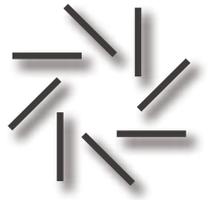


**VENTED TYPE  
STATIONARY LEAD-ACID BATTERY**

# **CS, HS, SS, PS SERIES**



# CS SERIES

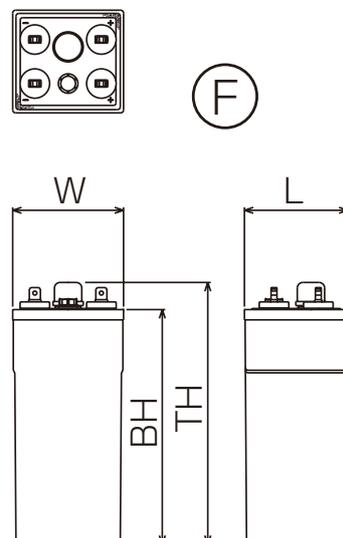
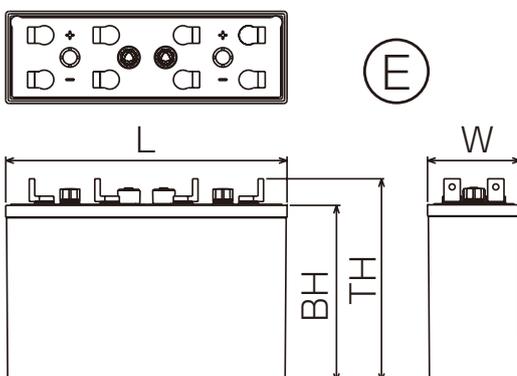
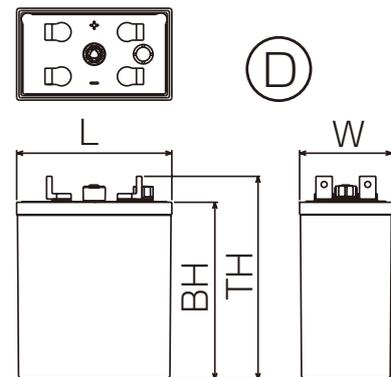
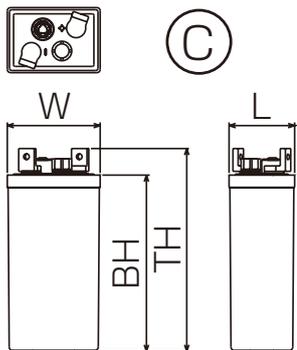
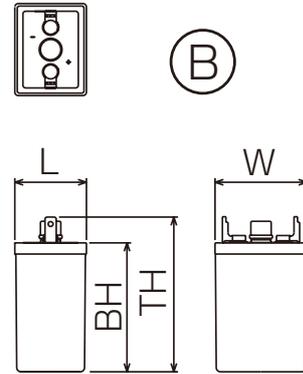
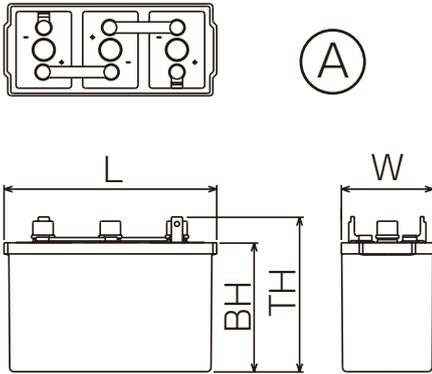
## Specifications

- Long service life of 10 to 14 years can be expected from Tubular positive plates.
- The Line-up covers a wide range of capacities from 15Ah to 2400Ah.

Battery type	Nominal capacity		Nominal voltage [V]	Dimensions of Cell (mm)				Approximate weight with Electrolyte (kg)	Approximate Electrolyte Volume (Liter)	Battery Outline
	10HR	5HR		Total Height (TH)	Height (BH)	Width (W)	Length (L)			
	[Ah]									
CS-15-6	15	12	6	223	185	132	149	6.5	2.0	Ⓐ
CS-30-6	30	24		223	185	132	200	9.5	2.7	
CS-45-6	45	36		223	185	132	252	12.6	3.4	
CS-60-6	60	48		223	185	132	303	15.6	4.1	
CS-90-6	90	72		223	185	133	472	24	6.6	
CS-15	15	12	2	223	185	131	67	2.7	1.0	Ⓑ
CS-30	30	24		223	185	131	67	3.2	0.9	
CS-45	45	36		223	185	132	102	4.6	1.5	
CS-60	60	48		223	185	132	102	5.2	1.4	
CS-90	90	72		223	185	133	154	7.9	2.1	
CS-130	130	104		374	325	170	120	12	3.7	Ⓒ
CS-170	170	136		374	325	170	120	15	3.4	
CS-210	210	168		374	325	170	195	21	6.3	
CS-250	250	200		374	325	170	195	23	6.0	
CS-290	290	232		374	325	170	195	24	5.7	
CS-400	400	320	374	325	170	285	33	9.0	Ⓓ	
CS-500	500	400	374	325	170	390	43	13		
CS-600	600	480	374	325	170	390	45	13		
CS-700	700	560	374	325	170	515	58	18		
CS-800	800	640	374	325	170	515	60	18		
CS-900	900	720	374	325	170	515	65	17	Ⓔ	
CS-1000	1000	800	714	640	300	280	103	32		
CS-1200	1200	960	714	640	300	280	111	30.5		
CS-1400	1400	1120	714	640	300	280	120	29.5		
CS-1600	1600	1280	714	640	300	390	148	44.5		
CS-1800	1800	1440	714	640	300	390	156	43		
CS-2000	2000	1600	714	640	300	390	165	41		
CS-2200	2200	1760	714	640	300	390	173	40		
CS-2400	2400	1920	714	640	300	390	182	39		

