

Megger[®]



MIT515 / MIT525 / MIT1025 / MIT1525

**5 kV, 10 kV and 15 kV Insulation
Resistance Testers**

User Guide

This document is copyright of:

Megger Limited, Archcliffe Road, Dover, Kent CT17 9EN. ENGLAND
T +44 (0)1304 502101 F +44 (0)1304 207342 www.megger.com

Megger Ltd reserves the right to alter the specification of its products from time to time without notice. Although every effort is made to ensure the accuracy of the information contained within this document it is not warranted or represented by Megger Ltd. to be a complete and up - to - date description.

For Patent information about this instrument refer to the following web site:

megger.com/patents

This manual supersedes all previous issues of this manual. Please ensure that you are using the most recent issue of this document. Destroy any copies that are of an older issue.

Declaration of Conformity

Hereby, Megger Instruments Limited declares that radio equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directive 2014/53/EU. Other equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directives 2014/30/EU and 2014/35/EU where they apply.

The full text of Megger Instruments EU declarations of conformity are available at the following internet address:

megger.com/eu-dofc

Contents

1. Safety warnings	6
1.1 Battery warnings	7
2. Symbols used on the instrument	8
3. General description	9
3.1 Features.....	9
4. Instrument controls and indicators	10
5. Preparations for use	11
5.1 Initial instructions.....	11
5.2 Power lead and battery charging.....	11
5.3 Power lead connection table.....	11
5.4 Functional verification	11
5.5 Storage.....	11
6. Operating instructions	12
6.1 General operation	12
6.2 Breakdown vs. burn mode	13
6.3 Voltmeter	13
6.4 Reset default settings.....	13
7. Instrument control	14
7.1 Initial setup	14
7.2 Lock voltage.....	14
7.3 Alarm setting	14
7.4 Recording temperature, humidity.....	15
7.5 Breakdown / burn mode – in IR & IR(t) test modes	15
8. Running an insulation test	16
9. Memory functions, downloading	18
9.1 Recall results	18
9.2 Download results	18
9.3 Deleting results.....	19
9.4 Real-time output during insulation tests.....	19
9.5 Testing with CertSuite Asset via USB cable (MIT525 only).....	20
9.6 Creating a CertSuite Asset account	20
9.7 Sending test results to CertSuite Asset.....	20
10. PowerDB	21
10.1 Download PowerDB	21
10.2 Interfacing MIT range to PowerDB	22
10.3 Import / live stream control application.....	23
11. Battery indicator	24
12. On screen error reporting	25

13. Measurement modes	26
13.1 Spot IR test	26
13.2 Timed IR test	26
13.3 DAR, PI and PI predictor insulation tests	27
13.3.1 What is a DAR test?	27
13.3.2 What is a PI test?	27
13.3.3 What is a PI predictor (PIp) test?	28
13.3.4 PI predictor (PIp) Error codes:	28
13.4 Dielectric discharge test	28
13.5 Step voltage test	29
13.5.1 Rotary switch setting indicated	29
13.6 Ramp voltage test	30
14. Measurement techniques	31
14.1 Understanding measurement currents	31
14.2 Insulation measurements above 100 GΩ	31
14.3 Terminals	32
14.4 GUARD terminal, screened leads	33
15. Preventive maintenance	34
15.1 Cleaning	34
15.2 Care of the instrument	34
15.3 Leads	34
15.4 Battery care	34
15.5 Replacing the battery	34
15.5.1 MIT515, MIT525, MIT1025 battery replacement instructions	35
15.5.2 MIT1525 battery packs (x 2) replacement instructions	35
16. Technical specification	36
16.1 Electrical specifications	36
16.2 Environmental conditions	38
16.3 General specification	38
17. Repair and warranty	39
17.1 Calibration, service and spare parts	39
17.2 Returning product to Megger UK and USA service centres	39
17.3 Approved service centres	39
18. Accessories, equipment and spares	40
19. Decommissioning	41
19.1 WEEE Directive	41
19.2 Battery disposal	41
20. Worldwide Sales Offices	42

1. Safety warnings

Safety warnings must be observed during use:

- The circuit under test must be switched off, de-energised, isolated and checked to be safe before insulation test connections are made. Make sure the circuit is not re-energised whilst the instrument is connected
- Only 15 kV rated Megger test leads with plug inserts of 75 mm must only be used on the MIT1525. Lead integrity can be verified by momentarily shorting clips together at the lowest test voltage range
- Circuit terminals must not be touched during an insulation test or before suitable grounding of the unit under test is in place in line with safe working practices
- When powered by battery and with the mains supply disconnected, the pins on the mains socket may be electrostatically charged to a high voltage. There is not enough energy for this to be hazardous but, to reduce discomfort from accidental discharge if the mains inlet plug is touched, it is strongly recommended that the functional earth terminal is connected to a convenient earth or unipotential protection circuit. The user is fully protected for safety by double insulation and this connection need not be capable of taking a fault current.
- After completing a test, capacitive circuits must be completely discharged before disconnecting the test leads. Capacitive charges can be lethal
- Tested items must be firmly shorted out with a shorting link, after discharge, until required for use. This is to guard against any stored dielectric absorption charge subsequently being released thereby raising the voltage to potentially dangerous levels
- The voltage indicator and automatic discharge features must be regarded as additional safety features and not a substitute for normal safe working practice
- It is rare, but in certain circumstances, breakdown of the circuit under test may cause the instrument to terminate the test in an uncontrolled manner, possibly causing a loss of display while the circuit remains energised. In this event, the unit must be turned off and the circuit discharged manually
- Test leads, including crocodile clips, must be in good order, clean and with no broken or cracked insulation
- The instrument must not be used if any part of it is damaged
- Insulation testing in wet conditions might be hazardous. It is recommended that this instrument is not used in these circumstances. If this is unavoidable, the user must take all necessary precautions
- This instrument is not intrinsically safe and must not be used in hazardous atmospheres
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired
- Switch the instrument OFF, and disconnect any AC source, measurement leads, and all other equipment before opening the case to change the battery. The instrument must not be operated with the case open. DANGER! Hazardous voltages are exposed with an AC source connected and the case open











1.1 Battery warnings

- Do not disassemble or modify the battery. The battery contains safety and protection devices which, if damaged, may cause the battery to generate heat, rupture or ignite
- Never heat the battery in a fire or otherwise
- Do not pierce or damage the battery in any way
- Do not subject the battery to strong impacts / shocks
- Do not expose the battery to water, salt water or allow the battery to get wet
- Never short circuit, reverse polarity or disassemble the battery pack
- In the event of a battery cell leaking, do not allow the liquid to come into contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice
- Keep cells and batteries out of reach of children
- Seek medical advice if a cell or battery has been swallowed
- Do not leave a battery on prolonged charge when not in use
- Retain the original product literature for future reference

NOTE : The instrument must only be operated by suitably trained and competent persons.

Users of this equipment and / or their employers are reminded that National Health and Safety Legislation requires them to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury such as inadvertent short circuits.

2. Symbols used on the instrument

Icon	Description
	Caution: refer to user manual
	Warning: risk of electric shock!
	Equipment protected throughout by Double Insulation
	Line Power / mains
	Equipment complies with current EU directives.
	Equipment complies with current UK legislation.
	Equipment complies with current 'C tick' requirements
	Do not dispose of via landfill, sewage system or by fire.
	Functional earth
	Universal Serial Bus (USB)

- CAT IV** Measurement category IV: Equipment connected between the origin of the low-voltage mains supply and the distribution panel. CAT IV applies to voltage measurement function of these instruments
- CAT III** Measurement category III: Equipment connected between the distribution panel and the electrical outlets
- CAT II** Measurement category II: Equipment connected between the electrical outlets and the user's equipment.

3. General description

The new range of Insulation Resistance Testers (IRT) consists of four models; an entry level 5 kV and three fully featured units, one 5 kV, one 10 kV and one 15 kV.

3.1 Features

- Max resistance is 10 TΩ (5 kV), 20 TΩ (10 kV) and 30 TΩ (15 kV)
- MIT515 with IR, IR(t), PI and DAR
- PI predictor function (**PIp**)
- MIT525, MIT1025, MIT1525 diagnostic and over voltage tests - PI, DAR, DD, SV and ramp test
- Operate and charge on line power / mains (except during actual test)
- Light weight Li-ion battery
- CAT IV 600 V safety rating (MIT515, MIT525, MIT1025)
CAT IV 1000 V safety rating (MIT1525) – applies to voltmeter function
- Advanced memory with time / date stamp
- AC and DC voltmeter (30 V to 660 V)
- Large LCD display with back-light
- Download of saved results and logs via isolated USB cable (MIT525, MIT1025, MIT1525 only)
- CertSuite Asset compatible with MIT515 via USB cable and Windows PC.
- PowerDB Lite software compatible with MIT525, MIT1025 and MIT1525.

4. Instrument controls and indicators



No.	Description	No.	Description
1	Positive (+) terminal	8	Central rotary switch
2	GUARD terminal	9	Save button – MIT525, MIT1025, MIT1525
3	Negative (-) terminal	10	Test mode rotary switch
4	USB device interface	11	LED indicating line power / mains
5	Four arrow buttons and OK button	12	Display
6	TEST button with associated HV warning lamp	13	Power socket
7	Backlight	14	Functional earth terminal – MIT1525 Only



Icon	Description	Icon	Description
	User lock voltage		Delete records
	Timer		Download via USB
	Save		Filter
	Open records		Alarm
	Battery		Breakdown mode
	Ramp test		Burn mode
	Danger HV		Refer to manual
	Fuse		Noise detected

5. Preparations for use

5.1 Initial instructions

- Remove instrument, power lead and pouch from the packing box
- Clip the test lead pouch to the lid
- Open the lid and familiarise yourself with the layout and position of the IEC 60320 power inlet on the left side of the panel. An isolated USB socket is found on the right side of the instrument
- Unpack leads and pack them into the lead pouch
- Read the product manual, especially the warnings
- A quick reference is provided in the instrument lid
- Keep the original packaging for re-use

5.2 Power lead and battery charging

- If the power lead supplied is not suitable for your line / mains connection, do not use an adaptor. Always use a power lead fitted with the correct plug
- Supply voltage: 90 to 265 V rms AC at 50 / 60 Hz
- A green LED illuminates when line power / mains is present
- The battery will charge as long as the mains supply is connected, except when a test is in progress
- For optimum battery life, charge the battery after each use. Full charge duration is up to 2½ hours but a first charge time of 3 hours is advised
- The battery must be charged between 0 °C and 40 °C ambient temperature. If the battery detects a temperature outside this range the battery symbol will flash

5.3 Power lead connection table

Connection	UK / International	USA
Earth (Ground)	Yellow / Green	Green
Neutral	Blue	White
Live (Line)	Brown	Black

5.4 Functional verification

Simply turning on the instrument will initiate a start-up process and the display will respond. If an error is detected 'Err' will be displayed with an associated error number.

