MAINS FREQUENCY SPARK TESTER

MODEL: STA – 15/ STA – 25/ STA – 30

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MAINTAINENCE MANUAL/ INSTRUCTION MANUAL

MAINS FREQUENCY SPARK TESTER STA-15/STA-25/STA-30

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LIST OF ABBREVIATIONS

1. M.F.S.T: MAINS FREQUENCY SPARK TESTER
2. AC: Alternating Current
3. kV: Kilo Volt
4. HV: High Voltage
5. NC: Normally Closed
6. NO: Normally Open
7. C: Common

STANDARDS REFERED

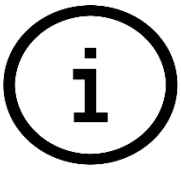
KAT make spark testers are compatible to IS: 10810 (PART 44)

1. SAFETY INSTRUCTIONS

This document contains the information necessary for wiring the product to its specifications. It is intended for specially trained Technician / Qualified Personnel who are well versed with the precautions to be taken, safety measures and maintenance activities. The product can be safely installed and commissioned. It functions without any problem if the safety instructions in Operation Manual are strictly observed.

WARNING

This means that personal injury or damage to property is caused unless appropriate safety measures are not taken.



NOTE

This draws your attention to important function about the product, handling of the product or to a particular section of the documentation

WARNING

When operating electrical equipment, some parts of the equipment always carry dangerous voltages. Ignoring these safety instructions and warnings may results in serious personal injury and / or damage to property.

Only a qualified person familiar with safety information, assembly operation, and maintenance instruction may carry out the work on this equipment.

The information below is for your safety and prevents damage to the described product or the other connected equipment.

2. QUALIFIED PERSONNEL

Only qualified people who know of assembling, commissioning, and operating the electronic components are recommended to handle this product.

APPROPRIATE USE

WARNING

You may use the equipment / system for the purpose specified in the operating instructions and in conjunction with the third-party equipment and components recommended as authorized. For thesafety reasons, you must not change or add the components on the equipment/ system.

1. Do not pass a wet wire through the electrode as it increases the load on the H.V. transformer. Also, moisture on the cable spoils the bead chains of the electrode. Hence, using a pneumatic wiper before SPARK TESTER is highly recommended.

2. Do not use the unit as a 'BREAK DOWN VOLTAGE TESTER' because in a steady-state condition, increasing the voltage applied to the cable increases the load on the SPARK TESTER.

3. The unit is meant to find pinholes and faults in the cable and not find the maximum voltage that the cable withstands.

4. Do not apply H.V. to non-moving cable. If the cable is stationary and H.V. is applied, the continuous application of high voltage losses in cable increases and the insulating material gets heated up. As a result, the voltage level that the cable can withstand lowers cable insulation and may finally get punctured.

5. There should not be physical vibration of wire. To dampen the vibration of the wire, mechanically use rollers before and after the H.V. unit.

6. Earthing of the complete unit is highly recommended.

7. Use rollers for guiding the cable with proper mechanical earth.

8. Apply suitable voltage to wire under test.

3. INSTALLATION

1. Mount the unit and Electrode Assembly in their respective locations. The electrode should be positioned so that the cable under test passes through the center of the electrode assembly

2. Potential free fault Relay contacts are provided at the rear side of the base of the mounting stand. These are designated as
   - N O (Normally open)
   - C (Common)

   The relay becomes ON in case of 'Fault,' i.e., 'NO' contacts are closed

3. Make sure that the unit is properly earthed.

WARNING

Earthing of the unit is mandatory. (Improper earthing may cause fatal accident.)

4. Connect the 230V AC mains power supply to L (Line) and N (Neutral). Connect E (Earth). Mains cord with 3-pin top is supplied with the unit

WARNING

The conductor of the cable under test should be earthed. For this purpose, connect the conductor to the metallic bobbin or spool on which it is wound. The metallic stand for the bobbin should also be connected to electrical earth.

