



The **WISE** Choice

EASTMAN WORLD

Welcome to Eastman World - Your Global Partner in Energy Solutions!



AGM VRLA BATTERIES

GENERAL PURPOSE(SMART SERIES) | FRONT TERMINAL
HIGH RATE | VRLA 2V | DEEP CYCLE GEL | CARBON

Eastman Introduction

Founded in 2006

Established in 2006, Eastman Auto & Power Limited is a well-known name in the field of solar energy, energy storage, and power electronics, boasting a USD 300 million revenue and a dedicated workforce of over 3,000 professionals. Building on the group's decades-long success and maintaining the trust of our partners, Mr. Jagdish Rai Singal ventured into the future of energy with Eastman Auto & Power Limited. Today, the business spans over 25 countries across Asia and Africa, providing the world with cutting-edge products that have set new benchmarks in their respective segments. Driven by innovation, we continually set industry standards, ensuring uninterrupted power supply for residential, commercial, and industrial applications.

Our global solar distribution business provides reliable and high-quality solar solutions, including solar inverters, solar panels, solar batteries (tubular, carbon, gel and lithium) solar pump inverters, solar charge controllers, and more. Our products offer a range of solutions to help you make the switch to clean energy. With us as your unwavering partners, we forge a sustainable future, amplifying global excellence through transformative products and services.



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EXPLORE OUR CATALOGUE FOR TOP-QUALITY ENERGY STORAGE AND SOLAR SOLUTIONS DESIGNED TO MEET YOUR NEEDS.

AGM VRLA BATTERIES

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AGM VRLA

General Purpose (Smart Series)

5Ah ~ 200Ah

Certifications



Characteristics

- Capacity range: 5Ah to 200Ah
- Available in: 12V blocks.
- EUROBAT design life:
12V ≤ 28Ah: 3-5 Years, standard commercial.
12V > 28Ah: 12 Years, long life.
- Self-discharge per month: ≤ 3% at 25°C.
- Operation temperature range: - 20°C to + 50°C.
- Recommended operation temperature: 25°C.

Introduction

Eastman Smart series batteries are designed with state-of-the-art AGM (Absorbent Glass Mat) technology, high-performance plates and electrolyte. With excellent value and characteristics, this range is suitable for all general purpose applications.

Product Features

- Stable quality & high reliability.
- Long service life.
- Maintenance-free operation.
- Heavy-duty grids.
- Low self-discharge.
- Container available in flame retardant (UL 94-VO).

Application Scenarios

Emergency light systems, Firefighting equipment, Alarm systems, UPS, Electric toys, Medical equipment, Telecommunications, IT equipment.

Product Specifications

Battery Model	Nominal Voltage [V]	Rated Capacity [Ah], 25°C			Internal Resistance [mΩ]	Terminal Type	Terminal Location	Design Life [years]		Weight [kg]	Length [mm]	Width [mm]	Height [mm]	Total Height [mm]
		20Hr (10.5V)	10Hr (10.5V)	1Hr (9.60V)				JIS 25°C	EUROBAT 20°C					
		10Hr (10.8V)	3Hr (10.8V)	1Hr (10.5V)										
EM5VB	12	5	4.6	3	28.0	T1/T2	C	5	3-5	1.58±4%	90±1	70±1	101±1	107±1
EM7VB	12	7	6.5	4.2	25.0	T1/T2	F	5	3-5	2.10±4%	151±1.5	65±1	94±1	100±1
EM7.5VB	12	7.5	7	4.6	21.0	T1/T2	F	5	3-5	2.25±4%	151±1.5	65±1	94±1	100±1
EM9VB	12	9	8.4	5.4	19.0	T1/T2	F	5	3-5	2.65±4%	151±1.5	65±1	94±1	100±1
EM12VB	12	12	11	7.2	19.0	T1/T2	F	5	3-5	3.40±4%	151±1.5	98±1	95±1	101±1
EM18VB	12	18	16.8	11	15.0	T3/T12	D	5	3-5	5.20±4%	181±2	77±2	167±2	167±2
EM26VB	12	26	24	16	12.0	T4/T12	D	5	3-5	7.90±4%	166±2	175±2	125±2	125±2
EM33VB	12	33	24	19	11.0	T14/T16	C	10	10/12	10.00±4%	195±2	130±2	155±2	180±2
EM40VB	12	40	30	22	9.0	T14	D	10	10/12	12.50±3%	197±2	165±2	170±2	170±2
EM55VB	12	55	41.1	30.5	6.5	T14	C	10	10/12	17.30±3%	230±2	138±2	211±2	215±2
EM65VB	12	65	51	37	6.5	T14	C	10	10/12	20.04±3%	350±2	166±2	179±2	179±2
EM75VB	12	75	57	43	5.5	T14	C	10	10/12	23.05±3%	260±2	168±2	211±2	215±2
EM100VB	12	100	75	55	4.5	T16	C	10	10/12	29.50±3%	330±2	171±2	214±2	220±2
EM150VB	12	150	114	88	4.0	T16	C	10	10/12	41.08±3%	485±2	172±2	240±2	240±2
EM200VB	12	200	150	110	3.5	T16	E	10	10/12	59.05±3%	522±2	238±2	218±2	222±2



AGM VRLA Front Terminal Series

50Ah ~ 200Ah

Certifications



Characteristics

- Capacity range: 50Ah to 200Ah.
- Available in: 12V blocks.
- EUROBAT design life: 10/12 years, Long Life.
- Self-discharge per month: $\leq 3\%$ at 25°C.
- Operation temperature range: - 20°C to + 50°C .
- Recommended operation temperature: 25°C.

