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SPECIFICATION.....

**“NTPL” MAKE
MICRO-CONTROLLER BASED AUTOMATIC
50KV/10A AC HIGH VOLTAGE TEST SET
SERIES: ACHVOCAU
TYPE: 050K10A-5mins**

The above automated test equipment is suitably designed and manufactured to test AC High Voltage Power Frequency (HVPF) dielectric withstand test on all type of electrical equipments like transformer, motor, generator, switchgear, cable etc. for which the testing requirement is within the output scope of this test set. The set is capable of giving continuously variable High voltage from zero to 50 KV AC.

TECHNICAL FEATURES

- Input** : 415 Volts $\pm 10\%$, 50 Hz $\pm 5\%$, 1 Phase (Between two phase of three phase system) AC.
- Output** : Continuously variable 0 to 50 KV AC.
- Capacity** : 10A max. at HT side.
- Duty Cycle** : 5 mins. ON, 10 mins. OFF, Continuous at 5A.
- Overall Accuracy** : $\pm 1.5\%$ or better.
- Impedance** : Not more than 8%.

Operation Control : Microcomputer based automatic control (programmable test voltage, test current, test duration, rate of rise, ramp and dwell control, automatic controls of motorized voltage regulator).

- **Over load Tripping adjustment:** Over the range of 500mA to 10A.
- Over Voltage Indication & Interlock Protection will be provided.

GENERAL ARRANGEMENT

The above test kit will be in multiple units i.e.

- **Power Mains Control Panel with Air Circuit Breaker**
- **Microcontroller Based Automatic Control Unit**
- **Regulator**



- **Reactor**
- **AC HV Transformer**
- **HV Potential Divider**

All the above units will be provided with wheels and lifting arrangement for easy movement.

1. POWER MAINS CONTROL PANEL WITH AIR CIRCUIT BREAKER

Power Mains ON – OFF operation is done by means of an Air Circuit Breaker which is coupled to the over current trip circuit, under voltage trip circuit and other protective device like zero start interlock, over current protective device at LT side, Reactor over current protection circuit. An auxiliary main ON/OFF circuit with fuse arrangement is provided for control circuit only.

2. MICROCONTROLLER BASED AUTOMATIC CONTROL UNIT

- Power ‘MAINS ON’ lamp indication.
- Control ON-OFF switch along with ‘CONTROL ON’ lamp indication & fuse protection.
- Isolation transformer for control operation, auxiliary supply to meters and power supply for electronic PCBs.
- ‘HT’ ON-OFF push button along with ‘HT ON’ lamp indication and ‘EMERGENCY OFF’ mushroom type push button.
- Lamp Indication on ‘REGULATOR NOT AT ZERO’, ‘TEST PROGRAM START’, ‘END of TEST’ & ‘TEST FAILURE’.
- Audio alarm for ‘OVERVOLTAGE’, ‘END OF TEST’ & ‘TEST FAILURE’.
- INCREASE/DECREASE circuit to control motor operated Voltage Regulator. When high voltage test circuit is switched ON the regulator will rotate to increase the output test voltage at preset speed up to the preset test voltage level.
- Max. HV test level can be adjusted at any value between 5 to 50KV. After reaching the set voltage the Regulator will stop and one lamp will indicate such event.
 - 1) Electronic control circuitry will be capable to control.....
 - 2) Rate of Rise : At the variable rate of 0.5KV/Sec to 2KV/Sec. in steps of 0.5KV/Sec
 - 3) Rate of Fall: At the fixed rate of 2KV/Sec.
 - 4) Dwell Time : a) Automatic Mode : From 30 Sec. to 300 Sec. in steps of 30 Sec
 b) Manual Mode : Operator specific within specification limit.
- Zero start interlocking will be provided to ensure that HV circuit cannot be energized unless the regulator is initially kept or brought back to zero position.



- Automatic tripping mechanism for protecting the HV transformer against over loading. The tripping mechanism can be adjusted at values as mentioned above. On tripping the last applied test voltage will be latched & indicated in the LCD. In addition to that, a protective device against overloading will be provided in the regulator output side and that will be set at maximum permissible loading in the regulator output side. These protective devices will be coupled to the Mains Air Circuit breaker unit. ON tripping, High Voltage will be switched OFF.
- HV Test Equipment & sample under test should be kept within an enclosure. Enclosure interlocking will be provided i.e. high voltage circuit cannot be energized unless the door of the enclosure is closed. However, this interlock can be by-passed by shorting corresponding terminals.
- One LCD display and key pad will be provided to set programs. This LCD will indicate the following:
 - Current at the input side
 - Output HV
 - Current at the HT side
 - Reactor current
 - Rate of Rise
 - Test Duration
 - Protective status/error message (if any, Over Voltage, Over Current, Regulator Over Run, Trip)

The whole control circuitry will be housed within a sheet metal cabinet with proper treatment and powder coated.

