

MIT2500 CAT IV Insulation testers



- Insulation testing up to 2.5 kV and 200 G Ω range in a hand held instrument
- Guard terminal for high resistance accuracy
- Adjustable insulation test voltage from 50 V to 2500 V
- Stabilized insulation test voltage
- Rechargeable options for mains and car charging
- Single range, faster continuity testing from 0.01 Ω to 1 M Ω
- Polarization Index (PI) and Dielectric Absorption Ratio (DAR)
- CAT IV 600 V applications

DESCRIPTION

The MIT2500 insulation and continuity tester has been designed for electrical and industrial test applications, where operation voltages exceed 1000 V and higher insulation test voltages are needed.

The MIT2500 offers both fixed range voltages of 50 V, 100 V, 250 V, 500 V, 1000 V and 2500 V, and a variable range that allows any voltage between 50 V and 2500 V to be “dialed in”. This is supported by the new test voltage feedback control, which maintains the output test voltage to within 2% of the selected range, even when under test.

The MIT2500 uses the redesigned case, back-stand, and six cell battery compartment, as well as incorporating a guard terminal to reduce surface tracking currents that reduce accuracy at higher voltages.

All instruments are over-molded for increased protection and achieve an IP54 weatherproof rating.

INSULATION RESISTANCE TESTING

The feedback controlled insulation test voltage is now accurate to +2% -0% compared to the original +20%, providing a more accurate test voltage without the risk of over-voltage damage to circuits.

A variable range allows the exact test voltage to be selected from 50 V to 999 V in 1 V steps, (1 kV to 2.5 kV in 10 V steps) providing 1100 test voltage options.

FEATURES AND BENEFITS

- **Test voltages**
 - 50 V, 100 V, 250 V, 500 V, 1000 V, and 2500 V
- **Guard terminal**
 - Improved performance on higher insulation test ranges
- **2.5 kV Silicone test leads**
 - Purpose-designed high 2.5 kV silicone test leads are included as well as standard 1000 V CAT III / 600 V CAT IV general purpose test leads.
- **Variable test voltage**
 - Adjustable test voltage from 50 V to 999 V in 1 V steps, 1000 V to 2500 V in 10 V steps
- **2% Test voltage accuracy** – The output test voltage is maintained within the tolerance of -0% +2% +2 V
- **Stabilized test voltage**
 - The voltage is feedback-controlled to ensure it remains within specification throughout the full test range
- **Test voltage display** – The actual test voltage is displayed on the smaller digital readout, with the measurement on the larger digital display.
- **Measurement range displayed**
 - The range voltage is displayed during selection.
- **Measurement voltage display**
 - The measurement voltage is displayed during the test.
- **Analog arc**
 - The display also features an analog arc to replicate the response of a moving coil display.

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■ PI and DAR

- Automatic Polarization Index (PI) and Dielectric Absorption Ratio (DAR) functions.

PI: 10 min / 1 minute ratio

DAR: 60 sec / 15 sec ratio

60 sec / 30 sec ratio

■ Timed testing

- Automatically test to a time limit.

■ 200 GΩ range

- Insulation testing up to 200 GΩ at ≥ 1000 V.

■ Test inhibit

- Prevents testing if voltages in excess of 25, 30, 50, 75 or 100 V (set by the user) are detected when making insulation tests. Default is 50 V.

■ - 15 nF capacitance inhibit where testing above 1000 V to prevent hazardous charge developing on the circuit under test.

■ Insulation buzzer

- The buzzer can be set to sound if the insulation resistance is above a user adjustable limit, configurable in the Setup menu.

■ Test Lock

- Holds insulation test on continuously.

Test ranges extend from 10 GΩ to 200 GΩ depending on test voltage as below:

■ 50 Volts 10 GΩ

■ 100 Volts 20 GΩ

■ 250 Volts 50 GΩ

■ 500 Volts 100 GΩ

■ 1000 Volts 200 GΩ

■ 2500 Volts 200 GΩ

The MIT2500 also includes a guard terminal to prevent errors from stray leakage paths.

VARIABLE INSULATION VOLTAGE

The variable mode provides a unique solution for awkward insulation voltage measurement applications. The range option allows an insulation test voltage from 50 V to 999 V in 1 V steps, or 1.0 kV to 2.5 kV in 10 V steps.

