MIT400/2
CAT IV Insulation testers

- **Designed for electrical and industrial testing**
- **Insulation testing up to 1000 V and 200 GΩ range**
- **Stabilized 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 ac power and car charging (New)**
- **CAT IV 600 V & IP54**

DESCRIPTION

The MIT400/2 Series insulation and continuity testers are designed for electrical and industrial testing. In addition, they have an exceptionally wide range of applications in 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 & 1000 V

MIT410/2: 50 V, 100 V, 250 V, 500 V & 1000 V + PI, DAR

MIT420/2: 50 V, 100 V, 250 V, 500 V & 1000 V + PI, DAR + VAR (New) & result storage

MIT430/2: 50 V, 100 V, 250 V, 500 V & 1000 V + PI + DAR + VAR (New) + Bluetooth download

INSULATION RESISTANCE TESTING:

The stabilized 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. Subject to the same stabilized output control.

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.
- **Stabilized 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.
- **Analog arc**
  - The display also features an analog arc to replicate the response of a moving coil display.
- **PI and DAR***
  - Polarization Index (PI) and Dielectric Absorption Ratio (DAR) functions - Polarization 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, 30, 50, 75 or 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 Ωs 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
- Analog arc measurement 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.
- Analog 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).

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 & 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, 30, 50, 75 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
- Stabilized 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 ac power and car charging (New)
- CAT IV 600 V & IP54

SPECFICATION 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 - 10 MΩ	100 Ω	■	■	■
Auto reverse polarity (setup ON-OFF)		■	■	■
Lead null (Less than <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				
Combined continuity and volts			■	■
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				■

SPECFICATION

All quoted accuracies are at +20 °C.

Insulation:

Test voltage

Nominal:

MIT400/2 250 V, 500 V, 1000 V

MIT410/2, 420/2, 430/250 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	Analog: 1 GΩ full scale
Resolution	0.1 kΩ
Short circuit/charge current	2 mA +0% -50% to EN 61557-2 (2007)
Open circuit voltage	-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
Guard terminal performance	<5% error at 500 kΩ
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 analog scale)
Continuity accuracy	± 3% ± 2 digits (0 to 100 Ω) Service Error: BS EN 61557-4 (2007) - ± 2.0%, 0.1Ω - 2Ω ± 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
Voltage range accuracy	AC: ±2% ±1 digit DC: ±2% ±2 digit Service Error: BS EN 61557-1 (2007) - ± 2.0% ± 2d, 0V - 300Vac/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	100 pF to 10 µF
Capacitance measurement accuracy	± 5.0% ± 2 digits 0.1 nF - 1 nF unspecified

Result storage (MIT420/2 & 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) 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), (28.74 oz)
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 10 kA minimum. Glass fuses MUST NOT be fitted.
Safety protection	The instruments meet EN 61010-1 (1995) to 600V 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

ORDERING INFORMATION

Description	Catalog No.
MIT400/2 — 250V, 500V, 1000V insulation tester + CATIV 600V	1006-719
MIT410/2 — 50V, 100V, 250V, 500V, 1000V insulation tester + PI & DAR + CATIV 600V	1006-732
MIT420/2 — 50V, 100V, 250V, 500V, 1000V insulation tester + PI & DAR + CATIV 600V + storage & recall	1006-740
MIT430/2 — 50V, 100V, 250V, 500V, 1000V insulation tester + PI & DAR + CATIV 600V + storage & recall + Bluetooth download	1006-746
Included accessories	
Red/black silicone test leads with probes and clips	1002-001
SP5 remote switch probe (not included with MIT400/2)	1007-157
User guide CD	2007-334
Batteries 6 x AA Alkaline 1.5V	23415
Carry case	1007-886
Calibration certificate	

Description	Catalog No.
Optional Accessories	
Certificate of calibration traceable to NIST	CERT-NIST
Line charger kit (for MIT430/2 only)	1007-464
12V battery charger (requires line charger kit C/N 1007-464 sold separately)	1004-183
Fused 500 mA (red/black) test lead set with probe and clips, right angle plugs	1002-015
SP5 remote switch probe (not included with MIT400/2)	1007-157
Carry case	1007-886
Pouch	1007-887
Probe and clip lead set	1002-491
Rechargeable battery pack (includes 6x NiMH)	1002-735