Wee *MEGGER*® Tester

WM6 catalog No. 21805-3

User Guide
Guide de l'utilisateur
Gebrauchsanleitung
Guía del usuario

MEGGER®

SAFETY WARNINGS

- ***The circuit must be de-energized and isolated BEFORE connections are made for any test.***
- ***Do not touch the circuit during an insulation test.***
- ***After insulation tests, capacitive circuits MUST be allowed to discharge BEFORE disconnecting the test leads.***
- ***Test leads, including prods and crocodile clips, must be in good order; clean and having no broken or cracked insulation.***
- ***Replacement fuses must be of the correct type and rating.***

Refer also to page 8 for further explanations and other precautions.

The warnings and precautions must be read and understood before the instrument is used. They must be observed during use.

NOTE

This instrument must only be used by suitably trained and competent persons.

CONTENTS

GENERAL DESCRIPTION

The WM6 MEGGER® Insulation and Continuity Tester is a completely self contained instrument designed to give rapid and accurate measurement of insulation resistance and continuity resistance.

The WM6 uses a low voltage hand-cranked a.c. brushless generator as the power supply. This generator is easy to turn and is connected to a rectifier and d.c. to d.c. converter to provide the test voltage.

The WM6 uses a moving coil meter with taut band suspension, white scales on a black scale plate and an orange 'dayglow' pointer. An electronic circuit is employed to produce a four decade calibrated scale for insulation resistance measurement from 0 to 200 MΩ.

Two shrouded sockets are provided in the side of the case for the test leads and a slider switch selects either insulation or continuity tests ('MΩ' or 'Ω'). The case is robust, made of ABS plastic, and the generator handle folds neatly against it when not in use.

APPLICATIONS

The WM6 is intended for the direct measurement of insulation resistance and continuity of domestic and industrial wiring, cables, transformers, motors, generators, electrical machinery and appliances. Because the WM6 is self-powered it is suitable for use during installation and commissioning work as well as for service and maintenance applications.

Note:— The cover of this instrument has been given an antistatic treatment which should be effective for many months. If in the course of time the cover is found to retain electrostatic charges, it should be re-treated with a suitable antistatic solution.

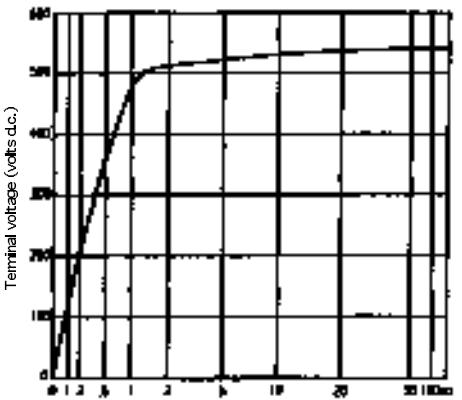
SPECIFICATION

		WM6
Ranges	insulation	0–200 MΩ and ∞
	continuity	0–100 Ω
Terminal Voltage on Open Circuit (d.c.)	insulation range	<600 V
	continuity range	800 mV approx.
Terminal Voltage at 1 MΩ Load (d.c.)	insulation range	500 V + 10% –5%
Terminal Current on Short Circuit	insulation range	1,3 mA approx.
	continuity range	55 mA approx.
Voltage Stability 160 r.p.m. to 240 r.p.m.	insulation range	<±1%
Ripple Content at 160 r.p.m. on Open Circuit	insulation range	500 mV pk-pk approx.
Accuracy		1,5 mm (0,060 in) from any marked position on the scale when measured against standard resistors.
Temperature	operating	–10 °C to +50 °C
	storage	–20 °C to +70 °C
Flash Test		2,3 kV a.c. r.m.s.
Voltage Source (d.c.)		Brushless a.c. hand-cranked generator with rectifier and d.c. to d.c. converter.

