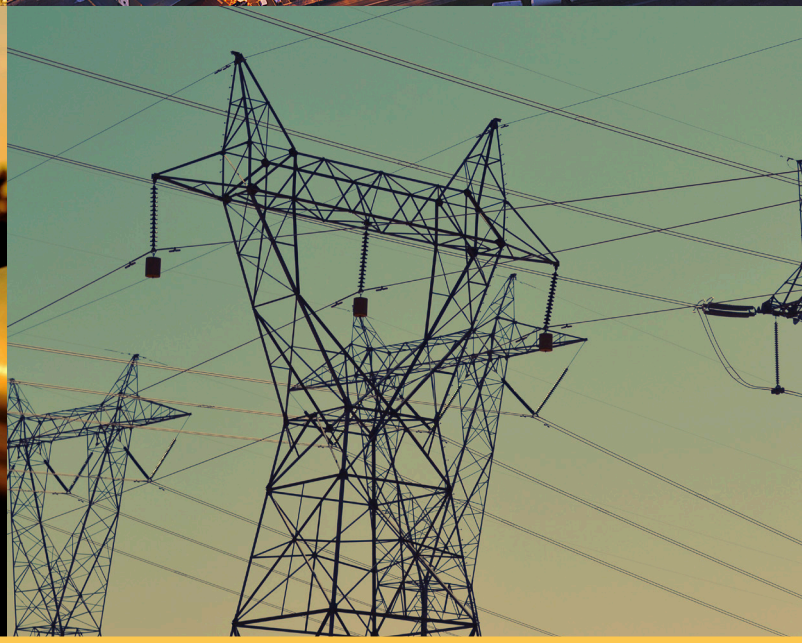
Distributed Temperature Sensing based in Optical Fibre

OPTRAL YOKOGAWA



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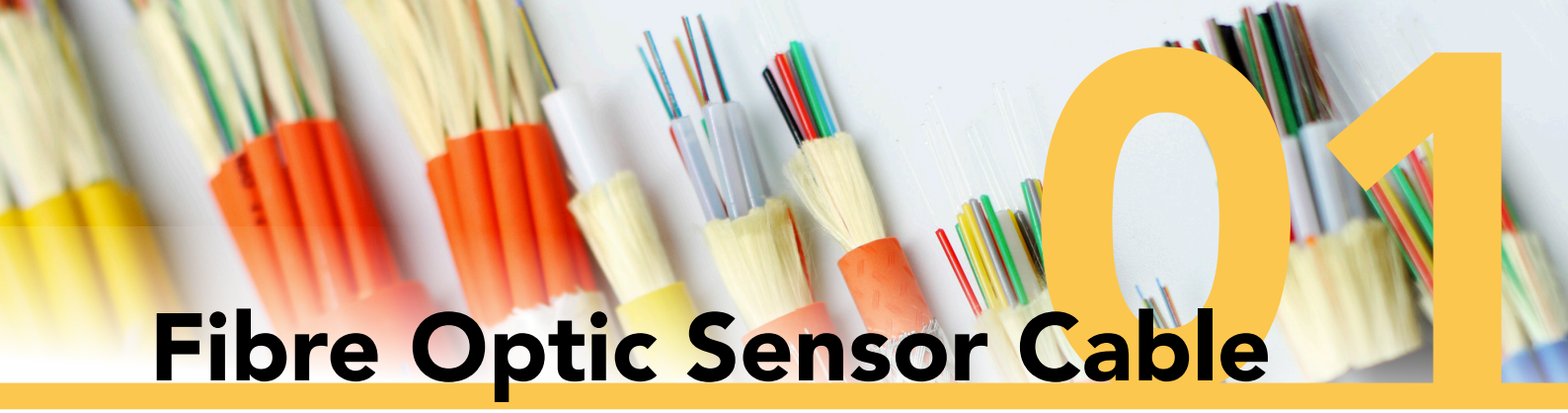


