

FUKUDA®

Delivering Power To People



FUKUDA® Nickel Cadmium Battery

is the most reliable source for standby backup today.

The Nickel Cadmium battery is manufactured to a design standard that meets a variety of harsh environments with a wide temperature range.

It has resilience to handle electrical and mechanical abuse.

Environmentally friendly, it is recyclable.



APPLICATIONS

Switchgear Tripping
Oil & Gas Petrochemical
Railway Lighting/Starting
Emergency Power Backup
Uninterrupted Power Supply (UPS)
Photovoltaic | Telecommunication System

MANUFACTURING STANDARD

FUKUDA® Nickel Cadmium Battery

has complied with all requirements specified by IEC 60623

INTRODUCTION

Introducing **FUKUDA** Pocket Plated Nickel Cadmium Battery – the most reliable battery system available in the market today.

It is designed and manufactured for a wide variety of harsh environments at wide temperature range, resistance to electrical and mechanical abuse and recyclable.

It is not surprising, therefore, that the nickel cadmium battery has become an obvious first choice for users looking for a reliable, long life, low maintenance, system.

FUKUDA NICKEL CADMIUM BATTERY

FUKUDA KAP Series Nickel Cadmium Battery works by an electrochemical reaction between a Nickel positive plate and a Cadmium negative plate, immersed in a liquid alkaline electrolyte (potassium hydroxide). This reaction produces a nominal voltage of 1.2 volts per cell. Required voltages are obtained by connecting these cells together in series to form a battery. The potassium hydroxide electrolyte used in **FUKUDA** Nickel Cadmium cells acts only as an ion conductor between the positive and negative plates and takes no part in the chemical reaction of the cell. As the concentration of the electrolyte does not alter during operation, the battery is not damaged at low temperatures, due to freezing.

All **FUKUDA** Nickel Cadmium batteries are fitted with a flip top flame arrestor vent designed to increase the operational safety in all environments.

BATTERY CASING

FUKUDA cell comes in both high-impact translucent polypropylene casing. Easy to assemble and allow full visibility of the electrolyte level.

MANUFACTURING STANDARD

FUKUDA Nickel Cadmium Batteries has complied with all requirements specified by IEC60623 and making them suitable for any local regulation.

BATTERY DESIGN FEATURE

- More than 15 years long life time
- Operation over a wide range of temperatures
 - 40°C to + 60°C
- No sudden death
- Flip-top flame arresting vents as standard
- High cycle ability
- Easy to transport and install. It can be stored for long period without the need of refresher charges.
- Resistance to electrical and mechanical abuse

APPLICATION

- Petrochemical Refineries
- Switchgear Tripping
- Railway Signalling
- Power Plants
- Emergency Power Backup
- UPS, etc.
- Water Treatment Plant

TECHNICAL CHARACTERISTICS

CHARGING

The battery can be charged by all normal methods. Generally, batteries in parallel operations with charger and load are charged with constant voltage. In operations where the battery is charged separately from the load, charging with constant current is recommended. High-rate or overcharging will not damage the battery, but excessive charging will increase water consumption to certain degree.

NOMINAL VOLTAGE PER CELL

Nominal voltage : 1.2 V/cell

CONSTANT VOLTAGE CHARGING

Continuous parallel operation with occasional battery discharge. A high voltage will increase the speed and efficiency of the recharging.

Recommended charge voltage :