\* The Above nominal capacity ; 25°C (77° F) Discharge at 0.1C<sub>10</sub> A (1xI<sub>10</sub>) to 1.80V/cell (1.80Vpc) and 0.2C<sub>5</sub> A (1xI<sub>5</sub>) to 1.75V/cell (1.75Vpc)

## CS Series outline drawings with terminal position



## CS Series Charge Specification

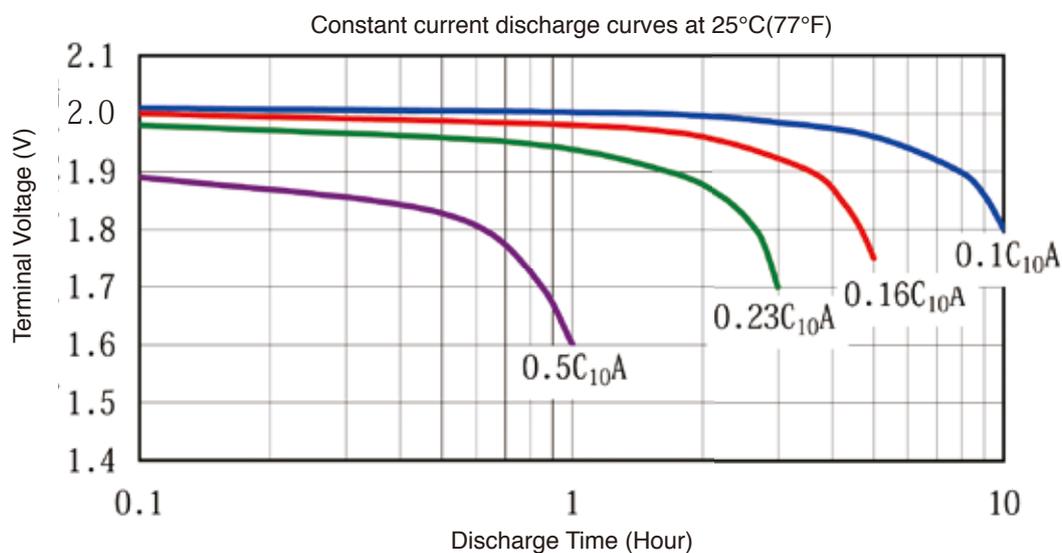
Item	Charge Specification		Remarks
Purpose	Floating charge	Equalizing charge Recovering charge Refreshing charge	Please do the equalizing charge once every six months at least.
Charge Type	Constant voltage charge		
Charge Voltage	2.15V/cell	2.30V/cell	
Charge Time	—	Approx.24 hours	charging with $0.1C_{10}$ A from 100% Discharge

## CS Series Discharge and Final Voltage

Discharge Current CA	Average final Voltage (V/each)		
	2V Battery	6V Battery	V/cell
Less than $0.1C_{10}$ A or Intermittent discharge	1.90	5.70	1.90
$0.1C_{10}$ A or close current	1.80	5.40	1.80
$0.16C_{10}$ A or close current	1.75	5.25	1.75
$0.23C_{10}$ A or close current	1.70	5.10	1.70
$0.5C_{10}$ A or close current	1.60	4.80	1.60
Over $0.5C_{10}$ A ( * )	1.50	4.50	1.50