Introduction

Eastman Front Terminal Series batteries are mainly used in the area of communication. By adopting a new AGM separator and centralized venting system, the battery can be installed in different positions while maintaining high reliability. Available in gel technology also.

Product Features

- Low internal resistance.
- Long service life.
- High energy density.
- Very low self-discharge.
- Container available in flame retardant (UL 94-V0).

Application Scenarios

UPS, Telecommunication, Solar Systems.

Product Specifications

Battery Model	Nominal Voltage [V]	Rated Capacity [Ah], 25°C			Internal Resistance [mΩ]	Terminal Type	Terminal Location	Design Life [years]		Weight [kg] ± 3%	Length [mm]	Width [mm]	Height [mm]	Total Height [mm]
		10Hr (10.8V)	20Hr (10.8V)	5Hr (10.8V)				JIS 25°C	EUROBAT 20°C					
		EM12-50-FT	12	50				53	42.7					
EM12-55-FT	12	55	58.4	47.0	7	T14	E	12	10/12	17.30±3%	277±2	106±2	221±2	221±2
EM12-75-FT	12	75	79.6	64	5.5	T14	E	12	10/12	24.50±3%	562±2	114±2	189±2	189±2
EM12-100-FT	12	100	106	85.5	5.50	T16	E	12	10/12	32.80±3%	395±2	110±2	286±2	286±2
EM12-105-FT	12	105	111.4	89.5	5.00	T16	E	12	10/12	32.00±3%	506±2	110±2	224±2	239±2
EM12-125-FT	12	125	132.6	100.5	4.50	T18	E	12	10/12	42.00±3%	550±2	105±2	315±2	315±2
EM12-150-FT	12	150	159	128	4.00	T16	E	12	10/12	47.50±3%	551±2	110±2	287±2	287±2
EM12-155-FT	12	155	164.4	132.5	4.00	T18	E	12	10/12	50.00±3%	546±2	125±2	315±2	315±2
EM12-165-FT	12	166	176	141.5	4.00	T16	E	12	10/12	50.00±3%	546±2	125±2	317±2	323±2
EM12-180-FT	12	180	190.8	153.5	3.50	T18	E	12	10/12	55.00±3%	546±2	125±2	315±2	315±2
EM12-200-FT	12	200	190.8	170.5	3.50	T18	E	12	10/12	60.50±3%	546±2	125±2	317±2	323±2



AGM VRLA High Rate Series

5Ah ~ 155Ah

Certifications



Characteristics

- Power range: 21W to 520W.
- Available in: 12V blocks.
- Self-discharge per month: $\leq 3\%$ at 25°C.
- High performance at high current discharges over 2°C.
- EUROBAT design life:
12V ≤ 110 W: 3 – 5 years, Standard Commercial.
12V > 110 W: 10/12 years, Long Life.
- Operation temperature range: - 20°C to + 50°C .
- Recommended operation temperature: 25°C.

Introduction

Eastman High Rate series batteries are specially designed for applications that require high power output. With their high-power density and low internal resistance, the HR series are the right choice for your most demanding applications.

Product Features

- Operation at a low internal pressure.
- Positive and negative plates in lead-calcium-tin alloy.
- Superior energy density.
- Very high power output.
- Container available in flame retardant (UL 94-VO).

Application Scenarios

UPS, High-power UPS, Data Centers, Telecommunication & Electric Power Systems.

Product Specifications

Battery Model	Nominal Voltage [V]	Rated Power [W/cell] @15min 1,67V/cell, 25°C	Rated Capacity [Ah] 20Hr 1,80V/cell	Internal Resistance [mΩ]	Terminal Type	Terminal Location	Design Life [years]		Weight [kg]	Length [mm]	Width [mm]	Height [mm]	Total Height [mm]
							JIS 25°C	EUROBAT 20°C					
EM12-21W-HR	12	21	5	23.0	T1/T2	C	5	3-5	1.62±4%	90±1	70±1	101±1	107±1
EM12-24W-HR	12	24	6	19.0	T1/T2	F	5	3-5	1.94±4%	151±1.5	51±1	94±1	99±1
EM12-34W-HR	12	34	9	14.0	T1/T2	F	5	3-5	2.60±4%	151±1.5	65±1	94±1	100±1
EM12-51W-HR	12	51	12	11.0	T1/T2	F	5	3-5	4.00±4%	151±1.5	98±1	95±1	101±1
EM12-76W-HR	12	76	18	12.0	T12	D	5	3-5	5.80±3%	181±2	77±1	167±1	167±2
EM12-100W-HR	12	100	28	9.0	T12	D	5	3-5	8.80±3%	166±2	175±2	125±2	125±2
EM12-110W-HR	12	110	28	9.0	T14	D	5	3-5	8.80±3%	166±2	126±2	174±2	174±2
EM12-130W-HR	12	130	35	8.0	T14	C	10	10/12	11.50±3%	195±2	130±2	155±2	167±2
EM12-160W-HR	12	160	48	7.0	T14	D	10	10/12	14.30±3%	197±2	165±2	170±2	170±2
EM12-200W-HR	12	200	58	6.5	T14	C	10	10/12	17.30±3%	230±2	138±2	211±2	215±2
EM12-280W-HR	12	280	80	5.0	T14	C	10	10/12	25.30±3%	260±2	168±2	211±2	215±2
EM12-330W-HR	12	330	100	5.0	T14	C	10	10/12	28.50±3%	306±2	169±2	211±2	215±2
EM12-390W-HR	12	390	115	4.0	T16	C	10	10/12	32.70±3%	330±2	171±2	214±2	220±2
EM12-475W-HR	12	475	145	3.8	T16	C	10	10/12	44.00±3%	342±2	172±2	280±2	285±2
EM12-520W-HR	12	520	155	3.4	T16	C	10	10/12	47.00±3%	342±2	172±2	280±2	285±2



