High-voltage meter-shaper **Installation UPEM**

- Combines the functions of a multimeter, megohmmeter, breakdown unit, and LCR meter
- It can be used as part of the TEST-9110 series of wire-mounted testers, or as a separate device
- Test voltage up to 4000VDC/3000 VAC

The UPEM meter-shaper is designed as a separate device in the LXI standard. Information communication with the PC can be carried out both via the USB interface and via the LAN interface.

Main function:
- the playback DC voltage;
- AC voltage playback;
- DC voltage measurements;
- DC power measurements;
- measurement of the RMS value of the AC voltage;
- measurement of the RMS value of the AC power;

Installation UPEM as part of the TEST-9110 series system

- DC resistance measurements using four-wire and two-wire measurement schemes;
- measurement of insulation resistance at a given value of the DC test voltage;
- checking the insulation strength at a given value of the DC test voltage;
- testing the insulation strength at a given RMS value of the AC test voltage;
- electrical capacitance measurements;
- measurement of inductance.

The UPEM installation provides reproduction of the DC voltage of positive polarity, using one of the available DC test voltage sources:
- low-voltage DC power supply (LVI);
- a high-voltage DC power source (VVI).

The device provides an indication of the presence of a test voltage on the output connector using an indicator located on the front panel.
The device contains a button for emergency shutdown of a high-voltage source located on the front panel.

The device contains a connector on the front panel for supplying two external signals for disconnecting a high voltage source through it:
- from the remote disconnect button;
- from the sensor of the open state of the protective door.

The high-voltage source is switched off when any of these signals are short-circuited to a common wire.
The device has a measurement mode with automatic range selection.

Specifications

The output voltage of each of the sources is set programmatically in the ranges • 0.3 to 30 V for (LVI); • 30 to 4000 V for VVI broken down by range: 1. 30 to 200 V - range “200 V”; 2. 200 to 2000 V - range “2000 V”; 3. 2000 to 4000 V V - range “4000 V”.	DC voltage setting step: • 0.05 V for LVI; • 1.0 V for VVI Limits of permissible relative error of DC voltage reproduction: • ± (0.5 % + 0.05 V) for NVI; • ± 1% for VVI
The LVI provides output current limits at a given level. Depending on the set value of the output voltage, the level of output current limitation can be set in the range: • at the set value of the output voltage from 0.3 to 20 V – from 1 mA to 2 A; • at the set value of the output voltage from 20.05 to 30 V – from 1 mA to 100 mA.	Step of setting the output current limit level HVI 0.1 mA When the load current reaches the set level of output current limitation, the LVI stabilizes the set value of the output current A high-voltage DC power supply (HVI) contains overcurrent protection. The protection level can be set in the range from 1 to 100 mA in 0.5 mA increments. When the output current reaches the set level of overload protection, the VVI is disabled
Software setting of the rise and release time of the test voltage in the RANGE from 0.01 to 10 s with a rise and release speed of no more than 20,000 V/s. Step of setting the time of rise and release of the test voltage no more than 0.01 s	Reproduction of sinusoidal AC voltage in the range from 50 to 2500 V RMS value broken down by ranges: • 50 to 150 V - range “150 V”; • 150 to 1500 V - range “1500 V”; • 1500 to 2500 V - range “2500 V”

