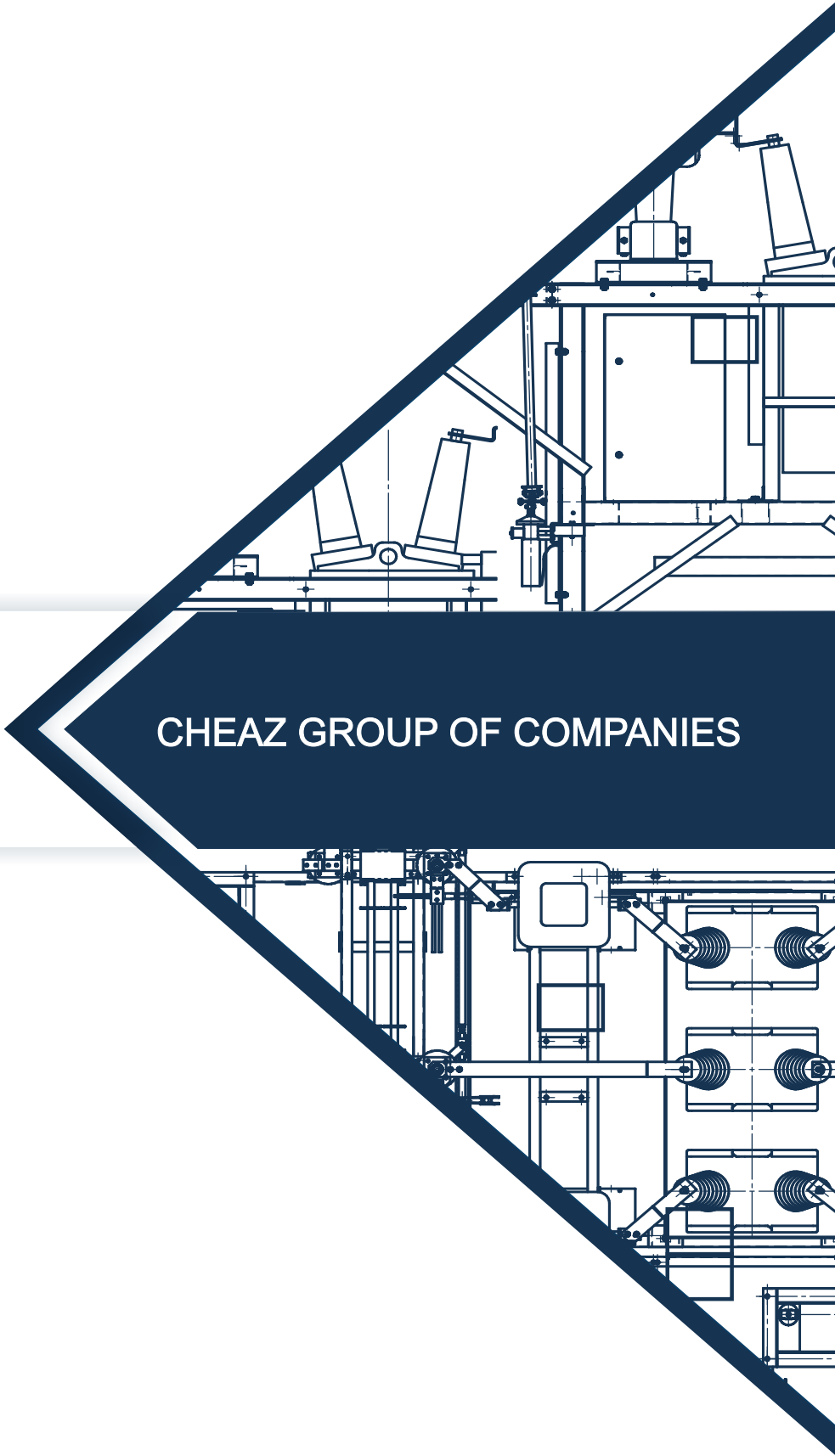




CHEAZ GROUP OF COMPANIES





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CHEAZ Group has won recognition at the national level through high quality of its products, rich scientific and manufacturing experience, new unique technologies, flexibility, responsibility and professionalism in decision-making.

The power of CHEAZ lies in the traditions of committed work established by the predecessors. Product reliability is achieved through continuous improvement of its characteristics, and it is proved by many years of operation.

Through hardships and difficulties CHEAZ has not only maintained its productive capacity and manufacturing procedures, but has increased R&D and engineering capabilities, diversified traditional product lines and ventured into new business areas. All of it allowed the company to grow into a research and production complex that provides a full range of services from metal processing to development of complex innovative devices, commissioning of energy facilities and implementation of digital substations.

It has always been our priority to stay customer-oriented.

We hope for long-term and mutually beneficial cooperation and believe that our work can bring stability and confidence in the future.

Sincerely yours,

A handwritten signature in blue ink, appearing to read 'M. Shurdov', written in a cursive style.

Chairman of the Board of Directors  
Michael Shurdov

## CHEAZ GROUP

Cheboksary Electrical Apparatus Plant (CHEAZ) is one of the leading enterprises in Russia in electrical engineering, a company ready to solve complex tasks of construction and upgrading of power distribution systems from designing to commissioning ("turnkey" projects).

Availability of production facilities, engineering resources, agreements with foreign and Russian suppliers, representative offices in the federal districts of the Russian Federation allow CHEAZ Group to participate in construction of facilities of any complexity.

The quality management system of CHEAZ companies meets the requirements of the international standard ISO 9001:2008. CHEAZ Group is certified by such Russian companies as Transneft, Rosneft, Gazprom, Rosenergoatom, ROSSETI. CHEAZ products are used successfully in the power systems of the Russian Federation and abroad.

If you cooperate with CHEAZ, you will get:

- high-quality equipment, reliable and convenient in operation;
- consultations of highly qualified specialists, including project-specific issues and maintenance;
- efficient management
- mutually beneficial terms of payment
- execution of orders of any complexity
- warranty maintenance and service.

Our mission is to enable safe and efficient use of energy!



## FIELD OF APPLICATION



**Power generation**



**Power distribution**



**Oil production and refining**



**Natural gas production and processing**



**Nuclear power industry**



**Industrial enterprises**



**Railways**



**The products in this catalog are manufactured under  
ISO9001 certified quality management system**

# HIGH VOLTAGE EQUIPMENT



# HIGH VOLTAGE EQUIPMENT



CHEAZ performs turnkey construction of modular complete transformer substation (KTPB) for voltage class of 35, 110, 220 kV acting as a General contractor.

Modular complete transformer substations are designed to receive, convert and distribute electric energy for power supply of industrial facilities in oil and gas, mining, railways, manufacturing enterprises, urban and municipal utilities, agricultural areas and large construction sites.



## Modular complete transformer substation

### KTPB 220/110/35 kV, 220/110/10(6) kV, 110/35/10(6) kV

Product type	Principal wiring diagram	Rated voltage on HV/MV/LV side, kV	Busbar rated current, A	Transformer capacity, kVA
KTPB 220 kV	1, 3H, 4H, 5H, 5AH, 6, 6H, 7, 8, 9, 9H, 9AH, 12, 12H, 13, 13H, 14, 15, 16, 17	220/110(35)/35(10,6)	1000, 2000	up to 125000
KTPB 110 kV	1, 3H, 4H, 5H, 5AH, 6, 6H, 7, 8, 9, 9H, 9AH, 12, 12H, 13, 13H, 14	110/35/10(6)	1000, 2000	up to 63000
KTPB 35 kV	1, 3H, 4H, 5H, 5AH, 9	35/-/10(6)	1000, 2000	up to 16000

Climatic design and placement category HL1 according to GOST 15150 from -60° C to +40° C.



## Outdoor switchgear ORU 220 (110, 35) kV



### Field of application:

- Electrical Engineering
- Oil and gas
- Arctic conditions (Far North)

### Description

Outdoor switchgear is made of modules with installed HV switching devices and busbars.

- Principal wiring diagrams: 1, 3H, 4H, 5H, 5AH, 6, 6H, 7, 8, 9, 9H, 9AH, 12, 12H, 13, 13H, 14, 15, 16, 17.
- Rated current: 1000, 2000, A.
- Short-time withstand current within 3 sec.: 50 kA.
- Power transformer capacity: up to 125000 kVA.
- Temperature range: from -60°C to +40°C.
- Earthquake resistance: up to degree 9.

### Product advantages

- Reduced installation time.
- Welding not required during installation.
- Can be mounted both on the foundation supports or sills.
- Components from any manufacturer can be used.
- Various combinations of modules and metal structures can be implemented.
- Implementation of standard modules and metal structures cuts the designing time.

## Indoor switchgear ZRU 110 kV



### Field of application:

- Electrical Engineering
- Oil and gas
- Arctic conditions (Far North)
- Iron and steel works, chemical enterprises, industries where substations are located in a polluted environment.
- Substations with special requirements to their appearance.

### Description

- Principal wiring diagrams: 1, 3H, 4H, 5H, 5AH, 6, 6H, 7, 8, 9, 9H, 9AH, 12, 12H, 13, 13H, 14.
- Rated current: 1000, 2000, A.
- Short-time withstand current within 3 sec.: 50 kA.
- Power transformer capacity: up to 63000 kVA.
- Technical parameters of the building:
  - ambient temperature: from -65 to +40 °C;
  - design temperature inside the building in winter: from +5 to +25 °C.
  - building length and width are selected depending on the diagram.
- Earthquake resistance: up to degree 9.

### Product advantages:

- Reduced installation time.
- Welding not required during installation.
- Can be mounted both on the foundation supports or sills.
- Components from any manufacturer can be used.
- Various combinations of modules and metal structures can be implemented.
- Implementation of standard modules and metal structures cuts the designing time.

## GIS Indoor Switchgear KRUE 110 kV



### Field of application:

- Electrical Engineering
- Oil and gas
- Facilities with limited space allocated for a substation

### Description

The equipment of gas insulated switchgear 110 kV is located in a modular unit.

- Wiring diagram: 1, 3H, 4H, 5H, 5AH, 12, 13.
- Rated current: 2500, 3150 A.
- Short-time withstand current within 3 sec.: 31.5 kA.
- Power transformer capacity: up to 63000 kVA.
- Temperature range: from -60°C to +40°C.
- Earthquake resistance: up to degree 9.

### Product advantages:

- The area required for KRUE installation is 7 times less than for open switchgear.
- Full operation safety.
- Low operating costs.
- High operational reliability.

## Indoor Switchgear ZRU 35/10(6) kV



### Field of application:

- Electrical Engineering
- Oil and gas

### Description

- Wiring diagram: 5H, 5AH.
- Rated current: up to 2500 A.
- Power transformer capacity: up to 16000 kVA.
- Earthquake resistance: up to degree 9.

### Product advantages:

- Best operating and economic characteristics.
- High reliability of power supply.
- Maintainability.



# COMPLETE TRANSFORMER SUBSTATIONS



# COMPLETE TRANSFORMER SUBSTATIONS

One of the main business areas on CHEAZ is manufacture of LV complete transformer substations of various types. CHEAZ produces metal enclosed and concrete enclosed complete transformer substations (kiosk-type), and substation in modular units. Modular units allow to make complex structures with specified dimensions that include power distribution equipment, HVAC and fire alarm systems.



Product type	Rated voltage, HV/LV, kV	Rated busbar current on LV side, A	Transformer capacity, kVA	By connection to mains	By number of power transformers	By type of input/output	By number of modular units
BM KTP	10(6)/0,4	up to 7000	up to 4000	single-ended; double-ended	1; 2; 4; and more	overhead/overhead; cable/overhead; overhead/cable; cable/cable	single multi
KTPNB	10(6)/0,4	up to 4000	up to 2500	single-ended; double-ended	1; 2	overhead/overhead; cable/overhead; overhead/cable; cable/cable	single
KTPk	10(6)/0,4	up to 2500	up to 1600	single-ended; double-ended	1; 2	overhead/overhead; cable/overhead; overhead/cable; cable/cable	single multi
KTPP	10(6)/0,4	up to 7000	up to 4000	single-ended	1; 2	Cable/cable	-
BM KTP PN	10(6)/0,4	up to 1600	up to 1000	single-ended	1	Overhead/cable; cable/cable	single

## Complete Transformer Substations in modular units up to 4000 kVA (up to 10 kV) BM KTP



### Description

Complete transformer substation in modular unit is a modular building which consists of one or several modular units with electrical equipment installed. For complete transformer substations non-standard units (up to 12.5 m long and 3.2 m wide) can be used.

- Rated current: 7000 A.
- Power transformer capacity: up to 4000 kVA.
- Temperature range: from -60°C to +40°C.
- Earthquake resistance: up to degree 9.

### Product advantages:

- Easy to install.
- Easy to ship.
- Tight schedule for substation erection.
- Different dimensions of modular units
- A wide range of operating temperatures.
- Pre-assembled.

## Complete transformer substations for outdoor installation in concrete casings KTPNB



### Description

Complete transformer substations KTPNB are produced in one or more concrete casings depending on the installed equipment and layout. They are provided as fully pre-assembled modules with installed equipment.

- Rated current: up to 4000 A.
- Power transformer capacity: up to 2500 kVA.
- Temperature range: from -40°C to +40°C.
- Earthquake resistance: up to degree 9.

Compact and two-storey designs are available to meet the following requirements of the Customer:

- Small land area allocated for development.
- Upgrading of a transformer substation in a major building (during demolition) to meet the dimensions of the existing building.
- Replacement of a kiosk-type complete transformer substation to comply with the design of residential buildings.

### Product advantages:

- Best operating and economic characteristics.
- High reliability of power supply.
- Maintainability.

## Kiosk-type complete transformer substations

### KTPk



#### Description

Kiosk-type complete transformer substation is a 100 % finished pre-assembled product in metal enclosure.

Kiosk-type complete transformer substation consists of three compartments enclosed in a compact single metal casing which allows to save the area allocated for construction of complete transformer substation.

- Rated current: up to 2500 A.
- Power transformer capacity: up to 1600 kVA.
- Temperature range: from -60°C to +40°C.
- Earthquake resistance: up to degree 9.

#### Product advantages:

- 100 % Pre-assembled.
- Factory-manufactured, assembled and checked.
- Certification and confirmation of the specified features.
- Full production cycle at the factory.

## Complete transformer substations for indoor installation

### KTPP 6(10)/0.4 kV



#### Description

A distinctive feature of KTPP is the absence of a common modular unit - all equipment is installed in the production room. Adaptable design of panels in KTPP allows to arrange the equipment in the required dimensions to meet the desires of the Customer. High degree of prefabrication ensures fast commissioning of KTPP and facilitates installation of equipment.

- Rated current: up to 7000 A.
- Power transformer capacity: up to 4000 kVA.
- Earthquake resistance: up to degree 9.
- Degree of protection of components: up to IP54.

#### Product advantages:

- Best operating and economic characteristics.
- High reliability of power supply.
- Maintainability.

## Complete transformer substations for submersible pumps BM KTP PN



### Product advantages:

- High degree of prefabrication which reduces the time required for on-site installation.
- Simple design, easy installation and maintainability.
- Possibility to develop a specific project for each facility.
- Various external and internal color designs can be used: aesthetic appearance.
- Can be shipped to the destination point by road and rail.
- Buildings of various configurations can be erected due to modular design.

### Description

Complete transformer substations for submersible pumps BM KTP PN are designed for power supply, control and protection of submersible electric motors (PED type) with power up to 500 kW for pumping systems of ESP units at water well pads.

The soft starters of submersible pump UPPVE1 PN installed in BM KTP PN allow to limit the motor starting currents by 2-4 times, to save power, to reduce voltage drops in the mains at start-up of motors, to reduce essentially mechanical shock on bearings of motor and pump installation of ESP unit.

- Rated current: up to 1600 A.
- Power transformer capacity: up to 1000 kVA.
- Temperature range: from -60°C to +40°C.
- Earthquake resistance: up to degree 9.





# SWITCHGEAR AND CONTROLGEAR



# SWITCHGEAR AND CONTROLGEAR



CHEAZ offers a wide range of solutions for development of modern switchgear that cover the entire range of applications on the power distribution level.

Versatility and flexible architecture of cabinets allow implementation of the most complex circuit solutions while providing a high level of safety, serviceability, and maintainability of switchgear.

## Product advantages:

- Single-front and double-front cabinets.
- High corrosion resistance (made of galvanized steel).
- Thickness of metal: 2.5-3 mm.
- State-of-the-art interlocks to prevent improper actions of the personnel.
- Degree of protection of a cabinet with doors closed: IP42.
- Rated current of the main circuit: up to 4000 A.
- Spring-charged earth switches.



