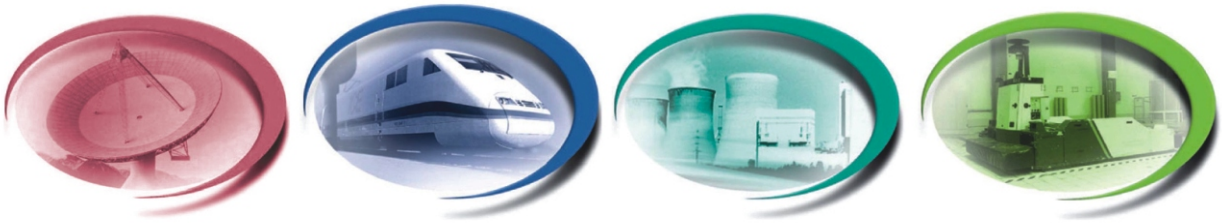
VRFP

Valve Regulated Fibre Plate Nickel Cadmium Batteries

Dimensional and Electrical Data



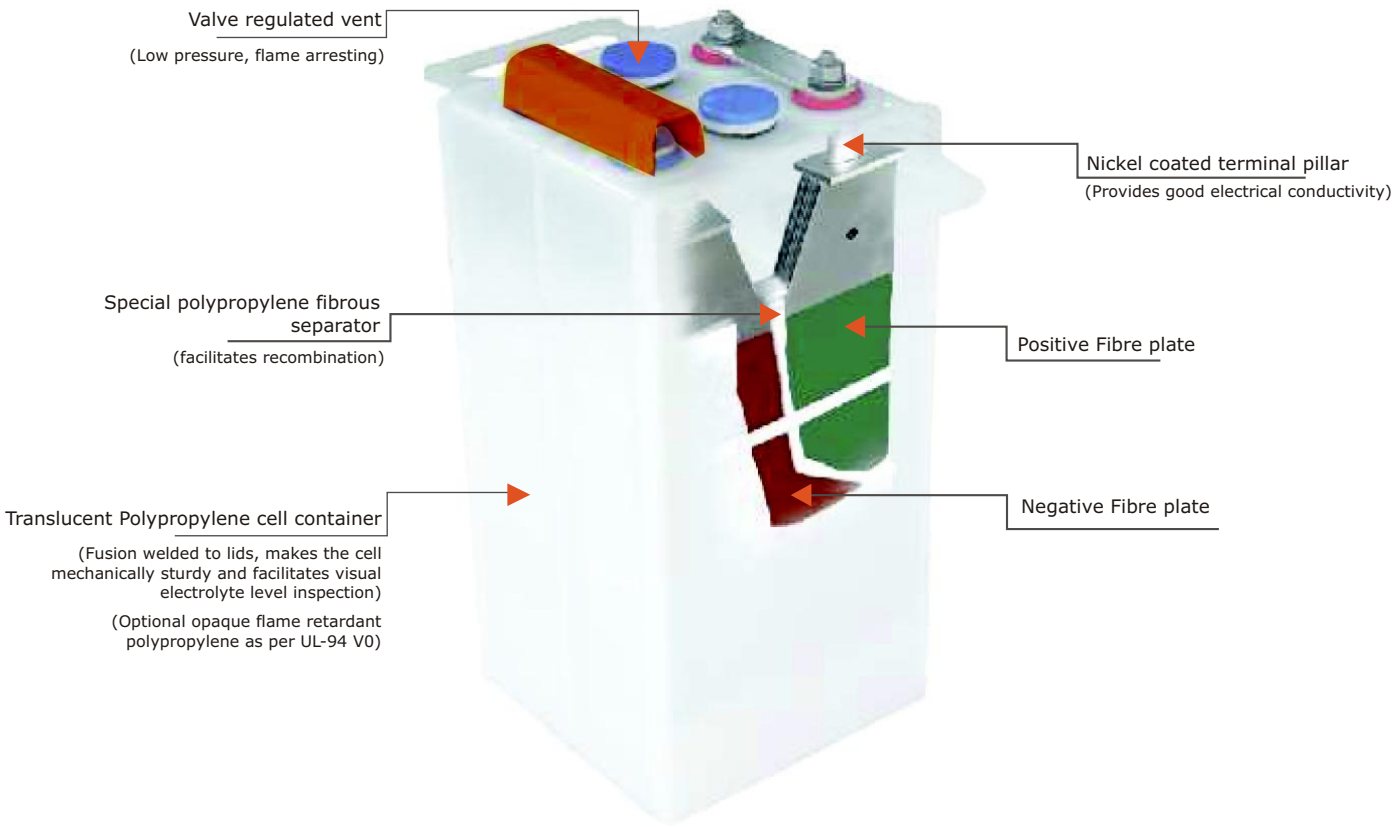
The Ultra low maintenance VRFP Ni-Cad battery is developed in line with HBL's proven fibre matrix technology. The addition of the special recombination technology of this battery to the fibre plate design gives exceptionally reliable performance in critical applications.