Float charge : 1.40 – 1.42 V/cell

Boost charge : 1.55 – 1.60 V/cell

Commissioning charge : 1.70 – 1.75 V/cell

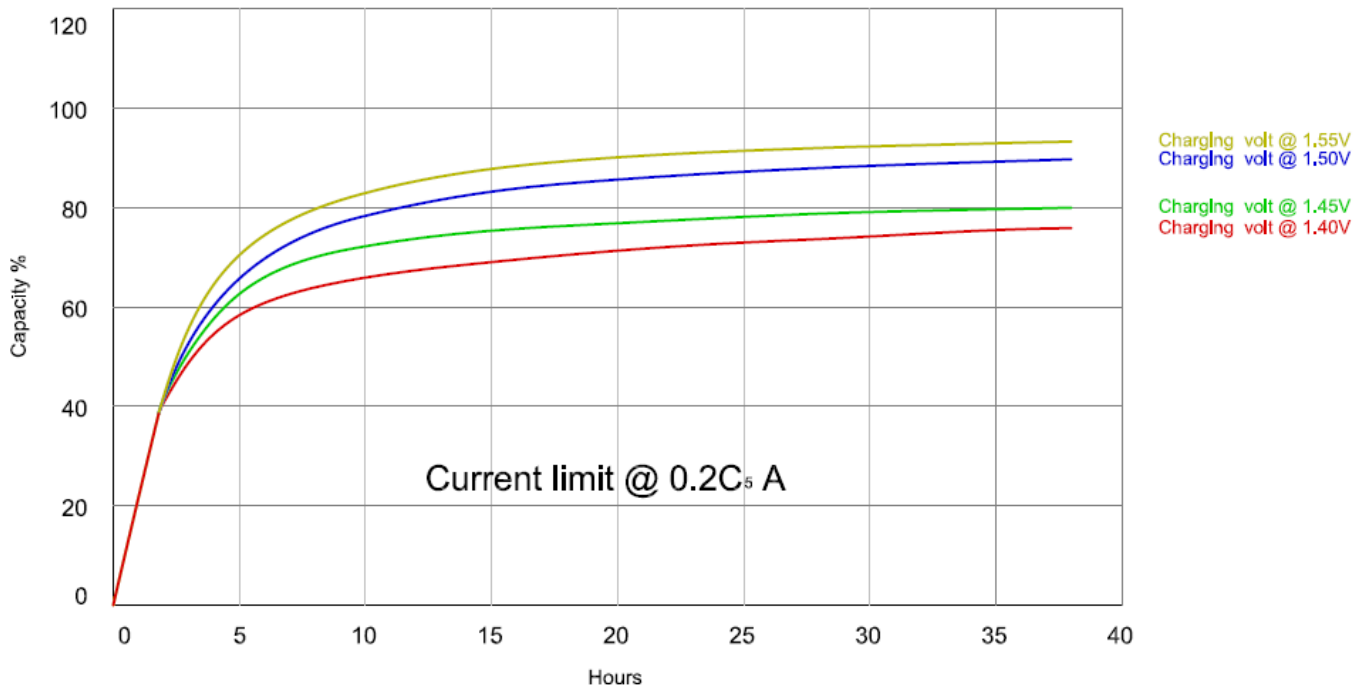
CONSTANT CURRENT CHARGING

Normal Charge : 0.2C₅ amperes for 10 hours

Fast Charge : 0.4C₅ amperes for 2.5 hours followed by 0.2C₅ amperes for 2.5 hours

Minimum Current Charge : 2.0 mA per Ah

CHARGING CURVES



Charging Curves of KAP Rate Series (20 ± 5°C)

CELL CAPACITY AND DIMENSIONS

Cell Type	Nominal Capacity (Ah)	Cell Dimension (mm)			Cell Weights Filled (kg)	Electrolyte Litres
		Width	Length	Height		
KAP 1	10	85	39	182	1.00	0.20
KAP 2	20	113	31	240	1.30	0.30
KAP 3	30	135	54	265	2.20	0.60
KAP 4	40	135	54	265	2.50	0.60
KAP 5	50	141	71	295	3.50	0.90
KAP 6	60	141	71	295	4.00	1.10
KAP 8	80	141	71	295	4.60	0.90
KAP 10	100	139	79	362	6.00	1.40
KAP 13	130	165	105	345	9.00	1.90
KAP 15	150	165	105	345	9.30	2.00
KAP 18	180	165	105	345	9.40	1.80
KAP 20	200	165	105	345	10.00	1.80
KAP 25	250	277	145	420	15.70	2.60
KAP 30	300	277	145	450	21.00	6.00
KAP 35	350	277	145	450	22.00	6.00
KAP 40	400	277	145	490	22.60	6.00
KAP 50	500	285	172	490	33.60	7.80
KAP 60	600	285	172	490	34.00	7.50
KAP 70	700	285	172	490	39.00	8.40
KAP 80	800	395	180	560	57.50	15.50
KAP 90	900	395	180	560	59.00	15.00
KAP 100	1000	395	180	560	60.00	14.00
KAP 110	1100	395	180	560	62.00	12.00
KAP 120	1200	395	180	560	62.00	11.30

KAP Series Battery

Discharge performance data after prolonged float charge of fully charged cells
Available Ampere at 20°C ±5°C

