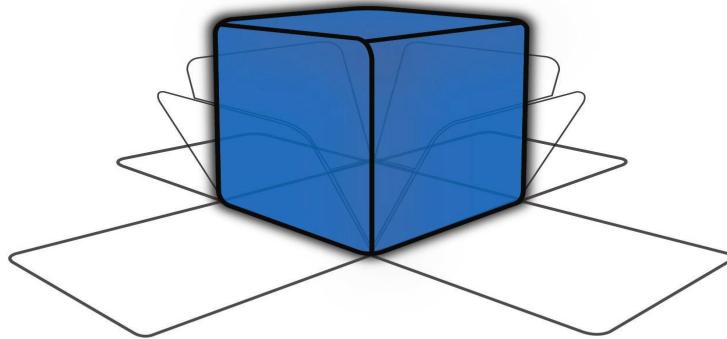


# **HT-10KVac/dc**

## **Dielectric Withstand Tester**

0-10000 Volts AC Output  
0-14000 Volts DC Output

Instruction Manual



***COMPLIANCE WEST***<sub>USA</sub>



*Dear Customer:*

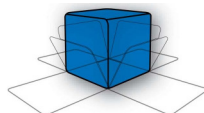
*Congratulations! Compliance West USA is proud to present you with your Dielectric Withstand Tester. Your instrument features a groundbreaking logic-controlled circuit design and ergonomic front panel, and represents the latest in high voltage laboratory testing.*

*To fully appreciate all the features of your new meter, we suggest that you take a few moments to review this manual. Compliance West USA stands by your instrument with a full one-year warranty. If the need arises, please don't hesitate to call on us.*

*Thank you for your trust and confidence.*

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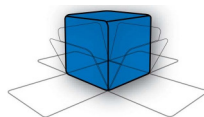
# Section 0

## Quick Start

For a quick look at the abilities of the HT-10KVAC/DC, we are providing this quick start page, designed to get you up and running quickly. We recommend that you read the entire manual before using the HT-10KVAC/DC to conduct actual testing.

## Initial Setup

1. Remove the HT-10KVAC/DC from its shipping carton and set it up on a bench. Plug it in to a correctly rated source of supply, using the supplied cordset. Turn it on using the AC Power Switch on the front panel.
2. Switch the Timer Control Switch on the front panel to DEFEAT.
3. Turn the Voltage Adjust knob on the front panel fully counterclockwise to set output voltage to zero.
4. Set the AC/DC button on the front panel.
5. Push the RESET Button, then push and hold the TEST Button. (The output voltage is present only while the TEST Button is pressed when the Timer Control Switch is set to the DEFEAT position)
6. Set the desired voltage level using the Voltage Adjust knob on the front panel.
7. Let the TEST Button go; output voltage will drop to zero.
8. Plug the High Voltage Output Lead into the proper receptacle, AC Out or DC Out.
9. Plug the black lead into the Return Receptacle.
10. Connect the Test Leads across the part to be tested. Push and hold the TEST Button. Watch the front panel meters and lights for test results.





## Section 1

### An Introduction to Dielectric Withstand Testing with the HT-10KVAC/DC

The dielectric withstand test is a test which is recognized by safety agencies worldwide as a valid criterion of safe assembly of end-use equipment. The HT-10KVAC/DC is designed as a research instrument to determine the dielectric properties of component assemblies of end-use equipment. It applies a high-voltage potential between Output and Return test leads and monitors Leakage Current and watches for Dielectric Breakdown during the test. To aid in testing, the HT-10KVAC/DC can be configured with or without voltage ramp time, with or without a test duration timer, and can be set to deliver high voltage after an arc has been detected to pinpoint an area of arcing.

The dielectric withstand test involves high voltage and caution should be exercised when using the HT-10KVAC/DC. The Return Receptacle on the front panel is connected to ground potential, and setups should be designed with this in mind, to guard against the operator contacting high voltage. Always make sure the return lead is firmly connected.

### Leakage Test

The HT-10KVAC/DC leakage test uses a separate low-frequency circuit to detect excessive current between the Output and Return receptacles on the front panel. There is not a specific leakage current level pass/fail requirement at this time for most equipment. However, higher than normal leakage current on a particular sample may indicate an assembly or component problem in the circuit.

The leakage current is also monitored by the HT-10KVAC/DC to ensure that excessive leakage does not keep the Tester from developing full voltage required for the high voltage test. The HT-10KVAC/DC will provide full voltage at any leakage current level up to 5 mA AC. Set the acceptable leakage current limit using the Shutdown Limit Potentiometer on the front panel. The Shutdown Limit Switch must be set to ON or the HT-10KVAC/DC keep testing regardless of Leakage Current. Voltage output may sag under these conditions.

If the green Full Voltage indicator lights and the test continues, the leakage current was below the acceptable limit.

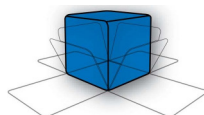
If the red Excess Leakage indicator lights, the buzzer sounds, and the test is terminated; the leakage current was above the acceptable limit.

### High Voltage Dielectric Withstand Test

This test checks for insulation system breakdowns by applying a high voltage between the Output and Return receptacles on the front panel. The HT-10KVAC/DC uses a separate high-frequency circuit to detect arc breakdowns of greater than 100 nsec duration.

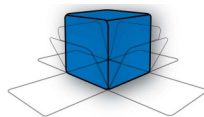
Set the test duration with the Timer Control Potentiometer on the front panel. The test time is counted from the time the Full Voltage indicator is lit to the completion of the test. The Timer Control Switch must be set to ON or the HT-10KVAC/DC will test only while the Test Button is pressed. The minimum test time is one second regardless of the setting of the Timer Control Switch.