Fibre Optic Sensor Cable

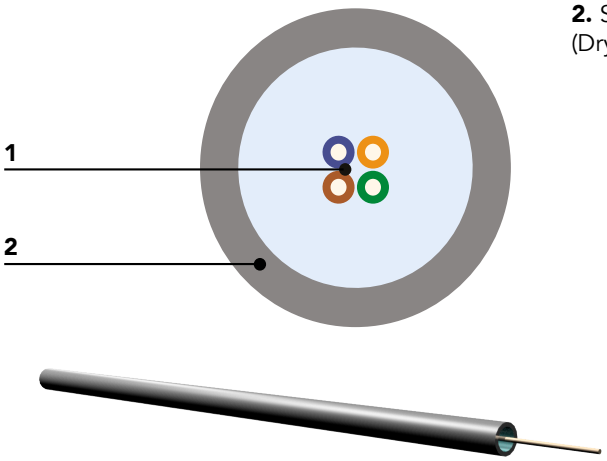
01

Sensor cables are supplied with different fibre types, suitable for temperature range from -200°C up to +300°C.

1. Fast Temperature Detector Cable

Operating Temperature Range:
-200°C ~ +300 °C

Metallic Steel Sensor Cable



1. Fibre Optics
2. Stainless Steel Tube (Dry Tube)

Applications
Furnace Chamber
Cable rack System
Tank leak detection
Room Temperature
Oil & Gas

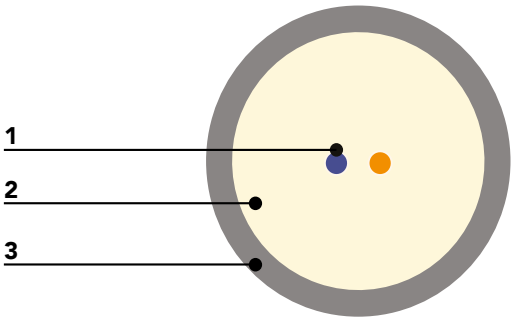
Features
Compact/Tough/Resistant/ Reduced diameter/ Excellent resistance to rodents

RODENT PROTECTION | FREE OF HALOGENS | DISTRIBUTED TEMPERATURE SENSOR

2. High Flexible Cable

Operating Temperature Range:
-25°C ~ +150 °C

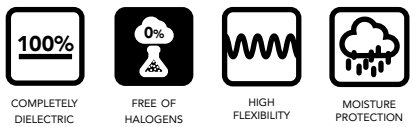
Dielectric Sensor Cable



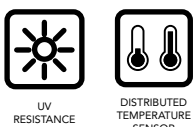
1. Fibre Optics
2. Strength Members
3. Outer Jacket

Applications
Cable rack System
Room Temperature
Tunnel Fire detection
Mining Deployment
High bending performance

Features
Dielectric/Compact/Flexible/ Reduced diameter



COMPLETELY DIELECTRIC | FREE OF HALOGENS | HIGH FLEXIBILITY | MOISTURE PROTECTION

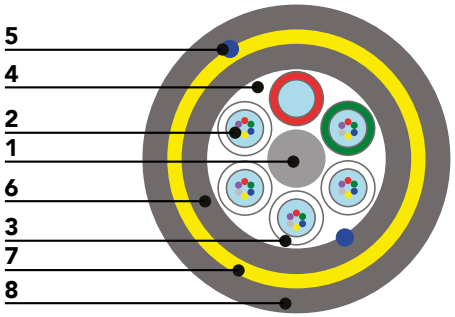


UV RESISTANCE | DISTRIBUTED TEMPERATURE SENSOR

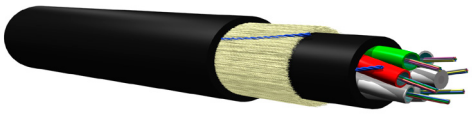
3. High Voltage Resistant Cable

Dielectric Sensor Cable

Operating Temperature Range:
-50°C ~ +90 °C

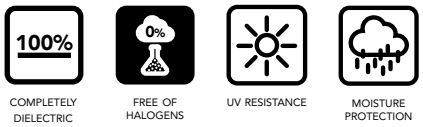


1. Central Element
2. Fibre Optics
3. Sensing Tube (jelly filled)
4. WB Members
5. Ripcord
6. Inner Jacket
7. Strength Members
8. Outer Jacket