VRFP's calibrated/controlled recombination technology, with valve regulated venting means no water addition/filling is needed over a 20 years service life when operated on float charge at 20°C. VRFP performs in severe environments, in temperatures ranging from -40° C to +60° C., and can survive over discharge, reversal or prolonged overcharge with no damage.

The incorporation of a low-pressure valve and self resealing flame arresting vent with the VRFP technology, enables recombination of Oxygen and Hydrogen gases within the cell with up to 95% efficiency. In addition to the standard fibre Plate design, the VRFP batteries use a **special separator** which allows gases generated during charging to recombine within the cell thus ensuring no water is lost. This makes the VRFP battery **virtually maintenance-free**. The self **resealing type vent cap** is used to release any excess pressure developed within the cell during abnormal operation.

Construction

The construction of VRFP is based on conventional fibre plate technology, introducing special features to eliminate the need for water topping.



VRFP benefits

- Long float life exceeding 20 years
- Reliable and predictable performance
- Resistant to abuse, electrical and mechanical
- No top-up required for 20 years
- No sudden death failure due to internal corrosion
- Wide operating temperature
- Low installation and life cycle cost
- Low gas evolution, no special ventilation required
- High energy density
- Good performance at low temperature

Specifications

- Operating temperature range: -40° C to +60° C
- Float Charge: 1.40 to 1.42 Volt Per Cell (VPC)
- Boost Charge: 1.42 to 1.45 VPC
- Top-up interval at 1.42 VPC: 20 years at 20° C
- Valve pressure: <1.0 psi
- Cell container/lid: Translucent Polypropylene
- Terminals: Nickel plated steel
- Plate construction: Fibre Plate

Battery applications

HBL's VRFP batteries are the best solution for all installations, whether they are UPS, Switchgear, Emergency lighting, Telecommunication systems and other standby applications, where the risk of failure of the system is unacceptable and frequent maintenance is difficult. VRFP batteries are also eminently suitable for remote applications such as photovoltaic systems, offshore oil & gas and switching substations, where the system must have total reliability without the need for battery maintenance.

Various applications where VRFP is used:

- Emergency lighting
- Railway signaling
- Switchgear
- Telecommunications
- Fire and Security systems
- UPS
- Offshore oil and gas
- Photovoltaics
- Process control
- Mass transit

VRFP Range

Cell Dimensions and Weight

Cell type	Capacity at 5 hour rate (Ah)	Cell Dimensions in mm					Cell Weight in Kg. for 1.2V	Cell Connection Bolt(s) Size	Container Size Ref.	Volume of Electrolyte above Plates (cc)
		Length			Width	Height				
		1.2V L(1)	2.4V L(2)	3.6V L(3)						
VRFP 22	22	-	88	124	123	264	2.15	M8	B22-1	178
VRFP 33	33	-	113	161	123	264	2.70	M8	B23-1	245
VRFP 44	44	-	137	197	123	264	3.35	M8	B24-1	312
VRFP 55	55	-	137	197	123	264	3.50	M8	B24-1	312
VRFP 64	64	-	91	126	195	405	5.05	M10	B45-1	466
VRFP 86	86	-	104	148	195	405	6.00	M10	B44-1	580
VRFP 95	95	-	104	148	195	405	6.20	M10	B44-1	580
VRFP 115	115	-	125	179	195	405	7.25	M10	B42A-1	803
VRFP 128	128	-	125	179	195	405	7.50	M10	B42A-1	803
VRFP 145	145	-	144	204	195	405	8.15	M10	B42-1	917
VRFP 160	160	-	144	204	195	405	8.40	M10	B42-1	917
VRFP 179	179	-	169	242	195	405	9.60	M10	B41B-1	1130
VRFP 192	192	-	169	242	195	405	10.0	M10	B41B-1	1130
VRFP 230	230	131	239	-	195	405	14.5	2xM10	B42A-2	1606
VRFP 256	256	131	239	-	195	405	14.7	2xM10	B42A-2	1606
VRFP 290	290	144	264	-	195	405	16.2	2xM10	B42-2	1834
VRFP 320	320	144	264	-	195	405	16.5	2xM10	B42-2	1834
VRFP 358	358	169	315	-	195	405	19.1	2xM10	B41B-2	2260
VRFP 384	384	169	315	-	195	405	19.5	2xM10	B41B-2	2260
VRFP 435	435	204	-	-	195	405	24.3	3xM10	B42-3	2751
VRFP 480	480	204	-	-	195	405	25.0	3xM10	B42-3	2751
VRFP 520	520	242	-	-	195	405	28.5	3xM10	B41B-3	3390
VRFP 537	537	242	-	-	195	405	28.8	3xM10	B41B-3	3390
VRFP 576	576	242	-	-	195	405	29.3	3xM10	B41B-3	3390
VRFP 620	620	315	-	-	195	405	37.1	4xM10	B41B-4	4520
VRFP 675	675	315	-	-	195	405	38.0	4xM10	B41B-4	4520
VRFP 716	716	315	-	-	195	405	38.4	4xM10	B41B-4	4520
VRFP 768	768	315	-	-	195	405	38.8	4xM10	B41B-4	4520

