



Ni-Cd batteries

THE BATTERY FACTORY



HISTORY

KRUŠIK-THE BATTERY FACTORY is the only large battery manufacturer in the South-East Europe and it belongs to the line of the most important in its branch in the whole Europe. Our tradition of the battery production is more than half a century old. The high quality and the competitiveness of our products, which are designed to meet the desires of each of our clients, stand for solid confirmation of Krušik-The Battery Factory, which is a reliable partner for the old and new clients, but also those who are yet to become ones.

KRUŠIK-THE BATTERY FACTORY has a long tradition of producing reliable, competitive, high quality batteries that are designed according to the ordered specifications of our customers in transport, aerospace and diverse industrial applications, for more than half a century.

Our beginnings date back to 1957 when we operated as Plant 1 in Krušik, a company that was soon to become one of the most prominent companies in the western Serbia, but the whole

of country as well. Today, after many transformations, we operate as a part of Holding Corporation Krušik.

The heyday of Krušik-The Battery Factory is the period between 1973 to 1991. At the start of the 70's the production of silver-zink batteries and batteries for use in aircrafts type MIG-21, MIG-23, MIG-25 and MIG-29 were launched. Production capacity was 10.000 batteries per year. Towards the end of the 70's, production of KPH type batteries was launched as well.

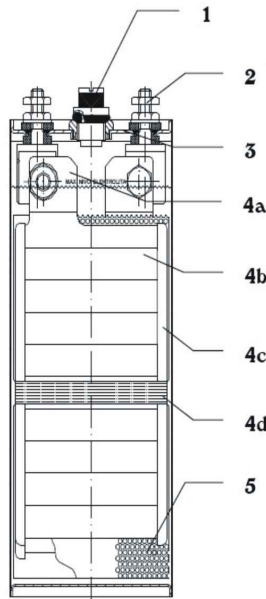
At the start of the 80's the factory introduced into its production program Ni-Cd batteries and batteries with sintered electrodes, then thermal batteries, chargers and devices for safety lighting and other. At that time as much as 70% of total output was exported to the markets of Eastern European countries.

Today, we take big steps towards a bright future in Europe and all around the world.

GENERAL INFORMATION

Assembly drawing of Ni-Cd cell with pocket plate electrodes:

1. Valve
2. Terminals
3. Cell casing
4. Electrodes
5. Separators





„Krušik“ - The Battery Factory vented prismatic Ni-Cd cells fall into the group of cells with alkaline electrolyte. The term prismatic relates to the shape of the cell casing, while in regards to the design of the electrode, the cell is a pocket plate Ni-Cd. The cell casing material can be plastic (polypropylene) or stainless steel.

- Type KPL up to 0,5 C5 (A) for a relatively long discharge period
- Type KPM from (0,5 up to 3,5) C5 (A) for a discharge period from 30 min. up to 3 hours
- Type KPH from (3,5 up to 7) C5 (A) for short discharge periods, less than 30 min.

CHARACTERISTICS AND ADVANTAGES

- applied for mobile and stationary applications, packed in mobile crates or on racks
- high mechanical strength
- high electrical resistance against overcharging and deep discharging
- minimum self-discharge
- long cycle life
- operating temperature range from -40 °C to +50°C
- recyclable
- fast and easy assembly, easy maintenance and handling
- small internal resistance
- electrical characteristics are fully in compliance with the IEC 60623 standard

CHARGING

Constant current charging

- charging current $I = 0,2 C5 A$
- charging time 7,5-8 h
- Charging is possible with currents ranging from 0,1 to 0,5 C5 A, but the charging time must satisfy the condition of full charge.

Charging at constant voltage (parallel connection to the load)

- Recommended voltage for this charging method is in range from 1,45 V to 1,55 V per cell
- Charging current at end of charge (float charge) is approximately 0,04 C5 A

Charging according to „IU system „

- Initial charging current is in the range of 0,1 to 0,5 C5 A
- Charging with constant current lasts to the limit voltage of 1,50 V or 1,55 V per cell
- Charging resumes at the limiting voltage level, with the current decreasing to the float charge current value $I=0,04 C5 A$
- Charging time depends on the initial charging current.

Boost charging

- Boost (intensified) charging is applied before putting batteries into operation or after longer storage periods, as well as after long operation in difficult conditions.
- Charging current is constant $I=0,2 C5 A$
- Charging time is 10 to 12 h
- Voltage per cell at the beginning of charging is 1,35 V and at the end of charge 1,75 V

TERMINOLOGY AND DEFINITIONS

Rated cell voltage (operational voltage) is 1,2 V. In order to achieve higher voltage values, the cells are connected into series in a battery. The rated capacity of the Ni-Cd battery is defined as the Ampere Hours (Ah) available at 5 hours rate of discharge at temperature of $20 \pm 5^\circ C$ and marked as C5 Ah.

Electrolyte in the Ni-Cd cell is the solution of KOH (potassium-hydroxide) in distilled water, with the density of $1,2 \pm 0,01 g/cm^3$.

Float charging

- After longer storage periods or for the purposes of maintaining the charge the battery is continuously float charged by the current $I=0,5$ to $2 mA/Ah$
- Float charging voltage is 1,40 to 1,42 V per cell
- Float charging time is unlimited.

APPLICATION:

- Railway:** starting of locomotives, lightning of railway cars, lightning of control and signal devices, power supply of equipment in automatic rail equipment and blocks
- Electric Power Industry:** power supply of protection and control devices in transformer stations; power supply for coils for *off/on* circuit breakers, radio equipment; local automatic control and monitoring devices
- Offices and residential buildings:** emergency lights, APA devices
- Public transportation companies:** trams, trolley buses
- Other purposes:**
 - military aviation, navy and land forces
 - police
 - mines
 - shipbuilding
 - hospitals
 - industrial facilities
 - hydro and thermal plants
 - professional electronics
 - telecommunications
 - alternative energy sources (wind generators and



CERTIFICATES

Krušik - The Battery Factory has the integrated quality management system certified as per: ISO 9001: 2008; OHSAS 18001: 2007; ISO 14001:2004 and Type product certificate IEC 60623.

Certificate CH09/1120

The management system of

Holding korporacija „Krušik“ a.d. Valjevo

Vladike Nikolaja 59, 14000 Valjevo, Serbia

has been assessed and certified as meeting the requirements of

ISO 9001:2008

For the following activities

Design and production of armament and military equipment.

This certificate is valid from 3 August 2015 until 2 August 2018 and remains valid subject to satisfactory surveillance audits and remains valid subject to satisfactory surveillance audits. Recertification audit due before 21 July 2018. Issue 3. Certified since August 2009.

Authorised by

S. Burić / S. Čuković

SGS Société Générale de Surveillance SA Systems & Services Certification
Technoparkstrasse 1 8005 Zurich Switzerland
t +41 (0)44 445-16-80 f +41 (0)44 445-16-88 www.sgs.com

Page 1 of 1

This document is issued by the Company subject to its General Conditions of Certification. Service accessible at www.sgs.com/terms_and_conditions.htm. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein. The authenticity of this document may be verified at <http://www.sgs.com/OurCompany/CertifiedClientDirectives/CertifiedClientDirectives.asp>. Any unauthorised alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Certificate CH09/1122

The management system of

Holding korporacija „Krušik“ a.d. Valjevo

Vladike Nikolaja 59, 14000 Valjevo, Serbia

has been assessed and certified as meeting the requirements of

OHSAS 18001:2007

For the following activities

Design and production of armament and military equipment.

This certificate is valid from 3 August 2015 until 2 August 2018 and remains valid subject to satisfactory surveillance audits and remains valid subject to satisfactory surveillance audits. Recertification audit due before 21 July 2018. Issue 3. Certified since August 2009.

Authorised by

S. Burić / S. Čuković

SGS Société Générale de Surveillance SA Systems & Services Certification
Technoparkstrasse 1 8005 Zurich Switzerland
t +41 (0)44 445-16-80 f +41 (0)44 445-16-88 www.sgs.com

Page 1 of 1

This document is issued by the Company subject to its General Conditions of Certification. Service accessible at www.sgs.com/terms_and_conditions.htm. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein. The authenticity of this document may be verified at <http://www.sgs.com/OurCompany/CertifiedClientDirectives/CertifiedClientDirectives.asp>. Any unauthorised alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



IKS INSTITUT KIRILO SAVIĆ www.iks.rs

СЕРТИФИКАТ О УСАГЛАШЕНОСТИ CERTIFICATE OF CONFORMITY

Бр: **056.C.09/2010**
No:

За Ni-Cd акумулаторе са ламелним електродама типа KPH
For Ni-Cd batteries with pocket plates of type KPH

Произвођач: Холдинг корпорација "Крушиќ" а.д. Ваљево
Manufacturer: Holding corporation "Krušik" a.d. Valjevo

Подносилац захтева: Холдинг корпорација "Крушиќ" а.д. Ваљево
Applicant: Holding corporation "Krušik" a.d. Valjevo

Извештај о испитивању: Дат у прилогу, бр: **056.1.03/2010**
Test report: As an attachment, no:

Рок важења сертификата: **2016-07-31**
Certificate validity:

Овим се потврђује да карактеристике Ni-Cd акумулатора са ламелним електродама типа KPH, на основу до сада обављених испитивања, одговарају захтевима следећих стандарда:
This confirms that the properties of Ni-Cd battery with pocket plates of type KPH, on the basis of performed tests so far, meet the requirements of the following standards:

**SRPS N. J5. 033
IEC 60623**

Обрадио, Prepared, Светислав Стефановић, дипл. инж. ел.

