TH8030 Calibration System for Permanent Magnet Magnetic Measuring Instrument

1. Summary

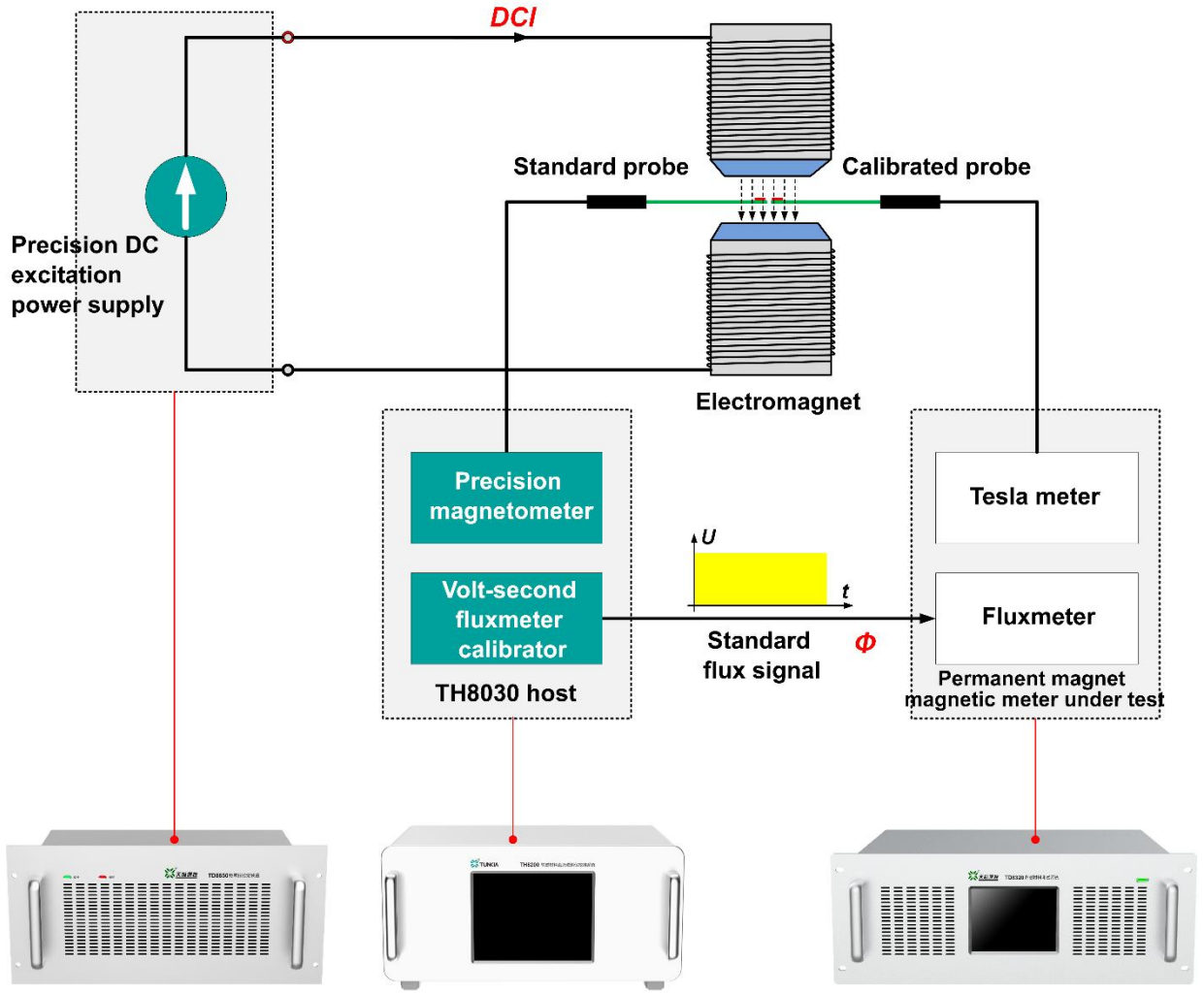
TH8030 is a system dedicated to calibrating magnetic properties measuring instruments of permanent magnet materials, including a measuring host and precision excitation power supply. It can realize the calibration of Tesla meter, flux meter, electromagnet magnetic field non-uniformity, coil constant, magnetic characteristic parameters and other items of the magnetometer being calibrated.

