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ABOUT COMPANY

NIPOM is an innovative, fast-growth company that implements complex projects in the power supply and automation. The company manages the integral process of construction, reconstruction and modernization of a facility: from survey and design to commissioning and maintenance service. NIPOM designs the power supply for industrial and civil facilities for voltages of up to 220 kV.

The company’s partners are recognized world leaders in the field of electrical engineering, such as Siemens, Schneider Electric, Eaton, ABB, etc. Every year, the company is certified, thus confirming the compliance of the manufactured products with the world-quality, reliability, safety and energy saving standards.

Research developments and innovative technical solutions from NIPOM were highly appreciated by flagships of the Russian industry: Gazprom, Rosneft, Transneft, Rosatom, Rosseti, etc. We have a long experience of active participation in the construction and reconstruction projects for facilities of various segments of industry, infrastructure, power supply grid economy and generating companies.

Structure of NIPOM, which includes research and development centers, a design institute, equipment manufacturing factories and an engineering company, NIPOM is a single center of responsibility for the quality of power facilities commissioned. The close interaction of all the business units, competent management at every stage of the project implementation help to increase the quality and the efficient implementation of a project. Our strong management team with vast experience that is able to promptly respond to any changes in the external environment leads NIPOM steadily to new successes.

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ENGINEERING COMPANY
RESEARCH AND DEVELOPMENT CENTERS
ELECTRIC EQUIPMENT PLANT
MODULAR EQUIPMENT PLANT
HISTORY

The scientific and technical potential and the high responsibility of the company that has kept up the traditions of the defense industry, the importance and significance of the decisions to be made have defined the main priorities of the company.

1955 – 2001
The industrial enterprise developed automated control systems for the manufacture of explosives. The developments were put into production and were successfully operated during many years.

2001 – 2005
- Received an order for technical modernization of the enterprises of PUC Gazprom – replace analog excitation systems of synchronous machines to digital devices. It began active development of the company in the direction of electrical production.
- Russia’s first Digital excitation systems of synchronous machines at the time was developed. A patent was obtained.
- The following products were developed: a DC switchgear, a Low-voltage switchgear.

2006 – 2010
A large number of orders and the growing demand for functional characteristics of equipment upgrade required the rapid development of production base and expanding product line. Develop new technical solutions for power supply systems of Gazprom, Rosneft, Rosatom, Silver Holding, mining and cement complexes.
- Mastered licensed production of electrical equipment for voltage up to 24 kV.
- The first international license for the manufacture of Low-voltage switchgear based on the constructive Logstrup (Denmark).
- Mastered the production of earthquake-resistant Low-voltage switchgear for nuclear power plants. As part of this project organized a full cycle of manufacture of electrical devices.
- The company has received the world’s first license for the production of the new development from Siemens – a modern Low-voltage switchgear based on the constructive Sivuxor SA.
- A site for manufacture of modular equipment was created and put into operation.
- Organized by the project activity.

In the context of steadily growing volume of production and services it was necessary to intensify of manufacturing and increase the productive capacity of the company. Process optimization and increased productivity are the most effective way of ensuring fulfillment of orders as well as appropriate in due time.
- Modernized the production based on modern technologies.

2011 – 2013
In order to meet the new, higher, customer requirements, the company begins to provide a full range of services, including construction and assembly, commissioning, service and warranty service. NIPOM develops and offers technical advice, detailed program of education and training customer staff. The company’s turnover grows up – there is a need to develop towards realization of complex supplies of engineering projects.
- The first general contracting projects for energy supply of oil and gas industry, the power grid sector and other sectors of the Russian industry were implemented.
- NIPOM gained public recognition: the company ranked among top-30 leaders of the rating “TechSuccess” among other sectors of the Russian industry were implemented.

2014 – 2016
Our partnerships with Siemens were actively developing: We obtained the Solution Partner status in the software module “Industrial Energy Efficiency – Energy Management”.
- The company was successfully passed the "Ready for Business" qualification of supplier allowing to participate in international projects of Siemens AG.
- The company obtained declarations of compliance with European quality standards for four types of electrical equipment.
- New products were developed: complete indoor substations based on unified block modules 110-35 kV, medium-voltage switchgears for primary and secondary distribution networks, modular packaged power installations, cabinet cases for low-voltage equipment and electrical wiring, digital relay protection and automation 110-220 kV.
- A project of an innovative combined network 6 (10) / 0.95 / 0.4 kV was implemented.

ENGINEERING

Following modern trends and requirements of customers, NIPOM company opened up a new trend of its activity – engineering in the sphere of power supply and automation. Our customers are interested in the efficient and optimum solution of its tasks, and NIPOM being the expert in its industry is ready to offer several variants of solving the customer’s task, to choose and manufacture the equipment satisfying the customer’s needs, collect it in a single, and the most important thing – in a working and plant-tested system, to carry out high quality construction and installation, as well as launch and adjustment works, to train the operators, as well as to provide the set of necessary documents etc.

Basic advantages of engineering are economy of time and financial expenditures of the customer. Besides that, the customer in this case deals with one responsible person and not with several contractors.

When implementing comprehensive projects, NIPOM engineering company provides a large range of services at all stages of the project.

CERTIFICATES
- Siemens Certificate
- Sovnet Certificate
- Certificate self-regulatory organizations of designers and builders
ENGINEERING AND CONSULTING SERVICES

For reduction of time and financial expenses of the customer in the course of coordination of subcontractors and interaction with them NIPOM Engineering Company carries out coordination of the whole process starting from the project agreement and ending with launching the facility:

- a complex of expert, check and control procedures including technical and economical reasoning of the projects, risk evaluation etc.;
- development, approval and control of performance of the project implementation schedule;
- development of authorization and pre-project documentation, including the development of technical requirements for design;
- underlying expert studies, receipt of necessary agreements and authorizations;
- technical supervision;
- quality control of the performed work;
- control over compliance with the requirements of surveillance authorities;
- organization of testing and launch and adjustment works;
- commissioning of the facility.

For successful implementation of the projects within the terms agreed with the customer and in accordance with the cost and quality, the system of project management is implemented and running out of the course of work performance. The planning system is built in the system of electronic document flow of the whole enterprise (EDFS (Electronic Document Flow System)). At that, it is realized not at file level (the project file is one of the types of electronic document flow) but at the level of interaction of software systems. Thus, in the process of project management EDFS interacting with the planning system carries out the issue of tasks to performers and acceptance of data from them concerning the course of performance.

Such union of two systems gives the following advantages: use of powerful performance of the system over the whole enterprise (EDFS (Electronic Document Flow System)). At that, it is realized not at file level (the project file is one of the types of electronic document flow) but at the level of interaction of software systems. Thus, in the process of project management EDFS interacting with the planning system carries out the issue of tasks to performers and acceptance of data from them concerning the course of performance.

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Innovative approach to design allows to work out unique project solutions adapted in accordance with the most complicated customer’s requirements:

- receipt of technical specifications for connection to power network;
- collection of reference data, drawing up of technical specifications with regard to the requirements of the customer, development of basic electro-technical solutions;
- calculation of power modes of the designed facility and the adjacent network, calculation of short circuit currents;
- development and choice of power equipment for the projects of any complexity with regard to adaptation to the customer’s conditions;
- comprehensive design of substations with the voltage from 0.4 to 220 kV;
- design and power supply to industrial and civil facilities;
- design of the systems of relay protection, regime and anti-accident automation systems;
- design of automated information and measuring system of commercial accounting of power supply and power rating (AWM CAPS), corresponding to the requirements of wholesale electricity market, telemetry systems (TS);
- design of automated systems of managing technological processes of substations (AXM TP);
- development of estimate documents, projects of construction organization and dismantling;
- agreement and expert studies: agreement of the project in controlling bodies and organizations, receipt of necessary authorizations and accommodating of expert studies of the project documents.

NIPOM Engineering Company provides for comprehensive delivery of the equipment necessary for construction, reconstruction and modernization of the facility of power supply and automation.

Within the framework of the comprehensive delivery the experts are ready to offer various variants of component sets of electrotechnical equipment in accordance with the customer’s requirements.

- electrotechnical equipment produced by leading domestic and foreign manufacturers;
- electrotechnical equipment of own development and production.

The Company has its own production facilities and more than 15 years of experience in delivery of electrotechnical equipment to various industries. More than 2,000 units of the equipment were supplied, mounted and adjusted by the experts of NIPOM in Russia and near-abroad. At present two plants of Company produce the products with the voltage up to 220 kV. All the equipment undergoes acceptance and handover testing in accordance with GOST RF requirements and the customer’s requirements. Delivery of the equipment is accompanied by its mounting, launch and installation works, as well as service maintenance.
the influence of "human" factor NIPOM comprehensively implements automation manufactured products. For reduction of expenses for production and reduction of on human factor, and this, in its turn, leads to the increase of the quality of the inter alia, the level of automation. The higher the level is, the less is the dependence
The competitive ability of the enterprises is influenced by many factors including, inter alia, the level of automation. The higher the level is, the less is the dependence on human factor, and this, in its turn, leads to the increase of the quality of the manufactured products. For reduction of expenses for production and reduction of the influence of "human" factor NIPOM comprehensively implements automation systems of management. Comprehensive implementation of AMS includes:
- development of technical solutions and technical and economical reasoning of the automation systems implementation;
- design of the systems;
- working-out of schematic solutions and software;
- creation of automation systems with the use of equipment of leading world manufacturers;
- high-quality technical support.

RESEARCH AND DEVELOPMENT CENTERS

The basis of our research and development center is our highly qualified and experienced specialists. NIPOM has kept up the traditions of work in the defense industry, the main one of which is the high responsibility to the customer for applied technical solutions.

The basis of our research and development center is our highly qualified and experienced specialists. NIPOM has kept up the traditions of work in the defense industry, the main one of which is the high responsibility to the customer for applied technical solutions. The company's Research and Development Center successfully achieves the increase in the reliability and safety of electric equipment due to the introduction and approbation of technical solutions and developments in our in-house production. With our scientific and intellectual potential, NIPOM is constantly evolving in new areas, developing and offering innovative solutions that meet customers' specific requirements. A number of patents on various inventions, utility models and industrial designs evidences this.

PATENTS
- Patent for a useful model – direct current voltage stabilization device
- Patent for the industrial specimen – thyristor trigger of digital synchronous electric engine
- Patent for a useful model – casing of cabinet for placing electric equipment
- Patent for invention of Method of controlling exciting current of synchronous electric engine
- Patent for invention of the Method of measuring resistance of isolation in branched direct current circuits
- Patent for invention of the Method of measuring resistance of isolation in branched direct and alternating current circuits
- Patent for invention of the Method of measuring resistance and strength of electric isolation of the products with a complex profile
- Patent for invention of the Method of pressing out of cable ends by method of radial pressing.
- Patent for the device for automatic maintenance of the battery in all modes of charge-boost charging with the function of uninterruptible power supply of consumers of direct current
- Patent for a useful model – Mechanism enable modular circuit breaker
QUALITY MANAGEMENT SYSTEM

The development and progress of NIPOM is based on the use of innovative technologies of production to ensure high quality standards and strict compliance with environmental requirements, combined with modern management technologies. Our production system is based on cross-integrated tools: the quality management system, environmental management system, innovative development, KAIZEN management, and Project Management. These systems ensured productivity growth during three years by 2 times.

Planning of the production is automated via daze ERP-system (system of resources management). For data providing is using:

- PDM-system (system of engineering data management)
- CAD-system (system of construction software)
- CAPP-system (technological software)
- ECM-system (electronic document flow system)

The results of production system implementation in 2011 – 2013:

- Increase of productivity +45%
- Release of production areas 16%
- Release of warehousing areas 25%
- Reduction of stock 18%
- Reduction of Lead Time of basic products 30%
- Reduction of reclaims 23%

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There are system of quality and system of business processes management implemented on plants which include:

- Incoming control
  The products quality control received from supplier enterprises is carried out in accordance with the plant-accepted check lists depending on the type of components and the way of their receipt.
- Self-control and control at different stages of technological conversions
  At each stage of production the contractors having completed their operations and making sure they have been executed correctly prove this attaching their personal mark to corresponding columns of the Assembly Certificate and photo recording. The photos of carrying out of the operations and of the ready-made products are stored in the information system of the enterprise all time during the facility use.
- Testing and adjustment
  Quality control carried out at all production limits is proved before the packing at the dedicated site of testing and adjustment. Employees of this site are trained in special centres and are provided with modern calibrated equipment and instruments. For reduction of time of adjustment at the site special stands of own development are applied. Modern IT infrastructure enables online recording and resolution of issues.
  Synchronization of programs, testing methods and adjustment with general technical requirements of the customers provides for maximum satisfaction of the customer’s needs.

In the course of testing and adjustment working capacity of the products is fully checked up to automated operations. If the testing programme provides for this, technological working-out of products from the point of view of failure analysis is carried out. Mandatory check is products’ inspection for Electrical Installation Code.
- Acceptance by Quality Control Department
  Handover of the equipment to the customer (on request and under pre – agreed test program).

Our cooperation with international companies in the area of consulting services related to the optimization of production processes in order to reduce costs allows us to increase every year the productivity of direct workers, build the processes of interaction of adjacent units with minimal loss of time, reduce the production cycle and involve workers through the development of a system of continuous improvements.

Our consulting partners are:

- KAIZEN Institute
- JMAC (Japan Management Association Consultants)

As the rapid audit carried out by Kaizen Institute has shown, the efficiency level of NIPOM’s manufacturing system is 55%.

Integration results:

- Reducing energy consumption by 10% with an increase in volume by 40%
- Annual energy savings of 5-10%
- Reducing the time of collecting the order by 40%
- Reduction of storage space in 2 times
- Increasing the storage capacity in 2.5 times

Main results:

- Fixed counter flows
- Redistribute space by type of activity
- Reduced transfer path
- Acceptance by Quality Control Department
  Handover of the equipment to the customer (on request and under pre – agreed test program).

CERTIFICATES

NIPOM is certified on compliance with management systems:

- ISO 9001:2015 IQNet
- ISO 14001:2015 IQNet

CONSULTING PARTNERS

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The total production area comprises 14,000 m², of them assembly production areas occupy 6,800 m², production capacity is 3,000 cabinets per year.

At the production manufacturing of the whole spectrum of distribution units and management systems is organized in the sphere of power supply. The structure, dimensions of the devices are adapted if there is a need of their placing within a constricted space for a reconstruction or modernization project.

The development of the product is carried out within the shortest terms with application of SAPR complex. NIPOM constantly improves the issued product, increases its functionality and quality, that confirmed by corresponding patents.

The enterprise actively applies modern technologies during the whole life cycle of the product.

Programs to recruit young talents NIPOM company cooperates with educational institutions, namely: participates in the development of educational programs, creates training job positions at the enterprise, employs last year course students. It increases practical and professional work experience, shortens adaptation professional period from 3 months to 1 month.

Internships abroad at our partner enterprises.

Internal training programs and workshops.

Involved staff in the process of production improvements and product quality.

Continuous professional development.

Remote courses.

Training and work placements enhance the professionalism of our employees, ensuring that any problems of customers are solved.

NIPOM offers any options of equipment packages using electrical components produced by leading international manufacturers, such as Siemens, Schneider Electric, ABB, Eaton, Tuci, Hyundai etc.