* In accordance with its policy of continuous improvement the company reserves the right to change specifications and designs without notice Illustrations, data, dimensions and weights given in this brochure are for guidance only and cannot be held binding on the company.

Performance after prolonged float charge of fully charged cells

Available amperes at +20 ± 5 deg.C **End Voltage 1.00 V / Cell**

Cell Type	C5 Ah	Minutes			Hours					
		20	30	45	1	2	3	5	8	10
VRFP 22	22	28.3	24.3	20.5	16.9	10.5	7.22	4.40	2.78	2.24
VRFP 33	33	42.4	36.4	30.7	25.3	15.7	10.8	6.60	4.18	3.37
VRFP 44	44	56.5	48.5	40.9	33.7	21.0	14.4	8.80	5.57	4.49
VRFP 55	55	70.7	60.7	51.2	42.1	26.2	18.0	11.0	6.96	5.61
VRFP 64	64	82.2	70.6	59.5	49.0	30.5	21.0	12.8	8.10	6.53
VRFP 86	86	111	94.9	80.0	65.9	41.0	28.2	17.2	10.9	8.78
VRFP 95	95	122	105	88.4	72.8	45.3	31.2	19.0	12.0	9.69
VRFP 115	115	148	127	107	88.1	54.9	37.7	23.0	14.6	11.7
VRFP 128	128	164	141	119	98.0	61.1	42.0	25.6	16.2	13.1
VRFP 145	145	186	160	135	111	69.2	47.6	29.0	18.4	14.8
VRFP 160	160	206	176	149	123	76.3	52.5	32.0	20.3	16.3
VRFP 179	179	230	197	166	137	85.4	58.7	35.8	22.7	18.3
VRFP 192	192	247	212	179	147	91.6	63.0	38.4	24.3	19.6
VRFP 230	230	296	254	214	176	110	75.4	46.0	29.1	23.5
VRFP 256	256	329	282	238	196	122	84.0	51.2	32.4	26.1
VRFP 290	290	373	320	270	222	138	95.1	58.0	36.7	29.6
VRFP 320	320	411	353	298	245	153	105	64.0	40.5	32.7
VRFP 358	358	460	395	333	274	171	117	71.6	45.3	36.5
VRFP 384	384	493	424	357	294	183	126	76.8	48.6	39.2
VRFP 435	435	559	480	405	333	207	143	87.0	55.1	44.4
VRFP 480	480	617	529	446	368	229	157	96.0	60.8	49.0
VRFP 520	520	668	574	484	398	248	171	104	65.8	53.1
VRFP 537	537	690	592	499	411	256	176	107	68.0	54.8
VRFP 576	576	740	635	536	441	275	189	115	72.9	58.8
VRFP 620	620	797	684	577	475	296	203	124	78.5	63.3
VRFP 675	675	867	745	628	517	322	221	135	85.4	68.9
VRFP 716	716	920	790	666	548	342	235	143	90.6	73.1
VRFP 768	768	987	847	714	588	366	252	154	97.2	78.4

