ELECTROSHIELD
SAMARA
Powering your future

KRU-SESH-70

COMPLETE SWITCHGEAR OF INDOOR INSTALLATION FOR VOLTAGE OF 6(10); 20 kV

voltage: medium

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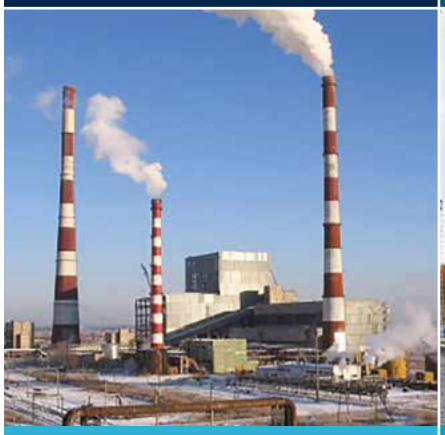
See more detailed information in TI-201-2018, TI-202-2018 at website: www.electroshield.ru

SCOPES OF APPLICATION OF KRU-SESH-70

Generation

Grid companies

Oil and gas extraction and processing



Industrial enterprises

Urban networks

Russian Railways

The products contained in this catalogue are manufactured using the certified management system ISO9001. The certificate is issued by Bureau Veritas Certification Holding SAS - UK Branch.

DESIGN FEATURES

KRU-SESH-70 of 10 kV

KRU-SESH-70 of 20 kV

KRU-SESH-70 one-sided maintenance complete switchgear with a cassette type switch in the middle part of the cabinet. Long-term working experience with design and installation organizations is taken into account when developing KRU-SESH-70.

KRU-SESH-70 is designed to receive and distribute electric energy of AC three-phase current with rated voltage of 6(10), 20 kV and current of 630-4000 A with frequency of 50 Hz.

Product advantages:

- reliability
- safety
- ease of maintenance
- wide range of options

Advantages	Design features
Reliability	All the main components (a switch, current transformers and voltage transformers, insulators, microprocessor protection) have been made in Electroshield Samara
Ease of maintenance	• Switch arrangement in the middle part of the cabinet provides: - operational convenience with cable harnesses and transformers; - easy access to the secondary wiring; - single-sided maintenance; - kinematic diagram simplification; - dimensions and weight reduction; - operation reliability improvement. • Earthing switch is located close to the front side and its energized blades are well seen through the windows in the door. • Easily accessible voltage transformer at the input. Voltage transformer with built-in fuses is installed on the folding bracket in the front part of the linear connection section • Control panel is on the front side door of the circuit breaker section. • The main control elements and meter are placed on the panel at the level of human eyes.
Safety	• Operation of KRU main apparatus (withdrawable element, switch, earthing switch) is remote with local manual control redundancy. • Bushing insulators or a composite insulating partition localize the arc inside the cabinet. • Only direct phasing A-B-C in cubicles. • Voltage presence indication.
Wide range of options	4- and 5-winding current transformers (TSHL) with sealing of the measuring circuits. Optionally: • increased cable harness section applying through-type current transformers; • high reliable non-contact sensors instead of limit switches; • allowable temperature rise alarm on the cabinet busbar arrangement.

TECHNICAL PARAMETERS

Parameter description	KRU-SESH-70-10	KRU-SESH-70-20
Rated voltage, kV	6; 10	15; 20
Rated frequency, Hz	50	50
Rated current of main circuits, A	630; 1000; 1250; 1600; 2000; 2500; 3150; 4000[1]	630; 1000; 1600; 2000; 2500
Rated current of collecting buses, A	1000; 1600; 2000; 2500; 3150; 4000[1]	1000; 1600; 2000; 2500
Rated breaking current of switch built in KRU, kA:	20; 31,5; 40 ; 50	16; 20; 25
Short-time withstand current, kA[2]	20; 25; 31,5; 40; 50	16; 20; 25
Short-time electrodynamic current, kA	51; 81; 128	51; 64
Protection degree of enclosures as per GOST 14254-96 in operating condition	IP30, IP31, IP40, IP41	
Climatic version and placement category as per GOST 15150-69	U3	
Earthquake resistance on MSK-64 scale, points	9	
Overall dimensions width depth of ordinary cabinets on the base, layout height	 650[3]; 750[4]; 1000 1349 2415; 2650[5]	 750; 1000 1599 2400
Weight of cabinets, kg	1100-1500	1400-1800
Maintenance variants	With single-sided operating maintenance With single-sided technical maintenance With double-side technological maintenance	
Type of draw-out elements drive	Manual, electric	
Earthing switch drive type	Manual, electric[6]	

