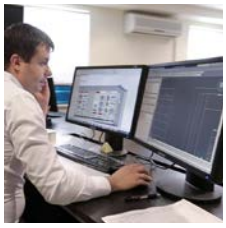
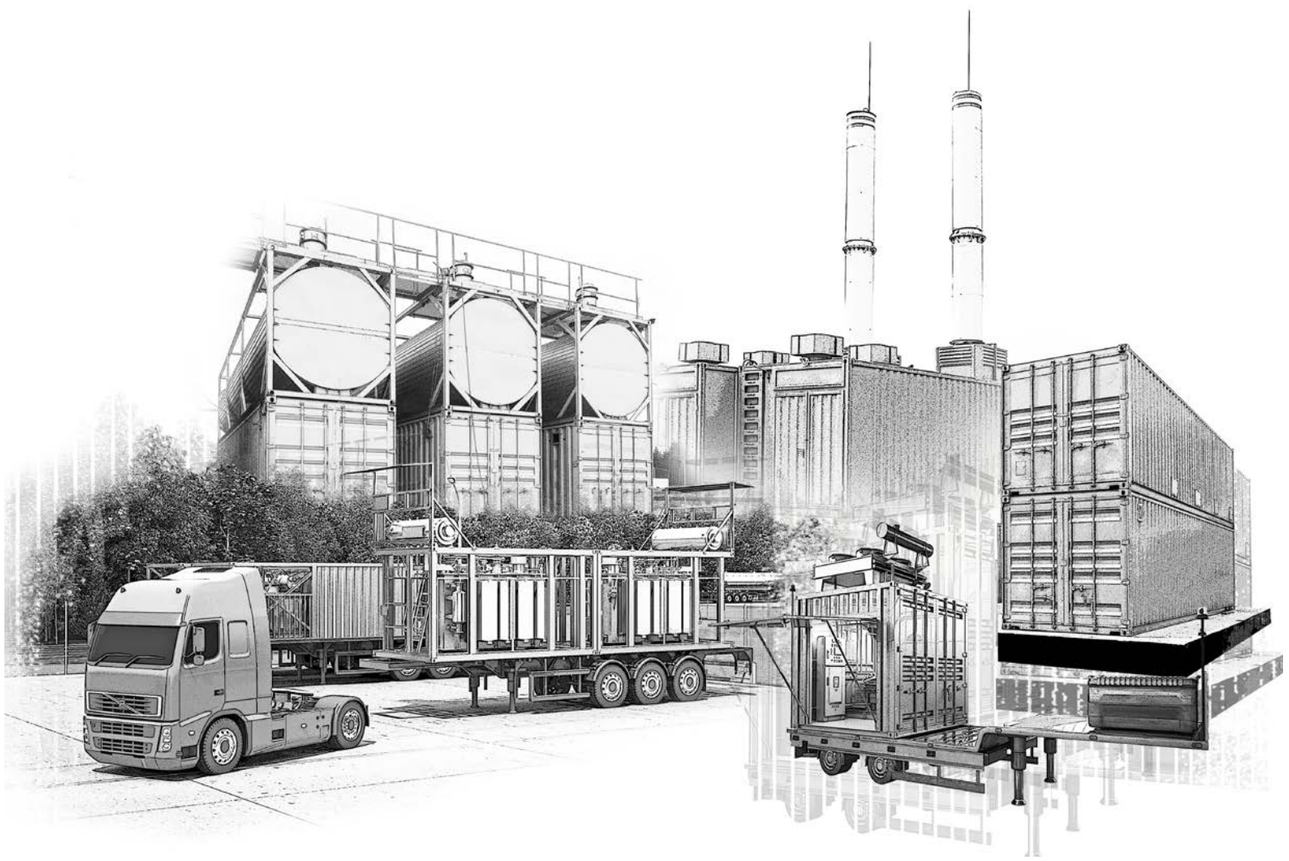


PITERENERGOMASH

The best technologies at the power market

CONTENT

St. Petersburg enterprise PiterEnergoMash is Russian power-engineering company designing, producing and supplying the new generation of generating, converting and distributing power engineering equipment, including the equipment of uninterruptible and autonomous power supply.



01

THE COMPANY

The company provides engineering design, production and integrated supply of power and electrical equipment for power, gas, oil, metallurgical, chemical and shipbuilding industries.

The research and technology potential, as well as the powerful production and design-and-engineering facility allow the company to organize a full life cycle manufacturing competitive products and implement the comprehensive innovative power solutions.

The company provides a full range of works for implementation of power supply projects starting from designing of power engineering equipment and facilities, producing power engineering complexes, to mounting of complexes at facilities, carrying out commissioning, operating the complexes, training customers' personnel and providing maintenance service. The comprehensive approach provides a guaranteed operating reliability of purchased equipment and complexes to the customer.

The company has all the licenses and certificates, required to provide a wide range of services for organizing a full production life cycle. The company has introduced an integrated system of production management and automated production technologies. An established partnership with the world's leaders in power-engineering allows us to solve complex problems in the shortest possible time and contributes to our successful experience in local integration of the foreign advanced power technologies.

01

THE COMPANY

THE COMPANY'S INDUSTRIAL STRUCTURE

The production base is purposed for: production of packaged power engineering systems of electric power generating, distributing and converting for metallurgical, power engineering, nuclear, gas, oil industries, machine engineering and shipbuilding; production of power engineering equipment range; production of ancillary equipment range (warehouses, fuel tanks, make-up containers, modular constructions, etc.).

The area, the production and technical infrastructure of the company is located over, equals 15 000 square meters. It incorporates engineering and office block, warehouses and an open storage ground.

Production is organized on the principle of a closed cycle applying functional conveyor and is intended for individual and small-batch production.
The company's industrial structure includes a container production, an electrical production unit and a welding engineering unit.

Container production provides designing and producing of block-containers structured as shipping containers, supplying with electrical equipment.
The structure of container production comprises from a sheet metal production area, a fitting area, a powder and airless coating area, an engineering area and an assembling workshop.

An electrical production unit provides producing of electrical equipment and electric power managing, distributing and converting systems for metallurgical, power engineering, nuclear, gas, oil industries, machine engineering and shipbuilding.

Welding engineering unit provides producing of welded container-type metal structures of various purpose. The unit consist of a welding assembling site includes a frame, apipe, welding and assembling areas and an area of spatial assembling, a blanking and machining site includes a gas and plasma cutting area, a hot and cold forging area and an engineering area and a modular fabrication site includes a modularization area, a testing area, a paint and coating area, an area of assembling, mounting and adjustment electrical equipment.

Annual Capacity of the enterprise comes up to the following:

– 3500 containers/block-modules (of administrative, ablution, special, power, engineering support accommodation, medical purposes, etc.)

– 800 block-modules complete with power engineering equipment (diesel-driven generators, diesel-rotary uninterruptible power systems, combined heat and power gas generators, indoor switchgear, packaged transformer electric substations etc.)

