

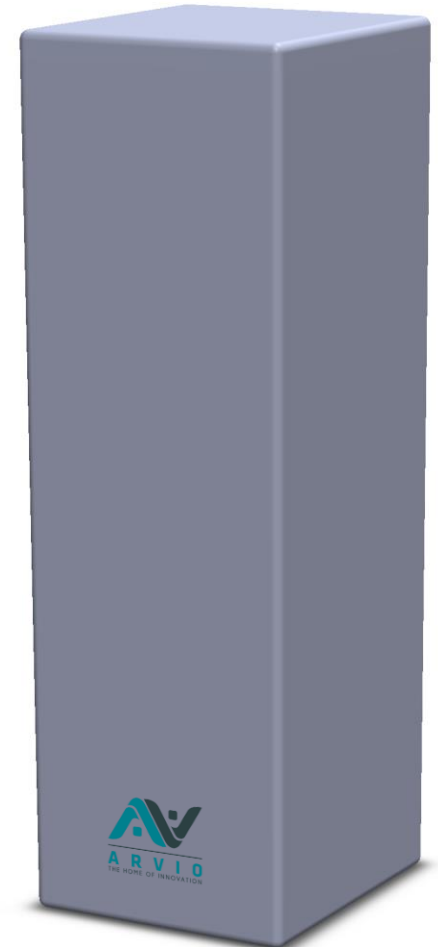


High Capacity Energy Storage Products

Technical Specification
UCB2.3V2.2k to UCB27.6V2.2k

2.2kWh series
& parallel connected
Ultra Capacitor Battery

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11/23 Cook Rd
Mitcham 3132
Melbourne, VIC
Australia



Item	Parameter Specification	Module							Unit
		UCB2.3V2.2k	UCB4.6V2.2k	UCB6.9V2.2k	UCB9.2V2.2k	UCB13.8V2.2k	UCB18.4V2.2k	UCB27.6V2.2k	
Energy Storage Module	Ultra Capacitor Battery								
Anode surface area		640,000	640,000	640,000	640,000	640,000	640,000	640,000	640,000m ²
Nominal energy 100% capacity (2.5V to 1.55V @ C4) +0/-5%		2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26 kWh
Nominal energy 98% capacity (2.5V to 1.8V @ C4) +0/-5%		2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21 kWh
Cells		24	24	24	24	24	24	24	24 cells
Cells in series per module		1	2	3	4	6	8		12 cells
Module Weight		43	43	43	43	43	43	43	43 kg
Short Circuit Current for 440VDC series connected module systems		1250	1250	1250	1250	1250	1250	1250	800 A
Short Circuit Current for 700VDC series connected module systems		800	800	800	800	800	800	800	800 A
Continuous Current based on terminal limits		800	800	800	800	800	800	800	800 A
Available Continuous Power for 800A fused modules		1.8	3.6	5.5	7.3	11.0	14.7		22.0 kWp
Peak A for unfused option upto 1,000V series connected*		4800	1250	1250	1250	1250	1200		800 A
Maximum voltage		700	700	700	700	700	700		700 V
Available peak power for unfused modules		11.0	5.7	8.6	11.5	17.2	22.0		22.0 kWp
Charging(CC-CV) & Discharging	Recomm. Max. (A) no fuse	1500	1000	1000	1000	1000	1000		800 A
	Charging Upper Limit Voltage	2.8	5.6	8.4	11.2	16.8	22.4		33.6 V
	Charging float Voltage	2.6	5.2	7.8	10.4	15.6	20.8		31.2 V
	Nominal Voltage	2.3	4.6	6.9	9.2	13.8	18.4		27.6 V
	Discharging Cut-off V	1.5	3	4.5	6	9	12		18 V
	Discharging Cut-off V recomm.	1.8	3.6	5.4	7.2	10.8	14.4		21.6 V
Charging / discharging Time	Standard	45	45	45	45	45	45		45 minutes
	Quick-acting** @ 20°C	75	38	25	19	12	9		6 minutes
Nominal Capacity	2.50 to 1.55V @ C4	1039.2	519.6	346.4	259.8	173.2	129.9		86.6 Ah
Arc flash energy calculation		3.241	3.241	3.241	3.241	3.241	3.241		2.074cal/cm ²
Prospective fault current	After fuses	625	625	625	625	625	625		400 A
Fault current	Before fuses	13.1	5.5	5.4	5.2	5.0	4.7		4.3 kA

