Rivne Plant of High-Voltage Equipment

✓ CIRCUIT-BREAKERS
✓ RETROFIT PROGRAM
✓ COMPLETE SWITCHGEARS
✓ TRANSFORMER SUBSTATIONS
Equipment for nuclear, thermal, hydro power stations, CHP plants
for switching circuits under normal and short circuit conditions in networks of three-phase alternating current with frequency 50 (60) Hz with rated voltage 7.2-12 kV for systems with insulated or partially grounded neutral, in seismic influences conditions at maximum calculated earthquake (MRZ) 9 points on a scale MSK-64.

Switchgears series KU6S
for operation in three-phase AC networks, a voltage class of 6 kV, a frequency of 50 (60) Hz for systems with insulated or grounded neutral through an arc-extinguish reactor or active resistance. With the placement of flush elements in the middle of the cabinets, directly above the feeder and current transformers compartment. The design of cabinets provides easy access to cables and current transformers, their individual replacement from the front without dismantling of the enclosure elements.

Vacuum circuit breakers series BP6B
a line of circuit breakers, the dimensions of which coincide with the dimensions of electromagnetic circuit breakers of series BE-6 and BEC-6, for switchgear of series KE-6 and KE-6C for power supply of nuclear and thermal power stations own needs.

Generator Vacuum circuit breakers VGGm series
for the replacement of small-volume generators circuit breakers MGG-10, as well as for installation in newly built switchgears.

Table of parameters of circuit breakers

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BP6B</th>
<th>VGGm-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>1600-3150</td>
<td>4000; 5000</td>
</tr>
<tr>
<td>Rated breaking current, kA</td>
<td>40</td>
<td>63</td>
</tr>
<tr>
<td>Electrodynamic withstand current, kA</td>
<td>128</td>
<td>173</td>
</tr>
<tr>
<td>Switching resource, cycles</td>
<td>- at rated currents 30000</td>
<td>10000</td>
</tr>
<tr>
<td></td>
<td>- at short-circuit current breaking 40; 50</td>
<td>30</td>
</tr>
</tbody>
</table>

Table of parameters of switchgears

<table>
<thead>
<tr>
<th>Parameter</th>
<th>KU6S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>630-4000</td>
</tr>
<tr>
<td>Rated breaking current, kA</td>
<td>40</td>
</tr>
<tr>
<td>Electrodynamic withstand current, kA</td>
<td>102; 128</td>
</tr>
<tr>
<td>Overall dimensions, mm</td>
<td>750; 900</td>
</tr>
<tr>
<td>- width</td>
<td>1400; 1500</td>
</tr>
<tr>
<td>- depth</td>
<td>2300</td>
</tr>
</tbody>
</table>
VACUUM CIRCUIT BREAKERS 6, 10 kV
for switching circuits in normal and emergency modes in networks of three-phase alternating current of frequency 50 (60) Hz with the nominal voltage of 6-10 kV for systems with insulated or partially grounded neutral.

Vacuum circuit breakers series BPC-10
cassette-type circuit breaker line, for installation in new switchgears with average position of the flush element. Circuit breakers are made with spring and electromagnetic actuators.

Vacuum circuit breakers series BP (BP1, BP2, BP3)
line of switches with electromagnetic actuators for installation in new switchgears with the traditional layout (flush elements in the lower compartments of cells). Also used when replacing switching devices that have worked their resources, according to the program RETROFIT in the switchgears released at past years.

Vacuum circuit breakers series BP1 with remote control units
line of circuit breakers for installation in new switchgears. The circuit breakers use the drive in full circuit - the main and additional coils of switching on and off are installed in the power electromagnet, which ensures to use a circuit breaker with any version of the electrical control scheme located in the remote control unit.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BPC-10</th>
<th>BP1</th>
<th>BP2</th>
<th>BP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6; 10</td>
<td>6; 10</td>
<td>6; 10</td>
<td>6; 10</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>630-4000</td>
<td>630-1250</td>
<td>630-2000</td>
<td>2000-3150</td>
</tr>
<tr>
<td>Rated breaking current, kA</td>
<td>20; 31.5; 40</td>
<td>20</td>
<td>20; 31.5</td>
<td>31.5, 40</td>
</tr>
<tr>
<td>Electrodynamic withstand current, kA</td>
<td>52;80;102</td>
<td>52</td>
<td>52;80</td>
<td>80;102</td>
</tr>
<tr>
<td>Switching resource, cycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- at rated currents</td>
<td>50000; 30000</td>
<td>50000</td>
<td>30000</td>
<td>30000</td>
</tr>
<tr>
<td>- at short-circuit current breaking</td>
<td>100; 50; 40</td>
<td>100</td>
<td>50; 40</td>
<td>50</td>
</tr>
</tbody>
</table>
**RETROFIT PROGRAM**

renewal of power utilities with minimal expenses and in the shortest time by the method of reconstruction of switchgears of past years of manufacturing using vacuum circuit breakers series BP.