Applications
Outdoor
Overhead Voltage Smart Grid Sensing
High Temperature Performance
Aerial Installations
Leak Detection
DAS Acoustic Sensors

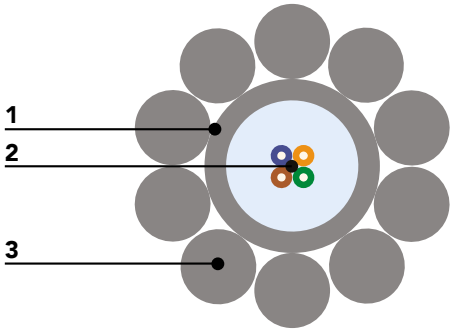
Features
Dielectric/Tough/Compact/
High density of fibres/ Self-supported aerial Applications



4. Rugged Cable

Metallic Armoured Sensor Cable

Operating Temperature Range:
-200°C ~ +300 °C



1. Fibre Optics
2. Stainless Steel Tube (Dry Tube)
3. Metallic Armour

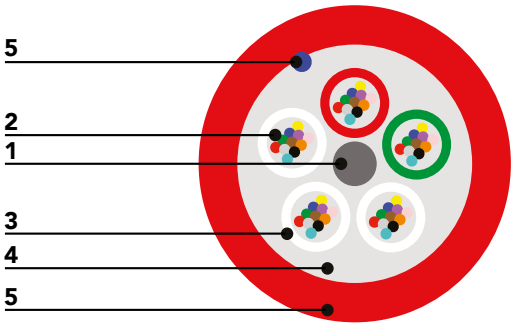
Applications
Cable rack System
Conveyor System
Wellbore & buried Systems
Room Temperature
Photovoltaic Solar Plant

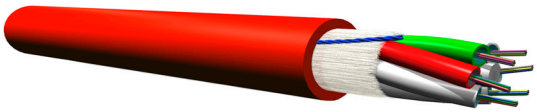
Features
Compact/Tough/Resistant/Reduced diameter/Excellent resistance to rodents

5. Dielectric Fire Resistant Cable

Euroclass Rated B2ca Sensor Cable

Operating Temperature Range:
-20°C ~ +70 °C





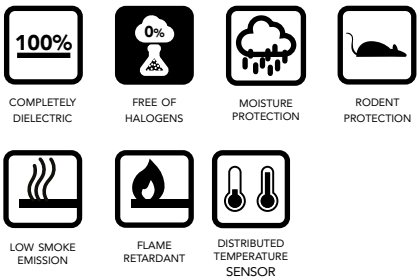
1. Central Element
2. Fibre Optics
3. FR Dry Loose Tube
4. Flame Retardant barrier
5. Ripcord
6. Outer Jacket

Applications

CE B2ca requirement
Tunnel Fire detection
High bending performance

Features

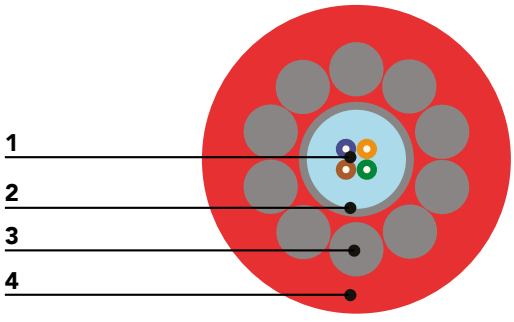
Compact/Flexible
Totally Dielectric/Reduced diameter/
Rodent protected

