

1. Introduction

1.1 Features: Digital Tesla meter is designed for technical and engineering persons to measure surface magnetic field density and DC magnetic field easily and conveniently. The meter is portable type with an interchangeable probe, which can be used in workshop or during the process for quality control. The meter has a large measurement range divided into two shifts 0.2T and 1T. The meter equipped with a LCD display and operates on standard 9 volt battery (4 hours of continuously use)

1.2 Application

Digital Tesla meter is a portable type instrument allowing customers to measure the surface magnetism and DC magnetic field. The accuracy is $\pm 2\%$.

1.3 Main Technical specifications

Range: 0~0.2T~1T

Basic error: $\pm(1.0\%$ of reading, $\pm 1.0\%$ of full scale) Resolution: 10^{-4}T

Zero floating: < 3 within 30 minutes

Ambient Temperature: $5\sim 40^{\circ}\text{C}$

Relative Humidity: $20\%\sim 80\%$ (no condensation)

Power Supply: $9\text{ VDC} \pm 10\%$ battery

Overall Dimension: $160\text{mm} \times 88\text{mm} \times 36\text{mm}$

Weight: 325g

Display: $3\frac{1}{2}$ LCD

The probe of the meter is interchangeable and accuracy will be $\pm 3\%$ after change.

2 Working principle

2.2 Principle

Digital Tesla is designed according to the principle of Hall effect. When a constant current is forced through the magnetic material, a positive proportion of Hall voltage will be occurred, on this principle, the measurement of the magnetic field can be done.

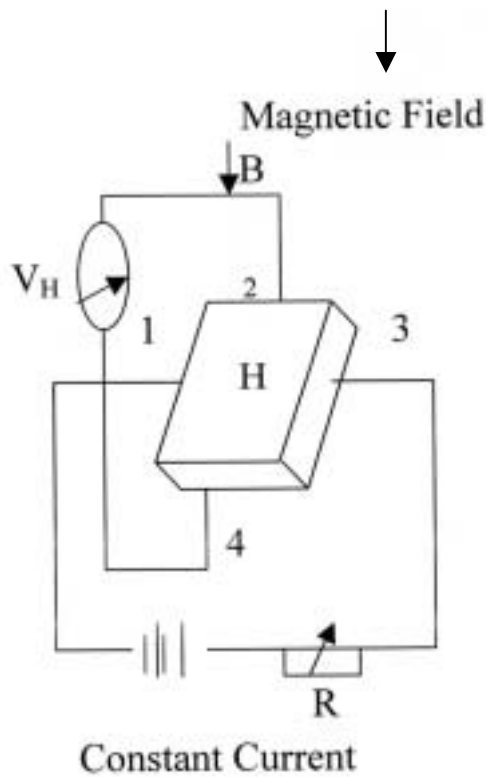
Hall voltage $V_H = S_H \times I \times B \times \sin\phi$

S_H : sensitivity of Hall element ($\text{mV}/\text{mA} \times \text{T}$), a constant

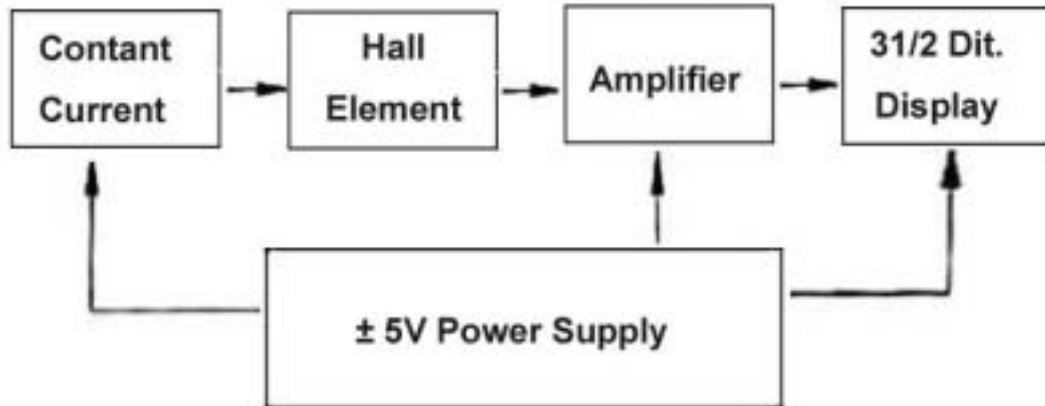
I : Current at control end (mA)

