



VALVE-REGULATED
SEALED LEAD
ACID BATTERY



Thunder

TS...W Series
TM...W Series

High Rate Discharge

Product Guide

Advanced Battery Technology

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Introduction

The ABT Thunder TS/TM...W VRLA are batteries according to Eurobat Classification and specially designed for applications which need high power backup.

Products Characteristics

ABT Thunder TS/TM...W series is specially designed for High Power Rate discharge applications.

Designed life at 20°C: TS...W (3~5 years)/TM...W (10 years)

High current discharge and high power output performance

High charging performance

Low rate of self-discharge: $\leq 3\%$ (20°C)monthly on average

Usable for any orientation

Easy installation and handling

Safety and reliable leakage-proof performance

Operating in wide ambient temperature range: -15°C~45°C

Technical Features

Positive and negative plate grids made of lead-calcium-tin alloy for long life and efficient high rate discharge and recharge

High integrity sealing of poles, box and lid to prevent from leakage to provide longer service life.

Higher wattage for high rate short time discharge

40% higher power output than standard SC/SGP series

Occupying less space for superior performance

Construction

High conductivity terminal

Faston /Threaded brass female insert for maximum conductivity and easy installation.

High integrity terminal seal

Compression grommet dual welded/epoxy seal designed for longer life.

Self-regulating relief valve

Low pressure non-return valve prevents ingress of atmospheric oxygen.

High performance positive and negative grids

Grids designed to resist corrosion and prolong service life.

Containers

Highly resistant to shock and vibration. ABS non-FV0 case and FV0 case optional.

Separators

Low resistance microporous glass fibre which ensure recombination efficiency .



Applications

Office Machines and computers
UPS / EPS
Diesel Starting Generator

Certification

CE
UL
ISO9001
ISO14001

Standards

IEC61056-1/2 2002
IEC60896-21/22 2004
BS6290-4 1997
JIS C8702-1/2 2003
DIN43539-T5 1997

General Specifications

TS...W series

Battery Type	Nominal Voltage (V)	Capacity (W/cell) 1.60Vpc@ 10min.20°C	Nominal Capacity C ₂₀ (Ah) 1.75Vpc at 20°C	Length	Width	Height	Overall Height with Poles mm	Weight	Terminal Types	Terminal Layout
				mm	mm	mm		kg		
TS6-7W	6	7.1	1.3	97	25	51	57	0.32	F1	B
TS6-15W	6	16.3	3.2	134	34	60	66	0.71	F1	B
TS6-25W	6	25	4.5	70	47	101	107	0.91	F1	A
TS6-45W	6	45	8.0	151	34	94	100	1.4	F1 or F2	B
TS6-70W	6	73	12.0	151	50	94	100	2.18	F2	B
TS12-7W	12	7.2	1.3	97	43	52	58	0.62	F1	D
TS12-12W	12	12	2.3	178	35	60	67	0.98	F1	B
TS12-18W	12	18	3.5	134	67	61	67	1.41	F1	D
TS12-30W	12	30	5.0	90	70	102	108	1.89	F1	B
TS12-33W	12	35	6.0	151	50	93	98	2.15	F1 & F2	E
TS12-46W	12	46	8.0	151	65	93	98	2.78	F1 or F2	E
TS12-50W	12	50	8.5	151	65	94	100	2.8	F1 or F2	E
TS12-70W	12	74	12.0	151	98	94	100	4.2	F2	E
TS12-100W	12	100	18.0	181	76	166	166	6.15	M5XΦ12	C
TS12-110W	12	110	20.0	181	76	166	166	6.7	M5XΦ12	C

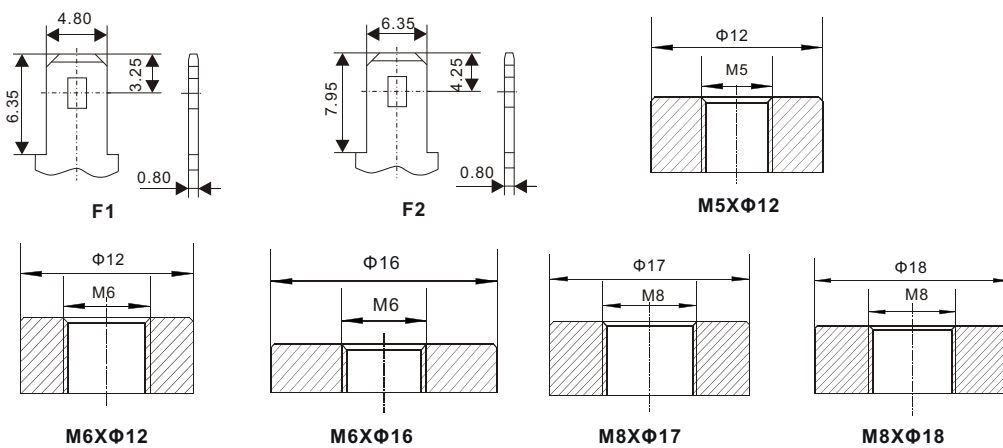
TM...W series

Battery Type	Nominal Voltage (V)	Watt@10 "end voltage 1.60Vpc, 20°C	Nominal Capacity @1.75Vpc/20°C		Length mm	Width mm	Height mm	Overall Height with Poles mm	Weight kg	Terminal Types	Terminal Layout
			C ₂₀ /Ah	C ₁₀ /Ah							
TM6-830W	6	830	180	166.50	306	169	220	225	31.00	M8XΦ18	A
TM6-1000W	6	1000	200	185.00	341	173	215	215	33.97	M8XΦ18	A
TM12-160W	12	160	24	22.20	166	125	175	175	8.70	M6XΦ12	D
TM12-165W	12	165	26	24.05	166	175	125	125	10.06	M6XΦ12	D
TM12-180W	12	180	35	32.38	196	129	158	163	11.09	M6XΦ12	B
TM12-233W	12	233	45	41.63	196	165	176	176	15.00	M6XΦ16	C
TM12-280W	12	280	55	50.88	229	138	208	213	18.75	M6XΦ16	B
TM12-310W	12	310	65	60.13	350	167	179	179	24.06	M6XΦ16	B
TM12-320W	12	320	70	64.75	258	168	207	212	24.73	M6XΦ16	B
TM12-350W	12	350	75	69.38	261	173	221	224	26.93	M6XΦ16	B
TM12-360W	12	360	80	74.00	350	167	179	179	26.39	M6XΦ16	B
TM12-375W	12	375	83	76.78	350	167	179	179	27.15	M6XΦ16	B
TM12-440W	12	440	90	83.25	304	168	208	213	31.25	M6XΦ16	B
TM12-460W	12	460	92	85.10	305	173	218	225	35.00	M8XΦ18	B
TM12-470W	12	470	95	87.88	329	172	216	223.5	35.00	M8XΦ18	B
TM12-510	12	510	100	92.50	341	173	210	215.0	35.00	M8XΦ18	B
TM12-535W	12	535	120	111.00	407	173	224	231.5	39.41	M8XΦ18	B
TM12-620W	12	620	135	124.88	342	172	273	278	45.00	M8XΦ18	B
TM12-650W	12	650	150	138.75	485	172	240	240	48.95	M8XΦ17	B
TM12-740W	12	740	160	148.00	530	209	218	218	60.50	M8XΦ17	D
TM12-800W	12	800	175	161.88	530	209	218	218	64.30	M8XΦ17	D
TM12-830W	12	830	200	185.00	522	238	218	223	68.05	M8XΦ18	D
TM12-1000W	12	1000	250	231.25	521	269	220	225	81.30	M8XΦ18	D

Terminal Layout



Terminals



Performance Data

TS Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.60 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	5.17	3.40	2.57	2.12	1.81	1.59	1.43	1.28	1.17	1.07	0.99	0.92	0.68	0.53	0.45	0.38	0.31	0.25	0.21	0.19	0.168	0.151	0.135	0.114	0.061
TS6-15W	12.71	8.38	6.32	5.22	4.46	3.91	3.51	3.16	2.89	2.63	2.44	2.27	1.66	1.32	1.10	0.94	0.75	0.61	0.53	0.46	0.413	0.371	0.331	0.281	0.150
TS6-25W	17.88	11.79	8.89	7.34	6.27	5.50	4.94	4.45	4.06	3.70	3.43	3.20	2.34	1.85	1.55	1.32	1.06	0.86	0.74	0.65	0.581	0.521	0.466	0.396	0.211
TS6-45W	31.79	20.95	15.80	13.05	11.14	9.78	8.78	7.90	7.22	6.59	6.09	5.68	4.16	3.29	2.76	2.35	1.88	1.52	1.32	1.16	1.034	0.927	0.828	0.703	0.375
TS6-70W	47.68	31.43	23.70	19.57	16.71	14.67	13.17	11.85	10.83	9.88	9.14	8.52	6.23	4.93	4.14	3.53	2.82	2.28	1.98	1.73	1.550	1.390	1.242	1.055	0.563
TS12-7W	5.17	3.40	2.57	2.12	1.81	1.59	1.43	1.28	1.17	1.07	0.99	0.92	0.68	0.53	0.45	0.38	0.31	0.25	0.21	0.19	0.168	0.151	0.135	0.114	0.061
TS12-12W	9.14	6.02	4.54	3.75	3.20	2.81	2.52	2.27	2.08	1.89	1.75	1.63	1.19	0.95	0.79	0.68	0.54	0.44	0.38	0.33	0.297	0.266	0.238	0.202	0.108
TS12-18W	13.91	9.17	6.91	5.71	4.87	4.28	3.84	3.46	3.16	2.88	2.67	2.49	1.82	1.44	1.21	1.03	0.82	0.67	0.58	0.51	0.452	0.405	0.353	0.308	0.164
TS12-30W	19.87	13.10	9.88	8.15	6.96	6.11	5.49	4.94	4.51	4.12	3.81	3.55	2.60	2.06	1.73	1.47	1.17	0.95	0.82	0.72	0.646	0.579	0.516	0.440	0.235
TS12-33W	23.84	15.71	11.85	9.79	8.36	7.34	6.59	5.93	5.41	4.94	4.57	4.26	3.12	2.47	2.07	1.76	1.41	1.14	0.99	0.87	0.775	0.695	0.621	0.527	0.281
TS12-46W	31.79	20.95	15.80	13.05	11.14	9.78	8.78	7.90	7.22	6.59	6.09	5.68	4.16	3.29	2.76	2.35	1.88	1.52	1.32	1.16	1.034	0.927	0.828	0.703	0.375
TS12-50W	33.77	22.26	16.79	13.86	11.84	10.39	9.33	8.40	7.67	7.00	6.47	6.04	4.42	3.50	2.93	2.50	2.00	1.62	1.40	1.23	1.098	0.985	0.879	0.747	0.399
TS12-70W	47.68	31.43	23.70	19.57	16.71	14.67	13.17	11.85	10.83	9.88	9.14	8.52	6.23	4.93	4.14	3.53	2.82	2.28	1.98	1.73	1.550	1.390	1.242	1.055	0.563
TS12-100W	71.52	47.14	35.55	29.36	25.07	22.01	19.76	17.78	16.24	14.82	13.71	12.78	9.35	7.40	6.21	5.29	4.23	3.42	2.96	2.60	2.326	2.085	1.818	1.582	0.844
TS12-110W	79.46	52.38	39.50	32.62	27.85	24.46	21.95	19.76	18.04	16.46	15.23	14.20	10.39	8.22	6.90	5.88	4.70	3.81	3.29	2.89	2.584	2.210	2.020	1.758	0.938

Constant Current Discharge (Amperes) at 20°C to 1.65 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	4.54	3.04	2.30	1.90	1.62	1.42	1.28	1.16	1.06	0.97	0.90	0.84	0.62	0.49	0.41	0.35	0.28	0.24	0.20	0.17	0.156	0.139	0.126	0.108	0.058
TS6-15W	11.17	7.48	5.66	4.68	4.00	3.51	3.16	2.84	2.61	2.39	2.21	2.06	1.52	1.20	1.01	0.86	0.69	0.58	0.49	0.43	0.384	0.342	0.310	0.266	0.142
TS6-25W	15.71	10.52	7.96	6.58	5.62	4.93	4.45	4.00	3.66	3.36	3.10	2.90	2.13	1.69	1.42	1.22	0.97	0.82	0.69	0.60	0.539	0.480	0.435	0.375	0.200
TS6-45W	27.92	18.71	14.16	11.70	9.99	8.77	7.90	7.11	6.52	5.97	5.51	5.15	3.79	3.00	2.53	2.16	1.72	1.45	1.23	1.06	0.959	0.854	0.774	0.666	0.356
TS6-70W	41.88	28.06	21.23	17.55	14.99	13.15	11.85	10.67	9.77	8.96	8.27	7.73	5.69	4.50	3.79	3.24	2.58	2.18	1.84	1.60	1.438	1.281	1.161	0.999	0.533
TS12-7W	4.54	3.04	2.30	1.90	1.62	1.42	1.28	1.16	1.06	0.97	0.90	0.84	0.62	0.49	0.41	0.35	0.28	0.24	0.20	0.17	0.156	0.139	0.126	0.108	0.058
TS12-12W	8.03	5.38	4.07	3.36	2.87	2.52	2.27	2.04	1.87	1.72	1.59	1.48	1.09	0.86	0.73	0.62	0.49	0.42	0.35	0.31	0.276	0.246	0.222	0.192	0.102
TS12-18W	12.22	8.19	6.19	5.12	4.37	3.84	3.46	3.11	2.85	2.61	2.41	2.25	1.66	1.31	1.11	0.95	0.75	0.64	0.54	0.47	0.420	0.374	0.330	0.291	0.156
TS12-30W	17.45	11.69	8.85	7.31	6.25	5.48	4.94	4.45	4.07	3.73	3.45	3.22	2.37	1.87	1.58	1.35	1.08	0.91	0.77	0.67	0.599	0.534	0.482	0.416	0.222
TS12-33W	20.94	14.03	10.62	8.77	7.50	6.57	5.93	5.33	4.89	4.48	4.14	3.86	2.84	2.25	1.89	1.62	1.29	1.09	0.92	0.80	0.719	0.641	0.580	0.500	0.267
TS12-46W	27.92	18.71	14.16	11.70	9.99	8.77	7.90	7.11	6.52	5.97	5.51	5.15	3.79	3.00	2.53	2.16	1.72	1.45	1.23	1.06	0.959	0.854	0.774	0.666	0.356
TS12-50W	29.67	19.88	15.04	12.43	10.62	9.31	8.40	7.56	6.92	6.34	5.86	5.47	4.03	3.19	2.68	2.30	1.83	1.54	1.30	1.13	1.019	0.908	0.822	0.708	0.378
TS12-70W	41.88	28.06	21.23	17.55	14.99	13.15	11.85	10.67	9.77	8.96	8.27	7.73	5.69	4.50	3.79	3.24	2.58	2.18	1.84	1.60	1.438	1.281	1.161	0.999	0.533
TS12-100W	62.82	42.10	31.85	26.32	22.49	19.72	17.78	16.00	14.66	13.43	12.41	11.59	8.53	6.75	5.68	4.86	3.87	3.27	2.76	2.40	2.158	1.922	1.699	1.499	0.800
TS12-110W	69.80	46.77	35.39	29.24	24.99	21.92	19.76	17.78	16.29	14.93	13.79	12.88	9.48	7.50	6.32	5.40	4.30	3.63	3.07	2.66	2.397	2.037	1.888	1.665	0.889

