



# PRESENTATION

[www.sipower.ru](http://www.sipower.ru)

# Our Partners & Customers



# General Information about Svyaz engineering

- Established in 1997 in Moscow.
- More than 1000 employees.
- 3 factories: Moscow-2006, Azov-2012, Dubna (PCB)-2014.
- Development and manufacturing of radioelectronic & electrotechnical equipment for:
  - cellular and fixed-line operators;
  - TV and radio broadcasting;
  - power industry including solar and wind energy;
  - rail and public transport;
  - oil & gas industry;
  - housing and industry.
- Membership in professional associations:
  - Association of manufacturers of electronics and electronic devices (APEAP);
  - Association of developers and manufacturers of television and radio broadcasting equipment (ARPAT);
  - Innovation and R&D Directors Club (iR&Dclub);
  - Non-commercial partnership: Intellectual Transport Systems - Russia;
  - Non-commercial partnership: Association of solar energy companies;
  - Association «Power supply»;
  - Russian Engineering Workers Union;
  - All Russia Public Organization «Delovaya Rossiya»;
  - Russian union of industrialists and entrepreneurs.

# Our Moscow factory

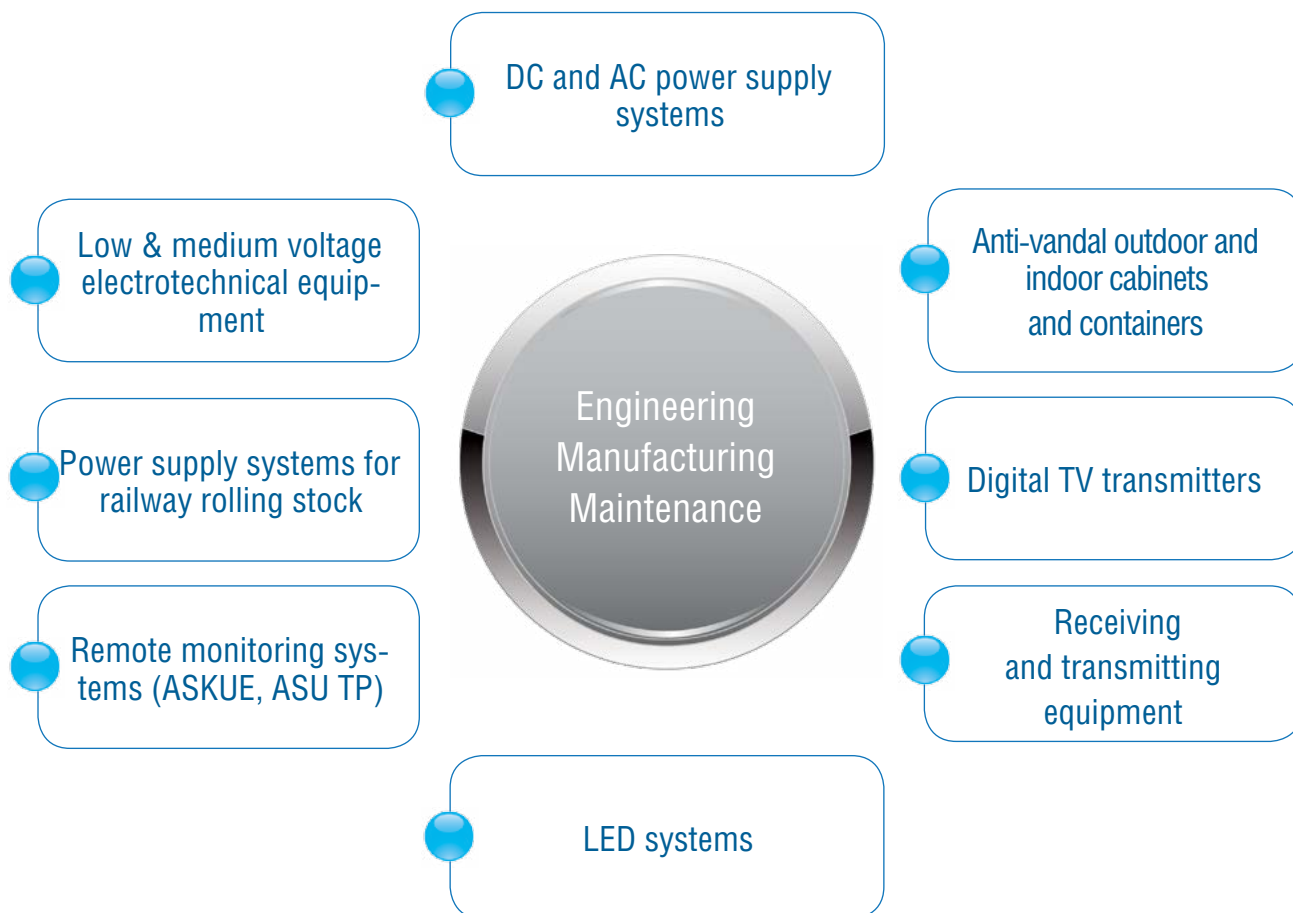
Full-cycle production of power electronics and electrical engineering.

Factory area is 25 000 m<sup>2</sup>, built in 2006.

Address: Moscow, 6-th Radialnaya str., 9 (Metro Tsaritsyno).



## Key business areas



# Our Azov factory, Rostov region

Full-cycle production of power electronics and electrical engineering.

Factory area is 36 000 m<sup>2</sup>. Launched in 2012.

Address: Rostov region, Azov, Promyshlennaya str., 5, build. 21.



Launch of a new factory in Azov allowed to reduce net cost of serial production up to 20%.

- The factory is equipped with absolutely new automated lines for metal working, painting and SMD-mounting.
- Full cycle of metalwork: metal sheet blanking, forming, lathe & milling works, welding works, powder & liquid painting with different surface preparation.
- Full cycle of radioelectronic production: SMD-mounting, electrical work & assembling, wiring & electrical testing.



Automated painting booth



A metal section is equipped with new engineering tools produced by TRUMPF



# Radioelectronic production

## Capabilities of electronics manufacturing:

- Mounting of any SMD components.
- Mounting of any through-hole components.
- Wave & reflow soldering with application of Nitrogen gas.
- Control of assembled boards, including AOI and x-ray control.
- Washing and application of conformal coatings.
- Production of coils.
- Functional testing & adjustment of manufactured products.
- Assembly into the housing.



