



**ENDURO  
SERIES**  
**DEEP CYCLE  
CARBON BATTERY**

**ES-200 CARBON  
ES-230 CARBON**



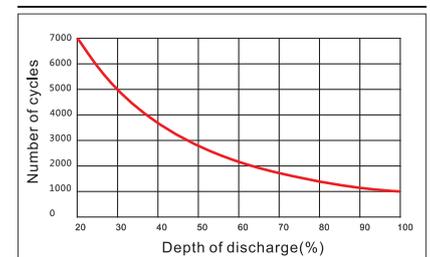
### Applications

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

### 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.

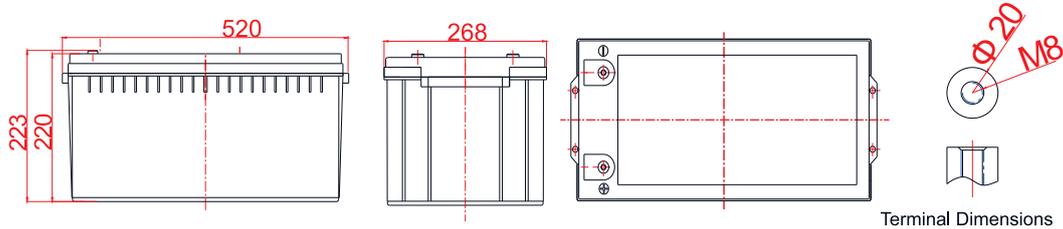
### DOD vs Number of cycles



### 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	

Dimension: 520(L)x268(W)x220(H)x223(TH) Unit: mm



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

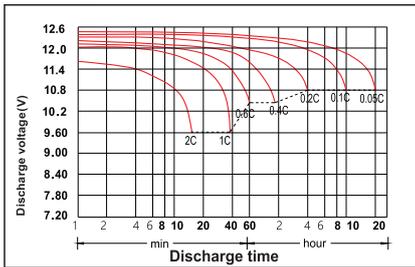
FV/Time	30min	1h	2h	3h	5h	8h	10h	20h
1.60V/Cell	210.0	121.0	95.0	60.0	44.3	26.1	22.4	11.8
1.65V/Cell	203.0	119.0	93.0	58.0	43.8	25.8	22.2	11.7
1.70V/Cell	195.0	117.0	92.0	57.0	43.1	25.4	22.1	11.6
1.75V/Cell	190.0	116.0	90.0	57.0	42.4	25.0	22.0	11.6
1.80V/Cell	183.0	114.0	88.0	55.0	41.8	24.5	22.0	11.4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

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

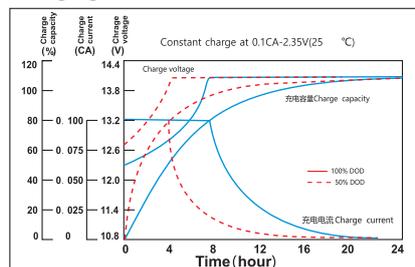
FV/Time	30min	1h	2h	3h	5h	8h	10h	20h
1.60V/Cell	417.0	255.0	146.0	107.0	71.3	48.0	40.0	21.6
1.65V/Cell	403.0	250.0	140.0	105.0	70.0	47.6	39.6	21.5
1.70V/Cell	390.0	241.0	135.0	105.0	69.4	47.4	39.2	21.5
1.75V/Cell	376.0	235.0	129.0	104.0	69.0	47.0	38.8	21.3
1.80V/Cell	361.0	230.0	123.0	103.0	68.5	46.6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

Product specification are subject to change without prior notice.

