MIT400/2
CAT IV Insulation testers

- **Designed for Electrical and Industrial testing**
- **Insulation testing up to 1000 V and 200 GΩ range**
- **Stabilised insulation test voltage (New)**
- **Single range, faster continuity testing from 0.01 Ω to 1 MΩ (New)**
- **Adjustable insulation test voltage from 10 V to 1000 V (New)**
- **600 V Trms AC and DC voltage measurement**
- **Test result storage and Bluetooth® downloading**
- **Live circuit detection and protection**
- **Rechargeable options for mains and car charging (New)**
- **CAT IV 600 V and IP54**

DESCRIPTION

The MIT400 mk2 series insulation and continuity testers are designed not just for Electrical and Industrial, but with an exceptionally wide range of applications from electrical installations, cable testing, motor testing, automotive, ESD, panel building, avionics, maintenance etc.

Insulation testing has been enhanced with feedback controlled test voltages to limit over-voltage to 2%, rather than the industry standard 10-20%.

A variable range has been added to allow any intermediate voltage from 10 V to 1000 V in 1 V steps, where application specific test voltages are required that do not appear in the standard ranges.

Continuity testing is now significantly faster, and a single auto-ranging 0.01 Ω to 1.0 MΩ function replaces the "ohms" and "kOhms" ranges. Retained are the 200 mA and 20 mA test options.

Replacing the original MIT400 instruments the new units feature a redesigned case, back-stand, and 6 cell battery compartment with separate fuse access.

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

THE MIT400 RANGE:

The range consists of four instruments:

MIT400/2	250 V, 500 V and 1000 V
MIT410/2	50 V, 100 V, 250 V, 500 V and 1000 V + PI, DAR
MIT420/2	50 V, 100 V, 250 V, 500 V and 1000 V + PI, DAR + VAR (New) and result storage
MIT430/2	50 V, 100 V, 250 V, 500 V and 1000 V + PI + DAR + VAR (New) + Bluetooth® download

INSULATION RESISTANCE TESTING:

The stabilised insulation test voltage is now accurate to +2% -0%. This compares to the industry standard +20%, providing a more accurate test voltage without the risk of over-voltage damage to circuits or components. The output voltage is maintained between 0 and 2% throughout the test range.

Where a non-standard test voltage is required, a variable range allows the exact test voltage to be selected from 10 V up to 1000 V. and is subject to the same stabilised output control.

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FEATURES INCLUDE:

- **Test voltages (New) ***
  - 50 V, 100 V, 250 V, 500 V and 1000 V.
- **Variable test voltage (New) ***
  - Adjustable test voltage from 10 V to 1000 V.
- **2% test voltage accuracy**
  - The output test voltage is maintained within the tolerance or -0% +2%
- **PASS/FAIL indication (New) ***
  – PASS or FAIL displayed depending on threshold voltage
- **Stabilised test voltage**
  - The voltage is feedback controlled to ensure it remains within specification throughout the full test range
- **Test voltage display (New)**
  - The actual test voltage is displayed on the smaller digital readout, with the measurement on the larger digital display.
- **Measurement range displayed (New) ***
  - The test range is displayed during selection
- **Measurement voltage display**
  - The measurement voltage is displayed during the test
- **Analogue arc**
  - The display also features an analogue arc to replicate the response of a moving coil display.
- **PI and DAR ***
  - Polarisation Index (PI) and Dielectric Absorption Ratio (DAR) functions
  - Polarisation Index (PI): 10 min / 1 minute ratio
  - Dielectric Absorption Ratio (DAR): 60 sec / 30 sec ratio
- **Timed testing ***
  - Automatically test to a time limit
- **High test range**
  - Insulation testing up to 200 GΩ at 1000 V.
- **Silicon leads**
  - High quality flexible silicon test leads are comfortable to use and prevent measurement errors on GΩ ranges above 5 GΩ.
- **Test inhibit**
  - prevents testing if voltages in excess of 25 V, 30 V, 50 V, 75 V 100 V (set by the user) are detected when making insulation tests. (Default is 50 V.)
- **Insulation buzzer**
  - The buzzer can be set to buzz if the insulation resistance is above a user adjustable limit, set in the Setup menu.
- **Test Lock**
  - Holds insulation test on continuously.

* Dependent on model

Test ranges extend from 2 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
- Variable 10 V to 1000 V dependent on test voltage

CONTINUITY (RESISTANCE) TESTING:

- **Single resistance range (New)**
  - One range fully automatic from 0.01 Ω to 1.0 MΩ.
- **Bi-directional testing (New) ***
  - Option for automatic bi-directional testing without reconnecting leads.
- **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.

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
- Analogue arc measurement to 600 V ac/dc
- Automatic display of frequency during voltage measurement.

DISPLAY:

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

Analogue arc:

- Full display width analogue arc.
- Analogue arc display shows essential charge and discharge characteristics not visible on a digital display.
- Single pointer "needle" response is similar to a moving coil meter.
- Setup functions allow control of Buzzer limit alarms, Continuity test currents, KΩ/MΩ/GΩ or 10^4 /10^5 /10^6 **(New)**

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).
- Test mode eg. PI, DAR or t (t = Timer mode).

