

**Electronic
Information
Systems**

POWER LINE COMMUNICATION EQUIPMENT

CATALOGUE 2024

EIS was established

1992

1993 – 1996

- Control and measuring instruments were developed and produced.

1998

1999

- Industrial controllers KSO were released.
- Software and hardware complex "Citron" was implemented for the first time.

2001

2005

- Coupling filters FP were first produced at EIS.
- SCADA for energy systems was implemented.

2008

2009

- Automatic long-distance communication equipment ADASE-BK for energy systems was first produced. EIS developed this new product line to be compatible with modern technological advances in this field.

2010

2012 – 2013

- EIS developed and implemented the systems for remote monitoring and control of the objects such as water pump stations, the stations for cathodic protection of the pipelines using the transmission lines (6–10 kV) on the basis of Pylon system.

2014

2017

- The Industry Control System PYLON-R was designed and implemented.

2018

2020

- New-type line traps were tested. A universal equivalent for the new line traps was developed.

2021

2022

- Monolithic and innovative line traps are mass produced.

2023

- First line traps VZ for rated currents of 630, 1250, 2000 A were manufactured.

- Tuning devices for line traps were produced.

- Complex allowing to communicate via 10 kV long-distance power lines was developed and implemented.

- EIS began to produce the terminal boxes ShON and decoupling devices.

- Filter ShON has been manufactured. The new product performs the functions of the filter as well as the voltage arrester equipment. The remote control systems for a mobile gas turbine power plant of PAES-2500M type were implemented at Gazprom. The system of remote monitoring and control of pipeline crane via radio channel with autonomous power supply "SDKU-RK" was put into pilot operation at Gazprom.

- Dry-type reactors were produced for the first time. The innovative construction of the line trap was designed.

- Dry-type reactor was tested.

- It is planned that dry-type reactors will be certified and included into the list of official equipment for PJSC ROSSETI.

COMPANY BACKGROUND



CJSC "Research and Production Enterprise "Electronic Information Systems" (EIS) was founded in 1992. The company is an engineering, software development and technical research company, specializing in providing turn-key automation and monitoring solutions. The of EIS' activities includes engineering new technological processes, the design and manufacturing of devices, and monitoring and control systems in the following industries: power, oil and gas, chemicals, petrochemicals and metallurgy. Our aim is to manufacture high quality products and to be a reliable partner exceeding all customer expectations.

Key facts

- More than 100 highly qualified specialists work at the company.
- The company manages 5 production workshops with over 4,000 sq meters of production, assembly and testing facilities across the 10 internal departments.
- During 30 years the company has automated more than 200 control complexes of gas pumping units, supplied more than 15000 line traps, more than 10 000 coupling filters.
- Our quality management system is certified according to ISO 9001-2015.



Directions

One of the key EIS' working directions is development and manufacture of the PLC equipment (line traps, tuning devices for line traps, coupling and decoupling devices), intended to transmit the telemetry signals through PLC lines. The company plays an important role in the Russian market of PLC equipment, manufacturing 60 different customized line traps, being the only Russian manufacturer of the tuning devices of new generation. Moreover EIS develops SCADA and Data Acquisition Systems to monitor and control the technological processes in the following industries: power, oil and gas, chemicals, petrochemicals and metallurgy. The company designs and manufac-



tures a wide spectrum of devices for the monitoring and regulation of electric and non-electric values (temperature, pressure, flow rate etc), rating transducers, supply units, flame monitoring devices, and temperature sensors.

