



TempoTech Controls Inc

Thermocouple Installation, Maintenance & Troubleshooting Manual

Purpose

This manual provides general installation, operation, maintenance and troubleshooting guidelines for Tempotech Controls industrial thermocouple assemblies including mineral insulated, bayonet, bearing, surface, immersion and thermowell-mounted sensors.

Safety

- Isolate process equipment before installation.
- Use appropriate PPE.
- Use a thermowell for pressurized or hazardous services.
- Do not exceed the specified temperature rating.
- Inspect sensor before installation.

Receiving & Storage

Inspect for shipping damage. Store clean and dry with probe caps installed. Avoid moisture, vibration and corrosive chemicals.

Installation & Operation

A thermowell is strongly recommended for pressurized, high-pressure, high-velocity, corrosive, or hazardous process applications. It protects the temperature sensor from mechanical damage while allowing the sensing element to be removed for inspection, calibration, or replacement without shutting down the process or releasing process media. To improve heat transfer, reduce response time, and enhance measurement accuracy, apply a thermal heat transfer compound between the sensor stem and the thermowell. Always select a thermal compound that is suitable for the application's operating temperature, especially in high-temperature service where a compound rated for elevated temperatures is required. Ensure the thermowell is compatible with the process pressure, temperature, and media, and complies with all applicable industry standards and local regulatory requirements, including CRN where required. If you need assistance selecting the appropriate thermowell or thermal compound for your application, contact Tempotech Controls Technical Support for expert guidance.

Installation

1. Verify the correct thermocouple type (K, J, T, E, N, R, S or B).
2. Install the thermowell securely using suitable thread sealant where required.
3. Apply thermal compound when recommended.
4. Insert the probe fully until positive contact is achieved.
5. Recommended immersion depth: minimum 10× probe diameter.
6. Use matching thermocouple extension wire.
7. Observe correct polarity.
8. Route cables away from motors, VFDs and power wiring.
9. Tighten all electrical terminals and cable glands.

Good Installation Practices

DO	DON'T
Use thermowells in pressure service	Run TC cable with power cables
Protect cable from abrasion	Over-tighten fittings
Maintain proper immersion	Expose connection head to excessive heat
Use correct extension cable	Mix different thermocouple alloys

Preventive Maintenance

Item	Frequency	Action
Visual inspection	Monthly*	Check sheath, cable and fittings
Connection terminals	Quarterly*	Retighten if required
Calibration	6-12 Months*	Verify against traceable standard
Thermowell	Atleast once year*	Inspect for corrosion and wear

*Frequency depends on process severity and quality requirements.

Calibration

- Calibration frequency depends on operating temperature, process conditions, vibration, and the accuracy required by your application.
- High temperatures, thermal cycling, contamination, and prolonged service may gradually affect thermocouple accuracy.
- Establish a calibration interval based on your quality system, process requirements, and operating experience.
- Verify thermocouple accuracy by comparing it with a **traceable reference standard**.
- Whenever possible, perform **in-place (installed) calibration** to evaluate the sensor under actual operating conditions.
- If the thermocouple is removed for calibration, reinstall it in the **same location and immersion depth** for consistent measurements.
- For thermowell installations, apply a **high-temperature thermal heat transfer compound** to improve heat transfer, reduce response time, and enhance measurement accuracy.
- Replace the thermocouple if calibration results fall outside acceptable tolerance or if physical damage is observed.
- **Tempotech Controls** recommends maintaining calibration records as part of your preventive maintenance and quality assurance program.
- Calibrate using a traceable reference. Return the sensor to the same immersion depth after calibration for consistent performance.

Replacement

Replace the thermocouple if it exhibits excessive drift, open circuit, insulation failure, severe corrosion, mechanical damage or slow response.

Troubleshooting

Problem	Possible Cause	Corrective Action
No temperature	Open circuit	Check continuity or replace sensor
Incorrect reading	Wrong TC type	Verify controller configuration
Reading unstable	Electrical noise	Separate TC wiring from power
Slow response	Poor immersion	Increase immersion depth
Drifting temperature	Sensor aging	Recalibrate or replace
Moisture in head	Condensation	Dry and reseal enclosure
Intermittent signal	Loose terminals	Retighten connections
Thermowell damage	Corrosion/erosion	Replace thermowell