TYPICAL APPLICATIONS INCLUDE

- Commercial Avionics
- Military land, marine and air communications
- Manufacturing/production line goods
- Electrostatic measurement
- Component testing
- Battery-powered traction and lifting equipment

GUARD TERMINAL

The guard terminal (G) is a third terminal on the connection panel. Connection of the guard terminal on certain applications provides a return path for parallel leakage currents that could otherwise create significant errors in the insulation measurement. This is especially so for surface contamination of equipment or cables.

■ For voltages of 1000 V and above, or expected insulation values over 100 MΩ the guard terminal should be considered to reduce measurement error.

CONTINUITY (RESISTANCE) TESTING

■ Single resistance range

- One range fully automatic from 0.01 Ω to 1.0 MΩ.

■ Auto test current selection

- Automatically uses the preferred test current for the load resistance under test.

■ Bi-directional testing

- Option for automatic bi-directional testing without reconnecting leads.

■ Fast response time

- Response time on contact buzzer has been reduced

■ 200 mA or 20 mA

- Either 200 mA or 20 mA continuity test currents are available. 20 mA test current will considerably increase battery life.

■ Lead null

- Lead resistance compensation (NULL) operates up to 10 Ω of resistance.

■ **Buzzer** – ON/OFF selected by simple push button.

■ Buzzer limit

- Continuity buzzer limit alarm provides adjustment of the maximum resistance the continuity buzzer sounds. This is adjustable from 1 Ω to 200 Ω in 12 steps.

■ Display PASS/FAIL (✓/✗) warnings

- For use where buzzer indication may be disruptive.

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VOLTAGE MEASUREMENT

True RMS voltage measurement to 600 V AC or DC with resolution from 0.1 mV.

- Digital voltage measurement up to 600 V AC/DC
- Automatic display of frequency during voltage measurement.

DISPLAY

The display offers a combination of analog arc and a dual digital readout:

Analog arc

- Full display width analog arc.
- Arc display shows essential charge and discharge characteristics not visible on a digital display.
- Single pointer “needle” response has a similar response to a moving coil meter.

Dual digital display

- Large main digital readout for good visibility of all main measurement results.
- Second digital display for additional data such as:
 - Insulation test voltage.
 - Insulation leakage current.
 - Supply frequency (when measuring volts).

OTHER FUNCTIONS AND FEATURES

Setup functions:

Allow control of:

- Continuity buzzer limit alarms;
- Insulation buzzer limit alarms;
- Insulation LOCK;
- Insulation test timer duration;
- Back-light ON duration;
- Sleep timer;
- Continuity test currents;
- Factory reset.

Weatherproof:

Every tester is sealed to IP54, providing a weatherproof case to reduce the chance of water ingress, including the battery and fuse compartment.

Tough housing:

Rubber over moulding combines the tough shock absorbing outer protection with excellent grip, on a strong modified ABS housing, providing an almost indestructible case.

Batteries:

Battery requirements are 6 AA batteries of either standard alkaline or nickel metal hydride (NiMH) rechargeable type, providing a minimum of 3000 insulation tests at 1000 V.

The MIT2500 is enabled for internal charging when used with the optional charging pack.

STORAGE & DOWNLOADING RESULTS

Smooth Bluetooth® and pairing procedures make the MIT2500s easy to pair and download data. The test results are downloaded to a CSV file which can then be opened as an Excel® spreadsheet.

SAFETY

Designed to be exceptionally safe to use, fast detecting circuitry prevents damage to the instruments if accidentally connected to live circuits or across phases. Specifically, all instruments:

- Meet the international requirements of IEC61010 and EN61557;
- Live circuit detection inhibits insulation testing on circuits above 25, 30, 50 74 or 100 V default (50 V);
- Live circuit detection and test inhibit on continuity measurements;
- Default display of live circuit voltage on all ranges;
- Detection and inhibit functions even if the protection fuse has failed;
- Suitable for use on CAT IV applications and supply voltages to 600 V;
- Automatic capacitance detection to prevent hazardous charge.