Performance Data

TS Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.70 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	4.52	3.02	2.29	1.89	1.62	1.42	1.28	1.16	1.06	0.97	0.89	0.84	0.61	0.49	0.41	0.35	0.28	0.22	0.19	0.17	0.153	0.139	0.125	0.105	0.057
TS6-15W	11.12	7.44	5.64	4.66	3.98	3.50	3.15	2.84	2.60	2.38	2.20	2.06	1.51	1.20	1.00	0.86	0.68	0.55	0.48	0.42	0.377	0.341	0.309	0.260	0.134
TS6-25W	15.63	10.47	7.94	6.56	5.60	4.91	4.43	4.00	3.65	3.35	3.09	2.89	2.13	1.68	1.41	1.20	0.96	0.77	0.67	0.59	0.530	0.480	0.434	0.365	0.196
TS6-45W	27.79	18.61	14.11	11.66	9.96	8.74	7.88	7.11	6.50	5.95	5.50	5.14	3.78	2.99	2.50	2.14	1.70	1.37	1.19	1.05	0.943	0.853	0.772	0.649	0.348
TS6-70W	41.68	27.91	21.16	17.49	14.94	13.11	11.82	10.66	9.74	8.93	8.25	7.71	5.67	4.49	3.75	3.21	2.55	2.05	1.79	1.57	1.414	1.279	1.158	0.974	0.522
TS12-7W	4.52	3.02	2.29	1.89	1.62	1.42	1.28	1.16	1.06	0.97	0.89	0.84	0.61	0.49	0.41	0.35	0.28	0.22	0.19	0.17	0.153	0.139	0.125	0.105	0.057
TS12-12W	7.99	5.35	4.06	3.35	2.86	2.51	2.26	2.04	1.87	1.71	1.58	1.48	1.09	0.86	0.72	0.61	0.49	0.39	0.34	0.30	0.271	0.245	0.222	0.187	0.096
TS12-18W	12.16	8.14	6.17	5.10	4.36	3.82	3.45	3.11	2.84	2.60	2.41	2.25	1.65	1.31	1.10	0.94	0.74	0.60	0.52	0.46	0.413	0.373	0.330	0.284	0.146
TS12-30W	17.37	11.63	8.82	7.29	6.23	5.46	4.92	4.44	4.06	3.72	3.44	3.21	2.36	1.87	1.56	1.34	1.06	0.86	0.75	0.66	0.589	0.533	0.481	0.406	0.217
TS12-33W	20.84	13.95	10.58	8.74	7.47	6.55	5.91	5.33	4.87	4.47	4.12	3.85	2.84	2.24	1.88	1.60	1.27	1.03	0.90	0.79	0.707	0.639	0.579	0.487	0.261
TS12-46W	27.79	18.61	14.11	11.66	9.96	8.74	7.88	7.11	6.50	5.95	5.50	5.14	3.78	2.99	2.50	2.14	1.70	1.37	1.19	1.05	0.943	0.853	0.772	0.649	0.348
TS12-50W	29.53	19.77	14.99	12.39	10.58	9.28	8.37	7.55	6.90	6.33	5.84	5.46	4.02	3.18	2.66	2.27	1.81	1.45	1.27	1.11	1.002	0.906	0.820	0.690	0.370
TS12-70W	41.68	27.91	21.16	17.49	14.94	13.11	11.82	10.66	9.74	8.93	8.25	7.71	5.67	4.49	3.75	3.21	2.55	2.05	1.79	1.57	1.414	1.279	1.158	0.974	0.522
TS12-100W	62.52	41.86	31.74	26.23	22.41	19.66	17.73	15.99	14.62	13.40	12.37	11.56	8.51	6.73	5.63	4.81	3.82	3.08	2.69	2.36	2.122	1.918	1.695	1.461	0.751
TS12-110W	69.47	46.51	35.27	29.15	24.91	21.84	19.70	17.77	16.24	14.88	13.75	12.85	9.46	7.48	6.26	5.35	4.25	3.42	2.99	2.62	2.357	2.033	1.884	1.623	0.834

Constant Current Discharge (Amperes) at 20°C to 1.75 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	4.22	2.86	2.17	1.79	1.53	1.34	1.21	1.09	1.00	0.92	0.85	0.79	0.59	0.46	0.39	0.33	0.27	0.22	0.19	0.16	0.147	0.133	0.120	0.103	0.055
TS6-15W	10.40	7.04	5.33	4.41	3.77	3.31	2.99	2.69	2.47	2.26	2.09	1.96	1.44	1.14	0.96	0.82	0.65	0.54	0.46	0.41	0.363	0.327	0.295	0.252	0.135
TS6-25W	14.62	9.90	7.50	6.20	5.30	4.65	4.20	3.78	3.47	3.18	2.94	2.75	2.03	1.61	1.35	1.16	0.92	0.76	0.65	0.57	0.510	0.460	0.415	0.355	0.190
TS6-45W	25.99	17.60	13.33	11.02	9.42	8.27	7.46	6.73	6.16	5.65	5.23	4.89	3.61	2.85	2.40	2.05	1.63	1.35	1.16	1.01	0.907	0.818	0.738	0.631	0.338
TS6-70W	38.99	26.40	20.00	16.53	14.13	12.40	11.20	10.09	9.25	8.48	7.85	7.33	5.41	4.28	3.60	3.08	2.45	2.03	1.74	1.52	1.360	1.227	1.107	0.947	0.507
TS12-7W	4.22	2.86	2.17	1.79	1.53	1.34	1.21	1.09	1.00	0.92	0.85	0.79	0.59	0.46	0.39	0.33	0.27	0.22	0.19	0.16	0.147	0.133	0.120	0.103	0.055
TS12-12W	7.47	5.06	3.83	3.17	2.71	2.38	2.15	1.93	1.77	1.63	1.50	1.41	1.04	0.82	0.69	0.59	0.47	0.39	0.33	0.29	0.261	0.235	0.212	0.181	0.097
TS12-18W	11.37	7.70	5.83	4.82	4.12	3.62	3.27	2.94	2.70	2.47	2.29	2.14	1.58	1.25	1.05	0.90	0.71	0.59	0.51	0.44	0.397	0.358	0.315	0.276	0.148
TS12-30W	16.24	11.00	8.33	6.89	5.89	5.17	4.66	4.20	3.85	3.53	3.27	3.06	2.26	1.78	1.50	1.28	1.02	0.84	0.72	0.63	0.567	0.511	0.460	0.394	0.211
TS12-33W	19.49	13.20	10.00	8.27	7.07	6.20	5.60	5.04	4.62	4.24	3.92	3.67	2.71	2.14	1.80	1.54	1.22	1.01	0.87	0.76	0.680	0.613	0.553	0.473	0.253
TS12-46W	25.99	17.60	13.33	11.02	9.42	8.27	7.46	6.73	6.16	5.65	5.23	4.89	3.61	2.85	2.40	2.05	1.63	1.35	1.16	1.01	0.907	0.818	0.738	0.631	0.338
TS12-50W	27.61	18.70	14.17	11.71	10.01	8.78	7.93	7.15	6.55	6.01	5.56	5.19	3.83	3.03	2.55	2.18	1.74	1.44	1.23	1.08	0.963	0.869	0.784	0.671	0.359
TS12-70W	38.99	26.40	20.00	16.53	14.13	12.40	11.20	10.09	9.25	8.48	7.85	7.33	5.41	4.28	3.60	3.08	2.45	2.03	1.74	1.52	1.360	1.227	1.107	0.947	0.507
TS12-100W	58.48	39.60	30.00	24.80	21.20	18.60	16.79	15.13	13.87	12.72	11.77	11.00	8.12	6.42	5.40	4.62	3.67	3.04	2.61	2.28	2.040	1.840	1.620	1.420	0.760
TS12-110W	64.98	44.00	33.33	27.56	23.56	20.67	18.66	16.81	15.41	14.14	13.08	12.22	9.02	7.13	6.00	5.14	4.08	3.38	2.90	2.53	2.267	1.950	1.800	1.578	0.844

Performance Data

TS Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.80 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	4.05	2.75	2.09	1.73	1.49	1.31	1.18	1.07	0.98	0.90	0.83	0.78	0.57	0.45	0.38	0.33	0.26	0.21	0.18	0.16	0.144	0.130	0.117	0.100	0.053
TS6-15W	9.97	6.77	5.15	4.27	3.66	3.22	2.91	2.63	2.40	2.21	2.04	1.91	1.41	1.12	0.94	0.81	0.65	0.51	0.45	0.39	0.355	0.320	0.288	0.245	0.130
TS6-25W	14.03	9.52	7.24	6.01	5.14	4.53	4.09	3.69	3.38	3.10	2.87	2.69	1.98	1.57	1.32	1.14	0.91	0.72	0.63	0.55	0.500	0.450	0.405	0.345	0.183
TS6-45W	24.94	16.93	12.88	10.68	9.14	8.06	7.27	6.57	6.01	5.51	5.11	4.78	3.52	2.80	2.35	2.02	1.62	1.28	1.12	0.98	0.889	0.800	0.720	0.613	0.325
TS6-70W	37.40	25.39	19.32	16.01	13.72	12.09	10.91	9.85	9.01	8.27	7.67	7.18	5.28	4.20	3.52	3.03	2.42	1.92	1.69	1.47	1.333	1.199	1.080	0.920	0.488
TS12-7W	4.05	2.75	2.09	1.73	1.49	1.31	1.18	1.07	0.98	0.90	0.83	0.78	0.57	0.45	0.38	0.33	0.26	0.21	0.18	0.16	0.144	0.130	0.117	0.100	0.053
TS12-12W	7.17	4.87	3.70	3.07	2.63	2.32	2.09	1.89	1.73	1.59	1.47	1.38	1.01	0.80	0.67	0.58	0.46	0.37	0.32	0.28	0.255	0.230	0.207	0.176	0.094
TS12-18W	10.91	7.41	5.63	4.67	4.00	3.53	3.18	2.87	2.63	2.41	2.24	2.09	1.54	1.22	1.03	0.88	0.71	0.56	0.49	0.43	0.389	0.350	0.307	0.268	0.142
TS12-30W	15.59	10.58	8.05	6.67	5.72	5.04	4.54	4.10	3.75	3.45	3.19	2.99	2.20	1.75	1.47	1.26	1.01	0.80	0.70	0.61	0.555	0.500	0.449	0.383	0.203
TS12-33W	18.70	12.70	9.66	8.01	6.86	6.05	5.45	4.93	4.50	4.14	3.83	3.59	2.64	2.10	1.76	1.51	1.21	0.96	0.84	0.73	0.666	0.600	0.540	0.460	0.244
TS12-46W	24.94	16.93	12.88	10.68	9.14	8.06	7.27	6.57	6.01	5.51	5.11	4.78	3.52	2.80	2.35	2.02	1.62	1.28	1.12	0.98	0.889	0.800	0.720	0.613	0.325
TS12-50W	26.50	17.99	13.68	11.34	9.72	8.56	7.72	6.98	6.38	5.86	5.43	5.08	3.74	2.97	2.49	2.15	1.72	1.36	1.19	1.04	0.944	0.850	0.765	0.651	0.346
TS12-70W	37.40	25.39	19.32	16.01	13.72	12.09	10.91	9.85	9.01	8.27	7.67	7.18	5.28	4.20	3.52	3.03	2.42	1.92	1.69	1.47	1.333	1.199	1.080	0.920	0.488
TS12-100W	56.11	38.09	28.98	24.02	20.58	18.14	16.36	14.78	13.51	12.41	11.50	10.76	7.91	6.30	5.28	4.54	3.64	2.89	2.53	2.20	1.999	1.799	1.580	1.379	0.732
TS12-110W	62.34	42.32	32.20	26.69	22.86	20.15	18.18	16.42	15.01	13.79	12.78	11.96	8.79	7.00	5.86	5.05	4.04	3.21	2.81	2.44	2.221	1.907	1.756	1.533	0.813

TS Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts) at 20°C to 1.60 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	11.59	7.10	5.27	4.27	3.56	3.10	2.75	2.46	2.26	2.10	1.94	1.81	1.30	1.04	0.87	0.74	0.58	0.48	0.41	0.36	0.326	0.297	0.272	0.232	0.128
TS6-15W	26.61	16.30	12.11	9.81	8.18	7.12	6.32	5.66	5.19	4.82	4.46	4.16	2.99	2.40	2.00	1.70	1.33	1.11	0.95	0.83	0.748	0.682	0.625	0.532	0.293
TS6-25W	40.82	25.00	18.57	15.05	12.55	10.92	9.69	8.67	7.96	7.40	6.84	6.38	4.59	3.67	3.06	2.60	2.04	1.70	1.46	1.28	1.148	1.046	0.959	0.816	0.449
TS6-45W	73.47	45.00	33.43	27.09	22.59	19.65	17.45	15.61	14.33	13.32	12.31	11.48	8.27	6.61	5.51	4.68	3.67	3.07	2.63	2.30	2.066	1.883	1.727	1.469	0.808
TS6-70W	119.18	73.00	54.23	43.95	36.65	31.88	28.31	25.33	23.24	21.60	19.96	18.62	13.41	10.73	8.94	7.60	5.96	4.98	4.26	3.72	3.352	3.054	2.801	2.384	1.311
TS12-7W	11.76	7.20	5.35	4.33	3.61	3.14	2.79	2.50	2.29	2.13	1.97	1.84	1.32	1.06	0.88	0.75	0.59	0.49	0.42	0.37	0.331	0.301	0.276	0.235	0.129
TS12-12W	19.59	12.00	8.91	7.22	6.02	5.24	4.65	4.16	3.82	3.55	3.28	3.06	2.20	1.76	1.47	1.25	0.98	0.82	0.70	0.61	0.551	0.502	0.460	0.392	0.216
TS12-18W	29.39	18.00	13.37	10.84	9.04	7.86	6.98	6.24	5.73	5.33	4.92	4.59	3.31	2.64	2.20	1.87	1.47	1.23	1.05	0.92	0.827	0.753	0.691	0.588	0.323
TS12-30W	48.98	30.00	22.29	18.06	15.06	13.10	11.63	10.41	9.55	8.88	8.20	7.65	5.51	4.41	3.67	3.12	2.45	2.04	1.75	1.53	1.378	1.255	1.151	0.980	0.539
TS12-33W	57.14	35.00	26.00	21.07	17.57	15.29	13.57	12.14	11.14	10.36	9.57	8.93	6.43	5.14	4.29	3.64	2.86	2.39	2.04	1.79	1.607	1.464	1.343	1.143	0.629
TS12-46W	75.10	46.00	34.17	27.69	23.09	20.09	17.84	15.96	14.64	13.61	12.58	11.73	8.45	6.76	5.63	4.79	3.76	3.14	2.68	2.35	2.112	1.924	1.765	1.502	0.826
TS12-50W	81.63	50.00	37.14	30.10	25.10	21.84	19.39	17.35	15.92	14.80	13.67	12.76	9.18	7.35	6.12	5.20	4.08	3.41	2.92	2.55	2.296	2.092	1.918	1.633	0.898
TS12-70W	120.82	74.00	54.97	44.55	37.15	32.32	28.69	25.67	23.56	21.90	20.24	18.88	13.59	10.87	9.06	7.70	6.04	5.04	4.32	3.78	3.398	3.096	2.839	2.416	1.329
TS12-100W	163.27	100.00	74.29	60.20	50.20	43.67	38.78	34.69	31.84	29.59	27.35	25.51	18.37	14.69	12.24	10.41	8.16	6.82	5.84	5.10	4.592	4.184	3.837	3.265	1.796
TS12-110W	179.59	110.00	81.71	66.22	55.22	48.04	42.65	38.16	35.02	32.55	30.08	28.06	20.20	16.16	13.47	11.45	8.98	7.50	6.42	5.61	5.051	4.602	4.220	3.592	1.976

