CHAUVIN® ARNOUX
CHAUVIN ARNOUX GROUP

50 to 5000 VDC Megohmmeters

2010 - Ed. 01

Insulation Resistance Testing Guide

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Electrical insulation testing

All electrical installations and equipment comply with insulation resistance specifications so they can operate safely. Whether it involves the connection cables, the sectioning and protection equipment, or the motors and generators, the electrical conductors are insulated using materials with high electrical resistance in order to limit, as much as possible, the flow of current outside the conductors.

The quality of these insulating materials changes over time due to the stresses affecting the equipment. These changes reduce the electrical resistivity of the insulating materials, thus increasing leakage currents that lead to incidents which may be serious in terms of both safety (people and property) and the costs of production stoppages.

In addition to the measurements carried out on new and reconditioned equipment during commissioning, regular insulation testing on installations and equipment helps to avoid such incidents through preventive maintenance. These tests detect aging and premature deterioration of the insulating properties before they reach a level likely to cause the incidents described above.

At this stage, it is a good idea to clarify the difference between two types of measurements which are often confused: dielectric testing and insulation resistance measurement.

Dielectric strength testing, also called "breakdown testing", measures an insulation's ability to withstand a medium-duration voltage surge without sparkover occurring. In reality, this voltage surge may be due to lightning or the induction caused by a fault on a power transmission line. The main purpose of this test is to ensure that the construction rules concerning leakage paths and clearances have been followed. This test is often performed by applying an AC voltage but can also be done with a DC voltage. This type of measurement requires a **hipot tester**. The result obtained is a voltage value usually expressed in kilovolts (kV). Dielectric testing may be destructive in the event of a fault, depending on the test levels and the available energy in the instrument. For this reason, it is reserved for type tests on new or reconditioned equipment.

Insulation resistance measurement, however, is non-destructive under normal test conditions. Carried out by applying a DC voltage with a smaller amplitude than for dielectric testing, it yields a result expressed in kΩ, MΩ, GΩ or TΩ. This resistance indicates the quality of the insulation between two conductors. Because it is non-destructive, it is particularly useful for monitoring insulation aging during the operating life of electrical equipment or installations. This measurement is performed using an insulation tester, also called a **megohmmeter**.

Insulation and causes of insulation failure

Because measuring insulation with a megohmmeter is part of a wider preventive maintenance policy, it is important to understand the different possible causes of insulation performance deterioration so that you can take steps to correct it.

It is possible to divide these causes of insulation failure into five groups, while keeping in mind, if no corrective measures are implemented, these different causes are superimposed, leading to insulation breakdown and equipment failure.

Electrical stresses:

Mainly linked to overvoltages and undervoltages.

Mechanical stresses:

Frequent start-up and shutdown sequences can cause mechanical stresses. Also, balancing problems on rotating machinery and any direct stress to the cables and the installations in general.

Chemical stresses:

The proximity of chemicals, oils, corrosive vapors and dust, in general, affects the insulation performance of the materials.

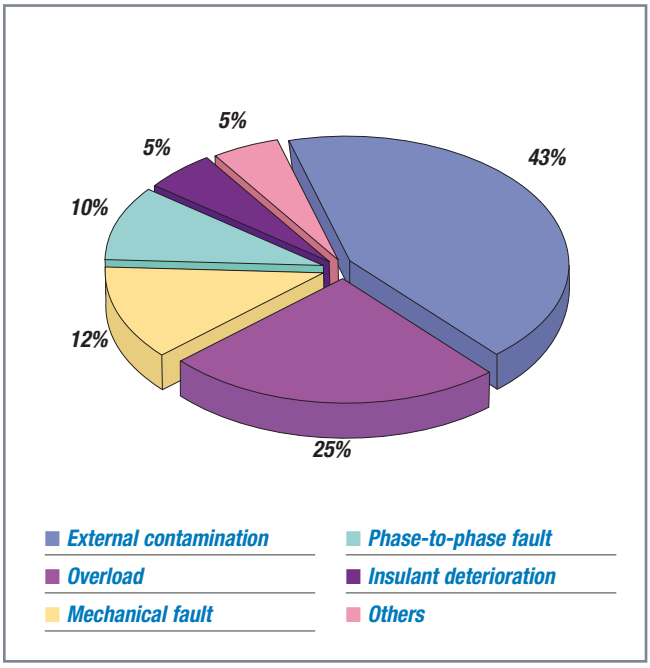
Stresses linked to temperature variations:

When combined with the mechanical stresses caused by the start-up and shutdown sequences, expansion and contraction stresses affect the properties of the insulating materials. Operation at extreme temperatures also leads to aging of the materials.

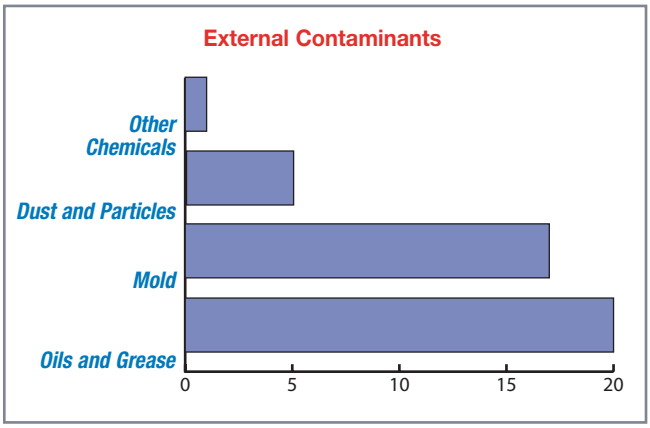
Environmental contamination:

The build-up of mold and particulate deposits in warm, moist environments also contributes to the deterioration of installations' insulation properties.

The chart below shows the relative frequency of the various causes of an electric motor failure.



Reference: AEMC® Instruments



Reference: AEMC® Instruments

In addition to sudden insulation faults due to exceptional events such as flooding, factors liable to reduce insulation performance are combined when the installation is started up, sometimes amplifying one another. In the long term, without monitoring, this will eventually lead to situations which may be critical in terms of both people's safety and operational considerations. Regular testing of the insulation on an installation or machine is therefore a useful way of monitoring this type of deterioration so you can act before total failure occurs.

Principle of insulation testing and influencing factors

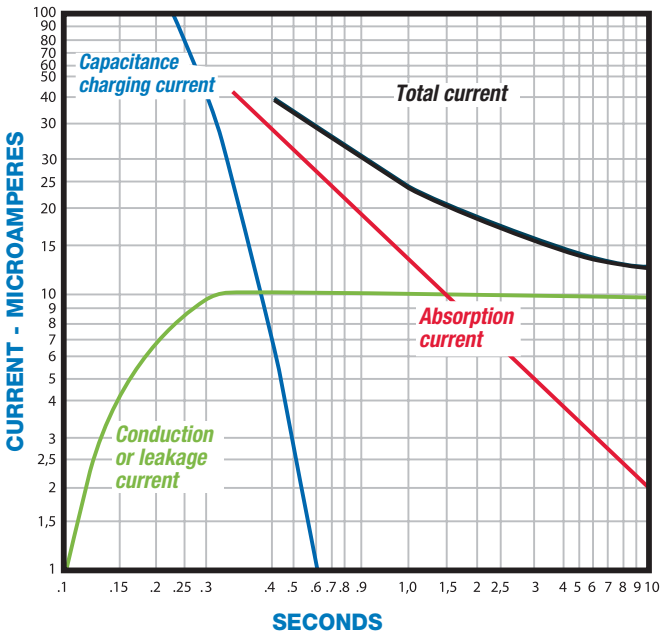
Insulation resistance measurement is based on Ohm's Law. By injecting a known DC voltage lower than the voltage for dielectric testing and then measuring the current flowing, it is very simple to determine the value of the resistance. In principle, the value of the insulation resistance is very high but not infinite, so by measuring the low current flowing, the megohmmeter indicates the insulation resistance value, providing a result in kΩ, MΩ, GΩ and also TΩ (on some models). This resistance characterizes the quality of the insulation between two conductors and gives a good indication of the risks of leakage currents flowing.

A number of factors affect the value of the insulation resistance and therefore the value of the current flowing when a constant voltage is applied to the circuit being tested. These factors, such as temperature or humidity for example, may significantly affect the measurement result. First let's analyze the nature of the currents flowing during an insulation measurement, using the hypothesis that these factors do not influence the measurement.

The total current flowing in the insulating material is the sum of three components:

- **Capacitance:** The capacitance charging current necessary to charge the capacitance of the insulation being tested. This is a transient current which starts relatively high and falls exponentially towards a value close to zero once the circuit being tested is charged electrically. After a few seconds or tenths of seconds, this current becomes negligible compared with the current to be measured.
- **Absorption:** The absorption current, corresponding to the additional energy necessary for the molecules of the insulating material to reorient themselves under the effect of the electrical field applied. This current falls much more slowly than the capacitance charging current, sometimes requiring several minutes to reach a value close to zero.
- **Leakage current:** The leakage current or conduction current. This current characterizes the quality of the insulation and is stable over time.