END VOLTAGE 1.00 VOLT / CELL

Cell Type	C5 Ah	Hours						Minutes						Seconds		
		10	8	5	3	2	1	30	20	15	10	5	1	30	5	1
KAP 1	10	1.03	1.28	2.0	3.2	4.5	6.7	8.6	8.3	10.3	11.0	12.3	15.1	15.6	19.1	19.5
KAP 2	20	2.06	2.55	4.0	6.2	8.9	13.2	16.6	17.8	18.7	20.9	22.8	29.7	35.3	42.0	43.0
KAP 3	30	3.09	3.83	6.0	9.3	13.2	19.5	24.0	25.5	27.5	30.4	33.2	48.3	52.7	57.3	58.7
KAP 4	40	4.12	5.11	8.0	12.4	18.3	26.3	32.6	34.3	36.8	40.8	44.1	56.4	70.5	75.7	78.3
KAP 5	50	5.15	6.39	10.0	15.5	22.3	32.5	40.3	42.5	45.4	51.2	59.8	69.3	91.3	95.5	97.9
KAP 6	60	6.19	7.66	12.0	18.6	26.1	39.6	48.4	51.2	54.8	62.3	71.4	92.4	107	114	117
KAP 8	80	8.25	10.2	16.0	24.8	35.6	52.9	64.2	68.5	72.1	84.4	94.5	118	143	152	156
KAP 10	100	10.3	12.8	20.0	32.8	45.1	67.4	87.5	96.7	105	110	123	152	177	191	195
KAP 13	130	13.4	16.6	26.0	41.1	57.3	93.4	104	124	134	130	164	183	212	273	254
KAP 15	150	15.5	19.2	30.0	46.5	65.5	97.5	120	128	135	152	173	210	265	286	293
KAP 18	180	18.4	22.3	36.0	54.4	76.1	114	140	154	164	182	202	245	309	334	342
KAP 20	200	20.6	25.5	40.0	62.4	86.7	130	160	180	192	211	230	280	353	382	391
KAP 25	250	25.8	31.9	50.0	77.5	108	163	200	213	225	250	288	305	390	477	489
KAP 30	300	30.9	38.3	60.0	96.3	128	205	260	281	300	327	360	402	450	573	587
KAP 35	350	36.1	44.7	70.0	112	154	253	280	315	336	370	403	489	526	607	685
KAP 40	400	41.2	51.1	80.0	124	168	260	320	340	360	422	461	559	624	764	783
KAP 50	500	51.5	63.9	100	159	210	325	400	415	450	528	550	610	780	955	979
KAP 60	600	61.9	76.6	120	189	252	390	480	510	540	634	660	732	936	1146	1174
KAP 70	700	72.2	89.4	140	221	294	455	560	595	630	739	770	854	1093	1337	1370
KAP 80	800	82.5	103	160	253	336	520	640	680	720	845	880	976	1249	1528	1566
KAP 90	900	92.8	115	180	284	378	585	720	765	810	950	990	1098	1405	1719	1762
KAP 100	1000	103	128	200	315	420	650	800	850	900	1056	1100	1220	1561	1910	1958
KAP 110	1100	113	141	220	347	462	715	880	935	990	1162	1210	1342	1651	1981	2129
KAP 120	1200	124	153	240	378	504	780	960	1020	1080	1264	1320	1464	1801	2161	2323