Performance after prolonged float charge of fully charged cells

Available amperes at +20 ± 5 deg.C **End Voltage 1.05 V / Cell**

Cell Type	C5 Ah	Minutes			Hours					
		20	30	45	1	2	3	5	8	10
VRFP 22	22	22.9	19.6	17.4	15.0	10.1	7.07	4.37	2.75	2.22
VRFP 33	33	34.3	29.4	26.1	22.5	15.2	10.6	6.55	4.13	3.33
VRFP 44	44	45.8	39.2	34.8	30.0	20.2	14.1	8.73	5.50	4.44
VRFP 55	55	57.2	49.0	43.5	37.5	25.3	17.7	10.9	6.88	5.56
VRFP 64	64	66.6	57.0	50.6	43.7	29.4	20.6	12.7	8.00	6.46
VRFP 86	86	89.4	76.5	67.9	58.7	39.6	27.7	17.1	10.8	8.69
VRFP 95	95	98.8	84.6	75.1	64.8	43.7	30.5	18.8	11.9	9.60
VRFP 115	115	120	102	90.9	78.5	52.9	37.0	22.8	14.4	11.6
VRFP 128	128	133	114	101	87.4	58.9	41.2	25.4	16.0	12.9
VRFP 145	145	151	129	115	99.0	66.7	46.6	28.8	18.1	14.6
VRFP 160	160	166	142	126	109	73.6	51.4	31.7	20.0	16.2
VRFP 179	179	186	159	141	122	82.3	57.6	35.5	22.4	18.1
VRFP 192	192	200	171	152	131	88.3	61.7	38.1	24.0	19.4
VRFP 230	230	239	205	182	157	106	74.0	45.6	28.8	23.2
VRFP 256	256	266	228	202	175	118	82.3	50.8	32.0	25.9
VRFP 290	290	302	258	229	198	133	93.2	57.5	36.3	29.3
VRFP 320	320	333	285	253	218	147	103	63.5	40.0	32.3
VRFP 358	358	372	319	283	244	165	115	71.0	44.8	36.2
VRFP 384	384	399	342	303	262	177	123	76.2	48.0	38.8
VRFP 435	435	452	387	344	297	200	140	86.3	54.4	43.9
VRFP 480	480	499	427	379	328	221	154	95.2	60.0	48.5
VRFP 520	520	541	463	411	355	239	167	103	65.0	52.5
VRFP 537	537	558	478	424	367	247	173	107	67.1	54.2
VRFP 576	576	599	513	455	393	265	185	114	72.0	58.2
VRFP 620	620	645	552	490	423	285	199	123	77.5	62.6
VRFP 675	675	702	601	533	461	311	217	134	84.4	68.2
VRFP 716	716	745	637	566	489	329	230	142	89.5	72.3
VRFP 768	768	799	684	607	524	353	247	152	96.0	77.6

Performance after prolonged float charge of fully charged cells

Available amperes at +20 ± 5 deg.C **End Voltage 1.10 V / Cell**

Cell Type	C5 Ah	Minutes			Hours					
		20	30	45	1	2	3	5	8	10
VRFP 22	22	18.9	15.8	13.6	12.2	9.13	6.82	4.27	2.74	2.20
VRFP 33	33	28.4	23.8	20.5	18.3	13.7	10.2	6.40	4.11	3.30
VRFP 44	44	37.8	31.7	27.3	24.4	18.3	13.6	8.54	5.49	4.40
VRFP 55	55	47.3	39.6	34.1	30.5	22.8	17.1	10.7	6.86	5.50
VRFP 64	64	55.0	46.1	39.7	35.5	26.6	19.8	12.4	7.98	6.40
VRFP 86	86	74.0	61.9	53.3	47.6	35.7	26.7	16.7	10.7	8.60
VRFP 95	95	81.7	68.4	58.9	52.6	39.4	29.5	18.4	11.9	9.50
VRFP 115	115	98.9	82.8	71.3	63.7	47.7	35.7	22.3	14.3	11.5
VRFP 128	128	110	92.2	79.4	70.9	53.1	39.7	24.8	16.0	12.8
VRFP 145	145	125	104	89.9	80.3	60.2	45.0	28.1	18.1	14.5
VRFP 160	160	138	115	99.2	88.6	66.4	49.6	31.0	20.0	16.0
VRFP 179	179	154	129	111	99.2	74.3	55.5	34.7	22.3	17.9
VRFP 192	192	165	138	119	106	79.7	59.5	37.2	24.0	19.2
VRFP 230	230	198	166	143	127	95.5	71.3	44.6	29.0	23.0
VRFP 256	256	220	184	159	142	106	79.4	49.7	32.0	25.6
VRFP 290	290	249	209	180	161	120	89.9	56.3	36.2	29.0
VRFP 320	320	275	230	198	177	133	99.2	62.1	39.9	32.0
VRFP 358	358	308	258	222	198	149	111	69.5	44.6	35.8
VRFP 384	384	330	276	238	213	159	119	74.5	47.9	38.4
VRFP 435	435	374	313	270	241	181	135	84.4	54.2	43.5
VRFP 480	480	413	346	298	266	199	149	93.1	59.9	48.0
VRFP 520	520	447	374	322	288	216	161	101	64.8	52.0
VRFP 537	537	462	387	333	297	223	166	104	67.0	53.7
VRFP 576	576	595	415	357	319	239	179	112	71.8	57.6
VRFP 620	620	533	446	384	343	257	192	120	77.3	62.0
VRFP 675	675	581	486	419	374	280	209	131	84.2	67.5
VRFP 716	716	616	516	444	397	297	222	139	89.3	71.6
VRFP 768	768	660	553	476	425	319	238	149	95.8	76.8