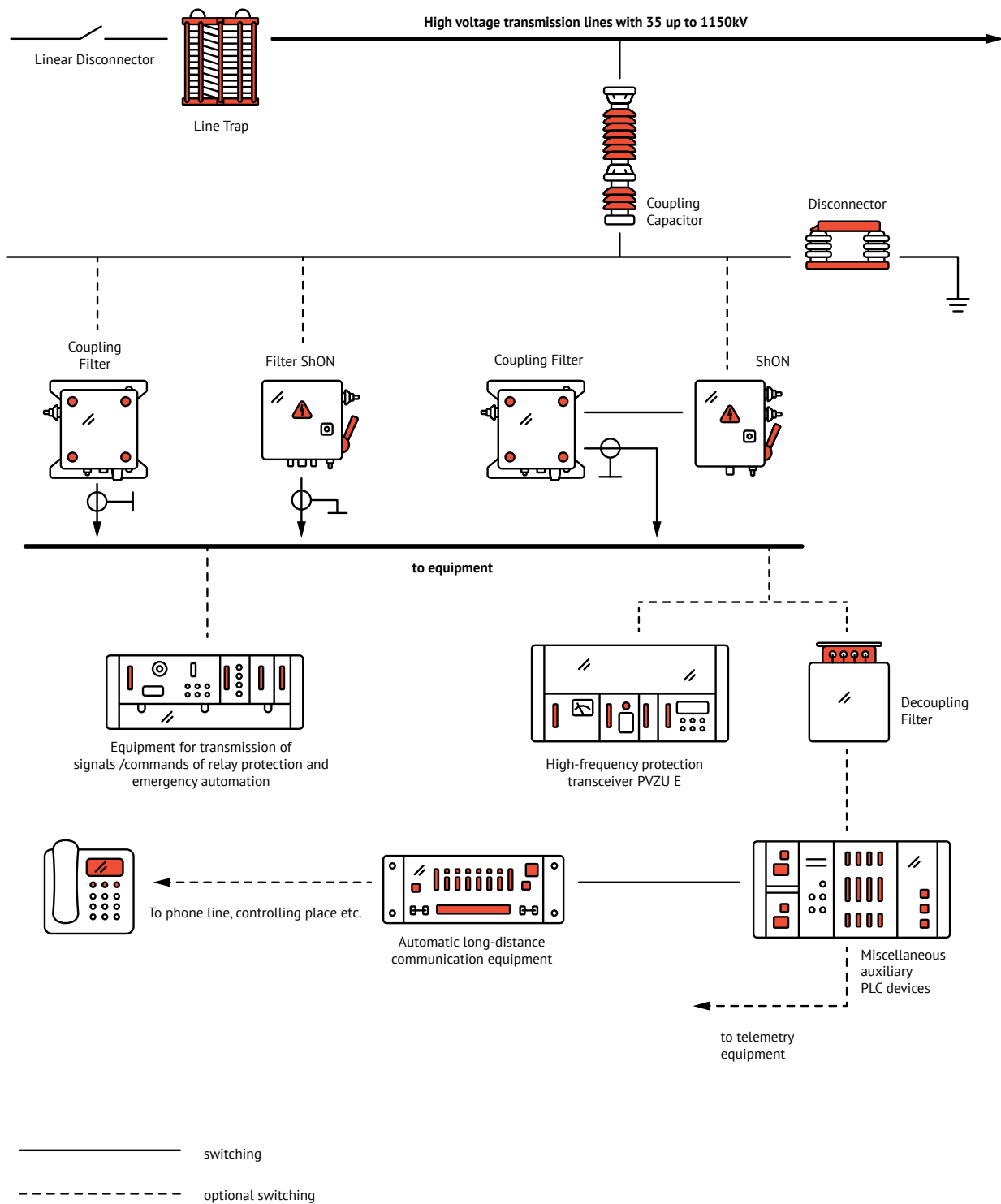
Our advantages

EIS specializes in providing turn-key automation and monitoring solutions. The areas of focus include: automation and control solutions for the oil and gas industry and control solutions utilizing the transmission of data over high voltage power lines: exploratory design; research and design work; environmental survey; engineering; manufacture and delivery; assembly and commissioning; after-sale service; overhaul.

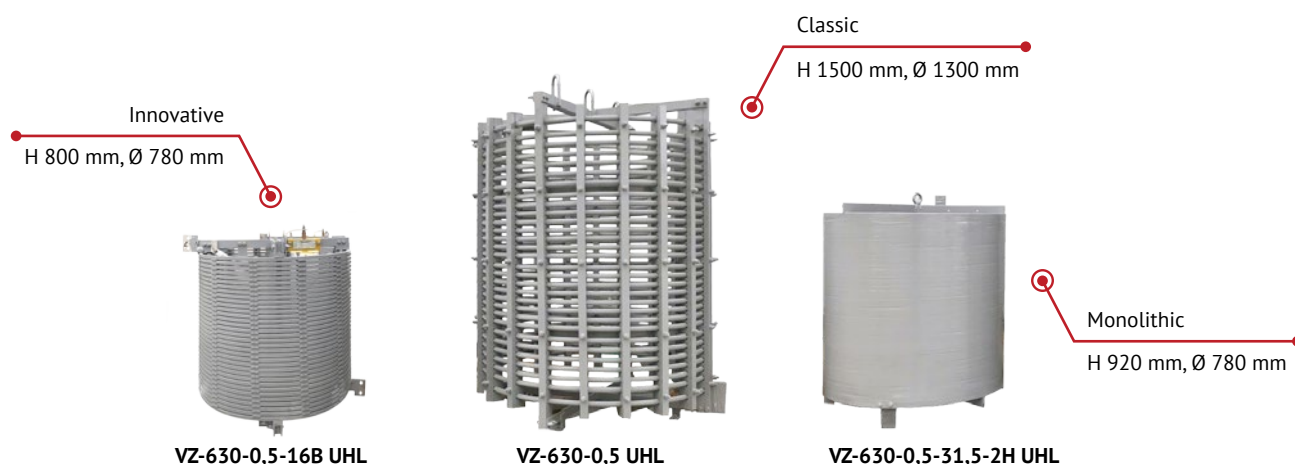
Customer benefits

The new patented constructive-technological solutions are used while developing the equipment. We are constantly working to modify the existing equipment and to develop the new types. The complex systems are built thanks to our successful development and joint work with our partners. Packaged supply of PLC equipment is the important area of our activity. We have more than a 30 year history of delivering fully integrated projects for our clients. Our PLC equipment has the best ratio of price and quality in Russia. Our engineering and technology solutions are well proven, meet the European quality standards and to the standards of PJSC Rosseti, the Russian energy operator. We have a broad portfolio of customizable solutions, which includes the Russian largest companies such as PJSC Gazprom, PJSC "Rosseti", PJSC "RusHydro", JSC "Concern Rosenergoatom".

PLC DIAGRAM (EXAMPLE)



LINE TRAPS VZ



Purpose

The line traps are used to attenuate the switching effects of high-voltage lines and equipment as well as to prevent signal losses (signals for remote control, voice communication, remote metering) transmitted along high-voltage lines (6–1150kV).

The line traps are filter-barriers, mounted in-line on phase conductors and could be configured for certain attenuation band range (16–1000 kHz).

Line traps can also be used to ground the cables in case PLC channels use stand-alone lightning protection cables.

Line traps characteristics

Main parameters of the line traps are as follows:

- blocking impedance;
- frequency bandwidth;
- continuous rated current;
- rated short-time current;
- emergency overload current;
- main coil inductance;
- class of transmission lines.

IEC 60353 and STO 56947007 (Russian Standard) have set the following values for transmission lines resistance, blocking impedance, continuous rated current.

Values of transmission lines resistance 35–750 kV

Trans- mission lines' rated voltage, kV	Transmission lines' resistance / Line trap blocking impedance, not less than						Continuous rated current of line traps (recommended IEC, STO)
	Phase-to- Earth	Phase- phase*	Two phases - Earth*	cable-Earth	Cable- cable*	Two cables - Earth*	
35 kV							100, 200, 400, 630 A
110 kV	450/640 Ohm	400/570 Ohm	540/770 Ohm				400, 630, 800, 1000, 1250 A
220 kV							1000, 1250, 1600 A
330 kV	330/470 Ohm	300/430 Ohm	400/570 Ohm				1600, 2000, 2500 A
500 kV	310/440 Ohm	275/390 Ohm	370/525 Ohm	550/780 Ohm	480/680 Ohm	550/780 Ohm	2000, 2500, 3150 A
750 kV	280/400 Ohm	250/355 Ohm	340/485 Ohm	550/780 Ohm	480/680 Ohm	550/780 Ohm	2000, 2500, 3150, 4000 A

* for each phase (each cable)

IEC and STO recommend the following values of the main coil inductance (mH):

0,2 – 0,25 – 0,315 – 0,4 – 0,5 – 1,0 – 2,0

IEC and STO recommend the following values for the short-time current and emergency overload current

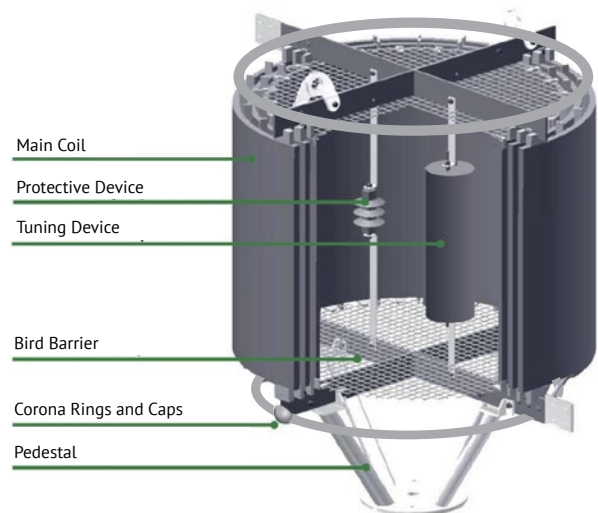
Peak values of rated continuous and overload current