KSO-306



KSO-307



KSO-202V



KSO-207V



KRU-CHEAZ-70/10



KMP-S

Product	Voltage rating, kV	Rated current of the main circuits, A	Rated breaking current, kA	Single-front/double-front design	Climatic design	Dimensions WxDxH, mm
KSO-306 KSO-306SHVV	6; 10	400; 630	0.63	single-front	UHL1	800(1125)x825(1000)x 1942(2150)
KSO-307	6; 10	630	20	single-front	U3	410x915x1600
KSO-202V KSO-202VM	6; 10	630; 1000; 1600	12.5; 20	single-front	U3	750(1000)x1090(950)x 2650(2200)
KSO-207V	6; 10	630; 1000; 1600	12.5; 20; 25; 31.5	single-front	U3	750x1100x2000
KRU-CHEAZ-70/10	6; 10	630; 1000; 1600; 2000; 2500; 3150; 4000	12.5; 16; 20; 25; 31.5; 40; 50	single-front, double-front	U3	650(750,900, 1000)x1400x 2300(2400)
KMP-S	6; 10	630; 1000; 1600; 2000; 2500; 3150; 4000	20; 25; 31.5; 40	single-front, double-front	U3, T3	650(750,1000)x 1350(1550, 1670)x 2325(2560)
KNV-10M	6; 6.3; 10	630; 1000; 1600; 2000; 2500; 3150; 4000	12.5; 16; 20; 25; 31.5;40; 50	single-front, double-front	OM3	750x1400x2400
KRU2-10	6; 10	630; 1000; 1250; 1600; 2000; 2500; 3150	20	single-front, double-front	U3	900x1664x2350
KRU-CHEAZ-63	6; 10	630; 1000; 1600; 2000; 2500; 3150; 4000	20; 31.5; 40	double-front	U3, T3	750(1125)x1330(1372)x 2184(2196)
KM1	6; 10	630; 1000; 1250; 1600; 2000; 2500; 3150	20; 25; 31.5; 40	double-front	U3, T3	750(1125)x1200(1300)x 2150(2310)
KM1-N	6; 10	630; 1000; 1250; 1600; 2000; 2500; 3150; 4000	20; 31.5; 40	double-front	U3	750(1125)x1395x2298
KRUN-CHEAZ-59	6; 10	630; 1000; 1600; 2000; 2500; 3150	12.5; 16; 20; 25; 31.5	double-front	U1, HL1	810(870)x3065(3180)x 2695(2780)
KRU-CHEAZ-70/20	20	630; 1000; 1600; 2000; 2500	20; 25; 31.5; 40	single-front, double-front	U3	1000x1832x2422
KRU-CHEAZ-70/35	35	630; 1000; 1250; 1600; 2000; 2500	16; 20; 25; 31.5	double-front	U3	1200x2232x2500
KM-35	35	630; 1000; 1250; 2000;	16; 20; 25	single-front	U3, T3	1600x1850x2600



KNV-10M



KRU2-10



KRU-CHEAZ-63



KM-10



KM1-N



KRUN-CHEAZ-59



KRU-CHEAZ-70/20



KRU-CHEAZ-70/35



KM-35

## Single-front panel KSO-306, 306SHV



### Description

Single-front panel KSO-306 is a universal solution for power distribution.

It is widely used due to its simple design, high reliability and low cost.

Modifications:

with load break switches, voltage transformers, disconnectors and surge arrestor.

## Single-front panel KSO-307



### Description

Single-front panels KSO-307 are designed for installation in small-size rooms. Small overall dimensions - 410 mm wide - allow to reduce the cost of construction of new premises for HV switchgear.

Compact size of the panel is achieved by installation of a three-position SF6 circuit breaker from Russian or foreign manufacturers.

## Single-front panel KSO-202V, 202VM



### Description

Single-front panels KSO-202 are among the most common MV power distribution devices due to unified design and easy maintenance.

Microprocessor-based protection relays and emergency control devices can be installed in KSO-202 with vacuum circuit breakers.

They can replace and be lined up without additional adjustment with panels KSO-2UM, 272, 285, 292, 2000, etc.

## Single-front panel KSO-207V



### Description

A draw-out module is available in KSO-207V panels. This design ensures serviceability and enhances maintainability of the equipment. Installation of a vacuum circuit breaker on a chassis provides easy access to the equipment for periodic inspections and ensures easy replacement. The panel is 1100 mm deep which allows to save up more space if compared to switchgear cabinets.

## Switchgear and Controlgear KRU-CHEAZ-70/10



### Description

Switchgear cabinet KRU-CHEAZ-70/10 is a cabinet with a draw-out module located in the middle. Galvanized steel. Busbars located at the top. Single-front and double-front modifications.

Minimum width - 650 mm.

Can be equipped with any circuit breaker provided that it is structurally compatible.

Segregation of compartments by metal or insulating partitions.

The circuit breaker can be racked in from test to connected position with the compartment door closed.

All necessary interlocks have been applied in the equipment against improper actions by the personnel.

KRU-CHEAZ-70/10 is equipped with:

- Motor operated drives for earthing switches and racking in/out of a circuit breaker.
- Video surveillance system in the cable compartment and circuit breaker compartment.
- Remote control, temperature control system for contact connections.
- Microprocessor-based protection relays from any manufacturer.
- Devices for displaying the position of switching devices, indicating availability of power supply.

Frame construction, convenient location of current transformers, control panel on the front door of the circuit breaker compartment.

KRU-CHEAZ-70/10 is widely used in power distribution and can be used in next-generation unattended digital substations.

KRU-CHEAZ-70 is energy efficient.

The equipment is certified and recommended for application at ROSSETI facilities.

## Switchgear and controlgear KMP-S



### Description

KMP-S cabinets are developed under the license from Schneider Electric. Components from different manufacturers can be used in the panel. Single-front and double-front modifications are available. They can be used at nuclear power facilities.

## Switchgear and controlgear KNV-10M



### Description

KNV-10M panels are designed for use on marine vessels and floating structures; they comply with the requirements of Rules of classification and construction of sea-going ships (hereinafter - Rules of Registry of Shipping), Rules of technical supervision during construction of ships and manufacture of materials and products for ships and Rules of classification, construction and equipment of mobile offshore drilling units and fixed offshore platforms.

KNV-10M panel is an assembled rigid metal structure made of galvanized steel.

Two rows of insulation handrails are provided on the front and back sides of panels at a height of 600 mm and 1200 mm.

## Switchgear and controlgear KRU2-10



### Description

KRU2-10 cabinets are manufactured from Russian or foreign components and have the following features:

- the cabinet has several compartments: relay protection, busbar, top plug-in contacts, current transformer, draw-out module;
- a special overload valve and a switch to protect against damage of an electrical arc inside the enclosure are available;
- motorized racking of a draw-out module from test to connected position and vice versa;
- various interlocks are available to ensure safety of the maintenance personnel;
- convenient and easy maintenance;
- a complete set of the main and secondary circuits diagrams is available to meet the requirements of the customer;
- switching devices and protection relays (including microprocessor-based) from Russian or foreign manufacturers can be used at customer's request;
- single-front and double-front modifications are available;
- high reliability and quality.

## Switchgear and controlgear KRU-CHEAZ-63



### Description

Switchgear KRU-CHEAZ-63 consists of separate double-front cabinets with installed circuit breakers, instruments, protection relays, automation, alarm and control devices interconnected according to the wiring diagram.

An earthing switch with a fast closing mechanism is provided; the operating speed of which is independent of the operator.

A draw-out module compartment has a front door to enhance the degree of protection IP; the door is locked with a handle and interlocked when the draw-out module is racked into the connected position. The draw-out module and circuit breaker are operated with the door closed. A HV breaker is placed on one draw-out module.

Busbars located at the bottom.

I/O connections can be made via cable or busbar.

The switchgear can include busbars for near and far rows of switchgear, bus bridges between two rows of switchgear, cable blocks for cable I/O, terminal cabinet for feeding of control cables to the switchgear, cable trays, transition cabinets for docking switchgear KRU-CHEAZ-63 with switchgear of other series.

Losses of transmitted power are minimized; the indicators meet the energy efficiency criterion.

The equipment is certified and recommended for application at ROSSETI facilities.

## Switchgear and controlgear KRUN-CHEAZ-59



### Description

KRUN-CHEAZ-59 is a double-front switchgear for outdoor installation; it is designed with a control aisle which allows to install protection panels for various purposes.

Modification UHL1 is insulated to meet the required temperature requirements.

A wide range of the main circuit diagrams which can be adjusted to meet the requirements of customers.

Simple and reliable design of cubicles, mounted on a single base frame, allows for shipment in sets of 2, 3, 5 cubicles.

The high degree of prefabrication enables installation and commissioning in the shortest possible time.

The technical features meet the energy efficiency criterion.

The equipment is certified and recommended for application at ROSSETI facilities.

## Switchgear and controlgear KRU-CHEAZ-70/20



### Description

KRU-CHEAZ-70/20 is a cubicle made of galvanized steel with rated voltage 20 kV and a draw-out module in the middle.

The design features and maintainability allow to use the cubicle in single-front and double-front switchgear.

It can be equipped with any circuit breaker provided that it is structurally compatible.

The busbar compartment is located at the top of the cubicle.

The compartments are separated by metal or insulating partitions.

The withdrawable circuit breaker is racked in from test to connected position with the compartment door closed.

All necessary interlocks have been applied in the equipment against improper actions by the personnel.

## Switchgear and controlgear KRU-CHEAZ-70/35



### Description

KRU-CHEAZ-70/35 is a cubicle with a compact draw-out module at the bottom. If required, the switchgear can be equipped with:

- motor operated drives for earthing switches and racking in/out of a circuit breaker
- video surveillance system in the cable compartment and circuit breaker compartment
- remote control
- contact connection temperature control system
- microprocessor-based protection relays
- mnemonic diagram display devices.

KRU-CHEAZ-70/35 can be used in new generation digital substations.

The equipment is certified and recommended for application at ROSSETI facilities.

## Switchgear and controlgear KM-35



### Description

Single-front cabinets KM-35 can be equipped with devices from any Russian or foreign manufacturers.

The cabinet body is made of galvanized steel, separated into compartments by earthed metal partitions and has increased mechanical strength.





# LOW-VOLTAGE SWITCHGEAR



# LOW-VOLTAGE SWITCHGEAR

LV switchgear by CHEAZ are designed for primary and secondary power distribution, monitoring and control of electrically driven equipment.

A flexible approach to power supply issues is achieved due to a wide range of cabinets for AC and DC power distribution, implementation of fixed plug-in circuit breakers, and 'draw-out units' technology (KUES).

## Internal separation forms up to 4b



## LV switchgear for power plants and substations

Product type	Brief description	Busbar rated current, A	Installation method	Degree of protection
RUSN-0.4 (KTPSN)	Designed for 0.4 kV power distribution	7000	Fixed, draw-out	IP54
KUES	Designed for AC power input and distribution to station service consumers	6300	Fixed, draw-out	Up to IP54
SHSN8300	Designed for AC power reception and distribution from transformers (capacity up to 1000 kVA) of power plants (voltage up to 750 kV)	Up to 1600	Fixed	Up to IP54
RTZO-88	Designed for power supply and control of electric drives with capacity up to 10 kW and 14-28 kW of shut-off control valves, and electric motors with capacity up to 11 kW of station service mechanisms (TPP and NPP)	100	Fixed	IP41
URSN	Designed for power supply of non-reversible and reversible electric motors with squirrel cage rotor with capacity up to 10 kW, electric motors of mechanisms with capacity from 10 to 55 kW, and for power supply of other current collectors of thermal power plants	Up to 630	Fixed	IP54

## Package auxiliary transformer substation RUSN 0.4 (KTPSN)



### Field of application:

- Power supply of auxiliary systems of all types of power plants.
- Oil and gas
- Power supply and automation systems of industrial enterprises, public utilities infrastructure and substations.

### Description

Switchgear RUSN 0.4 kV is a switchboard which is assembled from separate standard cabinets. It is used as switchgear in power supply systems of agricultural facilities, oil and gas fields, residential buildings, industrial enterprises and in-house substations.

### Product advantages:

- Fully pre-assembled.
- Factory-manufactured, assembled and checked.
- Certification and confirmation of the specified features.
- Full production cycle at the factory.
- Modular frames.
- Assembly quality control.
- Possibility to combine cabinets within its type (lead-in cabinets with distribution, control and protection).
- Possibility to connect a large number of low power consumers within small overall dimensions.
- For unconventional solutions.

## LV switchgear for distribution and control with draw-out units KUES



### Field of application:

- Power supply of auxiliary systems of all types of power plants.
- Oil and gas
- Power supply and automation systems of industrial enterprises, public utilities infrastructure and substations.
- Nuclear industry.

### Description

LV switchgear KUES includes main distribution switchboards of PCC type with rated busbar current up to 6300 A designed for lead-in and distribution of power, and secondary distribution switchboards of MCC type with rated busbar current up to 630 A designed for control of mechanisms and power supply of low-power outgoing lines.

### Product advantages:

- Fully pre-assembled.
- Factory-manufactured, assembled and checked.
- Certification and confirmation of the specified features.
- Full production cycle at the factory.
- Modular frames.
- Assembly quality control.
- Possibility to expand the existing switchgear if the number of consumers increases.
- Possibility to connect a large number of low power consumers within small overall dimensions.
- For unconventional solutions.

## DC switchgear

Product type	Brief description	Rated current, A	Installation method	Degree of protection
SHTE(M)8700	Designed for DC power reception and distribution at thermal and nuclear power plants	Up to 1600	Fixed	Up to IP54
SOPT	Designed for power supply of protection relays, emergency control system, PCS and control circuits of switching devices, automation and alarm systems in normal mode, up to two hours for a substation in case of blackout of auxiliaries.	-	Fixed	Up to IP54
SCHPT SHROT	Designed for reception, distribution and supply of operating DC to protection relays and automation devices of power plants and substations	-	Fixed	Up to IP54
SHOTV	Designed for reception of AC power and converting to DC power; distribution of power to DC auxiliaries; power supply of DC circuits via rectifiers or battery which are turned on when the voltage is lost on both AC auxiliaries sections	-	Fixed	Up to IP54

## Operating DC system



### Functions

- Automatic supervision of insulation resistance.
- Manual (periodic) search for outgoing line with low insulation resistance.
- Supervision of voltage and current on the busbars.
- Supervision of battery voltage and current.
- Supervision of battery charge/discharge.
- Circuit breaker position supervision.
- Configuring from the digital operator panel.
- Event log available.

## LV switchgear for power plants and substation at the request of the customer

Product type	Brief description	Rated current, A	Installation method	Degree of protection
PSN1100V	Designed for reception and distribution of AC power, 380 V, up to 1500 A, from transformers with capacity up to 1000 kVA at substations up to 750 kV.	Up to 1600	Fixed	Up to IP54
PSN1200V	Designed for power reception and distribution in networks with voltage up to 500 V at substations up to 500 kV.	Up to 250	Fixed	Up to IP54
SHE8350	Designed for AC power reception and distribution from transformers with capacity up to 1000 kVA at substations up to 750 kV.	Up to 1600	Fixed	IP20
SHSN1200	DC lead-in and distribution cabinets designed for switchboards at substation up to 500 kV with batteries.	Up to 250	Fixed	IP20

## LV switchgear for industries

Product type	Brief description	Rated current, A	Installation method	Degree of protection
MNS-2000	Modular structure MNS-2000 is based on existing unified structures, units and panels.	Up to 2500	Fixed	Up to IP54
SCHO70V	Designed for installation of switchboards 380/220 V AC, reception and distribution of power, and for overload and short-circuit protection at substations up to 1000 kVA.	Up to 2000	Fixed	IP20
SAU AVOG	Ensures automatic operation control of asynchronous motors as part of a single technological complex.	Up to 1600	Fixed	IP20

## Modular LV switchgear MNS-2000



### Standard units, panels and cabinets:

- Control units for asynchronous squirrel cage motors.
- Lead-in cabinets and panels with AUTOMATIC LOAD TRANSFER for current up to 630 A.
- Lead-in cabinets with AUTOMATIC LOAD TRANSFER for current up to 630 A.
- Lead-in cabinets and panels with AUTOMATIC LOAD TRANSFER for current over 630 A.
- Lead-in cabinets with AUTOMATIC LOAD TRANSFER for current over 630 A
- Power distribution units with circuit breakers.
- Automatic transfer switch units.

## LV switchgear for distribution and control with draw-out units under the license agreement with Siemens Sivacon S8



### Description

Designed for power reception, control, distribution, metering and protection of networks up to 690 V, 50 Hz.

- Rated current: up to 6300 A.
- Compact lead-in section: 400 mm wide.
- Earthquake resistance: up to degree 9.
- Degree of protection of components: up to IP54.