02

TECHNICAL SOLUTIONS

THE COMPLEX INNOVATIVE ELECTRIC POWER SOLUTIONS

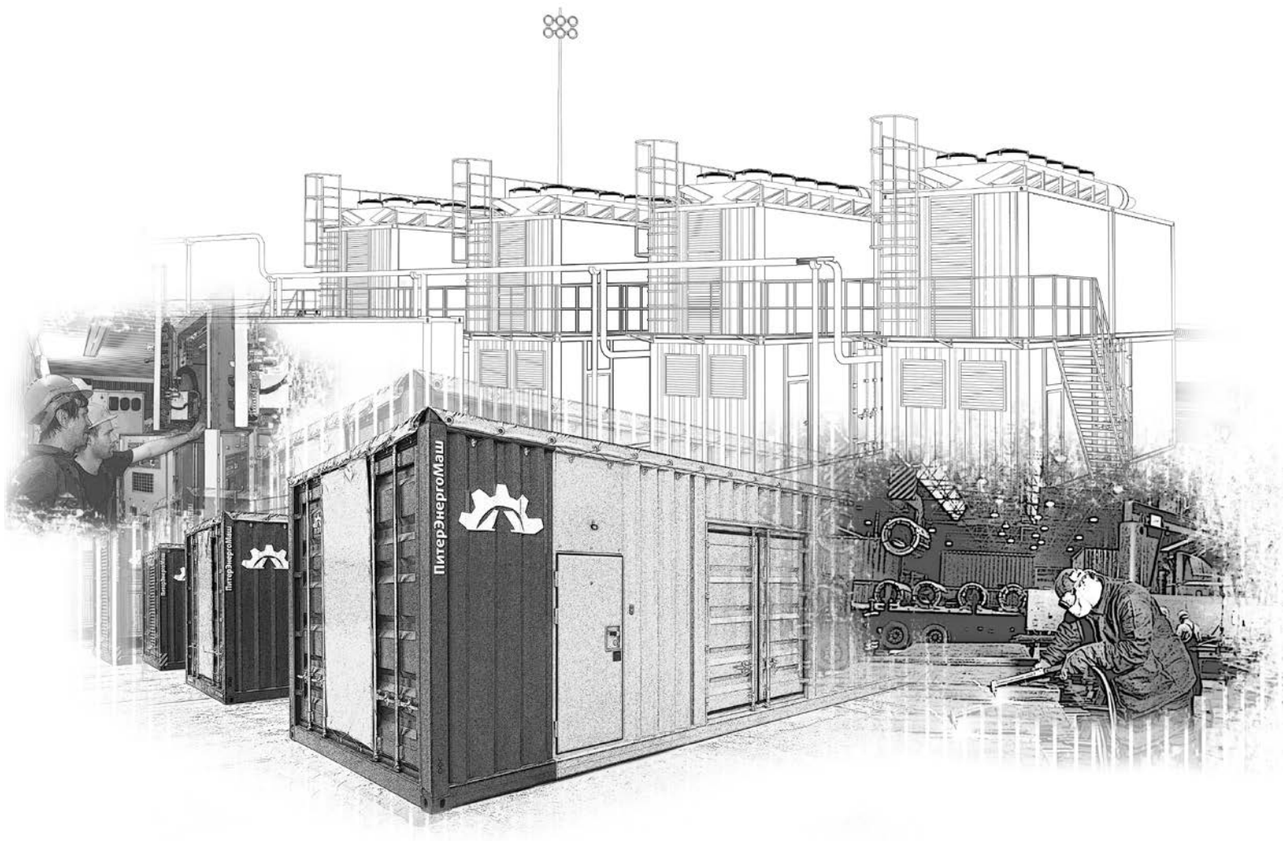
Complex electric power solutions of generating currently are the most cost-effective and efficient way to provide consumers with electric power and heat. Due to the vast experience PiterEnergoMash has in designing of power plants and power supply systems, our company can offer the best solutions complying with every customer's requirement. We have successfully implemented the dozens of designs introducing the fault-tolerant and cost-effective power electric generating systems based on equipment supplied by the leading international manufacturers. Applying the principle of block-modular infrastructure using equipment packaged in fully prefabricated modules guarantees reliable and efficient use of the customer's resources at all stages of the project implementation.

In accordance with conditions and requirements stated by the customer PiterEnergoMash designs comprehensive, cost-effective and operationally reliable systems with introduction of the modern advanced technologies of cogeneration and trigeneration. Applying of diesel-rotary uninterruptible power systems is provided if needed to ensure uninterrupted electric power supply to essential consumers. The control automation provided for diesel-rotary uninterruptible power systems allows to implement the most complex schemes of electric power supply (trough the first special category of power supply reliability according to 'Electrical Installation Code) and electric power sources compliant with standards TIA-942 of N trough 2 (N + 1). The undeniable advantages of cooperation with our company are supplying of the entire equipment complex necessary for the infrastructure of energy parks, being assembled at the company's production base, as well as applying of packaged modular systems.

Our company not only produces, assembles and supplies the most advanced energy equipment, but it also offers a wide range of complex design solutions and supports the customer at all stages of the design implementation, which ensures a high level of cost-efficiency and reliability of operated systems.

The layout of the modular energy center, including a cogeneration power plant with four GPP units with capacity of 3349 kW.

This complex can provide electricity for consumers with total capacity 13.2 MW and thermal energy with a total capacity 19 MW.



“PiterEnergoMash” has one of the largest container-producing facility in the European part of Russia. We consider the proven technology, highly qualified personnel and long experience in the organizing of a production process to be our main strengths.

02

TECHNICAL SOLUTIONS

The Company`s philosophy is providing simplicity in complex technical solutions. The long experience we obtained in the area of supplying of power equipment and designing of electric power facilities made us realize that the energy technologies supplied to our consumers should be highly reliable and productive yet be easy to operate.

We apply the same rule when it comes to the field of modular industrial construction. Considering the implementation of the customers’ project we find the optimal cost effective solution. Such approach made us introduce the advanced production technologies and search for optimal designs. Project developers and designers of our company manage to achieve objectives without compromising the quality. Years of practice in an area of design has provided us with a number of effective and innovative solutions which were successfully implemented. Currently we can ensure the efficient, high quality and reliable batch production as well as implementation of complex solutions based on modern technologies and long experience in operating of our products.

PACKAGING OF POWER EQUIPMENT

The implementation of complex technical solutions dimensioned as the standard transport modules, packaging, allows to form virtually any infrastructure, avoiding the capital construction. It often becomes the only solution, possible for constructing facilities in remote areas. The company supplies both the independent modules or electric power or engineering systems, as well as entire variously- purposed complexes, from stand-alone camps to specialized mobile stations.

Today PiterEnergoMash has designed and put in production the unique packaging technology for generating and distributing equipment, which, along with a full production life cycle, starting from design to maintenance service, allows the company to implement any turn-key complex innovative electric power solutions and guarantee reliable operating of purchased equipment and systems to the customer.

Containers applied by PiterEnergoMash in the production of gas engine power plant modules are specially designed for the equipment provided and the process operating conditions. Container frames have a reinforced structure, the container bodies are provided with the necessary input portals, hydroprotective ventilation grids, service openings and hatches. The container bodies have thermal and sound insulation. Containers are painted with use of high quality polyurethane coatings produced by Tikkurila.

When you purchase the fully prefabricated equipment, packaged in standard containers, its transport package becomes a part of the future facility infrastructure, while the standard means are required for its transportation as well as the standard equipment is applied for its reloading at terminals.

The modern specialized container-type module it is not just a simple metal box, although it maintains the advantage of the standard transport dimensioning. Containers designed for a specific purpose have a reinforced structure, required thermal insulation and waterproofing. Packaged modules are equipped with built-in ventilation systems, heating systems, fire extinguishing and get integrated into an automated process control system. The design office of PiterEnergoMash has also designed special reinforced containers for packaging heavy power equipment, such as diesel-rotary uninterruptible power systems and combined heat and power gas generators integrated in the modular combined heat and power plants.

MODULAR MOBILE SOLUTIONS

The company is the current Russian leader in the area of production of mobile modular electric substations of 35/10(6) kV and 110/10(6) kV of various power. Applying these electric substations allows to provide prompt power supply to consumers in a case of emergency black-out, as well as to carry out the extension of existing electric substations in restrained urban conditions. Mobile electric substations are indispensable when fast mounting, relocation or dismantling of high-voltage power-supply sources are required. A typical example of such situation is a case of existing electric substations requiring a complete reconstruction. In this case, the mobile electric substation is used as a temporary structure providing unloading of the facility undergoing reconstruction. There is also an option to pick-up a new load in the case of inconsistencies between the reconstruction terms and the time the power required to be delivered in order to power new facilities. Producing the mobile electric substations, we apply only the most modern technologies and materials, the equipment, produced by the leading manufacturers of the power industry, as well as the unique technical solutions, which allow to implement successfully even the most complex tasks at the facilities of our customers.

The equipment is adapted to the operational environment of Russian, particularly to operating at low temperatures and at voltage surges. Mobile electric substation and equipment are produced in compliance with all quality standards and regulations for staff safety. We provide the high quality of the equipment supplied at the minimum time required for implementation of designs due to employing company's own design resources and production capacities.


