



JSC "ENERGIYA"

CHEMICAL CURRENT SOURCES PRODUCTION



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[PRODUCT CATALOGUE]





Today JSC "Energiya" - stable enterprise with significant production capacity, its own scientific base, well-established partnerships firmly on the path of innovative development. The company pays more attention to the modernization of current sources, the development of new products, development of new materials and technologies, relationships with partners and cooperation with scientific institutions.

The main activity - development and production of independent power supply for domestic, industrial and special equipment for rocket artillery systems, aviation, naval and civilian sea and river fleets, for radio, consumer electronics and electrical

appliances, medical equipment, toys and games, emergency communications and signaling on the water, in the air and on the ground, fire extinguishing systems and other equipment for various purposes. The company consistently holds a leading position in the development and production of chemical power sources and other non-core products in the domestic and foreign markets. The main customers are the Ministry of Defense, the Federal Space Agency, the Interior Ministry, the FSB, the Emergencies Ministry, Gazprom, airlines, businesses and organizations IPU and communication Basin State administration throughout the territory of the Russian Federation, the fuel and energy complex, geology, geophysics, medical equipment manufacturers.

The company's products are exported to Belarus, Kazakhstan, Uzbekistan, Azerbaijan, Armenia, Ukraine, Moldova, Poland, India and other countries near and far abroad.

Two years ago of "Energiya" signed a contract with the Ministry to create a new lithium - ion polymer batteries , which are 3-4 times higher than today used nickel-cadmium batteries in performance and demand for all combat . The advantage of lithium-ion batteries - is a short charge time, high specific energy, high power density, no memory effect, which we have seen in nickel-cadmium batteries. The enterprise has developed a new plant, equipped with the most modern equipment. Successfully completed the development of lithium- ion battery with a rated capacitance value 4Ah and voltage 3.7 V required for the assembly of commercially available batteries based on this battery. Currently more

than five types of batteries are available. It is planned to expand the range of batteries with different weight and size and capacitive parameters to build a dozen current sources based on them. Use single battery allows you to create a battery with different specifications on request. This year, high capacity batteries LIA 550 are tested successfully for navigation aids.

Thermal battery created is based on lithium-boron, which produced by no one else in the world. More powerful, the battery is used in all forms of the Russian Defense. Energy intensity, duration and readiness achievement are several times higher than its predecessor. Moreover, the new battery is made from domestic materials.

In the first half of this year mass production of six new power sources are produced, the nine products successfully completed preliminary testing stages. JSC "Energiya" introduces advanced technologies, modernizing its production - without it there is no way in the future.

Science and Innovation is the engine of progress. The main activities in this area include the development of modern systems of electrochemical lithium-iron disulfide and lithium manganese dioxide, the use of renewable energy - photovoltaic installations issue on solar batteries. Lifetime of such a facility is more than ten years.

The company opened a modern laboratory for the introduction of new materials and technologies and the bureau of industrial electronics. Employees of these units, together with experts from scientific

organizations conduct thorough investigations of new materials to the possibility of their use in power sources, developing industrial technology of their production of "Energiya", create the necessary technological and testing equipment . Annually, there are works contracts OCD, R & D , which amount to about 15% of annual sales. All these activities contribute to the maintenance of good enterprise image, both in Russia and abroad.





# Chemical power sources for navigational aids

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## Air-zinc batteries:

Series “**Signal**” / «Сигнал»

Series “**Liman**” / «Лиман»

Battery “**Shtil**” / «Штиль» 2PP219/206

Battery “**2Baken 5V-80Ah**” / «2Бакен 5В-80А·ч» 4PP122/243

Battery “**Shtorm**” / «Шторм» 6PP368/195

Battery “**Yakor 4V-75Ah**” / «Якорь 4В-75А·ч» 3PP171/68

## Manganese-zinc batteries:

Series “**Lotsman**” / «Лоцман»

Battery “**Pulsar**” / «Пульсар» 28R257/132

Battery “**Akula**” / «Акула» 19LR254/270

Battery “**Impuls 3V-300Ah**” / «Импульс 3В-300А·ч»  
38R254/170

Battery “**Impuls 3V-500Ah**” / «Импульс 3В-500А·ч»  
38LR254/170

## Manganese –air-zinc batteries:

Series “**Liman M**” / «Лиман М»

Battery “**IT 6V-700Ah**” / «ИТ 6В-700А·ч» 2PP240/220

Batteries of lithium-manganese dioxide system:

Battery “**Korvet**” / «Корвет» 56CR254/132

Battery “**Borey**” / «Борей» 40CR254/92

Light optical power plants **SEU 1, SEU 2, SEU 3.**

Microprocessor battery switcher “**Neptun**”



# Chemical power sources for navigational aids

## Batteries "Signal" / «СИГНАЛ»

TY 3483-032-0477044-2007



The batteries with alkaline electrolyte of zinc-air battery electrochemical system.

The batteries are designed as a power source for luminous-signal devices for navigation equipment of river craft.

Changing of design of elements in comparison with the widely used batteries «LIMAN» and their horizontal laying in the case instead of vertical significantly reduce the possibility of internal short-circuit during operation and assure reliable contact between the electrodes.

They have FAA Russian River Register certificate of type approval (ФАУ «Российский речной регистр»).

### Characteristics of the battery «Signal»/«СИГНАЛ»

	"Signal 2.6V-160Ah" (4PP155/160)	"Signal 2.6V-180Ah" (5PP155/180)	"Signal 4V-90Ah" (2PP155/120)	"Signal 4V-130Ah" (3PP155/170)	"Signal 4V-180Ah" (2PP214/120)	"Signal 5V-90Ah" (2PP155/160)	"Signal 5V-180Ah" (2PP214/160)
Maximum dimensions, LxBxH, mm	130x85x160	130x85x180	130x85x120	130x85x170	130x171x120	130x85x160	130x171x160
Maximum weight, kg	2,6	3,2	1,9	3,2	3,8	2,5	5,0
Voltage, V, no less than	fresh	2,6		3,9			5,2
	At the end of guaranteed shelf life	2,5		3,75			4,75
External circuit resistance during voltage measurement, Ohm	9,0			23,0			20,0
Discharge mode	Pulsed / Intermittent	Pulsed / Intermittent	Pulsed / Intermittent	Pulsed / Intermittent	Pulsed / Intermittent	Pulsed / Intermittent	Pulsed / Intermittent
External circuit resistance during discharge, Ohm		4,1/9,0		23,0/50,0			- / 150
End-of-discharge voltage, V		1,8		2,7			3,8
Capacity, Ah	160	180	90	130	180	90	180
Shelf life before usage, months	15						
Operating temperature range, °C	from 15 below zero to 40 above zero (battery capacity at -15 °C should be not less than 30% of values indicated in the table)						

**Pulsed discharge mode:** 0.7 sec – discharge, 2.8 sec – pause for 10 hours a day.

**Intermittent discharge mode** – 10 hours a day.

Product design eliminates the possibility of explosion and ignition. They comply with State Standard GOST 12.2.007.12-88, GOST R IEC 60086-1-2010 and the technical regulations "safety of objects of inland water transport".

Packed in boxes batteries are able to be transported by any means of transport in accordance with the regulations concerning carriage of goods.

Transportation conditions in a part of climatic factors should meet the State Standard GOST 15150-69.

Transportation conditions in a part of the mechanical factors should meet the requirements of group Ж of State Standard GOST 23216-78.

## Chemical power sources for navigational aids

### Batteries “Liman” / “Лиман”

Batteries “Liman” / “Лиман” with alkaline electrolyte of zinc-air battery electrochemical system.

The batteries are used as self-contained power supply source for sea and river navigation equipment. The batteries are indispensable in beacons, buoys and illuminated land marks. The batteries are remarkable for stable performance during the navigation.

Ability to work in different modes - **flashing and continuous** - allows extending the field of application and increasing the operation life.



They have FAA Russian River Register certificate of type approval.

Characteristics of the battery  
“Liman”

	Dimensions, mm, no more than	Weight, kg, no more than	Discharge mode	External circuit resistance during voltage measurement, Ohm	Voltage, V, no less than		Rated capacity, Ah	Guaranteed shelf life, months
					Initial	Final		
“Liman P” (3PP130/185)	90x85x185	2,0	Intermittent	2,0	1,3	0,95	450	15
			Continuous	5,0				
“Liman 2.6V-150Ah” (4PP131/185)	100x85x185	1,7	Pulsed	4,1	2,6	1,8	150	
			Intermittent	9				
“Liman 2.6V-300Ah” (4PP155/185)	130x85x185	3,0	Pulsed	4,1	2,6	1,8	300	
			Intermittent	9,0				
“Liman 4V-80Ah” (3PP131/130)	100x85x130	1,7	Pulsed	23,0	3,9	2,7	80	
			Intermittent	50,0				
“Liman 4V-150Ah” (3PP131/185)	100x85x185	2,5	Pulsed	12,0	3,9	2,7	150	
			Intermittent	26,0				
“Liman 5V-150Ah” (2PP155/185)	130x85x185	3,0	Intermittent	150,0	5,3	3,8	150	
“Liman 6V-150Ah” (5PP175/185)	153x85x185	4,0	Pulsed	20,0	6,5	4,5	150	
			Intermittent	44,0				
“Liman 8V-150Ah” (6PP202/185)	184x85x185	5,0	Pulsed	24,0	7,8	5,4	150	
			Intermittent	53,0				
“Liman 2.6-4” (16PP344/190)	280x200x190	13,5	Pulsed	3,0	2,6	1,8	1200	
“Liman 2.6-4 M” (24PP430/190)	380x200x190	19,0	Pulsed	3,0	2,6	1,8	1800	

## Batteries "Liman M" / «Лиман М»

TY 3483-051-04707044-2008

The principal differences between batteries "Liman" and upgraded "Liman M"

Batteries "Liman"	Batteries "Liman M"
Zinc-mercury-air system	Zinc-air system
Gelled electrolyte	Electrolyte is aqueous solution of potassium hydroxide (KOH)
Guaranteed shelf life – 15 months	Guaranteed shelf life – 15 months. It is possible to supply batteries in dry state; electrolyte is supplied in bottles as one set. Quantity of bottles with electrolyte corresponds to quantity of cells in the battery. In that case the guaranteed self life in dry state – 5 years.
Capacity – to 300 Ah	Capacity – to 400 Ah
Weight, kg - from 1,7 to 19,0	Weight, kg - from 1,4 to 4,4



Characteristics of the battery "Liman M"

	"Liman M 2.6V-200Ah" (2PP100/180)	"Liman M 2.6V-400Ah" (4PP156/180)	"Liman M 4.0V-200Ah" (3PP127/180)	"Liman M 5.0V-200Ah" (4PP156/180)	"Liman M 6.0V-200Ah" (5PP188/180)	"Liman M 8.0V-200Ah" (6PP221/180)	"Liman M" 1PP128/186
Dimensions, mm, no more than	70x70x180	70x140x180	70x106x108	70x140x180	70x175x180	70x210x180	82,5x98,5x186
Rated voltage, V	2,6	2,6	3,9	5,3	6,5	7,8	1,2
External resistance during voltage measurement, Ohm	50,0	50,0	100,0	100,0	100,0	150,0	2,0
External resistance during pulsed discharge: 0.7 sec. – discharge, 2.8 sec. – pause during 10 hours a day	4,1	4,1	12,0	–	20,0	24,0	5,0 Continuous discharge
Charging rate is pulsed							
Charging rate is intermittent	9,0	9,0	26,0	150,0	44,0	53,0	2,0
End-of-discharge voltage, V	1,8	1,8	2,7	3,8	4,5	5,4	0,95
Capacity, Ah	200	400	200	200	200	200	450 Continuous discharge 450 Intermittent discharge
Operating temperature range, °C	From 15°C below zero to 40°C above zero						
Weight, kg, no more than	1,4	2,9	2,3	2,9	3,6	4,4	1,5
Guaranteed shelf life, months	15						

They have FAA Russian River Register certificate of type approval.



# Chemical power sources for navigational aids



The structure eliminates the possibility of explosion and ignition (safety requirements meet State Standard GOST 12.2.007.12-88, GOST IEC 60086-1-2010 and the technical regulations "safety of objects of inland water transport").

According to State Standard GOST 9294-83 the batteries are able to be transported to any distance by any means of transport in accordance with the regulations concerning carriage of goods.



**Batteries "Lotsman" / «ЛОЦМАН»**  
TV 3483-064-04707044-2011

The batteries "Lotsman" of manganese-zinc battery electro-chemical system are designed as a power source for buoyant luminous-signal devices for navigation equipment.

Design battery provides: the battery terminals are in the form of a flexible cable length 8 m; to protect against a possible reversal in the process of mounting a silicon diode is installed inside the case; a handle belt is on the battery cover for easy transport and installation in the equipment.

The battery has a protection class IP54 according to the classification system enclosure protection of electrical equipment against ingress of solid foreign objects and water in accordance with the international standard IEC 60529 (DIN 40050, State Standard GOST 14254-96).

The batteries are fire and explosion safe at exploitation and recycling and comply with State Standard GOST 12.2.007.12-88, GOST R IEC 60086-1-2010 and the technical regulations "safety of objects of inland water transport".

## Characteristics of the battery "Lotsman"

	"Lotsman" (7LR112/610)	"Lotsman 1" (10LR142/610)	"Lotsman 2" (10LR142/800)	"Lotsman 3" (10LR142/1000)	"Lotsman 4" (7LR112/1000)
Maximum dimensions, mm	Ø112x610	Ø142x610	Ø142x800	Ø142x1000	Ø112x1000
Maximal weight, kg	8,0	10,0	14,0	25,0	14,0
Initial voltage, V	12,0	12,0	15,0	21,0	21,0
External circuit resistance during voltage measurement and discharge, Ohm External circuit resistance during pulsed discharge with cycle 9.25 sec. during 10 hours a day, Ohm Cycle: 0.5 sec. – discharge, 0.5 sec. – pause – repeat 6 times, 1 sec. – discharge, 2.25 sec. – pause.	24,0±0,1	12,0±0,1	12,0±0,1	43,0±0,1	43,0±0,1
End-of-discharge voltage, V	7,5	7,5	7,5	9,0	9,0
Capacity, Ah	250	250	250	300	250
Capacity at minus -20°C, Ah	75				
Guaranteed shelf life, months	60				
Operating temperature range, °C	from 20°C below zero to 40°C above zero				

Battery «Shtil» / «ШТИЛЬ» (2PP219/206)

TU 3483-032-04707044-2007

The backup-type battery with alkaline electrolyte of air-zinc electrochemical system consists of 2 cells connected in series with voltage of 1.2V.

The battery is used as a power supply for coastal luminous navigational equipment.

The battery is fire and explosion safe during operation and utilization under keeping of State Standard GOST 12.2007.12-88, GOST R IEC 600086-1-2010 and the technical regulations "safety of objects of inland water transport".



The battery has the certificate of type approval of FAA Russian River Register.

According to State Standard GOST 9294-83 the batteries are able to be transported to any distance by any means of land transport and in cargo hold of ship in accordance with transportation rules, operating on those types of transport.

Transportation of the batteries by air is allowed in pressurized compartment and in accordance with the regulations concerning carriage of goods by air.



Characteristics of the battery «Shtil» / «ШТИЛЬ» (2PP219/206)

Dimensions, mm, not more than	198x95x206
Weight, kg, not more than excluding / including the electrolyte	3,5/5,0
Initial voltage, V, not less than	2,3
External circuit resistance during voltage measurement and discharge, Ohm	3,0
Intermittent discharge with the ratio of the discharge time to pause time of 1:1 with the duration of the discharge of 0.5 seconds during 24 hours	
Rated capacity, Ah, not less than	600
Guaranteed shelf life without electrolyte, years	5
Range of the operating temperatures, °C	from 30 °C below zero to 40 °C above zero



Battery "2 Baken 5V-80Ah" /  
«2 Бакен 5В-80А ч» (4PP122/243)

ЖШИЦ.563211.024 ТУ

The battery with alkaline electrolyte of air-zinc electrochemical system is designed as a power source for luminous-signal devices for navigation equipment of river craft.

