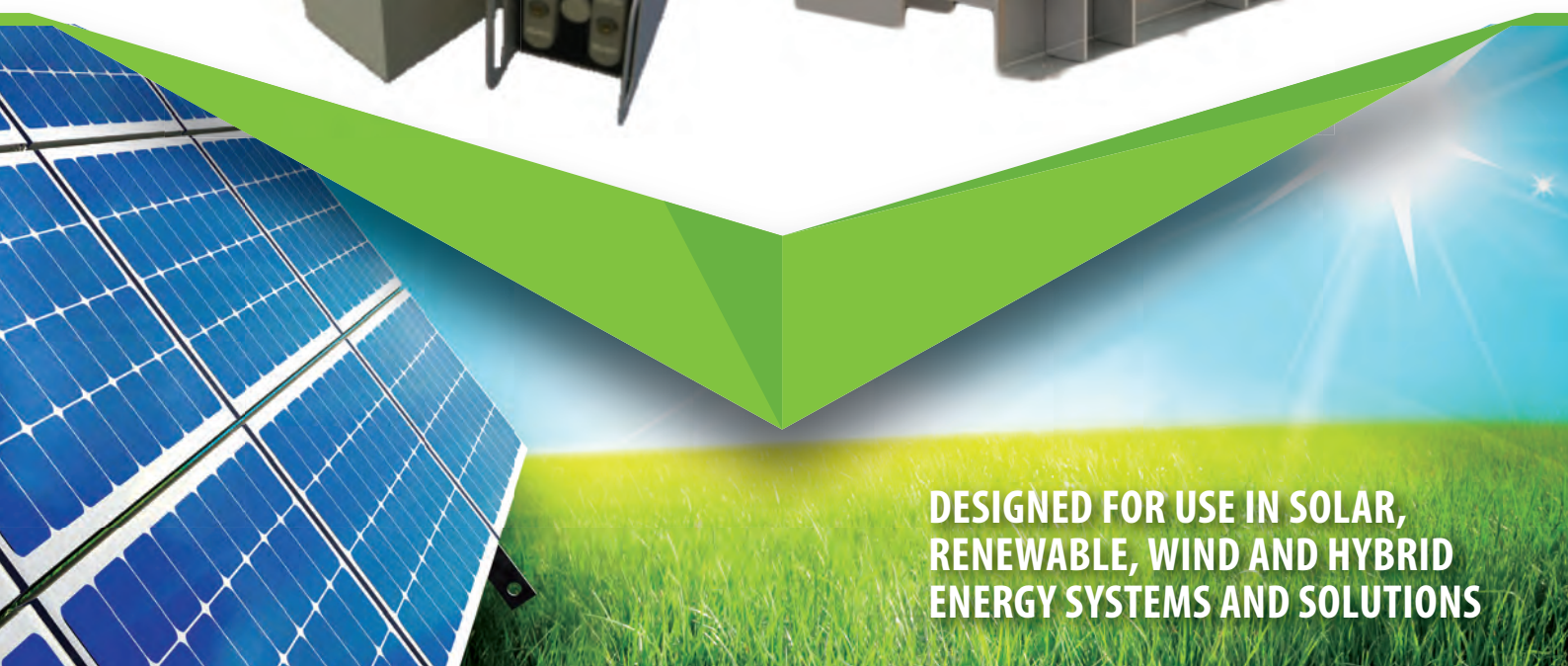




RENEWABLE ENERGY & PARTIAL STATE OF CHARGE SOLUTIONS



DESIGNED FOR USE IN SOLAR,
RENEWABLE, WIND AND HYBRID
ENERGY SYSTEMS AND SOLUTIONS

THE LIBERTY AES 50 SERIES CYCLE BATTERY

FOR RENEWABLE ENERGY STORAGE APPLICATIONS

The Liberty[®] AES features the proven DCS technology for maximum cycle life in a space efficient, cost effective package. The DCS technology coupled with an advanced C&D Nano-Carbon[®] enhanced negative electrode provides time proven results and unmatched, industry leading cycle life, even in partial state of charge (PSoC) operation.