Software setting of the holding time of the DC test voltage in the range from 0 to 655 s. Step of setting the test voltage holding time no more than 0.01 s	Frequency of reproducible sinusoidal AC voltage 50 Hz
Limits of permissible relative error of the frequency of the reproduced sinusoidal AC voltage ±0.5 %	
Coefficient of nonlinear distortion of sinusoidal AC voltage no more than 10 %	Discreteness of setting the RMS value of the AC voltage 1 V
The AC voltage source contains an overcurrent protection circuit. The amplitude value of the maximum output current, which is the same for the positive and negative half-waves of the output voltage, is set programmatically in the range from 1 to 100 mA in 0.5 mA increments. When the output current reaches the set level of overload protection, the AC voltage source is switched off	Limits of permissible relative error of setting the RMS value of the AC voltage ± 2 % The device provides software setting of the rise and fall time of the AC test voltage in the range from 0.01 to 10 s. Step of setting the time of rise and release of the test voltage is not more than 0.02 s
Software setting of the holding time of the AC test voltage in the range from 0 to 655 s. Step of setting the test voltage holding time no more than 0.01 s	Measurement of DC voltage with positive and negative polarity in the following ranges: • -1 to 1 V - range " 1 V"; • -10 to 10 V - range " 10 V"; • -100 to 100 - range "100 V"; • -700 to 700 V - range "700 V"
Limits of the permissible error in measuring DC voltage in each range, reduced to the upper limit of the range, for an integration time equal to one period of the supply network, ± 0.5 %	Input resistance of the DC voltage meter is not less than 9.8 MOhm
Measurement of DC power of positive and negative polarity in the following ranges: • -0,1 to 0,1 mA - range "0,1 mA"; • -1 to 1 mA - range "1 mA"; • -10 to 10 mA - range "10 mA"; • -100 to 100 mA - range "100 mA"; • -1 to 1 A - range "1 A"	Limits of the permissible error in measuring DC power in each range, reduced to the upper limit of the range, for an integration time equal to one period of the supply network, ± 0.5 % The maximum voltage drop on the measuring circuits of the DC power meter is not more than 0.7 V
Measurement of the RMS value of the AC voltage in the ranges • 0 to 10 V - range " 10 V"; • 0 to 100 V - range "100 V"; • 0 to 700 V - range "700 V"	Limits of the permissible error of measuring the RMS value of the AC voltage in the frequency range from 50 Hz to 1 kHz, reduced to the upper limit of the range, with an integration time of at least one period of the supply network ± 1 %
Input resistance of the AC voltage meter is not less than 9.8 MOhm	Measuring the RMS value of AC power in the range from 0 to 100 mA
Limits of the permissible error of measuring the RMS value of AC power in the frequency range from 50 Hz to 1 kHz, reduced to the upper limit of the range, with an integration time of at least one period of the supply network ± 5 %	The maximum AC voltage drop on the measuring circuits of the AC meter is not more than 0.7 V RMS
Measurement of DC resistance using four-wire and two-wire measurement schemes in the range • from 1 MOhm to 10 MOhm with a four-wire measurement scheme; • from 1 Ohm to 10 MOhm with a two-wire measurement circuit.	Limits of permissible relative error of DC resistance measurements: • ± (0.5%· R + 0.001 Ohm) for R up to 1 Ohm; • ± 0.1 % for R from 1 Ohm to 100 kOhm; • ± 1 % for R from 100 kOhm to 10 MOhm.
Note The resistance is measured using a low-voltage DC power source (DCV). The voltage at the measured resistance (UR)and the current flowing through it (IR) depend on the set values of the output voltage of the LVI, the level of limitation of the output current of the LVI, as well as the value of the measured resistance	
Note 1. 1) the Given limits of relative measurement error are provided when the following measurement conditions are met: а) Uвых/R > 0,4 μA; б) Ip · R > 1 mV, where: • Uвых – the set value of the output voltage of the LVI; • Ip – the set value of the output current limitation level of the LVI. 2. 2) for a two-wire measurement scheme, the limits of the relative measurement error are given taking into account the resistance of the wires connecting the measured resistance to the measuring inputs of the device.	
Measurement of insulation resistance in the range from 0.1 to 5000 MOhm with a positive polarity DC test voltage set programmatically in the range from 4 to 2000 V	The limits of the permissible relative error of insulation resistance measurements for an integration time of at least one period of the supply network correspond to the values given in table 1

Limits of permissible relative error of insulation resistance measurements for integration time of at least one period of the supply network

Range of measured leakage current (Iy) (see note)	The intervals of values of the leakage current Iун < Iy ≤ Iув		Acceptable relative error, %
	Iун, mA	Iув, mA	
«0,1 mA» (Iy ≤ 0,1 mA)	0,01	0,1	± 1
	0,001	0,01	± 2
	0,0001	0,001	± 5
	0	0,0001	± 10
«0,1 mA» (Iy ≤ 1 mA)	0,1	1,0	± 1
	0,01	0,1	± 2
	0,001	0,01	± 5
	0	0,001	± 10
«10 mA» (Iy ≤ 10 mA)	1,0	10	± 1
	0,1	1,0	± 2
	0,01	0,1	± 5
	0	0,01	± 10

Note
The leakage current is determined by the formula
Iy = Uисп / Rизм, (1)
where Uисп – is the value of the test voltage from 4 to 2000 V;
Rизм – measured resistance value from 10 E+3 to 5 E+9 Ohms.

Checking the insulation strength with a DC voltage of positive polarity, set programmatically in the range from 50 to 4000 V. The breakdown current value is set programmatically in the range from 1 to 100 mA in 0.5 mA increments	Checking the insulation strength with an AC voltage set in the range from 50 to 2500 V RMS. The amplitude value of the breakdown current, which is the same for the positive and negative half-waves of the test voltage, is set programmatically in the range from 1 to 100 mA in 0.5 mA increments
Measurement of electrical capacitance in the range from 100 pF to 100 MF	Limits of permissible relative measurement error of electrical capacitance ± (5 % + 20 pF)
Measurement of inductance in the range from 1 μh to 1 mH	Limits of permissible relative error of inductance measurements ± (10 % +1 μH)
Disconnecting all input and output lines of the product from the contacts of the output connectors at the program command	The outputs of the voltage and current sources, as well as the measuring inputs of the device are galvanically isolated from the housing
Electrical strength of the galvanic isolation is not less than 3000 V	Galvanic isolation resistance of at least 1 GOhm