Convection oven of reflow solder  
JT RS-1000II-N and Vitronics Soltec XPM<sup>2</sup>



3 Surface Mount lines with 5 Mount Assembly machines Universal (Advantis3 AC-30S, AX-30S, AC-72, AI-07S) with overall productivity of 105 000 components per hour and line of Automated Optical Inspection (AOI)

# Radioelectronic production

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Device for X-ray control  
Cougar SMT



The visual control device TR7500



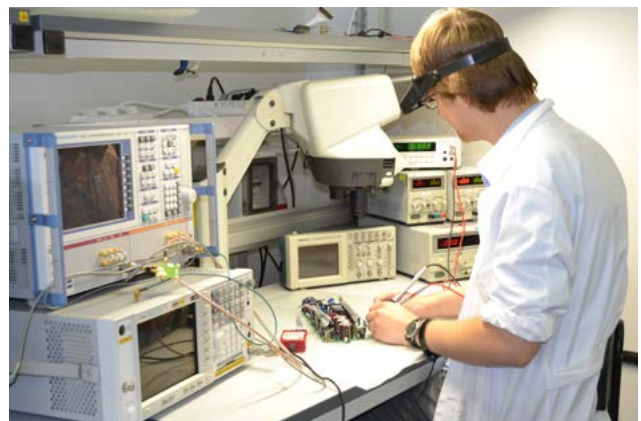
Mounting of terminal components



Application of water-proof coating



Winding production



Functional testing & adjustment

# Metalwork & Painting

## Capabilities of metalwork manufacturing:

- Cold pressing of sheet metal on coordinate nibbling machines Trumpf TruPunch 5000 (5 presses) and Amada and Trumpf pressbrake machines (10 presses).
- Automatic, semi-automatic and automatic welding of ferrous and non-ferrous metals (20 welding machines with using of platens and Semmelweis rope are available).
- Metalwork on multifunctional turning and milling equipment fitted with CNC (more than 30 different machines including Hermle are available).
- Gas-dynamic coating (zinc, copper).
- Assembly line for powder painting.
- Screen painting (serigraphy).
- Equipment assembly.



Punching presses  
Trumpf TruPunch 5000



Sheet and plate bending press  
Trumpf TruBend 5050



Milling equipment HERMLE C32U



Powder painting chambers  
(Ideal Line & Wagner)



# Test operations center

## Full range of inspection and testing:

- Final inspection throughout all the sectors of production.
- Functional testing.
- Climatic and heat tests.
- Vibration tests.
- Voltage-breakdown and electromagnetic compatibility tests.



Checking machine  
Mitutoyo



Climatic chamber  
ThermoTron SM-16-8200



Climatic chamber Terchy MHW-9HK



Functional testing

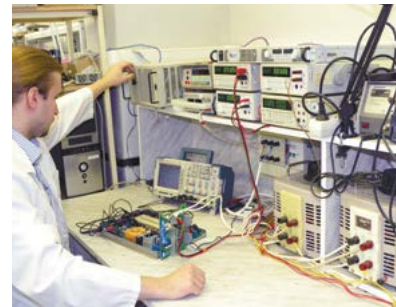
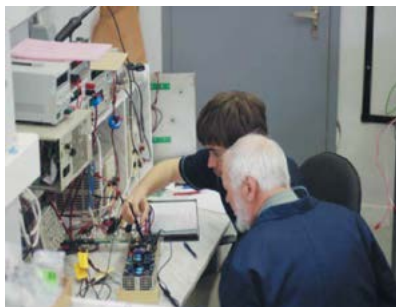


Voltage-breakdown tests



Electromagnetic compatibility tests

# Engineering, Mounting, Maintenance, Certificates



Engineering Department

## Svyaz engineering incorporates:

- Design engineering bureau with 5 engineering department and 1 mechanical design. More than 100 engineers and constructors work in the Bureau.
- Up-to-date laboratories, equipped with modern devices and stands for complex R&D and testing. Mounting and Project Divisions.
- R&D Department having been executed more than 50 projects during 5 years.
- Department of pilot production.
- Departments of Mounting and Pre-comissioning.
- Service company “ESY-Service” with more than 20 region service centres throughout Russia.



Certificate  
GOST R ISO 9001-2011

## Certificates and licenses:

- Certificates of conformity of the organization’s quality management system: GOST R ISO 9001-2011 and GOST R EN 9100-2011;
- RosTekhNadzor license to manufacture electric and electronic equipment for nuclear power stations;
- Federal Space Agency licence;
- FSB licence.



RosTekhNadzor license

# PCB Factory in Dubna, Moscow region

Launched in June, 2015.

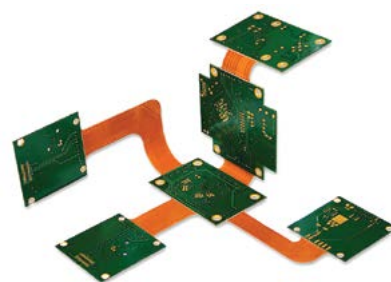
A full cycle production of multilayered PCBs for prototyping, low-volume and multiproduct manufacturing.

Located in Special Economic Zone in Dubna, giving tax and customs preferences for export.

Production building - 12 700 m<sup>2</sup>. Estimated capacity - 55 000 m<sup>2</sup> per year.

## Characteristics of PCBs to produce:

- Multilayered PCBs (until 25 layers).
- Multilayered PCBs with blind and concealed via holes.
- Flexible-rigid PCBs.
- PCBs with metal base.
- SHF PCBs.



# Power supply and monitoring systems for Telecom industry

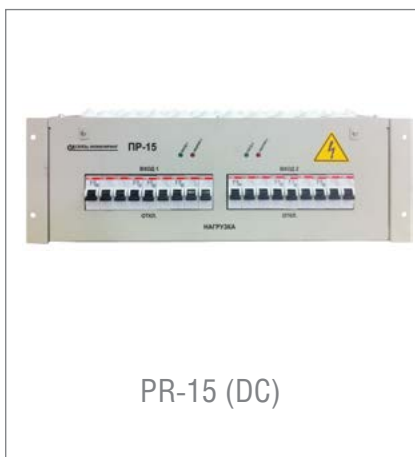
Complex solution based on equipment of Svyaz engineering and other domestic manufactures:



# Accounting & Distribution Systems



- AC accounting and distribution systems with 220/380 V AC voltage for power up to 500 kW.
- DC accounting and distribution systems with 12/24/48/60 V DC voltage for power up to 500 kW.
- Automatic load transfer for 1-and 3-phase of power supply network.
- Distributional panel (SHCR-B-1 kW) for 1-and 3-phase of DC power supply network with the line voltage in 380 V and 50 Hz.
- Load resistor box (BNR-48/150) for creating of steady load equivalent during in electric power supply of communications units installations with the line voltage in 48 V.