SPECIFICATION

Fuse	1 A 20 x 5 mm ceramic
Dimensions	131 x 98 x 61 mm ($5^1/_8$ x $3^7/_8$ x $2^3/_8$ in)
Weight	650 g (1 lb 7 oz)

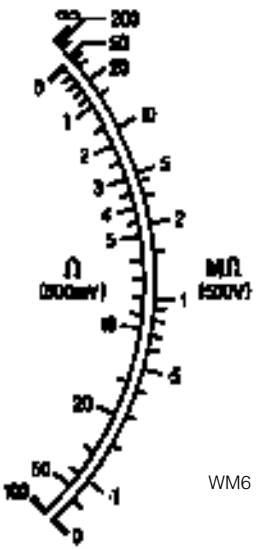
Terminal Voltage Characteristics



WM6

SPECIFICATION

Illustrations of Typical Scales (full size)



WM6

ACCESSORIES

SUPPLIED WITH THE INSTRUMENT

Test lead set including shrouded crocodile clips

User Guide	Part No. 6171-685
Test Record Card (5 supplied)	Part No. 6172-111

AVAILABLE AS AN OPTIONAL EXTRA

A leather 'test-and-carry' case with a special compartment for test leads	Part No. 6420-088
Test Lead set red/black	Part No. 6220-437
Test Record Card (Pack of Twenty)	Part No. 6111-216

OPERATION

WARNING

1. The circuit under test **must** be de-energized and isolated before insulation or continuity tests are made.
2. When capacitive circuits have been tested allow a suitable time to elapse before disconnecting the test leads, for the circuit to discharge.
3. Instruments used in dusty environments should be stripped and cleaned periodically.
4. Do not leave the instrument exposed to direct heat from the sun for long periods.
5. The instrument circuit contains a static sensitive device. If the instrument casing is opened for any reason (this will automatically invalidate any warranty covering the instrument), care must be exercised in handling the printed circuit board. This should be done in accordance with DEF STAN 59-98 and BS 5783 specifications for handling electrostatic sensitive devices. Printed circuit boards containing such devices are identified either by a yellow warning label or by a yellow legend and a large yellow dot on the p.c.b. (Initially the dot may not be included.)

PRELIMINARY CHECKS

Inspect the test leads to see that they have good unbroken insulation. Connect the red and black leads, terminated with the clips, to the red (+) and black (–) terminal sockets respectively in the side of the instrument case. Leave the leads coiled or twisted together, but ensure that their clips are not touching anything. Set the slider switch to the 'MΩ' position. Turn the generator handle at approximately 160 r.p.m. and observe the meter pointer, it should rest over the '∞' (infinity) position on the scale. If it does not the test leads may be faulty and should be inspected more closely for damage. Replace them if necessary.

Connect the test lead clips together and turn the generator handle again, the meter should read zero. If it indicates infinity or a high resistance value the leads may be open circuit and should be inspected further, replace if necessary. Shorting the leads together and obtaining a zero reading also proves that the instrument is working.

To check that the fuse in the continuity circuit is intact, leave the test leads connected together and set the slider switch to the 'Ω' position. Turn the generator handle again, the reading obtained should be zero (or very nearly so). If the reading is beyond full scale on the 'Ω' range the fuse has ruptured and should be replaced.

FUSE REPLACEMENT

The fuse is held in a screw-type holder. To change a fuse, use a screwdriver to release the centre part of the holder containing the fuse. Replace with a 1 A 20 x 5 mm ceramic fuse part no. 25413-286. An alternative fuse should not be used as the fuse resistance will affect the lower continuity readings.

INSULATION TESTING

After connecting the test leads to the instrument and making the preliminary checks as detailed above, set the slider switch to 'MΩ'. With the circuit to be tested isolated, connect the test leads as follows:—

(a) for insulation tests to earth — connect the red lead to earth or frame of the equipment, and the black lead to that part of the circuit to be tested.

(b) for insulation tests between wires — connect a lead to the core of each of the wires.

Turn the generator handle at between 160 r.p.m. and 240 r.p.m. The meter pointer will indicate the value of insulation resistance on the 'MΩ' scale. (If a capacitive circuit is tested the pointer will initially deflect towards zero and then gradually rise to its final steady value as the capacitance is charged up to the output voltage of the tester.)

If several successive readings of '∞' are obtained, connect the two further ends of the test leads together and turn the generator handle. A zero reading should result which double checks that the leads are not disconnected or broken and therefore the insulation resistance readings are correct.

Capacitive circuits automatically discharge through the tester when the generator handle stops rotating. The meter pointer will deflect beyond the '∞' position on the scale and then return to its normal rest position at '∞' when the circuit has discharged. Wait a few moments for this to happen before disconnecting the test leads. The discharge time (to 0 V) is approx. 8 seconds per microfarad.