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**Replacement withdrawable elements with old circuit breakers**

by using new withdrawable elements with circuit breakers series BP. New withdrawable elements in overall, installation and fitting sizes are fully in line with the replacement circuit breakers, with locking and relay protection schemes no needed to change. Such a method of reconstruction allows to minimize the time of withdrawal from the work of the switchgears.

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**Replacement old circuit breakers by modules with circuit breakers series BP**

the module with the circuit breaker of the BP series - a unified design, assembled at the plant, the dimensional and fitting dimensions of which fully coincide with the size of the old circuit breaker. Installed on the old withdrawable element of switchgears.

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**Replacement old circuit breakers with circuit breakers of series BP with assemblies of mounting parts (AMP)**

the most economical but also more laborious method, which involves carrying out certain actions using AMP, namely: dismantling of an existing circuit breaker, updating of the withdrawable element of the switchgear, assembly, installation and fixing of the mounting frame, installation on it of the circuit breaker series BP, bending and installation of current-carrying tires, connecting of tow blocks, connection of harnesses, and others.

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**Replacement old air and oil circuit breakers 35 kV by vacuum circuit breakers of series BP35HC and BP35HCM with current transformers**

replacement of circuit breakers occurs with the installation of one or two groups of current transformers from the side of the upper and lower contacts, as well as without current transformers.
VACUUM CIRCUIT BREAKERS 27.5, 35, 110 kV

Vacuum circuit breakers series BP27HC

for switching single phase electric circuits at normal and emergency modes in AC networks at a frequency of 50 (60) Hz with a nominal voltage of 27.5 kV. The circuit breakers are made with electromagnetic actuators. Used in blocks of open switchgears of traction railway substations.

Vacuum circuit breakers series BP35HC and BP35HCM

for switching circuits under normal and emergency modes in three-phase alternating current networks of 50 (60) Hz with a nominal voltage of 35 kV for systems with insulated or partially grounded neutral. Circuit breakers are made with spring and electromagnetic actuators. They are used in open switchgears of 35 kV complete transformer substations KTPBR-110/35/10 (6), KTPBR-35/10 (6), in blocks of switchgears of traction substations of railways, as well as for replacement old circuit breakers on operating substations.

Vacuum circuit breakers series BPC-110

designed for switching circuits under normal and emergency modes in networks of three-phase alternating current with frequency 50 (60) Hz with a nominal voltage of 110 kV for systems with grounded neutral with a coefficient of ground fault 1.4. Circuit breakers are made with spring drives. Used in open switchgears of 110 kV during the construction of transformer substations and the replacement of air and oil circuit breakers.

Table of parameters of circuit breakers

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BP27HC</th>
<th>BP35HC</th>
<th>BP35HCM</th>
<th>BPC-110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>27.5</td>
<td>35</td>
<td>35</td>
<td>110</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>1600-2000</td>
<td>1600-2000</td>
<td>1600-2000</td>
<td>2500; 3150</td>
</tr>
<tr>
<td>Rated breaking current, kA</td>
<td>25</td>
<td>20; 25</td>
<td>20; 25</td>
<td>31.5; 40</td>
</tr>
<tr>
<td>Electrodynamic withstand current, kA</td>
<td>64</td>
<td>52; 64</td>
<td>52; 64</td>
<td>81; 102</td>
</tr>
<tr>
<td>Switching resource, cycles</td>
<td>30000</td>
<td>30000</td>
<td>30000</td>
<td>10000</td>
</tr>
<tr>
<td>- at rated currents</td>
<td>30</td>
<td>55</td>
<td>55</td>
<td>25; 20</td>
</tr>
<tr>
<td>- at short-circuit current breaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
SWITCHGEARS SERIES KU10S

for operation in networks of three-phase alternating current, voltage class 6; 10 kV, frequency 50 (60) Hz for systems with insulated or grounded through an arc-duct reactor or active neutral resistance. With the placement of withdrawable elements in the middle of the cabinets, directly above the compartment of linear tire and current transformers. The design of the cabinets provides complete unilateral service.

