

# MIT400 Series CAT IV Insulation Resistance and Continuity Testers



- Insulation testing up to 1000 V and 200 GΩ
- Patented analog arc and dual digital display
- CAT IV 600 V rating
- TRMS & DC Voltage measurement
- Continuity testing at 200 mA or 20 mA down to 0.01
- Pass/Fail limit alarms
- PI/DAR and Timer function
- Test result storage (MIT Models 420, 430, 481 and 485)
- Bluetooth® wireless data transfer (MIT Models 430 and 485)
- Measurement of capacitance and distance by capacitance (MIT Models 481 and 485)
- User selectable test voltage in 1V increments from 10V to 100V (MIT Model 40X)
- Three year product warranty
- IP54 rated

## DESCRIPTION

The new Megger MIT400 Series insulation and continuity testers has been designed for electrical testing by power utilities, industrials, telecommunication companies, commercial/domestic electricians and anyone with unique test voltage requirements. The wide range of features also makes the MIT400 Series ideal for maintenance technicians and engineers.

They replace the well-established BM400 insulation tester range, giving greater functionality with simplified operation, greater application range and increased safety.

### The range

The range consists of eight instruments:

**MIT400** 250 V, 500 V and 1000 V

**MIT410** 50 V, 100 V, 250 V, 500 V and 1000 V plus PI and DAR

**MIT420** Same as Model 410 plus result storage and download

**MIT430** Same as Model 420 plus Bluetooth® download

**MIT480** 50 V, 100 V

**MIT481** 50 V, 100 V, 250 V, 500 V, 1000 V plus PI, DAR and result storage

**MIT485** Same as Model 481, plus Bluetooth® download

**MIT40X** 10 V to 100 V in 1 V steps



Panelboard testing is faster, easier and safer with the new MIT400 Series.

## APPLICATIONS

### MIT Models 400, 410, 420 and 430

#### Industrial and Power Electrical Installation Testing:

These models include all the features required for electricians, technicians and engineers working in a range of industries. Available features are selected to make testing easy and fast in a range of situations. Typical applications include:

- Building/Campus electrical maintenance
- Large and small scale electrical installations
- Periodic electrical systems inspection and testing
- Cable testing

## Service, Repair and Maintenance:

The MIT Models 410, 420 and 430 add additional features required for technicians and engineers working on more demanding applications. Functions such as PI and DAR, capacitance measurement and a higher insulation range increase the suitability for applications such as:

- Plant maintenance and production testing
- Panelboard testing
- Railway and other transportation maintenance and testing
- Motor testing
- Cable inspection/quality control
- Street lighting maintenance
- Avionics ground testing and maintenance
- Military hardware and facility maintenance

## MIT Models 480, 481 and 485

### Telecommunication Testing

Designed to cope with the additional requirements of the telecommunications industry, MIT Models 480, 481 and 485 include 50 V and 100 V range insulation testing as standard, plus higher voltages as required.

In addition, the voltage detection test inhibit feature has been raised to 75 V (from 50 V), to allow testing of cables with coactivity coupled induced voltages, which would normally inhibit such testing with a 50 V protected instrument.

Finally the MIT481 and MIT485 models include measurement of cable distance by capacitance, providing a convenient cable length without the need to use TDR technology, with adjustable cable capacitance from 40 nF/Km to 60 nF/Km (default is 50 nF/Km).

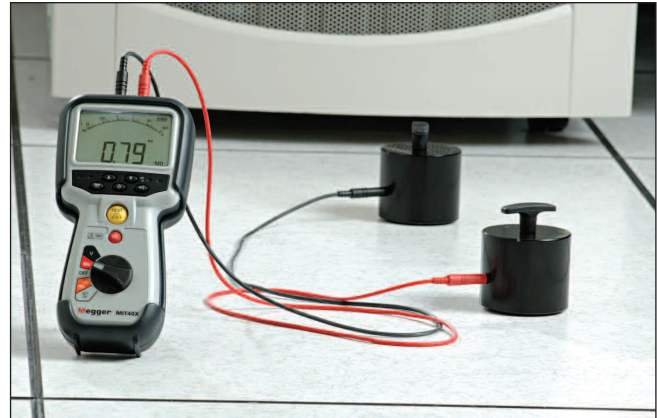
## MIT Model 40X

### Special Applications Testing

The MIT40X provides a new solution for unique insulation voltage measurement requirements. The MIT40X has a variable insulation test voltage from 10 V to 100 V **in 1 V steps**, selectable in the "Set-Up" menu.