FEATURES & BENEFITS

- 95% round trip efficiency
- 99.9% charge efficiency
- 20 year design life
- High density pasted plates for high cycle life
- Every cell capacity tested to ensure performance
- C&D Nano-Carbon[®] enhanced active material to maximize cycle performance and PSoC operation
- Low calcium Lead/Tin alloy plates for efficient gas recombination for long life in both cycling and float applications
- Absorbent Glass Mat (AGM) technology for efficient gas recombination of up to 99% and freedom from electrolyte maintenance
- Threaded copper alloy inserts for reduced maintenance and increased safety
- Reduced system hardware for rapid installation
- Flame retardant UL94V0/28% LOI standard
- Terminal versatility - ease of diagnostic readings with C&D Ohmic Ring[®]
- Meets IBC and UBC seismic requirements
- Non-Spillable design is classified as non-hazardous for any mode of transportation (land, air and water)
- 100% helium leak tested and dielectric tested to ensure seal integrity
- UL-recognized component

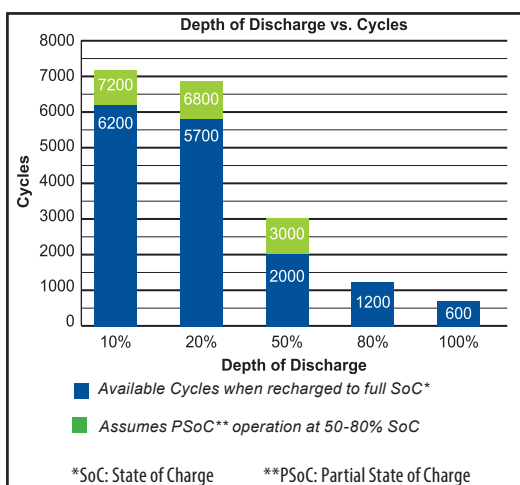


Modular systems & single jacketed cells available

APPLICATIONS

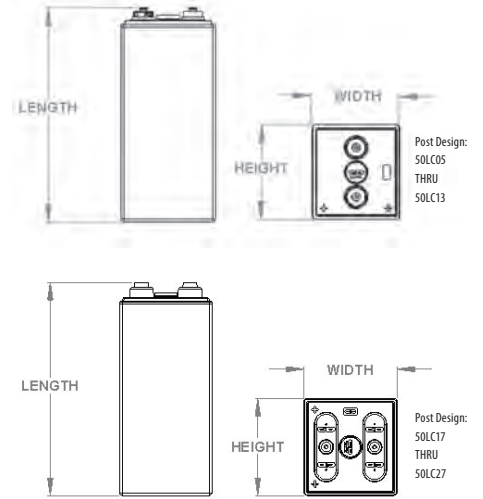
- Telephone Central Offices
- Mobile Telephone Switching Office
- Cable Head End Sites
- Fiber Optic Regenerator Sites
- Microwave Repeater Sites
- Telephone & Internet Network Nodes

INDUSTRY LEADING CYCLE LIFE



DIMENSIONS

Liberty AES Model	Height		Width		Length		Weight	
	inches	mm	inches	mm	inches	mm	lbs	kg
50LC05	6.19	157	2.00	51	13.96	355	19	8.6
50LC09			3.50	89			30	13.6
50LC13			5.00	127			44	20.0
50LC17	6.50	165	6.25	159	14.23	361	58	26.3
50LC19	7.25	184					63	28.6
50LC21	8.00	203					71	32.2
50LC23	8.75	222					77	34.9
50LC25	9.50	241					83	37.6
50LC27	10.25	260					94	42.6
50LC29	11.00	279					100	45.4
50LC31	11.75	299					107	48.5
50LC33	12.50	318					113	51.3