The graph below shows these three currents as a function of time. The time scale is indicative and may vary depending on the insulation tested.
Very large motors or very long cables may take 30 to 40 minutes before the capacitive and absorption currents are minimized enough to provide proper test results.



Reference: AEMC® Instruments

With the circuit supplied at a constant voltage, the total current flowing in the insulant being tested varies over time. This implies a significant resulting variation of the insulation resistance.

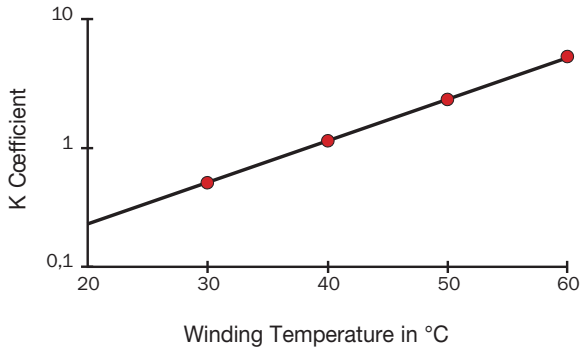
Before examining the various measurement methods in detail, it would be useful to look again at the factors that influence the insulation resistance measurement.

Influence of temperature:

The temperature causes the insulation resistance value to vary quasi-exponentially. In the context of a preventive maintenance program, the measurements should be carried out in similar temperature conditions or, if this is not possible, should be corrected so that they are expressed in relationship to the reference temperature. For example, as a rough guideline, a 10 °C increase in temperature halves the insulation resistance, while a 10 °C reduction doubles the insulation resistance value.

The level of humidity influences the insulation according to the degree of contamination of the insulating surfaces. Care must always be taken not to measure the insulation resistance if the temperature is lower than the dew point.

Correction of insulation resistance according to temperature (source IEEE - 43-2000)



Reference: AEMC® Instruments

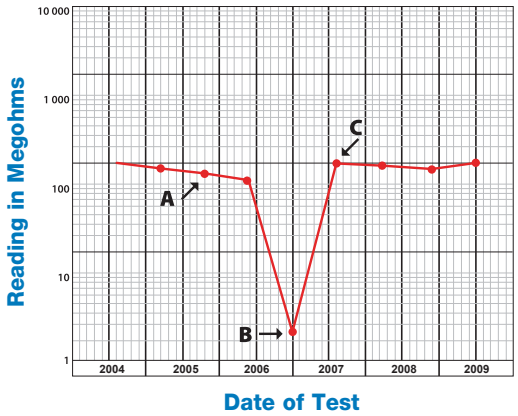
Testing methods and interpretation of the results

Short-time or spot-reading measurement

This is the simplest method. It involves applying the test voltage for a short time (30 or 60 seconds) and noting the insulation resistance reading at that moment. As indicated previously, this direct measurement of the insulation resistance is significantly affected by the temperature and humidity, so the measurement should be standardized at a reference temperature and the level of humidity should be noted for comparison with the previous measurements. With this method, it is possible to analyze insulation quality by comparing the current measured value with several previous test results. This trend, over time, is more representative of the evolution of the insulation characteristics on the installation or equipment being tested than a single test.

If the measurement conditions remain identical (same test voltage, same measurement time, etc.), it is possible to obtain a clear assessment of the insulation by monitoring and interpreting any changes in these periodic measurements. After noting the absolute value, the variation over time should be analyzed. Thus, a measurement showing a relatively low insulation value which is nevertheless stable over time is, in theory, less of a concern than a significant decrease in the insulation value over time, even if the insulation is higher than the recommended minimum. In general, any sudden fall in the insulation resistance is evidence of a problem requiring investigation.

The graph below shows an example of the insulation resistance readings on an electric motor.



*At **A**, the insulation resistance decreases due to aging and dust accumulation.*

*The sharp fall at **B** indicates there was an insulation fault.*

*At **C**, the fault has been repaired (rewinding of the motor) so the insulation resistance has returned to a higher value and has remained stable over time, indicating a good conition.*

Reference: AEMC® Instruments

Testing methods based on the influence of the test voltage application time (PI & DAR)

These methods involve measuring successive insulation resistance values at specified times. They have the advantage of not being particularly influenced by temperature, so they can be applied, without correcting the results, as long as the test equipment is not subject to significant temperature variations during the test.

They are ideal for preventive maintenance on rotating machines and for monitoring insulation.

If the insulation material is in good condition, the leakage or conduction current is low and the initial measurement is strongly influenced by the capacitance charging and dielectric absorption currents. The insulation resistance measurement will rise during the time when the test voltage is applied because these disturbance currents decrease. The stabilization time necessary for measurements on insulation in good condition depends on the type of insulation material.

If the insulation material is in poor condition (damaged, dirty and wet), the leakage current is constant and very high, often exceeding the capacitance charging and dielectric absorption currents. In such cases, the insulation resistance measurement will very quickly become constant and stabilize at a high voltage.

By examining the variations of the insulation value according to the test voltage application time, it is possible to assess the quality of the insulation. This method allows conclusions to be drawn even if there is no insulation measurement log, but it is nevertheless advisable to record the periodic measurements carried out in the context of a preventive maintenance program.

Polarization Index (PI)

For this method, two readings are taken at 1 minute and 10 minutes, respectively. The ratio (without dimensions) of the 10-minute insulation resistance over the 1-minute value is called the Polarization Index (PI) and can be used to assess the quality of the insulation.

The measurement method using the polarization index is ideal for testing solid insulating circuits. Because of this, it is not recommended for use on equipment such as oil-immersed transformers as it will give low results even if the insulation is in good condition.

The IEEE 43-2000 recommendation on "Recommended Practice for Testing Insulation Resistance of Rotating Machinery" defines the minimum value of the Polarization Index (PI) for AC and DC rotating machinery in temperature classes B, F and H as 2.0. More generally a PI greater than 4 is a sign of excellent insulation, while an index under 2 indicates a potential problem.

PI = R 10-minute insulation / R 1-minute insulation

The results are interpreted as follows:

PI Value	Insulation condition
< 2	Problem
2 to 4	Good
> 4	Excellent

Dielectric Absorption Ratio (DAR)

For installations or equipment containing insulation materials in which the absorption current decreases quickly, insulation measurements after 30 seconds and 60 seconds may be sufficient to qualify the insulation. The DAR is defined as follows:

DAR = R 60-second insulation / R 30-second insulation

The results are interpreted as follows:

DAR value	Insulation condition
< 1.25	Insufficient
< 1.6	OK
> 1.6	Excellent

Method based on the influence of test voltage variation (Step voltage test)

The presence of contaminants (dust, dirt, etc.) or moisture on the surface of the insulation is usually clearly revealed by time-dependent resistance measurements (PI, DAR, etc.). However, aging of the insulation or mechanical damage may sometimes be missed by this type of test, carried out with a low voltage in relation to the dielectric voltage of the insulating material tested. A significant increase in the test voltage applied may, on the contrary, cause these weak points to fail, leading to a considerable reduction in the insulation value measured.

To be effective, the ratio between voltage steps should be 1 to 5, and each step must last the same time (typically 1 to 10 minutes), while remaining below the classic dielectric test voltage (2 Un + 1000 V). The results from this method are totally independent of the type of insulation and the temperature because the method is not based on the intrinsic value of the insulants measured, but on the effective reduction of the value read after an identical time with two different test voltages.

A reduction of 25% or more between the first-step and second-step insulation resistance values is a sign of insulant deterioration usually linked to the presence of contaminants.

Dielectric Discharge (DD) Test method

The dielectric discharge (DD) test, also known as the re-absorption current test, is performed by measuring the current during dielectric discharge of the equipment being tested.

As all three components of the current (capacitance charging current, polarization current and leakage current) are present during a standard insulation test, the determination of the polarization or absorption current may be affected by the presence of the leakage current. Instead of trying to measure the polarization current during the insulation test, the dielectric discharge (DD) test measures the depolarization current and the capacitance discharging current after the insulation test.