2. Features

- Equipped with a precision DC excitation power supply with an accuracy of class 0.005.
- The host machine has a built-in precision magnetic flux meter with an accuracy of class 0.05.
- The host machine has a built-in precision magnetometer with an accuracy of class 0.05.
- The host has a built-in volt-second magnetic flux calibrator with an accuracy of class 0.02.
- The host machine has a built-in precision temperature and humidity meter to measure the temperature and humidity of the on-site environment.
- The host computer has a built-in three-axis fluxgate magnetometer to measure the on-site environmental magnetic field.
- Equipped with an intelligent probe positioning device to facilitate calibration of electromagnet magnetic field non-uniformity.
- Communication interfaces: RS232, USB, LAN
- The system adopts modular integrated design.
- Equipped with specialized calibration software.

3. Application

☆ Calibrating Tesla meters and flux meters



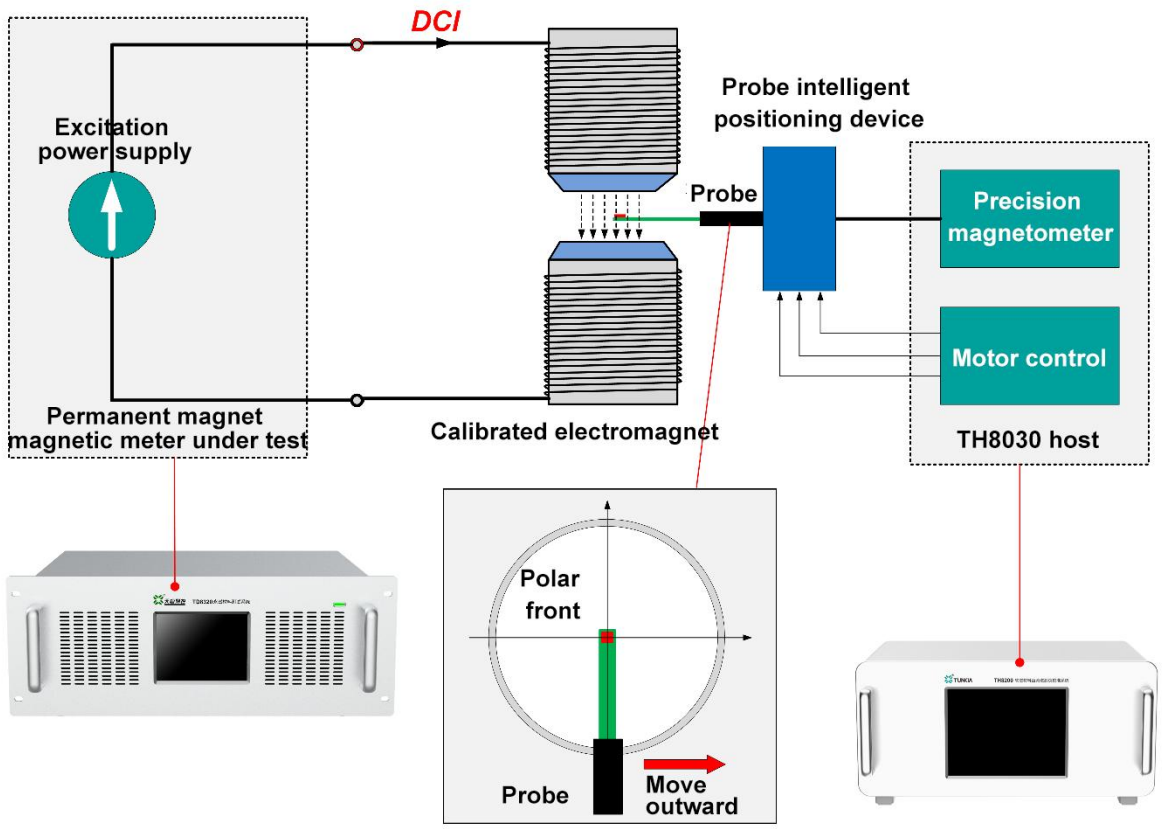
To calibrate the Tesla meter:

- Output precision excitation current to the electromagnet through a precision DC excitation power supply.
- Place the precision magnetometer probe of TH8030 and the Tesla meter probe of the magnetometer to be calibrated in the same uniform area of the electromagnet.
- Compare the two indications to achieve calibration of the Tesla meter.