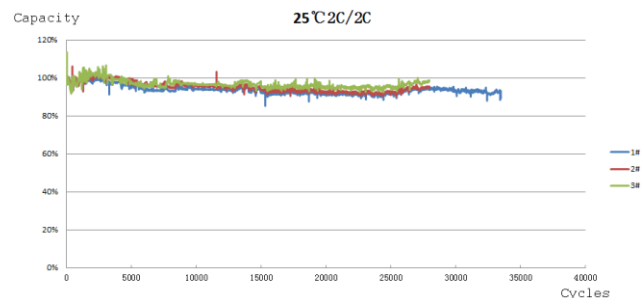
* Consideration of the "cal/cm²" value should be made based on relevant local standards for the installation. Operating this unit with no fuse protection is only for professional use by highly experienced persons.

** Consideration to be given to heat dissipation. Refer to manufacturer for advice when charging at high rates.

*** See reasonable use policy and warranty statement for details of warranty.

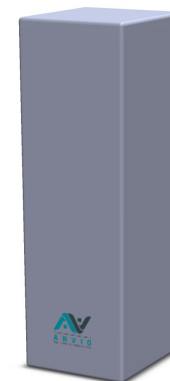
Specifications may change without notice 30/7/2019

Item	Parameter Specification	Module							Unit
		UCB2.3V2.2k	UCB4.6V2.2k	UCB6.9V2.2k	UCB9.2V2.2k	UCB13.8V2.2k	UCB18.4V2.2k	UCB27.6V2.2k	
Energy Storage Module	Ultra Capacitor Battery								
Balancers		4	4	6	4	6	8	12	Qty
Balancing energy maximum		3	12	18	12	18	24	36	W
Balancer consumption in use		0.05	0.2	0.3	0.2	0.3	0.4	0.6	W
Balancer consumption idle		0.02	0.08	0.12	0.08	0.12	0.16	0.24	W
Series connected modules	Dynamic balancing. Bring all modules to within $\Delta 0.1V$ before connecting balancing leads.	2 - 350							Modules
Auto Balancing between Modules		$\Delta 300mV$ 1A $\Delta 1V$ 3A							A
Balancer accuracy		10							mV
Balancer efficiency @ 1A		94							%
Balancing range		1.8-5.0							V
Module Operation Ambient T	Cell Charging / discharging	-50 ~ 60							$^{\circ}C$
	Balancer	-40 ~ 80							$^{\circ}C$
Module Storage Ambient T	Cell Short-term (within 1 month)	-20 ~ 45							$^{\circ}C$
	Cell Long term (within 1 year)	-20 ~ 20							$^{\circ}C$
	Balancer	-40 ~ 100							$^{\circ}C$
Storage Humidity		< 70							%
Module Dimension		233x210x665 (WxDxH)							mm
Terminals		2 (1 +ve, 1-ve)							qty
Terminal size		22mm solid copper conductor							type
Balancing linking connections		2							qty
Design Cycle Life with 3 average cycles per day @ 25 $^{\circ}C$		25,000 - 35,000							cycles
Design Cycle Life with 1 average cycles per day @ 55 $^{\circ}C$		4,000 - 6,000							cycles
Warranty with >85% original capacity @ 25 $^{\circ}C$ @ 3 cycles per day		10							yrs
Warranty with >85% original capacity @ 55 $^{\circ}C$ @ 1 cycle per day		10							yrs
General tolerances for values in this document		+/- 5							%
Round trip efficiency	2C	96.5							%
	1C	97.5							%
	C4	98.5							%



Cycle vs Capacity test

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Classification: UN3481
 ABS UL94-HB Casing
 H: 665mm
 W: 210mm
 D: 233mm

Series Design Table for 12V, 24V, 48V, 120V, 380V & up to 1,000V strings
 (Applications exceeding 170VDC should be confirmed before ordering)