1. *With forced ventilation in the cabinet.*
2. *Cable line cabinet for currents up to 1,250 A and short-time withstand currents up to 25 kA with VVE-SESH and up to 31.5 kA with VVE-SESH.*
3. *For cabinets for currents up to and including 2,000 A with VVM-SESH up to 1,250 A 31.5kA.*
4. *When installing forced ventilation of the cabinet (4,000 A and cabinets with TSN-63 kVA) and cabinets with increased height of the relay section.*
5. *When installing forced ventilation of the cabinet (4,000 A and cabinets with TSN-63 kVA) and cabinets with increased height of the relay section.*
6. *Installation possibility of the earthing switch electrical drive in specific cabinets shall be clarified in design departments in Electroshield Samara.*

BUILT-IN EQUIPMENT

Equipment type	KRU-SESH-70-10	KRU-SESH-70-20
Vacuum circuit breaker	VVU-SESH, VVM-SESH, VVE-SESH	VVU-SESH
SF6 circuit breaker	LF-1, LF-2, LF-3	–
Current transformers	TOL-SESH-10, TSHL-SESH-10	TOL-SESH-20
Zero sequence current transformers	TZLK(R)-SESH	
Zero sequence transformers	CSH120, CSH200	
Voltage transformers	NALI-SESH-10, ZNOL-SESH-10, NOL-SESH-10	ZNOL-SESH-20
Auxiliary transformers	OLS-SESH, TLS-SESH	–

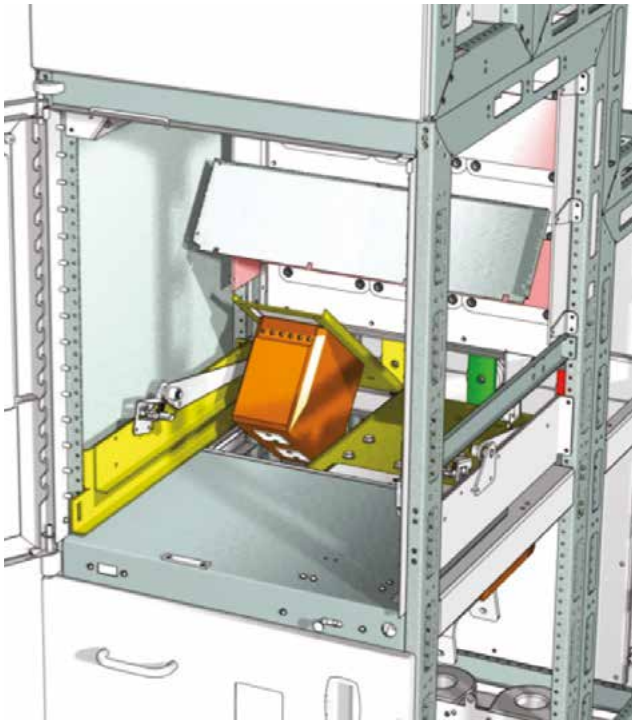
Full list of equipment used in KRU-SESH-70 is provided in the technical information on the website http://electroshield.ru

FEATURES OF DEVICE

In KRU-SESH-70-20, current transformers are installed on the rear wall of the cabinet. For the access to their initial contacts, it is required to remove the easy removable horizontal partition and metallic cover of the vertical panel.

For the access to the secondary wiring, it is not necessary to reach the transformers as the secondary contacts are connected with a 5-meter length cable and connected to the terminals inside the relay section.

In KRU-SESH-70-10, current transformers are fixed on the plates in the middle part of the cabinet and suspended with the primary leads downwards. Herewith, the access to the primary leads is easily performed through the door of the linear connection section. For the access to the secondary leads, it is required to roll out the withdrawable element from the cabinet on the instrument trolley and remove the window cover – terminal block is located below.



Dismantling of current transformers in KRU-SESH-70-10

To replace the transformer, it is required to remove the vertical panel part and, having disconnected the CT, take it out on the horizontal panel in the withdrawable element section (see figure). It should be noted that, with low transformation ratios and high thermal resistance, it can be impossible to produce current transformers with terminal blocks on the CT, that is why, the cable outlet is used, similar to KRU-SESH-70-20. Upon the request, all CT can be produced with the cable outlet. Cable is repairable in case of accidental damage or break. KRU-SESH-70 is the single-sided device of prompt service. All prompt switching, access to the VE compartment, linear connection to the relay cabinet are made from the front side. At the request of the customer, the cabinets can be also operated and with the double-sided maintenance. For taking the circuit breaker out of service for repair, drive repair, access to the secondary circuits of the current transformers, cabinet repair, cables connection the instrument trolley is used.

