature adjustment coefficient	-3mV/°C/unit
Max. charging current	0.10C <sub>10</sub> A
Design service life	20 years (20°C)
Self-discharge rate	Less than 40% after 2 years storage at 20°C
Recover performance after deep discharge	The battery can be recharged to 95% of the rated capacity after 12-hours deep discharge





### Life Cycle



### Floating Life Cycle – Relationship between Temperature and Life Cycle

Battery Type	Temperature (°C)	-10°C	0°C	5°C	25°C	35°C	45°C
2V Gel Battery	Life Cycle (Years)	5-6	≥ 8	≥ 10-12	≥ 14-15	≥ 7-8	≥ 3.5-6

**Discharge current at different discharge rate at terminal volt 1.80v/cell (A) (25°C)**

Type	15m	30m	1h	2h	3h	4h	5h	6h	8h	10h
GFMJ-200	343	279	208	137	106	85	72	63	49	41
GFMJ-250	429	349	261	172	131	107	90	78	63	52
GFMJ-300	516	420	314	205	157	128	108	94	75	63
GFMJ-350	523	450	351	239	187	152	128	112	90	75
GFMJ-420	626	539	420	286	223	183	154	135	108	90
GFMJ-500	731	628	492	334	262	214	180	158	126	105
GFMJ-600	771	683	564	411	328	269	227	200	161	136
GFMJ-630	798	707	584	425	339	278	236	208	167	142
GFMJ-700	887	785	649	473	377	309	263	231	186	158
GFMJ-770	975	864	714	520	415	340	289	254	204	173
GFMJ-800	1028	911	753	549	437	358	304	267	213	182
GFMJ-1000	1284	1138	940	685	547	447	378	332	267	227
GFMJ-1200	1542	1366	1128	823	656	537	455	399	320	274
GFMJ-1500	1571	1450	1232	924	742	612	519	457	367	306
GFMJ-2000	2096	1935	1643	1231	990	815	691	608	488	409
GFMJ-2500	2620	2419	2054	1539	1237	1019	865	760	610	512
GFMJ-3000	3144	2903	2465	1846	1485	1224	1036	913	731	615

**Data on Static Internal Resistance and Short Circuit Current**

Battery Model	Battery Static Internal Resistance (mΩ)	Short Circuit Current
GFMJ-200	0.465	4300
GFMJ-250	0.432	4630
GFMJ-300	0.418	4785
GFMJ-350	0.407	4915
GFMJ-420	0.385	5200
GFMJ-490	0.342	5850
GFMJ-800	0.274	7300
GFMJ-1000	0.266	7520
GFMJ-1200	0.258	7750
GFMJ-1500	0.255	7845
GFMJ-2000	0.242	8265
GFMJ-2500	0.237	8440
GFMJ-3000	0.228	8770

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