The MIT515, MIT525, MIT1025 and MIT1525 are supplied with a certificate which is automatically generated as part of Megger's final test procedure.

UKAS accredited certificates are available from Megger but this service is chargeable.

5.5 Storage

Instruments should be stored in storerooms which meet the storage temperature and humidity specifications listed in this document. If charging is incorporated in the storeroom the room must be well ventilated.

6. Operating instructions

6.1 General operation

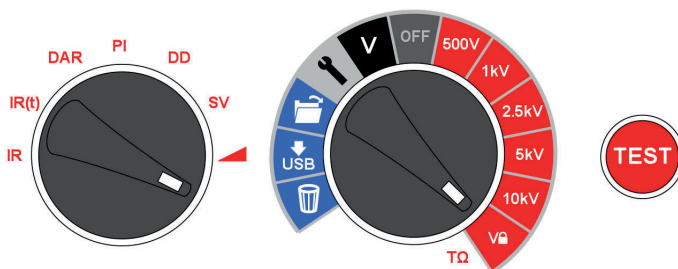
The MIT515, MIT525, MIT1025, MIT1525 Insulation resistance testers (IRTs) are primarily controlled by two rotary switches and a TEST button used to start and stop a test (see section entitled, 'Instrument Control and Indicators'). The central rotary switch includes an 'OFF' position; the instrument switches on by rotating the switch either clockwise or anticlockwise from this position. A range of test voltages for insulation resistance tests up to 5 kV for MIT515 / MIT525, 10 kV for MIT1025 and 15 kV for MIT1525 are available, including a user selectable voltage range which can be set between 40V or 100 V and 5000 V, 10000 V or 15000 V depending on model. The 'lockable' test voltage range can be adjusted in the settings function.

The settings function is indicated by a spanner symbol and facilitates lock voltage, low resistance alarm, temperature, time / date adjustment. A light blue coloured section of the rotary switch denotes memory functions; open records, download via USB and delete records. A dedicated save button is provided on the MIT525, MIT1025 and MIT1525 models and all models have a backlight button.

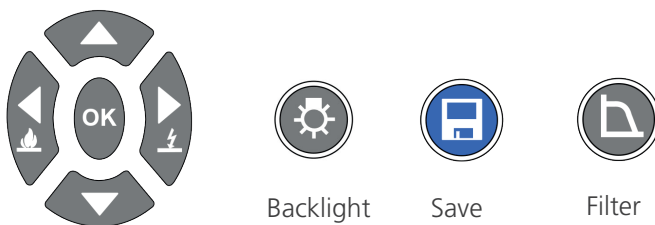
A second rotary switch controls the insulation test mode providing for the following tests:

- All models have basic insulation resistance IR, timed insulation resistance IR(t), Dielectric Absorption Ratio (DAR) and Polarisation Index (PI) tests
- MIT525, MIT1025, MIT1525 have additional tests; Dielectric Discharge (DD), Step Voltage (SV) and ramp test

A cluster of directional buttons and an OK button are used in settings and memory functions. The up / down arrows also enable the test voltage to be adjusted during a test. Prior to the start of an IR or IR(t) test, holding down the left arrow button with a voltage level selected on the central rotary switch will activate burn mode. Burn mode is deactivated if the voltage range or mode is changed or by pressing the right arrow / breakdown button.



Instrument controls are simple to operate. The central rotary switch incorporates the OFF position. The left hand rotary switch selects insulation test type (test mode switch). The TEST button starts and stops a test.



Four arrow buttons and OK facilitate adjustment and selection of settings, voltages and modes. Breakdown / burn modes are set using the left and right arrow buttons. Back-light and save functions are dedicated buttons. All models have backlight and the MIT525, MIT1025 and MIT1525 have the Save button.

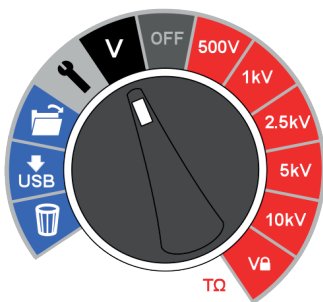
6.2 Breakdown vs. burn mode

In breakdown mode insulation tests are automatically stopped and display Brd when a fault causes the applied voltage to drop rapidly. Burn mode IR tests ignore breakdown and continue to test the insulation and are therefore destructive tests. Burn mode is used to purposely create a carbon track in insulation to facilitate fault location. Burn mode only operates at test voltages of 500 V and above.

6.3 Voltmeter

A voltmeter is incorporated in the instrument and measures AC / DC voltage from 30 V to 660 V. Frequency (Hz) is measured and displayed for AC voltages. Voltmeter mode is activated by switching to 'V' mode as illustrated.

Positive and negative terminals are used for the voltmeter function; do not connect the GUARD terminal when in voltmeter (V) mode.

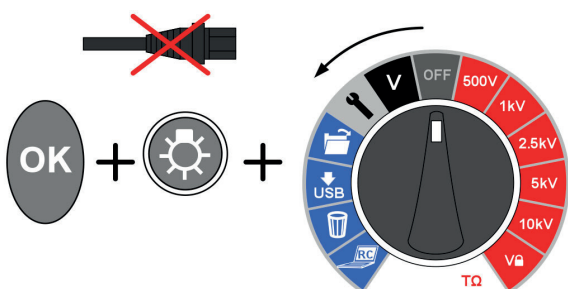


To assist user safety, the instrument will automatically switch to voltmeter mode if a voltage of 50 V or more is connected to the terminals. The measured voltage will be displayed accompanied by an intermittent beeper to warn the user that a dangerous voltage exists.

For further explanation *See 8. Running an insulation test on page 16.*

6.4 Reset default settings

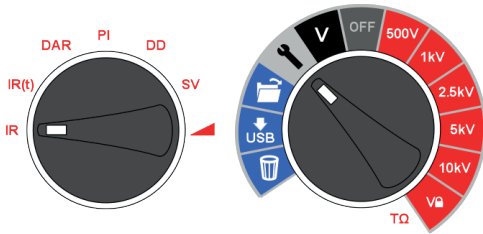
Remove AC source, press OK, backlight buttons and switch main rotary switch from OFF to setting icon.



7. Instrument control

7.1 Initial setup

It is important to setup the Real Time Clock (RTC) on models MIT525, MIT1025 and MIT1525 to ensure that records saved in the instrument are time / date stamped correctly. The MIT515 does not require time / date setting. The RTC has a separate battery to maintain settings even when the primary battery is removed.



To set the clock and date, select the settings function on the central rotary switch and turn the mode rotary switch to IR. Navigate using the left / right arrows to where the time and date is displayed.

Set the time using the up and down arrows. Change the hours and minutes then press OK to save.



Select the day / month format required, i.e. d:m for day:month or m:d for month:day and press the right arrow button, then set the date and press OK to save. A tick on the left of the display indicates that a setting is saved, a cross is displayed during adjustment indicates that it is not set. Exit settings by changing the central rotary switch to a different position.



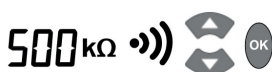
A tick on the left of the display indicates that a setting is saved, a cross is displayed during adjustment indicates that it is not set. Exit settings by changing the central rotary switch to a different position.

7.2 Lock voltage

The user selectable 'lock' voltage range is set by adjusting the displayed voltage using the up and down arrow buttons. When the desired voltage is displayed, it is saved, by pressing the OK button. The setting does not change even if the instrument is switched off.

7.3 Alarm setting

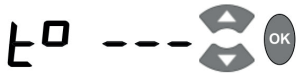
A low resistance alarm sounds when the resistance level of an insulator reaches the alarm, assuming alarm has been activated. The default alarm setting is 500 kΩ and inactive (X is displayed on the right of the display). Set central and mode rotary switches to the settings and IR positions respectively. Press the right arrow button once. The low resistance alarm can be set at the default value by simply pressing the OK button, or changed to a different alarm resistance level using the up / down arrow buttons and save it by pressing OK.




7.4 Recording temperature, humidity

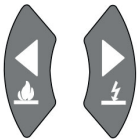
The MIT525 and MIT1025 are able to record insulation temperature measured by an independent thermometer. If you do not wish to record temperature do not change the default setting or reset it if it was previously set.

Move the central rotary switch to point to settings and press the right / left arrow buttons until 't° ---' is displayed. The default setting is no temperature record. This can be changed by pressing up or down arrows to select either °F or °C temperature entry. Pressing OK will confirm the setting and result in a prompt for temperature to be entered whenever the save button is pressed after completing any test. Up and down arrows facilitate temperature entry in 1 °C increments / decrements.



7.5 Breakdown / burn mode – in IR & IR(t) test modes

The insulation resistance 'IR' test operates in either  (Breakdown) or  (Burn) mode.



Left and right arrow buttons toggle between burn and breakdown mode when a voltage range is selected. Press and hold left arrow / burn to activate burn mode.

In breakdown mode the test will automatically terminate and display Brd on detection of a breakdown to prevent damage to the insulation.



Burn mode disables the normal breakdown detection and test voltage continues after breakdown of the insulation. This enables the location of a failure to be detected but it is a destructive test.

Due to the potential damage that could occur, the unit produces two long beeps when starting a test with burn mode activated.

8. Running an insulation test

Before testing any reactive load ensure that the insulation is fully discharged.

15 kV - The functional earth (\perp) terminal. Refer to **Note below. See page 7 for location on unit.**

Great care should always be taken when connecting the leads to a system to be tested. Even isolated systems may exhibit charges or induced voltages and appropriate Safe Working Practices must be employed.

