MIT400 Series CAT IV
Insulation Resistance and Continuity Testers

DESCRIPTION
The 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
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

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

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: MΩ plus test voltage or MΩ 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 GΩ to 200 GΩ - 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
## Instrument Comparison Chart

<table>
<thead>
<tr>
<th>Insulation Voltage range</th>
<th>400</th>
<th>410</th>
<th>420</th>
<th>430</th>
<th>480</th>
<th>481</th>
<th>485</th>
<th>40X</th>
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</thead>
<tbody>
<tr>
<td>10-100 V variable (2 GΩ - 20 GΩ)</td>
<td>✔</td>
<td>✔</td>
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<td>50 V</td>
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<td>100 V</td>
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<tr>
<td>250 V</td>
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<tr>
<td>500 V</td>
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<tr>
<td>1000 V</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation range</th>
<th>20 GΩ</th>
<th>100 GΩ</th>
<th>200 GΩ</th>
<th>200 GΩ</th>
<th>100 GΩ</th>
<th>200 GΩ</th>
<th>200 GΩ</th>
<th>2-20 GΩ</th>
</tr>
</thead>
</table>

### Continuity measurement

| 0.01 to 100 Ω            | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Variable current limit, 200 mA/20 mA | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Fast buzzer- selectable threshold | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| k Ω range to 999 k Ω      | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |

### Other functions and features

| Live circuit warning at 50 V | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Live circuit warning at 75 V | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Default voltmeter            | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| TRMS measurement to 600 V    | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Frequency Hz - 40 to 400 Hz  | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Capacitance (0.1 nF to 10 µF) | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| mV/transducer (0.1 to 19.99 V) | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Backlight                   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Battery condition display   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Insulation Timed - PI – DAR Tests | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Test button plus lock button | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Limit alarm pass band on INS | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Auto power down             | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |

### Other functions and features

| Result storage | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Bluetooth downloading | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |

### Included accessories

| Red/black silicone lead set with clips | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Protective rubber boot with built-in stand | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Remote switch probe                  | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Calibration certificate with product | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| Batteries                            | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| 3 Year warranty                      | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
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**

<table>
<thead>
<tr>
<th>Nominal test voltages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT400 250 V, 500 V, 1000 V</td>
</tr>
<tr>
<td>MIT410, 420, 430 50 V, 100 V, 250 V, 500 V, 1000 V</td>
</tr>
<tr>
<td>MIT480 50 V, 100 V</td>
</tr>
<tr>
<td>MIT481, 485 50 V, 100 V, 250 V, 500 V, 1000 V</td>
</tr>
<tr>
<td>MIT40X 10 V to 100 V variable (1 V increments)</td>
</tr>
</tbody>
</table>

**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

**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**

<table>
<thead>
<tr>
<th>Measurement:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01 Ω to 99.9 Ω (0 to 100 Ω on analog scale)</td>
</tr>
</tbody>
</table>

**Accuracy:** ±5% ±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)
MIT400 Series CAT IV
Insulation Resistance and Continuity Testers

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

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

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**ORDERING INFORMATION**

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

**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
- SP5 remote switch probe
- Instrument rubber boot with built-in stand
- Hard carry case
- Test and carry pouch