Performance Data

TS Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts) at 20°C to 1.65 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	11.08	6.84	5.06	4.15	3.44	3.01	2.67	2.39	2.19	2.04	1.89	1.76	1.27	1.02	0.85	0.72	0.56	0.47	0.41	0.35	0.317	0.291	0.266	0.229	0.123
TS6-15W	25.44	15.71	11.62	9.53	7.91	6.92	6.12	5.48	5.03	4.68	4.34	4.04	2.92	2.34	1.95	1.65	1.30	1.08	0.93	0.81	0.727	0.667	0.611	0.525	0.283
TS6-25W	39.02	24.09	17.82	14.62	12.13	10.61	9.39	8.41	7.72	7.18	6.65	6.20	4.47	3.59	2.98	2.53	1.99	1.66	1.43	1.24	1.115	1.024	0.937	0.805	0.434
TS6-45W	70.23	43.36	32.08	26.31	21.83	19.10	16.91	15.13	13.90	12.92	11.97	11.17	8.05	6.45	5.37	4.55	3.58	2.99	2.57	2.24	2.007	1.843	1.686	1.450	0.781
TS6-70W	113.94	70.35	52.03	42.68	35.42	30.98	27.43	24.55	22.55	20.96	19.42	18.11	13.07	10.47	8.71	7.38	5.80	4.85	4.17	3.63	3.256	2.989	2.736	2.351	1.266
TS12-7W	11.24	6.94	5.13	4.21	3.49	3.06	2.71	2.42	2.22	2.07	1.92	1.79	1.29	1.03	0.86	0.73	0.57	0.48	0.41	0.36	0.321	0.295	0.270	0.232	0.125
TS12-12W	18.73	11.56	8.55	7.02	5.82	5.09	4.51	4.04	3.71	3.45	3.19	2.98	2.15	1.72	1.43	1.21	0.95	0.80	0.68	0.60	0.535	0.491	0.450	0.387	0.208
TS12-18W	28.09	17.35	12.83	10.52	8.73	7.64	6.76	6.05	5.56	5.17	4.79	4.47	3.22	2.58	2.15	1.82	1.43	1.20	1.03	0.90	0.803	0.737	0.675	0.580	0.312
TS12-30W	46.82	28.91	21.38	17.54	14.55	12.73	11.27	10.09	9.27	8.62	7.98	7.44	5.37	4.30	3.58	3.03	2.38	1.99	1.71	1.49	1.338	1.228	1.124	0.966	0.520
TS12-33W	54.63	33.73	24.95	20.47	16.98	14.85	13.15	11.77	10.81	10.05	9.31	8.68	6.26	5.02	4.18	3.54	2.78	2.33	2.00	1.74	1.561	1.433	1.312	1.127	0.607
TS12-46W	71.80	44.33	32.79	26.90	22.32	19.52	17.28	15.47	14.21	13.21	12.24	11.41	8.23	6.60	5.49	4.65	3.66	3.06	2.63	2.29	2.052	1.884	1.724	1.482	0.798
TS12-50W	78.04	48.18	35.64	29.24	24.26	21.22	18.79	16.81	15.44	14.36	13.30	12.41	8.95	7.17	5.97	5.05	3.97	3.32	2.85	2.49	2.230	2.047	1.874	1.611	0.867
TS12-70W	115.50	71.31	52.75	43.27	35.90	31.40	27.81	24.88	22.86	21.25	19.69	18.36	13.24	10.61	8.83	7.48	5.88	4.92	4.22	3.68	3.301	3.030	2.773	2.384	1.284
TS12-100W	156.08	96.36	71.28	58.47	48.52	42.44	37.58	33.63	30.89	28.72	26.60	24.81	17.90	14.34	11.94	10.11	7.95	6.65	5.71	4.97	4.461	4.095	3.748	3.221	1.735
TS12-110W	171.69	106.00	78.41	64.32	53.37	46.68	41.33	36.99	33.98	31.59	29.26	27.29	19.69	15.78	13.13	11.12	8.74	7.31	6.28	5.47	4.907	4.504	4.122	3.543	1.908

Constant Power Discharge (Watts) at 20°C to 1.70 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	10.61	6.58	4.88	4.00	3.32	2.90	2.58	2.31	2.12	1.98	1.83	1.71	1.23	0.99	0.83	0.70	0.55	0.46	0.40	0.35	0.310	0.284	0.260	0.226	0.122
TS6-15W	24.35	15.11	11.20	9.18	7.63	6.66	5.92	5.31	4.87	4.54	4.21	3.93	2.83	2.27	1.90	1.61	1.27	1.06	0.91	0.80	0.713	0.653	0.596	0.518	0.281
TS6-25W	37.35	23.18	17.18	14.08	11.71	10.21	9.08	8.14	7.48	6.96	6.45	6.03	4.35	3.49	2.91	2.46	1.94	1.62	1.39	1.22	1.093	1.001	0.915	0.794	0.431
TS6-45W	67.23	41.73	30.92	25.34	21.07	18.37	16.35	14.65	13.46	12.53	11.62	10.85	7.82	6.28	5.23	4.43	3.50	2.91	2.51	2.20	1.968	1.803	1.646	1.430	0.775
TS6-70W	109.06	67.69	50.15	41.10	34.19	29.81	26.52	23.77	21.83	20.33	18.85	17.60	12.69	10.18	8.49	7.19	5.68	4.73	4.07	3.57	3.192	2.924	2.671	2.319	1.258
TS12-7W	10.76	6.68	4.95	4.05	3.37	2.94	2.62	2.34	2.15	2.00	1.86	1.74	1.25	1.00	0.84	0.71	0.56	0.47	0.40	0.35	0.315	0.288	0.263	0.229	0.124
TS12-12W	17.93	11.13	8.24	6.76	5.62	4.90	4.36	3.91	3.59	3.34	3.10	2.89	2.09	1.67	1.40	1.18	0.93	0.78	0.67	0.59	0.525	0.481	0.439	0.381	0.207
TS12-18W	26.89	16.69	12.37	10.14	8.43	7.35	6.54	5.86	5.38	5.01	4.65	4.34	3.13	2.51	2.09	1.77	1.40	1.17	1.00	0.88	0.787	0.721	0.658	0.572	0.310
TS12-30W	44.82	27.82	20.61	16.89	14.05	12.25	10.90	9.77	8.97	8.35	7.75	7.23	5.22	4.19	3.49	2.95	2.33	1.94	1.67	1.47	1.312	1.202	1.097	0.953	0.517
TS12-33W	52.29	32.45	24.05	19.71	16.39	14.29	12.72	11.40	10.47	9.75	9.04	8.44	6.09	4.88	4.07	3.45	2.72	2.27	1.95	1.71	1.531	1.402	1.280	1.112	0.603
TS12-46W	68.73	42.65	31.60	25.90	21.54	18.78	16.71	14.98	13.75	12.81	11.88	11.09	8.00	6.42	5.35	4.53	3.58	2.98	2.57	2.25	2.012	1.843	1.683	1.461	0.793
TS12-50W	74.70	46.36	34.35	28.15	23.41	20.42	18.17	16.28	14.95	13.92	12.91	12.06	8.69	6.98	5.82	4.92	3.89	3.24	2.79	2.44	2.187	2.003	1.829	1.589	0.862
TS12-70W	110.56	68.62	50.84	41.67	34.65	30.21	26.89	24.09	22.13	20.61	19.11	17.84	12.87	10.32	8.61	7.29	5.76	4.79	4.13	3.62	3.236	2.964	2.707	2.351	1.275
TS12-100W	149.40	92.73	68.70	56.31	46.83	40.83	36.33	32.56	29.90	27.85	25.82	24.11	17.39	13.95	11.63	9.85	7.78	6.48	5.58	4.89	4.373	4.006	3.658	3.177	1.723
TS12-110W	164.34	102.00	75.57	61.94	51.51	44.91	39.97	35.81	32.89	30.63	28.40	26.52	19.13	15.35	12.79	10.83	8.56	7.13	6.14	5.37	4.810	4.406	4.024	3.495	1.895

Performance Data

TS Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts) at 20°C to 1.75 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	10.10	6.29	4.70	3.84	3.21	2.80	2.49	2.24	2.06	1.92	1.78	1.66	1.20	0.96	0.80	0.68	0.54	0.45	0.39	0.34	0.304	0.278	0.257	0.219	0.122
TS6-15W	23.18	14.45	10.78	8.82	7.36	6.43	5.72	5.13	4.72	4.40	4.08	3.82	2.76	2.21	1.85	1.56	1.23	1.04	0.89	0.78	0.699	0.638	0.589	0.503	0.281
TS6-25W	35.55	22.16	16.53	13.54	11.29	9.86	8.77	7.87	7.24	6.75	6.26	5.85	4.23	3.39	2.83	2.40	1.89	1.59	1.36	1.19	1.071	0.979	0.903	0.772	0.430
TS6-45W	64.00	39.89	29.76	24.36	20.31	17.74	15.79	14.17	13.03	12.16	11.27	10.54	7.61	6.10	5.10	4.32	3.40	2.86	2.45	2.14	1.929	1.762	1.626	1.390	0.775
TS6-70W	103.82	64.70	48.27	39.52	32.95	28.78	25.62	22.99	21.14	19.72	18.27	17.09	12.35	9.90	8.27	7.00	5.52	4.64	3.98	3.47	3.129	2.859	2.638	2.255	1.257
TS12-7W	10.24	6.38	4.76	3.90	3.25	2.84	2.53	2.27	2.08	1.95	1.80	1.69	1.22	0.98	0.82	0.69	0.54	0.46	0.39	0.34	0.309	0.282	0.260	0.222	0.124
TS12-12W	17.07	10.64	7.94	6.50	5.42	4.73	4.21	3.78	3.47	3.24	3.00	2.81	2.03	1.63	1.36	1.15	0.91	0.76	0.65	0.57	0.514	0.470	0.434	0.371	0.207
TS12-18W	25.60	15.95	11.90	9.75	8.13	7.10	6.32	5.67	5.21	4.86	4.51	4.21	3.05	2.44	2.04	1.73	1.36	1.14	0.98	0.86	0.771	0.705	0.650	0.556	0.310
TS12-30W	42.66	26.59	19.84	16.24	13.54	11.83	10.53	9.45	8.69	8.10	7.51	7.02	5.08	4.07	3.40	2.88	2.27	1.91	1.64	1.43	1.286	1.175	1.084	0.927	0.517
TS12-33W	49.78	31.02	23.14	18.95	15.80	13.80	12.28	11.02	10.13	9.46	8.76	8.20	5.92	4.74	3.96	3.36	2.65	2.22	1.91	1.66	1.500	1.371	1.265	1.081	0.603
TS12-46W	65.42	40.77	30.42	24.90	20.77	18.14	16.14	14.49	13.32	12.43	11.52	10.77	7.78	6.24	5.21	4.41	3.48	2.92	2.51	2.19	1.971	1.802	1.662	1.421	0.792
TS12-50W	71.11	44.32	33.06	27.07	22.57	19.71	17.55	15.75	14.48	13.51	12.52	11.71	8.46	6.78	5.66	4.80	3.78	3.18	2.73	2.38	2.143	1.958	1.807	1.544	0.861
TS12-70W	105.24	65.59	48.93	40.06	33.40	29.18	25.97	23.30	21.43	19.99	18.52	17.33	12.52	10.03	8.38	7.10	5.60	4.70	4.03	3.52	3.171	2.898	2.674	2.286	1.274
TS12-100W	142.22	88.64	66.13	54.14	45.14	39.43	35.09	31.49	28.95	27.02	25.03	23.42	16.92	13.56	11.32	9.59	7.56	6.35	5.45	4.76	4.286	3.917	3.614	3.089	1.722
TS12-110W	156.44	97.50	72.74	59.55	49.66	43.37	38.60	34.64	31.85	29.72	27.54	25.76	18.61	14.91	12.46	10.55	8.32	6.99	6.00	5.23	4.714	4.308	3.975	3.398	1.894