М.П. Seal Потпис овлашћеног лица Signature of authorized person Милутин Протић

Место и датум Београд, март 2016.
Place and Date Belgrade, mart 2016

IKS INSTITUT KIRILO SAVIĆ www.iks.rs

СЕРТИФИКАТ О УСАГЛАШЕНОСТИ CERTIFICATE OF CONFORMITY

Бр: **056.C.07/2010**
No:

За Ni-Cd акумулаторе са ламелним електродама типа KPL
For Ni-Cd batteries with pocket plates of type KPL

Произвођач: Холдинг корпорација "Крушиќ" а.д. Ваљево
Manufacturer: Holding corporation "Krušik" a.d. Valjevo

Подносилац захтева: Холдинг корпорација "Крушиќ" а.д. Ваљево
Applicant: Holding corporation "Krušik" a.d. Valjevo

Извештај о испитивању: Дат у прилогу, бр: **056.1.03/2010**
Test report: As an attachment, no:

Рок важења сертификата: **2016-07-31**
Certificate validity:

Овим се потврђује да карактеристике Ni-Cd акумулатора са ламелним електродама типа KPL, на основу до сада обављених испитивања, одговарају захтевима следећих стандарда:
This confirms that the properties of Ni-Cd battery with pocket plates of type KPL, on the basis of performed tests so far, meet the requirements of the following standards:

**SRPS N. J5. 033
IEC 60623**

Обрадио, Prepared, Светислав Стефановић, дипл. инж. ел.

М.П. Seal Потпис овлашћеног лица Signature of authorized person Милутин Протић

Место и датум Београд, март 2016.
Place and Date Belgrade, mart 2016



СЕРТИФИКАТ О УСАГЛАШЕНОСТИ
CERTIFICATE OF CONFORMITY

Бр: **056.C.08/2010**
No:

За Ni-Cd акумулаторе са ламелним електродама типа KPM
For Ni-Cd batteries with pocket plates of type KPM

Произвођач: Холдинг корпорација "Крушиќ" а.д.Ваљево
Manufacturer: Holding corporation "Krušik" a.d. Valjevo

Подносилац захтева: Холдинг корпорација "Крушиќ" а.д.Ваљево
Applicant: Holding corporation "Krušik" a.d. Valjevo

Извештај о испитивању: Дат у прилогу, бр: **056.I.03/2010**
Test report: As an attachment, no:

Рок важења сертификата: **2016-07-31**
Certificate validity:

Овим се потврђује да карактеристике Ni-Cd акумулатора са ламелним електродама типа KPM, на основу до сада обављених испитивања, одговарају захтевима следећих стандарда:

This confirms that the properties of Ni-Cd battery with pocket plates of type KPM, on the basis of performed tests so far, meet the requirements of the following standards:

SRPS N. J5. 033
IEC 60623

Обрадио,
Prepared,
Светислав Стефановић,
дипл.инж.ел.



Потпис овлашћеног лица
Signature of authorized person

Милутин Протић

Место и датум: Београд, март 2016.
Place and Date: Belgrade, mart 2016

Recycling

Krušik - The Battery Factory takes over from its customers „End of life“ batteries that have been manufactured in our factory, for the purposes of recycling.

Awards

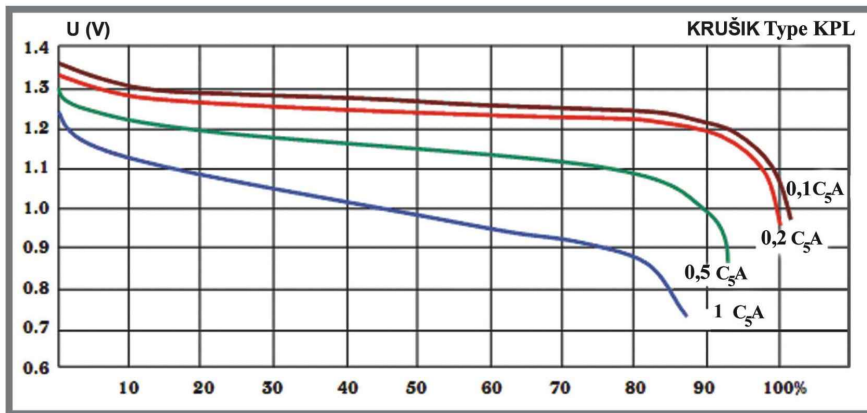
Krušik - The Battery Factory has won a GOLDEN medal in the 60th International technical exhibition held in 2004 in the Bulgarian city of Plovdiv.

Our factory has received this award for the highest quality of our battery type „12 KPL 30 P“ applied on automatic rail crossings.

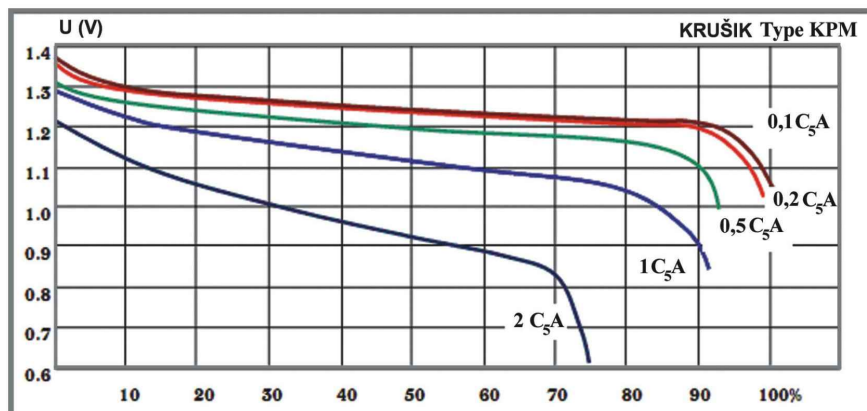




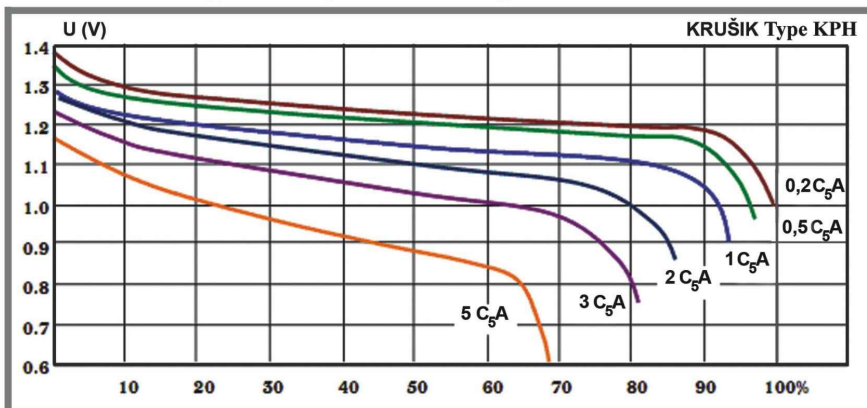
TYPICAL DISCHARGE CURVES FOR Ni-Cd CELLS



Typical discharge curves for KPL type Ni-Cd cell at 20°C



Typical discharge curves for KPM type Ni-Cd cell at 20°C



Typical discharge curves for KPH type Ni-Cd cell at 20°C



Ni-Cd cells type KPL

KPL TYPE CELLS IN METAL CASING

Item No.	Cell designation	C5 (Ah)	Cell dimension L x B x H (mm)	Terminals		Cell weight (kg)	
				No.	M (mm)	With electrolyte	Electrolyte
1.	KPL-10	10	86x38x126	2	6	0,80	0,17
2.	KPL-13	13	47x40x136	2	4	0,60	0,06
3.	KPL-22	22	111x80x138	2	6	2,65	0,35
4.	KPL-30	30	105x50x188	2	6	2,00	0,45
5.	KPL-45	45	105x50x213	2	6	2,30	0,50
6.	KPL-60	60	158x58x265	2	12	4,70	0,80
7.	KPL-80	80	158x58x330	2	12	5,70	1,40
8.	KPL-100	100	158x58x330	2	12	6,00	1,20
9.	KPL-120	120	158x58x330	2	12	6,20	1,20
10.	KPL-120N	120	130x76x335	2	16	7,00	1,40
11.	KPL-130P	130	136x92x312	2	20	6,0	0,9
12.	KPL-160	160	158x89x330	2	12	8,70	1,80
13.	KPL-190	190	130x110x360	2	12	10,00	1,90
14.	KPL-240	240	158x131x330	2	12	12,50	2,50
15.	KPL-275	275	158x131x330	2	12	13,50	2,30
16.	KPL-330	330	158x131x375	2	12	14,50	3,20
17.	KPL-375	375	203x138x370	2	16	18,50	4,80
18.	KPL-400	400	157x196x365	4	20	22,00	5,50
19.	KPL-450	450	203x138x400	2	16	21,50	4,60
20.	KPL-480	480	203x167x370	4	20	25,00	5,00
21.	KPL-520P	520	176x246x405	4	20	27,2	8,4
22.	KPL-560P	560	176x246x405	4	20	27,8	8,2
23.	KPL-625P	625	176x246x405	4	20	28,8	7,9
24.	KPL-960	960	470x246x395	8	20	56,00	10,00
25.	KPL-1250	1250	541x160x405	8	20	70,00	18,50