To calibrate the flux meter:

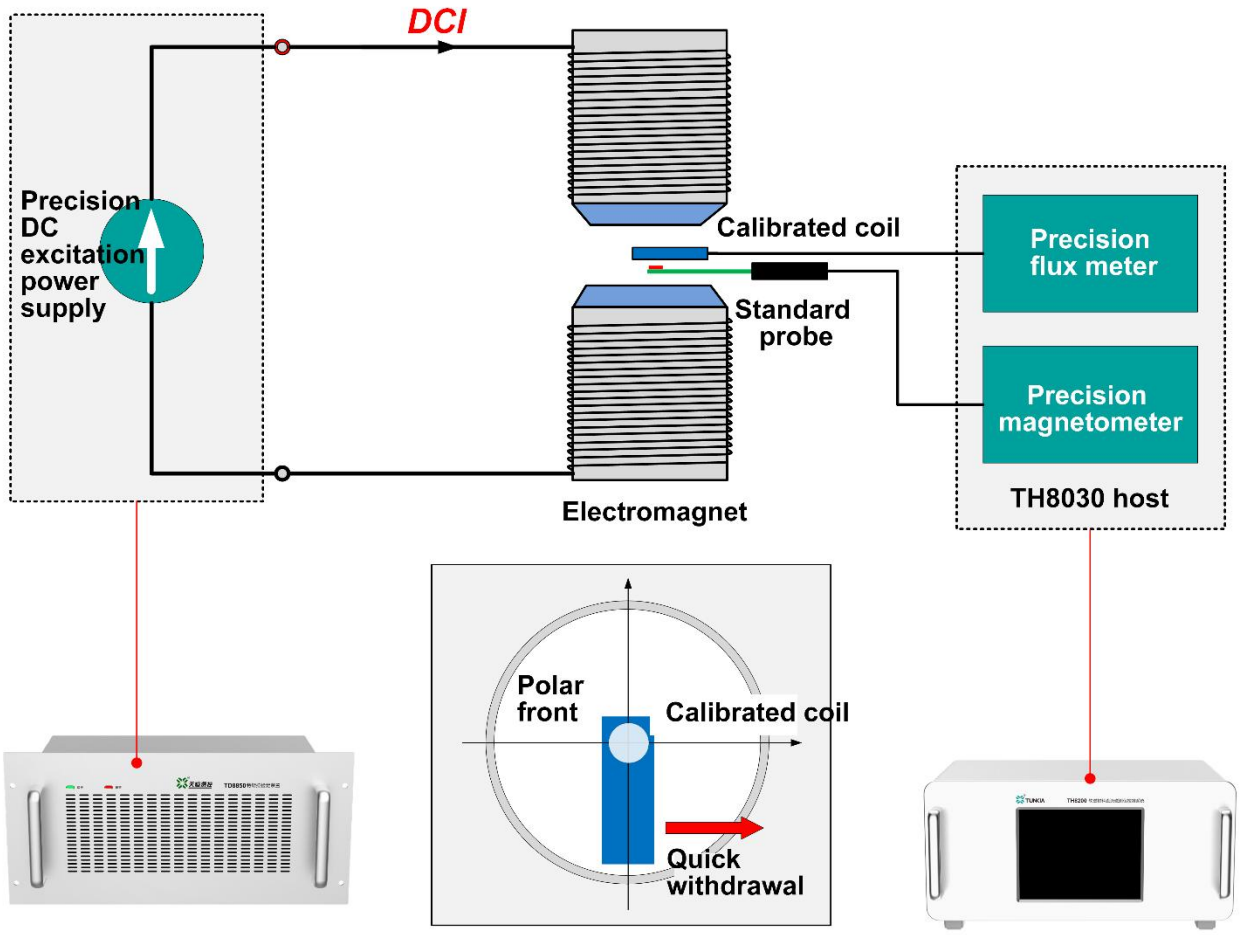
- Use the TH8030 built-in volt-second method fluxmeter calibrator to calibrate the fluxmeter of the magnetometer being calibrated.