### Product advantages:

- Fully pre-assembled
- Factory-manufactured, assembled and checked.
- Certification and confirmation of the specified features.
- Full production cycle at the factory.
- Modular frames.
- Assembly quality control.
- Possibility to expand the existing switchgear if the number of consumers increases.
- Possibility to connect a large number of low power consumers within small overall dimensions.
- For unconventional solutions.

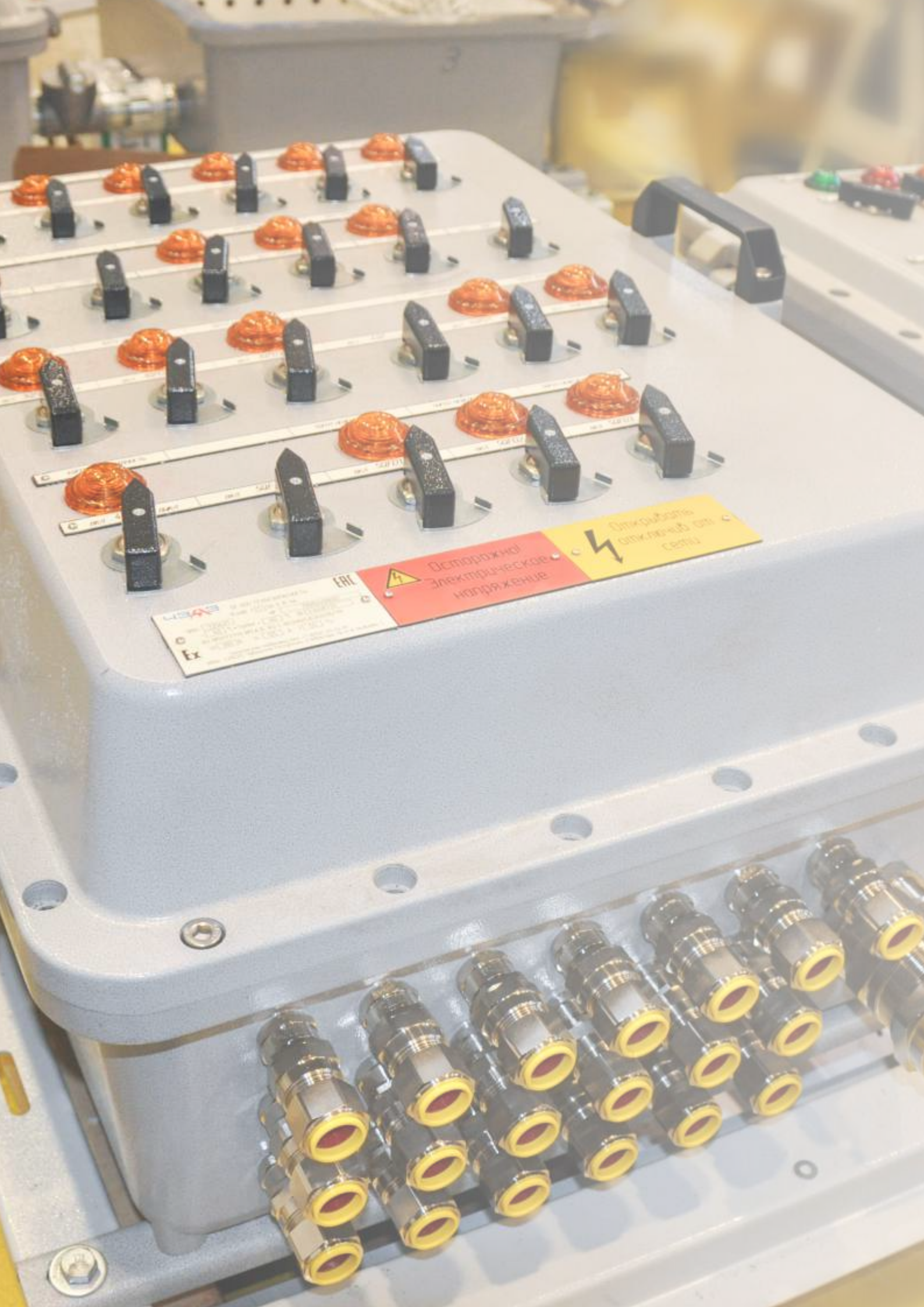
### Field of application:

- Power supply of auxiliary systems of all types of power plants.
- Oil and gas
- Power supply and automation of industrial enterprises, public utilities infrastructure and substations.
- Nuclear industry.

## Distributions points, boxes, posts and control cabinets

Product type	Brief description	Rated current, A	Installation method	Degree of protection
Distribution points (cabinets) PR series	Designed for power distribution and protection of electrical installations from overload and short circuits, and for infrequent (up to 6 times per hour) switching operations of circuits and asynchronous motors.	Up to 630	Fixed	Up to IP54
SHREV SCHO SCHRO	Designed for distribution and protection of electrical installations; ensure power distribution, overload and short-circuit protection for each feeder output, lighting feeders and earth leakage protection. Lighting panels (boxes) are designed to control the operation of the lighting system in manual and automatic mode in AC circuits	Up to 400	Fixed	IP54
YAOU	Designed for power distribution, overload and short-circuit protection of lighting networks	Up to 100	Fixed	IP54
YAV3 YAV3SH	Boxes with 3P and 2P circuit breakers with rated current up to 100 A are designed for non-automatic connection and disconnection of AC circuits, for overload and short-circuit protection	Up to 400	Fixed	IP54
YAVSH-S YAVSH3-SV	Designed for connection and infrequent closing and opening of circuits of AC/DC collectors (welding transformers, electric drills)	Up to 100	Fixed	IP54
YATPV	Designed for power supply of local lighting networks 12, 24, 36 or 42 V	Up to 4	Fixed	IP20 IP54
PKU15V	Designed for switching of AC control circuits up to 500 V, 50/60 Hz and DC control circuits up to 220 V	-	Fixed	IP20
YARV	Designed for drawing, connecting and tapping of wires and cables when cable lines up to 660 VAC and 440 VDC are laid openly	-	Fixed	IP54
Ya5000	Designed for local, remote and automatic control of asynchronous motors with power up to 75 kW in continuous mode. For signaling and protection of asynchronous squirrel cage motors	Up to 160	Fixed	IP20





LISAS  
EHC  
Ex

Осторожно!  
Электрическое  
напряжение

Отключить  
от сети





# EXPLOSION-PROOF ELECTRICAL EQUIPMENT



# EXPLOSION-PROOF ELECTRICAL EQUIPMENT



## Description

Explosion-proof electrical equipment by CHEAZ performs various functions of power lead-in, transmission and distribution, control of different processes at different facilities with hazardous areas.

The design helps eliminate, prevent and impede ignition of the surrounding explosive mixture during operation. Manufactured for all levels and types of explosion protection and for all groups and temperature classes.



Product type	Brief description
Explosion-proof marking:	1 Ex d IIC T6...T3 Gb 1 Ex d [ib] IIC «T6...T3» Gb X 1 Ex d [ia IIA/IIB/IIC Ga] IIB+H2 «T6...T3» Gb X
Certificate of conformity:	EAЭC RU C-RU.HA65.B.00228/19 № 0679258
Compliance with standards	GOST 31610.0-2014 GOST IEC 60079-1-2011 GOST R IEC 60079-7-2012 GOST 31610/11-2014
Degree of protection	IP66/67
Protection against electric shock	1
Ambient temperature	-60/-40/-20 ... 40/60° C
Ex application:	Zone 1, Zone 2
Rated current of main circuit	max. 2000 A

## Explosion-proof cabinets, control panels, control posts, lighting panels, heating control panels, starters UVN series



### Field of application:

- Oil refining industry
- Petrochemical industry.
- Gas processing industry
- Oil industry
- Gas industry
- Chemical industry
- Manufacturing industry and other.

### Description

UVN devices are designed with a case made of corrosion-resistant modified aluminum-silicon alloy or stainless steel. Cases of UVN devices can be provided with windows.

Depending on the specification, UVN devices can be equipped with various control, signaling, display and monitoring devices, and cable glands of various sizes. UVN devices can be equipped with switching equipment from world leading manufacturers, including products from CHEAZ.

## Explosion-proof junction boxes KVN series



### Field of application:

- Oil refining industry
- Petrochemical industry.
- Gas processing industry
- Oil industry
- Gas industry
- Chemical industry
- Manufacturing industry and other.

### Description

The cases of explosion-proof KVN boxes are made of a special corrosion-resistant modified aluminum-silicon alloy, reinforced polyester, stainless steel and low-carbon steel.

The internal equipment of the boxes is mounted on DIN rails, which in turn are attached to the mounting plate made of aluminum. Cases of KVN connection boxes have a stainless-steel outer and inner grounding bolt as standard.



43 АЭ

Откл.  Вызов  Вкл.  Неиспр.  Упит

# RELAY PROTECTION AND AUTOMATION DEVICES

Включить  МУ Местное управление   
 Отключить  АСУ Разрешение АСУ   
Ф1 Ключ АПВ  Ф3 Ключ УРОВ   
Ф2 Ключ АВР  Ф4 Ключ ЗМН

- МТЗ – 1
- МТЗ – 2 (М
- МТЗ – 3 (Перегруз
- ОЗЗ
- ЗОФ
- Внешн. откл./сигн
- ЗДЗ ячейки
- Сигнал ЛЗШ
- УРОВ
- АПВ
- АВР
- Неисправность Л
- Неисправность Л
- Неготовн. выкл
- Вывод функ

БЭМП РУ -ВВ.5.220.Д

USB

C Сброс



# RELAY PROTECTION AND AUTOMATION DEVICES



## Product advantages:

- Operating power supply:  $\approx$  88-242 B.
- Permissible power interruptions up to 1 s.
- Start-up time: max. 0.5 s
- Operating temperature: from -40 to +55°C
- Non-freezing LED display.
- Powered by USB.
- Unified hardware.
- Easy and convenient operation.
- Modern software BempExplorer.
- Wide communication capabilities: Modbus-RTU; Modbus-TCP; IEC 60870-101; -104; IEC 61850-8.1;-9.2; NMEA; TSIP; SNTP; PTP; PPS.
- Average service life: 25 years.
- Mean time to failure: 320 000 hrs
- Freely programmable logic.
- Re-assignable protection pick-up LEDs
- Re-assignable input and output signals.
- Re-assignable program keys on the front panel.
- Extended warranty of 15 years.

CHEAZ carries out research, development and design in the field of digital protection and automation systems, performs engineering, installation supervision and commissioning, training, maintenance, warranty and post-warranty service, offers a wide range of technical solutions for energy facilities:

- BEMP RU protection relays for 0.4-220 kV
- arc protection package BDZ-01
- power supply modules BPNT
- relay protection and automation panels for 6-220 kV.

All solutions and products manufactured by the company are certified for use at the facilities of Rosseti, Transneft, Rosneft, Gazprom, Rosatom.

Approved by Russian Maritime Registry of Shipping.



## Relay protection and automation devices for 0.4 kV networks

Name	Main purpose	Overall dimensions, WxHxD, mm	Analog inputs/binary inputs/outputs	Protections	Automation functions
BEMP RU-04V	0.4 kV incomer protection and automation	187x207x180	7/26/18	Overcurrent (4 steps), earth fault, negative sequence, voltage path supervision, undervoltage	Automatic load transfer, restoration of normal operation, online control
BEMP RU-04L	Protection and automation of lines, step-down transformers and installations for 0.4 kV	187x207x103	6/12/10	Overcurrent (3 steps), acceleration of overcurrent, earth fault, voltage path supervision, arc fault, undervoltage and overvoltage	Breaker failure protection
BEMP RU-04R	Protection and automation, control and signaling for 0.4 kV infeeds and sectionalizing switch control	187x207x207	6/58/18	Voltage path supervision, overvoltage, overfrequency, underfrequency	Automatic Load Transfer, restoration of normal operation, Breaker Control Automation, control circuit automation and supervision
BEMP RU-A4	Protection of 0.4 kV stand-by circuit breaker	187x207x180	10/28/26(+2)	Acknowledgement, overcurrent (2 steps), remote backup, overcurrent blocking, earth fault, voltage supervision, wrong chassis position	Automatic Load Transfer, normal operation restoration
BEMP RU-V4	Protection of 0.4kV incomer	187x207x180	10/28/26(+2)	Acknowledgement, overcurrent (2 steps), remote backup, overcurrent blocking, earth fault, voltage supervision, voltage supervision, wrong chassis position	Tripping of sectionalizing switch from protections
BEMP RU-S4	Protection of 0.4 kV sectionalizing switch	187x207x180	10/28/26(+2)	Acknowledgement, overcurrent (2 steps), voltage path supervision, wrong chassis position	I/O



## Relay protection and automation devices for 6-35 kV networks

BEMP RU	Main purpose	Overall dimensions, WxHxD, mm	Analog inputs/ binary inputs/ outputs	Protections	Automation functions
OL/OL2/ TL/TL2	Protection and automation of outgoing lines 6-35 kV	187x207x155 (180)	6(7)/12/10 6(7)/26/18	Overcurrent, single phase earth fault, voltage path supervision, arc fault, negative sequence, broken wire, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breaker Control Automation
TT34	6-35 kV Feeder current protections	187x207x70	5/6/7	Overcurrent, single phase earth fault, arc fault, negative sequence, broken wire, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breaker Control Automation
TT/TF	6-35 kV Line current protections	250x240x68	3/6/7	Overcurrent, single phase earth fault, arc fault, negative sequence, broken wire, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breakers Control Automation
TT2	6-35 kV Line current protections with shunt coil	187x207x120 (160)	4/12/10	Overcurrent, single phase earth fault, arc fault, negative sequence, broken wire, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breakers Control Automation
LT	6-35 kV Line current protection	187x207x137	3/12/10	Overcurrent, single phase earth fault, negative sequence, broken wire, underfrequency, fault locator	Breaker Failure, AR, underfrequency load shedding
SV	6-35 kV Sectionalizing switch protection	187x207x180	6/26/18	Overcurrent, voltage path supervision, arc fault, logical busbar protection, negative sequence, broken wire, fault locator	Breaker Failure, AR, Automatic Load Transfer, normal operation restoration, Breakers Control Automation
VV	6-35 kV Incomer protection	187x207x180	6/26/18	Overcurrent, single phase earth fault, voltage path supervision, arc fault, logical busbar protection, negative sequence, broken wire, undervoltage, section voltage supervision, fault locator	Breaker Failure, AR, Automatic Load Transfer, normal operation restoration, Breakers Control Automation
TN	6-35 kV Voltage transformer protection	187x207x180	6/12/10	Single phase earth fault, voltage path supervision, undervoltage, overvoltage, overfrequency, section voltage supervision, adjacent section frequency and voltage supervision, fault locator	Underfrequency load shedding, frequency-actuated automatic reclosing
ED/ED2/ Ed3/ Ed4	6-35 kV Motor protection, capacity up to 5 MW, two-speed motors including	187x207x155 (180)	6(7)/12/10 6(7)/26/18	Overcurrent, single phase earth fault, voltage path supervision, arc fault, negative sequence, broken wire, undervoltage, overvoltage, motor starting and locked rotor, motor number of starts, section voltage supervision, loss of load annunciation, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breakers Control Automation





## Relay protection and automation devices for 6-220 kV networks

BEMPRU	Main purpose	Overall dimensions, WxHxD, mm	Analog inputs/ binary inputs/ outputs	Protections	Automation
01/02/03	Multifunctional 6-35 kV bay controller	187x207x155 187x207x180 187x207x207	8/12/10 8/26/18 8/42/34	Overcurrent, single phase earth fault, voltage path supervision, arc fault, logical busbar, negative sequence, broken wire, loss of power supply, overvoltage, pole-slip, synchrocheck, section voltage supervision, loss of load, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Automatic Load Transfer, normal operation restoration, Breakers Control Automation
DD/DD2	6-10 kV Motor differential protection	187x207x103	6/12/10 6/26/18	Overcurrent, earth fault, arc fault, negative sequence, broken wire, undervoltage, overvoltage, motor starting and locked rotor, 3-phase overload protection of motor, generator and transformer, Motor differential protection, loss of power supply, fault locator	Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Breakers Control Automation
DM	6-35 kV Mains differential protection	187x207x103	6/12/10	Line differential, overcurrent, arc fault, single phase earth fault, fault locator	Breaker Failure, Breakers Control Automation
BK	Static capacitor banks protection	187x207x137	6/12/10	Overcurrent, single-phase earth fault, negative sequence, broken wire, undervoltage, voltage path supervision, underfrequency, fault locator, current unbalance	Breaker Failure, AR, underfrequency load shedding
RN2/RN	2-winding transformer control	187x207x155	6/12/10 6/26/18	Tap-changer control interlock, tap-changer drive control command unit, tap-changer monitoring, tap-changer control, fault locator	
OZZ5	Detection of faulty 6-35 kV bay	187x207x103	6/12/10	Single phase earth fault, pick-up of single phase earth fault, fault locator	
RCH3	Active and reactive power deficit elimination	187x207x156	6/26/50	Voltage path supervision, underfrequency load shedding, automatic undervoltage, automatic load shedding, automatic load shedding enable, fault locator	
RCH	Automatic frequency control	187x207x180	6/26/18	Underfrequency load shedding, automatic undervoltage, automatic load shedding, fault locator	



