



Fiber Optic Linear Heat Detection



Optimum Safety

in Tunnels and Special
Hazard Buildings



Optimum safety in fire detection

Increased safety consciousness calls for state of the art fire protection equipment in tunnels. Rising demand of fire surveillance in other facilities as rail and service tunnels, cable routes and ducts, storage facilities and warehouses or conveyor belts and many other special hazard facilities motivated LIOS Technology to offer a measuring system tailor-made for these applications.

LIOS OTS systems provide optimum safety for fire detection in tunnels and special hazard areas due to their ability to cope with extreme environmental conditions.



Over 2000 installations worldwide and 200 in tunnels have proven that the system is reliable and easy to operate.

With the cooperation of major players in the worldwide fire safety industry, the OTS system has been successfully installed in hundreds of kilometers of road and rail tunnels to detect fires.

A new standard in modern fire detection

Underground transport facilities are sensitive links in the economic chain that carry thousands of people as well as tons of goods every day. A safe transport is of growing importance.

Breakdowns in operation can have catastrophic consequences. Therefore safety precautions are vitally important and need to address the high potential risks involved. By far the greatest risk is a fire out of control. There is a great danger to life from toxic combustion gases, exceedingly high temperatures, total loss of visibility, limited means of escape and the panic reactions of drivers and passengers. At the same time it causes serious damage to the structure of the underground transport facility.

Modern fire detection in tunnels with LIOS is:

Fast –

■ Reaction time is minimized as LIOS systems detect heat compared to conventional smoke detectors and excessive heat is prior to Pyrolysis

Reliable –

■ One purely passive line sensor from LIOS compared to hundreds of single sensors, each in need of power supply and a data channel to the fire management system. LIOS systems are not influenced by high-speed air currents.

Intelligent –

■ LIOS systems allow for pinpointing the current location, the size and the

propagation direction of the fire

Connectable –

■ LIOS systems can address alarm and traffic control systems as well as activate fire controls and ventilation systems

Cost efficient –

■ Both in installation and operation as the running meter of installation is comparatively inexpensive

LIOS OTS systems are developed for efficient and pinpoint fire detection in road and rail tunnels. Since their introduction in 1997 they have revolutionized the safety standard in underground transport facilities as they introduced the complete monitoring of the entire tunnel length for the first time.

The line sensor is based on optical waveguides, which are immune to electromagnetic disturbances. Based on years of experience within the field of fiber-optic measuring techniques as well as the input of research partners and customers, multiple characteristics were added to offer reliable and adaptable measurement features for locally linear heat detection profiles.



Technologies creating value

Temperatures are recorded as a continuous profile along the entire sensor cable compared to a conventional setup using single point-type sensors.

The benefit of achieving highly accurate temperatures over great distances at short measuring times is combined with the ease in installation and data acquisition.

State of the art fire safety

The LIOS OTS systems have been developed for serving one purpose – sophisticated fire detection equilibrating response time, false alarm safety and system reliability on an unbeatable level. Based on the OTS evaluation unit and an appropriate sensor cable the system fulfils the demands of modern fire detection technology.

- A purely passive sensor unaffected by rough conditions and electromagnetic disturbances
- A system architecture that allows stand-alone operation
- Precise information about fire location, size and propagation
- Easy to install
- Easy to integrate in fire management systems

Smart sensor design

LIOS Technology provides the appropriate sensor cable for every application. One vital component is a tube that accommodates 2 optical fibers. The coatings of the optical fiber can be tailored to optimally suit the required resistance to temperature conditions and mechanical impacts. The wall thickness of the tube sheathing, the material used and additional protective measures as stranded wires or coatings allow for an optimized design. Versions with an additional stranded wire layer upon the tube are available for fast temperature detection or if stricter requirements apply with regards to tensile strength and mechanical robustness. For applications with a high amount of electromagnetic disturbances like rail tunnels or power supply line tunnels LIOS offers a metal-free cable to minimize the risk of induced voltages. No electronic components are needed along the cable. The sensor is completely passive over its entire detection range. LIOS Technology's fiber optic linear heat detection can therefore be carried out in areas where high safety risks exist, e.g. in areas with a risk of explosion.