Characteristics of the battery "2 Baken5V-80Ah"/"2 Бакен 5В-80Ач" (4PP122/243)

Dimensions, mm, not more than	133,5x88,5x243,0
Weight, kg, not more than	3,75-4,0
Initial voltage of fresh made, V, not less than	5,0
External circuit resistance during voltage measurement, Ohm	20,0
External circuit resistance during discharge, Ohm: intermittent - 10 hours a day; pulsed - 0.7 sec. - discharge, 2,8 sec. - pause during 10 hours a day	50,0 23,0
End-of-discharge voltage, V	3,8
Capacity of each block, Ah, at R=50 Ohm R=23 Ohm	80 80
Guaranteed shelf life without electrolyte before using, month	18
Range of operating temperatures, °C	from 10°C below zero to 50°C above zero

Characteristics of the battery "Pulsar" /"Пульсар"

Dimensions, mm, not more than	Ø257x132
Weight, kg, not more than	7,3
Voltage, V, not less than	1,55
End-of-discharge voltage, V	0,96
Resistance, Ohm	3,0
Intermittent discharge mode during 12 hours a day. The ratio of the discharge time to pause time is 1:1. The duration of the discharge is 0.5 seconds.	
Capacity, Ah, not less than	350
Guaranteed shelf life, month	12
Range of operating temperatures, °C	from -5 to +40

Battery "Pulsar" / «Пульсар» (28R257/132)

ТУ 3483-026-04707044-00



Battery with salt electrolyte of manganese-zinc electrochemical system is designed as a power source for buoyant luminous-signal devices for navigation equipment.

The battery is resistant to atmospheric condensed precipitation. The battery is safe at exploitation and recycling.



## Battery "Shtorm" / «Шторм» (6PP368/195)

ТУ 3483-065-04707044-2011

The battery with alkaline electrolyte of air-zinc electrochemical system is used as a power supply for coastal luminous navigational equipment.

The highcapacity and backup-type battery has a rigid frame with a handle for easy carrying. Switching to the equipment carried out by means of pin terminals.

The battery is able to storage for a long time in a dry state; the battery works at the free access of air after filling the electrolyte from the bottles supplied with battery.

The battery is fire and explosion safe during operation and utilization and meet requirements of State Standard GOST 12.2007.12-88, GOST R IEC 600086-1-2010.

### Characteristics of the battery "Shtorm" / «Шторм»

Maximal dimensions, mm	310x200x195
Maximal weight, kg	11,5
Minimal initial voltage, V	3,0
External circuit resistance during voltage measurement, Ohm	3,0±0,1
External circuit resistance during discharge, Ohm	6,0±0,1 3,0±0,1 2,0±0,1 1,0±0,1
End-of-discharge voltage, V	1,8
Maximal discharge current, A	1,0
Minimal capacity, Ah	1200
Guaranteed shelf life without electrolyte, month	60
Range of operating temperatures, °C	from -30 to +40

Battery case is made of high impact polystyrene, the unit of cells is fixed with bitumen composition inside the case, that allows the battery to operate in a long and static heel and the batteries are able to transport for any distance with all types of transport.

The batteries are fire and explosion safe during operation and utilization and meet requirements of State Standard GOST 12.2007.12.



## Battery "Yakor 4V-75 Ah" / «Якорь 4В-75А ч» (ЗРР171/68)

ЖШИЦ.563211.027 ТУ

The battery with alkaline electrolyte of air-zinc electrochemical system is used as a power supply for navigational equipment.



*Characteristics of the battery*  
**“Yakor 4V-75 Ah” / «Якорь 4В-75А Ч»**

Maximal dimensions, mm	128x115x68
Maximal weight, kg	1,58
Minimal initial voltage, V	3,9
External circuit resistance during voltage measurement and discharge, Ohm	23,0±1
External circuit resistance during pulsed discharge: 0.7 sec. – discharge, 2.8 sec. – pause for 10 hours a day, Ohm	23,0±1
External circuit resistance during intermittent discharge mode for 10 hours a day, Ohm	50
End-of- discharge voltage, V	2,7
Maximal discharge current, A	1,0
Capacity during continuous discharge mode, Ah	75
Capacity at minus 15°C, Ah, not less than	25
Capacity at the end of shelf life, Ah, not less	52
Guaranteed shelf life without electrolyte, month	15
Range of operating temperatures, °C	from -15°C to +40°C

**Battery “IT 6V-700Ah” /  
«ИТ 6В-700А Ч» (2PP240/220)**  
ЖШИЦ.563212.018 ТУ

*Characteristics of the battery*  
**“IT 6V-700Ah” / «ИТ 6В-700А Ч»**

Maximal dimensions, mm	215x107,5x220
Maximal weight, kg	9,8
Minimal initial voltage, V	5,2
<b>Discharge mode – pulsed</b> (0.5 sec – discharg, 1.0 sec – pause for 12 hours/day)	
External circuit resistance during discharge, Ohm	2,7±0,1
End-of-discharge voltage, V	4,5
Maximal discharge current, A	1,0
Minimal capacity at T= (20±5)°C, Ah	700
Guaranteed shelf life, month	24
Range of operating temperatures, °C	from - (30±2)°C to - (40±2)°C

*The battery with salt electrolyte of manganese air zinc electrochemical system is intended as a power supply for navigational equipment – coastal warning signs.*

Design battery provides the ability which allows serial or parallel connection between each other to provide the required voltage and capacity; switching to equipment is made using terminals. The batteries are fire and explosion safe during operation and utilization and meet requirements of State Standard GOST 12.2007.12.

Battery "Akula" / «Акула» (19LR254/270)

ЖШИЦ.563213.008 TV



The battery of manganese zinc electrochemical battery system is designed as a power source for luminous-signal floating devices for navigation equipment – floating warning beacons.

Design battery provides: the battery terminals are flexible cable 550 mm length; to protect against a possible reversal in the process of mounting a silicon diodes are installed inside the case; a handle belt is on the battery cover for easy transport and installation in the equipment; the unit of cells is fixed with sealing foam inside the case, that allows the battery to operate in a long and static heel and the batteries are able to be transported to any distance by any means of transport.

The battery has a protection class IP54 according to the classification system enclosure protection of electrical equipment against ingress of solid foreign objects and water in accordance with the international standard IEC 60529 (DIN 40050, GOST 14254-96).

The batteries are fire and explosion safe at exploitation and recycling and comply with State Standard GOST 12.2.007.12.

Characteristics of the battery "Akula" / «Акула»

Maximal dimensions, mm	Ø254x270
Maximal weight, kg	11,5
Minimal initial voltage, V	5,2
Discharge mode – pulsed (0.5 sec – discharge, 0.5 sec – pause for 12 hours/day )	
External circuit resistance during voltage measurement, Ohm	2,7±0,1
External circuit resistance during discharge, Ohm	12±0,1
End-of-discharge voltage, V	4,5
Max. discharge current, A	1,0
Minimal capacity at T= (20±5)°C, Ah	350
Guaranteed shelf life without electrolyte, month	60
Range of operating temperatures, °C	from - (30±2)°C to +(40±2)°C

Battery "Korvet" (56CR254/132) / «Корвет»

ЖШИЦ.563261.001 TV



The battery of lithium manganese dioxide electrochemical battery system is designed as a power source for light-optical devices of floating and coastal navigational equipment.



## Chemical power sources for navigational aids

Design battery provides: possibility to put the batteries one on another and use them in this position; the battery terminals are flexible cable 500 mm length; to protect against a possible reversal in the process of mounting a resettable fuse is installed inside the case; a handle belt is on the battery cover for easy transport and installation into the equipment; the unit of cells is fixed with silicone sealant inside the case, that allows the battery to operate in a long and static heel and the batteries are able to be transported to any distance by any means of transport.

The battery has a protection class IP54 according to the classification system enclosure protection of electrical equipment against ingress of solid foreign objects and water in accordance with the international standard IEC 60529 (DIN 40050, GOST 14254-96).

The batteries are fire and explosion safe during exploitation and recycling and comply with State Standard GOST 12.2.007.12, GOST R IEC 60086-1-2010 and the technical regulations "safety of objects of inland water transport".



The battery of lithium manganese dioxide battery system with organic electrolyte is designed as a power source for light-optical devices of floating and coastal navigational equipment.

Design battery provides: the ability which allows serial or parallel connection between each other to provide the required voltage and capacity; the battery terminals are flexible cable 500mm length; to protect against a possible reversal or shorting in the process of mounting a resettable fuse is installed inside the case; a handle belt is on the battery cover for easy transport and installation into the equipment; the unit of cells is fixed with silicone sealant inside the case, that allows the battery to operate in a long and static heel and the batteries are able to be transported to any distance by any means of transport.

The battery has a protection class IP54 according to the classification system enclosure protection of electrical equipment against ingress of solid foreign objects and water in accordance with the international standard IEC 60529 (DIN 40050, GOST 14254-96).

### Characteristics of the battery "Korvet"

Maximal dimensions, mm	Ø254x132
Maximal weight, kg	8,0
Minimal open circuit voltage, V	3,15
<b>Discharge mode – pulsed</b> (0.5 sec – discharge, 0.5 sec – pause for 12 hours/day)	
External circuit resistance during discharge, Ohm	6,0±0,1
End-of-discharge voltage, V	1,8
Max. discharge current, A	1,0
Minimal capacity at T= (25±2)°C, Ah	600
Guaranteed shelf life, month	60
Range of operating temperatures, °C	from - (40±2)°C to - (50±2)°C

### Battery Borey" / «Борей» (40CR254/92) ЖШИЦ.563261.002 ТУ

### Characteristics of the battery "Borey" /«Борей»

Maximal dimensions, mm	Ø254x92
Maximal weight, kg	6,5
Minimal open circuit voltage, V	3,15
<b>Discharge mode – pulsed</b> (0.5 sec – discharge, 0.5 sec – pause for 12 hours/day)	
External circuit resistance during voltage measurement, Ohm	6,0±0,1
External circuit resistance during discharge, Ohm	6,0±0,1
End-of-discharge voltage, V	1,8
Max. discharge current, A	1,0
Minimal capacity at T= (20±5)°C, Ah	450
Guaranteed shelf life, month	60
Range of operating temperatures, °C	from - (40±2)°C to +(50±2)°C

The batteries are fire and explosion safe at exploitation and recycling and comply with State Standard GOST 12.2.007.12, GOST R IEC 60086-1-2010 and the technical regulations "safety of objects of inland water transport".

Battery

**“Impuls 3V-300 Ah” / «Импульс 3В-300А ч»  
(38R254/170)**

**“Impuls 3V-500 Ah” / «Импульс 3В-500А ч»  
(38LR254/170)**

TU3483-031-04707044-2007

Battery “Impuls 3V-300 Ah” / «Импульс 3В-300А ч» is the battery of manganese-zinc electrochemical battery system with salt electrolyte.

Battery “Impuls 3V-500 Ah” / «Импульс 3В-500А ч» is the battery of manganese-zinc electrochemical battery system with alkaline electrolyte.

The batteries are intended to use as a power supply for luminous navigational devises.

The design of the battery provides a channel on the side for connecting wires when you install several batteries simultaneously into the object. A handle belt is on the battery cover for easy transport and installation into the equipment.

The batteries are fire and explosion safe at exploitation and recycling and comply with State Standard GOST 12.2.007.12, GOST R IEC 60086-1-2010 and the technical regulations “safety of objects of inland water transport”.



Characteristics of the battery “Impuls” / «Импульс»

	Impuls 3V-300Ah	Impuls 3V-500Ah
Dimensions, mm, not more than	Ø252x170	
Weight, kg, no more than	9,0	12,5
Voltage, V, no less than	3,0	
External circuit resistance during voltage measurement and discharge, Ohm	3,0	
End-of-discharge voltage, V	1,8	
Capacity at T= -5°C, Ah, not less than	120	200
Capacity at T= -30°C, Ah, not less than	90	150
Capacity at T= from -20°C to + 40°C, Ah, not less than	300	500
Impulse discharge mode for 24 hours a day: discharge/pause, sec.	0,5/0,5	
Range of operating temperatures, °C	from - 30°C to +40°C	
Guaranteed shelf life, month	24	60

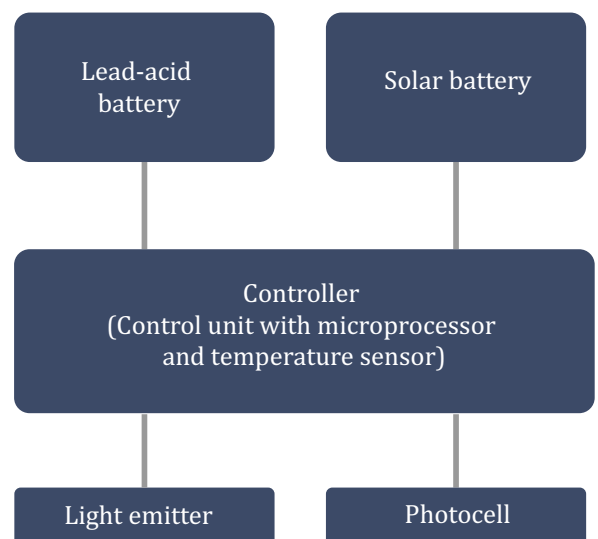


**Light-optical electric power.  
installation.  
Description.  
Construction.**

One way of solving this problem is to create a new kind of visual navigation aids, using a new light source, new source of energy and a new management principle of navigation aids

Power installation is based on solar modules, lead-acid battery with high power characteristics and excellent performance and the new intelligent controller based on modern chip microprocessor and intended for controlling the navigation equipment widely used.

General power installation electric scheme for autonomous navigation aids.



The product is designed to supply electrical power for navigational aids in the coastal zone of the Russian Federation. Photo-power installation provides a work of the automatic light-optical LED device in the mode of periodic recharging of energy storage.

The most important task of the Navy Hydrographic Service is to equip the country's coast-line with navigational systems, which is correspond to the tasks of combat and daily training of the Navy in a variety of conditions.

Over the last years, new requirements to ensure maritime navigation reflected among scientific developments, both in Russia and abroad. These requirements are intended to improve the accuracy of ships determination in the coastal zone.

### Microprocessor battery switcher "Neptun"



Microprocessor battery switcher "Neptun" is intended to automatically connect a load to one of the backup battery during voltage slump.

Switcher allows the connection of four batteries. One of which is considered to be working (for example, the first), and the other three - reserve. The device works on the following principle: when the voltage of the battery 1 dips below the permissible level - battery 2 is joined, when the resource of battery 2 is over - battery 3 is joined, then the battery 4.

Device program is written in such a way that creates an infinite loop of a circle: switcher continuously measures the battery voltage and connects the battery which resource is not over. The device consumes little current (less than 10mA). Number of connected batteries can be any from 2 to 4. The device works correctly with pulse load, such as an incandescent lamp having a low spiral resistance in cold state and has a significant initial current, because the second measurement of voltage is in 200 msec. after the first one. In other words any current release is simply ignored.

**It is allowed to use any type of battery.**



**It can be used for "Lotsman" batteries.**

*Technical characteristics of microprocessor battery switcher "Neptun".*

Voltage of connected batteries (accumulators), V	8...16
Maximal switched current, A	5
Minimal pulse duration of load connection under pulsed load, mSec	300
Battery switching voltage, V**	7,5

**All items can be changed at customer's request**

**\*\* 7,5 Volt is considered to be the full battery discharge**



# Chemical power sources for household usage

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## Manganese-zinc cells and batteries:

Battery **“Korund” 6PLF22 / «Корунд» 6PLF22**

Cell **A316 “ERA” Lr6 / A316 «ЭРА» Lr6**

Cell **A332 “ERA” Lr10 / A332 «ЭРА» Lr10**

Cell **A343 “ERA” Lr14 / A343 «ЭРА» Lr14**

Cell **286 r03 / 286 r03**

Cell **A373C “Orion M R20C / A373C «Орион М» R20C**

## Air-zinc cells and batteries:

Cell **PR44/PR44 (size A675)**

## Lithium cells and batteries:

Cell **“Blik-1” / «Блик-1»**

Cell **“Blik-2” / «Блик-2»**

Cell **“Blik-3” / «Блик-3»**

Battery **“2Blik-1” / «2Блик-1»**

Cells **CR 2016, CR 2025, CR 2032, CR 2325**

### Battery "Korund" / «Корунд» (6PLF22)

ТУ16-729.060-81 (ИЛЕВ.563212.002ТУ)



The battery with an alkaline electrolyte of manganese-zinc electrochemical system is used for photographic equipment, remote controls, radios, wireless microphones, medical equipment, and instrumentation.