CELL SPECIFICATIONS

Voltage	2 VDC Nominal per cell
Typical Operating Temperature	77°F (25°C)
Connection Torque	110 in-lbs (12.4 N-m)
Recommended float charging voltage	2.25 - 2.27 Volts per cell @ 77°F (25°C)
Recommended cycle service voltage	2.35 - 2.40 Volts per cell @ 77°F (25°C)
Recommended charging current limit	6 x I ₁₀ w/voltage limit of 2.40 Volts per cell @ 77°F (25°C)
Charger temperature compensation (not recommended for cycle service)	-2mV/cell/°F above 77°F (25°C) +2mV/cell/°F below 77°F (25°C)

PERFORMANCE SPECIFICATIONS

Hours	Amperes* to 1.75 VPC @ 77°F (25°C)									
	1	2	4	5	6	8	10	12	20	24
50LC05	54.1	34.2	20.6	17.5	15.3	12.4	10.6	9.2	6.2	5.3
50LC09	112.9	71.8	42.4	35.8	31.1	24.9	20.9	18.0	11.7	10.0
50LC13	169.3	107.6	63.6	53.7	46.7	37.4	31.3	27.0	17.6	15.0
50LC17	225.7	143.5	84.8	71.6	62.3	49.8	41.8	36.0	23.4	20.0
50LC19	253.9	161.4	95.4	80.6	70.1	56.1	47.0	40.5	26.4	22.5
50LC21	282.1	179.4	106.0	89.5	77.9	62.3	52.2	45.0	29.3	25.0
50LC23	310.3	197.3	116.6	98.5	85.7	68.5	57.4	49.5	32.2	27.5
50LC25	338.6	215.3	127.2	107.4	93.4	74.8	62.6	54.0	35.2	30.0
50LC27	366.8	233.2	137.8	116.4	101.2	81.0	67.8	58.5	38.1	32.5
50LC29	375.2	238.6	141.0	119.0	103.6	82.9	69.4	59.9	39.0	33.3
50LC31	402.0	255.6	151.1	127.5	111.0	88.8	74.4	64.2	41.8	35.6
50LC33	428.8	272.7	161.1	136.0	118.4	94.7	79.3	68.4	44.5	38.0

*All ratings are subject to change by C&D Technologies, Inc.

MODULE CONFIGURATIONS

Module Type	Nominal System Voltage	Nominal Ah Capacity (20 hr)	Stacking Dimensions						Unpacked Weight	
			Width		Height*		Depth**		lbs	kg
			in	mm	in	mm	in	mm		
12-50LC05	24	124	16.84	428	13.07	332	13.69	348	269	122
12-50LC09	24	234	25.78	655					422	191
12-50LC13	24	352	34.78	883					610	277
3-50LC17	6	468	21.91	557	6.88	175	7.63	194	218	99
4-50LC17	8		28.25	718					283	128
3-50LC19	6	528	21.91	557	7.63	194	8.38	213	233	106
4-50LC19	8		28.25	718					304	138
3-50LC21	6	586	21.91	557	8.38	213	9.13	232	258	117
4-50LC21	8		28.25	718					337	153
3-50LC23	6	644	21.91	557	9.13	232	9.88	251	276	125
4-50LC23	8		28.25	718					360	163
3-50LC25	6	704	21.91	557	9.88	251	10.63	270	296	134
4-50LC25	8		28.25	718					389	176
3-50LC27	6	762	21.91	557	10.63	270	11.38	289	329	149
4-50LC27	8		28.25	718					431	195
3-50LC29	6	741	21.91	557	11.38	289	12.13	308	348	158
4-50LC29	8		28.25	718					455	206
3-50LC31	6	794	21.91	557	12.13	308	12.88	327	371	168
4-50LC31	8		28.25	718					484	220
3-50LC33	6	846	21.91	557	12.88	327	16.08	408	390	177
4-50LC33	8		28.25	718					511	232

