

POWER FREQUENCY HIGH VOLTAGE TESTER



INSTRUCTION MANUAL



شركة الإنشراح للإمدادات الكهربائية (ذ.م.م.)

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CONSTRUCTION:

The high voltage Breakdown tester is simple in construction and broadly consists of 3 sections-

- 1) High Voltage Transformer
- 2) Controlled Supply to H.V Transformer
- 3) Control Circuit to cut-off H.V Transformer supply In case of over current

1) High Voltage Transformer:

3kV & 5kV High Voltage Transformers are air cooled dry type and are of double wound, resin moulded construction. The H.T winding is provided with graded insulation such that one end is insulated for 2kV insulation whereas other end is insulated at full rated voltage at full rated voltage and the same is brought out through H.T Cable and Prod. The 2kV insulated end is earthed through a current sensing transformer and milliammeter.

2) Controlled supply to H.V Transformer:

Controlled supply is provided through a continuously and steplessly Variable Voltage Auto Transformer having a suitable rating. All Variable Voltage Auto Transformers are rated 230V AC input and 0-270V output. The current rating of the same is decided by actual kVA rating of Transformer. Limit switch at extreme Zero end of Variable Voltage Auto Transformer winding is provided to facilitate the H.T to energise only when Variable Voltage Auto Transformer is at zero position.

3) Control Circuit to Cut-off H.V Transformer:

A Current sensing transformer primary winding with required current tap (standard taps of 5mA, 10mA, 20mA, and 30mA for 3kV Unit and 5mA, 10mA, 50mA and 100mA for 5kV Unit) is connected in series with the H.T winding at 2kV insulated end, The secondary winding supplies D.C voltage after rectification through Full Wave Rectifier to tripping relay. The NC contact of tripping relay is connected in series with the holding coil of main contactor. When current through the primary winding exceeds the set tap value of tripping transformer, the tripping relay actuates and supply to the hold coil of main contactor is disconnected. This isolated the supply to the H.V transformer.

OPERATION:

230V A.C supply is given through 3 pin cable to Variable Voltage Auto Transformer through single pole M.C.B. When M.C.B is switched ON supply to Variable Voltage Auto Transformer is given and same is indicated by Green L.E.D which is connected across the Variable Voltage Auto Transformer.

The supply to the hold coil of Relay is given through a 'NO' contact of Micro switch and NC contact of the current tripping relay. When Variable Voltage Auto Transformer is at zero position the arm of the Variable Voltage Auto Transformer shall press the Micro switch tab to close the 'NO' contact. This is also indicated by Green Neon Lamp labelled as 'DIM ZERO'. Now if H.T push button is pressed the supply is fed to relay hold coil. The continuous holding of the Relay is achieved by giving supply to the Hold Coil through one of the self 'NO' contact of Relay and in series with 'NC' contact of tripping relay.

Once the H.T push button is pressed, the output supply of Variable Voltage Auto Transformer gets connected across the primary terminals of the High Voltage Transformer. Now voltage can be increased by manually turning the knob of Variable Voltage Auto Transformer in clock-wise direction. The analogue voltmeter having full scale deflection of 230V is connected across the primary winding which reads the output H.T Voltage, calibrated at no load. The Milliammeter will indicate the H.T current.

INSTALLATION:

- 1) Unpack the unit carefully and check for any transit damage. If no damage is observed, install the H.V Tester in a cool dry place free from acid fumes and vibrations. The 3kV/5kV H.V tester is portable and table mounted type model.
- 2) Though the case of H.V Tester is connected to earth through supply cable, for additional safety, connect external casing of H.V Tester to earth by suitable earth wire.

- 3) Connect the H.V Tester to supply board with the help of 3 pin cable provider.
- 4) Switch 'On' the supply with the help of MCB. The Green LED marked 'MAINS ON' shall light 'ON'.
- 5) Ensure that the Variable Voltage Auto Transformer Knob is at extreme zero position. This will be indicated by Green Neon Lamp. Press the 'HT ON' Button. The red led should right 'ON'.
- 6) Short the H.T Prod (Red) to earth terminal provided on the case of short H.T Prod with earth Prod (Black) to check tripping circuit.
- 7) Switch 'ON' Main Supply and made H.T. "ON" as described above.
- 8) Increase output voltage slowly by manually turning the knob in clockwise direction. This will start circulating H.T. current in the H.T circuit and when it exceeds 5mA, the supply will trip-off by indicating 'H.T ON' RED LED OFF. (Confirm the tripping setting is at 5mA).
- 9) For most of the applications of insulation testing the leakage current of insulation is very low. Therefore the tripping set point is set at lowest (generally at 5ma) set point. however, one can select any tripping setting available as per application required. For this purpose, change the position of tripping selection knob provided on the front panel. Selected tripping setting shall be indicated by small red LED situated just above the knob.
- 10) If different H.T. current setting is selected, check for the tripping as indicated above before using H.V Tester for testing purpose.
- 11) Now your Test Set is ready for operation.