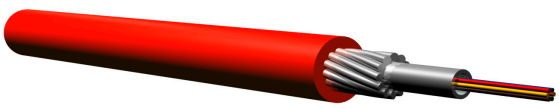


6. Metallic Fire Resistant Cable

Metallic Armoured Sensor Cable

Operating Temperature Range:
-30°C ~ +70 °C





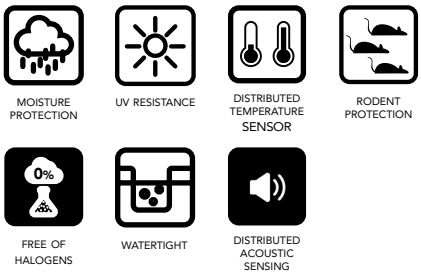
1. Fibre Optics
2. Stainless Steel Tube (Jelly filled)
3. Metallic Armour
4. Outer Jacket

Applications

Universal (Indoor/Outdoor)
Tunnel Fire Detection
Harsh Environments
Pipeline Leak Detection
Room Temperature
DAS Acoustic Sensors

Features

Compact/Tough/Resistant/Reduced diameter/Watertight/Excellent resistance to rodents



02

Yokogawa DTSX

Distributed Temperature Sensor

Features:

- Easy process control system integration
- Wide operating environment range
- Compact and ultra-low power consuption
- Measure upt to 50km
- Optional 2, 4, 16 channel modular optical switch
- Ethernet and Serial Modbus Communications
- LAS 2.0 and WITSNL 1.3.1.1 data formatting option
- STARDOM™ Field Controller (NFCP050) option
- Field enclosure with solar panels, batteries, and wireless communications available

DTS
Distributed
Temperature Sensing

DTSX3000 Flagship model

Power Module
DC10 - 30V
AC100V - 240V
Selectable

DTS Module

Optical Switch Module (option)
2ch/4ch/16ch
Selectable

Measurement Distance Range

- DTSX3000-S ~10km
- DTSX3000-N ~16km
- DTSX3000-M ~30km
- DTSX3000-L ~50km

Specification is available by GS (General Specification)
DTSX3000: GS 39J06B40-01E, GS 39J02B40-01E

DTSX200 Standard Model

Power Module
DC10 - 30V
AC100V - 240V
Selectable

DTS Module

Optical Switch Module (option)
2ch/4ch/16ch
Selectable

Measurement Distance Range

- DTSX200 ~6km

Specification is available by GS (General Specification
DTSX200: GS 39J06B45-01E, GS 39J02B45-01E

Monitoring Software 03

OMONITOR is OPTRAL's software platform for managing, displaying and monitoring the events or faults detected. The platform resides in a PC where all the databases are located: inventory, geolocation in GIS (Geographic Information System), real time status, registered alarms, users, etc.

It is designed with web technology and can be accessed from multiple browsers.

Technical Features

- Real-time monitoring and management of Yokogawa's DTSX and Optral's fibre optic sensor cable.
- User management.
- Monitoring and logging of events and alarms.
- Trace recording: reflectometry, temperature, stress.