## Relay protection and automation devices for 6-220 kV networks

BEMP RU	Main purpose	Overall dimensions, WxHxD, mm	Analog inputs/ binary inputs/ outputs	Protections	Automation
Line differential protection	Differential protection of line, HV circuit breaker 6-220 kV	187x207x180	10/26/18	Line differential, overcurrent, earth fault, single-phase earth fault, distance, negative sequence, broken wire, voltage path supervision, underfrequency, fault locator	Breaker Failure, AR, underfrequency load shedding
LD	Line distance protection and Breakers Control Automation	187x207x130	6/26/18	Distance, overcurrent, earth fault, single-phase earth fault, voltage path supervision, negative sequence, broken wire, fault locator, open phase	Breaker Failure, underfrequency load shedding, frequency-actuated load restoration, Breakers Control Automation
CS/CS3	Emergency and pre-trip alarm, position annunciation	187x207x162 187x207x175	4/44/10 4/76/10	Overcurrent, single phase earth fault, negative sequence, broken wire, underfrequency, fault locator	Breaker Failure, AR, underfrequency load shedding
VL	Protection and automation of a circuit breaker, backup protections of a transformer, graded line protections	187x207x180	6/26/18	Overcurrent, earth fault, voltage path supervision, negative sequence, broken wire, gas, fault locator, open phase	Breaker Failure, AR, Breakers Control Automation
Fault locator	Fault locator 6-220 kV	187x207x155 187x207x180	8/12/10 8/26/18	Voltage path supervision, fault locator	
OB 3/4	Interlocking system control while switching disconnectors, earthing switches, circuit breakers	187x207x200	44/42 76/42	Interlocking of disconnectors and other switchgear, control of disconnectors and other switchgear	
11/12/13	Multifunctional 6-220 kV bay controller	187x207x155 187x207x180 187x207x207	12/12/10 12/26/18 12/42/34	Overcurrent, earth fault, single-phase earth fault, voltage path supervision, arc fault, logical busbar, negative sequence, broken wire (open phase), overvoltage, undervoltage, loss of power supply, transformer differential, overfrequency, underfrequency, fault locator, CT supervision, underexcitation, thermal, motor starting and locked rotor, Motor number of starts, pole-slip, section voltage supervision, loss of load, Breaker Failure, AR, underfrequency load shedding, frequency-actuated automatic reclosing, Automatic Load Transfer, normal operation restoration, Breakers Control Automation	



## Relay protection and automation devices for 110-220 kV networks

BEMP RU	Main purpose	Overall dimensions, WxHxD, mm	Analog inputs/ binary inputs/ outputs	Protections	Automation
KS3	Graded current protections	185x205x235	13/48/48	Distance, overcurrent, earth fault, negative sequence, broken wire, faulty phase detection	Breaker failure protection
DZT4	Differential protection of 2-, 3- and 4-winding transformers and autotransformers	185x205x235	16/48/48	Differential transformer, earth fault, gas, overcurrent, overexcitation, tap-changer interlock, arc fault	Cooling automation, Breaker Failure, fire extinguishing
DZSH1/ DZSH2	Differential current protection of busbars 6-220 kV	185x205x235	16/48/48	Busbar differential, CT supervision, voltage path supervision, sensitive differential level, busbar test	Breaker Failure, AR inhibit
DV	Graded protections and Breakers Control Automation	185x 205x235	15/48/48	Distance, overcurrent, earth fault, negative sequence, broken wire, fault locator, voltage path supervision	Breaker Failure, AR
DV2	Breakers Control Automation	185x205x235	15/48/48	Distance, overcurrent, earth fault, broken wire, fault locator, open phase, single-phase earth fault, voltage path supervision	Breaker Failure, AR
DV3	Backup protections and Breakers Control Automation for transformer with HV 35-220 kV	185x205x235	15/48/48	Overcurrent, single-phase earth current, negative sequence, broken wire, gas, fault locator, open phase	Breaker Failure, AR, Breakers Control Automation, synchrocheck, automatic acceleration
DV4	Backup protections and Breakers Control Automation for autotransformer, transformer with HV 35-220 kV	185x205x235	15/48/48	Overcurrent, earth fault, voltage path supervision, negative sequence, broken wire, synchrocheck, distance, gas, fault locator, open phase	Breaker Failure, AR, Breakers Control Automation, power swing blocking
DZL2	OHL Differential protection	185x205x235	13/48/48	Line differential, distance, overcurrent, earth fault, negative sequence, broken wire	Breaker Failure, AR



## Arc protection units

### BDZ-01



#### Description

Designed to protect switchgear cabinets, switchgear of power plants and 0.4-35 kV substations in case of short-circuits accompanied by an arc, and to issue control signal to automation and relay protection systems.

- Tripping time: up to 8 ms.
- Arc detection sector: unlimited
- Temperature range: from -40°C to +55°C.
- Service life: 25 years.

#### Field of application:

- Power supply of auxiliary systems of all types of power plants.
- Power supply and automation systems of industrial enterprises, public utilities infrastructure and substations.
- Nuclear industry.

#### Functions

- Arc fault protection.
- Internal self-diagnostics of arc sensors and chips integrity
- Protection against false positives in case of high-power pulsed electromagnetic interference, from light sources
- Breaker failure protection

## Power supply modules

### BPNT



#### Description

Designed to provide uninterruptible power supply (rectified voltage) of protection relays installed at the power facilities with AC operating current, in normal and emergency modes.

The power supply units are connected to two current transformers of the protected bay and to the auxiliary transformer or instrument voltage transformer.

- Temperature range: from -40°C to +55°C.
- Service life: 25 years.

#### Special features

- The output power of BPNT-1 unit is 32 W; it has an additional output to charge external capacitor banks, which slow down the decrease of voltage of the load after current and voltage are lost at the power supply inputs.
- The output power of BPNT-2 unit is 23 W with minimum overall dimensions.
- BPNT-3 unit combines the functions of BPNT-2 unit and two relays with shunt coil contacts of increased power; it ensures switching of trip coils at currents up to 150 A.
- BPNT-4 unit combines the functions of BPNT-2 unit, a voltage charging device and capacitor bank. BPNT-4 unit includes a 100  $\mu$ F 400 V capacitor bank designed to supply the circuit breaker trip coils charged from the voltage circuit.

## Relay protection and automation panels 6-220 kV

### SHM35



#### Description

SHM35 panels are designed to perform various protection and automation function at 6-35 kV bays.

#### Standard configuration:

- Incomer protections.
- Sectionalizing switch protections.
- Voltage transformer protections.
- Line current protections.
- Motor protections.
- On-load tap changer package.
- Frequency shedding and automation package.
- Line current and distance protections.

### SHM3T



#### Description

SHM3T2 panels are designed for protection of 2-winding transformers for 6-220 kV.

SHM3T3 are designed for protection of 2-winding transformers with split LV winding and 3-winding transformers for 6-220 kV.

#### Standard configuration:

- Main protections for a 2- or 3-winding transformer
- Backup protections and Breakers Control Automation
- On-load tap changer package
- Protection package for the incomer from LV (MV) side

### SHMAT



#### Description

SHMAT panels are designed for protection of autotransformers for 6-220 kV.

#### Standard configuration:

- Main protections for autotransformer
- Backup protections and Breakers Control Automation
- On-load tap changer package
- Protection package for the incomer from LV side

## SHMRN



### Description

SHMRN panels are designed for control of on-load tap changer drives. Voltage control can be performed automatically or manually.

### Standard configuration:

- On-load tap changer package for 2-winding transformer.
- On-load tap changer package for 3-winding transformer.
- Voltage transformer package for 6-35 kV.
- Sectionalizing switch protections.
- Voltage transformer package for 6-220 kV for two busbar sections.

## SHMZSH



### Description

SHMZSH panels are designed for 110-220 kV busbar protection.

### Standard configuration:

- Busbar protections up to 4 bays.
- Package of three single-phase busbar differential protections up to 12 bays.
- Package of three single-phase busbar differential protections up to 15 bays.
- Package of three single-phase busbar differential protections up to 24 bays.

## SHMZL



### Description

SHMZL panels are designed for line protection and Breakers Control Automation of 110-220 kV bays.

### Standard configuration:

- Overhead line stepped protections.
- Stepped protections and Breakers Control Automation for line circuit breaker.
- Directional HF OHL protections.
- Stepped protections and Breakers Control Automation for bypass circuit breaker.
- Stepped protections and Breakers Control Automation for bus coupler.
- Differential current protection.
- Fault locator package.
- Voltage transformer package for 110-220 kV for two busbar sections.

## SHMTN



### Description

SHMTN panels are designed for indication of voltage in the section, voltage path supervision, and power supply of interlocks.

### Standard configuration:

- Voltage transformer package for 6-35 kV for two busbar sections.
- Voltage transformer package with instruments for 35 kV.
- Voltage transformer package for 110-220 kV for two busbar sections.
- Power supply package for disconnector interlocking

## SHMCHR and SHMPA



### Description

SHMCHR and SHMPA panels are designed for eliminating deficit of active and reactive powers at power facilities by automatic disconnecting of consumers at underfrequency and undervoltage, and consequent connection of disconnected consumers after restoration of frequency and voltage.

### Standard configuration:

- Frequency shedding and automation package.
- Frequency shedding and automation package with targeted action.
- Overload automation package.

## SHMCS



### Description

SHMCS panels are designed for central alarm system at power facilities.

### Standard configuration:

- Central alarm package.
- Frequency shedding and automation package.
- Voltage transformer package for 110-220 kV for two busbar sections.
- Power supply package for disconnector interlocking

## SHMOB



### Description

SHMOB panels are designed for centralized circuit of interlocks of high-voltage switching devices: circuit breakers, disconnectors, earthing switches.

### Standard configuration:

- Power supply package for disconnector interlocking
- Interlock package based on BEMP RU-OB4.
- Power supply package for disconnector interlocking with DC infeed.

## SHMSU



### Description

SHMSU panels are designed for protection control and monitoring systems.

### Standard configuration:

- Data storage package.
- Data display package.
- Network equipment.
- Interface converters (Ethernet/RS-485).
- Interface converters (RS-485/fiberoptic).
- Binary data acquisition controllers.
- Redundant power supply system 2x220 V.
- Master clock system.
- UPS package.
- Surge protection devices for RS-485 ports.





# **HIGH-SPEED TRANSFER SWITCH**



# HIGH-SPEED TRANSFER SWITCH

## BAVR-V



### Description

High-speed transfer switch BAVR-V is designed as high-speed AUTOMATIC LOAD TRANSFER in 6-10 kV switchgear with synchronous and asynchronous motors during emergencies in power system like power loss or short circuits in power supply path.

BAVR-V device is a high-speed transfer switch in 6-10 kV networks. The device issues early commands for the closing time of a switching device.

- Full transfer time: 38 mc.
- Data exchange protocols: Modbus, IEC 60870-5-104, IEC 61850.
- Service life: 30 years.
- Temperature range: from -40°C to +55°C.

### Product advantages:

- Low probability of power outages.
- Reliable operation regardless of load type and structure.
- Less negative impact of industrial factors on health and environment.
- Longer service life of machines.
- Elimination of ecological disasters due to prevention of hydraulic shocks in oil pipelines.
- Reliability of equipment operation.

### Field of application:

- Oil and gas.
- Industrial enterprises.
- Protection of various consumers, including those with a motor load.



КВАНТ-ЧЭАЗ

Главное меню

АРМ

ПС "Федоровка"

ПС "Казахстан"

ПС "Карачаганак"

ПС "Пойма"

Представления

Табличные измерения

Измерения терминалов от ПС "Федоровка"

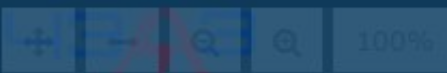
Измерения терминалов от ПС "Казахстан"

Измерения терминалов от ПС "Карачаганак"

Измерения терминалов от ПС "Пойма"

Журналы

Журналы событий  
Журналы осциллограмм



Команды сброса сигналов срабатываний

- КСЗ, ВЛ-135
- КСЗ+АУВ, ВЛ-135
- КСЗ, ВЛ-111
- КСЗ+АУВ, ВЛ-111
- КСЗ, ВЛ-133
- КСЗ+АУВ, ВЛ-133
- КСЗ, ВЛ-110
- КСЗ+АУВ, ВЛ-110
- КСЗ, ВЛ-136
- КСЗ+АУВ, ВЛ-136

КСЗ, ГТС-1

Ia	87,60 A	174 °
Ib	87,20 A	55 °
Ic	87,80 A	295 °
3I0	0,00 A	0 °
Ua	65,35 кВ	330 °
Ub	65,15 кВ	210 °
Uc	65,26 кВ	90 °

ШСМВ-110

Предупредительная сигн-ция от терминалов БЭМП ПС "Карачаганак"

13 июля 2018 г.

Все события

По представлению

Номер	Дата и время	Объект
1	13.07.2018 12:04:23	ПС "Карачаганак"
2	13.07.2018 12:04:23	ПС "Карачаганак"



# DIGITAL SOLUTIONS

# DIGITAL SOLUTIONS

## DIGITAL SUBSTATION

A digital substation is a 100% factory assembled product with automation system according to IEC 61850. A digital substation can be implemented in the standard layout of outdoor or indoor GIS switchgear.

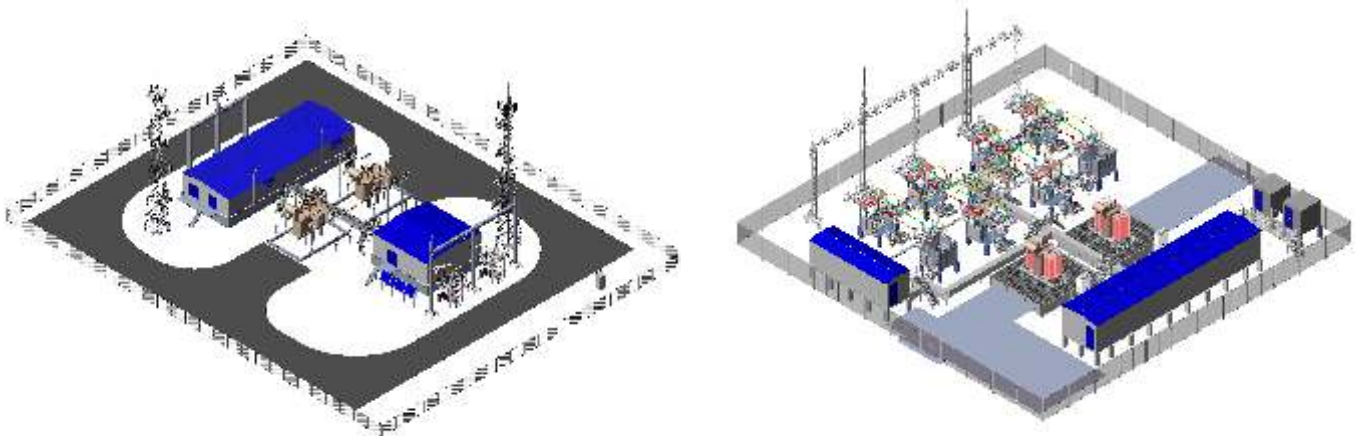
### Product advantages:

