

Multi-Channel Kiln Under Tyre Hot Spot Temperature Detection Systems



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Overview:

Measuring the under-tier temperature in kilns used in industries like cement, lime, and ceramics is crucial for maintaining consistent product quality and efficient operation. The under-tier section is where fuel combustion and heat transfer occur, making accurate temperature monitoring essential for controlling the firing process. Calex's multi-channel infrared (IR) sensor system offers a reliable solution for continuous, non-contact measurement of under-tier temperatures, overcoming several industrial challenges.



Challenges

- ❖ **Non-Uniform Heat Distribution:** Due to fluctuating combustion conditions, heat distribution in the kiln can be uneven. This makes it difficult to maintain consistent temperature control across different zones.
- ❖ **Fuel Efficiency:** Precise temperature monitoring is essential for optimizing fuel consumption. Overheating or underheating in the under-tier zone can result in excessive fuel use or poor product quality.
- ❖ **Harsh Environment:** The under-tier area is subject to dust, ash, and flame exposure, which can impair the performance of standard sensors. These harsh conditions demand durable, low-maintenance solutions.
- ❖ **Real-Time Data Needs:** Rapid temperature changes in the kiln require real-time monitoring to prevent potential damage to the kiln lining, avoid process inefficiencies, and ensure operator safety.

Solution Provided by Calex Multi-Channel IR Sensor:

- ❖ **Non-Contact Infrared Sensing Technology:** The Calex multi-channel IR sensor utilizes non-contact temperature measurement, avoiding direct exposure to the harsh conditions in the kiln under-tier area. It captures the infrared radiation emitted by hot surfaces to calculate precise temperatures.
- ❖ **Multi-Channel Configuration:** The system has multiple infrared sensors that monitor different points across the under-tier zone simultaneously. This ensures a comprehensive temperature map, highlighting temperature variations or uneven heating across the zone.

Benefits of Using Calex Multi-Channel IR System:

- ❖ **Enhanced Kiln Efficiency:** By providing continuous, accurate temperature data, the Calex system allows for better control of the firing process. This leads to optimal fuel usage, improving energy efficiency and lowering operational costs.
- ❖ **Prevention of Hot Spots and Damage:** The multi-channel system helps detect hot spots or areas of excessive heating before they can damage the kiln's lining. Early detection helps prevent costly repairs and extends the kiln's operational life.
- ❖ **Consistent Product Quality:** Maintaining uniform temperatures in the under-tier zone is essential for consistent material quality. The Calex system ensures temperature stability, improving the overall quality of the end product and reducing waste.
- ❖ **Reduced Maintenance Costs:** With non-contact, durable sensors that can withstand extreme conditions, the Calex system minimizes the need for frequent maintenance. Operators can focus on proactive maintenance schedules, reducing unplanned downtime and repair costs.
- ❖ **Improved Safety:** Continuous real-time monitoring enhances the safety of kiln operations by reducing the likelihood of dangerous temperature spikes or equipment failures. This reduces the risk to personnel and equipment.
- ❖ **Conclusion:** The Calex multi-channel IR sensor system is an ideal solution for monitoring under-tier temperatures in industrial kilns. It addresses the challenges of extreme heat, uneven temperature distribution, and harsh environmental conditions, while offering significant operational benefits. Improved efficiency, product quality, and safety, combined with reduced maintenance and energy costs, make the Calex system a valuable investment for any kiln operation.

The PyroMiniBus System

The Calex PyroMiniBus system provides an ideal integrated monitoring, alarm and data logging package for Kiln under tyre hotspot detection.

Sensors

PyroMiniBus sensors have RS485 Modbus RTU communications, and can be connected directly to a Modbus Master, or optional local displays. The sensor body is made of 316 stainless steel to maximise shielding from electromagnetic interference.

Local displays

With optional PM180 6-channel touch screen terminals positioned close to the sensors, maintenance engineers can quickly and easily locate the high temperature reading.

The PM180 provides local temperature display, sensor configuration, data logging to MicroSD Card, and alarm outputs via a connected module. It may in turn be networked with PM180.

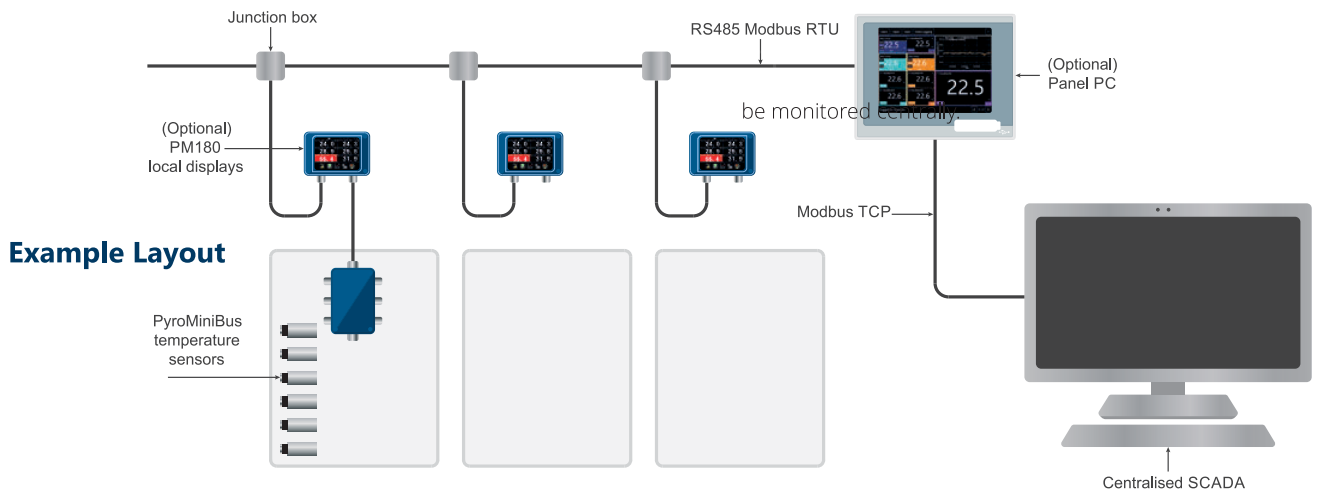
Local SCADA

Optional Panel PCs can display temperature data from multiple PM180 sub-networks, or from groups of sensors connected directly. One panel PC can monitor all the sensors in kiln shell, and the data may be accessed in real time via Ethernet using the software's Modbus TCP functionality.



Centralised SCADA

Sensors, PM180 units and Panel PCs can be connected to an external Supervisory Control and Data Acquisition (SCADA) system, or a Building Management System (BMS). The entire power distribution network can be monitored centrally.



Measurement Angle

When measuring painted surfaces, the angle of the sensor relative to the surface does not usually affect the measurement accuracy. This is because non-reflective surfaces emit infrared radiation evenly at a wide range of angles. Please note: when measuring at a 90-degree angle, the measured spot is circular, and at lower angles it is elliptical.