



# TEMPERATURE CONTROL IN CEMENT MANUFACTURING

Thermocouples and temperature sensor solutions

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# TEMPERATURE CONTROL IN CEMENT MANUFACTURING

**Temperature management is essential in cement manufacturing to ensure process control and product consistency.**

As a temperature sensor specialist with experience working within the cement manufacturing industry, we understand how important it is to accurately measure the temperature during the clinker process. We recognise the importance of achieving high sintering temperatures in the cement kiln and the need to ensure process stability. To achieve this process stability, adequate temperature control is required.

At Peak Sensors we manufacture and supply a complete range of temperature sensors to be used within all stages of the cement manufacturing process, including the grinding and sintering processes. Our sensors are used within the kilns burning conventional fuel or refuse-derived fuel. These cement manufacturing processes can range from room temperature to 1400°C.

## A LITTLE MORE ABOUT US...

Peak Sensors is a **temperature sensor specialist** who design, manufacture, and supply temperature sensor probes worldwide. We are **UK manufacturers based in Chesterfield, Derbyshire** and have been manufacturing sensors since 1997, making thermocouples and resistance thermometers to support your process control.

# THERMOCOUPLES AND TEMPERATURE SENSORS

Temperature sensors are used for monitoring purposes within the cement manufacturing industry. These sensors are typically thermocouples. Within lower temperature processes resistance thermometer devices (RTDs) can be used. Thermocouples are typically used for high temperature applications and the thermocouple conductors can be base metal (for temperatures as high as 1200°C) or rare metal (designed to withstand higher temperatures).

### Thermocouples Designed for Cement Manufacturing

There are a few different thermocouple types available to suit your cement manufacturing process. To determine your thermocouple type (rare metal, base metal or mineral insulated thermocouple) or if a resistance thermometer is best suited to your process, the firing temperature and level of protection needed from the environment is taken into consideration.

Rare metal thermocouples are made from conductors containing platinum and rhodium. They are suited for measuring high temperatures up to 1700°C. The probes are rugged and the sheaths can be made abrasion resistant for tough industrial use.

Base metal thermocouples are similar to rare metal thermocouples, however base metal can only withstand a lower maximum temperature of 1200°C. A special coating of Tungsten Carbide can be added to either of these probes to provide additional wear resistance for abrasive environments.

A mineral insulated thermocouple has a maximum temperature of 1100°C. These thermocouples can be bent and formed into a variety of shapes without damaging the sensor, to suit your application needs.

Temperature Sensors commonly used in the Cement Manufacturing Industry manufactured by Peak Sensors include:

- ▶ Rare Metal Thermocouple Assembly with Ceramic Sheath (RMC)
- ▶ Rare Metal Thermocouple Assembly with Metal Sheath (RMM)
- ▶ Base Metal Thermocouple Assembly with Metal Sheath (BMM)
- ▶ Mineral Insulated Thermocouple with Head (MTH)
- ▶ Mineral Insulated Resistance Thermometer with Head (MRH)
- ▶ Cable Resistance Thermometer with Metal Pocket (CRM).



## Rare Metal Thermocouple Assembly with Ceramic Sheath

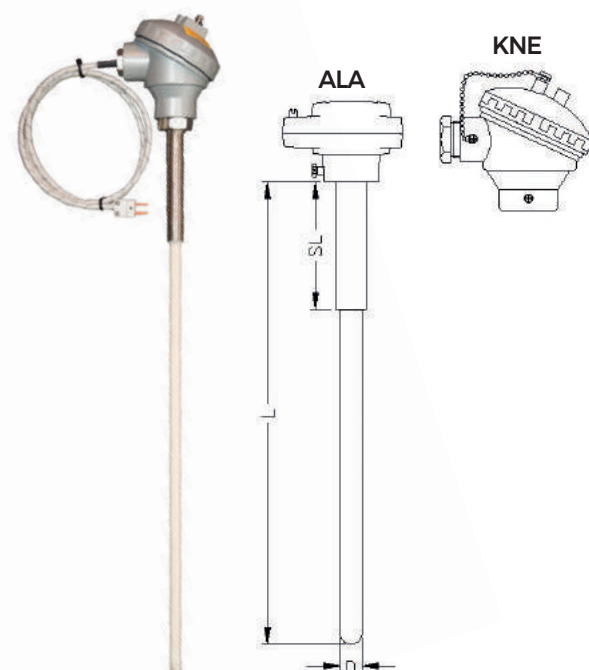
*Cyclone Sensor | Smoke Box Sensor*

In a rare metal thermocouple assembly with ceramic sheath (RMC) the sensor is protected with a ceramic sheath. Depending on the sheath material chosen the rare metal thermocouple can withstand maximum temperatures between 1000°C and 1700°C.