On connection of the test leads prior to starting a test, any voltages of 50 V or more will be indicated on the display, accompanied by an intermittent beeper, (**See 6.3 Voltmeter on page 13**). This is especially likely in electrically noisy environments.

Should electrical noise be present it will cause a current to flow through the instrument's internal discharge resistors. If this becomes excessive and exceeds instrument rating, damage to the instrument may result.

The MIT1525 has been designed to handle high noise currents up to 6 mA. If current above 6 mA is detected, the instrument will sound an urgent 'warble' tone and be accompanied by the symbols \triangle \sim .

NOTE : When powered by battery and with the mains supply disconnected, the pins on the mains socket may be electrostatically charged to a high voltage. There is not enough energy for this to be hazardous but, to reduce discomfort from accidental discharge if the mains inlet plug is touched, it is strongly recommended that the functional earth terminal is connected to a convenient earth or unipotential protection circuit. The user is fully protected for safety by double insulation and this connection need not be capable of taking a fault current.

The instrument should be immediately disconnected from the supply after discharging the DC test voltage taking care to ensure Safe Working Practices (NB very high induced voltages may be present).

To assist user safety, the instruments will not permit a test to be started if the induced voltage exceeds 6 mA.

It is possible to adjust the test voltage using the up and down arrow buttons, either before or during a test. Once a test has begun, it is advisable to only adjust the voltage in the first 10s of the test to prevent interference with the capacitive and absorptive currents in the insulator.

A test can be started by pressing the 'TEST' button for approximately 3 seconds from the test screen or voltmeter screen. A timer will be displayed to indicate elapsed time during the test. The test is stopped, by pressing the TEST button. As soon as the test is stopped a discharge of the insulator is automatically initiated. An 'StP' indication informs the user that the test is terminating and after a few seconds the voltage on the terminals will be displayed. Left and right arrows can be used to scroll between terminal voltage, last test voltage and the set range voltage. In the event of a terminal voltage of ≥ 50 V a voltage and warning will be displayed.



Do not disconnect instrument leads or clamps until the LED and display warnings are switched off indicating that the unit under test is discharged! Significant current can be stored in reactive loads which act as capacitors or inductors, which can be lethal.

The display shows the final resistance result, capacitance, test current and Time Constant (TC) in addition to test duration.

Running an insulation test

On MIT525, MIT1025, and MIT1525 models the result can be saved by pressing the dedicated save (📄) button after a resistance or voltage test is complete. The save button will appear momentarily to confirm the data is saved. If a full test curve is required the user must select logging by pressing the save button before starting the test. Data will be logged every 5 seconds for the duration of a resistance test. It is not possible to log voltages in voltmeter mode.

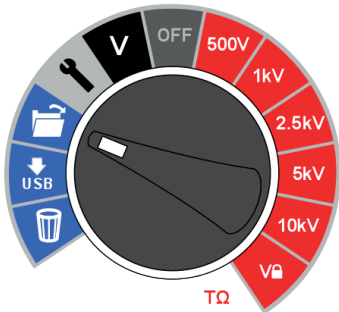
If temperature entry has been activated a prompt will appear for the user to enter a temperature reading after IR and IR(t) insulation tests. DAR, PI, SV, ramp and DD tests will not prompt for temperature input.

Display back-light is activated by pressing the (☀️) button. The back-light button can be pressed a second time to deactivate the back-light. Automatic deactivation will occur after a preset timeout period if not deactivated manually.

9. Memory functions, downloading

Models MIT525, MIT1025 and MIT1525 have advanced storage, recall and download functions to facilitate documentation of insulation tests.

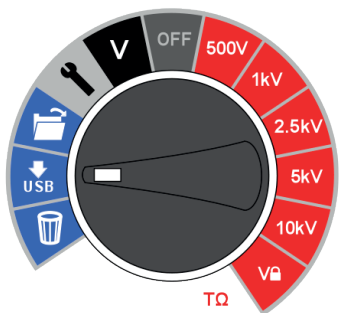
9.1 Recall results



Setting the central rotary switch to 'open folder' position enables the user to recall saved results beginning with the most recent result. Up and down arrow buttons enable the user to scroll through results based on a sequential four digit index. Left and right arrow buttons scroll through a single result showing all saved test data including time / date. Where logging has been enabled, only the final result is displayed on screen. The full result can be viewed by downloading to PowerDB / PowerDB Lite.

In saved results, the test mode is identified by the icon or abbreviation of each test on the display. In addition, the open folder icon is displayed to indicate recall memory mode.

9.2 Download results



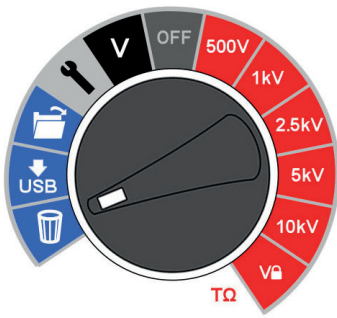
PowerDB Pro, Advanced and Lite are Megger's asset and data management software packages with integrated forms for MIT525, MIT1025, MIT1525 instruments.

The default download on the instrument is a single test log or summary result. To download all results press an arrow button.

Detailed instructions on how to interface with PowerDB are available on a document entitled 'Interfacing MIT525, MIT1025 and MIT1525 to PowerDB'.

PowerDB offers instructions specific to MIT525, MIT1025, MIT1525 regarding the download procedure. When results are downloaded the IRT can be disconnected from the PC after the application releases the port.

9.3 Deleting results



There are two delete functions; delete a single result and delete all results. Select the bin icon on the central rotary switch. The first record indicated contains the result of the last test performed. Up / down arrows navigate through records and the OK button is used to select delete where the 'X' changes to a tick and the on screen bin icon flashes. A subsequent press of the OK button activates the deletion.

The default delete is a single test result, press the right arrow button to select delete all test results from memory.

9.4 Real-time output during insulation tests

PowerDB or PowerDB Lite can be used to record real time data output from the MIT525, MIT1025 and MIT1525 models. Voltage, current and resistance data is sent at a rate 1 Hz from the IRT and displayed in real time on a graph, e.g. a plot of current (μA) versus voltage (kV) for the ramp test.

Before running a test where a real time output is required, attach a PC running PowerDB Pro, PowerDB Advanced or PowerDB Lite via a USB cable. Check the serial port allocation on Device Manager, and enter the serial port number allocated when starting PowerDB. PowerDB offers instructions specific to MIT525, MIT1025 and MIT1525 regarding the real time capture procedure.

Start the application and activate real time data capture in the form of choice. As soon as the test is started real time data output will begin. When the test is complete ensure that the form is saved in PowerDB Pro / Advanced / Lite.

9.5 Testing with CertSuite Asset via USB cable (MIT525 only)

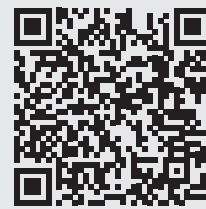
The instrument can be connected to a laptop or desktop for receiving the test results and passing them to the cloud-based Megger CertSuite Asset software. The CertSuite Asset software runs in a browser (such as Chrome or Edge), or via the Android app.

Test results transferred to CertSuite Asset are synchronized with the cloud system every 90 seconds to reduce any risk of data loss.

To use CertSuite Asset with your MIT525:

1. Create an account on the CertSuite™ web site. **See 9.6 Creating a CertSuite Asset account on page 20**
2. Connect the MIT525 with a Windows laptop or desktop via USB cable.
3. Open the browser on your Windows PC and log in to your account using the details from (1) above.
4. Connect CertSuite™ to your MIT525 from within CertSuite Asset by clicking on Get Data.

Visit [CertSuite.info](https://www.certsuite.info) to create an account for CertSuite Asset, or scan the QR code below:



9.6 Creating a CertSuite Asset account

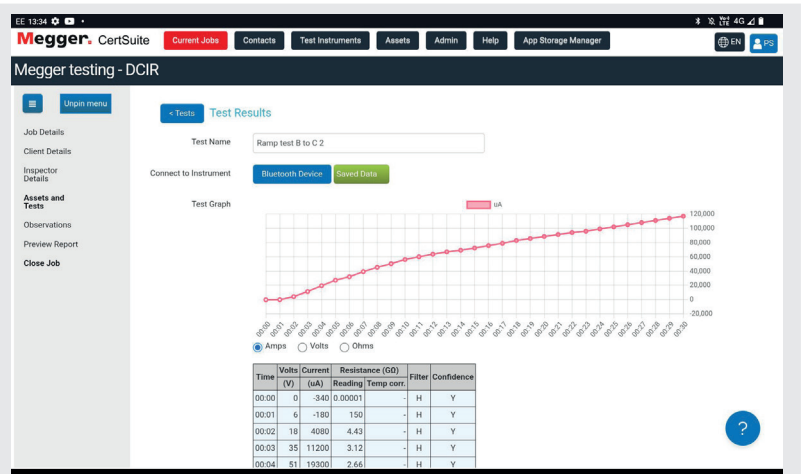
Before CertSuite Asset can be used an account has to be created. This can be done by going to [www.CertSuite.info](https://www.certsuite.info) and select the **FREE TRIAL** option. Follow the guidance on the CertSuite™ web site.

Keep a record of your account information and password as you will need this when using CertSuite Asset.

If necessary, any assistance can be accessed through the CertSuite™ ([www.CertSuite.info](https://www.certsuite.info)) or Megger web sites (www.megger.com) and Megger technical support (uksupport@megger.com).

9.7 Sending test results to CertSuite Asset

Once the MIT525 and CertSuite Asset are connected, results can be transferred to the Windows device. While the test is being run, the app builds a graph of the test results. It can store client's details, asset details, photos and comments.



10. PowerDB

PowerDB is software used for the collection and reporting of data from maintenance and inspection activities performed on electrical equipment used in the generation, transmission, and distribution of electric power.

The software includes interfaces for many test instruments and allows for automated testing and data acquisition, as well as imports from various file formats. Result and summary reports can be easily generated.