Constant Power Discharge (Watts) at 20°C to 1.80 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TS6-7W	9.62	6.04	4.51	3.69	3.09	2.70	2.40	2.16	1.99	1.86	1.72	1.61	1.16	0.93	0.78	0.66	0.52	0.44	0.38	0.33	0.298	0.272	0.250	0.216	0.118
TS6-15W	22.09	13.86	10.36	8.47	7.08	6.19	5.52	4.96	4.57	4.26	3.96	3.70	2.67	2.15	1.80	1.52	1.21	1.01	0.87	0.76	0.684	0.624	0.574	0.496	0.271
TS6-25W	33.89	21.25	15.89	12.99	10.86	9.50	8.46	7.61	7.00	6.54	6.07	5.68	4.10	3.29	2.75	2.33	1.85	1.55	1.33	1.17	1.050	0.957	0.881	0.761	0.415
TS6-45W	60.99	38.25	28.60	23.39	19.55	17.09	15.23	13.69	12.60	11.76	10.93	10.22	7.38	5.92	4.96	4.20	3.33	2.78	2.39	2.10	1.889	1.722	1.586	1.370	0.747
TS6-70W	98.94	62.05	46.39	37.94	31.72	27.73	24.71	22.21	20.44	19.08	17.73	16.58	11.98	9.61	8.04	6.81	5.40	4.51	3.88	3.41	3.065	2.794	2.573	2.223	1.212
TS12-7W	9.76	6.12	4.58	3.74	3.13	2.74	2.44	2.19	2.02	1.88	1.75	1.64	1.18	0.95	0.79	0.67	0.53	0.45	0.38	0.34	0.302	0.276	0.254	0.219	0.120
TS12-12W	16.26	10.20	7.63	6.24	5.21	4.56	4.06	3.65	3.36	3.14	2.91	2.73	1.97	1.58	1.32	1.12	0.89	0.74	0.64	0.56	0.504	0.459	0.423	0.365	0.199
TS12-18W	24.40	15.30	11.44	9.36	7.82	6.84	6.09	5.48	5.04	4.71	4.37	4.09	2.95	2.37	1.98	1.68	1.33	1.11	0.96	0.84	0.756	0.689	0.634	0.548	0.299
TS12-30W	40.66	25.50	19.07	15.59	13.04	11.40	10.16	9.13	8.40	7.84	7.29	6.82	4.92	3.95	3.30	2.80	2.22	1.85	1.60	1.40	1.259	1.148	1.057	0.913	0.498
TS12-33W	47.44	29.75	22.24	18.19	15.21	13.30	11.85	10.65	9.80	9.15	8.50	7.95	5.74	4.61	3.86	3.27	2.59	2.16	1.86	1.63	1.469	1.340	1.234	1.066	0.581
TS12-46W	62.35	39.10	29.23	23.91	19.99	17.47	15.57	13.99	12.88	12.03	11.17	10.45	7.55	6.06	5.07	4.29	3.40	2.84	2.45	2.15	1.931	1.761	1.621	1.401	0.764
TS12-50W	67.77	42.50	31.78	25.99	21.73	18.99	16.93	15.21	14.00	13.07	12.15	11.36	8.20	6.58	5.51	4.67	3.70	3.09	2.66	2.33	2.099	1.914	1.762	1.522	0.830
TS12-70W	100.30	62.90	47.03	38.46	32.16	28.11	25.05	22.51	20.72	19.35	17.97	16.81	12.14	9.74	8.15	6.91	5.47	4.57	3.94	3.46	3.107	2.832	2.608	2.253	1.229
TS12-100W	135.54	85.00	63.55	51.97	43.45	37.99	33.85	30.42	28.01	26.14	24.29	22.72	16.41	13.16	11.02	9.33	7.39	6.18	5.32	4.67	4.198	3.828	3.524	3.045	1.661
TS12-110W	149.10	93.50	69.91	57.17	47.80	41.79	37.24	33.47	30.81	28.76	26.72	24.99	18.05	14.48	12.12	10.27	8.13	6.80	5.85	5.14	4.618	4.210	3.877	3.349	1.827

Performance Data

TM Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.60 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	510.3	424.3	349.9	289.5	247.5	214.5	188.8	169.0	153.2	140.4	129.6	120.6	85.92	67.80	55.95	47.99	37.64	30.94	26.69	23.42	20.90	18.90	17.28	14.79	7.99
TM6-1000W	567.0	471.4	388.7	321.7	275.0	238.3	209.7	187.7	170.2	155.9	144.0	134.0	95.46	75.33	62.17	53.32	41.82	34.38	29.66	26.02	23.22	21.01	19.20	16.43	8.88
TM12-160W	68.04	56.57	46.65	38.60	33.00	28.60	25.17	22.53	20.43	18.71	17.29	16.08	11.46	9.04	7.46	6.40	5.02	4.13	3.56	3.12	2.79	2.52	2.30	1.97	1.07
TM12-165W	73.71	61.29	50.53	41.82	35.75	30.98	27.27	24.41	22.13	20.27	18.73	17.42	12.41	9.79	8.08	6.93	5.44	4.47	3.86	3.38	3.02	2.73	2.50	2.14	1.15
TM12-180W	99.23	82.50	68.03	56.29	48.13	41.71	36.71	32.85	29.79	27.29	25.21	23.44	16.71	13.18	10.88	9.33	7.32	6.02	5.19	4.55	4.06	3.68	3.36	2.88	1.55
TM12-233W	127.6	106.1	87.46	72.38	61.88	53.63	47.19	42.24	38.30	35.09	32.41	30.14	21.48	16.95	13.99	12.00	9.41	7.73	6.67	5.85	5.23	4.73	4.32	3.70	2.00
TM12-280W	155.9	129.6	106.9	88.46	75.63	65.54	57.68	51.63	46.81	42.89	39.61	36.84	26.25	20.72	17.10	14.66	11.50	9.45	8.16	7.15	6.39	5.78	5.28	4.52	2.44
TM12-310W	184.3	153.2	126.3	104.5	89.38	77.46	68.17	61.02	55.33	50.68	46.82	43.54	31.03	24.48	20.21	17.33	13.59	11.17	9.64	8.46	7.55	6.83	6.24	5.34	2.89
TM12-320W	198.5	165.0	136.1	112.6	96.25	83.42	73.41	65.71	59.58	54.58	50.42	46.89	33.41	26.37	21.76	18.66	14.64	12.03	10.38	9.11	8.13	7.35	6.72	5.75	3.11
TM12-350W	212.6	176.8	145.8	120.6	103.1	89.38	78.66	70.40	63.84	58.48	54.02	50.24	35.80	28.25	23.31	19.99	15.68	12.89	11.12	9.76	8.71	7.88	7.20	6.16	3.33
TM12-360W	226.8	188.6	155.5	128.7	110.0	95.33	83.90	75.10	68.09	62.38	57.62	53.59	38.19	30.13	24.87	21.33	16.73	13.75	11.86	10.41	9.29	8.40	7.68	6.57	3.55
TM12-375W	235.3	195.6	161.3	133.5	114.1	98.91	87.05	77.91	70.65	64.72	59.78	55.60	39.62	31.26	25.80	22.13	17.35	14.27	12.31	10.80	9.64	8.72	7.97	6.82	3.69
TM12-440W	255.2	212.1	174.9	144.8	123.8	107.3	94.39	84.48	76.61	70.18	64.82	60.29	42.96	33.90	27.98	23.99	18.82	15.47	13.35	11.71	10.45	9.45	8.64	7.39	4.00
TM12-460W	260.8	216.9	178.8	148.0	126.5	109.6	96.48	86.36	78.31	71.74	66.26	61.63	43.91	34.65	28.60	24.53	19.24	15.81	13.64	11.97	10.68	9.66	8.83	7.56	4.09
TM12-470W	269.3	223.9	184.6	152.8	130.6	113.2	99.63	89.18	80.86	74.08	68.42	63.63	45.35	35.78	29.53	25.33	19.86	16.33	14.09	12.36	11.03	9.98	9.12	7.80	4.22
TM12-510W	283.5	235.7	194.4	160.8	137.5	119.2	104.9	93.87	85.12	77.97	72.02	66.98	47.73	37.67	31.09	26.66	20.91	17.19	14.83	13.01	11.61	10.50	9.60	8.22	4.44
TM12-535W	340.2	282.9	233.2	193.0	165.0	143.0	125.8	112.6	102.1	93.57	86.43	80.38	57.28	45.20	37.30	31.99	25.09	20.63	17.80	15.61	13.93	12.60	11.52	9.86	5.33
TM12-620W	382.7	318.2	262.4	217.1	185.6	160.9	141.6	126.7	114.9	105.3	97.23	90.43	64.44	50.85	41.96	35.99	28.23	23.20	20.02	17.56	15.68	14.18	12.96	11.09	6.00
TM12-650W	425.3	353.6	291.5	241.3	206.3	178.8	157.3	140.8	127.7	117.0	108.0	100.5	71.60	56.50	46.63	39.99	31.36	25.78	22.24	19.51	17.42	15.75	14.40	12.32	6.66
TM12-740W	453.6	377.1	311.0	257.3	220.0	190.7	167.8	150.2	136.2	124.8	115.2	107.2	76.37	60.27	49.74	42.65	33.45	27.50	23.73	20.81	18.58	16.80	15.36	13.14	7.11
TM12-800W	496.1	412.5	340.1	281.5	240.6	208.5	183.5	164.3	149.0	136.5	126.0	117.2	83.53	65.92	54.40	46.65	36.59	30.08	25.95	22.77	20.32	18.38	16.80	14.38	7.77
TM12-830W	567.0	471.4	388.7	321.7	275.0	238.3	209.7	187.7	170.2	155.9	144.0	134.0	95.46	75.33	62.17	53.32	41.82	34.38	29.66	26.02	23.22	21.01	19.20	16.43	8.88
TM12-1000W	708.8	589.3	485.9	402.1	343.8	297.9	262.2	234.7	212.8	194.9	180.1	167.5	119.3	94.17	77.71	66.65	52.27	42.97	37.07	32.52	29.03	26.26	24.00	20.54	11.10

Constant Current Discharge (Amperes) at 20°C to 1.65 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	478.9	398.1	329.9	277.2	237.0	205.5	181.7	163.3	148.5	136.4	126.3	117.7	84.59	66.78	55.53	47.72	37.52	30.86	26.66	23.39	20.87	18.88	17.25	14.75	7.97
TM6-1000W	532.1	442.4	366.6	308.0	263.3	228.3	201.9	181.4	165.0	151.6	140.3	130.8	93.99	74.20	61.69	53.02	41.69	34.28	29.62	25.99	23.19	20.97	19.16	16.38	8.86
TM12-160W	63.85	53.08	43.99	36.96	31.60	27.40	24.23	21.77	19.80	18.19	16.84	15.70	11.28	8.90	7.40	6.36	5.00	4.11	3.55	3.12	2.78	2.52	2.30	1.97	1.06
TM12-165W	69.17	57.51	47.65	40.04	34.23	29.68	26.25	23.58	21.45	19.71	18.25	17.00	12.22	9.65	8.02	6.89	5.42	4.46	3.85	3.38	3.02	2.73	2.49	2.13	1.15
TM12-180W	93.11	77.41	64.15	53.89	46.08	39.96	35.33	31.75	28.88	26.53	24.56	22.89	16.45	12.99	10.80	9.28	7.30	6.00	5.18	4.55	4.06	3.67	3.35	2.87	1.55
TM12-233W	119.7	99.5	82.48	69.29	59.25	51.38	45.43	40.82	37.13	34.11	31.58	29.43	21.15	16.70	13.88	11.93	9.38	7.71	6.66	5.85	5.22	4.72	4.31	3.69	1.99
TM12-280W	146.3	121.7	100.8	84.69	72.42	62.79	55.52	49.89	45.38	41.69	38.60	35.97	25.85	20.41	16.97	14.58	11.46	9.43	8.14	7.15	6.38	5.77	5.27	4.51	2.44
TM12-310W	172.9	143.8	119.1	100.1	85.58	74.21	65.62	58.96	53.63	49.26	45.61	42.51	30.55	24.12	20.05	17.23	13.55	11.14	9.63	8.45	7.54	6.82	6.23	5.33	2.88
TM12-320W	186.2	154.8	128.3	107.8	92.17	79.92	70.66	63.49	57.76	53.05	49.12	45.78	32.90	25.97	21.59	18.56	14.59	12.00	10.37	9.10	8.12	7.34	6.71	5.73	3.10
TM12-350W	199.5	165.9	137.5	115.5	98.8	85.63	75.71	68.03	61.88	56.84	52.63	49.05	35.25	27.83	23.14	19.88	15.63	12.86	11.11	9.74	8.70	7.86	7.19	6.14	3.32
TM12-360W	212.8	176.9	146.6	123.2	105.3	91.33	80.76	72.56	66.01	60.63	56.14	52.32	37.60	29.68	24.68	21.21	16.67	13.71	11.85	10.39	9.28	8.39	7.67	6.55	3.54
TM12-375W	220.8	183.6	152.1	127.8	109.3	94.76	83.79	75.28	68.48	62.91	58.24	54.28	39.01	30.79	25.60	22.00	17.30	14.23	12.29	10.78	9.63	8.70	7.95	6.80	3.68
TM12-440W	239.4	199.1	165.0	138.6	118.5	102.8	90.85	81.63	74.26	68.21	63.16	58.86	42.30	33.39	27.76	23.86	18.76	15.43	13.33	11.69	10.44	9.44	8.62	7.37	3.99
TM12-460W	244.8	203.5	168.6	141.7	121.1	105.0	92.87	83.45	75.91	69.73	64.56	60.17	43.24	34.13	28.38	24.39	19.18	15.77	13.62	11.95	10.67	9.65	8.82	7.54	4.07
TM12-470W	252.7	210.1	174.1	146.3	125.1	108.5	95.90	86.17	78.38	72.00	66.66	62.13	44.65	35.25	29.31	25.18	19.80	16.29	14.07	12.34	11.02	9.96	9.10	7.78	4.21
TM12-510W	266.0	221.2	183.3	154.0	131.7	114.2	100.9	90.70	82.51	75.79	70.17	65.40	47.00	37.10	30.85	26.51	20.84	17.14	14.81	12.99	11.60	10.49	9.58	8.19	4.43
TM12-535W	319.2	265.4	219.9	184.8	158.0	137.0	121.1	108.8	99.0	90.95	84.21	78.48	56.40	44.52	37.02	31.81	25.01	20.57	17.77	15.59	13.92	12.58	11.50	9.83	5.31
TM12-620W	359.2	298.6	247.4	207.9	177.8	154.1	136.3	122.4	111.4	102.3	94.73	88.29	63.45	50.09	41.64	35.79	28.14	23.14	19.99	17.54	15.66	14.16	12.94	11.06	5.98
TM12-650W	399.1	331.8	274.9	231.0	197.5	171.3	151.4	136.1	123.8	113.7	105.3	98.1	70.49	55.65	46.27	39.76	31.26	25.71	22.21	19.49	17.39	15.73	14.37	12.29	6.64
TM12-740W	425.7	353.9	293.3	246.4	210.7	182.7	161.5	145.1	132.0	121.3	112.3	104.6	75.19	59.36	49.36	42.42	33.35	27.43	23.69	20.79	18.55	16.78	15.33	13.11	7.09
TM12-800W	465.6	387.1	320.7	269.5	230.4	199.8	176.7	158.7	144.4	132.6	122.8	114.4	82.24	64.93	53.98	46.39	36.48	30.00	25.92	22.74	20.29	18.35	16.77	14.34	7.75
TM12-830W	532.1	442.																							