Rated continuous current of the line trap (actual)	Rated continuous current (actual)		Emergency overload current (peak value)	
	Series 1	Series 2	Series 1	Series 2
100 A	2,5 kA	5 kA	6,38 kA	12,75 kA
200 A	5 kA	10 kA	12,75 kA	25,5 kA
400 A	10 kA	16 kA	25,5 kA	40,8 kA
630 A	16 kA	20 kA	40,8 kA	51 kA
800 A	20 kA	25 kA	51 kA	63,75 kA
1000 A	25 kA	31,5 kA	63,75 kA	80,33 kA
1250 A	31,5 kA	40 kA	80,33 kA	102 kA
1600 A	40 kA	50 kA	102 kA	127,5 kA
2000 A	40 kA	50 kA	102 kA	127,5 kA
2500 A	40 kA	50 kA	102 kA	127,5 kA
3150 A	40 kA	50 kA	102 kA	127,5 kA
4000 A	63 kA	80 kA	160,65 kA	204 kA

Construction

Main components:

- Main Coil is used to carry rated continuous power frequency currents of transmission lines with the line trap.
- Protective Device is used to protect the main coil and tuning device from over voltages occurring on lines and distribution devices of substations (atmospheric and switching over voltages, from short circuits);
- Tuning Device (together with the main coil) is used to adjust the blocking frequency or bandwidth i.e. the frequency range over which the line trap can provide a certain specified minimum blocking impedance or resistance. Sometimes the line traps are supplied without the tuning devices depending upon the special requirements.



Accessories:

- Bird Barrier;
- Corona Rings and Corona Caps;
- Pedestal for vertical mounting.

MAIN COIL

The main coil (single-layer or multi-layer) is an inductor coil, its winding (typically aluminum or copper) is placed on the frame (rack-based, cylindrical, etc.) from the well-proved insulating material. The main coil has high mechanical strength withstanding the short circuit currents (maximum values are indicated in table), working reliably during the long-term life cycle (up to 30 and more years) under harsh weather conditions.

The reactor coil is made from good insulating and high mechanical strength material.

Being an outdoor equipment the line trap should be designed to withstand the climatic and other environmental conditions (temperature, humidity, salt fog, ice, solar radiation, air pollution etc.)

The frame of the coil is made of composite materials.

The main coil the special surface (usually multi-layer) protecting from bypassing happened due to the ice coating, active (particularly contaminated) atmospheric precipitation, metal items accidentally fell on the coil conducting surface.



TUNING DEVICE

The tuning device is used to adjust together with the main coil the necessary blocking frequency or bandwidth.

The tuning device, depending on the desired frequency bandwidth could be either damped single frequency, double frequency or wide band tuned.

The manufacturer calculates and sets the frequency range individually for each customer.

According to the customer's specifications the tuning device can be made for any frequency range, with an accuracy of 0.5 kHz in frequency range from 16 to 1000 kHz.

Due to the unique scheme, design, types of materials, components and technologies of the tuning device the line trap could withstand the overvoltage caused by:

- the nominal short-term current see item 19.3.2 IEC 60353;
- atmospheric impacts (lightning) see item 19.3.1 IEC 60353;
- other effects see items 4.3 and 5.2 IEC 60353.

The warranty period for the tuning devices is 5 years.

Lifespan is 20 years.

"Electronic Information Systems" is ready to produce the customizable tuning devices (their specifications are available upon request):

- to ensure the blocking frequency for two, three or more bands:
 - universal, for the line traps of different classes and manufacturers;
 - tunable, with possibility to change the blocking frequency range;
 - universal and tunable, combined product;
- for all kinds of the line traps utilized in Russia at the moment.

Rating plate of the tuning device

EN-X-XX XXX XXXX (XXX-XXXX),

EN – tuning device (Russian abbreviation);

X - rated continuous current, A;

XX - main coil inductance, mH;

XXX – type;

- *UD - enhanced dynamic performance;*
- *D - IEC 60353 Series 2 (Series 1 default);*
- *M - small-size version;*

XXXX – climatic type according to GOST 15150-69 (Russian Standard);

(XXX-XXXX) – frequency bandwidth, kHz.

Example for order

EN-630-0,5 UD UHL1 (160-1000)

PROTECTIVE DEVICE

As a protective device we use the non-linear surge arresters.

Non-linear polymer housed surge arresters are designed to protect the tuning device against atmospheric (lightning) and switching over voltages.

Hermetically-sealed polymer housed varistors are the main elements of the surge arresters.

Its operation is based on a highly nonlinear current-voltage characteristic of the varistors.

The varistors have an electrical resistance that varies with the applied voltage: at operating voltage the active currents flowing through the varistors do not exceed 10 μ A, while at over-voltage they could reach hundreds or thousands of amperes.

Customer benefits

Many types of the line traps are produced (about 60) which have:

- different rated current;
- various inductance;
- different rated short-time current values.

Line traps with non-standard frequency band

- including the range from 16 to 24 kHz;
- two-, three- and multi-frequency bandwidth.
- Bandwidth Ranges $R_a > 1000 \text{ Ohm}$

Relatively small dimensions and light weight give:

- great opportunities to install the line traps directly on the coupling capacitors and switchgears;
- advantages during overhaul and repair when the old line traps could be replaced by the new ones without changing the whole PLC system.

INNOVATIVE LINE TRAP

Innovative design and technological ideas were implemented in the development and production of the new line traps.

Design

- Significantly reduced losses and improved frequency characteristics as there are almost no bolts in construction.
- No operations associated with the production of "ridge-shaped" rail (only cutting is used during machining of the reinforced plastics).
- A wire of rectangular cross-section is used.
- Elements made of fiberglass plastic with improved mechanical characteristics and heat resistance insulation class "H" are widely used in the construction.
- Due to the reduced dimensions, the wind load is reduced, and the wind less moves the line trap relative to the center of mass to the level that protects from fracture at the point of connection of the phase wire to the contact plates.