CONTINUITY TESTING

With the test leads connected to the instrument, and having checked them and the fuse as described above, set the slider switch to the 'Ω' position. With the circuit under test isolated, connect the test leads across the appropriate points and turn the generator handle at between 160 r.p.m. and 240 r.p.m. The resistance will be indicated on the 'Ω' scale. This resistance includes that of the test leads which should be measured separately, (by performing a test with the clips joined together), and the result deducted from the total.

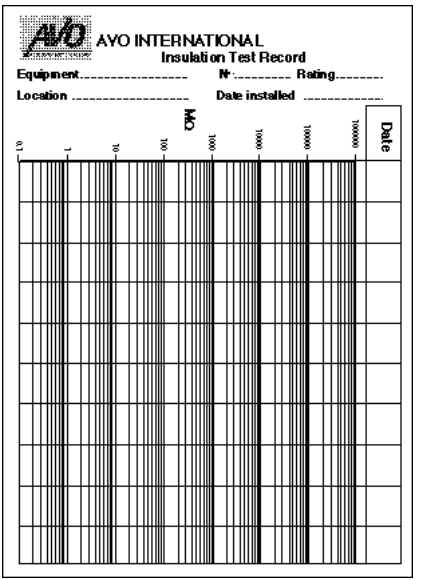
Preventive Maintenance

The proverb 'A stitch in time saves nine' inspired the title of an **AVO International** booklet on insulation testing, as it neatly sums up the benefits of preventative maintenance. The savings come in financial terms from costly repairs, lost production, lost profits and in human terms, from lives saved in the event of dangerous electrical faults.

Regular insulation testing of electrical equipment can help to detect deteriorating insulation. The effects which cause insulation to deteriorate include mechanical damage, vibration, excessive heat or cold, dirt, oil, moisture and localized voltage stresses - all of which can arise on most industrial or utility equipment.

Insulation tests are sometimes used in isolation as absolute measures of the quality of the insulation. This is most appropriate when equipment is being installed and checked for compliance with a specified 'Pass' level. For operational equipment the key factors are trends in the insulation readings.

It is therefore important that records of insulation readings are kept, relating to each piece of equipment or 'Asset' in your testing regime. **AVO International** supplies test record cards to assist with such record keeping. There are also a number of influences on the insulation readings - temperature, humidity and surface leakage for example and a range of test techniques have been developed to help with the interpretation of your insulation tests.



Test Record Example

Insulation Testing Concepts

Insulation resistance can be considered by applying Ohm's Law. The measured resistance is determined from the applied voltage divided by the resultant current,

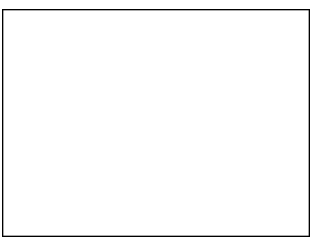
$$R = \frac{V}{I}$$

There are two further important factors to be considered. These are:

(i) the nature of the current through and/or over the insulation, and :

(ii) the length of time for which the test voltage is applied. These two factors are linked.

The total current that flows is made up of three separate currents:-



1. Capacitance charging current. This current is initially high and drops as the insulation becomes charged up to the applied voltage.
2. Absorption current. This current is also initially high but drops at a much slower rate than the charging current.
3. Conduction or Leakage current. This is a small steady current that can be sub-divided into two:-
   (a) A current flowing along conduction paths through the insulation material.
   (b) A current flowing along conduction paths over the surface of the insulation material.

As the total current depends upon the time for which the voltage is applied, Ohm's Law theoretically applies at infinite time.

The charging current falls relatively rapidly as the equipment under test becomes charged up. The actual length of time depends upon the size and capacitance of the item under test.

Larger items with more capacitance will take longer e.g. long supply cables. The absorption current decreases relatively slowly compared with the charging current. In essence it depends upon the nature of the insulation material. The conduction or Leakage current builds up quickly to a steady value and then remains constant for a particular applied voltage under stable conditions. It is this current that is affected by moisture, dirt etc. and the degree to which it flows bears a direct relation to the quality of the insulation, and consequently to the value of the insulation resistance measured. An increase in the leakage current is a pointer to possible future problems.

MODE D'EMPLOI

AVERTISSEMENTS

1) Le circuit à essayer doit être mis hors tension et isolé, préalablement à toute mesure.
2) Après l'essai de circuits capacitifs, attendre le temps nécessaire à la décharge avant de retirer les cordons de mesure.
3) Les appareils utilisés dans les environnements poussiéreux doivent être démontés et nettoyés périodiquement.
4) Ne pas laisser l'appareil trop longtemps exposé au soleil.