The measurement principle is as follows: the equipment to be tested is first charged for long enough to reach a stable state (capacitance charging and polarization are completed and the only current flowing is the leakage current). The equipment is then discharged through a resistor inside the megohmmeter and the current that flows is measured. This current is made up of the capacitance charging current and the re-absorption current, which combine to give the total dielectric discharge current. This current is measured after a standard time of 1 minute. The current depends on the overall capacitance and the final test voltage. The value DD is calculated using the formula:

$$DD = \text{Current after 1 minute} / (\text{Test voltage} \times \text{Capacitance})$$

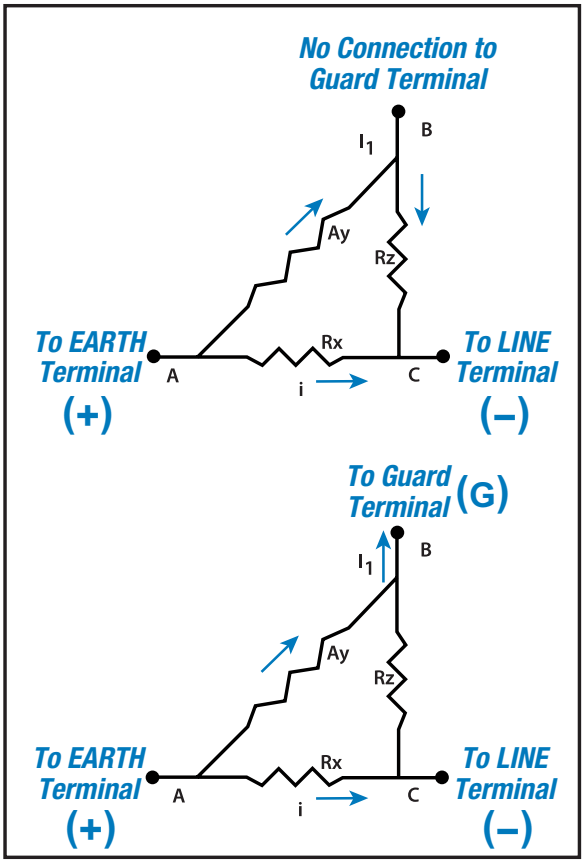
The DD test can identify excess discharge currents occurring when one of the layers of multi-layer insulation is damaged or contaminated, a defect that may be missed by spot tests or PI and DAR tests. The discharge current will be higher for a given voltage and capacitance if one of the insulation layers is damaged. The time constant of this individual layer will no longer match that of the other layers, leading to a higher current value than for undamaged insulation. Homogeneous insulation will have a DD value close to zero, while acceptable multi-layer insulation will have a DD value of up to 2. The table below indicates the sanctions according to the DD value obtained.

DD	Condition
> 7	Bad
4 to 7	Poor
2 to 4	Questionable
< 2	OK

Caution: This measurement method is temperature dependent, so every attempt should be made to perform the test at a standard temperature or at least to note the temperature alongside the test result.

High insulation testing: Using the guard terminal

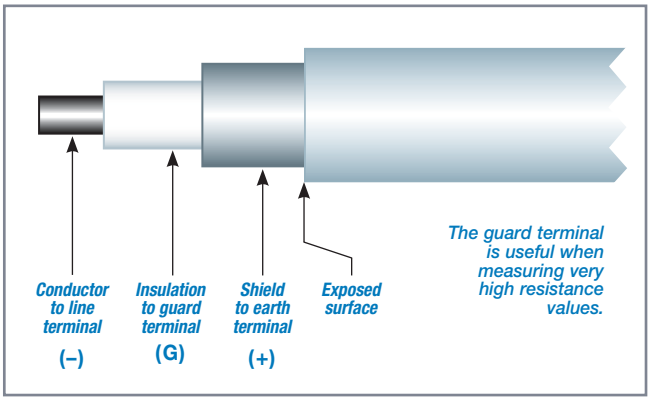
When measuring high insulation resistance values (more than 1 GΩ), the accuracy of the measurements may be affected by leakage currents flowing on the surface of the insulating material via the humidity and surface contaminants, whose resistance value is no longer very high and is therefore negligible compared with the resistance of the insulation that you are trying to assess. In order to eliminate this surface leakage current, which reduces the accuracy of insulation measurements, some megohmmeters include a third terminal called the guard terminal. This guard terminal shunts the measurement circuit and re-injects the surface current at one of the test points, bypassing the measurement circuit (see diagram below).



Reference: AEMC® Instruments

The first circuit, without a guard terminal, simultaneously measures the leakage current i and the unwanted surface current I1, so the insulation resistance measurement is incorrect.

The second circuit, however, only measures the leakage current i. The connection to the guard terminal drains the surface current I1, so the insulation resistance measurement is correct.



Reference: AEMC® Instruments

The guard terminal must be connected to a surface that allows surface currents to flow, which is not the case of insulants such as cable or transformer insulation materials. Thorough knowledge of the possible paths taken by the test current when flowing through the element tested is crucial for choosing where to position the connection to the guard terminal.

Selecting the test voltage

Cable/Equipment operating voltage	DC test voltage
24 to 50 V	50 to 100 VDC
50 to 100 V	100 to 250 VDC
100 to 240 V	250 to 500 VDC
440 to 550 V	500 to 1000 VDC
2400 V	1000 to 2500 VDC
4100 V	1000 to 5000 VDC
5000 to 12,000 V	2500 to 5000 VDC
> 12,000 V	5000 to 10,000 VDC

The table above shows the recommended test voltages according to the operating voltages of installations and equipment (taken from the IEEE 43-2000 Guide).

In addition, these values are defined for electrical appliances in a wide variety of local and international standards (IEC 60204, IEC 60439, IEC 60598, etc.).

In France, for example, the NFC15-100 standard stipulates the test voltage values and the minimum insulation resistance for electrical installations (500 VDC and 0.5 MΩ for a rated voltage of 50 to 500 V).

However, you are strongly advised to contact the cable/equipment manufacturer to find out about their own recommendations on the test voltage to be applied.

Testing safety

Before the test:

A The test must be carried out on a disconnected, NONCURRENT-CARRYING installation to ensure that the test voltage will not be applied to other equipment connected electrically to the circuit to be tested.

B Make sure that the circuit is discharged. It can be discharged by short-circuiting the equipment's terminals and/or connecting them to earth for the specified time (see discharge time).

C Special protection is necessary if the equipment to be tested is in a flammable or explosive environment, as sparks may occur while the insulation is discharging (before and after the test), as well as during the test if the insulation is faulty.

D Because of the presence of DC voltages which may be high, it is advisable to restrict access for other personnel and to wear individual protective equipment (i.e. protective gloves) for electrical applications.

E Only use connection cables suitable for the test to be performed and make sure that they are in good condition. In the best-case scenario, unsuitable cables will cause measurement errors, but even more importantly, they may be dangerous.

After the test:

By the end of the test, the insulation has accumulated a considerable amount of energy which needs to be discharged before any other operations can be attempted. One simple safety rule is to allow equipment to discharge for FIVE times the charging time (time of last test). The equipment can be discharged by short-circuiting the poles and/or connecting them to the earth. All the megohmmeters manufactured by Chauvin Arnoux are equipped with internal discharge circuits which ensure safe, automatic discharging.

Frequently asked questions

My measurement result is x megohms. Is that OK?

There is no single reply to this question. The equipment manufacturer or the applicable standards can answer it definitively. For LV installations, 1MΩ can be considered the minimum value. For installations or equipment operating at higher voltages, a good rule of thumb gives a minimum value of 1 MΩ per kV, while the IEEE guidelines concerning rotating machinery recommend a minimum insulation resistance of (n+1) MΩ, where n is the operating voltage in kV.

Which measurement leads should be used to connect the megohmmeter to the installation to be tested?

The leads used on the megohmmeters must have suitable specifications for the measurements carried out, in terms of the voltages used or the quality of the insulating materials. If unsuitable measurement leads are used, it may cause measurement errors or even prove dangerous.

What precautions should be taken for high insulation measurements?

In addition to the safety rules indicated above, specific precautions should be taken when measuring high insulation values.

- Use the guard terminal (see the paragraph explaining this).
- Use clean, dry leads.
- Set up the leads at a distance from one another and without contact with any objects or with the floor to limit the possibility of leakage currents within the measurement line itself.
- Do not touch or move the leads during measurement to avoid capacitive effects leading to disturbances.
- Wait for the necessary stabilization time for spot measurements.

Why do two consecutive measurements not always give the same result?

The application of a high voltage causes an electrical field which polarizes the insulating materials. It is important to understand that, after the test, the insulating materials will require what may be a considerable time to return to the state they were in before the test. This time may be significantly longer in some cases than the discharge times indicated previously.

I can't shut down the installation, so how can I check the insulation?

If it is not possible to switch off the power supply to the installation or equipment to be tested, a megohmmeter can obviously not be used. In some cases, it is possible to carry out a live test using a leakage-current measurement clamp, but this method is much less accurate.

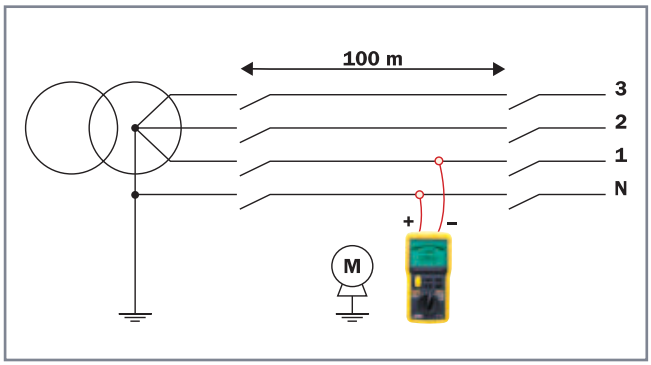
Choosing a megohmmeter

The key questions to ask when choosing megohmmeters are:

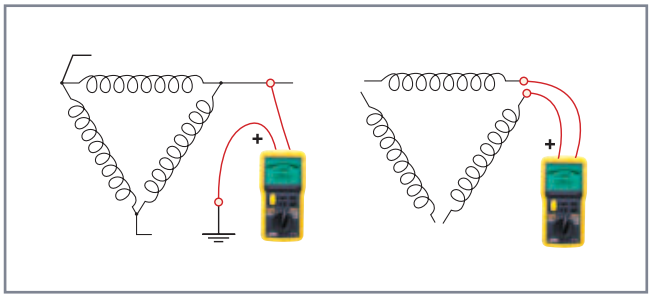
- What is the maximum test voltage necessary?
- Which measurement methods will be used (spot measurements, PI, DAR, DD, step voltage)?
- What is the maximum insulation resistance reading required?
- How will the megohmmeter be powered?
- What are the measurement storage capabilities?

