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User's Manual



10KV Digital High Voltage Insulation Tester

Model 380385



WARNING!
 This instrument should not be used to test explosive or inflammable materials, although there is a circuit breaker in the handle from the instrument itself. However, arcing in faulty insulation, sparking caused when making or removing connections to equipment that has not been properly discharged, or discharge of capacitance following tests, can all lead to ignition or fire hazard.

CAUTION!
 Instrument used in dusty environment should be sent only to an approved maintenance laboratory for periodic cleaning. The instrument contains clean sensitive devices. If opened for any reason, the warranty will be invalidated.

USE THE GUARD!
 This instrument has an Integral Guard Circuitry to minimize the measurement errors introduced by surface leakage current during testing. To ensure a leakage path may exist between the hand controller and the external insulation. The guard circuitry is activated when the high voltage, or line conductor may be brought safely around the insulation and connected to the guard terminal when the guard test lead is provided with clips for the purpose.

SAFETY!
 The circuit under test must be de-energized AND isolated before insulation test are made. Check Test Leads for Defects, they must have good, undamaged insulation, uncontaminated by grease, oil or dirt. For optimal results, only use supplied Test Leads. To avoid creating leakage path when measuring insulation, it is advisable not to allow the leads to touch together nor test excess metalwork etc, more than is really necessary. If this can't be avoided, only the Optional Proprietary Very High Voltage Current Limiter Test Lead could give best results. Make sure to check correct order test. Most units display shows "HOLD" before removing the test leads.

Preventive Maintenance when the results are entered into the logbook, a considerable variation between the tests could be noted. It is advisable to measure the test under normal conditions each time and to note the correct weather values. These conditions can cause large reductions in insulation resistance. Temperature of the equipment under test should also be noted.

The ENERSAVE MODE
 saves battery life by automatically turning the instrument to Low Consumption and reducing the test duration. *Insulation Tester Specified with Alkaline Batteries.* is enabled when pressing the "TEST" button for less than 3 seconds while starting the test. is disabled when pressing the "TEST" button for more than 3 seconds while starting the test. When The ENERSAVE Mode is disabled, the Instrument Operates Continuously (up to 99.9s). Testing can be interrupted at any time by depressing Start/Stop key, Auto-discharge Apply.

SAFETY PRECAUTION!

- Use only on Ge-energized system.
- Check test leads for defects.
- Always earth circuit under test.
- After testing, allow a few seconds for instrument to discharge circuit under test.

OPERATING INSTRUCTIONS

- Depress "ON".
- Insert leads into the instrument observing colour coding.
- Clip BLACK lead to earth.
- Select test voltage and follow display instructions.

CAUTION!

Touch RED lead to conductor under test. Stop test immediately if warning message and / or buzzer sound, must be removed. This indicates the presence of an external voltage which. Before proceeding, reset the tester by depressing "ON" (sets up to 99.9 s).

- Connect RED lead to conductor and depress "TEST".
- Display shows test duration, real time bargraph voltage indication and insulation resistance.

EXTECH INSTRUMENTS

Introduction

Congratulations on your purchase of the Extech High Voltage Insulation Tester. This device has four pre-set voltage test ranges (up to 10kV) and measures insulation resistance to 500G Ω . Other voltage test values can be selected using the $\pm 500V$ step buttons. This professional meter, with proper care, will provide years of safe reliable service.

Safety

1. Circuits under test must be de-energized and isolated before connections are made.
2. Circuit connections must not be touched during a test.
3. After insulation tests, capacitors must be discharged.
4. Test leads (including alligator clips) must be in good working order, clean and without broken or cracked insulation.
5. When servicing, use only specified replacement parts.
6. Environmental conditions:
 - Indoor use only; Installation category III 300V
 - Pollution degree 2
 - Altitude up to 2000 meters
 - Relative Humidity 80% max.; Temperature 0 to 40°C

International Safety Symbols



Caution, refer to this manual before using this meter



Dangerous Voltages; risk of electric shock



Meter is protected throughout by double or reinforced insulation

Maintenance

Battery Replacement

When 'REPLACE BATTERY' appears on the display, replace the eight 1.5V 'C' batteries.

1. Ensure that the meter is powered down and that the test leads are not connected
2. Close the instrument cover and turn the instrument upside down
3. Remove the screw located on the bottom of the meter
4. Remove the battery compartment cover
5. Replace the eight batteries ensuring proper polarity
6. Affix the rear cover and secure the rear screw

Cleaning

Periodically wipe the case with a dry cloth. Do not use solvents or abrasives to clean this instrument.

