

# MIT400 Series Industrial Insulation Testers



- **CATIV 600 V applications**
- **Insulation testing to 1000 V and to 200 GΩ**
- **TRMS & DC voltage measurement**
- **Continuity testing at 200 mA down to 0.01 Ω**
- **Analogue and dual digital display**
- **Insulation & continuity limit alarms**
- **PI/DAR and timer function**
- **Test result storage**
- **Bluetooth wireless data transfer**
- **Calibration certificate included**

## DESCRIPTION

The new Megger industrial insulation and continuity testers combine the latest range of measurement techniques with new instrument design to provide a state-of-the-art tester that is compact and comfortable to hold.

The MIT400 series directly replaces the well established BM400 and BM80, given greater functionality with simplified operation, greater application range and increased safety.

### The range

The range consists of eight instruments, which can be broken into 3 groups:

Industrial applications	Telecoms	Special apps
MIT400	MIT480	MIT40X
MIT410	MIT481	
MIT420	MIT485	
MIT430		

Every tester is designed to meet the stringent international requirements of IEC1010-2 as well as those for EN61557, and sealed to IP54, providing a weatherproof case to reduce the chances of water ingress, including the battery and fuse compartment.

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

Battery requirements are 5 AA batteries of either standard Alkaline or Nickel Metal Hydride (NiMH) rechargeable type.

## OPERATION

Operation of all instruments is kept simple. All functions are displayed on the range selector, with additional push-buttons under the display.

The display has a major and minor 3 1/2 digit readout, plus an analogue arc. All primary results are displayed in the larger digits. Additionally, auxiliary test information such as frequency, leakage current, insulation or circuit voltage etc is displayed in the smaller secondary 3 1/2 digit display within the main window.

## INSULATION TESTING

The insulation test voltages available range from 50 V to 1000 V depending on model, with a special 10V to 100 V tester for awkward low test voltages. Insulation resistance measurement extends from 20 GΩ to 200 GΩ, with the option to display the insulation test voltage or leakage current on the secondary display.

Timed insulation testing of 30/60 seconds and 1min/10min for DAR/PI testing is also available on the MIT410 upwards, but excludes the MIT480. A general timed measurement is also available with selectable 1 minute steps up to 10 minutes.

A buzzer threshold permits an operator to set a minimum buzzer limit. If the insulation resistance exceeds the minimum limit the buzzer sounds without the operator having to check the actual measured value.

## VARIABLE INSULATION VOLTAGE (MIT40X)

The MIT40X has a variable insulation test voltage from 10 V to 100 V in 1 V steps. Selected in SetUp, the instrument can be configured to suite the application in hand, and can be changed without the need to order custom configured instruments. Once selected this can only be changed by re-configuring in the Setup menu.

## CONTINUITY TESTING

A 200 mA continuity test is available with a resolution to 0.01  $\Omega$  for fast accurate cable resistance measurement.

This can be set to 20 mA where conformity to electrical testing regulations is not required, considerably extending battery life.

Alternatively a buzzer range can be used for fast point-to-point testing where measurement is not required.

Selectable buzzer threshold aids fast testing where measured values are not to be recorded, only a pass/fail at a specified limit is required, with the option to disable buzzer sounding if required.

## TEST LEADS

The test leads supplied with the MIT400 series are high quality silicon leads, which are essential when measuring in the higher G $\Omega$  ranges, especially above 10 G $\Omega$ .

## STORAGE & DOWNLOADING RESULTS

### MIT420 and MIT481

The MIT420 and MIT481 are capable of saving test results for recall to the screen. A simple storage structure allows for a test number and screen results to be recalled individually.

### MIT430 and MIT485

The MIT430 and the MIT485 support both test result storage and downloading.

For these instruments the result storage allows results to be stored, and subsequently downloaded to a computer with the Megger download manager software.

Data transfer is by Bluetooth, downloading to either internal Bluetooth enabled PC's or the USB ports available on a PC with a Bluetooth dongle. The Bluetooth interface offers excellent isolation from the test circuit, and utilises the convenience of wireless operation.

### 600 V CATIV

All MIT400 instruments are designed to meet the safety requirements for use on CATIV 600 V.

## APPLICATIONS

### (A) Service maintenance and electrical installations testing:

The MIT400, MIT410, MIT420 and MIT430 include all the features required for engineers working in a range of industries including:

Domestic and industrial service and maintenance

Manufacturing/production testing

Electrical installation

Panel building

Railway and other transportation

### (B) Telecommunications testers

Designed to cope with the additional requirements of the Telecommunications industry, the MIT480 and MIT481 includes 50 V and 100 V range insulation testing as standard, plus higher voltages as required.