Mobile modular electric substations 35/10(6) kV

THE MAIN ADVANTAGES OF MOBILE ELECTRIC SUBSTATIONS COMPARING TO STATIONARY ELECTRIC SUBSTATIONS ARE THE FOLLOWING:

- Compact equipment with a provided option of being transferred fast from transport position into operating;
- Mobility and implementation of the equipment in dimensions convenient for transportation;
- Increased quality of mounting and commissioning due to carrying out the most of work at the production site;
- Flexible lay-outs with an option of extension;
- An ability to use the equipment on various facilities;
- Easy operational maintenance of the equipment;
- Safety of equipment maintenance;
- Minimizing the cost of the electric substation by eliminating the cost of of the capital construction.


Mobile modular electric substations 110/10(6) kV

DIESEL-ROTARY UNINTERRUPTIBLE POWER SYSTEMS

In order to provide essential consumer with uninterruptable electric power supply, PiterEnergoMash offers designs of power engineering complexes equipped with diesel-rotary uninterruptible power systems.

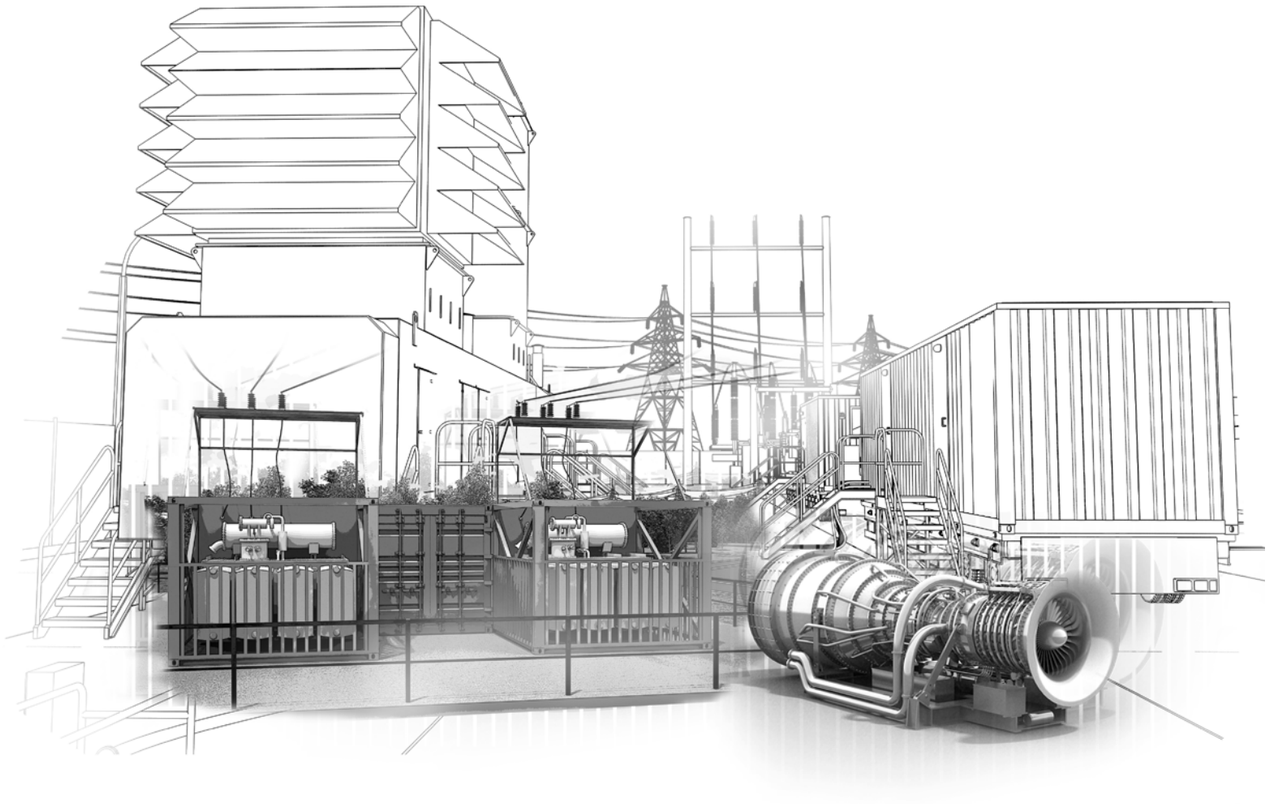
PiterEnergoMash and Dutch company Hitec Power Protection, the global leader and the pioneer in technology of diesel-rotary uninterruptible power systems, have signed an exclusive cooperation agreement.

The main unit installation of diesel-rotary uninterruptible power system is a reversible electrical machine, constantly connected into the section of a load line, which immediately starts to operate as a generator at the grid failures. A generator shaft is driven by a diesel motor. However, even the start of even the most modern diesel engine will not provide instant output of mechanical energy needed to maintain power. Diesel-rotary uninterruptible power systems applies rotary storage of kinetic energy for such purpose. Normal operating mode of diesel-rotary uninterruptible power system is filtering of a grid. While the diesel engine is in a hot standby state, and the generator operating as a motor is rotated by grid power. The shaft generator remains in rigid attachment to the shaft of the kinetic storage which is always in operating state. In all modes, except for maintenance, shafts of a generator and an outer storage rotor are rotating at a speed of 1500 r/min. At the same time the internal rotor of a storage accelerates to 4500 r/min. thereby the rotational kinetic energy is accumulating.

Accumulated kinetic energy reserve is sufficient to maintain the rotation of the generator while the diesel is started. The diesel engine gets connected to a kinetic storage through an overrunning clutch, closing at alignment of angular velocity of storage and generator shafts. Opening occurs at lowering of rotation rate of an engine shaft with respect to a kinetic storage. In case of brief grid power failure the motor-generator starts to operate as a generator, and through the transfer of storage kinetic energy from the storage to a generator shaft electric power generating occurs without deterioration of grid quality.

The diesel engine switches on only on command of the operator or automatically in 2 seconds after a grid electric power failure with diesel-rotary uninterruptible power system transferring into to diesel generation mode. Accordingly, during the long-term grid loss consumers are power through a generator by the operating diesel engine.

Diesel-rotary uninterruptible power systems allow to provide consumers with uninterruptible electric power supply maintaining 100% of the guaranteed grid capacity according to All-Union State Standard 13109-97.



Our mission is providing our customers with the equipment of guaranteed high quality, being responsible and finding an individual approach to each customer. We are the trusted partners of the companies which have the most demanding requirements to their suppliers.

03

PRODUCT CATALOG

We are honored to present a catalog of PiterEnergoMash products and systems. The catalog contains the general information on our products.

Please contact our sales department for any detailed information on technical characteristics, cost and delivery terms for any particular product or equipment and service package by phone: +7-812-322-22-33 or send a request via our site www.piterenergomash.ru using ‘questionnaire’ or ‘request a return phone call’ options.

03

PRODUCT CATALOG

GENERATION

The company “PiterEnergoMash manufactures and supplies generation systems for electric power and heat of different capacities both for stationary buildings or a block-modular solutions.

The company is constantly engaged in the development in the field of thermal power plants and boilers in container packaging. We provide packaging of generation systems in a standard 20 and 40 foot containers of our own production. Selection of the container is made based on the station power limit and accordingly, the size of the main power generator.

The production uses equipment and accessories of leading energy industry manufacturers, as well as products of our own production and unique technical solutions that allows to successfully implement even the most difficult tasks for our customer’s facilities. Generating units produced by “PiterEnergoMash” can be synchronized with other functional modules of power complexes, supplied by the company. In their design and manufacture unified parts and components are used. That is especially important for the stable operation of automation and control systems.

All our clients are supported with full expert advice on all matters of mutual interest relating to the choice of generating systems, their installation and operation, technical service, repair and operational maintenance of the equipment purchased.

GENERATION

DIESEL POWER PLANTS

PiterEnergoMash produces and supplies diesel power plants with a total capacity of 5 kW to 5000 kW, in block-modular implementation.