Marking: *P – cells in plastic case; H – internal designation; *N short; *V high; *I stainless steel case; *IN stainless steel case, short

KPL TYPE CELLS IN PLASTIC CASING

Item No.	Cell designation	C ₅ (Ah)	Cell dimension L x B x H (mm)	Cell terminals		Cell weight (kg)	
				No.	M (mm)	With electrolyte	Electrolyte
1.	KPL-14P	14	85x45x202	2	10	1,10	0,35
2.	KPL-18P	18	85x45x256	2	10	1,44	0,48
3.	KPL-25P	25	85x45x256	2	10	1,55	0,48
4.	KPL-30P	30	85x45x256	2	10	1,75	0,42
5.	KPL-35P	35	85x45x256	2	10	1,80	0,36
6.	KPL-40P	40	85x85x216	2	10	2,68	0,84
7.	KPL-45P	45	85x85x230	2	10	2,87	0,84
8.	KPL-55P	55	85x85x256	2	10	3,00	0,80
9.	KPL-60P	60	85x85x256	2	10	3,20	0,78
10.	KPL-70P	70	130x70x268	2	16	3,60	1,00
11.	KPL-80P	80	130x70x268	2	16	4,00	0,90
12.	KPL-100P	100	130x70x330	2	16	5,00	1,10
13.	KPL-120P	120	130x70x330	2	16	5,40	0,90
14.	KPL-140P	140	135x110x320	2	16	7,70	2,10
15.	KPL-140PH	140	196x61x360	2	16	7,05	1,67
16.	KPL-150P	150	135x110x320	2	16	7,80	2,00
17.	KPL-160P	160	135x110x320	2	16	8,00	2,00
18.	KPL-180P	180	135x110x320	2	16	8,50	1,50
19.	KPL-190P	190	135x110x320	2	16	8,60	1,60
20.	KPL-190P/I	190	165x105x355	2	16	9,00	2,00
21.	KPL-200P	200	165x105x355	2	16	10,00	2,50
22.	KPL-230P	230	196x86x403	2	20	11,00	2,50
23.	KPL-240P	240	165x105x355	2	16	11,00	2,25
24.	KPL-250P	250	196x86x403	2	20	11,50	2,50
25.	KPL-275P	275	165x105x400	2	16	12,00	2,50
26.	KPL-275PH	275	196x110x403	4	20	12,50	2,60
27.	KPL-300P	300	165x105x400	2	16	13,00	2,50
28.	KPL-300PH	300	196x110x403	4	20	14,50	3,00
29.	KPL-330P	330	196x147x360	4	20	16,50	4,00
30.	KPL-380P	380	196x147x360	4	20	18,50	4,00
31.	KPL-450P	450	196x147x403	4	20	22,50	4,00
32.	KPL-480P	480	196x147x403	4	20	24,00	3,50
33.	KPL-500P	500	196x147x403	4	20	25,00	3,00

H-internal designation;

Marking: * P-cells in plastic case

* N short * V-high * I stainless steel case * IN stainless steel case, short

Other cell types can be provided according to specific customer requirements.



KPL

DISCHARGE PERFORMANCE

Discharge currents for Ni-Cd cells type KPL
to end voltage of 1.00V/CELL at t=20°C



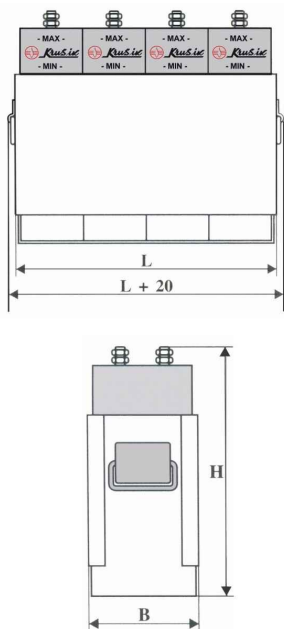
Capacity C_5 (Ah)	Discharge time (h)			
	10	8	5	3
10	1.08	1.31	2.00	3.06
13	1.40	1.70	2.60	3.98
14	1.51	1.83	3.40	4.29
22	2.37	2.88	4.40	6.74
25	2.70	3.28	5.00	7.66
30	3.24	3.93	6.00	9.20
35	3.78	4.58	7.00	10.73
40	4.32	5.24	8.00	12.26
45	4.86	5.90	9.00	13.80
55	5.94	7.21	11.00	16.86
60	6.48	7.87	12.00	18.40
70	7.56	9.18	14.00	21.46
80	8.64	10.50	16.00	24.53
100	10.80	13.12	20.00	30.66
120	12.96	15.75	24.00	36.80
140	15.12	18.37	28.00	42.93
150	16.20	19.68	30.00	46.00
160	17.28	21.00	32.00	49.06
180	19.44	23.62	36.00	55.20
190	20.52	24.93	38.00	58.26
200	21.60	26.25	40.00	61.33
230	24.84	30.18	46.00	70.53
240	25.92	31.50	48.00	73.60
250	27.00	32.81	50.00	76.66
275	29.70	36.09	55.00	84.33
300	32.40	39.37	60.00	92.00
330	35.64	43.31	66.00	101.20
375	40.50	49.21	75.00	115.00
380	41.04	49.87	76.00	116.53
400	43.20	52.50	80.00	122.66
450	48.60	59.06	90.00	138.00
480	51.84	63.00	96.00	147.20
500	54.00	65.62	100.00	153.33
960	103.68	126.00	192.00	294.40
1250	135.00	164.06	250.00	383.33



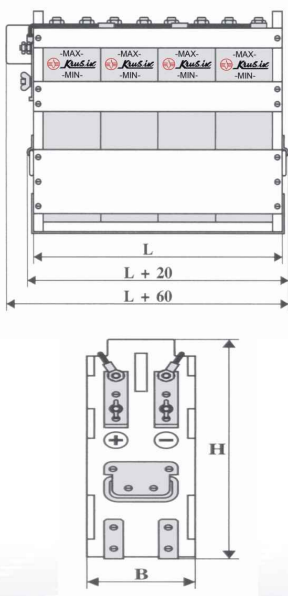
PACKAGING

KPL

Metal crates for KPL type cells in plastic casing



Wooden crates for KPL type cells in plastic casing



Item No.	Cell designation	B (mm)	H (mm)	Metal crates	
				L (mm) for	
				4 cells	5 cells
1.	KPL-14P	95	205	195*	240*
2.	KPL-18P	95	260	195*	240*
3.	KPL-25P	95	260	195*	240*
4.	KPL-30P	95	260	195*	240*
5.	KPL-35P	95	260	195*	240*
6.	KPL-40P	95	220	355*	445*
7.	KPL-45P	95	235	355*	445*
8.	KPL-55P	95	260	355*	445*
9.	KPL-60P	95	260	355*	445*
10.	KPL-70P	136	270	305	375
11.	KPL-80P	136	270	305	375
12.	KPL-100P	136	335	305	375
13.	KPL-120P	136	335	305	375
14.	KPL-140P	145	325	460	570
15.	KPL-140PH	206	365	260	320
16.	KPL-150P	145	325	460	570
17.	KPL-160P	145	325	460	570
18.	KPL-180P	145	325	460	570
19.	KPL-190P	145	325	460	570
20.	KPL-190P/I	175	360	440	545
21.	KPL-200P	175	360	440	545
22.	KPL-230P	206	405	362	448
23.	KPL-240P	175	360	440	545
24.	KPL-250P	206	405	362	448
25.	KPL-275P	175	360	440	545
26.	KPL-275PH	206	405	454	
27.	KPL-300P	175	405	440	545
28.	KPL-300PH	206	405	454	
29.	KPL-330PH	206	365	600	
30.	KPL-380P	206	405		
31.	KPL-450P	206	405		
32.	KPL-480P	206	405		
33.	KPL-500P	206	405		

* Metal crates do not have handles.

