

Distributed Temperature Sensing (DTS) for Warehousing, Storage, and Logistics

Warehousing, storage, and logistics facilities play a critical role in modern supply chains, supporting the storage and movement of goods across industries such as retail, e-commerce, manufacturing, and food distribution. As facilities grow in size and automation becomes more widespread, it has become increasingly important to ensure safety, operational continuity, and asset protection.



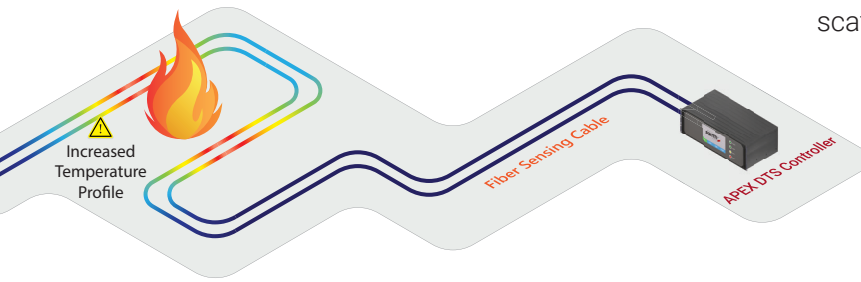
Fire risk, equipment overheating, and environmental conditions pose significant challenges, particularly in high-density storage environments. Early detection of thermal anomalies is essential to prevent incidents, minimise losses, and maintain operational efficiency.

Distributed Temperature Sensing (DTS) using optical fiber technology provides continuous, real-time temperature monitoring across large facilities. By delivering a full thermal profile, DTS enables early fault detection, improved safety, and enhanced operational visibility.

Key Challenges

- **Large floor areas:** Extensive coverage required across wide, deep and tall storage space
- **High storage density:** Racking systems can restrict access and visibility
- **Fire risk:** Combustible goods, packaging materials, and pallet storage
- **Automated systems:** Conveyor belts, sorting systems, and robotics
- **Variable environments:** Temperature-controlled zones (e.g., cold storage) and large external openings
- **Operational continuity:** Downtime disrupts supply chains and fulfilment

DTS Technology Overview



Distributed Temperature Sensing (DTS) systems use optical fibers as continuous linear temperature sensors. A DTS control unit sends laser pulses through the fiber and analyses backscattered light (typically Raman scattering) to determine temperature along the fiber.

Key Benefits

- Continuous monitoring over long distances
- Real-time temperature data
- Passive sensing element (no power required along the sensing cable)
- Immune to electromagnetic interference
- Low maintenance requirements

Key Applications

Fire Detection in Storage Areas

- Detect early temperature rises in racking systems
- Identify fire risks in high-density storage areas
- Rapidly locate incidents for targeted response
- Particularly valuable in high-bay warehouses where traditional detectors may have a delayed response

Conveyor and Sorting System Monitoring

Automated logistics systems rely heavily on conveyors and sorters.

- Detect overheating rollers, motors, and bearings
- Identify belt misalignment or friction
- Provide early warning of mechanical faults

Cable and Electrical Infrastructure Monitoring

Electrical systems in warehouses include power distribution, lighting, and automation controls.

- Detect overheating cables and connections
- Monitor cable trays and distribution routes
- Prevent electrical fire incidents

Cold Storage / Temperature-Controlled Environments

Temperature-sensitive goods require strict environmental control.

- Continuous temperature profiling in storage areas
- Detect localised temperature deviations
- Verify cooling system performance

Lithium-Ion Battery Charging Areas

Warehouses increasingly use electric forklifts and automated guided vehicles (AGVs) powered by batteries.

- Monitoring of battery charging stations
- Early detection of overheating or thermal events
- Integrate with fire protection systems

Perimeter and Roof Monitoring

- Detect external fire risks or heat intrusion
- Monitor rooftop equipment and solar installations
- Enhance overall facility safety