Typical applications include:

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



MIT40X shown measuring electrostatic charge in a computer control room.

## FEATURES AND BENEFITS

- **CAT IV 600 V rating** – provides greater safety when testing at higher voltage levels
- **Adjustable insulation test voltages** – provides 250 V to 1000 V or 50 V to 1000 V. The special applications instrument (Model MIT40X) offers test voltages from 10 V to 100 V in 1 V steps.
- **Dual digital display readout** – allows display of complimentary test information simultaneously (for example:  $M\Omega$  plus test voltage or  $M\Omega$  plus leakage current)
- **Digital and analog arc display** – includes not only the digital readout but also Megger's patented analog arc to replicate the response of a moving coil display
- **Exceptional measurement range from 20  $G\Omega$  to 200  $G\Omega$**  - highest insulation test range available on the market, providing a superior range of measurement applications.
- **Choice of 20 mA or 200 mA continuity testing** – allows user to select lower continuity range thus increasing battery life considerably
- **Continuity auto-test capability** – enables real two-handed operation without the need to press the test button
- **Adjustable continuity limit alarm** – allows pass/fail limits to be sent to speed testing
- **Automatically perform PI and DAR tests** – user is able to quickly perform two important diagnostic tests. . . Polarization Index (PI) and Dielectric Absorption Ratio (DAR)
- **True RMS voltage measurement** – allows accurate voltage measurement on noisy lines
- **Auto ranging voltage measurement** – automatically adjusts range from millivolts to 600 V AC or DC, eliminating the need to keep changing ranging
- **Live circuit warning** – automatically warns of contact to a live circuit, voltage is displayed and testing is inhibited
- **Auto fuse warning** – warns of fuse failure automatically. No need to test the fuse manually.
- **Buzzer select button** – enable or disable buzzer as required with resistance also displayed on the screen



- **MIT Models 480, 481 and 485 for telecommunication testing applications also include:**
  - 75 V live circuit inhibit
  - Cable length by capacitance measurement (Model 481 & 485)
  - Cable distance in feet or km (Model 481 & 485)
- **Extensive results storage capability** – store test date for later recall (Models MIT420, 430, 481 and 485)
- **Bluetooth download capability** – wireless transfer of stored results to a PC (Models MIT430 and 485)
- **Stylish tapered design and center button placement** – easy to use with either hand
- **Each instrument comes complete with:**
  - New flexible, long-lasting silicone leads
  - Rugged instrument rubber boot
  - Calibration certificate
  - High-impact polypropylene carry case
  - Three year product warranty

### Instrument Safety

The MIT400 Series instruments are designed to meet all of the requirements of IEC1010-2 and EN61557 and meets the safety requirements for use on CAT IV 600 V.

Specific safety features include:

- Any live circuit detection inhibits any insulation testing on circuits above 50 V (75 volts on Telecom models)
- Any live circuit detection and test inhibit on continuity measurements
- Default display of live circuit voltage on all ranges
- Detection and inhibit features function even if the protections fuse has failed

Also, fast detection circuitry prevents damage to the instruments if accidentally connected to live circuits or across phases.