**RMC** (Rare Metal Thermocouple Assembly with Ceramic Sheath)

### Specifications:

- ▶ 0°C to 1700°C temperature range
- ▶ Ceramic protection tube of  $\varnothing$  12mm,  $\varnothing$  15mm,  $\varnothing$  24mm
- ▶ Ceramic protection tube made of C799 (Recrystallised Alumina)
- ▶ Additional ceramic internal tube on request
- ▶ Connecting tube of  $\varnothing$  22mm, 27mm, 32mm, 150mm length or according to request
- ▶ Single or double element option (Simplex or Duplex)
- ▶ Type R, S or B according to BS EN 60584
- ▶ The wire diameter for this thermocouple is  $\varnothing$  0.50mm
- ▶ Long lasting grain stabilised wire available on request
- ▶ Flange for assembly
- ▶ Head options in ALA and KNE



## Base Metal Thermocouple Assembly with Metal Sheath

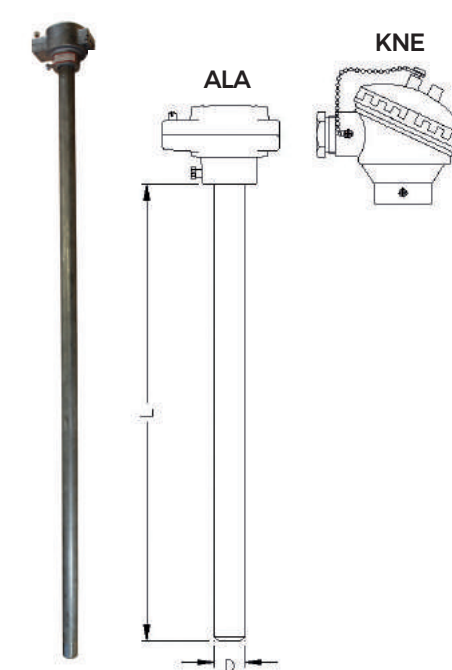
*Cyclone Sensor | Smoke Box Sensor | Flue Sensor*

In a base metal thermocouple assembly with metal sheath (BMM) the sensor is protected with a metal sheath. Depending on the sheath material chosen the Base Metal Thermocouple can withstand maximum temperatures between 1000°C and 1100°C.

**BMM** (Base Metal Thermocouple Assembly with Metal Sheath)

### Specifications:

- ▶ 0°C to 1100°C temperature range
- ▶ Additional ceramic internal tube on request
- ▶ Type K according to BS EN 60584
- ▶ The wire diameter of the thermocouple is typically  $\varnothing$  2.96mm
- ▶ Flange for assembly
- ▶ 446 or 253 stainless steel sheath
- ▶ Head options in ALA and KNE



## Rare Metal Thermocouple Assembly with Metal Sheath

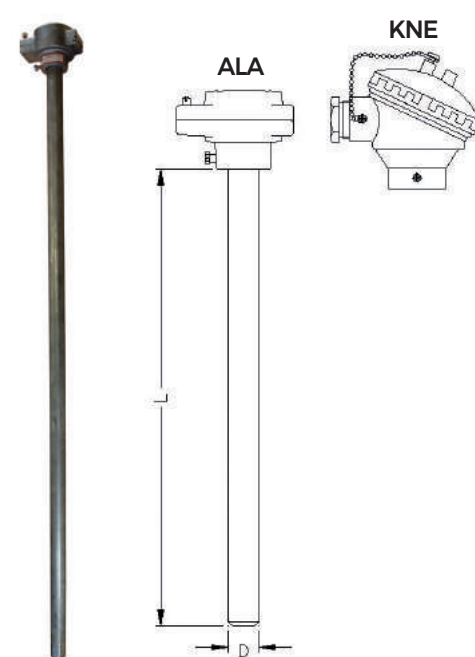
*Cyclone Sensor | Smoke Box Sensor*

In a rare metal thermocouple assembly with metal sheath (RMM) the sensor is protected with a metal sheath. Depending on the sheath material chosen the rare metal thermocouple can withstand maximum temperatures between 1000°C and 1200°C.