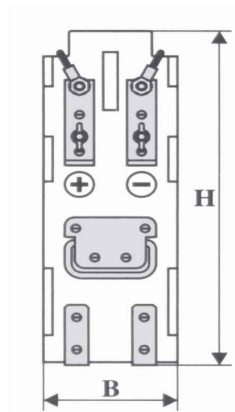
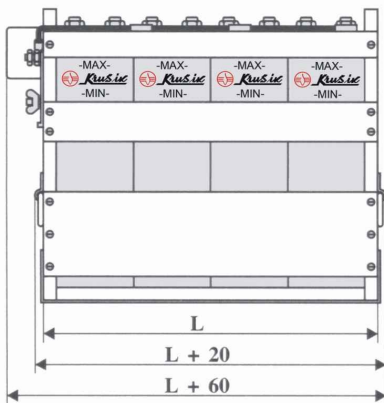
Item No.	Cell designation	B (mm)	H (mm)	Wooden crates	
				L (mm) for	
				4 cells	5 cells
1.	KPL-14P	120	220	220	266
2.	KPL-18P	120	276	220	266
3.	KPL-25P	120	276	220	266
4.	KPL-30P	120	276	220	266
5.	KPL-35P	120	276	220	266
6.	KPL-40P	120	276	380	466
7.	KPL-45P	120	276	380	466
8.	KPL-55P	120	276	380	466
9.	KPL-60P	120	276	380	466
10.	KPL-70P	162	285	329	400
11.	KPL-80P	162	285	329	400
12.	KPL-100P	162	350	329	400
13.	KPL-120P	162	350	329	400
14.	KPL-140P	170	345	485	600
15.	KPL-140PH	230	380	286	348
16.	KPL-150P	170	345	485	600
17.	KPL-160P	170	345	485	600
18.	KPL-180P	170	345	485	600
19.	KPL-190P	170	345	485	600
20.	KPL-190P/I	200	375	465	570
21.	KPL-200P	200	375	465	570
22.	KPL-230P	230	425	390	476
23.	KPL-240P	200	375	465	570
24.	KPL-250P	230	425	390	476
25.	KPL-275P	200	420	465	570
26.	KPL-275PH	230	425	486	598
27.	KPL-300P	200	420	465	570
28.	KPL-300PH	230	425	486	598
29.	KPL-330P	230	425	632	
30.	KPL-380P	230	425		
31.	KPL-450P	230	425		
32.	KPL-480P	230	425		
33.	KPL-500P	230	425		



Wooden crates for KPL type cells in steel casing

Item No.	Cell designation	B (mm)	H (mm)	Wooden crates						
				L (mm) for						
				1 cell	2 cells	3 cells	4 cells	5 cells	6 cells	10 cells
1.	KPL-30	141	225				280	345		640
2.	KPL-45	141	240				280	345		640
3.	KPL-60	196	300				325	420		755
5.	KPL-80	196	370				325	420		755
6.	KPL-100	196	370				325	420		755
7.	KPL-120	196	370				325	420		755
9.	KPL-120N	167	362				390	475	565	
12.	KPL-160	202	310				450	555		
13.	KPL-190	167	400					660		
14.	KPL-240	202	370				625	800		
15.	KPL-275	202	370				625	800		
16.	KPL-330	202	420				625	800		
17.	KPL-375	250	395		340	495				
18.	KPL-400	196	408							
19.	KPL-450	250	425		340	495				
20.	KPL-480	246	395		410					
21.	KPL-960	246	395	410						
22.	KPL-1250	202	451	595						

It is possible to provide other metal and wooden crate dimensions for various numbers of cells according to specific customer requirements.

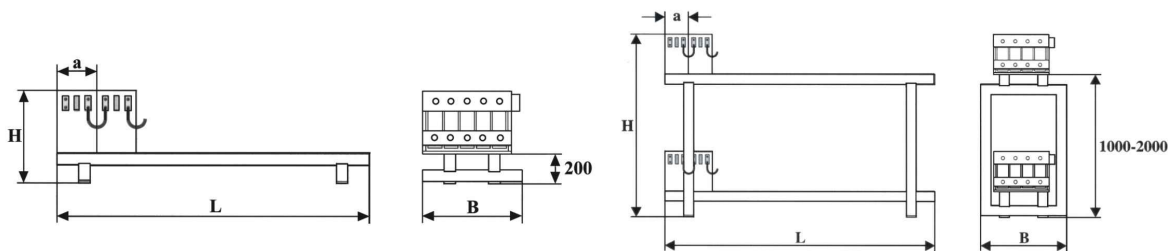




Ni-Cd KPL type Racks

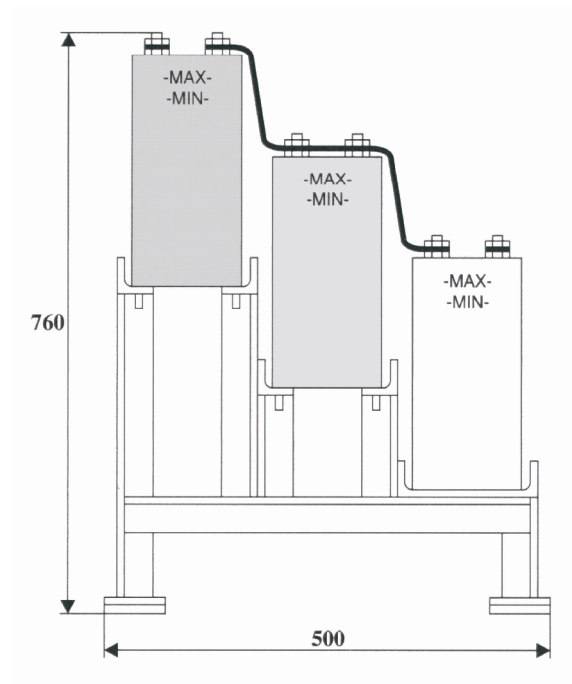
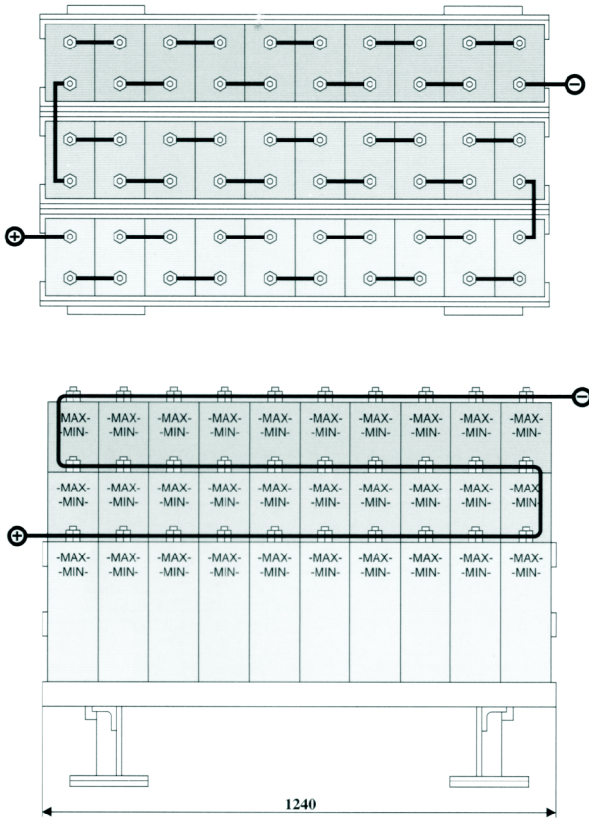
Dimensions of 1 step (JS) and 2 steps (DS) single tier racks

Type	a(mm)	B max (mm)		H (mm)	
		JS	DS	JS	DS
		KPL-30	145	685	920
KPL-45	145	685	920	440	1240
KPL-60	200	830	1070	500	1400
KPL-80	200	490	750	470	1520
KPL-100	200	490	750	570	1520
KPL-120	200	490	750	570	1520
KPL-160	200	655	920	570	1520
KPL-190	200	625	850	625	1625
KPL-240	210	840	1070	570	1520
KPL-275	210	840	1070	570	1520
KPL-330	210	840	1070	620	1520
KPL-375	255	455	700	595	1595
KPL-400	200	690	920	608	1610
KPL-450	255	455	700	625	1625
KPL-480	250	470	700	595	1595
KPL-1250	205	615	850	651	1655
KPL-1500	205	650	900	651	1655





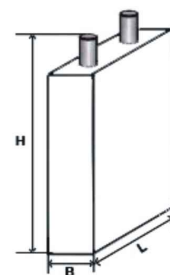
The photo shows an example of connected Ni-Cd type KPL-160 P cells in plastic casing. Total number of 45 cells type KPL-80 P can be mounted on the same rack. This means that for a battery of 110V/ 80 Ah two of these racks are needed.