### 75V test inhibit

Voltage detection test inhibit has been raised to 75 V (from 50 V) to allow testing on cables with coactively coupled induced voltages, which would normally inhibit testing on a 50 V protected instrument.

### Capacitance and distance

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

### (C) Special Applications

The MIT40X provides a unique solution for awkward insulation voltage measurement applications. The insulation test voltage is selectable, over a range from 10 V to 100 V. Common test voltages are 10 V, 55 V, 50 V, 65 V, 90 V etc found in diverse applications including:

Commercial Avionics

Military Land, Marine and Air communications

Manufacturing

Electrostatic measurement

Component testing



### SPECIFICATION

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	200 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
Analogue range	1 GΩ full scale

<b>Short Circuit Current:</b>	2 mA + 0% -50%
<b>Terminal voltage:</b>	-0% + 20% ± 1 V (Ii < 1 mA)

##### Test Current on load:

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

<b>EN61557 Operating range:</b>	0,10 MΩ to 1,00 GΩ
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<b>Leakage Current:</b>	10% ± 3 digits
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<b>Voltage display:</b>	3% ± 3 digits ± 0.5% of rated voltage
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<b>Polarisation Index (PI):</b>	10 min / 1minute ratio
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**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

<b>Measurement:</b>	0,01 Ω to 99,9 Ω (0 to 100 Ω on analogue scale)
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<b>Accuracy:</b>	± 3% ± 2 digits (0 to 100 Ω)
<b>Open circuit voltage:</b>	5 V ± 1 V

<b>Test current:</b>	200 mA (-0 mA + 20 mA) (0.01 Ω to 9.99 Ω) 20mA (± 1 mA ) (10.0 Ω to 99.9 Ω)
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<b>Zero offset at probe tips:</b>	0,10 Ω typical
<b>Lead resistance zeroing:</b>	Up to 9,00 Ω
<b>Buzzer:</b>	Variable limit 1 Ω, 2 Ω, 5 Ω, 10 Ω, 20 Ω

#### Resistance

<b>Measurement:</b>	0,01 kΩ to 1000 kΩ (0 to 1 MΩ on analogue scale)
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<b>Accuracy:</b>	± 3% ± 2 digits
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<b>Open circuit voltage:</b>	5 V ± 1 V
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<b>Short circuit current:</b>	20 μA ± 5 μA
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#### 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 Analogue 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
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<b>Default Voltmeter:</b>	Operates at > 25 V a.c. or d.c. on any range except OFF
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<b>Frequency:</b>	40-450 Hz (40 Hz - 99,9 Hz) ± 0.5% ± 1 digit (100 Hz to 450 Hz)
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#### Capacitance measurement

MIT420, MIT430, MIT481 and MIT485.

<b>Measurement range:</b>	100 pF to 10 μF
<b>Accuracy:</b>	± 5.0% ± 2 digits

#### Distance by capacitance:

MIT420, MIT430, MIT481, MIT485  
Arithmetic conversion from capacitance measurement on  
Default capacitance measurement: 50nF/m

<b>Capacitance range:</b>	40 nF/m to 60 nF/m
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#### Result storage

<b>Capacity:</b>	> 1000 test results
<b>Download:</b>	Bluetooth wireless
<b>Bluetooth Class:</b>	Class II
<b>Range:</b>	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

<b>Instrument:</b>	220 x 92 x 50 mm (8.66 in. x 3.63 in. x 1.97 in.)
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**Instrument + case:** 456 x 178 x 89 mm (18 in. x 7 in. x 3.5 in.)

#### Weight

**Instrument only:** 590 gms, 775 gms with boot (20.73 oz. (27.22 oz.))

**Instrument plus 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 < 0,1% per °C per GΩ above 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

## ORDERING INFORMATION

Item (Qty)	Order No.	Item (Qty)	Order No.
Basic CATIV 600 V with 250 V/500 V/1000 V insulation	MIT400-EN	<b>Included accessories</b>	
As MIT400 + 50 V, 100 V, PI and DAR	MIT410-EN	Test leads: 2 wire lead set to CAT IV 600 V, consisting of :	
As MIT410 + result storage and recall	MIT420-EN	1 x Red lead 1.25m complete with probe	
Bluetooth downloading version of MIT420	MIT430-EN	1 x Black lead 1.25m complete with probe	
Telecoms Base instrument with 50 V/100 V insulation	MIT480-EN	1 x Red croc clip	
		1 x Black croc clip	
Telecoms 50 V to 1000 V + Storage	MIT481-EN	1 x instrument rubber boot	
Telecoms 50 V to 1000 V + Storage & DL	MIT485-EN	1 x Calibration certificate	
Special selectable voltage 10-100 V	MIT40X-EN	1 x Switched probe (not included with MIT400 and MIT480)	

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