

## Measurement of Surface insulation resistivity of electrical steel sheet

### Franklin Tester Model FT02

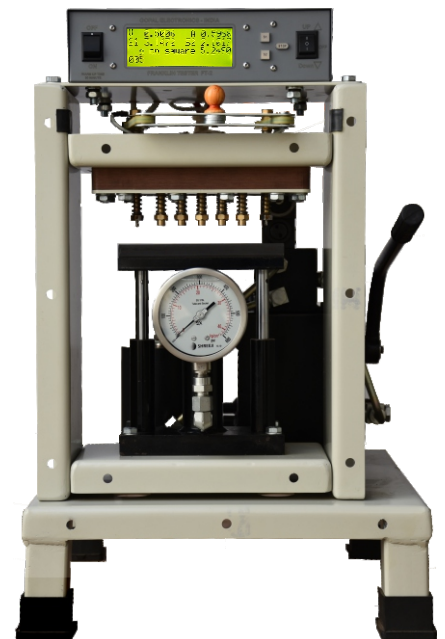
As per IS:649, ASTM:717

Gopal make Franklin Tester Model FT-2 is designed as per IS:649 & ASTM:717 Standard to measure insulation resistivity of electrical steel sheet. It requires precision & noise free DC regulated power supply and equally distributed pressure on electrode. FT-2 regulated power supply provides 0.5000V with 0.1% accuracy over load and no load. Most of national and international standard has specified only 0.5%, means FT-2 is equipped with five time better accuracy than required.

FT-2 has spring loaded, ten brass electrodes and two carbide drill bit, mounted over hydraulic flat surface head. The head and electrode are precisely elevated and mounted on 4mm metal structure, that keeps alignment accurately for long time hence no need to align head and electrode periodically. FT-2 has semi electrical hydraulic system in which two way solenoids switch provided for easy up and down the surface head. Double acting hand operated hydraulic pump provided, to which gives pressure rise in very less time to speed up the testing.

FT-2 is micro controller based equipment, so it calculates all required mathematic function and simultaneously displays on character type 20x4 jumbo LCD display, Voltage, current and ohms per CM square. The FT-2 has provided with two separate ohms meter for sample surface side one and two and separate key S1 & S2 given. so just need to press S1 to take result for side1 & s2 to take result of side 2 and then press STOP for final result of both side.

FT-2 has inbuilt Voltmeter, One multi range Ammeter, Two ohm meter and one added ohm meter for both side total value, hence user can see all data of all parameter simultaneously on display.



## **Franklin Tester Model FT02**

### General Details of Volt meter & Ammeter (ohms calculated on $R = V/A$ basis)

Sr	Parameter/ auto or manual	Range	Accuracy	Resolution
1	Voltage / single	0.5000 V	0.1%	0.0001 V
2	Current / auto	1.2000 A	0.1%	0.0001 A
3	Current / auto	600.00 mA	0.1%	0.01 mA
4	Current / auto	300.00 mA	0.15%	0.01 mA
5	Current / auto	150.00 mA	0.15%	0.01 mA
6	Current / auto	75.000 mA	0.25 %	0.001 mA
7	Current / auto	35.000 mA	0.35%	0.001 mA