### Included with every instrument

Each MIT400 Series instrument comes complete with the following:

- Set of silicone test leads – Flexible and long lasting, these leads prevent errors from test lead leakage on high resistance type of insulation testing. They also provide increased accuracy above 10 GΩ.
- Rugged instrument rubber boot with built-in stand– Protects the instrument from dings and drops and provides an easier, better grip of the instrument.
- Plug-in switch probe – Allows the user to remotely perform insulation tests, reducing the time taken to perform a test. Not included with the MIT400 and 40X.
- High-impact polypropylene carry case – Further protects the instrument and provides space for the leads, switch probe, etc.
- Free calibration certificate (not included with the MIT40X).
- Owner information CD.
- Three year product warranty.

## SPECIFICATIONS

All quoted accuracies are at +20° C.

### Insulation

#### Nominal test voltages

MIT400	250 V, 500 V, 1000 V
MIT410, 420, 430	50 V, 100 V, 250 V, 500 V, 1000 V
MIT480	50 V, 100 V
MIT481, 485	50 V, 100 V, 250 V, 500 V, 1000 V
MIT40X	10 V to 100 V variable (1 V increments)

#### Insulation resistance range

MIT400	20 GΩ
MIT410	100 GΩ
MIT420, 430	200 GΩ
MIT480	100 GΩ
MIT481, 485	200 GΩ
MIT40X	20 GΩ

#### Range Full Scale Accuracy

1000 volts	±3%	±2 digits	±0.2% per GΩ
500 volts	±3%	±2 digits	±0.4% per GΩ
250 volts	±3%	±2 digits	±0.8% per GΩ
100 volts	±3%	±2 digits	±2.0% per GΩ
50 volts	±3%	±2 digits	±4.0% per GΩ
10 volts	±3%	±2 digits	±2.0% per 100 MΩ

**Analog range:** 1 GΩ full scale

**Short Circuit Current:** 2 mA +0% -50%

**Terminal voltage:** -0% +20% ±1 V

#### Test Current on load:

1 mA at min. pass value of insulation specified in BS7671, HD384 and IEC364, 2 mA max.

**EN61557 Operating range:** 0.10 MΩ to 1.00 GΩ

**Leakage Current:** 10% ±3 digits

**Voltage display:** 3% ±3 digits ±0.5% of rated voltage

**Polarization Index (PI):** 10 min/1 minute ratio

**Dielectric Absorption Ratio (DAR):** 60 sec/30 sec ratio

#### Notes:

- (1) All ranges measure from 0.00 MΩ upwards.
- (2) Above specifications only apply when high quality silicone leads are being used.

### Continuity

**Measurement:** 0.01 Ω to 99.9 Ω (0 to 100 Ω on analog scale)

**Accuracy:** ±3% ±2 digits (0 to 100 Ω)

**Open circuit voltage:** 5 V ±1 V

**Test current:** 200 mA (-0 mA +20 mA)  
(0.01 Ω to 9.99 Ω)  
20mA (±1 mA )  
(10.0 Ω to 99.9 Ω)

**Zero offset at probe tips:** 0.10Ω typical  
**Lead resistance zeroing:** Up to 9.00 Ω  
**Buzzer:** Variable limit 1Ω, 2Ω, 5Ω, 10Ω, 20Ω

**Resistance**

**Measurement:** 0.01 kΩ to 1000 kΩ  
(0 to 1 MΩ on analog scale)

**Accuracy:** ±3% ±2 digits  
**Open circuit voltage:** 5 V ±1 V  
**Short circuit current:** 20 μA ± 5 μA

**Voltage range**

0 to 600 V d.c. ±2% ±2 digits  
 10 mV to 600 V TRMS sinusoidal (40 to 400 Hz) ±2% ±2 digits  
 0 to 1000 V on Analog scale  
 Unspecified input level 0 - 10 mV (40 to 400 Hz)

**For non-sinusoidal waveforms additional specification apply:**

±3% ±2 digits 101 mV to 600 V TRMS and ±8% ±2 digits 10 mV to 100 mV TRMS

**Default Voltmeter:** Operates at >25 V a.c. or d.c. on any range except OFF

**Frequency:** 40 - 450 Hz (40 Hz - 99.9 Hz) ±0.5% ±1 digit (100 Hz to 450 Hz)

**Capacitance measurement**

MIT420, MIT430, MIT481 and MIT485

**Measurement range:** 100 pF to 10 μF  
**Accuracy:** ± 5.0% ±2 digits

**Distance by capacitance:**

MIT481 and MIT485  
 Arithmetic conversion from capacitance measurement on  
 Default capacitance measurement: 50 nF/m