AGM VRLA 2V Series 200Ah ~ 3000Ah

Certifications



Characteristics

- Capacity range: 200Ah to 3000Ah.
- Available in: 2V cells.
- Cycle life:
 - 30% DOD: 1800 cycles (2V).
 - 50% DOD: 850 cycles (2V).
 - 100% DOD: 400 cycles (2V).
- EUROBAT design life:
 - 2V > 200Ah: >12 years, Very Long Life (depending on cycles).
- Self-discharge per month: ≤ 3% at 25°C.
- Operation temperature range: - 20°C to + 50°C.
- Recommended operation temperature: 25°C.

Introduction

Eastman AGM VRLA batteries are designed with state-of-the-art AGM (Absorbent Glass Mat) technology, high-performance plates and electrolyte. With excellent value and characteristics, this range is suitable for all general purpose applications.

Product Features

- Stable quality & high reliability.
- Long service life.
- Maintenance-free operation.
- Heavy-duty grids.
- Low self-discharge.
- Container available in flame retardant (UL 94-V0).

Application Scenarios

Emergency light systems, Firefighting equipment, Alarm systems, UPS, Electric toys, Medical equipment, Telecommunications, IT equipment.

Product Specifications

Battery Model	Nominal Voltage [V]	Rated Capacity [Ah], 25°C			Internal Resistance [mΩ]	Terminal Type	Terminal Location	Design Life [years]		Weight [kg]	Length [mm]	Width [mm]	Height [mm]	Total Height [mm]
		20Hr 1.80V/cell	10Hr 1.80V/cell	5Hr 1.80V/cell				JIS 25°C	EUROBAT 20°C					
		EM2-200-DC	2	211				200	182.5					
EM2-300-DC	2	322	300	278	0.75	T20	G	15	>12	19.50	171±2	151±2	330±2	364±2
EM2-400-DC	2	422	400	364.5	0.60	T20	H	15	>12	27.00	210±2	176±2	330±2	367±2
EM2-500-DC	2	533	500	460	0.50	T20	H	15	>12	31.50	241±2	271±2	330±2	367±2
EM2-600-DC	2	633	600	545	0.45	T20	H	15	>12	38.00	302±2	175±2	330±2	367±2
EM2-800-DC	2	844	800	730	0.35	T20	J	15	>12	53.00	410±2	175±2	330±2	367±2
EM2-1000-DC	2	1060	1000	910	0.28	T20	J	15	>12	63.00	475±2	175±2	330±2	367±2
EM2-1500-DC	2	1570	1500	1355	0.20	T20	K	15	>12	96.50	400±2	350±2	345±2	382±2
EM2-2000-DC	2	2110	2000	1825	0.17	T20	L	15	>12	131.00	490±2	350±2	345±2	382±2
EM2-3000-DC	2	3140	3000	2710	0.11	T20	L	15	>12	188.00	710±2	350±2	345±2	382±2

Technical Information

Charging & Discharging | Characteristics & Cycle Life

Charge Voltage & Charge Current

Ambient Temperature: 25°C

Usage	Standby Use				Cycle Use			
	2V Cell	4V Battery	6V Battery	12V Battery	2V Cell	4V Battery	6V Battery	12V Battery
Charge Voltage (V)	2.25-2.30	4.50-4.60	6.75-6.90	13.5-13.8	2.40-2.50	4.80-5.00	7.25-7.50	14.5-15.0
Max Charge Current (A)	0.3C*	0.3C	0.3C	0.3C	0.3C	0.3C	0.3C	0.3C
Max Charge Current HR (A)	0.08P*	0.08P	0.08P	0.08P	0.08P	0.08P	0.08P	0.08P