#### Technical characteristics of battery "Korund"

Maximal dimensions, mm	26,5x17,5x48,5
Maximal weight, kg	0,04
Initial voltage, V, not less than	8,5
Capacity, Ah	0,68
Guaranteed shelf life, months	12



### Cells A316 "ERA" / A316 «ЭРА» (LR14 G505) LR6

ЖШИЦ.563132.003ТУ

### A332 "ERA" / A332«ЭРА» (Lr21 G373) LR10

ЖШИЦ.563132.005ТУ

### A343 "ERA" / A343 «ЭРА» (LR26 500) LR14

ЖШИЦ.563132.001ТУ

Cells of manganese-zinc electrochemical system with alkaline electrolyte is used for remote controls, toys, clocks, communications equipment, photographic equipment, security and fire alarms, lighting equipment.

#### Technical characteristics of cells A316 "ERA", A332 "ERA", A343 "ERA"

	A316 "ERA" (LR14G505) LR6	A332 "ERA" (LR21G373) LR10	A343 "ERA" (LR26 500) LR14
Maximal dimensions, mm	Ø14,5x50,5	Ø21,5x37,3	Ø26,2x50
Maximal weight, kg	0,025	0,035	0,067
Initial voltage, V, not less than		1,4	
Capacity, Ah	1,2	1,6	4,0
Guaranteed shelf life, months	24	12	12

## Chemical power sources for household usage

### Cell 286 (R10 G445) R03

The cell of manganese-zinc electrochemical system with salt electrolyte is intended to power radios, hearing aids, remote controls and other household appliances.

#### Technical characteristics of cell 286

Maximal dimensions, mm	Ø10,5x44,5
Maximal weight, kg	0,011
Initial voltage, V, not less than	1,5
External circuit resistance during discharge, Ohm: Continuous Intermittent	200 300 (12 hours a day) 75 (4 hours a day)
Продолжительность работы свежеизготовленных элементов при непрерывном режиме, ч, R=200 Ом: t=(20±5)°C t=45°C t=-10°C	30 30 3
End-of-discharge voltage, V	1,0
New battery lifetime in intermittent mode: T=(20±5)°C R=300 Ohm R=45 Ohm	72 12
End-of-discharge voltage, V	0,9
Guaranteed shelf life, months	9

#### Technical characteristics of 373C "Orion M" / 373C «Орион М»

Maximal dimensions, mm	Ø34,2x61,5
Maximal weight, kg	0,11
Initial voltage, V, not less than	1,5
External circuit resistance during discharge, Ohm	10
Capacity, Ah	4,8
Guaranteed shelf life, months	36



### Cell 373C "Orion M" (R34615C) R20C/373C «Орион М» (R34615C) R20C



The cell of manganese-zinc electrochemical system with salt electrolyte is intended to replace imported and domestic salt cells such as 373 ("D", R20) in radio equipment, domestic appliances, lighting equipment, measuring equipment.

At R=2.2 Ohm (1 hour a day)  
V<sub>K</sub>=0,8 V – according to Technical Standard: 5 hours, actual: 8 – 9 hours.  
At R=3.9 Ohm (1 hours a day)  
V<sub>K</sub>=0.9 V – according to Technical Standard: 15 hours, actual: 14 – 16 hours.  
At R=10.0 Ohm (4 hours a day)  
V<sub>K</sub>=0.9 V – according to Technical Standard: 40 hours, actual: 45 – 50 hours.  
At R=39.0 Ohm (4 hours a day)  
V<sub>K</sub>=0,9 V – according to Technical Standard: 230 hours.

## Cell PR44 (size A675)

### Technical characteristics of PR44

Maximal dimensions, mm	Ø11,6x5,4
Weight, kg	0,002
Initial voltage, V, not less than	1,2
External circuit resistance during voltage measurement, Ohm	625
External circuit resistance during continuous discharge mode, Ohm	625 300
New cell lifetime R=625 Ohm, h: t=20°C t=40°C t=-10°C	200
	100
	20

The cell of zinc air electrochemical system is intended to power hearing aids with input current not more than 4 mA.

End-of-discharge voltage, V	0,9
New cell lifetime R=300 Ohm, h: t=20°C t=40°C t=-10°C	70
	40
	10
End-of-discharge voltage, V	0,9
Nominal capacity, Ah	0,4
Guaranteed shelf life, months	12

Lithium cells and batteries is intended for independent power storage devices, digital clocks, remote control, night vision devices, gas analyzers, cash registers, security and anti-theft devices, medical equipment.

All listed equipment consumes small and medium currents and requires power sources with a long shelf life and work in a wide range of temperatures, has requirements for miniature power supply. Lithium power sources satisfy all these requirements.

Lithium power sources provide three times greater specific energy than mercury batteries and four times greater than the alkaline-manganese batteries.

These current sources have a long shelf life. Capacity loss after three years of storage is negligible.

## Lithium cells and batteries



### Technical characteristics of the lithium current sources.

	Maximal dimensions, mm	Maximal weight, kg	Voltage, V	Rated capacity, Ah	Guaranteed self life, months
Cell "Blik-1"	Ø11,65x10,8	0,0031	2,85	0,15	60
Cell "Blik-2"	Ø17,0x33,5	0,0154 min	3,0	1,0	
Cell "Blik-3"	Ø14,5x50,5	0,0168 min	3	1,0	
Battery "2Blik-1"	Ø13,2x25,2	0,0072	5,9	0,15	36
Cell CR 2016	Ø20,0x1,7	0,002	2,9	0,05	
Cell CR 2025	Ø20,0x2,7	0,0024	2,9	0,08	
Cell CR 2032	Ø20,0x3,4	0,0032	2,9	0,14	
Cell CR 2325	Ø23,0x2,65	0,0031	2,9	0,14	



# Chemical power sources for communication facilities, rescue equipment

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## **mercury-zinc cells and batteries:**

Battery "Priboy 2c" / «Прибой 2с»

Battery "Aktsiya" / «Акция»

## **Zinc-mercury cells and units**

## **Water-activated battery:**

Batteries "Думок-М" / «ДЫМОК-М», "Думок-1М" / «ДЫМОК-1М»,

"Думок-2М" / «ДЫМОК-2М»

Battery "12-9AM" / «15-9AM»

Battery "Brig" / «Бриг»

## **Manganese-zinc cells and batteries:**

Cells "17P" / «17П», "ERM P" / «ЭРМ П», "Moskit" / «Москит»,

"Moskit-1" / «Москит-1»

Battery "GB-10-y-1,3" (6P7953) / «ГБ-10-y-1,3» (6P7953), «7LR6»  
(7LP7953)

## Zinc-mercury cells and batteries



### Battery "Priboy 2c" / «Прибой 2с»

ИЛТБ.563212.017

The battery is intended as an autonomous power supply for radio stations P-855 УМ и P-855 А.1.

Technical characteristic of the battery "Priboy 2c" / «Прибой 2с»

Dimensions, mm	137,5x80,0x25,5
Weight, kg	0,5
Initial voltage, V, not less than	9,4
External circuit resistance during voltage measurement, Ohm	200
Activity time when external circuit resistance is 80 Ohm, h	18
End-of-discharge voltage, V	7,2
Guaranteed shelf life, months	30

Where required voltage stability, the miniature autonomous sources, high discharge currents, trouble-free operation in a wide temperature range (from -30 °C to 60 °C) the power sources of zinc-mercury systems meet all the above requirements. The current sources are unrivaled in specific energy, stability characteristics during storage and discharge, in convenience and simplicity in operation as well. Cells and batteries of zinc-mercury system work fine in intermittent and continuous mode.

Ability to use the serial and parallel connections between the components allows producing units and batteries with the necessary characteristics and dimensions. The cells are resistant to corrosion and high relative humidity during a long storage.



The unique mechanical properties of the zinc-mercury cells are impact resistance, resistance to vibration, the ability to withstand vacuum 10-6 mm Hg. Art. and pressure up to 10 atm. Self-discharge during storage is negligible. In the period from 12 months to the end of operating life the working efficiency of the cell reduces by no more than 10%. The cells and batteries are used in instrumentation, radio, scientific and military equipment, geophysical devices.

### Batteries "Aktsiya" / «Акция» (6PЦ63)

ТУ16-529.899-73

The battery is intended as a power supply for radio devices P147 and P147П.

Technical characteristics of the battery "Aktsiya" / «Акция»

Dimensions, mm	Ø24,2x60
Weight, kg	0,082
Начальное напряжение, В, не менее	7,5
External resistance at voltage measurement, Ohm	360
Continuous discontinuous discharge mode:	
During resistance 115 Ohm/	10 мин.
During resistance 350 Ohm	30 мин.
Activity time, minutes, not less than	
At t = (2÷6)°C	80
At t = (20÷50)°C	720
End-of-discharge voltage, V	6,0
Guaranteed shelf life, months	15

## Chemical power sources for communication facilities, rescue equipment.

Technical characteristics of zinc-mercury cells and units.

	Maximal dimensions, mm	Maximal weight, kg	Voltage, V	Capacity, Ah	Guaranteed shelf life, months
<b>RTS11M</b>	ø4,7x3,6	0,00028	1,25	0,063	12
<b>RTS15</b>	ø6,3x6,0	0,085	1,25	0,033	24
<b>RTS17</b>	ø5,5x24,5	0,0024	1,25	0,1	25
<b>RTS31 C</b>	ø11,6x3,6	0,002	1,25	0,105	30
<b>RTS32</b>	ø10,9x3,6	0,0014	1,25	0,1	9
<b>RTS32X</b>	ø10,9x3,6	0,0014	1,25	0,05	6
<b>RTS33</b>	ø11,6x5,4	0,0025	1,25	0,11	12
<b>RTS53</b>	ø15,6x6,3	0,0046	1,25	0,3	18
<b>RTS53V</b>	ø15,6x6,3	0,0046	1,25	0,164	60
<b>RTS55</b>	ø15,6x12,5	0,0095	1,22	0,55	36
<b>RTS57</b>	ø16,6x17,8	0,017	1,25	1,0	18
<b>RTS59</b>	ø16,6x50,6	0,047	1,25	3,0	18
<b>RTS63</b>	ø21,0x7,4	0,011	1,25	0,65	24
<b>RTS65</b>	ø21,0x13,0	0,0181	1,22	1,1	36
<b>RTS73</b>	ø25,5x8,4	0,0172	1,25	1,1	24
<b>RTS75</b>	ø25,5x13,5	0,0273	1,22	1,8	36
<b>RTS82</b>	ø30,1x9,4	0,030	1,25	1,5	24
<b>RTS83</b>	ø30,1x9,4	0,0282	1,25	1,8	24
<b>RTS83X</b>	ø30,1x9,4	0,0253	1,25	1,5	18
<b>RTS85</b>	ø30,1x14,0	0,0395	1,22	2,8	36
<b>RTS93</b>	ø30,6x60,8	0,170	1,25	14,0	36
<b>RTS93C</b>	ø30,6x60,8	0,170	1,25	14,0	63
<b>2RTS53-10RTS53</b>	ø16,2 H16-72	0,010-0,05	2,5-12,5	0,25	15
<b>2RTS55-10RTS55</b>	ø16,2 H28-132	0,0201-0,0985	2,44-12,2	0,5	24
<b>2RTS63-10RTS63</b>	ø21,6 H18-81	0,0229-0,1135	2,5-12,5	0,55	18
<b>2RTS5-10RTS65</b>	ø21,0 H29-137	0,0368-0,1827	2,44-12,2	1,0	24

## Chemical power sources for communication facilities, rescue equipment.

	Maximal dimensions, mm	Maximal weight, kg	Voltage, V	Capacity, Ah	Guaranteed shelf life, months
<b>2RTS73-10RTS73</b>	ø26,1 H20-91	0,0357-0,1765	2,5-12,5	1,0	18
<b>2RTS75-10RTS75</b>	ø26,1 H30-142	0,0561-0,2787	2,44-12,2	1,5	24
<b>2RTS83-10RTS83</b>	ø30,7 H22-101	0,0573-0,285	2,5-12,5	1,5	18
<b>2RTS85-10RTS85</b>	ø30,7 H31-147	0,0838-0,4177	2,44-12,2	2,5	24
<b>4RTS57</b>	ø18,9x73,0	0,085	5,0	0,54	12
<b>“Motiv”</b>	ø17,3x40,5	0,042	6,25	0,02	60
<b>7RTS53Y</b>	ø17,3x53,5	0,050	8,75	0,1	54
<b>5RTS83X</b>	ø30,7x52,0	0,142	6,25	1,5	9
<b>6RTS83X</b>	ø30,7x62,0	0,171	7,5	1,5	9
<b>9RTS83X</b>	ø30,7x91,0	0,256	11,25	1,5	9
<b>10RTS83X</b>	ø30,7x101,0	0,285	12,5	1,3	9

### Technical characteristics of cell RTS983

### Cell **RTS983** ФШ3.513.136TV

Maximal dimensions, mm	60,1x30,1x6,5
Maximal weight, kg	0,05
Initial voltage, V, not less than	1,25
External circuit resistance during voltage measurement, Ohm	25
External circuit resistance during discharge, Ohm	12 25 300
Activity time, h, not less than, at a) T= + (20÷40)°C: R=12 Ohm R=250hm R=300 Ohm b) T= -5°C R=250hm R=300 Ohm	10 50 700 10 700
End-of-discharge voltage, V	0,9
Capacity, Ah, not less than a) T= + (20÷40)°C: R=12 Ohm R=250hm R=300 Ohm b) T= -5°C R=25 Ohm R=300 Ohm	1,0 2,5 3,0 0,5 3,0
Guaranteed shelf life, years	5

*The cell is intended as a power supply for radio devices and equipment..*



## Chemical power sources for communication facilities, rescue equipment.

### Water-activated batteries

Water-activated batteries are used in search and detection offshore facilities, navigation, radio, sea and river rescue equipment, flashing lights, smoke bombs, hardware sensing of the atmosphere.

These batteries are also suitable for use as an energy source to power the lighting devices for jackets, diving suits, rafts and other means to rescue people in distress on the water.

In case of contact with water, the victim pulls the plug, the product is filled with water and a warning light of rescue vehicle is activated. The product can be proposed for development for use in any emergency situations to produce energy in the presence of fresh or salt water.

Water-activated single action batteries are durable, resistant to mechanical stress and climatic factors.

The batteries are simple to operate, efficient in a wide range of temperatures and pressures.

They differ in the absence of electrolyte, which allows storing them installed in device up to 6 years.



Battery "Dymok M" is designed to power supply the buoy BS-2 and ship lifebuoys.

Battery "15-9AM" is used in light signaling devices of marine life rafts BM-16.

Batteries "Dymol-1M" and "Dymok-2M" are intended for use as a power source of lighting devices in life jackets and immersion suits. The uniqueness of these sources is the ability to operate immersed in the sea and in fresh water.

Battery "Brig" of magnesium lead chloride electrochemical system is intended for the supply of signal rescue units, luminous buoys and other facilities operated in seawater.

Technical characteristics of water-activated batteries.