☆ Measuring electromagnet magnetic field non-uniformity



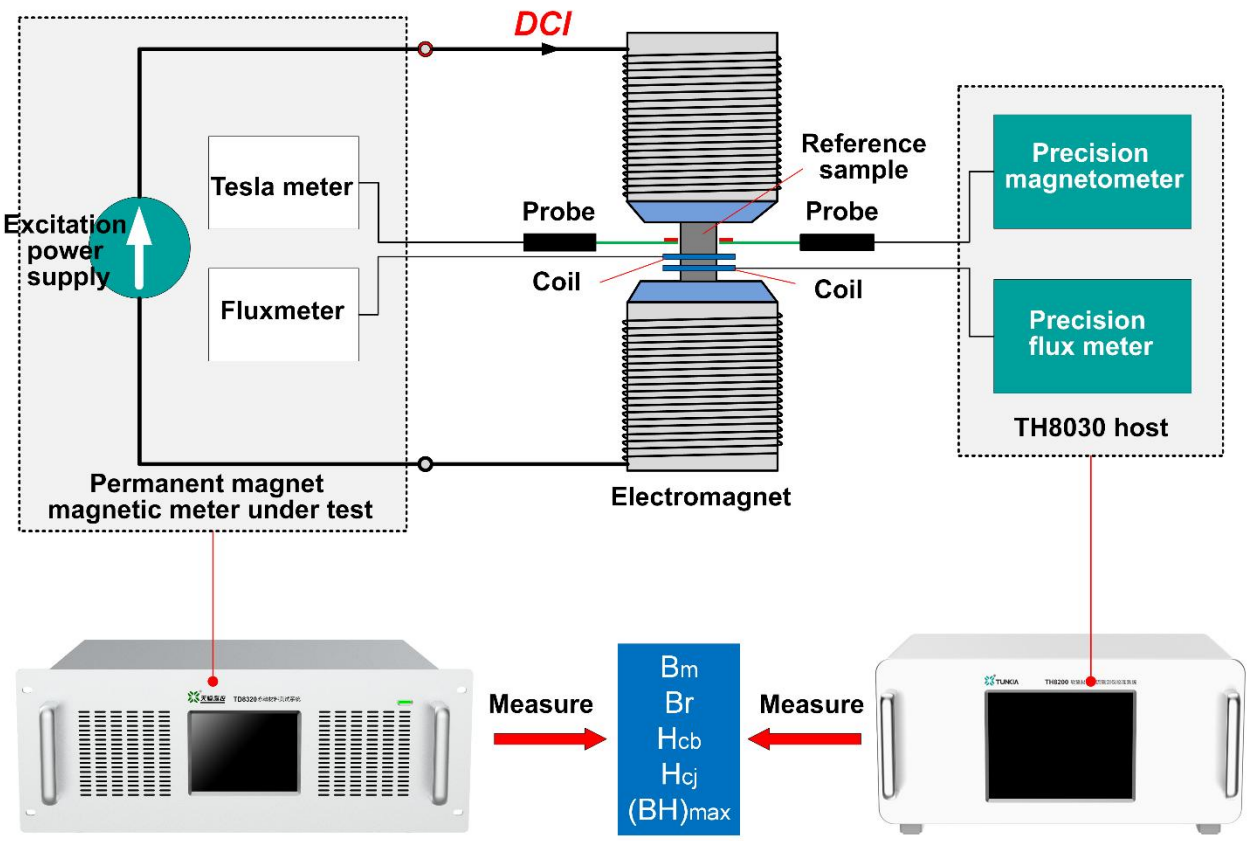
- The excitation current is output to the electromagnet to be calibrated through the calibrated permanent magnet magnetic detector.
- Place the precision magnetometer probe of TH8030 at the center of the pole surface of the electromagnet to be calibrated.
- The host controls the intelligent positioning device of the probe to move the probe slowly to measure the non-uniformity of the magnetic field of the electromagnet.

