

High-Precision Temperature Sensor for Motorsport & Automotive Telemetry

1. PRODUCT OVERVIEW & APPLICATIONS

The GE-TCK-30500-M is an ultra-durable Type K mineral insulated thermocouple sensor engineered specifically for demanding temperature measurement in motorsport telemetry, automotive testing, dynamometer benches, and harsh industrial environments. Built with a high-grade AISI 310 stainless steel outer sheath and high-purity compacted Magnesium Oxide (MgO) powder, the sensor provides outstanding resistance to severe vibration, thermal shocks, and mechanical stress. Featuring an insulated (ungrounded) hot junction, it eliminates electrical noise and ground loops across vehicle data networks, providing seamless plug-and-play compatibility with Gubellini Electronics CAN-BOARD-THERMOK, GUBELOG, and MICROLOG acquisition systems.

2. KEY FEATURES

- **IEC 60584-1 Class 1 Accuracy:** Calibrated to premium Class 1 tolerance ($\pm 1.5^{\circ}\text{C}$ or $\pm 0.0040 \cdot |t|$) across the entire measuring range.
- **Bendable AISI 310 Sheath:** $\varnothing 3.0$ mm x 500 mm stainless steel sheath can be custom bent and routed (min. bend radius 9 mm) without loss of insulation.
- **Insulated Hot Junction:** Galvanically isolated from the protective metal sheath, safeguarding inputs from ignition and alternator noise.
- **High Temperature Range:** Probe tip operates continuously from -40°C to $+1100^{\circ}\text{C}$ (short excursions up to $+1150^{\circ}\text{C}$).
- **Durable Pot Seal Transition:** Stainless steel plain cylindrical pot seal ($\varnothing 6.35$ mm x 30 mm) filled with epoxy rated to $+200^{\circ}\text{C}$.
- **Industrial PFA Extension Lead:** 1.0 m flexible flat-pair cable with 7/0.2 mm stranded conductors and PFA Teflon insulation (-50°C to $+250^{\circ}\text{C}$).
- **IEC Miniature Flat-Pin Plug:** Standard green polarized 2-pin mini thermocouple plug for rapid, vibration-proof connection.

3. DIMENSIONAL & MECHANICAL SCHEMATIC

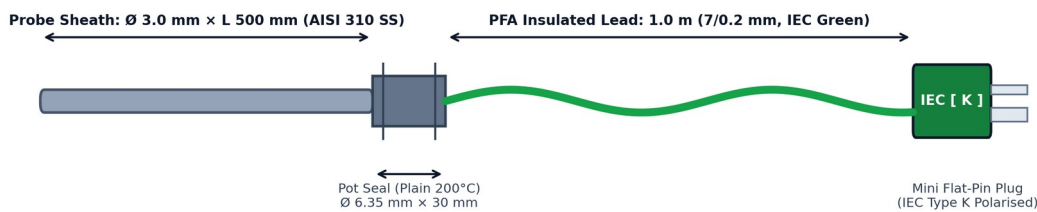


Figure 1: GE-TCK-30500-M Dimensional layout showing probe sheath, transition pot, 1m PFA lead, and IEC mini plug.

4. ORDERING INFORMATION & ACCESSORIES

Part Number	Description	Compatible System
GE-TCK-30500-M	Type K Thermocouple, $\varnothing 3.0$ mm x 500 mm, 1m PFA, Mini Plug	CAN-BOARD-THERMOK / GUBELOG / MICROLOG
GE-CB-THERMOK	CAN Bus Interface Board for Type K Thermocouples	CAN 2.0A/B Telemetry Bus
GE-CONN-MINI-K	Spare IEC Miniature Female Socket (Green, Type K)	Wiring harness / chassis mount

5. TECHNICAL SPECIFICATIONS

Parameter	Specification
Thermocouple Type	Type K (Nickel-Chromium / Nickel-Alumel, NiCr-NiAl)
Calibration Standard & Tolerance	IEC 60584-1 / IEC 60584-2 Class 1 ($\pm 1.5^{\circ}\text{C}$ or $\pm 0.0040 \cdot t $)
Probe Sheath Diameter	3.0 mm nominal (± 0.05 mm)
Probe Sheath Length	500 mm nominal
Sheath Material	Stainless Steel AISI 310 / 1.4841 (High oxidation resistance)
Insulation Medium	Compacted Magnesium Oxide (MgO) powder, purity > 99.4%
Measuring Junction	Insulated / Ungrounded (electrically isolated from sheath)
Insulation Resistance	> 1000 M Ω at 500 V DC (at ambient 20°C)
Continuous Temperature Range (Probe)	-40°C to +1100°C (-40°F to +2012°F) continuous; peak +1150°C
Pot Seal Transition Rating	Up to +200°C (+392°F) continuous
Extension Cable Temperature Rating	-50°C to +250°C (-58°F to +482°F) continuous
Pot Seal Construction	Plain cylindrical pot seal, stainless steel, $\varnothing$ 6.35 mm $\times$ 30 mm
Extension Cable Length & Type	1.0 m (1000 mm) flat pair, stranded conductors 7/0.2 mm (AWG 24)
Cable Insulation & Sheath	PFA (Perfluoroalkoxy) fluoropolymer (oil, fuel, chemical resistant)
Color Coding	IEC Standard: Positive (+) Green, Negative (-) White, Outer: Green
Termination Connector	IEC Miniature 2-pin flat plug (polarized mini plug, green casing)
Connector Pin Metallurgy	Positive (+): NiCr (non-magnetic) Negative (-): NiAl (magnetic)
Minimum Bend Radius	9.0 mm (3x outer probe diameter)
Response Time (t_{90})	< 1.8 seconds in agitated liquid / rapid gas flow

6. SYSTEM INTEGRATION & WIRING (GUBELLINI DAQ)

The sensor connects directly to the Gubellini Electronics CAN-BOARD-THERMOK thermocouple acquisition interface. The CAN-BOARD-THERMOK digitizes temperature with 24-bit resolution, executes high-speed cold junction compensation (CJC), and broadcasts temperature data onto the CAN 2.0A/B bus directly to GUBELOG and MICROLOG data loggers.

Mini Plug Pin	Lead Wire	Conductor Metallurgy	CAN-BOARD-THERMOK Terminal
+ (Narrow pin)	Green	Nickel-Chromium (NiCr, Non-mag.)	Channel (+) Positive Input
- (Wide pin)	White	Nickel-Alumel (NiAl, Magnetic)	Channel (-) Negative Input

7. INSTALLATION & HANDLING GUIDELINES

- Bending Radius:** Do not bend the probe within 25 mm of the tip or transition pot seal. Maintain a minimum bend radius of 9 mm (3x sheath diameter).
- Pot Seal Protection:** Ensure the transition pot seal is located in an area where ambient temperatures do not exceed 200°C (use thermal shielding near exhausts).
- Vibration Isolation:** Secure the PFA extension cable with vibration-dampening clamps to eliminate mechanical strain on the pot seal transition.