Discharge Voltage & Final Voltage

Ambient Temperature: 25°C

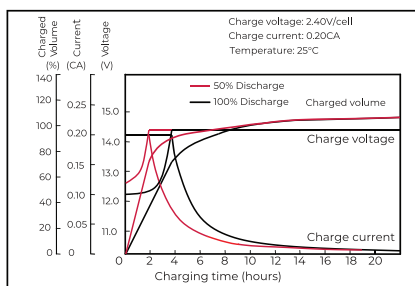
Discharge Current (A)	Final Voltage (V)			
	2V Battery	4V Battery	6V Battery	12V Battery
0.05C ₂₀	1.75	3.50	5.35	10.50
0.1C ₁₀ ~ 0.25C ₁₀	1.80	3.60	5.40	10.80
0.55C ₂₀	1.75	3.50	5.25	10.50
1C ₁₀ ~ 3C ₁₀	1.60	3.20	4.80	9.60

Notes

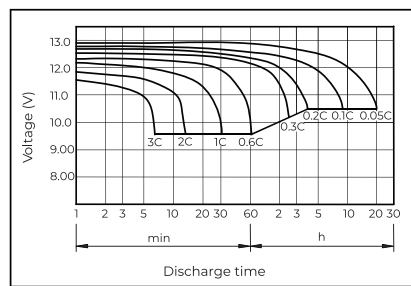
- "C" means Ah value of battery's rated capacity. "P" means watt value of battery's rated power (HR series).
- When the ambient temperature is outside of 15°C to 35°C range, use a temperature compensation factor ± 3 mV/°C/cell (standby charge) or ± 5 mV/°C/cell (cycle charge), starting from the standard centre point at 25°C.
- When charging, the ambient temperature should be in the range of -10°C to +50°C.
- End of discharge voltage should vary according to the discharge current.
- Battery voltage must be higher than its corresponding end voltage when discharge.
- Charge the batteries immediately after discharge.
- When discharging, the ambient temperature should be in the range of -15°C to +50°C.

Characteristics & Cycle Life

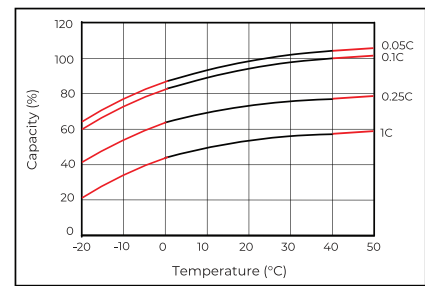
Charging Characteristics (25°C) - All Series



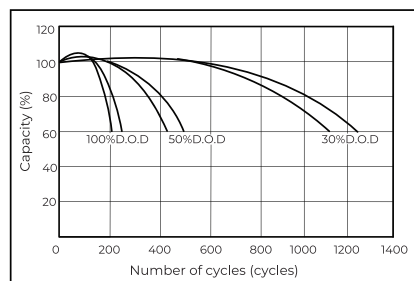
Discharge Characteristics (25°C) - All Series



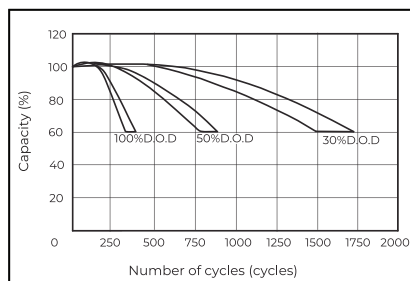
Temperature effects on capacity - All Series



Cycle Life on D.O.D (25°C) - Smart, FT & HR Series

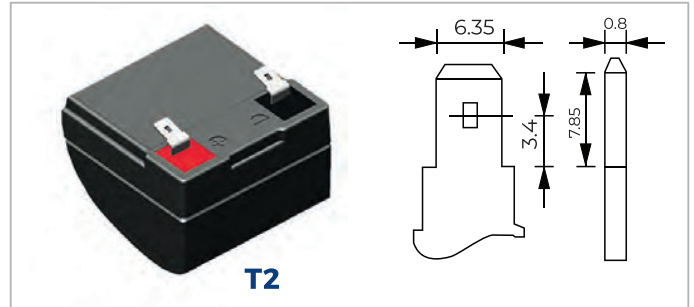
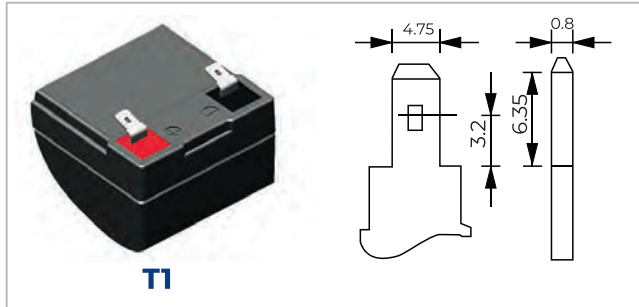


Cycle Life on D.O.D (25°C) - 2V Deep Cycle Series



Technical Information

Terminal Type & Position



Flat Terminal

Type	A (mm)	B (mm)	C (mm)	D (mm)	Material
T3	12	6	12	2	Cu
T4	14	6	14	2	Cu
T5	16	7	17	8	Pb
T6	18	8	18	7	Pb
T7	18	7	20	8	Pb
T8	24	9	24	7	Pb
T9	26	9	25	8	Pb
T10	26	9	21	7	Pb
T21	20	6	18	3	Cu
T22	22	9	23	3	Cu
T25	25	9	23	3	Cu
T64	20	6	16	3	Cu