Performance Data

TM Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.70 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	443.6	368.8	311.6	261.8	226.5	195.0	173.2	156.1	142.4	131.2	121.7	113.7	82.36	65.34	54.51	46.96	37.04	30.53	26.40	23.18	20.70	18.73	17.12	14.64	7.91
TM6-1000W	492.8	409.8	346.3	290.9	251.7	216.7	192.4	173.5	158.3	145.8	135.3	126.3	91.51	72.60	60.57	52.18	41.15	33.92	29.34	25.76	23.00	20.81	19.02	16.26	8.79
TM12-160W	59.14	49.18	41.55	34.90	30.20	26.00	23.09	20.82	18.99	17.49	16.23	15.16	10.98	8.71	7.27	6.26	4.94	4.07	3.52	3.09	2.76	2.50	2.28	1.95	1.06
TM12-165W	64.07	53.28	45.01	37.81	32.72	28.17	25.01	22.55	20.58	18.95	17.58	16.42	11.90	9.44	7.87	6.78	5.35	4.41	3.81	3.35	2.99	2.71	2.47	2.11	1.14
TM12-180W	86.25	71.72	60.60	50.90	44.04	37.92	33.67	30.36	27.70	25.51	23.67	22.10	16.01	12.71	10.60	9.13	7.20	5.94	5.13	4.51	4.03	3.64	3.33	2.85	1.54
TM12-233W	110.9	92.2	77.91	65.44	56.63	48.75	43.29	39.03	35.61	32.80	30.43	28.42	20.59	16.34	13.63	11.74	9.26	7.63	6.60	5.80	5.18	4.68	4.28	3.66	1.98
TM12-280W	135.5	112.7	95.2	79.99	69.21	59.58	52.91	47.71	43.53	40.08	37.20	34.73	25.17	19.97	16.66	14.35	11.32	9.33	8.07	7.08	6.33	5.72	5.23	4.47	2.42
TM12-310W	160.2	133.2	112.5	94.5	81.79	70.42	62.53	56.38	51.44	47.37	43.96	41.05	29.74	23.60	19.68	16.96	13.38	11.02	9.53	8.37	7.48	6.76	6.18	5.29	2.86
TM12-320W	172.5	143.4	121.2	101.8	88.08	75.83	67.34	60.72	55.40	51.02	47.34	44.20	32.03	25.41	21.20	18.26	14.40	11.87	10.27	9.02	8.05	7.28	6.66	5.69	3.08
TM12-350W	184.8	153.7	129.8	109.1	94.4	81.25	72.15	65.05	59.35	54.66	50.72	47.36	34.32	27.23	22.71	19.57	15.43	12.72	11.00	9.66	8.63	7.80	7.13	6.10	3.30
TM12-360W	197.1	163.9	138.5	116.3	100.7	86.67	76.96	69.39	63.31	58.30	54.10	50.52	36.60	29.04	24.23	20.87	16.46	13.57	11.73	10.30	9.20	8.32	7.61	6.51	3.52
TM12-375W	204.5	170.1	143.7	120.7	104.4	89.92	79.84	71.99	65.68	60.49	56.13	52.41	37.98	30.13	25.14	21.65	17.08	14.08	12.17	10.69	9.55	8.64	7.89	6.75	3.65
TM12-440W	221.8	184.4	155.8	130.9	113.3	97.5	86.58	78.07	71.22	65.59	60.86	56.83	41.18	32.67	27.26	23.48	18.52	15.26	13.20	11.59	10.35	9.36	8.56	7.32	3.96
TM12-460W	226.7	188.5	159.3	133.8	115.8	99.7	88.50	79.80	72.81	67.05	62.22	58.10	42.10	33.40	27.86	24.00	18.93	15.60	13.49	11.85	10.58	9.57	8.75	7.48	4.04
TM12-470W	234.1	194.7	164.5	138.2	119.5	102.9	91.39	82.40	75.18	69.24	64.25	59.99	43.47	34.49	28.77	24.78	19.55	16.11	13.93	12.24	10.93	9.89	9.03	7.73	4.18
TM12-510W	246.4	204.9	173.1	145.4	125.8	108.3	96.2	86.74	79.14	72.88	67.63	63.15	45.76	36.30	30.28	26.09	20.58	16.96	14.67	12.88	11.50	10.41	9.51	8.13	4.40
TM12-535W	295.7	245.9	207.8	174.5	151.0	130.0	115.4	104.1	95.0	87.46	81.15	75.78	54.91	43.56	36.34	31.31	24.69	20.35	17.60	15.46	13.80	12.49	11.41	9.76	5.28
TM12-620W	332.7	276.6	233.7	196.3	169.9	146.3	129.9	117.1	106.8	98.4	91.30	85.25	61.77	49.01	40.88	35.22	27.78	22.90	19.80	17.39	15.53	14.05	12.84	10.98	5.93
TM12-650W	369.6	307.4	259.7	218.1	188.8	162.5	144.3	130.1	118.7	109.3	101.4	94.7	68.63	54.45	45.43	39.13	30.87	25.44	22.00	19.32	17.25	15.61	14.27	12.20	6.59
TM12-740W	394.3	327.9	277.0	232.7	201.3	173.3	153.9	138.8	126.6	116.6	108.2	101.0	73.21	58.08	48.45	41.74	32.92	27.14	23.47	20.61	18.40	16.65	15.22	13.01	7.03
TM12-800W	431.2	358.6	303.0	254.5	220.2	189.6	168.3	151.8	138.5	127.5	118.3	110.5	80.07	63.53	53.00	45.65	36.01	29.68	25.67	22.54	20.13	18.21	16.64	14.23	7.69
TM12-830W	492.8	409.8	346.3	290.9	251.7	216.7	192.4	173.5	158.3	145.8	135.3	126.3	91.51	72.60	60.57	52.18	41.15	33.92	29.34	25.76	23.00	20.81	19.02	16.26	8.79
TM12-1000W	616.1	512.3	432.8	363.6	314.6	270.8	240.5	216.8	197.8	182.2	169.1	157.9	114.4	90.75	75.71	65.22	51.44	42.40	36.67	32.20	28.76	26.01	23.78	20.33	10.99

Constant Current Discharge (Amperes) at 20°C to 1.75 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	416.1	345.9	298.5	252.0	216.0	187.5	166.0	149.3	136.0	125.1	116.0	108.2	78.25	63.75	51.87	44.76	35.45	29.59	25.47	22.45	20.12	18.27	16.75	14.41	7.79
TM6-1000W	462.3	384.4	331.7	280.0	240.0	208.3	184.4	165.9	151.1	139.0	128.9	120.2	86.94	70.83	57.64	49.74	39.38	32.88	28.30	24.95	22.36	20.30	18.61	16.01	8.66
TM12-160W	55.48	46.12	39.80	33.60	28.80	25.00	22.13	19.91	18.14	16.68	15.46	14.43	10.43	8.50	6.92	5.97	4.73	3.95	3.40	2.99	2.68	2.44	2.23	1.92	1.04
TM12-165W	60.10	49.97	43.12	36.40	31.20	27.08	23.98	21.57	19.65	18.07	16.75	15.63	11.30	9.21	7.49	6.47	5.12	4.27	3.68	3.24	2.91	2.64	2.42	2.08	1.13
TM12-180W	80.91	67.26	58.04	49.00	42.00	36.46	32.28	29.04	26.45	24.33	22.55	21.04	15.21	12.40	10.09	8.70	6.89	5.75	4.95	4.37	3.91	3.55	3.26	2.80	1.51
TM12-233W	104.0	86.5	74.63	63.00	54.00	46.88	41.50	37.34	34.01	31.28	28.99	27.05	19.56	15.94	12.97	11.19	8.86	7.40	6.37	5.61	5.03	4.57	4.19	3.60	1.95
TM12-280W	127.1	105.7	91.2	77.00	66.00	57.29	50.72	45.63	41.56	38.23	35.43	33.06	23.91	19.48	15.85	13.68	10.83	9.04	7.78	6.86	6.15	5.58	5.12	4.40	2.38
TM12-310W	150.3	124.9	107.8	91.0	78.00	67.71	59.94	53.93	49.12	45.18	41.88	39.07	28.26	23.02	18.73	16.16	12.80	10.69	9.20	8.11	7.27	6.60	6.05	5.20	2.81
TM12-320W	161.8	134.5	116.1	98.0	84.00	72.92	64.56	58.08	52.90	48.65	45.10	42.08	30.43	24.79	20.17	17.41	13.78	11.51	9.90	8.73	7.83	7.10	6.51	5.60	3.03
TM12-350W	173.4	144.1	124.4	105.0	90.0	78.13	69.17	62.23	56.68	52.13	48.32	45.08	32.60	26.56	21.61	18.65	14.77	12.33	10.61	9.35	8.38	7.61	6.98	6.01	3.25
TM12-360W	184.9	153.7	132.7	112.0	96.0	83.33	73.78	66.38	60.46	55.60	51.54	48.09	34.78	28.33	23.06	19.90	15.75	13.15	11.32	9.98	8.94	8.12	7.44	6.41	3.46
TM12-375W	191.9	159.5	137.6	116.2	99.6	86.46	76.54	68.86	62.72	57.69	53.47	49.89	36.08	29.40	23.92	20.64	16.34	13.64	11.74	10.35	9.28	8.42	7.72	6.65	3.59
TM12-440W	208.0	173.0	149.3	126.0	108.0	93.8	83.00	74.67	68.01	62.55	57.98	54.10	39.12	31.88	25.94	22.38	17.72	14.80	12.73	11.23	10.06	9.13	8.37	7.21	3.90
TM12-460W	212.7	176.8	152.6	128.8	110.4	95.8	84.84	76.33	69.52	63.94	59.27	55.30	39.99	32.58	26.51	22.88	18.12	15.12	13.02	11.47	10.28	9.34	8.56	7.37	3.98
TM12-470W	219.6	182.6	157.5	133.0	114.0	99.0	87.61	78.82	71.79	66.03	61.21	57.11	41.30	33.65	27.38	23.63	18.71	15.62	13.44	11.85	10.62	9.64	8.84	7.61	4.11
TM12-510W	231.2	192.2	165.8	140.0	120.0	104.2	92.2	82.97	75.57	69.50	64.43	60.11	43.47	35.42	28.82	24.87	19.69	16.44	14.15	12.47	11.18	10.15	9.31	8.01	4.33
TM12-535W	277.4	230.6	199.0	168.0	144.0	125.0	110.7	99.6	90.7	83.40	77.31	72.13	52.16	42.50	34.58	29.84	23.63	19.73	16.98	14.97	13.41	12.18	11.17	9.61	5.19
TM12-620W	312.1	259.4	223.9	189.0	162.0	140.6	124.5	112.0	102.0	93.8	86.98	81.15	58.68	47.81	38.91	33.57	26.58	22.19	19.10	16.84	15.09	13.70	12.56	10.81	5.84
TM12-650W	346.7	288.3	248.8	210.0	180.0	156.3	138.3	124.5	113.4	104.3	96.6	90.2	65.21	53.13	43.23	37.30	29.54	24.66	21.22	18.71	16.77	15.22	13.96	12.01	6.49
TM12-740W	369.9	307.5	265.3	224.0	192.0	166.7	147.6	132.8	120.9	111.2	103.1	96.2	69.55	56.67	46.11	39.79	31.51	26.30	22.64	19.96	17.89	16.24	14.89	12.81	6.92
TM12-800W	404.5	336.3	290.2	245.0	210.0	182.3	161.4	145.2	132.2	121.6	112.7	105.2	76.07	61.98	50.43	43.52	34.46	28.77	24.76	21.83	19.56	17.76	16.28	14.01	7.57
TM12-830W	462.3	384.4	331.7	280.0																					

Performance Data

TM Series Discharge Current (Amperes @ 20°C)