Three editions of PowerDB are available:

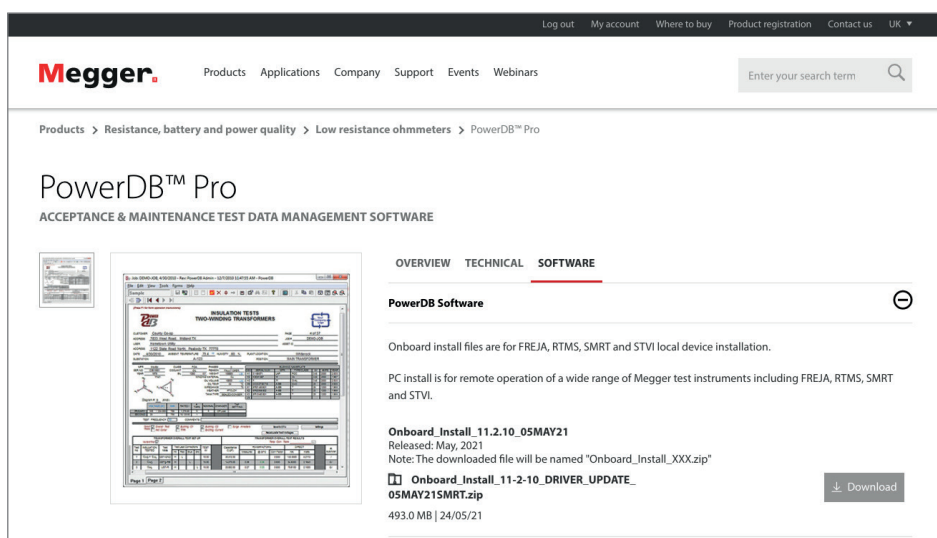
- PowerDB Pro
- PowerDB Advanced
- PowerDB Lite

PowerDB provides a simple and consistent user interface to many Megger instruments including the DELTA Series Power Factor Test Sets, 3-Phase TTR units, earth testers, 5 kV, 10 kV and 15 kV insulation resistance testers (IRTs), and many more. PowerDB Lite is bundled with the Megger's MIT.

10.1 Download PowerDB

You can now download direct from the Megger website to ensure that you have the most recent version available.

Visit megger.com/powerdb

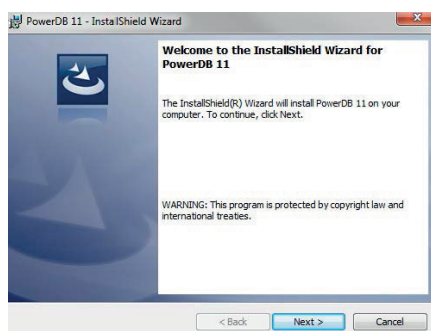


The screenshot shows the Megger website's product page for PowerDB™ Pro. The page is titled "PowerDB™ Pro" and is categorized as "ACCEPTANCE & MAINTENANCE TEST DATA MANAGEMENT SOFTWARE". It features a navigation menu with "OVERVIEW", "TECHNICAL", and "SOFTWARE" tabs. Under the "SOFTWARE" tab, there is a section for "PowerDB Software" with a "Download" button. The page lists two software files for download:

- Onboard_Install_11.2.10_05MAY21**: Released: May, 2021. Note: The downloaded file will be named "Onboard_Install_XXX.zip".
- Onboard_Install_11-2-10_DRIVER_UPDATE_05MAY21SMRT.zip**: 493.0 MB | 24/05/21.

The latest edition will be at the top. Click the "download" button beside the file.

This will ask if you want to open or save the file. By clicking "Save" you will begin to download the installation package, then just follow the onscreen instructions to complete installation.



10.2 Interfacing MIT range to PowerDB

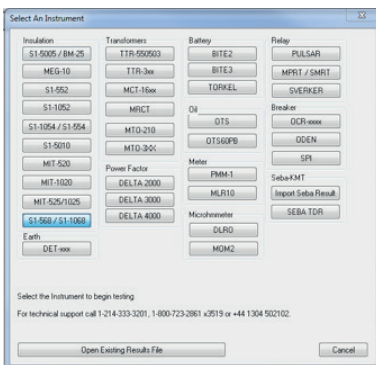
The MIT range has a USB cable connection.

Connect the MIT to a PC via the USB cable provided and enable the driver for the MIT to be found via the internet. The instrument does not need to be powered up to respond to the driver as it is powered via the USB cable.

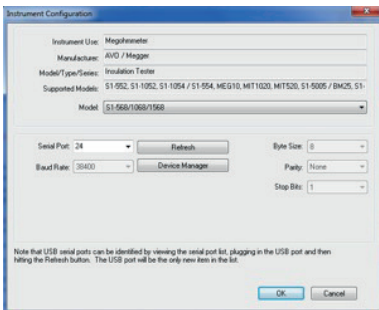
Run PowerDB Lite software by clicking the PowerDB Lite icon on your desktop. Make sure you are using PowerDB version 10.5 or higher.

Select the appropriate soft button for the instrument you are testing with from the window entitled, 'Select An Instrument'. This will take you to the Instrument Configuration window.

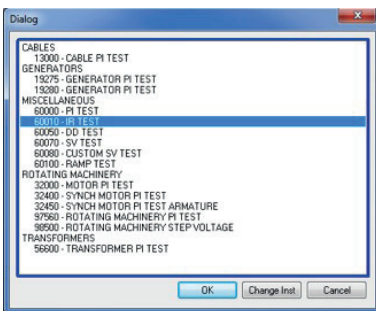
Expand the 'Ports' section in Device Manager. One serial port should be allocated to 'Megger Device (COMxx)' where xx is the port number.



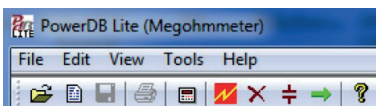
Ensure that port number xx is allocated correctly in the Instrument Configuration window, then click the OK to complete configuration after ensuring that the correct model is selected.



Select the required test mode from the Select a Form window and click OK to continue.



After the form loads, click the 'zap' icon on the toolbar to initialise the instrument. An 'OK' confirmation appears at the top of the form if communications have been successful.



Scroll down the PowerDB form until you see a table with cyan filled headers. RIGHT CLICK once on one of the cyan coloured areas to activate the MIT control application. The cyan filled cells represent three phases A, B and C. Right clicking on a phase will open up the appropriate application.

TEMPERATURE 20 °C TEMPERATURE CORRECTION FACTOR TO 20 °C, TCF 1.00 ← ENTER TCF

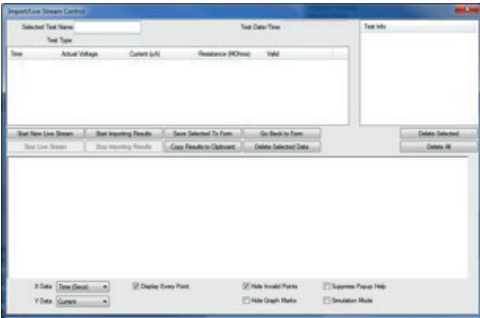
Display Every 0.1 Minutes or 0.1 %IRChange or 10 Delta uAmps

...SELECT DEVICE

A				B				C			
TIME (minutes)	Volts (kV)	READING (megohms)	TEMP CORR. (megohms)	TIME (minutes)	Volts (kV)	READING (megohms)	TEMP CORR. (megohms)	TIME (minutes)	Volts (kV)	READING (megohms)	TEMP CORR. (megohms)

10.3 Import / live stream control application

When using a MIT the Import / Live Stream Control Application will launch.

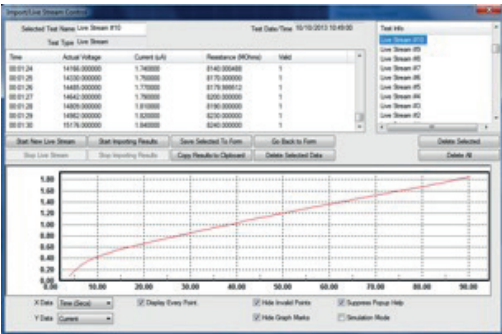


Import / Live Stream Control application enables capture of live streaming data directly by activating the Start New Live Streaming function. Results are recorded once a second for the duration of the test.

Other functions include:



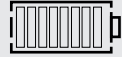
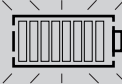
- Save Selected To Form – this soft key saves a selected test result in top right hand menu to the current form in PowerDB Lite. Typically three tables are available in the PowerDB form representing three phases named A, B and C. Tests listed in the Import / Live Stream Control application listed under Test Info can be saved in any form by exiting the logger (Go Back To Form), right clicking the require phase in the form and selecting to Save Selected To Form from the logger
- Copy Results to Clipboard function facilitates a copy of all data to Excel and other popular software
- Delete Selected Data – removes test data from the Test Info section
- Start Importing Results – download results saved on the instrument

Sample Import / Live Stream Control application after a test.



11. Battery indicator

The battery symbol on the LCD display contains four pairs of segments. The battery is monitored continuously when the instrument is turned on. The charge remaining in the battery is indicated by segment pairs as follows:

Fully charged battery	
50% charged battery	
Tests cannot be started, insufficient charge	
Symbol flashes when there is not enough charge for a test and the instrument will turn itself off.	

When mains power is present the indicator shows the battery is being charged by animating the segments of the bar graph.

A blinking full battery icon indicates that the battery is prevented from charging due to the temperature being out of the allowable charge temperature range, 0 °C to 40 °C, or that the battery has failed.

12. On screen error reporting

Should an error be detected during the operation of the MIT515, MIT525, MIT1025 or MIT1525 an error code is reported preceded by 'Err' with the read handbook warning.

Error codes are given in the following table.

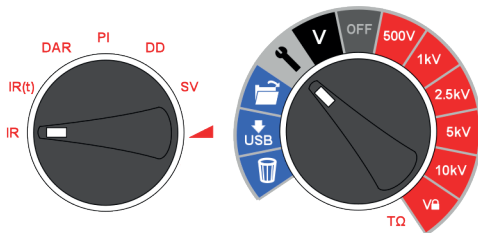
'Err' code	Fault
2	Output voltage over limit
3	FIFO (memory) overflow
4	HV board mismatch with control board setup
5	Battery low error
6	Control board detected inter-board communication failure
7	Test button stuck
8	Measurement board i2c failed
9	Measurement board detected inter-board communication failure
10	Isolation power supply cut-out
11	Instrument attempted auto power off but failed
12	HV circuit control fault

If an error occurs do not attempt to repair the instrument. Obtain a repair number from Megger Instruments Limited, carefully pack in a suitable box and send the faulty instrument to the nearest Megger Approved Service Centre, if possible noting the error that was reported.