SWITCHGEARS SERIES KU-10C

for operation in networks of three-phase alternating current, voltage class 6; 10 kV, frequency 50 (60) Hz for systems with insulated or partially grounded neutral. Performed with the lower placement of the withdrawable element.

SWITCHGEARS SERIES KU35

internal installation, designed for operation in three-phase AC networks, voltage class 35 kV, frequency 50 (60) Hz for systems with insulated or partially grounded through arc-free reactor neutral. Used as part of transformer substations 110/35/10 or 35/10 kV, or in independent distribution devices of internal installation.

SWITCHGEARS PREFABRICATED OF UNILATERAL SERVICING (KZO) 6, 10 kV

chambers prefabricated of single-sided maintenance of internal installation, for operation in networks of three-phase alternating current, voltage class 6; 10 kV and frequency 50Hz, for systems with insulated or grounded through an arc-duct reactor or active neutral resistance. As a switching element, vacuum circuit breakers or load circuit breakers are used.

### Table of parameters of switchgears

<table>
<thead>
<tr>
<th>Parameter</th>
<th>KU10S</th>
<th>KU-10C</th>
<th>KU35</th>
<th>KZO-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage, kV</td>
<td>6;10</td>
<td>6; 10</td>
<td>35</td>
<td>6; 10</td>
</tr>
<tr>
<td>Rated current, A</td>
<td>630-4000</td>
<td>630-3150</td>
<td>630-3150</td>
<td>400-1250</td>
</tr>
<tr>
<td>Rated breaking current, kA</td>
<td>20; 31.5; 40</td>
<td>20; 31.5</td>
<td>20; 31.5</td>
<td>20; 0.63</td>
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<tr>
<td>Electrodynamic withstand current, kA</td>
<td>51; 81; 102</td>
<td>51; 81</td>
<td>51; 81</td>
<td>51</td>
</tr>
<tr>
<td>Overall dimensions, mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- width</td>
<td>650; 750; 900</td>
<td>750; 900</td>
<td>1500</td>
<td>750; 900</td>
</tr>
<tr>
<td>- depth</td>
<td>1400; 1500</td>
<td>1000; 1300</td>
<td>3150</td>
<td>950</td>
</tr>
<tr>
<td>- height</td>
<td>2300</td>
<td>2000</td>
<td>2532</td>
<td>2500</td>
</tr>
</tbody>
</table>
COMPLETE TRANSFORMER SUBSTATIONS 220, 110, 35, 27.5 kV

a line of block and closed-end substations - KTPBR-220/110/35/10, KTPBR-35/10, ZKTPR-35/10 with capacity from 25 kVA to 125 MVA for the organization of power supply of industrial, communal, railway, agricultural, mining and other enterprises according to the schemes, layouts and design execution, which allow the stage-by-stage development of the electricity grids.

The main elements of the complete transformer substations 220, 110, 35, 27.5 kV:

- blocks of open distribution devices 220, 110, 35, 27.5 kV with elements of flexible or hard power rails;
- power transformers;
- switchgears KU35, mounted in a modular structure of type КРПЗ-35, or in a capital construction;
- 10 kV switchgears, mounted in a modular structure of type КРПЗ-10, or in a capital building;
- general substation control;
- equipment and equipment for relay protection, control, communication, telemechanics, sources of backup power;
- transformer cabinets for own needs;
- devices for lightning protection, grounding, lighting, fences, spare parts, tools and accessories, a set of individual and fire protection, and other elements according to the project.
Project work

complex design of power supply facilities - substations 35-220 kV, substation transformer substations 10 (6) / 0.4 kV, distribution points 10 (6) kV, air and cable lines 10-110 kV, automated control systems, solving energy saving problems and voltage quality at enterprises:

- Pre-design work (departure of a specialist on an object, visual inspection, collection of information and data for designing);
- Assistance in obtaining technical specifications in the Accession Agreement (at the request of the Customer);
- Preparation of a task for designing (in cooperation with the Customer);
- Selection and layout of primary equipment;
- Design of electricity supply with the necessary calculations, schemes, drawings in accordance with the requirements of the normative and technical documentation;
- Selection of relay protection devices, automation, ASKOE, TM, ACS TP;
- Selection of materials and components;
- Preparation of investor estimates, cost reduction;
- Obtaining a decision on a project in a power supply organization;
- Protection of technical decisions in the bodies of State expertise (if necessary);
- Carrying out of author's supervision at all stages of construction and assembly and start-up and adjustment works;
- Assistance in the issuance of permits: Declarations on the beginning of construction and installation work (Declaration on the readiness of the object for commissioning, etc.);
- Assistance to the Customer in agreeing and approving project documentation in the relevant services of energy supplying companies;
- Assistance in obtaining permission in the State Energy Inspection for switching on the electrical installation under voltage;
- Preparation of schedules for the work of work with an attachment for certain types of work, as well as schedules of movement of labor at the facility;
- Help in the development of operational documentation.