Amperes

Constant Current Discharge (Amperes) at 20°C to 1.80 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	384.0	329.7	282.0	240.0	205.0	180.0	160.1	144.6	132.1	121.9	113.2	105.9	77.20	62.25	51.58	44.59	35.39	29.54	25.47	22.45	20.12	18.25	16.73	14.38	7.77
TM6-1000W	426.7	366.3	313.3	266.7	227.8	200.0	177.9	160.7	146.8	135.4	125.8	117.6	85.78	69.17	57.31	49.55	39.32	32.83	28.30	24.94	22.35	20.28	18.59	15.98	8.64
TM12-160W	51.20	43.95	37.60	32.00	27.33	24.00	21.35	19.28	17.62	16.25	15.10	14.12	10.29	8.30	6.88	5.95	4.72	3.94	3.40	2.99	2.68	2.43	2.23	1.92	1.04
TM12-165W	55.47	47.62	40.73	34.67	29.61	26.00	23.13	20.89	19.09	17.60	16.36	15.29	11.15	8.99	7.45	6.44	5.11	4.27	3.68	3.24	2.91	2.64	2.42	2.08	1.12
TM12-180W	74.67	64.10	54.83	46.67	39.86	35.00	31.13	28.12	25.69	23.70	22.02	20.59	15.01	12.10	10.03	8.67	6.88	5.74	4.95	4.37	3.91	3.55	3.25	2.80	1.51
TM12-233W	96.0	82.4	70.50	60.00	51.25	45.00	40.03	36.15	33.03	30.47	28.31	26.47	19.30	15.56	12.89	11.15	8.85	7.39	6.37	5.61	5.03	4.56	4.18	3.59	1.94
TM12-280W	117.3	100.7	86.2	73.33	62.64	55.00	48.92	44.19	40.38	37.24	34.60	32.35	23.59	19.02	15.76	13.63	10.81	9.03	7.78	6.86	6.15	5.58	5.11	4.39	2.38
TM12-310W	138.7	119.0	101.8	86.7	74.03	65.00	57.82	52.22	47.72	44.01	40.89	38.23	27.88	22.48	18.62	16.10	12.78	10.67	9.20	8.11	7.26	6.59	6.04	5.19	2.81
TM12-320W	149.3	128.2	109.7	93.3	79.72	70.00	62.27	56.24	51.39	47.39	44.03	41.17	30.02	24.21	20.06	17.34	13.76	11.49	9.90	8.73	7.82	7.10	6.51	5.59	3.02
TM12-350W	160.0	137.4	117.5	100.0	85.4	75.00	66.71	60.25	55.06	50.78	47.18	44.11	32.17	25.94	21.49	18.58	14.75	12.31	10.61	9.35	8.38	7.61	6.97	5.99	3.24
TM12-360W	170.7	146.5	125.3	106.7	91.1	80.00	71.16	64.27	58.73	54.16	50.32	47.05	34.31	27.67	22.92	19.82	15.73	13.13	11.32	9.98	8.94	8.11	7.44	6.39	3.45
TM12-375W	177.1	152.0	130.0	110.7	94.5	83.00	73.83	66.68	60.93	56.19	52.21	48.82	35.60	28.70	23.78	20.56	16.32	13.62	11.74	10.35	9.28	8.42	7.71	6.63	3.58
TM12-440W	192.0	164.8	141.0	120.0	102.5	90.0	80.06	72.31	66.07	60.93	56.62	52.93	38.60	31.13	25.79	22.30	17.70	14.77	12.73	11.22	10.06	9.13	8.37	7.19	3.89
TM12-460W	196.3	168.5	144.1	122.7	104.8	92.0	81.84	73.91	67.54	62.29	57.87	54.11	39.46	31.82	26.36	22.79	18.09	15.10	13.02	11.47	10.28	9.33	8.55	7.35	3.97
TM12-470W	202.7	174.0	148.8	126.7	108.2	95.0	84.51	76.32	69.74	64.32	59.76	55.87	40.74	32.85	27.22	23.54	18.68	15.59	13.44	11.85	10.62	9.63	8.83	7.59	4.10
TM12-510W	213.3	183.1	156.7	133.3	113.9	100.0	89.0	80.34	73.41	67.70	62.91	58.81	42.89	34.58	28.65	24.77	19.66	16.41	14.15	12.47	11.18	10.14	9.30	7.99	4.32
TM12-535W	256.0	219.8	188.0	160.0	136.7	120.0	106.7	96.4	88.1	81.24	75.49	70.58	51.47	41.50	34.38	29.73	23.59	19.70	16.98	14.97	13.41	12.17	11.15	9.59	5.18
TM12-620W	288.0	247.2	211.5	180.0	153.8	135.0	120.1	108.5	99.1	91.4	84.92	79.40	57.90	46.69	38.68	33.45	26.54	22.16	19.10	16.84	15.09	13.69	12.55	10.78	5.83
TM12-650W	320.0	274.7	235.0	200.0	170.8	150.0	133.4	120.5	110.1	101.6	94.4	88.2	64.33	51.88	42.98	37.16	29.49	24.62	21.22	18.71	16.76	15.21	13.94	11.98	6.48
TM12-740W	341.3	293.0	250.7	213.3	182.2	160.0	142.3	128.5	117.5	108.3	100.6	94.1	68.62	55.33	45.85	39.64	31.46	26.26	22.64	19.96	17.88	16.23	14.87	12.78	6.91
TM12-800W	373.3	320.5	274.2	233.3	199.3	175.0	155.7	140.6	128.5	118.5	110.1	102.9	75.06	60.52	50.14	43.36	34.41	28.72	24.76	21.83	19.56	17.75	16.27	13.98	7.56
TM12-830W	426.7	366.3	313.3	266.7	227.8	200.0	177.9	160.7	146.8	135.4	125.8	117.6	85.78	69.17	57.31	49.55	39.32	32.83	28.30	24.94	22.35	20.28	18.59	15.98	8.64
TM12-1000W	533.3	457.8	391.7	333.3	284.7	250.0	222.4	200.8	183.5	169.3	157.3	147.0	107.2	86.46	71.63	61.94	49.16	41.03	35.37	31.18	27.94	25.35	23.24	19.97	10.80

Performance Data

TM Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts per cell) at 20°C to 1.60 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	1037	830.0	672.0	559.4	476.3	420.8	376.7	340.0	308.8	284.6	263.0	245.2	175.9	138.7	115.2	98.9	77.72	64.50	55.15	48.36	43.15	39.01	35.63	30.70	16.46
TM6-1000W	1249	1000	809.6	674.0	573.8	507.0	453.8	409.6	372.0	342.9	316.8	295.4	211.9	167.1	138.8	119.2	93.6	77.71	66.44	58.27	51.99	47.00	42.93	36.99	19.83
TM12-160W	199.8	160.0	121.5	96.49	81.55	70.84	62.73	56.36	51.21	47.00	43.50	40.80	29.30	23.14	19.23	16.52	12.97	10.74	9.20	8.07	7.20	6.50	5.94	5.07	2.77
TM12-165W	206.1	165.0	125.3	99.50	84.10	73.05	64.69	58.13	52.81	48.47	44.86	42.08	30.21	23.85	19.82	17.03	13.38	11.08	9.49	8.32	7.42	6.70	6.12	5.23	2.85
TM12-180W	224.8	180.0	136.7	108.2	90.76	80.73	71.40	64.17	58.38	53.63	49.65	46.28	33.23	26.24	21.80	18.73	14.71	12.18	10.43	9.15	8.16	7.37	6.73	5.75	3.14
TM12-233W	291.0	233.0	177.0	140.0	117.5	104.5	92.42	83.06	75.57	69.42	64.28	59.90	43.01	33.96	28.22	24.24	19.04	15.77	13.51	11.84	10.56	9.54	8.72	7.44	4.06
TM12-280W	349.7	280.0	206.0	168.0	141.0	123.0	109.0	98.80	89.00	81.96	75.73	70.00	50.26	39.61	32.91	28.26	22.20	18.39	15.75	13.81	12.32	11.13	10.17	8.69	4.74
TM12-310W	387.2	310.0	231.6	193.4	162.3	140.8	125.9	113.6	102.4	94.33	87.16	80.87	58.06	45.76	38.02	32.65	25.65	21.24	18.20	15.95	14.23	12.86	11.75	10.03	5.48
TM12-320W	399.7	320.0	237.7	200.2	168.0	146.9	131.3	118.5	105.6	97.26	89.87	83.68	60.08	47.35	39.34	33.79	26.54	21.98	18.83	16.51	14.73	13.31	12.16	10.38	5.67
TM12-350W	437.1	350.0	260.0	219.0	183.8	160.7	143.6	129.6	115.5	106.4	98.30	91.53	65.71	51.79	43.03	36.96	29.03	24.04	20.59	18.06	16.11	14.56	13.29	11.36	6.20
TM12-360W	449.6	360.0	268.9	224.6	188.5	163.6	146.2	131.9	119.0	109.5	101.2	93.91	67.43	53.14	44.15	37.92	29.79	24.67	21.13	18.53	16.53	14.94	13.64	11.65	6.36
TM12-375W	468.4	375.0	280.1	234.0	196.3	170.4	152.3	137.4	123.9	114.1	105.4	97.83	70.24	55.35	45.99	39.50	31.03	25.70	22.01	19.30	17.22	15.56	14.21	12.14	6.63
TM12-440W	549.6	440.0	328.7	274.5	230.4	199.9	178.7	161.3	145.4	133.9	123.7	114.8	82.41	64.95	53.97	46.35	36.41	30.15	25.83	22.64	20.20	18.26	16.67	14.24	7.77
TM12-460W	574.5	460.0	343.6	287.0	240.8	209.0	186.8	168.6	152.0	140.0	129.3	120.0	86.16	67.90	56.42	48.45	38.06	31.52	27.00	23.67	21.12	19.09	17.43	14.89	8.13
TM12-470W	587.0	470.0	351.1	286.6	246.1	213.2	190.9	172.3	155.2	143.0	132.2	122.5	87.95	69.38	57.65	49.51	38.89	32.21	27.59	24.19	21.58	19.50	17.81	15.21	8.30
TM12-510W	637.0	510.0	381.0	311.0	267.0	231.4	207.1	186.9	168.4	155.2	143.4	132.9	95.4	75.28	62.55	53.72	42.20	34.95	29.94	26.25	23.41	21.16	19.33	16.51	9.01
TM12-535W	668.2	535.0	433.1	360.6	307.0	271.2	242.8	219.1	199.0	183.5	169.5	158.0	113.4	89.39	74.27	63.78	50.10	41.58	35.55	31.17	27.81	25.14	22.97	19.79	10.61
TM12-620W	754.7	620.0	483.4	393.5	335.0	292.6	261.9	236.4	215.5	199.0	183.9	173.3	124.4	98.1	81.46	69.96	54.95	45.60	38.99	34.19	30.51	27.58	25.19	21.70	11.64
TM12-650W	811.8	650.0	526.3	438.1	373.0	329.6	295.0	266.2	241.8	222.9	206.0	192.0	137.7	108.6	90.23	77.49	60.86	50.51	43.19	37.87	33.79	30.55	27.90	24.04	12.89
TM12-740W	924.2	740.0	599.1	498.8	424.6	375.2	335.8	303.1	275.3	253.7	234.5	218.6	156.8	123.6	102.7	88.22	69.29	57.51	49.17	43.12	38.47	34.78	31.77	27.37	14.68
TM12-800W	999.2	800.0	647.7	539.2	459.0	405.6	363.0	327.7	297.6	274.3	253.5	236.3	169.5	133.7	111.1	95.4	74.91	62.17	53.15	46.62	41.59	37.60	34.34	29.59	15.87
TM12-830W	1037	830.0	672.0	559.4	476.3	420.8	376.7	340.0	308.8	284.6	263.0	245.2	175.9	138.7	115.2	98.9	77.72	64.50	55.15	48.36	43.15	39.01	35.63	30.70	16.46
TM12-1000W	1249	1000	809.6	674.0	573.8	507.0	453.8	409.6	372.0	342.9	316.8	295.4	211.9	167.1	138.8	119.2	93.6	77.71	66.44	58.27	51.99	47.00	42.93	36.99	19.83

Constant Power Discharge (Watts per cell) at 20°C to 1.65 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	984.4	802.6	655.0	547.8	467.6	414.2	371.5	335.7	305.4	281.5	260.6	243.0	174.6	137.0	114.5	98.0	77.00	64.00	54.80	48.00	42.90	38.80	35.50	30.50	16.41
TM6-1000W	1186	967.0	789.1	660.0	563.4	499.0	447.6	404.5	368.0	339.2	314.0	292.8	210.4	165.1	138.0	118.1	92.8	77.11	66.02	57.83	51.69	46.75	42.77	36.75	19.77
TM12-160W	192.4	157.0	119.0	95.27	80.21	69.62	61.72	55.58	50.65	46.60	43.00	40.31	28.94	22.88	19.02	16.34	12.88	10.67	9.14	8.02	7.15	6.45	5.90	5.04	2.75
TM12-165W	198.4	161.9	122.7	98.24	82.71	71.79	63.65	57.31	52.23	48.05	44.34	41.56	29.85	23.60	19.61	16.85	13.28	11.01	9.43	8.27	7.38	6.65	6.08	5.20	2.84
TM12-180W	214.9	175.4	131.3	105.1	88.26	79.57	70.41	63.31	57.62	52.95	49.04	45.71	32.82	25.95	21.57	18.53	14.61	12.11	10.37	9.09	8.11	7.32	6.69	5.72	3.12
TM12-233W	278.2	227.0	170.0	136.0	114.2	103.0	91.15	81.95	74.58	68.54	63.47	59.17	42.49	33.59	27.92	23.99	18.91	15.67	13.42	11.77	10.50	9.47	8.66	7.40	4.04
TM12-280W	334.6	273.0	204.0	166.0	139.4	122.0	108.0	97.50	87.50	80.57	74.59	69.00	49.55	39.05	32.45	27.88	21.90	18.14	15.53	13.62	12.15	10.98	10.10	8.62	4.71
TM12-310W	370.7	302.5	228.5	190.7	160.2	139.6	125.1	112.5	101.2	93.22	86.30	80.27	57.64	45.43	37.75	32.43	25.48	21.10	18.08	15.85	14.14	12.79	11.68	9.98	5.45
TM12-320W	384.1	313.4	235.0	197.3	165.7	145.7	130.5	117.3	104.4	96.12	88.98	83.06	59.64	47.01	39.06	33.56	26.36	21.84	18.71	16.41	14.64	13.23	12.08	10.33	5.64
TM12-350W	420.1	342.7	257.0	215.8	181.3	159.3	142.7	128.3	114.2	105.1	97.32	90.85	65.23	51.41	42.73	36.70	28.83	23.88	20.46	17.94	16.01	14.47	13.22	11.29	6.17
TM12-360W	430.5	351.2	265.3	221.4	186.0	162.2	145.3	130.6	117.6	108.3	100.2	93.22	66.94	52.76	43.84	37.66	29.59	24.51	21.00	18.41	16.43	14.85	13.56	11.59	6.33
TM12-375W	448.4	365.9	276.4	230.6	193.8	168.9	151.3	136.0	122.5	112.8	104.4	97.10	69.72	54.95	45.67	39.23	30.82	25.53	21.87	19.18	17.11	15.47	14.13	12.07	6.60
TM12-440W	526.1	429.3	324.3	270.6	227.3	198.2	177.5	159.6	143.7	132.3	122.5	113.9	81.81	64.48	53.58	46.03	36.16	29.95	25.66	22.50	20.08	18.15	16.58	14.16	7.74
TM12-460W	550.0	448.8	339.0	282.9	237.7	207.2	185.6	166.9	150.2	138.3	128.1	119.1	85.53	67.41	56.02	48.12	37.80	31.31	26.83	23.53	20.99	18.97	17.33	14.81	8.09
TM12-470W	562.0	458.2	345.7	282.9	242.8	211.4	189.6	170.5	153.3	141.3	130.8	121.6	87.30	68.88	57.24	49.17	38.63	32.00	27.41	24.04	21.44	19.38	17.71	15.13	8.27
TM12-510W	609.8	497.2	375.1	307.0	263.5	229.4	205.8	185.0	166.4	153.4	142.0	131.9	94.7	74.74	62.11	53.35	41.91	34.72	29.74	26.08	23.27	21.03	19.21	16.42	8.97
TM12-535W	634.5	517.3	422.2	353.1	301.4	267.0	239.5	216.4	196.9	181.5	168.0	156.6	112.5	88.31	73.81	63.17	49.63	41.25	35.32	30.94	27.65	25.01	22.88	19.66	10.58
TM12-620W	724.3	604.4	471.2	387.0	330.4	288.9	259.1	234.2	213.7	197.0	182.3	171.5	123.2	96.7	80.82	69.17	54.35	45.17	38.68	33.88	30.28	27.38	25.06	21.53	11.58
TM12-650W	770.9	628.5	512.9	429.0	366.2	324.4	290.9	262.9	239.2	220.5	204.1	190.3	136.7	107.3	89.68	76.75	60.30	50.12	42.92	37.59	33.60	30.39	27.80	23.89	12.85
TM12-740W	877.6	715.5	583.9	488.4	416.9	369.3	331.2	299.3	272.3	251.0	232.4	216.7	155.7	122.1	102.1	87.37	68.65	57.06	48.86	42.80	38.25	34.59	31.65	27.19	14.63
TM12-800W	948.8	773.6	631.3	528.0	450.7	399.2	358.1	323.6	294.4	271.4	251.2	234.2	168.3	132.0	110.4	94.5	74.22	61.69	52.82	4					