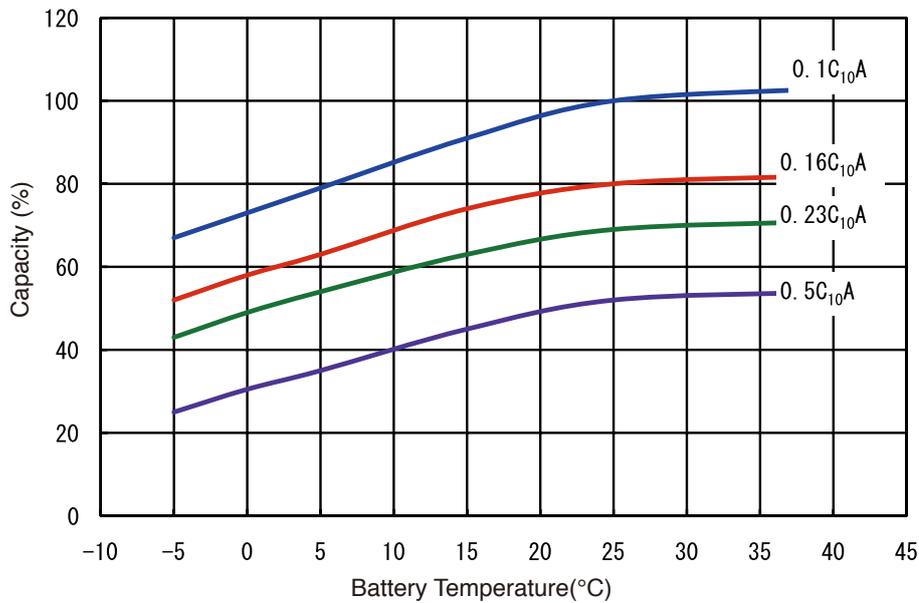
\* The average voltage must not be less than 1.2V for each cell for the engine starting applications.

## CS Series Discharge Characteristics



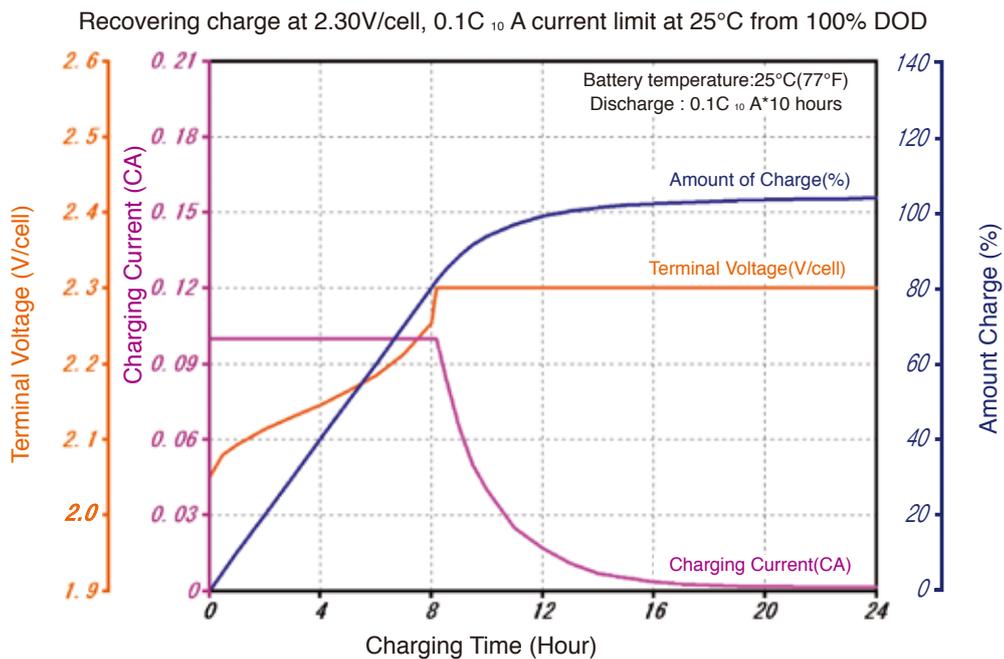
- \* The above-mentioned graph becomes the characteristic of CS-900 or smaller size.
- \* If you need these characteristic of CS-1000 or bigger, please contact us.
- \* The graph is one example and not guaranteed values.

## CS Series Relationship between battery temperature and capacity



- \* The above-mentioned graph becomes the characteristic of CS-900 or smaller.
- \* If you need these characteristic of CS-1000 or bigger, please contact us.
- \* The graph is one example and not guaranteed values.

## CS Series Constant voltage charge characteristics



- \* The above-mentioned graph becomes the characteristic of CS-900 or smaller size.
- \* If you need these characteristic of CS-1000 or bigger, please contact us.
- \* The graph is one example and not guaranteed values.

# HS SERIES

## Specifications

- Service life of 5 to 7 years can be expected.
- The high rate discharge performance is achieved by adopting the pasted plate design.  
The HS Series has a maximum discharge current about twice that of the CS Series. It can withstand 6CA for 5 seconds.
- The Line-up covers a wide range of capacities from 30Ah to 2500Ah.