13. Measurement modes

13.1 Spot IR test

The spot insulation resistance test (IR) is selected on the test mode rotary switch. Select the IR setting and then the required test voltage using the preconfigured voltage ranges on the central rotary switch or the V_{L} user settable / lockable voltage range. All preconfigured voltage ranges, but not V_{L} , are adjustable using up and down arrow buttons before and during the test, but the latter should be limited to the first 10 seconds of IR and IR(t) tests. Press and hold TEST to start the test.



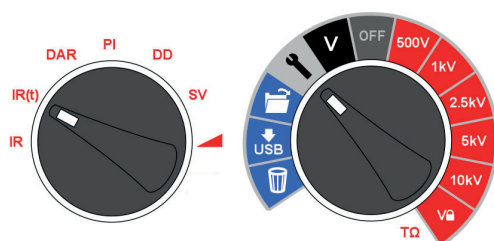
To set the user defined lock voltage V_{L} , turn the central rotary switch to settings and the mode switch to IR. The preset voltage 5000 V will flash and can be changed using the up / down buttons. When the required maximum voltage is displayed, press the OK button to save the setting. This setting will remain until it is reset.

Whenever V_{L} is selected the set voltage is shown on the display. The voltage lock is useful when, for example, testing insulation of XLPE cables that should not be tested above 5000 V. The lock function will ensure it does not exceed the V_{L} voltage within the stated output voltage accuracy.

Time Constant (TC) = Rinsulation x Cinsulation

On test completion, insulation capacitance (C) and Time Constant (TC) associated with it is calculated and displayed.

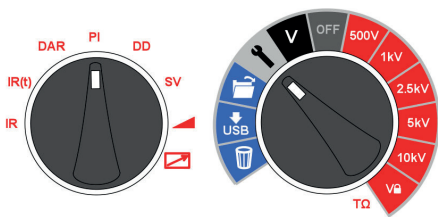
13.2 Timed IR test



A timed test IR(t) will automatically terminate an insulation test after a preset time. Default timer is set to 1 minute and is adjustable within the settings function. This is a useful feature which saves the user watching the display for the full duration of the test and the possibility of missing the 1 minute reading.

Turn the central rotary switch to the settings position. Select IR(t) on the test mode rotary switch. The default time of 1:00 minute will flash prompting the user to select a new time using the up / down arrow buttons. Press OK to set test duration and turn central rotary switch to desired test voltage. Press and hold TEST to start the test.

13.3 DAR, PI and PI predictor insulation tests



DAR and PI tests are measurements of resistance over time expressed as a ratio of resistance at time t2 divided by resistance at time t1. The assumption is that insulation temperature does not vary widely over the duration of the test so the resulting DAR and/or PI value are temperature independent. Testing should be done at or below 40 °C, 104 °F for this assumption to hold.

DAR and PI timers t1 and t2 are set when DAR or PI is selected on the test mode rotary switch with the central rotary switch in the settings position. Timer t1 is set first followed by t2. Up and down arrow buttons are used to change the t1 and t2 default values and OK confirms each setting.

DAR and PI insulation test voltages are selected on the central rotary switch by simply aligning the switch opposite to the required insulation test voltage. Press and hold TEST to start a DAR/PI test.

To turn on PI prediction (**PIp**) testing, select PI on the central rotary switch by simply aligning the switch opposite to the required insulation test voltage. Press the OK button to toggle the prediction test on and off. Then press and hold the TEST button to start the test.

13.3.1 What is a DAR test?

DAR is defined as the ratio of insulation resistance at 1 minute divided by insulation resistance at 30 seconds, although a 1 minute, 15 second DAR is also popular:

$$\text{DAR} = \text{IR}_{60\text{s}} / \text{IR}_{30\text{s}}$$

Insulation Condition	DAR result
Poor	<1
Acceptable	1 – 1,4
Excellent	1,4 – 1,6

13.3.2 What is a PI test?

IEEE standard 43-2000, Recommended Practice for Testing Insulation Resistance for Rotating Machines, defines PI as the ratio of insulation resistance at 10 minutes divided by insulation resistance at 1 minute:

$$\text{PI} = \text{IR}_{10 \text{ min}} / \text{IR}_{1 \text{ min}}$$

If $\text{IR}_{1\text{min}} > 5000 \text{ M}\Omega$ the PI may or may not be an indication of insulation condition and is therefore not recommended by IEEE std. 43.

Insulation Condition	PI result
Poor	< 1
Questionable	1 – 2
Acceptable	2 – 4
Good	> 4

PI results > 1.5 are regarded as acceptable by IEC60085:-01:1984 for thermal class rating A, and PI results > 2.0 for thermal class ratings B, F and H.

Measurement modes

13.3.3 What is a PI predictor (PIp) test?

PI Predictor uses the first part of the IR curve to predict what the whole curve would be at the full 10 minutes test. During the start of the PI test, the scale will NOT flash, then once the prediction has started the PI scale starts to flash. Prediction starts after 3 minutes.



As the confidence in the prediction grows the scale becomes narrower, when the PI Predictor is 100% confident in the prediction, the test will automatically stop and the predicted PI value displayed. The prediction can take between 3 and 7 minutes depending on the testing conditions.

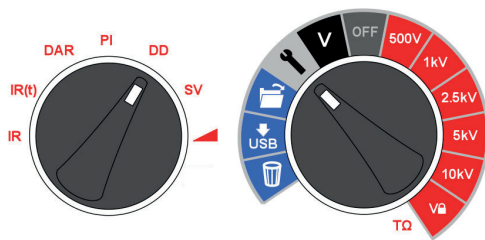
If an open circuit is detected, the PI Predictor test will automatically stop within 1 minute.

13.3.4 PI predictor (PIp) Error codes:

If there is an error when running the test using PI predictor, the following error codes will appear on the instrument:

Error code	Description
UC10	Too noisy for prediction
UC20	Not connected (e.g. open circuit)
UC30	Underrange (e.g. short circuit)

13.4 Dielectric discharge test



The Dielectric Discharge (DD) or re-absorption current test operates during the discharge of the dielectric under test. Originally developed by EDF, France's power utility company, it is a diagnostic insulation test that allows ageing, deterioration, and voids in the insulation to be assessed. The result is dependent on the discharge characteristic so the internal condition of the insulation is tested, largely independent of any surface contamination.

The insulator must first be charged for a sufficient time to be stable, i.e. charging and polarization are complete and the only remaining component of current is leakage current due to the insulation. On discharge the capacitive component of the discharge current decays from a high value with a relatively short time constant of a few seconds. The released absorption current decays from a lower value with a relatively long time constant of up to several minutes.

The DD timer defaults to 30 minutes of charging, which is generally sufficient time for full absorption to take place in an insulation material. The default test voltage is set to 500 V so the primary rotary switch must be set at or above 500 V.

The default DD test duration (t1) is 30 minutes insulation test followed by a fixed 1 minute discharge. The initial 30 minute period can be adjusted but care should be taken to ensure that full absorption will take place in the insulation test period. DD should be selected on the test mode rotary switch and settings on the central rotary switch. Timer t1 is set using the up and down arrow buttons and OK confirms the setting.

The 'DD' test requires the instrument to measure the discharge current 1 minute after the removal of the test voltage, which is greater than the primary time constant of the discharge. On completion of the test, the instrument uses this measurement along with the test voltage and calculated capacitance to produce a figure of merit indicating the quality of the insulation.

$$DD = I_{1min}/(V \times C)$$

where I_{1min} is the discharge current in mA one minute after removal of the test voltage V in Volts and C is the capacitance in Farads.

DD results can identify excess discharge currents that arise when a layer of multi-layer insulation is damaged or contaminated, a condition that will be missed by both the IR and PI tests. Discharge current will be higher, for a given value of voltage and capacitance, if an internal layer is damaged. The time constant of this individual layer will mismatch the other layers, giving rise to a higher value of current than for insulation that is 'good' in this respect.

Homogenous insulation will have a DD value of 0, while good multi-layer insulation will have a value up to 2. The following table is a guide to DD test results:

Insulation Condition	DD result
Bad	> 7
Poor	4 - 7
Questionable	2 - 4
Good	< 2
Homogenous	0

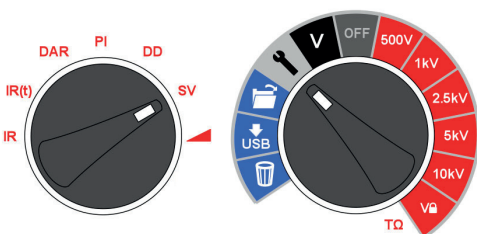
13.5 Step voltage test

The SV test is a controlled overvoltage test that can be applied to stator and rotor windings on synchronous and asynchronous AC motors and the armature and field windings on DC motors. It is advisable to perform a PI test before an SV test to determine if the insulation is suitable for overvoltage testing. If a PI test was performed to verify the winding's suitability for overvoltage testing, the winding must be completely discharged before an overvoltage test is performed.

The SV test is based on the principle that an ideal insulator will produce identical readings at all voltages, while an insulator which is being over stressed, will show lower insulation values at higher voltages.

The SV test is selected using SV mode switch position and any voltage range including V_{\square} range setting. If no custom SV test has been setup then a standard five step test will be performed where each step is 1/5th of the test voltage and 1/5th of the test time. If a standard 5 step test is required at the V_{\square} voltage, set timer 1 to 0 sec. if a custom SV test has previously been setup.

13.5.1 Rotary switch setting indicated



The SV test is a controlled overvoltage test that can be applied to stator and rotor windings on synchronous and asynchronous AC motors and the armature and field windings on DC motors. It is advisable to perform a PI test before an SV test to determine if the insulation is suitable for overvoltage testing. If a PI test was performed to verify the winding's suitability for over voltage testing, the winding must be completely discharged before the overvoltage test is performed.

The SV test is based on the principle that an ideal insulator will produce identical readings at all voltages, while an insulator which is being over stressed, will show lower insulation values at higher voltages.

Measurement modes

During the test the applied voltage steps incrementally by one fifth of the final test voltage each minute for 5 minutes, taking successive measurements.