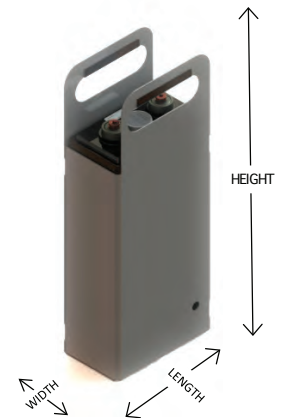
*Height does not include base. Typical base height is 4.00" (102 mm)

** Depth does not include terminal protection. Typical terminal protection adds 0.50" (12.7 mm)

SINGLE CELL TRAY DIMENSIONS

Liberty AES Model	Height		Width		Length		Weight	
	in	mm	in	mm	in	mm	lbs	kg
50LC05	17.12	435	2.20	56	6.37	162	24	11
50LC09			3.69	94			36	16
50LC13			5.19	132			50	23
50LC17	17.13	435	6.78	172	6.58	168	71	32
50LC19			7.53	191			76	35
50LC21			8.28	210			85	39
50LC23			9.03	229			92	42
50LC25			9.78	248			98	45
50LC27			10.53	267			110	50
50LC29	17.13	435	11.34	288	6.64	169	122	55
50LC31			12.09	307			130	59
50LC33			12.84	326			136	62

*All dimensions are subject to change by C&D Technologies, Inc.



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C&D
TECHNOLOGIES

Liberty[®] AES

THE LIBERTY AES CYCLE SERIES BATTERY

For Renewable Energy Storage Applications

CAPACITIES UP TO 1834 AMPERE-HOURS

The Liberty[®] AES features the proven DCS technology for maximum cycle life in a space efficient, cost effective package. The DCS technology coupled with an advanced C&D Nano-Carbon[®] enhanced negative electrode provides time proven results and unmatched, industry leading cycle life, even in partial state of charge (PSoC) operation.

APPLICATIONS

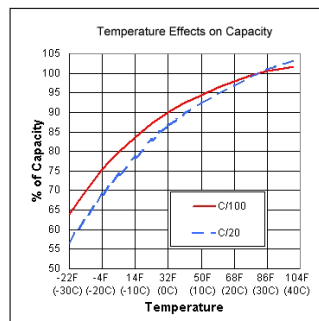
- Remote/Hybrid Sites
- Communications
- Off-Grid/Renewable
- Grid scale energy storage
- Other cycling applications



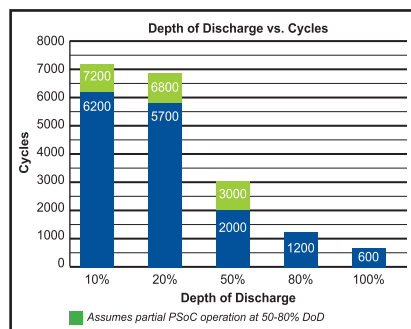
FEATURES AND BENEFITS

- 95% round trip efficiency
- 99.9% charge efficiency
- 20 year design life
- High density pasted plates for high cycle life
- Every cell capacity tested to ensure performance
- C&D Nano-Carbon[®] enhanced active material to maximize cycle performance and PSoC operation
- Low calcium Lead/Tin alloy plates for efficient gas recombination for long life in both cycling and float applications
- Absorbent Glass Mat (AGM) technology for efficient gas recombination of up to 99% and freedom from electrolyte maintenance
- Threaded copper alloy inserts for reduced maintenance and increased safety
- Reduced system hardware for rapid installation
- Terminal versatility - ease of diagnostic readings with C&D Ohmic Ring[®]
- Meets IBC and UBC seismic requirements
- High-strength, leak-free polymer container allows for non-restricted shipping: Water: non-hazardous per IMDG Amendment 27 Surface: non-hazardous per DOT-CFR title 49, 171-189 Air: IATA/ICAO, provision A67
- 100% helium leak tested and dielectric tested to ensure seal integrity
- UL-recognized component
- Flame retardant UL94V0/28% LOI is optional.