B : Magnet Field (T)

ϕ : The angle between element and magnetic field, when they are upright $\sin 90^{\circ} = 1$

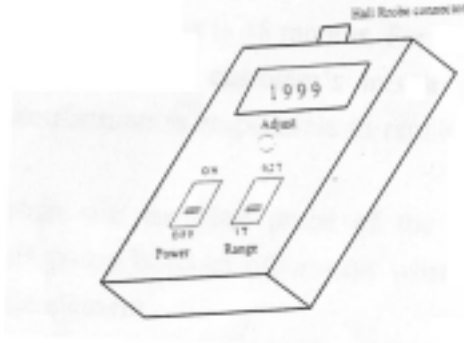


2.3 The frame chart of the working principle of digital Tesla meter:



When Hall element H is placed in the magnetic induction field with intensity B and connect a constant current I through end 1 and 3, then a voltage V_H would be occurred between end 2 and 4, after amplified by the arithmetic amplifier, it output to the display and the relevant readings of magnetic field intensity will be displayed on the LCD.

3 Operating Instructions



3.1 Description: the operating features refer the figure below:

Power Switch: when is at “ON” position the power is on and at the other position the power is off.

Range Selector: when it is switched to “0.2T” shift, the max. range (1999) is 0.2T, and when it is on “1T” shift, the max. range is 2T.

Zeroing Knob: turn it in a zero magnetic field till the display indicate zero.

Hall Probe Connector: connect the meter to the Hall probes.

3.2 Operating Procedures

- 1) First place the Power Switch at “OFF” position and shift Range Selector to “0.2T” position.
- 2) Open the battery compartment cover, install the battery and then reinstall the battery compartment cover.
- 3) Connect the Hall probe to the Hall Probe Connector of the meter.
- 4) Place the Power Switch to “ON” position and ± 000 should appear on the display, if not, adjust the Zeroing Knob.
- 5) Warm up the meter for ten minutes and meanwhile adjust the Zeroing Knob to keep the display always indicating ± 000 if it not.
- 6) Take off the protection of the Hall probe and select the measuring range according to the density of the magnetic field to be measured. (The zero should be readjusted after change the range).
- 7) Slightly put the Hall probe in the magnetic field to be measured, the readings on the display are density of the magnetic measured.
- 8) Every time the range is shifted, the Hall probe should be taken away from magnetic field and readjust the zero.
- 9) The meter cannot be used continuously for more than four hours. Than Power Switch should be placed ion “OFF” position when it is not be used.
- 10) It is better to take out the battery form the meter after measurements in order to extent the battery life.

3.3 Reading method Digital Tesla meter:

1) Measure in 1T range

Readings displayed	Density of field measured
000	0T
200(200)	0.2T(1×10 GS)
1000(1000)	1T(1×10 GS)

2) Measure in 0.2T range

Readings displayed	Density of field measured
000	0T
100(100)	0.01T(1×10 GS)
1999(1999)	0.2T(1×10 GS)

4. Maintenance and Cautions:

The warranty period of this instrument is 18 months. For any damages, malfunctions that not caused by customer's misuse during the warranty period, the manufacturer is responsible to repair, replace or change.

- 1) Care must be taken when use the Hall probe of the meter, the protection jacket of Hall probe is taken off always when it is used because it is a very fragile element.
- 2) Avoid using the meter out of the specified environment.
- 3) Avoid falling down or putting it near strong disturbing during the operation.
- 4) Hall probe should be prevented from falling down, pressure, shock, corrosion, etc.
- 5) Take out the battery and disconnect the Hall probe from the instrument after measurement. Put them together with instrument inside the packing box.
- 6) The voltage of the 9-volt battery cannot be lower than 7.2 volt, otherwise change a new battery.

5. Content of the packing

- 1) Digital Tesla meter
- 2) Instruction Manual
- 3) Certificate of Quality
- 4) Hall Probe
- 5) 9-volt Battery