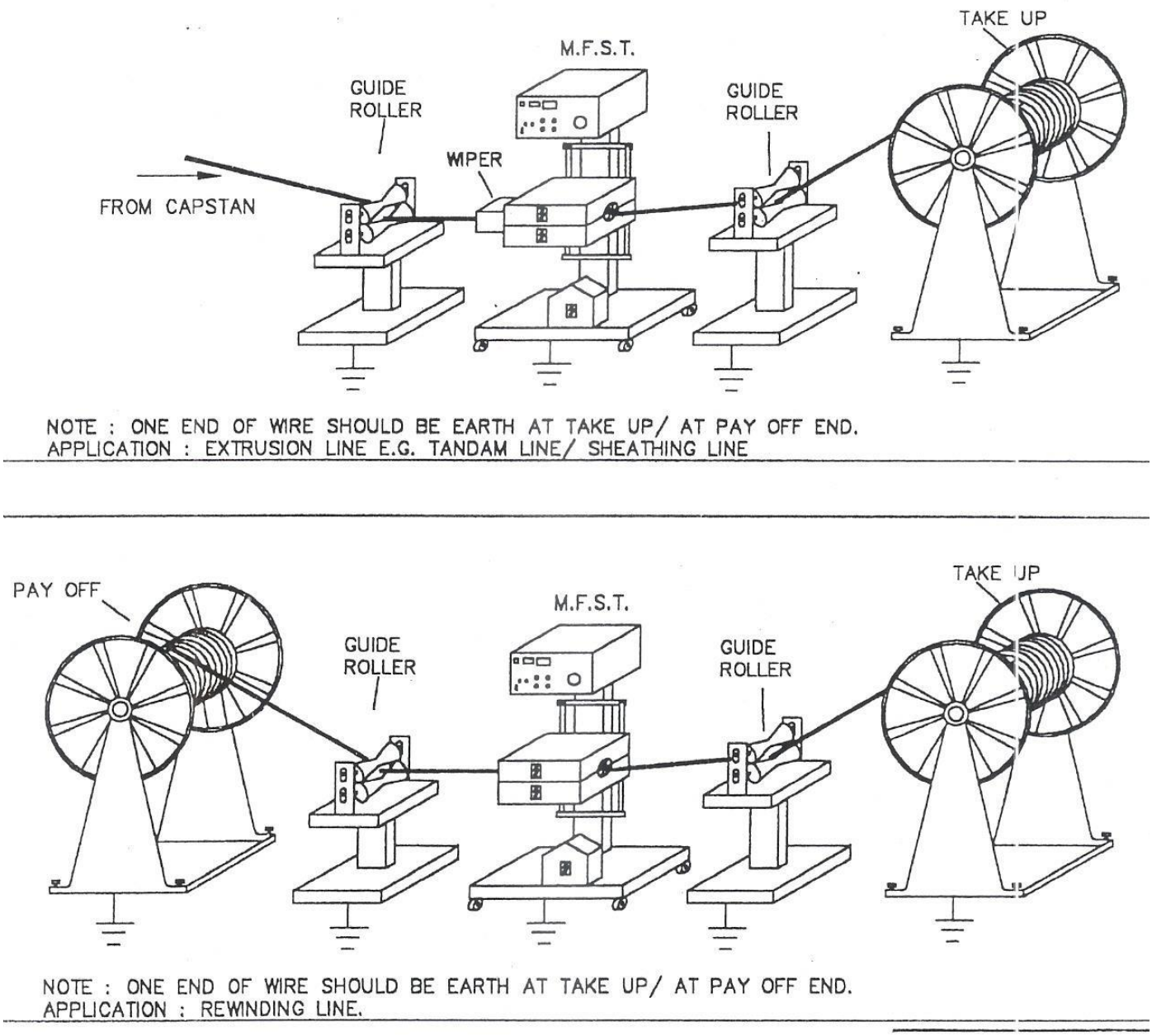


Fig.3.1 Online Installation of M.F.S.T

4. OPERATING INSTRUCTIONS

1. Center the wire to be tested in the electrode, ensuring that it remains centered as it is passed through. Use guide positioning pulley if required. Close the door.