NIPOM is a licensee of Siemens for the production of low-voltage switch-gears and switchgears medium voltage. NIPOM is a supplier to Siemens and has the Ready for Business status, enabling us to participate in international projects of the concern. We obtained the status of a regional engineering partner of Siemens in Automation and Driven Equipment that confirms that we have competencies required for the implementation of projects in this area using Siemens equipment.

NIPOM company is an authorized partner center of local adaptation of Schneider Electric expert level. This allows to conduct assembly and testing of Schneider Electric NX³ circuit breakers with the release of product passport.

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Comprehensive design and manufacture of low-voltage electrical equipment and switchgear for the needs of nuclear power plants and facilities of the offshore industry, as well as the development of high-quality equipment for the electronics sector.

NIPOM is a licensed manufacturer of nuclear power plant equipment. The company holds the following certificates:

-的设计和制造低电压电气设备和开关设备满足核能发电厂和海上设施的需求，以及电子产品领域的高质量设备。

- is a licensed manufacturer of nuclear power plant equipment. The company holds the following certificates:

- 设计和制造满足核能发电厂和海上设施需求的低电压电气设备和开关设备，并且提供电子产品领域的高质量设备。

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APPLICATION:
- as a low-voltage switchgears of packaged transformer substations;
- as main and auxiliary switchboards, automatic load transfer switches, including high-speed automatic switches;
- as an aggregate boards of an electrical installation control station;
- as an auxiliary switchboards, etc.

ELECTRIC EQUIPMENT PLANT
Connection of the customers to device
Design
Device connection to distribution networks
Type of maintenance
Connection of the customers to device

Basic specifications
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>up to 0.69</td>
</tr>
<tr>
<td>Type of grounding system</td>
<td>TN-C, TN-C-S, TN-S</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>up to 6 300</td>
</tr>
<tr>
<td>Rated frequency, Hz</td>
<td>50 (60)</td>
</tr>
<tr>
<td>Rated temporary admissible current at bus bar, kA</td>
<td>up to 150</td>
</tr>
<tr>
<td>Rated surge current at bus bar, kA</td>
<td>up to 330</td>
</tr>
<tr>
<td>Quantity of distribution and control sections and modules</td>
<td>according to the wiring diagram and customer’s order</td>
</tr>
<tr>
<td>Enclosure class (as per GOST 14254)</td>
<td>up to IP54 inclusive</td>
</tr>
<tr>
<td>Equipment susceptibility to seismic load as per MSK64 scale</td>
<td>9 points</td>
</tr>
<tr>
<td>Service life, minimum, years</td>
<td>30 years</td>
</tr>
</tbody>
</table>

FEATURES AND ADVANTAGES OF CONSTRUCTION

Flexible and universal low-voltage switchgears that can be adapted to the requirements and trends
- Freely configurable system allows selecting the desired combination of the low-voltage switchgears package that would meet the special customer’s requirements.
- Flexibility in design of cabinets with different customized dimensions. Each cabinet can be equipped with various types of units and modules.
- Device is compatible with accessories of different manufacturers.
- Efficient use of the installation area due to the compact size of sections.

Long-term protection of customers’ investments: easily expandable, fit for modernization and improvements in future
- Withdrawable and removable modules are interchangeable.
- Configuration of the units can be changed without switching off voltage at the bus wire.
- Configuration of the modules can be changed – cells can be reshaped to fit withdrawable units of different dimensions without switching off the device.
- Withdrawable units of the same dimension are fully interchangeable for all types of the cabinets that provide the opportunity to install withdrawable units.
- Formation of the cabinet compartments is uniform for all types of low-voltage switchgear cabinets.

Maximum level of operational personnel safety and minimization of maintenance
- The cabinet is divided into compartments.
- Islanding degrees are 3a, 3b, 4a, 4b.
- All devices have successfully passed the type-tests in the Russian test centers.
- Screwed terminal connections at bus wire are maintenance-free.

Warranty of uninterrupted power supply and high reliability for the entire service life of equipment
- Power reserve up to 6 sources, including emergency sources.
- The risk of short circuit and conductor insulation overheating is excluded due to application of the patented terminal crimping technology.
- Resistance to impact of electric arc, earthquakes, shocks and vibration.
- Microprocessor-based units for protection of motors.
- Automatic switch is developed on the basis of microprocessor-based units of relay protection and programmable logic controllers.

Complete and prompt feedback ensures the minimization of downtime
- Control signals and status signals for electrical receivers are sent via wire and digital channels.
- Each unit is equipped with LED lamps.
- Control over thermal condition of terminal connections.

Smart device are the way to optimize management and control
- Electrical receivers have manual, remote, and automatic control.
- The device is integrated into existing production infrastructure due to application of industry-standard interfaces and protocols.
- Low-voltage switchgears are equipped with electricity meters with digital transmission of information to the automated power supply monitoring and control system.
ELECTRIC EQUIPMENT PLANT

LOW-VOLTAGE SWITCHGEARS BASED ON THE CONSTRUCTIVE SIVACON S8

Production under the license of Siemens AG

APPLICATION:
- as a low-voltage switchgears of packaged transformer substations;
- as main and auxiliary switchboards, automatic load transfer switching, including high-speed automatic switches;
- as an aggregate boards of an electrical installation control station;
- as an auxiliary switchboards, etc.

DETAILS AND ADVANTAGES OF CONSTRUCTION

- Flexible and cost-effective low-voltage switchgears that can be adapted to the requirements and trends
- Low-voltage switchgear can be adapted to the customer requirements due to the modularity principle to be placed both in a separate section and as a complete switchboard.
- Efficient use of the installation area due to small size of compartments (400 x 500 mm).
- Combining different ways of installation in one mounting compartment.
- Highly efficient ventilation system.
- Multifunctional hinges allow easy change of door position.
- Quick replacement or expansion of functional units.

Maximum reliability

- Components of device have successfully passed the type tests.
- All components are resistant to short circuit arc.

Safety for operational personnel

- Providing the test and disconnected position in case of closed door with IP control.
- Simple and safe conversion of compartments without shutting down the section.
- Protection against contact with live parts even in the absence of protective shutters due to location of plug-in connections at the rear panel.

Design

<table>
<thead>
<tr>
<th>Design</th>
<th>ST – sections with fixed installation of equipment</th>
<th>SM – sections with withdrawable and removable modules</th>
</tr>
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<tbody>
<tr>
<td>Type of maintenance</td>
<td>one-sided</td>
<td>double-sided</td>
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<td>Device connection to distribution networks</td>
<td>by cable at the bottom and at the top</td>
<td>by bus / bus wire at the bottom and at the top</td>
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BASIC SPECIFICATIONS

| PARAMETER                                      | VALUE | E
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<tr>
<td>Type of grounding system</td>
<td>TN-C, TN-C-S, TN-S</td>
<td></td>
</tr>
<tr>
<td>Rated current, A</td>
<td>up to 7,000</td>
<td></td>
</tr>
<tr>
<td>Rated frequency, Hz</td>
<td>50 (60)</td>
<td></td>
</tr>
<tr>
<td>Rated temporary admissible current at bus bar, kA</td>
<td>up to 110</td>
<td></td>
</tr>
<tr>
<td>Rated surge current at bus bar, kA</td>
<td>up to 330</td>
<td></td>
</tr>
<tr>
<td>Quantity of distribution and control sections and modules</td>
<td>according to the wiring diagram and customer’s order</td>
<td></td>
</tr>
<tr>
<td>Enclosure class (as per GOST 14254)</td>
<td>up to IP54 inclusively</td>
<td></td>
</tr>
<tr>
<td>Equipment susceptibility to seismic load as per MSK64 scale</td>
<td>9 points</td>
<td></td>
</tr>
<tr>
<td>Service life, minimum, years</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

APPLICATION:

- as packaged transformer substations;
- as main and auxiliary switchboards, automatic load transfer switching, including high-speed automatic switches;
- as an aggregate boards of an electrical installation control station;
- as an auxiliary switchboards, etc.
AGGREGATE BOARD OF CONTROL STATIONS

APPLICATION:
- The board is intended to receive and to distribute the electricity with voltage 0.4 kV to consumers, as well as to serve as a control station for 1st category electric loads of process units (including gas and oil processing equipment).

FUNCTIONS:
- Manual, remote and automatic control of the power-consuming units, including: fan and valve motors, pumps, heaters, power instrumentation, emergency protection, and lighting;
- Thermal and current microprocessor-based protection of power-consuming units;
- Monitoring of parameters, light indication of state of power-supply system and apparatus;
- Sending signals about the status of electrical installation to the site control system;
- Power automatic switch on the basis of a programmable relay/controller.

LOW-VOLTAGE SWITCHGEARS FOR GAS AND LIQUID AIR COOLING UNITS

APPLICATION:
- Low-voltage switchgear is intended to receive and to distribute the electricity, and to manage the motors of gas and liquid air cooling units.

FUNCTIONS:
- Manual, remote and automatic control of the power-consuming units, including: fan and valve motors, pumps, heaters, power instrumentation, emergency protection, and lighting;
- Thermal and current microprocessor-based protection of power-consuming units;
- Monitoring of parameters, light indication of state of the power-supply system and apparatus;
- Sending signals about the status of electrical installation to the site control system;
- Power automatic switch on the basis of a programmable relay/controller or the standby power switch in the manual mode.

MODIFICATIONS

| LOW-VOLTAGE SWITCHGEARS equipped with soft starters for sequential / group smooth start of motors | LOW-VOLTAGE SWITCHGEARS equipped with frequency converters for fan rotation speed control |

ADDITIONAL FUNCTIONS:
- Continuous monitoring and display of motor current;
- Digital protection of motor from skewing, loss and incorrect phase sequence, exceed of starting current tolerances and intervals between starts;
- Process and commercial metering of electricity;
- Protection of power transformer on the basis of temperature and oil pressure data.

GENERAL BOARD OF CONTROL STATIONS

APPLICATION:
- The board is intended to receive and to distribute the electricity with voltage 0.4 kV to consumers, as well as to serve as a control station for 1st category electric loads of general-purpose and auxiliary systems of buildings and construction of engineering and manufacturing facilities.

FUNCTIONS:
- Manual, remote and automatic control of the power-consuming units, including: fan and valve motors, pumps, heaters, power instrumentation, emergency protection, and lighting;
- Prompt switching on/ switching off of power-consuming units;
- Thermal and current microprocessor-based protection of power-consuming units;
- Monitoring of parameters, light indication of state of the power-supply system and apparatus;
- Sending signals about the status of electrical installation to the site control system;
- Power automatic switch on the basis of a programmable relay/controller or the standby power switch in the manual mode.

FIRE-RESISTANT CABINETS OF SEISMIC EXECUTION

APPLICATION:
- Fire-resistant cabinets of seismic execution are intended to install the low-voltage equipment.

FUNCTIONS:
- Manual, remote and automatic control of the power-consuming units, including: fan and valve motors, pumps, heaters, power instrumentation, emergency protection, and lighting;
- Prompt switching on/ switching off of power-consuming units;
- Thermal and current microprocessor-based protection of power-consuming units;
- Monitoring of parameters, light indication of state of the power-supply system and apparatus;
- Sending signals about the status of electrical installation to the site control system;
- Power automatic switch on the basis of a programmable relay/controller or the standby power switch in the manual mode.

ADVANTAGES:
- Resistance to seismic impacts of up to 9 points of scale MSK64;
- Fire-resistance – REI starting from 30 minutes and longer;
- Various sizes;
- Fire-resistant cable duct;
- Sending signals about the status of an electrical installation to the site control system.
In terms of design, the high-speed automatic switch system comprises of the power unit and the control unit.

The power switching and measuring section of the high-speed automatic switch is intended for:
- measuring the electrical parameters of bus sections;
- switching of a faulty bus section to standby section in two-section power networks with two 0.4 kV inputs;
- overload and short-circuit protection of switchboard buses.

Switching is implemented by disconnecting the local switch of a faulty bus section with subsequent activation of the thyristor switch. A power switching command is sent by the control system of high-speed automatic switch. The high-speed automatic switch control system is a single unit on the front panel of which there are controls and indicators arranged. Control system is powered from two independent 24 VDC inputs or from uninterruptible 24 VDC power supply. Control system also provides:
- signaling and monitoring of parameters;
- keeping the event log;
- oscillographic testing of transient processes;
- data transfer to the upper level via Modbus RTU protocol;
- device self-testing.

Uninterruptible power supply and high reliability
- Bus section fault detection time (dependent to the type of fault and load nature) is at least 8 ms.
- Capability of forecasting and early recognizing of most common power supply interruptions.
- No motive power is required.
- Modern hardware components of analogue and digital circuitry.
- Thyristor switch in part of the power switching unit enables high switching speed.
- Thyristor power switching unit minimizes no-current condition at activation of section switch, which, in its turn, allows using less quick power circuit breakers.
- Detection of short-circuits in a customer supply network.
- Locking at short-circuits on outgoing lines.

Single intelligent control system is the way to optimize monitoring and control
- Full continuity monitoring of control circuits.
- Various adjustable emergency detection criteria.
- Extensive system of self-testing and operator’s monitoring of equipment’s internal condition.
- User-friendly graphical interface enables easy adjustability.
- Alarm event logging system (event log and oscillograms).

**APPLICATION:**
- as a device to ensure uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions and to forecast and early recognize such interruptions.

**DESIGN FEATURES**
- Ensuring uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions.
- Preventing synchronous motor from falling out of step, preventing magnetic starters and low-voltage power-consuming units from dropping out.
- Synchronous switching of a faulty bus section to standby input without excess currents.
- Improving self-starting conditions of electric motors after power supply to consumer is restored.
- Oscillographic testing of transient processes of disruption and restoration of normal parameters of power supply to sections.

**ADVANTAGES**
- Uninterruptible power supply and high reliability
- Bus section fault detection time (dependent to the type of fault and load nature) is at least 8 ms.
- Capability of forecasting and early recognizing of most common power supply interruptions.
- No motive power is required.
- Modern hardware components of analogue and digital circuitry.
- Thyristor switch in part of the power switching unit enables high switching speed.
- Thyristor power switching unit minimizes no-current condition at activation of section switch, which, in its turn, allows using less quick power circuit breakers.
- Detection of short-circuits in a customer supply network.
- Locking at short-circuits on outgoing lines.