If the green Hipot Pass indicator lights, the test cycle has been successfully completed, meaning there was no dielectric breakdown. If the red Hipot Fail indicator lights, a breakdown arc has been detected.



## High Voltage Discharge

The HT-10KVAC/DC has an internal ramp down circuit designed to discharge the high voltage after completion of the dielectric withstand test. The HT-10KVAC/DC should remain connected to the circuit until the front panel meter shows that the output voltage has dropped to a safe level. On very high voltages, this time may be up to eight seconds.





## Section 2

### Introduction and Specifications

#### Introduction

This manual contains complete operating, maintenance and calibration instructions for the Compliance West USA Model HT-10KVAC/DC Dielectric Withstand Tester.

The instrument is a bench-type or rack-mount Dielectric Withstand Tester with AC or DC Output, designed for laboratory testing of components and insulation systems.

As shipped from the factory, the HT-10KVAC/DC is configured for bench top use.

The HT-10KVAC/DC features automatic one button operation, with numerous safety features designed to protect the operator:

- The Return Lead is directly connected to ground potential for operator safety.
- The test can be immediately terminated at any time by pressing the RESET button.
- Before the test can commence, the unit must be armed by pressing the RESET Button. The test will not begin until the TEST Button is pushed.
- A non-defeatable ramp down circuit returns output voltage to safe levels before test termination.
- If a failure is encountered, the high voltage output is disabled, a buzzer sounds, and any voltage stored in the equipment being tested is bled off by an internal ramp down circuit in the HT-10KVAC/DC. Voltage discharge progress is shown by front panel meter. (PLEASE NOTE: High voltage output continues after a failure if the Breakdown Detect Switch is set to the DEFEAT position.)
- The failure mode is shown by the front panel indicators.

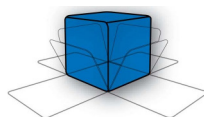
Testing features include:

- Voltage ramp, test time and leakage limit are operator set or may be defeated for special tests.
- Testing may be terminated or continued when a dielectric breakdown is detected, depending on the front panel switch settings.

The HT-10KVAC/DC is warranted for a period of one year upon shipment of the instrument to the original purchaser.

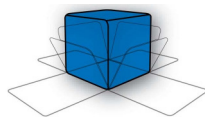
#### Specifications

Specifications for the HT-10KVAC/DC are listed in Table 2-1.



<b>ELECTRICAL</b>	
Output	0-10000 Volts AC or 0-14000 Volts DC .
Leakage Current	1-5 mA AC from 0-9500Vac output, derated linearly to 2mA output current at 10kVac. 1-5 mA DC.
Pass/Fail Criteria:	
Leakage Current:	Pass/Fail point user adjustable.
Dielectric Breakdown:	Separate high frequency detection circuit for breakdown spike detection
Test Time:	User adjustable 1->60 sec., defeatable
Voltage Ramp-up Time:	User adjustable 1-5 sec., defeatable
Voltage Ramp-down Time:	Factory set 8 seconds maximum (open circuit)
Pass/Fail Repeatability	± 2%
Duty cycle	100 %
Test adjustments	Ramp Time (using Ramp Control) Test Time (using Timer Control) Leakage Limit (using Shutdown Limit) Voltage Adjust Ramp Control ON/DEFEAT Timer Control ON/DEFEAT Shutdown Limit ON/DEFEAT
<b>ENVIRONMENTAL</b>	
Operating Temperature	15-40°C
Relative Humidity Range	0-90% non-condensing
<b>GENERAL</b>	
Input power requirements	108-132 volts, 50/60 Hz, 2A max
Weight	32 lbs.
<b>SAFETY AGENCY TOPICS</b>	
Transformer Output	< 500VA
Visual Indication of Voltage Output	Provided by front panel meter, directly connected to high voltage output
Failure Indication	Audible, provided by internal buzzer Visual, provided by red LEDs on front panel
Leakage Test	Test can be automatically terminated on failure Provided; 5 mA AC factory set pass/fail point, user adjustable.

Table 2-1. HT-10KVAC/DC Specifications



## Section 3

### Operation

This section describes how to set up and make measurements with the HT-10KVAC/DC. We recommend that you read the entire section carefully so that you can use all of its features.

#### Setting up the HT-10KVAC/DC

The HT-10KVAC/DC is shipped in a special protective container that should prevent damage during shipping. The container should include the following:

- The HT-10KVAC/DC Dielectric Withstand Tester
- A black 18 AWG Test Return Lead (Alligator Clip/Banana Plug ends)
- A red 18 AWG High Voltage Test Lead (Alligator Clip/High Voltage Plug ends)
- A Power Cord.
- This Instruction Manual

Use the original shipping container for subsequent shipping. If the original shipping container is not available, be sure that adequate protection is provided to prevent damage during shipment.

Remove the Tester from its container and place it on a test bench.

#### AC Line Voltage Requirements

Connect the HT-10KVAC/DC only to a voltage source per the rating on the rear panel.

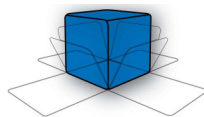
#### Fuse Replacement

There is a user-replaceable fuse located on the front panel. The fuse rating is printed on the front panel. For continued protection against risk of fire, replace only with same type and rating of fuse.

The AC Power switch should be turned off while the fuse is replaced.

#### Front and Rear Panel Features

The front panel features of the HT-10KVAC/DC are shown in Figure 3-1 and described in Table 3-1.