Construction and installation work

Construction and installation works for the construction of power supply facilities - substations 35 - 220 kV, complete switchgear 35, 10 (6) kV, replacement of circuit breakers 6-110 kV:

- Soil development, arrangement of soil structures;
- Arrangement of bases and foundations of prefabricated and monolithic ones;
- Construction of metal constructions;
- Erection of prefabricated concrete and reinforced concrete constructions;
- Construction of monolithic concrete, reinforced concrete and reinforcement cement constructions;
- Installation of engineering structures;
- Installation of technological equipment;
- Installation of electrical equipment;
- Installation of engineering networks, systems of devices, measuring instruments;
- Installation of heating, ventilation, air conditioning, water supply, sewage;
- Installation of electric lighting, communication, signaling.
Start-up and commissioning works

*start-up and commissioning works and complex tests of power supply objects - substations 35-220 kV, complete switchgear 35, 10 (6) kV, circuit breakers 6-110 kV:*

- Checking the correct connection of circles of secondary connections;
- Programming microprocessor protection (configuration);
- Checking the operation (interaction) of microprocessor protection with actuators;
- Verification of schemes of secondary switching, alarm panels, accounting, control systems;
- Checking and debugging modems for telemechanics;
- Complex testing of all systems of relay protection and automatics;
- Testing and measuring work;
- phasing;
- Measurement of parameters of incoming and outgoing signals;
- Testing of the main equipment with high voltage;
- Measurement of the grounding contour;
- Removal of volt-ampere characteristics;
- Production of executive documentation, measuring protocols, debugging protocols, configuration of microprocessor devices, etc.

Turnkey Projects

*complex of works on designing, construction and delivery of power supply objects to the customer - substations 35 - 220 kV, complete switchgears 35, 10 (6) kV, replacement of circuit breakers 6-110 kV:*

- Creation of a feasibility study or the stage of the "Project";
- Development of a working project;
- Equipments completion;
- Materials completion;
- Carrying out of building and installation works;
- Carrying out of commissioning works;
- The commissioning of the facility.

Engineering

- Consulting;
- Organization of construction.

Service

- Qualified chief installation works when installing new and reconstruction of existing electrical equipment;
- Performance of guarantee and after-guarantee obligations;
- Supply of spare parts for a certain amount of repair work, or on a separate order;
- Analysis and assessment of the causes of accidents and malfunctions in networks 6 (10) kV;
- Work on increasing the reliability of equipment for distribution networks 6 (10) and 0.4 kV.
LABORATORY OF RELIABILITY

Accredited in accordance with the requirements of DSTU ISO / IEC 17025: 2006 by the National Accreditation Agency of Ukraine. Carries out the following types of tests of electric apparatuses for voltage classes 6-110 kV:

- checking the appearance and checking for compliance with the requirements of the assembly drawing,
  - verification of the performance of the mechanism and the test for the validity of its operation,
- testing of electric strength of insulation by voltage of industrial frequency (50 Hz, up to 200 kV),
- testing of electrical insulation strength with full and cut thunderstorms (up to 500 kV),
- measurement of the characteristics of partial discharges,
- checking the length of the path of leakage and air gaps;
- measurement of electrical resistance of insulation,
- measurement of electrical resistance of the main circles
- test for the heating of electric apparatuses in the long-term mode with variable three-phase current (up to 5000 A),
- heat resistance under operating conditions (up to + 70 °C),
- cold resistance during operation (minus 25 °C),
  - moisture resistance (relative humidity up to 100%, temperature up to + 55 °C),
- testing of the quality of protection against corrosion and the quality of painting,
- test of the degree of protection,
- mechanical wear resistance test and resource,
- measurement of resistance of windings to direct current,
- check of resistance to mechanical influence of tension of wires and wind load of supporting insulators.
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