

# MIT515, MIT525, MIT1025

## 5-kV and 10-kV Insulation Resistance Testers



- Industry best guard terminal accuracy
- Compact and lightweight for easy transport and use
- PI, DAR, DD, SV and ramp test
- Unique dual case design provides additional user protection
- Lithium-ion battery - extended capacity, rapid charge
- Advanced memory with time/date stamp
- CATIV 600 V safety rating on all terminals

### DESCRIPTION

The new range of insulation resistance testers consists of three models: two 5 kV units (MIT515 and MIT525) and a 10 kV unit (MIT1025). Resistance measurement is available up to 10 TΩ for the 5 kV models and 20 TΩ for the 10 kV model. The new instruments are smaller and lighter than previous models yet offer advanced features and rapid charge capability.

A key productivity feature is the ability to take measurements when connected to line power/mains with a dead battery. Intelligent battery charging ensures the optimum charge rate as a function of battery level, resulting in minimum charge times.

The rugged, unique dual case design provides the ultimate protection for a portable instrument and a clip-on lead pouch ensures that leads remain with the instrument at all times. The case lid is removable for improved terminal access. IP rating is IP65 with the case closed preventing water/dust ingress. High reliability and safety are built in; all models are safety rated to CATIV 600 V and are double insulated.

Five preset voltage ranges are provided in insulation test mode, plus a user settable lock voltage range. Any selectable test voltage may be locked and restored via the selector switch, thereby increasing efficiency of commissioning and repetitive tests. Preconfigured diagnostic tests include Polarization Index (PI), Dielectric Absorption Ratio (DAR), dielectric discharge (DD), Step Voltage (SV) and ramp test.

The ramp function gradually increases voltage up to a selected level while graphing current vs. voltage (graph downloadable). Graphs can be compared to example curves in IEEE 95-2002 to reveal a variety of faults difficult to detect otherwise. Small defects can be easily detected without risking the sudden large voltage increments produced by a Step Voltage test. Monitoring the developing graph during test enables the operator to terminate prior to breakdown, thereby reducing the possibility of damage to already flawed insulation. These units are particularly informative on polyester, asphalt and epoxy-mica insulations. They can also test voltage suppression devices.

Simplicity of operation is achieved with two rotary switches and the large backlit display enables multiple results to be displayed simultaneously.

Advanced memory storage includes time/date stamping of results, logging of data and recall of results to screen. A fully isolated USB device interface (type B) is used for safe transfer of data to Megger's PowerDB asset management software.

Typical end users include:

- Electrical contractors
- Testing and service companies
- Wind farm and solar generation operators
- Power generation and distribution companies
- Industrial companies
- Rail companies

**FEATURES AND BENEFITS**

- Smaller size and lighter weight allows easier transport and use without compromising performance.
- High measurement range enables installation testing and long-term trending of higher value apparatus.
- Unique dual case design allows for fire-retardant protection while maintaining ruggedness.
- High-quality, flexible silicon test leads meet safety regulations of IEC 61010-31:2008 while ensuring measurement accuracy.
- Timed IR plus PI, DAR, DD, SV and ramp tests maximize diagnostic testing capability.
- Operate from line power when battery fully discharged (charges while operating).
- Two and one-half hour full battery charge time (one-half hour charge for one hour testing) significantly increases productivity.
- Up to six hours continuous testing (5 kV) on a single battery charge.
- Industry best guard terminal performance to insure highest accuracy of measured values.
- Enhanced driver technology provides plug-and-play when connected to the internet. No tedious and potentially interruptive setup procedures.
- Dedicated voltmeter function (30 V to 660 V) with frequency measurement allows the user to check for induced voltages.
- CATIV 600 V safety rating on all terminals allows for safe use in the widest range of applications.
- Large LCD with automatic backlight.
- Noise filter rejects up to 3 mA noise for effective operation in electrically noisy environments.
- High altitude operation up to 3000 m while maintaining CATIV 600 V rating.
- Rotary switch operation for easy, intuitive field use.
- Field replaceable battery.