For taking the circuit breakers out of service for repair, also for circuit breakers for high rated currents, it is recommended to use the instrument trolley with the lifting mechanism allowing to lower the circuit breaker down on the floor. It can be ordered additionally.

In other cases, the folding light instrument trolleys are used with the help of which the circuit breaker is rolled away from the cabinet. Normally, 2 trolleys are supplied for each section. Some diagrams of KRU-SESH-70 cabinets having the busbar, linear and additional connections are designed only for the double-sided technical maintenance.

KRU-SESH-70 of 10 kV version for replacement of the old cubicles

For reconstruction, there is a special version of cubicles with current transformers combined with a low bushing insulator that allows to lift the cable harness point 700 mm above the floor. A special cabinet is designed for rated current up to 1,600 A and single-sided or double-sided maintenance. The width of the cabinet is 750 mm. (see figure).

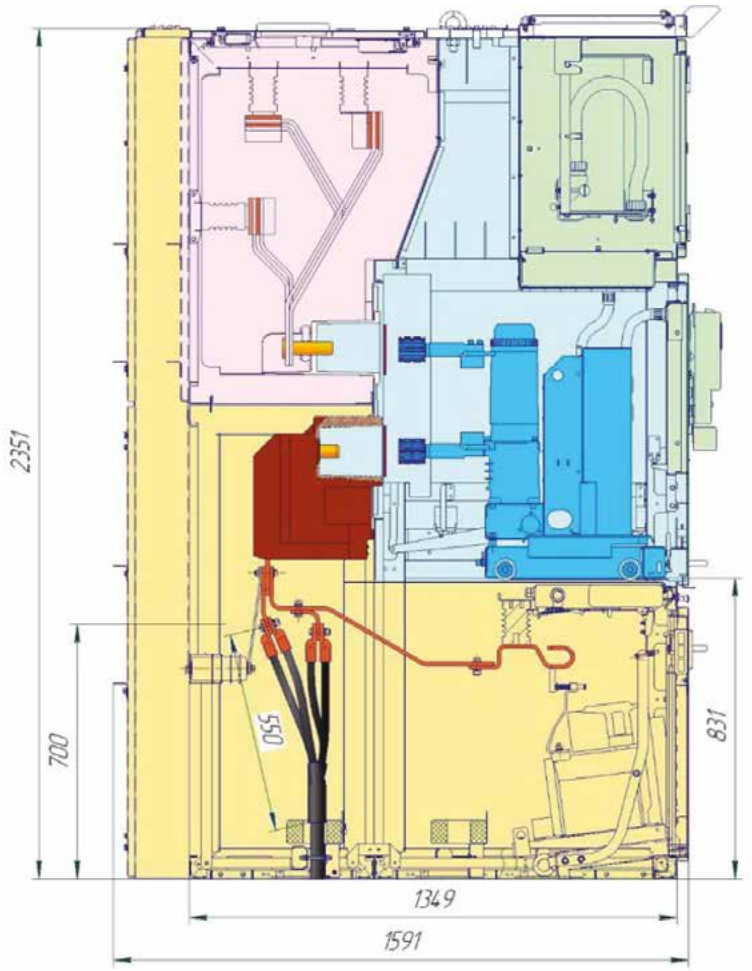
Busbar bridges and busbar inputs

If required the input in KRU-SESH-70 cabinets with busbars, busbar inputs that are connected to the cabinet with the busbar lift installed instead of the rear wall can be used. Busbar input is made in the lower part of the cabinet. The busbar lift is fixed with the cabinet carcass and not rested on the floor; therefore, the embedded elements for the cabinet with a busbar input are the same as also for the other cabinets. The sectioning with a busbar bridge and connection with collecting buses are performed similarly. The busbar inputs and the bridges block the room and are hazardous elements of the switchgear, therefore, it is recommended to make input and sectioning with a cable

Control wiring trays

In KRU-SESH-70 cabinets, the built-in trays for laying of control and power cables of secondary connections are used. These trays are located in the upper part of the relay cabinet and have the hinged cover providing the free access to cable laying. The conduit section inside the trays is 78x401 mm. Inside the conduit, there is a metal partition for separation of control and power cables. These trays are the integral part of the cabinet design and allow not to use the hanging trays inside KRU section. For connections between the sections or for the routing to the freestanding equipment beyond the sections, it is required to use the hanging cable trays.

Control cables are supplied through the bottom on the left wall close to the front side and (or) through the tray on the roof of the relay cabinet.



Layout of KRU-SESH-70 of 10 kV with the increased cable harness section and TPL-SESH current transformers.