Ni-Cd cells type KPM

Item No.	Cell designation	C5 Ah	Cell dimension L x B x H (mm)	Terminals		Cell weight (kg)	
				No.	M (mm)	With electrolyte	Electrolyte
1.	KPM-20P	20	85x45x256	2	10	1,50	0,20
2.	KPM-30P	30	85x45x256	2	10	1,72	0,37
3.	KPM-40P	40	85x85x256	2	10	2,80	0,90
4.	KPM-50P	50	85x85x256	2	10	2,90	0,67
5.	KPM-70I	70	130x76x257	2	16	5,22	0,96
6.	KPM-70TI	70	130x76x257	2	16	4,80	1,20
7.	KPM-70P	70	130x70x242	2	16	4,10	0,70
8.	KPM-80P	80	130x70x330	2	16	5,00	1,00
9.	KPM-85I	85	130x51x367	2	16	5,60	1,00
10.	KPM-85TI	85	130x51x367	2	16	5,40	1,20
11.	KPM-100P	100	130x70x330	2	16	5,70	1,10
12.	KPM-105I	105	130x51x405	2	16	6,53	1,16
13.	KPM-105TI	105	130x51x405	2	16	6,13	1,00
14.	KPM-120P	120	136x92x312	2	20	7,0	0,9
15.	KPM-120PH	120	196x61x360	2	16	7,50	2,50
16.	KPM-140P	140	135x110x320	2	16	8,60	1,75
17.	KPM-140PH	140	196x61x360	2	16	10,00	2,50
18.	KPM-140I	140	130x110x412	2	20	11,00	2,70
19.	KPM-150P	150	135x110x320	2	16	8,80	1,30
20.	KPM-160P	160	165x105x400	2	16	11,00	3,00
21.	KPM-180P	180	165x105x400	2	16	11,00	2,65
22.	KPM-180PH	180	196x86x403	2	20	11,00	2,65
23.	KPM-190P	190	165x105x400	2	16	11,20	2,50
24.	KPM-200P	200	165x105x400	2	16	11,50	3,00
25.	KPM-220P	220	165x105x400	2	16	11,60	2,20
26.	KPM-240P	240	165x105x400	2	16	12,00	2,00
27.	KPM-255I	255	129x135x330	2	20	13,00	2,00
28.	KPM-255TI	255	129x135x330	2	20	12,70	2,30
29.	KPM-260P	260	196x110x403	4	20	14,00	2,50
30.	KPM-280P	280	196x110x403	4	20	15,50	3,00
31.	KPM-300	300	172x100x380	4	20	16,50	2,90
32.	KPM-300P	300	196x110x403	4	20	16,20	3,20
33.	KPM-320P	320	196x110x403	4	20	16,80	3,40
34.	KPM-340P	340	196x147x403	4	20	20,00	4,00
35.	KPM-375P	375	196x147x403	4	20	20,10	5,10
36.	KPM-390PL	390	185x123x428	4	20	19,50	4,00
37.	KPM-400P	400	196x147x403	4	20	20,80	4,30
38.	KPM-410I	410	155x145x425	4	20	22,00	4,00
39.	KPM-410TI	410	155x145x425	4	20	21,7	4,30
40.	KPM-450P	450	196x147x403	4	20	23,00	4,00
41.	KPM-500P	500	176x246x405	4	20	28,3	7,0
42.	KPM-550P	550	176x246x405	4	20	31,5	6,50
43.	KPM-600P	600	176x246x405	4	20	32,0	6,0
44.	KPM-675P	675	176x246x405	4	20	33,00	5,00
45.	KPM-600I	600	203x225x364	4	20	31,80	6,50
46.	KPM-600TI	600	203x225x364	4	20	31,40	6,90



Cell type KPM dimensions

Marking: I- Steel casing
P-Plastic casing
H; T -internal designation

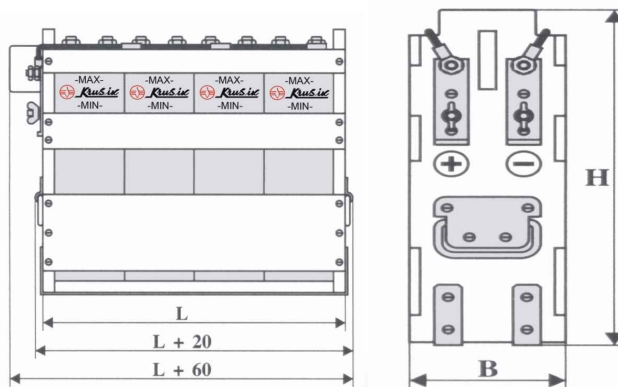
Other cell types can be provided according to specific customer requirements.



PACKAGING

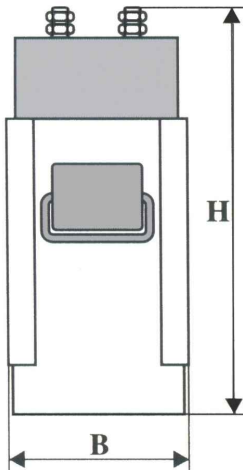
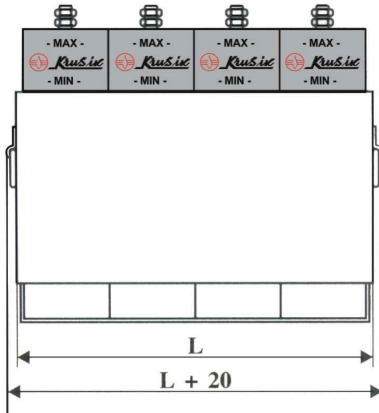
Wooden crates

Item No.	Cell designation	B (mm)	H (mm)	Wooden crates					
				2 cells	3 cells	L (mm) for			
					4 cells	5 cells	8 cells	10 cells	
1.	KPM-20P	120	276	129	175	220	266	385	496
2.	KPM-30P	120	276	129	175	220	266	385	496
3.	KPM-40P	120	276	208	294	380	466		
4.	KPM-50P	120	276	208	294	380	466		
5.	KPM-70I	155	285				475		
6.	KPM-70TI	155	285				475		
7.	KPM-70P	165	260			329	400		753
8.	KPM-80P	165	350			329	400		753
9.	KPM-85I	177	410					485	
10.	KPM-85TI	177	410					485	
11.	KPM-100P	165	350			329	400		753
12.	KPM-105I	170	450						635
13.	KPM-105TI	170	450						635
14.	KPM-120P	170	340			485	600		
15.	KPM-120PH	230	380			286	348		
16.	KPM-140P	170	340		375	485	600		
17.	KPM-140PH	230	380			286	348		
18.	KPM-140I	166	410		392		644		
19.	KPM-150P	170	340		375	485	600		
20.	KPM-180P	200	400			465	570		
21.	KPM-180PH	230	425			390	476		
22.	KPM-190P	200	375			465	570		
23.	KPM-200P	200	375			465	570		
24.	KPM-220P	200	375			465	570		
25.	KPM-240P	200	425			465	570		
26.	KPM-255I	170	365	352	480				
27.	KPM-255TI	170	365	352	480				
28.	KPM-260P	200	425			465	570		
29.	KPM-280P	230	425		340	486			
30.	KPM-300I	200	405			470	598		
31.	KPM-300P	230	425	260	370	486	598		
32.	KPM-320P	230	425	260	370	486	598		
33.	KPM-375P	230	425	335	482				
34.	KPM-390PL	218	446	290	416				
35.	KPM-400P	230	425	335	482				
36.	KPM-410I	200	460	355	518				
37.	KPM-410TI	200	460	355	518				
38.	KPM-450P	230	425	334	482				
39.	KPM-600I	250	395	510					
40.	KPM-600TI	250	395	510					





Metal crates



Item No.	Cell designation	B (mm)	H (mm)	Metal crates	
				L (mm) for 4 cells	L (mm) for 5 cells
1.	KPM-20P	95	260	195	240
2.	KPM-30P	95	260	195	240
3.	KPM-40P	95	260	355	445
4.	KPM-50P	95	260	355	445
5.	KPM-70P	136	245	305	375
6.	KPM-80P	136	335	305	375
7.	KPM-100P	136	335	305	375
8.	KPM-120P	145	325	460	570
9.	KPM-120PH	206	365	260	320
10.	KPM-140P	145	325	460	570
11.	KPM-140PH	206	365	260	320
12.	KPM-150P	145	325	460	570
13.	KPM-180P	175	405	432	
14.	KPM-180PH	206	405	362	448
15.	KPM-190P	175	360	435	540
16.	KPM-200P	175	405	435	540
17.	KPM-220P	175	405	435	540
18.	KPM-240P	175	405	435	540
19.	KPM-260P	175	405	435	540
20.	KPM-280P	206	405	454	
21.	KPM-300P	206	405	454	
22.	KPM-320P	206	405	454	
23.	KPM-375P	206	405	600	
24.	KPM-390PL	195	430	510	
25.	KPM-400P	206	405	600	
26.	KPM-450P	206	405	600	

* L- internal marking

It is also possible to provide other wooden and metal crates for various number of cells according to specific customer requirements.



DISCHARGE PERFORMANCE

Electrical characteristics for KPM type Ni-Cd cell according to IEC 60623

Discharge currents (A) for Ni-Cd cells type KPM to the end cell voltage of 1.14V/CELL at t=20°C