Performance after prolonged float charge of fully charged cells

Available amperes at +20 ± 5 deg.C **End Voltage 1.14 V / Cell**

Cell Type	C5 Ah	Minutes			Hours					
		20	30	45	1	2	3	5	8	10
VRFP 22	22	17.3	13.8	12.5	11.1	6.82	6.05	4.20	2.64	2.14
VRFP 33	33	26.0	20.7	18.8	16.6	10.2	9.08	6.30	3.96	3.20
VRFP 44	44	34.7	27.6	25.0	22.2	13.6	12.1	8.40	5.28	4.27
VRFP 55	55	43.4	34.5	31.3	27.7	17.1	15.1	10.5	6.60	5.34
VRFP 64	64	50.5	40.1	36.4	32.3	19.8	17.6	12.2	7.68	6.21
VRFP 86	86	67.8	53.9	48.9	43.4	26.7	23.7	16.4	10.3	8.35
VRFP 95	95	74.9	59.5	54.0	47.9	29.5	26.1	18.1	11.4	9.22
VRFP 115	115	90.7	72.1	65.3	58.0	35.7	31.6	22.0	13.8	11.2
VRFP 128	128	101	80.2	72.7	64.5	39.7	35.2	24.4	15.4	12.4
VRFP 145	145	114	90.9	82.4	73.1	45.0	39.9	27.7	17.4	14.1
VRFP 160	160	126	100	90.9	80.7	49.6	44.0	30.6	19.2	15.5
VRFP 179	179	141	112	102	90.2	55.5	49.2	34.2	21.5	17.4
VRFP 192	192	151	120	109	96.8	59.5	52.8	36.7	23.0	18.6
VRFP 230	230	181	144	131	116	71.3	63.3	43.9	27.6	22.3
VRFP 256	256	202	160	145	129	79.4	70.4	48.9	30.7	24.9
VRFP 290	290	229	182	165	146	89.9	79.8	55.4	34.8	28.2
VRFP 320	320	252	201	182	161	99.2	88.0	61.1	38.4	31.1
VRFP 358	358	282	224	203	180	111	98.5	68.4	43.0	34.8
VRFP 384	384	303	241	218	194	119	106	73.3	46.1	37.3
VRFP 435	435	343	273	247	219	135	120	83.1	52.2	42.2
VRFP 480	480	379	301	273	242	149	132	91.7	57.6	46.6
VRFP 520	520	410	326	295	262	161	143	99.3	62.4	50.5
VRFP 537	537	423	337	305	271	166	148	103	64.4	52.1
VRFP 576	576	454	361	327	290	179	158	110	69.1	55.9
VRFP 620	620	489	389	352	313	192	171	118	74.4	60.2
VRFP 675	675	532	423	384	340	209	186	129	81.0	65.5
VRFP 716	716	565	449	407	361	222	197	137	85.9	69.5
VRFP 768	768	606	481	436	387	238	211	147	92.2	74.6

Battery arrangement as per rack design

CONT. REF	1 TIER								2 TIER							
	1 STEP		2 STEP		3 STEP		4 STEP		1 STEP		2 STEP		3 STEP		4 STEP	
	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H
B22/B23/B24-1			296	703	434	818	572	933					434	1450	572	1700
B41B/42/42A B44/45-1			440	844	650	959	860	1074			440	1550	650	1800	860	2050
B42A-2			312	844	458	959	604	1074			312	1550	458	1800	604	2050
B42-2			338	844	497	959	656	1074			338	1550	497	1800	656	2050
B42-3			458	844	677	959	896	1074			458	1550	677	1800	896	2050
B41B-2			388	844	572	959	756	1074			388	1550	572	1800	756	2050
B41B-3			534	844	791	959					534	1550	791	1800		
B41B-4			680	844							680	1550				