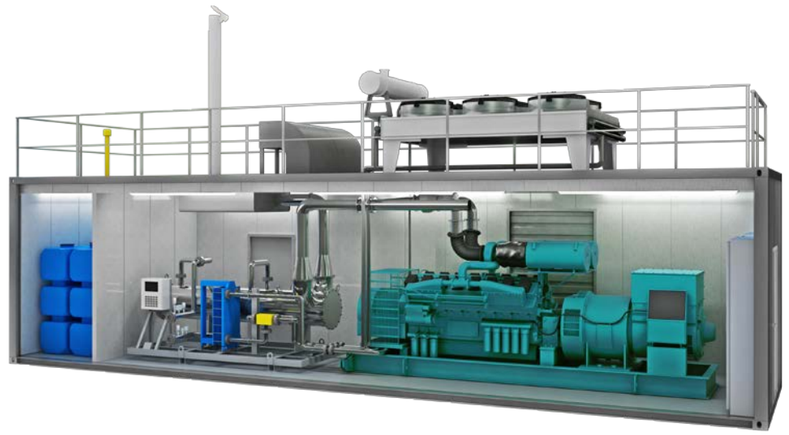
We provide services of design and construction of autonomous electric power systems with diesel-driven generators, offering the complete packages based on turn-key principle, as well as solve the separate tasks concerning choosing the required power generating equipment, supplying and servicing of diesel power plants.

All items of equipment for the stations are provided with quick disconnect joints, which makes it easy and timesaving to mount and disassemble the components of the system in case of repairing or replacement.

All diesel power plants packaged by PiterEnergoMash are equipped with the necessary automation systems, integrated security and fire alarm systems, and, if required, access monitoring and control systems. We will also provide equipping of diesel-driven generators with full range of associated equipment and supply the power plant in required implementation: in the block-container produced by our company, in prefabricated soundproof enclosure, open-type implementation (on a frame) or in mobile implementation on chassis. The modules can be optimally produced in ‘Moderately Cold Climate (UKHL1)’ climatic modification, allowing the modules to be operated in harsh climatic conditions at temperatures ranging from –45 °C to +40 °C.

Modules of diesel power plants 1400 kVA / 1100 kW

Diesel power plant 300 kVA / 240 kW



Module of diesel power plants 1400 kVA / 1100 kW
based on 40-foot container

03

PRODUCT CATALOG

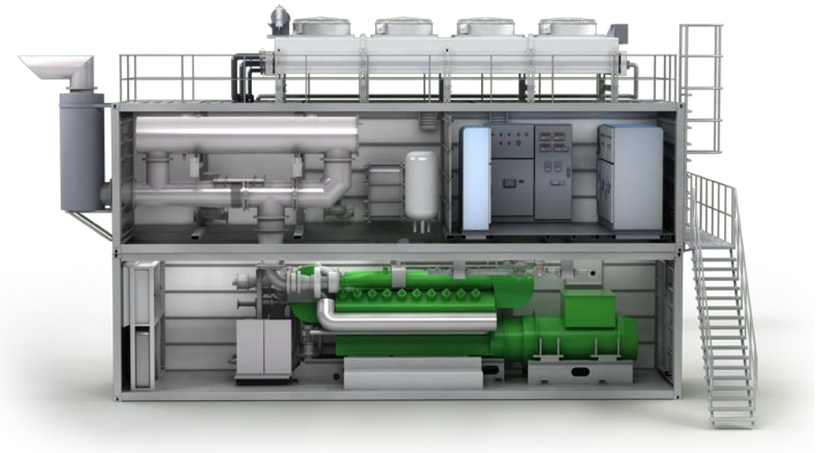
GENERATION

GAS-RECIPROCATING POWER PLANTS

PiterEnergoMash designs, supplies, mounts and commissions the power plants based on gas-reciprocating units with a capacity of 250 kVA to 52.000 kVA in container and block-modular implementation. We provide gas-reciprocating power plants packaged in standard 20- and 40-foot containers produced by our company. The choice of container is made is based on power of the station undergoing packaging and the size of the main gas-reciprocating unit. All items of equipment for the stations are provided with quick disconnect joints, which makes it easy and timesaving to mount and disassemble the components of the system in case of repairing or replacement. All gas-reciprocating power plants packaged by PiterEnergoMash are equipped with security and fire alarm systems and access monitoring and control systems integrated into containers.

Gas-reciprocating power plants have a simple and reliable design, service-tested thought decades of operating in various climatic environment. Electrical efficiency of gas-reciprocating power plants is considered high, in contrast, to efficiency of turbines and microturbines, and at operating on quality natural gas equals approximately 39–44%, which means that for generating the same amount of electric power, gas-reciprocating power plants consume one-third less natural gas compared with the turbines.

PiterEnergoMash designs gas-reciprocating power plants, which, in extended version, are capable of operating in cogeneration mode, i.e. operating as a thermal power plant. The exhaust gas temperature at the exit of the power machine of the gas-reciprocating power plant equals approximately 390 +/– 10°C. Such temperature allows to obtain easily virtually free thermal power in cogeneration mode.



A two-storey module of a gas-reciprocating power plant 3350 kW / 4000 kVA based on GE Jenbacher J612 unit. (2x40-foot containers)

03

PRODUCT CATALOG

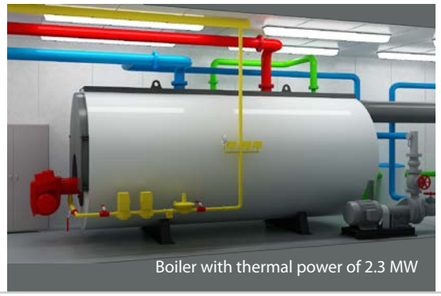
GENERATION

BOILER PLANTS

PiterEnergoMash provides a designing, supplying and mounting of boiler plants with capacity of 100 kW to 100 MW for various purposes both as a part of new power facilities and as independent constructions. The full range of our service includes all stages equipment starting with providing technical design specification and thermal design to supplying the required equipment on a turn-key basis. We design steam, gas, diesel and dual-fuel boilers in container-type and block-modular implementation. In addition, the company is engaged in modernization and reconstruction of boiler plants applying innovative technologies.

All block-modular boiler plants are factory-assembled which ensures high reliability and minimizes the effort required for installation. Operational control provided for the boiler plants produced by PiterEnergoMash has a high degree of automation and it doesn't require constant involvement of personnel. The responsibilities of personnel are reduced to monitoring and verification. Fuel feeding, operating control of boilers, burners, pumps, maintaining stable parameters of pressure and temperature are performed automatically. Critical fuel pressure changes (increase or decrease, exceeding the specified allowable values) automatically suspend operating of a boiler plant which minimizes the risk of accidents. Moreover, the modern automation system provides an ability to manage and control remotely all operating parameters of the boiler plants. In the case of an emergency a warning signal is transmitted to the control panel immediately.

Equipment of a boiler plant module 1.12 MW



Boiler with thermal power of 2.3 MW

Modules of dual-fuel boiler with 7 MW peak power, running on gas or diesel fuel and modules of make-up water treatment plant with capacity for 40 m^3.

TRANSFORMATION AND DISTRIBUTION

TRANSFORMER, DISTRIBUTION AND COMBINED ELECTRIC SUBSTATIONS

PiterEnergoMash provides designing, supplying, mounting and maintenance of transformer electric substations (TS), distribution substations (DS) and the combined distribution and transformer electric substations (DTS) with voltage class of 0.4 kV to 110 kV in fixed-site and modular versions. We provide a full range supply of the necessary equipment in accordance with design solutions. The experts of PiterEnergoMash will offer you various versions of fully prefabricated electric substations or will select the equipment for built-in electric substation depending on the design specifications and requirements of the operating organization. Each project is individually designed on the base of connection scheme and the type of equipment. We apply only highly reliable electrical equipment, produced by Russian and foreign companies, in completing of transformer electric substations.

TRANSFORMATION AND DISTRIBUTION

PACKAGED TRANSFORMER ELECTRIC SUBSTATIONS

Packaged transformer electric substation (PTS) is a type outdoor transformer electric substations, equipped with one or two transformers, designed for receipting, metering and further distributing of three-phase electric power. PiterEnergoMash supplies packaged transformer electric substation of 10/0.4 kV, modular-type (PTSM) of various capacities.

