

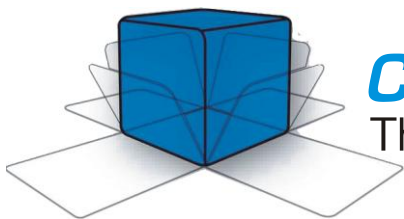
Dielectric Withstand Tester

Model

HT-20KVPac

0 - 20,000 Volts AC Output

Instruction Manual



COMPLIANCE WEST USA

The blue box that tests. And tests.

Dear Customer:

Congratulations! Compliance West USA is proud to present you with your Dielectric Withstand Tester. Your instrument features a groundbreaking microcontroller 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 1

Quick Start

For a quick look at the abilities of the HT-20KVPac, 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-20KVPac to conduct actual testing.

Initial Setup

1. Remove the HT-20KVPac from its shipping carton and set it up on a bench.
2. Plug it in to a correctly rated source of supply, using the supplied cordset.
3. Turn on the tester using the AC Power Switch.
4. Change the Test Timer Switch to DEFEAT position.
5. Turn the Voltage Adjust knob fully counterclockwise to set output voltage to minimum.
6. Push the RESET Button.
7. Push and hold the TEST Button. (The output voltage is present only while the TEST Button is pressed when the Test Timer Switch is set to the DEFEAT position).
8. Set the desired voltage level using the Voltage Adjust knob.
9. Release the TEST button; output voltage will drop to zero.
10. Plug the red High Voltage lead into the output.
11. Plug the black lead into the Return jack.
12. Connect the Test Leads across the part to be tested.
13. Push and hold the TEST Button and observe the front panel meters and lights for test results.
14. Release the TEST button to finish the Test.

Section 2

An Introduction to Dielectric Withstand Testing with the HT-20KVPac

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-20KVPac 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-20KVPac 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-20KVPac. 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-20KVPac 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, and or a component problem in the circuit.

The leakage current is also monitored by the HT-20KVPac to ensure that excessive leakage does not keep the tester from developing full voltage required for the high voltage test. The HT-20KVPac will provide full voltage at any leakage current level up to 5mA. Set the acceptable leakage current limit using the Shutdown Limit Potentiometer on the front panel.

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 breakdown's by applying a high voltage between the Output and Return receptacles on the front panel. The HT-20KVPac uses a separate high-frequency circuit to detect arc breakdowns.

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-20KVPac 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-20KVPac has an internal circuit designed to remove the high voltage, after completion of the dielectric withstand test. The HT-20KVPac should remain connected to the circuit until the front panel meter shows that the output voltage has dropped to a safe level.

Section 3

Introduction and Specifications

This manual contains complete operating and specifications for the HT-20KVPac Dielectric Withstand Tester.

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

The HT-20KVPac features automatic two buttons operation, with numerous safety features designed to protect the operator:

- The test return lead is directly connected to ground potential for operator safety.
- The test can be immediately terminated at any time by pressing the red **RESET** button.
- Before the test can commence, the unit must be armed by pressing the red **RESET** button. The test will not begin until the blue **TEST** Button is pushed.
- If a failure is encountered, the high voltage is immediately shut down, a buzzer sounds and the voltage discharge progress is shown by the front panel meter.
- Failure modes are shown by the front panel LED's.

Convenience and testing features include:

- Voltage ramp, test time, and leakage limit are settable.
- Voltage ramp, and test duration timer are defeatable for specialized testing.
- Testing may be terminated or continued when a dielectric breakdown is detected.
- Test results are determined quickly, without operator intervention.
- The HT-20KVPac allows custom setups for voltage ramp, test time and leakage limit.

Your Tester has a warranty for a period of one year upon shipment of the instrument to the original purchaser.