Advantages

- **Energy saving technologies.** Reactor power losses are reduced by 20–25%.
- **Resource-saving technologies.** Reduced size and weight by 50–70%.
- **Reduced environmental pollution.** Waste-free technologies of processing composite materials.
- **Improved performance and reliability.** Thanks to the introduction of manufacture technologies of open and closed type reactor with the use of composite insulating, the variability in the types of barriers has been increased, including barriers with the ability to operate at above-normal continuous currents and above-normal operating temperatures, with increased resistance to short-circuit currents, barriers with increased resistance to short-circuit currents, and line-traps with increased resistance to short-circuit currents, line traps for operation in difficult climatic conditions (tropics, high mountains, sea fog, etc.).
- **Reduction of dimensions and weight** has significantly changed the cost of suspension and support structures designed for installation of the line traps, structures designed for installation of the line traps, reduced transportation costs and installation costs. Low reactor capacitance and high goodness of fit have provided excellent frequency characteristics.

MONOLITHIC LINE TRAP

Design

The design provides complete insulation of the reactor coils. Insulating layers of fiberglass plastic with heat resistance class "H", which make up the intercrew and outer insulation, form the bearing structure of the line trap's reactor and determine its mechanical strength. Due to the fact that the entire space between the coils is filled with dielectric, it provides an extremely high resistance to short circuit currents.

Advantages

- increased reliability of the line trap;
- operation in the most difficult environmental conditions: in tropical climates, high mountains (more than 2000 m above sea level), under the influence of sea fog, in the zone of anthropogenic pollution;
- improved dimensional and mass characteristics, which allow to reduce the load on supporting structures (1.5 times) and wind load (1.5–2 times);
- smaller dimensions and weight;
- protection of the reactor winding from aggressive impact of the environment;
- high mechanical strength;
- high resistance to short-circuit currents;
- reduced wind load;
- no inter-turn and interlayer short circuits;
- possible to use in industrial polluted areas;
- small dimensions and insulated winding of the reactor allows to use more freely in switchgear substations;
- thanks to design there is no ice on the reactor winding;
- high overload capacity
- comply with regulatory and technical requirements (STO Rosseti and IEC 60353);
- corresponds to the high level of equipment performance of the world's leading manufacturers;
- possibility to install a monolithic line trap on a standard communication capacitor, without using reinforced capacitor structures; the monolithic line trap can be installed on a standard communication capacitor without using reinforced capacitor designs;
- high resistance of tuning elements to switching overvoltages during the whole period of operation.



Three main reasons to use the monolithic line traps, manufactured by EIS

- uniform (universal) design for all climatic zones, including high mountains and tropics;
- energy saving: less added losses due to reduction of metal parts in the construction;
- environmental friendly: the level of environmental pollution is considerably lower due to the absence of mechanical processing of composite materials in the manufacture of line traps.

Line traps specifications

№	Line trap classification	Dimensions of the main coil		Weight of the line trap incl. the tuning device and surge arrester, not more than, kg	Class of transmission lines	Rated short-time current, kA (r.m.s.)	Short-time current, kA (peak value)
		Height, mm	Diameter, mm				
1	VZ-630-0,25 UHL1*	1000	1060	100	35 – 220	16	41
2	VZ-630-0,5 UHL1*	1456	1060	167		40	102
3	VZ-630-0,5 UD UHL1*	1193	980	202		16	41
4	VZ-630-1,0 UHL1*	1640	1390	268			
5	VZ-1250-0,1 UHL1*	1060	950	167	110 – 330	31,5	80
6	VZ-1250-0,25 UHL1*	1235	1070	220		40	102
7	VZ-1250-0,5 UHL1*	1540	1250	300		31,5	80
8	VZ-1250-0,5 D UHL1*	1575	1250	390		40	102
9	VZ-1250-1,0 UHL1*	1595	1540	450		31,5	80
10	VZ-1250-1,0 D UHL1*	1585	1540	475		40	102
11	VZ-1250-1,5 UHL1*	1595	1760	580	330 – 750	31,5	80
12	VZ-1250-2,0 M UHL1*	1680	1415	757		50	128
13	VZ-2000-0,1 D UHL1*	1060	1060	282		40	102
14	VZ-2000-0,25 UHL1*	1235	1100	347		50	128
15	VZ-2000-0,5 UHL1*	1510	1205	424		40	102
16	VZ-2000-0,5 D UHL1*	1535	1540	629		50	128
17	VZ-2000-1,0 UHL1*	1595		610		40	102
18	VZ-2000-1,0 D UHL1*	1595	1540	835		50	128
19	VZ-2000-1,5 UHL1*	1718	1850	900	330 – 750	40	102
20	VZ-2000-2,0 UHL1*	3170	1540	1270		54	138
21	VZ-3150-0,1 UHL1*	1065	1200	360	500 – 750	40	102
22	VZ-3150-0,5 UHL1*	1535	1540	865		63	161
23	VZ-4000-0,1 UHL1*	1065	1200	380			
24	VZ-4000-0,5 UHL1	1535	1540	870			
25	VZ-100-0,5-5-B UHL1	715	780	40	35 – 110	5 (10**)	12,75 (25,5**)
26	VZ-200-0,5-5-B UHL1	800	700	60 (75**)		5 (10**)	12,75 (25,5**)
27	VZ-200-1,0-5-B UHL1	1200	780	105 (120**)		10 (16**)	25,5 (40,8**)
28	VZ-400-0,5-10-B UHL1	800	700	64 (70**)		10 (16**)	25,5 (40,8**)
29	VZ-400-1,0-10-B UHL1	1200	780	120 (130**)	35 – 220	16 (20**)	41 (50**)
30	VZ-630-0,25-16-B UHL1	620	700	72 (75**)		16	41
31	VZ-630-0,5-16-B UHL1	800 (750***)	780 (750***)	110 (80***)		20	50
32	VZ-630-0,5-20-B UHL1	800	780	120		16	41
33	VZ-630-0,5-16-2H UHL1	800	780	110 (90***)		20	50
34	VZ-630-0,5-20-2H UHL1	850	780	120		31,5	80
35	VZ-630-0,5-31,5-2H UHL1	920	780	130		40	102
36	VZ-630-0,5-40-2H UHL1	1317	780	190		16 (20**)	41 (50**)
37	VZ-630-1,0-16-B UHL1	1450	780	170	110 – 330	16 (20**)	41 (50**)
38	VZ-630-2,0-16-B UHL1	1600	1250	260		31,5 (40**)	80 (102**)
39	VZ-1250-0,25-31,5-B UHL1	850	780	180		31,5 (40**)	80 (102**)
40	VZ-1250-0,5-31,5-B UHL1	1250	1000	270		40	102
41	VZ-1250-0,5-40-B UHL1	1250	1000	320	350 – 750	31,5 (40**)	80 (102**)
42	VZ-1250-1,0-31,5-B UHL1	1350	1250	380		40 (50**)	102 (128**)
43	VZ-2000-0,25-40-B UHL1	1000	1050	280		40	102
44	VZ-2000-0,5-40-B UHL1	1250	1250	400		50	128
45	VZ-2000-0,5-50-B UHL1	1250	1250	450		40	102
46	VZ-2000-1,0-40-B UHL1	1850	1250	540			