END VOLTAGE 1.05 VOLT / CELL

Cell Type	C5 Ah	Hours						Minutes						Seconds		
		10	8	5	3	2	1	30	20	15	10	5	1	30	5	1
KAP 1	10	1.02	1.26	1.96	3.1	4.3	6.1	6.9	7.6	8.2	8.7	11.2	12.9	14.3	16.1	16.8
KAP 2	20	2.04	2.53	3.92	6.1	8.5	12.2	13.8	15.2	16.4	17.4	22.1	25.8	31.4	35.3	37.1
KAP 3	30	3.06	3.79	5.88	9.2	12.8	18.3	20.7	22.8	24.6	26.1	33.0	38.7	42.8	48.1	50.6
KAP 4	40	4.08	5.05	7.84	12.2	17.1	24.4	27.6	30.4	32.8	34.8	42.9	51.6	57.1	64.1	67.5
KAP 5	50	5.10	6.31	9.80	15.3	21.4	30.5	34.5	38	41	43.5	55.4	64.5	71.4	80.2	84.3
KAP 6	60	6.12	7.58	11.8	18.4	25.6	36.6	41.4	45.6	49.2	52.2	66	77.4	85.7	96	101
KAP 8	80	8.16	10.1	15.7	24.5	34.2	48.8	55.2	60.8	65.6	69.6	88	103	114	128	135
KAP 10	100	10.2	12.7	19.8	30.6	42.7	61.7	69.8	76.5	82.1	87.4	110	129	142	160	168
KAP 13	130	13.3	16.5	25.7	40.3	55.1	87.3	95.6	112	122	127	147	171	185	208	219
KAP 15	150	15.3	19.1	29.7	45.9	64.1	91.5	104	114	123	131	165	194	213	240	253
KAP 18	180	18.2	22.2	34.6	53.5	74.7	107	121	133	144	153	193	226	249	280	295
KAP 20	200	20.4	25.4	39.6	61.2	85.4	122	138	152	164	174	220	258	285	320	337
KAP 25	250	25.5	31.8	49.5	76.5	107	153	173	190	205	218	275	281	356	400	421
KAP 30	300	30.6	38.1	59.4	94	122	180	217	240	251	274	308	339	427	480	506
KAP 35	350	35.7	44.5	69.3	107	148	233	258	302	327	357	398	452	499	560	590
KAP 40	400	40.8	50.8	79.2	125	163	240	289	320	335	365	411	517	570	640	675
KAP 50	500	51.0	63.5	99.0	157	203	300	362	400	418	457	513	565	713	801	813
KAP 60	600	61.2	76.2	119	188	244	360	434	480	502	548	616	678	855	961	1012
KAP 70	700	71.4	88.9	139	219	285	420	506	560	586	639	719	791	1000	1121	1181
KAP 80	800	81.6	102	158	251	325	480	579	640	669	731	821	904	1141	1281	1350
KAP 90	900	91.8	114	178	282	366	540	651	720	753	822	924	1017	1283	1441	1518
KAP 100	1000	102	127	198	313	407	600	723	800	837	913	1027	1130	1426	1602	1687
KAP 110	1100	112	140	218	345	447	660	796	880	920	1005	1129	1231	1569	1761	1856
KAP 120	1200	122	152	238	376	488	720	868	960	1004	1096	1232	1344	1712	1921	2025

KAP Series Battery

Discharge performance data after prolonged float charge of fully charged cells
Available Ampere at 20°C ±5°C

END VOLTAGE 1.10 VOLT / CELL

Cell Type	C5 Ah	Hours						Minutes						Seconds		
		10	8	5	3	2	1	30	20	15	10	5	1	30	5	1
KAP 1	10	1.00	1.23	1.8	2.9	4.1	4.7	5.8	6.4	6.6	7.3	8.5	10.1	11.5	13.8	14.3
KAP 2	20	2.00	2.45	3.7	5.8	8.2	9.4	11.6	12.8	13.2	14.6	17.4	20.2	25.4	30.1	31.6
KAP 3	30	3.00	3.68	5.6	8.7	11.9	14.1	17.4	19.2	19.8	21.9	25.5	30.3	35.9	41.2	43.0
KAP 4	40	4.00	4.9	7.5	11.6	15.9	18.8	23.2	25.6	26.4	29.2	34.3	40.4	47.5	54.9	57.4
KAP 5	50	5.00	6.1	9.4	14.6	19.9	23.5	29.0	32.1	33.7	36.5	42.5	50.5	59.1	68.6	71.7
KAP 6	60	6.00	7.3	11.3	17.5	23.9	28.2	34.8	38.4	39.6	43.8	51.2	60.6	71.5	82.3	86.1
KAP 8	80	8.00	9.8	15.1	23.3	31.8	37.6	46.4	51.2	52.8	58.4	68.4	80.8	95.4	109	114
KAP 10	100	10.0	12.3	18.8	29.1	39.8	47.2	58.3	64.7	66.1	73.1	85.8	101	120	137	143
KAP 13	130	13.0	16.0	24.5	38.9	48.6	61.1	75.4	83.2	85.8	109	121	141	155	178	186
KAP 15	150	15.0	18.4	28.5	43.7	59.7	70.5	87.7	96.5	99.2	110	128	152	179	205	215
KAP 18	180	18.0	21.4	33.1	50.9	69.6	82.4	102	112	116	128	149	177	209	240	251
KAP 20	200	20.0	24.5	37.7	58.2	79.6	94.3	116	128	132	146	170	202	238	274	287
KAP 25	250	25.0	30.7	47.1	72.8	99.5	118	145	160	165	183	213	253	288	343	358
KAP 30	300	30.0	36.8	56.5	82	106	138	178	195	208	217	251	276	345	411	430
KAP 35	350	35.0	42.9	65.9	104	130	165	203	224	231	256	326	354	403	480	502
KAP 40	400	40.0	49.1	75.3	109	141	184	237	260	277	289	335	368	460	549	574
KAP 50	500	50.0	61.3	94.2	137	177	230	297	325	347	362	418	460	576	686	717
KAP 60	600	60.0	73.6	113	164	212	276	356	390	416	434	502	552	691	823	861
KAP 70	700	70.0	85.9	132	191	247	322	415	455	485	506	586	644	805	959	1000
KAP 80	800	80.0	98.2	151	219	283	368	475	520	555	579	669	736	921	1098	1148
KAP 90	900	90.0	110	169	246	318	414	534	585	624	651	753	828	1036	1235	1291
KAP 100	1000	100	123	188	273	353	460	593	650	693	723	837	920	1152	1372	1453
KAP 110	1100	110	135	207	301	389	506	653	715	763	796	920	1012	1268	1515	1575
KAP 120	1200	120	147	226	328	424	552	712	780	832	868	1004	1104	1384	1654	1718