**RMM** (Rare Metal Thermocouple Assembly with Metal Sheath)

### Specifications:

- ▶ 0°C to 1200°C temperature range
- ▶ Metal protection tube of  $\varnothing$  21.3mm,  $\varnothing$  26.7mm,  $\varnothing$  33.3mm, all British standard pipe size.
- ▶ Internal ceramic protection tube made of C610 (Aluminous Porcelain)
- ▶ Single or double element option (Simplex or Duplex)
- ▶ Type R or S according to BS EN 60584
- ▶ The wire diameter for this thermocouple is  $\varnothing$  0.50mm
- ▶ Long lasting grain stabilised wire available on request
- ▶ Flange for assembly
- ▶ Head options in ALA and KNE



## Mineral Insulated Thermocouple with Head

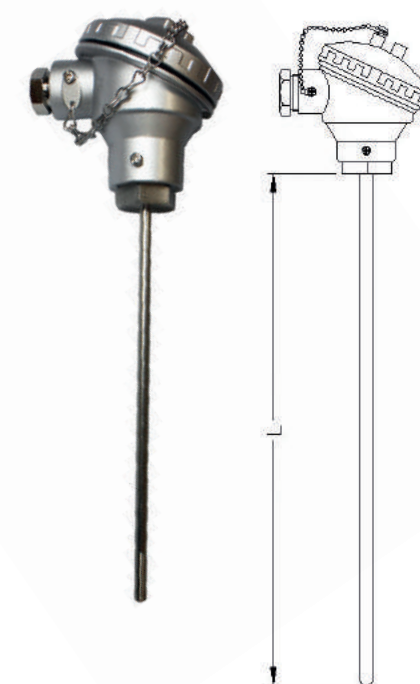
*Flue Sensor | Conditioning Tower Sensor | Motor Bearing Sensor*

In a mineral insulated thermocouple with head (MTH) the sensor is protected with an outer metal sheath with the inner elements insulated with magnesium oxide powder, tightly packed so no air is trapped inside to provide great thermal conductivity. The sheath of a mineral insulated thermocouple can be easily bent and formed into a variety of shapes to suit your application. The thermocouple output is millivolts (mV) and can have a temperature range up to 1100°C.

**MTH** (Mineral Insulated Thermocouple with Head)

### Specifications:

- ▶ 0°C to 1100°C temperature range
- ▶ Common diameters  $\varnothing$  3.0mm and  $\varnothing$  6mm
- ▶ Single or double element option (Simplex or Duplex)
- ▶ Type K or N according to BS EN 60584
- ▶ Transmitter available in the head
- ▶ Flange or compression fitting for assembly
- ▶ Head options in BUZ and KNE



## Mineral Insulated Resistance Thermometer with Head

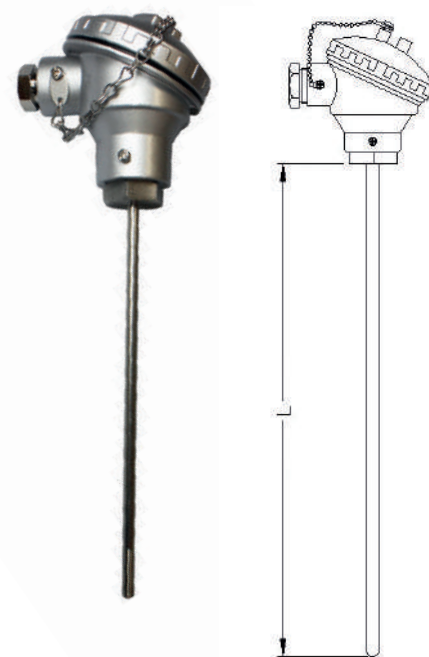
Flue Sensor | Conditioning Tower Sensor

A mineral insulated resistance thermometer has an output of ohms ( $\Omega$ ). The sensor is protected within a stainless steel sheath and is insulated with magnesium oxide. The sheath of the probe can be easily bent and formed into a variety of shapes to suit your application. The resistance thermometer has a maximum temperature up to 500°C. Above this temperature a thermocouple must be used.