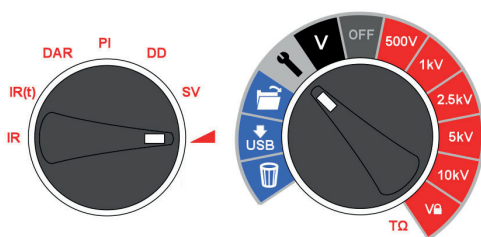
Resistance readings for the first four 'steps' are displayed under consecutive time designators '1 m' to '4 m'. The 5 minute reading is displayed by the main display. If the default 5 minute test duration is changed by the user the four readings will not show the respective '1 m' to '4 m' indicators.

The SV test duration can be adjusted if desired from the 5 minute default value using the up / down arrows and OK to save the setting.

The step timer will always be set to total test time divided by five. Too short a step time may result in incorrect readings and too long a step time may over stress a motor.

The reference standard for step voltage testing is IEEE 95-2002.

13.6 Ramp voltage test



The ramp voltage test is an overvoltage test similar to the SV test but with improved control and warning of potential insulation failure. The slow continuous voltage ramp is less likely to result in unpredictable damage to the insulation than the rapid step increases employed in SV test.

If a PI test was performed to verify the winding's suitability for over voltage testing, the winding must be completely discharged before the over voltage test is performed.

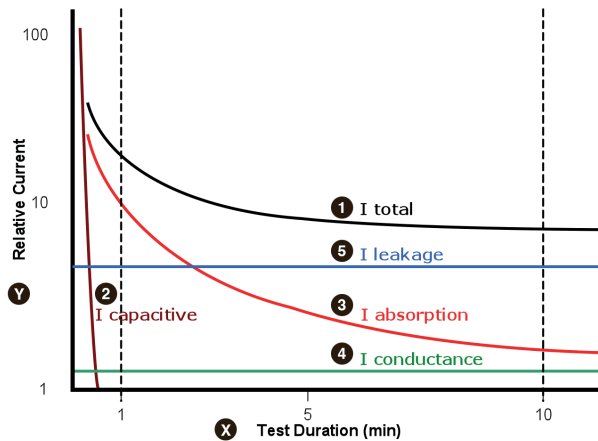
The typical voltage ramp (dV/dt) is 1 kV/min which is the default for MIT525, MIT1025 and MIT1525. This value is user adjustable from the settings function with the mode rotary switch set to ramp. Up and down buttons are used to adjust dV/dt to the required rate and OK confirms the setting. Press and hold TEST to start.

The test will ramp the voltage until it reaches the selected test voltage unless a breakdown or sudden rise in current is detected. The result displayed after the test is the final insulation resistance, voltage and current. If the result is saved a complete curve of current (μA) and voltage (kV) is recorded and can be read into PowerDB, PowerDB Lite or converted to a spreadsheet so that the current vs. voltage curves can be compared to published curves in IEEE 95-2002.

14. Measurement techniques

14.1 Understanding measurement currents

Insulation resistance is defined as the DC test voltage divided by the total current flowing in an insulator. The total current has four components; capacitive current, absorption current, conductance current and leakage current.



X = Test Duration (minutes)

Y = Relative Current

1 = Total current

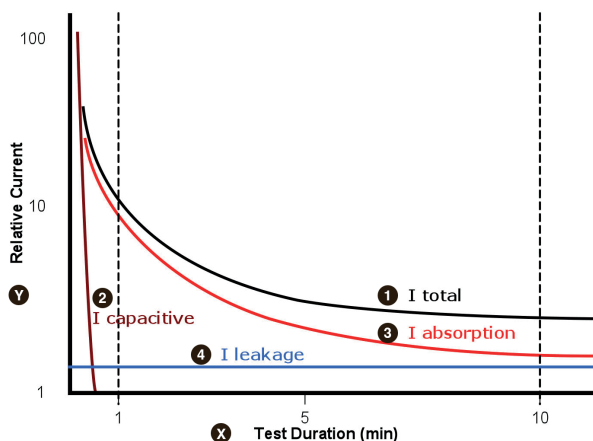
2 = Capacitive current

3 = Absorption current

4 = Conductance current

5 = Leakage current

In the case of dry insulation, conductance current may be negligible and the leakage current may be low, in which case the absorption current will dominate the total current measured.



X = Test Duration (minutes)

Y = Relative Current

1 = Total current

2 = Capacitive current

3 = Absorption current

4 = Leakage current

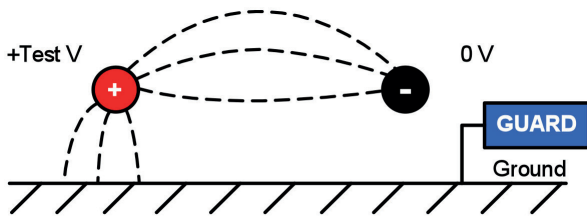
14.2 Insulation measurements above 100 GΩ

Measurements up to 100 GΩ can be made without any special precautions, assuming that the test leads are reasonably clean and dry. The guard lead can be used to remove the effects of surface leakage if necessary. When measuring resistances above 100 GΩ, the test leads should not be allowed to touch each other, or any other object since this will introduce leakage paths. Sharp points at the test lead connections should also be avoided since this will encourage corona discharge.

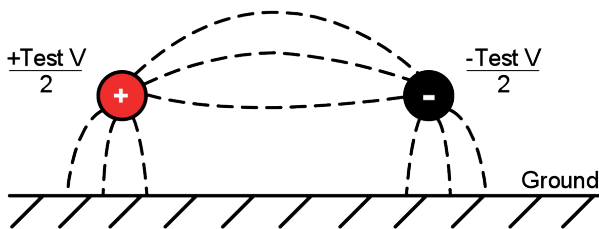
The output is isolated, and so will float relative to ground such that the positive terminal is at plus half of the test voltage, and the negative terminal is at minus half of the test voltage with respect to ground.

Leakages therefore occur between the positive terminal and ground, between the negative terminal and ground, and directly between the positive and negative terminals. These leakages have a significant effect and can occur through air.

Measurement techniques



If the guard lead is grounded, and since the negative terminal is at the same voltage as the guard terminal, the leakage into the negative terminal will be considerably reduced. This will improve accuracy because the current flowing into the negative terminal is measured by the instrument and used to calculate resistance. This technique is only permissible if the item under test is isolated from ground. In this context isolated means insulated by a resistance of at least 5 M Ω for the positive terminal, or at least 10 k Ω for the negative terminal.



Conversely, if the positive terminal is grounded, then the negative terminal will be at a voltage equal to the test voltage relative to ground, which will result in an increase in leakage current, and worsening of measurement accuracy.

When making measurements above 100 G Ω therefore, the user should ground the Guard lead where possible, otherwise parallel leakage paths may occur.

Alternatively, screened leads are available as an optional accessory from Megger. When using a screened lead the screen is plugged into the Guard terminal, diverting any leakage currents. This considerably improves measurements made with a floating output, where the leads might touch each other or another object other than the test piece.

14.3 Terminals

There are three test terminals marked +, - and GUARD. These terminals are designed to accept only genuine Megger test leads. Shutters across the terminals prevent accidental ingress of dirt and other objects. Test lead plugs interlock with the shutters and are released by rotating the test lead plug by a quarter turn.

The GUARD terminal, as explained below, is only used in cases where surface leakage currents need to be eliminated. Most measurements use just the + and - terminals. The instrument's internal voltage generator drives the + terminal with respect to the - terminal, current being measured in the - terminal.

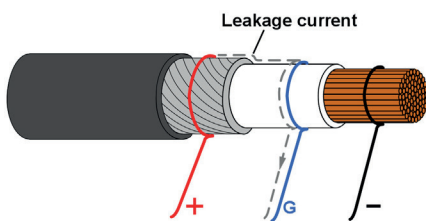
14.4 GUARD terminal, screened leads

For basic insulation tests and where there is little possibility of surface leakage affecting the measurement it is unnecessary to use the guard terminal, i.e. if the insulator is clean and there are unlikely to be any adverse current paths.

However in cable testing for example, there may be surface leakage paths across the insulation between the bare cable and the external sheathing due to the presence of moisture or dirt. Where it is required to remove the effect of this leakage, particularly at high testing voltages, a bare wire may be bound tightly around the insulation and connected via the third test lead to the guard terminal 'G'.

The guard terminal is at the same potential as the negative terminal. Since the leakage resistance is effectively in parallel with the resistance to be measured, the use of the guard causes the current flowing through surface leakage to be diverted from the measuring circuit. The instrument therefore reads the leakage of the insulator, ignoring leakage across its surface.

The display will show a warning and fuse terminal symbol if the internal guard terminal fuse has blown. The instrument must be switched off to clear the message before further testing is permitted. The fuse should be replaced by an authorised repairer. The instrument may be used in the meantime if the guard terminal not used. Refer to notes regarding measurements above 100 G Ω above.



This diagram illustrates GUARD terminal used to prevent surface leakage on cable insulation from affecting a high resistance measurement.

Screened leads are available for the complete range of insulation testers. They are useful in HV switchyards where induced currents are an issue. The screen connects to GUARD and prevents induced currents in the lead.

15. Preventive maintenance

15.1 Cleaning

Disconnect the instrument and wipe it with a clean cloth slightly dampened with soapy water or Isopropyl alcohol (IPA). Care should be taken near the terminals, IEC power and USB sockets.

15.2 Care of the instrument

The instrument should always be handled with care and not dropped. Always ensure that the instrument is secured when being transported to prevent mechanical shock.

15.3 Leads

Leads are silicone insulated and perform well in all weather conditions. Always keep the leads in the clip-on lead pouch supplied with the instrument.

Regular inspection of leads is recommended to ensure they are not damaged in any way. Damaged leads could affect insulation resistance readings and are a safety hazard.

15.4 Battery care

The battery should be charged on a routine basis at an absolute minimum of once a year. However more frequent charging, i.e. once per quarter is preferable.

Never attempt to charge the battery below 0 °C or above 40 °C. The battery is charged by connecting line power at the instrument IEC power socket.

Store the instrument in a cool, dry location to improve battery life. Storage temperatures below freezing should be avoided.

