

TESTING  
EQUIPMENT

KHARKOVENERGOPRIBOR LTD.



PRODUCT  
CATALOGUE

 high-voltage  
testing equipment

**KEP**







**intertek**  
Total Quality Assured.

## CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

### KharkovEnergOPribor Ltd.

Main Site: 9 Generala Momota Street, Kharkov, 61075, Ukraine  
 has been registered by Intertek as conforming to the requirements of:

### ISO 9001:2015

The management system is applicable to:

Production of testing transformers, high-voltage electric gears, electric signal generators, measuring, controlling and testing apparatus, high-voltage stands, providing installation service, maintenance and repair of issued apparatuses.

**Certificate Number:**  
28110804001

**Initial Certification Date:**  
30 June 2014

**Date of Certification Decision:**  
13 May 2020

**Issuing Date:**  
13 May 2020

**Valid Until:**  
29 June 2023



**UKAS**  
MANAGEMENT SYSTEMS  
014



**Intertek**



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President, Business Assurance  
Intertek Certification Limited, 110A Victory Park, Victory Road, Derby DE24 8EP, United Kingdom  
Intertek Certification Limited is a UKAS accredited body under schedule of accreditation no. 014.





**NATIONAL ACCREDITATION AGENCY OF UKRAINE**  
NATIONAL ACCREDITATION BODY OF UKRAINE

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### ACCREDITATION CERTIFICATE




Registered on April 22, 2019  
No. 40040  
valid until April 21, 2024

Date of the Initial Accreditation: **April 22, 2014**

NATIONAL ACCREDITATION AGENCY OF UKRAINE  
BY THIS CONFIRMS THE COMPETENCE OF

**Calibration laboratory  
of «KHARKOVENERGOPRIBOR» LIMITED**  
61075, Kharkiv, Generala Momota str., 9

3 2 8 6 8 9 7 0  
(EDRPOU Code)

IN COMPLIANCE WITH THE REQUIREMENTS OF DSTU ISO/IEC 17025:2017  
(ISO/IEC 17025:2017) IN THE SCOPE OF:

**calibration by the following types of measurement: EM - electricity and magnetism**

The scope of accreditation is determined by the Annex to this Certificate.  
The Annex is an integral part of this Certificate and consists of 2 pages.

Acting Chairman



Valerii Krasiuk

Translation dated 20.05.2019

Registered in the logbook under No. 1049 A

NAAU is a signatory to: 1) EA BLA in the scopes of "Testing", "Calibration", "Product certification", "Certification of persons", "Management systems certification" and "Inspection"; 2) ILAC-MRA in the scopes of "Testing", "Calibration" and "Inspection"; 3) IAF MLA in the scopes of "Product certification", "Certification of persons", "Management systems certification".



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### RESONANT TESTERS

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# CABLE TEST VANS

A test van is a set of test and measuring apparatus mounted in a vehicle and used for testing cable lines and substation equipment as well as to quickly locate faults in power cables accessible by a specialised car.

The capabilities of test vans are determined by their equipment. We offer our customers a choice of cable test vans which are designed for testing and locating faults in underground power cables, and test vans for comprehensive maintenance of substation equipment.

In order to obtain the optimal solution, our customers enjoy a great deal of flexibility when choosing the vehicle base for their test van as well as the equipment that will be mounted in it.

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■ CABLE TEST AND FAULT LOCATION SYSTEMS ■



ETL-40



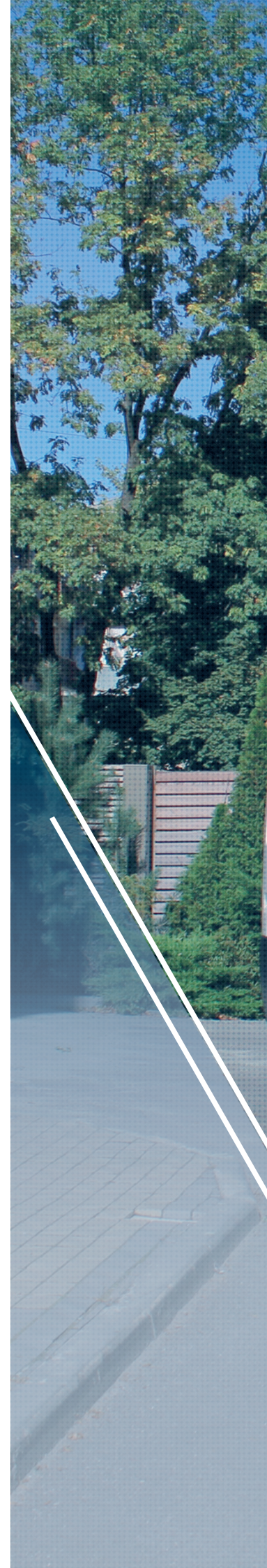
ETL-10M



ETL-35K



ETL-35









# ETL-40

## ▪ CABLE TEST VAN ▪



ETL-40 is a fully equipped van-mounted cable test and fault location system which allows to test cable insulation with DC voltage up to 40 kV and is equipped with a 1 A burn module. The system is also capable of pre-locating cable faults with an aid of a built-in time-domain reflectometer and pinpoint faults with an acoustic method.

Centralised digital control provides easy operation while multi-level safety and protection ensures complete operator safety.

### ■ Features

- DC testing up to 40 kV with high output current up to 300 mA
- Fault conditioning (burning) with up to 1 A current
- Built-in reflectometer
- Surge generator up to 2000 J
- Centralised microprocessor-based control



## ETL-10M

### ▪ CABLE TEST VAN ▪



ETL-10M is a cable test van with a three-phase connection method designed for testing cable insulation with DC voltage up to 60 kV and testing other electrical objects with AC voltage up to 50 kV at industrial frequency.

The system also allows to pre-locate cable faults with an aid of a built-in time-domain reflectometer and pinpoint faults with an inductive and acoustic methods.

#### ■ Features

- Three-phase connection
- DC testing up to 60 kV and AC testing up to 50 kV
- Fault conditioning (burning) with up to 12 A current
- Built-in reflectometer
- Surge generator up to 2000 J
- Powerful 200 V·A low frequency generator





# ETL-35K

## ■ CABLE AND SUBSTATION EQUIPMENT TEST VAN ■



ETL-35K is a versatile multipurpose cable and substation test van with three-phase connection to electrical objects. ETL-35K allows to test cable insulation with DC voltage up to 60 kV, detect very small leakage currents during surge arrestors testing, conduct high-voltage testing with AC voltage up to 100 kV at industrial frequency, trace underground utilities, pre-locate and pinpoint cable faults, and measure capacitance and tangent delta of various electrical objects at industrial frequency.

ETL-35K is fitted with a collection of traditional and modern safety systems which ensure the comprehensive operator protection.

### ■ Features

- Three-phase connection
- DC testing up to 60 kV and AC testing up to 50 kV
- Fault conditioning (burning) with up to 12 A current
- Detachable reflectometer
- Surge generator up to 2000 J
- Powerful 200 V·A low frequency generator
- Tangent Delta measurement



## ETL-35

### ■ SUBSTATION EQUIPMENT TEST VAN ■



ETL-35 is a van-mounted system designed for testing electrical substation equipment.

Apart from insulation withstand testing with DC voltage up to 60 kV and ability to indicate very small leakage currents, the system can be used for testing various substation objects with small electrical capacitance with AC voltage of up to 100 kV and measuring tangent delta (dielectric dissipation factor) at industrial frequency.

#### ■ Features

- Tangent Delta measurement
- Indication of very small leakage currents during surge arrestors testing
- DC testing up to 60 kV and AC testing up to 100 kV





# ETL-40, ETL-10M, ETL-35K, ETL-35

## ■ CABLE TEST VANS ■

|  | ETL-40  | ETL-10M   | ETL-35K           | ETL-35 |
|--|---|---|-------------------|--------|
| <b>CONNECTION</b>  |   |   |                   |        |
| Number of phases   | 1   | 3   | 3                 | 1      |
| <b>DC TESTING</b>  |   |   |                   |        |
| Output voltage adjustment and indication range             | 0 ... 40 kV   | 0 ... 60 kV   |                   |        |
| Output current indication range                            | 0 ... 300 mA  | 0 ... 35 mA   | 0 ... 30 (65) mA  |        |
| <b>AC TESTING</b>  |   |   |                   |        |
| Output voltage adjustment and indication range             | –   | 0 ... 50 kV   | 0 ... 100 kV      |        |
| Output current indication range                            | –   | 0 ... 50 mA   | 0 ... 75 (175) mA |        |
| <b>FAULT CONDITIONING (BURNING)</b>                        |   |   |                   |        |
| Burn voltage levels and adjustment ranges                  | 0 ... 20 kV   | Level 1: 0 ... 0.5 kV<br>Level 2: 0 ... 1 kV<br>Level 3: 0 ... 5 kV<br>Level 4: 0 ... 10 kV<br>Level 5: 0 ... 20 kV               |                   | –      |
| Burn current (open-circuit run)                            | up to 1 A   | <ul style="list-style-type: none"> <li>■ Up to 12 A in the 0 ... 0.5 kV range</li> <li>■ Up to 6 A in all other ranges</li> </ul> |                   | –      |
| <b>FAULT PRE-LOCATION</b>                                  |   |   |                   |        |
| Pre-location methods                                       | <ul style="list-style-type: none"> <li>■ TDR (impulse reflection method)</li> <li>■ ARC / ARC multi-shot (single impulse / multiple impulse arc reflection method)</li> <li>■ ICE (impulse current method)</li> <li>■ DECAY (voltage decay method)</li> </ul> |   |                   | –      |
| Fault detection range                                      | 0 ... 120 km  |   |                   | –      |
| Distance to fault detection accuracy                       | 0.2 % of selected range   |   |                   | –      |
| Sampling rate  | 200 MHz   |   |                   | –      |
| Time marks accuracy  | 0.01 %  |   |                   | –      |
| Output impedance adjustment range                          | 2 ... 100 Ω, resolution 2 Ω   |   |                   | –      |
| Probe pulse voltage  | 45 V  |   |                   | –      |
| Probe pulse width adjustment range                         | 10 ns ... 100 μs  |   |                   | –      |
| Gain adjustment range                                      | minus 21 ... + 69 dB  |   |                   | –      |
| Velocity factor adjustment range                           | 0.750 ... 3.000, resolution 0.001   |   |                   | –      |
| Velocity of propagation adjustment range                   | 50.0 ... 200.0 m/μs, resolution 0.1 m/μs  |   |                   | –      |
| <b>TRACING AND FAULT PINPOINTING WITH INDUCTIVE METHOD</b> |   |   |                   |        |
| Sets of operating frequencies                              | –   | 491 / 982 / 8440 Hz<br>480 / 1450 / 9820 Hz<br>526 / 1024 / 8928 Hz<br>1024 / 2048 / 9820 Hz                                      |                   | –      |
| Number of frequencies used simultaneously                  | –   | 1 ... 3   |                   | –      |
| Modulation type  | –   | Amplitude   |                   | –      |
| Output power adjustment range                              | –   | 0 ... 200 V•A   |                   | –      |
| Operating modes  | –   | <ul style="list-style-type: none"> <li>■ Continuous</li> <li>■ Pulse</li> </ul>   |                   | –      |
| Load resistance  | –   | 0.5 ... 1000 Ω  |                   | –      |
| Load resistance matching                                   | –   | Automatic   |                   | –      |