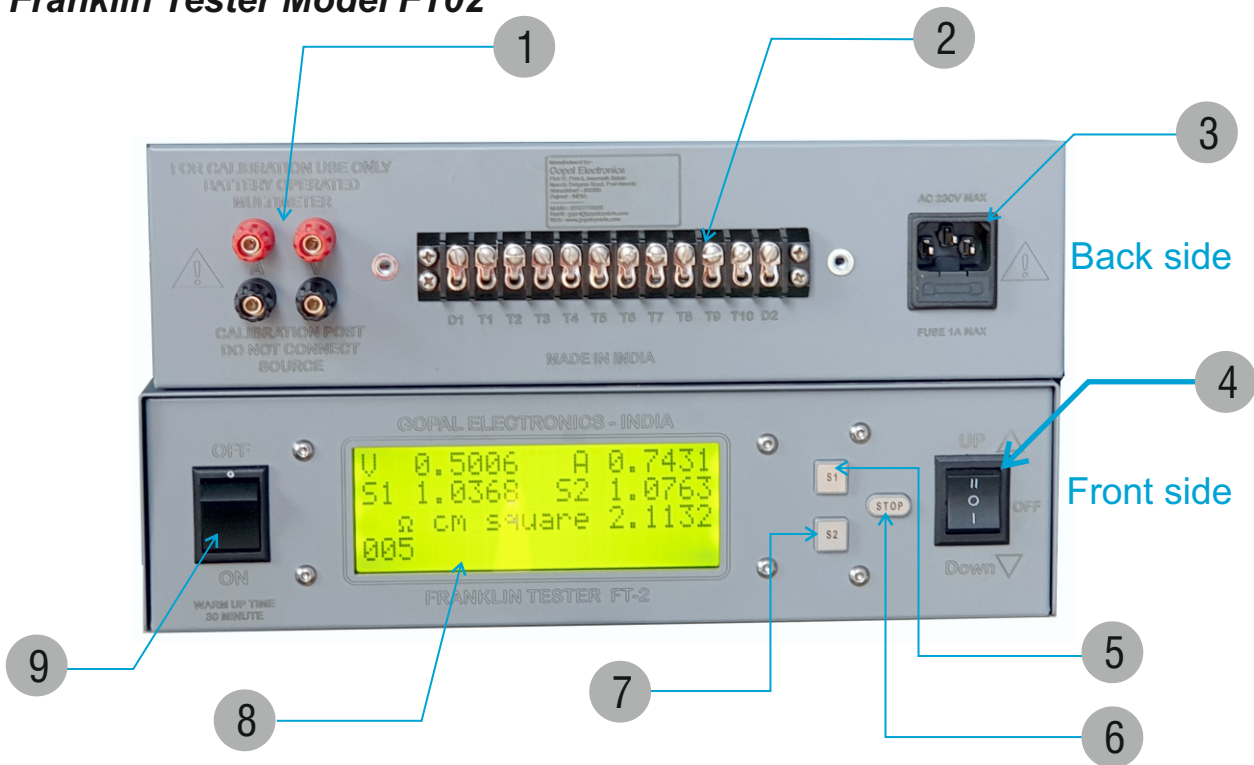
The Gopal make FT-2 has heavy duty well aligned Electric contact Heads, in which all brass components are made from extruded high quality brass with CNC turning to maintain accuracy of each contact as required. Ten electrodes and two drill spindles are having bush bearing guide, mounted on 27mm insulating block to give millions of tests without fail. The electric head is intensively designed in such a way that user can easily clean the surface of each electrode. Many manufacturers and even all national and international standard recommended twist drill method to puncture the lamination. But in that method drill rotate once half and stop, sometime hard lamination like C2 coating does get properly punctured which impact on result.

FT-2 provided hand operated twin drill so user can rotate it till puncture the lamination and get proper contact with base metal. Even though best practice of operation of instrument by operator, human mistake damaged instrument accidentally,

FT-2 designed such a way that one can easily reassemble or replace any part.



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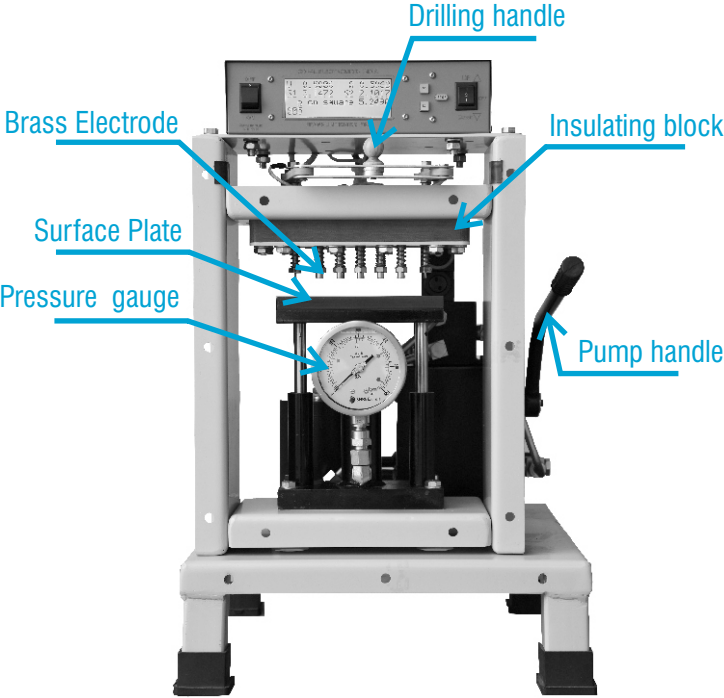