PRECAUTIONS:

- 1) It is always desirable to connect the test object to H.V Tester first (Precaution must be taken to connect always live part of the object to H.T Terminal of tester and earth part to earth of the H.V. Tester and then the voltage should be increased slowly. However, for protection purpose, one can set test voltage value on H.V. Tester and the high voltage can be directly applied to test object with the help of Test Prods. The live parts of the Test Prods are covered in normal position and are exposed when the sliding switch is pulled back. (This method should be restricted for the objects having low leakage current only.)
- 2) Object having large capacitive value of the insulation can draw high charging current instantaneously when high voltage is connected directly and may exceed the pre-set value to trip-off Tester giving false indication of insulation failure.
- 3) Always bring voltage to zero before switching off the supply as sudden disconnection of H.T supply may develop surge voltage.

LIST OF COMPONENTS

Sl. No.	Name of Components	Qty (Nos.)
01.	M.C.B.	01
02.	Push Button	01
03.	Voltmeter	01
04.	Milliammeter	01
05.	Auto Transformer	01
06.	Indicating LED	06
07.	High Voltage Transformer	01
08.	Tripping CT	01
09.	Tripping Relay	01
10.	Diodes	06
11.	Main Relay	01
12.	Zero Interlocking Switch	01
13.	Input Cable	01
14.	Power Supply for LED	01
15.	Tripping Selection Switch	01
16.	Test Prods	02

TROUBLE SHOOTING:

Repair must be done by responsible Licensed Electrician Only as Equipment deals with High Voltage.

- 1) Supply do not appear after M.C.B switched to 'ON':
 - a) Check the supply in supply board
 - b) Check the continuity of the cable
 - c) Check the continuity of M.C.B. while in 'ON' position.
 - d) check the mains 'ON' LED.
- 2) H.T do not energise when HT 'ON' press button PRESSED:
 - a) Check the resistance between two poles of HT On push button when Variable Voltage Auto Transformer is at zero position, it should indicate equivalent resistance of the path which is approximately 9800 ohms. If discontinuity is observed, check for continuity as explained under following points:
 - i) if resistance value is comparatively less or higher than the required, relay coil must be shorted or open circuited. Check the coil individually and if found defective. Replace the Relay.
 - ii) If resistance values are correct, press the 'HT ON' Push button. Resistance values should become Zero. If not, replaced 'HT ON' Push button.
 - b) Check continuity between common pole and 'NO' POLE of Variable Voltage Auto Transformer zero micro switch by pressing micro switch tab. If you do not get continuity replace the micro switch. If you get continuity bring the Variable Voltage Auto Transformer to zero position. The arm of the Variable Voltage Auto Transformer should press the micro switch tab firmly to indicate continuity between common pole and NO pole. If you don't get continuity, readjust the alignment of the micro switch such that the micro tab must be pressed firmly when Variable Voltage Auto Transformer is at Zero position.
 - c) Check the 'HT ON' LED. 'HT' may be getting energised but not indicated by L.E.D. If found defective, placed the L.D.D.
- 3) H.T becomes 'ON' when HT button pressed but not hold if button is released.
 - a) Check the Continuity of the NC contact of contact of tripping relay. If you do not get continuity, change the Relay.
 - b) Check for the continuity between 'HT ON' press button pole to main relay hold on contact pole. Also between the other poles of the relay and relay coil.
 - c) Check for the continuity between relay contact used for hold purpose by giving auxiliary supply to relay coil. If continuity is not observed, replace the relay.
- 4) H.T is 'ON' but no output supply:
 - a) Check the continuity of the HT & LT winding of the main H.V Transformer.
 - b) Check the continuity of prods. Check the connections from H.T point of the transformer to the prod.
 - c) Remove the connection from the LT winding of main H.V. Transformer. Check the voltage across these two removed wires by making 'HT ON' and raising the voltage. If voltage do not appear, check the voltage at Variable Voltage Auto Transformer output terminals A & E. Then at input terminals of Relay poles and output terminals of relay. Remove any discontinuity, if found. Also check for the brush contact on the Variable Voltage Auto Transformer.
 - d) Check the KV meter. If found defective, replace it.
- 5) H.T do not trip off when HT terminal is shorted:
 - a) 1K-ohm fixed resistor provided for fine adjustment of tripping on PVB of tripping CT may have short circuited. Replace, if found shorted.
 - b) Check the continuity between H.T winding and earth.
 - c) No H.T output supply (Refer clause No. 4 above). This can be checked by any voltmeter across H.T winding. (Care must be taken as very small movement of variable voltage auto transformer will give comparatively high voltage output.)
 - d) Check the tripping circuit diode and tripping relay coil.