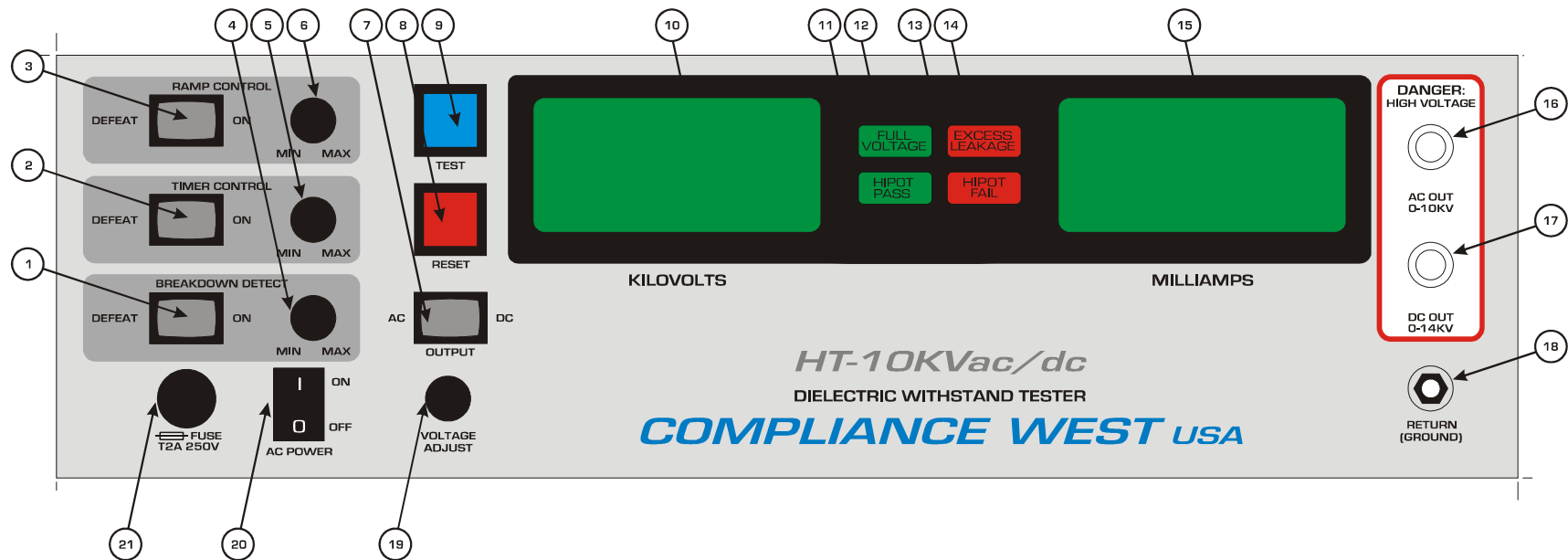
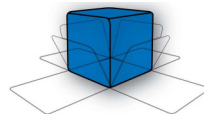
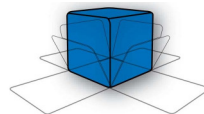


Figure 3-1. Controls, Indicators, Connectors - Model HT-10KVAC/DC Front Panel

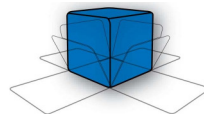


ITEM NO.	NAME	FUNCTION
1	Breakdown Detect Switch	When ON, Leakage Limit is as set by the Breakdown Detect Potentiometer, Item 4. When in DEFEAT position, test will continue regardless of leakage current or dielectric breakdown. The Test Ramp Control Switch and Timer Control Switch must also be in the DEFEAT position. The test will continue only as long as the TEST Button on front panel is pressed. Minimum test time is approximately one second. See Table 3-3 for more details. NOTE: Continued testing into a short circuit condition may damage the HT-10KVAC/DC. Make sure there is a voltage indication on the meter. If there is no voltage present, you are testing a short circuit and the HT-10KVAC/DC may be damaged or the fuse may blow.
2	Timer Control Switch	When ON, test duration is set by Timer Control Potentiometer, Item 5. When in DEFEAT position, testing continues only as long as TEST button is pressed. Minimum test time is one second. NOTE: Timer Control Switch position must be DEFEAT when Shutdown Limit Switch is in the DEFEAT position. See Table 3-3 for more details.
3	Ramp Control Switch	When ON, Voltage ramp up time is controlled by Ramp Control Potentiometer, Item 6. When in DEFEAT position, high voltage is applied immediately when TEST button is pressed. NOTE: Ramp Control Switch position must be DEFEAT when Shutdown Limit Switch is in the DEFEAT position See Table 3-3 for more details.
4	Breakdown Detect Potentiometer	Adjusts the shutdown point for the Leakage Current Test. For details see "Leakage Current Level Adjustment." For continuous testing, DEFEAT the Breakdown Detect Switch, Item 1.
5	Timer Control Potentiometer	Adjusts the test duration after TEST button is pressed. For details see "Test Time Adjustment." To test only when the TEST button is pressed, DEFEAT Timer Control Switch, Item 2.
6	Ramp Control Potentiometer	Adjusts delay between time TEST button is pushed and time desired output voltage is attained. For details see "Ramp Time Adjustment". For no delay, DEFEAT Ramp Control Switch, Item 3.
7	AC/DC Switch	Selects AC or DC output. Operates only when RESET or TEST switch is lit – does not function while a test is underway.
8	RESET Switch	When lit, indicates that the HT-10KVAC/DC is unarmed. When the RESET Button is pressed, the TEST switch is lit. <b>PRESSING THE RESET BUTTON AT ANY TIME IMMEDIATELY STOPS TESTING.</b>
9	TEST Switch	When lit, indicates the HT-10KVAC/DC is ready to test; press to begin testing.
10	Voltage Meter	Connected to the output. Reads actual output voltage. Adjust meter range with Voltage Range Switch, Item 20.
11	Hipot Pass Indicator	Indicates test conclusion with satisfactory results.
12	Full Voltage Indicator	Lights when output voltage has ramped up. Test time starts when this indicator lights.
13	Hipot Fail Indicator	Arcing or insulation flashover has occurred. Depending on setting of Shutdown Limit Switch, Item 1, test may terminate immediately or continue.
14	Excess Leakage Indicator	Actual leakage current has exceeded the shutdown point set with Shutdown Limit Potentiometer, Item 4. Depending on setting of Shutdown Limit Switch, Item 1, test may terminate immediately or continue.