VERIFICATIONS PRELIMINAIRES

Vérifier si l'isolement des cordons de mesure est correct. Pour ce, brancher les cordons rouge et noir, munis de leur pince crocodile, dans les bornes rouge (+) et noire (–) de l'appareil.

Torsader ensemble les deux cordons et s'assurer que leurs extrémités ne sont pas en contact. Placer le commutateur de gamme sur "MΩ". Tourner la manivelle du générateur à environ 160 tours par minute et controler que l'aiguille de l'indicateur se place sur la position "∞" de l'échelle. Si ce n'est pas le cas, il faut vérifier minutieusement l'état des cordons et les remplace si nécessaire.

Court-circuiter les pinces crocodiles et actionner à nouveau la manivelle. L'aiguille de l'indicateur doit se placer sur le zéro de l'échelle. En cas d'indication de résistance de valeur élevée (ou position '∞') les cordons sont peut-être coupés. Vérifier leur état et les remplacer si nécessaire.

Le fait d'obtenir une lecture 'zero' apres avoir court circuite les cordons d'essai est aussi une preuve de bon funcionement de l'instrument.

Pour vérifier l'état du fusible du circuit de continuité, laisser les cordons en court-circuit et placer le commutateur de gamme sur la position 'Ω'. Tourner la manivelle du générateur. On doit obtenir une lecture très proche de zéro. En cas de lecture ohmique élevée, le fusible est coupé et doit être remplacé.

REMPLACEMENT DU FUSIBLE

Le fusible est placé dans un logement fixé entre les bvornes de sortie de l'appareil. Pour remplacer un fusible, dévisser à l'aide d'un tournevis la partie centrale du logement porte-fusible. Utiliser des fusibles ceramique 1 A (20 x 5 mm).

MESURE D'ISOLEMENT

Après avoir branché les cordons sur l'appareil et avoir réalisé les essais préliminaires indiqueés ci-dessus, placer le commutateur de gamme sur 'MΩ'. Une fois le circuit à tester isolé, brancher les cordons comme suit:

(a) Pour les essais d'isolement par rapport à la terre — Relier le cordon rouge à la terre ou au bâti de la structure en essai, et le cordon noir à la partie du circuit à mesurer.
(b) Pour les essais entre fils — Relier un cordon à chacun des deux fils.

Tourner le manivelle à une vitesse comprise entre 160 et 240 t.p.m. La valeur d'isolement sera lue sur l'échelle 'MΩ' de l'indicateur. (Lors d'essais sur circuits capacitifs, l'aiguille de l'indicateur se déplace d'abord vers le zéro puis dévie graduellement jusqu'a prendre une valeur fixe quand la capacité est chargée à la tension de sortie de l'appareil.)

Si plusieurs mesures successives fournissent une lecture '∞', court-circuiter les extrémités des cordons de mesure et tourner la manivelle de la génératrice. Une lecture 'zéro' indique que les cordons ne sont ni débranchés, ni coupés et que les mesures d'isolement effectuées sont en fait correctes.

Les circuits capacitifs sont automatiquement déchargés dans l'appareil quand on arrête de tourner la manivelle — L'aiguille se déplace au delà de la position '∞' puis reprend sa position de repos sur la marque '∞' quand le circuit est déchargé. Attendre le temps nécessaire pour que cette décharge se réalise avant de débrancher les cordons d'essai. Le temps de décharge est d'environ 8 secondes par microfarad.

ESSAIS DE CONTINUITE

Après avoir branché les cordons sur l'appareil, avoir vérifié leur état ainsi que celui du fusible, placer le commutateur de gamme sur 'Ω' — Une fois le circuit en essai isolé, relier les cordons aux points à tester et tourner la manivelle à une vitesse comprise entre 160 et 240 t.p.m. — La résistance est indiquées sur l'échelle 'Ω' — Elle comprend la résistance des cordons, qui doit être mesurée séparément (en court-circuitant leurs extrémités), cette valeur doit ensuite être retranchée du résultat de la mesure.

BETRIEBSANWEISUNG

ACHTUNG!