# Vandal-proof cabinets with climate control

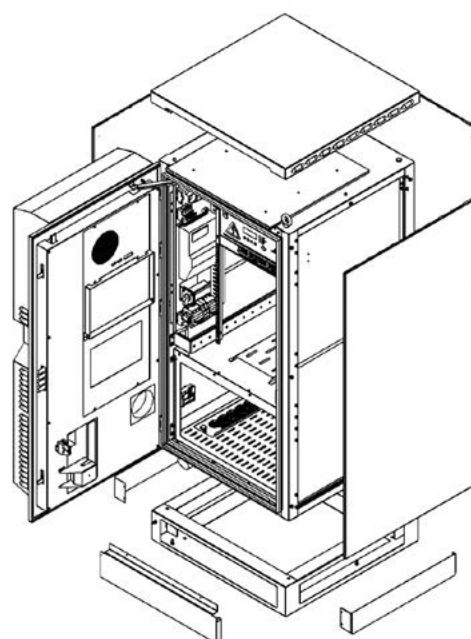
Mass production of more than 20 types of vandal-proof telecom cabinets with different typical sizes, format (Indoor/Outdoor) and security levels. The cabinets are equipped with the following systems:

1. Internal micro climate control.
2. Power supply of DC 24/48/60 V and/or AC 220/380 V.
3. Power supply and distribution.
4. Security & fire alarm, automatic fire suppression.
5. Remote monitoring and control.
6. Electronic access and video monitoring.
7. Emergency ventining and lighting.



## Distinctions:

- The cabinet consists of moduls that permits to substitute any element of construction in case of injuries.
- Cabinets/sections may be equipped with 2 doors (front/back panel) for easy access for both sides.
- Cabinets are made in following climatic modifications: U (from -45 to +40), UHL (moderate cold), HL (cold). Placement category: 1, 2 or 3 by GOST 15150-69.
- For more convenient transportation and manual installation all the covered elements (side walls, roof and door) can be easily dismantled.
- Double-layer-walls of the cabinet provides the hermiticity and resistibility to external influences.



# Vandal-proof cabinets with climate control

## Constructions:

- Constructively cabinet can consist of 1, 2 or 3 sections.
- In order to maintain specified environmental conditions the cabinet can be equipped with an air-conditioner, heat exchanger, fans and heating element. A combination of climate control equipment is possible: for example, air-conditioner + fan.
- For convenient installation and maintenance clamping elements can be mounted on telescopic guideways.
- Doors of the cabinet are equipped the cam system with the 4th class of safety protection (IP).
- Basic cabinet design ensures high IP55 level of protection. The degree of protection may be changed according to customer's requirements.
- External panels of the cabinet (walls, roof, base and door) are made of sheet steel of 2 mm.
- All assembly units are made of steel and protected by weather resistant, corrosion-resistant polyester coating.
- Some units are made of zinc-coated steel or protected with galvanic coating.
- Internal design of the cabinet provides a possibility to install both standard equipment (19 or 23 inches) and customer's equipment with special clamping.

## Available series-produced models:

Model	Functionality	Height excluding base*, mm	Width, mm	Depth, mm		Depth of inside, mm	Batteries space (WxDxH), mm	Maximum equipment height without install equipment, U	Netto of packed weight, kg
				excluding door	including door and cover				
SHKV-60	Vandal-proof	600	640	630	-	550		-	56
SHKV-78	Vandal-proof climatic	780	600	700	946	650		8	140
SHKV-90	Vandal-proof climatic battery operated	900	850	780	952	510	560x470x630	-	150
SHKV-98***	Vandal-proof	980	1020	450	475	-		-	90
SHKV-100	Vandal-proof climatic	988	640**	612	840	460		13	100
SHKV-110.01	Vandal-proof climatic	1133	797	724	939	450		21	250
SHKV-110.02	Vandal-proof climatic battery operated	1133	797	-	971	550	490x520x330 500x550x450	-	220
SHKV-165	Vandal-proof climatic	1505	784	777	995	450	535x380x580	20	350
SHKV-195	Vandal-proof climatic	1800	850	780	952	510	560x400x580	26	380

\* Height of base may be changed according to customer's requirements (available series-produced cabinets with 75 and 150 mm height)

\*\* Size without accounting of cooler (117 mm)

\*\*\* Available in 2 types of version in depending on completing units of the cabinet

# Telecommunication cabinets

Telecom cabinets of ARSH-series are used for accommodation, mounting and further operation of the equipment, standardized in sizes of 19" with depth until 1000 mm.

The cabinet may be equipped with any computing, telecommunicational and electrical engineering equipment which need to be installed in compact space and accessible in the operation.



ARSH-42U/800

Each model of the cabinet can have two types of front door mount: left-handed or right-handed. The door may be produced from metal or glass sheet according to customer's requirements.

No	Word code of main implementation	Dimensional specifications, mm			Net weight, kg
		height	width	depth	
1	ARSH-27U/600	1405	600	600	46
2	ARSH-27U/800			800	61
3	ARSH-27U/1000			1000	76
4	ARSH-32U/600	1625	600	600	53
5	ARSH-32U/800			800	71
6	ARSH-32U/1000			1000	88
7	ARSH-37U/600	1845	600	600	60
8	ARSH-37U/800			800	80
9	ARSH-37U/1000			1000	100
10	ARSH-42U/600	2065	600	600	68
11	ARSH-42U/800			800	90
12	ARSH-42U/1000			1000	113
13	ARSH-45U/600	2205	600	600	72
14	ARSH-45U/800			800	96
15	ARSH-45U/1000			1000	120
16	ARSH-47U/600	2295	600	600	75
17	ARSH-47U/800			800	100
18	ARSH-47U/1000			1000	125



# Crates of Advanced TCA standarts with an embedded power supply

The integrated system is intended for installation of submodules of different purpose equipment, meeting the ATCA standard.

The integrated system is an Advance TCA crate, revised in accordance with additional requirements and adopted for domestic manufacture, produced by plenty of foreign companies.



## Integrated systems are equipped with the following parts:

- power supply;
- influx&extract air cooling of a compartment for the submodules and the autonomous power supply;
- temperature control system for the submodules compartment;
- system of built-in self test that transmits the information about technical condition (TC) of key parts of integrated systems to external control devises;
- power supply equipped of three (IS-001) or one (IS-002/003) of galvanically isolated channel links of connection voltage;
- IS-003 is allowed with ATCA interconnection wiring.