### Details of measuring Instrument

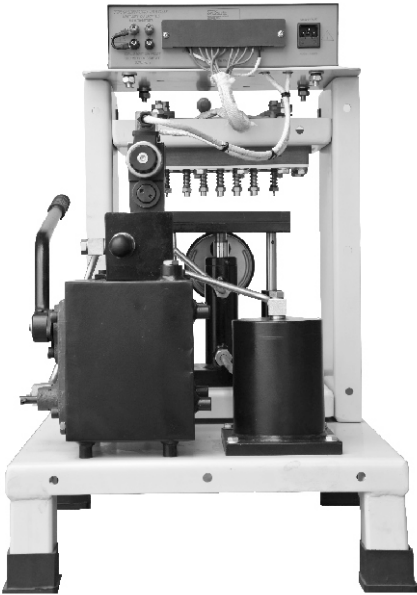
1	Calibration post for checking Voltage and current
2	Electrode connector
3	Power input jack
4	Solenoid up down switch, keep OFF when not in use
5	Side one testing switch with 0.5000V regulator ON
6	0.5000V regulator OFF switch
7	Side two testing switch with 0.5000V regulator ON
8	20x4 LCD jumbo display
9	Power ON / OFF switch

**Franklin Tester Model FT02**  
Details of Hydraulic system

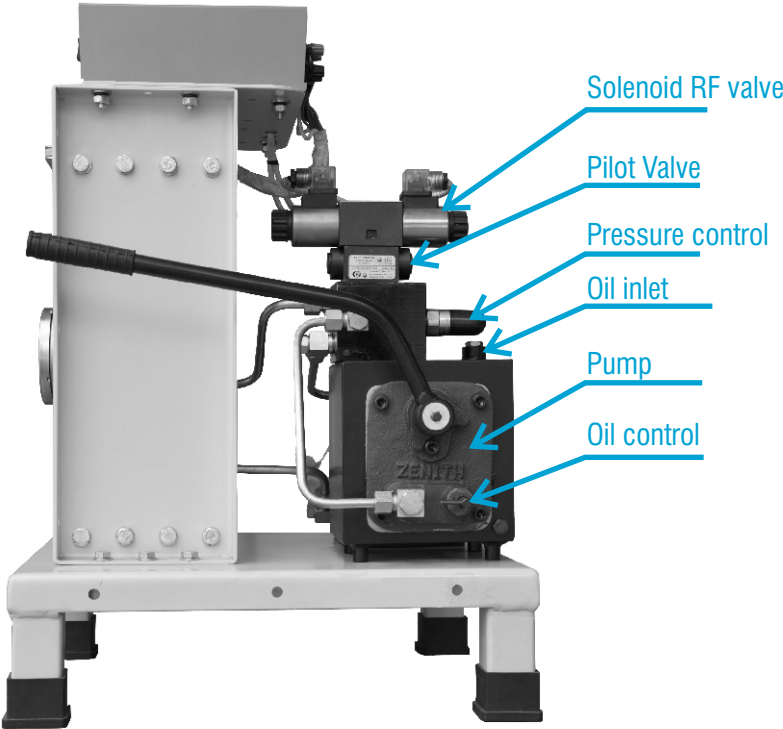
**Front View**



**Rear View**

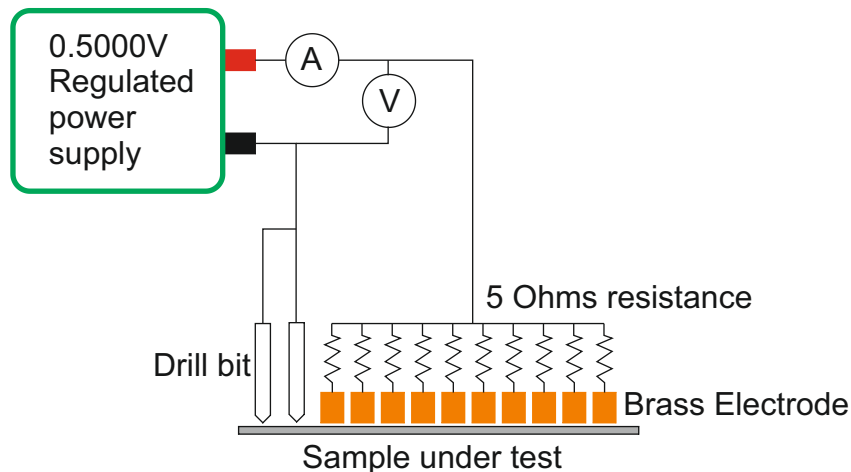


**Side View**



## Franklin Tester Model FT02

# Principle of operation and calculation



Calculation derived as follows:

$$I = \sum_{n=1}^{10} 1/(R_s + R_n) = 10E/(R_s + (R_j/A b))$$

$$R_j = Ab (R_s + (10E/I))$$

$$R_i = 2 R_j = 2Ab ((10E/I) - R_s)$$

Where as

- I = Ammeter reading in Amp
- E = Applied Voltage in Volt
- R<sub>s</sub> = resistance of resistor in series with each contact button in Ohms
- R<sub>n</sub> = resistance of surface between single contact button and base metal of the test specimen in Ohms
- R<sub>j</sub> = surface insulation resistivity of one surface of test sample in Ohms cm<sup>2</sup>/surface or Ohms mm<sup>2</sup>/surface
- Ab = area of each contact button in cm<sup>2</sup> or mm<sup>2</sup>  
= 0.645 cm<sup>2</sup> or 64.5 mm<sup>2</sup>