|  | ETL-40 | ETL-10M   | ETL-35K  | ETL-35      |
|--|--------|---|--|-------------|
| <b>FAULT PINPOINTING WITH ACOUSTIC METHOD</b>                    |        |   |  |             |
| Surge voltage levels and adjustment ranges                       |        | Level 1: 0 ... 8 kV<br>Level 2: 0 ... 16 kV<br>Level 3: 0 ... 32 kV   |  | –           |
| Surge energy at each level                                       |        | up to 2000 J  |  | –           |
| Surge rate   |        | <ul style="list-style-type: none"> <li>▪ Single pulse, manually triggered</li> <li>▪ 4 ... 12 pulses/min, automatic mode</li> </ul> |  | –           |
| <b>DIELECTRIC DISSIPATION FACTOR (TANGENT DELTA) MEASUREMENT</b> |        |   |  |             |
| Measured values  | –      |   | <ul style="list-style-type: none"> <li>▪ Electrical capacitance</li> <li>▪ Tan <math>\delta</math></li> <li>▪ Operating voltage</li> <li>▪ Operating frequency</li> </ul>  |             |
| Measurement modes  | –      |   | <ul style="list-style-type: none"> <li>▪ Direct</li> <li>▪ Inverted</li> </ul>   |             |
| Measurement voltage  | –      |   | up to 10 kV  |             |
| Maximum load capacitance   | –      |   | <ul style="list-style-type: none"> <li>▪ 64 nF @ 5 kV</li> <li>▪ 32 nF @ 10 kV</li> </ul>  |             |
| <b>SAFETY</b>  |        |   |  |             |
| Isolating transformer  | 4 kV·A | 8 kV·A  |  | 8 (18) kV·A |
| Grounding  |        |   | <ul style="list-style-type: none"> <li>▪ Protective earthing</li> <li>▪ Operating grounding</li> <li>▪ Vehicle chassis potential monitoring</li> <li>▪ Continuous grounding monitoring system</li> <li>▪ Automatic discharge device</li> </ul> |             |
| Protection   |        |   | <ul style="list-style-type: none"> <li>▪ Overvoltage</li> <li>▪ Overcurrent</li> <li>▪ Overheating</li> </ul>  |             |
| High voltage presence signalling                                 |        |   | <ul style="list-style-type: none"> <li>▪ Light signalling (optional)</li> <li>▪ Acoustic signalling (optional)</li> </ul>  |             |
| High voltage switch off  |        |   | <ul style="list-style-type: none"> <li>▪ EMERGENCY STOP button</li> <li>▪ Power keylock switch</li> <li>▪ Open rear door monitoring</li> </ul>   |             |
| <b>POWER SUPPLY AND CONSUMPTION</b>                              |        |   |  |             |
| Mains supply voltage   |        |   | 230 VAC, $\pm 10\%$  |             |
| Mains supply frequency   |        |   | 50 Hz  |             |



# MOBILE CABLE FAULT LOCATION SYSTEMS

SWG family of systems has been designed as a universal, yet compact solution for servicing underground power cables.

SWG systems contain the modules necessary for the DC cable insulation testing, fault conditioning through burning faulty insulation, and determining the distance to a fault with main pre-location methods. Together with a suitable receiver, SWG family of systems can be used for cable fault pinpointing with an acoustic method.

Transportation and use of these compact systems do not require a specialised vehicle, which makes SWG systems a cost-effective, yet fully functional alternative to cable test vans.



SWG-12



SWG-32









# SWG series

## ■ MOBILE CABLE TEST AND FAULT LOCATION SYSTEMS ■

Mobile SWG-series systems are designed for testing and locating faults in low- and medium-voltage power cables. The SWG system encapsulates all the main components that normally make up a full-fledged cable test van: a time-domain reflectometer, a test/burn module, and a powerful surge generator, while the mobile form factor simplifies the delivery and deployment of the system to the work sites.

The built-in surge generator is at the core of the cable fault pinpointing with an acoustic method. As standard, surge generators in SWG systems are accompanied by a surge levels switch which allows to achieve the maximum surge impulse energy at various voltage levels, providing a high acoustic signal level.

SWG systems are supplied with the detachable reflectometer RIF-9 for added flexibility, ease, and efficiency of the TDR fault pre-location. Using the reflectometer in conjunction with the built-in high-voltage sources enables high-voltage pre-location methods: impulse arc reflection (ARC), impulse current (ICE), and voltage decay (DECAY).



### SWG-12

#### ■ Features

- Cable insulation testing with DC voltage up to 12 kV
- Fault conditioning (burning) with current up to 100 mA @ 12 kV
- TDR, ARC / ARC multi-shot, ICE and DECAY pre-location
- Surge generator up to 1100 J with 0 ... 3 / 6 / 12 kV surge levels switch
- Continuous grounding monitoring system

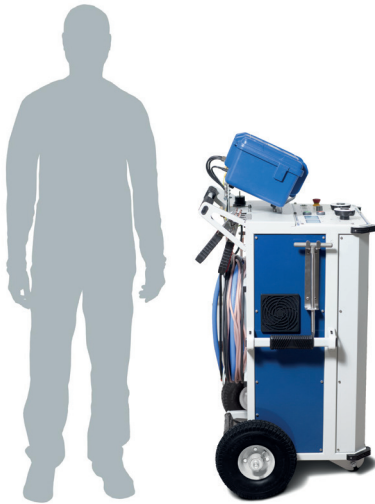


### SWG-32

#### ■ Features

- Cable insulation testing with DC voltage up to 32 kV
- Fault conditioning (burning) with current up to 100 mA @ 32 kV
- TDR, ARC / ARC multi-shot, ICE and DECAY pre-location
- Surge generator up to 2000 J with 0 ... 8 / 16 / 32 surge levels switch
- Continuous grounding monitoring system





Mobility



Control panel

|  | SWG-12  | SWG-32  |
|--|---|---|
| <b>DC TESTING</b>                              |   |   |
| Output voltage adjustment and indication range | 0 ... 12 kV   | 0 ... 32 kV   |
| Output current indication range                | 0 ... 10 mA   |   |
| <b>FAULT CONDITIONING (BURNING)</b>            |   |   |
| Output voltage adjustment and indication range | 0 ... 12 kV   | 0 ... 32 kV   |
| Burn current (open-circuit run)                | up to 100 mA  |   |
| <b>FAULT PRE-LOCATION</b>                      |   |   |
| Pre-location methods                           | <ul style="list-style-type: none"> <li>▪ TDR (impulse reflection method)</li> <li>▪ ARC / ARC multi-shot (single impulse / multiple impulse arc reflection method)</li> <li>▪ ICE (impulse current method)</li> <li>▪ DECAY (voltage decay method)</li> </ul> |   |
| <b>FAULT PINPOINTING WITH ACOUSTIC METHOD</b>  |   |   |
| Surge voltage levels and adjustment ranges     | Level 1: 0 ... 3 kV<br>Level 2: 0 ... 6 kV<br>Level 3: 0 ... 12 kV  | Level 1: 0 ... 8 kV<br>Level 2: 0 ... 16 kV<br>Level 3: 0 ... 32 kV |
| Surge energy at each level                     | up to 1100 J  | up to 2000 J  |
| Surge rate                                     | <ul style="list-style-type: none"> <li>▪ Single pulse, manually triggered</li> <li>▪ 4 ... 12 pulses/min, automatic mode</li> </ul>   |   |
| <b>SAFETY</b>                                  |   |   |
| Protection                                     | <ul style="list-style-type: none"> <li>▪ Overvoltage</li> <li>▪ Overcurrent</li> <li>▪ Overheating</li> <li>▪ Continuous grounding monitoring system</li> <li>▪ Automatic discharge device</li> </ul>   |   |
| High voltage switch off                        | <ul style="list-style-type: none"> <li>▪ EMERGENCY STOP button</li> <li>▪ Power keylock switch</li> </ul>   |   |
| <b>POWER SUPPLY AND CONSUMPTION</b>            |   |   |
| Mains supply voltage                           | 230 VAC, ± 10 %   |   |
| Mains supply frequency                         | 50 Hz (60 Hz option)  |   |
| Power consumption                              | up to 1.0 kV·A  | up to 2.0 kV·A  |
| <b>PHYSICAL</b>                                |   |   |
| Dimensions, H × W × D                          | 1172 × 775 × 603 mm   | 1215 × 764 × 675 mm   |
| Total weight                                   | 120 kg  | 185 kg  |



# TIME-DOMAIN REFLECTOMETERS

Time-domain reflectometers are used as standalone devices for determining the length and the velocity factor of electrical cable lines, and as part of cable test vans or mobile cable fault locations systems – for determining the distance to and a type of a fault.

Three-phase reflectometers allow for effective detection of low-resistance faults through a comparative analysis of the cores in the cable line as well as for an automatic determination the nature of the wave resistance inhomogeneities.

The distance to cable faults may be determined using either a low-voltage method of pulse reflectometry (TDR) or advanced high-voltage methods of remote localisation (ARC, ICE, DECAV) with minimal negative effects on the healthy cable insulation.

The additional advantages of reflectometer by KharkovEnergoPribor Ltd. include a convenient touch control, an ability to export measurements data to a PC, and the use of ARC multi-shot technology (aka MIM) which allows to obtain more reliable results when using arc reflection method of pre-location.