- Locking test leads provide additional safety.
- 3 mA short circuit current with unique max power regulations technology ensures maximum transfer whatever the load until selected voltage is reached.
- 5% accuracy all the way up to 1 T-ohm at 5 kV and 2 T-ohm at 10 kV ensures highest accuracy where it matters most.
- Date and time-stamped test results reduce the risk of error in result interpretation.

**APPLICATIONS**

The units are designed for testing the insulation of high-voltage electric equipment. Their wide voltage range also allows applications for low-voltage equipment. Generators, motors, transformers, cables and switchgear all require effective maintenance. The test techniques on the instruments provide valuable diagnostic information.

All three instruments test the insulation resistance of:

- High-voltage power cables and high-voltage buses
- Large motor/generator windings
- Line and substation transformers

The MIT525 and MIT1025 also perform spot tests, step-voltage tests, dielectric discharge tests, ramp tests, and dielectric absorption tests for the following applications:

- Acceptance testing at installation to check conformance to specifications.
- Routine preventive/predictive maintenance testing after installation.
- QA testing as part of the manufacturing process.
- Diagnostic testing to isolate faulty components for repair.

With its higher voltage testing capability, the MIT1025 is the perfect everyday work tool for manufacturers, users and maintainers of rotating machinery. Designed in accordance with the requirements of IEEE43:2000, the MIT1025 is ideal for measuring the insulation resistance of armature and field windings in rotating machines rated 1hp (750 W) or greater. The standard applies to synchronous, induction and dc machines as well as synchronous condensers.

**What is the IEEE Standard 43-2000?**

In March 2000, the IEEE-SA Standards Board approved a revision of IEEE Std 43-1974 by the Electric Machinery Committee of the IEEE Power Engineering Society. This revision is IEEE Std 43-2000, the "IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery." Following is a brief summary of its highlights:

- Test voltages up to 10 kV are recommended for windings rated greater than 12 kV.
- Both the insulation resistance and the polarization index test are recommended.

- Test results should be compared to historical values to identify changes.
- In lieu of historical records, minimum acceptable values (based on the type of equipment) for both tests are indicated.
- Depending on the machine rating, the readings for one or both tests should exceed the minimum acceptable values.
- If the readings are below the minimum acceptable values, the winding is not recommended for an over-voltage test or for operation.

## SPECIFICATIONS

### Insulation Range, Analog

100 k $\Omega$  to 10 T $\Omega$

### Insulation Range, Digital

MIT515 & MIT525: 10 k $\Omega$  to 10 T $\Omega$   
MIT1025: 10 k $\Omega$  to 20 T $\Omega$

### Test Voltages

MIT515 & MIT525: 250 V, 500 V, 1000 V, 2500 V, and 5000 V  
MIT1025: 500 V, 1000 V, 2500 V, 5000 V, and 10,000 V

### User Defined Test Voltages

MIT515 & MIT525: 100 V to 1 kV in 10 V steps,  
1 kV to 5 kV in 25 V steps  
MIT1025: Same as above plus 5 kV to 10 kV in 25 V steps

### Accuracy (23° C)

MIT515 & MIT525:  $\pm 5\%$  to 1 T $\Omega$ ,  $\pm 20\%$  to 10 T $\Omega$   
MIT1025:  $\pm 5\%$  to 2 T $\Omega$ ,  $\pm 20\%$  to 20 T $\Omega$

### Voltage Output Accuracy (0°C to 30°C)

+4% -0%  $\pm 10$  V of nominal test voltage at 1 G $\Omega$  load

### Voltmeter Range

30 to 660 V ac or dc, 50/60 Hz  
Accuracy:  $\pm 3\% \pm 3$  V  
Frequency range: 45 Hz to 65 Hz

### Short Circuit Current

3 mA nominal, max. power on all loads outperforming many  
5 mA testers

### Insulation Alarm

100 k $\Omega$  to 1 G $\Omega$

### Current Measurement

Range: 0.01 nA to 6 mA  
Accuracy:  $\pm 5\% \pm 0.2$  nA at all voltages

### Capacitance Range (above 500 V)

10 nF to 25  $\mu$ F (dependent on measurement voltage)  
Accuracy (23°C):  $\pm 10\% \pm 5$  nF