15.5 Replacing the battery

Read and fully understand the warnings on the Li-ion battery in the Safety Warnings section of this document.

The battery pack contains Lithium-ion cells and should be replaced when it no longer holds a charge. A new battery is available as a spare part from Megger. Genuine Megger battery packs must be used. Failure to use genuine parts may affect product safety performance and will invalidate your warranty.

Danger Electric Shock Hazard: Removing the lower case to change the battery exposes the AC supply wiring which will be at a hazardous voltage if the equipment is connected to the AC supply.

Replacement involves removal of four screws from the bottom of the instrument after which the base can be lifted away from the front panel and internal moulded assembly. Care should be taken to keep the front panel and moulding assembly together. The battery pack is housed within a grey moulded cover secured by four screws.

On no account must the transparent inner case be opened. Hazardous voltages up to 15 kV will be exposed. No user serviceable parts are inside. Refer servicing to qualified service personnel. If there is any damage to the inner transparent casing or its lid, then confirm that the Central Rotary Switch is in the OFF position, disconnect the old battery and DO NOT connect the new one. Refit the bottom cover and contact Megger Instruments for service.

15.5.1 MIT515, MIT525, MIT1025 battery replacement instructions

1. Remove the lid, switch the central rotary switch to OFF.
2. Disconnect the IEC AC power lead and all test leads before inverting the lower case, resting the front panel on a soft surface so as not to damage the keypad.
3. Remove the four case fixing screws and lift off case bottom.
4. Carefully unclip the battery cable connector leading from the main printed circuit board to the battery and remove the cables from recesses designed to hold them in place.
5. Remove the four screws and lift off the battery cover.
6. Remove the used battery and replace with a genuine spare battery ordered from Megger, ensuring correct orientation of cable exit.
7. Route the battery cables via the recesses and clip the battery connector to the printed circuit board battery receptacle ensuring correct orientation.
8. Replace the battery cover and secure with the four screws.
9. Ensure the alignment of the instrument panel and high voltage moulding, then replace the lower case and secure with the retaining screws. Take especial care not to leave foreign bodies inside the casing.
10. Check and verify instrument operation.

15.5.2 MIT1525 battery packs (x 2) replacement instructions

1. Switch the instrument OFF, and disconnect the AC supply, measurement leads, and all other equipment before opening the case to change the battery.
2. Always replace both battery packs together.
3. The instrument must not be operated with the case open. DANGER! Hazardous voltages are exposed with an AC source connected and the case open.
4. Remove the lid and invert the lower case resting the front panel on a soft surface so as not to damage the keypad.
5. Remove the four case fixing screws and lift off case bottom.
6. Remove the two screws holding the battery support bracket and remove the bracket.
7. Withdraw one used battery and carefully unclip its battery cable connector, then the other used battery and its connector.
8. Replace with two genuine spare batteries ordered from Megger, ensuring correct orientation of the cable in the socket.
9. With both new batteries fitted, replace the battery support bracket and the two retaining screws.
10. Replace the lower case and secure with the retaining screws.
11. Check and verify instrument operation.

16. Technical specification

16.1 Electrical specifications

AC voltage input range					
5 kV, 10 kV	90-264 V rms, 47 / 63 Hz, 100 VA				
15 kV	90-264 V rms, 47 / 63 Hz, 200 VA				
Battery	11.1 V, 5.2 A hour, safety rated to IEC 62133:2003				
Battery life					
MIT515, MIT525	Typical capacity is 6 hours continuous @ 5 kV with a 100 M Ω load				
MIT1025	Typical capacity is 4.5 hours continuous @10 kV with a 100 M Ω load				
MIT1525	Typical capacity is 4.5 hours continuous @ 15 kV with a 100 M Ω load				
Auto power off	Instrument turns off after a few minutes if non-use to conserves battery life				
Battery charge time	2.5 hours from deep discharge 2 hours from normal discharge				
30 min. charge	1 hour continuous test at 100 M Ω , 5 kV				
Test voltages					
MIT515, MIT525	250 V,	500 V,	1000 V,	2500 V,	5000 V
MIT1025	500 V,	1000 V,	2500 V,	5000 V,	10000 V
MIT1525	1000 V,	2500 V,	5000 V,	10000V,	15000 V
User defined test voltage					
MIT515, MIT525	40 V to 1 kV in 10 V steps				
MIT1025, MIT1525	100 V to 1 kV in 10 V steps				
All units	1 kV to 5 kV in 25 V steps				
MIT1525 only	5 kV to 15 kV in 25 V steps				
MIT515, MIT525 accuracy (23 °C) from 1 MΩ to					
	5000 V	2500 V	1000 V	500 V	250 V
$\pm 5\%$ to	1 T Ω	500 G Ω	200 G Ω	100 G Ω	50 G Ω
$\pm 20\%$ to	10 T Ω	5 T Ω	2 T Ω	1 T Ω	500 G Ω
MIT1025 accuracy (23 °C) from 1 MΩ to					
	10000 V	5000 V	2500 V	1000 V	500 V
$\pm 5\%$ to	2 T Ω	1 T Ω	500 G Ω	200 G Ω	100 G Ω
$\pm 20\%$ to	20 T Ω	10 T Ω	5 T Ω	2 T Ω	1 T Ω
MIT1525 accuracy (23 °C) from 1 MΩ to					
	15000 V	10000 V	5000 V	2500 V	1000 V
$\pm 5\%$ to	3 T Ω	2 T Ω	1 T Ω	500 G Ω	200 G Ω
$\pm 20\%$ to	30 T Ω	20 T Ω	10 T Ω	5 T Ω	2 T Ω
Guard terminal performance	Guards out parallel leakage resistance down to 500 k Ω with a maximum additional resistance error of 1% with a 100 M Ω load				
Display range analogue	100 k Ω ... 10 T Ω				
Display range digital					
MIT515, MIT525	10 k Ω to 10 T Ω				
MIT1025	10 k Ω to 20 T Ω				
MIT1525	10 k Ω to 30 T Ω				

Short circuit current	3 mA nominal* *Maximum power regulation technology ensure maximum power transfer throughout all loads not just at short circuit outperforming many 5 mA testers
Insulation alarm	100 k Ω to 1 G Ω
Capacitor charge	
MIT515, MIT525	< 3 s/ μ F to 5 kV
MIT1025	< 5 s/ μ F to 10 kV
MIT1525	< 6.3 s/ μ F to 15 kV
Capacitor discharge	
MIT515, MIT525	<250 ms/ μ F to discharge from 5 kV to 50 V
MIT1025	<250 ms/ μ F to discharge from 10 kV to 50 V
MIT1525	<3500 ms/ μ F to discharge from 15 kV to 50 V
Capacitance range (above 500 V)	
	10 nF to 25 μ F (5 kV, 10 kV)
	10 nF to 50 μ F (15 kV)
	dependent on measurement voltage
Capacitance accuracy (23 °C)	\pm 10% \pm 5 nF
Voltage output accuracy	(>200V, 0 °C to 30 °C): +4%, -0%, \pm 10 V nominal test voltage at 1 G Ω
Current measurement range	0.01 nA to 6 mA
Current measurement accuracy (23 °C)	
	\pm 2% \pm 0.5 nA at all voltages
Interference (noise) rejection mArms	
MIT515, MIT525	1 mA per 250 V to a maximum of 3 mA
MIT1025	1 mA per 600 V to a maximum of 3 mA
MIT1525	1 mA per 350 V to a maximum of 6 mA
Voltmeter range	30 V to 660 V AC or DC, 50 / 60 Hz
Voltmeter accuracy	\pm 3%, \pm 3 V
Timer range	Up to 99 minutes, 15 second minimum setting
Memory capacity	5½ hours continuous logging every 5 s or 33 logged PI tests, or 350 logged IR tests
Test regimes	
MIT515	IR, IR(t), DAR, PI
MIT525, MIT1025	IR, IR(t), DAR, PI, SV, DD, ramp test
MIT1525	IR, IR(t), DAR, PI, SV, DD, ramp test
Interface	USB type B (device)
Real time output	USB, 1 reading / second (resistance, current and voltage)

16.2 Environmental conditions

Altitude					
MIT515, MIT525, MIT1025	3000 m, test lead CAT rating valid to 2000 m, safe working practices must be applied and clips must not be handled until discharge is complete				
MIT1525	3000 m				
Operating temperature	-20 °C to 50 °C				
Storage temperature	-25 °C to 65 °C				
Humidity	90% RH non-condensing at 40 °C				
Ingress protection	IP65 (lid closed), IP40 (lid open)				

16.3 General specification

Safety					
MIT515, MIT525, MIT1025	Meets the requirements of IEC 61010-1, CAT IV 600 V to 3000 m Instrument must be operated with all test leads connected above 2000 m				
MIT1525	Meets the requirements of IEC 61010-1, CAT IV 1000 V to 3000 m				
EMC	Meets the requirements of IEC 61326-1				
Dimensions					
(5 kV, 10 kV)	L 315 mm x W 285 mm x H 181 mm				
(15 kV)	L 360 mm x W 305 mm x H 194 mm				
Weight	4.5 kg (MIT515, MIT525, MIT1025)				
	6.5 kg (MIT1525)				

17. Repair and warranty

If the protection of an instrument has been impaired it should not be used, but sent for repair by suitably trained and qualified personnel. The protection is likely to be impaired if, for example, the instrument shows visible damage, fails to perform the intended measurements, has been subjected to prolonged storage under unfavourable conditions, or has been exposed to severe transport stresses.

New instruments are covered by a two year warranty from the date of purchase by the user, the second year being conditional on registration of the product on www.megger.com. Any unauthorised prior repair or adjustment will automatically invalidate the warranty.

These products contain no repairable parts, with the exception of the user replaceable battery, and if defective should be returned to your supplier in original packaging or packed so that it is protected from damage during transit. Damage in transit is not covered by this warranty and replacement / repair is chargeable.

17.1 Calibration, service and spare parts

For service requirements for Megger Instruments contact:

<p>Megger Limited Archcliffe Road Dover Kent CT17 9EN U.K. Tel: +44 (0) 1304 502 243 Fax: +44 (0) 1304 207 342</p>	OR	<p>Megger Valley Forge 400 Opportunity Way Phoenixville PA 19460 U.S.A. Tel: +1 610 676 8579 Fax: +1 610 676 8625</p>
--	----	---

Megger operate fully traceable and repair facilities, ensuring your instrument continues to provide the high standard of performance and workmanship you expect. These facilities are complemented by a worldwide network of approved repair and companies to offer excellent in-service care for your Megger products.