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■ CABLE TEST AND FAULT LOCATION SYSTEMS ■



RIF-9







**RIF-9**

pulse



# RIF-9

## ■ TIME-DOMAIN REFLECTOMETER ■

The RIF-9 reflectometer can be connected to up to three cable cores simultaneously and can be used to detect, determine the type of and distance to various inhomogeneities (couplings, branching, etc.), determine the total length (including on drums and in bundles) as well as the velocity factor of balanced and unbalanced power cables and communication lines up to 120 km long.

When locating cable faults, the reflectometer RIF-9 can be used standalone for determining the distance to the points of low-resistance cable defects (which formed, for example, naturally or in the process of burning insulation in the damaged area) as well as in conjunction with a high-voltage source or a surge generator for fault pre-location with high-voltage methods of impulse arc reflection, impulse current, and voltage decay.

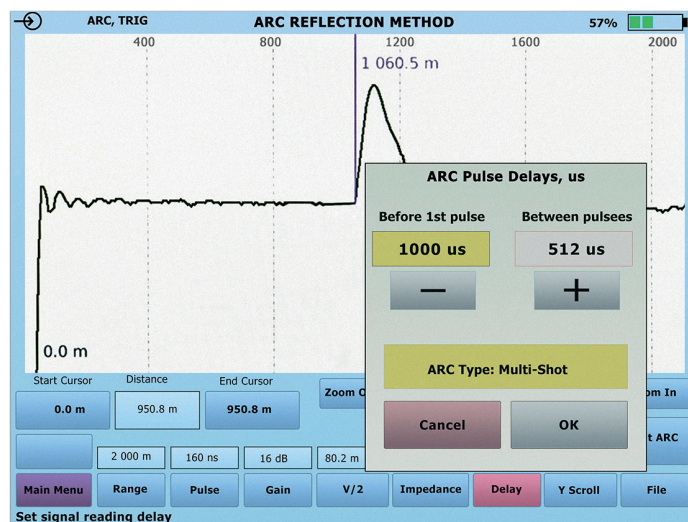


### ■ Features

- Three-phase connection
- All main pre-location methods – TDR, ARC, ICE, and DECAY
- ARC multi-shot technology
- Fault detection range up to 120 km
- Touch control
- Automatic cursor positioning at fault and cable end



Control panel



Determining the distance to a fault



## PRE-LOCATION METHODS

|                      |  |
|----------------------|--|
| Low-voltage methods  | TDR (impulse reflection method)  |
| High-voltage methods | <ul style="list-style-type: none"> <li>▪ ARC / ARC multi-shot (single impulse / multiple impulse arc reflection method)</li> <li>▪ ICE (impulse current method)</li> <li>▪ DECAY (voltage decay method)</li> </ul> |

## SYSTEM PARAMETERS

|   |   |
|---|---|
| Number of connection phases   | 3   |
| Fault detection ranges for velocity factor 1.50 ( $v/2 = 100 \text{ m}/\mu\text{s}$ )   | 0 ... 60 / 120 / 250 / 500 / 1000 / 2000 / 5000 / 10 000 / 20 000 / 50 000 / 120 000 m                            |
| Fault detection resolution: <ul style="list-style-type: none"> <li>▪ for velocity factor 1.50 (<math>v/2 = 100 \text{ m}/\mu\text{s}</math>)</li> <li>▪ for velocity factor 1.87 (<math>v/2 = 80.2 \text{ m}/\mu\text{s}</math>)</li> </ul> | <p style="text-align: center;">0.5 m</p> <p style="text-align: center;">0.4 m</p>                                 |
| Distance to fault detection accuracy  | 0.2 % of selected range   |
| Sampling rate   | 200 MHz   |
| Time marks accuracy   | 0.01 %  |
| Output impedance adjustment range   | 2 ... 100 $\Omega$ , resolution 2 $\Omega$  |
| Probe pulse parameters: <ul style="list-style-type: none"> <li>▪ voltage</li> <li>▪ width adjustment range</li> </ul>   | <p style="text-align: center;">45 V</p> <p style="text-align: center;">10 ns ... 100 <math>\mu\text{s}</math></p> |
| Gain adjustment range   | minus 21 ... + 69 dB  |
| Velocity factor adjustment range  | 0.750 ... 3.000, resolution 0.001   |
| Velocity of propagation ( $v/2$ ) adjustment range  | 50.0 ... 200.0 $\text{m}/\mu\text{s}$ , resolution 0.1 $\text{m}/\mu\text{s}$                                     |

## INTERFACES

|  |   |
|--|---|
| Display  | 10.4" colour TFT, 800 × 600 px, resistive touch   |
| Connection interfaces  | <ul style="list-style-type: none"> <li>▪ USB-A (user memory stick)</li> <li>▪ USB-B (PC connection)</li> <li>▪ RS-485 (service only)</li> </ul> |
| Internal memory: <ul style="list-style-type: none"> <li>▪ reflectograms with parameters</li> <li>▪ cable velocity factors</li> </ul> | <p style="text-align: center;">1000</p> <p style="text-align: center;">500</p>  |

## SAFETY

|   |  |
|---|--|
| Protection                                | <ul style="list-style-type: none"> <li>▪ Protective earthing</li> </ul>  |
| Fuses                                     | <ul style="list-style-type: none"> <li>▪ Accumulator power supply circuit</li> <li>▪ Mains power supply circuit</li> </ul> |
| Allowable voltage on measuring terminals  | up to 50 V   |
| Protection rating (according to EN 60529) | IP 54 (with lid closed)  |

## POWER SUPPLY AND CONSUMPTION

|                               |                                |
|-------------------------------|--------------------------------|
| Internal rechargeable battery | 12 B, 9 A·h, lead-acid battery |
| Battery life                  | up to 6 h                      |

## PHYSICAL

|                       |                    |
|-----------------------|--------------------|
| Dimensions, H × W × D | 178 × 366 × 271 mm |
| Weight                | 8 kg               |



# LOW FREQUENCY GENERATORS

Portable and rack-mountable LFG-series generators are used in tracing systems standalone or as part of cable test vans for locating underground utility lines, pinpointing cable faults, and selecting the required cable from a bunch with an inductive method.

A wide range of operating frequencies allows for effective pairing of LFG generators with various receivers and tracers, while a powerful output signal and a wide range of special functions simplify the work with long cable lines or when operating in adverse location conditions.



LFG-50



LFG-200



LFG-2500







# LFG series

## ■ LOW FREQUENCY GENERATORS ■

Portable and rack-mountable generators of the LFG series are used in route tracing systems as a source of a low frequency electrical signal when searching for power cable faults, tracing underground utility lines or selecting the required cable from a bundle with an inductive method.



### LFG-50

#### ■ Features

- Output power up to 50 V·A
- Multi-frequency and pulse modes
- Automatic load resistance matching
- Built-in transmission antenna
- Bright OLED display
- Built-in LED light



### LFG-2500

#### ■ Features

- Output power up to 2500 V·A
- Frequency modulation mode
- Automatic load resistance matching
- Bright OLED display



### LFG-200

#### ■ Features

- Output power up to 200 V·A
- Multi-frequency and pulse modes
- Automatic load resistance matching
- Integration with cable test vans
- Bright OLED display



|   | LFG-50   | LFG-200                      | LFG-2500  |
|---|--|------------------------------|---|
| <b>SYSTEM PARAMETERS</b>  |  |                              |   |
| Sets of operating frequencies*  | 491 / 982 / 8440 Hz<br>480 / 1450 / 9820 Hz<br>526 / 1024 / 8928 Hz<br>1024 / 2048 / 9820 Hz |                              | 1024 Hz<br>1024 / 2048 Hz   |
| Number of frequencies used simultaneously                                   | 1 ... 3  |                              | 1   |
| Frequency selection   | Manual   |                              |   |
| Modulation type   | Amplitude  |                              | Frequency   |
| Output power adjustment range   | 0 ... 50 V·A   | 0 ... 200 V·A                | 0 ... 2500 V·A  |
| Operating modes   | <ul style="list-style-type: none"> <li>▪ Continuous</li> <li>▪ Pulse</li> </ul>              |                              | <ul style="list-style-type: none"> <li>▪ Constant frequency output signal</li> <li>▪ Frequency-modulated output signal</li> </ul> |
| Modulation (pulses) frequency   | 1 Hz   |                              |   |
| Load resistance range within which the maximum output power may be achieved | 0.5 ... 1000 Ω   |                              | 0.5 ... 100 Ω   |
| Load resistance matching  | Automatic  |                              |   |
| Maximum output open-circuit voltage   | 235 V <sub>RMS</sub>   | 460 V <sub>RMS</sub>         | 320 V <sub>RMS</sub>  |
| <b>RANGES AND ACCURACIES OF THE OUTPUT PARAMETERS</b>                       |  |                              |   |
| Output voltage  | 0.1 ... 240 V <sub>RMS</sub>   | 0.1 ... 450 V <sub>RMS</sub> | –   |
| Output current  | 0.01 ... 9.9 A <sub>RMS</sub>  | 0.01 ... 20 A <sub>RMS</sub> | 0.1 ... 50 A <sub>RMS</sub>   |
| Phase shift angle   | 0 ... 90°  |                              | –   |
| Relative error of output voltage indication                                 | 5 %  |                              | –   |
| Relative error of output current indication                                 | 5 %  |                              |   |
| <b>INTERFACES</b>   |  |                              |   |
| Display   | Monochrome OLED  |                              |   |
| Connection interfaces   | USB-B (service only)   |                              | –   |
| <b>POWER SUPPLY AND CONSUMPTION</b>   |  |                              |   |
| Internal rechargeable battery   | 12 V, 10 A·h, LiFePO <sub>4</sub>  |                              | –   |
| Battery life  | Over 1 h @ maximum output power  |                              | –   |
| External power source voltage   | 10 ... 15 VDC  |                              | –   |
| Current consumption when powered from external source (12 VDC)              | up to 8 A  |                              | –   |
| Mains supply voltage  | 230 VAC, ± 10 %  |                              |   |
| Mains supply frequency  | 50 / 60 Hz   |                              |   |
| Power consumption when powered from mains                                   | up to 100 V·A  | up to 400 V·A                | up to 3000 V·A  |
| <b>PHYSICAL</b>   |  |                              |   |
| Dimensions, H × W × D   | 266 × 366 × 270 mm   | 133 × 482 × 350 mm           | 241 × 415 × 327 mm  |
| Weight  | 8 kg   | 8.3 kg                       | 13 kg   |

\* Sets of operating frequencies for LFG-50 and LFG-200 may be changed on the customer's request in the range of 100 ... 10000 Hz.