Modules	2.3 V module			4.6 V module			6.9 V module			9.2 V module			13.8 V module			18.4 V module			27.6 V module				
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.		
1	2.2	1.9	2.3	2.6	3.8	4.6	5.2	5.7	6.9	7.8	7.6	9.2	10.4	11.4	13.8	15.6	15.2	18.4	20.8	22.8	27.6	31.2	
2	4.4	3.8	4.6	5.2	7.6	9.2	10.4	11.4	13.8	15.6	15.2	18.4	20.8	22.8	27.6	31.2	30.4	36.8	41.6	45.6	55.2	62.4	
3	6.6	5.7	6.9	7.8	11.4	13.8	15.6	17.1	20.7	23.4	18.4	22.8	27.6	31.2	34.2	41.4	46.8	45.6	55.2	62.4	68.4	82.8	93.6
4	8.8	7.6	9.2	10.4	15.2	18.4	20.8	22.8	27.6	31.2	30.4	36.8	41.6	45.6	55.2	62.4	60.8	73.6	83.2	91.2	110.4	124.8	
5	11	9.5	11.5	13	19	23	26	28.5	34.5	39	38	46	52	57	69	78	76	92	104	114	138	156	
6	13.2	11.4	13.8	15.6	22.8	27.6	31.2	34.2	41.4	46.8	45.6	55.2	62.4	68.4	82.8	93.6	91.2	110	125	137	165.6	187.2	
7	15.4	13.3	16.1	18.2	26.6	32.2	36.4	39.9	48.3	54.6	53.2	64.4	72.8	79.8	96.6	109	106	129	146	160	193.2	218.4	
8	17.6	15.2	18.4	20.8	30.4	36.8	41.6	45.6	55.2	62.4	60.8	73.6	83.2	91.2	110	125	122	147	166	182	220.8	249.6	
9	19.8	17.1	20.7	23.4	34.2	41.4	46.8	51.3	62.1	70.2	68.4	82.8	93.6	103	124	140	137	166	187	205	248.4	280.8	
10	22	19	23	26	38	46	53	57	69	78	76	92	104	114	138	156	152	184	208	228	276	312	
11	24.2	20.9	25.3	28.6	41.8	50.6	57.2	62.7	75.9	85.8	83.6	101	114	125	152	172	167	202	229	251	303.6	343.2	
12	26.4	22.8	27.6	31.2	45.6	55.2	62.4	68.4	82.8	93.6	91.2	110	125	137	166	187	182	221	250	274	331.2	374.4	
13	28.6	24.7	29.9	33.8	49.4	59.8	67.6	74.1	89.7	101	98.8	120	135	148	179	203	198	239	270	296	358.8	405.6	
14	30.8	26.6	32.2	36.4	53.2	64.4	72.8	79.8	96.6	109	106	129	146	160	193	218	213	258	291	319	386.4	436.8	
15	33	28.5	34.5	39	57	69	78	85.5	104	117	114	138	156	171	207	234	228	276	312	342	414	468	
16	35.2	30.4	36.8	41.6	60.8	73.6	83.2	91.2	110	125	122	147	166	182	221	250	243	294	333	365	441.6	499.2	
17	37.4	32.3	39.1	44.2	64.4	78.2	88.4	96.9	117	133	129	156	177	194	235	265	258	313	354	388	469.2	530.4	
18	39.6	34.2	41.4	46.8	68.4	82.8	93.6	103	124	140	137	166	187	205	248	281	274	331	374	410	496.8	561.6	
19	41.8	36.1	43.7	49.4	72.2	87.4	98.8	108	131	148	144	175	198	217	262	296	289	350	395	433	524.4	592.8	
20	44	38	46	52	76	92	104	114	138	156	152	184	208	228	276	312	304	368	416	456	552	624	
21	46.2	39.9	48.3	54.6	79.8	96.6	109	120	145	164	160	193	218	239	290	328	319	386	437	479	579.6	655.2	
22	48.4	41.8	50.6	57.2	83.6	101	114	125	152	172	167	202	229	251	304	343	334	405	458	502	607.2	686.4	
23	50.6	43.7	52.9	59.8	87.4	106	120	131	159	179	175	212	239	262	317	359	350	423	478	524	634.8	717.6	
24	52.8	45.6	55.2	62.4	91.2	110	125	137	166	187	182	221	250	274	331	374	365	442	499	547	662.4	748.8	
25	55	47.5	57.5	65	95	115	130	143	173	195	190	230	260	285	345	390	380	460	520	570	690	780	
26	57.2	49.4	59.8	67.6	98.8	120	135	148	179	203	198	239	270	296	359	406	395	478	541	593	717.6	811.2	
27	59.4	51.3	62.1	70.2	103	124	140	154	186	211	205	248	281	308	373	421	410	497	562	616	745.2	842.4	