Specifications

ELECTRICAL	
Voltage Output	0 - 20,000 Vac
Leakage Current	Adjustable from 1 to 5mA in 0.1mA steps
Max Leakage Current Output	5mA from 0 – 20,000V
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 to 60 sec. 1 sec steps, defeatable
Voltage Ramp-up Time:	User adjustable 1-5 sec., defeatable
Voltage Meter Accuracy	±0.1KV full scale
Leakage Meter Accuracy	±0.1mA full scale
Duty cycle	100 %
Test adjustments	Front Panel: Ramp Time Test Time Leakage Limit Voltage Adjustment Ramp ON/DEFEAT Timer ON/DEFEAT Hipot ON/DEFEAT
ENVIRONMENTAL	
Operating Temperature	15-40°C
Relative Humidity Range	0-90% non-condensing
GENERAL	
Input power requirements	120 volts, 50/60 Hz, 2A max
Weight	42 lbs (packaging +10lbs)
SAFETY AGENCY TOPICS	
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 Test can be automatically terminated on failure
Leakage Test	Provided; 5 mA AC factory set pass/fail point, user adjustable.

Table 3-1. HT-20KVPac Specifications

Section 4

Operation

This section describes how to set up and make measurements with the HT-20KVPac unit. We recommend that you read the entire section carefully so that you can use all of its features.

Setting up the HT-20KVPac

The HT-20KVPac is shipped in a special protective container that should prevent damage during shipping. The container will include the following:

- The HT-20KVPac 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


18 AWG Line Power Cord	GL Return Test Lead	Red 18 AWG High Voltage Test Lead
		

Table 4-1. Shipment Cables & Connectors

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.

AC Line Voltage Requirements and Fuse Replacement

Connect the HT-20KVPac only to the voltage source indicated on the rear panel.

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 being replaced.

Front and Rear Panel Features

Before using the HT-20KVPac tester, take a few minutes to become familiar with the use of its controls, indicators, and connectors. The front panel features of the HT-20KVPac are shown in Figure 4-1 and described in Table 4-2.