## Technical characteristics of the system:

	IS-001	IS-002/003
The rated voltage of the primary power network	(220 ± 22) V of AC	
Primary power network frequency	(50 ± 2) Hz	
Limit deviation of the primary network voltage, permitting the module to preserve its capacity without deterioration of its characteristics	+ 44 V - 80 V	
Rated output voltage and maximum current of the power channels	10,7 V, 15 A; 5,0 V, 8 A; 3,3 V, 8 A;	48 V, 11 A
Capacity of the hardware compartment air conditioning system, m <sup>3</sup> /min	10 for blowing in; 13,2 for blowing out	
The number of the hardware compartment temperature sensors	2 at inlet; 2 at outlet	
Interface with the temperature data collection external device	RS-232	RS-232, Ethernet
Dimensions (H*W*D)	220 x 490 x 480 (mm)	
Weight	max 23 kg	

# DC UPS and inverters

Manufactured power supplies have capacities of 500, 2000 and 3000 W with output voltage of 24, 48 and 60 V that allow to assemble UPS DC with capacities from 500 W to 60 kW in a single cabinet.

## Main advantages of our UPS:

- Module construction with the reservation of power modules.
- Mean time between failures of power supplies is over 400 000 hours.
- Easy of maintenance and service reliability.
- Compactness and low weight.

## 9-th generation UPS specifications:

Ambient operating temperature is from  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ .

Power supply voltage is 85~300 V.

Rectifier assembly type – BP-2,0/48R:

- Efficiency 96% (with efficient manager).
- Output voltage:
  - mains operation  $54,5\text{ V} \pm 0,35\%$ ;
  - battery operation  $48,0 \pm 6\text{ V}$ .

Fluctuation of output voltage is in the following interval:

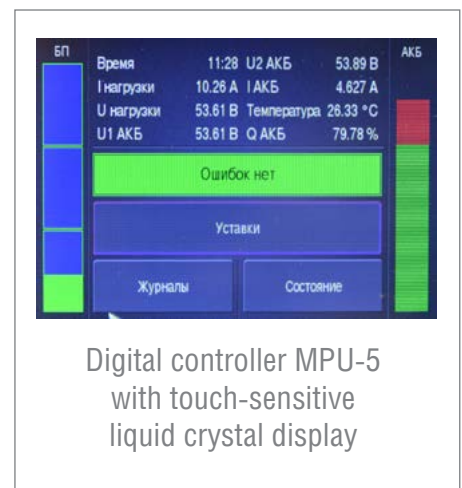
- from 300 Hz  $< 50\text{ mV}$ .
- from 300 Hz to 150 kHz  $< 7\text{ mV}$ .

Psophometric noise power  $< 2\text{ mV}$ .

Power factor ( $\cos \varphi$ ) 0,99.

Construction: crate 19" for installation in telecommunications cabinet/rack or inside a special-structure casing.

Production of inverters with voltage up to 3 kW in 1U enclosure that provide the equipment with AC power supply with voltage of 220 V / 50 Hz from the source of DC power supply with voltage of 24 V, 48 V, 60 V.



# AC UPS with a high-power-modulation, SIP380 series

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**AC three phase uninterruptible power supplies are produced in two series:**

1. SIP380A (10~500 kVA with inverter without transformer).
2. SIP380B (10~800 kVA with an integrated transformer of inverter).



## **Main features:**

- High reliability provides guaranteed high-quality power supply for critical loads.
- Compact size allows to install a UPS in a restricted space.
- Low THDi excludes the impact of a UPS on other critical loads connected to the same mains.
- High output power factor (PF=0.9) allows to connect more units of modern equipment with a high input power factor.
- High efficiency factor allows to reduce connected capacities.
- Integration into a client's equipment monitoring and control system of any complexity (proprietary software for the remote monitoring and control of the UPS is also available).
- Possible modifications under client's requirements (management cards, installation of internal batteries, availability of adapter transformer, 6 or 12-pulse rectifier, etc.).
- The possibility of parallel operation mode for up to 4 UPS.

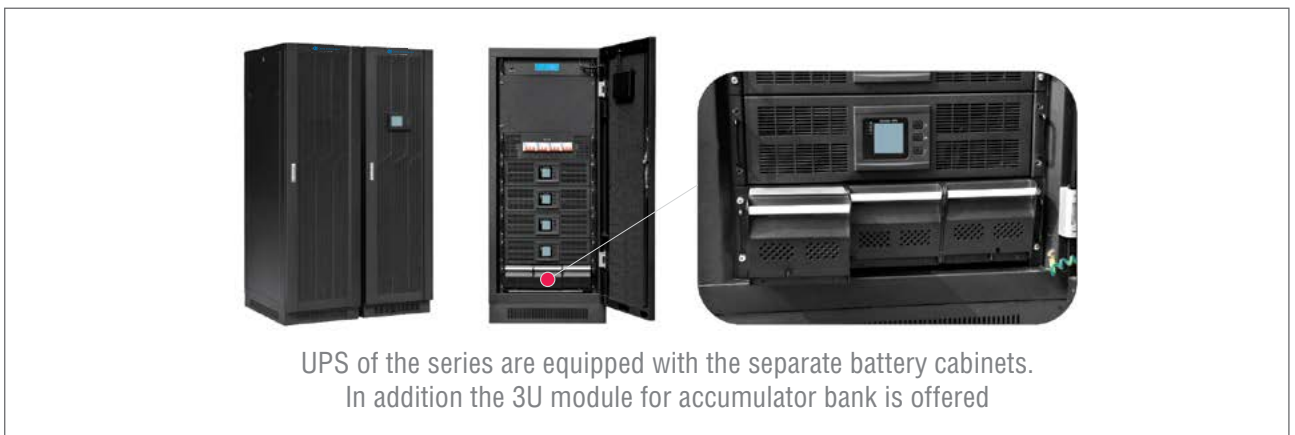
# AC UPS high-power modulation, SIP380A MD (modular)

The UPS combines a modular construction with technology of parallel N + x reservation. Amounts of full power: 30 kVA, 60 kVA, 100 kVA, 200 kVA, 250 kVA, 320 kVA, 400 kVA, 520 kVA, 800 kVA allow to customize the UPS without any difficulties.