**Capacitance range:** 40 nF/m to 60 nF/m

**Result storage**

**Capacity:** >1000 test results  
**Download:** Bluetooth wireless  
**Bluetooth Class:** Class II  
**Range:** up to 10 m

**Power Supply:**

5 x 1.5 V cells type IEC LR6 (AA, MN1500, HP7, AM3 R6HP) Alkaline NiMH rechargeable cells may be used.

**Battery life:** 2200 insulation tests with duty cycle of 5 sec ON /55 sec OFF @ 1000 V into 1 MΩ

**Dimensions**

**Instrument:** 220 x 92 x 50 mm (8.66 in. x 3.63 in. x 1.97 in.)  
**Instrument and case:** 456 x 178 x 89 mm (18 in. x 7 in. x 3.5 in.)

**Weight**

**Instrument only:** 590 gms (20.73 oz.), 775 gms (27.22 oz.) with boot  
**Instrument and case:** 1.75kg (3.86 lb)

**Fuse**

Use only a 500 mA (FF) 1000 V 32 x 6 mm ceramic fuse of high breaking capacity HBC 50 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.

**E.M.C.**

In accordance with IEC 61326 including amendment No.1

**Temperature effects**

**Temperature coefficient:** <0.1% per °C up to 1 GΩ

**Environmental**

**Operating range:** -10 to +55° C  
**Operating humidity:** 90% RH at 40° C max.  
**Storage temperature range:** -25 to +70° C  
**Calibration Temperature:** +20° C  
**Maximum altitude:** 2000 m

**Dust and water protection:**

IP54 Protected against dust and splashing water

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**Instrument Dual Digital Display Example**

The MIT400 Series offers an impressive dual digital display readout. It allows complimentary information to be displayed simultaneously such as:

- MΩ plus test voltage
- MΩ plus leakage current
- Capacitance plus cable length (a test measurement for telecom applications)

The second digital display simultaneously displays the following information, depending upon the mode of operation or function chosen:

- Insulation voltage being delivered
- INS test modes
- Leakage current
- Test current
- Timer modes
- Countdown times
- Cable length

The following display example shows the key elements of the first digital display:



**ORDERING INFORMATION**

Item (Qty)		Order No.
Model MIT400	250 V, 500 V and 1000 V Insulation & Continuity Tester	MIT400EN
Model MIT410	50 V, 100 V, 250 V, 500 V and 1000 V Insulation and Continuity Tester with PI, DAR and switch probe	MIT410EN
Model MIT420	Same as Model MIT410 PLUS capacitance and data storage/download	MIT420EN
Model MIT430	Same as Model MIT420 PLUS wireless Bluetooth® download	MIT430EN
Model MIT40X	10 V to 100 V (in 1 V steps) Insulation and Continuity Tester	MIT40XEN
Model MIT480	50 V and 100 V Insulation and Continuity Tester	MIT480EN
Model MIT481	50 V, 100 V, 250 V, 500 V and 1000 V Insulation and Continuity Tester with capacitance, cable length measurement, data storage/download and switch probe	MIT481EN
Model MIT485	Same as Model MIT481 PLUS wireless Bluetooth® download	MIT485EN

**Included Accessories**

- Red/Black silicone test lead set with crocodile clips
- Hard carry case
- Instrument rubber boot with built-in stand
- Calibration certificate (not included with Model MIT40X)
- SP5 remote switch probe (not included with MIT400 and MIT40X)
- Owner information CD

**Optional Accessories**

Replacement lead set	6220-813
SP5 remote switch probe	6220-812
Instrument rubber boot with built-in stand	6231-802
Hard carry case	5410-420