**MRH** (Mineral Insulated Resistance Thermometer with Head)

### Specifications:

- ▶ -50°C to 500°C temperature range
- ▶ Pt100 class A or B
- ▶ 3 wire configuration, red/red/white
- ▶ Common diameters  $\Phi$  3.0mm and  $\Phi$  6mm
- ▶ 316 stainless steel sheath
- ▶ Head options in BUZ and KNE



## Cable Resistance Thermometer with Metal Pocket

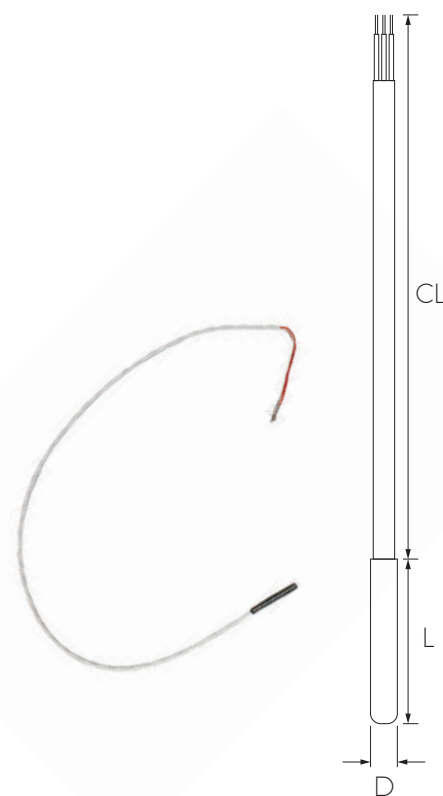
Flue Sensor | Conditioning Tower Sensor | Motor Bearing Sensor

Cable resistance thermometers are very cost effective for temperature measurement below 350°C. The construction of a cable resistance thermometer consists of a RTD element securely attached to a length of cable. The sensor is protected with a metal pocket. The maximum temperature for a cable resistance thermometer is determined by its insulation, there are high temperature insulation options available including glass fibre.

**CRM** (Cable Resistance Thermometer with Metal Pocket)

### Specifications:

- ▶ -100°C to 350°C temperature range
- ▶ Pt100 class A or B
- ▶ 3 wire configuration, red/red/white
- ▶ Common pocket diameters  $\Phi$  5mm to  $\Phi$  8mm
- ▶ Insulation PVC, Silicon Rubber, PTFE, Glass Fibre
- ▶ Common stranding 7x 0.2
- ▶ 316 stainless steel sheath
- ▶ 50mm tails, 10mm tinned



## CUSTOM DESIGNS

Please contact us at [pslsales@peakensors.com](mailto:pslsales@peakensors.com) to discuss your requirements. Our technical team can work with you to develop and manufacture custom designs of thermocouples.

## CALIBRATION SERVICE

Old and new temperature sensors can be calibrated to ensure they are reading accurately and to specification. We can calibrate your existing sensors, offer calibration as part of the manufacturing process for new sensors built by Peak Sensors or provide on-site calibration visits.

## OTHER PRODUCTS AND SERVICES AVAILABLE

- ▶ Tungsten Carbide Coating - we can provide a special coating to give added abrasion resistance to sensors like Rare Metal or Base Metal Thermocouples.
- ▶ Platinum and Rhodium Recycle Service - we can support with the recovery of platinum and rhodium thermocouple wire to help cover the cost of replacement probes.

**If you are unsure of what thermocouple or temperature sensor is the best option for your process, please contact us to discuss your requirements and our technical team will work with you and advise the appropriate solutions.**





**PEAK SENSORS**

temperature measurement & control

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