Performance:

- UD – enhanced dynamic characteristics
- E – Series 2 IEC 60353 (default is Series 1)

* Class of insulation heat resistance according to GOST 8865-93 – "A"

** Variant with increased resistance to short-circuit currents

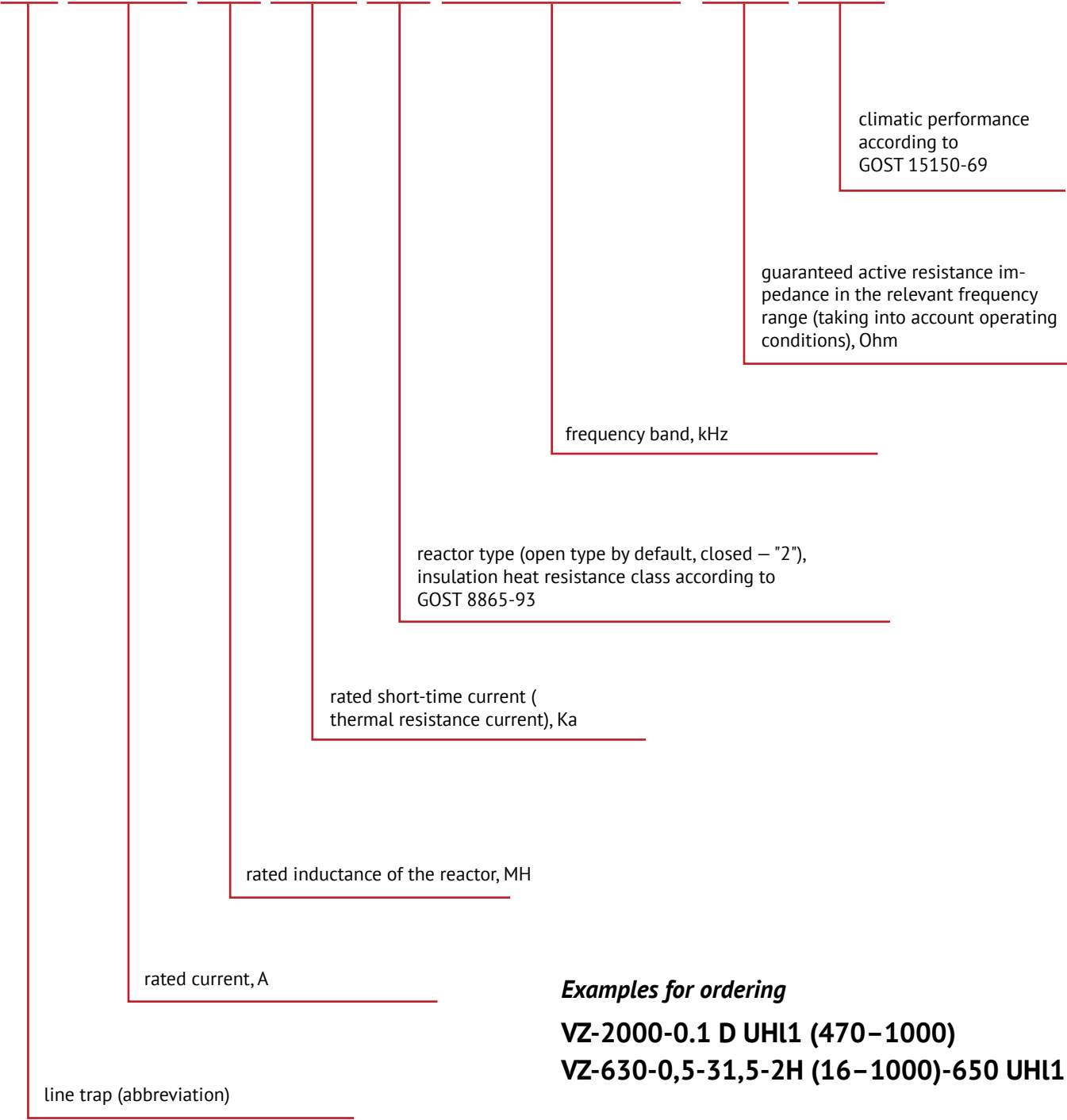
*** Lightweight version

Heat resistance classes and their corresponding temperatures according to GOST 8865-93:

Y – 90 °C	H – 180 °C
A – 105 °C	200 – 200 °C
E – 120 °C	220 – 220 °C
B – 130 °C	250 – 250 °C
F – 155 °C	

RATING PLATE OF THE LINE TRAP

VZ XXXX-XX-XXX-XX (XXX-XXXX)-XXX XXX



Besides EIS manufactures line traps with rated current of up to 4000 A, with reactor inductance up to 2,5 mHn, characteristics of which are not given in the table above, on the basis of technical specifications.

COUPLING FILTER FP

Purpose

The coupling filter (FP) is designed to ensure (together with the coupling capacitor) resistance matching when connecting equipment of high-frequency relay protection channels, emergency control and telephone communication equipment to the phase of overhead power lines (overhead lines) with voltage of 6–1150 kV and to overhead line lightning protection cables.

Main functions

- tuning, designed to compensate for the reactive component of the coupling capacitor(s) impedance
- galvanic isolation between high voltage overhead lines and input circuits of communication equipment;
- impedance matching between the power line and the carrier frequency connection;
- earthing the coupling capacitor bottom plate.

In combination with the coupling capacitor, the coupling device makes up a transformer (autotransformer) bandpass filter. The filter can be supplied in different configurations, each designed to operate within a specific frequency band and in conjunction with a specific coupling capacitor.

The difference between our coupling filter and the devices of other manufacturers is that it employs new protective devices in its input circuits. Protective devices such as transmission line arrester OPN (instead of the valve dischargers) on the line side and the varistor cable (instead of the gas discharger) on the HF side.

For application in a phase to phase circuit, design of the FP coupling device allows for 180 degree input (output) signal phase shift. You can do it by shifting connection of the terminals on the secondary winding of the transformer.

