

# STARMAX

The world's leading battery brand



## HRL SERIES-LONG LIFE **BATTERIES**

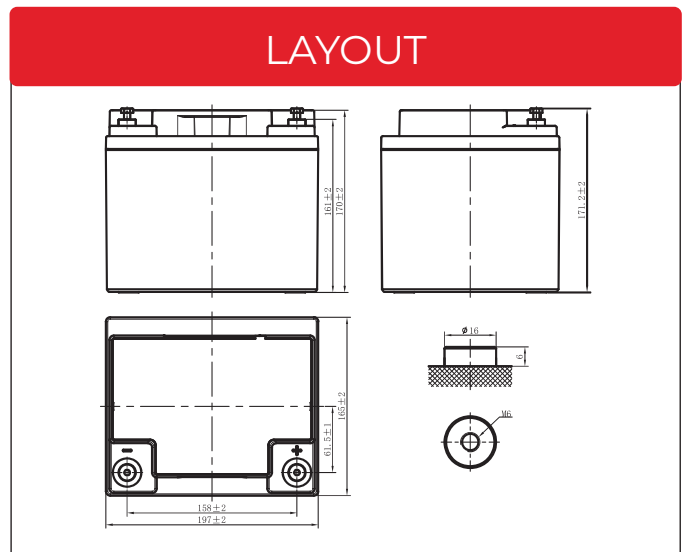
HRL 12160W



[www.starmaxbatteries.com](http://www.starmaxbatteries.com)

# HRL Series

## HRL 12160W



## General Features

- ✓ **High quality AGM separator:** Extend cycle life and prevent micro short circuit
- ✓ **PbCaSn alloy for plate grids:** Less gassing, less self-discharging
- ✓ **Unique vent valve design:** Reduce water losing and prevent air/spark going inside

## Applications

- ✓ UPS
- ✓ Hospitals & Testing Laboratories
- ✓ Emergency Power Supply
- ✓ Industrial Process Control Facilities
- ✓ Banks & Financial Markets
- ✓ Data & Network Operation Centers

## Standards

- ✓ Compliance with IEC 60896 standards
- ✓ Classified as "General Purpose" according to Eurobat
- ✓ CE, UL, IEC Cer tified
- ✓ Manufactured in Starmax, ISO 45001, ISO 9001 and ISO 14001 certified production facilities



# SPECIFICATIONS

Rated Voltage	12V		
Nominal Rate	(W <sub>15</sub> ,1.67V/cell)	160W	
Nominal Capacity	(C <sub>10</sub> ,1.80V/cell)	45Ah	
Dimensions	Length	197±2mm (7.76 inches)	
	Width	165±2mm (6.50 inches)	
	Container height	170±2mm (6.69 inches)	
	Total height	170±2mm (6.69 inches)	
Approx. weight	14.2 Kg (31.3 lbs)		
Terminal	M6		
Container material	ABS: UL 94 HB or V-0		
Rated capacity (25°C)	4 5.0 A h	(10hr, 4.50A,1.80V/cell)	
	41.8 A h	(8hr, 5.23A,1.80V/cell)	
	3 9.6 A h	(5hr, 7.92A,1.75V/cell)	
	36.0 A h	(3hr, 12.0A,1.75V/cell)	
	29.0 A h	(1hr,29.0A,1.67V/cell)	
Max. discharge current	540A		
Internal resistance (25°C)	Approx. 9.0mΩ		
Operating temp. range	Discharge	-20~55°C (4~131°F)	
	Charge	-20~40°C (-4~104°F)	
	Storage	-15~50°C (5~122°F)	
Nominal operating temp. range	25±3°C (77±5°F)		
Max.Charging Current(25°C)	11.25A		
Charge voltage(25°C)	<b>Charge voltage</b>		<b>Temp. Coefficient</b>
	Float	2.25~2.30V/cell	-3mV/cell/°C
	Equalization	2.30~2.40V/cell	-4mV/cell/°C
Effect of temp. to Capacity	40°C (104°F)		106%
	25°C (77°F)		100%
	0°C (32°F)		86%
Self discharge	≤3%/month @ 25°C		