BATTERY CHARACTERISTICS

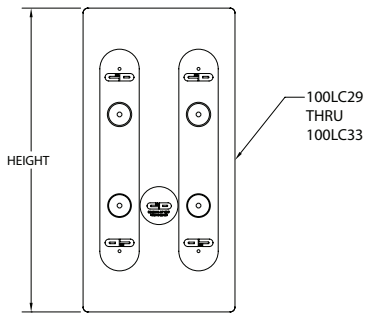
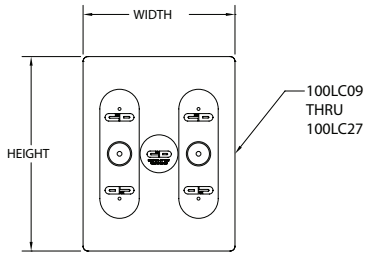


INDUSTRY LEADING CYCLE LIFE

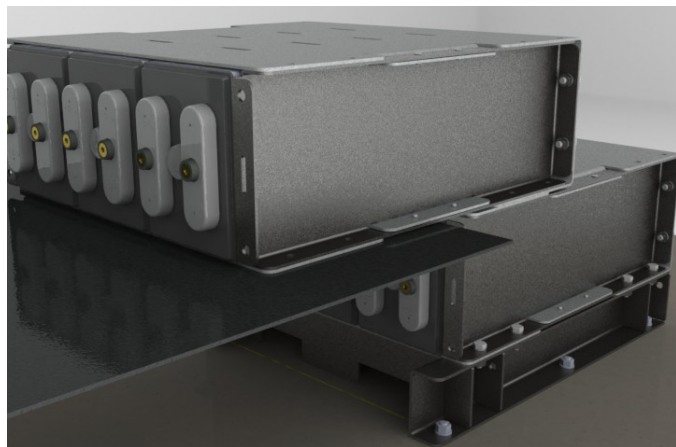
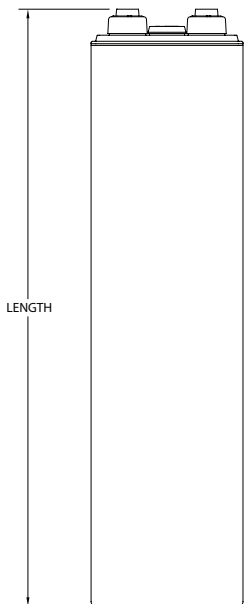


CELL SPECIFICATIONS

Voltage	2 VDC Nominal per cell
Energy saving operating temperature	77°F (25°C)
Connection Torque	110 in-lbs (12.4 N-m)
Recommended float charging voltage	2.25 - 2.27 Volts per cell average @ 77°F (25°C)
Recommended cycle service voltage	2.35 - 2.40 Volts per cell average @ 77°F (25°C)
Charger compensation temperature/voltage	- 2 mV/cell/°F above 77°F (-3.6 mV/cell°C above 25°C) + 2 mV/cell/°F below 77°F (+3.6 mV/cell°C above 25°C)



Individual Cell Dimensions (not including module)								
Liberty AES Model	Height		Width		Length		Weight	
	inches	mm	inches	mm	inches	mm	lbs	kg
100LC09	3.50	88.9	6.19	157	24.22	615	60	27
100LC13	5.00	127					81	37
100LC17	6.50	165					109	49
100LC19	7.25	184					120	54
100LC21	8.00	203	6.25	159	24.55	624	132	60
100LC23	8.75	222					146	66
100LC25	9.50	241					157	71
100LC27	10.25	260					168	76
100LC29	11.00	279					183	83
100LC31	11.75	299					195	89
100LC33	12.50	318					209	95