		"Dymok-M"	"Dymok-1M"	"Dymok-2M"	15-9AM	"Brig"
Service conditions (water temperature)		Seawater: From -10C to +30 oC	Seawater: From -10C to +30 oC Fresh water: ambient temperature		Seawater: From -10C to +30 oC	
Working voltage, V	Not less than	3,6	1,8		18,0	
	Not more than	5,1	3,4		23,6	
Time to minimal working voltage, sec., not more than		60	180		60	
Activity time, h, not less than		2	13	19	4,5	
Maximal dimensions, mm		76,0x41,0x100,0	48,5x21,5x101,0	61,5x31,5x101,0	89,7x76,0x91,3	
Maximal weight, kg		0,35	0,15	0,28	0,8	
Guaranteed shelf life, months		60			72	

## Chemical power sources for communication facilities, rescue equipment.

Cells **17P/ 17П**  
ТУ 16-529.594-81

**ERM P / ЭРМ П**  
ТУ 16-529.594-81

**"Moskit" / «Москит»**  
ЖШИЦ.563261.003

**"Moskit" / «Москит-1»**  
ЖШИЦ.563261.004



The cells 17P / 17П and ERM / ЭРМ are cells of manganese-zinc electrochemical system with salt electrolyte.

"Moskit" / «Москит», "Moskit-1" / «Москит-1» are batteries of lithium iron disulfide system with organic electrolyte.

The cells "Moskit", "Moskit-1" have improved performance and increased shelf life.

The cells 17P, ERM P, "Moskit", "Moskit-1" are designed to supply equipment of special purpose.

Technical characteristics of 17P, ERM P, Moskit, Moskit-1.

	17P	ERM P	Moskit	Moskit-1
Maximal dimensions, mm	47,0x28,0x143,0	61,0x36,0x150,0	61,0x136,0x150,0	47,0x28,0x143,0
Maximal weight, kg	0,33	0,57	0,35	0,25
Начальное напряжение, В	1,4		1,6	
External resistance at voltage measurement, Ohm	1,0		5,0	
External resistance at discharge, Ohm	10,0			
Capacity, Ah	4,0	9,0	11,0	7,0
Final voltage, V	1,0			
Guaranteed shelf life, years	4	5	10	
Range of operating temperature, °C	From -40 to +50		From - 60 to + 50	

## Chemical power sources for communication facilities, rescue equipment.

### Batteries

#### GB-10-y-1,3 / ГБ-10-y-1,3

ТУ16-529.298-77

#### 7LR6

ТУ3483-050-04707044-2008



The battery GB-10-y-1,3 / ГБ-10-y-1,3 with salt electrolyte of manganese-zinc system.

The battery 7LR6 with alkaline electrolyte of manganese-zinc system.

The batteries are intended to power supply handsets TA-57 and other special equipment.

Technical characteristics of the batteries 7LR6, GB-10-y-1,3

	The battery 7LR6	The battery GB-10-y-1,3
Maximal dimensions, mm	54,0x59,0x53,5	
Maximal weight, kg	0,22	0,25
Initial voltage, V, not less than	10,5	9,8
External circuit resistance during voltage measurement and discharge, Ohm	700	
Activity time during continuous discharge mode, h	170	120
Capacity, Ah	2,0	1,3
End-of-discharge voltage, V	5,7	
Guaranteed shelf life, years	24	15

# NI-Cd LI-Ion Secondary batteries

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## NI-CD

rechargeable batteries:

4NMGTS-2.1 / 4НМГЦ-2,1  
5NKGTS-5.0 / 5НКГЦ-5,0  
6NKGTS-0.94 / 6НКГЦ-0,94  
6NKGTS-1.5 / 6НКГЦ-1,5  
6NKGTS-1.5-2 / 6НКГЦ-1,5-2  
6NKGTS-1.5-2M / 6НКГЦ-1,5-2M  
6NKGTS-2.0 / 6НКГЦ-2,0  
10NKGTS-0,94 / 10НКГЦ-0,94  
10NKGTS-1.2 / 10НКГЦ-1,2  
10NKGTS-1.4 / 10НКГЦ-1,4  
10NKGTS-1.5-P / 10НКГЦ-1,5-П  
10NKGTS-2.3 / 10НКГЦ-2,3  
10NKGTS-3.0 / 10НКГЦ-3,0  
10NKGTS-3.4 / 10НКГЦ-3,4  
10NKGTS-4.5 / 10НКГЦ-4,5  
10NKGTS-5.0 / 10НКГЦ-5,0  
10NKGTS-8.0 / 10НКГЦ-8,0  
10NKGTS-10 / 10НКГЦ-10

LI-ION

## LI-ION

rechargeable batteries:

2LIA-1.6 / 2ЛИА-1,6  
2LIA-4-1 / 2ЛИА-4-1  
2LIA-4.1 / 2ЛИА-4,1  
2LIA-4-2 / 2ЛИА-4-2  
2LIA-3 / 2ЛИА-3  
2LIA-8 / 2ЛИА-8  
2LIA-12 / 2ЛИА-12  
4LIA-2 / 4ЛИА-2  
4LIA-4.8 / 4ЛИА-4,8  
4LIA-7 / 4ЛИА-7  
4LIA-8.0 / 4ЛИА-8,0  
4LIA-9 / 4ЛИА-9  
4LIA-10 / 4ЛИА-10  
7LIA-32 / 7ЛИА-32  
LIA-550 / ЛИА-550



## Ni-Cd rechargeable batteries

Rechargeable nickel-cadmium battery system designed to power radios used oilmen, geologists, gas companies, equipment traditional mass explosions on open mountain spaces, night vision equipment, mining equipment, medical devices, and electronic equipment.

NKGTS batteries consist of sealed nickel-cadmium cylindrical cells placed in an enclosure latching. Batteries connected in series with jumper wires, welded to the respective positive and negative poles.

Positive and negative terminals are located on the battery cover, and are intended to connect it to the charger and the consumer.



Technical characteristics of Ni-Cd rechargeable batteries.

	Dimensions, mm	Max. weight, kg	Rated capacity (CH), Ah	Rated voltage, V	Final voltage, V	Charging current, A (0.1 CHA)	Discharging current, A (0.2 CHA)	Guaranteed shelf life, years
<b>5NKGTS-5.0</b>	172,0x66,0x40,0	0,8	5,0	6,0	5,0±0,2	0,5	1,0	5
<b>6 NKGTS-0.94</b>	118,0x58,3x18,0	0,2	0,94	7,2	6,0±0,2	0,094	0,188	
<b>6 NKGTS-1,5</b>	118,0x58,0x20	0,24	1,5			0,15	0,3	
<b>6 NKGTS-2.0</b>	152,0x30,0x70,0	0,6	2,0			0,2	0,4	
<b>10 NKGTS-0.94</b>	67,8x40,3x57,0	0,3	0,94			0,094	0,188	
<b>10 NKGTS-1.2</b>	112,0x46,0x65,5	0,4	1,2	12,0	10,0±0,2	0,12	0,24	
<b>10 NKGTS-1.4</b>	112,0x46,0x65,5	0,4	1,4			0,14	0,28	
<b>10 NKGTS-1.5P</b>	144,5x68,0x22	0,4	1,5			0,15	0,3	
<b>10 NKGTS-2.3</b>	134,7x55,4x56,5	1,0	2,3			0,23	0,46	
<b>10 NKGTS-3.4</b>	188,5x39,5x98,5	1,2	3,4			0,34	0,68	
<b>10 NKGTS-5.0</b>	176,5x72,5x69,0	1,88	5,0	0,5	1,0			
<b>10 NKGTS-8.0</b>	176,5x72,5x99,0	3,0	8,0	0,8	1,6			
<b>10 NKGTS-10</b>	210,0x88,0x126,5	4,5	10,0	1,0	2,0			



Nominal voltage, V, no less than				6,0			
Nominal capacity, Ah				5,0			
<b>Charging mode</b>							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,5 (0,1 CнА)	16	1,0 (0,2 CнА)	8	1,5 (0,3 CнА)	4	5,0 (CнА)	1
<b>Discharging modes</b>							
Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than
1,0 (0,2 CнА)	5,0 (Cн)	5,0 (CнА)	4,0 (0,8 Cн)	15,0 (3 CнА)	3,75 (0,75 Cн)		
<b>Capacity, Ah at ambient temperature, oC</b>							
50°C above zero	20°C below zero	30°C below zero	40°C below zero				
4,4 (0,88 Cн)	3,2 (0,64 Cн)	2,5 (0,5 Cн)	1,5 (0,3 Cн)				
<b>Discharge mode with current 0.2 CнА is considered to be a nominal</b>							
Operating temperature during charging, °C				от минус 10 до плюс 50			
Operating temperature during discharging, °C				от минус 40 до плюс 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 Cн)			
Lifetime, years				5			
Dimensions, mm				172x66,0x40,0			
Weight, no more than, kg				0,8			

## Ni-Cd rechargeable batteries

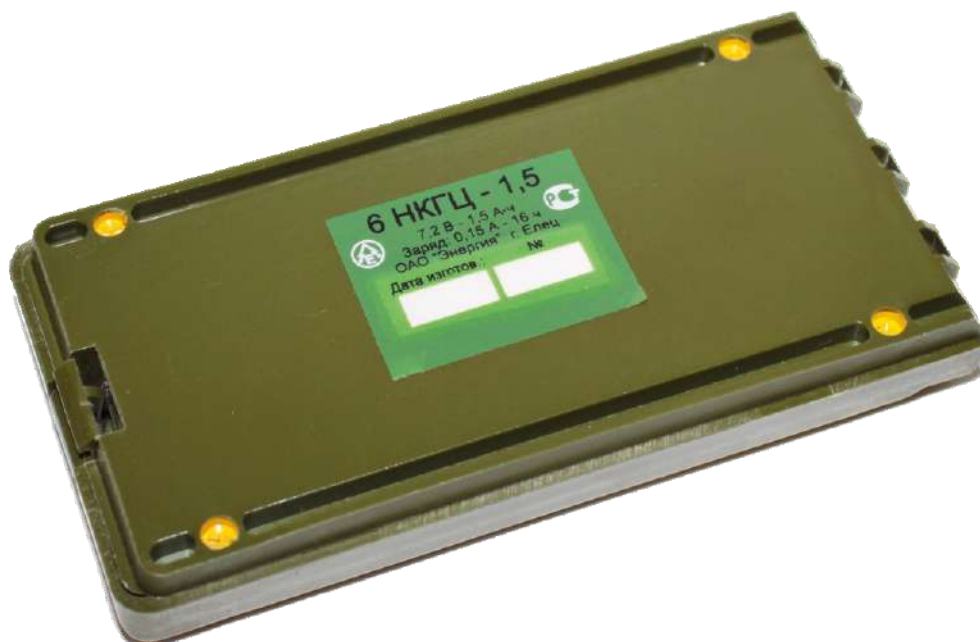
### Battery 6NKGTS-0.94



Technical characteristics of 6NKGTS-0.94 rechargeable battery.

Nominal voltage, V, no less than				7,2			
Nominal capacity, Ah				0,94			
<b>Charging mode</b>							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,094 (0,1 C <sub>нА</sub> )	16	0,188 (0,2 C <sub>нА</sub> )	8	0,282 (0,3 C <sub>нА</sub> )	4	0,94 (C <sub>нА</sub> )	1
<b>Discharging modes</b>							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,188 (0,2 C <sub>нА</sub> )		5		0,94 (C <sub>нА</sub> )		55	
<b>Capacity, Ah at ambient temperature, °C</b>							
55°C above zero		20°C below zero		30°C below zero			
0,827 (0,88 C <sub>н</sub> )		0,602 (0,64 C <sub>н</sub> )		0,47 (0,5 C <sub>н</sub> )			
<b>Discharge mode with current 0.2 C<sub>нА</sub> is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 55			
Operating temperature during discharging, °C				From – 30 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 C <sub>н</sub> )			
Lifetime, years				5			
Dimensions, mm				118,0x58,3x18,0			
Weight, no more than, kg				0,2			

## Battery 6NKGTS-1.5



Technical characteristics of 6NKGTS-1.5 rechargeable battery.

Nominal voltage, V, no less than				7,2			
Nominal capacity, Ah				1,5 <sub>0,1</sub>			
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,15 (0,1 CHA)	16	0,3 (0,2CHA)	8	0,45 (0,3CHA)	4	1,5 (CHA)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,3 (0,2CHA)		1,5 <sub>0,1</sub> (CH)		1,5 (CHA)		1,2 (0,8CH)	
Capacity, Ah at ambient temperature, °C							
55°C above zero		20°C below zero		30°C below zero			
1,32 (0,88CH)		0,96 (0,64CH)		0,75 (0,5CH)			
<b>Discharge mode with current 0.2 CHA is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 55			
Operating temperature during discharging, °C				From – 30 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 CH)			
Lifetime, years				5			
Dimensions, mm				118,0x58,0x20,0			
Weight, no more than, kg				0,24			



## Ni-Cd rechargeable batteries

### Battery 6NKGTS-1.5-2



Technical characteristics of 6NKGTS-1.5-2 rechargeable battery.

Nominal voltage, V, no less than				7,2			
Nominal capacity, Ah				1,5 <sub>0,1</sub>			
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,15 (0,1 CHA)	16	0,3 (0,2CHA)	8	0,45 (0,3CHA)	4	1,5 (CHA)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,3 (0,2CHA)		1,5 <sub>0,1</sub> (CH)		1,5 (CHA)		1,2 (0,8CH)	
Capacity, Ah at ambient temperature, °C							
55°C above zero		20°C below zero		30°C below zero			
1,32 (0,88CH)		0,96 (0,64CH)		0,75 (0,5CH)			
Discharge mode with current 0.2 CHA is considered to be a nominal							
Operating temperature during charging, °C				From – 10 to + 55			
Operating temperature during discharging, °C				From – 30 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 CH)			
Lifetime, years				5			
Dimensions, mm				101,9x58,0x20,5			
Weight, no more than, kg				0,24			

Battery **6NKGTS-1.5-2M**



Technical characteristics of 6NKGTS-1.5-2M rechargeable battery.

Nominal voltage, V, no less than		7,2			
Nominal capacity, Ah		1,5 <sub>0,1</sub>			
<b>Charging mode</b>					
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,15 (0,1ChA)	16	0,6 (0,4ChA)	8	1,5 (ChA)	1
<b>Nominal discharging modes</b>					
Current, A			Period, h, no less than		
0,3			4 h 40 minutes		
<b>Discharge time, h, at ambient temperature, °C</b>					
55°C above zero		20°C below zero		30°C below zero	
4 h 10 minutes		3 h		2 h 30 minutes	
Operating temperature during charging, °C			From 0 to + 50		
Operating temperature during discharging, °C			From - 30 to + 55		
Operating time, cycles			600 (time in the end of operating time is not less than 2 hours 40 minutes)		
Lifetime, years			3		
Dimensions, mm			101,9x58,0x20,5		
Weight, no more than, kg			0,24		

## Ni-Cd rechargeable batteries

### Battery 6NKGTS-2.0



Technical characteristics of 6NKGTS-2.0 rechargeable battery.

Nominal voltage, V, no less than		6,0					
Nominal capacity, Ah		2,0					
<b>Charging mode</b>							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,2 (0,1 C <sub>hA</sub> )	16	0,4 (0,2C <sub>hA</sub> )	8	0,6 (0,3C <sub>hA</sub> )	4	2,0 (C <sub>hA</sub> )	1
<b>Discharging modes</b>							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,4 (0,2C <sub>hA</sub> )		5		2,0 (C <sub>hA</sub> )		55	
<b>Capacity, Ah at ambient temperature, °C</b>							
50°C above zero		20°C below zero			40°C below zero		
1,8 (0,9C <sub>h</sub> )		1,3 (0,65C <sub>h</sub> )			0,6 (0,3C <sub>h</sub> )		
<b>Discharge mode with current 0.2 C<sub>hA</sub> is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 C <sub>h</sub> )			
Lifetime, years				5			
Dimensions, mm				152,0x30,0x70,0			
Weight, no more than, kg				0,6			

Battery **4NMGTS-2.1**

Technical characteristics of 4NMGTS-2.1 rechargeable battery.