Design

Elements of the filter are installed in a cast silumin enclosure under an aluminum cover with a rubber sealant held together by stainless steel connecting screws. There is a coaxial cable inlet hole and a ventilation device on the bottom panel of the enclosure.

Operating conditions

Climatic performance – UHL.

Placement category – 1 according to GOST 15150.

Seismic resistance on MSK-64 scale – 9 points.

Advantages

If required, the coupling filters can be manufactured:

- with 180° phase rotation;
- with two-band tuning;
- for phase-to-phase organization of the PLC channel the filters can be manufactured with built-in differential transformer.



Technical specification

Name	Value
Composite loss within passband	not more than 1.5 dB
Return loss within passband	not less than 12 dB
Rated input impedance of the FP from the high-frequency cable side	75 Ohms
Resistance of FP from the overhead line side to industrial frequency current	not more than 4 Ohm
The nominal input impedance of the FP from the overhead line side	corresponds to the wave impedance of the overhead line
Nominal peak power P.E.P.	not more than 400 W
Non-linear distortion, intermodulation 2nd and 3rd order regarding to the acceptable HF signal power	not more than minus 80 dB
Dimensions	335×328×172 mm
Maximum weight	not more than 12 kg

Основные характеристики фильтров серии ФП соответствуют рекомендации МЭК 60481.

Designation

FP (XX-XXX)/XXXXX UHL1,

where: FP – coupling filter; XX – lower frequency bandwidth, kHz; XXX – upper frequency bandwidth, kHz; XXXX – capacitance of the coupling capacitor, pF; UHL-1 – climatic version according to GOST 15150.

SEPARATING FILTERS

Purpose

Separating filters RF are designed to reduce the bypass action of apparatus on various HF channels operating via a common coupling filter.

Separating filters must be integrated:

- into the circuit of each channel where devices on dedicated HF protection channels or dedicated relay protection and emergency control automatics channels are connected in parallel;
- into the communication equipment circuit where devices on dedicated HF protection channels or dedicated relay protection and emergency control automatics channels are connected in parallel.

For application in HF channels with bypass of substations, where several channels are connected to one phase in parallel, we recommend to integrate a decoupling filter in the HF bypass. Such filter will pass signals at transit channel frequencies and block signals at the frequencies of the channels that terminate at the bypass.



Design

Steel enclosure and steel cover. All units inside the filter are installed on the housing base. The cover is attached to the base with screws.

Designed and manufactured in accordance with requirements and recommendations of IEC 60481, GOST 15150-69.

Types of mounting

- mounting on DIN-rail;
- possibility of mounting on any surface.

Technical specifications

Name	Value
High frequency bandwidth signal power	250 VA
Attenuation introduced by the isolation filter when it is included in the RF path in parallel with a 75 Ohm load	does not exceed 0.8 dB in the frequency band ± 2 kHz relative to the filter tuning frequency. To ensure $\Delta F > 4$ kHz, a bandpass RF can be manufactured
Attenuation introduced by the separating filter when it is included in the RF path in series with a 75 Ohm load	does not exceed 0.8 dB at frequencies that are 10 % or more away from the filter tuning frequency in both directions. For bandpass RF 10% is considered from the boundary frequencies
Isolation resistance of the separating filter output circuits with respect to the housing	≥ 100 mOhm
Electrical strength of the insulation between the housing and the terminal of the terminal block)	withstands 1500 V (effective) AC current with a frequency of (50 ± 3) Hz for 1 minute
Operating frequency range	from 16 till 1000 kHz
Dimensions	120×120×95 mm
Maximum weight	not more than 1 kg
Warranty period	5 years
Service life	at least 12 years

Operating conditions

Climatic performance – UHL.

Placement category – 4 according to GOST 15150-69.

Nominal value of main technical characteristics are specified for nominal climatic conditions according to GOST 15150-69:

- temperature from 1 to 45°C;
- relative air humidity from 45 to 80%;
- atmospheric pressure from 8.4×10^4 Pa to 10.7×10^4 Pa (630 to 800 mmHg)

Advantages

- reduced size and mass characteristics;
- enhanced dust and moisture protection;
- two types of RF cable connection: through the terminal block (version 1); through the high-frequency connector SR-75 (version 2)

Designation

1. Standard separating filter RF-F xx UHL4,

where: F – filter tuning frequency, kHz; xx – method of radio-frequency cable connection: "KK" – terminal block. or "SR" – high-frequency connector SR-75.

2. Band-pass separating filter RF-(Fn - Fv) xx UHL4,

where: Fn – lower boundary of the frequency range, kHz; Fv – upper boundary of the frequency range, kHz; xx – method of connection of radio-frequency cable: "KK" – terminal block or "SR" – high-frequency connector SR high-frequency connector SR-75.

VOLTAGE SAMPLING CABINET SHON

Purpose

Voltage sampling cabinet (ShON) is designed to generate control voltages for control, measurement, and protection of the power line to which it is connected by means of a coupling capacitor, at AC electrical substations with rated frequency 50 Hz and rated voltage 110 kV, 220 kV and 330 kV.

Construction

Structurally, ShON is a cabinet with access through the front door. Functional units installed in ShON are placed on a mounting plate fixed to the rear wall of the cabinet.



Technical specifications

Name	Value	
	ShON-301S	ShON-303P
Operating voltage	380 V	380 V
Rated current of primary winding at frequency 50 Hz, Inom input	0,128 A	0,128 A
Rated secondary winding current Inom out	0,075 A XT1 (XT3) 0,15 A XT2 (XT4)	0,075 A XT1 (XT3) 0,15 A XT2 (XT4)
Type of coupling capacitor/capacitance, nF for overhead line voltage, 110 kV 220 kV 330 kV	1*(110v3-6,4)/6,4 2*(110v3-6,4)/3,2 3*(110v3-6,4)/2,15	1*(110v3-6,4)/6,4 2*(110v3-6,4)/3,2 3*(110v3-6,4)/2,15
Possibility of step regulation of secondary winding current	±5 % ±10 %	
Permissible deviation of secondary winding current	±5 %	±5 %
Maximum secondary winding voltage	120 V	120 V
Degree of protection according to GOST 14256-96	IP 54	IP 54
Mechanical design according to GOST 17516.1-90	M3	M3
Overall dimensions	470×398×210 mm	667×488×250 mm
Weight	not more than 25 kg	not more than 25 kg

NPP "EIS" CJSC manufactures the cabinets with the characteristics, not given in the table above.