Insert Terminal

Type	A (mm)	B (mm)	C (mm)	Material
T12	12	5	2	Cu
T14	14	6	4	Cu
T16	16	8	5	Cu
T16A	16	6	5	Cu
T18	18	8	5	Cu
T20	20	8	5	Cu

Configuration	Torque specification N.m
A, B, C, D, E, F, G, H	3.0 ± 0.6
I, J, K, L	5.1 ± 0.6
	12.3 ± 2.5
	5.1 ± 0.6
	12.3 ± 2.5
	12.3 ± 2.5



AGM VRLA Deep Cycle Gel 100Ah ~ 250Ah

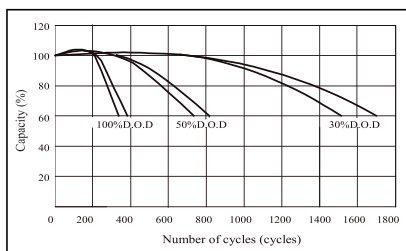
Certifications



Applications

- Home, UPS, Hospitals, Power plant, Solar Street light

DOD vs Number of cycles



Product Specifications

Model	ES-100 GEL	ES-150 GEL	ES-200 GEL	ES-250 GEL
Nominal Voltage (V)	12V (6 Cells Per Unit)			
Rated Capacity (10HR)	100Ah/10.8V	150Ah/10.8V	200Ah/10.8V	250Ah/10.8V
Dimensions(L*W*H)mm	330*171*214 (Total H 220mm)	485*172*240*240 (Total H 240mm)	552*238*218 (Total H 222mm)	521*269*220 (Total H 224mm)
Approx. Weight	30.50Kg	44.50Kg	62.50Kg	74.50Kg
Capacity (25°C)	10Hour Rate (10.8V) : 100Ah 3Hour Rate (10.8V) : 75Ah 1Hour Rate (10.5V) : 55Ah	10Hour Rate (10.8V) : 150Ah 3Hour Rate (10.8V) : 112.5Ah 1Hour Rate (10.5V) : 83Ah	10Hour Rate (10.8V) : 200Ah 3Hour Rate (10.8V) : 150Ah 1Hour Rate (10.5V) : 110Ah	10Hour Rate (10.8V) : 250Ah 3Hour Rate (10.8V) : 187.5Ah 1Hour Rate (10.5V) : 140Ah
Terminal	T16			
Internal Resistance(Fully Charged, 25°C)	Approx. 5mΩ	Approx. 3.8mΩ	Approx. 3.3mΩ	Approx. 2.8mΩ
Capacity Affected by Temperature (10HR)	40°C - 102% 25°C - 100% 0°C - 85% -15°C - 65%			
Self-Discharge	Discharge: -15°C ~ 50°C (5°C~122°F) Charge: -10°C ~ 50°C (14°C~122°F) Storage: -20°C ~ 50°C (-4°C~122°F)			
Nominal Operating Temp	25°C±3°C (77°F±5°F)			
Operating Temp	3 Months - Remaining Capacity: 91% 6 Months - Remaining Capacity: 82% 12 Months - Remaining Capacity: 65%			
Floating Charging current(25°C)	13.50 to 13.80V Temperature Compensation: -18mV/°C/Block			
Cycle Charging Voltage(25°C)	14.50 to 14.70V Temperature Compensation: -30mV/°C/Block			
Cycle Life	>750 Cycles @ 0.2C 50% DOD.			
Maximum Charging Current	20A	30A	40A	50A
Pulse Discharge Current	800A (5 Sec.)	1200A (5 Sec.)	1400A (5 Sec.)	1500A (5 Sec.)
Design life	12 Years for floating(25°C) Eurobat (20°C): 10-12 Years, Long Life.			

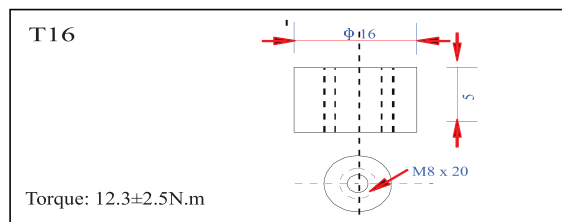
Introduction

Eastman AGM VRLA GEL Series are manufactured following the highest demands in the deep cycle and renewable energy applications. The batteries use colloidal or foamed silica gel to immobilize the electrolyte, which further enhances the cycling stability. Available in top and front terminal types.