17.2 Returning product to Megger UK and USA service centres

1. When an instrument requires re, or in the event of a repair being necessary, a Returns Authorisation (RA) number must first be obtained from one of the addresses shown above. You will be asked to provide the following information to enable the Megger Service Department to prepare in advance for receipt of your instrument, and to provide the best possible service to you.
2. Model, e.g. MIT1025.
3. Serial number, to be found on the underside of the case or on the certificate.
4. Reason for return, e.g. required, or repair.
5. Details of the fault if the instrument is to be repaired.
6. Make a note of the RA number. A returns label can be emailed or faxed to you if you wish.
7. Pack the instrument in the original packing box to prevent damage in transit.
8. Ensure the returns label is attached, or that the RA number is clearly marked on the outside of the package and on any correspondence, before sending the instrument, freight paid, to Megger. Copies of the original purchase invoice and packing note should be sent simultaneously by airmail to expedite clearance through customs. In the case of instruments requiring repair outside the warranty period, an immediate quotation can be provided when obtaining the RA number.
9. You may track progress of your return online at www.megger.com

17.3 Approved service centres

A list of Approved Service Centres may be obtained from the UK address above, or by contacting Megger on ukrepairs@megger.com, and giving details of your location.

18. Accessories, equipment and spares

Included accessories (all models)	
3 m leadset x 3, medium insulated clips (5 kV, 10 kV)	1008-022
Power lead	
Included accessories (MIT525, MIT1025, MIT1525)	
USB cable	25970-041
3 m leadset x 3, large insulated clips (MIT1025 only)	1002-534
3 m 15 kV leadset x 3, 15 kV clip (MIT1525 only)	1002-949
HV test lead sets 5 kV, 10 kV	
3 m leadset x 3, medium insulated clips	1008-023
3 m leadset x 3, large insulated clips	1002-534
3 m leadset x 3, bare clips	8101-181
8 m leadset x 3, bare clips	8101-182
15 m leadset x 3, bare clips	8101-183
Screened HV test lead sets 5 kV, 10 kV	
15 m, 5 kV screened un-insulated small clips	6311-080
3 m, 10 kV screened un-insulated small clips	6220-834
10 m, 10 kV screened un-insulated small clips	6220-861
15 m, 10 kV screened un-insulated small clips	6220-833
Optional accessories	
CB101, 5 kV calibration unit	6311-077
Calibration certificate	1000-113
UKAS calibration certificate	1000-047
Spare Li-ion Battery	1008-002
GILS1 EHV Guard interconnecting lead and strap kit	1011-357
GILS2 Advanced guard interconnecting lead and strap kit	1011-358

19. Decommissioning

19.1 WEEE Directive



The crossed out wheeled bin symbol placed on Megger products is a reminder not to dispose of the product at the end of its life with general waste.

Megger is registered in the UK as a Producer of Electrical and Electronic Equipment.
The Registration No is WEE/ HE0146QT.

For further information about disposal of the product consult your local Megger company or distributor or visit your local Megger website.

19.2 Battery disposal

The crossed out wheeled bin symbol placed on a battery is a reminder not to dispose of batteries with general waste when they reach the end of their usable life.

For disposal of batteries in other parts of the EU contact your local Megger branch or distributor.

Megger is registered in the UK as a producer of batteries (registration No.: BPRN00142).

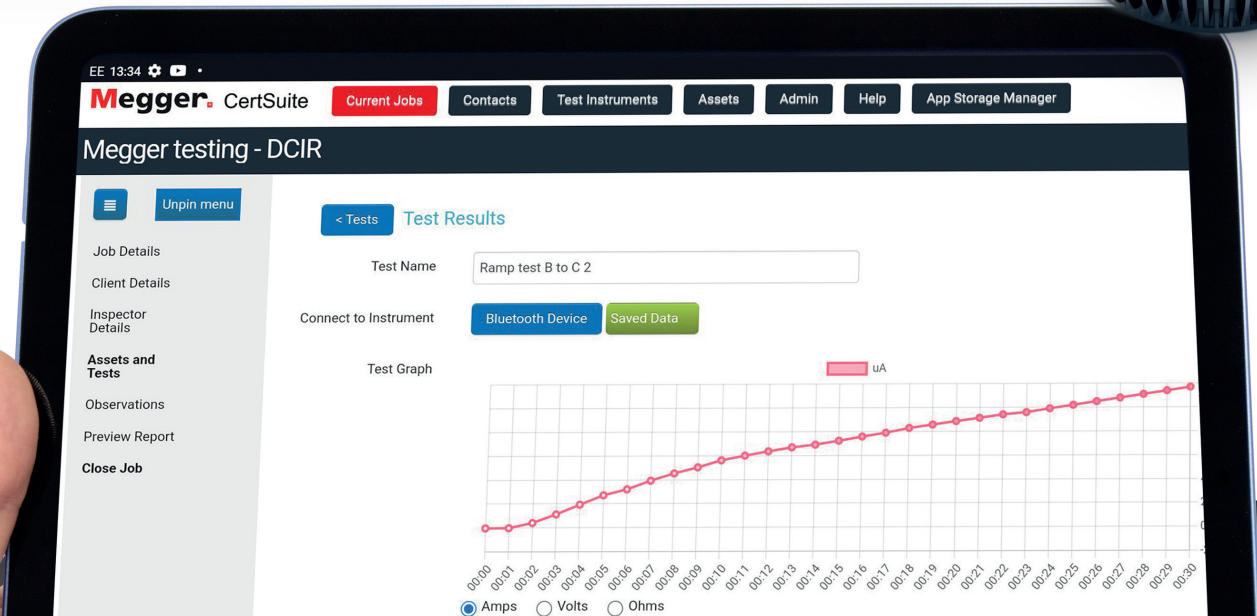
For further information see www.megger.com

20. Worldwide Sales Offices

Sales Office	Telephone	Email
UK	T. +44 (0)1 304 502101	E. UKsales@megger.com
USA – Dallas	T. +1 214 333 3201	E. USsales@megger.com
USA – Valley Forge	T. +1 214 333 3201	E. USsales@megger.com
USA – Dallas	T. +1 214 333 3201	E. USsales@megger.com
DEUTSCHLAND – Aachen	T. +49 (0) 241 91380 500	E. info@megger.de
SVERIGE	T. +46 08 510 195 00	E. seinfo@megger.com
AUSTRALIA	T. +61 2 9397 5900	E. ausales@megger.com
中国	T. +86 512 6556 7262	E. meggerchina@megger.com
中国 - 香港	T. +852 26189964	E. meggerchina@megger.com
ČESKÁ REPUBLIKA	T. +420 222 520 508	E. info.cz@megger.com
AMÉRICA LATINA	T. +1 214 330 3293	E. csasales@megger.com
ESPAÑA	T. +34 916 16 54 96	E. info.es@megger.com
SUOMI	T. +358 08 510 195 00	E. seinfo@megger.com
LA FRANCE	T. +01 30 16 08 90	E. infos@megger.com
ΕΛΛΑΔΑ	T. +49 (0) 9544 68 0	E. sales@sebakmt.com
MAGYARORSZÁG	T. +36 1 214-2512	E. info@megger.hu
ITALIA	T. +49 (0) 9544 68 0	E. sales@sebakmt.com
日本	T. +44 (0)1 304 502101	E. UKsales@megger.com
한국	T. +1-800-723-2861	E. sales@megger.com
ضاي رة لرب	T. +966 55 111 6836	E. MEsales@megger.com
نرب لة لرب	T. +973 17440620	E. MEsales@megger.com
NEDERLAND	T. +46 08 510 195 00	E. seinfo@megger.com
NORGE	T. +46 08 510 195 00	E. seinfo@megger.com
POLSKA	T. +48 22 2809 808	E. info.pl@megger.com
PORTUGAL	T. +34 916 16 54 96	E. info.es@megger.com
ROMÂNIA	T. +40 21 2309138	E. info.ro@megger.com
РОССИЯ	T. +7 495 2 34 91 61	E. sebaso@sebaspectrum.ru
SLOVENSKO	T. +421 2 554 23 958	E. info.sk@megger.com
SOUTH AFRICA	T. +27 (031) 576 0360	E. sales.rsa@megger.com
TÜRKIYE	T. +46 08 510 195 00	E. seinfo@megger.com

CertSuite Asset

Cloud based testing and reporting software that works with the Megger S1 and MIT insulation testers



Working with you,
and your team,
anywhere.

More details at



CertSuite.info

Connects to
S1 and MIT

Free
Trial >>



*CertSuite Asset connects to:
S1568, S11068, S11568, MIT2500, MIT430, MIT525

Megger[®]

Local Sales office

Megger Limited
Archcliffe Road
Dover
Kent
CT17 9EN
ENGLAND
T. +44 (0)1 304 502101
F. +44 (0)1 304 207342

Manufacturing sites

Megger Limited
Dover, ENGLAND
T. +44 (0)1 304 502101
E. uksales@megger.com

Megger AB
Danderyd, SWEDEN
T. +46 08 510 195 00
E. seinfo@megger.com

Megger Valley Forge
Phoenixville, PA USA
T. +1 610 676 8500
E. USsales@megger.com

Megger USA - Dallas
Dallas, TX USA
T. +1 214 333 3201
E. USsales@megger.com

Megger USA - Fort Collins
Fort Collins, CO USA
T. +1 970 282 1200

Megger GmbH
Aachen, GERMANY
T. +49 (0) 241 91380 500
E. info@megger.de

Megger Germany GmbH
Baunach, GERMANY
T. +49 (0) 9544 68 - 0
E. baunach@megger.com

Megger Germany GmbH
Radeburg, GERMANY
T. +49 (0) 35208 84-0
E. radeburg@megger.com

This instrument is manufactured in the United Kingdom.

The company reserves the right to change the specification or design without prior notice.

Megger is a registered trademark

The Bluetooth[®] word mark and logos are registered trademarks owned by Bluetooth SIG, Inc and is used under licence.