MIT2500 INCLUDED ACCESSORIES:

Silicone test leads:

2.5 kV rated test leads fitted with medium size croc clips

1 x Red, 1 x Black, 1 x Blue (guard)

1 kV rated standard test leads with probes and clips

1 x Red, 1 x Black

OPTIONAL ACCESSORIES

Battery charger

A charging pack is available to charge the MIT2500 when fitted with NiMH AA batteries.

Remote switch probe

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APPLICATION

- Single and three phase rotating machinery
- Single and multi-core cable testing
- Motor testing

FEATURES AND BENEFITS

- Designed for the electrical and industrial markets
- Insulation testing up to 2.5 kV and 200 GΩ range in a hand held instrument
- Guard terminal for high resistance accuracy
- Adjustable insulation test voltage from 50 V to 2500 V
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- Rechargeable options for mains and car charging
- Single range, faster continuity testing from 0.01 Ω to 1 MΩ
- Polarization Index (PI) and Dielectric Absorption Ratio (DAR)
- 600 V Trms AC and DC voltage measurement
- New case design with optional magnetic hanging strap
- Test result storage and review and Bluetooth download
- Live circuit detection and protection
- CAT IV 600 V applications
- IP54

FUNCTIONAL SUMMARY

INSULATION	
50 V / 100 V	■
250 V / 500 V / 1000 V	■
2500 V	■
VARIABLE voltage from 50 V to 2500 V	■
PI- / DAR / timed	■
Lock button on MΩ	■
Guard terminal	■
CONTINUITY	
Continuity 0.01 Ω - 1 MΩ	■
Auto reverse polarity (setup ON-OFF)	■
Lead null (<10 Ω)	■
VOLTAGE	
AC / DC Volts 600 V	■
mV AC / DC range	■
Frequency measurement 15 - 400 Hz	■
Input impedance	250 kΩ
CAPACITANCE	
Capacitance 0.1 nF - 10 μF	■
OTHER FEATURES	
PASS/FAIL on limit alarms	■
Auto power down (setup)	■
On board memory	■
Bluetooth® Download and Software	■
AA Alkaline or NiMH	■
Recharger ready	■
CAT IV 600 V	■
ACCESSORIES	
Silicone leads (Red/Black/Blue with probes and clips)	■
2.5 kV Silicone croc clip leads	■
OPTIONAL Switched probe supplied	■
OPTIONAL Battery charger available	■

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SPECIFICATIONS

All quoted accuracies are at +20 °C.

INSULATION

Insulation accuracy

50 Volts	10 GΩ	± 2%	±2 digits ±4.0% per GΩ
100 Volts	20 GΩ	± 2%	±2 digits ±2.0% per GΩ
250 Volts	50 GΩ	± 2%	±2 digits ±0.8% per GΩ
500 Volts	100 GΩ	± 2%	±2 digits ±0.4% per GΩ
1000 Volts	200 GΩ	± 2%	±2 digits ±0.2% per GΩ
2500 Volts	200 GΩ	± 2%	±2 digits ±0.2% per GΩ

Service Error: BS EN 61557-2 (2007).

50 V, ± 2.0% ±2d, 100 kΩ - 900 kΩ	±10.5%
100V, ± 2.0% ±2d, 100 kΩ - 900 kΩ	±10.3%
250V, ± 2.0% ±2d, 100 kΩ - 900 kΩ	±10.3%
500V, ± 2.0% ±2d, 100 kΩ - 900 kΩ	±10.3%
1000V, ± 2.0% ±2d, 100 kΩ - 900 kΩ	±11.5%

Guard terminal performance <5% error at 500 kΩ parallel circuit resistance with 100 MΩ load

Display range Analog: 1 GΩ full scale

Resolution 0.1 kΩ

Short circuit/charge current 2 mA +0% -50% to EN 61557-2 (2007) (except 2500 V)

Terminal voltage accuracy -0% +2% ±2 V

Test current 1 mA at min. pass value of insulation to a maximum of 2 mA max

Operation EN61557 : 0.10 MΩ to 1.0 GΩ

Max. capacitive load 15 nF on tests above 1000 V (only available on MIT2500)

Leakage current display 10% ±3 digits

Voltage ±3% ±2 digits ±0.5% of rated voltage

Timer control Countdown timer 60 second (adjustable to 10 minutes)

Note Above specifications only apply when high quality silicone leads are being used.