Each block-module has a base section for entries of the cable lines and for placing and connecting bridle cables. Due to applying cold-rolled steel in production of packaged transformer electric substation body, the equipment operates reliably in various climatic environment. There is an option to install as many outgoing lines, as required by the customer, for supplying the consumer with electric power. Modular packaged transformer electric substations are protected against short circuits, atmospheric overvoltage, overload and overheating.

Modules of a packaged transformer electric substation 2500 kVA 0.4/10 kV with 0.4 kV switchgear

TRANSFORMATION AND DISTRIBUTION

MOBILE MODULAR TRANSFORMER ELECTRIC SUBSTATIONS 110/10(6) KV

PiterEnergoMash produces mobile modular electric substations of 110/10 (6) kV with various capacity.

Mobile modular electric substations are designed for operating in such modes as: the standalone mode, the mode of two or more transformer electric substations operating, parallel operating with a stationary electric substation, in order to provide consumers with an emergency, temporary or main power supply of various reliability categories, with a total capacity of up to 160 MVA.

The module is provided with systems of ventilation, lighting, fire alarm and fire-fighting, air conditioning and automatic heating. The weight of the module amounts to 29 tons.

THE MAJOR DIRECTIONS OF APPLICATION:

- operational electrical power supplying of new facilities;
- maintenance and reconstruction of existing electric substations;
- construction of a new substation prior to its commissioning;
- unloading networks during the peak periods;
- providing electrical power to the consumers, in areas, where construction of stationary electric substations is considered to be uneconomical.

Module 110 kV incorporated into mobile modular electric substation 110/10 (6) kV

03

PRODUCT CATALOG

TRANSFORMATION AND DISTRIBUTION

MOBILE MODULAR TRANSFORMER ELECTRIC SUBSTATION 35/10(6) KV

PiterEnergoMash produces mobile modular transformer electric substations of 35/10(6) kV with various capacity designed for receipting, converting and distributing of electric power of three-phase electric current with frequency of 50 Hz, for supplying electric power to industrial, mining, power-grid and other facilities Mobile modular transformer electric substations are indispensable when fast mounting, relocation or dismantling of high-voltage power-supply sources are required.

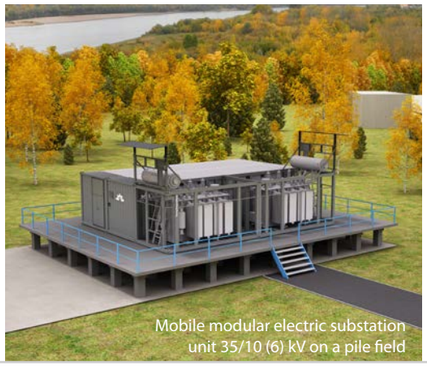
One of the areas mobile modular transformer electric substations 35/10 kV can be applied in is the case of existing electric substations 35/6 kV requiring a complete reconstruction. In this case, the mobile modular transformer electric substation is used as a temporary structure providing the unloading of the facility undergoing reconstruction. There is also an option to pick-up a new load in the case of inconsistencies between the reconstruction terms and the time the power required to be delivered in order to power the new facilities.

The electric substations are designed for operating in such modes as: the standalone mode, the mode of two or more transformer electric substations operating, parallel operating with a stationary electric substation, in order to provide consumers with an emergency, temporary or main power supply of various reliability categories, with a total capacity of up to 140 MVA.

Template solution of mobile modular electric substation 35/10(6) kV includes three modules, mounted as a single construction at the facility. A configuration and a composition of equipment of electric substation can vary depending on the exact purposes and objectives of every customer

Container bodies are mechanically reinforced with additional steel structures, allowing a construction to achieve required solidity and durability.

Module of power transformers in road position



Mobile modular electric substation unit 35/10 (6) kV on a pile field

TRANSFORMATION AND DISTRIBUTION

GAS-INSULATED SWITCHGEAR

PiterEnergoMash has designed a flexible scheme for reconstruction of outdoor switchgear applying modular gas-insulated switchgear. The design feature of the gas-insulated switchgear is a sealed housing filled with gas, the switchgear equipment is placed in. The special SF6 gas applied (sulfur hexafluoride SF6) with the best insulating and arc-control properties serves as the main isolator in the elements of cells with gas-insulation. Switchgear of 110 kV is designed for protecting equipment, electrical switching, distributing and controlling of electric power to the set parameters.

PiterEnergoMash supplies gas-insulated switchgear of 110 kV both as part of mobile modular electric substations of 110/10 kV, and as individual modules for the design solution for constructing of new or modernization of existing stationary electric substations.

Among the advantages of gas-insulated switchgear is its multi-functionality, reached by placing bus bars, a switch, disconectors with earthing disconnecting switches and power current transformers in one single case which significantly down-sizes the outdoor switchgear and increases its reliability.


Gas-insulated switchgear 110 kV

TRANSFORMATION AND DISTRIBUTION

INDOOR SWITCHGEAR

The company designs, produces and supplies modular- type indoor switchgear 35/10 (6) kV based on standard company's own-produced containers. Indoor switchgear is designed for receipting and distributing of electric power of three-phase electric current with frequency of 50 Hz for voltage of 6–10 kV.

The electrical engineering systems and high-voltage equipment applied in our indoor switchgear designs are compact and operationally safe, fully comply with the requirements of rules and regulations valid in Russia, and have an excellent record of operating in various climatic environment.

The indoor switchgear gets integrated into lower and upper level automatic process control systems via various communication channels (fiber-optic cable, RS-485 cable, GSM-channel, etc.). The containers are designed with regards to equipment requiring packaging. They protect the equipment from environmental factors. The containers are designed for operating in ambient air temperature ranging from –60 °C to +40 °C.


Module (indoor switchgear) 35/10(6)


Electric installation work. Module (indoor switchgear) 35/10(6)

TRANSFORMATION AND DISTRIBUTION

LOW VOLTAGE ELECTRICAL SWITCHBOARDS

Piterenergomash produces and supplies low voltage electrical switchboards for currents of 6300 A (maximum). A complete stock of all required components and materials always available at the company's warehouse as well company's own electrical engineering plant allows to find effective solutions to tasks concerning production of any switchboard equipment, meeting all up-to-date regulations and standards. The production process of low voltage electrical switchboards at our plant involves applying of equipment of such leading national and world manufacturers as ABB, Schneider Electric, SIEMENS, LSIS, Hyndai, KEAZ, Provento, DKS, Rittal.

Low voltage electrical switchboards are designed for receiving and distributing electrical power of three-phase alternate current with frequency of 50 (60) Hz and voltage of 0.4 kV or 0.69 kV in grids with solidly earthed or isolated neutral, electrical controlling and protecting against short-circuits and overloads. These devises are applied as a part of power supply, control and automation systems, as distribution boards, power distribution stations, switchboards and control cabinets. Low voltage electrical switchboards can also be applied as switchgear of the low voltage of packaged transformer substations.

Piterenergomash experts provide their comprehensive assistance with a complete range of baseline details required for placing an order for low voltage electrical switchboards including: designing of layout arrangements; designing of electric circuits in accordance with customer's specifications; an assistance with selecting a required template solution; consulting customers on technical and commercial issues; designer mounting supervision and commissioning at the facility.