### Capacitor Charge

MIT515 & MIT525: <3 s per  $\mu$ F at 3 mA to 5 kV  
MIT1025: <5 s per  $\mu$ F at 3 mA to 10 kV

### Capacitor Discharge

MIT515 & MIT525: <250 ms/ $\mu$ F to discharge from 5000 V to 50 V  
MIT1025: <500 ms/ $\mu$ F to discharge from 10,000 V to 50 V

### Timer Range

Up to 99 minutes, 15 seconds minimum setting

### Memory Capacity

5-1/2 hours continuous logging every 5 s.  
or 33 logged PI tests  
or 350 logged IR tests

### Industry-Standard Tests

MIT515: IR, IR(t), DAR, PI  
MIT525 & MIT1025: IR, IR(t), DAR, PI, SV, DD, Ramp Test

### Interface

USB type B (device)

### Real Time Output

USB, 1 reading/second (voltage, current and resistance)

### Interference Rejection

MIT515 & MIT525: 1 mA per 250 V up to a maximum of 3 mA  
MIT1025: 1 mA per 600 V up to a maximum of 3 mA

### Guard Terminal

2% error guarding 500 k $\Omega$  leakage with 100 m $\Omega$  load

### Voltage Input Range

85 to 265 V, 50/60 Hz, 60 VA

### Battery Type

Lithium-ion, 11.1 V, 5.2 A hour, meets IEC 62133:2003

### Battery Life

MIT515 & MIT525: Typical capacity 6 hours continuous at 5 kV with a 100 M $\Omega$  load  
MIT1025: Typical capacity 4.5 hours continuous at 10 kV with a 100 M $\Omega$  load

### Battery Charge Time

2.5 hours from deep discharge, 2 hours normal discharge  
30 min. quick charge: 1 hour operation at 5 kV, 100 M $\Omega$

### Safety

Meets the requirements of IEC61010-1 CAT IV 600 V  
Default voltmeter warns operator of applied voltage above 50 V

### EMC

Meets the requirements of IEC61326-1

### Ingress Protection

IP65 (lid closed); IP40 (lid open)

### Temperature Range

Operating: -4°F to +122°F (-20°C to +50°C)  
Storage: -13°F to +149°F (-25°C to +65°C)

### Humidity Range

90% RH @ 104°F (40°C)

### Altitude

3000 m, CAT rating maintained >2000 m\*  
(\*test load connected)

### Dimensions

12 in. x 11 in. x 7 in. (315 mm x 285 mm x 181 mm)

### Weight

10 lb. (4.5 kg)

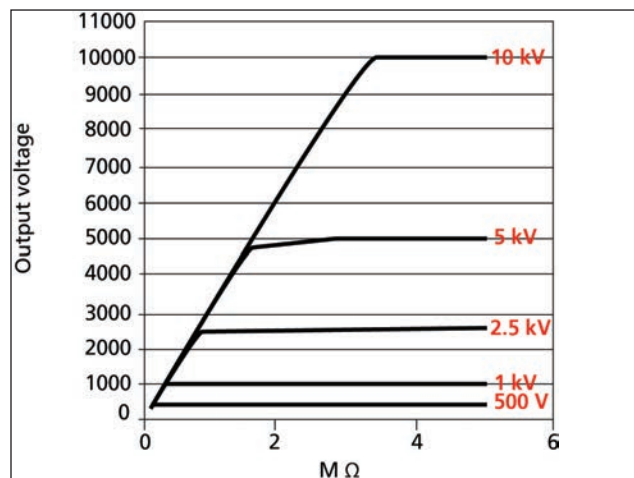



Fig. 1: Quality insulation testers exhibit fast voltage rise times to resistance levels commensurate with minimum acceptable values, and maintain selected voltage throughout the remaining measurement range. Below an acceptable level of resistance, rapid voltage drop protects the test item from exposure to high voltage, so that it may be reclaimed by appropriate maintenance.