**DESIGN CAPABILITIES**
- Integrated in the low voltage switchboard of a packaged transformer substation
- Separate device

<table>
<thead>
<tr>
<th>Switchboard and control unit arrangement</th>
<th>In a single floor-standing rack cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>control unit in a single wall-hanging cabinet</td>
</tr>
<tr>
<td></td>
<td>local switches, section switch, thyristor switch and control unit in separate cabinets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BASIC SPECIFICATIONS</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARAMETER</strong></td>
<td><strong>VALUE</strong></td>
</tr>
<tr>
<td>Inputs</td>
<td>2</td>
</tr>
<tr>
<td>Type of current, number of phases</td>
<td>AC, 3 phases, 50 Hz</td>
</tr>
<tr>
<td>Rated voltage, V</td>
<td>380</td>
</tr>
<tr>
<td>Rated input current, A</td>
<td>at the customer's request</td>
</tr>
<tr>
<td>Initial short-circuit current, kA</td>
<td>at the customer's request</td>
</tr>
<tr>
<td>Insulation resistance of switchboard conducting parts in normal conditions, min, MOhm</td>
<td>1.0</td>
</tr>
<tr>
<td>Enclosure protection</td>
<td>max. IP54</td>
</tr>
<tr>
<td>Climatic factors</td>
<td>moderately cold climate 3</td>
</tr>
<tr>
<td>Mean time between failures, h</td>
<td>250 000</td>
</tr>
<tr>
<td>Bus section fault detection time, max, ms</td>
<td>80</td>
</tr>
<tr>
<td>Service life, min, years</td>
<td>30</td>
</tr>
</tbody>
</table>

**FUNCTIONS:**

- Ensuring uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions.
- Preventing synchronous motor from falling out of step, preventing magnetic starters and low-voltage power-consuming units from dropping out.
- Synchronous switching of a faulty bus section to standby input without excess currents.
- Improving self-starting conditions of electric motors after power supply to consumer is restored.
- Oscillographic testing of transient processes of disruption and restoration of normal parameters of power supply to sections.

**APPLICATION:**
- as a device to ensure uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions and to forecast and early recognize such interruptions.

**ADVANTAGES**
- Uninterruptible power supply and high reliability
- Bus section fault detection time (dependent to the type of fault and load nature) is at least 8 ms.
- Capability of forecasting and early recognizing of most common power supply interruptions.
- No motive power is required.
- Modern hardware components of analogue and digital circuitry.
- Thyristor switch in part of the power switching unit enables high switching speed.
- Thyristor power switching unit minimizes no-current condition at activation of section switch, which, in its turn, allows using less quick power circuit breakers.
- Detection of short-circuits in a customer supply network.
- Locking at short-circuits on outgoing lines.

**DESIGN FEATURES**
- Ensuring uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions.
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**APPLICATION:**
- as a device to ensure uninterrupted operation of electrical equipment of production facilities in case of most common power supply interruptions and to forecast and early recognize such interruptions.
**APPLICATION:**
As a 6 (10) kV switchboard in packaged transformer and distribution substations.

**ELECTRIC EQUIPMENT PLANT**

**MEDIUM VOLTAGE SWITCHGEARS FOR PRIMARY AND SECONDARY DISTRIBUTION NETWORKS**

**FEATURES AND ADVANTAGES OF CONSTRUCTION**

- Multi-purpose devices adaptable to requirements and trends
- Convenient installation, operation and maintenance — reduced servicing time
- Full and latest information to minimize downtime
- Maximum personnel safety
- High reliability means the long-term protection of investments

**ELECTRIC EQUIPMENT PLANT**

**PARAMETER**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6 / 10</td>
</tr>
<tr>
<td>Maximum operating voltage, kV</td>
<td>7.2 / 12</td>
</tr>
<tr>
<td>Main and auxiliary circuit AC frequency, Hz</td>
<td>50</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>up to 40</td>
</tr>
<tr>
<td>CT rated current, A</td>
<td>200 / 300 / 400 / 600 / 800 / 1000 / 1200 / 1500 / 2000 / 3000 / 4000</td>
</tr>
<tr>
<td>Power circuit breaker rated breaking current, kA</td>
<td>up to 40</td>
</tr>
<tr>
<td>Short-time thermal current, kA</td>
<td>up to 40</td>
</tr>
<tr>
<td>Short-time thermal current flow duration, s</td>
<td>3</td>
</tr>
<tr>
<td>Grounding circuits</td>
<td>1</td>
</tr>
<tr>
<td>Short-time electrodynamic current, kA</td>
<td>51 / 64 / 81 / 102</td>
</tr>
<tr>
<td>Protection level as per GOST 14554-96</td>
<td>IP4X</td>
</tr>
<tr>
<td>Service life, min., years</td>
<td>30</td>
</tr>
</tbody>
</table>

**CONTACT WIRING CIRCUITS**

- Draw-out element: ground, section 1000 / 1600 / 2000 / 2500 / 3150 / 4000
- Bus sections: main conducting parts 630 / 1000 / 1250 / 1600 / 2000 / 2500 / 3150
- Cable junctions: 1000 / 1600 / 2000 / 2500 / 3150

**OVERALL DIMENSIONS**

<table>
<thead>
<tr>
<th>Width, mm</th>
<th>Depth, mm</th>
<th>Height, mm</th>
<th>Weight, kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>630 A</td>
<td>1250 A</td>
<td>2500 A</td>
<td>700</td>
</tr>
<tr>
<td>1600 A</td>
<td>1450 A</td>
<td>2300 A</td>
<td>850</td>
</tr>
<tr>
<td>2500 A</td>
<td>1400 A</td>
<td>2300 A</td>
<td>1000</td>
</tr>
</tbody>
</table>

**DOORS ON THE CABINET’S DRAW-OUT ELEMENT COMPARTMENT**

- With doors
- One-sided
- Two-sided
ELECTRIC EQUIPMENT PLANT

MEDIUM VOLTAGE SWITCHGEARS FOR SECONDARY DISTRIBUTION NETWORKS

APPLICATION:
As a 6 (10) kV cubicle switchboard in packaged transformer and distribution substations.

FEATURES AND ADVANTAGES OF THE CONSTRUCTION

- Multi-purpose usefulness and minimum investments
- Wide range of circuits provides freedom in choosing of engineering solutions for each specific facility.
- Minimal costs for building of areas for new 6 (10) kV cubicle switchboards and upgrading of the existing ones due to small dimensions (transverse, relatively to bus sections, arrangement of switching units).
- Convenient installation, operation and maintenance — maximized personnel safety and reduced servicing time
- Actuators of switching units are arranged directly on the front sides of cells, compact in size, have intuitive mnemonic symbols, easy and convenient in operation.
- Multi-level system of integrated locking mechanisms (electromagnetic and mechanical), three-position structure of SF6-gas insulated switching units.
- Cell units are withdrawable or draw-out, all controls are arranged on the front panel, the status indication of units is implemented on mechanical and light mnemonic diagrams, advanced digital relay protection units are equipped with self-test system.
- Minimized maintenance costs
- Highly reliable equipment in part of cubicle switchboards, gas-insulated arc suppression medium that significantly increases commutation life of load break switch; the wide range of functional capabilities of digital relay protection minimizes the failure probability.
- Remote control and data acquisition — full and latest information
- Application of advanced microprocessor-based units of relay protection enables determination of the electric power system parameters, oscillographic testing of alarm events, and distant control of switches.
- Medium voltage switchgears can be integrated both in automated power supply monitoring and control systems and in electric power plant ACSs.

BASIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6 / 10</td>
</tr>
<tr>
<td>Maximum operating voltage, kV</td>
<td>7,2 / 12</td>
</tr>
<tr>
<td>Main and auxiliary circuit AC frequency, Hz</td>
<td>50 (60)</td>
</tr>
<tr>
<td>Rated current, A:</td>
<td></td>
</tr>
<tr>
<td>bus sections</td>
<td>630 / 1000</td>
</tr>
<tr>
<td>line taps</td>
<td>630 / 1000</td>
</tr>
<tr>
<td>fuses</td>
<td>max 300</td>
</tr>
<tr>
<td>power vacuum circuit breakers</td>
<td>1000</td>
</tr>
<tr>
<td>load break switches</td>
<td>630</td>
</tr>
<tr>
<td>disconnectors</td>
<td>630 / 1000</td>
</tr>
<tr>
<td>current transformers</td>
<td>50 - 1000</td>
</tr>
<tr>
<td>Rated breaking current, kA:</td>
<td></td>
</tr>
<tr>
<td>fuses rated max. 160 A</td>
<td>63</td>
</tr>
<tr>
<td>fuses rated 200 A</td>
<td>50</td>
</tr>
<tr>
<td>power vacuum circuit breakers</td>
<td>20</td>
</tr>
<tr>
<td>Short time thermal current during 3 sec, kA</td>
<td>20</td>
</tr>
<tr>
<td>Short time electrodynamic current, kA</td>
<td>51</td>
</tr>
<tr>
<td>Rated breakpoint current parameters for load break switches, kA:</td>
<td></td>
</tr>
<tr>
<td>maximum peak</td>
<td>31,5 / 40 / 51</td>
</tr>
<tr>
<td>initial rms value of periodic component</td>
<td>12,5 / 16 / 20</td>
</tr>
<tr>
<td>Rated voltage of control and auxiliary circuits, V:</td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>28 / 48 / 100 / 220</td>
</tr>
<tr>
<td>AC</td>
<td>220</td>
</tr>
<tr>
<td>light circuits</td>
<td>24</td>
</tr>
<tr>
<td>Insulation test ratings for 1 minute 50 Hz voltage tests of main conducting circuits, kV:</td>
<td></td>
</tr>
<tr>
<td>relative to ground</td>
<td>42</td>
</tr>
<tr>
<td>between contacts of power circuit breakers and load break switches</td>
<td>42</td>
</tr>
<tr>
<td>between contacts of disconnectors and fuses</td>
<td>48</td>
</tr>
<tr>
<td>Protection level as per GOST 14254-96</td>
<td>IP31</td>
</tr>
<tr>
<td>Service life, min. years</td>
<td>30</td>
</tr>
</tbody>
</table>

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width, mm</td>
<td>375 / 500 / 750</td>
</tr>
<tr>
<td>Depth, mm</td>
<td>840</td>
</tr>
<tr>
<td>Height, mm</td>
<td>up to 2235</td>
</tr>
</tbody>
</table>

DESIGN CAPABILITIES

- Housing: Made of stainless galvanized steel
- Reinforced, resistant to M6 and M40 mechanical loads
- Insulation type: Air
- Compartmentation: Relay protection, Devices and cable connections
- Types of suitable power circuit breakers: Vacuum (6A,12 (“PO Elektroika”), BB-TEL (“Tavrida-Elektro”))
- Type of maintenance: One-sided
**APPLICATION:**
- as a 6 (10) kV cubicle switchboard in packaged transformer substations;
- as a 6 (10) kV cubicle switchboard in headers of radial, main and loop distribution networks.

**PARAMETER VALUES**

<table>
<thead>
<tr>
<th>Equipment used</th>
<th>Gas-insulated circuit breakers and load break switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Reinforced, resistant to M6 and M40 mechanical loads</td>
</tr>
<tr>
<td>Insulation type</td>
<td>Combined</td>
</tr>
<tr>
<td>Compartmentation</td>
<td>Switching unit</td>
</tr>
<tr>
<td></td>
<td>Secondary switching circuit</td>
</tr>
<tr>
<td></td>
<td>Devices and cable connections</td>
</tr>
<tr>
<td></td>
<td>Vacuum power circuit breakers</td>
</tr>
</tbody>
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<td>50 (60)</td>
</tr>
<tr>
<td>Rated current, A:</td>
<td></td>
</tr>
<tr>
<td>bus sections</td>
<td>630 / 1000</td>
</tr>
<tr>
<td>main circuits</td>
<td>630</td>
</tr>
<tr>
<td>fuses</td>
<td>max 200</td>
</tr>
<tr>
<td>Power circuit breaker rated breaking current, kA</td>
<td>20</td>
</tr>
<tr>
<td>Short-time thermal current, kA</td>
<td>20</td>
</tr>
<tr>
<td>Short-time thermal current flow duration, s:</td>
<td></td>
</tr>
<tr>
<td>main conducting parts</td>
<td>3</td>
</tr>
<tr>
<td>grounding circuits</td>
<td>1</td>
</tr>
<tr>
<td>Short time electrodynamic current, kA</td>
<td>51</td>
</tr>
<tr>
<td>Rated voltage of control and alarm circuits, V</td>
<td>24 / 220</td>
</tr>
<tr>
<td>DC</td>
<td>220</td>
</tr>
<tr>
<td>AC</td>
<td>24</td>
</tr>
<tr>
<td>light circuits</td>
<td>24</td>
</tr>
<tr>
<td>Insulation resistance, min, MOhm:</td>
<td></td>
</tr>
<tr>
<td>Main conducting circuits</td>
<td>1000</td>
</tr>
<tr>
<td>Control and auxiliary circuits</td>
<td>1</td>
</tr>
<tr>
<td>Protection level as per GOST 14254-96</td>
<td>IP31</td>
</tr>
<tr>
<td>Service life, min, years</td>
<td>25</td>
</tr>
</tbody>
</table>

**OVERALL DIMENSIONS**

| Width, mm                              | 375 / 500                        |
| Depth, mm                              | 840                             |
| Height, mm                             | 1650 to 1900                     |

**FEATURES AND ADVANTAGES OF THE CONSTRUCTION**
- Multi-purpose usefulness and minimum investments
  - Small dimensions to enable compact switchboard placement.
  - Cubicle switchboard is assembled in a monoblock unit consisting of several functional subunits. The modular design allows implementing switchboard circuitry with the optimal number of switching units due to a wide range of subunits for various purposes.
- High cost-effectiveness
  - Optimized number of switching units due to high flexibility of switchboard circuitry and creation of various layout solutions.
  - Maintenance-free switching units.
  - High serviceability that distinguishes Ruskon small-sized cubicle switchboards from traditional gas-insulated monoblock units due to the use of switching units that can be integrated separately under the modularity principle.
  - Competitive product price and independence from the market conditions due to components of Russian origin.
- Convenient installation, operation and maintenance — maximized personnel safety and minimized maintenance costs
  - Withdrawable vacuum circuit breakers.
  - High point of frontal cable connection (600 to 750 mm).
  - Cabling compartments are separated from power circuits and from each other.
  - Maintenance-free bus bar that does not require contact couplings to be pulled throughout the operating life.
  - Maintenance-free vacuum power circuit breakers and gas-insulated load break switches (disconnectors).
  - Cable voltage check by means of fixed voltage meters.
  - Prevention of mistakes by maintenance personnel due to the integrated locking system.
  - Personnel protection against short-circuit failures due to the system of pressure-discharge valves mounted on the rear side of cells.
  - Unambiguous determination of the main circuit contact positions due to the graphic mnemonic diagram, mechanical and electrical indication.
  - Voltage monitoring and cable phasing at low voltage.
- High reliability means uninterruptible power supply
  - Corrosion resistance due to the housing made of stainless galvanized steel.
  - High localizability due to the sectioning by means of heat-resistant plastic and metal.
  - High mechanical strength.
  - Bus sections are made of oxygen-free copper of high environmental resistance partitions.
  - For the purpose of reduced field intensity, buses have no sharp edges but rounded to the radius of 5 mm.
  - No overlapping on buses and no foreign objects can penetrate the closed bus section.
  - High commutation life.
  - Reduced electrical field intensity and no disruptive discharge probability for insulated clearances due to baffle plates mounted on the load break switches terminals.
  - Excessive pressure of gases that occur at arcing short circuit faults is released through the valves mounted on the rear part of cells.

**DESIGN CAPABILITIES**

- Made of stainless galvanized steel:
  - High mechanical strength.
  - High localizability due to the sectioning by means of heat-resistant plastic and metal.
- Reinforced, resistant to M6 and M40 mechanical loads:
  - High reliability means uninterruptible power supply.
  - Corrosion resistance due to the housing made of stainless galvanized steel.