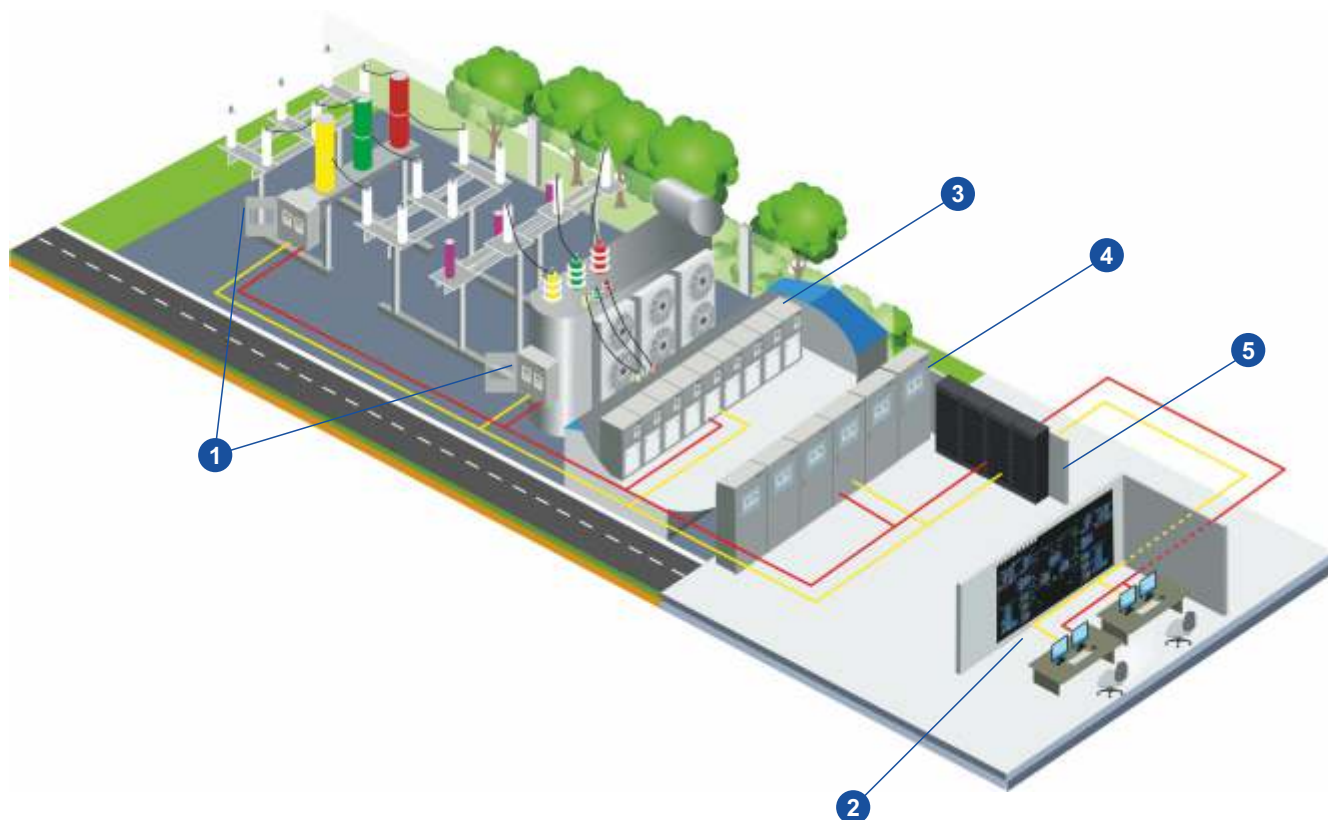
- Reduced space requirements.
- Transition to unattended substations.
- Increased safety.
- Lower requirements of instrument transformers.
- Reduced burden on secondary circuits.
- Implementation of factory assembled equipment.
- Flexible configuration.
- Hardware testing without disabling.
- Reduced cost of control cables.
- Self-diagnostics of cable connections.
- Faster installation and commissioning.

### Turnkey solution:

- Pre-project inspection.
- Audit.
- Engineering.
- Shipment.
- Installation.
- Commissioning.

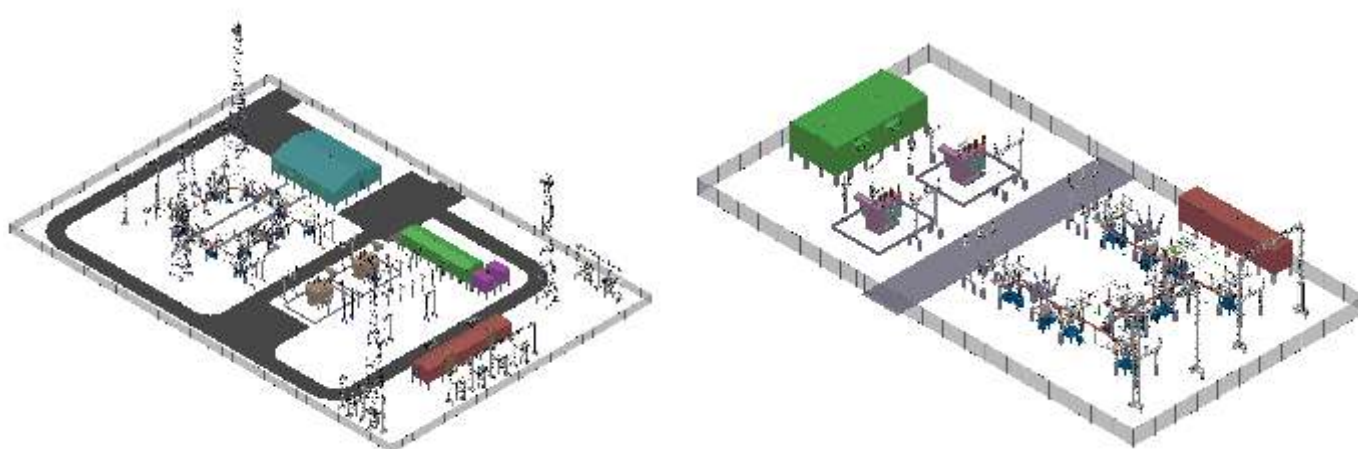
Modular complete digital transformer substation 110/35/10 kV is a substation built as 'digital power facility'. It is designed to receive, convert and distribute power. It is equipped with an automation system operated by digital signal transmission, and provides maximum automation of measurement, control and protection of equipment. The automation system is based on digital equipment and fiber-optic communication lines united by a single data transfer protocol according to IEC 61850.





### Functional groups of a digital substation:

- 1 Cabinets for converting analog and binary signals based on BEMP RU-USO devices.
- 2 Remote control of a digital substation via KVANT-CHEAZ 2.0 software.
- 3 Intelligent digital cubicles.
- 4 Centralized intelligent electronic devices.
- 5 Network hardware and time servers.



## Cabinets for converting analog and binary signals



### Description:

SHPDS and SHPAS cabinets (based on BEMP RU-USO) input signals from primary equipment into the automated system of digital substation and output control actions in 6-220 kV networks:

- Binary GOOSE signals (IEC 61850-8-1).
- Analog SV signals (IEC 61850-9-2LE).

## Merging unit BEMP RU-USO



### Description:

BEMP RU-USO devices are designed to convert analog and binary signals from primary equipment into digital form and transfer them to the station bus and process bus according to IEC61850.

### Capabilities:

- Conversion of analog signals.
- Conversion of binary signals.
- Issuing of control commands via output contacts.

BEMP RU	Main purpose	Analog inputs	Binary I/O	Capabilities
USO4	Binary signal converter	-	76/44	<ul style="list-style-type: none"> <li>• Field controller: tele signaling, telecontrol</li> <li>• Standard: IEC61850-8-1 (MMS, GOOSE).</li> <li>• Time synchronization: PTP.</li> <li>• Redundancy: PRP.</li> </ul>
USO11	Analog signal converter	4I+4U	12/10	<ul style="list-style-type: none"> <li>• Supports 80 samples per period.</li> <li>• Can be used with conventional CTs and VTs.</li> <li>• Standard: IEC61850-8-1(MMS), IEC61850-9-2LE. Reception and transmission 4CT, 4VT via digital communication channels.</li> <li>• Redundancy: PRP.</li> <li>• Time synchronization: PTP, SNTP.</li> </ul>
USO21	Analog signal converter	3I+5U	12/10	<ul style="list-style-type: none"> <li>• Supports 80 samples per period.</li> <li>• Can be used with conventional CTs and VTs.</li> <li>• Standard: IEC61850-8-1(MMS), IEC61850-9-2LE. Reception and transmission 4CT, 4VT via digital communication channels.</li> <li>• Redundancy: PRP.</li> <li>• Time synchronization: PTP, SNTP.</li> </ul>

## Intelligent digital cubicles



### Description:

- Motor-driven rack in/out of circuit breaker, earthing switches.
- Video surveillance cameras in the cable and circuit breaker compartments.
- Calculation of circuit breaker life by measured short-circuit currents and CO cycles.
- Mimic diagram.
- Telemetry, telecommand/telecontrol, remote indication.
- Remote control.
- Support of IEC 61850.

## Centralized digital protection devices



### Description

A centralized digital protection cabinet protects the 110-220 kV side of the substation, which allows to reduce significantly the area of the control room building.

Universal protection devices BEMP RU-MFC do not have analogue and discrete boards, it allows to place all the necessary packages for protection and automation on the HV side of the digital substation in one cabinet.

## Single Multifunctional Digital Device

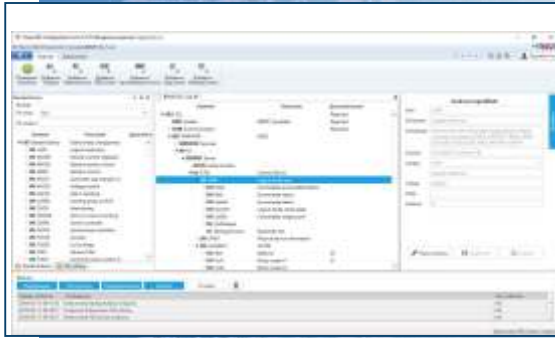


### Description:

Protection relay for 6-35 kV bays with wide capabilities and support of:

- IEC 61850-8-1 and -9-2LE (GOOSE, MMS, SV).
- IEC 60870-5-104.
- Telemetry, telecontrol and telemonitoring.
- Mimic diagram.
- Redundancy: PRP.
- Time synchronization: PTP, SNTP.
- Can serve as a metering facility.
- Can be used with conventional CTs and VTs and optical CTs and VTs.

## Engineering of a digital substation



### Description:

- CHEAZ has developed proprietary software for substation engineering on SCL according to IEC 61850.
- CHEAZ Substation Configuration Tool is used to:
  - Make system specification description files (SSD).
  - Make system configuration description files (SCD).
  - Develop substation single-line diagram.
  - Create user graphic library.
  - Create data flow (Report, GOOSE, SV).
  - Create a graphic library of standard solutions.
  - Verify compliance with SCL rules and specified profile.
  - Log changes.

## Surveillance system



### Description:

- Visual process control.
- Ensure safety of the maintenance personnel.
- Prevent emergencies.
- Monitor the state of substation process equipment.
- Acquire valid data about the protected zones.
- Intrusion detection.
- Access to the video from central surveillance office.
- Video archive to review emergencies.
- Video surveillance of the facility 24/7 in different conditions of visibility, light, temperature and weather.



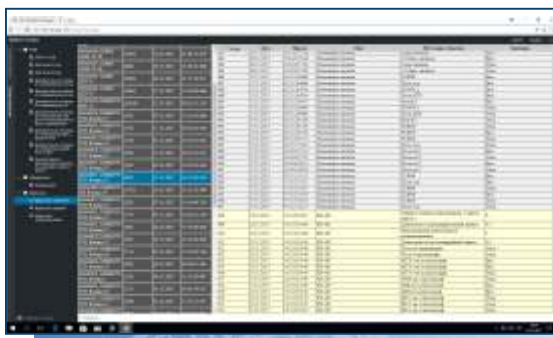
## Server equipment



### Description:

- SHSO server equipment cabinets are designed to acquire and store data from microprocessor-based devices, process and transfer it to dispatcher centers, and to display it as process screens, tables, diagrams, etc. to the personnel.
- SCL rules and specified profile.
- Log changes.

## KVANT CHEAZ-2.0 software



### Capabilities of the software:

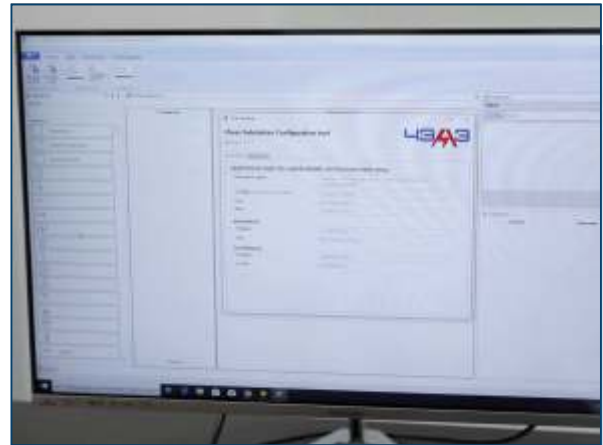
- Data archive.
- Read and write of setpoints.
- Report and trend generation for any time period.
- Diagnostics of network infrastructure.
- Event and alarm log with filtering by any attribute.
- Backup.
- Automatic reading and archiving of events, alarms, disturbance records.
- All standard protocols supported.
- Distributed system.
- Web-based.
- Scalability and expandability.
- Full compatibility with Kaspersky Industrial Cyber Security.

## Digital Energy Laboratory – beta-testing territory

A Digital Energy Laboratory has been created in CHEAZ research center. It allows to develop, test and adjust equipment for digital substations in accordance with modern requirements of digital energy.

The laboratory is a physical model of a digital substation. It is used for development of technical solutions - from engineering of a digital substation and SAS to adjustment and testing of equipment before delivery to the Customer, and for development of new products as part of R&D and specific orders.

A digital substation is based on intelligent electronic devices (IEDs) connected in networks with different levels and configurations provided by IEC-61850. The laboratory is equipped with BEMP RU devices (with Ethernet and support for all IEC-61850 protocols), and network hardware, standard time signal systems and special testing facilities.



A photograph of several large, blue and white modular units, likely for industrial or laboratory use, arranged in a row in a warehouse. The units are on wheels and have doors with handles and locks. The background shows a high ceiling with a metal truss structure and some lights. The entire image has a blue overlay.

# MODULAR SOLUTIONS



# MODULAR SOLUTIONS

Modular solutions are 100 % pre-assembled products, fully engineered, manufactured and tested at CHEAZ facilities. A module is a product with pre-installed switchgears and control gear, LV switchgear, control and protection systems, transformers and other equipment, as required.

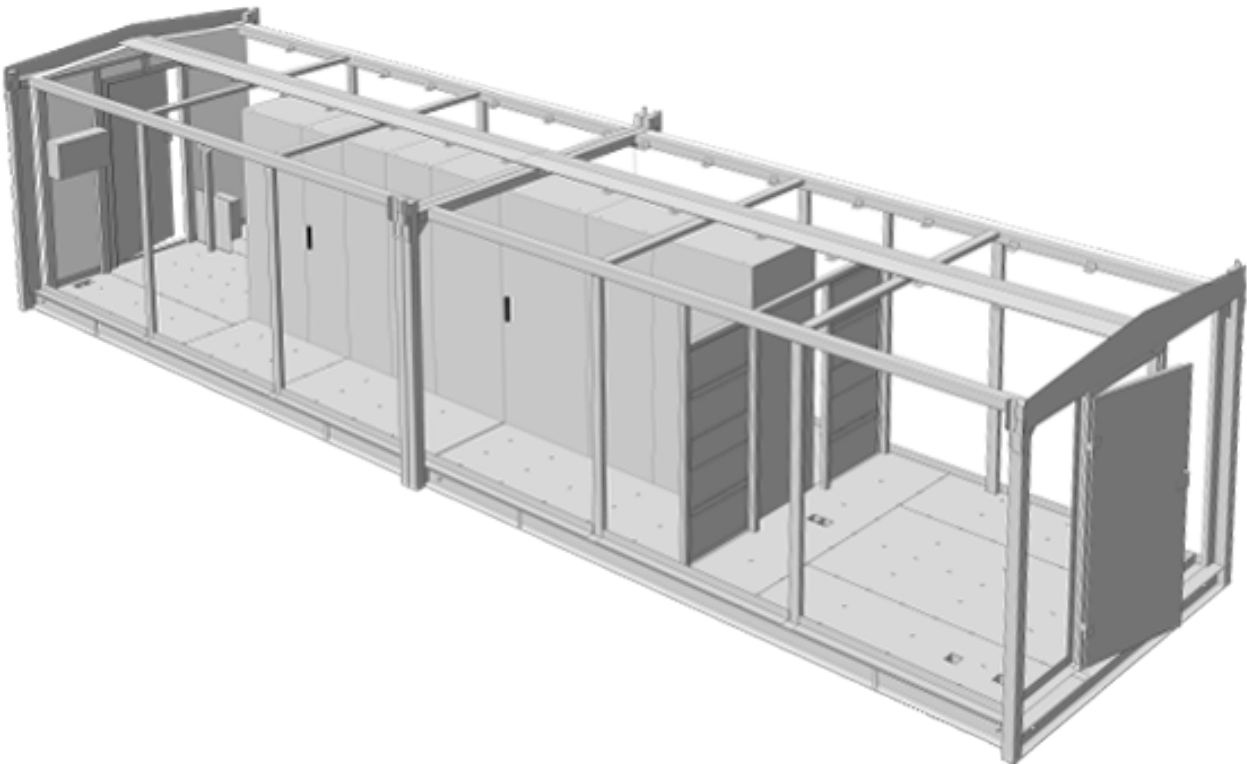
A modular solution is a comprehensive approach to address the issues of the Customer.