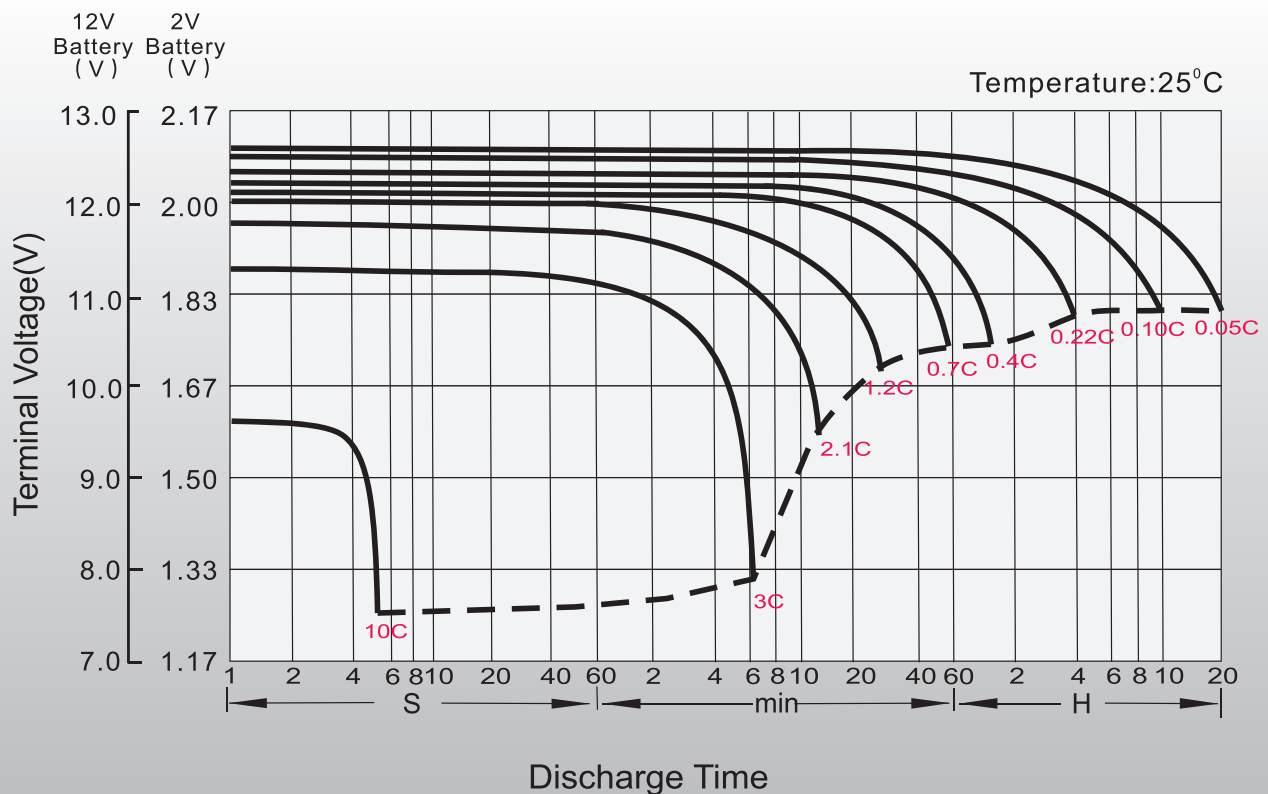
## Constant Current Discharge (Amperes) at 25°C (77°F)

F.V/Time	5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	4h	5h	8h	10h
1.85V/cell	95.7	76.4	66.3	52.1	36.8	31.8	24.9	18.5	14.9	11.1	8.76	7.41	5.12	4.38
1.80V/cell	108.8	86.7	75.1	58.9	41.5	33.7	26.5	19.6	15.7	11.6	9.08	7.70	5.23	4.50
1.75V/cell	118.2	94.1	81.3	63.6	44.6	35.0	27.6	20.4	16.3	12.0	9.38	7.92	5.28	4.52
1.70V/cell	126.4	100.3	86.3	67.4	47.3	36.1	28.3	20.9	16.7	12.2	9.61	8.10	5.36	4.55
1.67V/cell	130.8	103.5	88.8	69.3	48.4	37.1	29.0	21.5	17.1	12.5	9.74	8.21	5.42	4.62
1.60V/cell	135.4	107.0	91.6	71.0	49.6	37.8	29.5	21.9	17.5	12.8	10.0	8.37	5.45	4.64