Nominal voltage, V, no less than		4,8					
Nominal capacity, Ah		2,1					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,21 (0,1 CHA)	16	0,42 (0,2CHA)	8	0,63 (0,3CHA)	4	2,1 (CHA)	1
Discharging modes							
Current, A	Period, h, not less than	Current, A	Period, h, not less than	Current, A	Period, h, not less than	Current, A	Period, h, not less than
0,42 (0,2CHA)	2,1	1,05 (0,5CHA)	2,1	2,1 (CHA)	1,65		
Capacity, Ah at ambient temperature, oC							
50°C above zero		10°C below zero		20°C below zero		30°C below zero	
1,85 (0,88CH)		1,34 (0,64CH)		1,34 (0,64CH)		1,05 (0,5CH)	
Discharge mode with current 0.2 CHA is considered to be a nominal							
Operating temperature during charging, °C		From - 10 to + 50					
Operating temperature during discharging, °C		From - 40 to + 50					
Operating time, cycles		500 (емкость в конце наработке 0,6CH)					
Lifetime, years		5					
Dimensions, mm		56,0x31,0x31,0					
Weight, no more than, kg		0,1					





## Ni-Cd rechargeable batteries

### Battery 10NKGTS-0.94



Technical characteristics of 10NKGTS-0.94 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		0,94					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,094 (0,1 C <sub>нА</sub> )	16	0,188 (0,2 C <sub>нА</sub> )	8	0,282 (0,3 C <sub>нА</sub> )	4	0,94 (C <sub>нА</sub> )	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,188 (0,2 C <sub>нА</sub> )		5		0,94 (C <sub>нА</sub> )		55	
Capacity, Ah at ambient temperature, °C							
50°C above zero		20°C below zero		30°C below zero		40°C below zero	
0,846 (0,9 C <sub>н</sub> )		0,611 (0,65 C <sub>н</sub> )		0,5 (0,53 C <sub>н</sub> )		0,282 (0,3 C <sub>н</sub> )	
<b>Discharge mode with current 0.2 C<sub>нА</sub> is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 C <sub>н</sub> )			
Lifetime, years				5			
Dimensions, mm				67,8x40,3x57,0			
Weight, no more than, kg				0,3			



Technical characteristics of 10NKGTS-1.2 rechargeable battery.

Nominal voltage, V, no less than				12,0			
Nominal capacity, Ah				1,2			
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,12 (0,1 CHA)	16	0,24 (0,2CHA)	8	0,36 (0,3CHA)	4	1,2 (CHA)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,24 (0,2CHA)		5		1,2 (CHA)		55	
Capacity, Ah at ambient temperature, °C							
45°C above zero		20°C below zero		40°C below zero			
0,846 (0,9CH)		0,611 (0,65CH)		0,282 (0,3CH)			
<b>Discharge mode with current 0.2 CHA is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 45			
Operating temperature during discharging, °C				From – 40 to + 45			
Operating time, cycles				500 (capacity in the end of operating time 0.6 CH)			
Lifetime, years				5			
Dimensions, mm				112,0x46,0x65,5			
Weight, no more than, kg				0,4			

## Ni-Cd rechargeable batteries

### Battery 10NKGTS-1.4



Technical characteristics of 10NKGTS-1.4 rechargeable battery.

Nominal voltage, V, no less than				12,0			
Nominal capacity, Ah				1,4			
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,14 (0,1 СнА)	16	0,28 (0,2СнА)	8	0,42 (0,3СнА)	4	1,4 (СнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,28 (0,2СнА)		5		1,4 (СнА)		55	
Capacity, Ah at ambient temperature, °C							
45°C above zero		20°C below zero		40°C below zero			
1,26 (0,9Сн)		0,91 (0,65Сн)		0,14 (0,3Сн)			
<b>Discharge mode with current 0.2 СнА is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 45			
Operating temperature during discharging, °C				From – 40 to + 45			
Operating time, cycles				500 (capacity in the end of operating time 0.6 Сн)			
Lifetime, years				5			
Dimensions, mm				112,0x46,0x65,5			
Weight, no more than, kg				0,4			

Battery **10NKGTS-1.5-P**

Technical characteristics of 10NKGTS-1.5-P rechargeable battery.

Nominal voltage, V, no less than				12,0			
Nominal capacity, Ah				1,5			
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,15 (0,1 C <sub>Н</sub> A)	16	0,3 (0,2 C <sub>Н</sub> A)	8	0,45 (0,3 C <sub>Н</sub> A)	4	1,5 (C <sub>Н</sub> A)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,3 (0,2 C <sub>Н</sub> A)		1,5 (C <sub>Н</sub> )		1,5 (C <sub>Н</sub> A)		1,2 (0,8 C <sub>Н</sub> )	
Capacity, Ah at ambient temperature, °C							
50°C above zero		20°C below zero		30°C below zero		40°C below zero	
0,846 (0,9 C <sub>Н</sub> )		0,611 (0,65 C <sub>Н</sub> )		0,75 (0,5 C <sub>Н</sub> )		0,2 (0,14 C <sub>Н</sub> )	
<b>Discharge mode with current 0.2 C<sub>Н</sub>A is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 C <sub>Н</sub> )			
Lifetime, years				5			
Dimensions, mm				114,5x21,98x68,0			
Weight, no more than, kg				0,4			



## Ni-Cd rechargeable batteries

### Battery 10NKGTS-2.3



Technical characteristics of 10NKGTS-2.3 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		2,3					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,23 (0,1 CнА)	16	0,46 (0,2 CнА)	8	0,69 (0,3 CнА)	4	2,3 (CнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,46 (0,2 CнА)		5		2,3 (CнА)		55	
Capacity, Ah at ambient temperature, °C							
45°C above zero		20°C below zero		40°C below zero			
2,07 (0,9 Cн)		1,495 (0,65 Cн)		0,69 (0,3 Cн)			
Discharge mode with current 0.2 CнА is considered to be a nominal							
Operating temperature during charging, °C		From - 0 to + 45					
Operating temperature during discharging, °C		From - 40 to + 45					
Operating time, cycles		500 (capacity in the end of operating time 0.6 Cн)					
Lifetime, years		5					
Dimensions, mm		143,7x55,4x56,5					
Weight, no more than, kg		1,0					



Technical characteristics of 10NKGTS-3.0 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		3,0					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,3 (0,1 CнА)	16	0,6 (0,2CнА)	8	0,9 (0,3CнА)	4	3,0 (CнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,6 (0,2CнА)		3,0 (Cн)		3,0 (CнА)		2,4 (0,8Cн)	
Capacity, Ah at ambient temperature, °C							
50°C above zero		20°C below zero		30°C below zero		40°C below zero	
2,64 (0,88Cн)		1,92 (0,64Cн)		1,5 (0,5Cн)		0,9 (0,3Cн)	
Discharge mode with current 0.2 CнА is considered to be a nominal							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 Cн)			
Lifetime, years				5			
Dimensions, mm				134,7x55,4x56,5			
Weight, no more than, kg				1,0			

Battery **10NKGTS-3.4**



Technical characteristics of 10NKGTS-3.4 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		3,4					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,34 (0,1 CнА)	16	0,68 (0,2 CнА)	8	1,02 (0,3 CнА)	4	3,4 (CнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,68 (0,2 CнА)		5		3,4 (CнА)		55	
Capacity, Ah at ambient temperature, °C							
50°C above zero		20°C below zero		30°C below zero		40°C below zero	
3,06 (0,9 Cн)		2,21 (0,65 Cн)		1,8 (0,53 Cн)		1,02 (0,3 Cн)	
<b>Discharge mode with current 0.2 CнА is considered to be a nominal</b>							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 Cн)			
Lifetime, years				5			
Dimensions, mm				188,5x39,5x98,5			
Weight, no more than, kg				1,2			



Technical characteristics of 10NKGTS-4.5 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		4,5					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,45 (0,1 CнА)	16	0,9 (0,2 CнА)	8	1,35 (0,3 CнА)	4	4,5 (CнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
0,9 (0,2 CнА)		5		4,5 (CнА)		55	
Capacity, Ah at ambient temperature, °C							
50°C above zero		20°C below zero		30°C below zero		40°C below zero	
3,96 (0,88 Cн)		2,88 (0,64 Cн)		2,25 (0,5 Cн)		1,35 (0,3 Cн)	
Discharge mode with current 0.2 CнА is considered to be a nominal							
Operating temperature during charging, °C				From – 10 to + 50			
Operating temperature during discharging, °C				From – 40 to + 50			
Operating time, cycles				500 (capacity in the end of operating time 0.6 Cн)			
Lifetime, years				5			
Dimensions, mm				176,5x72,5x69,0			
Weight, no more than, kg				1,88			



## Ni-Cd rechargeable batteries

### Battery 10NKGTS-5.0



Technical characteristics of 10NKGTS-5.0 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		5,0					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,5 (0,1 CнА)	16	1,0 (0,2 CнА)	8	1,5 (0,3 CнА)	4	5,0 (CнА)	1
Discharging modes							
Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than
0,5 (0,2 CнА)	5,0 (Cн)	5,0 (CнА)	4,0 (0,8 Cн)	15,0 (3 CнА)	3,75 (0,75 Cн)		
Capacity, Ah at ambient temperature, °C							
50°C above zero	30°C below zero	40°C below zero	50°C below zero				
4,4 (0,88 Cн)	2,5 (0,5 Cн)	1,5 (0,3 Cн)	1,25 (0,25 Cн)				
Discharge mode with current 0.2 CнА is considered to be a nominal							
Operating temperature during charging, °C		From - 10 to + 50					
Operating temperature during discharging, °C		From -40 to + 50					
Operating time, cycles		500 (capacity in the end of operating time 0.6 Cн)					
Lifetime, years		5					
Dimensions, mm		176,5x72,5x69,0					
Weight, no more than, kg		1,88					



Technical characteristics of 10NKGTS-8.0 rechargeable battery.

Nominal voltage, V, no less than		12,0					
Nominal capacity, Ah		8,0					
Charging mode							
Current, A	Time, h	Current, A	Time, h	Current, A	Time, h	Current, A	Time, h
0,8 (0,1 CнА)	16	1,6 (0,2 CнА)	8	2,4 (0,3 CнА)	4	8,0 (CнА)	1
Discharging modes							
Current, A		Capacity, Ah, not less than		Current, A		Capacity, Ah, not less than	
1,6 (0,2 CнА)		8,0 (Cн)		8,0 (CнА)		6,4 (0,8 Cн)	
Capacity, Ah at ambient temperature, °C							
50°C above zero		30°C below zero		40°C below zero		50°C below zero	
7,0 (0,88 Cн)		4,0 (0,5 Cн)		2,4 (0,3 Cн)		2,0 (0,25 Cн)	
Discharge mode with current 0.2 CнА is considered to be a nominal							
Operating temperature during charging, °C		From – 10 to + 50					
Operating temperature during discharging, °C		From – 50 to + 50					
Operating time, cycles		500 (capacity in the end of operating time 0.6 Cн)					
Lifetime, years		5					
Dimensions, mm		176,5x72,5x99,0					
Weight, no more than, kg		3,0					

### Battery 10NKGTS-10



Technical characteristics of 10NKGTS-10 rechargeable battery.

Nominal voltage, V, no less than		12,0			
Nominal capacity, Ah		10,0			
Charging mode					
Current, A		Time, h		Current, A	
1,0 (0,1СнА)		16		2,0 (0,2СнА)	
				7	
Discharging modes					
Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than	Current, A	Capacity, Ah, not less than
2,0 (0,2СнА)	5	10 (СнА)	55	30 (3СнА)	7,0 (0,7Сн)
Capacity, Ah at ambient temperature, °C					
50°C above zero		20°C below zero		40°C below zero	
9,0 (0,9Сн)		6,5 (0,65Сн)		3,0 (0,3Сн)	
Discharge mode with current 0.2 СнА is considered to be a nominal					
Operating temperature during charging, °C		From – 10 to + 50			
Operating temperature during discharging, °C		From – 40 to + 50			
Operating time, cycles		500 (capacity in the end of operating time 0.6 Сн)			
Lifetime, years		5			
Dimensions, mm		210,0x88,0x126,5			
Weight, no more than, kg		4,5			



Lithium-ion power sources have replaced nickel-cadmium (Ni-Cd) and Nickel-Metal Hydride (NiMH) batteries and have a number of advantages:

- high power density
- increased capacity
- high specific indexes: 100 – 180 W h/kg and 250 – 400 W h/dm<sup>3</sup>
- a special protection circuit for the voltage and current limitation to prevent overcharge, short-circuiting of the terminals and overheating the battery pack
- a rapid charging of battery
- high discharge current
- no memory effect

Lithium-ion power sources of JSC "Energy" are designed to supply the means of communication, lighting equipment and other devices.

Battery activity is controlled by built board protection preventing overcharging, short circuiting the battery, overheating of the battery pack.

To ensure safe and efficient operation of the lithium-ion power sources they need to ensure that the charge modes that differ from other modes for current sources. In this connection, on request, the batteries can be supplied with rechargeable battery chargers.

Currently, the market of lithium-ion power sources is under active development: scientific works on the improvement of technology, materials and equipment used in the manufacture of lithium-ion batteries; determining ways to improve characteristics of this type of power supply. The above advantages and innovations in manufacturing suggest that lithium-ion batteries are an innovative product with new properties.



*Technical characteristics of Li-Ion rechargeable battery.*

Name		Size, mm	Nominal capacity, mAh		Nominal voltage, V		Operating temperature range		Guaranteed lifetime, cycles	
Li-Ion	Ni-Cd		Li-Ion	Ni-Cd	Li-Ion	Ni-Cd	Li-Ion	Ni-Cd	Li-Ion	Ni-Cd
2LIA-1.6	-	80,5x52,3x12,3	1600	-	7,4	-	from -10 to +40	-	300	-
2LIA-4-1 2LIA-4.1	6NKGTS-0.94 6NKGTS-1.5	118,5x58,3x21,8	4000	1500	7,4	7,2	from -30 to +50	from -40 to +50	500	500
2LIA-4-2	6NKGTS-1.5-2M	102,0x58,3x24,3	4000	1500	7,4	7,2	from -30 to +50	from -40 to +50	500	500
2LIA-3	6NKGTS-2.0	152,0x70,0x30,0	3000	2000	7,4	7,2	from -30 to +50	from -40 to +50	300	500
2LIA-8	-	91,0x56,0x20,0	8000	-	3,7	-	from -10 to +40	-	300	-
2LIA-12	-	134,7x55,4x66,5	12000	-	7,4	-	from -40 to +50	-	300	-
4LIA-2	10NKGTS-1.2	111,8x65,5x45,5	2000	1200	14,8	12,0	from -40 to +50	from -40 to +50	300	500
4LIA-4,8	10NKGTS-2,3	134,7x55,4x56,5	4800	2300	14,6	12,0	from -40 to +50	from -40 to +50	300	500
4LIA-7	10NKGTS-3,4	188,5x39,5x98,5	7000	3400	14,8	12,0	from -40 to +50	from -40 to +50	300	500
4LIA-8,0	10NKGTS-5,0	176,5x72,5x69,0	8000	5000	14,8	12,0	from -40 to +50	from -40 to +50	300	500
4LIA-9	10NKGTS-8,0	176,5x72,5x99,0	9000	8000	14,8	12,0	from -40 to +50	from -40 to +50	300	500
4LIA-10	10NKGTS-10	210,0x124.7x88,0	10000	10000	14,8	12,0	from -40 to +50	from -40 to +50	300	500
7LIA-32	-	Ø252x170	32000	-	25,9	-	from -20 to +50	-	300	-