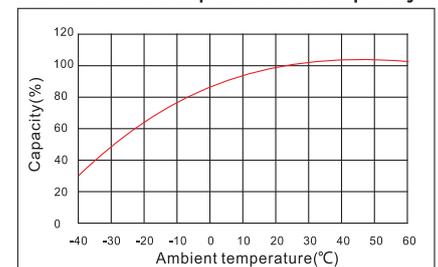
Discharge characteristic



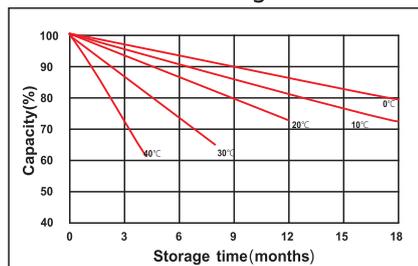
Charging characteristic



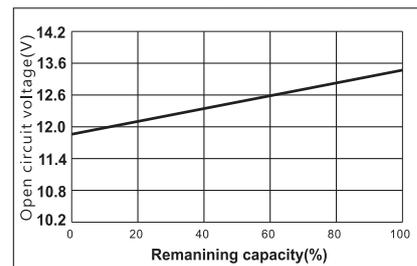
The effect of temperature on capacity



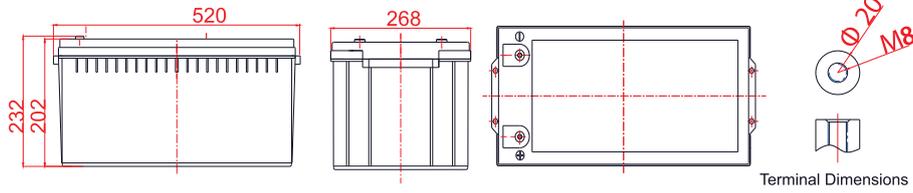
Curves of self - discharge



The effect of discharge depth on cycle life



Dimension:520(L)x268(W)x220(H)x223(TH) Unit: mm



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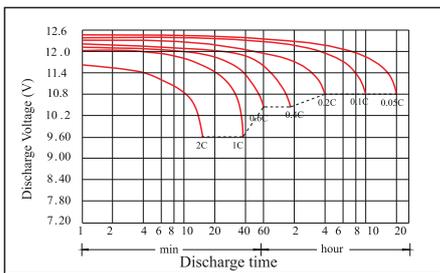
FV/Time	5min	15min	30min	1h	2h	3h	5h	8h	10h	20h
1.60V	898	483	293	170	97.5	70.8	47.5	31.3	26.3	13.8
1.65V	870	468	288	169	97.0	70.0	47.0	31.0	26.0	13.7
1.70V	838	458	283	168	96.3	69.0	46.5	30.8	25.8	13.6
1.75V	770	443	280	165	94.8	68.3	46.0	30.5	25.5	13.6
1.80V	690	413	270	161	93.0	67.8	44.8	30.3	25.0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

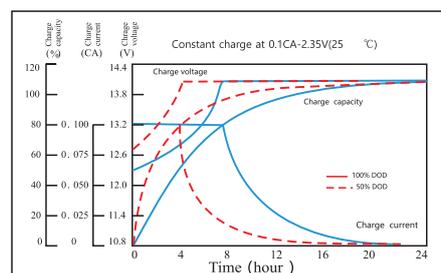
FV/Time	5min	15min	30min	1h	2h	3h	5h	8h	10h	20h
1.60V	1508	850	533	323	184	135	90.0	60.5	50.5	27.3
1.65V	1450	835	528	320	184	133	89.5	60.0	50.0	27.3
1.70V	1443	825	528	318	183	132	88.8	59.8	49.5	27.0
1.75V	1345	820	525	315	182	132	88.3	59.3	49.0	27.0
1.80V	1235	775	513	313	182	131	87.3	58.8	48.5	26.8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

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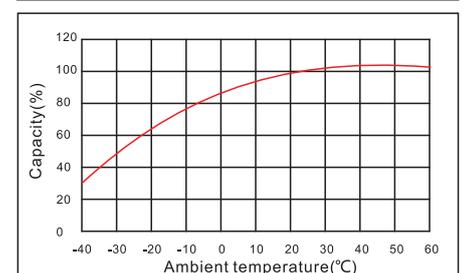
Discharge characteristic



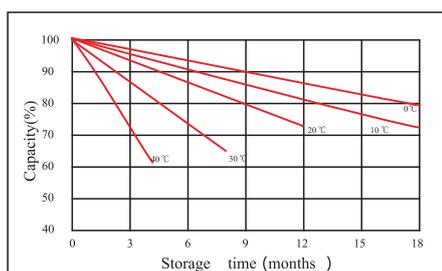
Charging characteristic



The effect of temperature on capacity



Curves of self - discharge



The effect of discharge depth on cycle life