Examples of insulation tests

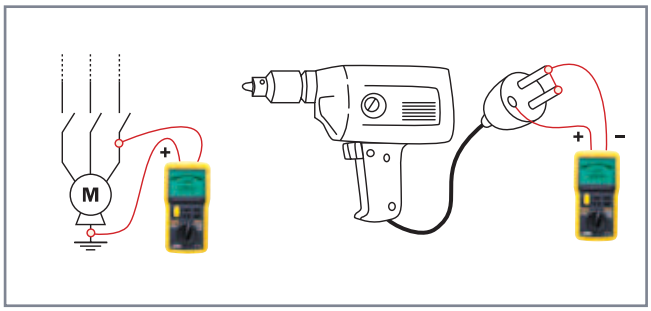
Insulation measurement on an electrical installation



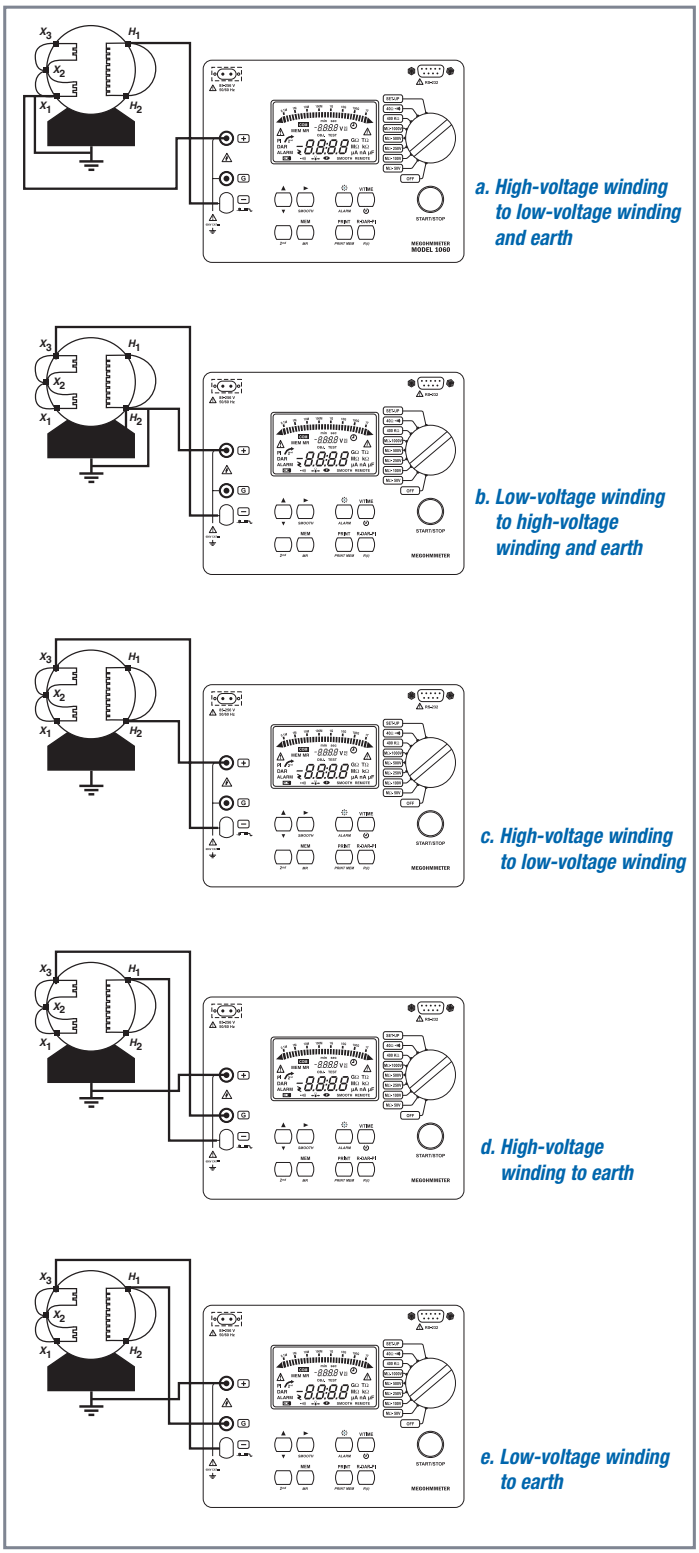
Insulation measurement on a rotating machine



Insulation measurement on an appliance and an electric motor



Insulation measurement on a transformer



a. High-voltage winding to low-voltage winding and earth

b. Low-voltage winding to high-voltage winding and earth

c. High-voltage winding to low-voltage winding

d. High-voltage winding to earth

e. Low-voltage winding to earth

DataView®

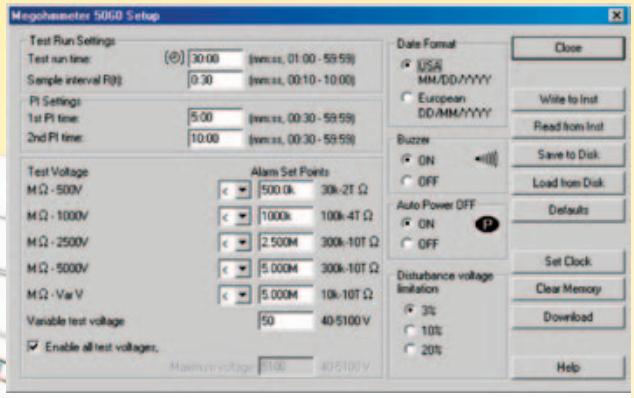
The essential tool for configuring, measuring and viewing data in real time, as well as for recording data and creating standard or customized measurement reports

(DataView® software is available in 5 languages: French, English, German, Spanish and Italian)

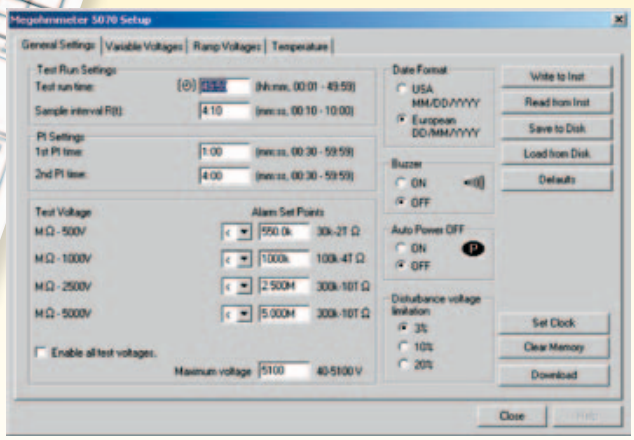
Configure all the functions of your C.A 6543, C.A 6547 and C.A 6549 megohmmeters

DataView® functions:

- Remote test activation
- Real-time data capture and display
- Recovery of data recorded in instruments
- Display of DAR, PI and DD values
- Graph plotting for time-resistance and step voltage tests
- Possibility of creating a library of configurations suitable for specific applications
- Possibility of inserting user comments directly into the measurement report
- Printing of measurement reports

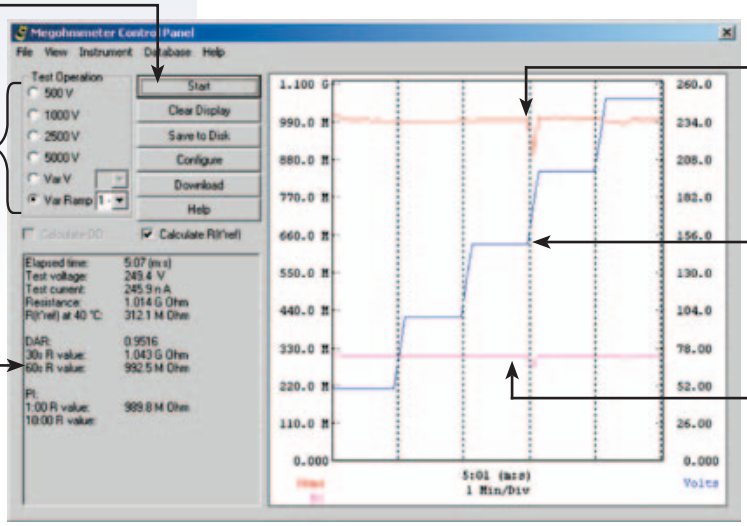


A single dialog box for simple configuration.



The four-tab dialog box allows clear, simple configuration of all the C.A 6549's functions, including programming of the test voltages, alarm values, voltage steps and temperature compensation.