## Technical features and main advantages of modular units

- ambient temperature: from -60 °C to +40°C (UHL1)
- earthquake-resistant structure (up to degree 9)
- fire resistance of a module - II, III or IV
- high degree of pre-fabrication
- different transformers from Russian and foreign manufacturers can be used
- facility-specific engineering
- various options of exterior finishes and paint color
- shipment to the destination point by road and railway.

### Design

A module consists of a load-bearing frame lined with wall panels. The load-bearing frame is covered on the inside with sandwich panels (wall panels filled with non-flammable mineral wool insulation).



## All electrical modules are equipped with additional systems:



### Options at the request of the Customer

- Ventilation equipment (pressurized supply and exhaust systems).
- Conditioners.
- Security and fire alarm systems and access control and management system (ACS).
- Gaseous, dry chemical, aerosol, water-based fire suppression.

## Control buildings



### Description

Designed for:

- protection, automation and control of HV equipment, feeders and outgoing bays
- remote control of HV equipment.

### Ensures:

- unattended operation of equipment 24/7
- operation of remote control, security and communication systems via fiber-optic and HF lines
- compatibility of remote data transfer protocols in accordance with GOST R IEC 870-5-101, GOST R IEC 60870-5-104.

## Modular complete LV devices BNKU



### Description

An assembled modular building with pre-installed equipment. The scope of equipment is determined by the Customer and the project; generally it includes:

- LV switchgear
- auxiliary equipment
- main grounding bus box (on request)
- HVAC and lighting equipment
- security and fire alarm systems.

## Switchgear for voltages up to 35 kV RU BM



### Description

Switchgear cabinets are installed in the modules. The size of the module depends on the quantity and size of the installed cabinets.

Advantages:

- high degree of pre-fabrication
- wide range of climatic modifications
- wide range of auxiliary equipment
- flexible approach to the Customer's needs.

## Vandal-resistant modular buildings



### Description

Manufactured for switchgear, complete transformer substations, installed in areas without sufficient protection from unauthorized access.

External metal enclosure – from 2 mm thick.

## Deployable buildings BVZ-110



### Product advantages

- Reliability of load-bearing structures.
- Air-tightness and high thermal insulation.
- Lower weight as compared to reinforced concrete structures, minimum load on the foundation.
- Aesthetic and modern appearance.
- A lot of working space inside.
- The shortest possible time for the construction of an object of any complexity due to the complete factory readiness of building structures.
- Convenient and cost-effective shipment; heavy lifting and loading mechanisms not required.
- Construction can be performed throughout the year.
- Convenient and safe operation.

# ELECTRICAL DEVICES



# Vacuum circuit breakers BB-CHEAZ, BBH-CHEAZ



## Key features

- unified circuit breakers and drives for different modifications
- reliable isolation
- mechanical reliability
- interchangeability of the chassis

## Description

BB-CHEAZ, BBH-CHEAZ Vacuum circuit breakers are designed for switching of electrical circuits under healthy and emergency operating conditions in 3-phase AC networks (50 Hz):

- rated voltage up to 10 kV inclusive (for networks with isolated neutral)
- rated voltage up to 35 kV inclusive (for networks with resistance grounded neutral)

Fixed and withdrawable modifications are available.

Three poles of a circuit breaker have a common drive.

A fixed circuit breaker can be installed on withdrawable chassis in different switchgears.

## Technical features of BB-CHEAZ vacuum circuit breakers

	BB-CHEAZ-2-10	BB-CHEAZ-2-35	BBH-CHEAZ-35
Rated voltage, kV	10	35	35
Rated current, A	630 ... 4000	1250 ... 2500	1600 ... 2500
Rated breaking current, kA	20 ... 40	25 ... 31.5	31.5
Mechanical durability	10000 ... 25000	10000	10000
Electrical durability at 100 % of rated breaking current	25	25	25
Pole center distance	150, 210, 275	210, 275	770
Opening time (at rated voltage), ms	60	50	40
Closing time (at rated voltage), ms	65	50	80
Installation	indoor	indoor	indoor
Service life	30 years	30 years	30 years
Poles	3	3	3



## Earthing Switch ZR-CHEAZ-10/31.5

### Description

Earthing Switches ZR-CHEAZ-10/31.5 (indoor installation) are designed for operation in switchgear cabinets in 3-phase AC networks (50 Hz) at rated voltage up to 10 kV, with isolated, arc-suppression-coil or resistance grounded neutral. A spring-loaded drive of an earthing switch moves the blades independently of the operator. Earthing switches comply with GOST 52726-2007.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	10
2	Rated short-time withstand current	kA	31.5
3	Rated short-circuit duration	s	4
4	Rated peak withstand current	kA	80
5	Rated power frequency withstand voltage (1 min.)	kV	42
6	Lightning impulse withstand voltage	kV	75
7	Mechanical endurance	times	2000
8	Earthquake resistance as per MSK-64	degree	8
9	Ambient temperature	°C	-40...+40

## Earthing Switch ZR-CHEAZ-35/31.5

### Description

Earthing Switches ZR-CHEAZ-35/31.5 (indoor installation) are designed for operation in switchgear cabinets in 3-phase AC networks (50 Hz) at rated voltage up to 10 kV, with isolated, arc-suppression-coil or resistance grounded neutral. A spring-loaded drive of an earthing switch moves the blades independently of the operator. Earthing switches comply with GOST 52726-2007.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	35
2	Rated short-time withstand current	kA	31.5
3	Rated short-circuit duration	s	4
4	Rated peak withstand current	kA	80
5	Rated power frequency withstand voltage (1 min.)	kV	95
6	Lightning impulse withstand voltage	kV	190
7	Mechanical endurance	times	2000
8	Earthquake resistance as per MSK-64	degree	8
9	Ambient temperature	°C	-40...+40

## Chassis truck TVV-CHEAZ-10

### Description

Chassis truck TVV-CHEAZ-10 is a metal truck designed for racking in/out of a switching device (BB-CHEAZ-2-10 vacuum circuit breaker or similar) inside the draw-out module compartment in switchgear.

Chassis meet the interlock requirements of applicable codes to prevent:

- racking in/out of the switching device with the compartment door open;
- racking out of the switching device in the connected position;
- operation of the switching device in an intermediate position;
- racking in/out of the switching device when the earthing switch is on.

At the Customer's request chassis can be equipped with auxiliary contacts to indicate the position of a switching device in the switchgear - up to 43/4P.



## Insulation bushing D-CHEAZ-5 polymer (6-10 kV)

### Description

Insulation bushing D-CHEAZ-5 is designed for insulation of current-conducting busbars from the metal enclosure and is installed at the origin of 6-10 kV switchgear.

The bushings are designed to insulate current-conducting busbars with rated current from 630 to 4000 A.



## Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	10
2	Maximum operating voltage	kV	12
3	Rated power frequency withstand voltage (1 min.)	kV	42
4	Lightning impulse withstand voltage	kV	75
5	Ambient temperature	°C	-40...+40

## Insulation Bushing D-CHEAZ-5-S polymer (6-10 kV)

### Description

Insulation bushing D-CHEAZ-5-S is designed for insulation of current-conducting busbars from the metal enclosure and is installed between the sections in 6-10 kV switchgear.

The bushings are designed to insulate current-conducting busbars with rated current from 630 to 4000 A.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	10
2	Maximum operating voltage	kV	12
3	Rated power frequency withstand voltage (1 min.)	kV	42
4	Lightning impulse withstand voltage	kV	75
5	Ambient temperature	°C	-40...+40

## Insulator support IO-CHEAZ-8 polymer (6-10 kV)

### Description

Support insulator IO-CHEAZ-8 is designed for rigid fastening and insulation of current-conducting busbars from metal structures in 6-10 kV switchgear.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	10
2	Maximum operating voltage	kV	12
3	Rated power frequency withstand voltage (1 min.)	kV	42
4	Lightning impulse withstand voltage	kV	75
5	Ambient temperature	°C	-40...+40

## Insulation Bushing D-CHEAZ-8-O polymer (35 kV)

### Description

Insulation bushing D-CHEAZ-8-O is designed for insulation of current-conducting busbars from the metal enclosure and is installed at the origin of 35 kV switchgear.

The bushing comes complete with the support.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	35
2	Maximum operating voltage	kV	40.5
3	Rated power frequency withstand voltage (1 min.)	kV	80
4	Lightning impulse withstand voltage	kV	190
5	Ambient temperature	°C	-40...+40

## Insulation bushing D-CHEAZ-8 polymer (35 kV)

### Description

Insulation bushing D-CHEAZ-8 is designed for insulation of current-conducting busbars from the metal enclosure and is installed at the origin of 35 kV switchgear.



### Main technical features

No	Parameter	Unit	Value
1	Rated voltage	kV	35
2	Maximum operating voltage	kV	40.5
3	Rated power frequency withstand voltage (1 min.)	kV	80
4	Lightning impulse withstand voltage	kV	190
5	Ambient temperature	°C	-40...+40

## Shutters SHM-CHEAZ

### Description

Shutters SHM-CHEAZ are designed to protect the service personnel from touching the current-conducting parts of fixed contacts in the main circuit of 6-10, 35 kV switchgear.

Shutters for 35 kV switchgear are available of toggle, roller and guide rail type.



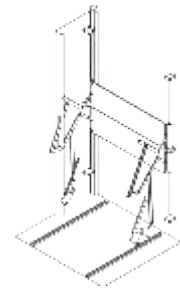
Shutters for 6-10 kV  
switchgear  
800/1000 mm



Shutters 1 for  
6-10 kV switchgear  
1000 mm



Shutters 2 for 6-10 kV  
switchgear 1000 mm



Toggle-type shutters  
for 35 kV switchgear

## Power contacts

### Description

KN-CHEAZ Fixed contacts are to be installed in switchgear where a withdrawable circuit breaker is used with KL-CHEAZ tulip contacts.



KN-CHEAZ Fixed contacts for rated current from 630 to 4000 A.



KL-CHEAZ Plug-in Tulip contacts for rated current from 630 to 4000 A.

## Dry-type transformers with cast insulation TSL-CHEAZ

### Description

TTSL-CHEAZ Dry-type transformers with cast insulation with voltage up to 10 kV are designed for converting power in the networks of power facilities and power consumers. They are designed for indoor installation.

TSL-CHEAZ transformers comply with GOST 52719-2003.

TSL-CHEAZ transformers are available in standard and energy-efficient modifications. Energy efficiency of our transformers is better than required by Rosseti document STO 34.01-3.2-011 'Requirements to no-load and short-circuit losses'.



### Features of TSL transformers, voltage class 10 kV

Rated power, kVA	No-load loss, W		Short-circuit loss, W
	Standard	Energy-efficient	
30	170	130	710
50	240	190	1000
80	330	260	1380
100	360	280	1570
125	420	330	1850
160	490	380	2130
200	560	435	2530
250	650	505	2760
315	790	615	3470
400	880	685	3990
500	1045	810	4880
630	1210	940	5960
800	1370	1065	6960
1000	1590	1240	8130
1250	1880	1460	9690
1600	2205	1715	11730
2000	2745	2135	14450
2500	3240	2520	17170

## Molded case circuit breakers

### BA-40



#### Description

The circuit breakers are designed to carry current under normal conditions and to break current at short circuit, overcurrent or undervoltage, and for rare switching operations (up to 30 times per 24 hours). They are designed for operation in installations with rated voltage of 250 to 500 V DC, from 240 to 690 V AC, 50/60 Hz.

#### Features:

BA-40 Circuit breakers comply with GOST R IEC 60947-1-2014, GOST R 50030.2-2010, GOST IEC 60947-2-2014. They can operate under pollution degree III according to GOST R IEC 60947-1-2014.

Ambient temperature:

- for circuit breakers with electronic and magnetic trip units: from -25 to +70 °C
- for circuit breakers with thermal magnetic trip unit: from -5 to +70 °C
- the circuit breakers will be derated if the ambient temperature is above 40 °C (above 65 °C for motor protection circuit breakers).

Ba40 Circuit breakers can be stored in the manufacturer's package at the temperature from -50 to +85 °C (-40 °C for electronic trip units with LCD).

#### Technical features

		BA40-02	BA40-06	BA40-16
Rated operating voltage, V		AC 690, DC 500	AC 690, DC 500	AC 690
Rated current, A		16, 25, 32, 40, 50, 63, 80, 100, 125, 150, 160, 250	320, 400, 500, 550, 600, 630	630, 1000, 1250, 1600
Poles		3,4	3,4	3,4
Breaking capacity at AC 380/415 V, kA		15 ... 150	15 ... 150	15 ... 70
Durability, CO cycles	Mechanical	10000 ... 50000	5000 ... 15000	10000
	Electrical	10000 ... 30000	4000 ... 6000	2000 ... 5000
Design (modification)		Fixed, plug-in, withdrawable	Fixed, plug-in, withdrawable	Fixed
OCR unit		thermal, electronic	thermal, electronic	electronic

## Air circuit breakers

### BA50-47



#### Description

The circuit breakers are designed to carry current under normal conditions and to break current at short circuit, overcurrent or undervoltage, and for rare switching operations (up to 30 times per 24 hours). They are designed for operation in installations with rated voltage up to 690 VAC, 50/60 Hz.

#### Features:

- Ambient temperature: from -5 °C to +40°C
- Max. altitude: 2000m
- Relative humidity: max. 50% at +40° C; higher relative humidity at lower ambient temperature
- Pollution degree according to GOST IEC 60947-1-2014 - III
- Place of installation shall be protected against water, oil, emulsion splashes
- Atmosphere as per GOST 15150-69 - IV for the main circuit; III for auxiliary and control circuits
- Operating position: vertical; deviation from the vertical position: 5° max.
- Category B
- Environment: non-explosive, without current-conducting dust disrupting the operation of the circuit breaker, without corrosive gases and vapors in concentrations harmful to the insulation and metals; without water vapor.

#### Technical features

	BA50-47-1000	BA50-47-1600	BA50-47-2500	BA50-47-4000	BA50-47-6300	
Rated operating voltage, V	AC 50/60 Hz, 400, 440, 690	AC 50/60 Hz, 400, 440, 690	AC 50/60 Hz, 400, 440, 690	AC 50/60 Hz, 400, 440, 690	AC 50/60 Hz, 400, 440, 690	
Rated current, A	200, 400, 630, 800, 1000	200, 400, 630, 800, 1000, 1250, 1600	630, 800, 1000, 1250, 1600, 2000, 2500	1000, 1250, 1600, 2000, 2500, 2900, 3200, 3600, 4000	4000, 5000, 6300	
Poles	3, 4	3, 4	3, 4	3, 4	3, 4	
Breaking capacity at AC 400 V, kA	65	65	65 ... 100	85 ... 100	120 ... 135	
Durability, CO cycles	Mechanical	30000	30000	25000	20000	13000
	Electrical	9000 ... 15000	5000 ... 15000	8000 ... 12500	6000 ... 10000	2000 ... 6000
Design (modification)	fixed, withdrawable	fixed, withdrawable	fixed, withdrawable	fixed, withdrawable	fixed, withdrawable	
OCR unit	electronic	electronic	electronic	electronic	electronic	



# PROTECTION AND AUTOMATION DEVICES

## Description

Relay protection is the main type of electrical automation without which normal operation of power systems is impossible. Electromechanical and microelectronic relay protection and automation devices are used in AC and DC protection circuits; they respond to an increase and/or decrease of current, voltage, and other measured variables.

### Equipment group: Protection and Automation Relays

#### Automation and power control relays



Used as directional elements, for automatic reclosing, frequency changing, etc. частоты тока и т.п.