Performance Data

TM Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts per cell) at 20°C to 1.70 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	914.0	761.4	629.1	527.9	452.2	401.7	361.5	327.4	298.0	275.1	254.9	238.2	171.3	135.3	112.6	96.8	76.25	63.29	54.32	47.71	42.63	38.59	35.30	30.23	16.34
TM6-1000W	1101	917.4	758.0	636.0	544.8	484.0	435.6	394.4	359.0	331.5	307.2	287.0	206.3	163.0	135.6	116.7	91.9	76.25	65.44	57.49	51.36	46.50	42.53	36.43	19.69
TM12-160W	183.0	152.7	114.8	94.05	78.99	68.40	60.49	54.35	49.42	45.37	41.97	39.08	28.25	22.38	18.64	16.04	12.62	10.46	8.97	7.87	7.02	6.34	5.79	4.94	2.70
TM12-165W	188.7	157.4	118.4	96.98	81.46	70.53	62.38	56.05	50.96	46.78	43.28	40.31	29.14	23.07	19.22	16.54	13.02	10.79	9.25	8.11	7.24	6.54	5.97	5.10	2.79
TM12-180W	199.1	166.1	126.7	103.5	87.37	77.25	68.55	61.78	56.33	51.85	48.09	44.88	32.45	25.70	21.40	18.42	14.49	12.02	10.30	9.03	8.06	7.28	6.65	5.68	3.11
TM12-233W	257.7	215.0	164.0	134.0	113.1	100.0	88.74	79.96	72.92	67.12	62.25	58.10	42.00	33.26	27.71	23.84	18.76	15.56	13.33	11.69	10.43	9.42	8.61	7.35	4.02
TM12-280W	314.0	262.0	199.0	162.0	136.7	119.0	106.0	95.50	85.00	78.41	72.66	68.00	48.93	38.62	32.12	27.63	21.72	18.01	15.44	13.54	12.09	10.93	9.99	8.54	4.67
TM12-310W	347.7	290.1	225.6	185.9	156.9	136.7	122.8	111.2	99.4	91.73	85.00	79.07	56.89	44.90	37.35	32.13	25.26	20.94	17.95	15.75	14.06	12.71	11.61	9.93	5.43
TM12-320W	360.6	300.9	230.5	191.5	161.6	142.5	128.1	116.0	102.5	94.58	87.64	81.82	58.87	46.46	38.65	33.24	26.13	21.67	18.57	16.30	14.55	13.15	12.02	10.27	5.62
TM12-350W	394.5	329.1	252.1	209.5	176.8	155.9	140.1	126.8	112.1	103.5	95.85	89.49	64.39	50.82	42.27	36.36	28.58	23.70	20.31	17.82	15.91	14.39	13.14	11.24	6.15
TM12-360W	403.8	336.9	262.0	215.8	182.2	158.7	142.6	129.1	115.5	106.5	98.7	91.83	66.07	52.15	43.38	37.31	29.33	24.32	20.84	18.29	16.32	14.76	13.49	11.53	6.31
TM12-375W	420.6	350.9	273.0	224.8	189.8	165.3	148.6	134.5	120.3	111.0	102.8	95.65	68.82	54.32	45.18	38.86	30.55	25.33	21.71	19.05	17.00	15.38	14.05	12.01	6.57
TM12-440W	493.5	411.8	320.3	263.8	222.7	194.0	174.3	157.8	141.1	130.2	120.6	112.2	80.75	63.73	53.02	45.60	35.85	29.72	25.48	22.35	19.95	18.04	16.48	14.09	7.71
TM12-460W	515.9	430.5	334.8	275.8	232.8	202.8	182.2	165.0	147.6	136.1	126.1	117.3	84.42	66.63	55.43	47.67	37.48	31.07	26.63	23.37	20.86	18.86	17.23	14.73	8.06
TM12-470W	527.1	439.2	338.4	277.6	237.8	206.9	186.2	168.6	150.6	139.1	128.9	119.8	86.18	68.08	56.63	48.71	38.29	31.74	27.21	23.88	21.31	19.27	17.61	15.05	8.24
TM12-510W	572.0	476.5	367.2	301.3	258.1	224.5	202.0	182.9	163.4	150.9	139.8	130.0	93.5	73.87	61.45	52.85	41.55	34.45	29.53	25.91	23.13	20.91	19.11	16.33	8.94
TM12-535W	589.1	490.8	405.5	340.3	291.5	258.9	233.0	211.0	192.1	177.4	164.3	153.5	110.4	87.21	72.57	62.41	49.15	40.79	35.01	30.76	27.48	24.88	22.75	19.49	10.53
TM12-620W	681.7	578.7	453.1	375.1	321.3	282.5	254.2	230.2	210.0	193.9	179.7	168.8	121.3	95.8	79.76	68.60	54.02	44.83	38.48	33.80	30.20	27.34	25.01	21.42	11.58
TM12-650W	715.8	596.3	492.7	413.4	354.1	314.6	283.1	256.4	233.4	215.5	199.7	186.6	134.1	106.0	88.17	75.83	59.71	49.56	42.54	37.37	33.39	30.22	27.64	23.68	12.80
TM12-740W	814.9	678.9	560.9	470.6	403.2	358.2	322.3	291.9	265.7	245.3	227.3	212.4	152.7	120.6	100.4	86.33	67.98	56.42	48.43	42.54	38.01	34.41	31.47	26.96	14.57
TM12-800W	880.9	733.9	606.4	508.8	435.8	387.2	348.5	315.5	287.2	265.2	245.7	229.6	165.1	130.4	108.5	93.3	73.49	61.00	52.35	45.99	41.09	37.20	34.02	29.14	15.75
TM12-830W	914	761.4	629.1	527.9	452.2	401.7	361.5	327.4	298.0	275.1	254.9	238.2	171.3	135.3	112.6	96.8	76.25	63.29	54.32	47.71	42.63	38.59	35.30	30.23	16.34
TM12-1000W	1101	917.4	758.0	636.0	544.8	484.0	435.6	394.4	359.0	331.5	307.1	287.0	206.3	163.0	135.6	116.7	91.9	76.25	65.44	57.49	51.36	46.50	42.53	36.43	19.69

Constant Power Discharge (Watts per cell) at 20°C to 1.75 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	828.3	707.4	591.8	500.5	430.8	384.3	346.7	314.6	287.2	265.3	245.9	229.9	166.1	131.6	109.7	94.5	74.53	61.91	53.16	46.70	41.73	37.77	34.90	29.81	16.11
TM6-1000W	998	852.3	713.0	603.0	519.0	463.0	417.7	379.0	346.0	319.6	296.3	277.0	200.2	158.6	132.2	113.9	89.8	74.59	64.04	56.27	50.27	45.50	42.05	35.91	19.41
TM12-160W	169.7	145.3	111.1	90.38	76.91	66.30	58.50	53.30	48.20	44.10	41.00	38.20	27.72	21.99	18.34	15.79	12.44	10.32	8.84	7.75	6.91	6.25	5.70	4.86	2.66
TM12-165W	175.0	149.9	114.6	93.21	79.31	68.37	60.33	54.97	49.71	45.48	42.28	39.39	28.58	22.68	18.92	16.29	12.83	10.64	9.12	8.00	7.13	6.44	5.88	5.02	2.75
TM12-180W	184.0	157.6	122.1	100.4	85.62	75.40	67.05	60.53	55.28	50.94	47.30	44.19	32.06	25.44	21.22	18.27	14.39	11.93	10.23	8.97	8.00	7.23	6.59	5.63	3.08
TM12-233W	238.1	204.0	158.0	130.0	110.8	97.6	86.80	78.35	71.55	65.94	61.22	57.20	41.50	32.93	27.47	23.65	18.63	15.45	13.24	11.61	10.35	9.35	8.54	7.28	3.99
TM12-280W	288.3	247.0	190.0	155.0	132.1	114.0	102.7	92.00	82.00	76.00	70.46	66.00	47.71	37.77	31.48	27.11	21.36	17.73	15.22	13.36	11.93	10.79	9.87	8.44	4.62
TM12-310W	320.2	274.3	214.7	177.6	151.4	131.9	118.8	107.8	97.0	89.55	83.03	77.28	55.86	44.22	36.86	31.74	25.01	20.76	17.82	15.64	13.97	12.64	11.55	9.88	5.41
TM12-320W	331.0	283.5	219.7	184.0	156.9	137.5	123.9	112.4	100.1	92.33	85.61	79.96	57.81	45.75	38.14	32.84	25.88	21.49	18.44	16.19	14.46	13.08	11.95	10.22	5.60
TM12-350W	362.0	310.1	240.3	201.3	171.6	150.4	135.5	123.0	109.4	101.0	93.63	87.46	63.22	50.04	41.71	35.92	28.31	23.50	20.17	17.71	15.81	14.30	13.07	11.18	6.12
TM12-360W	371.9	318.6	249.3	206.3	175.9	153.1	137.9	125.2	112.7	104.0	96.4	89.74	64.87	51.35	42.80	36.86	29.04	24.11	20.69	18.17	16.22	14.68	13.41	11.47	6.28
TM12-375W	387.4	331.9	259.7	214.9	183.2	159.5	143.7	130.4	117.4	108.3	100.4	93.48	67.58	53.49	44.59	38.39	30.25	25.12	21.55	18.92	16.90	15.29	13.97	11.95	6.54
TM12-440W	454.5	389.4	304.7	252.1	214.9	187.2	168.6	153.0	137.7	127.1	117.8	109.7	79.29	62.76	52.31	45.05	35.50	29.47	25.29	22.21	19.83	17.94	16.40	14.02	7.68
TM12-460W	475.2	407.1	318.5	263.6	224.7	195.7	176.3	159.9	144.0	132.9	123.2	114.7	82.89	65.61	54.69	47.10	37.11	30.81	26.44	23.21	20.73	18.75	17.14	14.66	8.03
TM12-470W	485.5	414.7	323.0	266.8	229.6	199.6	180.1	163.4	147.0	135.8	125.9	117.0	84.61	67.04	55.88	48.12	37.92	31.48	27.01	23.72	21.18	19.16	17.51	14.98	8.20
TM12-510W	526.8	449.9	350.5	289.5	249.1	216.6	195.4	177.3	159.5	147.3	136.6	127.0	91.8	72.75	60.64	52.22	41.15	34.16	29.31	25.74	22.98	20.79	19.00	16.25	8.90
TM12-535W	533.9	456.0	381.5	322.6	277.7	247.7	223.5	202.8	185.1	171.0	158.5	148.2	107.1	84.85	70.73	60.91	48.04	39.90	34.26	30.10	26.90	24.35	22.50	19.21	10.39
TM12-620W	630.0	545.7	431.1	359.5	309.4	272.4	245.7	223.0	204.5	188.9	175.2	165.1	119.3	94.5	78.80	67.86	53.51	44.45	38.17	33.53	29.96	27.12	25.06	21.40	11.57
TM12-650W	648.7	554.0	463.5	392.0	337.4	301.0	271.5	246.4	224.9	207.7	192.6	180.1	130.1	103.1	85.94	74.01	58.36	48.48	41.63	36.57	32.68	29.58	27.33	23.34	12.62
TM12-740W	738.5	630.7	527.6	446.2	384.1	342.6	309.1	280.5	256.0	236.5	219.3	205.0	148.1	117.4	97.8	84.25	66.45	55.20	47.39	41.64	37.20	33.67	31.12	26.58	14.37
TM12-800W	798.4	681.8	570.4	482.4	415.2	370.4	334.2	303.2	276.8	255.7	237.1	221.6	160.1	126.9	105.8	91.1	71.83								

Performance Data

Performance Data

TM Series Discharge Power (Watts @ 20°C)