END VOLTAGE 1.14 VOLT / CELL

Cell Type	C5 Ah	Hours						Minutes						Seconds		
		10	8	5	3	2	1	30	20	15	10	5	1	30	5	1
KAP 1	10	0.98	1.2	1.6	2.7	3.2	4.6	4.7	5.3	5.8	6.1	6.6	8.9	10.5	10.9	11.2
KAP 2	20	1.96	2.4	3.3	5.4	6.5	8.5	9.4	10.6	11.6	12.2	13.1	17.8	21.7	24.1	24.6
KAP 3	30	2.94	3.5	4.9	8.1	9.7	12.3	14.1	15.8	17.4	18.3	19.5	26.7	31.5	32.7	33.6
KAP 4	40	3.92	4.7	6.6	10.8	12.9	16.7	18.8	21.1	23.2	24.4	28.5	35.6	41.9	43.6	44.8
KAP 5	50	4.90	5.9	8.3	13.6	16.2	20.4	23.5	26.4	29	30.5	35.4	44.5	52.5	54.5	56.1
KAP 6	60	5.88	7.1	10.0	16.3	19.4	24.6	28.2	31.7	34.8	36.6	42.3	53.4	62.9	64.4	67.2
KAP 8	80	7.84	9.4	13.3	21.7	25.8	32.8	37.6	42.2	46.4	48.8	56.9	71.2	83.4	87.3	89.6
KAP 10	100	9.80	11.8	16.6	27.1	32.3	40.1	47.4	52.8	58.3	61.1	70.5	89.3	104	108	118
KAP 13	130	12.7	15.0	21.6	36.1	42.8	59.8	61.1	68.5	83.3	87.7	97.3	119	129	139	146
KAP 15	150	14.7	17.7	24.9	40.7	48.5	60.4	70.5	79.2	87.6	91.5	105	133	142	152	168
KAP 18	180	17.2	20.6	29.0	47.4	56.5	70.4	82.3	92.6	102	107	122	156	177	185	196
KAP 20	200	19.6	23.6	33.2	54.2	64.6	80.5	94.2	106	116	122	140	178	211	218	224
KAP 25	250	24.5	28.8	41.5	65.9	80.8	100	118	132	145	153	175	223	263	272	280
KAP 30	300	29.4	34.6	49.8	68.3	82.3	120	139	158	168	178	217	258	310	327	330
KAP 35	350	34.3	40.4	58.0	79.9	91.0	128	165	185	203	214	269	321	368	381	392
KAP 40	400	39.2	46.1	66.2	92.5	105	136	185	211	224	237	289	376	393	436	448
KAP 50	500	49.0	57.6	82.9	116	133	168	232	263	280	297	362	430	522	545	560
KAP 60	600	58.8	69.2	100	139	159	201	278	316	336	356	434	516	627	654	672
KAP 70	700	68.6	80.7	116	162	186	235	324	369	392	415	506	602	731	763	784
KAP 80	800	78.4	92.2	133	185	210	268	371	421	448	475	579	688	845	873	896
KAP 90	900	88.2	104	149	206	237	301	417	474	504	534	651	774	940	982	1008
KAP 100	1000	98.0	115	166	230	260	334	463	527	560	593	723	860	1043	1091	1120
KAP 110	1100	108	127	182	253	289	367	510	579	616	653	796	946	1130	1200	1232
KAP 120	1200	117	138	199	275	315	403	556	632	672	712	868	1032	1225	1309	1352