**OVERALL DIMENSIONS**

- Width, mm: 375 / 500
- Depth, mm: 840
- Height, mm: 1650 to 1900

**ELECTRIC EQUIPMENT PLANT**

**MEDIUM VOLTAGE SWITCHGEARS SMALL-SIZED FOR SECONDARY DISTRIBUTION NETWORKS**
APPLICATION:
Packaged transformer substations of the internal plant are intended for receipt and conversion of electric power of medium voltage of 6 (10, 15, 20) kV into electrical power of low voltage of 0.4 (0.23, 0.69) kV and distribution of 50 (60) Hz three-phase AC power to customers.

**DESIGN CAPABILITIES**

| Design                                      | Made of stainless galvanized steel  
|                                            | Reinforced, resistant to NV and M40 mechanical loads  
| Delivery package                           |  
| HV side                                    | with combined insulation (rated for up to 3150 A)  
|                                            | with air insulation (rated for up to 1000 A)  
|                                            | produced by leading international manufacturers  
| LV side                                    | low-voltage switchgears based on the structural elements of its own design (rated for up to 6300 A)  
|                                            | low-voltage switchgears based on the constructive SIVACON S8 (rated for up to 7000 A)  
| Power transformers                         | Oil-filled sealed or dry types  
| Reactive power compensation installations  | Automatic regulation of reactive power of up to 1000 kVAR  

**BASIC SPECIFICATIONS**

| PARAMETER                                             | VALUE E  
|-------------------------------------------------------|------  
| Power transformer power, kVA                          | max 3150  
| Power transformer current                             | oil-filled, dry  
| HV side rated voltage, kV                              | max 20  
| LV side rated voltage, kV                              | max 0.69  
| HV side rated bus section current, A                   | max 3150  
| LV side rated bus section current, A                   | max 7000  
| LV incoming switch rated current, A                    | max 6300  
| HV short-time thermal current, for cubicle switchboard:|  
| with air insulation, kA / 2 s                          | 20  
| SF6 gas insulation, kA / 1 s                           | 20 / 25  
| LV short-time thermal current, kA / 1 s                | 31.5 / 40 / 51  
| SF6 gas insulation, kA                                 | 50 / 63  
| LV short-time electrodynamic current, kA               | max 150  
| LV short-time electrodynamic current, kA               | max 330  
| Insulation strength of the main HV circuits 8 (10) kV / 1 min, min | 32(42)  
| Insulation level as per GOST 1916:1 oil-filled / dry type of transformer | normal / light  
| Climatic modification and placement category (as per GOST 19150, GOST 15543.1) | moderately cold climate 3 / moderately cold climate 4 and combination of the categories (combined installation)  
| Protection level (as per GOST 14254) of HV switchboard / LV switchboard / enclosure of the packaged transformer substation | IP31 / IP20 to IP54 / IP23  
| Service life, min, years                               | 30  

**APPLICATION:**

- Power transformers
  - Oil-filled sealed or dry types
  - Reactive power compensation installations
- Delivery package
  - HV side
    - with combined insulation (rated for up to 3150 A)
    - with air insulation (rated for up to 1000 A)
    - produced by leading international manufacturers
  - LV side
    - low-voltage switchgears based on the structural elements of its own design (rated for up to 6300 A)
    - low-voltage switchgears based on the constructive SIVACON S8 (rated for up to 7000 A)
- Design
  - Made of stainless galvanized steel
    - Reinforced, resistant to NV and M40 mechanical loads
- Design
  - Made of stainless galvanized steel
    - Reinforced, resistant to NV and M40 mechanical loads

**PHOTO:**

- Image of packaged transformer substations of the internal plant.
**ELECTRIC EQUIPMENT PLANT**

**APPLICATION:**
- as uninterruptible power supplies of up to 0.4 kV AC of up to 220 VDC supplies in manufacturing and other facilities with higher requirements for the quality and stability of power supply.

**FEATURES AND ADVANTAGES OF THE CONSTRUCTION**
- Long-term protection of the customer’s investment
  - Condition monitoring and battery protection.
  - Applicability of any type of accumulator battery (lead-acid, alkaline and lithium-ion).
  - Modern software allowing expansions of UPS functions.
- Reliable and uninterrupted power supply
  - Smoothing small and short voltage surges.
  - Survival of the system for some time after de-energizing the power line.
  - Protection of the system from overloads or short circuit.
  - Ability to connect the electronic and manual bypasses.
- Full and prompt information means minimization of downtime
  - Indication of values of alternating voltage in the power line, output supply voltage and the power consumed by the load.
  - Warning of the user in case of emergencies with indicators and monitor.
  - Connection with user PS ACS via RS485 / ModBus RTU, SNMP interfaces.

**LIST OF EQUIPMENT**

- Charging / Boost Charging Rectifier
- Input automatic switches
- Inverter
- Accumulator batteries
- Switching equipment
- Electronic bypass
- Manual (maintenance) bypass
- Voltage regulator for DC

**FEATURES AND ADVANTAGES OF THE CONSTRUCTION**

**APPLICATION:**
- as uninterruptible power supplies of up to 0.4 kV AC of up to 220 VDC supplies in manufacturing and other facilities with higher requirements for the quality and stability of power supply.

**LIST OF EQUIPMENT**

- Charging / Boost Charging Rectifier
- Input automatic switches
- Inverter
- Accumulator batteries
- Switching equipment
- Electronic bypass
- Manual (maintenance) bypass
- Voltage regulator for DC

**PARAMETERS OF THE NETWORK**

- Number of phases: 3
- Supply-line voltage, V: 380
- Line frequency, Hz: 50
- Availability of a neutral wire and PE: yes

**PARAMETERS OF THE BATTERY**

- according to IEC

**PARAMETERS OF THE BATTERY**

- Capacity: 1,000 Ah
- Voltage: 2 V

**BASIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD CHARACTERISTIC</td>
<td></td>
</tr>
<tr>
<td>Number of phases</td>
<td>1 / 3</td>
</tr>
<tr>
<td>Rated load voltage, V</td>
<td>380 / 220</td>
</tr>
<tr>
<td>Frequency of load voltage, Hz</td>
<td>50</td>
</tr>
<tr>
<td>cos φ</td>
<td>1,0</td>
</tr>
<tr>
<td>PARAMETERS OF THE NETWORK</td>
<td></td>
</tr>
<tr>
<td>Number of phases</td>
<td>3</td>
</tr>
<tr>
<td>Supply-line voltage, V</td>
<td>380</td>
</tr>
<tr>
<td>Line frequency, Hz</td>
<td>50</td>
</tr>
<tr>
<td>Availability of a neutral wire and PE</td>
<td>yes</td>
</tr>
<tr>
<td>AUXILIARY EQUIPMENT</td>
<td></td>
</tr>
<tr>
<td>Input automatic switch</td>
<td>yes</td>
</tr>
<tr>
<td>Parameters of the battery</td>
<td>according to IEC</td>
</tr>
</tbody>
</table>

* for AC

**TYPES**

<table>
<thead>
<tr>
<th>Direct current systems that include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC switchgears for currents of up to 2500 A</td>
</tr>
<tr>
<td>Charging / boost charging rectifier for currents of up to 2500 A</td>
</tr>
<tr>
<td>An accumulator battery cabinet</td>
</tr>
<tr>
<td>Can additionally be equipped with a voltage regulator or an accumulator battery manager</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direct current systems that include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative DC cabinets for currents of up to 60 A capable of being equipped with a voltage regulator</td>
</tr>
<tr>
<td>An accumulator battery cabinet</td>
</tr>
</tbody>
</table>
Guaranteed load supply

- Feeder insulation monitoring using a patented insulation monitoring system, that performs:
  - automated continuous feeder-by-feeder monitoring of the insulation resistance value (the insulation resistance measurement error is independent of the network capacity);
  - detection of a feeder with a lower insulation resistance value regardless of the length of the line;
  - continuous voltage monitoring on buses.

Reliability and safety of loads

- Selective overcurrent protection when using circuit breakers as protective devices for electrical network sections due to the use of current overload relay that provides:
  - protection from surge currents;
  - condition monitoring of the circuit breaker;
  - measurement of current in the line under monitoring;
  - self troubleshooting;
  - transmission of information to the top-level ACS.

Efficient operation and increased equipment service life

- Supply of constant voltage to loads that do not tolerate voltage fluctuations using a voltage regulator.

**FEATURES AND ADVANTAGES OF THE CONSTRUCTION**

### DESIGN CAPABILITIES

**Types of design**
- cellular design with compartmentation, (compartmentation of up to 4b) in operating current systems of distribution substations, substations and power plants
- panelized design

### BASIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>24V</th>
<th>110V with no tap / with a tap</th>
<th>220V with no tap / with a tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, V</td>
<td>27</td>
<td>110</td>
<td>220</td>
</tr>
<tr>
<td>Rated current of the device, A</td>
<td>up to 2500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated currents of connections, A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time permissible current of collecting buses, I/CA</td>
<td>up to 630</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated surge current of collecting buses, Ipk, kA</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of connections</td>
<td>up to 128*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of compartmentation</td>
<td>up to 4b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service life, min, years</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Specified for one insulation monitoring device, the number of connections in the DC switchgears is not limited.

### OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width, mm</td>
<td>900 - 600</td>
</tr>
<tr>
<td>Depth, mm</td>
<td>400 - 800</td>
</tr>
<tr>
<td>Height, mm</td>
<td>1800 - 2200</td>
</tr>
</tbody>
</table>

**APPLICATION:**
- in DC systems of industrial process facilities;
- in operating current systems of distribution substations, substations and power plants;
- in emergency power systems of power supply sources.
**APPLICATION:**
- in DC systems of industrial process facilities;
- in operating current systems of distribution substations, substations and power plants;
- in emergency power systems of power supply sources.

**FEATURES AND ADVANTAGES OF THE CONSTRUCTION**
- Guaranteed DC supply to loads
- Expanded allowable range of input voltage fluctuations.
- Redundancy scheme N+1
- Provision of jogging loads through a 2.5 fold excess of the output current rating.
- Automatic recovery after a short loss of the input voltage.
- Prevention of the DCS from deteriorated power quality.
- Full and timely information to minimize downtime
- Maintaining communication protocols with ACS PS: ModBus, ProfiBus, CAN, Ethernet, and USB.
- Monitoring of the circuit and the condition of AB.
- Temperature compensation of the float charge voltage.
- IR compensation.

**OVERALL DIMENSIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal output current limit, A</td>
<td>80 / 160 / 250 / 320</td>
</tr>
<tr>
<td>Width, mm</td>
<td>700 / 800 / 800</td>
</tr>
<tr>
<td>Depth, mm</td>
<td>600 / 860 / 860</td>
</tr>
<tr>
<td>Height, mm</td>
<td>1620 / 1820 / 2200</td>
</tr>
</tbody>
</table>

**DESIGN CAPABILITIES**
- Types of design: a cabinet design of rack and modular type (for currents of up to 1200 A)
- of a built-in type (for currents of up to 60 A)

**USEFUL MODEL PATENT**

**APPLICATION:**
- in DC systems to provide:
  - regulation of output voltage by bucking and raising the input voltage;
  - protection of the accumulator batteries from the discharge below the predetermined limits;
  - limitation of short-circuit current in case of an accident in a DC system to trip selectively protective devices;
  - direct connection of the battery to the DC system where the device is faulty.

**DESIGN CAPABILITIES**
- Types of design: of a built-in type (for currents of up to 100 A), analog or digital
- of a cabinet type (for currents of up to 100 A) digital

**BASIC SPECIFICATIONS**
- **PARAMETER**
  - **Value**
    - Rated output current Inom., A: 80 / 160 / 250 / 320
    - Output current control band, A: 1 to 80 / 1 to 160 / 1 to 250 / 1 to 320
    - Number of modules: 1 / 2 / 3 / 3
    - Rated output voltage Uout.nom, V: 24 / 115 / 230
    - Output voltage control band of collecting buses, lm, kA: (0.9-1.15) Uout.nom
    - Allowable input voltage deviation, %: -25 % to +15%
    - Allowable output voltage deviation from the set value within the band (0.9-1.15) Uout.nom, max, %: ± 0.5
    - Output voltage ripple factor with the battery disconnected from the output, Rf, max, %: 0.5
    - Efficiency factor in the rated operation, η, min, %: 95
    - Service life, min, years: 30

**USEFUL MODEL PATENT**

**APPLICATION:**
- Supply of constant voltage to loads that do not tolerate voltage fluctuations
- in DC systems to provide:
  - regulation of output voltage by bucking and raising the input voltage;
  - protection of the accumulator batteries from the discharge below the predetermined limits;
  - limitation of short-circuit current in case of an accident in a DC system to trip selectively protective devices;
  - direct connection of the battery to the DC system where the device is faulty.

**DESIGN CAPABILITIES**
- Types of design: of a cabinet type (for currents of up to 100 A) digital
USEFUL MODEL PATENT

**APPLICATION:**
- within DC systems as a device providing full service and protection of accumulator batteries, power supply of constant voltage to loads in case of loss of external power.

**ELECTRIC EQUIPMENT PLANT**

**APPLICATION:**
- Long service life of batteries and uninterrupted DC power supply

- **Fundamentals:**
  - Service life, years: 30
  - Redundancy: Automatic breakers
  - Protective elements in input and output circuits: Automatic breakers
  - Enclosure protection level: IP 20 / IP21 / IP31 / IP41
  - Voltage ripple factor, \( R_f \), max, %: 0.5
  - Output voltage ripple factor, \( F_{ov} \), max, %: ±2.0
  - Efficiency factor in the rated operation, \( \eta \), %: 96
  - Service life, min, years: 30

**FEATURES AND ADVANTAGES OF USE OF AB MANAGER WITHIN DC SYSTEMS**
- Long-term protection of customer investments — long service life of batteries and low losses
- Full service of batteries, control of each battery element (optional).
- Applicability of any type of battery (lead-acid, alkaline, etc.).
- Possible selection of an optimal number of cells and the capacity of batteries.
- The highest efficiency among systems with voltage regulation at the load due to operation in the normal mode when recharging the battery, thus, the lowest heat release.

**Minimized maintenance**
- Independent service of batteries through pre-selected modes for cycles of automatic charge-discharge.

**Reliable and uninterrupted power supply, increased equipment service life**
- Constant-voltage regulation at the load at the level specified in the battery discharge mode up to 1.7 V/cell.
- Guaranteed provision of selectivity of protections when using circuit breakers due to the limitation of output current with a rectifier and a battery manager.

**FUNCTIONS:**
- Automatic maintenance of the following battery charge modes according to the program of the process controller:
  - floating charge of batteries with constant voltage and charge after an emergency switching on of battery using a predetermined charging method.
  - Accelerated battery charging using the methods IU, IU1, IU2,
  - Equalizing charge of battery cells,
  - Charge of a deeply discharged battery,
  - Equalizing charge of battery cells,
  - Accelerated battery charge using the methods IU, IU1, IU2,
  - Battery using a predetermined charging method,
  - Floating charge of batteries with constant voltage and charge after an emergency switching on of battery using a predetermined charging method.