Battery type	Nominal capacity		Nominal voltage [V]	Dimensions of Cell (mm)			Approximate weight with Electrolyte (kg)	Approximate Electrolyte Volume (Liter)	Battery Outline	
	1HR	10HR		Total Height (TH)	Height (BH)	Width (W)				Length (L)
	[Ah]									
HS-30-6 ●	18	30	6	223	185	132	149	8.0	A	
HS-40-6	24	40		223	185	132	200	10		
HS-50-6 ●	30	50		223	185	132	200	11		
HS-60-6	36	60		223	185	132	252	14		
HS-80-6	48	80		223	185	132	303	17		
HS-100-6	60	100		223	185	133	472	24		
HS-120-6	72	120	2	223	185	133	472	27	B	
HS-30	18	30		223	185	131	67	3.0		
HS-40	24	40		223	185	131	67	3.5		
HS-50 ●	30	50		223	185	131	67	4.0		
HS-60	36	60		223	185	132	102	5.0		
HS-80	48	80		223	185	132	102	6.0		
HS-100	60	100		223	185	133	154	8.0	C	
HS-120	72	120		223	185	133	154	9.0		
HS-150	90	150		374	325	170	120	12		
HS-200	120	200		374	325	170	120	13		
HS-250	150	250		374	325	170	120	14		
HS-300	180	300		374	325	170	195	22		
HS-400	240	400		D	374	325	170	195	24	
HS-500	300	500			374	325	170	285	32	
HS-600	360	600			374	325	170	285	34	
HS-700	420	700			377	325	170	390	43	
HS-800	480	800			377	325	170	390	46	
HS-900	540	900			377	325	170	390	48	
HS-1000	600	1000	E	374	325	170	515	61		
HS-1200	720	1200		374	325	170	515	64		
HS-1500	900	1500		420	333	280	653	105		
HS-2000	1200	2000		420	333	280	653	120		
HS-2500	1500	2500		420	333	280	653	130	33	

\* The Above nominal capacity ; 25°C (77°F) Discharge at 0.1C<sub>10</sub> A (1xI<sub>10</sub>) to 1.80V/cell (1.80Vpc) and 1C<sub>1</sub> A (1xI<sub>1</sub>) to 1.60V/cell (1.60Vpc)

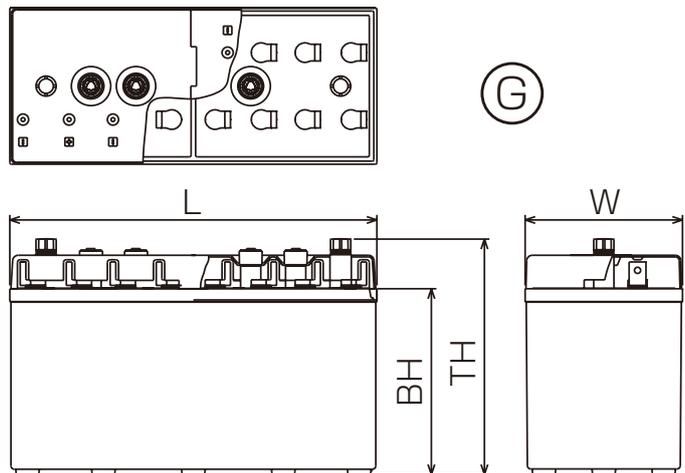
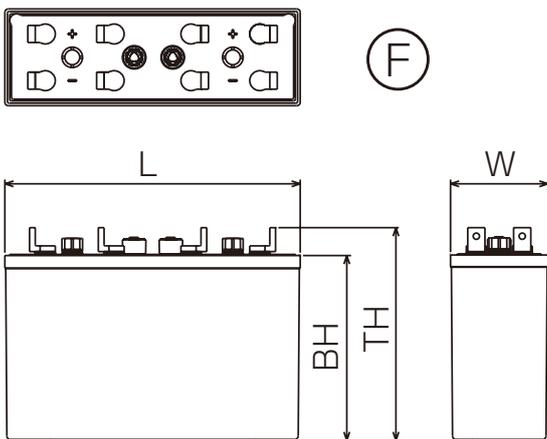
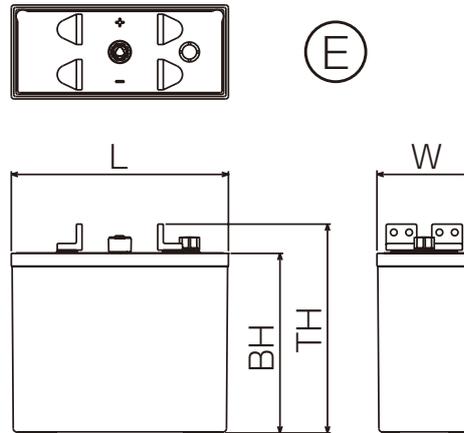
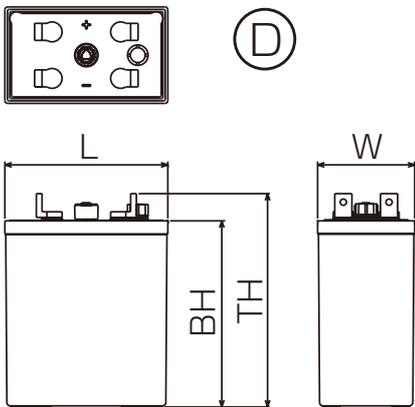
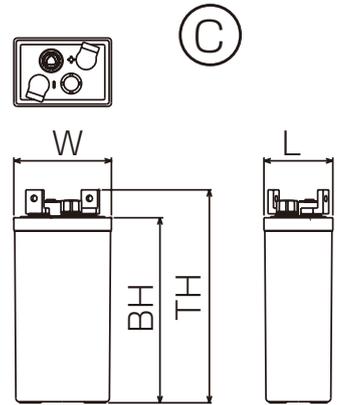
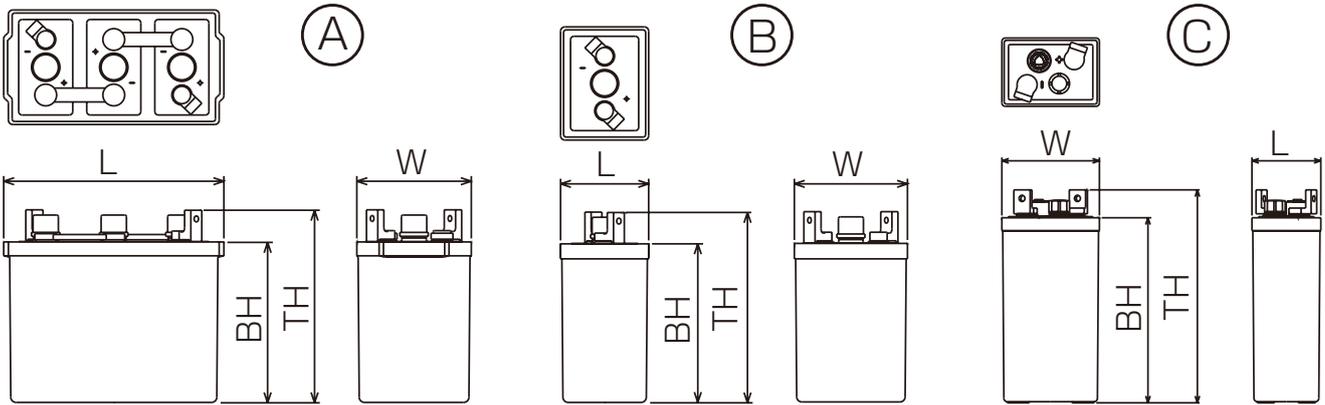
\* Nominal capacity 10HR is just for reference for HS series(Nominal capacity 1HR is formal JIS value)