Cell type	C ₅ (Ah)	Discharge time (h)					Discharge time (minutes)				
		8	5	3	2	90	60	30	20	10	5
KPM-20P	20	2.38	3.50	5.00	6.30	7.60	8.90	11.2	13.2	15.6	19.5
KPM-30P	30	3.56	5.25	7.50	9.45	11.40	13.3	16.8	19.8	23.4	29.2
KPM-40P	40	4.75	7.00	10.00	12.60	15.20	17.8	22.4	26.4	31.3	39.0
KPM-50P	50	5.94	8.75	12.50	15.75	19.00	22.2	28.0	33	39.1	48.7
KPM-70P	70	8.31	12.30	17.50	22.05	26.60	31.1	39.2	46.2	54.8	68.3
KPM-70TI	70	8.31	12.30	17.50	22.05	26.60	31.1	36.1	41.6	46.6	53.2
KPM-80P	80	9.50	14.20	20.00	25.20	30.40	35.6	44.8	52.8	62.6	78
KPM-85I	85	10.09	14.90	21.25	26.78	32.30	37.8	47.6	56.1	66.5	82.9
KPM-85TI	85	10.09	14.90	21.25	26.78	32.30	37.8	43.8	50.5	56.5	64.6
KPM-100P	100	11.87	17.60	25.00	31.50	38.00	44.5	56.0	66	78.3	97.5
KPM-105I	105	12.46	18.37	26.25	33.07	39.90	46.7	58.8	69.3	82.2	102
KPM-105TI	105	12.46	18.37	26.25	33.07	39.90	46.7	52.9	32.3	69.8	79.5
KPM-120P	120	14.25	21.10	30.00	37.80	45.60	53.4	67.2	79.2	93.7	117
KPM-140P	140	16.62	24.60	35.00	44.10	53.20	62.3	78.4	92.4	109.6	136.6
KPM-150P	150	17.81	26.25	37.50	47.25	57.00	66.7	84.0	99	117.4	146.3
KPM-180P	180	21.37	31.50	45.00	56.70	68.40	80.1	100.8	118.9	140.9	175.6
KPM-190P	190	22.56	33.60	47.50	59.85	72.20	84.5	106.4	125.5	148.7	185.4
KPM-200P	200	23.75	35.00	50.00	63.00	76.00	89.0	112	132.1	156.6	195.1
KPM-220P	220	26.12	38.60	55.00	69.30	83.60	97.9	123.2	145.3	172.2	214.4
KPM-240P	240	28.50	42.60	60.00	75.60	91.20	106.8	134.4	158.5	187.9	234.2
KPM-255I	255	30.28	44.90	63.75	80.32	96.90	113.5	142.8	168.4	199.7	248.8
KPM-255TI	255	30.28	44.90	63.75	80.32	96.90	113.5	131.4	151.5	169.7	194.0
KPM-260P	260	30.87	45.70	65.00	81.90	98.80	115.7	145.6	171.7	203.6	253.7
KPM-280P	280	33.25	49.00	70.00	88.20	106.4	124.6	156.8	184.9	219.2	273.2
KPM-300P	300	35.62	52.90	75.00	94.50	114.0	133.5	168.0	198.1	234.9	292.7
KPM-320P	320	38.00	56.00	80.00	100.8	121.6	142.4	179.2	211.3	250.6	312.2
KPM-375P	375	33.53	64.90	93.75	118.1	142.5	166.9	210	247.7	293.6	365
KPM-390PL	390	34.88	67.5	97.5	122.8	148.2	173.6	201.0	222.9	259.5	296.2
KPM-400P	400	47.50	70.70	100.0	126.0	152.0	178.0	224	261.8	313.2	390.3
KPM-410I	410	48.68	72.20	102.5	129.1	155.8	182.4	229.6	270.8	321	400
KPM-410TI	410	48.68	72.20	102.5	129.1	155.8	182.4	211.2	243.7	272.8	312
KPM-450P	450	53.43	78.75	112.5	141.7	171.0	200.2	252	297.2	352.4	439
KPM-600I	600	71.25	105.0	150.0	189.0	228.0	267.0	336	396.3	469.8	585
KPM-600TI	600	71.25	105.0	150.0	189.0	228.0	267.0	309.1	356.6	399.3	456.3



Discharge currents (A) for Ni-Cd cells type KPM to the end cell voltage of 1.10V/CELL at t=20°C

Cell type	C ₅ (Ah)	Discharge time (h)					Discharge time (minutes)					
		8	5	3	2	90	60	30	20	10	5	
KPM-20P	20	2.4	3.8	5.7	7.4	8.8	11.1	14.4	16.8	20.0	24.2	
KPM-30P	30	3.6	5.8	8.5	11.1	13.2	16.6	21.6	25.2	30.0	36.4	
KPM-40P	40	4.9	7.7	11.4	14.8	17.6	22.2	28.8	33.6	40.0	48.6	
KPM-50P	50	6.1	9.7	14.3	18.5	22.0	27.7	36.0	42.0	50.0	60.8	
KPM-70P	70	8.5	13.5	20.0	25.9	30.8	38.8	50.4	58.8	70.0	85.1	
KPM-70TI	70	8.5	13.5	20.0	25.9	30.8	38.8	46.4	52.9	59.5	66.3	
KPM-80P	80	9.8	15.5	22.8	29.6	35.2	44.4	57.6	67.2	80.0	97.2	
KPM-85I	85	10.4	16.4	24.3	31.4	37.4	47.1	61.2	71.4	85.0	103.3	
KPM-85TI	85	10.4	16.4	24.3	31.4	37.4	47.1	56.3	64.2	72.2	80.5	
KPM-100P	100	12.2	19.4	28.6	37.0	44.0	55.5	72.0	84.0	100.	121.6	
KPM-105I	105	12.8	20.3	30.0	38.8	46.2	58.2	75.6	88.2	105	127.6	
KPM-105TI	105	12.8	20.3	30.0	38.8	46.2	58.2	69.5	79.4	89.2	99.5	
KPM-120P	120	14.7	23.2	34.3	44.4	52.8	66.6	86.4	100.8	120	145.9	
KPM-140P	140	17.1	27.1	40.0	51.8	61.6	77.7	100.8	117.6	140	170.2	
KPM-150P	150	18.3	29.1	42.9	55.5	66.0	83.2	108	126	150	182.4	
KPM-180P	180	22.0	34.9	51.4	66.6	79.2	99.9	129.6	151.2	180	218.8	
KPM-190P	190	23.2	36.8	54.3	70.3	83.6	105.4	136.8	159.6	190	231	
KPM-200P	200	24.5	38.8	57.2	74.0	88.0	111.0	144	168	200	243.2	
KPM-220P	220	26.9	42.6	62.9	81.4	96.8	122.1	158.4	184.8	220	267.5	
KPM-240P	240	29.4	46.5	68.6	88.8	105.6	133.2	172.8	201.6	240	291.8	
KPM-255I	255	31.2	49.4	72.9	94.3	112.2	141.5	183.6	214.2	255	310	
KPM-255TI	255	31.2	49.4	72.9	94.3	112.2	141.5	168.9	192.7	216.7	241.8	
KPM-260P	260	31.8	50.4	74.3	96.2	114.4	144.3	187.2	218.4	260	316.1	
KPM-280P	280	34.3	54.3	80.0	103.6	123.2	155.4	201.6	235.2	280	340.4	
KPM-300P	300	36.7	58.2	85.8	111	132	166.5	216	252	300	364.8	
KPM-320P	320	39.2	62.0	91.5	118.4	140.8	177.6	230.4	268.8	320	389.1	
KPM-375P	375	45.9	72.7	107.2	138.7	165	208.1	270	315	375	456	
KPM-390PL	390	47.74	75.6	111.4	144.4	171.8	216.6	260	294.9	331.5	369.9	
KPM-400P	400	49	77.6	114.4	148	176	222	288	336	400	486.4	
KPM-410I	410	50.2	79.5	117.2	151.7	180.4	227.5	295.2	344.4	410	498.5	
KPM-410TI	410	50.2	79.5	117.2	151.7	180.4	227.5	271.6	309.9	348.5	389.0	
KPM-450P	450	55.1	87.3	128.7	166.5	198	249.7	324	378	450	547.2	
KPM-600I	600	73.5	116.4	171.6	222	240	333	432	504	600	729.6	
KPM-600TI	600	73.5	116.4	171.6	222	240	333	397.4	453.6	510	569.0	



Discharge currents (A) for Ni-Cd cells type KPM to the end cell voltage of 1.05V/CELL at t=20°C

Cell type	C ₅ (Ah)	Discharge time (h)					Discharge time (minutes)					
		8	5	3	2	90	60	30	20	10	5	
KPM-20P	20	2.5	3.9	6.4	8.3	9.9	13.2	17.6	19.9	25.0	29.6	
KPM-30P	30	3.7	5.9	9.6	12.4	14.8	19.8	26.4	29.9	37.5	44.4	
KPM-40P	40	5.0	7.8	12.8	16.6	19.9	26.4	35.2	39.9	50.0	59.3	
KPM-50P	50	6.2	9.8	16.0	20.7	24.8	33.0	44.0	49.8	62.5	74.1	
KPM-70P	70	8.7	13.8	22.4	29.0	34.8	46.2	61.6	69.8	87.5	103.7	
KPM-70TI	70	8.7	13.8	22.4	29.0	34.8	46.2	56.7	62.8	74.4	80.8	
KPM-80P	80	10	15.7	25.6	33.2	39.8	52.8	70.4	79.8	100	118.6	
KPM-85I	85	10.6	15.7	25.6	35.2	42.2	56.1	74.8	84.8	106.2	125.9	
KPM-85TI	85	10.6	15.7	25.6	35.2	42.2	56.1	68.8	76.3	90.2	98.2	
KPM-100P	100	12.5	19.7	32.0	41.5	49.8	66	88	99.8	125	148.2	
KPM-105I	105	13.1	20.6	33.6	43.5	52.2	69.3	92.4	104.7	131.2	155.6	
KPM-105TI	105	13.1	20.6	33.6	43.5	52.2	69.3	85.0	94.2	111.7	121.5	
KPM-120P	120	15	23.6	38.4	49.8	59.7	79.2	105.6	119.7	150	177.9	
KPM-140P	140	17.5	27.5	44.8	58.1	69.7	92.4	123.2	139.7	175	207.5	
KPM-150P	150	18.7	29.5	48	62.2	74.6	99	132	149.6	187.5	222.3	
KPM-180P	180	22.5	35.4	57.6	74.7	89.6	118.8	158.4	179.6	225	266.8	
KPM-190P	190	23.7	37.4	60.8	78.8	94.5	125.4	167.2	189.6	237.5	281.6	
KPM-200P	200	25	39.4	64	83.0	99.6	132	176	199.5	250	296.5	
KPM-220P	220	27.5	43.3	70.4	91.3	109.5	145.2	193.6	219.5	275	326.1	
KPM-240P	240	30.0	47.2	76.8	99.6	119.5	158.4	211.2	239.5	300	355.8	
KPM-255I	255	31.8	50.2	81.6	105.8	126.9	168.3	224.4	254.4	318.7	377.9	
KPM-255TI	255	31.8	50.2	81.6	105.8	126.9	168.3	206.4	228.9	270.8	294.7	
KPM-260P	260	32.5	51.2	83.2	107.9	129.4	171.6	228.8	259.4	325	385.4	
KPM-280P	280	35.0	55.1	89.6	116.2	139.4	184.8	246.4	279.4	350	415.1	
KPM-300P	300	37.5	59.1	96.0	124.5	149.4	198	264	299.3	375	444.7	
KPM-320P	320	40.0	63.0	102.4	132.8	159.3	211.2	281.6	319.3	400	474.4	
KPM-375P	375	46.8	73.8	120.0	155.6	186.7	247.5	330	374.2	468.7	555.8	
KPM-390PL	390	48.7	76.7	124.8	161.8	195.0	257.4	315.8	351	414.3	450.8	
KPM-400P	400	50.0	78.8	128.0	166.0	199.2	264	352	399.1	500	593	
KPM-410I	410	51.2	80.7	131.2	170.1	204.1	270.6	360.8	409.1	512.5	607.8	
KPM-410TI	410	51.2	80.7	131.2	170.1	204.1	270.6	331.9	368.1	435.6	474.0	
KPM-450P	450	56.2	88.6	144.0	186.7	224	297	396	449	562.5	667.1	
KPM-600I	600	75.0	118.2	192.0	249.0	298.8	396	528	598.7	750	889.5	
KPM-600TI	600	75.0	118.2	192.0	249.0	298.8	396	485.7	538.8	637.5	693.8	