## Technical characteristics:

- Technology of high-cycle double conversation.
- Completely digital microprocessing operation.
- Power and battery modules with 3U height.
- Function of emergency power cut-off.
- Protection from short circuit and overload.
- Protection from atmospheric overvoltage and voltage steps.
- Interference filter (electromagnetic interference and radio interference).
- Monitor and control through the communications port RS232/485.
- A couple of slots for SNMP and «Dry contacts» cards. Setting of smart parallel reservation through the installation of several reserve modules. When exceeding the load level UPS can keep normal operation with issuing warning call.



# AC UPS

## small and middle rating, SIPB series

### Architecture with Online double conversion



#### Main features:

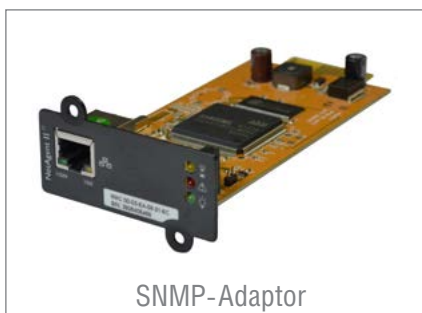
- Wide range of input voltage.
- Power factor corrector.
- Digital control.
- Higher efficiency mode.
- Self-Testing while starting.
- Cold start.
- Possibility of parallel operation for up to 4 UPS.
- Batteries deep discharge protection.
- Efficient protection system.
- Models with higher charging current are available.
- Interfaces: RS232/USB/SNMP/Dry Contacts.

#### Application:

LAN, Data Centers, telecommunication systems, industrial controllers, protection systems and automatics, security systems and access systems.

Model	Output Power	Dimensions (WxHxD), mm	Weight, kg
SIPB1KA.9-11 / SIPB1KD.9-11	1000 VA / 900 W	440x430x86,5	13/ 8
SIPB2KA.9-11 / SIPB2KD.9-11	2000 VA / 1800 W	440x690x86,5	24,6 / 13,6
SIPB3KA.9-11 / SIPB3KD.9-11	3000 VA / 2700 W		24,6 / 13,6
SIPB6KD.9-11 + BMSIPB6-10KD	6000 VA / 5400 W	443x580x131 и 443x720x131	98
SIPB10KD.9-11 + BMSIPB6-10KD	10000 VA / 9000 W		100

#### Options for UPS communication features expansion:



# Electric power converters for renewable energy

Electric power converters are made for output power from 1 to 30 kW and meant for supply the equipment with AC electric power supply from renewable energy.

Due to modular design of the system it is possible to increase the output power to 300 kW with parallel connection of converters.

Possibility of loading of energy accumulators or supercondensers is provided.



Electric power converters  
30 kW

## Main features:

Rated value of output voltage .....	380/220 V ± 10%
Rated current frequency .....	50 ± 1 Hz
Power output .....	1/2,5/5/15/30 kW
Rated value input voltage.....	500 V

The system is designed under requirements of stability of seismoshock influence with range of shock acceleration in 200 m/s (20g) under half-wavelength from 30 to 50 ms.

Electric power converters are able to work in the range of background temperature from 50°C below zero to 85°C above zero.

Electromagnetic compatibility is under state standart «GOST R 51317.6.4-2009».



Charging system  
ZU-15/600



Active power filter

Charging system provides compound-stage operation of recharge with coefficient of charge rate pulsation and voltage no more 5%.

With the purpose to degrade the higher harmonic component levels of phase current that raise in electric network the electric power converter may be equipped with active power filter (for power supply in 15 and 30 kW).

# Electric power converters of power up to 2,5 MW

Cooperation project of Svyaz engineering and Gamesa electric (Spain) in local manufacturing content of electric power supply from renewable energy in Russia.

The product supplied as complete solution in climatic container that includes:

- inverters 100 kW, 500 kW, 630 kW, 1 or 1.25 MW;
- step-up transformer in 10 kW;
- protection distributing gear system with middle voltage;
- system of water quenching with closed circuit system;
- transformer for ancillary services.

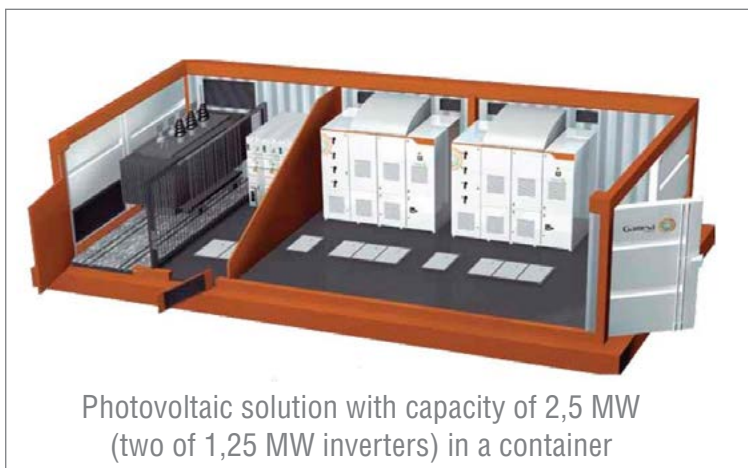
## Main features of 1,25 MW inverters:

Input characteristics:

- recommended voltage of power supply ..... 1500 kVA
- range of DC current voltage ..... 570~1000 V
- quantity of DC current inputs ..... 12

Output characteristics:

- quantity of phases ..... 3
- name plate rating ..... 1250 kVA
- maximum capacity ..... 1300 kVA
- nominal voltage of AC current ..... 400 V
- range of accepted voltage value ..... -15% / +10%
- output frequency ..... 50 / 60 Hz
- highest efficiency ..... 98,6%



# Climatic containers for accommodation of equipment at complicated conditions

**Container base support design KBNK-1,2,3** for accommodation of large equipment maintaining the working ability at complicated climatic conditions:

- temperature changes of the environment from - 65 to + 60°C;
- high humidity 98% (with temperature 25°C);
- influence of frost, dew, rain and solar radiance;
- influence of sand, dust and salt (sea) fog;
- wind force to 50 m/s, snow load not over 200 kg/m<sup>2</sup>.



## KBNK could be equipped with the systems:

- access checking and monitoring of presence the operation and maintenance personnel;
- fire-fighting, warning and signaling system;
- maintaining of microclimate;
- uninterruptible power supply;
- remote monitoring of process environment;
- online access and video monitoring;
- ventilation;
- energy-efficient lighting;
- supply of self-generated power supply (solar panels and wind-powered generator).