# SURGE RECEIVERS AND CABLE LOCATORS

In tracing systems, consisting of a low frequency generator and a receiver, receivers and locators are used for pinpointing faults in underground power cables, tracing and determining the burial depth of hidden conductive communication lines, and identifying a specific cable in bunches. Tracers are also used for mapping the route of objects and may be effectively applied for surveying areas for hidden energised power lines. Multifunctional receivers are used for fault pinpointing with an acoustic method when used with surge generators, which are supplied as part of cable test vans or mobile fault location systems.

Our compact, lightweight, and functionally rich receivers are simple to operate and effective in the field.



P-900



PT-14









# PT-14

## ■ CABLE AND PIPE LOCATOR ■

In conjunction with low frequency generators in tracing and fault location sets, the locator PT-14 is used as a receiver of inductive signals when searching the route and determining the burial depth of underground utilities, pinpointing insulation faults in power cables, and identifying a correct cable from a bunch.

The PT-14 locator may also used autonomously (in passive mode) for locating energised communication lines using induced signals of various frequencies.



### ■ Features

- Active and passive operating modes
- Cable route, direction and burial depth detection
- GPS and Bluetooth
- Bright colour display
- Low weight and durability

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### SYSTEM PARAMETERS

|  |  |
|--|--|
| Operating frequencies when used with a low frequency generator (active mode)   | 273 / 491 / 512 / 526 / 982 / 1024 / 2000 / 2048 / 8440 / 8928 / 9828 / 10000 / 32768 (33k) Hz |
| Operating frequencies when used standalone (passive mode)  | 25 / 50 / 60 / 100 / 300 / 550 / 1450 Hz   |
| Dynamic range of input signals   | up to 102 dB   |
| Bandwidth for each operating frequency: <ul style="list-style-type: none"><li>■ at level minus 3 dB</li><li>■ at level minus 60 dB</li></ul> | up to 9 Hz<br>up to 24 Hz  |
| Burial depth detection range   | 0.10 ... 10.00 m   |
| Operating frequency current detection range  | 10 mA ... 10.0 A   |
| Burial depth detection accuracy for single extended direct communication line  | $\pm (0.05 \cdot h + 0.1)$ m,<br>where h – determined depth                                    |
| Operating frequency voltage detection range in the "SENSOR" input  | 0.01 mV ... 1.70 V   |
| Sensitivity of the "SENSOR" input at 6 dB signal-noise ratio   | 0.05 mV  |
| Voltage detection accuracy   | $\pm (0.03 \cdot U + 3 \text{ dgt})$ V,<br>where U – determined voltage                        |

### POWER SUPPLY AND CONSUMPTION

|                   |           |
|-------------------|-----------|
| Battery life      | up to 5 h |
| Power consumption | up to 2 W |

### PHYSICAL

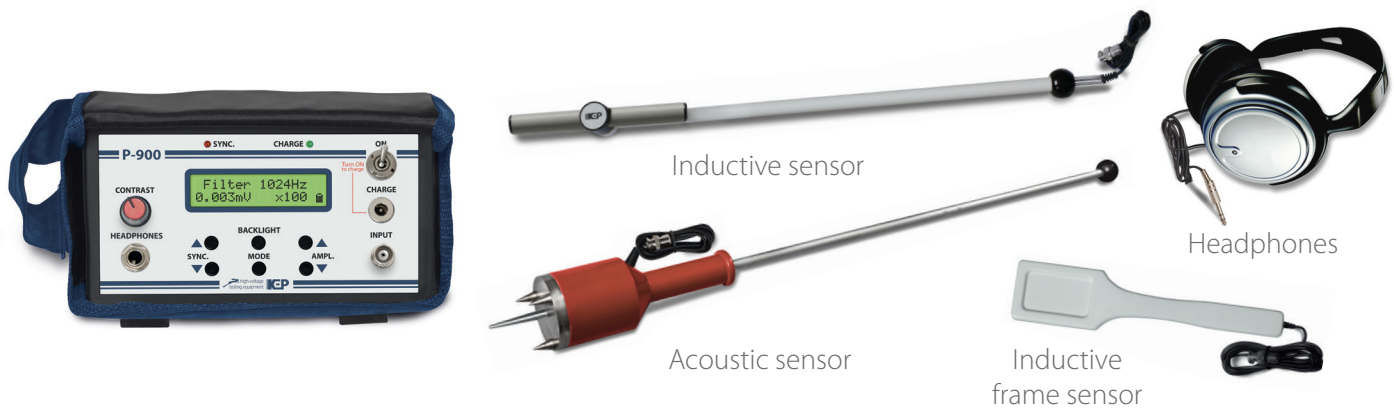
|                       |                    |
|-----------------------|--------------------|
| Dimensions, H × W × D | 700 × 300 × 140 mm |
| Weight                | 1.8 kg             |



# P-900

## ▪ MULTIFUNCTIONAL PINPOINTING RECEIVER ▪

The P-900 receiver is used in combination with surge generators for pinpointing faults in power cables with an acoustic method. The P-900 may also accompany low frequency generators in tracing and fault location sets during tracing, determining the burial depth of underground communication lines, identifying places of power cable faults as well as for selecting a cable from a bunch with an inductive method.



### ACOUSTIC MODE

|   |                |
|---|----------------|
| Range of operating frequencies  | 20 ... 2200 Hz |
| Detection and indication of EM pulse during surge generator discharge | Yes            |
| Indication of the time difference between EM and acoustic signals     | Yes            |

### INDUCTIVE MODE

|                               |   |                |
|-------------------------------|---|----------------|
| Operating frequencies         | mode "1024 Hz"  | 1024 Hz ± 2 Hz |
|                               | mode "2048 Hz"  | 2048 Hz ± 2 Hz |
| Sensitivity                   | at maximum gain   | 20 µV          |
|                               | at minimum gain   | 500 mV         |
| Bandwidth at level minus 3 dB | mode "1024 Hz"  | 10 Hz          |
|                               | mode "2048 Hz"  | 12 Hz          |
| Types of detectable signals   | <ul style="list-style-type: none"> <li>▪ Continuous</li> <li>▪ Pulse</li> </ul> |                |

### INTERFACES

|         |   |
|---------|---|
| Display | Monochrome, 2 lines, 20 characters each, with backlight |
|---------|---|

### SAFETY

|   |       |
|---|-------|
| Protection rating (according to EN 60529) | IP 50 |
|---|-------|

### POWER SUPPLY AND CONSUMPTION

|                               |                |
|-------------------------------|----------------|
| Internal rechargeable battery | 6 V, 2500 mA·h |
| Battery life                  | up to 16 h     |

### PHYSICAL

|                                 |                   |
|---------------------------------|-------------------|
| Base unit dimensions, H × W × D | 180 × 70 × 120 mm |
| Weight (without sensors)        | 0.64 kg           |

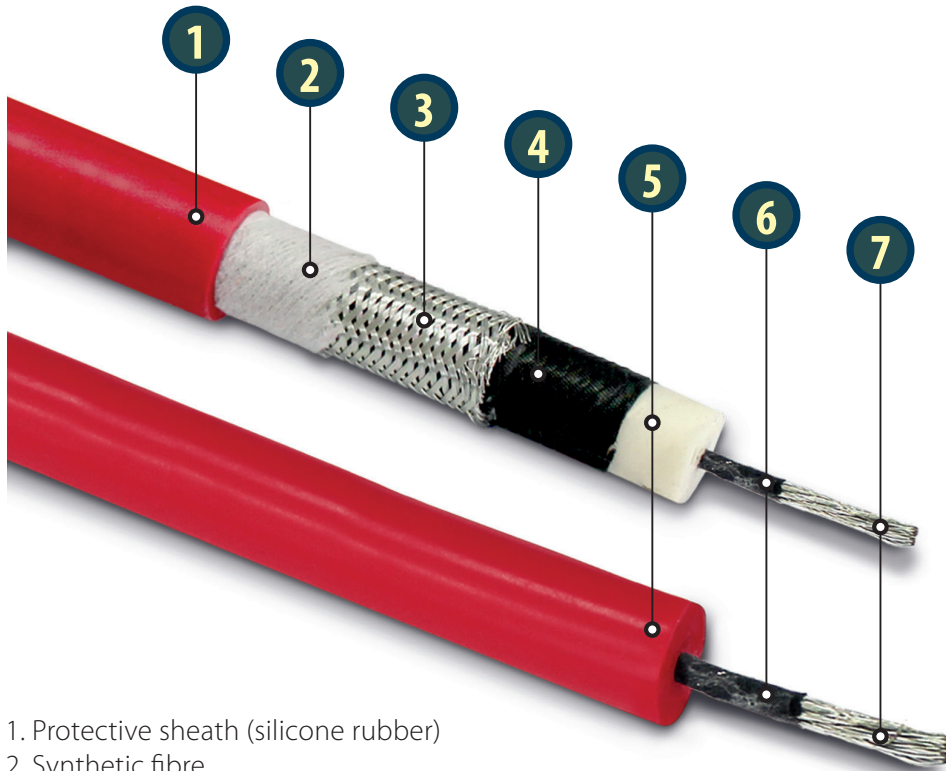




# CABLES & WIRES

KEP-series high-voltage cables are a perfect solution for connecting high-voltage testing equipment to a variety of test objects.

KEP cables are supplied as part of our own equipment (ETL cable test vans, SWG mobile cable test and fault location systems, portable high-voltage VLF test systems, etc.).