Operating conditions

Climatic version according to GOST 15543-70 and GOST 15150-69:

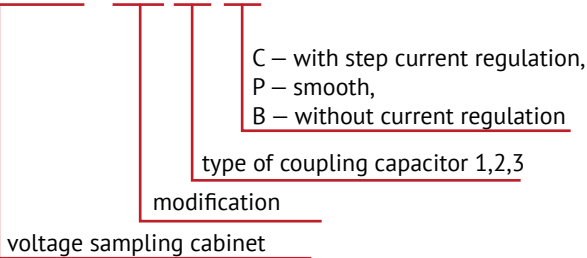
- U1 – for delivery to areas with moderate climate;
- UHL1 – for delivery to areas with moderate-cold climate;
- T1 – for delivery to areas with tropical climate.

Group of operating conditions with regard to the impact of mechanical factors – M1 according to GOST 17516-92..

Method of installation – mounted.

Designation

ShON-30X X



FILTER-SHON

COUPLING FILTER WITH FUNCTIONS OF VOLTAGE SAMPLING CABINET

Purpose

The product consists of a coupling filter intended for connection of equipment of high-frequency relay protection and emergency control channels and telephone communication by means of a coupling capacitor to the phase of the overhead power lines with nominal voltages of 110 kV, 220 kV and 330 kV, and a voltage sampling cabinet, designed to generate control voltages for control, measurement and protection of the transmission line.

Construction

Filter-ShON by the type of construction represents small-sized cabinets with access through the front door and elements of fixing and protection elements. Components to be installed in the cabinet, are placed on a frame fixed on the back wall of the cabinet.

Filter-ShON enclosure is made of stainless steel.

On request the enclosure can be made of sheet steel with polymer-powder coating.

Connection method – standard connection of the Filter-ShON and the voltage sampling cabinet ShON.

Degree of protection according to GOST 14254-96 – IP54.

Technical specifications

Name	Value
Operating voltage	380 V
Rated current of primary winding at frequency 50 Hz, I_{nom} input	0,128 A
Rated secondary winding current I_{nom} out	0,075 XT1 (XT3) A 0,15 XT2 (XT4) A
Type of coupling capacitor/capacitance, nF for overhead line voltage, 110 kV 220 kV 330 kV	1*(110√3–6,4)/6,4 2*(110√3–6,4)/3,2 3*(110√3–6,4)/2,15
Possibility of step regulation of secondary winding current	±5 % ±10 %
Permissible deviation of secondary winding current	±5 %
Maximum secondary winding voltage	120 V
Degree of protection according to GOST 14256-96	IP 54
Mechanical design according to GOST 17516.1-90	M3
Overall dimensions	470×300×225 mm
Weight	not more than 27 kg



Operating conditions

Climatic design – UHL1.

Placement category – 1 according to GOST 15543-70 and GOST 15150-69.

Group of operating conditions with regard to the impact of mechanical factors – M1 according to GOST 17516-92.

Method of installation – mounted.

Advantages

- Reduced costs;
- no additional connection busbars are required between the feeder filter and the extraction cubicle voltage selection cabinet;
- no switching operations are required: Filter-ShON simultaneously fulfils the functions of the feeder filter and the voltage sampling cabinet at the same time;
- integrated line disconnecter (earthing switch).

Designation

ShONFP-301S (XX-XXX)/XXXXX UHL1,

where:

ShON – voltage sampling cabinet; FP – feeder filter;

301S – modification of ShON with step-by-step regulation of secondary currents of transformers; XX – lower frequency of the bandwidth, kHz; XXX – upper frequency of the bandwidth, kHz; XXXX – capacitance of the coupling capacitor, pF; UHL1 – climatic design according to GOST 15150.

UNIVERSAL PEDESTAL



Marking

Universal pedestal (PVZ)-XXXX UHL1 (moderate cold climatic modification),
where: XXXX-nominal current frequency of the line trap, for which the pedestal is mounted.

ERVZU

UNIVERSAL LINE TRAP EQUIVALENT

Purpose

ERVZU is designed to check the tuning element of the line trap (barrier band).
ERVZU parameters (inductance and capacitance) according to the type of the tuning element to be tested are set by switches located on the front panel.
The testing of the tuning element is carried out together with the protective device from the delivery set of VZ line trap.
ERVZU is manufactured in a shockproof case.

Technical specifications

Name	Value
Inductance, Lnom	0,1...2,09 mHn
Capacitance, Snom	10...1005 pF
Operating temperature range	+5...+ 45 °C
Protection class according to GOST 14254: closed open	IP 67 IP 40
Overall dimensions	258×230×170 mm
Weight	not more than 5 kg

Purpose

The universal pedestal is intended for vertical mounting of the line traps with rated current from 630 to 4000 A.

The pedestals are installed:

- on any kind of the bearing construction;
- on the insulated coupling capacitor for line traps connected to 35and 110 kV transmission lines ;
- on the 220 kV coupling capacitor column, consisting of two coupling capacitors and the insulating support, in case the line traps are connected to 220 kV transmission line;
- on all existing types of bus-bar supports, consisting of one or more supporting insulators;
- on other supporting constructions upon customer's request.



Operating conditions

Climatic design according to GOST 15150-69 – UHL4.

COUPLING CAPACITORS

As the network of high-voltage transmission lines develops, their length increases, and they are equipped with automatics, it becomes necessary to have a reliable dispatching and administrative and economic communication between individual points, transmission of telemetering signals, emergency shutdowns, relay protection and other data. Usually such communication is carried out directly via high-voltage power lines. One of the elements of such communication are capacitors, which separate the communication equipment from the high voltage of 50 Hz, allowing high frequency signals

through the communication channels. The same capacitors are used to make power take-off devices at 50 Hz directly from power lines to supply measuring equipment and power equipment, as well as measuring devices (dividers, voltage transformers) for measurement of transmission line voltage.

Purpose

- to provide high-frequency communication at frequencies from 16 to 1500 kHz in power transmission lines with nominal voltage of 35, 110, 150, 220, 330, 500, 750 kV AC of 50 and 60 Hz frequency.
- for connection of communication equipment to power lines 6 to 35 kV power lines and lightning protection ropes.

Capacitors are made in porcelain or composite covers and are impregnated with environmentally safe liquid.

Construction

- Capacitors are manufactured using a film dielectric material.
- By agreement with the customer it is possible to manufacture the capacitors for nominal voltages 110/ $\sqrt{3}$ kV with paper-film dielectric.
- The coupling capacitors are impregnated with an environmentally friendly dielectric fluid, which is not included in the list of substances banned by the Stockholm Convention on Persistent organic pollutants (2001).
- suspended capacitor for active power extraction from AC electric power from alternating current networks of frequency 50 Hz with a voltage of 110 kV.