Discharge currents (A) for Ni-Cd cells type KPM to the end cell voltage of 1.00V/CELL at t=20°C

Cell type	C ₅ (Ah)	Discharge time (h)					Discharge time (minutes)					
		8	5	3	2	90	60	30	20	10	5	
KPM-20P	20	2.6	4.0	6.6	9.5	11.5	15	22	24.6	30.1	36.6	
KPM-30P	30	3.9	6.0	9.9	14.2	17.2	22.5	33	36.9	45.2	54.9	
KPM-40P	40	5.2	8.0	13.2	19	22.9	30	44	49.2	60.2	73.2	
KPM-50P	50	6.5	10	16.5	23.7	28.6	37.5	55	61.6	75.3	91.5	
KPM-70P	70	9.1	14	23.1	33.2	40.1	52.5	77	86.1	105.4	128.1	
KPM-70TI	70	9.1	14	23.1	33.2	40.1	52.5	70.8	77.4	89.5	99.9	
KPM-80P	80	10.4	16	26.4	38	45.8	60	88	98.5	120.4	146.4	
KPM-85I	85	11	17	28	40.3	48.7	63.7	93.5	104.6	128	155.6	
KPM-85TI	85	11	17	28	40.3	48.7	63.7	86.0	94.1	108.8	121.3	
KPM-100P	100	13	20	33	47.5	57.3	75	110	123.1	150.6	183.1	
KPM-105I	105	13.6	21	34.6	49.8	60.2	78.7	115.5	129.3	158.1	192.2	
KPM-105TI	105	13.6	21	34.6	49.8	60.2	78.7	106.2	116.3	134.3	149.9	
KPM-120P	120	15.6	24	39.6	57	68.8	90	132	147.7	180.7	219.7	
KPM-140P	140	18.2	28	46.2	66.5	80.3	105	154	172.3	210.8	256.3	
KPM-150P	150	19.5	30	49.5	71.2	86	112.5	165	184.7	225.9	274.6	
KPM-180P	180	23.4	36	59.4	85.5	103.2	135	198	221.6	271	329.5	
KPM-190P	190	24.7	38	62.7	90.2	108.9	142.5	209	233.9	286.1	347.9	
KPM-200P	200	26	40	66	95	114.6	150	220	246.2	301.2	366.2	
KPM-220P	220	28.6	44	72.6	104.5	126.1	165	242	270.8	331.3	402.8	
KPM-240P	240	31.2	48.0	79.2	114	137.6	180	264	295.5	361.4	439.4	
KPM-255I	255	33.1	51	84.1	121.1	146.2	191	280.5	314	384	466.9	
KPM-255TI	255	33.1	51	84.1	121.1	146.2	191	258.0	282.6	326.4	364.1	
KPM-260P	260	33.8	52	85.8	123.5	149.1	195	286	320	391.5	476	
KPM-280P	280	36.4	56	92.4	133	160.5	210	308	344.7	421.6	512.6	
KPM-300P	300	39.0	60	99.0	142.5	172	225	330	369.3	451.8	549.3	
KPM-320P	320	41.6	64	105.6	152	183.4	240	352	394	481.9	585.9	
KPM-375P	375	48.7	75	123.7	178.1	215	281	412.5	461.7	564.7	686.6	
KPM-390PL	390	50.6	78.0	128.7	185.7	224.1	293.2	326.1	408.1	499.0	556.9	
KPM-400P	400	52.0	80	132	190	229.3	300	440	492.5	602.4	732.4	
KPM-410I	410	53.3	82	135.3	194.7	235.1	307.5	451	504.8	617.4	750.7	
KPM-410TI	410	53.3	82	135.3	194.7	235.1	307.5	414.9	454.3	524.8	585.5	
KPM-450P	450	58.5	90	148.5	213.7	258	337.5	495	554	677.7	823.9	
KPM-600I	600	78.0	120	198	285	344	450	660	738.7	903.6	1098.6	
KPM-600TI	600	78.0	120	198	285	344	450	607.2	664.8	768.0	856.9	



Ni-Cd cells type KPH

Item No.	Cell designation	C5 (Ah)	Cell dimension L x B x H (mm)	Terminals		Cell weight (kg)	
				No.	M (mm)	With electrolyte	Electrolyte
1.	KPH-20P	20	85x45x256	2	10	1,65	0,40
2.	KPH-24P	24	85x45x256	2	10	1,75	0,35
3.	KPH-30P	30	85x85x256	2	10	2,75	0,90
4.	KPH-40P	40	85x85x256	2	10	2,95	0,80
5.	KPH-60P	60	130x70x330	2	16	5,30	1,10
6.	KPH-60I	60	130x50,5x365	2	20	5,70	1,10
7.	KPH-70P	70	130x70x330	2	16	5,10	1,00
8.	KPH-80P	80	130x70x330	2	16	5,70	1,10
9.	KPH-100P	100	135x110x320	2	20	7,50	2,20
10.	KPH-100PH	100	196x61x360	2	16	9,50	3,00
11.	KPH-100I	100	130x76x365	2	20	8,20	1,50
12.	KPH-120P	120	165x105x355	4	20	8,20	1,80
13.	KPH-120PH	120	196x86x403	2	20	9,00	3,00
14.	KPH-140P	140	196x86x403	2	20	10,70	3,00
15.	KPH-155I	155	157x95x365	4	20	12,50	2,50
16.	KPH-155P	155	165x105x355	4	20	11,50	2,50
17.	KPH-170P	170	196x110x403	4	20	14,00	3,50
18.	KPH-155VI	155	172x76x425	2	20	14,00	2,50
19.	KPH-190IN	190	172x100x365	4	20	14,50	2,60
20.	KPH-190P	190	165x105x400	4	20	14,80	3,30
21.	KPH-200P	200	196x110x403	4	20	14,80	3,00
22.	KPH-250P	250	196x147x403	4	20	19,30	5,50
23.	KPH-250I	250	172x100x425	4	20	17,50	3,50
24.	KPH-275P	275	196x147x403	4	20	19,60	5,30
25.	KPH-300P	300	196x147x403	4	20	20,50	4,20
26.	KPH-310I	310	157x196,5x365	6	20	21,50	5,00
27.	KPH-310VI	310	155x145x386	4	20	18,50	4,00
28.	KPH-350I	350	157x196,5x365	6	20	24,00	4,00
29.	KPH-400I	400	157x220x365	8	20	28,00	5,00
30.	KPH-400P	400	176x246x405	4	20	27,1	6,5
31.	KPH-450P	450	176x246x405	4	20	28,0	6,0

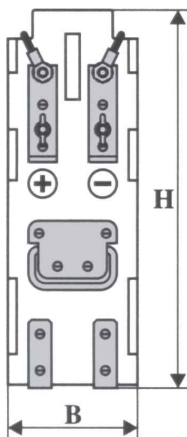
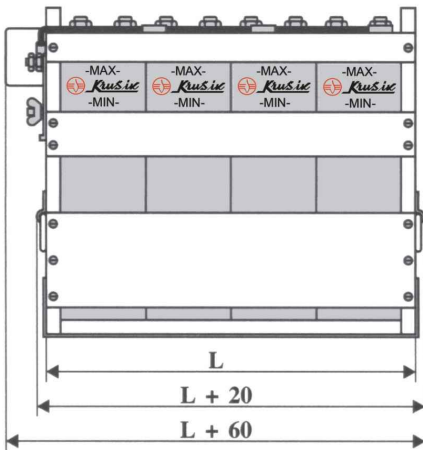
Marking : VI – steel casing-long; P – plastic casing, H – internal designation, I - steel casing, IN- steel casing-short, N – short, V – long