1. Protective sheath (silicone rubber)
2. Synthetic fibre
3. Screen (tinned copper wire)
4. Semiconductive layer
5. Main insulation (silicone rubber)
6. Semiconductive layer
7. Core (flexible tinned copper wire)

|           |  |
|-----------|--|
| KEP-70P   | High-voltage wire, up to 50 kV AC, 1 × 4.0 mm <sup>2</sup>                     |
| KEP-12t   | High-voltage cable, up to 12 kV AC, 1 × 0.5 mm <sup>2</sup>                    |
| KEP-12    | High-voltage cable, up to 20 kV DC, 1 × 6.0 mm <sup>2</sup>                    |
| KEP-70    | High-voltage cable, up to 70 kV DC, 1 × 4.0 mm <sup>2</sup>                    |
| KEP-40    | High-voltage cable, up to 50 kV DC, 1 × 6.0 mm <sup>2</sup>                    |
| KEP-32-4  | High-voltage wire, up to 50 kV AC, 1 × 4.0 mm <sup>2</sup>                     |
| KEP-32-1  | High-voltage wire, up to 50 kV AC, 1 × 1.0 mm <sup>2</sup>                     |
| KEP-4GCb  | Operating grounding wire with black insulation, 1 × 4.0 mm <sup>2</sup>        |
| KEP-10Gct | Protective earthing wire with transparent insulation, 1 × 10.0 mm <sup>2</sup> |









# AC/DC HIPOT TESTERS

High-voltage systems by KharkovEnergoPribor Ltd. allow to quickly and safely conduct the testing of various types of electrical equipment and cables according to a multitude of standards.

One of the main advantages of our systems is an ability to output both DC and AC test voltages. Such universal approach provides our clients with a cost-efficient solution for conducting a wide range of testing using a single test system.

Our test systems provide consistent and accurate results, while the high level of operator safety is assured by all-round built-in protection mechanisms.

Systems equipped with a digital control allow to carry out tests in both fully automatic and manual control modes as well as store test results.

Our portable and mobile test systems are easy to use and well suited for both laboratory and field application.



HVT-70/50



HVTS-70/50



HVTS-HP









# HVT series

## ■ PORTABLE HIGH-VOLTAGE TEST SYSTEMS ■

HVT-series systems are designed for high-voltage testing of solid dielectrics with low and medium electric capacitance (power cables, switchgear, busbars, insulators, etc.) with DC voltage up to 70 kV and high-voltage testing of other objects with AC voltage up to 50 kV<sub>RMS</sub> at industrial frequency (f = 50 Hz).

### HVT-70/50



#### ■ Features

- DC & AC test modes
- Simple control
- Reliable pointer indication
- Safe two-module composition
- Built-in automatic grounding bar



### HVTS-70/50



#### ■ Features

- DC & AC test modes
- Graphic display and digital control
- Manual and automatic control modes
- Internal memory for test results storage
- Built-in automatic grounding bar



|  | HVT-70/50                       | HVTS-70/50         |
|--|---------------------------------|--------------------|
| <b>DC TESTING</b>                              |                                 |                    |
| Output voltage adjustment and indication range | 0 ... 70 kV                     |                    |
| Output current indication range                | 0 ... 15 mA                     |                    |
| <b>AC TESTING</b>                              |                                 |                    |
| Output voltage adjustment and indication range | 0...50 kV <sub>RMS</sub>        |                    |
| Output current indication range                | 0 ... 40 mA <sub>RMS</sub>      |                    |
| Load capacitance @ rated output voltage        | up to 1.6 nF                    |                    |
| <b>SYSTEM PARAMETERS</b>                       |                                 |                    |
| Control modes                                  | Manual                          | Manual / Automatic |
| Indication                                     | Analogue                        | Digital            |
| <b>POWER SUPPLY AND CONSUMPTION</b>            |                                 |                    |
| Mains supply voltage                           | 230 VAC, ± 10 % (110 Hz option) |                    |
| Mains supply frequency                         | 50 Hz (60 Hz option)            |                    |
| <b>PHYSICAL</b>                                |                                 |                    |
| Control unit dimensions, H × W × D             | 265 × 349 × 240 mm              |                    |
| Control unit weight                            | 13 kg                           |                    |
| High-voltage unit dimensions, H × W × D        | 500 × 360 × 310 mm              |                    |
| High-voltage unit weight                       | 35 kg                           |                    |

# HVTS-HP series

## ■ MOBILE HIGH-POWER HIGH-VOLTAGE TEST SYSTEMS ■

The HVTS-HP-series systems are designed for high-voltage testing of various dielectrics with DC voltage (up to 140 kV) and AC voltage (up to 100 kV<sub>RMS</sub>, f = 50 Hz) where a high testing current (up to 80 mA and 175 mA in DC and AC modes respectively) is required.



### ■ Features

- DC & AC test modes
- High power output
- Graphic display and digital control
- Manual and automatic control modes
- Internal memory for test report storage



|  | <b>HVTS-HP<br/>100/100-7.5 (17.5)</b> | <b>HVTS-HP<br/>140/100-7.5 (17.5)</b> |
|--|---------------------------------------|---------------------------------------|
| <b>DC TESTING</b>                              |                                       |                                       |
| Output voltage adjustment and indication range | 0 ... 100 kV                          | 0 ... 140 kV                          |
| Output current indication range                | 0 ... 40 (80) mA                      | 0 ... 30 (60) mA                      |
| <b>AC TESTING</b>                              |                                       |                                       |
| Output voltage adjustment and indication range | 0 ... 100 kV <sub>RMS</sub>           |                                       |
| Output current indication range                | 0 ... 75 (175) mA <sub>RMS</sub>      |                                       |
| Load capacitance @ rated output voltage        | up to 2.4 (5.4) nF                    |                                       |
| <b>SYSTEM PARAMETERS</b>                       |                                       |                                       |
| Control modes                                  | Manual / Automatic                    |                                       |
| Indication                                     | Digital                               |                                       |
| <b>POWER SUPPLY AND CONSUMPTION</b>            |                                       |                                       |
| Mains supply voltage                           | 230 VAC, ± 10 %                       |                                       |
| Mains supply frequency                         | 50 Hz                                 |                                       |
| Power consumption                              | up to 9 (19) kV•A                     |                                       |
| Current consumption                            | up to 40 (82) A                       |                                       |
| <b>PHYSICAL</b>                                |                                       |                                       |
| Control unit dimensions, H × W × D             | 1063 × 735 × 561 mm                   |                                       |
| Control unit weight                            | 82 (127) kg                           |                                       |
| High-voltage unit dimensions, H × W × D        | 1012 × 639 × 750 mm                   |                                       |
| High-voltage unit weight                       | 125 kg                                |                                       |



# VLF TESTERS

Subjecting cross-linked polyethylene (XLPE) cables to DC testing leads to the formation of residual capacitive charges (space charges) which may damage healthy insulation. Very low frequency (VLF) testing provides a non-destructive alternative and thus is a preferable approach to testing polymer-insulated cables.

Our multifunctional VLF-60 system allows to perform VLF testing of high-capacitance XLPE-insulated cables, conduct DC- and DC+ withstand testing of various solid dielectrics, carry out initial burning of faulty cable insulation, test vacuum circuit breakers as well as test and pinpoint cable sheath faults (with a suitable receiver).

VLF-60 can run tests in either a fully automatic mode according to IEEE 400.2-2013 or in a manual mode according to a wide range of standards, while the control is realised via a touch-sensitive colour display.



VLF-60









# VLF-60

## ■ PORTABLE HIGH-VOLTAGE VLF TEST SYSTEM ■

Portable system VLF-60 is used for VLF (0.1 Hz) withstand testing of cables with polymeric (PE, XLPE, TRXLPE, EPR, etc.) insulation, DC+ and DC- hipot testing of various electrical equipment (generators, transformers, switchgear, etc.), vacuum bottle testing as well as cable sheath testing and fault pinpointing.

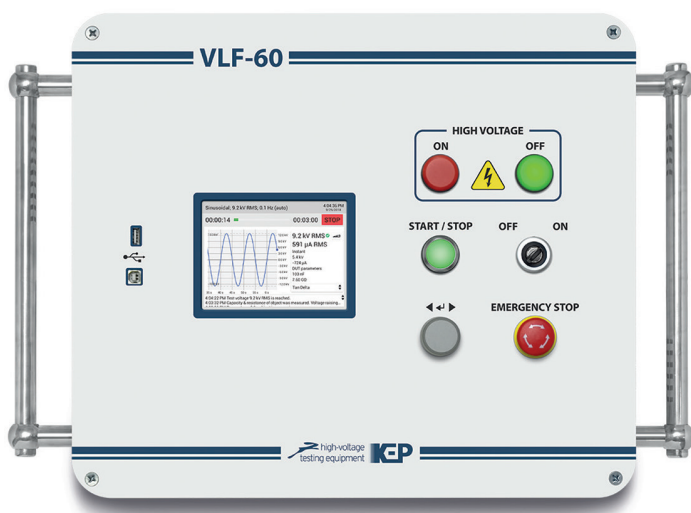


### ■ Features

- VLF withstand testing according to IEEE 400.2-2013
- VLF sinewave, VLF squarewave, DC+ and DC- voltage waveform output
- Up to 10  $\mu\text{F}$  load capacitance testing
- Cable sheath testing and fault pinpointing
- Manual & automatic test cycles
- Colour LCD with touch screen control

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■ HIGH-VOLTAGE TESTERS ■



Control panel



Touch control



## OUTPUT VOLTAGE AND CURRENT

|   | Voltage   | Current   |
|---|---|---|
| ▪ Sinewave                                  | 0.1 ... 62 kV <sub>PEAK</sub> (44 kV <sub>RMS</sub> )                           | 0.1 ... 40 mA <sub>PEAK</sub> (26 mA <sub>RMS</sub> ) |
| ▪ Bi-polar pulse                            | 0.1 ... 62 kV <sub>PEAK</sub>   | 0.1 ... 40 mA <sub>RMS</sub>                          |
| ▪ DC+                                       | + (0.1 ... 60) kV   | + (0.1 ... 40) mA                                     |
| ▪ DC-                                       | minus (0.1 ... 60) kV   | minus (0.1 ... 40) mA                                 |
| ▪ Vacuum bottle test                        | minus (0.1 ... 60) kV   | minus (1 ... 1000) µA                                 |
| ▪ Sheath test                               | minus (0.1 ... 10) kV   | minus (0.1 ... 40) mA                                 |
| ▪ Sheath fault location                     | + (0.1 ... 10) kV   | + (0.1 ... 40) mA                                     |
| Setting and indication resolution           | 0.1 kV  | 1 µA, 0.1 mA  |
| Relative indication accuracy                | ± [2 % + 2 dgt]   |   |
| Indication                                  | Real time voltage wave visualisation  |   |
| Output frequency (sinewave, bi-polar pulse) | 0.01 ... 0.1 Hz, resolution 0.01 Hz   |   |
| Frequency selection                         | <ul style="list-style-type: none"> <li>▪ Automatic</li> <li>▪ Manual</li> </ul> |   |