- R<sub>i</sub> = surface insulation resistivity of test sample (two surfaces in series) in Ohms cm<sup>2</sup> / lamination or Ohms mm<sup>2</sup>/ lamination



## Franklin Tester Model FT02

### Technical Specifications

Characteristics	Data
Warm up time	30 minute
Operating temperature	10 °C to 35 °C
Operating humidity	20% to 55% RH (non condensation)
Storage temperature (No operating)	-20 °C to 40 °C
Power supply	AC 230V Max (power 100 VA apx)
Power plug socket type	220V three pin
Accuracy of voltmeter	0.1%
Accuracy of ammeter	0.1%
Accuracy of 0.5V DC power supply	0.1%
Accuracy of 5? resistor connected to each contact road	15ppm TCR / value calibrated and processed with measurement this method null the effect of 5 ohms resistance and wiring resistance.
Dimension of two drill tips of electrical contact with base plate	Carbide drill bit 4 mm end point 3 mm
Accuracy Insulation Resistivity	0.3% ? *cm <sup>2</sup>
Display	4 x 20 line character LCD
Hydraulic Press capacity	600psi
Direction valve for head up/down	220V max
Hydraulic Cylinder size	40.54 mm (2") ± 0.6 mm
Test head	100 x 200 mm
Structure	4 mm mild steel
Length x Width x Height	533mm x 482mm x 762mm
Weight	76kg apx
Sample size requirement	Minimum        175 x 50 mm Recommended   200 x 100 mm Maximum        306 x 306 mm

#### Standard accessories

1. Mains cord
2. 200 x 100 mm copper plate
3. Test report , catalog /manual