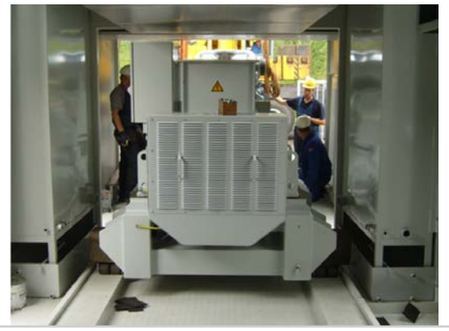
03

PRODUCT CATALOG

UNINTERRUPTED POWER SUPPLY

DIESEL-ROTARY UNINTERRUPTIBLE POWER SYSTEMS

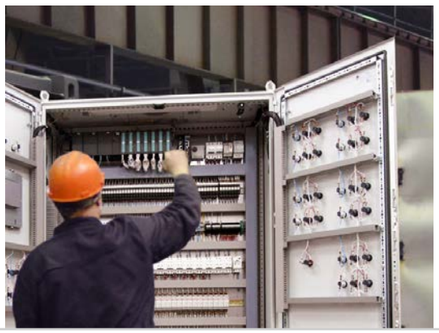
The diesel-rotary uninterruptible power system, fixed on a single frame, consists of a diesel engine, an alternating current generator and a rotary storage of kinetic energy. The diesel-rotary uninterruptible power system does not allow interruptions in supplying consumers with power when transfer to the backup power supply occurs (without breaking the sine wave). Uninterruptable electric power supply is provided by electric power generated by a diesel generator applying existing fuel reserve. Applying high-speed automation control of diesel generator and kinetic drive operating allows to maintain high quality electrical power performance at the he grid gets failures. Packaged diesel-rotary uninterruptible power systems supplied by PiterEnergoMash allow to provide consumers with uninterruptible electric power supply maintaining 100% of the guaranteed grid capacity according to All-Union State Standard 13109-97. The power of diesel-rotary uninterruptible power system ranges from 500 kVA to 3000 kVA, with voltage output of 0.4 kV and 10 kV. PiterEnergoMash is an recognized partner of Hitec Power Protection and the only Russian manufacturer and supplier of diesel-rotary uninterruptible power system with voltage output of 10 kV.



UNINTERRUPTED POWER SUPPLY

UNINTERRUPTIBLE POWER SUPPLY

Static uninterruptible power supply, commonly abbreviated as UPS, consists mainly of various electric power storage systems and the systems providing electric power transforming into power supply voltage. The energy gets accumulated in an electrochemical form in special storage batteries, or in a kinetic form applying flywheels and then gets re-converted into the required type by special electronic converters. For contemporary supply the valve-regulated lead-acid batteries(VRLA), which doesn't require a separate chamber for mounting or special ventilation, are commonly applied. Battery capacity is chosen by ability to provide power load supply for 12–15 minutes after the supply voltage is lost. PiterEnergoMash supplies static UPS of various configurations corresponding to the valid standards of IEC 62040 and EN 62040-3. As a rule, static UPS is mounted in a pair with diesel generator sets at electric power facilities to ensure uninterrupted power supply.



Diesel-rotary uninterruptible power systems can be installed at the capital buildings, block-modular buildings or shipping containers. PiterEnergoMash provides design solutions and supplies the full range of equipment required for constructing the facilities, designed to accommodate diesel-rotary uninterruptible power systems.

CONTAINERS AND MODULAR SOLUTIONS

Modular solutions, produced by our company, are applied in constructing of mobile infrastructures of various purposes, such as: stand-alone field camps, remote stations for various crews (including frontier encampments, temporary-based special units, search and rescue teams), mobile power parks and other engineering support facilities, stand-alone modular repair and maintenance facilities, etc.

The technology applied at our production unit allows TEU-dimensioned packaging of any equipment of any purpose (function). The implementation of complex technical solutions, dimensioned as the standard transport modules (packaging) almost completely eliminates any complications in mounting and maintenance due to full prefabrication of the equipment being supplied. Modular solutions allow quick redeployment of the facilities, if it is required. For instance, mounting of the frontier station for 14 people (the basic version) will take less than 2 days. Facilities based on such solutions allow to avoid expenditures for capital construction, and cost twice cheaper than a similar capitally-constructed building or construction, and, also, they can be mounted both on pre-prepared, and unprepared ground.

Climatic version for modular solutions is the moderately cold climate, which allows to apply them in a temperature range from –50 °C to +50 °C. Modular solutions are mobile. Mobility can be also accomplished by supplying ready-made modules on chassis.

Modules supplied are fully prefabricated, weather-resistant, equipped with all required engineering systems, which minimize efforts required for mounting and commissioning at the site. Modules are equipped with intrusion and fire alarm systems. The concept of modular structure allows to change the size of a modular camp and increase the number of personnel of a frontier station. The modules are connected to each other by bolting along the contact line of transversal beams and contracting at the end fittings. When modules are transformed into one functional space, every two containers are connected at the main points, which results in making modules hermetically sealed. The special intermodular seal is applied to ensure waterproofing of construction.

During the period of 2014–2015 the Company supplied container modules for stand-alone field camps AFC-500. There were 769 modules in total produced for the project of six camps which included six diesel power stations, each equipped with a control systems and a fuel tanks in standard 20-foot containers.

CONTAINERS AND MODULAR SOLUTIONS

10-, 20-, 30-, 40- FOOT CONTAINERS

PiterEnergoMash produses and supplies standard 10-, 20-, 30-, 40-foot shipping containers in accordance with All-Union State Standard 18477-1979 ‘Universal containers’; All-Union State Standard R 51.876-2008 ‘General- purpose containers’; All-Union State Standard 20527-82 ‘Angle fittings for gross weight freight containers’; GOST 50697-94 ‘Freight containers, 1-st series (the first part)’; All-Union State Standard R 51876-2008 ‘Freight containers, 1-st series. Specifications’ (the first part). ‘General- purpose containers’; All-Union State Standard R 52524-2005 ‘Freight containers. Coding, identification and marking’; All-Union State Standard 2.501-88 Unified system for design documentation. ‘Rules of registration and storage’; All-Union State Standard 2.051-2006 Unified system for design documentation. ‘Electronic documents’. The company has a well-equipped production line for container production, providing about 200 manufacturing operations.

20-foot container, prepared for packaging of gas-insulated switchgear 110 kV

CONTAINERS AND MODULAR SOLUTIONS

40- FOOT NON-STANDARD CONTAINERS

The company produces 40-foot and 45-foot non-standard shipping special-purpose containers. Containers are used for packaging of various power equipment (diesel-driven generators, combined heat and power gas generators, boiler plants, etc.), arranging warehouses, constructing of mobile modular buildings.

The container is designed as a welded steelwork with anti-vandal (anti-burglar) entrance doors and gate assembly, with fittings for container lifting and transporting of by crane.

The external and internal sides of the frame are sheathed with steel plates with insulation material with thickness of 100 mm placed in space between them in order to provide reliable thermal and acoustic insulation. The walls and roof of containers are made of galvanized panels, and get extra sheathed at the edges and reinforced with steel angles for rigidity.

45- foot containers with indoor switchgear 35/10(6) kV prepared for release

CONTAINERS AND MODULAR SOLUTIONS

REFRIGERATED CONTAINERS

The company produces standard 20-foot and 40-foot refrigerated containers, which are used as warehouses for storing of frozen food and, if mounted on chassis, they can be used as mobile refrigerated road vehicles.

The body of refrigerated container consists of load-carrying frame equipped inside with a cargo compartment, made of polyurethane sandwich panels over-covered with duralumin sheet (with thickness of 2.0 mm) and inner- covered with profiled sheet food grade stainless steel (with thickness of 0.6 mm). The doors are equipped with special locks to ensure tightness. This design guarantees maintaining of the desired temperature inside the cargo compartment. The floor of a container is made from aluminum extrusion with the strength which allows to apply conventional warehouse truck for processing of goods. A refrigeration unit placed in the end of a body, maintains the desired temperature the range starting from +25 to –25 °C in the automatic mode within the container.

It is powered by a three-phase power grid with the voltage of 360/460 V and the frequency of 50 Hz.

The electronic control unit allows to set and maintain the temperature and air humidity in the automatic mode, to set the frequency of a defrost cycle, monitor the performance of the basic units and record their failure or malfunction.

Currently refrigerated container units generally operate with application of refrigerants (Freon) “R-134A”, “R-409A”.

Transport dimensions of 40-foot container provides both stationary and mobile use of the same product

CONTAINERS AND MODULAR SOLUTIONS

Accommodation modules

Accommodation modules are designed to make the residing for the personnel of stand-alone modular camp comfortable. Accommodation modules are designed as a system of modules which optionally could be interlinked or used separately. It is possible to accommodate up to eight people in one standard module.

Accommodation module for officer personnel (accommodating 4 people)

Accommodation module for officer personnel (accommodating 2 people)

Interior of an accommodation module for 2 people

CONTAINERS AND MODULAR SOLUTIONS

Life support modules

Life support modules are designed to provide catering, full-range utility service, sanitary and hygienic needs for the personnel of stand-alone modular camp. Each of them could be used separately or integrated into a block. The modules meet requirements of all current construction, sanitary, epidemiological and environmental standards and regulations. They are equipped with independent exhaust ventilation (or air conditioning), electric heaters, lighting system, powered from the general power supply (or independent accumulator batteries).