**Design Capabilities**

<table>
<thead>
<tr>
<th>Types of design</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>of a cabinet type (for currents of up to 100 A)</td>
<td>of a built-in type (for currents of up to 100 A)</td>
</tr>
<tr>
<td><strong>BASIC SPECIFICATIONS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PARAMETER</strong></td>
<td><strong>VALUE</strong></td>
</tr>
<tr>
<td>Main circuit design concept</td>
<td>Transistor with a radio-frequency conversion</td>
</tr>
<tr>
<td>Rated input voltage from the rectifier, V</td>
<td>27 / 110 / 220</td>
</tr>
<tr>
<td>Limits of input voltage within which the predetermined accuracies of output parameters of battery charging are maintained, V</td>
<td>27 ( \min ) / 100 ( \max ) / 220 ( \min )</td>
</tr>
<tr>
<td>Variation limits of the setpoint of the rated voltage in the line, V</td>
<td>where ( U_{in} ) is the voltage at the DCB buses</td>
</tr>
<tr>
<td>Rated output voltage on the batteries, V</td>
<td>( U_{in} ) - ( U_{max} ) ( \max ) x n</td>
</tr>
<tr>
<td>Limits of the output voltage on the batteries, V</td>
<td>from ( U_{max} ) ( \max ) x n to ( U_{min} ) ( \max ) x n</td>
</tr>
<tr>
<td>Range of constant-voltage regulation at the load in battery charging mode, V</td>
<td>27 ( \min ) / 100 ( \max ) / 220 ( \min )</td>
</tr>
<tr>
<td>Rated current of the device, A</td>
<td>100 / 200 / 400 / 600 / 800 / 1000 / 1200</td>
</tr>
<tr>
<td>Allowable deviation of voltage on the battery from the predetermined value in battery charge mode, %</td>
<td>±1</td>
</tr>
<tr>
<td>Allowable deviation of voltage in the line from the predetermined value in battery charge mode, %</td>
<td>±2.0</td>
</tr>
<tr>
<td>Output voltage ripple factor, ( R_f ), max, %</td>
<td>0.5</td>
</tr>
<tr>
<td>Efficiency factor in the rated operation, ( \eta ), %</td>
<td>96</td>
</tr>
<tr>
<td>Protection level of the enclosure according to GOST 14254</td>
<td>IP 20 / IP21 / IP31 / IP41</td>
</tr>
<tr>
<td>Protective elements in input and output circuits</td>
<td>Automatic breakers</td>
</tr>
<tr>
<td>Redundancy</td>
<td>Automatic switching-on of the bypass in case of an accident with generation of a discrete and digital signal</td>
</tr>
</tbody>
</table>

**Structure of a DCS with an ACC**

- Load
- Rectifier
- DC boards
- Accumulator battery manager
- Battery
Uninterrupted power supply of constant voltage to consumers

OPERATIVE DC CABINETS

APPLICATION:
- in DC systems as a DC control power sources and complete distribution devices for the technologically enclosed switchboards.

FEATURES AND ADVANTAGES OF THE CONSTRUCTION

Uninterrupted supply to consumers
- Modular design of the rectifying devices adapted to hot swapping.
- Automatic recovery of operation after a loss of the input voltage.

Increased service life of the battery
- Compensation of jogging loads without switching to battery supply.

Guaranteed supply to loads
- Feeder insulation monitoring using a patented insulation monitoring system, that performs:
  - automated continuous feeder-by-feeder monitoring of the insulation resistance value (the insulation resistance measurement error is independent of the network capacity);
  - detection of a feeder with a lower insulation resistance value regardless of the length of the line;
  - continuous voltage monitoring on buses.
- Electromagnetic interference filters at the inlet and outlet.
- Compensation of jogging loads.
- Monitoring of the batteries.
- Temperature compensation of the boost charge voltage.

Reliability and safety of loads
- Selective overcurrent protection when using circuit breakers as protective devices for electrical network sections due to the use of current overload relay that provides:
  - protection from surge currents;
  - condition monitoring of the circuit breaker;
  - measurement of current in the line under monitoring;
  - self-troubleshooting;
  - transmission of information to the top-level ACS.

Efficient operation and increased equipment service life
- Supply of constant voltage to loads that do not tolerate voltage fluctuations using a voltage regulator.

BASIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated output current Iout.nom, A</td>
<td>20 / 40 / 60</td>
</tr>
<tr>
<td>Rated output DC voltage uout.nom, V</td>
<td>230</td>
</tr>
<tr>
<td>Efficiency factor in the rated operation, min</td>
<td>0.85</td>
</tr>
<tr>
<td>Allowable input voltage deviation, %</td>
<td>-25% to +15%</td>
</tr>
<tr>
<td>Allowable output voltage deviation from the predetermined value within the band (0.85-1.15) uout.nom, max, %</td>
<td>± 1.0</td>
</tr>
<tr>
<td>Allowable current deviation in the battery circuit in charge modes, from the predetermined value, %</td>
<td>± 1.0</td>
</tr>
<tr>
<td>Error of battery recharge voltage regulation, max, %,</td>
<td>± 0.5</td>
</tr>
<tr>
<td>Output voltage ripple factor with the battery disconnected from the output, Rf, max, %</td>
<td>0.5</td>
</tr>
<tr>
<td>Efficiency factor in the rated operation, η, min, %</td>
<td>95</td>
</tr>
<tr>
<td>Number of outgoing connections, max</td>
<td>24</td>
</tr>
<tr>
<td>Cooling</td>
<td>natural air cooling*</td>
</tr>
<tr>
<td>Service life, min, years</td>
<td>30</td>
</tr>
</tbody>
</table>

OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width, mm</td>
<td>600</td>
</tr>
<tr>
<td>Depth, mm</td>
<td>800</td>
</tr>
<tr>
<td>Height, mm</td>
<td>1800 - 2200</td>
</tr>
</tbody>
</table>

* Forced air cooling is activated in the event the rectifier module is overheated during maximum load.
**APPLICATION:**
- as devices for management of excitation current of high-voltage brush / brushless synchronous motors and generators.

---

**BASIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power of the excited synchronous motor (turbine generator), kW</td>
<td>200–12500</td>
</tr>
<tr>
<td>Rated rectified voltage, V</td>
<td>48 75 115 150 230 230 300 / 345 / 460 / 600</td>
</tr>
<tr>
<td>Rectification circuit</td>
<td>3-phase with a neutral tap 3-phase bridge connection</td>
</tr>
<tr>
<td>Rated rectified current, A</td>
<td>320 / 630 up to 630</td>
</tr>
<tr>
<td>Ceiling current factor</td>
<td>up to 2.0 from</td>
</tr>
<tr>
<td>Supply voltage of control and protection circuits, V</td>
<td>-220 / +220</td>
</tr>
<tr>
<td>Protection level of the enclosure (according to GOST 14254)</td>
<td>IP 21 / IP 54</td>
</tr>
<tr>
<td>Service life, min, years</td>
<td>20</td>
</tr>
</tbody>
</table>

---

**OVERALL DIMENSIONS**

| devices for management of excitation current of high-voltage brush synchronous motors and generators |

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power of SD and SG, kW</td>
<td>200–12500</td>
</tr>
<tr>
<td>Width, mm</td>
<td>700</td>
</tr>
<tr>
<td>Depth, mm</td>
<td>800</td>
</tr>
<tr>
<td>Height, mm</td>
<td>1900</td>
</tr>
<tr>
<td>Mass, kg</td>
<td>250</td>
</tr>
</tbody>
</table>

---

**FEATURES AND ADVANTAGES OF THE DESIGN**

- **Universal and maximum safe**
  - Stable operation of synchronous machines with different types of loads due to free access to an expanded setpoint list included in the software.
  - Adaptation to work with high-voltage smooth start systems and frequency regulation of synchronous motors.
  - Compartmentation.
  - Protection from accidental contact and dust with protective screens.
- **Energy saving – cost-effectiveness**
  - Reactive power compensation in the regulation mode cos f due to increased accuracy, no drift of the parameters and application of an efficient cascade algorithm for excitation control.
  - Gains from the reduction of losses in the transformer that feeds the motor through the elimination of losses from the flow of the reactive component of the motor current.
  - Gains from the reduction of losses in the rotor winding due to reducing the consumed value of excitation current.
- **High reliability and uninterrupted operation**
  - Full equivalence, independence, and the interchangeability of the primary and backup controllers.
  - Use of a modern element base with an extended temperature range.
  - Optimization of the number of electronic components in the device and the number of used modules, the number of contacts and plug connections due to a high level of integration of microelectronics.
  - Quick replacement of a damaged board (module).
  - Change of a regulation mode and other parameters without shutting down the excitation device.
  - Prevention of the synchronous machine from switching to an asynchronous run and, thus, the decreased likelihood of damage to the stator and rotor windings through the use of digital technologies enabling to introduce new technological protections in addition to the traditional protections.
  - Transfer of heat beyond the device form factor and enhanced dust protection through the use of modular thyristors and placement thereof on the common flat radiator with a natural cooling system.
- **Smart devices – full and timely information and minimized downtimes**
  - Hardware and software self-diagnostics of the device assemblies.
  - Continuous transmission of the current parameters of regulation, operation modes and the condition from one of the two mutually redundant controllers.
  - Digital channel of communication with the top-level ACS using Modbus RTU protocol via an RS485 interface.
  - Maintenance of protocols of exchange with supervisory control systems.
  - Control and indication.
  - Oscillography of the parameters during motor starts and stops, self-starting processes, event-driven processes that occur during the run.
  - Event logging.
- **Ease of use – optimized maintenance**
  - Easy control of modes and settings, quickly and error-free adjustment of the excitation device, obtaining data about warnings and activations of the protections of primary and backup controllers, real-time viewing oscillograms and trends of the basic parameters.
  - Remote control and uploading of the event log and oscillograms to a USB flash-drive.
  - Mounting an optical proximity sensor on the front door of the cabinet.
APPLICATION:
Digital relay protection and automation is used for installation both in existing and new (modernized) substations having voltage class of 110-220 kV and complies with all the requirements to modern relay protection and automatic equipment.

CONSTRUCTION DESIGN:
Digital relay protection is made in the form of packaged cabinets of relay protection with terminals of in-house production. Protection terminal has size of 19" which enables mounting both in cabinets of in-house production and in third-party cabinets.

ADVANTAGES
Cost-effective solution applicable for all kinds of protection of 110-220 kV lines made using standard components for industrial automation independent of specific manufacturer.
Different options of terminal hardware in accordance with customer requirements.
Flexible and user-friendly software of terminal for activities on all the stages of process chain “production-design-operation”, compliance with IEC 61850, verified by certified laboratory DNV GL (KEMA).
Informative and developed human-machine interface of the terminal based on touch-enabled LCD with possibility to be adjusted according to the customer requirements.
Sufficient number of digital inputs and relay outputs (expandable in case of the complex circuits) required for implementation of function of protection, automation, and connection management.
Cybersecurity of terminal due to usage of trusted hardware/software platform, the key components of which have been developed in Russia with use of import-substituting components (implementation using hardware platform MCST “ELBRUS”).

PROTECTION AND AUTOMATION SETS

<table>
<thead>
<tr>
<th>SET</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0101</td>
<td>A set for differential protection of lines with staged protection function and possibility of acceleration (operative and acceleration using channels of high-frequency equipment of remote tripping (HFRT))</td>
</tr>
<tr>
<td>P0201</td>
<td>A set for phase differential protection of lines with staged protection function and possibility of acceleration (operative and acceleration using channels of HFRT)</td>
</tr>
<tr>
<td>P0301</td>
<td>A set for staged protection with possibility of acceleration (operative acceleration and acceleration using channels of HFRT) with function of breakers control automation</td>
</tr>
<tr>
<td>P0402</td>
<td>A set for staged protection with possibility of acceleration (operative acceleration and acceleration using channels of HFRT)</td>
</tr>
<tr>
<td>P0401</td>
<td>A set of breakers control automation</td>
</tr>
</tbody>
</table>

RPA TERMINAL HARDWARE CONFIGURATIONS

<table>
<thead>
<tr>
<th>HARDWARE</th>
<th>COST-EFFECTIVE</th>
<th>BASIC</th>
<th>CYBERSECURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIEMENS</td>
<td>•</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>AD-LINK</td>
<td>•</td>
<td>•</td>
<td>-</td>
</tr>
<tr>
<td>ADVANTIX</td>
<td>•</td>
<td>•</td>
<td>-</td>
</tr>
<tr>
<td>“ELBRUS”</td>
<td>•</td>
<td>•</td>
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BASIC SPECIFICATIONS

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<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
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<tbody>
<tr>
<td>Operating voltage</td>
<td>110 or 220 V, direct or rectified current</td>
</tr>
<tr>
<td>Current transformer inputs</td>
<td>5 AC inputs (1A or 5A)</td>
</tr>
<tr>
<td>Voltage transformer inputs</td>
<td>5 AC voltage inputs</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>44 programmable digital inputs (expandable up to 66 and with possibility to choose pick-up voltage of 220, 110, 60, 48 or 24 V)</td>
</tr>
<tr>
<td>Output relays</td>
<td>40 programmable output relays (expandable up to 60)</td>
</tr>
<tr>
<td>eSB-port</td>
<td>on front panel for terminal operation</td>
</tr>
<tr>
<td>Data communication</td>
<td>2 x Gbit Ethernet</td>
</tr>
<tr>
<td>Dimension (Wx DxH), mm</td>
<td>800 x 600 x 2200</td>
</tr>
</tbody>
</table>
APPLICATION:
Cabinet cases based on the structural element of its own design is a ground for manufacturing of low voltage switchgears for distribution and control. Cabinets’ structure guarantees freedom of electric plant and allows easy upgrading of electric plant with new customer’s options.

PARAMETER
Rated working voltage, V
220, 380, 660
Ground system type
IT, TT, TN-C, TN-C-S, TN-S
Rated current, A
3,200 max.

OVERVIEW RULER UNIVERSAL CABINETS (ONE-WAY AND TWO-WAY SERVICE)

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<tr>
<td>Rated current, A</td>
<td>3,200 max.</td>
</tr>
<tr>
<td>Overall dimensions, mm</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>600; 800; 1,000; 1,200; 1,400; 1,600</td>
</tr>
<tr>
<td>Depth</td>
<td>600; 800; 1,000; 1,200</td>
</tr>
<tr>
<td>Height</td>
<td>1,700; 1,900; 2,100</td>
</tr>
<tr>
<td>Socle, mm</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>100; 200; 300</td>
</tr>
</tbody>
</table>

OVERVIEW OF THE MODEL LINE OF CABINETS (ONE-WAY AND TWO-WAY SERVICE)

CABINET SERVICE TYPE
Single-side or double-side maintenance cabinets are included into standard and multi-purpose cabinets. Access to a functional compartment and attachments compartment in single-side maintenance cabinets is provided at the cabinet’s front face. Access to a functional compartment in double-side maintenance cabinets is provided at the cabinet front face and to a attachments compartment at the cabinet’s back side.

All cabinets of one and the same type of maintenance (i.e. single-side or double-side maintenance ones) are structurally attached and electrically connected with each other if they are installed in one switchboard with a common bus bar system. Multi-purpose and standard cabinets may be combined in one and the same switchboard; in this regard, service degree and type for all cabinets in one switchboard shall be identical.