Calculation of length :

length of rack = (x + 5) x no. of block cells in a row (for all block cells)

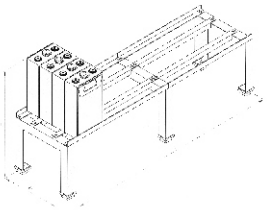
Where x = length of cell or block cell for row-wise mounting (i.e. For B 22/23/24/41B/42/42A/44/45-1)
= width of cell or block cell for cross-wise mounting (i.e. For B 42A-2/42-2,3/41B-2,3,4)

The value of length should be rounded-off to nearest to 50 mm and 5mm should be added.

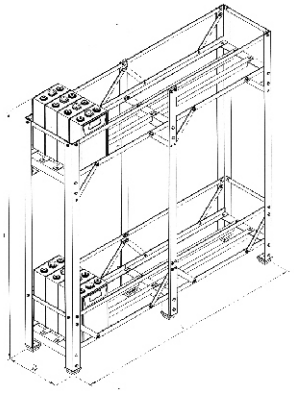
Optional Items :
(To be supplied on request)

1. Cubicles in place of racks
2. Low electrolyte level/alarm
3. Containers in structural foam molded polypropylene
4. Stainless/wooden/HDPE crates for cells

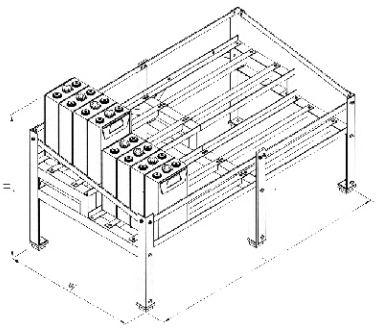
1 step, 1 tier rack



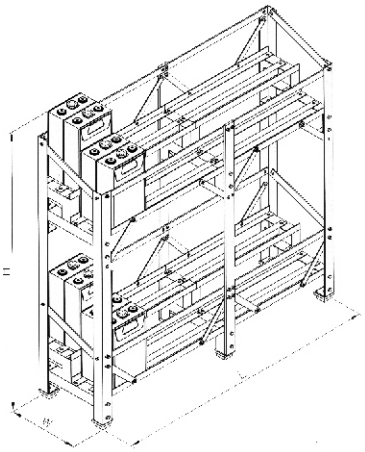
1 step, 2 tier rack



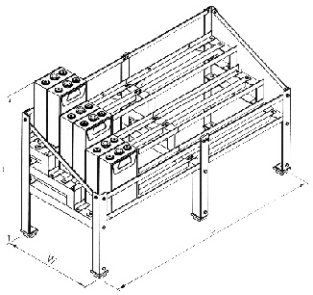
2 step, 1 tier rack



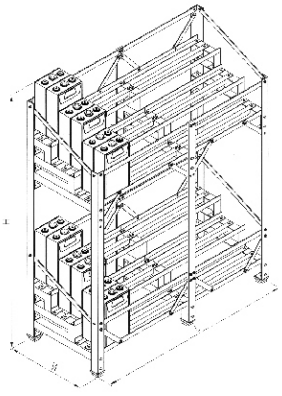
2 step, 2 tier rack



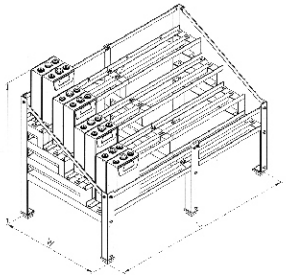
3 step, 1 tier rack



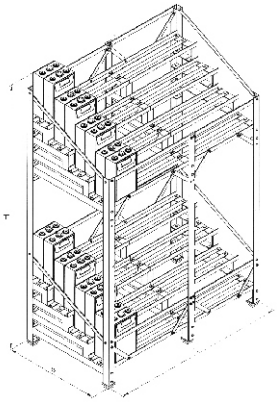
3 step, 2 tier rack



4 step, 1 tier rack



4 step, 2 tier rack



ISO 9001-2000 Certified

EMS ISO 14001-2004 Certified

HBL NIFE Power Systems Limited
Road # 10, Banjara Hills, Hyderabad - 500 034. INDIA
E-mail: contact@hblnife.com
www.hblnife.com

Utsav Graphics/Corp.Comm/2006/500