Laundry module

Ablution module

Kitchen module based on 20-foot containers

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PRODUCT CATALOG

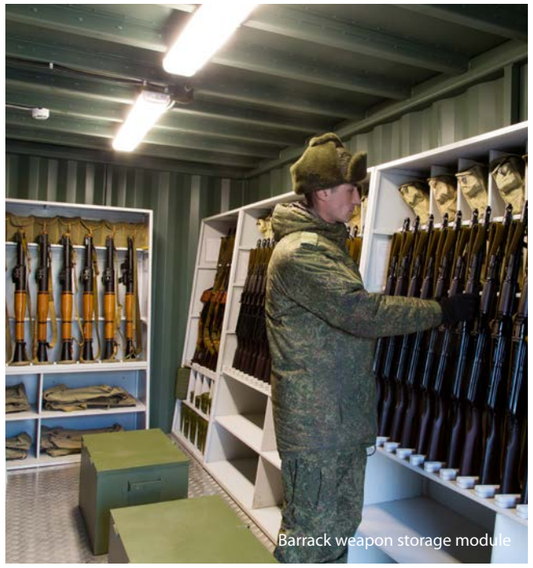
CONTAINERS AND MODULAR SOLUTIONS

Special modules

Special modules are designed to provide required work conditions for the specialists of stand-alone modular camp and officials in charge of organizing and managing of the service. It include the following modules: module for operators of the technical equipment, module of modular camp duty, checkpoint module, module of headquarters, weapon storage module, fuel storage and refueling module, workshop and spare parts storage module, classroom module, module of psychological release.

Module for operators of the technical equipment for border surveillance

Checkpoint module



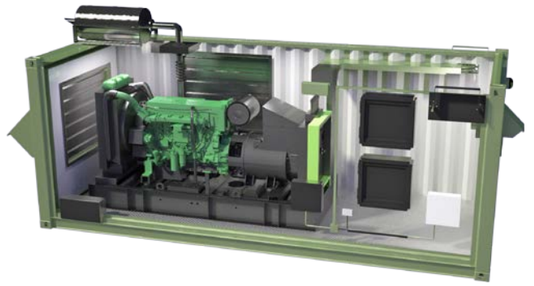
Barrack weapon storage module

Medical aid module

CONTAINERS AND MODULAR SOLUTIONS

Engineering support modules

Self-sufficiency of stand-alone modular camps is reached by integration of all required life-support systems into their structures. The structure of stand-alone modular camp incorporates an electricity supply system (based on diesel power plans or solar power stations), a station of water treatment (retention and purification) and a solid waste disposal system. Therefore every typical of stand-alone modular camp is an integrative independent and ecologically safe system.



Diesel power plant module (300 kW)

Switchgear module

Diesel power 1400 kW in the autonomous field camp APL-500

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PRODUCT CATALOG

CONTAINERS AND MODULAR SOLUTIONS

MODULAR BUILDINGS

PiterEnergoMash produces, supplies and provides full-range service of mounting of block-modular buildings for various purpose and of various configurations.

Construction modularity allow to form facility of any configuration, depending on the customer's requrements, number of personnel, meteorological condition and final objectives.

Each module may incorporate one or more block-modules, based on containers of various size (16-, 20-, 24-, 30-, 40-foot).

Block-modules are delivered fully prefabricated and require minimum mounting and commissioning work at the facilities. A foundation on screw-piles or a concrete slab are generally used as the base.

The most important advantages of the frame- modular house constructing are extremely short construction time and cost-effective price. The main distinction of modular buildings from other types of houses is the technology applied for their production. High percentage of prefabrication (75% and above) allows to mount a building on unprepared terrain in a period ranging from 2 to 7 days.

Modern prefabricated metal buildings are mounted applying high-strength bolting or welding. The works can be carried out year-round. We provide our facilities with heating, lighting, air conditioning systems and security and fire alarm.

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PRODUCT CATALOG

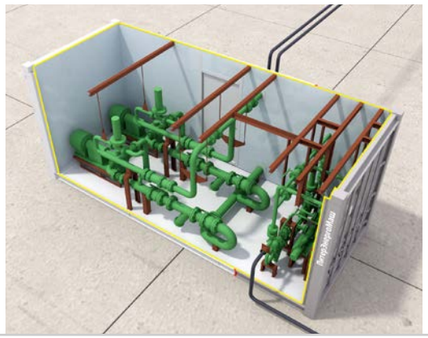
ENERGY CENTERS INFRASTRUCTURE

FUEL PREPARATION STATION

PiterEnergoMash produces and supplies bloc-modular fuel gas treatment units designed for gas treating from condensed moisture, mechanical impurities and treating from gas condensate and its reducing as well as for maintaining the output pressure at a given level.

Basic parameters of fuel gas treatment unit modules correspond to All-Union State Standards 25957-83, 23345-78, 23274-78. Modules are operating as a part of infrastructure of power supply complexes and applied for conversion and separation of fuel gas, as well as its fiscal metering . Fuel gas treatment unit are packaged in a standard 20-foot containers produced in company's own production base in accordance with All-Union State Standard 20259-80.

The module is equipped with heating and ventilation systems, power supply utilities. A climatic version of a fuel gas treatment unit is chosen according to the area of construction, in accordance with the requirements of All-Union State Standard 15150-69.



ENERGY CENTERS INFRASTRUCTURE

FUEL STORAGE TANKS

PiterEnergoMash produces and supplies horizontal and vertical fuel tanks of various capacity, designed for long-term storage of fuel in order to provide uninterrupted equipment operating, refilling of supply tanks of boiler plants and diesel-driven generators. A structure of fuel tank besides design features includes such equipment necessary for safe and convenient operation as fire safety devices and respiratory equipment, arresters and couplers, filters, inlet-outlet devises. We take into account strict quality requirements for diesel fuel storage tanks concerning both materials and design features. Fuel tanks are made of materials which do not react with diesel fuel.

Diesel fuel storage modules

ENERGY CENTERS INFRASTRUCTURE

MAKE-UP TANKS

PiterEnergoMash produces and supplies horizontal make-up tanks of various capacity, designed for long-term storage of technical water used by boiler plants, heating and fire-extinguishing systems.

The main parameters of tanks comply with All-Union State Standard 17032-2010. All tanks are equipped with a heat exchanger mounted inside the tank. We produce make-up tanks take into account the design operating conditions. Aboveground tanks are mounted in 20- and 40-foot heat insulated containers.

ENERGY CENTERS INFRASTRUCTURE

WATER TREATMENT PLANT

PiterEnergoMash produces and supplies block-module water treatment plants with nominal capacity range starting from 50 to 800m/day. The plants are designed to receive and purify water used in heating systems, as well as to control the pressure at low inlet water pressure is at insufficient debit receiving wells.

PiterEnergoMash water treatment plants are packaged in a standard 20-foot containers produced by the company. Containers climatic version is chosen according to the area of operating. The modules are equipped with heating and ventilation systems, power supply utilities, as well as controllers providing an option of integration into automatic process control system, providing an option of unattended plant operating.

Water treatment (purification) module

03

PRODUCT CATALOG

ENGINEERING SYSTEMS AND NETWORKS

GAS DISTRIBUTION NETWORKS

Certified exerts of PiterEnergoMash design and mount off-site and internal gas distribution networks providing fuel supply to generator plant and boiler plants. All work is carried out in according with All-Union State Standard R 54961-2012. Forwarding of the main fuel (natural gas), to a gas-turbine or a gas-reciprocating units is carried out via on-site high-pressure pipeline (with 28 atm). Modular gas distribution stations are installed to transmit the main gas.

The gas pressure gets regulated and stabilized in distribution stations, and then it gets supplied to the consuming equipment. Gas distribution networks are designed with minimum provided extent of pipelines. To improve the reliability, the pipeline routes are arranged applying dead-end and loop scheme with duplication of certain elements.

