

Your Company Name / Logo	RTD AND THERMOCOUPLE SENSOR CALIBRATION SOP	Doc no: SOP INST 004	Rev: 0
Department: Instrumentation	Standard operating procedure	Date:	Page: see footer

1. Purpose

To verify that temperature sensors are within their tolerance class and to detect drift or damage.

2. Scope

Pt100 RTDs and base metal thermocouples (K, J, T, N, E) removed from their thermowells, tested from ambient to the dry block limit.

3. References

- IEC 60751 (RTD tolerance classes)
- IEC 60584-1 (thermocouple tolerances)
- Dry block calibrator manual

4. Responsibilities

- Instrument technician: carries out the work and records results.
- Instrument engineer or supervisor: reviews and approves the records.
- Operations: grants the permit, isolates the process and returns the equipment to service.

5. Safety precautions

- Work only under a valid permit to work and follow the site isolation (lockout tagout) procedure.
- Wear the PPE required for the area: safety helmet, glasses, gloves and safety shoes as a minimum.
- In hazardous areas use certified or intrinsically safe test equipment, or obtain a gas free certificate and hot work permit.
- Inform the control room before starting, and before returning the instrument to service.
- Dry blocks reach several hundred °C: use heat resistant gloves, let probes cool before handling, and keep the block on a stable, clear surface.

6. Tools and equipment

- Dry block calibrator with suitable insert, or stirred liquid bath
- Reference probe and readout with valid certificate
- Resistance or mV readout for the sensor under test (or the loop transmitter)
- Heat resistant gloves

7. Prerequisites

- Sensor removed from the thermowell under permit; process side safely isolated.
- Insert bore matching the sensor diameter.

8. Procedure

8.1 Setup

- 8.1.1 Insert the reference probe and the sensor under test into adjacent bores to the full depth of the insert.
- 8.1.2 Make sure the immersion is at least 15 times the sheath diameter where possible, to avoid stem conduction error.

8.2 Test

- 8.2.1 Choose 3 points covering the operating range (for example 0 or ambient, mid range, and near maximum).
- 8.2.2 At each point wait for stability (typically 10 to 20 minutes, or as the dry block indicates stable).
- 8.2.3 Record the reference temperature and the sensor reading (Ω or mV converted to °C).

8.2.4 Calculate the error and compare with the tolerance class for that temperature.

8.3 Completion

8.3.1 Allow the sensor to cool before handling and reinstalling.

8.3.2 Reinstall in the thermowell with the correct immersion, and check the reading in the DCS.

9. Acceptance criteria

- RTD error within its class (for example class A: $\pm (0.15 + 0.002 |t|)$ °C; class B: $\pm (0.3 + 0.005 |t|)$ °C).
- Thermocouple error within its IEC 60584-1 class tolerance.
- Sensor insulation and continuity normal.

10. Records

- Calibration certificate format (free template: instrumentationblog.in/downloads/templates/calibration-certificate-format/)
- Calibration master list (free template: instrumentationblog.in/downloads/templates/calibration-master-list/)

11. Approval

	Prepared by	Reviewed by	Approved by
Name			
Signature			
Date			

This procedure is a generic template. Adapt it to your site permit system, the manufacturer instructions and your quality system before use.