№	Main Code	Outside dimensions, mm			Internal dimensions of apparatus cabinet, at least, mm		
		length	width	height	length	width	height
1	KBNK-1	12192	2438	2896	10800	2200	2600
2	KBNK-2	6058	2438	2438	4800	2200	2150
3	KBNK-3	2991	2438	2438	2800	2200	2150



# AeroGreen is an wind-power engineering of a new generation

## AeroGreen wind-powered generator is a solution of a new generation

- Innovative complex solution in alternative energy consists of wind-powered generator, inverter and cabinet or container for accomodation the equipment in complicated climatic conditions.
- Wind-powered generator based on turbine technology, places minimum space and may be put on any surface.
- Doesn't need orientation on the wind, could work at directional flow of the air even under the high rate of the wind.
- System based on turbine is safe for environment and not injury-causing. Noise floor in opposition to three-blade wind-powered generators.



## Main advantages of AeroGreen wind-powered generator



- Short vanes

Design of vanes with turbine type made of light-weight polymeric materials allows to work efficiently under windstorm.

- Windwheel enclosed-type

Windwheel is installed inside of airframe on vertical centerline that allows to work under differently directed gusting wind.

- Using of solar panels

Polymer solar elements on the top blister allow to raise an design efficiency.

- Guide planes in the basis

Thank to guide planes mounted on the basis it's not necessary to focus on the wind.

# Automated Power Consumption Measurement System

## The system is designed for:

- automation of electric power commercial and technical record-keeping;
- studying consumption dynamics;
- network parameter control;
- consumption imbalance calculation at transportation and power consumption facilities.

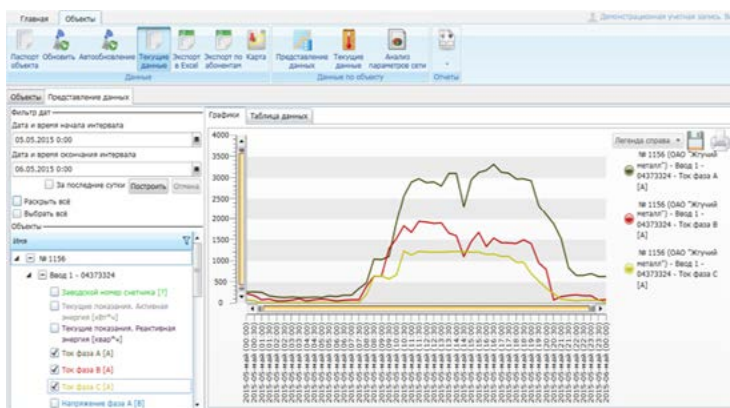
Areas of using: facilities operated by companies and enterprises for housing and communal services, apartment blocks, trade centers, and office buildings.

The APCMS for electric power commercial record-keeping is operated using meters to measure power resources of all major russian manufacturers.

The System, USPD UM-31 and USPD UM-40 monitoring units for data acquisition and transmission are included in the State Register of Measuring Equipment.

## Economy:

- Reduction of expenses connected with meter reading, possibility to transfer the data directly to the utilities company.
- Reduction of expenses on electric energy due to selecting the optimal payment rate for electricity consumption.
- Reduction of expenses on power resource meter reading.
- Fixing of electricity consumption rate in the range of the claimed scopes to reduce financial expenses.



# Remote monitoring and control systems

## Application:

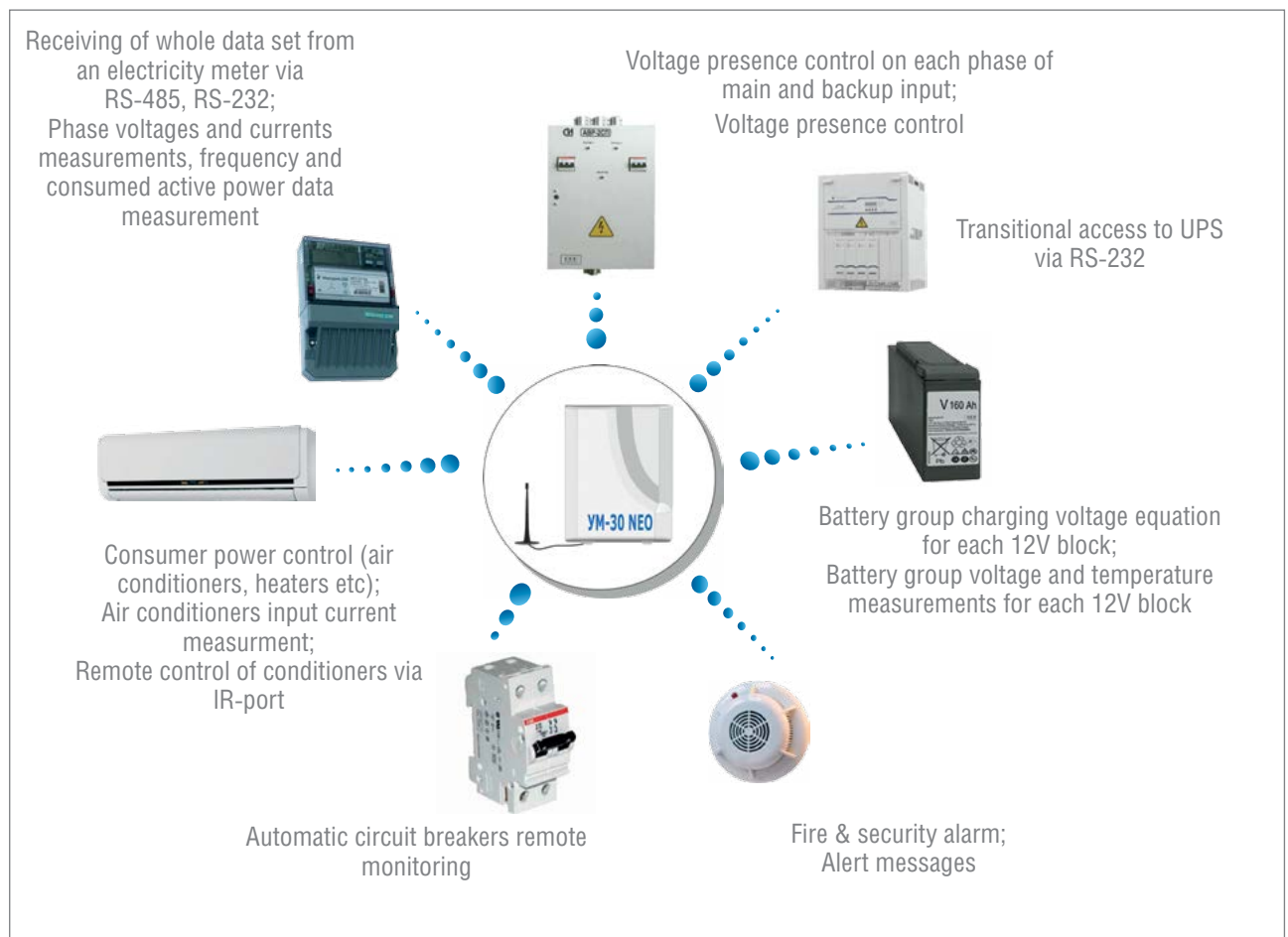
- Commercial measurement of power consumption (Automatic system for commercial measurement of power consumption - ASCMPC).
- Monitoring & control of auxiliary equipment (conditioners, heaters, automatic transfer circuit breakers, diesel power stations, storage batteries).
- Acquisition of information from temperature meters and fire & security alarms.