Product Features

- Superior deep cycle design
- Very long life in deep cycle applications
- Superior recovery from deep discharge
- Wide working environment

Terminal Type





Charging & Discharging | Characteristics & Cycle Life

Construction

Component	Positive plate	Negative plate	Container	Cover	Separator	Electrolyte	Safety valve	Terminal
Raw material	Lead dioxide	Lead	ABS	ABS	AGM	Gel	Rubber	Copper

Constant Current Discharge Characteristics Unit: A/Cell (25°C, 77°F)

ES-100GEL 12V100Ah

F.V/Time	10min	15min	30min	60min	2h	3h	4h	5h	8h	10h	20h
9.60V	195	160	97.0	60.0	36.5	26	20.4	17.3	12.2	10.2	5.40
9.90V	189	156	95.1	59.1	36.3	25.9	20.3	17.2	12.2	10.2	5.38
10.2V	181	150	92.2	57.6	36.0	25.7	20.1	17.1	12.1	10.1	5.37
10.5V	174	145	89.9	55.8	35.5	25.5	20.0	17.0	12.0	10.1	5.34
10.8V	164	138	86.6	54.0	34.6	25.0	19.4	16.5	11.6	10.0	5.30

ES-150GEL 12V150Ah

F.V/Time	10min	15min	30min	60min	2h	3h	4h	5h	8h	10h	20h
9.60V	293	240	146	90.0	54.8	39.0	30.6	26.0	18.4	15.3	8.09
9.90V	284	234	143	88.7	54.5	38.8	30.4	25.9	18.3	15.2	8.08
10.2V	272	226	138	86.4	54.0	38.5	30.2	25.7	18.1	15.2	8.05
10.5V	260	218	135	83.7	53.2	38.3	30.0	25.5	18.0	15.1	8.01
10.8V	246	206	130	81.0	51.8	37.5	29.1	24.7	17.5	15.0	7.95

ES-200GEL 12V200Ah

F.V/Time	15min	30min	60min	2h	3h	4h	5h	6h	8h	10h	20h
9.60V	320	194	120	73.1	52.0	40.8	34.7	30.6	24.5	20.4	10.8
9.90V	312	190	118	72.6	51.7	40.6	34.5	30.4	24.3	20.3	10.8
10.2V	301	184	115	72.0	51.4	40.3	34.2	30.2	24.2	20.3	10.7
10.5V	291	180	112	70.9	51.0	40.0	34.0	30.0	24.0	20.1	10.7
10.8V	275	173	108	69.1	50.0	38.8	33.0	29.1	23.3	20.0	10.6

ES-250GEL 12V250Ah

F.V/Time	15min	30min	60min	2h	3h	4h	5h	6h	8h	10h	20h
9.60V	400	243	150	91.4	65.0	51.0	43.4	38.3	30.6	25.5	13.5
9.90V	390	238	148	90.8	64.6	50.7	43.1	38.0	30.4	25.4	13.5
10.2V	376	230	144	90.0	64.2	50.4	42.8	37.8	30.2	25.3	13.4
10.5V	363	225	140	88.7	63.8	50.0	42.5	37.5	30.0	25.2	13.3
10.8V	344	217	135	86.4	62.5	48.5	41.2	36.4	29.1	25.0	13.3



Charging & Discharging | Characteristics & Cycle Life

Constant Power Discharge Characteristics Unit: W/Cell (25°C, 77°F)

ES-100GEL 12V100Ah

F.V/Time	10min	15min	30min	60min	2h	3h	4h	5h	8h	10h	20h
9.60V	2106	1757	1088	684	423	306	240	205	145	122	64.7
9.90V	2043	1715	1067	674	421	304	238	204	145	121	64.6
10.2V	1959	1651	1034	657	417	302	237	202	144	121	64.4
10.5V	1874	1595	1009	636	411	300	235	201	143	120	64.0
10.8V	1769	1511	972	616	400	294	228	195	138	119	63.6

ES-150GEL 12V150Ah

F.V/Time	10min	15min	30min	60min	2h	3h	4h	5h	8h	10h	20h
9.60V	3159	2635	1633	1026	635	459	360	307	218	182	97.1
9.90V	3064	2572	1600	1011	631	456	358	306	217	182	96.9
10.2V	2938	2477	1551	985	625	453	355	304	215	181	96.6
10.5V	2812	2393	1513	954	616	450	353	301	214	180	96.1
10.8V	2654	2266	1458	923	600	441	342	292	207	179	95.4

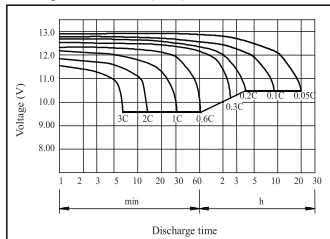
ES-200GEL 12V200Ah

F.V/Time	15min	30min	60min	2h	3h	4h	5h	6h	8h	10h	20h
9.60V	3514	2177	1368	846	612	480	410	362	291	243	129
9.90V	3429	2133	1347	841	608	477	408	360	289	243	129
10.2V	3303	2068	1313	834	604	474	405	357	287	242	129
10.5V	3190	2018	1272	821	600	470	402	355	285	240	128
10.8V	3022	1944	1231	800	588	456	390	344	277	239	127

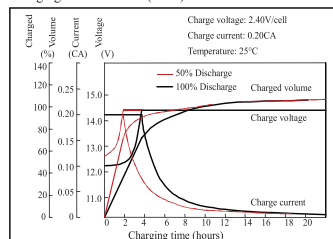
ES-250GEL 12V250Ah

F.V/Time	15min	30min	60min	2h	3h	4h	5h	6h	8h	10h	20h
9.60V	4392	2721	1710	1058	765	600	512	452	364	304	162
9.90V	4287	2666	1684	1052	760	596	509	449	361	303	162
10.2V	4128	2585	1642	1042	755	592	506	446	359	302	161
10.5V	3988	2522	1590	1027	750	588	502	443	356	301	160
10.8V	3777	2430	1539	1001	735	570	487	430	346	299	159