2. Turn the ‘SET kV’ variac fully counterclockwise. Switch the " Mains ON” switch. Kilo voltmeter should indicate a minimum voltage of 0.5 kV (Approx.) or less.

NOTE

This equipment cannot be used below 3kV as no valid test occurs at voltages $< 3kV$

3. The method to adjust kV is as follows:
   a. Put the cable in the electrode and start the line.
   b. When the line reaches its full speed, start increasing the “SET kV” variac as per requirement. The kV adjustment depends on the insulation thickness of the wire under test
   c. Do not increase the kV beyond the required level to avoid puncture in insulation. When the line is running, always set the kV value.

WARNING

Do not touch the electrode when the Power is ‘ON’. It may cause fatal accident.

4. When a fault occurs, the counter advances by one count and the relay turns ‘ON’. The external lamp or alarm indications can be given if fault relay contacts are used. The applied H.V is disconnected when the faulty section of the cable passes through the electrode, and the H.V can be reset as per the 'Fault Reset' mode selected in ‘Manual Reset’ mode. But in ‘Auto Reset’ mode, a fault occurs momentary and kV is disconnected. After sensing the fault, kV is applied again (if a fault is removed)

5. INTRODUCTION

Insulated wire is ordinarily subjected to the High Voltage Test as insulation is being extruded or in some subsequent operation.

The STA Mains Frequency Spark Tester is designed to test the insulation of PVC Cable after the Sheathing / Rewinding Process. The unit can perform non-destructive integrity testing on all types of insulated cable, detecting pinholes, cuts, cracks, slits & bare patches in the cable insulation.

Ball Chain Electrode Assembly is utilized in the Gauging Head making intimate contact with the surface of the cable under test & this combines the resulting corona to form an extremely effective contact zone around the cable insulation. This unique feature ensures that the actual test voltage displayed on the meter is applied accurately & consistently to the cable surface even if the ball chains do not touch the cable from all sides.

A pre-adjusted and sensitive fault detection circuit detects all the faults in the cable insulation at proper voltage settings. This spark tester is found to locate all the faults, which are located in water immersion testing of cables.

The interlock with the electrode cover protects the operator from accidental contact with the electrode. Also, an isolated relay contacts are provided for controlling external visual indications, alarms or machines.

The insulated wire, its conductor, being earthed, passes through a high voltage electrode which subjects the insulating dielectric to electrical stress to reveal holes' cracks, voids or other imperfections. For this purpose, the spark tester is used in the cable industry to control the quality of the cable.

Since the mains frequency spark tester has a 50/60 Hz sine wave at the output, these are used in the sheathing line or for low line speed applications up to 200 MPM.

Since the wire moves through the electrode, the instantaneous value of the voltage varies with time. Each point on the conductor must be in contact with the electrode for at least 1/20 of the second to ensure that the maximum instantaneous value has been applied. At that point, this places a limitation on the wire speed; hence, M.F. Spark Testers are not used for tandem lines.

6. TECHNICAL SPECIFICATIONS

MAINS FREQUENCY SPARK TESTER MODEL STA-15/STA-25/STA-30

1. Input Supply : 230 V± 10%, 50 Hz 1 Phase AC.

2. Output : 0.5 to 15/25/30 kV, 50/60Hz adjustable through a variac

3. Electrode : Ball Chain Type of length @ 300 mm, rectangular shape with cover Interlock

4. Electrode Height : Adjustable between 660 mm to 1330 mm from ground level to suit cable line height

5. Maximum Cable Diameter: 120 mm **(higher diameter available on request)**

6. Maximum Line Speed : 200 MPM

7. Indications : Output kV – Digital
   Power ON
   Fault Trip LED Indication

8. Front Controls : Power ON/OFF Switch
   Set kV using Variac
   Test/ Reset Push Buttons
   Electromechanical Fault Counter (Resettable)
   START/STOP Pushbuttons.