MONITOR

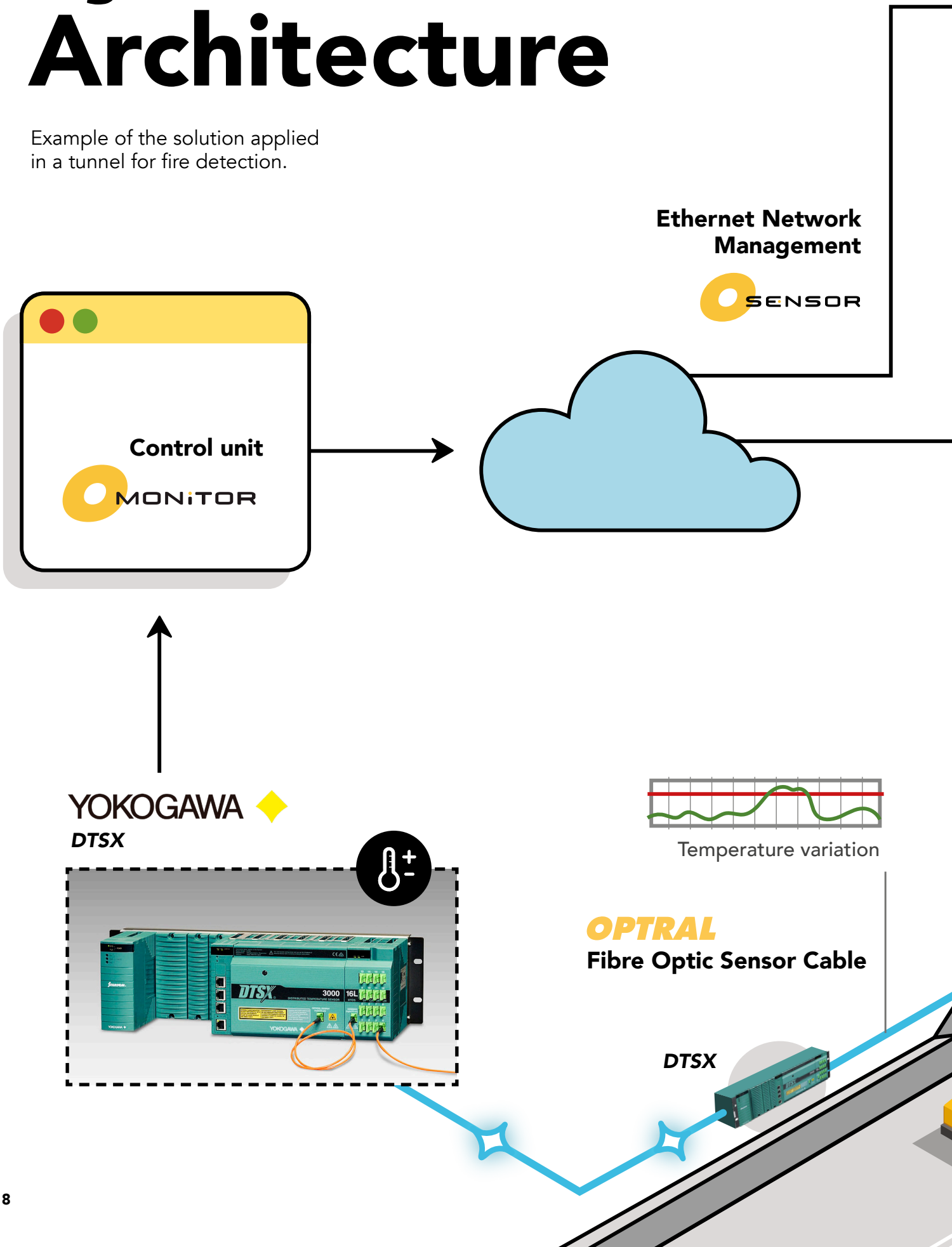
Example of the main view of the management and monitoring system for an application of potential leakage in a steam pipe. We can observe, in real time, a graph in schematic or GIS using a colour code, the reception of alarms and the offline playback of the historical temperature records of the last six months.