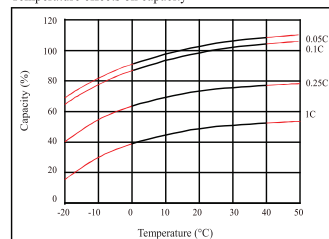
Discharge characteristics (25°C)



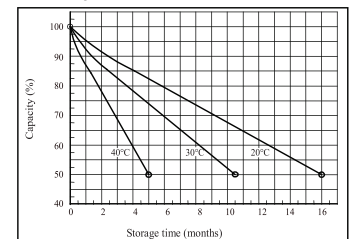
Charging characteristics (25°C)



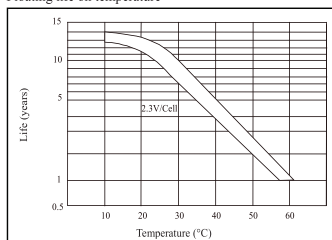
Temperature effects on capacity



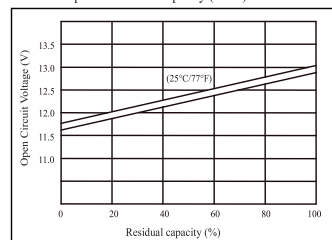
Self-discharge characteristics



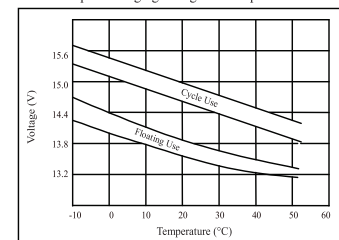
Floating life on temperature



Relationship for OCV and capacity (25°C)



Relationship for charging voltage and temperature





AGM VRLA Deep Cycle Carbon 200Ah & 230Ah

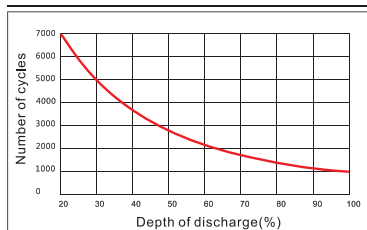
Certifications



Applications

- Solar / Wind Energy And Other New Energy Storage.
- Backup, UPS, Mobile & Temporary Power Solutions.
- Electric Boats, Marine Applications.
- Auxiliary Power Applications

DOD vs Number of cycles

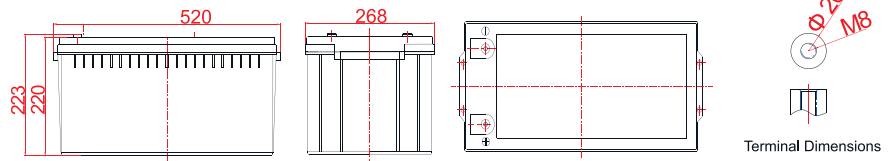


Introduction

Revolutionize energy storage with our Carbon Battery featuring lead carbon composite negative plates. Combining the best of both capacitance and battery traits for unmatched performance.

Product Features

- Lead-Carbon Composite Negative Plate, Both Capacitance And Battery Characteristics.
- Long Cycle Life, Excellent Deep Cycle Discharge Ability.
- Excellent Charge Acceptance Ability.
- Optimized Capability Of Instant High-Current Discharging.
- Strong High And Low Temperature Performance.
- Precision Sealing Technology.



Product Specifications

Model	ES-200 CARBON	ES-230 CARBON
Nominal Voltage (V)	12V	
Nominal Capacity	200Ah	230Ah
Design Life	15 Years	
Terminal	M8	
Approx. Weight	64.0kg (141 lbs)	71.0kg (157 lbs)
Dimensions(L*W*H)mm	520*268*220 (Total Height 223)	
Container Material	ABS	
Rated Capacity	200Ah 10Hour Rate (22.0A to 10.8V) 180Ah 3Hour Rate (60.0A to 10.2V) 121Ah 1Hour Rate (165A to 10.5V)	230Ah 10Hour Rate (25.0A to 10.8V) 203Ah 3Hour Rate (67.8A to 10.2V) 165Ah 1Hour Rate (165A to 10.5V)
Internal Resistance	Full Charged at 25 °C: 4.20 mΩ	Full Charged at 25 °C: 2.70 mΩ
Pulse Current	2200A(5S)	3000A(5S)
Operating Temperature	Discharge: -20~60 °C(-4~140 °F) Charge: -20~50 °C(-4~122 °F) Storage: -20~50 °C(-4~122 °F)	
Cycle Life	2800 Cycles @ 50% DOD	
Charge Current	Max. 55A; Recom. 40A	Max. 75A; Recom. 50A
Charge Method	Float Charge: 13.5-13.8V, Revom.13.5V(-18mV/°C) Equalize Charge: 13.8-14.1V, Revom.14.1V(-24mV/°C) Cycle Charge: 14.4-15.0V, Revom.14.7V(-30mV/°C)	
Warranty	2 Years	