☆ Measuring the coil constant



- The excitation current is output to the electromagnet through a precision DC excitation power supply.
- Place the precision magnetometer probe of TH8030 in the center of the pole surface of the electromagnet.
- Place the coil to be calibrated in the center of the electromagnet pole surface. After clearing the precision flux meter in the host computer, quickly pull out the coil, record the magnetic flux, and calculate the coil constant.

☆ Calibrating magnetic properties parameters



- Use the reference sample as the load, set the calibration point through the magnetometer to be calibrated, and output the excitation current.
- Use TH8030 and the magnetometer to be calibrated to simultaneously measure the remanence Br, coercivity *Hc*, intrinsic coercivity *Hcj*, and maximum magnetic energy product $(BH)_{max}$ of the reference sample to achieve calibration of the magnetic property parameters of permanent magnet materials.

4. Specifications (Host)

4.1 Precision volt-second magnetic flux calibrator

Voltage output	Range	2 mV、20 mV、200 mV、2V
	Uncertainty(k=2)	0.01%*RD+0.005%*RG or 0.01%*RD + 0.2 μV; use the larger value of the two
	Adjust fineness	0.005%*RG
	Protective function	Short circuit protection, overload protection
Adjustable timer	Pulse width range	0.1 s~5 s
	Uncertainty (k=2)	0.005%*RG
Flux output	Flux	Combination of voltage and time
	Range	0.1 mWb~10 Wb
	Display digits	7-digit decimal display
	Uncertainty(k=2)	200 ppm*RD + 0.1μWb

4.2 Precision flux meter

Magnetic flux measurement range	0.2 mWb～10 Wb
Minimum resolution	10 nWb
Magnetic flux measurement uncertainty (k=2)	0.05%*RD + 5 μWb
Zero drift typical value	0.5 μWb/min
Display digits	6-digit display

4.3 Precision magnetometer

Measurement range	Resolution	Measurement uncertainty (k=2) *A%*RD+B*	Temperature coefficient *± ppm/℃*	Zero drift *± μT/h*
3 mT	1 nT	0.1% + 100 μT	50	15
30 mT	10 nT	0.05% + 100 μT	50	20
300 mT	100 nT	0.05% + 100 μT	50	50
2500 mT	1 μT	0.05% + 150 μT	50	75

4.4 Environmental parameter measurement

Temperature and humidity measurement	Probe	Temperature and humidity probe
Environmental magnetic field measurement	Range	1 mT
	Display digits	5-digit display
	Probe	Three-dimensional magnetic field sensing probe
	Measurement uncertainty (k=2)	0.5%

4.5 General specification

Power supply	*AC (220 ± 22) V，(50 ± 2) Hz*
Temperature performance	Working temperature：0°C～50°C; Storage temperature：*-20*°C～*70*°C
Humidity performance	Working humidity: *40%～80% R·H;* non-condensing Storage humidity: < *80% R·H*, non-condensing

5. Specification (Precision DC excitation power supply)

Maximum output current	± 25 A
Measurement uncertainty (k=2)	0.005%*RG①
Protective function	Open circuit protection, overload protection
Power supply	AC (220 ± 22) V，(50 ± 2) Hz

6. TM2800 Magnetic Shielding Cavity

- The shielding frame is made of high magnetic permeability shielding material, which can completely remove the influence of the geomagnetic field.
- The internal magnetic field is <10-6 T and can be regarded as zero magnet during calibration.
- Small size, light weight (about 1kg), exquisite workmanship, and easy to carry.
- This device is suitable for calibrating the zero point of the standard Tesla meter or the Tesla meter being calibrated.

7. Configuration List

S/N	Item Name	Quantity	Configuration	Note
1	TH8030 test host	1	Standard	
2	Precision DC excitation power supply	1	Standard	Bipolar current output
3	TM2800 magnetic shielding cavity	1	Standard	Internal magnetic field: $<10^{-6}T$
4	Probe intelligent positioning device	1	Standard	
5	Temperature and humidity probe	1	Standard	
6	Three-dimensional magnetic field sensing probe	1	Standard	
7	Reference sample	1	Standard	
8	Automatic calibration software	1	Standard	
9	Complete set of test leads and power cords	1	Standard	
10	workbench	1	optional	third party products

11	computer	1	optional	third party products
12	printer	1	optional	third party products

Note: The above is for reference only. The specific configuration list depends on the technical protocol.