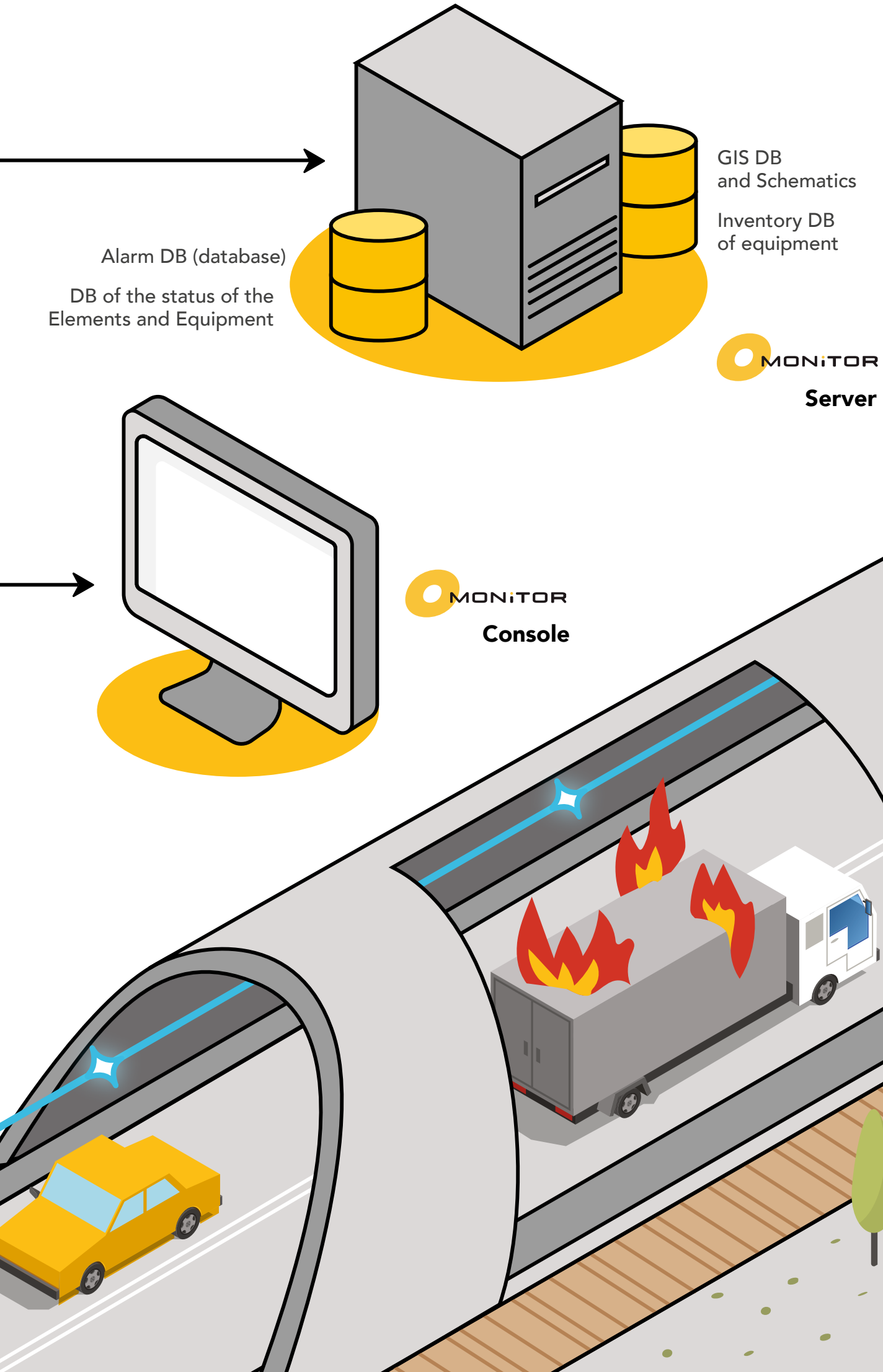
1. Inventory of the equipment
2. Alarm Received
3. GIS/graphics in schematic
4. Real time monitoring
5. Offline monitoring

- Reproduction and monitoring of registered traces.
- Identification of the status of the elements using a colour code.
- Geolocation using Geographic Information System (GIS).
- Graphical representation of 3D Schematics: industrial plants, buildings, etc.
- Northbound interface to integrate other platforms.
- Software license: multi-user.
- Multi-platform Server.
- Web browser.
- Remote management of Yokogawa's DTSX through Local Craft Terminal.

System Architecture

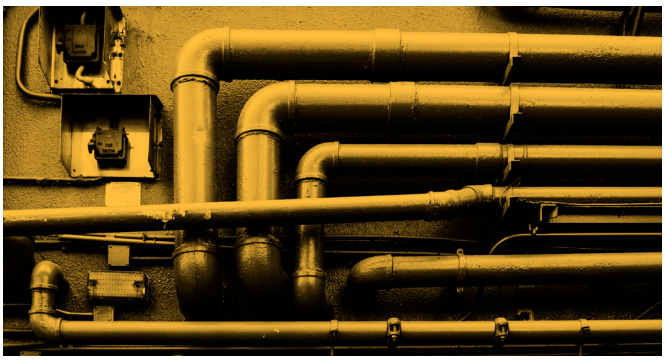
Example of the solution applied in a tunnel for fire detection.