Charging & Discharging | Characteristics & Cycle Life

Constant Current Discharge Characteristics Unit: A/Cell (25°C, 77°F)

12V200Ah	FV/Time	30min	1h	2h	3h	5h	8h	10h	20h
	1.60V/Cell	210.0	121.0	95.0	60.0	44.3	26.1	22.4	11.8
	1.65V/Cell	203.0	119.0	93.0	58.0	43.8	25.8	22.2	11.7
	1.70V/Cell	195.0	117.0	92.0	57.0	43.1	25.4	22.1	11.6
	1.75V/Cell	190.0	116.0	90.0	57.0	42.4	25.0	22.0	11.6
	1.80V/Cell	183.0	114.0	88.0	55.0	41.8	24.5	22.0	11.4
1.85V/Cell	179.0	112.0	87.0	53.0	41.0	24.1	21.9	11.3	

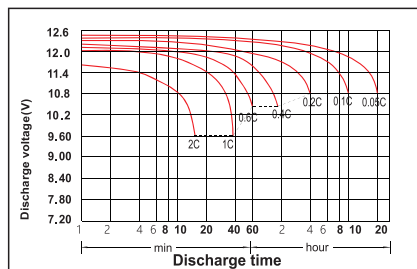
12V230Ah	FV/Time	5min	15min	30min	1h	2h	3h	5h	8h	10h	20h
	1.60V	898	483	293	170	97.5	70.8	47.5	31.3	26.3	13.8
	1.65V	870	468	288	169	97.0	70.0	47.0	31.0	26.0	13.7
	1.70V	838	458	283	168	96.3	69.0	46.5	30.8	25.8	13.6
	1.75V	770	443	280	165	94.8	68.3	46.0	30.5	25.5	13.6
	1.80V	690	413	270	161	93.0	67.8	44.8	30.3	25.0	13.5
1.85V	615	368	246	149	88.3	63.8	42.5	29.0	24.5	13.3	

Constant Power Discharge Characteristics Unit: W/Cell (25°C, 77°F)

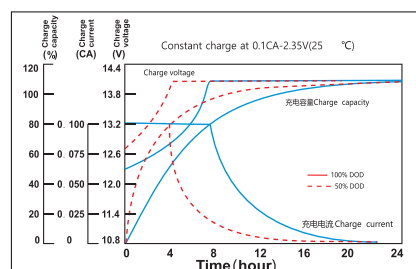
12V200Ah	FV/Time	30min	1h	2h	3h	5h	8h	10h	20h
	1.60V/Cell	417.0	255.0	146.0	107.0	71.3	48.0	40.0	21.6
	1.65V/Cell	403.0	250.0	140.0	105.0	70.0	47.6	39.6	21.5
	1.70V/Cell	390.0	241.0	135.0	105.0	69.4	47.4	39.2	21.5
	1.75V/Cell	376.0	235.0	129.0	104.0	69.0	47.0	38.8	21.3
	1.80V/Cell	361.0	230.0	123.0	103.0	68.5	46.6	38.4	21.1
1.85V/Cell	345.0	220.0	118.0	100.0	66.1	45.1	37.8	21.0	

12V230Ah	FV/Time	5min	15min	30min	1h	2h	3h	5h	8h	10h	20h
	1.60V	1508	850	533	323	184	135	90.0	60.5	50.5	27.3
	1.65V	1450	835	528	320	184	133	89.5	60.0	50.0	27.3
	1.70V	1443	825	528	318	183	132	88.8	59.8	49.5	27.0
	1.75V	1345	820	525	315	182	132	88.3	59.3	49.0	27.0
	1.80V	1235	775	513	313	182	131	87.3	58.8	48.5	26.8
1.85V	1103	693	470	290	174	125	83.5	57.0	47.8	26.5	

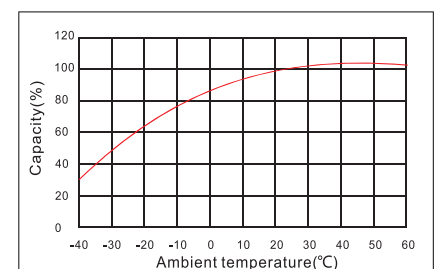
Discharge characteristic



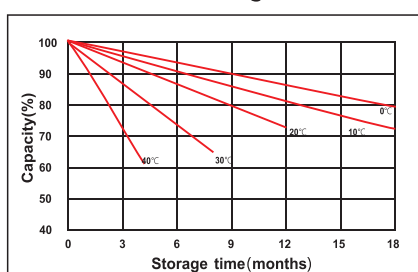
Charging characteristic



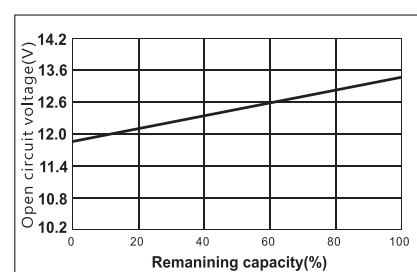
The effect of temperature on capacity



Curves of self - discharge



The effect of discharge depth on cycle life







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