3. REGULATOR

Continuously variable motorised voltage regulator of suitable capacity & control circuitry will be provided to increase & decrease the test voltage. Minimum & maximum position interlock will be provided so that limit switch will automatically disconnect Increase/Decrease circuit of motor connection at maximum and minimum position respectively.

Over voltage protection i.e. in case the output voltage crosses the maximum rated value a buzzer will indicate over voltage and the increase mode circuit will not function further, even if 'INCREASE' push is pressed.

4. REACTOR

The device or component under testing being mainly capacitive a Reactor is required to avoid too low power factor as well as for compensating the mains supply current. The Reactor unit is a combination of Shunt Reactor along with a Variable Reactor.

The range of Reactor setting can be done by brief manual link changeover arrangement. This Bank is so designed that the mains input current may be restricted within 40% of the rated input current.



The Variable Reactor will be motor controlled. Minimum & maximum position interlock for the Reactor will be provided so that limit switch will automatically disconnect 'INCREASE/DECREASE' circuit of motor connection at maximum and minimum position respectively.

Apart from the interlock facility overload tripping for the Reactor current will be provided.

5. HV TRANSFORMER

HV Transformer used in the test set will be oil natural cooled type and of suitable capacity. One end of the high voltage winding will get earth connection through a CT operated Ammeter & protective device while the other end will be connected to HT terminal. One end of the high voltage winding will get earth connection through an insulated bushing housed in a small separate cabinet at the side of LV Terminal Box. The HV point will be brought out through suitable porcelain insulator.

2 core CT will be provided at HV winding Neutral side of which 1st C.T will be able to measure HV side Current & 2nd C.T shall be used to trip Incomer Breaker beyond pre-set value of HV winding Current.

The transformer will be designed to withstand frequent intermittent spark over or short circuit conditions under which such testing transformers are designed to operate.

6. HV CAPACITIVE POTENTIAL DIVIDER

This is well known that for high capacitive loading the HV output may be more than the expected voltage i.e. voltage ratio of the transformer. Hence, HV measurement is very vital in this high capacity AC HV test set.

There will be a capacitive HV Potential Divider provided with low voltage arm. A UHF connector with co axial cable is used to connect a metering circuit (provided in the panel) to indicate High Voltage.

Rated max working voltage : 50KV AC rms.

Capacitance : 100pF (nominal)

The capacitor will be oil-cooled type, provided with corona guard and will be movable with wheels at bottom.

TEST MODES

In the Test Set two Test Modes are provided, a) Automatic & b) Manual. Before starting the test in either of the modes, the Operator has to select the following required fields,



- Test Voltage
- Test Current Limit
- Mode of Test (Automatic / Manual)
- Dwell Time (Only for Automatic Mode)

Automatic Cycle: In this mode the test sequence will run automatically when a push button located close to the operator is activated.

Manual Mode: In this mode increase in voltage up to the required level will be controlled by the operator pushing a button and holding until the required voltage is reached. In this mode the timing is operator dependent.

Programmable microcontroller system will measure the time duration of HV applied i.e. dwell time.

The Units will be powder coated except Regulator, HV Transformer, Reactor which will be coated with rust preventive paint.

ACCESSORIES

DISCHARGE ROD: In AC High Voltage test, after testing, the device under test is normally discharged through transformer winding. However, for device under test having large capacitance a discharge rod may be used and hence it is provided with the set.

POWER & INTERCONNECTING CABLES:

Power cables, interconnecting cables along with suitable plug & sockets will be provided. Multicore cables with due termination on multiway Terminal block will be supplied for interconnection between the units. Flexible earthing wire with yellow – green insulation will be provided.

DOCUMENTS:

Operation Manual, Works Test Report, Warrantee Certificate, Circuit diagram of each unit and total system will be supplied along with the set. Soft Copy of all the above documents including Circuit diagram of the system in CAD & PDF will be submitted in two CDs along with the system.

TESTS TO BE CONDUCTED AT NTPL WORKS DURING INSPECTION:

1. Programming features like Control sequential operation such as "ACB ON/OFF", "H.T. ON/OFF", "zero start interlock ", "Door Interlock" ,Regulator & Reactor motor, Control operation , "Increase/Decrease " operation for output voltage control, "Overvoltage" indication , 'Timer' function etc.

2. Performance verification of output voltage in open circuit condition.
3. Performance verification of output current in equivalent short circuit condition.
4. Overload tripping at equivalent short circuit mode.