CONTINUITY:

Continuity measurement 0.01 Ω to 1 MΩ (0 to 1000 kΩ on analog scale)

Continuity accuracy ±3% ±2 digits (0 to 100 Ω)
±5% ±2 digits (100 Ω - 500 kΩ)

Service Error: BS EN 61557-4 (2007) - ±2.0%, 0.1 Ω - 2 Ω ±6.8%

Open circuit voltage 5 V ± 1 V

Test current 200 mA (-0 mA +20 mA) (0.01 Ω to 4 Ω)

Polarity Single polarity (Default) / Dual polarity (configurable on setup).

Lead resistance Null up to 10 Ω

VOLTAGE RANGE:

Voltage range DC: 0 to 600 V
AC: 10 mV to 600 V TRMS sinusoidal (15 Hz to 400 Hz)

Unspecified:
0 – 10 mV (15 to 400 Hz)

Volt range accuracy AC: ±2% ±2 digits

Service Error: BS EN 61557-1 (2007) ±2.0% ±2d,
0 V – 300 V AC/DC ±5.1%

Waveform Non-sinusoidal:

±3% ±2 digits >100 mV to 600 V TRMS
±8% ±2 digits 10 mV to 100 mV TRMS

Default voltmeter ±0.5% ±1 digit (100 Hz to 400 Hz) unspecified

FREQUENCY:

Frequency measurement range 15 Hz – 400 Hz

Frequency measurement accuracy ±0.5% ±1 digits

CAPACITANCE MEASUREMENT:

Capacitance range 0.1 nF to 10 μF
Accuracy ±5.0% ± 2 digits (1 nF - 10 μF)

RESULTS STORAGE:

Storage capacity >1000 test results

Data download Bluetooth® wireless
Bluetooth® Class II

Range up to 10 m

Power supply 6 x 1.5 V cells type IEC LR6 (AA, MN1500, HP7, AM3 R6HP) Alkaline or 6 x 1.2 NiMH rechargeable cells may be used.

Battery life 3000 insulation tests with duty cycle of 5 sec ON /55 sec OFF @ 1000 V into 1 MΩ

Charger (Optional): 12 - 15 V DC (accessory interface)

Dimensions Instrument: 228 mm x 108 mm x 63 mm (9.00 in x 4.25 in x 2.32 in)

Weight 815 g (1 lb 13 oz)

Weight (inc. case) 1.75 kg (3 lb 14 oz)

Fuse Use only 2 x 500 mA (FF) 1000 V 32 x 6 mm ceramic fuse of high breaking capacity HBC 30 kA minimum.

Safety protection The instruments meet EN 61010-1:2010 and EN 61010-2-030:2010 to 600 V phase to earth, Category IV. Refer to safety warnings supplied

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EMC	In accordance with IEC 61326 including amendment No.1
Temperature co-efficient	<0.1% per °C up to 1 GΩ <0.1% per °C per GΩ above 1 GΩ

ENVIRONMENTAL:

Operating temperature range	-10 °C to +55 °C (+14 °F to +131 °F)
Humidity	90% RH at 40 °C max
Storage temperature range	-25 °C to +70 °C (-13 °F to +158 °F)
Calibration temperature	+20 °C
Maximum altitude	2000 m
IP rating	IP 54

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ORDERING INFORMATION

Description	Part number	Description	Part number
MIT2500 - 50 V to 2500 V insulation tester + store and download	1004-745	Optional Accessories	
Included Accessories		AC Charger kit	1007-764
Red/Black/Blue silicone test leads with prods and clips		12 V DC car charger (requires AC charger kit)	1004-183
2.5 kV Red/Black/Blue silicone test leads with clips		Switched probe SP5	1007-157
Batteries 6 x AA Alkaline		Test lead set and crocodile clips	1002-001
Carry Case		2 wire 500 mA fused test lead set	1002-015
		Batteries (6 x NiMH)	1002-735
		Magnetic Strap	1010-013
		Carry Pouch MIT400/2 Series	1007-887

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