1. Vor der Isolierungs-oder Durchgangsprüfung **muß** die zu prüfende Schaltung entladen und von der Stromquelle getrennt werden.
2. Nach der Prüfung kapazitiver Schaltungen sind die Testkabel kurzzeitig angeschlossen zu lassen, damit sich die Schaltung entladen kann.
3. In staubiger Umgebung eingesetzte Geräte sind regelmäßig zu warten und zu reinigen.
4. Das Gerät niemals längere Zeit direkter Wärme durch Sonneneinstrahlung aussetzen.

VORPRÜFUNGEN

Das Testkab el auf gute nichtspröde Isolierung prüfen. Mit Kabelklemmen abgeschlossenes rotes und schwarzes Kabel verwenden Rote an (+), bzw. schwarze (–) Anschlußbuchse an das Gerätgehäuse anschließen. Die Kabel verdrillt bzw. zusammengedreht lassen, jedoch darauf achten, daß die Klemmen nichts berühren. Schiebeschalter auf Stellung 'MΩ' bringen. Die Generatorkurbel mit etwa 160 Umdrehungen/MInute drehen und den Meßgerätezeiger beobachten. Er soll auf der Stellung '∞' (Unendlich) auf der Skale ruhen. Ist dies nicht der Fall, können die Testkabel defekt sein, und sie sind genauer auf eine Beschädigung zu untersuchen. Die Kabel erforderlichenfalls ersetzen.

Die Kabelklemmen bzw. Enden verbinden und die Generatorkurbel erneut drehen. Das Meßgerät soll nun Null anzeigen. Liegt die Anzeige auf Unendlich oder bei einem hohen Widerstandswert, kann eine Kabelunterbrechung vorliegen. Die Kabel genauer untersuchen und gegebenenfalls auswechseln.

Bei Kurzgeschlossenen kabeln zeigt die Anzeige 0 an und man kann sich vergewissern ob das gerate arbeitet.

Um zu prüfen, ob die Sicherung in der Durchgangsschaltung in Ordnung ist, die Testkabel zusammengeschlossen lassen und den Schiebeschalter in die Stellung 'Ω' bringen. Die Generatorkurbel erneut drehen: die Ablesung sollte Null (oder fast Null) ergeben. Wenn die Anzeige im 'Ω'-Bereich über die volle Skale hinausgeht, ist die Sicherung defekt und zu erneuern.

AUSWECHSELN DER SICHERUNG

Die Sicherung sitzt in einer Schraubhalterung zwischen den Ausgangs-Anschlußbuchsen. Zum Auswechseln der Sicherung den mittleren Teil des Sicherungshalters mit einem Schraubenzieher lösen. Die alte Sicherung mit einer keramic 1 A, 20 x 5 mm ersetzen.

PRÜFEN DER ISOLIERUNG

Nach Anschließen der Testkabel an das Gerät und Ausführen der oben genannten Vorprüfungen den Schiebeschalter auf 'MΩ' stellen. Nachdem die zu prüfende Schaltung von der Stromquelle getrennt ist, die Tedstkabel wie folgt anschließen:

(a) Isolierungsprüfungen gegen Erde — das rote Kabel auf Erde bzw. Rahmenmasse der jeweiligen Ausrüstung legen und das schwarze Kabel an den Teil der Schaltung anschließen ,der getestet werden soll.

(b) Isolierungsprüfungen zwischen Drähten — jeweils ein Kabel an die Drahtadern anschließen.

Die Generatorkurbel mit 160 bus 240 U/min drehen. Der Gerätzeiger zeigt den Wert des Isolationswiderstands auf der 'MΩ'-Skale an. (Beim Prüfen einer kapazitiven Schaltung geht der Zeiger zunächst auf Null und steigt dann langsam auf den endgültigen Ruhewert, während die Kapazität auf die Ausgangsspannung des Prüfgeräts aufgeladen wird.)

Ergeben sich nacheinander mehrere Ablesungen von '∞', die beiden anderen Enden der Testkabel miteinander verbinden und die Generatorkurbel drehen. Dabei sollte man nun eine Nullablesung erhalten als Gegenprüfung dafür, daß die Kabel nicht getrennt oder unter brochen sind und Isolationswiderstandsablesungen somit korrekt sind.