ADVANTAGES
- Cabinet structure is rigid, free-of-distortion and impact-proof due to a frame made of galvanized profiles fastened by original right-angle connectors.
- Metal elements have an anticorrosive coating; internal guards and mounting elements are protected with a zinc coating.
- High degree of sectionalizing (up to 4b) and protection (up to IP54).
- Max. seismic load resistance as per MSK64 scale-9 grade and high strength due to the patented method of elements interfacing and fixing.
- Wide range of cabinets to implement any electric circuits
- It is possible to order a cabinet with bus bars
- Quick and simple selection of individual solutions with the help of Configurator custom-made software

CABINET VERSIONS
STANDARD LEAD-IN, SECTIONALIZATION AND DISTRIBUTION CABINETS

Specified function of each cabinet type
Selected overall dimensions
Inner sectionalization as per types: 3a, 4b
Switching devices energy supply over rigid bus-bars

MULTI-PURPOSE CABINETS (USER-DEFINED / UNSPECIFIED DESIGN)

Types of completeness: from frame with a shelf to a cabinet fully ready for wiring with bus-bars and universal perforated wiring panels
A variety of overall dimensions with 200 mm pitch as per width and depth
Inner sectionalization as per types: 1.2a, 1.2b
Switching devices energy supply over wires or flexible bus-bars
LIST OF EQUIPMENT
The monitoring and control system implemented by NIPOM includes the following elements:

- a software and hardware suite for local control of electrical installations that controls the parameters of the electrical installations and the condition of the switchgear equipment, protection control, automatic switches, which enables manual control of electrical devices in the remote control mode from the duty personnel’s station at the facility;
- a software and hardware suite of Industrial Ethernet with fiber-optic communication lines;
- a software and hardware unit of the duty personnel’s station at the facility that provides: visualization of dynamic mimics of all electrical installations and remote control of their switching equipment;
- indication of abnormalities, emergency and pre-emergency situations; event logging and archiving;
- means of GSM mobile communication for an automatic transmission of SMS about any important emergency situations to mobile phones.

FEATURES AND ADVANTAGES
The efficiency of the basic equipment and the reliability of the power supply system due to the operational control of electrical power supply to consumers

- Provision of personnel with sufficient, reliable and timely information on the modes of operation and the condition of electrical equipment, information for analysis, optimization and scheduling of equipment operation and repairs:
  - monitoring of the current basic operating parameters of the power equipment;
  - monitoring of the condition and position of the basic switching devices;
  - indication of equipment taken out of operation for repair;
  - indication that the equipment is not ready and information received from it is unreliable.

- Operational control of switching devices, the possibility to change the working conditions of electrical equipment using remote control.

- Control of the number of switching operations, control of tripping of circuit breakers, warning about the approaching exhaustion of the life span.

- Transfer of the data received to MES and ERP system of the enterprise, remote control centers and offices of the company.

The reliability of the power supply system due to the prompt warning of the duty personnel in case of emergency and pre-emergency situations and reduced time for troubleshooting

- Warnings and alarms.
- Logging with assigning a timestamp.
- Sound warning.
- Sending SMS to the operating personnel about important emergency situations.
- Creation of reporting documentation.

Increased quality of service and a reduced number of human errors

- Separation of user access levels.
- Protection from erroneous user actions.
- Logging of operating personnel’s actions.
- Archiving data with different sampling frequency, data display in graphical and tabular form, grouping of data by type of equipment, list of parameters and time interval.

Flexible and easy-to-expand system

- The system is open to upgrades and improvements in the future.
- The possibility of using domestic hardware and software.

MODULAR EQUIPMENT PLANT
Total production area comprises 5,000 m², production capacity – 12 concrete casings per month or 15 metal casings per month.

Manufacturing of modular equipment is organized at the production facilities. The products go through the whole production cycle and are released as fully finished manufactured products.

Development of modular packaged transformer substations with metal enclosure is based on project solutions and typical modules allowing to apply the design technology for archetypes. A typical product line is created based on multiple changes of dimensions within the established limits. This allows for providing for minimum periods of the development, the quality and maximum satisfaction of the customer’s needs.

COMPETENCES

LICENSES, CERTIFICATES
- Membership in self-regulatory organizations of designers, builders and energy auditors

EC DECLARATIONS
Documents confirming compliance of products with GOSTs and the specific requirements of the industries where it is used:
- Certification system of GOST R and the Technical Regulation of Custom Union
- Voluntary certification system of Gazprom PJSC
- Register of technical specifications and testing programs and methods of AC Transneft PJSC
- Certification in Rosneft Oil Company PJSC
APPLICATION:
- Designed to receive and transform electrical energy of 35-110 kV into 6-24 kV energy and to distribute 3-phase AC, 50 (60) Hz energy to the consumers.

Due to developed standard modules base a substation of any complexity and configuration with wide range of power capabilities can be created within minimum period.

Modern design.

Shortest time to implement a project
- Configuration following the modular principle.

No additional approvals for transportation are required
- Modules are of a standard transportation size.

Reduction of time losses and financial expenses of a client, single responsibility
- No need to coordinate cooperating organizations due to work with a single contractor, having integrated competencies and experience at all stages of a project implementation.

APPLICATION:
- Designed to receive and transform electrical energy of 35-110 kV into 6-24 kV energy and to distribute 3-phase AC, 50 (60) Hz energy to the consumers.

- MODULAR EQUIPMENT PLANT

DETAILS AND ADVANTAGES OF CONSTRUCTION
- Flexible and universal solution that meets the requirements of customer
- Due to developed standard modules base a substation of any complexity and configuration with wide range of power capabilities can be created within minimum period.
- It is possible to build a substation pursuant to the most common schemes 4H, 5H, 5AH.

BASIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>NAME OF PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated feeder line voltage, kV</td>
<td>35 (110)</td>
</tr>
<tr>
<td>Number of line leads to the HV switchgear section, pcs.</td>
<td>2</td>
</tr>
<tr>
<td>Availability and position of the automatic transfer switch on the HV side</td>
<td>yes / no</td>
</tr>
<tr>
<td>Design of the automatic transfer switch on the LV side</td>
<td>yes / no</td>
</tr>
<tr>
<td>HV switchgear type</td>
<td>SDBN produced by Siemens AG</td>
</tr>
<tr>
<td></td>
<td>KM-100 kV produced by CJSC “ZETO”</td>
</tr>
<tr>
<td>Switchgear cabinets produced by leading international manufacturers</td>
<td></td>
</tr>
<tr>
<td>20/10 (6) kV in-house switchgear type</td>
<td>Medium voltage switchgears with composite insulation (for current up to 3150 A) produced by RPSM</td>
</tr>
<tr>
<td></td>
<td>Medium voltage switchgears produced by leading international manufacturers</td>
</tr>
<tr>
<td>0.4 kV low-voltage switchgear type</td>
<td>Low-voltage switchgears based on the structural elements of its own design (rated for up to 6300 A)</td>
</tr>
<tr>
<td></td>
<td>Low-voltage switchgears produced by the constructive SIVACON S8</td>
</tr>
<tr>
<td></td>
<td>Low-voltage switchgears produced by leading international manufacturers</td>
</tr>
<tr>
<td>Availability of electric power metering equipment on the LV side</td>
<td>Yes / no</td>
</tr>
<tr>
<td>Design of the line leads on the HV side</td>
<td>Cable (CL) / aerial (AL)</td>
</tr>
</tbody>
</table>

COMPARISON OF DESIGN VARIANTS

<table>
<thead>
<tr>
<th>INDICATORS</th>
<th>One-level</th>
<th>Type</th>
<th>Three-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum usable construction space, m²</td>
<td>800 and more</td>
<td>450 and more</td>
<td>300 and more</td>
</tr>
<tr>
<td>Construction term (after execution of a contract), months</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>-—including the work completion time at the construction site, months</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
**APPLICATION:**
Designed for self-contained power supply of remote consumers located in regions with poor electrical infrastructure and for operation with minimum maintenance:
- residential buildings;
- communication sites;
- linear facilities of gas and oil pipelines;
- gas distribution stations;
- oil pumping stations;
- gas regulating points;
- other.

MPPI is a freely-configurable installation which can be equipped with the following equipment depending on the purpose of application and customer requirements:
- Solar-wind power module
- Gas piston power generator
- Diesel driven generator
- Electrochemical generator with polyethylene fuel cells
- Water-heating solar module
- Gas water boiler
- Voltage inverter
- Transformer (manager) of wind generator
- Transformer (manager) of diesel driven generator or gas piston power generator
- Transformer (manager) of solar module
- Heating system
- Ventilation system
- Security and fire alarm system with access control
- Gas extinguishing system
- Lighting system
- Automated system of power installation control with possibility of remote control and data communication to upper level over RS-485 or GSM

**HARDWARE**

**MODIFICATIONS OF MPPI**

**MPPI ON BASED SOLAR–WIND POWER MODULE AND DIESEL DRIVEN GENERATOR**

**Power supply to:**
- Clusters of gas and gas-condensate wells
- Pig send and receive points and linear station of geomonitoring
- Linear communication facilities

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Diesel driven generator</td>
</tr>
<tr>
<td>MPPI output, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>Actual daily average output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>Output capacity of a solar module, kW*h</td>
<td>up to 10</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>DDG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>Battery capacity, A*h</td>
<td>up to 5000</td>
</tr>
<tr>
<td>Effective energy storage of battery, kW*h</td>
<td>up to 100</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

**MPPI ON BASED SOLAR–WIND POWER MODULE AND GAS PISTON POWER GENERATOR**

**Power supply to:**
- Valve stations, CPTC, CPS, KITSO in linear part of gas transmittal and distribution pipelines of PSRP and linear stations
- Gas reduction and distribution sites

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module</th>
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- gas distribution stations;
- oil pumping stations;
- gas regulating points;
- other.

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**HARDWARE**

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<tr>
<td>Actual daily average output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>Output capacity of a solar module, kW*h</td>
<td>up to 10</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>GPPG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>Battery capacity, A*h</td>
<td>up to 5000</td>
</tr>
<tr>
<td>Effective energy storage of battery, kW*h</td>
<td>up to 100</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

**APPLICATION:**
Designed for self-contained power supply of remote consumers located in regions with poor electrical infrastructure and for operation with minimum maintenance:
- residential buildings;
- communication sites;
- linear facilities of gas and oil pipelines;
- gas distribution stations;
- oil pumping stations;
- gas regulating points;
- other.

MPPI is a freely-configurable installation which can be equipped with the following equipment depending on the purpose of application and customer requirements:
- Solar-wind power module
- Gas piston power generator
- Diesel driven generator
- Electrochemical generator with polyethylene fuel cells
- Water-heating solar module
- Gas water boiler
- Voltage inverter
- Transformer (manager) of wind generator
- Transformer (manager) of diesel driven generator or gas piston power generator
- Transformer (manager) of solar module
- Heating system
- Ventilation system
- Security and fire alarm system with access control
- Gas extinguishing system
- Lighting system
- Automated system of power installation control with possibility of remote control and data communication to upper level over RS-485 or GSM

**HARDWARE**

**MODIFICATIONS OF MPPI**

**MPPI ON BASED SOLAR–WIND POWER MODULE AND DIESEL DRIVEN GENERATOR**

**Power supply to:**
- Clusters of gas and gas-condensate wells
- Pig send and receive points and linear station of geomonitoring
- Linear communication facilities

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Diesel driven generator</td>
</tr>
<tr>
<td>MPPI output, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>Actual daily average output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>Output capacity of a solar module, kW*h</td>
<td>up to 10</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>DDG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>Battery capacity, A*h</td>
<td>up to 5000</td>
</tr>
<tr>
<td>Effective energy storage of battery, kW*h</td>
<td>up to 100</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

**MPPI ON BASED SOLAR–WIND POWER MODULE AND GAS PISTON POWER GENERATOR**

**Power supply to:**
- Valve stations, CPTC, CPS, KITSO in linear part of gas transmittal and distribution pipelines of PSRP and linear stations
- Gas reduction and distribution sites

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Gas piston power generator</td>
</tr>
<tr>
<td>MPPI output, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>Actual daily average output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>Output capacity of a solar module, kW*h</td>
<td>up to 10</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>GPPG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>Battery capacity, A*h</td>
<td>up to 5000</td>
</tr>
<tr>
<td>Effective energy storage of battery, kW*h</td>
<td>up to 100</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

PSRP – Pig send and receive points
CPTC – Control points of telecommunications
CPS – Cathodic protection station
KITSO – Technical Security Equipment Set
PWH – Pipeline walker’s houses
### MODULAR PACKAGED POWER INSTALLATIONS (MPPI)

#### MPPI ON BASED SOLAR–WIND POWER MODULE (WATER–HEATING SOLAR MODULE) AND GAS PISTON POWER GENERATOR (GAS WATER BOILER)

<table>
<thead>
<tr>
<th>Application</th>
<th>Power supply to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gas reduction and distribution sites</td>
</tr>
<tr>
<td></td>
<td>PWH</td>
</tr>
</tbody>
</table>

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module (Water-heating solar module)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Gas piston power generator (Gas water boiler)</td>
</tr>
<tr>
<td>Rated power output of MPPI, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>Actual daily average output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>Output capacity of a solar module, kW/h</td>
<td>up to 20</td>
</tr>
<tr>
<td>SWPM output, kW/h</td>
<td>up to 10</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 10</td>
</tr>
<tr>
<td>GPPG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>GWB output, kW</td>
<td>up to 50</td>
</tr>
<tr>
<td>Battery capacity, Ah</td>
<td>up to 5000</td>
</tr>
<tr>
<td>Effective energy storage of battery, kW/h</td>
<td>up to 100</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

#### MPPI IN THE FORM OF CABINET ON BASED SOLAR–WIND POWER MODULE AND GAS–PISTON ELECTRIC GENERATOR

<table>
<thead>
<tr>
<th>Application</th>
<th>Power supply to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CPTC</td>
</tr>
<tr>
<td></td>
<td>Consumers of linear station of geomonitoring, transition monitoring equipment</td>
</tr>
<tr>
<td></td>
<td>Gas pipeline over barriers with average daily power consumption of up to 1.0 kW and maximal output of up to 2.0 kW</td>
</tr>
</tbody>
</table>

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Solar-wind power module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Gas–Piston Electric Generator</td>
</tr>
<tr>
<td>Actual daily average output, kW</td>
<td>up to 2</td>
</tr>
<tr>
<td>Wind generator output, kW</td>
<td>up to 5</td>
</tr>
<tr>
<td>Solar battery output, kW</td>
<td>up to 2 kW with increments of 250 W</td>
</tr>
<tr>
<td>GPPG output, kW</td>
<td>up to 5</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold climate 1</td>
</tr>
</tbody>
</table>

#### Mini MPPI ON BASED SOLAR MODULE

<table>
<thead>
<tr>
<th>Application</th>
<th>Power supply to small power consumers:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CPTC</td>
</tr>
<tr>
<td></td>
<td>Consumers of linear stations of geomonitoring, transition monitoring equipment</td>
</tr>
<tr>
<td></td>
<td>Gas hazard monitoring systems</td>
</tr>
</tbody>
</table>

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power output of MPPI, kW</td>
<td>up to 500 kW</td>
</tr>
<tr>
<td>Solar battery output, kW</td>
<td>up to 500 W with increments of 250 W</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to moderate cold climate</td>
</tr>
</tbody>
</table>

#### MPPI ON BASED ELECTROCHEMICAL GENERATOR WITH POLYETHYLENE FUEL CELLS AND GAS PISTON POWER GENERATOR

<table>
<thead>
<tr>
<th>Application</th>
<th>Power and heating supply to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valve stations, CPTC, CPS, KITSO in linear part of gas transmission and distribution pipelines of PSRP and linear stations</td>
</tr>
<tr>
<td></td>
<td>Gas reduction and distribution sites</td>
</tr>
<tr>
<td></td>
<td>Linear communication objects</td>
</tr>
<tr>
<td></td>
<td>PWH and others</td>
</tr>
</tbody>
</table>

**Basic specifications**

<table>
<thead>
<tr>
<th>Primary power source</th>
<th>Electrochemical generator with polyethylene fuel cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve power source</td>
<td>Gas piston power generator</td>
</tr>
<tr>
<td>Rated power output of MPPI, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>Rated thermal output of MPPI, kW</td>
<td>up to 20</td>
</tr>
<tr>
<td>GPPG output, kW</td>
<td>up to 30</td>
</tr>
<tr>
<td>Climatic category</td>
<td>up to cold 1</td>
</tr>
</tbody>
</table>

### DETAILS AND ADVANTAGES OF CONSTRUCTION

- **Flexible and universal solution that meets the requirements of customer**
  - Power supply to consumers of any category of reliability.
  - Modular principle of equipment configuration depending on customer’s needs and targets.
  - Easy to transport due to compact and block division (in case of cabinet type).