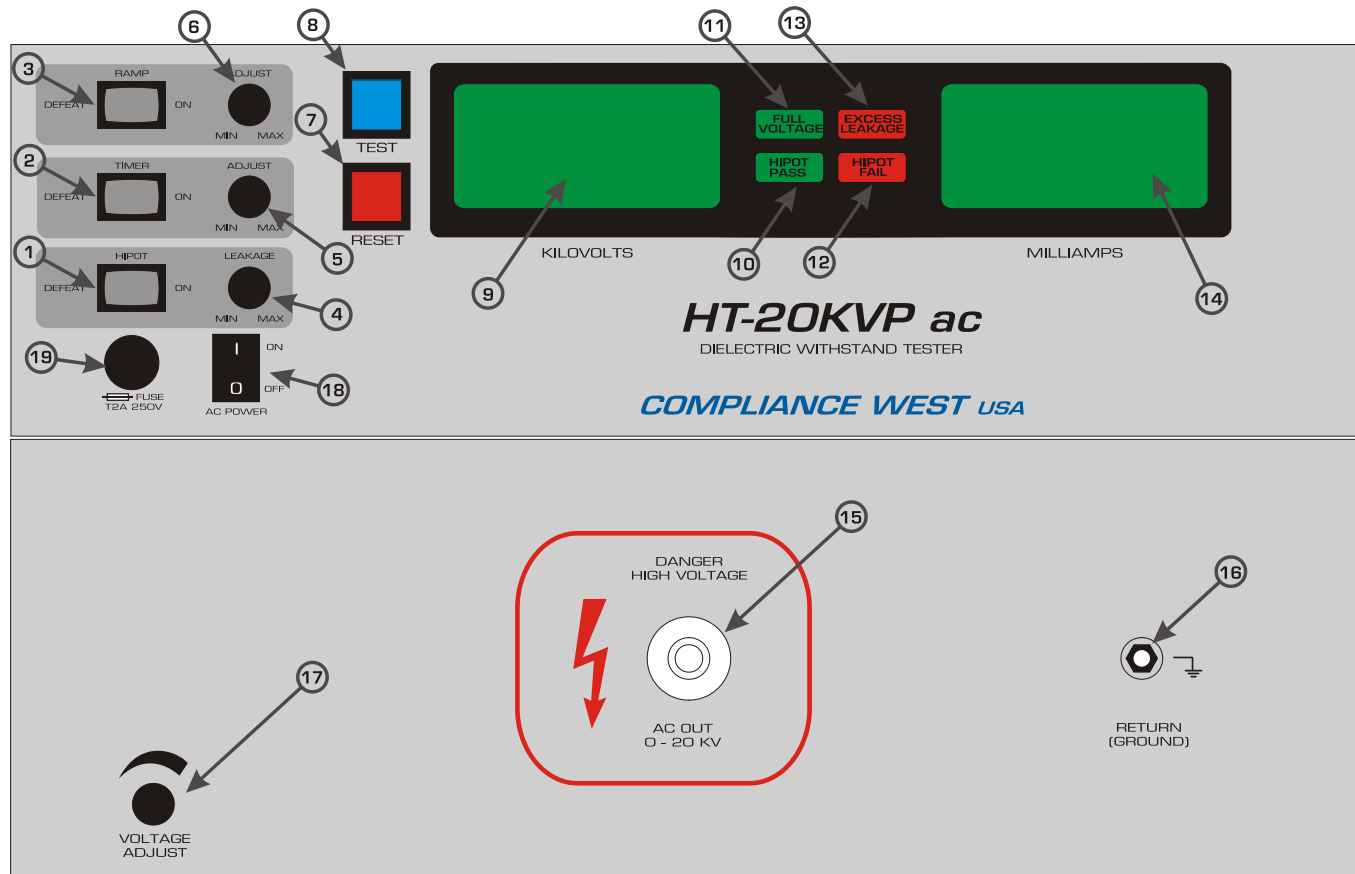


Figure 4-1. Front Panel Controls, Indicators and Connectors

ITEM NO.	NAME	FUNCTION
1	HIPOT	When ON, Dielectric breakdown detect will be activated. When in DEFEAT position, test will continue regardless of a dielectric breakdown, but it can be stopped by the excess leakage limit. NOTE: The RAMP switch, and TIMER switch must also be in the DEFEAT position, otherwise the buzzer will sound. The test will continue only as long as the TEST button is pressed. Minimum test time is approximately one second.
2	TIMER	When ON, test duration is set by TIMER ADJUST, Item 5. When in DEFEAT position, testing continues only as long as TEST button is pressed. Minimum test time is one second. NOTE: TIMER Switch position must be DEFEAT when HIPOT Switch is in the DEFEAT position.
3	RAMP	When ON, Voltage ramp up time is controlled by RAMP ADJUST potentiometer, Item 6. When in DEFEAT position, high voltage is applied immediately when TEST button is pressed. NOTE: RAMP switch position must be DEFEAT when HIPOT switch is in the DEFEAT position.
4	LEAKAGE ADJUST	Adjusts the shutdown point for the Leakage Current Test. For details see "Leakage Current Adjust."
5	TIMER ADJUST	Adjusts the test duration. For details see "Test Time Adjust".
6	RAMP ADJUST	Adjusts the delay between time TEST button is pushed and time desired output voltage is attained. For details see "Ramp Time Adjust". For no delay, DEFEAT Ramp Time Switch, Item 3.
7	RESET Button	When lit, indicates that the HT-20KVPac is unarmed. When the RESET button is pressed, the TEST switch is lit. PRESSING THE RESET BUTTON AT ANY TIME IMMEDIATELY STOPS TESTING.
8	TEST Button	When lit, indicates the HT-20KVPac is ready to test; press to begin testing.
9	VOLTAGE METER	Connected to the output. Reads actual output voltage. Adjust meter range with VOLTAGE ADJUST Knob, Item 17.
10	HIPOT PASS LED	Indicates test conclusion with satisfactory results.
11	FULL VOLTAGE LED	Lights when output voltage has ramped up. Test time starts when this indicator lights.
12	HIPOT FAIL LED	Lights when arcing or insulation flashover has occurred.
13	EXCESS LEAKAGE LED	Actual leakage current has exceeded the shutdown point set with Shutdown Limit Potentiometer, Item 4.
14	CURRENT METER	Connected to the output. Read the current flowing through the return lead of the HT-20KVPac during the test.
15	AC OUTPUT Receptacle	Connect high voltage lead here to conduct an AC test.
16	RETURN Receptacle	At chassis ground reference level. Connect black return lead here.
17	VOLTAGE ADJUST Knob	Voltage is continuously adjustable during testing with this knob.
18	AC POWER Switch	Energizes the HT-20KVPac.
19	FUSE	Mains fuse. Replace only with type, and rating of fuse specified on the front panel label. Turn off power switch, Item 18, before servicing fuse.