9. Auto / Manual toggle switch for fault condition (In Auto mode, kV comes Automatically& in manual mode, manual reset is required)

10. a) Latest Design to meet the all-technical specifications as per latest IS standardsIS 10810 (Part 44) 1984 Appendix A.
    b) Sturdy, rugged mechanical structure.
    c) Trolley Type arrangement advantageous to move/shift Spark Tester easily from one line to another.

11. Kat Unique Feature: Output current limited to 8mA.
This is essential as it reduces the intensity of Spark. Unlimited output current is Hazards for Human being & can cause a fatal accident.

7. SPARK TESTER CONTROLS

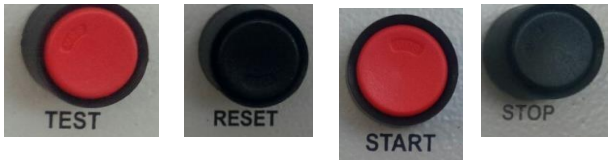
MAINS "ON" SWITCH:
A rocker-type switch is located on the unit's front panel to power ON the Spark Tester.

POWER FUSE:
A 10A fuse with holder. Check when Spark Tester is OFF.

'SET kV' VARIAC AND 'kV DISPLAY':
The kV Variac is used to adjust the voltage to the required value. Vary the variac to set the correct kV reading. The value of the voltage is displayed on the "kV display".

'FAULT COUNTER':
The 'FAULT COUNTER' control displays the number of faults encountered. It is incremented by one every time a fault is detected.

PUSH BUTTONS ON UNIT:



'STOP 'BUTTON:

'STOP' push-button is used to Disable kV and set display to '0'

'START 'BUTTON:

THE 'START' pushbutton is used to reset the kV to the previously set value.

'RESET' BUTTON:

The 'RESET' pushbutton is used to reset the buzzer.

'TEST' BUTTON:

The 'TEST' pushbutton is used to simulate fault conditions.

'FAULT' LED:

Fault LED flashes once when a fault is detected, and fault counter advances by one.

'MODE SELECTION':

This toggle switch is used for selecting the mode (Auto & Manual Mode).

8. MODES OF OPERATION

There are two modes of operation

8.1 Manual Mode

8.2 Auto Mode

8.1 MANUAL MODE:

1. Keep Mode Selector Switch on `MANUAL' Position.
2. Keep "SET KV" variac at minimum position.
3. Operate "MAINS ON" Switch.
4. Press the "HV START" Push-button.
5. Slowly increase the primary voltage from 0.5 to the required kV through variac to get the desired output voltage (H.V.) at the electrode indicated on KV Meter.
6. When a fault occurs in the wire, it is detected by internal processing circuitry & the fault counter is advanced by one count.
7. The high voltage to the electrode gets disconnected due to Fault Trip Condition.
8. Press the "RESET" push button to clear the fault trip conditions and press "HV START" to reach a set high voltage.

8.2 AUTO MODE:

NOTE

When fault occurs in 'AUTO' mode, the momentarily disconnected kV returns automatically

1. Keep Mode Selector Switch on `AUTO' Position.
2. Keep "SET KV" variac at minimum position.
3. Turn ON the "MAINS ON" rocker Switch.

4. Slowly increase the primary voltage from 0 kV to the required value through variac to get the desiredoutput voltage (H.V.) at the electrode indicated on KV Meter.

5. When a fault occurs in the wire, it is detected by the internal processing circuitry & the fault counter is advanced by one count.