## Advantages:

- Easy-to-mounting equipment.
- Possibility to gradual equipping of system with additional monitoring modules.
- Informing of operating personnel about current situations on the objects by SMS to cellular phones.

## Economy:

- Decrease of expenses on recording of data from electricity meters.
- Possibility to pass the data directly to an energy retail company, producing the ASCMPC based on UM-30NEO controller.
- Efficient performance of maintenance service.



# LED lighting system



## We design and manufacture LED-systems for:

- industrial and manufacturing facilities;
- commercial real estate;
- housing & public utilities;
- warehouse complexes;
- private facilities.

Our product line consists of more than 50 modern energy-saving LED lamps.

We provide customized solutions in designing of efficient energy-saving systems for objects with any degree of complexity. We provide complex service in designing, mounting and maintenance of lighting equipment.

Explosionproof LED models are also available.



# Automated Highway Lighting Monitoring and Control System (AMCS)

**The System makes possible to control the following functions:**

- Both automatic (as per regulations and instructions, and/or by reference to the intensity of illumination) and manual control of lighting (switching ON and OFF).
- Transfer of illumination data and lighting energy usage data to the server.
- Energy consumption control and control over quality of electricity supply.
- Detecting an unauthorized connection to electric supply lines.

**System Features:**

- The automatic equipment is operated under all operating temperature conditions.
- Operation expenses are kept to a minimum (signal transmission over the GSM-GPRS channel).

**The following highway monitoring and lighting projects have been implemented:**

- Moscow – Caspian (34 sections).
- Vologda – Tambov (19 sections).
- Moscow – Kharkov (13 sections).
- Moscow – Saint-Petersburg (8 sections).
- Tambov – Penza (6 sections).

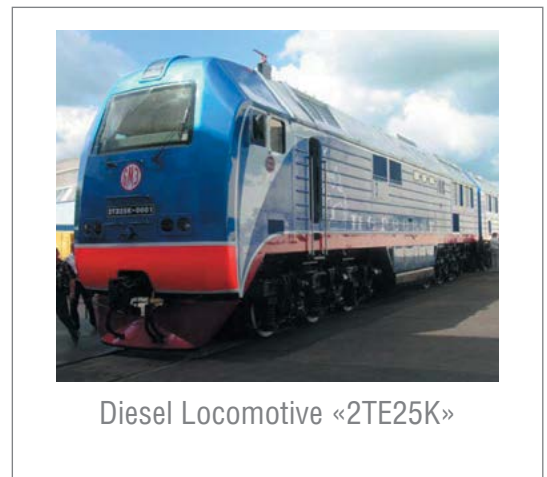
Grand total: 80 sections, approximately 1200 km.



# Power Supply Systems for Railway Rolling Stock

The following product line of PSS for the Railway Rolling Stock is produced:

- Traction Motor Supply System «TP» for Diesel Locomotives.
- Auxiliary Power Supply «PV-80» for Diesel Locomotives.
- Auxiliary Power Supply «PSN-100» for Electric Locomotives.
- On-board power supply systems.
- Power Supply Systems are certificated of Russian Certification Register at railway rolling stock and passed a 100% quality control.



# Power Supply Systems for Railway Rolling Stock



# Fare Payment System and Public Transport Fare Violations Detection system

## Main Subsystems:

- Ticketing system: the self-service ticket machine is equipped with a cash processing intelligent system (one note per 3 seconds, and 4 coins per second).
- Ticket checking system: combining main modern ticket systems: cash, fare cards, NFC, QR-tickets.
- Passenger Counting System: Precision in the calculation of incoming and outgoing passengers amounts up to 97%. Fare violations can be detected on a real-time basis.
- Data transmission system: on-line transmission of financial data, statistical data and data on positioning via GSM/GPRS and GLONASS/GPS communication. The system provides multi-level security of automated payments and data storage. Mutual payments can be made twice a day.
- Video-based registration System: transmitting all data to the Central Server.

## The introduction of the System allows the following:

- Integration of all urban traffic control systems (for land transport, Metro, shuttle vans and suburban traffic) into an integrated traffic management system.
- Achieving payment flexibility – payment operations with unified fare card suitable for any kind of transport.
- Speeding up and facilitating the fare payment process by enabling individual payment via different options.
- Increasing traffic capacity by letting exits/entries through all doors.
- Productive work of checkers and ticket inspectors, when the number of violators aboard is precisely known.

The set of necessary equipment:

1. Fare card checking unit (validators) – 3 to 5 units per vehicle.
2. Vandal-proof automated self-service ticket machine for buying tickets in cash
3. Cash-Register Machine for checking fare cards and cash registration
4. Passenger location sensors taking account of the incoming and outgoing flows. Subject to the number of doors.





# Fare Payment System and Detection System for Public Transport Fare Violations

A specially designed video camera to be used in vehicle safety systems makes possible to take account of the passengers leaving the vehicle and just coming back at the stop.