RGR RELAY; RM11, RM12 RELAY; RMOP RELAY; RN55 RELAY; RPV01 RELAY; RPV02 RELAY; RPV258 RELAY; RPV58 RELAY; RSG RELAY; RSM13 RELAY; RSN RELAY

#### Time relay



Used for an adjustable time delay and to select control signals by duration

Rv03 RELAY; RV100, RV200 RELAY; RSV01-1, RSV01-4 RELAY; RSV01-3 RELAY; RSV01-5 RELAY; RSV13-14, RSV13-18 RELAY; RSV14 RELAY; RSV160, RSV255, RSV260 RELAY; RV01 RELAY

#### Relays and devices for protection and signaling of single-phase earth faults in 6-10 kV networks



Used for protection against single-phase faults in 6-10 kV networks

ZZN RELAY; ZZZ RELAY; RTZ RELAY; USZ RELAY; RKI RELAY; ПЕЛЕ УСЗ; ПЕЛЕ ПКИ

#### Voltage relay



Used as elements responding to voltage increase and/or voltage decrease with different pickup setpoints

Rn153, RN154 RELAY; RN51, RN151 RELAY; RN53, RN54 RELAY; RN58 RELAY; RN73, RN74 RELAY; RN57 RELAY; RNF1M RELAY; RSN11, RSN12, RSN18 RELAY; RSN13-1, -2, -3 RELAY; RSN13-4 RELAY; RSN14, RSN15, RSN16, RSN17 RELAY; RSN14M, RSN15M, RSN16M, RSN17M RELAY; RNB RELAY

Auxiliary relay		
	Used as auxiliary relays in DC/AC circuits for switching electrical loads	RELAY RP11M, RP12M; RELAY RP16; RELAY RP17; RELAY RP17M; RELAY RP18; RELAY RP18V; RELAY RP18M; RELAY RP220; RELAY RP23, RP25; RELAY RP232, RP233; RELAY RP250; RELAY RP321; RELAY RP341; RELAY RP342; RELAY RP361; RELAY RP362; RELAY RP8, RP9, RP11, RP12; RELAY RP8T; RU21 RELAY; UPP RELAY; RP16M RELAY
Current relay		
	Used in relay protection and automation of power systems as an element responding to increase and decrease of current	RELAY DZT11; RELAY RNT565, RNT566, RNT567; RELAY RST11M; RELAY RST13; RELAY RST15; RELAY RST23; RELAY RT40, RT140; RELAY RT40D; RELAY RT40R; RELAY RT40F; RELAY RT80, RT90; RELAY RTF8/9; RELAY RE570; RELAY REV200; RELAY REV570; RELAY TRTP
Units and packages of protection and automation		
Resistance relay units		
	Used as a starting or measuring element in various protection and automation circuits	Be2801, BRE2801.01 UNITS
Protection packages		
	Designed for current cut-off and current protection in case of short circuits with different parameters	Packages KZ 9, 9/2; KZ 12; KZ 13; KZ 14; KZ 15; KZ 17; KZ 35; KZ 36; KZ 37; KZ 38
Test units		
	Used as multi-pole plug connectors in relay protection, automation circuits and in measuring devices	UNIT BI-4, UNIT BI-4M, UNIT BI-6, UNIT BI-6M

## Features

Climatic version UHL, U or O, placement category 2, 3, 3.1 and 4 according to GOST 15150-69 and special modifications. Degree of protection of the enclosure - IP40, degree of protection of terminals for external conductors - IP00 according to GOST 14255-69.

Relay elements are usually mounted in a housing which consists of a base and a removable transparent casing.






## Key advantages

- wide range of modifications
- reliability proven over many years of operation
- mechanical reliability
- maintenance and service from the manufacturer.

# Control relay

## Description

Control relays are widely used in control and automation circuits: they can be used to control large output capacities at low power input signals; perform logical operations; create multifunctional relay devices; switch electric circuits; register deviations of controlled parameters from the set level; store data, etc.

Equipment group: Control Relays		
<b>Time relay</b>		
	Used in automatic control circuits to obtain an adjustable time delay. Contacts can be changed on site.	RELAY REV810; RELE REV810T; RELAY REV880
<b>Voltage relay</b>		
	Used as elements responding to voltage increase and/or decrease in switchgear and for electrical equipment of subway carriages	RELAY RE14, RE17; RELAY RE15, RE15T
<b>Auxiliary relay</b>		
	Used as elements responding to current increase and decrease in switchgear circuits for electric drives, including cranes, subway carriages, locomotives and electric locomotives. Can also be used in critical equipment of mobile and stationary objects: ground equipment, shipbuilding, aviation, aerospace equipment, NPPs.	RELAY RNE22; RELAY RNE31; RELAY RNE44; RELAY RNE66; RELAY RPU; RELAY REP15; RELAY REP18
<b>Current relay</b>		
	Used for switching circuits as an element responding to increase and decrease of current in switchgear circuits for electric drives, including electrical equipment of subway carriages and ship electrical equipment	RELAY RE12; RELAY RE13, RE15
<b>Electromagnetic relays</b>		
	Designed for use in switchgear circuits for electric drives, including cranes, subway carriages and escalators, locomotives and electric locomotives and in stationary installations	RE16 RELAY; RE16T RELAY; REV1000/2000 RELAY; REV310 RELAY; REV800 RELAY; REM RELAY

## Features

Climatic version UHL, U or O, placement category 2, 3, 3.1 and 4 according to GOST 15150-69 and special modifications.








## Key advantages

- wide range of modifications
- reliability proven over many years of operation
- can be manually adjusted on site
- mechanical reliability
- maintenance and service from the manufacturer.

# Contactors

## Description

CHEAZ manufactures a wide range of contactors (MK, KT, KM, KV series) and compact low-voltage DC devices for special purposes (KNE U and KNI series). Vacuum contactors for currents from 160 to 630 A and voltages up to 1140 V are available.

Equipment group: Contactors		
Vacuum contactors		
		Designed for switching of making and breaking currents of asynchronous motors (DOL starting) and other electric loads; they are used in remote control systems of electric drives. The main application areas are iron and steel works, oil and gas, mining, urban transport and railways and other industries with heavy duty of electric drives.
	KV1	
AC contactors		
		
	KT6050/2 AC Contactors	KT6050/2 contactors with NO main contacts and a latch are designed for operation in electrical circuits up to 380 V AC, 50/60 Hz and intended for continuous duty when voltage is lost temporarily or long-term in the power supply chain of the coil
	Kt6060 AC Contactors	Kt6060 contactors with NO main contacts are designed for switching of electrical circuits with rated voltage up to 400 V, 50/60 Hz.
	KT6060/2 AC Contactors	KT6060/2 contactors with NO main contacts and a latch are designed for operation in electrical circuits up to 380 V AC, 50/60 Hz and intended for continuous duty when the voltage is lost in the power supply chain of the coil
	KTPV600 AC Contactors	KTPV600 contactors are designed for switching on/off of electrical circuits in fixed installations



KTP6050 AC Contactors

KTP6050 contactors with NO main contacts are rated for 380 V AC, 50/60 Hz and are designed for remote switching on/off of power circuits in metallurgical, crane and other electric drives with heavy duty operation.

**DC Contactors**



KM DC Contactors

KM electromagnetic contactors are designed for operation in power circuits for control of motors of electric loaders, in HV breakers circuits for switching of the drive - contactors KM5100V, KM5102B



KPB600 DC Contactors

The contactors are designed mainly to control DC motors and are used as linear, reversing, acceleration contactors, etc



MK2-20B DC Contactors

MK2-20B contactors are designed for remote switching on of electromagnetic drives of HV breakers



KT6050/3 DC Contactors

KT6050/3 electromagnetic contactors with NO/NC main contacts and a latch are designed for use in electrical circuits with voltage up to 220 V DC and are intended mainly for damping the field of synchronous machines and to operate in circuits that do not allow the contactor to switch off in case of temporary or long-term loss of voltage in the power supply circuit of the coil

**AC/DC Contactors**



MK AC/DC Contactors

MK electromagnetic contactors are intended for operation in power electric circuits and DC control circuits at voltage up to 220 V DC (except contactors MK1-20D, MK3-20D, MK1-30, MK2-30), up to 1000 V DC (contactors MK1-20M) and up to 380 V AC, 50/60 Hz (contactors MK1-20A, B; MK1-22A, B; MK1-30A, B; MK2-20A, B; MK2-30A, B; MK1-20D; MK3-20D) of general-purpose industrial installations, and for switching of electric circuits of locomotives and electric locomotives with voltage 220 V DC



Mk5, MK6 AC/DC Contactors

MK5-10, MK6-10 contactors are designed for operation in power electric circuits of rolling stock and general-purpose industrial fixed installations with rated voltage of 220 V DC, MK5-20, MK6-20 contactors - in power electric circuits with rated voltage 440-660 V DC

## Heavy duty products

### Description

Heavy-duty products are used in safety critical equipment of mobile and stationary objects: in special and general-purpose industrial ground equipment, shipbuilding, aviation, space equipment, NPPs and other facilities with high requirements to the quality of electrical equipment.

### Equipment group: Circuit breakers

#### AZS Circuit breakers



The devices are designed for operation in fixed and mobile installations to protect equipment during overloads or short circuits in DC path at voltage up to 30 V

A-0.5 P; A-1P; A-2P; A-5P; A-7.5 P; A-10P; A-14P; A-25P; A-35PA; A-50PA; A-35P; A-50P; A-0.5 M; A-1M; A-2M; A-5M; A-7.5 M; A-10M; A-14M; A-25M; A-35MA A-50MA; A-35M; A-50M; A-5VP; A-7.5 VP; A-10VP; A-35VP; A-50VP; A-5VM; A-7.5 VM; A-10VM; A-35VM; A-50VM

#### Remotely operated circuit breakers, A series



Remotely operated circuit breakers are designed for the following purposes:

- for protection of equipment during overload in DC path;
- for switching of electrical circuits: DC/AC (frequency from 400 to 1000 Hz) - A-0.5P, A-0.5M, A-1P, A-1M, A-2P, A-2M, A-14P, A-14M, A-25P, A-25M, A-35PA, A-35MA, A-50PA, A-50MA;
- DC - A-5P, A-5M, A-5VP, A-5VM, A-7.5P, A-7.5M, A-7.5VP, A-7.5VM, A-10P, A-10M, A-10VP, A-10VM, A-35P, A-35M, A-35VP, A-35VM, A-50P, A-50M, A-50VP, A-50VM;
- for automatic disconnection of consumers if operating voltage is simultaneously present on the windings of closing and opening coils

A3C-2; A3C-5; A3C-10; A3C-15; A3C-20; A3C-30; A3C-40

### Switches

#### 1P, 2P, 3P switches



The devices are designed for operation in fixed and mobile installations to switch DC circuits at voltage up to 30 V; 2PP-250 switch is designed to switch AC circuits in closed installations. They can be used as switches in different equipment, like cars, tractors, railway and river transport.

V-45M; V-45M-K; VN-45M; VN-45M-K; 2B-45; 2V-45-K; 2VN-45; PP-45M; PP-45M-K; PN-45M-2; PPN-45; PPN-45-K; 2PP-45; 2PP-45-K; 2PPN-45; 2PPN-45-K; 2PN-20; 2PNP-47; 3PPN-45; 3PPN-45P; 3PPN-45-K; 2PP-250; 2PP-250-K

## DP-1 Remote switches



DP-1 remote switches are designed for switching of electric circuits: DC and AC (frequency ranging from 400 to 1000 Hz) circuits - DP-1-2, DP-1-2A, DP-1-25, DP-1-50A, DP-1-100 switches; DC circuits - DP-1-10, DP-1-50, DP-1-50B switches. The devices are highly reliable and suitable for a wide range of climatic conditions and mechanical impacts.

DP-1-2; DP-1-2A;  
DP-1-10; DP-1-25;  
DP-1-50; DP-1-50A;  
DP-1-50B; DP-1-100

## Electromagnetic contactors

### Ke16 Electromagnetic contactors



Designed for switching loads up to 660 V AC, frequency 50 and 400 Hz, including control of squirrel-cage induction motors. Contactors can be used in various environmental conditions and are highly reliable.

KE 16-010; KE16-025; KE 16-063; KE16-100

### KNE U, KNI Electromagnetic contactors



KNE U contactors are monostable self-resetting electromagnetic devices with DC control circuits. KNI contactors are bistable polarized electromagnetic switching devices. They are operated by square voltage pulses with duration of not less than 0,3 s. The contactors are designed for switching of DC circuits up to 132 V and AC circuits up to 418 V, frequency from 50 to 1000 Hz and can be used in critical devices of mobile and fixed installations

KNE 030U;  
KNE 020U; KNI 030;  
KNI 020; KNE 130U;  
KNE 120U; KNI 130;  
KNI 120; KNE 230U;  
KNI 230; KNE 220U;  
KNI 220

### TKD, TKS, KM-600 Electromagnetic contactors



TKD501DOD, TKS601DOD, KM-600D-V contactors are designed for switching of electrical DC loads with voltage up to 30 V; TKD501DOD contactors – for switching of AC loads up to 220 V, with frequency from 360 to 1100 Hz. They can be used in various equipment, including motor vehicles and tractors, shipbuilding and railway.

TKD501DOD;  
TKS601DOD;  
KM-600D-V

### KECH Electromagnetic contactors



Designed for switching of AC circuits with current from 6 to 150 A and voltage up to 690 V, 50/60 and 400 Hz at normal currents and overload

KECH1 Series;  
KECH2 Series

## Devices for manual control

### Description

Manual control equipment is designed for remote non-automatic control of electromagnetic devices of fixed installations in electrical control circuits.

#### Equipment group: Button switches

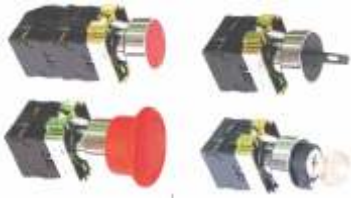
##### KU button switches



Designed for remote control of electromagnetic devices of fixed installations in electrical control circuits up to 500 V AC, 50/60 Hz and up to 220 V DC. In terms of overall, mounting dimensions and technical parameters, they are similar to KE 000 buttons and PE 000 switches

ВЫКЛЮЧАТЕЛИ с IP40 (КУ..101, ..111, ..121, ..131, ..141, ..151, ..161, ..171, 201)  
ВЫКЛЮЧАТЕЛИ с IP54 (КУ..102, ..112, ..122, ..132, ..202)

##### KU M Pushbutton switches



Designed for remote control of electromagnetic devices in electrical control circuits up to 380 V AC, 50/60 Hz and up to 250 V DC.

##### Push-button control posts

##### PKU Push-button control posts



Designed for remote control of electromagnetic devices in electrical control circuits up to 500 V AC, 50/60 Hz and up to 220 V DC in fixed installations and on rolling stock.

##### PKU M Push-button control posts



Used on moving and fixed parts of stationary installations and are designed for switching electric control circuits with voltage up to 380 V AC, 50/60 Hz and 250 V DC. Similar to PKU, PKE

##### Switch-disconnectors and VRA plug-in switches



Designed for non-automatic switching of power electric circuits with rated voltage up to 660V AC, 50/60 Hz and up to 440V DC in electric power distribution devices

VRA1-1 and VRA1-2



# **ELECTRIC DRIVES AND ENERGY-SAVING EQUIPMENT**



# VARIABLE FREQUENCY DRIVES

## VARIABLE FREQUENCY DRIVE VCHRP



### Description

VCHRP drives are designed to control rotation speed of asynchronous and synchronous motors. They are used as drives of mechanisms with various types of load characteristics.

### Field of application:

Power generation, oil and gas production, oil refining, mining, iron and steel, cement industry, housing and utilities, pulp and paper industry (pumps, fans, smoke pumps, superchargers, compressors, crushers, mills, conveyors, etc.)

### Product advantages:

- vector control with and without speed sensor, automatic detection of motor parameters
- multi-level output voltage generation that ensures sinusoidal output current at a minimum level of higher harmonics (THDi <2%)
- operability at supply voltage drops up to -40%
- automatic bypass for power cells
- incoming dry multi-winding transformer, insulation class N
- intelligent short-circuit detection system for any of the secondary windings of the incoming transformer, which allows to avoid failure when a short circuit occurs in one of the secondary windings, not only of the transformer, but also of the power cells connected to it
- modular design, high reliability, easy maintenance
- acceptance tests with rated motor load on a certified test bench witnessed by the customer.

### Technical features

Input voltage, kV		3; 6; 10
Rated output current, A	3 kV	Up to 1600
	6 kV	
	10 kV	
Rated total power, kVA	3 kV	Up to 8300
	6 kV	Up to 16600
	10 kV	Up to 27700
Motor shaft output, kW	3 kV	Up to 7100
	6 kV	Up to 14000
	10 kV	Up to 22500
Efficiency, %, not less		97.1
Input power factor, not less than		0.96
Adjustment range, Hz		0...120
Pulse number of the integrated transformer (rectifier)		Up to 54
Maintenance		single-front/double-front
Degree of protection		Up to IP42

# Soft starter for high-voltage electric motors UPPVE



### Description

The device ensures soft starting of synchronous and asynchronous motors by setting the rate of voltage increase on the motor stator windings from zero to the nominal value, while limiting the starting current at  $4I_r$  mot max.