15	Leakage Current Meter	Connected to the output. Reads the current flowing through the return lead of the HT-10KVAC/DC during the test.
16	AC High Voltage Receptacle	Connect high voltage lead here to conduct an AC test.
17	DC High Voltage Receptacle	Connect high voltage lead here to conduct a DC test.
18	Return Lead Receptacle	At chassis ground reference level. Connect black return lead here.
19	Voltage Adjust Knob	Voltage is continuously adjustable during testing with this knob.
20	AC Power Switch	Energize the HT-10KVAC/DC with this double pole, double throw switch. I indicates power on, O indicates power off.
21	Fuse	Mains fuse. Replace only with type and rating of fuse specified on the front panel label. Turn off power switch, Item 22, before servicing fuse.

Table 3-1. Controls, Indicators, Connectors - Model HT-10KVAC/DC Front Panel



## Initial Checkout Procedure

Use this procedure to verify that the HT-10KVAC/DC is working correctly. This procedure should be conducted daily. Refer to Figures 3-1 and 3-2 for location of items.

### CAUTION

**High voltage. Risk of shock. Use care.**

1. Turn the Tester on using the AC Power switch.
2. Set the AC/DC Switch to the AC position.
3. Set the Ramp Control, Timer Control, and Shutdown Limit switches to ON.
4. Disconnect leads from the Output and Return receptacles.
5. Make sure the Timer control is set to mid-travel.
6. Push the RESET button. The TEST button should light.
7. Push the TEST button.
8. The HT-10KVAC/DC will conduct a test. The meter will read a voltage, hold, and return to zero. During the test, the voltage can be adjusted using the Voltage Adjust knob. At the end of the test, the Full Voltage, Hipot Pass, and RESET switch indicators should be lit.
9. Connect the red lead to the AC Output receptacle, and the black lead to the Return receptacle.
10. Connect the two leads together to simulate a high leakage current condition. Push the RESET button and then push the TEST button.
11. Test should terminate immediately and the buzzer should sound. The Excess Leakage Indicator and RESET button indicators should be lit. If a spark occurred, the Hipot Fail indicator will also be lit.
12. Leaving the red and black leads connected together, disconnect the black lead from the HT-10KVAC/DC.
13. Enable the voltage output by pressing the RESET button, then the TEST button. When the full voltage indicator lights, adjust the Voltage knob so the output is approx. 2500 volts. Press the RESET button to disable high voltage output.
14. Verify that the red and black leads are connected together, the black lead is connected to the Return receptacle, and the black lead is disconnected from the HT-10KVAC/DC.
15. (This test simulates a dielectric breakdown. High voltage could exist on the alligator clips. Exercise caution to avoid shock.) Push the RESET button, then the TEST button. After the full voltage indicator lights, pick up the black lead and insert it into the return Receptacle. The test will immediately terminate with a buzzer. The Full Voltage, Hipot Fail, and RESET button indicators should be lit.
16. Change the AC/DC switch to DC and repeat steps 4-16. Use the DC Output receptacle for these tests.

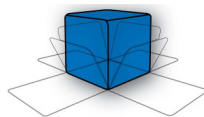
If any of these tests give unexpected results, service may be required. Please check the test setup and if further information is needed, contact our Service hotline for assistance.

## Setting up the HT-10KVAC/DC for Laboratory Testing

This section describes procedures for setting the a. voltage type

- a. leakage current level
- b. high voltage ramp time
- c. high voltage level
- d. high voltage test time
- e. voltage ramp switch
- f. test timer switch
- g. breakdown detect switch.

This will allow you to change settings from the factory settings below. Refer to Figures 3-1 and 3-2 for location of items.



## Factory Settings

The HT-10KVAC/DC is configured as shown when shipped from Compliance West USA:

Voltage Type:	AC
Leakage Current Level:	minimum
High Voltage Ramp Time:	minimum
High Voltage Level:	0 volts
High Voltage Test Time:	minimum
Voltage Ramp Switch:	ON
Test Timer Switch:	ON
Breakdown Detect Switch:	ON

## Voltage Type Selection

Use the AC/DC Voltage Switch, item 7. This switch is functional only when the RESET or TEST button is lit. The Leakage Current level must be reset when switching between AC and DC output.

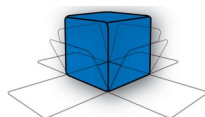
## Adjustment of the Leakage Current Shutdown Point

Leakage Current can be set to levels of up to 5 mA.

1. Set the AC/DC Switch as required for the test being conducted.
2. Connect the high voltage lead to the proper high voltage receptacle.
3. Connect the Return Lead.
4. Set the Voltage Range Switch to minimum and the Current Range Switch to the position best suited to the desired leakage current shutdown point.
5. Set the Timer Control Switch to ON and adjust the Timer Control Potentiometer to midrange.
6. Set the Shutdown Limit Switch to ON and adjust the Shutdown Limit Potentiometer to maximum.
7. Set the Voltage Adjust knob to minimum.
8. Connect the a resistor between the high voltage and return leads. This can be a convenient value and does not affect the setting of the shutdown value. It is only used to provide a load to allow the shutdown value to be set easily. We recommend using a 10Mohm ¼ watt resistor for shutdown values below 50 uA; a 1Mohm ½ watt resistor for shutdown values between 50uA and 500uA; and a 100kohm 5 watt resistor for shutdown values between 500uA and 5 mA.
9. Push the RESET button, then the TEST button. The Full Voltage indicator should light, indicating that the HT-10KVAC/DC is operational.
10. Slowly increase the Voltage Adjust knob setting, watching the Current Meter until the desired shutdown point is displayed. **In no instance should the voltage exceed 600V.**
11. While the desired alarm current is displayed on the Current Meter, slowly turn the Shutdown Limit Potentiometer counterclockwise until the EXCESS LEAKAGE indicator lights.
12. Verify correct adjustment by pressing the RESET button, then the TEST button. The FULL VOLTAGE indicator should light, followed by the EXCESS LEAKGE indicator. Repeat above steps if necessary to fine-tune the adjustment.
13. Changing from AC to DC or vice versa requires the Current Shutdown Point to be reset.
14. Reset the high voltage level and test duration before testing using the following procedures.