\* Marked "●" meaning if you use specific gravity indicator, the container size will be bigger for one rank.  
Also weight and electrolyte volume would be changed.

\* Specific gravity indicator is not available for HS-250.

\* Specific gravity indicator for HS-400 only one side is available.

## HS Series outline drawings with terminal position



## HS Series Charge Specification

Item	Charge Specification		Remarks
Purpose	Floating charge	Equalizing charge Recovering charge Refreshing charge	Please do the equalizing charge once every six months at least.
Charge Type	Constant voltage charge		
Charge Voltage	2.18V/cell	2.30V/cell	
Charge Time	—	Approx.24 hours	charging with $0.1C_{10}$ A from 100% Discharge

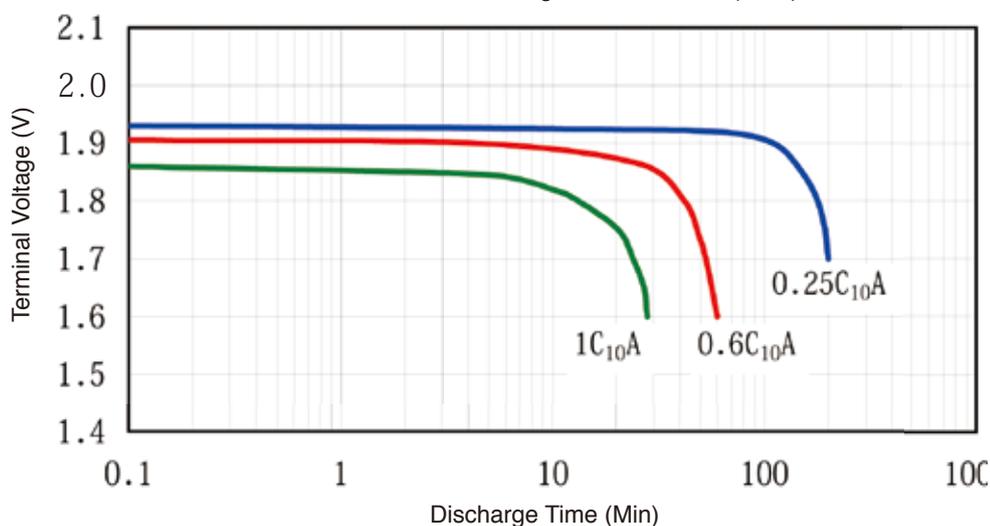
## HS Series Discharge and Final Voltage