AUTOMATIC REPORT GENERATION



Press the button to start the test and plot the result

Selection of test voltage

Box showing the full result of the test in real time

Insulation resistance during the test

Voltage step during the test

Insulation resistance with temperature compensation

Test activation with the results (text + graph) grouped in a dialog box. On the C.A 6549, the voltage steps are also displayed.

	IMEG 500N CA6501	IMEG 1000N CA6503	CA6511	CA6513	CA6521	CA6523	CA6525	CA6531	CA6533	CA6541	CA6543	CA6505	CA6545	CA6547	CA6549
Test voltage (V)															
50 V								●	●	●	●	●	●	●	●
100 V								●	●	●	●	●	●	●	●
250 V		●			●		●		●	●	●	●	●	●	●
500 V	●	●	●	●	●	●	●		●	●	●	●	●	●	●
1000 V		●		●		●	●			●	●	●	●	●	●
2500 V												●	●	●	●
5000 V												●	●	●	●
Max. insulation measured															
200 MΩ	●														
400 MΩ								●							
1 GΩ			●	●											
2 GΩ					●	●	●								
5 GΩ		●													
20 GΩ									●						
4 TΩ										●	●				
10 TΩ												●	●	●	●
Type of measurement															
Spot reading	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PI										●	●	●	●	●	●
DAR										●	●	●	●	●	●
DD													●	●	●
Step voltage															●
Display															
Analog	●	●	●	●											
Digital + Bargraph					●	●	●	●	●	●	●	●	●	●	
Graphic															●
Power supply															
Hand-cranked	●	●													
Batteries			●	●	●	●	●	●	●						
Battery/Mains										●	●	●	●	●	●
Other features															
Guard terminal		●								●	●	●	●	●	●
Timer							●			●	●	●	●	●	●
Alarms						●	●	●	●	●	●		●	●	●
Resistance (time)										●	●		●	●	●
Memory/Communication											●			●	●
Continuity	●		●	●	●	●	●			●	●				
Resistance	●			●				●	●	●	●				
Capacitance								●		●	●	●	●	●	●
Page No.	12	12	14	14	16	16	16	18	18	20	20	22	24	24	26

Hand-cranked insulation testers

C.A 6501 & C.A 6503

IMEG 500N & IMEG 1000N

Lightweight and compact, the C.A 6501 and C.A 6503 insulation testers are hand-held instruments which are totally independent because they are powered by a hand-cranked magneto. Particularly versatile, they are ideal for on-site, industrial and residential applications, power distribution networks, telecommunications, etc. They can be used to check that electrical installations comply with the applicable standards, as well as for preventive maintenance on cables, motors, circuit-breakers, etc.

C.A 6501

C.A 6503

No batteries required

Ergonomics

- Simple, immediate implementation
- Lightweight instrument
- Site-proof version with rugged plastic casing suitable for all C.A 6501 & C.A 6503 operating situations
- Reinforced version in a metal case for difficult environments, delivered in a field case (IMEG 500N & IMEG 1000N)

Measurement

- Strictly constant test voltage
- Auto-ranging
- Insulation measurement up to 200 MΩ with the C.A 6501 and up to 500 MΩ with the C.A 6503
- LEDs to indicate when measurement conditions are satisfactory

Safety

- Automatic discharging at the end of the test
- Measurements comply with the NFC 15-100, IEC 60364-6 and VDE 0110 standards, etc

Power supply

- Powered independently by hand-cranked magneto

IMEG 500N / IMEG 1000N

	C.A 6501 IMEG 500N	C.A 6503 IMEG 1000N
Insulation (MΩ calibre)		
Test voltage (DC)	500 V	250 V / 500 V / 1000 V
Range	0.5 to 200 MΩ	1 to 5000 MΩ
Accuracy	2.5 % at full scale	2% at full scale
Resistance		
Range	45 to 500 kΩ	—
Accuracy	2.5% at full scale	—
Continuity		
Range	0 to 100 Ω	—
Accuracy	2% at full scale	—
Voltage		
Range	0 to 600 VAC	0 to 600 VAC
Frequency	45 to 450 Hz	45 to 450 Hz
Accuracy	3% at full scale	3% at full scale
Other Features		
Display	Analog	Analog
Dimensions	120 x 120 x 130 mm	120 x 120 x 130 mm
Weight	1.06 kg	1.06 kg
Power supply	Hand-cranked magneto: stable, constant test voltage	Hand-cranked magneto: stable, constant test voltage
Protection rating	High protection: IP 54 with cover / IP 52 without	High protection: IP 54 with cover / IP 52 without
Electrical safety	IEC 61010 – 600 V CAT II / 300 V CAT III	IEC 61010 – 600 V CAT II / 300 V CAT III

: No batteries required

Ordering information

> IMEG 500N.....P01132501A
Delivered in on-site case with 1 operating manual, 2 elbowed/straight PVC leads 1.5 m long (black/red), 1 earth lead, 2 crocodile clips (black/red), 1 black test probe.

> IMEG 1000N.....P01132502A
Delivered in on-site case with 1 operating manual, 3 elbowed/straight PVC leads 1.5 m long (black/red/blue), 1 earth lead, 3 crocodile clips (black/red/blue), 1 black test probe.

> C.A 6501.....P01132503
Delivered in carrying bag with 1 operating manual, 2 elbowed/straight PVC leads 1.5 m long (black/red), 1 earth lead, 2 crocodile clips (black/red), 1 black test probe.

> C.A 6503 .....P01132504
Delivered in carrying bag with 1 operating manual, 3 elbowed/straight PVC leads 1.5 m long (black/red/blue), 1 earth lead, 3 crocodile clips (black/red/blue), 1 black test probe.

Accessories/Replacement parts

C.A 846 thermo-hygrometer.....P01156301Z
C.A 861 thermometer + K thermocouple.....P01650101Z
0.2 A fuses (set of 10).....P02297302
Set of 2 crocodile clips (red/black).....P01102052Z
Set of 2 test probes (red/black) P01102051Z
Set of 2 leads 1.5 m long (red/black).....P01295283Z
5 crocodile clips (red, black, blue, yellow, green/yellow P01101849
3 safety leads 1.5 m long (red, blue, black) P01295171

Analog insulation testers

C.A 6511 & C.A 6513

The C.A 6511 and C.A 6513 are insulation and continuity testers which comply with the most stringent French and European standards on testing. These megohmmeters are ideal for checking the compliance of industrial and residential electrical installations.

The C.A 6511 is aimed more specifically at the tertiary and residential sectors, while the C.A 6513, with its 1000 V range, is designed more for industrial requirements.

C.A 6511

Ergonomics

- Automatic voltage absence test by direct measurement
- Single input on two color-coded terminals
- Easy-to-read display
- Logarithmic scale for easy insulation readings
- Non-slip shockproof housing

Measurement

- Insulation measurement at 500 V and 1000 V, depending on the model
- 200 mA continuity measurement
- Resistance measurement (armature, motor, etc.) on the C.A 6513

Safety

- Extra safety: double insulation
- Measurements comply with the French and European standards: NFC 15-100, IEC 60364, VDE 0110, etc

Power supply

- Battery charge test
- Battery life of approximately 1000 measurements

C.A 6513

	C.A 6511	C.A 6513
Insulation (MΩ calibre)		
Test voltage (VDC)	500 V	250 V / 500 V / 1000 V
Range	0.1 to 1000 MΩ	0.1 to 1000 MΩ
Accuracy	± 5 % of measurement	± 5 % of measurement
Resistance		
Range	—	0 to 1000 Ω
Accuracy	—	± 3% at full scale
Continuity		
Range	-10 to +10 Ω	-10 to +10 Ω
Accuracy	± 3 % at full scale	± 3 % at full scale
Measurement current	≥ 200 mA	≥ 200 mA
Reverse current	Yes	Yes
Voltage		
Range	0 to 600 VAC	0 to 600 VAC
Frequency	45 to 400 Hz	45 to 400 Hz
Accuracy	3 % at full scale	3 % at full scale
Other features		
Display	Analog	Analog
Dimensions	167 x 106 x 55 mm	167 x 106 x 55 mm
Weight	500 g	1.06 kg
Power supply	4 x 1.5 V AA batteries	4 x 1.5 V AA batteries
Electrical safety	IEC 61010 – 600 V CAT III	IEC 61010 – 600 V CAT III

Ordering information

> C.A 6511 ..... P01140201
Delivered mounted in its shockproof housing with 2 elbowed/straight PVC leads 1.5 m long (black/red), 1 black test probe, 1 red crocodile clip, 1 operating manual, 4 x 1.5 V AA batteries.

> C.A 6513 ..... P01140301
Delivered mounted in its shockproof housing with 2 elbowed/straight PVC leads 1.5 m long (black/red), 1 black test probe, 1 red crocodile clip, 1 operating manual, 4 x 1.5 V AA batteries.