GIS DB
and Schematics
Inventory DB
of equipment
Alarm DB (database)
DB of the status of the
Elements and Equipment
MONITOR
Server
MONITOR
Console

Markets

01 Oil & Gas



Downhole & Driling Technology

Pipeline Leak Detection

Pressurised gas

- Ammonia
- Chlorine
- LNG
- Steam

02 Infrastructures

Fire detection

Industrial plants

Tunnels

Structures and Buildings

03 Safety

Fire detection system

04 Energy

Photovoltaic Solar Plant

Power transmission lines

Detection of electrical overloads

Intelligent Power Grid Monitoring (Smart Grid)

Energy monitoring

Monitoring of excessive heating

05 Industry

Monitoring of industrial processes

Control of wine and beer fermentation

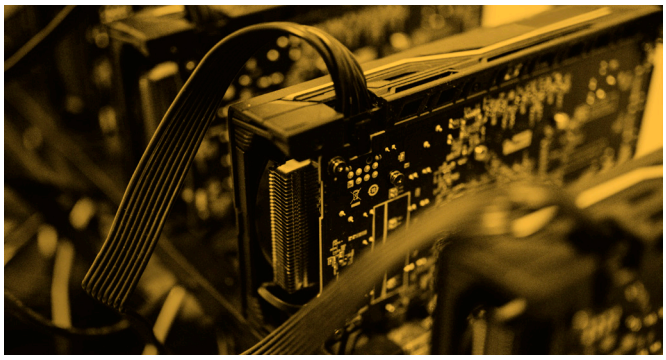
Cold chain control

Ammonia leak detection

Manufacturing control

Heat source detection

06 Data Centre



Temperature control of servers

07 Mining

Temperature control in galleries for personnel safety

Monitoring of conveyor belt bearings

Electrolysis temperature control

Leakage mine waste

Cooper bioleaching

Shortcut control in electrolysis mining

08 Logistics and distribution

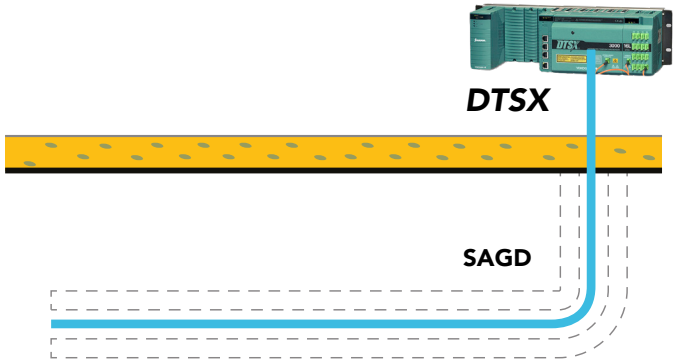
Temperature control in automated warehouses

Temperature control in pharmaceutical warehouses

Application Examples

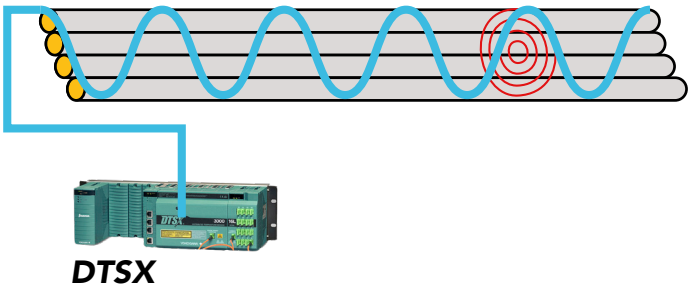
Wellbore Dynamics / Geophysical Monitoring

Wellbore temperature distribution profile can be used to detect thermal events related to steam breakthrough and oil & gas intake position, o other geophysical conditions.