Rapid System Assembly

PERFORMANCE SPECIFICATIONS

Amperes to 1.75 Final Volts Per Cell @ 77°F (25°C)															
	1 hr	2 hr	4 hr	5 hr	6 hr	8 hr	10 hr	12 hr	20 hr	24 hr	36 hr	48 hr	72 hr	100 hr	120 hr
100LC09	196.2	134.7	84.9	72.1	62.8	50.0	41.6	35.7	22.8	19.3					
100LC13	293.4	203.7	126.4	107.2	93.3	74.5	62.2	53.4	34.4	29.2	20.1	15.6	10.8	8.0	6.7
100LC17	391.1	271.5	168.6	142.9	124.4	99.3	82.9	71.2	45.9	39.0	26.8	20.8	14.4	10.6	9.0
100LC19	440.0	305.5	189.6	160.8	139.9	111.7	93.2	80.1	51.6	43.9	30.2	23.4	16.2	12.0	10.1
100LC21	488.9	339.4	210.7	178.6	155.5	124.1	103.6	89.1	57.3	48.7	33.5	26.0	18.0	13.3	11.2
100LC23	537.8	373.4	231.8	196.5	171.0	136.5	114.0	98.0	63.1	53.6	36.9	28.6	19.8	14.6	12.3
100LC25	586.7	407.3	252.9	214.3	186.6	148.9	124.3	106.9	68.8	58.5	40.2	31.2	21.6	16.0	13.4
100LC27	635.6	441.2	273.9	232.2	202.1	161.3	134.7	115.8	74.5	63.4	43.6	33.8	23.4	17.3	14.6
100LC29	684.5	475.2	295.0	250.1	217.7	173.7	145.0	124.7	80.3	68.2	46.9	36.4	25.2	18.6	15.7
100LC31	733.4	509.1	316.1	267.9	233.2	186.2	155.4	133.6	86.0	73.1	50.3	39.0	27.0	19.9	16.8
100LC33	782.3	543.1	337.2	285.8	248.8	198.6	165.8	142.5	91.7	78.0	53.6	41.6	28.8	21.3	17.9

Amperes to 1.80 Final Volts Per Cell @ 68°F (20°C)															
	1 hr	2 hr	4 hr	5 hr	6 hr	8 hr	10 hr	12 hr	20 hr	24 hr	36 hr	48 hr	72 hr	100 hr	120 hr
100LC09	170.6	120.5	77.4	66.1	57.8	46.3	38.7	33.3	21.4	18.2					
100LC13	255.9	180.5	116.1	99.1	86.7	69.5	58.1	50.0	32.1	27.3	18.9	14.7	10.2	7.5	6.3
100LC17	341.2	240.7	154.8	132.2	115.5	92.6	77.4	66.6	42.9	36.4	25.2	19.6	13.6	10.0	8.4
100LC19	383.8	270.8	174.1	148.7	130.0	104.2	87.1	74.9	48.2	41.0	28.3	22.0	15.3	11.3	9.5
100LC21	426.4	300.8	193.5	165.2	144.4	115.8	96.8	83.3	53.6	45.5	31.5	24.5	17.0	12.5	10.6
100LC23	469.1	330.9	212.8	181.7	158.9	127.3	106.5	91.6	58.9	50.1	34.6	26.9	18.7	13.8	11.6
100LC25	511.7	361.0	232.2	198.2	173.3	138.9	116.2	99.9	64.3	54.6	37.8	29.4	20.4	15.1	12.7
100LC27	554.4	391.1	251.5	214.8	187.8	150.5	125.8	108.2	69.7	59.2	40.9	31.8	22.1	16.3	13.7
100LC29	597.0	421.2	270.9	231.3	202.2	162.1	135.5	116.6	75.0	63.7	44.0	34.3	23.8	17.6	14.8
100LC31	639.7	451.3	290.2	247.8	216.6	173.6	145.2	124.9	80.4	68.3	47.2	36.7	25.5	18.8	15.8
100LC33	682.3	481.4	309.6	264.3	231.1	185.2	154.9	133.2	85.7	72.8	50.3	39.1	27.2	20.1	16.9