## SYSTEM PARAMETERS

|                      |  |
|----------------------|--|
| Output power         | up to 1200 W   |
| Breakdown management | <ul style="list-style-type: none"> <li>▪ Burn on Arc (keep arc burning)</li> <li>▪ Trip out on Arc (current limit trip)</li> </ul> |

## INDICATION

- Voltage
- Current
- Load capacitance
- Load resistance

## OBJECT UNDER TEST

|                        |   |
|------------------------|---|
| Load capacitance range | 0.1 nF ... 12 µF  |
| Load resistance range  | 10 kΩ ... 20 GΩ   |
| Maximum load           | <ul style="list-style-type: none"> <li>▪ 1.0 µF at 0.1 Hz, 44 kV<sub>RMS</sub><br/>(3 km for a typical cable with capacitance 330 pF/m)</li> <li>▪ 5.0 µF at 0.02 Hz, 44 kV<sub>RMS</sub><br/>(15 km for a typical cable with capacitance 330 pF/m)</li> <li>▪ 10.0 µF at 0.01 Hz, 44 kV<sub>RMS</sub><br/>(30 km for a typical cable with capacitance 330 pF/m)</li> </ul> |
| Duty cycle             | Continuous, unlimited   |

## CONTROLS AND INTERFACES

|                       |  |
|-----------------------|--|
| Connection interfaces | <ul style="list-style-type: none"> <li>▪ USB-A (user memory stick)</li> <li>▪ USB-B (service only)</li> <li>▪ RS-485 (service only)</li> </ul> |
| Display               | 5.7" colour TFT, 640 × 480 px, capacitive multi-touch  |
| Internal memory       | 10,000 test reports  |

## POWER SUPPLY AND CONSUMPTION

|                        |                         |
|------------------------|-------------------------|
| Mains supply voltage   | 110 ... 230 VAC, ± 10 % |
| Mains supply frequency | 50 / 60 Hz              |

## PHYSICAL

|                       |                    |
|-----------------------|--------------------|
| Dimensions, H × W × D | 528 × 577 × 408 mm |
| Weight                | 64 kg              |



# ELECTRICAL PROTECTIVE EQUIPMENT TEST SYSTEMS

Additional safety during electrical works is achieved through the reliable insulation of hand tools and personal protective equipment.

The CBC family of test systems from KharkovEnergoPribor Ltd. are designed for rapid and quality assessment of dielectric strength of a wide range of objects, including dielectric gloves, footwear, hand tools with insulated handles, voltage indicators, discharge rods, etc.

The test cycle of the CBC-C-series is automated: the supply, stabilisation and control of the test voltage is carried out automatically, while the filling and drainage of the test bath is done by an electric pump.

All CBC-family systems feature a remote-control unit and all-round auxiliary protection mechanisms for maximum operator safety.



CBC-12Ц



CBC-Ц



CBC-M







# CBC-M series

## ■ ELECTRICAL PROTECTIVE EQUIPMENT TEST SYSTEMS ■

The CBC-M-series systems are designed for acceptance and operational high-voltage testing of personal electrical protective equipment used in electrical installations.



The CBC-M-series systems are supplied with a set of accessories that allow to test a wide range of objects:

- Dielectric gloves
- Dielectric boots and shoes
- Hand tools with insulated handles (screwdrivers, wire cutters, pliers, etc.)
- Voltage indicators

The systems can be used without a test bath for general purpose high-voltage AC testing of various solid dielectrics.

Withstand tests are carried out with AC voltage up to 50 kV<sub>RMS</sub> (up to 100 kV<sub>RMS</sub> for CBC-100M) at industrial frequency (f = 50 Hz).

|  |   | CBC-50M  | CBC-100M                     |
|--|---|--|------------------------------|
| <b>TEST MODES AND PARAMETERS</b>                 |   |  |                              |
| "100 V"  | Output voltage                            | 10 ... 100 V <sub>RMS</sub>  |                              |
|  | Number of simultaneously testable objects | 1  |                              |
| "3 kV"   | Output voltage                            | 0.3 ... 3 kV <sub>RMS</sub>  |                              |
|  | Leakage current threshold                 | 7.6 mA   |                              |
| "15 kV"  | Number of simultaneously testable objects | up to 4  |                              |
|  | Output voltage                            | 1.5 ... 15 kV <sub>RMS</sub>   |                              |
| "50 kV"  | Leakage current threshold                 | 7.6 mA   |                              |
|  | Number of simultaneously testable objects | up to 4  |                              |
| "100 kV"   | Output voltage                            | 5 ... 50 kV <sub>RMS</sub>   | –                            |
|  | Leakage current threshold                 | 10 mA  | –                            |
|  | Number of simultaneously testable objects | 1  | –                            |
| "100 kV"   | Output voltage                            | –  | 10 ... 100 kV <sub>RMS</sub> |
|  | Leakage current threshold                 | –  | 10 mA                        |
|  | Number of simultaneously testable objects | –  | 1                            |
| Relative error of current and voltage indication |   | ± 3 %  |                              |
| <b>SAFETY</b>                                    |   |  |                              |
| Protective devices                               |   | <ul style="list-style-type: none"> <li>■ Built-in automatic grounding bar</li> <li>■ Overcurrent protection</li> <li>■ Overheating warning</li> <li>■ SF6 low pressure warning</li> <li>■ EMERGENCY STOP button</li> </ul> |                              |
| <b>POWER SUPPLY AND CONSUMPTION</b>              |   |  |                              |
| Mains supply voltage                             |   | 230 VAC, ± 10 %  |                              |
| Mains supply frequency                           |   | 50 Hz (60 Hz option)   |                              |
| Power consumption                                |   | up to 0.7 kV•A   | up to 1.5 kV•A               |

## CBC-C series

### ■ AUTOMATIC ELECTRICAL PROTECTIVE EQUIPMENT TEST SYSTEMS ■

Automatic CBC-C-series systems are designed for testing personal protective equipment used in electrical installations with an AC voltage up to  $50 \text{ kV}_{\text{RMS}}$  (up to  $100 \text{ kV}_{\text{RMS}}$  for CBC-100C) at industrial frequency ( $f = 50 \text{ Hz}$ ).



Application, stabilisation and control of the output voltage is done automatically according to the pre-set parameters. Filling and drainage of the test bath is carried out automatically with an aid of an electric pump.

The value of the leakage current is displayed on the LCD throughout the entire test cycle for each of the four available channels.

The CBC-C-series testers have five pre-programmed and one user-defined output voltage levels.

|  |                | CBC-50C  | CBC-100C                            |
|--|----------------|--|-------------------------------------|
| <b>TEST MODES AND PARAMETERS</b>                 |                |  |                                     |
| "Neon lamp, 100 V"                               | Output voltage | 20 ... 100 $\text{V}_{\text{RMS}}$   |                                     |
| "Test bath"                                      | Output voltage | 1 ... 15 $\text{kV}_{\text{RMS}}$  |                                     |
| "BVI-50"   | Output voltage | 10 ... 50 $\text{kV}_{\text{RMS}}$   |                                     |
| "BVI-100"  | Output voltage | –  | 10 ... 100 $\text{kV}_{\text{RMS}}$ |
| Relative error of current and voltage indication |                | ± 3 % of full range  |                                     |
| Leakage current threshold                        |                | 7.6 mA   | 10 mA                               |
| Number of simultaneously testable objects        |                | up to 4  |                                     |
| <b>SAFETY</b>                                    |                |  |                                     |
| Protective devices                               |                | <ul style="list-style-type: none"> <li>■ Built-in automatic grounding dar</li> <li>■ Overcurrent protection</li> <li>■ Overheating warning</li> <li>■ SF6 low pressure warning</li> <li>■ EMERGENCY STOP button</li> </ul> |                                     |
| <b>POWER SUPPLY AND CONSUMPTION</b>              |                |  |                                     |
| Mains supply voltage                             |                | 230 VAC, ± 10 %  |                                     |
| Mains supply frequency                           |                | 50 Hz (60 Hz option)   |                                     |
| Power consumption                                |                | up to 0.8 $\text{kV}\cdot\text{A}$   | up to 1.6 $\text{kV}\cdot\text{A}$  |



# CBC-12C

## ■ AUTOMATED ELECTRICAL INSULATING GLOVES TESTER ■

Automated system CBC-12C is designed for electrical withstand testing of rubber insulating gloves with an AC voltage of  $10 \text{ kV}_{\text{RMS}}$  at industrial frequency ( $f = 50 \text{ Hz}$ ). In addition, the system allows to test neon lamps.

The control and test progress monitoring are carried out from the remote control unit while test objects are submerged in the bath with a built-in high voltage source.