Discharge Current CA	Average final Voltage (V/each)		
	2V Battery	6V Battery	V/cell
Less than $0.1C_{10}$ A or Intermittent discharge	1.90	5.70	1.90
$0.1C_{10}$ A or close current	1.80	5.40	1.80
$0.16C_{10}$ A or close current	1.75	5.25	1.75
$0.23C_{10}$ A or close current	1.70	5.10	1.70
$0.6C_{10}$ A or close current	1.60	4.80	1.60
Over $0.6C_{10}$ A ( * )	1.50	4.50	1.50

\* The average voltage must not be less than 1.2V for each cell for the engine starting applications.

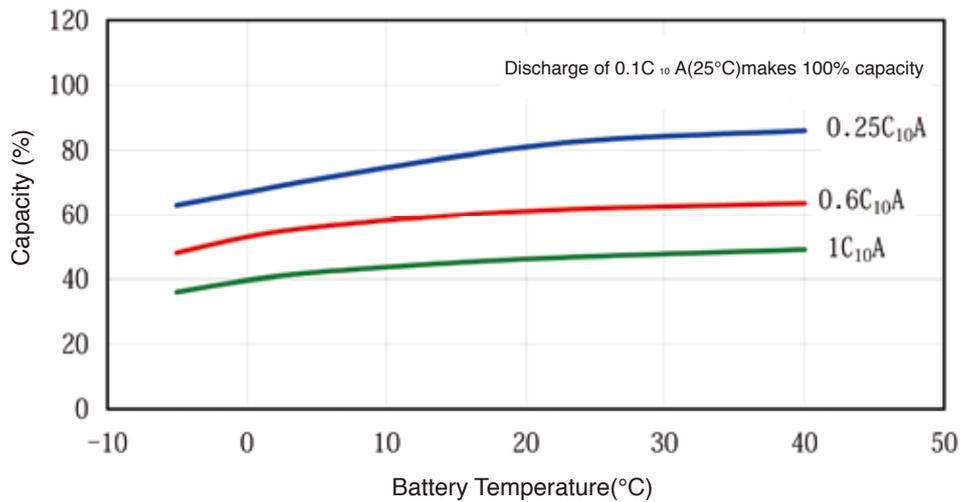
## HS Series Discharge Characteristics

Constant current discharge curves at 25°C(77°F).



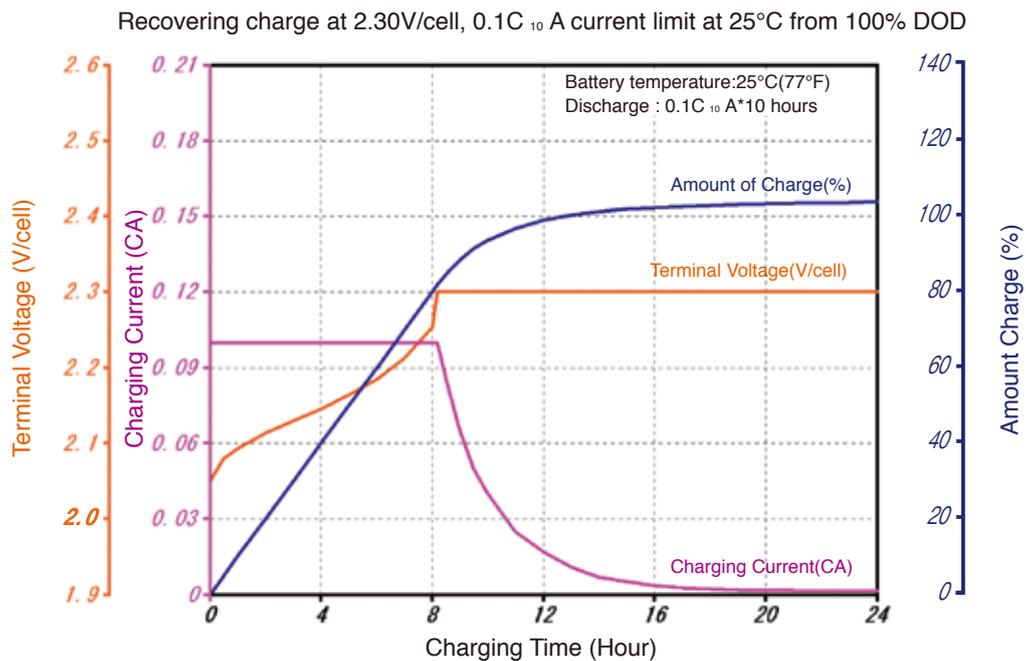
\* The graph is one example and not guaranteed values.