Upon agreement with the customer it is possible to manufacture capacitors with the leakage path length of external insulation corresponding to III or IV degree of contamination according to GOST 9920-89.

Depending on the design of types there may be differences in overall and installation dimensions capacitors. The required dimensions are specified when ordering.



TERMINATING RESISTOR RO-75/100

Purpose

The RO-75/100 terminating resistor is designed for connection to the coupling filter on the high frequency cable side.

Technical specifications

Name	Value
Active resistance R	75 Ohm ± 5%
Total resistance Z	75 Ohm ± 10%
Attenuation of incoherence Ans	not more than 15 dB
Power dissipation, R	not more than 100 W
Protection class according to GOST 14256-96	IP 54
Overall dimensions	350×330×165 mm
Weight	9 kg



Operating conditions

Climatic design according to GOST 15150-69 – UHL1.

USPD-VL-M

DATA ACQUISITION AND TRANSMISSION DEVICE FOR MONITORING THE STATE OF COMMUNICATION CAPACITORS

Purpose

The data acquisition and transmission device (USPD-VL-M) is designed to determin automatically the change of leakage current of high-voltage communication capacitors.

Design

19" 42U telecoms cabinets.

Main functions

- Detection of changes in the capacitance of the communication capacitors (standard number of communication capacitors 8 with the possibility of increasing to 16, 24, 32 on request);
- display of parameters (capacitance, capacitance change) on a full-colour liquid crystal display;
- information about normal, warning or emergency value of capacitor capacity value of communication capacitors by means of inbuilt sensors, installed in feeder filters or voltage sampling cabinets manufactured by EIS;
- transmission of measured parameters to the control system via Ethernet interface 100 Base-T, MODBUS TCP protocol.



CABLE RK 75-9-12

Purpose

Radio frequency coaxial cable RK 75-9-12 is designed for transmission of radio and video signals in the range from metre to centimetre waves.

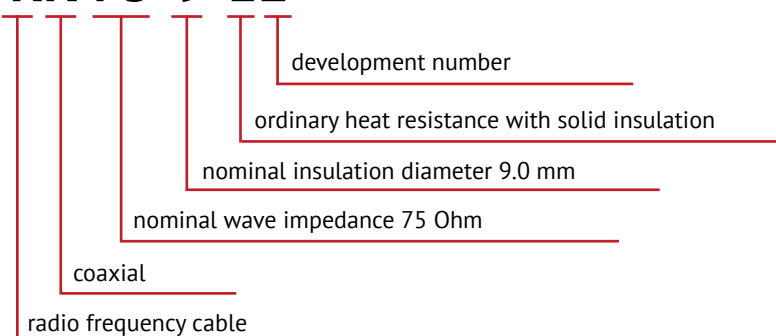
Construction

- inner conductor made of copper wire with nominal diameter of 1,4 mm;
- low density polyethylene insulation overlaid on the inner conductor until it reaches the diameter of the insulation conductor until the insulation diameter reaches $9,00 \pm 0,25$ mm;
- outer conductor in the form of braid of copper wires with nominal diameter of 0,2 mm, overlapped at an angle of 50-60° with a density of 88-92%;
- PVC plasticate sheath overlaid on the outer conductor until the outer diameter reaches $12,0 \pm 0,4$ mm.



Designation

RK 75-9-12



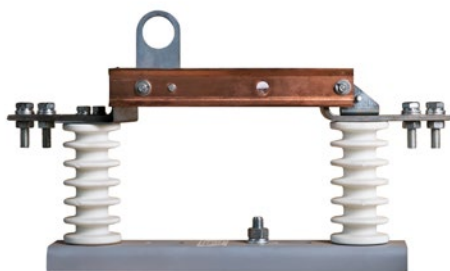
Mass and dimensions characteristics

Name	Value
Calculated mass (weight)	189,0 kg/km
Outer diameter	12,0 mm
Minimum reel length	Nº 8 – 360 m
Maximum length in a coil	264 m

Technical specifications

Name	Value
Wave impedance	$75 \pm 2,5$ Ohm
Attenuation coefficient	not more than 0,12 dB/m at frequency 0,2 GHz not more than 0,75 dB/m at frequency 3,0 GHz
Internal discharges onset voltage in insulation	not less than 5.0 kV with frequency 50 Hz
Test alternating insulation voltage	10 kV with frequency 50 Hz
Bonding resistance	not more than 200 mOhm/m
Electrical capacitance	67 pF/m
Wavelength shortening factor	1,52
Insulation resistance at 20 °C	not less than 5.0 GOhm-km
Construction length	not less than 100 m
Small sizes in a batch	not more than 20% in pieces from 10 m
Minimum bending radius	120 mm during storage and transport 60 mm at installation from 5 °C and above
Operating temperature range	-40...+85 °C
Service life	not less than 8 years from the date of acceptance
Minimum operating time	1000 h at 85 °C 5000 h at 70 °C 10000 h at 50 °C

INDOOR DISCONNECTORS TYPE RVZ, RVFZ, RVO, RVF



Purpose

AC indoor single-pole disconnectors are used for 10kV. Indoor disconnectors are used:

- to close and open the electrical circuits in currentless state, and to modify the circuit diagram.
- to ensure safety of the staff on off-load areas;
- to enable and disable the charging currents of air and cable lines, idling current of the transformers and light load currents.

Operating conditions

Disconnectors are manufactured for UHL 2 (moderate cold) climatic conditions for working at a height of up to 1000 m above sea level; in rooms where indoor temperature and humidity fluctuations do not differ much from outdoor values and have relatively free access of outside air, e.g. in tents, trailers, trailers, metal rooms without thermal insulation, as well as housed in the complete device or under a porch to avoid direct exposure and fall.

Technical specification

Name	Value
Voltage <ul style="list-style-type: none">• Rated• Peak	10 kV 12 kV
Rated current	400 A
Rated short-withstand current	
Current amplitude	41 kA
Peak current for main knives, 4s	16 kA
Peak current for earthing knives, 1s	16 kA

Designation



Disconnecter nameplate:
Disconnecter RVO-10/400 UHL1, 2
R – disconnector
V – indoor use
O – single pole
10 – rated voltage, kV
400 – rated current, A
UHL – moderate cold climatic version as per GOST 15150
1 (2) – mounting according to GOST 15150.

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Prepared 03.06.2024