5220A
HY/POT® TESTER
Dual Range 0-6/15kVDC With Current Meter

The model 5220A DC Hypot® tester is used to test new or repaired motors, generators, switchgear, cables, wiring and other electrical and electronic products. The 5220A DC Hypot Tester can be used to:

- ❑ Determine the adequacy and safety of newly installed insulation.
- ❑ Determine when corrective steps must be taken to restore windings to a safe operating condition.
- ❑ Help predict the useful life of insulation.
- ❑ Establish maintenance and inspection programs to reduce failure and extend equipment service life.

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The 5220A Hypot tester from Associated Research is designed for non-destructive, high voltage direct current testing for both assembly line and field use.

The generally accepted formula for high voltage DC hipot testing potential is to apply 1.6 times the AC operating voltage, plus 1,000 volts. With this standard, the 5220A can be used to test equipment with operating voltages as high as 4,160 volts AC.

The 5220A accurately measures insulation leakage as low as 0.05 microampere. Two test voltage ranges are available, 0-6 and 0-15 kVDC. Both voltage and current meter readings are accurate within 2% of full scale.

Current limiting and other built-in safety features protect test personnel and equipment from excessive current leakage, insulation failure, shorts, surges and transient currents.

FEATURES:

DC Test Potential:
Continuously variable from 0-6 and 0-15 kVDC, accurately metered directly in the output circuit.

Metering:
Leakage Current Meter:
Four overlapping ranges: 0-2, 0-20, 0-200 and 0-2000 microamperes. Capable of measurements from 0.05 microamperes to 2 milliamperes.

Kilovoltmeter:
Dual scale, 0-6 and 0-15 kVDC. Both Leakage Current Meter and Kilovoltmeter are 4-1/2" (11.4 cm) rectangular wide view type, accurate to within 2% of the full scale reading.

Controls:
Input power "on-off" switch with pilot light, continuous test voltage adjustment from zero to maximum output, kilovolt range selector, high voltage "on-off" switch with pilot light, microammeter range selector, metered and by-pass return and ground terminals with ground selector switch.

Standard Protection Features:
Both the voltmeter and microammeter have built-in electronic circuit protection against damage from overload or a direct short across the output, even on high voltage or low current ranges. Guard circuits using metered and by-pass return terminals, with selectable grounding switch. Guard circuit by-passes stray current so that it does not interfere with the leakage measurements.

Silicon Rectifier Power Supply:
Operates on 115 volts AC, 50/60 Hz input. Up to 10 milliamperes output current is available for rapid charging of capacitive loads. Also available with 230 volts AC 50/60 Hz power input (Model 5220AA).

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Dual Range 0-6/15kVDC With Current Meter

High Voltage, Metering and Ground Leads:

All leads are 15 ft. (4.6 m) long and detachable. All four leads and the permanently attached 5 ft. (1.5m) power cord are stored in a zippered canvas bag placed between the cover and the panel when the instrument is not in use.

Physical Features:

Case and removable cover are welded steel with baked on gray hammertone finish. Case has a convenient carrying handle. Front panel has a blue hammertone finish.

Weight, 27lbs (12.2 Kg)

Dimensions, with cover: 13-1/2" wide,13-1/2" high, 8-1/2" deep (340 mm x 340 mm x 205 mm).

DC Hipot Testing Basics

DC hipot testing is done primarily to determine the condition of insulation. The actual breakdown point for insulation may or may not be significant for any given test. What is important is the condition of and the level of protection given by the insulation at and slightly above the normal operating voltages for the product being tested.

There are several ways to test insulation, but the two most popular procedures are "Leakage Current vs Voltage" (Figure 1) and "Current vs Time" test (Figure 2). The Leakage Current vs. Voltage test is done first to predict a possible voltage breakdown point. Then the Current vs Time test is done to verify a stable current flow at the full test voltage.

Leakage Current vs Voltage

After properly preparing the product and test area, following all safety procedures, connect the hipot leads. The Leakage Current vs Voltage test is done by gradually increasing the output voltage and measuring the leakage current.

Output voltage is slowly raised in discrete steps. Adequate time is allowed between each increase to allow current leakage to stabilize.

As long as the Leakage Current vs Voltage curve is linear, with equal increases in voltage output resulting in a linear increase in leakage current, (Figure 1, Points A to B), insulation on the item being tested is considered to be in good condition.

However, if as the output voltage is increased, leakage current suddenly increases at a faster rate, this could indicate insulation weakness. When these current readings are plotted on a graph, the failure point is shown as a "knee" (Point C) in the curve. It is very important that output voltage increases be kept small enough to accurately identify the knee of the curve before breakdown occurs.

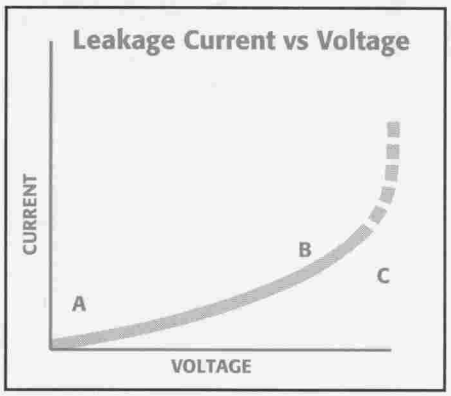

Figure 1.

If the output voltage is increased much beyond the knee, leakage current increases rapidly and the insulation breakdown point is reached. Unless it is necessary to determine the actual breakdown point, the usual practice is to halt the test as soon as the beginning of the knee (Point C) is observed. With a little experience, the operator can easily extrapolate the curve and estimate the insulation breakdown point without actually reaching the breakdown voltage and possibly damaging the insulation.

While the most important part of this test is to note the rate of current change as voltage increases, other information can also be obtained. Comparison of leakage current from phase to phase, comparison of leakage current values in similar equipment, or comparison of readings on the same equipment to previous test results can be used to determine the condition of the insulation. In general, any increase in leakage current levels at a given output voltage indicates poor insulation. The actual condition of insulation is difficult to determine from a single test.

But as long as the curve is similar to Figure 1 and as long as the "knee" is at or above the maximum test voltage level, the equipment tested may be considered satisfactory.

Current vs Time

When the final test voltage is reached, the hipot is left on, at this setting, and Current vs Time is plotted (Figure 2). The current is recorded at fixed intervals as it decays from the initial high charging value to the steady state leakage value.

This curve should indicate a continuous decrease in leakage current over time or a stabilization of current with no increase during the test.

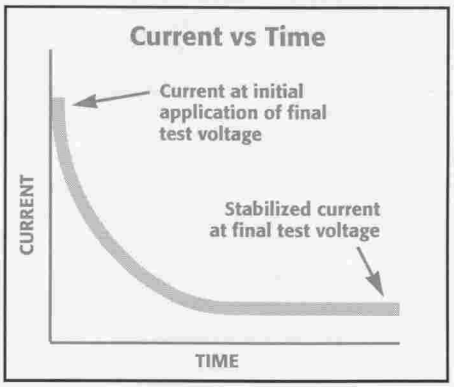

Figure 2.

The initial high value of current is known as the charging current and is dependent primarily on the capacitance of the item being tested.

The lower, steady state reading consists of the actual leakage current and the dielectric absorption current (which is relatively minor as far as these tests are concerned).

For more detailed information about hipot testing procedures, please request our guide book, manual #35772.

For technical assistance or to order the 5220A, call:

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