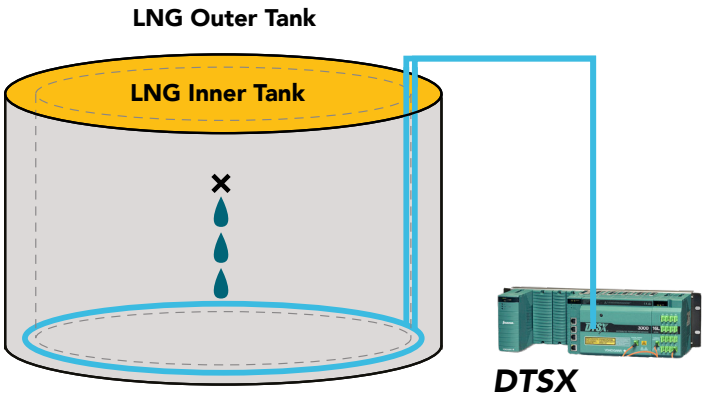
Cable Rack Monitoring

DSTX can be easily deployed along cable tunnels, ducts, trays or rack systems where heat build-up could indicate the potential for a fire hazard, or conductor over-temperature condition.



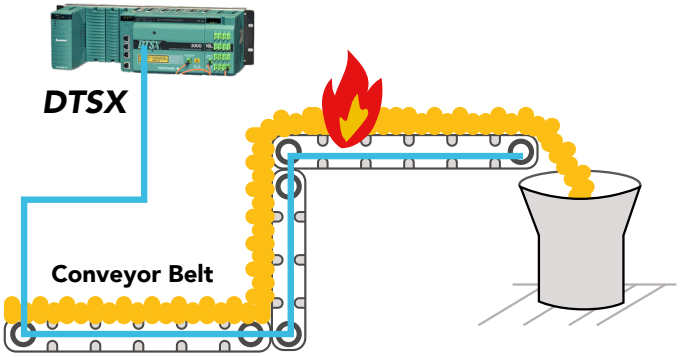
LNG Storage Tank

DTSX is commonly used for LNG tank leak detection by monitoring the expected differential in temperatures between the inner and outer liners comprising the tank system.



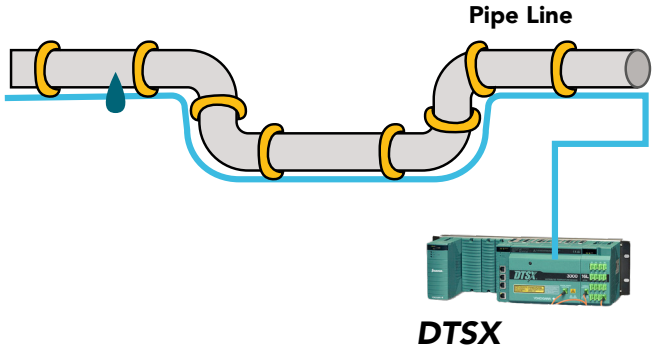
Conveyor System Safety Monitoring

DTSX can be used to detect heat build up along conveyor systems indicating mechanical component failure or potential combustion conditions.



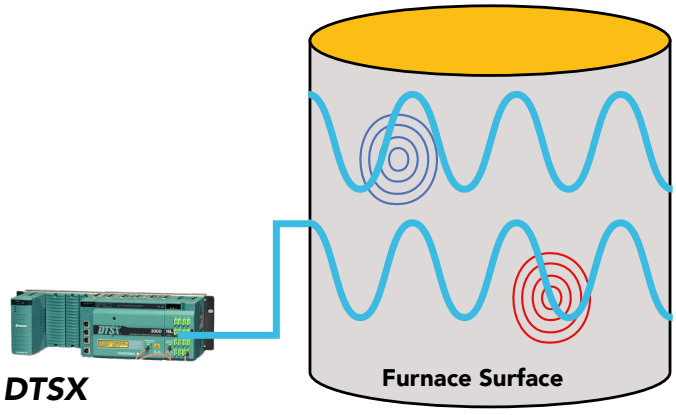
Pipeline Leak Detection System

DTSX thermal profiles can be used to detect leak locations along LNG, liquid ammonia and other compressed gas pipelines where escaping content creates a thermal variance from normal background temperatures.



Furnace Chamber Skin Temperature Monitoring

Furnace chamber or reactor vessel liner deterioration diagnosis via external wall surface temperature profiling.



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