LAYOUT AND DESIGN OF KRU-SESH-70 CABINETS

KRU-SESH-70 cabinet is a frame-modular structure consisting of several modules, assembled with the help of coupling elements.

The cabinet is divided with partitions into 4 sections:

- linear connection section
- withdrawable element section
- collecting buses section
- relay section

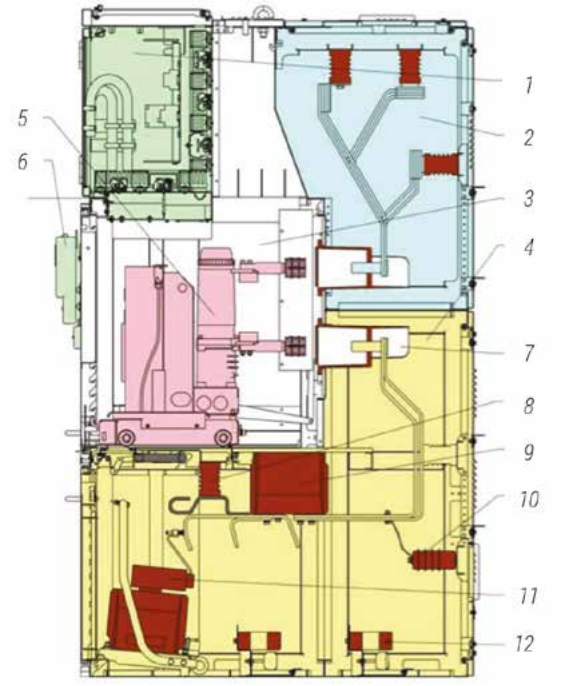
The front side of the cabinet is formed with three doors:

- the upper door – relay section door
- the middle door – withdrawable element section
- the lower door – linear connection section

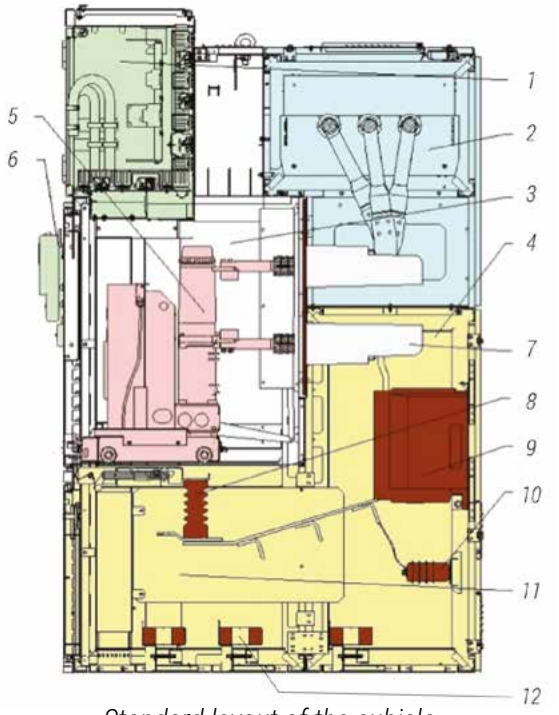
The middle and the lower doors (high-voltage sections doors) provide fault localization in case of arcing short circuit in the cabinet.

Collecting buses are located in general (6-10 kV) for the cabinets of the same compartment section and placed in the upper rear part of the cabinet. The access to this section is made through the roof or the withdrawable element section.

The withdrawable element is located in the middle part of the cabinet and separated from the linear connection section and the collecting buses section by a panel with bushing insulators. From the linear connection section, a removable metal panel separates the switch.



Standard layout of the cubicle KRU-SESH-70 of 10 kV



Standard layout of the cubicle KRU-SESH-70 of 20 kV

1 – relay cabinet;
2 – collecting buses section;
3 – withdrawable element section;
4 – linear connection section;
5 – circuit breaker on the withdrawable element;
6 – control panel and meter;
7 – bushing insulators;
8 – earthing switch;
9 – current transformers;
10 – overvoltage suppressors;
11 – voltage transformer (for KRU-SESH-70 of 20 kV are not shown);
12 – ZSCT - zero sequence current transformer.

The diagrams of main circuits of KRU-SESH-70 can be found on the company website: http://electroshield.ru

Busbar arrangement of KRU-SESH-70-10 cabinet is made with copper or aluminum busbars. Aluminum busbar arrangement is used for currents up to 1,600 A. In case of necessity to apply copper busbars in cabinets for currents up to 1,600 A, it is required to indicate it in the questionnaire. Assembly buses from aluminum can be made up to and including 3,150 A.