- **Cost-effective solution**
  - Minimum costs for power supply in areas with poor network facilities.
  - No power issues during power supply.
  - Minimized energy and maintenance costs.
  - Vandal proof structure of block-boxes.
  - Minimized costs for installation and commissioning due to full operational readiness and complete volume of standard tests.
  - The presence of bypass line:
    - more efficient use of DDP’s technical capabilities;
    - reduction of time for battery recharge;
    - ensuring E-mode of diesel consumption.

- **Ease of operation and full operational information — reduction of maintenance time and downtimes**
  - Easy maintenance due to withdrawable construction of racks (in case of cabinet type).
  - Easy installation due to folding structure (in case of cabinet type).
  - Automated control system ensures:
    - on-line monitoring of installation operation;
    - fault and warning alarms;
    - detailed explanation of errors in work of individual components and systems.

- **High reliability and flawless operation**
  - Transfer from primary power source to reserve (if available) power source in case of power interruption at primary source (at inverter’s leads) due to automatic control system.
  - Block-box is built of insulated sandwich panels.
  - High mechanical performance, humidity resistance, freeze resistance, seismic resistance and fire safe execution of equipment.
(modular equipment plant)

**APPLICATION:**
- designed to receive and transform electrical energy of 6(10)–24 kV into 0.4 kV energy and to distribute 3-phase AC, 50 (60) Hz energy to the consumers.

**CONSTRUCTION DESIGN:**
- Single-storey structure made of high strength concrete. A substation block comprises two separate parts, specifically:
  - electrical equipment module;
  - cable structure (cable spreading room).

**APPLICATION:**
- Single-storey structure made of high strength concrete. A substation block comprises two separate parts, specifically:
  - electrical equipment module;
  - cable structure (cable spreading room).

**BASIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power transformer power, kVA</td>
<td>100; 160; 250; 400; 630; 1000; 1250; 1600*</td>
</tr>
<tr>
<td>HV side rated voltage, kV</td>
<td>up to 24</td>
</tr>
<tr>
<td>LV side rated voltage, kV</td>
<td>up to 0.69</td>
</tr>
<tr>
<td>HV side rated bus section current, A</td>
<td>630 (1000)</td>
</tr>
<tr>
<td>LV incoming switch rated current, A</td>
<td>160; 250; 400; 630; 1000; 1600; 2000; 2500</td>
</tr>
<tr>
<td>LV side rated bus section current, A</td>
<td>200; 320; 500; 750; 1250; 2000; 2500</td>
</tr>
<tr>
<td>HV short time thermal current, kA/3s (kA/1s)</td>
<td>Composite insulation switchgear</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>HV short time thermal current, kA</td>
<td>31.5; 40; 51</td>
</tr>
<tr>
<td>LV short time thermal current, kA/1s</td>
<td>20; 30; 50</td>
</tr>
<tr>
<td>LV short time electrodynamic current, kA</td>
<td>50; 70; 110</td>
</tr>
<tr>
<td>Secondary circuit rated voltage, V</td>
<td>AC basic lighting AC</td>
</tr>
<tr>
<td></td>
<td>220</td>
</tr>
<tr>
<td>Insulation level as per GOST 1516.1</td>
<td>oil-filled transformer</td>
</tr>
<tr>
<td></td>
<td>dry transformer</td>
</tr>
<tr>
<td></td>
<td>light</td>
</tr>
<tr>
<td></td>
<td>moderate 1, moderate cold 1</td>
</tr>
<tr>
<td>Protection level (as per GOST 14254) at enclosure</td>
<td>I200</td>
</tr>
<tr>
<td>Dimensions of one module, mm</td>
<td>Height of enclosure</td>
</tr>
<tr>
<td></td>
<td>2865</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>18100</td>
</tr>
<tr>
<td></td>
<td>oil tray, max.</td>
</tr>
<tr>
<td>Service life, years</td>
<td>Min. 30 years</td>
</tr>
</tbody>
</table>

*Installation of transformers of TSL, TON and other brands with power output up to 1600 kVA is available upon request.*

---

**DETAILS AND ADVANTAGES OF CONSTRUCTION**

- Flexible and universal solution that meets the requirements of customer
- Equipment is ready-to-operate and undergoes a complete set of standard tests.
- Electrical equipment is up-to-date.
- Exterior finish, color and structure of concrete surface are project-specific.
- Equipment is compact and compatible with urban architecture.

- Shipment by any transportation means to any part of the country. No additional approvals for transportation are required.
- Modules are of a standard transportation size.
- Shortest time to implement a project
- Quick installation and commissioning.
- Simplification of land allocation.
- Reduction of time losses and financial expenses of a client
- Minimized costs for installation and commissioning due to full operational readiness.
- Possibility to expand capacity by adding additional modules.
- Possibility to expand power output of a substation without increase of building area by expanding a two-transformer substation to two-storied four-transformer substation.
- Modules and substation have a vandal-proof structure.
- High reliability and flawless operation
- Customers’ requirements in terms of mechanical performance, humidity resistance, freeze resistance, seismic resistance and fire safety are taken into account during design.
- Seismic resistance and durability are ensured by means of double reinforcement and usage of high-strength concrete.

---

**CONFIGURATION**

**HV side switchgear**
- medium voltage switchgears with air insulation (rated for up to 1000 A)
- medium voltage switchgears Small-Size with composite insulation (for current up to 630 A)
- packaged switchgears produced by leading international manufacturers
- low-voltage switchgears based on the structural elements of its own design (rated for up to 6300 A)
- low-voltage switchgears based on the construction SIVACON 58 (rated for up to 7000 A)
- low-voltage switchgears produced by leading international manufacturers

**LV side switchgear**
- local distribution boards and switchboards
- one or two transformers:
  - oil-filled sealed
  - with dry insulation

**Power transformers**
- automatic heating and cooling systems (quantity and power output are defined by climate of a region)
- emergency lighting system
- security and fire alarm systems
- systems for integration into automated systems for power metering
- switchboards with uninterruptible power supply
- current and voltage transformers in HV switchgear
- current transformers for incoming and distribution lines of LV switchboards

**Additional systems and boards**
- active and reactive energy meters
- switchboard with a switch at input of LV switchboard
- amper-meter at each phase of at input of LV switchboard
- automated meter reading and control system modules
**APPLICATION:**

- Designed to receive and transform electrical energy of 6 (10)-24 kV into 0,4 kV energy and to distribute 3-phase AC, 50 (60) Hz energy to the consumers.

**CONSTRUCTION DESIGN:**

A substation is made of welded metal block-boxes. A block-box can be produced of metal sheets with powdered painting coating and sufficient layer of thermal insulation or sandwich panels.

**BASIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power transformer power, kVA</td>
<td>100, 160, 250, 400, 630, 1000, 1250, 1600, 2500</td>
</tr>
<tr>
<td>HV side rated voltage, kV</td>
<td>up to 24</td>
</tr>
<tr>
<td>LV side rated voltage, kV</td>
<td>up to 0.69</td>
</tr>
<tr>
<td>HV side rated bus section current, A</td>
<td>630 (1000)</td>
</tr>
<tr>
<td>LV side rated bus section current, A</td>
<td>up to 6300</td>
</tr>
<tr>
<td>HV short time thermal current, kA/3s</td>
<td>20</td>
</tr>
<tr>
<td>HV short time thermal current, kA</td>
<td>up to 130</td>
</tr>
<tr>
<td>LV short time thermal current, kA/3s</td>
<td>up to 300</td>
</tr>
<tr>
<td>LV short time thermal current, kA</td>
<td>up to 300</td>
</tr>
<tr>
<td>HV short time electrodynamic current, kA</td>
<td>51</td>
</tr>
<tr>
<td>LV short time electrodynamic current, kA</td>
<td>up to 130</td>
</tr>
<tr>
<td>LV short time electrodynamic current, kA/3s</td>
<td>up to 300</td>
</tr>
<tr>
<td>Climatic category (as per GOST 15150)</td>
<td>moderate 1, moderate cold 1</td>
</tr>
<tr>
<td>Protection level (as per GOST 14254) of enclosure</td>
<td>IP23</td>
</tr>
<tr>
<td>Dimensions of one module, mm</td>
<td>length 6000 9000 12000</td>
</tr>
<tr>
<td></td>
<td>width up to 3000</td>
</tr>
<tr>
<td></td>
<td>height up to 3000</td>
</tr>
<tr>
<td>Weight of an equipped module without transformer, max., kg</td>
<td>5000 6850 11000</td>
</tr>
<tr>
<td>Service life, years</td>
<td>Equipment Min. 30 years</td>
</tr>
<tr>
<td></td>
<td>Metal enclosure Min. 50 years</td>
</tr>
</tbody>
</table>

* Dimensions may vary depending on equipment installed in MPTSME.

**DETAILS AND ADVANTAGES OF CONSTRUCTION**

- Flexible and universal solution that meets the requirements of customer
- Equipment is ready-to-operate and undergoes a complete set of standard tests.
- Electrical equipment is up-to-date.
- Exterior finish, color and structure of concrete surface are project-specific.
- Equipment is compact and compatible with urban architecture.
- Shipment by any transportation means to any part of the country. No additional approvals for transportation are required.
- Modules are of a standard transportation size.
- Shortest time to implement a project
- Quick installation and commissioning.
- Simplification of land allocation.
- Reduction of time losses and financial expenses of a client
- Minimized costs for installation and commissioning due to full operational readiness.
- Modules and substation have a vandal-proof structure.
- High reliability and flawless operation
- Customers’ requirements in terms of mechanical performance, humidity resistance, freeze resistance, seismic resistance and fire safety are taken into account during design.

**EQUIPMENT CONFIGURATION VARIANTS**

- **HV side switchgear**
  - compartments with composite insulation (for current up to 3150 A) produced by NIPOM
  - medium voltage switchgears with air insulation (rated for up to 1000 A)
  - medium voltage switchgears Small-Size with composite insulation (for current up to 630 A)
  - packed switchgears produced by leading international manufacturers
  - low-voltage switchgears based on the structural elements of its own design (rated for up to 6300 A)
  - low-voltage switchgears based on the construction SVACON 58 (rated for up to 7000 A)
  - low-voltage switchgears produced by leading international manufacturers
  - local distribution boards and switchboards
  - one or two transformers:
    - oil-filled and watertight with dry insulation
  - Power transformers
  - Systems for organization of power consumption metering and accounting
    - current and voltage transformers in HV switchgear
    - current transformers for incoming-current and distribution lines of LV switchboards
    - active and reactive energy meters
    - voltage meter with a switch at input of LV switchboard
    - amperes-meters at each phase of input of LV switchboard
    - automated meter reading and control system modules
  - climate control
  - Options of a block-box
    - emergency lighting system
    - fire extinguishing system
    - security and fire alarm system
    - utility module
MODULAR EQUIPMENT PLANT

MODULAR PACKAGED DISTRIBUTION SUBSTATIONS WITH CONCRETE AND METAL ENCLOSURES

APPLICATION:
- modular packaged distribution substations with voltage of 6(10)-24 kV are designed to receive and distribute electrical energy in urban and industrial networks;
- modular packaged distribution transformer substations are designed to receive and transform electrical energy of 6 (10, 15, 20) kV onto 0.4 (0.23; 0.46) kV energy for local power supply at a substations with voltage up to 220 kV.

CONSTRUCTION DESIGN:
Substations have a modular design. Quantity of modules is project specific.

### BASIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>up to 24</td>
</tr>
<tr>
<td>Rated bus section current, A</td>
<td>630 (1000)</td>
</tr>
<tr>
<td>Short time thermal current, kA/3s*</td>
<td>20</td>
</tr>
<tr>
<td>Short time electrodynamic current, kA</td>
<td>51</td>
</tr>
<tr>
<td>Secondary circuit rated voltage, V</td>
<td>220 (24)</td>
</tr>
<tr>
<td>Power transformer power, kVA*</td>
<td>concrete enclosure</td>
</tr>
<tr>
<td></td>
<td>100; 160; 250; 400; 630; 1000; 1250; 1600**</td>
</tr>
<tr>
<td>LV side rated voltage, kV*</td>
<td>up to 0.69</td>
</tr>
<tr>
<td>LV side rated bus section current, A</td>
<td>1600; 2000; 2500</td>
</tr>
<tr>
<td>LV short time thermal current, kA/ls*</td>
<td>20; 30; 50</td>
</tr>
<tr>
<td>LV short time electrodynamic current, kA*</td>
<td>50; 70; 110</td>
</tr>
<tr>
<td>LV incoming switch rated current, A</td>
<td>1600; 2500; 4000; 6300; 1000; 1600; 2000; 2500</td>
</tr>
<tr>
<td>Climatic category (as per GOST 15150)</td>
<td>moderate 1, moderate cold 1</td>
</tr>
<tr>
<td>Insulation level as per GOST 15151.1</td>
<td>IP23</td>
</tr>
<tr>
<td>Dimensions of one module, mm</td>
<td>concrete enclosure</td>
</tr>
<tr>
<td>length</td>
<td>5240</td>
</tr>
<tr>
<td>width</td>
<td>2060</td>
</tr>
<tr>
<td>height</td>
<td>2860</td>
</tr>
<tr>
<td>Weight of one module without equipment, max., kg</td>
<td>15000</td>
</tr>
<tr>
<td>Service life, years</td>
<td>Equipment</td>
</tr>
<tr>
<td></td>
<td>Min. 30 years</td>
</tr>
</tbody>
</table>

* Only for modular packaged distribution transformer substations
** In case of in-line installation of a transformer

### DETAILS AND ADVANTAGES OF CONSTRUCTION
- Flexible and universal solution that meets the requirements of customer
- Equipment is ready-to-operate and undergoes a complete set of standard tests.
- Equipment and equipment is up-to-date.
- Exterior, finish, color and structure of concrete surface are project-specific.
- Equipment is compact and compatible with urban architecture.
- Shipment by any transportation means to any part of the country.
- No additional approvals for transportation are required.
- Modules are of a standard transportation size.
- Shortest time to implement a project
- Quick installation and commissioning
- Simplification of land allocation.
- Reduction of time losses and financial expenses of a client
- Minimized costs for installation and commissioning due to full operational readiness.
- Possibility to expand capacity by adding additional modules.
- Possibility to expand power output of a substation without increase of building area by expanding a two-transformer substation to two-storied four-transformer substation.
- Modules and substation have a vandal-proof execution.
- High reliability and flawless operation
- Customers' requirements in terms of mechanical performance, humidity resistance, freeze resistance, seismic resistance and fire safety are taken into account during design.
- Seismic resistance and durability are ensured by means of double armoring and usage of high-strength concrete.