Specifications

General specifications

Display	2 x 20 character alphanumeric multi-function dot matrix
Range selection	20 ranges in 500V steps with automatic ranging. Preset buttons for 1KV, 2.5KV, 5KV, and 10KV
Bargraph	Displays voltage ramp, soak, and decay
Automatic discharge	After automatic & manual stop or upon completion of test
Low battery indicator	"Replace battery" displayed when battery voltage is low
Power source	Eight 1.5V 'C' cells; Battery life 40 hrs (no load at 10kV)
Auto Power off	After 5 minutes of inactivity
Enersave™ mode	Shorter test time to conserve battery life
Test Leads	Supplied. RED (length = 108") with GREEN guard lead. BLACK lead is 42".
Operating conditions	32 to 104°F (0 to 40°C); < 80% RH
Storage conditions	14 to 140°F (-10 to 60°C); < 80% RH
Dimensions	13 x 10.2 x 6.3" (330 x 260 x 160mm)
Weight	7.9 lbs (3.6kg)

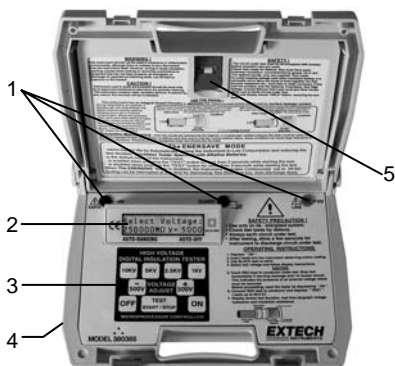
Range Specifications

DC Test Voltages	Resistance Ranges (in GΩ)	Short Circuit Current	Accuracy	Resolution
0.5KV	25	100mA	± (3% + 2d)	1MΩ
1KV	50			
1.5KV	75			
2KV	100	120mA		
2.5KV	125			
3KV	150			
3.5KV	175			
4KV	200			
4.5KV	225	170mA		
5KV	250			
5.5KV	275			
6KV	300			
6.5KV	325			
7KV	350			
7.5V	375			
8KV	400	360mA		
8.5KV	425			
9KV	450			
9.5KV	475			
10KV	500			

Note: Voltage Regulation is +20% -5% unless current limited.

Meter Description

1. Test lead jacks
2. Dot Matrix Display
3. Keypad
4. Battery compartment (on bottom)
5. Test lead compartment latch



Preparation

Warning: Ensure that the circuit under test does not include devices or components that can be damaged by 10KVDC; such devices include power factor correction capacitors, low voltage mineral insulated cables, electronic light dimmers, ballasts and starters for fluorescent lamps.

Connecting the Test Leads to the meter

The **Black (Earth)**, **Red (Line)**, and **Green (Guard)** test leads connect to the meter directly above the dot matrix display (the meter jacks are color coded). NOTE: The **Green (Guard)** lead is attached to the Red lead and should be used (refer to applications section next).

Connecting the Test Leads to the device under test

The **Black (Earth)** lead is connected to the conductive material. The **Red (Line)** and **Green (Guard)** leads are connected to insulating, sheathing, and covering material as shown in the following applications section.

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781.665.1400 | 800.517.8431 | Fax: 781.665.0780

Operation

Powering the meter

Press the **ON** button to turn the unit on. Press the **OFF** button to turn the unit off.

Insulation Resistance Measurements

Warning: The circuit under test must be completely de-energized and isolated before making test connections.

1. After turning the unit on, the display will prompt the user to select a test voltage (diagram at right).
2. Select the test voltage by pressing one of the preset voltage buttons (**1KV, 2.5KV, 5KV, 10KV**) or by pressing the Voltage Adjust buttons (**500+**, **500-**) to step through the available test voltages in 500V steps.
3. The resistance range for the selected voltage is indicated on the dot matrix display as shown above.
4. Press the **TEST START / STOP** button again.
5. The display will prompt the user to connect the leads. Press the **TEST START/STOP** button to start testing.
6. The elapsed test time appears on the upper line (right hand side) of the display. The resistance reading is shown on the upper left hand side of the display. The lower line shows the test voltage in bargraph format (see diagram at right).
7. The HOLD icon will appear in place of the bargraph when the test is complete and the voltage has been discharged.

Select Voltage:
250000MΩ V = 5000V

Connect Leads
. Press TEST

R=9.998MΩ 6.8s
0> ■■■■■■ <500V

WARNING: DO NOT REMOVE THE TEST LEADS BEFORE THE HOLD DISPLAY APPEARS.

8. The meter automatically discharges the system at the end of the test.
9. The meter automatically powers down after 5 minutes.

The Enersave™ Mode

Enersave™ mode conserves battery life by performing a relatively short test (10 seconds). The Enersave™ mode is the default test mode. To bypass this mode and run a longer test (100 seconds max), press and hold the **TEST** button for 3 seconds when starting a test.

Bargraph Voltage Display

The bargraph represents the voltage present on the test leads as it rises, soaks, and decays. The bargraph appears on the lower left of the dot matrix display during a test.

Automatic Under/Over Range Resistance Detect

If the display shows the message "LOW MΩ", the test should be interrupted immediately by pressing the **TEST** button. This message indicates that the insulation under test has broken down and the meter is trying to inject a high potential onto a short circuit. If 'HIGH' appears, it is likely that the test configuration is open. Check the test set-up then test again.