## Adjustment of the High Voltage Ramp Time

This procedure sets the high voltage ramp time between 0.5 and 5 sec. The factory setting of minimum is adequate for most situations. However, DC testing into a larger capacitive loads may cause a shutdown due to excessive leakage current. In this case, increasing the ramp time may solve the problem.





1. Make sure there are no test leads connected to the Tester.
2. Set the Ramp Control Switch to ON.
3. Set the Timer Control Switch to ON.
4. Set the Shutdown Limit Switch to ON.
5. Push the RESET button, then the TEST button.
6. The FULL VOLTAGE indicator will light. The time from when the TEST button is pushed to when the FULL VOLTAGE indicator lights is the Ramp Time. Set the Ramp Control Potentiometer to change the ramp time. Repeat until the desired Ramp Time is set.

### **Adjustment of the High Voltage Level**

This procedure controls the high voltage level used in the dielectric withstand test. The HT-10KVAC/DC is factory set for 0 volts AC as shipped from the factory. Use the procedure below to set it.

1. Make sure there are no leads connected to the tester.
2. Set the Ramp Control Switch to ON.
3. Set the Timer Control Switch to DEFEAT.
4. Set the Shutdown Limit Switch to ON.
5. Turn the Voltage Adjust knob to Zero(counterclock wise)
6. Set the Voltage Range Switch to the appropriate range for the voltage desired.
7. Use the AC/DC Switch for the desired output voltage.
8. Push the RESET button.
9. Push and hold the TEST button. Voltage will be supplied while the TEST button is pressed.
10. After the FULL VOLTAGE indicator lights, use the Voltage Adjust knob to set the desired output voltage. The HT-10KVAC/DC is rated for up to 10,000 volts AC and 14,000 volts DC.
11. Release the TEST button to terminate the test.

### **Adjustment of the High Voltage Test Duration**

This procedure sets the amount of time the Tester will conduct the high voltage test. The test duration of the HT-10KVAC/DC is factory set for minimum duration, approximately 1 second. If a different test duration is required, use this procedure to set it.

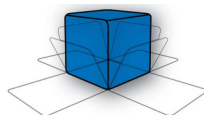
1. Make sure there are no test leads connected to the Tester.
2. Set the Ramp Control Switch to ON.
3. Set the Timer Control Switch to ON.
4. Set the Shutdown Limit Switch to ON.
5. Set the Timer Control knob to Minimum(counterclock wise)
6. Push the RESET button.
7. Push the TEST button.
8. The test time is from when the Full Voltage indicator lights to when the voltage meter starts dropping.
9. Adjust the Timer Control to change the test time. Repeat until desired time is achieved.

### **Setting the Ramp Control Switch**

When this switch is in the DEFEAT position, the voltage will immediately rise to the level set by the Voltage Adjust knob. The Timer Control setting is ignored.

When this switch is in the ON position, the voltage ramps according to the setting of the Timer Control. See adjustment instructions above.

The Voltage Ramp Switch must be defeated if Shutdown Limit Defeat is desired. See Table 3-3 for details.



## Setting the Test Timer Switch

The Timer Control switch allows test time to be controlled by the HT-10KVAC/DC's internal timer or to continue until terminated by the operator.

When this switch is in the DEFEAT position, the test will continue only while the TEST button is held down. The minimum test time is approx. 1 second.

When this switch is in the ON position, the test time will be controlled by the HT-10KVAC/DC's internal timer. For information on how to set this time, see instructions above.

The Test Timer must be defeated if Breakdown Detect Defeat is desired. See Table 3-3 for details.

## Setting the Breakdown Detect Switch

### Use Extreme Caution when using this function!

The Breakdown Detect switch allows the operator to continue testing after a failure is encountered. This allows the operator to find a breakdown point, but **all arc shutdown circuitry in the HT-10KVAC/DC is disabled when the Breakdown Detect switch is in the DEFEAT position.** Tests may be terminated at any time by releasing the TEST button.

When the Breakdown Detect switch is in the DEFEAT position, the test continues while the TEST button is held down (minimum duration 1 second). This allows the operator to find insulation breakdowns easily.

When the Breakdown Detect switch is in the ON position, the HT-10KVAC/DC will stop the test when excessive leakage or a high voltage arc is detected. Leave the Shutdown Limit switch in the ON position for normal testing.

**WARNING: Testing with the Shutdown Limit switch in the DEFEAT position is extremely hazardous. The HT-10KVAC/DC can generate lethal levels of voltage and current. Therefore, care should be taken in examining the equipment being tested to locate areas of failure while the HT-10KVAC/DC is operating. Do not operate the HT-10KVAC/DC for extended periods under conditions of dielectric failure, as overheating and/or damage to the equipment being tested may result.**

## Operating Techniques

The following paragraphs describe how to operate the HT-10KVAC/DC Dielectric Withstand Tester.