Accessories / Replacement parts

C.A 846 thermo-hygrometer P01156301Z
C.A 861 thermometer + K thermocouple P01650101Z
Set of 2 crocodiles clips (red/black) P01102052Z
Set of 2 test probes (red/black) P01102051Z
Set of 2 leads 1.5 m long (red/black) P01295283Z
1.5 V AA alkaline battery P01296033
1.5 V AA alkaline battery (x12) P01296033A
1.5 V AA alkaline battery (x24) P01296033B
1.6 A fuse P01297022
Shockproof housing no.13 ..... P01298016

Electrical installation and equipment testers

C.A 6521, 6523 & C.A 6525

The highly innovative C.A 6521, C.A 6523 and C.A 6525 megohmmeters offer genuine measurement facilities and unrivalled comfort in use.

Ergonomics

- Giant backlit display for easy reading
- 4000-count digital display and logarithmic bargraph offer simultaneous measurement and analogue variation readings
- Rear stand for use on a benchtop or on the floor
- Over-molded design for excellent handling

Measurement

- Threshold values
- High or low thresholds can be programmed to trigger a buzzer (no longer necessary to read the value in order to validate the result)
- Timer function
- Automatic measurements over longer periods with display of a timer (0 to 15 min)
- Cable compensation
- Ensures accurate measurement during continuity tests

Safety

- Automatic voltage detection
- If a hazardous voltage is present in the circuit tested, insulation measurement is inhibited automatically
- Protection of the instrument against external voltages
- Operator safety
- Automatic discharge of the high voltage on the device at the end of the test (capacitive loads)

Power supply

- Powered by 6 x AA batteries
- Automatic shutdown after 5 min to save battery power
- Battery charge indication upon start-up

C.A 6521

C.A 6523

C.A 6525

		C.A 6521	C.A 6523	C.A 6525
Insulation				
Test voltage	250 V	50 kΩ to 2 GΩ	—	50 kΩ to 2 GΩ
	500 V	100 kΩ to 2 GΩ	100 kΩ to 2 GΩ	100 kΩ to 2 GΩ
	1000 V	—	200 kΩ to 2 GΩ	200 kΩ to 2 GΩ
Accuracy	200 kΩ to 2 GΩ	± 3 % of value ± 2 cts		
Voltage test / Safety		0 to 600 VAC/DC		
Voltage alert indicator		Yes > 25 V		
Test inhibition		Yes > 25 V		
Continuity				
Range		0.0 to 19.99 Ω		
Measurement current		≥ 200 mA up to 20 Ω		
Current inversion		Yes		
Cable compensation		—	Yes	Yes
Buzzer		Yes		
Resistance				
Range		—	0 to 400 kΩ	0 to 400 kΩ
Other Features				
Alarms		—	Yes	Yes
Timer		—	—	0 to 15 min
Display		LCD + Bargraph		
Backlighting		—	Yes	Yes
Power supply		6 x AA batteries		
Dimensions		211 x 108 x 60 mm		
Weight		830 g		
Electrical safety		IEC 61010 300 V CAT II – IEC 61557		

Ordering information

> **C.A 6521** **P01140801D**
Delivered with a "hands-free" bag containing a set of 2 leads 1.5 m long,
1 crocodile clip, 1 black test probe, 6 x 1.5 V AA batteries and an operating manual

> **C.A 6523** **P01140802D**
Delivered with a "hands-free" bag containing a set of 2 leads 1.5 m long,
1 crocodile clip, 1 black test probe, 6 x 1.5 V AA batteries and an operating manual

> **C.A 6525** **P01140803D**
Delivered with a "hands-free" bag containing a set of 2 leads 1.5 m long,
1 crocodile clip, 1 black test probe, 6 x 1.5 V AA batteries and an operating manual

Accessories/Replacement parts

Remote control probe.....P01101935
C.A 846 thermo-hygrometer.....P01156301Z
C.A 861 thermometer + K thermocouple.....P01650101Z
Carrying bag / "hands-free" use.....P01298049
Set of 5 x 0.63A fuses.....P01297078
1.5 V AA alkaline battery.....P01296033
Test probes (red + black).....P01102051Z
Crocodile clips (red + black).....P01102052Z
Elbowed-straight safety leads (red + black) 1.5 m long.....P01295283Z

The remote control probe is an optional accessory. (Ref. P01101935)

Delivered with each megohmmeter, this specially-designed bag can be used not only to carry the instrument and its accessories, but also for "hands-free" measurements. (Ref. P01298049)

Testing of Telecom installations and "low-current" equipment

C.A 6531 & C.A 6533

The megohmmeters C.A 6531 and C.A 6533 measure insulation test voltages of 50 V and 100 V (C.A 6531) and 50 V to 500 V (C.A 6533), making them ideal for measurements on equipment or installations using low currents (telecommunications, electronics, etc.).

The best for insulation

In terms of ergonomics, safety and availability, the C.A 6531 and C.A 6533 offer the same advantages as the related models designed for testing electrical installations. To simplify your measurements, it is also possible to program thresholds that trigger a buzzer.

Special for telecommunications (C.A 6531)

Ideal for measurements on telephone lines, the C.A 6531 tests insulation at 50 V or 100 V and includes specific functions: resistance, capacitance, current and AC voltage measurement.

- **Practical**
  The C.A 6531 can be used to check the presence of transmission frames or to measure the resistance difference between 2 wires with the ΔREL function.
- **Clever**
  The C.A 6531 directly displays the length in km of the line being tested through programming of the capacitance per unit length in nF/km.

Telecommunications & electronics (C.A 6533)

- Capable of measuring insulation at 50 V, 100 V, 250 V and 500 V, with an extensive measurement range from 10 kΩ to 20 GΩ, the C.A 6533 is more versatile.
- Handling measurements on telecommunications systems, the C.A 6533 is also ideal for testing electronic equipment.

C.A 6531

C.A 6533

	C.A 6531	C.A 6533
Insulation		
Test voltage 50 V	10 kΩ to 400 MΩ	10 kΩ to 2 GΩ
100 V	20 kΩ to 400 MΩ	20 kΩ to 2 GΩ
250 V	—	50 kΩ to 20 GΩ
500 V	—	100 kΩ to 20 GΩ
Accuracy 200 kΩ to 4 GΩ	± 3% of value ± 2 cts	
Voltage test / Safety	0 to 600 VAC/DC	
Voltage alert indicator	Yes > 25 V	
Test inhibition	Yes > 25 V	
Capacitance	0 to 4000 nF*	—
AC/DC current measurement	0 to 400 mA	—
Resistance		
Range	0 to 40 kΩ	0 to 400 kΩ
Other features		
Alarms	Yes	Yes
Display	LCD + Bargraph	
Backlighting	Yes	
Power supply	6 x 1.5 V AA alkaline batteries	
Dimensions	211 x 108 x 60 mm	
Weight	830 g	
Electrical safety	IEC 61010 600 V CAT III	

* Also calculates the length of a line using its capacitance per unit length

Ordering information

> C.A 6531 ..... P01140804B
Delivered with a "hands-free" bag containing a set of 2 leads 1.5 m long, 1 crocodile clip, 2 wire grips, 1 black test probe, 6 x 1.5 V AA batteries and 1 operating manual.

> C.A 6533 ..... P01140805
Delivered with a "hands-free" bag containing a set of 2 leads 1.5 m long, 1 crocodile clip, 2 wire grips, 1 blue crocodile clip, 1 guarded safety lead 1.5 m long, 1 black test probe, 6 x 1.5 V AA batteries and 1 operating manual.

Accessories / Replacement parts

Remote control probe P01101935
C.A 846 thermo-hygrometer P01156301Z
C.A 861 thermometer + K thermocouple P01650101Z
Carrying bag / "hands-free" use P01298049
Set of 5 x 0.63 A fuses P01297078
1.5 V AA alkaline battery P01296033
Test probes (red + black) P01102051Z
Crocodile clips (red + black) P01102052Z
Elbowed-straight safety leads (red + black) 1.5 m long P01295283Z

The remote control probe is an optional accessory. (Ref. P01101935)

Delivered with each megohmmeter, this specially-designed bag can be used not only to carry the instrument and its accessories, but also for "hands-free" measurements. (Ref. P01298049)

Designed for use in the field!

C.A 6541 & C.A 6543

The C.A 6541 and C.A 6543 are comprehensive instruments for industrial maintenance applications which make it simple to assess the insulation of your equipment in the field at test voltages of up to 1000 V.