Watts per cell

Constant Power Discharge (Watts per cell) at 20°C to 1.80 volts per cell																									
Battery Type	5min	10min	15min	20min	25min	30min	35min	40min	45min	50min	55min	1h	1.5h	2h	2.5h	3h	4h	5h	6h	7h	8h	9h	10h	12h	24h
TM6-830W	724.7	640.1	543.7	464.5	402.5	361.2	326.9	297.6	272.4	252.1	234.1	219.2	159.5	127.1	106.4	92.0	72.95	60.88	52.48	46.27	41.47	37.63	34.40	29.66	16.03
TM6-1000W	873	771.2	655.0	559.7	484.9	435.1	393.9	358.5	328.2	303.7	282.0	264.1	192.2	153.1	128.2	110.8	87.9	73.35	63.23	55.75	49.96	45.34	41.45	35.74	19.32
TM12-160W	148.4	131.5	102.1	83.89	72.00	62.50	56.23	50.70	46.40	42.80	39.30	37.20	26.80	21.39	17.91	15.48	12.25	10.20	8.77	7.71	6.89	6.24	5.70	4.88	2.66
TM12-165W	153.1	135.6	105.3	86.51	74.25	64.45	57.64	52.28	47.85	44.14	40.53	38.36	27.64	22.06	18.47	15.96	12.64	10.52	9.04	7.95	7.10	6.43	5.88	5.03	2.74
TM12-180W	161.0	142.6	112.1	93.2	80.00	71.07	63.56	57.65	52.85	48.87	45.50	42.62	31.06	24.95	20.89	18.04	14.26	11.85	10.17	8.92	7.96	7.19	6.56	5.60	3.08
TM12-233W	208.4	184.6	145.2	120.7	103.6	92.0	82.28	74.62	68.41	63.26	58.90	55.17	40.21	32.30	27.05	23.35	18.46	15.34	13.16	11.55	10.30	9.31	8.50	7.24	3.99
TM12-280W	252.3	223.5	174.6	143.9	123.5	107.1	96.8	88.14	78.00	73.00	67.79	62.92	45.86	36.50	30.54	26.39	20.88	17.39	14.95	13.16	11.77	10.66	9.75	8.35	4.60
TM12-310W	280.2	248.2	197.2	164.9	141.5	123.9	112.0	101.9	92.0	85.10	79.02	73.67	53.70	42.73	35.76	30.90	24.44	20.36	17.51	15.40	13.78	12.48	11.42	9.78	5.38
TM12-320W	289.6	256.5	203.0	170.8	146.6	129.3	116.8	106.3	94.9	87.74	81.47	76.23	55.56	44.22	37.00	31.98	25.29	21.06	18.12	15.94	14.25	12.91	11.81	10.12	5.57
TM12-350W	316.7	280.6	222.0	186.8	160.3	141.4	127.8	116.3	103.8	96.0	89.11	83.37	60.77	48.36	40.47	34.98	27.66	23.04	19.82	17.43	15.59	14.12	12.92	11.07	6.09
TM12-360W	325.4	288.3	229.0	191.5	164.3	143.9	130.1	118.4	106.9	98.8	91.8	85.55	62.36	49.62	41.52	35.89	28.39	23.64	20.33	17.89	16.00	14.49	13.26	11.36	6.25
TM12-375W	338.9	300.3	238.6	199.4	171.2	149.9	135.5	123.3	111.3	102.9	95.6	89.11	64.96	51.69	43.25	37.38	29.57	24.62	21.18	18.63	16.66	15.09	13.81	11.83	6.51
TM12-440W	397.7	352.3	279.9	234.0	200.8	175.9	159.0	144.7	130.6	120.8	112.2	104.6	76.21	60.65	50.75	43.86	34.69	28.89	24.85	21.86	19.55	17.71	16.20	13.88	7.64
TM12-460W	415.8	368.3	292.6	244.6	210.0	183.9	166.2	151.3	136.6	126.3	117.3	109.3	79.68	63.41	53.06	45.86	36.27	30.21	25.98	22.86	20.44	18.52	16.94	14.52	7.99
TM12-470W	424.8	375.2	296.8	247.6	214.5	187.6	169.8	154.6	139.4	129.0	119.8	111.6	81.33	64.79	54.21	46.85	37.06	30.86	26.55	23.35	20.89	18.92	17.31	14.83	8.16
TM12-510W	461.0	407.1	322.0	268.7	232.8	203.6	184.3	167.7	151.3	140.0	130.0	121.1	88.3	70.30	58.83	50.84	40.21	33.49	28.81	25.34	22.66	20.53	18.78	16.09	8.86
TM12-535W	467.1	412.6	350.4	299.4	259.4	232.8	210.7	191.8	175.6	162.5	150.9	141.3	102.8	81.91	68.58	59.27	47.02	39.24	33.83	29.82	26.73	24.26	22.17	19.12	10.34
TM12-620W	551.2	493.8	396.0	333.7	289.1	256.0	231.7	210.9	194.0	179.5	166.7	155.7	113.3	90.3	75.57	65.32	51.82	43.25	37.28	32.87	29.45	26.73	24.43	21.07	11.39
TM12-650W	567.5	501.3	425.8	363.8	315.2	282.8	256.0	233.0	213.3	197.4	183.3	171.6	124.9	99.5	83.32	72.01	57.13	47.68	41.10	36.23	32.47	29.47	26.94	23.23	12.56
TM12-740W	646.1	570.7	484.7	414.2	358.9	322.0	291.5	265.3	242.8	224.7	208.7	195.4	142.2	113.3	94.9	81.98	65.04	54.28	46.79	41.25	36.97	33.55	30.67	26.45	14.30
TM12-800W	698.5	616.9	524.0	447.7	388.0	348.1	315.1	286.8	262.5	243.0	225.6	211.3	153.8	122.5	102.5	88.6	70.31	58.68	50.59	44.60	39.97	36.27	33.16	28.59	15.45
TM12-830W	724.7	640.1	543.7	464.5	402.5	361.2	326.9	297.6	272.4	252.1	234.1	219.2	159.5	127.1	106.4	92.0	72.95	60.88	52.48	46.27	41.47	37.63	34.40	29.66	16.03
TM12-1000W	873	771.2	655.0	559.7	484.9	435.1	393.9	358.5	328.2	303.7	282.0	264.1	192.2	153.1	128.2	110.8	87.9	73.35	63.23	55.75	49.96	45.34	41.45	35.74	19.32

Battery Charging

Correct battery charging ensures the maximum possible service life for the battery.

There are three major methods of charging:

- Constant Voltage Charging
- Constant Current Charging
- Two Stage Constant Voltage Charging

1. Constant Voltage Charging

This is the recommended method of charging for VRLA batteries. It is necessary to closely control the actual charge voltage to ensure that it is within the limits advised.

Float Service: 2.25-2.30 Vpc at 20°C

Cycle Service: 2.40-2.50 Vpc at 20°C

Sacredsun suggest that the initial current should be set within $0.3C_{20}$ Amps for TS/ $0.3C_{20}$ Amps for TM.

It is necessary to charge a greater amount of energy into the battery than was taken out of the battery on discharge. The actual current indicating that the battery is fully charged is approx 2mA/Ah under charging voltage is 2.30Vpc@20°C.

2. Constant Current Charging

This method of charging is generally not recommended for VRLA batteries. It is necessary to understand that if the batteries are not removed from the charger after reaching a state of full charge, considerable damage will occur to the batteries due to overcharging.

3. Two Stage of Constant Voltage Charging

This method should not be used when the battery and load are connected in parallel. If this method is to be used, it is suggested that the ABT technical department is contacted.

Effect of Temperature on Charging Voltage

As temperature rises, electrochemical activity in a battery increases. Similarly, as temperature falls, electrochemical activity decreases. Therefore, conversely, as temperature rises, charging voltage should be reduced to prevent over charge, and increased as temperature falls to avoid undercharge. In general, to assure optimum service life, use of a temperature compensated charger is recommended. The recommended compensation factor for TS&TM batteries is $-3\text{mV}/^\circ\text{C}/\text{Cell}$ (stand by). The standard center point for temperature compensation is 20°C.

Effect of Voltage on Battery Gassing

Although the batteries are of the recombination type and the amount of gassing at normal operating voltages and temperature is negligible, if the charging voltage is increased, gassing will occur despite the recombination design of the product. Gassing does not normally occur while the battery is operating under float conditions and normal constant voltage recharge of 2.25-2.30 Vpc at 20°C. Very little gassing occurs when the battery is recharged under normal cycling recharge procedures. However, higher voltages especially under conditions of constant current charging will substantially increase the volume of gas.

Discharge Characteristic

Battery discharge characteristics

The discharge capacity of a lead acid battery varies and is dependant on the discharge current, discharge temperature and end voltage. ABT TS/TM... use a discharge rate at the 20-hour rate. i. e. the capacity of the battery at 20 hours discharged to an end voltage of 1.75Vpc at a temperature of 20°C.

General Comments

The discharge curves show the minimum design parameters for each fully charged battery after installation. Full capacity is reached after some initial service.

Float Service.

One month after installation and recharging.

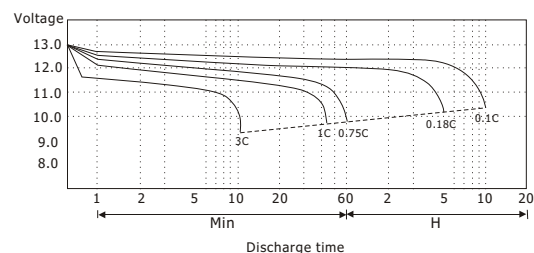
Cycle Service.

Within three to five cycles after initial charge and service entry.

Effect of temperature on capacity:

Rough correction factor of the capacity, according to the temperature, reference temperature being 20°C.

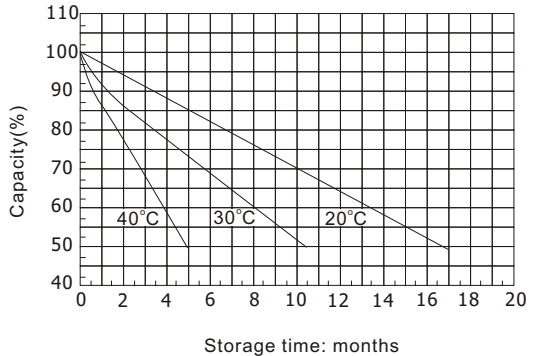
Characteristic discharge curve for TS/TM...W



Temperature Vs Discharge Time

Discharge time	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C
10min	0.46	0.53	0.59	0.65	0.74	0.83	0.91	1.00	1.09	1.18	1.25	1.30
1 hour	0.59	0.65	0.69	0.74	0.84	0.89	0.95	1.00	1.05	1.10	1.15	1.20
10hour	0.73	0.77	0.81	0.85	0.89	0.93	0.96	1.00	1.03	1.06	1.09	1.11

Self-discharge characteristic



Self-life

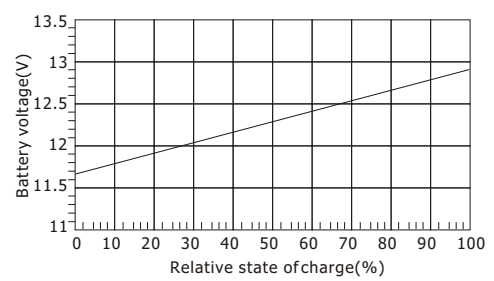
In general, when lead acid batteries of any type are stored for extended periods of time, lead sulphate is formed on the negative plates of the batteries. This phenomenon is referred to as "sulphation". Since the lead sulphate acts as an insulator, it has a direct detrimental effect on charge acceptance. The more advanced the sulphation, the lower the charge acceptance.

The below table shows the normal storage time or shelf life at various ambient temperatures.

Shelf Life at Various Temperatures

Temperature	Shelf Life
0°C (32°F) to 20°C (68°F)	12 months
21°C (70°C) to 30°C (86°F)	9 months
31°C (88°F) to 40°C (104°F)	5 months
41°C (106°F) to 50°C (122°F)	2.5 months

Relationship of OCV and state of charge (25°C)



Charge Characteristics

The batteries in the ABT TS/TM...W product range must be charged at a constant voltage. At an ambient temperature of 20°C. The charging voltage of 2.27-2.30 v/cell should be for float charging. It is not necessary to limit the current as this will be governed by the maximum output available from charger until the voltage limit is reached. Maintenance is recommended as the battery approaches end of useful life used for float charging. To achieve nominal performance characteristics, it is recommended to adjust this value to suit the ambient temperature, as indicated in the following table:

Temperature	Float charge Voltage
5°C	2.36-2.39Vpc
10°C	2.31-2.34Vpc
20°C	2.27-2.30Vpc
25°C	2.25-2.28Vpc
30°C	2.23-2.26Vpc

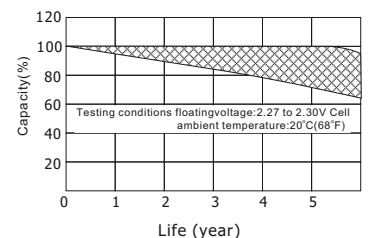
Temperature Floating charge voltage

Operating

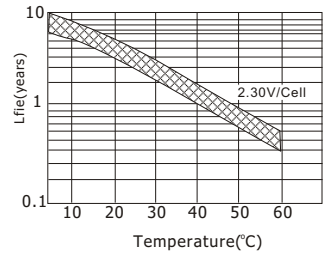
Operating temperature range

Discharge	Charge	Storage
-20~60°C	-10~60°C	-20~60°C

Life characteristics of standby use

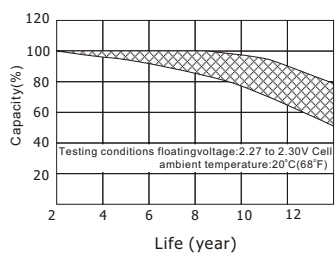


Temperature effects on float life

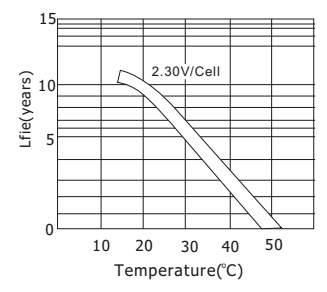


TS...W series

Life characteristics of standby use



Temperature effects on float life



TM...W series

Shipment and storage

1. When moving batteries suitable mechanical handling aids should be used. Never drag or roll the battery since damage will be caused.
2. Do not touch the battery terminals or the safety valve during handling.
3. The batteries are fully charged before shipment, do not short circuit.
4. The batteries can be stored in an ambient where the temperature range is -20°C to 60°C, but the maximum storage time without charging is 6 months. If the storage time is more than 6 months, the batteries must be recharged at once.

The storage area should be clean, dry and ventilated.

Storage Conditions:

The battery should be stored away from any moisture , corrosive gas and source of heat.

Storage times:

The self-discharge of ABT TS/TM...W as a function of temperature is as follows:

- 3 % per month at 20°C
- 6 % per month at 30°C
- 10 % per month at 40°C

In order to ensure that the battery can be charged easily after a long period of storage, it is recommended that batteries should not be stored for more than the following periods without recharging:

- 6 months at 20°C
- 4 months at 30°C
- 2 months at 40°C

Failure to comply with these recommendations may compromise the life expectancy of the battery. Determining the state of charge of the battery.

The state of charge of the battery can be determined by measuring the off-load voltage after the battery has been allowed to rest for 24 hours.

% of capacity at 20°C	Voltage per cell at different temperatures				
	0°C	10°C	20°C	30°C	40°C
100%	2,16	2,15	2,14	2,13	2,13
80%	2,09	2,09	2,09	2,09	2,09
60%	2,06	2,06	2,06	2,06	2,06
40%	2,02	2,02	2,02	2,02	2,02
20%	1,97	1,97	1,97	1,97	1,97

Recharging stored batteries

The batteries should be recharged at the float charge voltage of 2.25~2.30Vpc at 20°C for a minimum period of 48 hours.

The battery will be charged when the charging current has remained constant for a period of 3 hours.

Maintenance

Check the tightening of connections.

Every month, it is recommended that the total voltage at the battery terminals be measured. It should be (NX2.25~2.30)V at a temperature of 20°C ,where N is the number of cells in the battery,2.25-2.30 is the float voltage of each cell.

A difference of plus or minus 2.0% between these individual voltages and the average voltage may be observed. This is due to the gas-recombination process.

A check on capacity (independent operation on load) can be performed once or twice per year.

New and old batteries cannot be used together.

The batteries of various specifications and from different manufacturers cannot be used together.

Safety: When carrying out any work on the battery, the applicable safety standards should be followed.

Note: it is recommended that a battery log be maintained, and that records should be kept of the total voltage measurements, any mains failures, major battery discharges (current and time) etc.

The main factors causing reduction in the life expectancy of ABT TS/TM Series cells:

- Deep discharges
- Poor regulation on the float voltage
- Cycling or micro- cycling
- Poor quality (smoothing) of the charging current
- High ambient temperature.
- Overcharge

Installation of the battery

General recommendations

Do not wear clothing of synthetic material to avoid the generation of static potentials.

Use insulated tools.

Consult the drawing for the correct position of the cell poles (positive=red color, negative = black color).

Before attaching the inter-cell flexible cables, check that all terminals are in the correct position.

The battery cells are connected in series, which is with a positive pole connected to a negative pole.

Use only a damp cotton cloth for cleaning purposes.

ABT VRLA Battery:

PowerLine/Thunder/Enduro/Sunwind/e-Trek

ABT World Wide

Our sales growth is due to a complete Global Network with Master distributors and Country managers who apply ABT commercial strategy and through Global Key Account, in Telecom, Power Supply and UPS



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