

Sulfur Thermocouple High Temperature Sulfidation Resistant Sensor

Item Number: KT-LDO



Introduction

Engineered for harsh sulfur recovery and Claus furnace environments, this high performance sulfur thermocouple delivers exceptional sulfidation resistance, unmatched mechanical durability, and precision temperature measurement to protect critical assets, optimize reaction kinetics, and minimize unplanned industrial facility downtime.

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Application	Description	Key Benefit
Claus Reaction Furnaces	Monitoring thermal zones within thermal reactor chambers processing high-concentration acid gas and ammonia streams.	Prevents refractory brick burnout, optimizes sulfur conversion efficiency, and withstands harsh hydrogen sulfide combustion.
Claus Waste Heat Boilers	Measuring hot gas inlet and outlet temperatures in waste heat recovery steam generators exposed to sulfur vapor.	Accurately balances boiler heat exchange efficiency and prevents localized tube overheating and acidic condensation.
Sulfuric Acid Regeneration Furnaces	Continuous thermal profiling in spent sulfuric acid decomposition furnaces operating under oxidizing sulfur dioxide atmospheres.	Resists catastrophic high-temperature acid gas corrosion while providing stable signals for stoichiometric burner regulation.
Hydroprocessing and Desulfurization Units	Temperature tracking inside high-pressure hydrodesulfurization (HDS) reactors handling sour hydrocarbon feeds and hydrogen gas.	Maintains continuous process kinetics control, prevents catalyst coking, and eliminates sulfur-induced thermocouple embrittlement.
Coal and Coke Gasification Plants	Monitoring synthetic gas exit gas streams containing substantial hydrogen sulfide, carbonyl sulfide, and slag particulate.	Delivers high abrasion and sulfidation resilience, preventing sudden tube rupture and unscheduled gasifier shutdowns.
Non-Ferrous Metal Smelting	Tracking metallurgical furnace off-gas lines and roasters where sulfurous concentrates produce high-volume sulfur dioxide.	Resists heavy metal vapor attack, corrosive oxidation, and abrasive dust accumulation, reducing sensor replacement frequency.
Sulfur Pit and Storage Tank Condensers	Temperature management in sulfur collection pits, run-down lines, and seal pots keeping elemental sulfur in liquid state.	Avoids freezing or excessive vaporization of molten sulfur by ensuring tight thermal maintenance around viscosity minimums.
Industrial Incinerators and Flare Stacks	Exhaust temperature monitoring for sour gas flare systems and industrial off-gas thermal oxidizers with fluctuating sulfur content.	Withstands rapid gas velocity fluctuations and continuous outdoor exposure while ensuring total regulatory destruction efficiency.

Specification Parameter	Specification Details (Model Series KT-LDO)
Product Identifier	KT-LDO Industrial Sulfur Thermocouple Series
Thermocouple Element Types	Type B (Pt-30%Rh / Pt-6%Rh), Type S (Pt-10%Rh / Pt), Type R (Pt-13%Rh / Pt), Type K (NiCr / NiAl), Type N (NiCrSi / NiSi)
Temperature Measurement Range	Type B: 0°C to 1600°C (32°F to 2912°F) Type S/R: 0°C to 1450°C (32°F to 2642°F) Type N/K: -40°C to 1150°C (-40°F to 2102°F)
Calibration Tolerance / Accuracy	Class 1 / Special Limits of Error ($\pm 1.5^{\circ}\text{C}$ or $\pm 0.004 \times [t]$ whichever is greater for base metals; $\pm 1.0^{\circ}\text{C}$ or $\pm [1 + (t - 1100) \times 0.003]^{\circ}\text{C}$ for precious metals)
Outer Protection Tube Materials	High-purity Alumina (Al2O3 99.7%), Recrystallized Silicon Carbide (R-SiC), Silicon Nitride Bonded SiC, Haynes HR-160, Inconel 600/625, Hastelloy C-276
Inner Protection Tube Materials	High-purity Impervious Recrystallized Alumina (Corundum C799) or Quartz
Sheath Diameter Options	12 mm, 16 mm, 20 mm, 22 mm, 25 mm, 32 mm, custom diameters available upon request

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Insertion Length (U-Dimension)	Standard: 250 mm to 2000 mm (custom lengths configurable up to 3500 mm)
Process Mounting Connection	Flanged (ASME B16.5 Class 150/300/600/900/1500, DN25 to DN100, RF/RTJ) or Threaded (1/2" to 1-1/2" NPT / BSP)
Connection Head Enclosure	Cast Aluminum alloy or precision investment-cast 316 Stainless Steel with screw cover and retaining chain
Ingress Protection Rating	IP66 / IP67 / NEMA 4X weather-tight and corrosion-resistant construction
Hazardous Area Certifications	ATEX / IECEx Ex d IIC T6...T1 Gb (Flameproof / Explosion-Proof), Ex ia IIC T6...T1 Ga (Intrinsically Safe)
Insulation Resistance	>1000 MΩ at 500 VDC ambient; >20 MΩ at maximum rated operating temperature
Purge Gas Connection	Optional 1/4" or 3/8" NPT inert gas (N2 / Ar) purge port with integrated non-return check valve
Transmitter Integration	Optional head-mounted 4-20 mA HART, Foundation Fieldbus, or Profibus-PA programmable temperature transmitter
Thermowell Integrity Testing	Hydrostatic pressure testing up to 150 bar, helium leak testing (1×10^{-8} mbar·l/s), dye penetrant weld inspection