Elapsed Timer

The test duration is indicated on the display. This is particularly useful in determining whether an insulating material under test will break down in a given amount of time.

Manual Test STOP

To stop a test in progress, press the **TEST** button. The test will immediately end and the system will automatically discharge.

Automatic Test STOP

When in the default Enersave™ mode, the test automatically stops after approx. 10 seconds. The test automatically stops after approx. 100 seconds if the meter is not in the Enersave™ mode.

Live Circuit Warning

If the test leads are connected to a live circuit (approx. 500V), a warning beeper will sound and the meter will display "Live Warning...Circuit Live...". In this case, correct the problem and retest.

Automatic Discharge

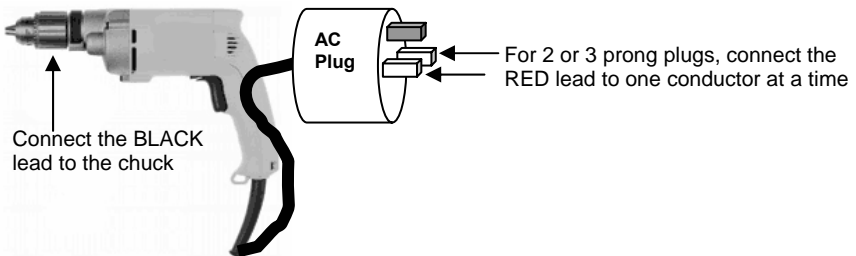
At the end of a test, the meter automatically discharges the high voltage. The automatic discharge status is reflected on the display. During discharge the beeper will sound and, when completely discharged, the HOLD icon appears on the display.

Applications

Measuring Power Tools and Small Appliances

For small appliances, connect the Black (EARTH) lead to conductors and the Red (LINE) lead to insulating material.

For single or double insulated power tools, one lead should be connected to the device's chuck, blade, etc. and the other lead to one of the AC power cord conductors (test both conductors in turn). Refer to the power tool application diagram below.



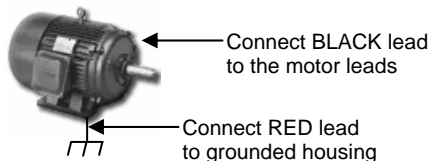
Testing Motors

AC Motors

Disconnect the motor from the line by:

- Disconnecting the wires from the motor terminals or
- Opening the main switch

If the main switch is opened, and the motor also has a motor-starter, then the starter must be held in the ON position. With the main switch opened, the measured resistance will include the resistance of the motor wire and all other components between the motor and the main switch. If a weakness is indicated, the motor and other components should be checked individually. If the motor is disconnected at the motor terminals, connect the RED lead to the grounded motor housing and the BLACK lead to one of the motor leads.

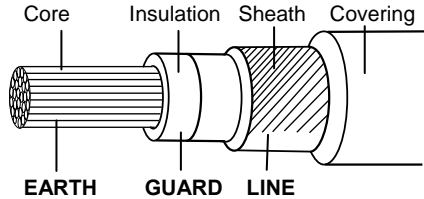


DC Motors

1. Disconnect the motor from the line.
2. To test the brush rigging, field coils and armature, connect the RED lead to the grounded motor housing and the BLACK lead to the brush on the commutator.
3. If the resistance measurement indicates a weakness, raise the brushes off of the commutator and separately test the armature, field coils and brush rigging by connecting one lead to each individually, leaving the other connected to the grounded motor housing. This also applies to DC Generators.

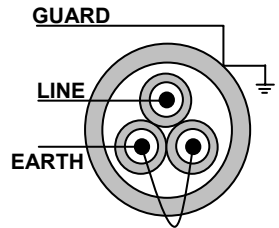
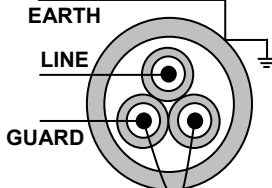
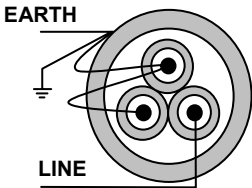
Testing Single Conductor Cables

1. Completely disconnect the cable under test from its source and destination.
2. Connect the test leads to the cable as shown at right.



Testing Multi Conductor Cables

1. Completely disconnect the cable under test from its source and destination.
2. Refer to the diagrams below for three possible tests.



Testing one conductor to all of the conductors	Testing one conductor to earth	One conductor to all minus ground
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Transformer Testing

Transformer tests are performed with the transformer completely disconnected from the line and the load. Note that the case ground should not be removed.

The five tests listed below will completely test a single-phase transformer. Note that at least 1 minute should be allowed between each test.

1. High voltage winding to low voltage winding and ground
2. Low voltage winding to high voltage winding and ground
3. High voltage winding to low voltage winding (pictured at right)
4. High voltage winding to ground
5. Low voltage winding to ground