Table 4-2. Front Panel Control, Indicators and Connectors

Initial Checkout Procedure

Use this procedure to verify that the HT-20KVPac tester is working correctly. Refer to table 4-1, figure 4-1 and table 4-2 for location of items.

CAUTION

High voltage, risk of shock, use with care.

1. Turn the Tester on using the AC Power switch.
2. Set the Voltage Ramp switch, Test Timer switch, and Failure Shutdown switch to ON position.
3. Disconnect leads from the Output and Return jacks.
4. Set the Test Time to 30 seconds.
5. Push the RESET button. The TEST button should light.
6. Push the TEST button.
7. The HT-20KVPac tester 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 Adjustment knob. At the end of the test, the Full Voltage, Hipot Pass, and RESET switch indicators should be lit.
8. Connect the red lead to the Output receptacle, and the black lead to the Return receptacle.
9. Connect the two leads together to simulate a high leakage current condition. Push the RESET button and then push the TEST button.
10. 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.
11. Leaving the red and black leads connected together, disconnect the red lead from the HT-20KVPac.
12. 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.
13. Verify that the red and black leads are connected together, the black lead is connected to the Return receptacle, and the red lead is disconnected from the HT-20KVPac.
14. (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 red lead and insert it into the HV Output. The test will immediately terminate with a buzzer. The Full Voltage, Hipot Fail, and RESET button indicators should be lit.
15. Adjust the voltage and time to the desired settings

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-20KVPac for Laboratory Testing

This section describes procedures for setting the HT-20KVPac tester.

- 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 table 4-1, figure 4-1 and table 4-2 for location of items.

Factory Settings

The HT-20KVPac is configured as shown when shipped from Compliance West USA:

Voltage Type:	AC
Voltage Display:	Vrms
Leakage Current Level:	1mA
High Voltage Ramp Time:	Minimum
High Voltage Level:	Minimum
High Voltage Test Time:	1 second
Voltage Ramp switch:	ON
Test Timer switch:	ON
Breakdown Detect switch:	ON

Display of Leakage Limit and Duration Settings

To view the Test Duration, and Leakage Limit current settings, hold down the **RESET** button for 2 seconds. The meter will display “L” with the Leakage Limit value in mA. Hold down the **RESET** button again for 2 seconds, and the meter will display “d” with the Test Duration set time in seconds.

Leakage Current Level Adjust

1. Connect the HT-20KVPac to a correctly rated source of supply and turn ON the tester.
2. Push the **RESET** button. The **TEST** indicator should light, indicating that the HT-20KVPac is ready.
3. Turn the **Leakage Limit Adjust**. As soon as the potentiometer starts turning, the voltage meter will start blinking and displaying “L” with the new value. Leakage Level can be set in 0.1 mA increments.

Ramp Time Adjust

This procedure sets the high voltage ramp time between 0.5 and 5 sec. The factory setting of one second is adequate for most situations.

1. Make sure there are no test leads connected to the Tester.
2. Set the Voltage Ramp Switch to ON.
3. Set the Test Timer Switch to ON.

4. Set the Failure Shutdown 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 Time Potentiometer to change the ramp time. Repeat until the desired Ramp Time is set.

Voltage Adjust

This procedure controls the high voltage level used in the dielectric withstand test. The HT-20KVPac is factory set for minimum voltage 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 Voltage Ramp Switch to ON.
3. Set the Test Timer Switch to DEFEAT.
4. Set the Failure Shutdown Switch to ON.
5. Turn the Voltage Adjust knob to minimum (counterclock wise)
6. Push the RESET button.
7. Push and hold the TEST button. Voltage will be supplied while the TEST button is pressed.
8. After the FULL VOLTAGE indicator lights, use the Voltage Adjust knob to set the desired output.
9. Release the TEST button to terminate the test.