The combination of KRU main circuits from aluminum and copper busbars is possible. For example, copper assembly buses and aluminum busbar arrangement of the cabinet. Assembly buses and busbar arrangement of the cabinet can be isolated upon the customer's request (except bolted connections). KRU-SESH-70-20 has always assembly buses in solid heat shrinkable insulation.

Cabinet ventilation is made through the louvers made in the rear wall and overpressure relief valves. For ventilation and valves operation, it is required to ensure the distance not less than 100 mm from the bearing wall to the rear wall of the cabinet. For this reason, when installing KRU-SESH-70 near the wall made of combustible material and away from the wall, it is required to order the casing with the depth of 170 mm for rear walls of the cabinet.

The cabinets of 6-10 kV with rated current of 4,000 A and cabinets with TLS-63 kVA are equipped with the forced ventilation, their height is increased up to 2,650 mm.

The withdrawable element is located in the middle part of the cabinet and consists of the electric drive fixed on the frame and a carriage with high-voltage equipment. The carriage travel is 200 mm (for 10 kV) or 250 mm (for 20 kV). For adjustment and emergency works, it is allowed the manual drive of the carriage with the detachable handle.

Metal horizontal partition under the withdrawable element is made as a detachable one for easy access to the linear connection section. In the standard version up to 6 three-core or 18 single-core cables with zero-sequence current sensors can be placed in the linear connection section.

In the same section on the folding bracket instrument voltage transformers of ZNOL or NALI type (VT at the input, line) with built-in fuses can be fixed. The quantity of three-core cables can be increased up to 9 without possibility to install VT at the input.

A small-size relay section with a swiveling block is used in KRU-SESH-70. For ease of maintenance of the relay section with KRU, a light portable platform with a height of 400 mm is supplied. The connection between the cabinets is provided by the trays on the roof of the relay section.

The shutter mechanism is for linear movement with movement of shutters in vertical direction. In the control position of the withdrawable element, the shutters are closed.

The earthing switch is located in the front part of the linear connection section; its energized blades are clearly seen through the door window. The earthing switch drive is made with a screw gear; the control socket is located on the front side. To operate the earthing switch, it is possible to install the electric drive.

In KRU-SESH-70 cabinets, support-type current transformers (up to and including 2,000 A) of TOL-SESH type are used and bushing-type current transformers of TSHL-SESH type are used for the currents more than 2,000 A.

The arc protection of the cabinets is recommended to make on fiber optic sensors, that ensures reliable actuation with minimum short-circuit through arc currents. In the standard version of cabinets, the optical probes are located in three sections: withdrawable element section, collecting buses section and linear connection section. The connection of the sensor for the busbar bridge to the block Duga-0 is possible and indicated in the questionnaire.

HV sections have overpressure relief valves. The valves of withdrawable element and collecting buses are opened up.

The valve of the linear connection section is opened backwards, therefore, for its normal operation the space not less than 100 mm from the rear wall of the cabinet to the wall is required. If there is the switchgear maintenance corridor the protective casing is produced that extracts the emissions towards the roof and prevents the access to the live parts. Overpressure relief valves can be equipped with the position sensors – limit switches.

SERVICE SOLUTIONS

Electroshield Samara provides a warranty and post-warranty service of its own manufactured equipment, as well as modernization of the obsolete equipment of other manufacturers.

The aim of the service team is to provide the complex service support and safe, effective equipment usage.

Advantages of Electroshield Samara:

- **Installation supervision and commissioning works**

The specialists of Electroshield Samara make the efforts to implement the project as efficiently as possible and deliver it on time.

- **Inspection and modernization of equipment**

At the stage of reconstruction of switchgears, the specialists of Electroshield Samara are ready to inspect, develop recommendations and implement a project for modernization (replacement) of obsolete equipment based on solutions of the equipment manufactured by Electroshield Samara.

- **Restoring to working condition**

Specialists of Electroshield Samara provide the necessary measures to restore the equipment operability to the specified performance characteristics.

- **Personnel traineeship**

Highly qualified personnel is one of the key factors of reliable operation of equipment. The set of training programs and their practical orientation will help the personnel to operate correctly and safely.

- **Spare parts supply**

For repair and quick recovery of equipment operability, availability of spare parts has great importance. The specialists of Electroshield Samara developed the extended sets of SPTA. They can be purchased together with the equipment or separately.

- **Equipment repair**

For inspection of equipment and performing repair works, service engineer promptly visits the site.

Answers to your questions can be obtained at our website: www.electroshield.ru

443048, Samara, Krasnaya Glinka, Electroshield Samara
+7 (846) 2 777 444 | info@electroshield.ru

http://electroshield.ru