ENGINEERING SYSTEMS AND NETWORKS

FUEL SYSTEMS

The of equipment fuel systems plays a crucial part in operating of electric power stations, regardless of the type of engine (diesel or gas) applied to generate electric power.

PiterEnergoMash designs systems for treating and supplying of fuel gas for the gas turbines of various capacity, based individual engineering projects, as well as systems for treating, filtering, supplying and draining of the diesel fuel for diesel power plants and diesel-rotary uninterruptible power systems.Gas treating system include gas booster stations and fuel treatment skids of corresponding modification and configuration. Decades of experience provided us with deep insight into needs concerning mounting and operating of electric power plants. The equipment of a power facility should provide well-timed receival of the fuel used, emergency drain, proper storage, treatment and uninterrupted supply of fuel to generating units and carrying out the necessary maintenance activities.

PiterEnergoMash fuel systems can be supplied in a block-modular implementation in 20-foot containers equipped with a security and fire alarm system, an access monitoring and control system and a system of fuel technical record-keeping.

Station preparation main gas based on 40-foot containers

CONTROL AND AUTOMATED SYSTEMS

AUTOMATED PROCESSES CONTROL SYSTEMS FOR ELECTRIC SUBSTATIONS

An automated process control system is a set of hardware and software designed to automate control of process equipment. Automated control management should be implemented mainly in unattended remote electric substations. The experts of PiterEnergoMash implement various designs of automated process control systems providing the use of either local or remote automated process control system.

Automatic control provides controlling of voltage and reactive power, controlling an operating transformer bank (optimization a number of operating transformers on bases of minimal loss of active power), load control in emergency condition, adaptive automatic reclosing and automatic transfer switch.Automatic control functions, at normal operating condition, include voltage regulation at electric substation busbars by changing the transformation ratio of transformers, switching on and off of capacitors, operational switching to a given program, locking of disconnectors, synchronizing, disabling one of parallel- operating transformers to reduce total power loss at small loads, automated reading of electricity meters.

CONTROL AND AUTOMATED SYSTEMS

AUTOMATED DISPATCH CONTROL SYSTEM OF POWER FACILITIES

The automated dispatch control system of power facilities is a geographically-distributed multi-level measuring and information centralized system of real-time operating. It is designed for monitoring and control of technological processes and equipment of electric power facilities, supplying industrial enterprises, and of town mains. The system provides an option of electric power technical record-keeping.

CONTROL AND AUTOMATED SYSTEMS

AUTOMATED SYSTEMS OF ELECTRIC POWER TECHNICAL RECORD-KEEPING

KPiterEnergoMash designs scalable and flexible automated systems of electric power technical record-keeping. The systems provide the rational management of electric power consumption, ensure reliable power supply through providing information for recording and analyzing of efficiency of electric power consumption by various equipment. Introduction of an automated system of electric power technical record-keeping at an enterprise is very effective for reducing of electric power consumption.

PiterEnergoMash automated systems of electric power technical record-keeping design and equipping are tailor-made for every facility with impeccable integration into a single hardware and software complex operating at a thermal-electric power plant or an industrial plant.

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PRODUCT CATALOG

AUXILIARY SYSTEM

ACCESS CONTROL SYSTEMS

PiterEnergoMash designs and mounts access control systems. The systems are designed to control an access to a territory of the facility and its secure premises, as well as for operational monitoring of personnel location and time spent at the facility. Barriers can be optionally installed at the site entrance to monitor and control the motor transport entering and exiting the site territory. The barriers are controlled by radio control boards and redundant switches locater in the dispatch room.

An emergency mode of the manual open/close operating of the barriers by means of a locking key is provided. The traffic lights of the access control are installed at the entrance points used for fuel unloading and transport refueling. A push-button assembly for controlling the traffic lights is located in the dispatch room.

AUXILIARY SYSTEM

SECURITY AND FIRE ALARM

PiterEnergoMash designs and carries out mounting of fire alarm systems, fire public alerting systems and security alarm systems.

Transmission of signals over the communication lines (fire alarm loops), receiving and processing signals by a fire alarm control panel, actuation of light and sound sirens in case of alarm, with the information on event location and type output at a control panel.

AUXILIARY SYSTEM

GAS-ANALIZING

PiterEnergoMash designs and mounts alarm systems indicating concentration of hazardous gases and vapors exceeding the maximum level. The systems automatically monitor the explosion hazard level in the atmosphere of working areas, as well as alert the personnel in case of fire hazardous situation.

PiterEnergoMash alarm systems indicating concentration of hazardous gases and vapors exceeding the maximum level system provide: continuous automatic monitoring of explosive fumes contained in air at the bunding area of constructions №8 (according to GP); sound and light alarm at the information panel if the thresholds of one or more sensors are exceeded. The power supply for a panel of a gas analyzer is provided by an uninterruptible-power system.

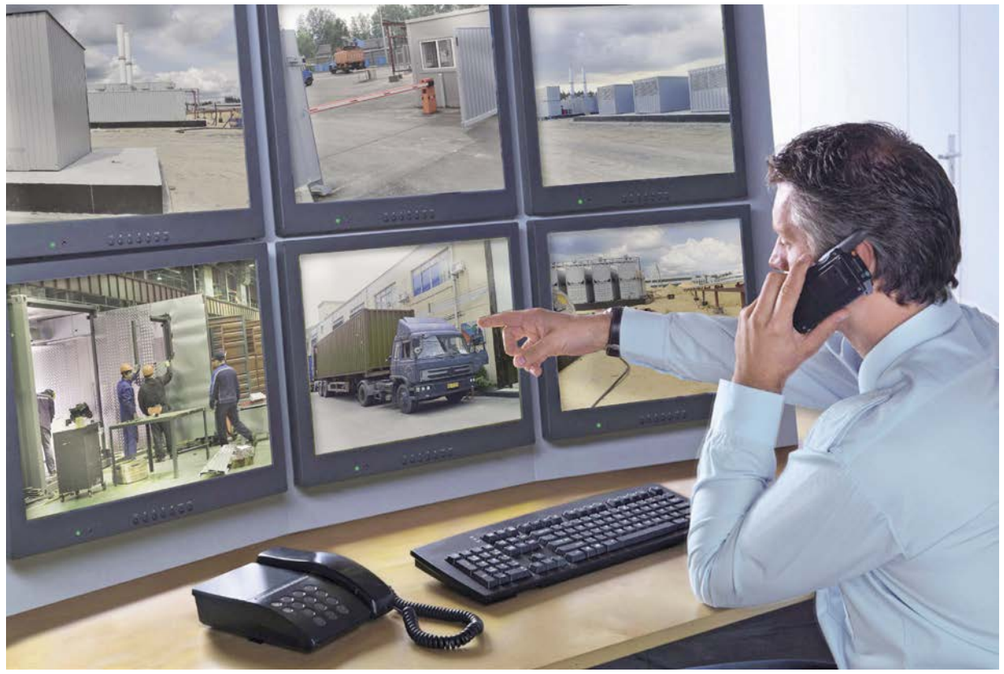
AUXILIARY SYSTEM

VIDEO MONITORING

PiterEnergoMash designs and mounts television surveillance systems. The systems are designed for automated real-time displaying of the following: Perimeter of a facility with adjacent roads; Inner area (buildings, motion of people and vehicles); Status and operating of equipment; Actions of personnel. The system provides to storing of all data in a long-term storage archive. IP network camera of high resolution are used as the source signals.

PiterEnergoMash designs and mounts television systems of in-process monitoring. The systems are designed for automated real-time displaying of the following: Inner space of block modules or rooms with control and process equipment placed in; Indoor premises of administrative purpose; Actions of personnel at starting, switching, maintenance and repairing of equipment. The system provides to storing of all data in a long-term storage archive. IP network camera of high resolution are used as the source signals.

PiterEnergoMash television systems of in-process monitoring provide: Controlling current situation within the block modules or premises as well as the equipment status (normal, maintenance, replacement, relocation etc.); monitoring and recording of all actions of personnel conducting of routine, scheduled, maintenance; controlling emergencies concerning equipment (non-standard stopping, smoke, fire). Recording all changes and emergencies done in the video archive.



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