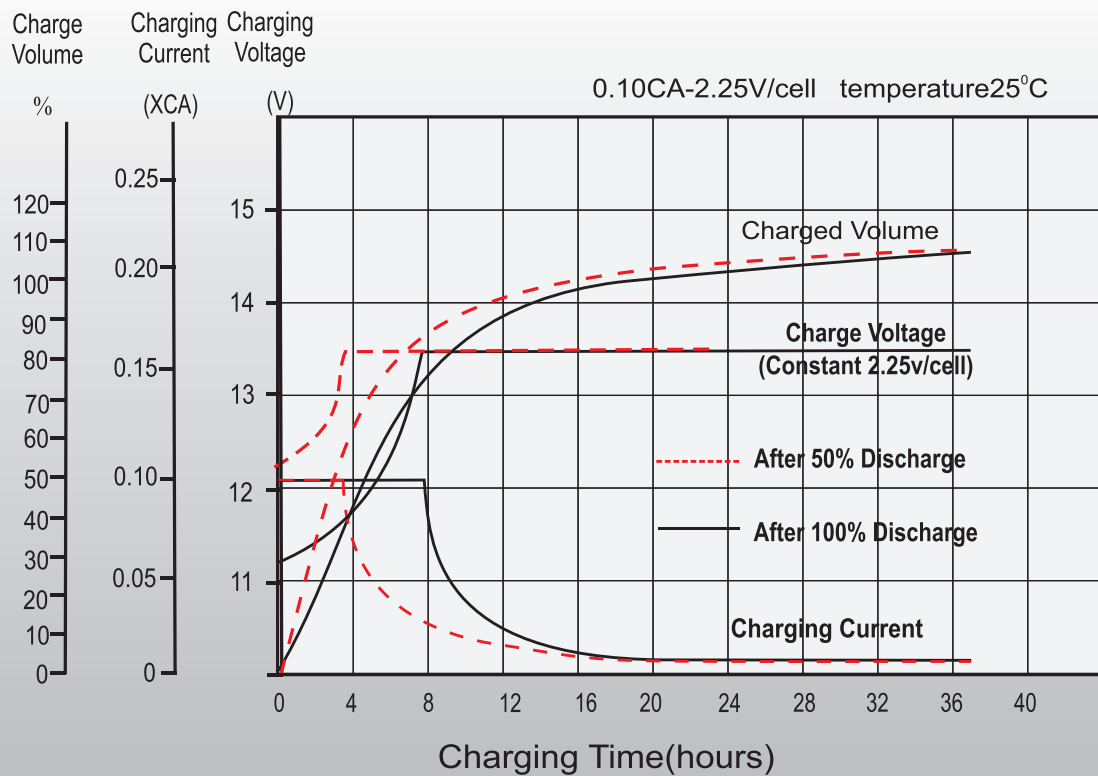
## Constant Power Discharge (Watts/cell) at 25°C (77°F)

F.V/Time	5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	4h	5h	8h	10h
1.85V/cell	178.8	143.8	125.4	99.1	70.2	61.1	48.2	35.8	28.9	21.6	17.2	14.6	10.2	8.70
1.80V/cell	200.0	160.8	140.3	110.9	78.6	64.3	51.0	37.9	30.5	22.5	17.8	15.1	10.3	8.94
1.75V/cell	213.4	171.6	149.8	118.3	83.9	66.5	52.8	39.2	31.5	23.3	18.3	15.5	10.4	8.96
1.70V/cell	224.4	180.4	157.4	124.4	88.2	68.1	53.8	40.0	32.1	23.7	18.6	15.8	10.6	9.02
1.67V/cell	228.0	183.4	160.0	126.4	89.6	69.6	55.0	40.8	32.8	24.1	18.8	15.9	10.7	9.14
1.60V/cell	231.2	185.9	162.2	128.2	90.9	70.1	55.6	41.3	33.2	24.5	19.2	16.2	10.7	9.18