### CAUTION

**High voltage is generated by the HT-10KVAC/DC. Although the chassis of the equipment under test is grounded by the HT-10KVAC/DC, a risk of shock exists.**

**Exercise care when using the HT-10KVAC/DC.**

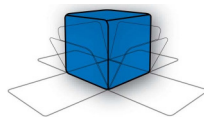
## Daily Operation Test

The operation of the HT-10KVAC/DC should be checked daily by conducting the tests described in the **Initial Checkout Procedure** section of this Manual.

## Testing Products

This section describes how to conduct a test. Testing can be terminated at any time by pressing the RESET button.

1. Set up tester to correct parameters for unit to be tested using the previously described procedures.
2. Connect the HT-10KVAC/DC to a correctly rated source of supply and turn it on.
3. Plug the black lead into the Return receptacle. Plug the red lead into the AC or DC Output receptacle, and set the AC/DC switch accordingly.



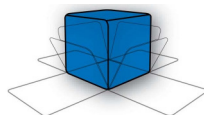
4. Connect the alligator clips of the leads across the circuit or part being tested. Keep in mind that the black lead is connected to earth ground.
5. Press the RESET button; item 1. The TEST button should light, indicating that the HT-10KVAC/DC is ready to test.
6. Push the TEST button. The HT-10KVAC/DC will either:
  - Ramp the voltage at the rate set by the Ramp Time Procedure, if the Ramp Control switch is set to ON.
  - Immediately energize the high voltage output if the Ramp Control Switch is set to DEFEAT.
7. If the Shutdown Limit switch is set to ON, and if the leakage current of the circuit under test exceeds the alarm value, the Excess Leakage indicator will light and the test will terminate. If the Shutdown Limit switch is set to DEFEAT, and the requirements of Table 3-3 are met, the HT-10KVAC/DC will continue to test. Voltage output may sag if the power required by the circuit is beyond the capabilities of the HT-10KVAC/DC.
8. If the Timer Control switch is set to ON, the HT-10KVAC/DC will conduct the high voltage test for the amount of time set in the Test Duration procedure. If the Timer Control switch is set to DEFEAT, the high voltage test will continue only while the TEST button is pressed.
9. If a insulation system breakdown is detected, and
  - The Shutdown Limit switch is ON, the Hipot Fail indicator will light, the buzzer will sound, the voltage will ramp down to a safe level, and the test will terminate.
  - The Shutdown Limit switch is set to DEFEAT, and the requirements of Table 3-3 are met, the Hipot Fail indicator will light and the test will continue as long as the TEST button is pressed.
10. If no breakdown is detected, the high voltage will ramp down, the Hipot Pass indicator will light, and the RESET button will light.
11. Do not disconnect the leads from the equipment being tested until test has terminated, and the meter indicates less than 50 volts.

## Test results

**Hipot Pass:** If the Hipot Pass light is lit, the equipment being tested passed all test parameters.

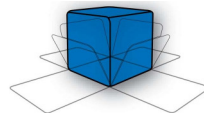
**Red Indicator/Buzzer:** Any red indicator/buzzer test result means the equipment being tested failed a test phase. If unanticipated test failures continue, and you suspect that the equipment under test is built correctly, check the following items:

1. Shutdown Limit Setting (AC tests): May be set too low. This would cause normal input capacitor charging to draw more than the preset leakage current limit, triggering a Leakage Current Fail light and terminating the test. Consider raising the acceptable leakage current level; see **Adjustment of the Leakage Current Shutdown point**.  
If the Shutdown Limit level is at its highest setting and failures continue, switch to a DC test. If failures still continue after switching to a DC test, check the circuit being tested with an ohmmeter; it may be shorted.
2. Ramp Time (DC tests): May be set too low. A very fast ramp time may allow input capacitors to charge, triggering a Leakage Current Fail light and terminating the test. Consider lengthening the ramp time; see **Adjustment of the High Voltage Ramp Control Time**.

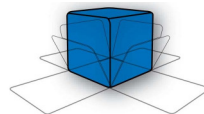


Voltage Ramp	ON	DEFEAT	ON	DEFEAT	DEFEAT	DEFEAT	ON	DEFEAT
Test Timer	ON	ON	DEFEAT	DEFEAT	DEFEAT	ON	DEFEAT	DEFEAT
Breakdown Detect	ON	ON	ON	ON	DEFEAT	DEFEAT	DEFEAT	DEFEAT
See Below	A	B	C	D	E	F	G	H