Rechargeable battery **LIA-4**

Basic technical characteristics of lithium-ion rechargeable battery LIA-4

Nominal voltage, V, no less than	3,7		
Nominal capacity, Ah	4,1		
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (falling current charging)	
4,0 A	up to 4.2 V	from 4.0 to 0.12 A	at 4.2
<b>Battery discharge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,8	4,1	4,1	3,6
<b>Discharge mode with current 0.8 A is considered to be a nominal</b>			
EOD voltage, V	3,0±0,2		
Operating temperature during charging, °C	from – 10 to + 50		
Operating temperature during discharging, °C	from – 30 to + 50		
Weight, g, no more than	95		
Operating time, cycles	500 (capacity in the end of operating time 0,75 CH)		
Lifetime, years	5		
Dimensions, mm, no more than	87,6x51,3x8,9		



Basic technical characteristics of lithium-ion rechargeable battery 2LIA-1.6

Nominal voltage, V, no less than		7,4			
Nominal capacity, Ah		1,6			
<b>Battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
1,6 A		up to 8.4 V		from 1.6 to 0.05 A	
				at 8.4 V	
<b>Battery charge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,12	1,6	0,4	1,6	1,6	1,4
<b>Discharge mode with current 0.12 A is considered to be a nominal</b>					
EOD voltage, V		6,0±0,2			
Operating temperature during charging, °C		from – 10 to + 40			
Operating temperature during discharging, °C		from – 10 to + 40			
Weight, kg, no more than		0,1			
Operating time, cycles		300 (capacity in the end of operating time 0.8 CH)			
Lifetime, years		5			
Dimensions, mm, no more than		80,5x52,3x12,3			

Rechargeable battery **2LIA-3**

Basic technical characteristics of lithium-ion rechargeable battery 2LIA-3

Nominal voltage, V, no less than		7,4			
Nominal capacity, Ah		3,5			
<b>Battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
4,0 A		up to 8,4 V		from 4.0 to 0.12 A	
				at 8,4 V	
<b>Battery charge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,7	3,5	2,0	3,5	3,5	3,15
<b>Discharge mode with current 0.7A is considered to be a nominal</b>					
EOD voltage, V		6,0±0,2			
Operating temperature during charging, °C		from – 10 to + 50			
Operating temperature during discharging, °C		from – 30 to + 50			
Weight, kg, no more than		0,5			
Operating time, cycles		300 (capacity in the end of operating time 0.8 CH)			
Lifetime, years		5			
Dimensions, mm, no more than		152,0x30,0x70,0			



Rechargeable battery **2LIA-4-1** and **2LIA-4-2**



Basic technical characteristics of lithium-ion rechargeable battery 2LIA-4-1 and 2LIA-4-2

Nominal voltage, V, no less than		7,4			
Nominal capacity, Ah		4,0			
<b>battery charge</b>					
1 step (continuous current charging)			2 step (falling current charging)		
4,0 A		up to 8,4 V		from 4.0 to 0.12 A	
				at 8,4 V	
<b>battery discharge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,8	4,0	2,3	4,0	4,0	3,6
Discharge mode with current 0.8 A is considered to be a nominal					
<b>Capacity, Ah at temperature, ° C</b>					
50°C above zero		10°C below zero		20°C below zero	
30°C below zero					
4,0		2,4		2,4	
				2,0	
EOD voltage, V		6,0±0,2			
Operating temperature during charging, °C		from – 10 to + 50			
Operating temperature during discharging, °C		from – 30 to + 50			
Weight, kg, no more than		0,23			
Operating time, cycles		500 (capacity in the end of operating time 0.75 CH)			
Lifetime, years		5			
Dimensions of 2LIA-4-1, mm, no more than		118,5x58,3x21,8			
Dimensions of 2LIA-4-2, mm, no more than		102,0x58,3x24,3			



Rechargeable battery **2LIA-4.1**

Basic technical characteristics of lithium-ion rechargeable battery 2LIA-4.1

Nominal voltage, V, no less than	7,4				
Nominal capacity, Ah	3,5				
<b>Battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
4,0 A	up to 8.4 V		from 4.0 to 0.12 A	at 8.4 V	
<b>Battery charge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,7	3,5	2,0	3,5	3,5	3,15
<b>Discharge mode with current 0.7 A is considered to be a nominal</b>					
EOD voltage, V	6,0±0,2				
Operating temperature during charging, °C	from - 10 to + 50				
Operating temperature during discharging, °C	from -30 to + 50				
Weight, kg, no more than	0,5				
Operating time, cycles	300 (capacity in the end of operating time 0.8 CH)				
Lifetime, years	5				
Dimensions, mm, no more than	102,0x58,3x24,3				

Basic technical characteristics of lithium-ion rechargeable battery 2LIA-8

Nominal voltage, V, no less than		3,7	
Nominal capacity, Ah		8,0	
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
4,0 A	up to 4.2 V	from 4.0 to 0.12 A	at 4.2 V
<b>Battery charge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
1,6	8,0	4,1	7,2
<b>Discharge mode with current 1.6 A is considered to be a nominal</b>			
EOD voltage, V		3,0±0,2	
Operating temperature during charging, °C		from - 10 to + 50	
Operating temperature during discharging, °C		from -20 to + 50	
Weight, kg, no more than		0,18	
Operating time, cycles		300 (capacity in the end of operating time 0.75 CH)	
Lifetime, years		5	
Dimensions, mm, no more than		91,0x56,0x20,0	



Rechargeable battery **2LIA-12**

Basic technical characteristics of lithium-ion rechargeable battery 2LIA-12

Nominal voltage, V, no less than	7,4		
Nominal capacity, Ah	12,0		
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
2,0 A	up to 8,4 V	from 2.0 to 0.3 A	at 8.4 V
<b>Battery charge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
2,4	12,0	6,0	10,8
<b>Discharge mode with current 2.4 A is considered to be a nominal</b>			
EOD voltage, V	6,0±0,2		
Operating temperature during charging, °C	from – 10 to + 50		
Operating temperature during discharging, °C	from – 40 to + 50		
Weight, kg, no more than	1,0		
Operating time, cycles	300 (capacity in the end of operating time 0.75 CH)		
Lifetime, years	5		
Dimensions, mm, no more than	134,7x55,4x66,5		



Basic technical characteristics of lithium-ion rechargeable battery 4LIA-2

Nominal voltage, V, no less than	14,8		
Nominal capacity, Ah	2,0		
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
2,0 A	up to 16.8 V	from 2.0 to 0.05 A	at 16.8 V
<b>Battery charge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
1,0	2,0	2,0	1,8
<b>Discharge mode with current 0.96 A is considered to be a nominal</b>			
EOD voltage, V	6,0±0,2		
Operating temperature during charging, °C	from - 10 to + 50		
Operating temperature during discharging, °C	from -40 to + 50		
Weight, kg, no more than	0,3		
Operating time, cycles	300 (capacity in the end of operating time 0.75 CH)		
Lifetime, years	5		
Dimensions, mm, no more than	112,0x65,5x46,0		

## Rechargeable battery 4LIA-4.8



Basic technical characteristics of lithium-ion rechargeable battery 4LIA-4.8

Nominal voltage, V, no less than	14,6		
Nominal capacity, Ah	4,8		
<b>battery discharge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
2,4 A	up to 16.8 V	from 2.0 to 0.05 A	at 16.8 V
<b>battery discharge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
0,96	4,8	2,4	4,8
Discharge mode with current 0.96 A is considered to be a nominal			
Operating temperature during charging, °C	from - 10 to + 50		
Operating temperature during discharging, °C	from - 40 to + 50		
Weight, kg, no more than	0,76		
Operating time, cycles	300 (capacity in the end of operating time 0.75 CH)		
Lifetime, years	5		
Dimensions, mm, no more than	134,7x55,4x56,5		





Basic technical characteristics of lithium-ion rechargeable battery 4LIA-7

Nominal voltage, V, no less than		14,8			
Nominal capacity, Ah		7,0			
<b>battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
3,5 A	до 16,8 В		от 3,5 до 0,10 А		при 16,8 В
<b>battery charge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
1,4	7,0	3,5	7,0	7,0	6,3
Discharge mode with current 1,6 A is considered to be a nominal					
Operating temperature during charging, °C		from - 10 to + 50			
Operating temperature during discharging, °C		from -40 to + 50			
Weight, kg, no more than		1,2			
Operating time, cycles		300 (capacity in the end of operating time 0.75 CH)			
Lifetime, years		5			
Dimensions, mm, no more than		188,5x39,5x98,5			

Rechargeable battery **4LIA-8.0**

Basic technical characteristics of lithium-ion rechargeable battery 4LIA-8.0

Nominal voltage, V, no less than		14,8			
Nominal capacity, Ah		8,0			
<b>battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
4,0 A		up to 16.8 V		from 4.0 to 0.10 A	
				at 16.8 V	
<b>battery charge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
1,6	8,0	4,0	8,0	8,0	7,2
Discharge mode with current 1.6 A is considered to be a nominal					
Operating temperature during charging, °C		from - 10 to + 50			
Operating temperature during discharging, °C		from - 40 to + 50			
Weight, kg, no more than		1,0			
Operating time, cycles		300 (capacity in the end of operating time 0.75 CH)			
Lifetime, years		5			
Dimensions, mm, no more than		176,5x72,5x69,0			



Basic technical characteristics of lithium-ion rechargeable battery 4LIA-9

Nominal voltage, V, no less than		14,8			
Nominal capacity, Ah		9,0			
<b>battery charge</b>					
1 step (continuous current charging)			2 step (continuous current charging)		
5,0 A		up to 16.8 V		from 5.0 to 0.15 A	
				at 16.8 V	
<b>battery discharge</b>					
Current, A	Capacity, Ah	Current, A	Capacity, Ah	Current, A	Capacity, Ah
1,8	9,0	4,5	9,0	9,0	8,1
Discharge mode with current 1.6 A is considered to be a nominal					
Operating temperature during charging, °C		from - 10 to + 50			
Operating temperature during discharging, °C		from - 40 to + 50			
Weight, kg, no more than		1,5			
Operating time, cycles		300 (capacity in the end of operating time 0.75 CH)			
Lifetime, years		5			
Dimensions, mm, no more than		176,5x72,5x99,0			

Rechargeable battery **4LIA-10**

Basic technical characteristics of lithium-ion rechargeable battery 4LIA-10

Nominal voltage, V, no less than	14,8		
Nominal capacity, Ah	10,0		
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
5,0 A	up to 16.8 V	from 5.0 to 0.15 A	at 16.8 V
<b>Battery charge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
2,0	10,0	5,0	10,0
<b>Discharge mode with current 2.0 A is considered to be a nominal</b>			
EOD voltage, V	12,0		
Operating temperature during charging, °C	from - 10 to + 50		
Operating temperature during discharging, °C	from - 40 to + 50		
Weight, kg, no more than	2,0		
Operating time, cycles	300 (capacity in the end of operating time 0.75 CH)		
Lifetime, years	5		
Dimensions, mm, no more than	210,0x124,7x88,0		

Basic technical characteristics of lithium-ion rechargeable battery 7LIA-32

Nominal voltage, V, no less than		25,9	
Nominal capacity, Ah		32,0	
<b>Battery charge</b>			
1 step (continuous current charging)		2 step (continuous current charging)	
4,0 A	up to 29.7 V	from 4.0 to 0.96 A	at 29.7 V
<b>Battery charge</b>			
Current, A	Capacity, Ah	Current, A	Capacity, Ah
6,4	32,0	16,0	32,0
<b>Discharge mode with current 16.0 A is considered to be a nominal</b>			
EOD voltage, V		22,2±0,2	
Operating temperature during charging, °C		from 0 to + 50	
Operating temperature during discharging, °C		from 20 to + 50	
Weight, kg, no more than		11,0	
Operating time, cycles		300 (capacity in the end of operating time 0.75 CH)	
Lifetime, years		3	
Dimensions, mm, no more than		ø252x170	





Battery **LIA-550**

Lithium-Ion battery LIA-550 is designed to replace the primary chemical power supply - battery "Impuls 3V-300A h."

The battery consists of 96 lithium-ion batteries with capacity 6 Ah each and microcontroller control, providing protection against short circuits in the external circuit, over charge and over discharge protection when the control parameters are reached.

Specific energy of the battery LIA-550 - 135.7 Wh / kg, which is 88.5% more than the "Impuls 3V-300A h."

One battery LIA-550 battery can replace 49 batteries "Impuls 3V-300A h" for period of service.

Table of comparative characteristics of batteries "Impuls 3B-300A h" and LIA-550

	"Impuls 3V-300A h"	LIA-550
Dimensions, mm	ø252,0x170,0	
Maximal weight, kg	9,0	15,0
Nominal capacity, Ah	300	550
Nominal voltage, V	3,0	3,7
Operating temperature when charging, °C	-	From - 10 to + 50
Operating temperature when discharging, °C	From - 40 to + 50	
Number of cycles "charge-discharge"	-	150
Lifetime, years	-	5

# Thermal batteries

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Battery **BT-5, BT-5k / БТ-5, БТ-5к**

Battery **BT-8, BT-8k / БТ-8, БТ-8к**

Battery **BT-25, BT-25k / БТ-25, БТ-25к**

Battery **BT-30 / БТ-30**

Battery **BT-17, BT-17e / БТ-17, БТ-17э**

Battery **IT-18 / ИТ-18**

Battery **BT-19 / БТ-19**

Battery **BT-20 / БТ-20**

Battery **T-457 / Т-457**

Battery **T-493 / Т-493**

Battery **T-514A / Т-514А**

Battery **T-514B / Т-514Б**

Battery **T-514AM / Т-514АМ**

Battery **TB-06 / ТБ-06**

Battery **TB-77 / ТБ-77**

Battery **IT-58 / ИТ-58**

Battery **9B 239 / 9Б 239**

Battery **9B 254 / 9Б 254**

Battery **9B 255 / 9Б 255**

Battery **9B 253-2 / 9Б 253-2**

Battery **BT-33 / БТ-33**

Battery **TB-150-1 / ТБ-150-1**

Battery **TB-L / ТБ-Л**

Battery **T-150-3-1 / Т-150-3-1**



JSC "Energy" is the leading company in Russia and Eastern Europe in production of current sources for the Ministry of Defense.

The company is the only Russian producer of thermal batteries for military equipment: missiles "air-air", "air-land", portable missiles "air-land", torpedoes, anti-tank systems.

Thermal batteries are used as stand-alone backup power sources for military equipment: anti-tank systems, air defense systems, missiles on internal power, systems of the automation of the

warhead, multiple launch rocket systems, non-contact radio blasting systems and sensors, as well as sonar systems, various electrical and wireless devices, communication systems, fire fighting, rescue equipment.

### Advantages of thermal power sources:

- instantaneous
- long-term storage (up to 20 years)
- resistance to high and low temperatures
- high reliability
- no self-discharge
- high mechanical strength

### General characteristics of thermal power sources:

- voltage from 3 V to 250 V
- discharge current of 0.2 A to 50 A
- operating time from 15 msec. to 30 min.
- Operating temperature from  $-60^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Readiness time from 0.3 sec.



## Thermal batteries

### Batteries **BT-5** and **BT-5K**

Technical characteristics of batteries **BT-5** and **BT-5K**

	<b>BT-5</b>	<b>BT-5K</b>
Maximal dimensions, mm*	Ø28,5x37,0	Ø28,5x48,0
Maximal weight, kg	0,08-0,09	
Voltage, V, no less than	7,5	
Minimal voltage achievement time. Sec., no more than	1,0	
Minimal operating current, A	12,0	
Discharge time with current 5A, sec., no less than	1,0	
Operating temperature range, °C	From -50 to +60	
Guaranteed shelf life, years, no less than	10	

The batteries are designed for short-term DC power supply of various electrical automation facilities, communication systems, signaling means, warning facilities, protection systems, alarm systems, fire extinguishing systems and activate other devices.