### ■ Features

- Simultaneous testing of up to 12 gloves
- Automated test cycle
- Digital control
- Safe two-module composition



### TEST PARAMETERS

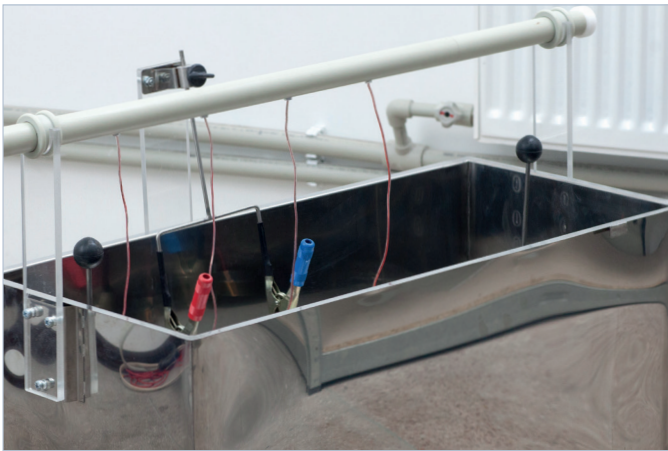
|  |                                    |
|--|------------------------------------|
| Output voltage                           | 1 ... $10 \text{ kV}_{\text{RMS}}$ |
| Relative error of voltage indication     | $\pm 3 \%$ of full range           |
| Number of simultaneously testable gloves | up to 12                           |

### POWER SUPPLY AND CONSUMPTION

|                        |                                     |
|------------------------|-------------------------------------|
| Mains supply voltage   | 230 VAC, $\pm 10 \%$                |
| Mains supply frequency | 50 Hz                               |
| Power consumption      | up to $1.5 \text{ kV}\cdot\text{A}$ |

### PHYSICAL

|                                    |                      |
|------------------------------------|----------------------|
| Control unit dimensions, H x W x D | 316 x 187 x 132 mm   |
| Control unit weight                | 3 kg                 |
| Bath dimensions, H x W x D         | 1100 x 1815 x 745 mm |
| Bath weight                        | 258 kg               |



Testing hand tools in CBC-M-series bath



Testing dielectric gloves in CBC-C-series bath



Testing dielectric gloves in CBC-12C bath

## ■ Functional comparison of CBC testers

|  | CBC-M | CBC-C | CBC-12C |
|--|-------|-------|---------|
| Automatic filling and drainage of the test bath with water | ✗     | ✓     | ✓       |
| Automatic voltage ramp up/down                             | ✗     | ✓     | ✓       |
| Indication of the breakdown voltage and leakage current    | ✗     | ✓     | ✓       |
| Swivel-lever mechanism of test objects fastening           | ✗     | ✓     | ✓       |
| Graphic display  | ✗     | ✓     | ✓       |
| Dielectric gloves testing                                  | ✓     | ✓     | ✓       |
| Dielectric boots, shoes and voltage indicators testing     | ✓     | ✓     | ✗       |



# CIRCUIT BREAKER TESTERS

Mobile UPA-series systems from KharkovEnergoPribor Ltd. are used for testing the trip functionality and time-current characteristics of circuit breakers with thermal and electromagnetic tripping units.

These systems allow to supply high current to a circuit breaker under test for very short periods of time. Pairing UPA systems with an external voltage regulator makes it possible to obtain a sinusoidal output current which guarantees highly accurate results of time-current characteristics testing of overcurrent protection devices.



УПА-1 / УПА-3



УПА-6 / УПА-10



УПА-16 / УПА-20







# UPA series

## ■ CIRCUIT BREAKER TEST SYSTEMS ■

Mobile UPA-series systems are designed for testing tripping characteristics of the magnetic and thermal-magnetic circuit breakers used in the AC circuits of industrial frequency.

Particularly, UPA-series systems may be used for testing time-current characteristics of the circuit breakers according to IEC 60898-1:2019 or IEC 60934:2019 (when used with an external voltage regulator).



UPA-6 / UPA-10



UPA-1 / UPA-3



UPA-16 / UPA-20



Current source

### ■ Features

- Output current up to 20 kA
- Time-current characteristics testing according to IEC 60898-1:2019 or IEC 60934:2019
- Continuous and time-limited current generation
- Versatile loop-through current source
- Safe two-module composition
- Mobile form factor



|   |             | UPA-1   | UPA-3            | UPA-6           | UPA-10          | UPA-16         | UPA-20        |
|---|-------------|---|------------------|-----------------|-----------------|----------------|---------------|
| <b>OUTPUT CURRENT</b>   |             |   |                  |                 |                 |                |               |
| Maximum value   |             | 1 kA  | 3 kA             | 6 kA            | 10 kA           | 16 kA          | 20 kA         |
| Current measurement ranges in amperes   | one turn    | 10 ... 100 A  | 100 ... 1000 A   |                 | 200 ... 4000 A  |                |               |
|   | two turns   | 5 ... 50 A  | 50 ... 500 A     |                 | 100 ... 2000 A  |                |               |
|   | three turns | 3.3 ... 33 A  | 33 ... 330 A     |                 | 66.7 ... 1333 A |                |               |
|   | four turns  | 2.5 ... 25 A  | 25 ... 250 A     |                 | 50 ... 1000 A   |                |               |
|   | five turns  | 2 ... 20 A  | 20 ... 200 A     |                 | 40 ... 800 A    |                |               |
| Current measurement ranges in kiloamperes   | one turn    | 0.1 ... 1 kA  | 1 ... 3 kA       | 1 ... 6 kA      | 1 ... 10 kA     | 3 ... 16 kA    | 3 ... 20 kA   |
|   | two turns   | 0.05 ... 0.5 kA   | 0.5 ... 1.5 kA   | 0.5 ... 3 kA    | 0.5 ... 5 kA    | 1.5 ... 8 kA   | 1.5 ... 10 kA |
|   | three turns | 0.03 ... 0.33 kA  | 0.33 ... 1 kA    | 0.33 ... 2 kA   | 0.33 ... 3.3 kA | 1 ... 5.33 kA  | 1 ... 6.67 kA |
|   | four turns  | 0.025 ... 0.25 kA   | 0.25 ... 0.75 kA | 0.25 ... 1.5 kA | 0.25 ... 2.5 kA | 0.75 ... 4 kA  | 0.75 ... 5 kA |
|   | five turns  | 0.02 ... 0.2 kA   | 0.2 ... 0.6 kA   | 0.2 ... 1.2 kA  | 0.2 ... 2 kA    | 0.6 ... 3.2 kA | 0.6 ... 4 kA  |
| Measurement error (of maximum value in a given range)   |             | ± 3 %   |                  |                 |                 |                |               |
| <b>SYSTEM PARAMETERS</b>  |             |   |                  |                 |                 |                |               |
| Current generation cycle  |             | <ul style="list-style-type: none"> <li>▪ Continuous (up to 7200 s)</li> <li>▪ Time-limited (50 / 100 / 200 / 400 / 600 / 800 / 990 ms, 10 s)</li> </ul> |                  |                 |                 |                |               |
| Ranges of test duration measurement   |             | <ul style="list-style-type: none"> <li>▪ 50 ... 990 ms</li> <li>▪ 1 ... 7200 s</li> </ul>   |                  |                 |                 |                |               |
| Absolute test duration measurement error in 50 ... 990 ms range                                       |             | ± 20 ms   |                  |                 |                 |                |               |
| Relative test duration measurement error in 1 ... 7200 s range  |             | ± 3 %   |                  |                 |                 |                |               |
| Open-circuit voltage (with one current conductor turn and 220 V voltage supply to the current source) |             | 0.9 V   |                  | 1.2 V           |                 | 0.9 V          |               |
| <b>SAFETY</b>   |             |   |                  |                 |                 |                |               |
| Protection  |             | <ul style="list-style-type: none"> <li>▪ Protective earthing</li> <li>▪ Over-current tripping</li> <li>▪ Overheating protection</li> </ul>              |                  |                 |                 |                |               |
| <b>POWER SUPPLY AND CONSUMPTION</b>   |             |   |                  |                 |                 |                |               |
| Mains supply voltage  |             | 230 VAC, ± 10 %   |                  |                 |                 |                |               |
| Mains supply frequency  |             | 50 Hz (60 Hz option)  |                  |                 |                 |                |               |
| Power consumption   |             | up to 3.6 kV·A  | up to 7.5 kV·A   | up to 20 kV·A   | up to 37 kV·A   | up to 50 kV·A  |               |

### External voltage regulators suitable for UPA systems

|                 |                  |
|-----------------|------------------|
| VT-20A (20 A)   | UPA-1<br>UPA-3   |
| VT-80A (80 A)   | UPA-6<br>UPA-10  |
| VT-120A (120 A) | UPA-16<br>UPA-20 |





# OIL BREAKDOWN TESTERS

Portable OLT-series testers are used for determining the dielectric strength of mineral and synthetic insulating oils. Our testers determine the oil breakdown voltage (BDV) in a fully automatic mode and feature a built-in printer for printing out test results. The testers are also equipped with the means of stirring and determining the temperature of the oil sample which ensures compliance with the requirements of the majority of the national and international oil testing standards. Proprietary KEP Suite software allows to create custom user standards with a high degree of flexibility. OLT testers provide high accuracy and stability of the obtained breakdown voltage values and feature a comprehensive operator protection during high-voltage tests.

To simplify the procedure of calibration and adjustment of the OLT-series oil testers, we have developed a special C-series reference voltage measurement cell with a bright LED display. The cells C-80 and C-100 are equipped with an infrared port for wireless connection to a PC. This allows an operator to remain at a safe distance from a high voltage source while using the proprietary KEP Suite software aids quick and efficient adjustment of the cell itself.



OLT-80



OLT-100



C-80



C-100









# OLT series

## ■ AUTOMATIC INSULATING OIL DIELECTRIC STRENGTH TESTERS ■

Portable automatic OLT-series testers are designed for dielectric strength testing of insulating oils (mineral and synthetic) with AC industrial frequency voltage.



### OLT-80

#### ■ Features

- Test voltage up to 80 kV
- Automatic test cycle
- Support of wide selection of standards (IEC 60156:2019, GOST 6581-75, etc.)
- Highly accurate results
- Integrated printer, stirrer and temperature sensor
- Test report storage and exporting to PC
- Portability and low weight

### OLT-100

#### ■ Features

- Test voltage up to 100 kV
- Automatic test cycle
- Support of wide selection of standards (IEC 60156:2019, GOST 6581-75, etc.)
- Highly accurate results
- Integrated printer, stirrer and temperature sensor
- Test report storage and exporting to PC
- Portability and low weight



|   | OLT-80                | OLT-100            |
|---|-----------------------|--------------------|
| <b>TEST PARAMETERS</b>                                  |                       |                    |
| Breakdown voltage determining and indication range      | 20 ... 80 kV          | 20 ... 100 kV      |
| Relative breakdown voltage determining error            | ± 3 %                 |                    |
| Output frequency  | 50 / 60 Hz            |                    |
| <b>SYSTEM PARAMETERS</b>                                |                       |                    |
| Switch off time at breakdown                            | < 5 μs                |                    |
| Oil sample temperature determining and indication range | minus 55 ... + 125 °C |                    |
| <b>PHYSICAL</b>   |                       |                    |
| Dimensions, H × W × D                                   | 278 × 461 × 274 mm    | 312 × 555 × 312 mm |
| Weight  | 21 kg                 | 32 kg              |



# C series

## ■ REFERENCE VOLTAGE MEASUREMENT CELL ■



Cells C-80 and C-100 are used as reference voltage meters during calibration and adjustment of the OLT-series testers.