Table 3-3: Front Panel Switch Truth Table



A	Fully automatic operation. When Test button is pressed, the output voltage will ramp at a rate determined by the position of the TEST TIME adjustment knob. Test will stop automatically on all leakage or breakdown failures.
B	Voltage Ramp is defeated. Same as (A) above except that full voltage is produced at the output immediately. Test will stop automatically on all leakage or breakdown failures. For safety, we recommend that you begin testing with the front panel voltage knob set at minimum.
C	Test Timer is defeated. Same as (A) above except that after full voltage is reached, the test will continue only as long as the Test button is held in, minimum one second. Test will stop automatically on all leakage or breakdown failures.
D	Voltage Ramp and Test Timer are defeated. Full voltage is produced at the output immediately when the Test button is pressed. The test will continue only as long as the Test button is held in, minimum one second. Test will stop automatically on all leakage or breakdown failures. For safety, we recommend that you begin testing with the front panel voltage knob set at minimum.
E	Voltage Ramp and Timer are ON, Breakdown Detect is defeated. The HT-10KVAC/DC will not shut down when a breakdown is detected, allowing evaluation of arcing within the EUT. The Hipot Fail light may flash when an arc is detected. The HT-10KVAC/DC ramp and test time will be controlled by the knobs on the front panel. At the end of the test, the Hipot Pass light will not illuminate. For safety reasons, excessive leakage current, as set by the Breakdown Detect knob, will cause the HT-10KVAC/DC to shut down.
F	Test Timer is ON, Voltage Ramp and Breakdown Detect are defeated. The HT-10KVAC/DC will not shut down when a breakdown is detected, allowing evaluation of arcing within the EUT. The Hipot Fail light may flash when an arc is detected. The HT-10KVAC/DC test time will be controlled by the knob on the front panel, but voltage will be immediately applied to the EUT when the TEST button is pushed (no ramping). At the end of the test, the Hipot Pass light will not illuminate. For safety reasons, excessive leakage current, as set by the Breakdown Detect knob, will cause the HT-10KVAC/DC to shut down.
G	Voltage Ramp is ON, Test Timer and Breakdown Detect are defeated. The HT-10KVAC/DC will not shut down when a breakdown is detected, allowing evaluation of arcing within the EUT. The Hipot Fail light may flash when an arc is detected. The HT-10KVAC/DC ramp time will be controlled by the knob on the front panel, but the test will last for only one second when the full voltage is reached. No operator intervention will make the test continue longer; i.e. pushing the TEST button will have no effect. At the end of the test, the Hipot Pass light will not illuminate. For safety reasons, excessive leakage current, as set by the Breakdown Detect knob, will cause the HT-10KVAC/DC to shut down.
H	Hipot Test Defeat. Full voltage is produced at the output immediately. Test will continue only as long as the TEST button is held in, minimum one second. The HT-10KVAC/DC will not shut down on a dielectric failure, but the front panel Hipot Fail light will flash to indicate a dielectric breakdown. The Hipot Pass light will not light at the completion of a successful test. For safety, we recommend that you begin testing with the front panel voltage knob set at minimum. For safety reasons, excessive leakage current, as set by the Breakdown detect knob, will cause the HT-10KVAC/DC to shut down.



## **Section 4**

### **Technical Assistance**

For Technical Assistance

Phone: (800) 748-6224

Technical Assistance is available from Compliance West USA between the hours of 8:30 AM and 4:30 PM Pacific Time Monday through Friday.

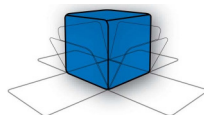
Compliance West USA

2120 Jimmy Durante Blvd, Suite 118

Del Mar, CA., 92014

Phone: (858) 481-6454

FAX: (858) 481-8527



## Section 5

### Maintenance and Calibration

#### WARNING

**THESE SERVICE INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.**

This section of the manual contains maintenance information for the Model HT-10KVAC/DC Dielectric Withstand Tester. This maintenance information is divided into service information, general maintenance, a performance test, and a calibration procedure. The performance test is recommended as an acceptance test when the instrument is first received, and later as a preventative maintenance tool to verify proper instrument operation. A 1-year calibration cycle is recommended to maintain the specifications given in Section 1.

No test equipment is required to conduct the performance test.

The test equipment required for the calibration procedure is a DMM able to read true rms 0-10000 Vac and 0-14000 Vdc  $\pm$  0.5%. Resistors 100Kohm 5 watt, 1Mohm ½ watt, and 10Mohm ¼ watt are required to provide loading for current range adjustments.

#### Service Information

The HT-10KVAC/DC is warranted to the original purchaser for a period of 1 year. This warranty does not cover problems due to misuse or neglect.

Malfunctions which occur within the limits of the warranty will be corrected at no charge. Mail the instrument post paid to the manufacturer. Dated proof of purchase is required for all in-warranty repairs.

Compliance West USA is also available for calibration and / or repair of instruments that are beyond their warranty period. Contact us for a cost quotation.

#### General Maintenance

#### Calibration Access

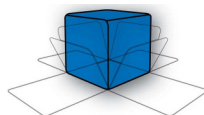
Use the following procedures to gain access to the calibration adjustments of your instrument.

1. Set AC Power switch to OFF.
2. Disconnect the power cord from the rear of the instrument.
3. Remove the four screws on the top of the unit.
4. Lift the top panel off the enclosure.
5. All calibration adjustments are now accessible.

#### WARNING

**Dangerous voltages exist when energized. Exercise extreme care when working on an energized circuit.**

6. To reassemble, reverse steps 1-5 above.



## Cleaning

Clean the front panel and case with a mild solution of detergent and a damp sponge. Clean dust from the PWB with clean, dry, low pressure (<20 psi).

## Performance Test

The performance test evaluates the performance of your instrument to ensure that the logic, lights and high voltage sections are working properly. This test is recommended for incoming inspection, as a preventative maintenance check, and to verify proper operation during the calibration procedure. It is not necessary to disassemble the instrument to conduct these tests. If the instrument fails any part of the performance test, calibration and / or repair is indicated.

Allow the instrument to stabilize and perform the test at an ambient temperature of 23°C ±5°C (73°F ±9°F).

## Operation/Lamp Function Test

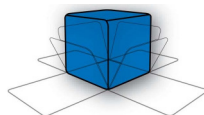
Use this procedure to verify that the HT-10KVAC/DC is working correctly. This procedure should be conducted daily. Refer to Figures 3-1 and 3-2 for location of items.

