

## MJ159 / MJ359 / 210170

### Major Megger Insulation Resistance Testers



- Portable tester
- No scale multipliers
- Multiple test voltages for spot and step voltage testing
- Guard terminal to eliminate surface leakage current
- Voltage indicating range
- Large, easy-to-read scale

#### DESCRIPTION

Quality is crafted into every Major Megger® Insulation Tester, with excellent test voltage regulation, direct measurement readout and an external guard terminal to eliminate surface leakage current from the measurement.

The instrument is all electronic; it generates a regulated DC high voltage and uses low-zero-drift, high-accuracy circuits, with high current sensitivity. Designed for portability, it is enclosed in a molded, impact-resistance, flame-retardant case. Power for model MJ159 and 210170 comes from a low-voltage, hand cranked generator which has been designed to be easy to turn even under full load conditions. The low-voltage generator is connected to an electronic inverter to provide a very stable test voltage. Accuracy of measurement is unaffected by variations in the generator cranking speed and the test voltage is maintained at its rated value. Power for model MJ359 is provided by 120 V AC 50/60 Hz or low-voltage generator. Each instrument is built into a strong ABS plastic case with a fold down carrying handle.

As a safety feature, the AC voltage range becomes effective as soon as the instrument is connected to the circuit under test. Therefore, a warning is given that the circuit under test is not de-energized before the instrument is operated.

Though calibrated for AC voltage, this range also monitors the automatic discharge feature so that after equipment having capacitance (i.e. a cable), has been tested, an indication can be given that the voltage has discharged to a level that is safe for removing the test leads.

All three models are portable, self-contained instruments designed to give rapid and accurate measurements. The instrument is protected for connection to power distribution systems up to 300 V Line-Ground and 500 V Line-Line for Installation Category III.

This relates to transient overvoltage likely to be found in fixed installation wiring.

#### MJ159

The MJ159 has four selectable test voltages of 100, 250, 500 and 1000 V DC. It measures insulation resistance up to 2000 M $\Omega$ , and an ohm range to 5000  $\approx$ .

#### MJ359

The MJ359 has four test voltages of 50, 100, 250 and 500 V DC.

#### 210170

The 210170 provides high-resistance readings up to 20,000 M $\Omega$ . The meter is calibrated directly in megohms, ohms and AC volts. Insulation resistance measurements up to 20 G $\Omega$  can be made on all voltage ranges.

The 210170 is also equipped with a 0 to 5000  $\Omega$  continuity range and a 0 to 600 V AC or presence of DC voltage measuring range.

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#### APPLICATIONS

The Major Meggers have been designed for convenience and ease-of-use when testing complex or larger electrical installations, and commissioning, servicing or maintaining electrical equipment. Typically, these testers are used to take a series of measurements over a period of time which will show the gradual decline that takes place in the insulation during its operational life. Such monitoring enables the user or to anticipate future performance and to plan ahead for repairs. They are also used to show improvements in the insulation of motor, transformer and generator windings that result from drying-out procedures used after exposure to excessive humidity or water.

All models offer multiple test voltages for performing spot and step-voltage tests. Typical applications include:

- Acceptance testing at time of installation to check conformance to specifications
- Routine preventive maintenance testing after installation
- Quality assurance testing by the manufacturer
- Diagnostic testing to isolate faulty components for repair

The Major Megger units are designed to safely test:

- Motors
- Generators
- Cables
- Switchgear
- Transformers
- Distribution networks
- Industrial and domestic installations
- Components and appliances

The range of insulation test voltages available allows one instrument to be used for a variety of applications. For example, installations and equipment can be tested at 1000 V DC when this requirement is specified, also aircraft and tele-communications equipment can be tested at the relatively low 100 V DC and 110 V to 120 V AC systems can be tested using 250 V DC.

Test leads with fused prods are available and it is recommended that these be used when checking that equipment has been isolated from the supply (by performing a voltage test), especially in high energy situations.

Major Megger insulation testers can be used for detecting high or low-resistance grounds, short circuits in apparatus, cables, wiring, etc., whether caused by moisture, oil, dirt, corrosion, damage to insulation or natural deterioration. They can also be used to determine the presence of moisture, solvents and semiconducting foreign materials in wires, cables and other conductors, and in built-up insulation systems such as those found in motor windings.

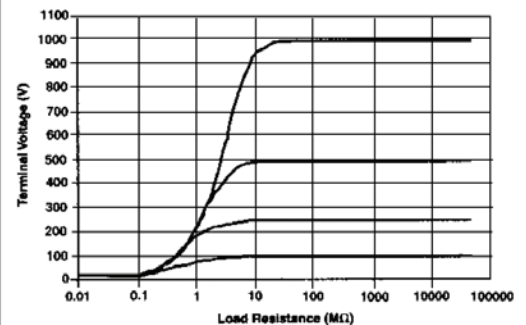
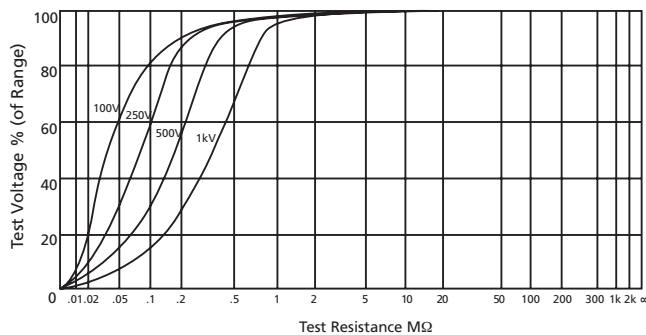
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# Major Megger Insulation Resistance Testers

### SPECIFICATIONS

	MJ159	MJ359	210170
<b>Insulation Resistance:</b>	0.1 $\Omega$ - 2000 M $\Omega$		0 to 20,000 MW
<b>Accuracy:</b>	$\pm 1.25\%$ of fsd on a 2.8 in. (71.1mm) arc length		$\pm 3\%$ of scale length on a 3.08 inch arc length
<b>Nominal Test Voltages:</b>	DC: 100 V, 250 V, 500 V, 1000 V.		
<b>Applied test voltage accuracy: 250 V, 500 V, 1000 V ranges</b>	+30%, -0% max.		+5%, -5% max.
<b>Applied test voltage accuracy: 100 V range</b>	+40%, -0% max.		+5%, -5% max.