28	61.6	53.2	64.4	72.8	106	129	146	160	193	218	213	258	291	319	386	437	426	515	582	638	772.8	873.6	
29	63.8	55.1	66.7	75.4	110	133	151	165	200	226	220	267	302	331	400	452	441	534	603	661	800.4	904.8	
30	66	57	69	78	114	138	156	171	207	234	228	276	312	342	414	468	456	552	624	684	828	936	
31	68.2	58.9	71.3	80.6	118	143	161	177	214	242	236	285	322	353	428	484	471	570	645	707	855.6	967.2	
32	70.4	60.8	73.6	83.2	122	147	166	182	221	250	243	294	333	365	442	499	486	589	666	730	883.2	998.4	
33	72.6	62.7	75.9	85.8	125	152	172	188	228	257	251	304	343	376	455	515	502	607	686				
34	74.8	64.6	78.2	88.4	129	156	177	194	235	265	258	313	354	388	469	530	517	626	707				
35	77	66.5	80.5	91	133	161	182	200	242	273	266	322	364	399	483	546	532	644	728				
36	79.2	68.4	82.8	93.6	137	166	187	205	248	281	274	331	374	410	497	562	547	662	749				
37	81.4	70.3	85.1	96.2	141	170	192	211	255	289	281	340	385	422	511	577	562	681	770				
38	83.6	72.2	87.4	98.8	144	175	196	217	262	296	289	350	395	433	524	593	578	699	790				
39	85.8	74.1	89.7	101	148	179	203	222	269	304	296	359	406	445	538	608	593	718	811				
40	88	76	92	104	152	184	208	228	276	312	304	368	416	456	552	624	608	736	832				
41	90.2	77.9	94.3	107	156	189	213	234	283	320	312	377	426	467	566	640	623	754	853				
42	92.4	79.8	96.6	109	160	193	218	239	290	328	319	386	437	479	580	655	638	773	874				
43	94.6	81.7	98.9	112	163	198	224	245	297	335	327	396	447	490	593	671	654	791	894				
44	96.8	83.6	101	114	167	202	229	251	304	343	334	405	458	502	607	686	669	810	915				
45	99	85.5	104	117	171	207	234	257	311	351	342	414	468	513	621	702	684	828	936				
46	101	87.4	106	120	175	212	239	262	317	359	350	423	478	524	635	718							
47	103	89.3	108	122	179	216	244	268	324	367	357	432	489	536	649	733							
48	106	91.2	110	125	182	221	250	274	331	374	365	442	499	547	662	749							
49	108	93.1	113	127	186	225	255	279	338	382	372	451	510	559	676	764							
50	110	95	115	130	190	230	260	285	345	390	380	460	520	570	690	780							
51	112	96.9	117	133	194	235	265	291	352	398	388	469	530	581	704	796							
52	114	98.8	120	135	198	239	270	296	359	406	395	478	541	593	718	811							
53	117	101	122	138	201	244	276	302	366	413	403	488	551	604	731	827							
54	119	103	124	140	205	248	281	308	373	421	410	497	562	616	745	842							
55	121	105	127	143	209	253	286	314	380	429	418	506	572	627	759	858							
56	123	106	129	146	213	258	291	319	386	437	426	515	582	638	773	874							
57	125	108	131	148	217	262	296	325	393	445	433	524	593	650	787	889							
58	128	110	133	151	220	267	303	331	400	451	441	534	603	661	800	905							
59	130	112	136	153	224	271	307	336	407	460	448	543	614	673	814	920							
60	132	114	138	156	228	276	312	342	414	468	456	552	624	684	828	936							
61	134	116	140	159	232	281	317	348	421	476	464	561	634	695	842	952							
62	136	118	143	161	236	285	322	353	428	484	471	570	645	707	856	967							
63	139	120	145	164	239	290	328	359	435	491	479	580	655	718	869	983							
64	141																						