<p><b>Product comparison guide.</b> A look at each instrument's features.</p>				
		Model Number	MIT515-US	MIT525-US
<b>Display</b>	Analog/Digital	■	■	■
	<b>Power Supply</b>	Line power	■	■
	Rechargeable	■	■	■
<b>Test Voltage</b>	10.0 kV			■
	5.0 kV	■	■	■
	2.5 kV	■	■	■
	1.0 kV	■	■	■
	500 V	■	■	■
	250 V	■	■	
	10 V steps 50 V to 1 kV 25 V steps 1 kV to max. test voltage	■	■	
	10 V steps 100 V to 2.5 kV, 25 V steps 2.5 kV to max. test voltage			■
<b>Measurements</b>	Max. reading	10 TΩ	10 TΩ	20 TΩ
	Min. reading	10 kΩ	10 kΩ	10 kΩ
	Voltage	■	■	■
	Capacitance and time constant	■	■	■
	Leakage current	■	■	■
<b>Test Types</b>	Auto IR	■	■	■
	Auto PI	■	■	■
	Auto SV		■	■
	Auto DD		■	■
	Auto DAR	■	■	■
	Ramp test		■	■
<b>Other Features</b>	CAT IV 600 V safety rating	■	■	■
	Timer control	■	■	■
	Timer display	■	■	■
	3mA test currents	■	■	■
	USB output (cable included)		■	■
	RS232 output (cable included)		■	■
	Calibration certificate included	■	■	■
	IP65 rating	■	■	■
	Alarm limit mode	■	■	■
	Compatible with PowerDB		■	■
	User programmable lock voltage range	■	■	■
	Temp. recording (manual entry)		■	■
	Real time clock		■	■
	Battery charge time (hours)	2.5	2.5	2.5
	Noise rejection	3mA	3mA	3mA
Guard terminal performance	2% error guarding 500 kΩ leakage with a 100 MΩ load			

**Model MIT1025 Panel**

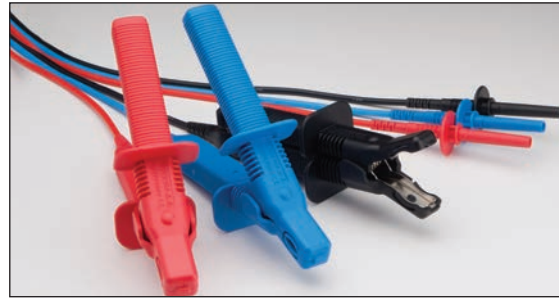
1. Positive (+) terminal
2. GUARD terminal
3. Negative (-) terminal
4. USB device interface
5. Four arrow buttons and OK button
6. TEST button with associated HV warning lamp
7. Backlight button
8. Operational rotary switch
9. Save button on MIT525 and MIT1025
10. Test mode rotary switch
11. LED indicated line power / mains
12. Display
13. Power socket



These unique features improve insulation testing efficiency and effectiveness



Large backlit LCD shows multiple parameters simultaneously.



High quality flexible silicon insulated test leads with test clips meet IEC 61010. (Large clips shown.)



CAT IV 600V rating on ALL terminals



Easy-to-read rotary test selection button includes IR, IR(t), DAR, PI, DD, SV and Ramp Test



Rotary switch operation for intuitive field use.

**ORDERING INFORMATION**

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
MIT515-US	1001-936	<b>Included Accessories (MIT525, MIT1025)</b>	
MIT525-US	1001-940	USB cable	25970-041
MIT1025-US	1001-944	PowerDB Lite software	
<b>Included Accessories</b>		<b>Optional Accessories</b>	
User guide CD		CB101, 5 kV Calibration Box	6311-077
Power lead		Calibration Certificate - CB101	1000-113
3 m leadset x 3, medium insulated clips	1002-531	Control circuit test leads	6220-822
3 m leadset x 3, large insulated clips (MIT1025 only)	1002-534		