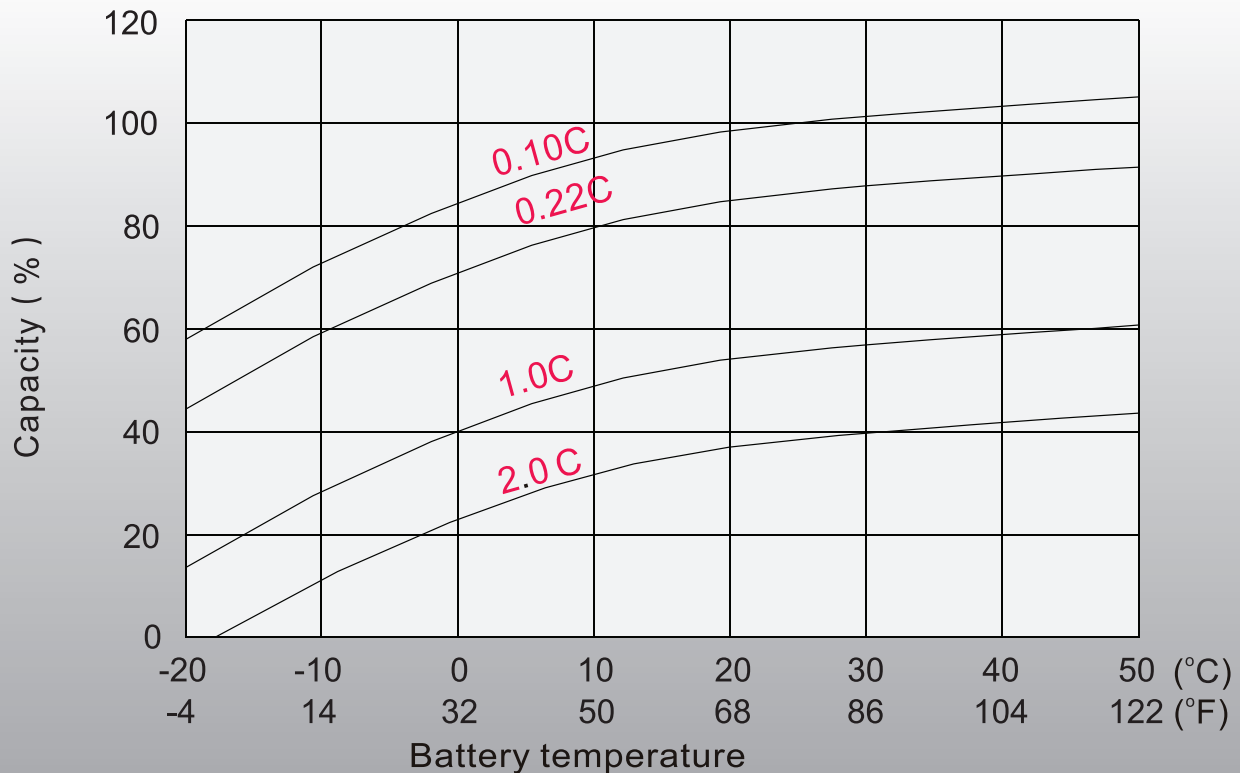
## Discharge Characteristics



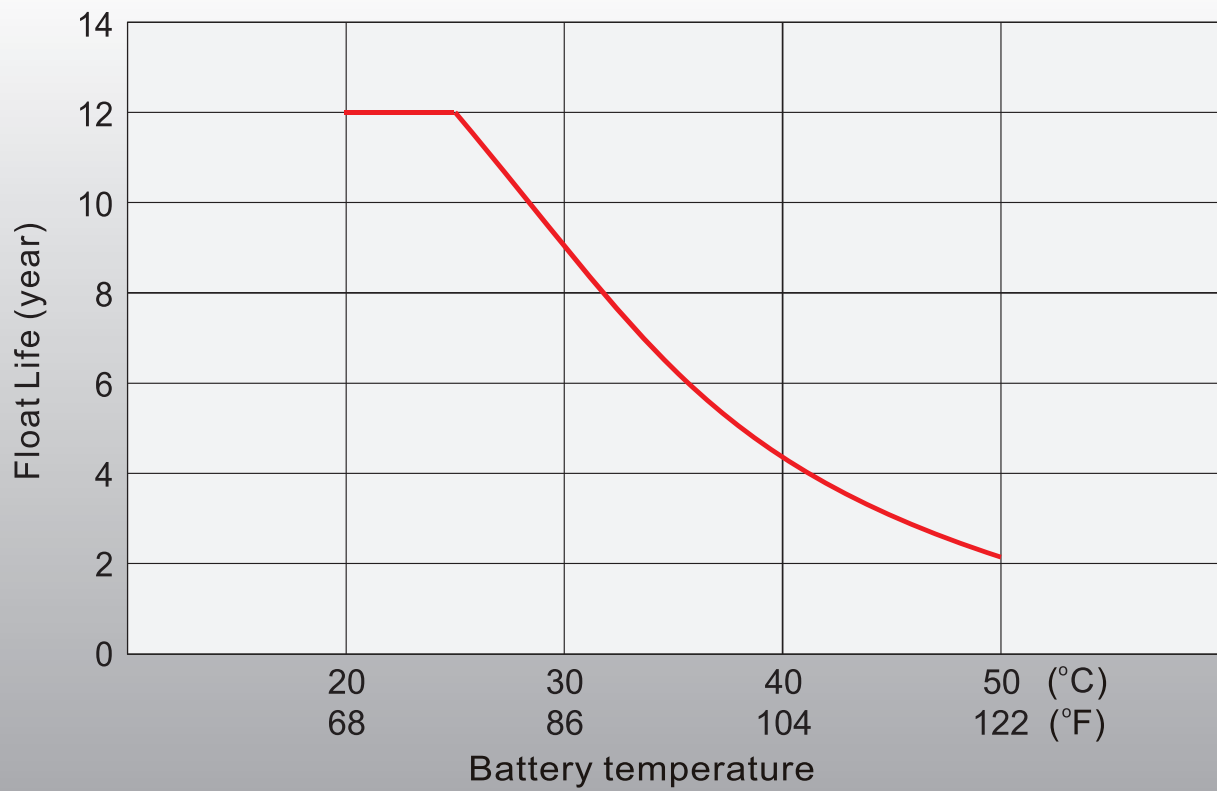
# Float Charging Characteristics



# Temperature Effects in Relation to Battery Capacity



# Effect of Temperature on Long Time Float Life







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