## HS Series Relationship between battery temperature and capacity



\* The graph is one example and not guaranteed values.

## HS Series Constant voltage charge characteristics



\* The graph is one example and not guaranteed values.

# SS and PS SERIES For marine Purpose

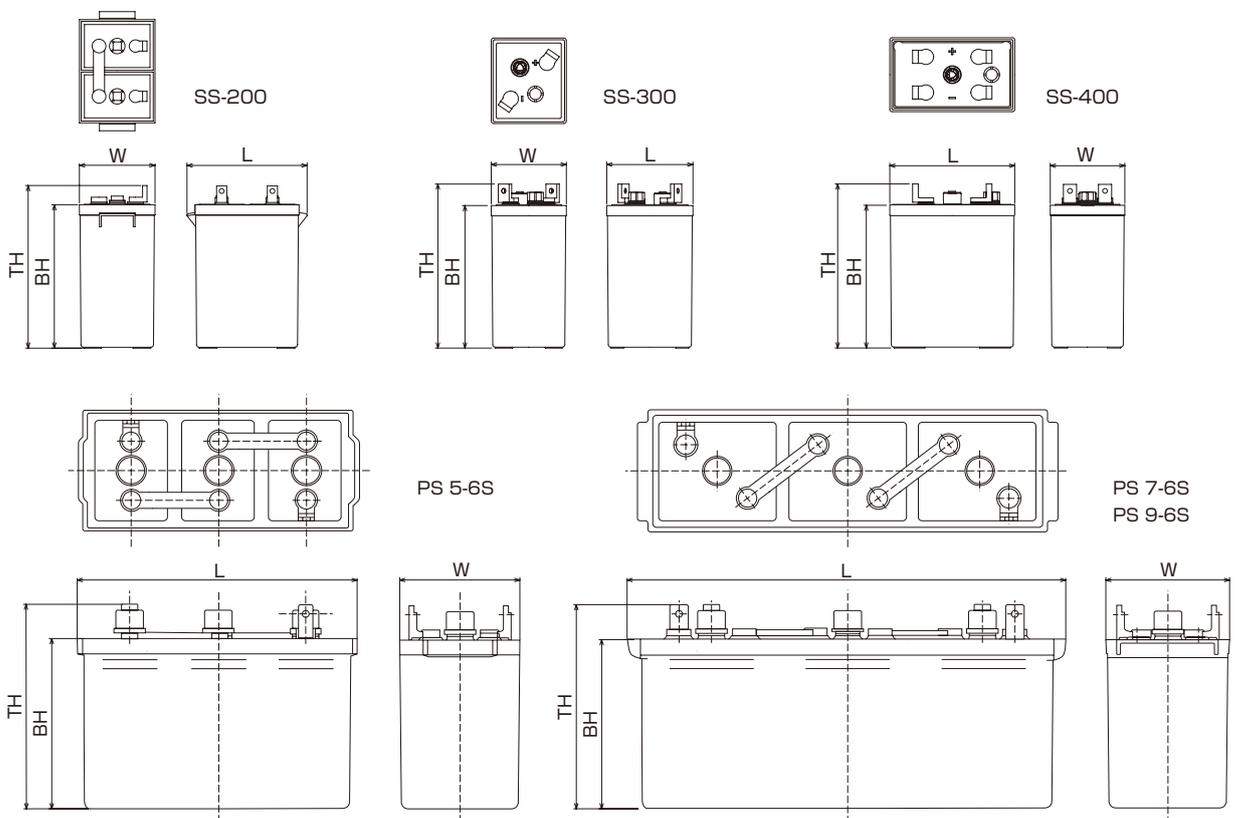
## Specifications

- Service life of 5 to 7 years can expected.
- The specific gravity can be confirmed at any time with specific gravity indicator in the electrolyte.
- It is compliant with JIS F8101.

Battery type	Nominal capacity	Nominal voltage [V]	Dimensions of Cell (mm)				Approximate weight with Electrolyte (kg)	Approximate Electrolyte Volume (Liter)
	10HR [Ah]		Total Height (TH)	Height (BH)	Width (W)	Length (L)		
SS-200	200	4	367	325	170	270	30	7
SS-300	300	2	374	325	170	195	25	5.5
SS-400	400		374	325	170	285	32	8
PS5-6S	60	6	223	185	132	303	17	3.8
PS7-6S	84		223	185	133	472	25	6.5
PS9-6S	108		223	185	133	472	28	5.9

\* The Above nominal capacity ; 25°C (77°F) Discharge at 0.1C<sub>10</sub>A (1xI<sub>10</sub>) to 1.80V/cell (1.80Vpc)  
 Note : SS-200, PS5-6S, PS7-6S and PS9-6S batteries have the vent plug instead of explosion resistant plug.