Cell C-80 in a case



Cell C-80 in OLT tester

|                                     | C-80   | C-100                        |
|-------------------------------------|--|------------------------------|
| <b>MEASUREMENT PARAMETERS</b>       |  |                              |
| Measured values                     | <ul style="list-style-type: none"> <li>■ Voltage</li> <li>■ Frequency</li> <li>■ Crest factor</li> </ul> |                              |
| Voltage measurement range           | 10 ... 80 kV <sub>RMS</sub>  | 10 ... 100 kV <sub>RMS</sub> |
| Relative voltage measurement error  | ± 1 %  |                              |
| Voltage indication resolution       | 0.01 kV  |                              |
| Frequency measurement range         | 45 ... 65 Hz   |                              |
| Frequency indication resolution     | 0.01 Hz  |                              |
| Crest factor indication resolution  | 0.01   |                              |
| <b>SYSTEM PARAMETERS</b>            |  |                              |
| Input resistance                    | 800 MΩ   | 900 MΩ                       |
| <b>INTERFACES</b>                   |  |                              |
| Display                             | 8 characters   |                              |
| Connection interfaces               | IrDA port (PC connection)  |                              |
| <b>POWER SUPPLY AND CONSUMPTION</b> |  |                              |
| Internal rechargeable battery       | 3.7 V, LiPo  |                              |
| Battery life                        | up to 4 h  |                              |
| <b>PHYSICAL</b>                     |  |                              |
| Compatible electrode spacing        | 221 mm   | 273 mm                       |





# OIL DIELECTRIC DISSIPATION FACTOR METERS

During the normal operation, the insulating oil may get contaminated with colloidal impurities, organometallic compounds, particles of solid insulation and various aging by-products. The degree of contamination of liquid dielectrics can be determined by the value of its dissipation factor ( $\tan \delta$  or tangent delta), while the dependency of the dissipation factor on the temperature of the liquid can help identify the type of such contaminants.

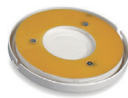
High-accuracy TANGENT-3M testers from KharkovEnergoPribor Ltd. are used for automated measurement of dissipation factor of insulating oils according to IEC 60247:2004. We have designed our testers with a built-in memory for the measurement results storage, PC-connection capability, and robust operator safety systems for all-round operator protection.

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■ INSULATING OIL TESTERS ■



ТАНГЕНС-3М



ЯОИ-3



ЯПИ-3







# TANGENT-3M

## ■ AUTOMATIC INSULATING OIL DISSIPATION FACTOR METER ■



TANGENT-3M is designed for measuring the dielectric dissipation factor ( $\tan \delta$ ) of insulating oils at industrial frequency ( $f = 50 \text{ Hz}$ ) according to IEC 60247:2004. The measurements are taken in an automated test cycle which includes cell calibration and oil sample heating.

In addition to the dielectric dissipation factor, TANGENT-3M determines the temperature, absolute permittivity, and electrical capacitance of the oil sample.

### ■ Features

- Automated test cycle
- Test report storage and exporting to PC
- High accuracy and rate of measurement
- Compact design

#### DISSIPATION FACTOR (TANGENT DELTA) MEASUREMENT PARAMETERS

|  |   |
|--|---|
| Dissipation factor measurement range   | 0.0001 ... 1.0  |
| Absolute dissipation factor measurement error  | $\pm (0.01 \cdot \tan \delta + 0.0002)$ ,<br>where $\tan \delta$ – measured value of the dissipation factor |
| Dissipation factor measurement resolution  | 0.00001   |
| Measurement time, including cell calibration and oil sample heating to 90 °C (with measurement at 70 / 80 / 90 °C)   | up to 35 min  |
| Measurement time, including cell calibration and oil sample heating to 90 °C (with measurement at 70 / 80 / 90 °C) and cooling (with measurement at 90 / 80 / 70 °C) | up to 85 min  |

#### CAPACITANCE DETERMINING PARAMETERS

|  |                              |
|--|------------------------------|
| Electrical capacitance determining range | 5 ... 50 pF                  |
| Relative capacitance determining error   | $\pm (\tan \delta + 0.5) \%$ |

#### SYSTEM PARAMETERS

|  |  |
|--|--|
| AC voltage applied to the measurement cell | 2000 V <sub>RMS</sub>                      |
| Relative voltage measurement error         | $\pm 2.5 \%$                               |
| Temperature of the oil sample heating      | up to 90 °C                                |
| Absolute temperature determining error     | $\pm 1 \text{ °C}$                         |
| Measurement cell volume                    | 12 cm <sup>3</sup> $\pm$ 1 cm <sup>3</sup> |

#### POWER SUPPLY AND CONSUMPTION

|                        |                      |
|------------------------|----------------------|
| Mains supply voltage   | 230 VAC, $\pm 10 \%$ |
| Mains supply frequency | 50 / 60 Hz           |
| Power consumption      | up to 0.3 kV·A       |

#### PHYSICAL

|                       |                   |
|-----------------------|-------------------|
| Dimensions, H x W x D | 90 x 405 x 260 mm |
| Weight                | 5 kg              |



## YAOI-3

### ■ REFERENCE TEST CELL ■



Reference cell YAOI-3 is used as a working measurement standard during the calibration of the automatic insulating oil dissipation factor meter TANGENT-3M.

Sealed case made of high-quality stainless steel is highly resistant to corrosion and reliably protects the internal components of YAOI-3 against external influences. This ensures a long-term stability of the reference values the cell provides.



## YAPI-3

### ■ THREE-TERMINAL TEST CELL ■



The test cell YAPI-3 is used as a vessel for holding the oil sample in the automatic tester TANGENT-3M during the measurement of the dielectric dissipation factor ( $\tan \delta$ ).

The cell electrodes are made of high-quality corrosion-resistant stainless steel.

The electrodes are reliably isolated from the external environment with an insulating disk made of low porosity PTFE.





# RESONANT TESTERS

UIG-series systems from KharkovEnergoPribor Ltd. are successfully used by customers in the energy generation sector internationally (Ukraine, Russia, Belarus, and Tajikistan). UIG-series testers can be used in both industrial and field conditions for DC and AC high-voltage testing. All our resonant test systems are built to order in accordance with current standards and customer's requirements.

Additionally, our resonant test systems feature high quality factor (Q-factor), are compact, and equipped with touch-control interface.



УИГ-35/70/80-250









# UIG series

## ■ RESONANT TESTERS ■

UIG-series resonant testers are designed for high-voltage testing of high-capacitance objects such as generator stator windings, busbars, cables etc. The testing can be performed with either a DC (rectified) or an AC voltage at industrial frequency, in automatic or semi-automatic modes.

All UIG resonant testers are built to order according to customer's specifications.



### ■ Features

- AC test voltage up to  $50 \text{ kV}_{\text{RMS}}$  in generator stator windings test mode
- AC test voltage up to  $80 \text{ kV}_{\text{RMS}}$  in busbar test mode
- DC test voltage up to 100 kV in leakage current measurement mode
- Power consumption up to 45 kV·A
- Output power up to 1500 kV·A
- Ability to test objects with up to 6  $\mu\text{F}$  capacitance
- High quality factor (Q-factor)

### ■ Completed projects

| Model              | Power, kV·A | Test object capacitance, $\mu\text{F}$ | Operating site                  |
|--------------------|-------------|--|---------------------------------|
| UIG-25/50/70-180   | 180         | 0.2 ... 0.8                            | Ust-Khantayka HPP, Russia       |
| UI-15/225          | 225         | 0.01 ... 6 (at 7.5 kV)                 | ZAO Beltelecabel, Belarus       |
| UIG-35/70/80-250   | 250         | 0.2 ... 0.6                            | Zatonskaya TPP, Russia          |
| UIG-35/70/80-250   | 250         | 0.2 ... 0.6                            | Shaturskaya GRES, Russia        |
| UIG-35/70/80-250   | 250         | 0.2 ... 0.6                            | Shaturskaya GRES, Russia        |
| UIG-35/50/70-315   | 315         | 0.2 ... 0.8                            | Dniester PSPP, Ukraine          |
| UIG-35/400         | 400         | 0.2 ... 1                              | Boguchansk HPP, Russia          |
| UIG-50-500         | 500         | 0.15 ... 0.7                           | Rogunsk HPP, Tajikistan         |
| UIG-60/60/80-500   | 500         | 0.2 ... 0.8                            | Protech Power Ltd. , Ukraine    |
| UIG-40/80/100-500  | 500         | 0.25 ... 0.94                          | JSC Atomtechenergo, Russia      |
| UIG-30/60/85-700   | 700         | 0.5 ... 2.5                            | Volga HPP, Russia               |
| UIG-35/70/100-750  | 750         | 0.3 ... 1.5                            | Sayano-Shushenskaya HPP, Russia |
| UIG-35/70/100-800  | 800         | 0.3 ... 1.8                            | Krasnoyarsk HPP, Russia         |
| UIG-30/60/85-900   | 900         | 0.7 ... 2.8                            | Volga HPP, Russia               |
| UIG-35/70/100-1400 | 1400        | 0.01 ... 1.5                           | Sayano-Shushenskaya HPP, Russia |





UIG resonant tester is used at Krasnoyarsk HPP in Russia





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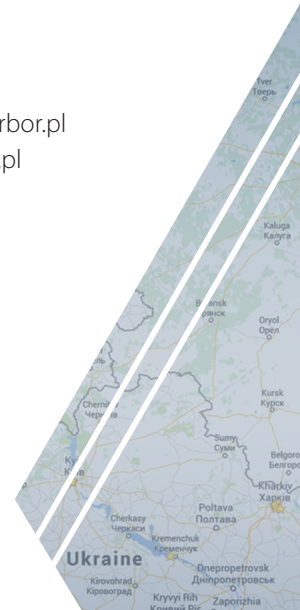


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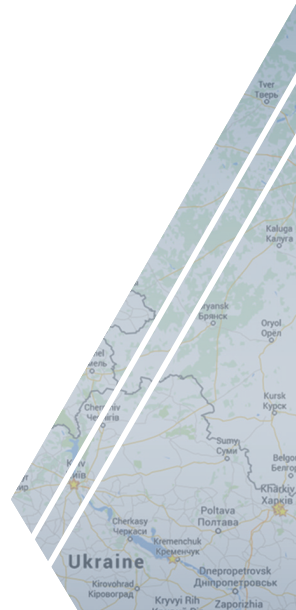
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