6. The high voltage to the electrode gets disconnected due to Fault Trip Condition.

7. After a Reset Period (Factory Setting), Spark Tester is automatically reset & High Voltage is again applied to the electrode as set earlier.

8.3 H.V. ON/ FLASHER WITH HOOTER LAMP FUNCTION

1. H.V. On Indication & Flasher with Hooter are inbuilt in one lamp.

2. In AUTO mode, H.V. ON Lamp glows immediately after giving the input supply & in MANUAL mode, it glows after pressing the start button.

3. When a fault occurs, the H.V. ON Lamp turns OFF & Flasher with Hooter starts giving the indication

4. In AUTO mode, resetting is automatic & in MANUAL mode, press the “RESET” Push-button.

8.4 POTENTIAL-FREE CONTACT FUNCTION

Potential Free Contact is located at the external terminal strip between 4 & 5 closes momentarily as pulse input is applied when a fault occurs in AUTO and MANUAL mode.

8.5 230 VAC ON FAULT FUNCTION

In AUTO mode, 230 VAC generates momentarily at pin 6 & 7 of the external terminal Strip when a fault occurs. The H. V. ON. lamp turns OFF, and the buzzer operates momentarily.

In MANUAL mode, when a fault occurs, 230 VAC generate at pins 6 & 7 of the external terminal strip. H.V. ON lamp goes off & Buzzer & Flasher ON until it is reset by RESET Push Button. When the START Push Button is pressed, the H.V. ON. lamp turns ON & kV is generated and displayed on the kV Meter

8.6 RESETTING MODES

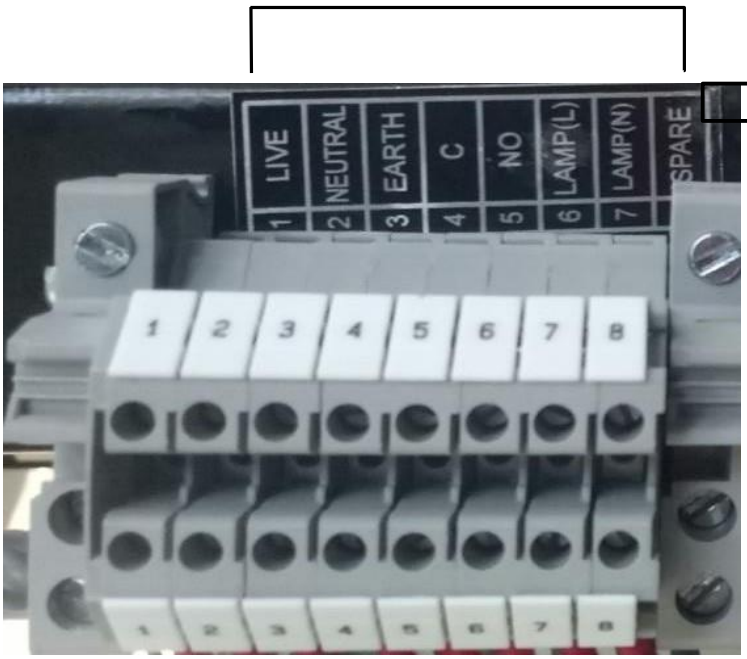
8.6.1 MANUAL MODE:

In this mode, high voltage is removed from the electrode when a fault occurs, and the 'FAULT TRIP' lamp indicates that fault. To reset this fault, we have to press the 'RESET' push button. When you press the "H.V. ON" push button H.V is again generated at the electrode.