Ergonomics

- Large backlit LCD screen with digital display and bargraph
- Shockproof, leakproof case (IP53) for on-site use in the field
- Foldaway handle for easier instrument storage

Measurement

- Extensive measurement range, up to 4 TΩ
- Automatic calculation of insulation quality ratios (DAR-PI)
- Storage of results (C.A 6543)

Saftey

- Automatic shutdown if the instrument is not used in order to save battery power
- Instrument protected by fuse, with detection of faulty fuses
- Operator safety guaranteed by automatic discharging of the device tested
- Locking of test voltages: ideal when lending the instrument to less-experienced users
- Automatic test inhibition if a dangerous external voltage (AC or DC) is detected before or during measurement
- IEC 61010 CAT III 600 V

Power supply

- The C.A 6543 is powered by built-in NiMH battery or by mains connection
- The C.A 6541 is powered by batteries
- Battery life of up to 1000 measurements

C.A 6541

C.A 6543

	C.A 6541	C.A 6543
Insulation		
Test voltage 50 V	2 kΩ to 200 GΩ	
100 V	4 kΩ to 400 GΩ	
250 V	10 kΩ to 1 TΩ	
500 V	20 kΩ to 2 TΩ	
1000 V	40 kΩ to 4 TΩ	
Accuracy 2 kΩ to 400 GΩ	± 5 % of value ± 3 cts	
400 GΩ to 4 TΩ	± 5 % of value ± 10 cts	
Programmable test duration	1 to 59 minutes	
DAR (1 min/30 sec)	0.000 to 9.999	
PI (10 min/1 min)	0.000 to 9.999	
Customizable PI	Time from 30 s to 59 min as required	
Voltage test / Safety	0 to 1000 VAC/DC	
Voltage alert indicator	Yes > 25 V	
Test inhibition	Yes > 25 V	
Smooth function	Yes	
Continuity		
Range	0.01 to 39.99 Ω	
Measurement current	≥ 200 mA up to 20 Ω	
Resistance		
Range	0.01 to 400 kΩ	
Capacitance		
Range	0.005 to 4.999 µF	
Storage - Communication		
Storage of R(t)	20-kbyte memory	128-kbyte memory
Storage of measurements	20 measurement results	Up to 1500 measurement results
Direct report printing	No	On local printer - fixed format
Communication port	No	RS 232
PC Software	No	DataView (option)
Other features		
Display	LCD + bargraph	
Power supply	8 x C batteries	NiMH rechargeable battery
Dimensions	270 x 250 x 110 mm	
Weight	3.4 kg	
Electrical safety	IEC 61010 600 V CAT III – IEC 61557	

Ordering information

> C.A 6541 ..... P01138901
Delivered with an accessories bag containing a set of 2 leads 1.5 m long (red/black), 1 black guarded lead 1.5 m long, 3 crocodile clips (red/blue/black), 1 test probe (black), 1 simplified operating manual, 1 complete operating manual in 5 languages, 8 x C batteries.

> C.A 6543 ..... P01138902
Delivered with an accessories bag containing a set of 2 leads 1.5 m long (red/black), 1 black guarded lead 1.5 m long, 3 crocodile clips (red/blue/black), 1 test probe (black), 1 simplified operating manual, 1 complete operating manual in 5 languages, 1 mains power cable 2 m long, 1 communication cable.

Accessories/Replacement parts

C.A 846 thermo-hygrometer P01156301Z
C.A 861 thermometer + K thermocouple P01650101Z
AN1 artificial neutral box P01197201
Bag No. 6 for accessories P01298051
Crocodile clips (red, black, blue, white, yellow, green/yellow) P01101849
1.5V C alkaline battery P01296034
Fuse F 2.5 A, 1,200 V, 8 x 50 mm, 15 kA (set of 5) P01297071
Fuse F 0.1 A, 660 V-6, 3 x 32 mm, 20 kA (set of 10) P01297072

AUTOMATIC REPORT GENERATION

DataView®
(optional for the C.A 6543 - see page 10)

> For the C.A 6543
Serial printer No. 5 ..... P01102903
Series-parallel adapter P01101941
MegohmView software P01101938A
DataView® software P01102058
1.5 m safety leads (red, blue, black) P01295171
RS 232 cable PC DB 9F - DB 25F x 2 ..... P01295172
RS 232 cable for printer DB 9F - DB 9M No. 01 ..... P01295173
2P EUR mains power cable P01295174
GB mains power cable P01295253
Battery pack P01296021

Performance in the field...

C.A 6505

Easy to use with a comprehensive set of measurement features, the C.A 6505 megohmmeter can test insulation at voltages up to 5000 V.

C.A 6505

Ergonomics

- Large backlit LCD screen with digital display and bargraph
- Shockproof, leakproof on-site casing (IP53) for use in the field
- Foldaway handle for simpler instrument storage

Measurement

- Wide measurement range from 10 kΩ to 10 TΩ
- Fixed test voltages:
  500 V, 1000 V, 2500 V and 5000 V
- Programmable test voltages from 40 to 5100 V
- Automatic calculation of the quality ratios (DAR/PI)
- Direct reading of insulation value with display of the leakage current, capacitance, test voltage and test duration

Safety

- Automatic shutdown if the instrument is not used in order to save battery power
- Instrument protected by fuse, with detection of faulty fuses
- Operator safety guaranteed by automatic discharging of the device tested
- Locking of test voltages: ideal when lending the instrument to less-experienced users
- Automatic test inhibition if a dangerous external voltage (AC or DC) is detected before or during measurement
- IEC 611010-1, CAT III 1000 V

Power supply

- Powered by built-in NiMH or mains connection
- Battery life of up to 1000 measurements

	C.A 6505
Insulation	
Test voltage 500 V 1000 V 2500 V 5000 V	30 kΩ to 2 TΩ 100 kΩ to 4 TΩ 100 kΩ to 10 TΩ 300 kΩ to 10 TΩ
Voltage programming	40 to 1000 V: 10 V increments 1000 to 5100 V: 100 V increments
Accuracy 1 kΩ to 40 GΩ 40 GΩ to 10 TΩ	± 5 % of value ± 3 cts ± 15 % of value ± 10 cts
Programmable test duration	1 to 59 min
DAR (1 min/30 sec)	0.02 to 50.00
PI (10 min/1 min)	0.02 to 50.00
Customizable PI	Time from 30 s to 59 min as required
Voltage test / Safety	0 to 1000 VAC/DC
Voltage alert indicator	Yes > 25 V
Test inhibition	Yes > 25 V
Capacitance	0.005 to 49.99 µF
Leakage current measurement	0.001 nA to 3 mA
Other features	
Display	LCD + bargraph
Power supply	NiMH rechargeable battery
Dimensions	270 x 250 x 180 mm
Weight	4.3 kg
Electrical safety	IEC 61010 1000 V CAT III – IEC 61557

Ordering information

> C.A 6505 ..... P01139704

Delivered with a bag containing 2 simplified measurement leads 2 m long, each equipped with an HV plug at each end, 1 guarded safety lead 2 m long with an HV plug at one end and an HV plug with rear connection at the other end, 1 guarded safety lead 0.35 m long with HV plug / HV plug with rear connection, 3 crocodile clips (red, blue and black), 1 mains power cable 1.80 m long, 1 operating manual in 5 languages.

Accessories / Replacement parts

C.A 861 thermometer + K thermocouple P01650101Z
AN1 artificial neutral P01197201
Set of 2 simplified HV measurement leads (red/black) P01295231
1 guarded simplified HV lead + 1 crocodile clip (blue) P01295232
1 HV lead 8 m long with blue crocodile clip..... P01295214
1 HV lead 8 m long with red crocodile clip P01295215
1 HV lead 8 m long with black crocodile clip (EARTH) P01295216
1 HV lead 15 m long with blue crocodile clip..... P01295217
1 HV lead 15 m long with red crocodile clip P01295218
1 HV lead 15 m long with black crocodile clip (EARTH) P01295219
Standard bag for accessories P01298066
Fuse FF 0.1A - 380 V - 5 x 20 mm - 10 kA (set of 10) P03297514
2P EUR mains power cable P01295174

C.A 6505 megohmmeters are delivered with a bag, 2 measurement leads 2 m long (black/red), 2 guarded leads (blue) terminated with a 4mm banana plug for high insulation measurements and 3 crocodile clips.

Available as an option: 3 m, 8 m or 15 m leads terminated by extra-large, totally-insulated, built-in crocodile clips.

The insulation measurement experts!

C.A 6545 & C.A 6547

In their site-proof case designed for even the severest measurement, the C.A 6545 and C.A 6547 offer the best solution for insulation testing in terms of accuracy and expertise.

As soon as they are connected, they start measuring voltages, frequencies, capacitances and residual currents on the installation or equipment to be tested.

With their extensive range of functions, they qualify the insulation measured and also help to ensure genuine preventive maintenance.