Kapazitive Schaltungen entladen automatisch durch das Prüfgerät, wenn die Generatorkurbel nicht mehr gedreht wird. Der Gerätzeiger geht über die Stellung '∞' auf der Skale hinaus und kehrt dann zur normalen Ruhestellung bei '∞' zurück, sobald sich die Schaltung entladen hat. Einige Augenblicke warten, damit die vollständige Entladung erfolgen kann, und dann die Testkabel abnehmen. Die Entladezeit (auf 0 V) beträgt ca. 8 Sekunden pro Mikrofarad.

DURCHGANGSPRÜFUNG

Nach Durchführung der Vorprüfungen (wie bereits beschrieben) und Anschluß der Meßleitungen den Schiebeschalter auf die Stellung 'Ω' setzen. Die zu prüfende Schaltung muß von der Stromquelle getrennt sein. Die Testkabel an die zu messenden Punkte anschließen und die Generatorkurbel mit 160 bis 240 U/min drehen. Der Widerstand wird auf der 'Ω'-Skale angezeigt. Dieser Widerstand enthält auch den Widerstandswert für die Testkabel, der (durch Ausführen eines Tests mit kurzgeschlossenen Meßleitungen) separat zu messen ist; dieses Ergebnis wird dann vom angezeigten Gesamtwert ab gezogen.

INSTRUCCIONES DE USO

ADVERTENCIA

1. El circuito bajo prueba **debe** ser descargado y aislado antes de efectuar las pruebas de aislamiento o continuidad.
2. Cuando se han probado circuitos capacitivos, dejar transcurir un periodo de tiempo adecuado antes de desconectar los cables, de modo que se descargue el circuito, a través del instrumento.
3. Los instrumentos usados en condiciones polvorientas, deben ser despiezados y limpiados periodicamente.
4. Nos dejar los instrumentos expuestos a la luz directa del sol durante largos periodos de tiempo.

COMPROBACIONES PRELIMINARES

Inspeccionar las sondas de prueba para cerciorarse de que estén en buenas condiciones de aislamiento.

Conectar las sondas roja y negra rematadas en clips en los enchufes terminales rojo (+) y negro (–) respectivamente situados en el lateral del instrumento. Pueden dejarse las sondas enrolladas o entrelazadas una con la otra, pero ha de asegurarse que los clips no hacen contacto con nada. Seleccionar el interruptor deslizante en la posición "MΩ". Girar la manivela del generador en, aproximadamente, 160 r.p.m. y observar la aguja del indicador, la cual deberá permanecer sobre la posición "∞" (infinito) de la escala. Si esto no es asi, puede que estén averiadas las sondas de prueba, y deberán inspeccionarse mas detenidamente por si están dañadas. Recambiarlas si es necesario.

Conectar los clips de las sondas nuevamente, girando la manivela del generador.

Al conectarse los cables y oztener que marca (zero) esto prueba que el instrumento funciona bein.

Para comprobar que está intacto el fusible incluido en el circuito de continuidad, dejar los conductores de prueba conectados y regular el interruptor deslizante en la posición "Ω". Girar nuevamente la manivela del generador. La lectura deberá reflejar cero (o muy cerca del mismo).

Si la aguja indica una lectura más allá de la escala completa de la gamma "Ω", el fusible se ha quemado y deberá recambiarse.

RECAMBIO DEL FUSIBLE

El fusible es retenido en un alojamiento tipo roscable situado entre los enchufes terminales de salida. Para cambiar un fusible, usar un destornillador con el fin de liberar la parte central del alojamiento que contiene el fusible. Recambiar el viejo con un fusible de cerámic 1 A 20 x 5 mm.

COMPROBACION DE AISLAMIENTO

Después de conectar las sondas de prueba en el instrumento y de efectuar las verificaciones indicadas previamente, seleccionar el interruptor deslizante en la posición "MΩ". Con el circuito que ha de comprobarse aislado, conectar los conductores de prueba que sigue:

(a) Para las pruebas de aislamiento a tierra: Conectar el conductor rojo a tierra o al bastidor del equipo y el conductor negro en la parte del circuito que se desea comprobar.
(b) Para las pruebas de aislamiento entre hilos: Conectar un conductor en cada uno de los núcleos de los hilos.

Girar la manivela del generador entre 160 y 240 r.p.m. La aguja del instrumento indicará el valor de resistencia de aislamiento en la escala de "MΩ". (Si se está probando un circuito capacitivo, la aguja se desviará inicialmente hacia el cero, para luego, gradualmente ascender hasta su valor final, a medida que la capacitancia es cargarda hasta el voltaje de salida del probador.)