### Product advantages:

- high-quality components from leading manufacturers
- high noise immunity, fiber-optic connections between the components
- self-diagnostics of the power circuit before and after starting the motor, and in standby mode
- special software for sequential starting of a group of electric motors
- acceptance tests at rated motor load on a certified test bench witnessed by the customer
- best value for money.

### Field of application:

Power generation, oil and gas production, oil refining, mining, iron and steel, cement industry, housing and utilities, pulp and paper industry (pumps, fans, smoke pumps, superchargers, compressors, crushers, mills, conveyors, etc.)

### Technical features

Kind of current	3-phase AC
Rated voltage, kV	3; 6.3; 10,5
Maximum starting current, A	350...3500
Frequency, Hz	50
Power range of motors, MW	0.2 ... 12.5
Starting current limits	(1 - 4) $I_r$ mot
Supply voltage of auxiliary circuits, V	~ 220
Adjustable start time, s	5 ... 120
Thyristors	By ABB
Control pulses	Optical, full galvanic isolation of the control system and power cells
Number of starts	3 starts in a row with a break between starts of 15 min.
Degree of protection	Up to IP41
Climatic design	UHL4

## Low-voltage frequency converters

### EPV frequency converters

#### EPV-V

A wide power range from 0.25 to 5000 kW with voltage up to 690 V, a high degree of protection and small dimensions allow to use EPV-V devices in all industries and life support to improve the quality and efficiency of process control. With built-in network filters and EMC filters.



#### EPV-VL

They are available for the power range from 0.25 to 30 kW, 380-500 V and have small dimensions. Compact size, various degrees of protection and electromagnetic compatibility classes allow to choose the best drive for any operating conditions. EPV-VL is the best solution where small dimensions and various mounting options are required (mounting on the back or side wall, etc.).

#### EPV-VS

Up to 355 kW, 380-500V. It is a standard, user-friendly frequency converter for a wide range of applications. The employed sensorless vector control technology ensures high-quality motor control in any situation.

#### EPV-VR

It is used to ensure high accuracy of maintaining the torque or rotation speed of the motor. Due to its high computing power the drive can use information from speed sensors (encoder or resolver) to provide more precise motor control.

#### Product advantages:

- Speed error in steady state mode < 1%
- Low torque ripple
- High immunity to resonant vibrations
- Can be used in a multi-motor drive
- Built-in EMC filter
- Built-in line choke
- Built-in brake chopper unit.



## Soft starters UPP1, UPP2



### Description

UPP1 and UPP2 devices are thyristor switching devices (three-phase voltage regulators) that ensure soft starting by switching an external shunt contactor and smooth braking of three-phase asynchronous motors with squirrel cage rotor, and voltage (current) regulation on active-inductive loads.

UPP1 and UPP2 devices combine the functions of soft starting and braking, protection of mechanisms and motors, and communication with automation systems.

### Field of application:

Soft starters are designed for soft starting and braking of asynchronous motors.

Implementation of soft starters allows to reduce the inrush currents, motor overheating, increase motor service life, eliminated jerks for the mechanical part or hydraulic shock in pipeline and valves when motors are started and stopped.

Controllers also allow to reduce the active power, significantly reduce the reactive power, protect the motor, reduce the noise, heating and vibration.

### Product advantages:

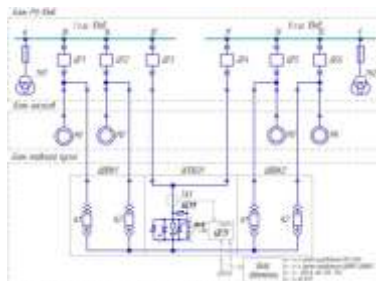
- Adjustable starting torque
- Reduced inrush current
- Reduces losses after acceleration due to a shunt contactor
- Allows cascading start of several motors with a single soft start device
- Improves the operating conditions of the drive mechanism
- Improves the operating conditions of the motor, start-up protection equipment and power supply network
- Reduces maintenance costs
- Control via RS232 or RS485 interfaces

### Technical features:

Parameter	Value
Maximum starting current	75, 190, 300, 480, 750, 1200 A
Mains voltage	380 +10%, -15%
Mains frequency	50 Hz
Isolated inputs	analog and digital (2+3)
Isolated programmable outputs	analog and relay (opto-coupler) (2+4)
Degree of protection	IP00
Ambient temperature	+5...45°C

## Cabinets for frequency regulation and soft starting of motors

Product type	Brief description	Busbar rated current, A	Installation method	Degree of protection
SHVVK	Cabinet with high-voltage vacuum contactors/breakers for automatic connection of motors to VCHRP and UPPVE-6; 10 kV	400, 630, 1000, 1250 A	withdrawable	IP21, IP31
SHVR	Cabinet with high-voltage AC disconnectors (RVZ) with main and earthing switches for visible clearance at the input and output of VCHRP and UPPVE-6; 10 kV during maintenance and repair	630, 1000 A	fixed	IP21, IP31
SHVP	Cabinet with high-voltage fuses for visible clearance and protection of the power elements of UPPV and VCHRP-6; 10 kV	200, 400 A	fixed	IP21, IP31
SHA	Automation and control cabinet for automation and control of frequency regulation and soft starting systems-6; 10 kV	-	fixed	IP21, IP31, IP54
PU	Remote control	-	fixed	IP21, IP31, IP54



## Power factor correction/Reactive power compensation unit UKKRM-7



### Description

High-voltage adjustable and non-adjustable capacitor units of reactive power compensation UKKRM-7 with capacity from 50 to 10000 kVAr are designed to increase the power factor of electrical installations of industrial enterprises and three-phase distribution networks with voltage pf 6-10 kV, 50 Hz. They are manufactured as single-front cabinets and consist of an incoming cubicle and capacitor cells, the number of which depends on the power of the capacitor unit.

### Product advantages

- high-quality components from leading manufacturers
- easy control, quality assurance, operational reliability
- best value for money.

### Technical features

Parameter	Value
Kind of current	3-phase AC
Rated voltage, kV	6.3; 10.5
Frequency, Hz	50
Rated power, kVAr	50; 150; 300; 450; 600; 750; 900; 1050; 1200; 1350; 1500; 1800; 2100; 2250; 2400; 2700; 3150; 3600, 10000
Maximum number of control stages	14
Type of plant	adjustable; non-adjustable
Microprocessor controller	NOVAR 1206; NOVAR 1214
Control step, kVAr	150; 300; 450; 600; 750; 900
Overall dimensions of cells (W x H x D)	800 x 2000 x 800 mm

## Power factor correction/Reactive power compensation unit UKKRM-5, 6, SK

### UKKRM-6

#### Description

Capacitor units for reactive power compensation, 660 V, 50 Hz

#### Technical features

Parameter	Value
Rated power	100, 150, 160, 200, 250, 262,5, 300, 350, 400, 450, 500, 550, 600, 650, 700 kVAr
Mains voltage	660 V, 50 Hz
Overcurrent factor	1.5

### UKKRM-5

#### Description

Capacitor units for reactive power compensation at 380 V, 50 Hz, with power up to 1000 kVAr are designed to increase the power factor in automatic operation when connected to the mains at a transformer substation or directly at the consumer.

#### Technical features

Parameter	Value
Rated power	100, 150, 200, 300, 350, 400, 500, 600, 800, 1000 kVAr
Mains voltage	380 V, 50/60 Hz
Overcurrent factor	1.3

### UKKRM-SK

#### Description

UKKRM-5 units for increasing the power factor of a continuous load.





## DC drive EPU1M-7

### Description

Digital DC drive EPU1M-7 is designed to regulate the rotation speed of DC motor with feedback from speed sensor and EMF in reversible/non-reversible versions.



### Technical features

Parameter	Value
Mains	~104 -380 / 575/ 690 V, 50 Hz
Permissible deviation of the mains	-25% /+10%
Rated output current	25, 50, 100, 200, 400, 630, 800, 1000, 1250, 1600, 2000 A
Maximum output current	2 x I <sub>r</sub> , 10 s
Reverse	Armature circuit
Output voltage	110-460 / 500-660 / 660-825 V
Excitation rated current	5, 10, 25, 40 A
Excitation voltage	Up to 160 V; up to 320 V
Feedback	EMF, tachogenerator (BR), encoder-optional
Adjustment range	By EMF 1: 20; by tachogenerator 1: 2000
Isolated digital inputs	10, 8 are optional
Isolated digital outputs	8 (6 up to =24 V, 2 up to ~=250 V), optional
Analog input	±10 V (17 bit)
Analog tacho input	Up to ±300 V (17 bit)
Analog output	±10 V (11 bit), optional
Digital potentiometer	16 preset speeds
Parameter sets	4, can control multiple motors
Control panel	2-line LCD (touch panel on request)
Remote control	RS485, Modbus RTU
Assignment	Analog, remote control, digital potentiometer, "more-less", encoder
Efficiency	min. 97%

# Permanent Magnet Synchronous Motor 5DVM



## Description

5DVM Motors are three-phase synchronous machines, flange mounted, with excitation from permanent magnets on the rotor. They are designed for use in high-precision machines, numerical control (CNC) machines, robotics, automatic process lines, etc.

Available modifications: motors with an integrated resolver sensor, an integrated tachogenerator, and an integrated backlash-free magnetoelectric (normally closed) parking brake (designed for emergency stop of the motor when power supply voltage is lost and for registering the position of the motor shaft stopped by the electric drive during operation) and/or with the possibility to attach angular transducer (BE178A5, LIRA158A, LIRA158A, LIRA158A and LIRA158A).

Motors can be operated in any position of the rotation axis and under environmental mechanical impacts as per group M8 according to GOST 17516.1. Degree of protection IP54 as per GOST 17494.

## Technical features

Parameter	Unit	5DVM85	5DVM115	5DVM165									
		A	S	M	L	A	S	M	L	A	S	M	L
Pull-out torque, Mdo	Nm	0.23	0.47	0.7	1.3	2.3	3.5	4.7	7	10	13	17	23
Rotation speed, n max	rpm	2000; 3000; 4000; 6000	1000; 2000; 3000; 4000										
Length w/o brake (with brake*)	mm	168	178	198	218	262	282	302	342	371 411	396 436	446 486	496 536
Length with angular transducer **w/o brake (with brake)	mm	270	280	300	320	362	382	402	442	408 448	433 473	483 523	533 573
Weight w/o brake (with brake)	kg	2.15 2.65	2.45 2.95	3.05 3.55	3.75 4.25	6.60 6.95	7.65 8.00	8.70 9.05	10.8 11.2	17.5 21	20 23.5	25.0 28.5	30.0 33.5
Rotor inertia w/o brake (with brake)	kg*cm <sup>2</sup>	0.56 1.17	0.76 1.36	1.10 1.70	1.50 2.10	3.74 5.46	4.70 6.40	5.64 7.40	7.50 9.30	40	50	70	90

Parameter	Unit	5DVM215				5DVM300					
		A				S	M	L	S	M	L
Pull-out torque, Mdo	Nm	23				35	47	70	100	130	170
Rotation speed, n max	rpm	1000; 2000; 3000; 4000				1000, 2000, 3000					
Length w/o brake (with brake*)	mm	407 457				457 507	507 557	582 632	636 703	686 753	786 853
Length with angular transducer **w/o brake (with brake)	mm	494 544				544 594	594 644	669 719	744 811	794 861	894 961
Weight w/o brake (with brake)	kg	32 37				42 47	47 50	65 70	125 135	145 155	165 175
Rotor inertia w/o brake (with brake)	kg*cm <sup>2</sup>	100				150	200	275	375	470	655

\* The brake provides a torque of at least Mdo

\*\*Motor shaft diameter for connecting the converter coupling 5 mm

## UIN-3000M



### Description

UIN-3000M is a pulsed process unit designed for

- magnetization to technical saturation
- demagnetization to a specified level of high-coercivity permanent magnets.

The operating principle of UIN-3000M is based on the open magnetic circuit method in combination with a pulsed magnetic field created by discharge of a capacitive energy storage device to a special solenoid (inductor), manufactured according to the Customer's specifications and included in the delivery package.

### Main technical features:

- Power supply: 220 V AC, 50 Hz.
- Maximum charge energy of the capacitor bank: 32 kJ.
- Capacity of the capacitor bank (energy storage device): 7200 mF.
- Maximum charge voltage of the energy storage device: 3000 V.
- Standard sizes of magnets: prisms, cylinders, rings, segments.
- Magnet material: barium, strontium anisotropic ferrites, permanent magnets on rare earth materials (CS-37, CS-25, NdFeB, etc.).
- Weight: max. 700 kg.

The control system of UIN-3000 unit is made using OVEN controllers.

## Maintenance, testing and commissioning department



### Description

The test complex includes a whole park of bench equipment which allows to carry out loading, acceptance, qualification, periodic and other tests of all possible operation algorithms of converter equipment in close to real-life conditions.

### Main technical features

Multifunctional testing complex is designed for testing of the following devices:

- power up to 1.5 MW inclusive at rated load on the motor (continuous load with rated current)
- power up to 17.5 MW at rated power (continuous load with rated current at rated output voltage).

Two lines with voltage of 6 kV with a total capacity of 3.5 MW, one line 0.4 kV, 1000A are available.

Switching of supply voltages to power transformers and stator windings of asynchronous motors is carried out via switchgear KSO-202VM with BEMP protection relays and KSO-306.



### The range of services includes:

- installation supervision and commissioning
- warranty and post-warranty service of CHEAZ equipment
- testing of third-party equipment
- maintenance of third-party equipment
- training for the Customer's specialists on site
- comprehensive technical support.

Our employees have high professional qualifications, all necessary permits for installation supervision and commissioning at the customer's facilities.



# SERVICES



# SERVICES

CHEAZ provides warranty and post-warranty services for the supplied equipment.

## Advantages of cooperation with CHEAZ:

- General contracting, supervision and commissioning.  
Engineering departments of CHEAZ provide a comprehensive approach to construction and upgrading of the customer's facilities.



- Hardware upgrade, retrofitting  
Due to extensive experience and a catalogue of technical solutions, CHEAZ is ready to implement even the most complex projects to upgrade and replace the old equipment from Russian and foreign manufacturers.
- Repair and maintenance of equipment.
- In case of emergencies related to the equipment you can contact our technical specialists. If repair cannot be done by the maintenance staff, our specialists will arrive at the facility as soon as possible with the necessary spare parts.
- Training for the personnel.
- Every year we organize seminars and have advanced courses at CHEAZ Resource Center which is licensed by the Ministry of education of the Russian Federation, or our specialists can organize them at the Customer's facility.
- Training is provided by technical specialists involved in the development and engineering of the equipment.

## Industrial chair of Chuvash State University at CHEAZ



The capabilities of any enterprise are determined by the human resources. Since its foundation CHEAZ has paid great attention to the training of specialists, preserving the tradition of mentoring, apprenticeship, and stimulating professional growth of the employees.

Systematic work in the field on training of personnel and professional development of specialists is carried out at a new large-scale level.

In 2014 the Industrial Chair of Chuvash State University was founded at CHEAZ and since that time close relationship between the oldest engineering enterprise and leading university of the republic has transformed into a new form of cooperation. The university and CHEAZ conduct joint projects in the field of training with targeted funding for the development of educational and teaching facilities. The university has created laboratories of enterprises of the innovative electrotechnical cluster of the Chuvash Republic which are equipped for practical training. An integrated environment has been formed that combines production, research, and education, and facilitated high-quality training, selection and career guidance for students.

Working in a productive tandem, using the created sites with the latest laboratory equipment, CHEAZ and the university organize seminars on the possibilities of extended education for specialists of electricity companies.



### Main activities of the Resource center:

vocational guidance for school and university students

training, advanced courses for the personnel

educational services, expert training for specialists of the customers who are engaged in engineering and operation of power facilities.





Educational workshops about CHEAZ microprocessor-based and digital protection relays and automation devices have become common practice. Any complex equipment requires specialized courses. Employees of CHEAZ R&D Centre and Relay Protection Division organize fee-based and free, stationary and off-site specialized seminars for our customers with duration up to 80 academic hours.

The experience accumulated throughout 77 years of the company's history in development of electromechanical relay protection and automation devices allows the company to carry out unique courses on operation of electromechanical protection panels.

The company produces specialized equipment - training simulator cabinets and panels which allow operating personnel of enterprises to practice their professional skills.

Licensed educational services also provide for the development of specialized programs for the companies that wish to train their specialists.

Development and launching of new products in CHEAZ Group is performed in cooperation with other universities, Kazan State Power Engineering University, Ufa State Oil Technical University among them. Participation in tenders for state grants, creation of industrial chairs of universities at the enterprise, exchange of information in various scientific and technical area enable the company to launch modern products.





# Licenses and certificates



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