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OTHER FUNCTIONS AND FEATURES

Weatherproof - Every tester is sealed to IP54, providing a weatherproof case to reduce the chances 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.

VARIABLE INSULATION VOLTAGE TESTER *

The variable mode provides a unique solution for awkward insulation voltage measurement applications. The range option allows an insulation test voltage from 10 V to 1000 V in 1 V steps.

* Dependent on model

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

STORAGE AND DOWNLOADING RESULTS

Revised Bluetooth® and pairing procedures have made the MIT430/2 far easier 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 V, 30 V, 50 V, 75 V 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.

FEATURES AND BENEFITS

- Designed for Electrical and Industrial testing
- Insulation testing up to 1000 V and 200 GΩ range
- Stabilised insulation test voltage **(New)**
- Single range, faster continuity testing from 0.01 Ω to 1 MΩ **(New)**
- Adjustable insulation test voltage from 10 V to 1000 V **(New)**
- 600 V Trms AC and DC voltage measurement
- New case design with optional magnetic hanging strap **(New)**
- Test result storage and Bluetooth® downloading
- Live circuit detection and protection
- Rechargeable options for mains and car charging **(New)**
- CAT IV 600 V and IP54

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SPECIFICATION SUMMARY TABLE

INSULATION	MIT400/2	MIT410/2	MIT420/2	MIT430/2
50 V / 100 V		■	■	■
250 V / 500 V / 1000 V	■	■	■	■
Variable			■	■
PI- / DAR / Timed		■	■	■
Lock button on MΩ	■	■	■	■
CONTINUITY				
Continuity 0.01 Ω - 1 MΩ	100 Ω	■	■	■
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	0.25 MΩ	0.25 MΩ	0.25 MΩ	0.25 MΩ
CAPACITANCE				
Capacitance 0.1 nF - 10 µF			■	■
OTHER FEATURES				
PASS/FAIL on limit alarms		■	■	■
Auto power down (setup)	■	■	■	■
On board memory			■	■
Bluetooth® download + software				■
AA Alkaline or NiMH	Both	Both	Both	Both
Recharger ready				■
CAT IV 600 V / CAT III 1000 V	■	■	■	■
ACCESSORIES				
Silicone leads (red/black)	■	■	■	■
Switched probe supplied		■	■	■
OPTIONAL Battery charger available				■

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SPECIFICATION

All quoted accuracies are at +20 °C.

Insulation:

Test voltage

Nominal:

MIT400/2	250 V, 500 V, 1000 V
MIT410/2, 420/2,430/2	50 V, 100 V, 250 V, 500 V, 1000 V

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
Service Error: BS EN 61557-2 (2007).
50V, ± 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%

Display range	Analogue: 1 GΩ full scale
Resolution	0.1 kΩ
Short circuit/charge current	2 mA +0% -50% to EN 61557-2 (2007)
Open circuit voltage insulation	-0% +2% ± 2V
Test current	1 mA at min. pass value of insulation to a maximum of 2 mA max.
Leakage	10% ±3 digits
Voltage	3% ±3 digits ±0.5% of rated voltage
Timer control	60 second countdown timer
Note	Above specifications only apply when high quality silicone leads are being used.

Continuity:

Continuity measurement	0.01 Ω to 999 kΩ (0 to 1000 kΩ on analogue scale)
Continuity accuracy	± 3% ± 2 digits (0 to 100 Ω) ±5% ±2 digits (100 to 500kΩ) (500kΩ to 1MΩ unspecified) 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 9.00 Ω

Voltage:

Voltage range	AC: 10 mV to 600 V TRMS sinusoidal (15 Hz to 400 Hz) DC: 0 to 600 V
Volt range accuracy	AC: ±2% ±1 digit DC: ±2% ±2 digit Service Error: BS EN 61557-1 (2007) - ± 2.0% ± 2d, 0 V - 300 V AC/DC ± 5.1%
Waveform	Unspecified range: 0 – 10 mV (15 to 400 Hz) For non-sinusoidal waveforms additional specifications apply Non-sinusoidal waveforms: ±3% ± 2 digits >100 mV to 600 V TRMS ±8% ± 2 digits 10 mV to 100 mV TRMS

Frequency:

Frequency measurement range	15 Hz - 400 Hz
Frequency measurement accuracy	±0.5% ± 1digit (100 Hz to 400 Hz unspecified)

Capacitance measurement:

MIT420/2, MIT430/2

Capacitance measurement	1 nF to 10 µF
Capacitance measurement accuracy	± 5.0% ± 2 digits (0.1 nF - 1 nF unspecified)

Storage:

Result storage (MIT420/2 and MIT430/2):

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 6 x 1.2 V 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	600 g (MIT400/2), (1.32 lb)

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Weight (instrument and case)	1.75 kg (3.86 lb)
Fuse	Use only 1 x 500 mA (FF) 1000 V 32 x 6 mm ceramic fuse of high breaking capacity HBC 30 kA minimum. Glass fuses MUST NOT be fitted.
Safety protection	The instruments meet EN 61010-1 (1995) to 600 V phase to earth, Category IV. Refer to safety warnings supplied.
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 and humidity	-10 to +55 °C 90% RH at 40 °C max.
Storage temperature range	-25 to +70 °C
Calibration temperature	+20 °C
Maximum altitude	2000 m
IP rating	IP 54