### CONFIGURATION

#### HV side switchgear
- compartments with composite insulation (for current up to 3150 A) produced by NIPOM
- medium voltage switchgears with air insulation (rated for up to 1000 A)
- medium voltage switchgears Small-Sized with composite insulation (for current up to 630 A) produced by leading international manufacturers
- low-voltage switchgears produced by leading international manufacturers
- low-voltage switchgears produced by NIPOM

#### Layout design of HV side switchgear
- cross feed of four bus sections with corresponding section devices
- low-voltage switchgears based on the structural elements of its own design (rated for up to 630 A)
- low-voltage switchgears based on the constructive SIVACON S8 (rated for up to 7000 A)

#### LV side switchgear (only for MPDTS)
- LV-side switchgear:
  - one or two transformers
  - oil-filled salved
  - with dry insulation

#### Power transformers (only for MPDTS)
- voltage meters with a switch voltage transformer compartments
- amperes meters in coils of input and distribution lines
- current and voltage transformers in HV switchgear
- current transformers for input and distribution lines of LV switchboards
- active and reactive energy meters are installed in a separate accounting switchboard, type of meter depends on a project
- as a RPA of input, switching and sectional cells, and for the organization of automatic transfer circuit-breaker it’s possible to use different series of microprocessor units of any manufacturer
- function of logical selection is provided for full coordination of protection operation of HV switchgear
- automatic heating and cooling systems (quantity and power output are defined by climate of a region)
- emergency lighting system
- security and fire alarm system with possibility to transfer a radio signal to centralized surveillance office
- systems for organization of power consumption metering and accounting
- systems for integration into automated systems for power metering
- switchboards with uninterruptible power supplies
MODULAR EQUIPMENT PLANT

APPLICATION:
- Designed for reserved power supply of consumers of I category of linear or main pipeline (LMP), provided with one primary AC power source of 6 (10) kV or 380 V and frequency 50 Hz, in case building of a pipeline is considered as economically inexpedient.

CONSTRUCTION DESIGN:
Integrated Installations are made of welded metal block-containers. A block-container can be produced of metal with powdered painting coating and sufficient layer of thermal insulation or sandwich panels.

IMPS may be of the following types:
- "01" type – combined execution (into a block-container are placed both Integrated Installations equipment and equipment of control and monitoring station);
- "02" type – Integrated Installations is placed near existing block-container with equipment and equipment of control and monitoring station and ensures its backup power supply.

PARAMETER | VALUE
---|---
Allowable output voltage deviation, linear load, %, max. | 3
Allowable output voltage deviation, non-linear load, %, max. | 5
Efficiency factor at rated operation, %, min. | 95
Allowable overcurrent, % min. | 1 min. 150, 10 min. 125
UPS output connection type | 3L+N+PE
Cross-ratio | 2:1
Noise level, dB, max. | 65

Accumulator battery (included into uninterruptible power supply scope of supply)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage of an accumulator, V</td>
<td>12</td>
</tr>
<tr>
<td>Nominal capacitance, Ah</td>
<td>according to customer’s requirements</td>
</tr>
<tr>
<td>Type of accumulator battery</td>
<td>lead-acid, sealed</td>
</tr>
<tr>
<td>Allowable quantity of charge-discharge cycles for AB with depth of discharge till 40%, min.</td>
<td>800</td>
</tr>
<tr>
<td>Battery local action at temperature of up to 20°C, %, max.</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Power plant

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power output, kVA/kW</td>
<td>according to customer’s requirements</td>
</tr>
<tr>
<td>Allowable overpowering during 1 h, % min.</td>
<td>10</td>
</tr>
<tr>
<td>Rated output voltage, kV</td>
<td>0.38</td>
</tr>
<tr>
<td>Rate output frequency, Hz</td>
<td>50</td>
</tr>
<tr>
<td>Rated power factor, min.</td>
<td>0.8</td>
</tr>
<tr>
<td>Level of automation (as per GOST R 53987)</td>
<td>3</td>
</tr>
<tr>
<td>PP output, neutral mode</td>
<td>5-wire, dead-end earthed neutral, with division of PEN bus to PE and N</td>
</tr>
<tr>
<td>Fuel</td>
<td>diesel or gasoline (according to customer’s requirements)</td>
</tr>
<tr>
<td>Structural fire hazard class as per Federal Law 123-Fz</td>
<td>CO</td>
</tr>
<tr>
<td>Fire rating as per SNIP 21-01-97</td>
<td>IV (default), II, III</td>
</tr>
<tr>
<td>Protection level of a block-box, as per GOST 14254</td>
<td>IP23 and higher</td>
</tr>
<tr>
<td>Protection level of external equipment, as per GOST 14254</td>
<td>IP44 and higher</td>
</tr>
<tr>
<td>Climatic category (as per GOST 15150)</td>
<td>moderate 1, moderate cold 1, cold 1</td>
</tr>
</tbody>
</table>

APPLICATION:
- Designed for reserved power supply of consumers of I category of linear or main pipeline (LMP), provided with one primary AC power source of 6 (10) kV or 380 V and frequency 50 Hz, in case building of a pipeline is considered as economically inexpedient.
Solutions for guaranteed uninterruptible power supply to I category consumers

INTEGRATED INSTALLATIONS ON THE BASIS OF PACKAGED TRANSFORMER SUBSTATIONS WITH DDG RESERVE POWER SOURCE

DETAILS AND ADVANTAGES OF CONSTRUCTION

- Flexibility and universal solution that meets the requirements of customer
- Maximum level of localization of IRPS hardware components (99%)
- Manufacture of integrated installations pursuant to standard and individual schemes of customer
- Uniform technical solutions for equipment installation and layout of compartments of block-module
- Shipment by any transportation means to any part of the country
- No additional approvals for transportation are required
- High reliability and flawless operation
- Replacement of faulty equipment without interruption of production process and disassembly of properly functioning equipment

MODULAR EQUIPMENT PLANT

NIPOM

PUBLIC RECOGNITION

- 2 products from NIPOM are the best developments selected by the International Exhibition of Inventions (Genoa) in 2015
- The holder of the Honorary Standard of the Governor of the Nizhny Novgorod Region for the best performance of the activities of industrial enterprises in 2014
- Winner of the competition “Innovations of the Region – 2014” in the category “Innovation in the Construction Industry” with a project “Packaged indoor substations 35-110/24 kV on the basis of unified block-modules”
- Medium voltage switchgear is the winner of the All-Russian competition under the Program “100 Best Products of Russia” in 2014
- Winner of the competition “Innovations of the Region – 2014” in the category “Innovation in the Construction Industry” with a project “Packaged indoor substations 35-110/24 kV on the basis of unified block-modules”
- Winner of the competition “Innovations of the Region – 2013” in the category “Innovation in the Power Generation Sector”
- 4 products are the winners of the All-Russian competition under the Program “100 Best Products of Russia” in 2013
- Feeder insulation monitoring system and low-voltage complete are the best developments selected by SIF Seoul International Invention Fair – 2013 (Seoul)
- The highest rating of the production system in Russia according to the audit performed in 2013 by the International Kazan Institute
- 3rd place in the All-Russian rating of “Production systems – 2013” in the category “The best system of workplace organization-5C”
- Among the top 30 companies according to “Tech Success” Rating among Russian high-tech fast-growing enterprises in 2013
- 3rd place according to the assessment of the industrial enterprises’ performance in the Nizhny Novgorod region in 2012
- The holder of the Honorary Standard of the Governor of the Nizhny Novgorod Region for the best performance of the activities of industrial enterprises in 2014
- Winner of the competition “Innovations of the Region – 2014” in the category “Innovation in the Construction Industry” with a project “Packaged indoor substations 35-110/24 kV on the basis of unified block-modules”
- 3rd place in the Rating “League of the Best – National Level” in 2012
- Winner in the category “Pilot Project of the Year” among Siemens-partner companies in 2012
- Winner of the competition “Russian Quality” in 2011
- Winner in the categories “Quick Growth” and “Project of the Year” among Siemens-partner companies in 2011 for implementation of an integrated project of a power supply to Tuapse oil refinery plant, which includes supply of packaged transformer substations
- Winner in the category “Project of the Year - 2011” among Siemens-partner companies
- Winner of the All-Russian competition “Best Russian Enterprises. Dynamics, Efficiency, Responsibility - 2010”
- Badge of honor “Engineering bravery” from the Supreme Engineering Council and the Russian Academy of Engineering in 2010

CONSTRUCTION

Power plant compartment
- Power control board 0.4 kV
- Uninterruptible power supply cabinet with power modules
- Instrumentation and telemetry cabinets
- Security and fire alarm cabinet
- Firing system cabinet
- Transformer compartment
- Lighting
- Heaters
- Accumulator compartment
- Lighting
- Heaters
- Block-container
- Lighting
- Security and fire alarm system
- Vandal-proof doors, gates and ventilation grids
- Quick-release couplings for drainage and fill-up of fuel
- Fuel tank vent valve

* only for (01) type IRPS

CONFIGURATION VARIANTS

1. Connection rack
2. TSE rack
3. Equipment installation-place
4. Instrumentation and telemetry
5. V-OPE SCP
6. Alarm warning system control cabinet
7. Place of individual protection means installation
8. Distribution panel
9. Power control board
10. Uninterruptible power supply
11. PPE cabinet
12. Local distribution board 1
13. Folding table and chair

I - power plant compartment
II - service compartment
III - accumulator compartment
IV - transformer compartment

IV - transformer compartment
III - accumulator compartment
II - service compartment
I - power plant compartment

Transformer compartment
- Aerial HV input board (optional) in combination with HV fuses
- Ventilation system
- Power transformer
- Lighting
- Video surveillance system
- External lighting
- Security and fire alarm system
- Vandal-proof doors, gates and ventilation grids
- Quick-release couplings for drainage and fill-up of fuel
- Fuel tank vent valve

Power plant compartment (compartment may be divided into two parts: compartment for PP and compartment with fuel storage tank, additional fuel tank may be placed outside a block-box)
- Standby plant
- Additional fuel tank (option)
- Exhausting system with a damper
- Induced exhausting and natural positive ventilation
- Automated gas axe fire extinguishing system
- Heaters
- Lighting
- Fuel drainage and fill-up piping system
- Electronic fuel consumption meter

Service compartment
- Power control board 0.4 kV
- Uninterruptible power supply cabinet with power modules
- Instrumentation and telemetry cabinets
- Security and fire alarm cabinet
- Firing system cabinet
- Transformer compartment
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* only for (01) type IRPS
**EXPERIENCE OF SUPPLIES**

**Gas industry**
- Gazprom
- Rosneft
- Silovest
- Lukoil
- Gazprom nefte
- Sintez Group
- Transneft
- Caspian Pipeline Consortium
- Mazėsio nafta (Lithuania)

**Electrical energy industry**
- Territorial generating companies
- RusHydro
- Rosatom
- Rosatti

**Metallurgy, mining industry**
- Norilsk Nickel
- Metallinvest
- UGMK-Holding
- Severstal
- OMK
- Russian Copper Company
- Kazakmys (Kazakhstan)

**Cementing industry**
- Altynamas (Kazakhstan)

**Production facilities**
- Prasair Rus
- Uralalmas
- Taf
- GAZ Group
- EuroChem
- Mirgorst

**Utilities**
- Water treatment plants
- Airports
- Sochi Olympic facilities
- Russian Railways
- and others

**GAS INDUSTRY**
- Gazprom

**OIL SECTOR**
- Sibur
- Rosneft
- Silovest
- Lukoil
- Gazprom nefte
- Sintez Group
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**NUCLEAR INDUSTRY**
- Reconstruction of Tyumen compressor station
- 274 702 €
- Reconstruction of 6/0.4 kV modular package transformer station
- 1 217 287 €
- Modernization of electric power supply with a comprehensive electric equipment delivery and work execution
- 942 005 €
- Reconstruction of Tyumen compressor station
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- 1 217 287 €
- Modernization of electric power supply with a comprehensive electric equipment delivery and work execution
- 942 005 €

**PRODUCTION FACILITIES**
- Production facilities
- 78 982 €
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The trust of customers and partners is our core value.

In order to develop a productive long-term cooperation, NIPOM is willing to:

- present our company, our line of manufactured equipment and services in the premises of any companies and organizations concerned;
- confirm the compliance of NIPOM products with the corporate requirements of customers;
- enable to organize professional interaction in the premises of NIPOM within corporate meetings, seminars, conferences and consultations.

The advantages of cooperation with NIPOM are as follows:

- reduced time and financial costs of the customer due to avoiding the need to coordinate and interact with allied suppliers; work with a single contractor having comprehensive competencies and experiences at all the project stages from the survey and design to commissioning and further maintenance service;
- selection of balanced, financially proven and optimal technical solutions enabling the further development of the customer’s energy system, due to many years of experience of NIPOM in various industries, custom-tailored approach to each customer and our partnership with leading domestic and foreign manufacturers of electrical products;
- reduced energy losses due to our innovative approach to the development of electric equipment and usage of new technologies in production;
- commissioning a facility just in time and guarantee of reliable power supply due to the European production level offered by NIPOM, which is officially recognized at the global level; consistently high quality of our integrated solutions and rapid response to customers’ requests;
- reduced operation costs of the equipment manufactured by NIPOM and avoidance of accidents due to various programs of consulting support to the customers.

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- enable to organize professional interaction in the premises of NIPOM within corporate meetings, seminars, conferences and consultations.

Social responsibility

We care where we live!

Our contribution to the preservation and development of the values of a healthy society.

NIPOM pays great attention to work with children in order to increase their interest in science and industry, to train future qualified young professionals.

Sponsorship support for Solyshko orphanage
- NIPOM has maintained warm friendly relations with the teachers and foster children of the orphanage for many years.

Support to Dzerzhinsk schools
- We organize excursions to the plant for the children of the company employees, hold Energy Days and give lessons on energy saving.

Support to the Dzerzhinsk Technical College
- The laboratory classroom is equipped with NIPOM electric equipment.

Environment protection
- NIPOM develops and implements environmental policies, a set of energy-saving and energy-efficiency measures in order to mitigate the negative impact of the company on the environment.