### CAUTION

**High voltage. Risk of shock. Use care.**

1. Turn the Tester on using the AC Power switch.
2. Set the AC/DC Switch to the AC position.
3. Set the Ramp Control, Timer Control, and Shutdown Limit switches to ON.
4. Disconnect leads from the Output and Return receptacles.
5. Make sure the Timer control is set to mid-travel.
6. Push the RESET button. The TEST button should light.
7. Push the TEST button.
8. The HT-10KVAC/DC will conduct a test. The meter will read a voltage, hold, and return to zero. During the test, the voltage can be adjusted using the Voltage Adjust knob. At the end of the test, the Full Voltage, Hipot Pass, and RESET switch indicators should be lit.
9. Connect the red lead to the AC Output receptacle, and the black lead to the Return receptacle.
10. Connect the two leads together to simulate a high leakage current condition. Push the RESET button and then push the TEST button.
11. Test should terminate immediately and the buzzer should sound. The Excess Leakage Indicator and RESET button indicators should be lit. If a spark occurred, the Hipot Fail indicator will also be lit.
12. Leaving the red and black leads connected together, disconnect the black lead from the HT-10KVAC/DC.
13. Enable the voltage output by pressing the RESET button, then the TEST button. When the full voltage indicator lights, adjust the Voltage knob so the output is approx. 500 volts. Press the RESET button to disable the high voltage output.
14. Verify that the red and black leads are connected together, the black lead is disconnected to the Return receptacle, and the red lead is connected from the HT-10KVAC/DC.
15. (This test simulates a dielectric breakdown. High voltage could exist on the alligator clips. Exercise caution to avoid shock.) Push the RESET button, then the TEST button. After the full voltage indicator lights, pick up the black lead and insert it into the return receptacle. The test will immediately terminate with a buzzer. The Full Voltage, Hipot Fail, and RESET button indicators should be lit.
16. Change the AC/DC switch to DC and repeat steps 4-16. Use the DC Output receptacle for these tests.

If the results of the performance test are not in accordance with the above, service is required. Remove the Tester from service and contact the manufacturer for servicing information.





## Calibration Procedure

The Calibration Procedure should be used any time your instrument has been repaired or fails to pass the performance test. The calibration procedure consists 12 adjustments that must be performed in order. If an adjustment is made during any steps, then all of the following steps must be performed to insure proper calibration of the instrument. The accuracy of the setting during each step affect every following step.

Unless otherwise specified, the front-panel controls should be set as follows during the calibration procedure:

- Ramp Control switch set to ON
- Ramp Control potentiometer set to mid-travel
- Timer Control switch set to ON
- Timer Control potentiometer set to MAX
- Shutdown Limit switch set to ON
- Shutdown Limit potentiometer set to MAX
- Voltage Adjust knob set to MINIMUM
- AC/DC switch set for AC

Before starting the Calibration procedure, perform the Calibration access procedure given earlier in this Section.

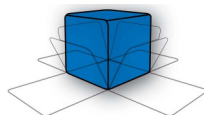
### NOTE

*Allow the instrument to stabilize for approximately five minutes. Perform all calibration adjustments at an ambient temperature of  $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  ( $73\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$ ).*

### WARNING

**CALIBRATION ADJUSTMENTS ARE PERFORMED ON ENERGIZED CIRCUITS. EXERCISE CAUTION AT ALL TIMES, AND USE A NON-CONDUCTIVE TOOL FOR ALL ADJUSTMENTS.**

**IMPORTANT NOTE:** Be very aware of possible capacitive coupling between the high voltage probe of the reference DMM and ground, which could materially affect the output voltage, especially on AC measurements. If it is not possible to obtain accurate readings on both the AC and DC scales during calibration, the problem may be capacitive coupling. It is possible to obtain up to 10% difference in output voltage indication on the DMM by re-routing the high voltage lead. Generally, watch for proximity of the high voltage lead to conductive and non-conductive surfaces. (Non-conductive surfaces can act as a ground plane to high voltages.) Re-orient the leads in different ways to obtain the highest voltage possible on the DMM for any given setting of the Voltage Adjust knob. Use extra caution to avoid shock, and do not touch the test leads, as contact will cause capacitive coupling to the operator and affect the output voltage.



## Meter Calibration Adjustment

Use the following procedure to calibrate the output voltage. Pot R326 is located on the lower PWB, and is accessible through a hole in the top board next to R210. Pot R341 is located on the lower board, in front and to the left of R326.

1. Ensure that all test leads are removed from the HT-10KVAC/DC.
2. Reset the Test Time control on the front Panel to MAX.
3. Connect the red lead of the DMM to the alligator clip of the High voltage lead which is plugged into the DC Output receptacle, and the black lead of the DMM to the RETURN receptacle.
4. Set the HT-10KVAC/DC, AC/DC switch to DC. Push the red RESET button, then the yellow TEST button on the front panel. The Tester will begin a test sequence. After the Full Voltage LED is lit, but before the Hipot Pass LED is lit, adjust the Voltage Adjust control on the front panel until the DMM reads 7000 volts DC.
5. While the Full Voltage LED is still lit, but before the Hipot Pass LED is lit, adjust R326 until the front panel meter also reads 7000 volts.
6. Set the HT-10KVAC/DC AC/DC switch to AC. Push the red RESET button, then the yellow TEST button on the front panel. The Tester will begin a test sequence. After the Full Voltage LED is lit, but before the Hipot Pass LED is lit, adjust the Voltage Adjust control on the rear panel until the DMM reads 5000 volts AC.
7. While the Full Voltage LED is still lit, but before the Hipot Pass LED is lit, adjust R341 until the front panel meter also reads 5000 volts.

## Calibration of the Leakage Current Knob

- This procedure will ensure the Shutdown Limit knob on the front of the Tester will have a range of 0-5 mA.

Before starting the Calibration procedure, perform the Calibration access procedure given earlier in this Section.

1. Make sure the Tester is turned off.
2. Attach the Test Leads to the Tester.
3. Connect the Test Leads to each other, which will simulate a short.
4. In the front center of the top PWB, adjust Pot R210 all the way counter-clockwise.
5. Make sure the voltage is set to the minimum and turn the Tester on.
6. Turn the Timer Control Switch on the front of the Tester to Max. (This will allow for more time to set the Leakage limit.)
7. Turn the Shutdown Limit knob on the front of the Tester to Max.
8. **Making sure the voltage is set to minimum, SLOWLY** turn the voltage adjust knob until the milliamp reading is at 5.0 mA.  
**SLOWLY** turn Pot R210 clockwise until the Excess Leakage and/or the Hipot fail lights come on.