### Batteries **BT-8** and **BT-8K**

Technical characteristics of batteries **BT-8** and **BT-8K**

	<b>BT-8</b>	<b>BT-8K</b>
Maximal dimensions, mm*	Ø28,5x28,0	Ø28,5x39,0
Resistance, Ohm		
Mode 1	2,0±1,5%	
Mode 2	1,5±2%	
Mode 3	0,4±2%	
Voltage, V		
Mode 1	5,0	
Mode 2	6,0	
Mode 3	4,0	
Maximal voltage, V	8,0	
Maximal operating current, A		
Mode 1	2,5	
Mode 2	4,0	
Mode 3	10,0	
Minimal voltage achievement time, Sec.		
Mode 1	2,0	
Mode 2	2,0	
Mode 3	2,0	
Discharge time to load, sec., no less than		
Mode 1	1,0	
Mode 2	1,0	
Mode 3	1,0	
Максимальная масса, кг	0,07	0,08
Maximal weight, kg	From -50 to +50	
Guaranteed shelf life, years, no less than	20	10

The batteries are designed for short-term DC power supply of various electrical automation facilities, communication systems, signaling means, warning facilities, protection systems, alarm systems, fire extinguishing systems and activate other devices.





Batteries **BT-25** and **BT-25K**



The batteries are designed for short-term DC power supply of various electrical automation facilities, communication systems, signaling means, warning facilities, protection systems, alarm systems, fire extinguishing systems and activate other devices.

Technical characteristics of batteries BT-25 and BT-25K

	BT-25	BT-25K
Maximal dimensions, mm**	Ø48,0x66,5	Ø48,0x77,5
Maximal weight, kg	0,28	0,32
Voltage, V, no less than	10,0	
Response time. Sec., no more than	0,8	
Minimal operating current, A	25,0	
Operating time, sec., no less than	12,0	
Load resistance, Ohm	0,4	
Operating temperature range, °C	From -50 to +60	
Guaranteed shelf life, years, no less than	10	

Battery **BT-30**

The batteries are designed for short-term DC power supply of various electrical automation facilities, communication systems, signaling means, warning facilities, protection systems, alarm systems, fire extinguishing systems and activate other devices.

Technical characteristics of battery BT-30

Modes	1	2	3
Voltage, V	30 <sup>+7,5</sup> <sub>-3,0</sub>		
Discharge current, A	1,2	0,9	0,45
Response time. Sec., no less than	1		
Discharge duration sec., no less than	60	85	170
Dimensions, mm*	Ø31,5x60,2		
Weight, kg	0,15		
Operating temperature range,	From -50 to +50		
Guaranteed shelf life, years, no less than	15		

\* Dimensions are excluding the height of the contacts.



Batteries **BT-17** and **BT-17E**

Technical characteristics of batteries BT-17 and BT-17E

	BT-17	BT-17E
Maximal dimensions, mm*	Ø70x118	Ø70x114
Maximal weight, kg	1,0	
Voltage, V, no less than	10,0÷21,0	
Constant power discharge, W	115÷120	
Operating time, sec.	840	900
Response time. Sec.	3	
Operating temperature range, °C	From -40 to +60	
Guaranteed shelf life, years, no less than	15	

Battery **IT-18**

Technical characteristics of battery IT-18

Maximal dimensions, mm*	Ø31,3x60,0
Maximal weight, kg	0,135
Voltage, V, no less than	13,3÷16,5
Load resistance, Ohm	6,2÷12,2
Operating time, sec.	25
Response time. Sec., no more than	0,95
Operating temperature range, °C	From -50 to +55
Guaranteed shelf life, years, no less than	18

Battery **BT-19**

Technical characteristics of battery BT-19

Maximal dimensions, mm*	Ø35,0x15,0
Maximal weight, kg	0,04
Voltage, V, no less than	6,5÷3,6
Load resistance, Ohm	6,0
Response time. Sec., no more than	1,0
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years, no less than	10



Battery **BT-20**



Technical characteristics of battery BT-20

Maximal dimensions, mm*	Ø35,0x36,0
Maximal weight, kg	0,08
Voltage, V, no less than	13,5÷3,6
Load resistance, Ohm	6,0
Response time. Sec., no more than	1,0
Operating time, sec., no less than	150
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years, no less than	10

Battery **T-457**



Technical characteristics of battery T-457

Maximal dimensions, mm*	Ø42,6x62,7
Maximal weight, kg	0,185
Voltage, V 1 and 2 sections	14,25 <sup>+2.8</sup> <sub>-0.3</sub>
2 and 3 sections	14,25 <sup>+2.8</sup> <sub>-0.3</sub>
1 and 3 sections	28,5 <sup>+5.6</sup> <sub>-0.6</sub>
Operating current, A	0,5÷15
Response time. Sec., no more than	1,0
Operating time, sec., no less than	10,0
Operating temperature range,	From -50 to +50
Guaranteed shelf life, years, no less than	14

Battery **T-493**



Technical characteristics of battery T-493

Maximal dimensions, mm*	Ø31,3x60,0
Maximal weight, kg	0,125±0.015
Voltage, V 1 and 2 sections	11,0÷15,5
3 section	22,0÷31,0
Operating current, A	1.0
External circuit resistance, Ohm 1 and 2 sections	13,3
3 section	15,0
Operating time, sec., no less than	21,0
Operating temperature range°C	From -50 to +50
Guaranteed shelf life, years, no less than	21

\* Dimensions are excluding the height of the contacts.

Battery **T-514A**



Technical characteristics of battery T-514A

Maximal dimensions, mm*	ø31,3x60.0
Maximal weight, kg	0,125
Voltage, V 1 and 2 sections	10,1÷12,5
Operating current, A	0,5
External circuit resistance, Ohm 1 and 2 sections 3 section	120,0 12,0
Response time, sec., no more than	1,2
Operating time, sec., no less than	35,0
Operating temperature range, °C	From -40 to +50
Guaranteed shelf life, years, no less than	13,5

Battery **T-514B**



Technical characteristics of battery T-514B

Maximal dimensions, mm*	ø47,8x56.0
Maximal weight, kg	0,3
Voltage, V	200,0÷250,0
Operating current, A	0,5
External circuit resistance, kOhm	46,0
Response time, sec., no more than	2,1
Operating time, sec., no less than	35,0
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years, no less than	13,5

Battery **T-514AM**



Technical characteristics of battery T-514AM

Maximal dimensions, mm*	ø31,3x55,0
Maximal weight, kg	0,12
Voltage, V	10,2–12,5
Operating current, A	0,5
External circuit resistance, Ohm	29,0
Operating time, sec., no less than	57
Response time, sec., no more than	1,2
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years, no less than	13,5

### Battery TB-06



Technical characteristics of battery TB-06

Maximal dimensions, mm*	172,0x88,0x245,0
Maximal weight, kg	4,3
Nominal voltage, V	28,5 <sup>+2,5</sup> <sub>-4,2</sub>
Operating current, A	20,0
Response time, sec., no more than	1,54
Operating time, sec., no less than	360
Operating temperature range, °C	From -50 to +60
Guaranteed shelf life, years	16

### Battery TB-77



Technical characteristics of battery TB-77

Maximal dimensions, mm*	221,0x176,0x178,0
Maximal weight, kg	5,0
Nominal voltage, V	28,5 <sup>+1,5</sup> <sub>-4,2</sub>
Discharge current, A	
Discharge mode I	25-27
Discharge mode II	30-32
Discharge mode III	20
Response time, sec., no more than	1,05
Discharge time, sec., no less than	
Discharge mode I	120
Discharge mode II	90
Discharge mode III	180
Operating temperature range, °C	From -60 to +60
Guaranteed shelf life, years	15

### Battery IT-58



Technical characteristics of battery IT-58

Maximal dimensions, mm*	ø47,5x145
Maximal weight, kg	0,6
Voltage, V	35±24
Response time, sec., no more than	1,5
Discharge time, sec., no less than	
Discharge mode I	182,5
Discharge mode II	83,5
External circuit resistance, Ohm	0,55
Operating temperature range, °C	From -50 to +40
Guaranteed shelf life, years	10,5

\* Dimensions are excluding the height of the contacts.

Battery **9B239**



Technical characteristics of battery 9B239

Maximal dimensions, mm*	ø56,0x82,5
Maximal weight, kg	0,5
Voltage, V 1 and 2 sections 3 section	17,5-22,5 4,5-5,8
External circuit resistance, Ohm 1 and 2 sections 3 section	10,25 3,57
Operating time, sec.	30
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years	14

Battery **9B254**



Technical characteristics of battery 9B254

Maximal dimensions, mm*	ø31,5x50,0
Maximal weight, kg	0,12
Voltage, V	15 <sup>+5,0</sup> <sub>-3,0</sub>
External circuit resistance during discharge, Ohm	1000,0
Response time, sec., no more than	1,0
Operating time, sec., no less than	250
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years	13

Battery **9B255**



Technical characteristics of battery 9B255

Maximal dimensions, mm*	ø80,0(104,0)x65,0
Maximal weight, kg	0,53
Voltage, V 3-6 terminals 3-2 terminals	28,5 <sup>+2,5</sup> <sub>-6,5</sub> 14,25 <sup>+1,25</sup> <sub>-4,25</sub>
External circuit resistance during discharge, Ohm 3-6 terminals 3-2 terminals	8,4 24
Operating time, sec., no less than	20
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years	12



Battery **9B253-2**

*Technical characteristics of battery 9B253-2*

Maximal dimensions, mm*	ø28,5x61,0
Maximal weight, kg	0,11
Voltage, V Discharge mode I Discharge mode II	$\pm 20,0^{+3,5}_{-2,5}$ $\pm 20,0^{4,0}_{-3,0}$
Load resistance, Ohm Discharge mode I Discharge mode II	8,3 & 80,0; 8,7 & 91,0 4,5 & 400,0
Discharge time, sec., no less than	15
Response time, sec., no more than	0,65
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years	15

Battery **BT-33**

*Technical characteristics of battery BT-33*

Maximal dimensions, mm*	ø31,3x56,2
Maximal weight, kg	0,15
Voltage, V	12,0 ÷ 16,5
Load current, A	0,9
Readiness time, sec., no more than	0,6
Discharge time, sec., not less than	100
Operating temperature range, °C	From -50 to +50
Guaranteed shelf life, years	11

Battery **TB-150-1**

*Technical characteristics of battery TB-150-1*

Maximal dimensions, mm*	ø31,5x70,0
Maximal weight, kg	0,18
Voltage, V	18,0 ÷ 36,0
Load current, A	15,5 ÷ 55,0
Readiness time, sec., no more than	0,36
Discharge time, sec., not less than	180
Operating temperature range, °C	From -60 to +60
Guaranteed shelf life, years	14



\* Dimensions are excluding the height of the contacts.

### Battery TB-L

Technical characteristics of battery TB-L

Maximal dimensions, mm*	ø47,0x145,0
Maximal weight, kg	0,8
Voltage, V Discharge mode I Discharge mode II	$\pm 28,5^{+5,1}_{-5,1}$ $\pm 28,5^{+5,1}_{-5,1}$
Discharge current, A Discharge mode I Discharge mode II	0,5 – 25,0 6,5
Operating time, sec., no less than Discharge mode I Discharge mode II	100 100
Response time, sec., no more than	1,0
Operating temperature range, °C	From -2 to +35
Guaranteed shelf life, years	11

### Battery TB-150-3-1

Technical characteristics of battery TB-150-3-1

Discharge mode	Voltage, V	Load resistance, Ohm	Load current, A, no less than	Load turn-on time, sec.	Discharge time, sec., no less than
<b>I</b> (automation supply)	18,0÷36,0	15,5	-	0 – 2,0	180
		55,0		2,0 – 180,0	
<b>II</b> (pulsed)	not less than 1,8	0,3	6,0	In modes I and II load resistance 15.5 and 0.3 Ohm is turned on upon initiation. The duration of the loading 0.3 Ohm is equal current 6A achievement time.	180
	not less than 8,0	2,0	4,0	0,45	
	not less than 4,8	0,6	8,0	0,60	
	not less than 3,2	0,8	4,0	0,80	
	not less than 4,0	2,0	2,0	2,00	
	not less than 7,0	3,5	2,0	2,05 – 180,00	
<b>Dimensions, mm*</b>			ø31,5x71,2		
<b>Maximal weight, kg</b>			0,18		
<b>Operating temperature range,</b>			From -60 to +60		
<b>Guaranteed shelf life, years</b>			15		

# Electrochemical capacitor

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Specifications of capacitor cells:

Capacitor module **20EK402-29**

Capacitor module **20EK501-29**

Capacitor module **30EK503N-45**

Capacitor module **30EK404N-45**

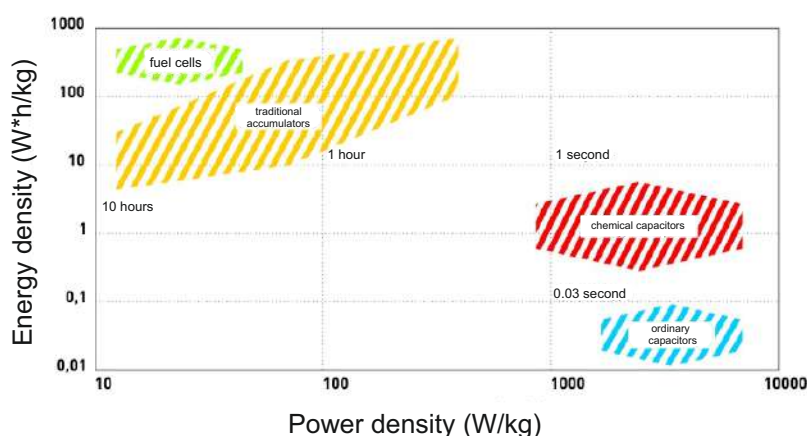
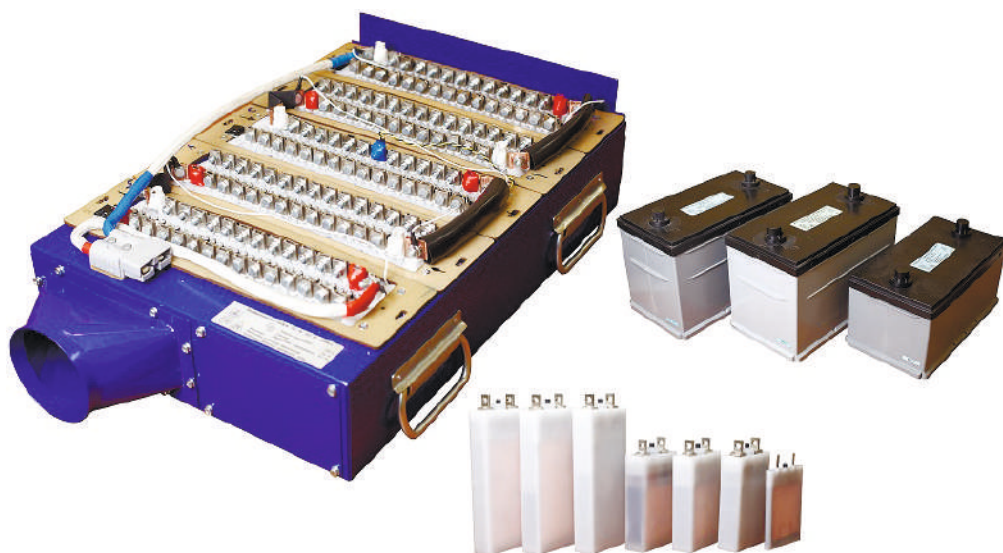
Capacitor module **20EK09-29**

Starter "**Tarzan**"

Corrosion protection station **SKZ-IT-24**

## Electrochemical capacitor

For more information visit the web-site of the developer ZAO "Elton" [www.elton-cap.ru](http://www.elton-cap.ru)

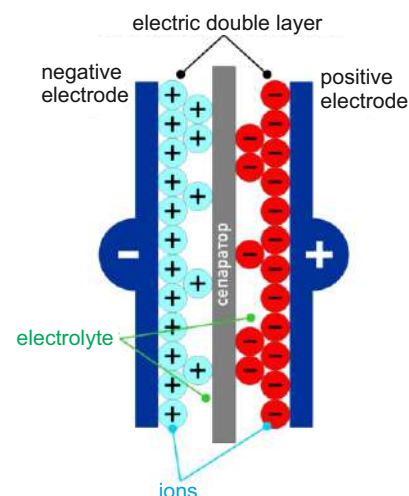


Electrochemical capacitors are devices in which energy accumulation occurs in the electric double layer ( EDL ) on the boundary of the electrolyte and the electronic conductor. Electric double layer creates a surface layer of a charged conductor and its surrounding electrolyte ions. The electric double layer capacitor can be considered as two plates, the capacitance of which is proportional to the area of the plates and inversely proportional to the distance between them. Taking into account that

the distance between the plates is very small and is measured angstroms and the surface area of the conductor, for example, activated carbon reaches 1500-2000 m<sup>2</sup>/g, the capacitance of formed double layer is very large and the energy stored by such capacitors may reach 50-60 J/g.