8.6.2 AUTO MODE:

In this mode, high voltage is disconnected from the electrode for desired time interval and again applied to the electrode

8.7 EXTERNAL CONNECTION DIAGRAM FOR MFST



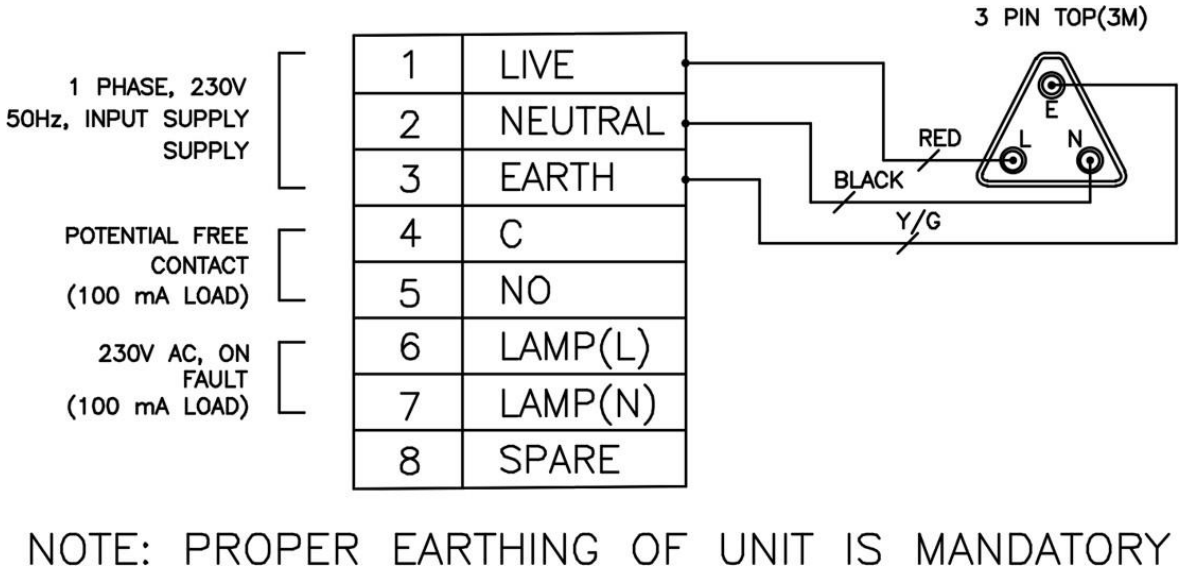


Fig.8.7 – External Connection of M.F.S.T

9. DIMENSIONAL DETAILS

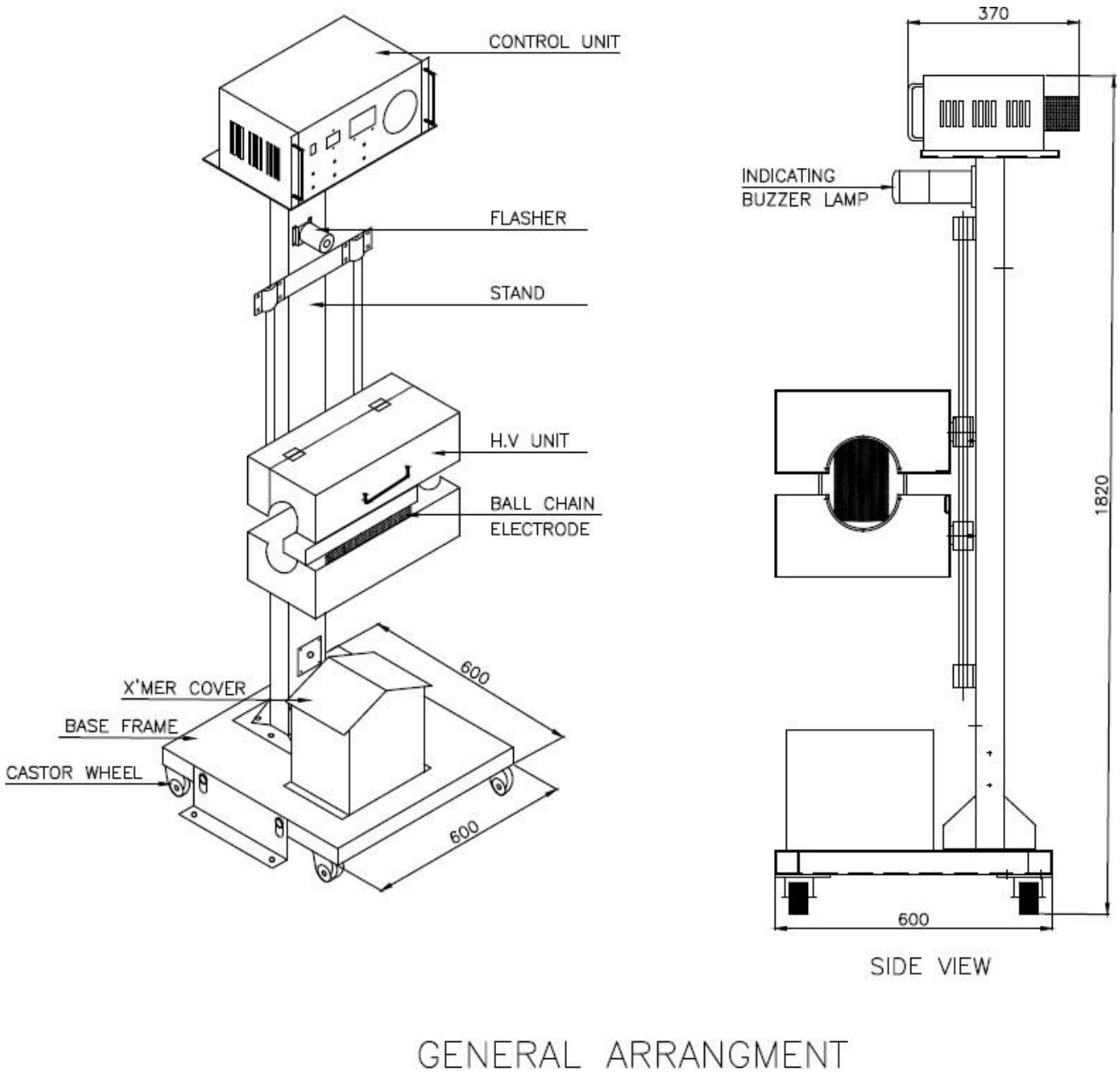


Fig: 9.1 – Dimensional Details of M.F.S.T

10. TROUBLESHOOTING

Table 10.1: Troubleshooting of M.F.S.T

Sr. No.	SYMPTOMS	CAUSES (PROBABLE)	REMEDY
1	NO 'HV ON' Indication	Relay RL2, RL1 Faulty. Micro Switch Faulty	Check The Cause and Replace the Element
2	No output voltage	KV Meter Faulty H.V. Transformer Faulty	Replace the Faulty Element
3	High Voltage Does Not Trip in Fault Condition	Malfunctioning of Relays. Earthing is not proper. Fuse blown	Replace the Element
4	Fault Trip Circuit is not working properly	Malfunctioning of Fault Counter. Problems in Control Card	Replace the counter. Consult With KAT Controls

11. SPARE PARTS

Table 11.1: Spare Parts for M.F.S.T

SR. NO.	COMPONENT / PART	QTY.	PART NO
1	Fault Counter	1	30040027
2	Control Card KAT/MFST/1162	1	20150026
3	H.V. Transformer	1	30040172
4	Variac	1	30040247
5	Flasher with hooter	1	30090003
6	Digital kV Meter	1	30090043
7	PCB KAT/1237	1	20150174

MAINS FREQUENCY SPARK TESTER

HIGH FREQUENCY SPARK TESTER

HIGH FREQUENCY INLINE INDUCTION PREHEATER

SPARK TESTER CALIBRATOR

HEATER CONTROLLER

AC HIGH VOLTAGE BREAKDOWN TESTER

STANDARD & CUSTOM-BUILT CONTROL PANELS

LIST OF PRODUCTS MANUFACTURED

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