Si se obtienen varias lecturas sucesivas "∞", conectar los dos extremos de los cables de pureba conjuntamente y girar la manivela del generador. Deberá obtenerse una lectura cero, con lo cual se comprueba por partida doble que las sondas no están desconectadas o rotas y que por consiguiente son correctas las lecturas de aislamiento. Los circuitos capacitivos se descargan automaticamente a través del probado cuando se detiene el giro de la manivela del generador. La aguja del medidor se desviará más allá de la posición "∞" en la escala para luego retornar a su posición "∞" cuando se ha descargado el circuito. Aguardar unos momentos para que esto ocurra antes de desconectar las sondas de prueba. El tiempo de descarga hasta 0 V es, aproximadamente, 8 segundos por microfaradio.

COMPROBACION DE CONTINUIDAD

Con las sondas de prueba conectadas en el instrumento, y una vez verificadas las sondas y el fusible, como se describe anteriormente, seleccionar el interruptor deslizante en la posición "Ω".

Con el circuito que se está probando aislado, conectar las sondas de prueba entre los puntos apropiados y girar la manivela del generador entre 160 y 240 r.p.m. La resistencia será indicada en la escala de "Ω". Esta resistencia incluve a la de las sondas de prueba, la cual deberá medirse separadamente (efectuando una prueba con los clips unidos), y el resultado deberá restarse del total.

SETTING-UP PROCEDURE

Notes on the basic setting-up procedure are given in the table below. See 'Repair and Warranty' notes opposite.

WM6

Step	Adjustment potentiometer	Adjustment for	Conditions for adjustment
1.	R15	scale 10 MΩ mark	(a) switched to 'MΩ' (b) 10 MΩ (500 V rating) resistor across terminals.
2.	R16	scale 0 MΩ mark	(a) switched to 'MΩ' (b) short circuit across terminals.
3.	R14	scale 1 MΩ mark	(a) switched to 'MΩ' (b) 1 MΩ (500 V rating) resistor across terminals.
4.	R17	scale 100 Ω mark	(a) switch to 'Ω' (b) 100 Ω resistor across terminals.

REPAIR AND WARRANTY

The instrument circuit contains static sensitive devices, and care must be taken in handling the printed circuit board. If the protection of an instrument has been impaired it should not be used, and be 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 Guaranteed for 1 Year from the Date of Purchase by the User.

Note: Any unauthorized prior repair or adjustment will automatically invalidate the Warranty.

Instrument Repair and Spare Parts
For service requirements for **MEGGER**® Instruments contact:-

AVO INTERNATIONAL **or** **AVO INTERNATIONAL**

Archcliffe Road
Dover
Kent CT17 9EN
England
Tel: +44 (0)1304 502243
Fax: +44 (0)1304 207342

Valley Forge Corporate Center
2621 Van Buren Avenue
Norristown, PA 19403
U.S.A.
Tel: +1 (610) 676-8579
Fax: +1 (676) 676-8625

or an approved repair company.

Approved Repair Companies
A number of independent instrument repair companies have been approved for repair work on most **MEGGER**® instruments, using genuine **MEGGER**® spare parts. Consult the Appointed Distributor/Agent regarding spare parts, repair facilities and advice on the best course of action to take.

Returning an Instrument for Repair
If returning an instrument to the manufacturer for repair, it should be sent, freight pre-paid, to the appropriate address. A copy of the Invoice and of the packing note should be sent simultaneously by airmail to expedite clearance through Customs. A repair estimate showing freight return and other charges will be submitted to the sender, if required, before work on the instrument commences.

AVO INTERNATIONAL

Archcliffe Road
Dover
Kent, CT17 9EN.
England.
Tel: +44 (0) 1304 502100
Fax: +44 (0) 1304 207342

POBox 9007
Valley Forge
PA 19484-9007
U.S.A.
Tel: +1 (610) 676-8500
Fax: +1 (610) 676-8610

4271 Bronze Way
Dallas
TX 75237-1017
U.S.A.
Tel: +1 (800) 723-2861 (U.S.A. only)
Tel: +1 (214) 330-3203 (International)
Fax: +1 (214) 337-3038

MEGGER SARL
29 Allée de Villemomble
93340 Le Raincey
Paris, France
Tel: +33 1 43.02.37.54
Fax: +33 1 43.02.16.24

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