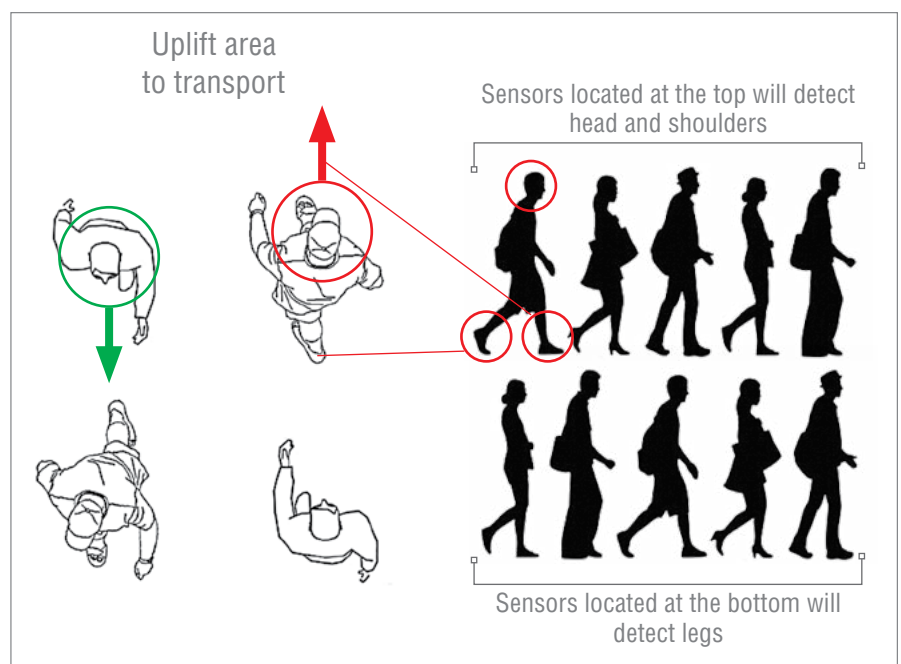
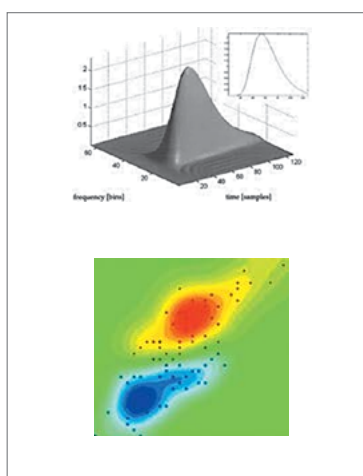
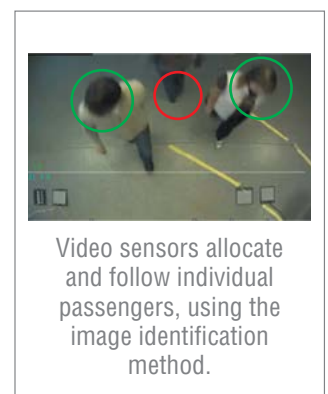
## Video Camera Functions:

- Several observed passengers are allocated and simultaneously followed.
- Creating unique color texture identifiers, which may be used to follow unmistakably and compare passengers as they enter and exit vehicles.
- Making cyclic video and audio recording.



## Operating principle of passenger location sensor:

- The sensor principle of operation is radiation and receipt of the reflected signal from a passenger after time delay.
- Different wave lengths are used.
- Sensors located at the top produce a blind effect.
- Sensors located at a floor distance from 150 to 200 mm.
- The transducers measure distance to the subjects in the loading area, generate a set of 3D points and create a video image.
- Original mathematical algorithms reliably allocate figures of adult persons, as well as children, dogs, bicycles, skis, bulk items.

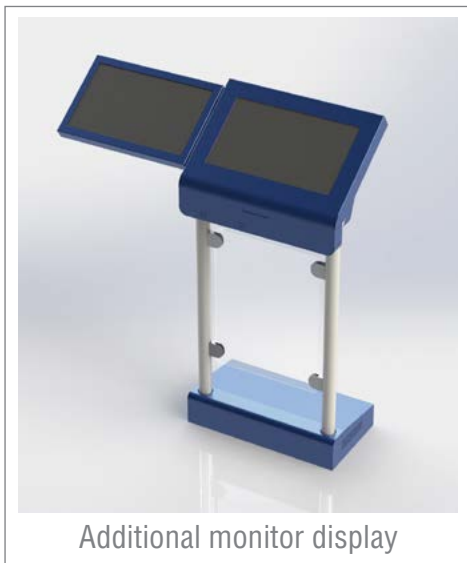


# Smart kiosk

We develop and produce ergonomic multiservice smart kiosks with different configuration. Customized manufacturing according to technical requirements.

## Main advantages:

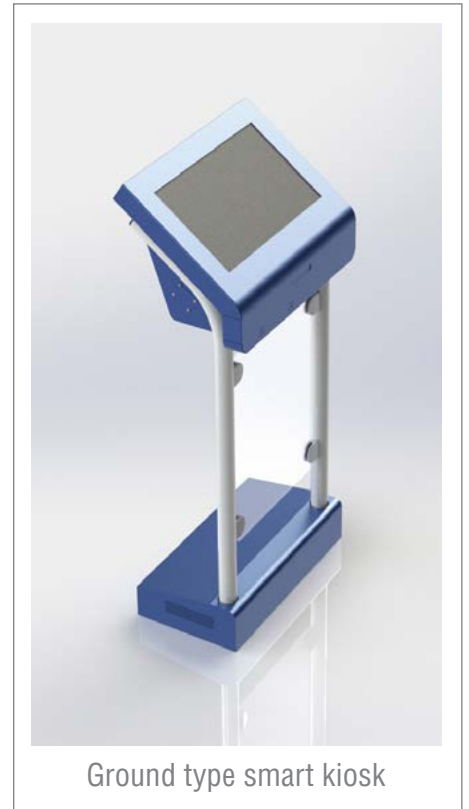
- Ground and table type models with 21" and larger monitor displays.
- Installation of temperature printer and card-reader for access authorization is available.
- Connection of additional monitor displays.
- Built-in compact UPS for off-line work.
- Mounting to the floor for safe operation.



Additional monitor display



Table type smart kiosk



Ground type smart kiosk



Smart kiosk installed in the Central Child Store (CDM)

# Digital Television Transmitters

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Production of Maxiva UAX Digital Television Transmitters  
(in partnership with Harris Corp., USA)

## Main characteristics:

- Rugged, reliable design and construction.
- Easy adjustment and control of parameters.
- DVB-T/T2 digital broadcast standard.
- Output power: 10 – 2000 W.
- Output frequency range: 470...862 MHz.
- Channel bandwidth: 8 MHz.
- Type of cooling system: air cooling.
- Digital linear and non-linear pre-correction, optional real-time adaptive correction (RTAC).
- Remote control and control of main Tx parameters using Graphical User Interface (GUI).





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