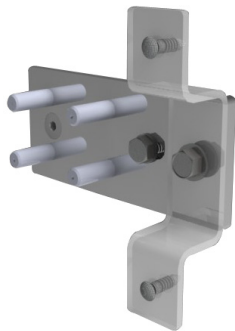
You may also access the product ratings by logging onto the C&D Battery Sizing program at www.cdstandbypower.net

MODULE CONFIGURATIONS

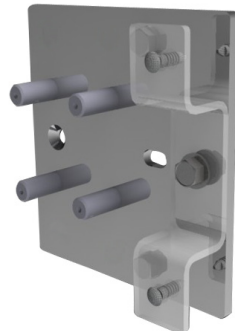
Module Type	Nominal Volts	Nominal AH Capacity (20 HR)	STACKING DIMENSIONS						UNPACKED WEIGHT	
			WIDTH		HEIGHT		DEPTH		lbs	kgs
			in	mm	in	mm	in	mm		
100LC09	6	456	21.73	552	3.88	99	26.25	667	258	117
100LC09	8	456	28.01	711	3.88	99	26.25	667	333	151
100LC13	6	688	21.73	552	5.38	137	26.25	667	322	146
100LC13	8	688	28.01	711	5.38	137	26.25	667	421	191
100LC17	6	918	21.91	557	6.88	175	26.25	667	405	184
100LC17	8	918	28.25	718	6.88	175	26.25	667	533	242
100LC19	6	1032	21.91	557	7.63	194	26.25	667	441	200
100LC19	8	1032	28.25	718	7.63	194	26.25	667	581	264
100LC21	6	1146	21.91	557	8.38	213	26.25	667	477	216
100LC21	8	1146	28.25	718	8.38	213	26.25	667	628	285
100LC23	6	1262	21.91	557	9.13	232	26.25	667	523	237
100LC23	8	1262	28.25	718	9.13	232	26.25	667	688	312
100LC25	6	1376	21.91	557	9.88	232	26.25	667	556	252
100LC25	8	1376	28.25	718	9.88	251	26.25	667	731	332
100LC27	6	1490	21.91	557	10.63	270	26.25	667	592	269
100LC27	8	1490	28.25	718	10.63	270	26.25	667	779	353
100LC29	6	1606	21.91	557	11.38	289	26.25	667	640	290
100LC29	8	1606	28.25	718	11.38	289	26.25	667	842	382
100LC31	6	1720	21.91	557	12.13	308	26.25	667	676	307
100LC31	8	1720	28.25	718	12.13	308	26.25	667	890	404
100LC33	6	1834	21.91	557	12.88	327	26.25	667	721	327
100LC33	8	1834	28.25	718	12.88	327	26.25	667	949	430

You may also access the complete product binder by logging onto the C&D Battery Sizing Program at www.cdstandbypower.net

Terminal Plates (standard)

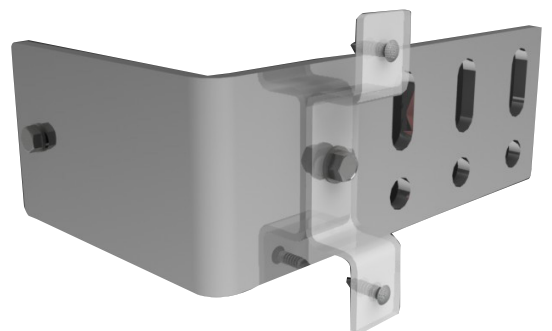


For 100LC17 through 100LC27
(Cover removed for clarity)



For 100LC29 through 100LC33
(Cover removed for clarity)

Side Termination (optional)



For 100LC17 through 100LC33
(Cover removed for clarity)