Essentially conventional electrochemical capacitor is a system consisting of two chemically inert electrode placed in the electrolyte.

The electric double layer on the surface of each electrode is a separate capacitor. They are connected in series via the electrolyte being ionic conductor conductivity. In the production of electrochemical capacitors, aqueous and organic electrolytes are used. Aqueous electrolytes are cheaper, easy to use, does not pollute the environment. Organic electrolytes can increase the operating voltage of the capacitor and therefore specific reserved energy, but have the worst conductivity, are expensive and flammable, have a complex manufacturing process (do not allow the ingress of water vapor into the electrolyte), often environmentally unsafe. Feature of electrochemical capacitors Elton (EKE) is a so-called "asymmetric" design. In this structure, a negative electrode made of activated carbon material (polarizable electrode, wherein charge is accumulated in the electric double layer), and a positive non-polarizable (Faraday) electrode.



A positive electrode is made of nickel hydroxide (particle size is less than 10 nm) which is the main component of the active material; the electrolyte is an aqueous alkaline solution used in alkaline batteries. Thus, an electrochemical capacitor Elton consists of positive and negative electrodes, separator, electrolyte, and resembles the structure of the battery.

Since 2007 JSC "Energy" organized mass production capacitor modules and components developed by ZAO "Elton".

Electrochemical capacitors passed a large amount of trials in Russia and the United States, where more than 10 years used successfully in freight and passenger transport to run internal combustion engines, included in the design of buses, prototypes of passenger and freight transport with hybrid power plants, high-quality energy systems and energy systems of industrial enterprises. One use of capacitors is to run engines on the railway. Currently extensive technical and operational tests are carried out on the railways of JSC "Russian Railways" (Privolzhskaya rail) and the Bulgarian State road.

As a result, the pilot operation found that the use of capacitors allows you to;

Provide reliable engine starting in winter conditions at temperatures up to  $-50^{\circ}\text{C}$ , which reduces the engine to "idle" and save up to 20-25% of the fuel;

Apply a cheaper system to provide electrical power and start the engine compared to the traditionally used batteries.

When using capacitors on locomotives as part of a hybrid power plant fuel, it is possible to reduce costs by 3 times, reduce engine emissions by 80%, reduce the cost of maintenance and repair. When installing capacitors on electric trains and the underground railway, it is possible to accumulate of braking energy and use it to break up the train that saves up to 30 % of the electricity consumed by cravings, providing an independent course of 3-5 km and supply its own needs without external transport network, reducing the load the contact network.

Externally Elton electrochemical capacitor (or any other electrochemical capacitor) behaves similarly to the conventional capacitor, namely:

linearly varies the voltage during discharge and charge constant current, or discharged to the load exponentially;

has a low internal resistance and high power, battery power is much greater than;

has a resource of one million cycles "charge-discharge" and a long service life..

**The capacitor design feature will ensure:**

- **high energy and power density (up to 13 Wh / l and 6 kW / l);**
- **resource of over 1 million cycles;**
- **life of over 15 years and non- maintenance over the life of the;**
- **wide operating temperature range (from  $-50^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ );**
- **low self-discharge;**
- **significant resistance to overvoltage and overcharge without failure;**
- **operational safety;**
- **no materials hazardous to health and the environment.**

In operation, the system does not require external alignment devices capacitor voltage (during self-balancing occurs voltage elements comprising modules). The modular design allows the capacitor, as in the case of batteries, collect energy blocks at the desired operating voltage, power and energy store.

The modification modules are designed to meet different consumers. For extra heavy duty operation, the module is equipped with a cooling system. Wide range of products (capacitors with a capacity of up to 100F 100kF) meets the requirements of a wide range of consumers.

**The capacitor's design is protected by patents in Europe, the U.S. and China.**

**Characteristics and quality capacitors confirmed by national laboratories in the United States:**

IINEEL (Idaho National Engineering and Environmental Laboratory)

ERPI (Electric Power Research Institute)

TVA (Tennessee Valley Authority)

SNL (Sandy National Laboratory)

AEP (American Electric Power)

JC (Joganson Controls, Inc)

Bowling Green University (Ohio)

And Russia:

НАТИ (Research tractor Institute, Moscow)

НИИР (Scientific-Research Institute of Radio, Moscow)

ВНИИЖТ (Russian Research Institute of Railway Transport, Moscow)

МЭИ (Moscow Power Engineering Institute)

МАДИ (Moscow Road Institute)

ВНИКТИ (Russian Research and Design Institute of rolling stock, Kolomna)

The condenser modules have Russian certificates of conformity № ROSS RU.ML02.N00044, № ROSS RU.ML02.N00096 / № РОСС RU.МА02.Н00044, № РОСС RU.МА02.Н00096



# Electrochemical capacitor



Technical characteristics of capacitor cells\*

\*-capacitor cells are part of the capacitor modules and don't supply separately.

	EK401	EK402	EK404	EK405	EK501	EK502	EK503
Usage	Engine starting. Quality energy system	Engine starting	Transport with hybrid drive. Quality energy system. Electric transport.	Engine starting	Engine starting	Quality energy system	Transport with hybrid drive. Electric transport
Operating temperature range, °C	From - 50 to +60						
Operating voltage range at 25°C, V	1,5/0,75	1,5/0,3	1,5/0,75	1,5/0,3	1,5/0,3	1,5/0,75	1,5/0,75
Capacitor, F	10000	10000	12000	12000	6000	6000	7200
Internal resistance at +25 °C, mOhm	0,2	0,3	0,4	0,5	0,3	0,25	0,4
Internal resistance at -35 °C, mOhm	0,3	0,4	0,6	0,8	0,5	0,4	0,7
Reserved energy in operating voltage range at 25 °C, kJ	8,4	10,8	10,1	13,0	6,5	5,1	6,1
Dimensions (LxWxH), mm	83,5x31,5x210,0				83,5x31,5x148,0		

Capacitor modules **20EK402-29**, **20EK501-29**



Technical characteristics of capacitor modules.

	20EK402-29	20EK501-29
Operating voltage, V	29,0 – 8,0	
Max.operating voltage, V	32,0	
Min.operating voltage, V	8,0	
Capacity, F	500	300
Supplied energy at +(25±10) °C and load discharge 0.1 Ohm in voltage range 26.0-13.0 V, kJ, no less than	90,0	48,0
Internal resistance at +25 °C (-50 °C),mOhm	6,0 (15,0)	7,0 (21,0)
Leakage current at voltage 25V and temperature (25±10) °C, mA, no more than	10,0	6,0
Resource, number of cycles, no less than	300000	
Weight, kg	26	19
Dimensions (LxWxH), mm	350,0x195,0x253,0	350,0x195,0x194,0
Operating temperature range, °C	From -50 to +50	
Service life, years, no less than	15	
Usage	Used on track machines of the SM-2, AC4040, MPT-4-115, VPG-2. Provides pumping oil and reliable start all engines track equipment up to 500 hp. Annual fuel savings of up to 5 tons.	Used in locomotives. Provides pumping oil and reliable start all engine of locomotives in all weather conditions. Annual fuel savings of up to 5 tons.

## Electrochemical capacitor

### Capacitor modules **30EK503N-45**, **30EK404N-45**



*Technical characteristics of modules.*

	30EK503N-45	30EK404N-45
Operating voltage, V	45,0 – 22,5	
Max.operating voltage, V	48,0	
Min.operating voltage, V	22,5	
Capacity, F	240	400
Supplied energy at +(25±10) °C and load discharge 0.15 Ohm in voltage range 45.0-22.5 V, kJ, no less than	112,0	227,0
Internal resistance at +25 °C (-50 °C), mOhm	12,0 (48,0)	12,0 (36,0)
Voltage reducing time when current is absent at temperature from -50 °C to +50 °C, no less than From 45.0V to 33.0V From 33.0V to 27.0V	24 hours 3 months	
Resource, number of cycles, no less than	300000	
Weight, kg	27,0	37,0
Dimensions (LxWxH), mm	560,0x219,0x188,0	560,0x219,0x245,0
Operating temperature range, °C	From -50 to +50	
Service life, years, no less than	15	
Usage	For hybrid transport: hybrid bus, locomotive with hybrid drive.	For hybrid transport: hybrid bus, locomotive with hybrid drive. The possibility of using this module in electric motor car and subway.

### Capacitor module **30EK09-29**



The module is designed for use as an energy source in pulse mode high power, for reliable starting of internal combustion engines, uninterruptible power supply.

*Technical characteristics of modules.*

Dimensions (LxWxH), mm	332,0x109,5x197,0
Weight, kg	9,5
Guaranteed shelf life from the day of acceptance by customer's representative at enterprise-manufacturer, years	16,5
Guaranteed operation period from the day of commissioning within the guaranteed shelf life, years	15
Lifetime including storage, work in the buffer mode in the range of operating voltages and temperatures at operating no more than 300 000 cycles, years	15
Operating voltage, V	29,0
Min.operating voltage during current absence and storage, V	8
Capacity, F	90,0
Supplied energy at load discharge 0.1 Ohm in voltage range 26-13 V, kJ	13,0
Operating temperature range, °C	From -50 to +50
Storage temperature, °C	From -55 to +60

### Starter **"Tarzan"**



The starter is designed to start a explosion engine of up to 1000 horsepower of various vehicles in conditions of "bad" accumulator and low ambient temperature.

Dimensions (LxWxH), mm	209x417x554
Max.weight, kg	43
Operating voltage, V	29,0 – 8,0
Internal resistance, mOhm	6,0 – 8,0
Max.power at operating voltage, kW	35,0
Reserved energy in operating voltage range, kJ	194,0
Resource, number of cycles, no less than	300000
Lifetime, years, no less than	15
Operating voltage temperature, °C	From -50 to+50

## Electrochemical capacitor

### Corrosion pulsed current protection station **SKZ-IT-24 / CK3-IT-24**



According to statistics, one of the main causes of pipeline accidents is the corrosion of pipes. Application of cathodic protection can significantly extend the life of the pipeline. Expenses for repair of the pipeline, the elimination of accidents and rehabilitation work exceeds the cost of design, construction and operation of cathodic protection systems dozens of times, that's why cathodic protection has become an integral part of all existing pipelines, water and heating systems in the world. Through the use of cathodic

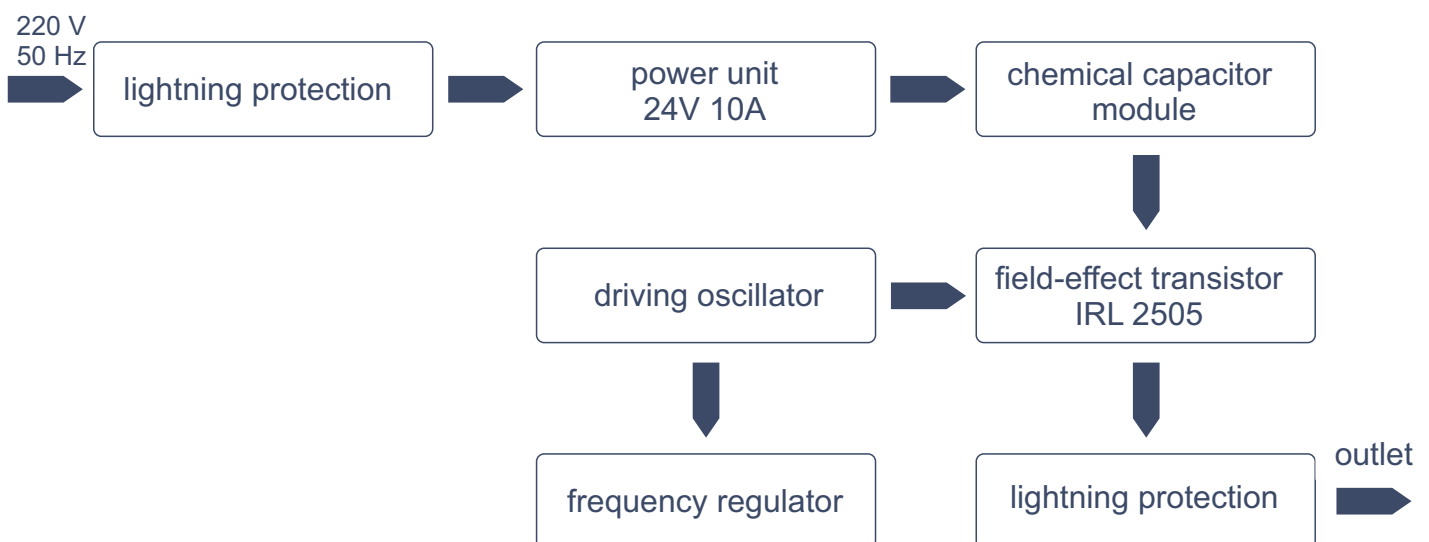
protection, the lifetime of the pipeline can be extended to 30 years.

The principle of operation is based on the fact that during the protection of pulsed current, pulse duration is set much shorter than the duration of the intervals between them, as under the influence of electric field pulses of negative ions, causing corrosion of the protected object moving at a speed of directional movement is many times greater than their rate of back-diffusion to the surface of the protected object in the absence of the field. This should be maintained efficiency of corrosion protection at the same level as for the DC protection.

The ratio of the time intervals between pulses and pause allows them to implement such a mode of the device, when formed during the pulse as a result of electrolytic dissociation of water oppositely charged ions can not be removed from each other by a field so that between them would cease Coulomb interaction.

After the end of the field, these ions begin to move towards each other, interact with each other, forming a molecule of water again. Therefore, there is no release of hydrogen, and hence the hydrogenation, causing corrosion of securable.

### Corrosion protection station. Flow chart.





### Benefits of corrosion pulsed current protection station:

- multiple energy savings in 4 - 5 times;
- preventing hydrogenation metal , leading to increased fragility of structures;
- decrease in mass flow Anode 2 - 5 times;
- more uniform polarization protected surfaces;
- not sensitive to short-circuit;
- partial elimination of the negative impact of other closely spaced metal objects;
- increase the interval between repairs of pipelines and their protective coatings;



Technical characteristics of corrosion pulsed current protection station **SKZ-IT-24**

Output voltage, V	to 24,0
Current, A	to 80,0
Pulse duration, sec.	1±0,2
Pause duration, sec.	4,5÷13,5
Main power, W	to 250
Dimensions, mm	404,0x513,0x163,0
Weight, kg, no more than	25
Service life, years, no less than	10
Operating temperature range, °C	From -45 to +50
Efficiency, %	80

## Contact information

Open Joint Stock Company "Energiya"  
399775, Russia, Lipetsk region, Yelets, pos. Elektrik, 1

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### Chief Engineer's reception room

8 (47467) 402-17

### Chief Constructor's department

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### Marketing department

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8 (47467) 416-14

e-mail: [marketing@oao-energiya.ru](mailto:marketing@oao-energiya.ru)

### Sales department

Tel./ Fax: 8 (47467) 271-03

8 (47467) 211-60

### Export department

Tel./Fax: 8 (47467) 274-40

### Directory inquiries

8 (47467) 741-09



**GPS coordinates to drive to the enterprise** 52.600727,38.503188



Travel directions to  
enterprise  
(Yandex.Maps)

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