PACKAGING

Wooden and metal crates for KPH type cells



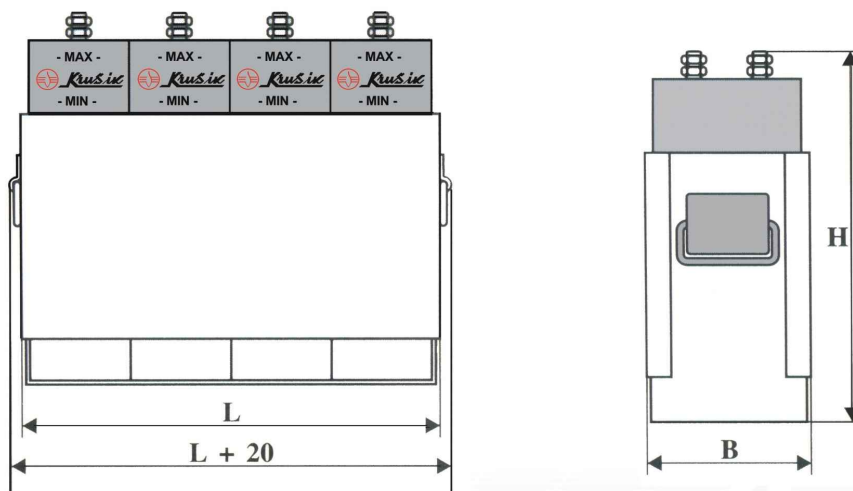
Item No.	Cell designation	B (mm)	H (mm)	Wooden crates					
				L (mm) for					
				2 cells	3 cells	4 cells	5 cells	6 cells	10 cells
1.	KPH-20P	120	276	129	175	220	266	330	496
2.	KPH-24P	120	276	129	175	220	266	330	496
3.	KPH-30P	120	276	208	294	380	466	552	
4.	KPH-40P	120	276	208	294	380	466	552	
5.	KPH-60P	162	350	183	256	329	400	475	
6.	KPH-60I	158	391			290	350	410	
7.	KPH-70P	162	350	183	256	329	400	475	
8.	KPH-80P	162	350	183	256	329	400	475	
9.	KPH-100P	167	340	263	376	485	600	715	
10.	KPH-100PH	230	385			286	370		
11.	KPH-100I	158	391			390	480	565	
12.	KPH-120P	200	375		356	465	570		
13.	KPH-120PH	230	425			390	476		
14.	KPH-140P	230	425		305	390	476		
15.	KPH-155P	200	375		356	465	570		
16.	KPH-155I	197	391			470	572	678	
17.	KPH-170P	230	425			486	598	710	
18.	KPH-190IN	210	398		360	495	570	695	
19.	KPH-190P	200	420		356	465	570		
20.	KPH-200P	230	425						
21.	KPH-250P	230	425	335	482				
22.	KPH-250I	210	458			495	570	695	
23.	KPH-275P	230	425	335	482				
24.	KPH-300P	230	425	335	482				
25.	KPH-310I	235	408	390					
26.	KPH-350I	235	408	390					
27.	KPH-400I	259	408	390					



Item No.	Cell designation	B (mm)	H (mm)	Metal crates				
				L (mm) for				
				2 cells	3 cells	4 cells	5 cells	10 cells
1.	KPH-20P	95	260			195*	240*	470*
2.	KPH-24P	95	260			195*	240*	470*
3.	KPH-30P	95	260			355	445*	
4.	KPH-40P	95	260			355	445*	
5.	KPH-60P	136	260			305	375	
6.	KPH-70P	136	335			305	375	
7.	KPH-80P	136	335			305	375	
8.	KPH-100P	141	325			460	570	
9.	KPH-100PH	206	365			260	320	
10.	KPH-120P	175	360	220	325	435	540	
11.	KPH-120PH	206	405			362	448	
12.	KPH-140P	206	405	184	273	362	448	
13.	KPH-155P	175	360	220	325	435	540	
14.	KPH-170P	206	405	230	342	454	566	
15.	KPH-190P	175	400	220	325	435	540	
16.	KPH-275P	206	405	302	450			
17.	KPH-300P	206	405	302	450			

* Metal crates do not have handles.

It is possible to provide other types of wooden and metal crates according to specific customer's requests.





DISCHARGE PERFORMANCE

Discharge currents for an electrically charged Ni-Cd cell type KPH at t=20°C

Cell type	C _s (Ah)	Cut off voltage 1.15 V/CELL						Cut off voltage 1.08 V/CELL									
		Discharge time in minutes															
		60	45	30	20	15	10	5	1	60	45	30	20	15	10	5	1
		Discharge current (A)															
KPH-20P	20	16	20	23	28	31.6	37	42	62	17.4	21	29	39	44.5	49	55	77
KPH-24P	24	20	23	28	34	38.4	45	51	74	20.6	25	34	46	52.5	57	63	88
KPH-30P	30	23	30	36.3	44.2	50	57	64	93	26	31.2	43.5	58	66	72	79	110
KPH-40P	40	31	39	46.3	56.4	63.7	74.5	84	124	34.4	48	58	78	89	98	109	152
KPH-60P	60	47	59	71	86.5	98	114	129	182	52	64.4	87	117	133	146	161	225
KPH-70P	70	55	69	83	101	114	133	150	209	60	72	101.5	137	156	171	190	266
KPH-80P	80	64	80	96	117	132	153	173	239	69	83	116	157	179	197	219	306
KPH-100P	100	79	100	118.4	144	163	189	213	298	86	103	145	196	223	245	272	380
KPH-120P	120	79	118	138	168	136	225	254	351	103	124	174	235	268	295	327	457
KPH-140P	140	92	137	167.5	204	231	266	300	402	120	144	203	274	312	343	381	533
KPH-155P	155	112	151	181	220	249	290	328	415	133	160	225	304	347	382	420	588
KPH-170P	170	133	168	199	242	273	316	357	493	146	175	247	333	380	418	464	649
KPH-190P	190	148	187	220.6	269	304	352	397	532	163	196	276	373	425	467	518	725
KPH-200P	200	156	198	231	281	318	368	415	542	172	206	290	391.5	445	489	543	760
KPH-250P	250	195	244	290	353	399	460	520	650	215	258	362	489	557	612	679	950
KPH-275P	275	215	269	321	391	442	512	578	720	237	284	399	539	615	676	750	1050
KPH-300P	300	234	293	349	425	480	552	623	778	258	310	435	587	669	735	816	1142
KPH-310	310	242	305	360	439	496	570	644	805	267	320	450	607	692	761	845	1183
KPH-350	350	273	332	407	496	560	644	727	909	301	361	507	668	748	822	912	1276
KPH-400	400	312	392	465	567	641	737	832	1040	344	413	580	780	872	952	1056	1478

Cell type	C _s (Ah)	Cut off voltage 1.00V/CELL					Cut off voltage 0.85V/CELL					Cut off voltage 0.65V/CELL				
		Discharge time in seconds														
		90	60	30	10	1	90	60	30	10	1	90	60	30	10	1
		Discharge current (A)														
KPH-20P	20	103	112	119	130	146	149	161	174	188	209	213	232	257	270	310
KPH-24P	24	123	134	142	155	174	178	192	207	223	247	252	275	305	320	368
KPH-30P	30	153	168	178	194	217	221	238	257	277	307	282	307	341	358	411
KPH-40P	40	204	224	238	259	290	296	320	345	372	413	379	413	458	481	553
KPH-60P	60	295	324	344	375	420	428	462	499	538	597	609	664	737	774	890
KPH-70P	70	344	378	400	436	488	497	536	579	625	693	707	770	855	897	1031
KPH-80P	80	393	432	459	500	560	571	616	665	718	797	813	886	983	1032	1187
KPH-100P	100	473	520	552	601	673	686	741	800	884	959	978	1066	1183	1242	1428
KPH-120P	120	568	624	663	723	810	826	892	963	1040	1154	1177	1283	1424	1495	1719
KPH-140P	140	599	658	699	762	853	870	939	1014	1095	1215	1239	1350	1498	1572	1808
KPH-155P	155	677	744	790	861	964	983	1061	1145	1236	1372	1399	1524	1692	1776	2049
KPH-170P	170	742	816	866	944	1057	1078	1164	1257	1357	1506	1536	1674	1858	1950	2242
KPH-190P	190	830	912	968	1055	1181	1205	1301	1405	1517	1684	1717	1871	2077	2180	2507
KPH-200P	200	874	960	1019	1110	1243	1268	1369	1478	1596	1771	1806	1968	2184	2293	2637
KPH-250P	250	1092	1200	1274	1388	1554	1585	1711	1847	1994	2213	2257	2460	2730	2866	3296
KPH-275P	275	1201	1320	1402	1528	1711	1745	1884	2034	2196	2437	2485	2708	3005	3155	3628
KPH-300P	300	1310	1440	1529	1666	1866	1903	2055	2219	2396	2659	2712	2956	3281	3445	3961
KPH-310	310	1354	1488	1580	1722	1928	1966	2123	2303	2487	2760	2815	3068	3405	3575	4111
KPH-350	350	1528	1680	1784	1944	2177	2220	2397	2588	2795	3102	3164	3448	3827	4018	4621
KPH-400	400	1765	1920	2039	2222	2488	2538	2741	2960	3196	3547	3618	3943	4376	4595	5284