SYSTEM CONFIGURATIONS

Cell Per Module	Model Number	System Voltage	Stacks	System Configuration	Total Modules	Nominal Capacity*	Width		Height		Depth		Weight	
							in.	mm	in.	mm	in.	mm	lbs	kgs
3	100LC09	24	1	3 x 4	4	456	21.73	552	20.02	508	26.38	670	1097	498
		48		3 x 8		456	21.73	552	35.54	903	26.38	670	2120	962
4	100LC09	24	1	4 x 3	3	456	28.01	712	16.14	410	26.38	670	1070	485
		48		4 x 6		456	28.01	712	27.78	706	26.38	670	2059	934
3	100LC13	24	1	3 x 4	4	688	21.73	552	26.02	661	26.38	670	1265	574
		48		3 x 8		688	21.73	552	47.54	1206	26.38	670	2480	1125
4	100LC13	24	1	4 x 3	3	688	28.01	712	25.14	639	26.38	670	1250	567
		48		4 x 6		688	28.01	712	45.78	1163	26.38	670	2440	1107
3	100LC17	24	1	3 x 4	4	918	21.91	557	32.02	813	26.38	670	1661	753
		48		3 x 8		918	21.91	557	59.54	1512	26.38	670	3269	1483
4	100LC17	24	1	4 x 3	3	918	28.25	718	25.14	639	26.38	670	1639	743
		48		4 x 6		918	28.25	718	45.78	1163	26.38	670	3220	1461
3	100LC19	24	1	3 x 4	4	1032	21.91	557	35.02	890	26.38	670	1813	822
		48		3 x 8		1032	21.91	557	65.54	1665	26.38	670	3573	1621
4	100LC19	24	1	4 x 3	3	1032	28.25	718	27.39	696	26.38	670	1789	811
		48		4 x 6		1032	28.25	718	50.28	1277	26.38	670	3520	1597
3	100LC21	24	1	3 x 4	4	1146	21.91	557	38.02	966	26.38	670	1953	886
		48		3 x 8		1146	21.91	557	71.54	1817	26.38	670	3853	1748
4	100LC21	24	1	4 x 3	3	1146	28.25	718	29.64	753	26.38	670	1927	874
		48		4 x 6		1146	28.25	718	54.78	1391	26.38	670	3795	1721
3	100LC23	24	1	3 x 4	4	1262	21.91	557	41.02	1042	26.38	670	2141	971
		48		3 x 8		1262	21.91	557	77.54	1970	26.38	670	4229	1918
4	100LC23	24	1	4 x 3	3	1262	28.25	718	31.89	810	26.38	670	2113	958
		48		4 x 6		1262	28.25	718	59.28	1506	26.38	670	4165	1889
3	100LC25	24	1	3 x 4	4	1376	21.91	557	44.02	1118	26.38	670	2269	1029
		48		3 x 8		1376	21.91	557	83.54	2122	26.38	670	4488	2036
4	100LC25	24	1	4 x 3	3	1376	28.25	718	34.14	867	26.38	670	2239	1016
		48		4 x 6		1376	28.25	718	63.78	1620	26.38	670	4420	2005
3	100LC27	24	1	3 x 4	4	1490	21.91	557	47.02	1194	26.38	670	2409	1093
4	100LC27	24	1	4 x 3	3	1490	28.25	718	36.39	924	26.38	670	2377	1078
		48		4 x 6		1490	28.25	718	68.28	1734	26.38	670	4695	2130
3	100LC29	24	1	3 x 4	4	1606	21.91	557	50.02	1271	26.38	670	2609	1183
4	100LC29	24	1	4 x 3	3	1606	28.25	718	38.64	981	26.38	670	2575	1168
		48		4 x 6		1606	28.25	718	72.78	1849	26.38	670	5090	2309
3	100LC31	24	1	3 x 4	4	1720	21.91	557	53.02	1347	26.38	670	2749	1247
4	100LC31	24	1	4 x 3	3	1720	28.25	557	40.89	1039	26.38	670	2713	1231
		48		4 x 6		1720	28.25	718	77.28	1963	26.38	670	5365	2434
3	100LC33	24	1	3 x 4	4	1834	21.91	557	56.02	1423	26.38	670	2937	1332

* 20 hour rate to 1.75 VPC @ 77°F (25°C) - Ampere hours.

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