High Voltage Test Time Adjust

This procedure sets the length of time the HT-20KVPac will conduct the high voltage test. The test time is specified by the safety agencies, and is tied to the test voltage. Most safety agencies will allow a much shorter test (usually 1 second vs. 1 minute) if the voltage is increased by 20%. The factory set is for 1 second. Consult the safety agencies on the test time for the type of equipment being tested. If a different test time is required, use this procedure to set it.

1. Connect the tester to a correctly rated source of supply and turn ON the power switch.
2. Push the **RESET** button. The **TEST** indicator should light, indicating that the HT-20KVPac is ready.
3. Adjust the **Test Time** potentiometer. As soon as the potentiometer starts turning, the voltage meter will display “d” with the new value. Test Time can be set in 1 second increments from 1 to 60 seconds.

Setting the Voltage Ramp Switch

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

When this switch is in the ON position, the voltage ramps according to the setting of the Ramp Potentiometer. See adjustment instructions above. The Voltage Ramp Switch must be defeated if Shutdown Limit Defeat is desired. See Table 4-3 for details.

Setting the Test Timer Switch

The Timer Control switch allows test time to be controlled by the HT-20KVPac 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-20KVPac 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 4-3 for details.

Setting the Failure Shutdown Switch

Use extreme caution when using this feature

The Breakdown Detect switch allows the operator to continue testing after a failure is encountered. This allows the operator to find the breakdown point, but **all arc shutdown circuitry in the HT-20KVPac is disabled when the Breakdown Detect switch is in the DEFEAT position.** The excess leakage limit may stop the test. Also the tests may be terminated at any time by releasing the TEST button.

WARNING: Testing with the Shutdown Limit switch in the DEFEAT position is extremely hazardous. The HT-20KVPac 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-20KVPac is operating.

Operating Techniques

The following paragraphs describe how to operate the HT-20KVPac Dielectric Withstand Tester.

CAUTION:

High voltage is generated by the HT-20KVPac. Although the chassis of the equipment under test is grounded by the HT-20KVPac, a risk of shock exists.

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-20KVPac 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 Output receptacle.
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, the TEST button should light, indicating that the HT-20KVPac is ready to test.

6. Push the TEST button. The HT-20KVPac 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 4-3 are met, the HT-20KVPac will continue to test. Voltage output may sag if the power required by the circuit is beyond the capabilities of the HT-20KVPac.
8. If the Timer Control switch is set to ON, the HT-20KVPac 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 an 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 be removed.
 - The Shutdown Limit switch is set to DEFEAT, and the requirements of Table 4-3 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 be removed at the end of the test, 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 ended, and the voltage meter indicates zero 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: 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, a DC hipot tester may be required
2. Ramp Time: May be set too fast. A very fast ramp time may allow input capacitors to act as short circuits, triggering a Leakage Current Fail light and terminating the test. Consider to have a slower Ramp Time, by increasing the time; see **Ramp Time Adjust**.

RAMP	TIMER	HIPOT	Result
ON	ON	ON	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.
DEFEAT	ON	ON	Voltage Ramp is defeated. 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.
ON	DEFEAT	ON	Test Timer is defeated. 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.
DEFEAT	DEFEAT	ON	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.
ON	ON	DEFEAT	Buzzer will turn sound, It will not allow to test until all the switches are in defeat.
DEFEAT	ON	DEFEAT	Buzzer will turn sound, It will not allow to test until all the switches are in defeat.
ON	DEFEAT	DEFEAT	Buzzer will turn sound, It will not allow to test until all the switches are in defeat.
DEFEAT	DEFEAT	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-20KVPac 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 Leakage knob, will cause the HT-20KVPac to shut down.

Table 4-3: Front Panel Switch Truth Table

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 contains maintenance information for the HT-20KVPac Dielectric Withstand Tester. A 1-year calibration cycle is recommended to maintain the specifications given in Section

Service Information

The HT-20KVPac 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.

The manufacturer is also available for calibration and/or repair of instruments that are beyond their warranty period. Contact the manufacturer for a cost quotation. Ship the instrument and your remittance according to the instructions given by the manufacturer.

Cleaning

CAUTION

Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastic materials used in the instrument.