## Outline drawings with terminal position



## Example of usage

- Communication for marine purpose
- For wireless telecommunications
- Lighting for marine purpose
- Emergency power for marine purpose

## ■ Safety precautions ■

- ▲ Be sure to read through the instruction manual before using the battery.
- ▲ Keep the instruction manual near at hand future reference.



### Danger

- The battery may generate hydrogen gas, thus causing a risk of ignition or explosion. Be sure to ventilate the chamber where the battery is used so that the hydrogen gas concentration is kept at 0.8% or lower.
- Do not install the storage battery in a sealed, gas-tight enclosure, near a fire or source of sparks. Violation of this rule may result in the generation of hydrogen gas from the storage battery, causing a risk of fire or explosion. Provide an appropriate ventilation opening on the top of the battery enclosure or appropriate room ventilation to avoid the hydrogen concentrations greater than 0.8% in air.
- The battery contains diluted sulfuric acid, which is corrosive. If the battery is damaged and electrolyte is spilt on to skin or clothes, immediately wash it off with large amount of water. If it gets into the eyes, wash thoroughly with eye-wash solution or clean tap water and immediately seek medical treatment.
- Do not short-circuit the (+) terminal and (-) terminal of the battery with a metallic objects, such as wires. Do not allow tools, such as wrenches or spanners, to touch parts of the battery having different voltages. Otherwise, burns, leakage of electrolyte, heating, or explosion may result.
- Do not incorporate the battery into equipment with a sealed structure; i.e. without ventilation. Otherwise, the equipment may be damaged or personal injury may result.
- Use insulated tools, such as torque wrenches or spanners, when working on the cells of battery. Be sure to use insulation processed tools.
- Do not clean the battery with dry cloth or a duster. Only use a water wetted cloth. Otherwise, static electricity may build up, thus resulting in an explosion. Never use cleaning products or solvents. These can cause cracking of the cell or battery container. Resulting in leakage of electrolyte, acid burns, fire or explosion.
- Be sure to use a charger appropriate to the battery, or charge it while observing charging conditions specified by us. Otherwise, the battery may not be charged fully, or leakage of electrolyte, heating, explosion, performance deterioration or decrease of service life may result.



### Warning

- Do not throw the battery into flames or heat it. Otherwise, leakage of electrolyte, fire or explosion may result.
- Do not disassemble, modify, or damage the battery. Otherwise, leakage of electrolyte, fire, or explosion may result.
- Be sure to replace the battery before the replacement period specified in the instruction manual or when the equipment expires. Otherwise, leakage of electrolyte, fire, or explosion may result.
- Be sure to check the polarity (+ / -) when making connections. Reverse polarity connection may result in fire or damage to the charger.
- Do not use the battery near heat generating components or equipment. Otherwise, leakage of electrolyte, fire, or explosion may result.
- Do not use the battery if abnormal phenomenon such as corrosion of terminals, liquid leakage, or deformation of the battery container is observed. Otherwise, leakage of electrolyte, fire or explosion may result.



### Caution

- Observe the following service temperature range of the battery. Otherwise, performance deteriorating, reduction of service life, damage or deformation of the battery may result.  
Discharge: -15 to +45°C    Charge: -15 to +45°C    Storage: -15 to +45°C
- Do not use the battery near heating sources such as transformers, or use, store the battery in a high temperature environment near heaters or fires or in intense direct sunlight..
- Do not wet or immerse the battery in water or seawater. Otherwise, damage of the battery, electrical shock, fire, or corrosion of the terminals or connecting boards may result.
- Do not use the battery in a place subjected to a lot of dust. Otherwise, short circuit of the battery may result. (If it is used in a dusty place, be sure to clean the battery terminal and the area of lid between them periodically.)
- Install the battery according to the relevant local fire law, or other regulations, if any.
- Be sure to perform periodic inspections of the battery at intervals specified by the local fire law or other regulations. Correct any items that do not confirm to the description in the instruction manual.
- The containers of the storage battery are made of resin. Therefore, note that the adherence of solvent or oil (organic solvent, gasoline, kerosene, or benzene, etceteras) damages the containers.

# Request of Cooperation of Recycling

Used lead-acid storage batteries can be recycled. Do not scrap used storage batteries with general waste, but bring them to a place specified by government law. Please contact our local sales company for the details. When returning storage batteries, insulate terminals with adhesive tapes. Electric energy still remains in used storage batteries, insufficient insulation of terminals may result in explosion or fire.

- Please read the manual of the product concerned when you use it.
- The design and the specification might be changed without a previous notice. Please confirm it to our company when you order.
- The content of this catalog is as of January, 2011.

## GS YUASA CLEAN ENERGY FOR THE WORLD



ISO14001 certification

ISO9011 certification

KYOTO OFFICE : DEC, 24, 1997 (certification number :EC97J1151)

GS Yuasa International Ltd.

1-8-1, Nishi-shimbashi, Minato-ku

Tokyo 105-0003

Japan

Tel +81-3-3597-2403

Fax +81-3-3597-2405