#### Test Voltage characteristics:



<b>Midscale resistance:</b>	4 M $\Omega$	40 M $\Omega$
<b>Short Circuit Current:</b>	1.9 mA	220 $\mu$ A nominal on all ranges
<b>Maximum Load Capacitance:</b>	1 $\mu$ F with less than $\pm 0.1$ " pointer movement	
<b>Discharge rate:</b>	Up to 1 $\mu$ F capacitance is discharged from 1000 V to less than 42.4 V in less than 4 secs	
<b>Automatic discharge:</b>	Capacitive circuits are automatically discharged when the "TEST" button is released following an insulation test.	

### LOW RESISTANCE RANGE

<b>Measuring range:</b>	0.1 $\Omega$ - 5000 $\Omega$	
<b>Accuracy:</b>	$\pm 1.25\%$ of fsd on a 2.8 in. (71.1mm) arc length	$\pm 3\%$ of scale length on a 3.08 inch arc length
<b>Test Voltage (open circuit):</b>	3 V $\pm 0.2$ V	3 V $\pm 5\%$
<b>Scale length:</b>	3.08 in. (78 mm)	
<b>Short circuit current:</b>	2 mA $\pm 10\%$	30 mA $\pm 10\%$

### SAFETY VOLTAGE MEASUREMENT

<b>Voltage measurement: 0.1 V - 600 V AC</b>	0.1 V - 600 V AC; the meter is RMS calibrated and average responding	
<b>Safety voltage indicator:</b>	Indicates the presence of DC voltages. Scaling is not the same as the AC meter. True DC voltage equals scale reading divided by 2.22	
<b>Accuracy:</b>	2.5% of full scale	

### PHYSICAL CHARACTERISTICS

<b>Dimensions</b>	8.25 H x 5 W x 5 D in. (213H x 124 W x 128 D mm)	
<b>Weight</b>	Approximately 1 kg (2,3lb)	
<b>Cleaning</b>	Wipe disconnected instrument with a clean cloth dampened with soapy water or Isopropyl Alcohol (IPA).	

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POWER SUPPLY AND SAFETY			
<b>Power Supply:</b>	Hand cranked brushless AC generator, Cranking speed between 130 rpm and 170 rpm	Hand cranked brushless AC generator, Cranking speed between 130 rpm and 170 rpm or 120 V 50/60 Hz mains (line) supply	Hand cranked brushless AC generator, Cranking speed between 130 rpm and 170 rpm
<b>Safety:</b>	IEC 1010-1(1995), EN 61010 (1995) to installation Category II, 300 V phase to earth (ground), 600 V installation Category I		IEC 1010-1(1995), EN 61010 (1995) to installation Category III, 300 V phase to earth (ground), 500V line to line
<b>Flash Test:</b>	4.5 kV AC r.m.s		
<b>Fuses:</b>	500 mA (F) HBC 50kA 600V (32 mm x 6 mm)		
	7A (F) 440 V Ceramic 10 kA HBC 1 1/4 x 1/4 in. (32 mm x 6 mm)		500 mA (F) HBC 50kA 600V (32 mm x 6 mm)
	N/A	100 mA (F) HBC 20 mm x 5 mm (for line protection only)	N/A
	N/A	Power connection plug fuse 100 mA 240 V HBC (20 mm x 6 mm) Mains power cord fused plug (when applicable) 3A 250 V ceramic HBC fuse to BS1362 1 1/4 x 1/4 in. (32 mm x 6 mm)	N/A
ENVIRONMENT			
<b>E.M.C.:</b>	In accordance with IEC 61326-1. Note: These instruments are designed for use in a controlled electromagnetic environment		
<b>Operating Temperature:</b>	14° to 122°F (-10° to 50°C)		
<b>Storage Temperature:</b>	-4°F to 158°F (-20°C to +70°C)		
<b>Humidity operating:</b>	70% RH max. at 68°F (20°C), 60% RH max. at 95°F (35°C), 50% RH max. at 105°F (40°C)		
<b>Humidity storage:</b>	95% RH max. at 95° F (35°C)		

#### ORDERING INFORMATION

Description	Part number	Description	Part number
MJ159 Hand-cranked insulation tester	212159	210170 extended range insulation tester	6410-957
MJ359 120 V AC/hand-cranked insulation tester	212359		
<b>Included accessories</b>		<b>Included accessories</b>	
User guide	6172-113	Test lead set, 6 ft (1.8 m) [1 pair]	1007-155
Test lead set (3 leads, 3 prods, 3 clips)	6220-436	Pouch	1008-021
Power cord (where applicable)	25970-002	Test record cards, universal	6111-216
Test record card (5 supplied)	1010-850	User guide	6172-382
Carrying case	1008-021	<b>Optional accessories</b>	
		Fuses 500 mA, 600 V (F) H.B.C. [pk of 5]	6121-561
		"A Stitch in Time" manual	AVTM21-P8B
		Fused prod test leads	1002-015

#### SALES OFFICE

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#### MJ\_Tester\_ds\_en\_V15

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