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).

Calibration Procedure

The Calibration Procedure should be performed annually and any time your instrument has been repaired. The calibration procedure consists of the next sections:

- 1) Entering Calibration Mode.
- 2) Calibration and Software Version Information.
- 3) Voltage Meter Verification.
- 4) Voltage Meter Re-calibration.
- 5) Leakage Meter Verification.
- 6) Leakage Current Re-Calibration.

NOTE

Allow the instrument to stabilize for approximately five minutes. Perform all calibration adjustments at an ambient temperature of 23°C ±5°C (73°F ±9°F).

WARNING

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

Entering Calibration Mode

NOTE

Only enter into this mode if the HT-20KVPac unit needs a re-calibration on any of the parameters of Voltage Meter or Leakage.

1. Turn Off the HT-20KVPac unit.
2. Hold in both the **Test** and **Reset** buttons.
3. Turn On the HT-20KVPac unit.
4. Release the **Test** button, release the **Reset** button, press and hold the **Reset** button, press and hold the **Test** button, release the **Test** button, and then release the **Reset** button.
5. If the correct sequence was entered, the display will read "Sure", if not, start over at step 1.
6. While "Sure" is displayed on the screen you can:
 - 6.1 Press **Reset** to exit out of the **Calibration Mode** and keep all of the currently programmed calibration settings, or.
 - 6.2 Press **Test** to enter the **Calibration Mode** and create new calibration settings. (Be sure you want to enter the **Calibration Mode** as this will change the laboratory number so it will show the calibration was not performed by Compliance West USA).
7. Once the **Calibration Mode** has been entered, the **Reset** button toggles between the calibration menu: Volt, V1, V2, L1, L2, and bars.

Calibration and Software Version Information

This will allow the user to see the version of the software as well as who performed the last calibration.

1. Turn off the HT-20KVPac tester.
2. Hold in the **Reset** button while turning on the tester.
3. The meter will display 3 items:
 - A) The model number of the tester.
 - B) The version of the software
 - C) Laboratory number to designate who performed the last calibration:
(1= Compliance West USA, 2= another company)

Voltage Meter Verification

1. Turn Off the HT-20KVPac unit.

2. Turn the Voltage Adjust to minimum.
3. Set up a 1000:1 probe with an external volt meter as is shown on Figure 5-1.
4. Turn On the HT-20KVPac unit.
5. Press the Test button and turn up the Voltage Adjust to compare the front meter of the HT-20KVPac unit vs. the external volt meter, tolerance must be +/-0.1KV full scale.
6. If one value is out of the specified tolerances, the HT-20KVPac unit needs a voltage meter re-calibration. Follow the Voltage Meter Re-Calibration procedure.