C.A 6545

Ergonomics

- Large backlit LCD screen with digital display and bargraph
- Site-proof case suitable for the severest measurement conditions
- Direct reading of the insulation value with display of the leakage current and capacitance values

Measurement

- Wide measurement range from 10 kΩ to 10 TΩ
- Fixed test voltages: 500 V, 1000 V, 2500 V and 5000 V
- Programmable test voltages from 40 to 5100 V
- Programmable test duration and possibility of setting the measurement times for the DAR/PI/DD tests
- Smooth function for smoothing the insulation values so they are easier to read and quicker to interpret
- Programmable alarms with visual warning signal and buzzer

Safety

- Automatic calculation of DAR/PI/DD quality ratios
- Locking of test voltages: ideal when lending the instrument to less-experienced users
- Automatic test inhibition if a dangerous external voltage (AC or DC) is detected before or during measurement
- Operator safety guaranteed by automatic discharging of the device being tested, with display of the discharge voltage
- IEC 611010-1, CAT III 1000 V

C.A 6547

	C.A 6545	C.A 6547
Insulation		
Test voltage 500 V	30 kΩ to 2 TΩ	
1000 V	100 kΩ to 4 TΩ	
2500 V	100 kΩ to 10 TΩ	
5000 V	300 kΩ to 10 TΩ	
Voltage programming	40 to 1000 V: 10 V increments 1000 to 5100 V: 100 V increments	
Accuracy 1 kΩ to 40 GΩ	± 5% of value ± 3 cts	
40 GΩ to 10 TΩ	± 15% of value ± 10 cts	
Programmable test duration	1 to 59 minutes	
DAR (1 min/30 sec)	0.02 to 50.00	
PI (10 min/1 min)	0.02 to 50.00	
Customizable PI	Time from 30 s to 59 min as required	
DD	0.02 to 50.00	
Voltage test / Safety	0 to 1000 VAC/DC	
Voltage alert indicator	Yes > 25 V	
Test inhibition	Yes – adjustable according to test voltage	
Smooth function	Configurable – Digital filtering to stabilize the measurements	
Capacitance	0.005 to 49.99 µF	
Leakage current measurement	0.001 nA to 3 mA	
Storage - Communication		
Storage of R(t)	4 kB memory	128 kB memory
Storage of measurements	20 measurement results	Up to 1500 measurement results
Direct report printing	No	On local printer, fixed format
Communication port	No	RS 232
PC software	No	DataView (option)
Other features		
Display	Large LCD + bargraph	
Power supply	NiMH rechargeable battery	
Dimensions	270 x 250 x 180mm	
Weight	4.3 kg	
Electrical safety	IEC 61010 1000V CAT III – IEC 61557	

Ordering information

> C.A 6545 ..... P01139701

Delivered with a bag containing 2 safety leads 3 m long with HV plugs and HV crocodile clips (red / blue), 1 guarded safety lead 3 m long with HV plug with rear connection and HV crocodile clip (black), 1 lead with rear connection (blue) 0.35 m long, 1 mains power cable 2 m long, 1 simplified operating manual, 1 operating manual in 5 languages.

> C.A 6547 ..... P01139702

Delivered with a bag containing 2 safety leads 3 m long with HV plugs and HV crocodile clips (red / blue), 1 guarded safety lead 3 m long with HV plug with rear connection and HV crocodile clip (black), 1 lead with rear connection (blue) 0.35 m long, 1 mains power cable 2 m long, 1 communication cable, 1 simplified operating manual, 1 operating manual in 5 languages.

Accessories/Replacement parts

C.A 861 thermometer + K thermocouple P01650101Z
AN1 artificial neutral P01197201
Set of 2 simplified HV measurement leads (red/black) P01295231
1 guarded simplified HV lead + 1 crocodile clip (blue) P01295232
1 HV lead 8 m long with blue crocodile clip P01295214
1 HV lead 8 m long with red crocodile clip P01295215
1 HV lead 8 m long with black crocodile clip (EARTH) P01295216
1 HV lead 15 m long with blue crocodile clip P01295217
1 HV lead 15 m long with red crocodile clip P01295218
1 HV lead 15 m long with black crocodile clip (EARTH) P01295219
Standard bag for accessories P01298066
DataView® software P01102058
Fuse FF 0.1 A - 380 V - 5 x 20 mm - 10 kA (set of 10) P03297514
2P EUR mains power cable P01295174

AUTOMATIC REPORT GENERATION

DataView®

(optional for the C.A 6547 - see page 10)

The C.A 6545 and C.A 6547 megohmmeters are delivered with a bag, 3 m leads terminated with large, totally-insulated, built-in crocodile clips, 2 measurement leads and a guarded lead for high insulation measurements

The 5 kV insulation measurement expert!

C.A 6549

With its graphical interface, the C.A 6549 megohmmeter makes it easy to interpret measurements in the field. As well as calculating the quality ratios (DAR/PI/DD), the C.A 6549 includes a Step Voltage function that puts it at the top of its class.

C.A 6549

Ergonomics

- Large graphic screen with digital display and bargraph
- Possibility of displaying the measurement graph in real time for quicker interpretation
- Site-proof case suitable for the severest measurement conditions
- Compatible with the DataView® software, allowing users to configure the instrument, trigger tests remotely via a PC, view the test results in real time, recover stored data and generate standard or customized measurement reports
- Storage of 1500 results

Measurement

- Wide measurement range from 10 kΩ to 10 TΩ
- Fixed test voltages: 500 V, 1000 V, 2500 V and 5000 V
- Programmable test voltages from 40 to 5100 V (storage of 3 voltages)
- Direct reading of the insulation value with display of the leakage current, capacitance, test voltage and test duration
- Programmable test duration and possibility of customizing the measurement time for DAR/PI/DD
- Step Voltage function with the possibility of programming the voltage and time values for each step: storage of 3 step profiles, each with 5 steps maximum
- Automatic calculation of the insulation value at a reference temperature
- Smooth function for smoothing the insulation values so they are easier to read and quicker to interpret
- Possibility of automatically measuring the samples of the insulation tested, at a rate chosen by the user
- Programmable alarms with visual warning signal and buzzer

Safety

- Locking of test voltages: ideal when lending the instrument to less-experienced users
- Automatic test inhibition if a dangerous external voltage (AC or DC) is detected before or during measurement
- Operator safety guaranteed by automatic discharging of the device being tested, with display of the discharge voltage
- IEC 611010-1, CAT III 1000 V

		C.A 6549
Insulation		
Test voltage	500 V	30 kΩ to 2 TΩ
	1000 V	100 kΩ to 4 TΩ
	2500 V	100 kΩ to 10 TΩ
	5000 V	300 kΩ to 10 TΩ
Voltage programming		40 to 1000 V: 10 V increments 1000 to 5100 V: 100 V increments
Automatic voltage steps		Programming of value and duration up to 5 steps, 3 profiles stored
Accuracy	1 kΩ to 40 GΩ	± 5% of value ± 3 cts
	40 GΩ to 10 TΩ	± 15% of value ± 10 cts
Programmable test duration		1 to 59 minutes
DAR (1 min/30 sec)		0.02 to 50.00
PI (10 min/1 min)		0.02 to 50.00
Customizable PI		Time from 30 s to 59 min as required
DD		0.02 to 50.00
Voltage test / Safety		0 to 1000 VAC/DC
Voltage alert indicator		Yes > 25 V
Test inhibition		Yes – adjustable according to test voltage
Smooth function		Configurable – Digital filtering to stabilize the measurements
Capacitance		0.005 to 49.99 µF
Leakage current measurement		0.001 nA to 3 mA
Storage – Communication		
Storage of R(t)		Display on screen + Storage of samples
Storage of measurements		Up to 1500 measurement results
Direct report printing		On local printer, fixed format
Communication port		RS 232
PC software		DataView (option)
Other features		
Display		Large LCD + bargraph
Power supply		NiMH rechargeable battery
Dimensions		270 x 250 x 180 mm
Weight		4.3 kg
Electrical safety		IEC 61010 1000 V CAT III – IEC 61557

Ordering information

> C.A 6549 ..... P01139703

Delivered with a bag containing 2 safety leads 3 m long with HV plugs and HV crocodile clips (red / blue), 1 guarded safety lead 3 m long with HV plug with rear connection and HV crocodile clip (black), 1 lead with rear connection (blue) 0.35 m long, 1 mains power cable 2 m long, 1 communication cable, 1 simplified operating manual, 1 operating manual in 5 languages.

AUTOMATIC REPORT GENERATION

DataView®

(optional for the C.A 6549 - see page 10)

Accessories / Replacement parts

C.A 861 thermometer + K thermocouple P01650101Z
AN1 artificial neutral P01197201
Set of 2 simplified HV measurement leads (red/black) P01295231
1 guarded simplified HV lead + 1 crocodile clip (blue) P01295232
1 HV lead 8 m long with blue crocodile clip..... P01295214
1 HV lead 8 m long with red crocodile clip P01295215
1 HV lead 8 m long with black crocodile clip (EARTH) P01295216
1 HV lead 15 m long with blue crocodile clip..... P01295217
1 HV lead 15 m long with red crocodile clip P01295218
1 HV lead 15 m long with black crocodile clip (EARTH) P01295219
Standard bag for accessories P01298066
Fuse FF 0.1 A - 380 V - 5 x 20 mm - 10 kA (set of 10)..... P03297514
2P EUR mains power cable P01295174
Serial Printer No. 5 ..... P01102903
Series-parallel adapter P01101941
MegohmView software..... P01101938A
DataView® software P01102058
RS 232 PC cable DB 9F - DB 25F x2 ..... P01295172
RS 232 printer cable DB 9F - DB 9M N°01..... P01295173

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The European leader in measurement

Three complementary businesses, global expertise

Chauvin Arnoux's role as a French instrument manufacturer and its work to implement energy management and control systems place it at the heart of the electrical measurement business and the Group is now acknowledged as a major player in the electrical sector, as well as a leader in the temperature measurement market.

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From transformation of the raw materials through to after-sales service, our teams strive to innovate every day in order to provide a global solution meeting the needs of cutting-edge industries, tertiary infrastructures and self-employed electricians.

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906211195 - Ed. 01 - 2010

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