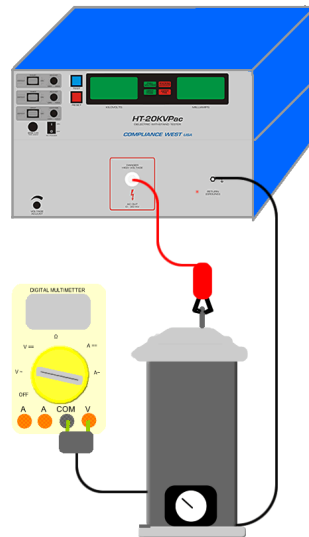


Figure 5-1. Voltage Measurement with 1000:1 High Voltage Probe

Voltage Meter Re-Calibration

1. Turn Off the HT-20KVPac unit.
2. Set up a 1000:1 probe with the volt meter as is shown on Figure 5-1.
3. Enter to **Calibration Mode**. See Entering Calibration Mode procedure.
4. Select the top calibration voltage point by pressing the **Reset** button until V1 is shown on the front display of the HT-20KVPac unit.
5. Turn the Voltage Adjust on the front panel to minimum (counterclockwise). Press the **Test** button and a voltage number will be displayed on the front panel meter (16.00 for AC). Be careful as the HT-20KVPac will be putting out voltage at this point.
6. Turn the Voltage Adjust on the front panel clockwise until the output on the external voltage meter equals the number showed on the front meter of the HT-20KVPac unit, then, press the Test button to record the new top calibration voltage point in the internal memory. The front display on the HT-20KVPac unit will show "V1" again.
7. Select the bottom calibration voltage point by pressing the **Reset** button until V2 is shown on the front display of the HT-20KVPac unit.
8. Turn the Voltage Adjust on the front panel to minimum (counterclockwise). Press the **Test** button and a voltage number will be displayed on the front panel meter (01.00). Be careful as the HT-20KVPac will be putting out voltage at this point.
9. Turn the Voltage Adjust on the front panel clockwise until the output on the external voltage meter equals the number showed on the front meter of the HT-20KVPac unit, then, press the Test button to record the new bottom calibration voltage point in the internal memory. The front display on the HT-20KVPac unit will show "V2" again.

10. Turn Off the HT-20KVPac tester.
11. Confirm the new voltage meter calibration performing again the Voltage Meter Verification procedure, mentioned before.

Leakage Meter Verification

1. Turn Off the HT-20KVPac unit.
2. Connect the output of the HT-20KVPac through a 100 watt high voltage load resistor (60k Ω) in series with an external current meter returning to the Return jack on the front panel of the HT-20KVPac as is shown on figure 5-2.
3. Turn the Voltage Adjust to minimum.
4. Turn On the HT-20KVPac unit.
5. Turn the Leakage Limit potentiometer to the maximum.
6. Press the Test button and slowly turn up the voltage comparing the leakage current on front meter with the external meter. Reading on the external meter should be +/- 0.1mA.
7. If one value is out of the specified tolerances, the HT-20KVPac unit needs a leakage current re-calibration. Follow the Leakage Current Re-Calibration procedure.

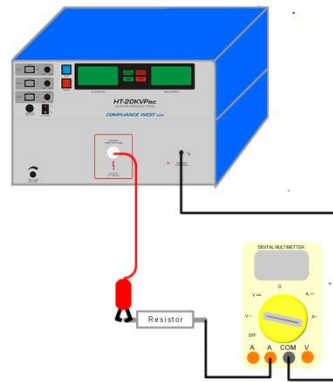


Figure 5-2. Current Measurement with 100 W High Voltage Resistor.

Leakage Current Re-Calibration

1. Turn Off the HT-20KVPac unit.
2. Connect the output of the HT-20KVPac through a 100 watt high voltage load resistor (60k Ω) in series with an external current meter returning to the Return jack on the front panel of the HT-20KVPac as is shown on figure 5-2.
3. Enter to **Calibration Mode**. See Entering Calibration Mode procedure.
4. Select the top calibration leakage point by pressing the **Reset** button until L1 is shown on the front display of the HT-20KVPac unit.
5. Turn the Voltage Adjust on the front panel to minimum. Press the **Test** button and a leakage number will be displayed on the front panel meter (5.0). Be careful as the HT-20KVPac will be putting out voltage at this point.

6. Slowly turn the Voltage Adjust on the front panel clockwise until the current flowing on the external current meter (mA scale) equals the number showed on the front meter of the HT-20KVPac unit, then, press the Test button and the front display will show “hold” for a few seconds, wait until the front display show again "L1" again.
7. Select the bottom calibration leakage point by pressing the **Reset** button until L2 is shown on the front display of the HT-20KVPac unit.
8. Turn the Voltage Adjust on the front panel to minimum. Press the **Test** button and a leakage number will be displayed on the front panel meter (1.0). Be careful as the HT-20KVPac will be putting out voltage at this point.
9. Slowly turn the Voltage Adjust on the front panel clockwise until the current flowing on the external current meter (mA scale) equals the number showed on the front meter of the HT-20KVPac unit, then, press the Test button and the front display will show “hold” for a few seconds, wait until the front display show again "L2" again.
10. Turn Off the HT-20KVPac tester.
11. Confirm the new leakage current calibration performing again the Leakage Current Verification procedure, mentioned before.

Section 6

Technical Assistance

Technical Assistance from Compliance West USA is available:

Phone: (800) 748-6224

Hours: 8:30 AM - 4:30 PM Pacific Time.

Also available on our web site at: **www.compwest.com**

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