Solutions for explosive hazards

It is exceptionally important that safety systems themselves do not become a source of danger. LIOS Technology offers the right concept for areas with a certain risk of explosive conditions. The OTS-„EX“-system is classified in accordance with ATEX directive for explosive atmospheres Group II category 1GD, „Increased safety“. This system option certified for operation in special hazard areas has been deployed with great success as a fire alarm system for tanks with floating or fixed roofs. It is exactly the sensor cable's 100% resistance to dirt and dust and the purely passive nature of the fiber technology that makes the linear heat detection system an outstanding safety technology for special hazard applications.

| Cable | Outer Sheathing | Stainless steel tube | Diameter | Characteristics |
|---------------|-----------------|----------------------|----------|--------------------------|
| Fast Response | Stranded wire | yes | 4 mm | Fast detection/robust |
| Metal-Free | FRNC | no | 4 mm | No induced voltages |
| EX | Stranded wire | yes | 8 mm | Heavy Duty/ATEX approved |

Fire Management – every second counts

In case of fires developing intense heat and dense smoke, the fire must be kept subdued until the fire brigade arrives. The LIOS OTS systems can be coupled to operate with modern fire suppression systems on the basis of water mist that dissipate the heat energy from the fire. The LIOS OTS systems can pinpoint the fire location and ensure that these fire suppression systems are selectively actuated at the fire location and in the direction of the propagation to allow the fire fighting forces maximum accessibility and to minimize the heat impact on the structure. Extensive tests have confirmed the efficiency of these combined systems in tunnel fires.

Technical highlights

- detection range up to 4500m/14764ft or 2 times 4000m/13123ft (loop redundancy)
- power supply 24VDC/115VAC/230VAC available
- 20 volt free and configurable outputs to connect to fire panels, fire controls or management systems
- connection to PC and SCADA using TCP/IP or RS232 interface
- as an option a PC can be connected to indicate fire-zones and temperature profiles along the cable leaving the alarm performance of the controller unaffected



Exemplary types of sensor cable – each designed for different application requirements.

Practical, field-tested and approved

Communication

When measuring temperature with a high spatial resolution on long sensor lengths at short measuring cycles, efficient handling and compression of the measuring data volume is important.

The CHARON_02 software for configuration and visualization of the LIOS OTS systems is just designed to fulfill this purpose. It can easily be adapted to specific requirements and offers numerous options for displaying and processing the recorded measurement data. CHARON_02 enables you to create zone views as subdivisions of the entire sensor lengths. These zones can be building sections of the facility as well as technically driven such as deluge zones. Since they are freely configurable the possibilities for zone-related alarm scenarios and event-handling are manifold.

CHARON_02 visualization highlights

- synchronized measurement browsing even with multiple OTS systems connected
- import and export of configuration sets
- embedded configuration within all measurement data files
- ring buffer storage functionality allowing permanent data storage or event triggered storage of measurement data
- easy tracing of measurement data by time, event or OTS number
- detailed reports to file configurations

Practical, field-tested and approved

Driven by demanding requirements from today's safety market LIOS OTS systems provide a highly proven product based on fulfilling international quality standards recognized by the

- VdS (Association of German Property Insurers)
- EN 54-5, A1
- ISO 9001 and ISO 14001
- EXAM (Atex zone 0 certified system available)
- CE (Electromagnetic Compliance, Europe)

Through our local partners

- FM (USA)
- IBS (Austria)
- VKF (Switzerland)
- CNBOP (Poland)
- CNAEL (Chinese State Bureau of Technology Supervision)
- KFI (Korea)



These institutions – most accredited according to the European Standard EN 45001 – are unbiased and competent partners for type testing of our products. Their laboratories perform tests under controlled conditions regarding the mechanical environment and ambience evaluating electrical and electronically devices for compliance with EU and other international standards.

In addition our implemented quality management certified according to ISO 9001 and the repeated quality audits ensure the steady quality of our products and pave the way to achieve these highly reputed approvals.





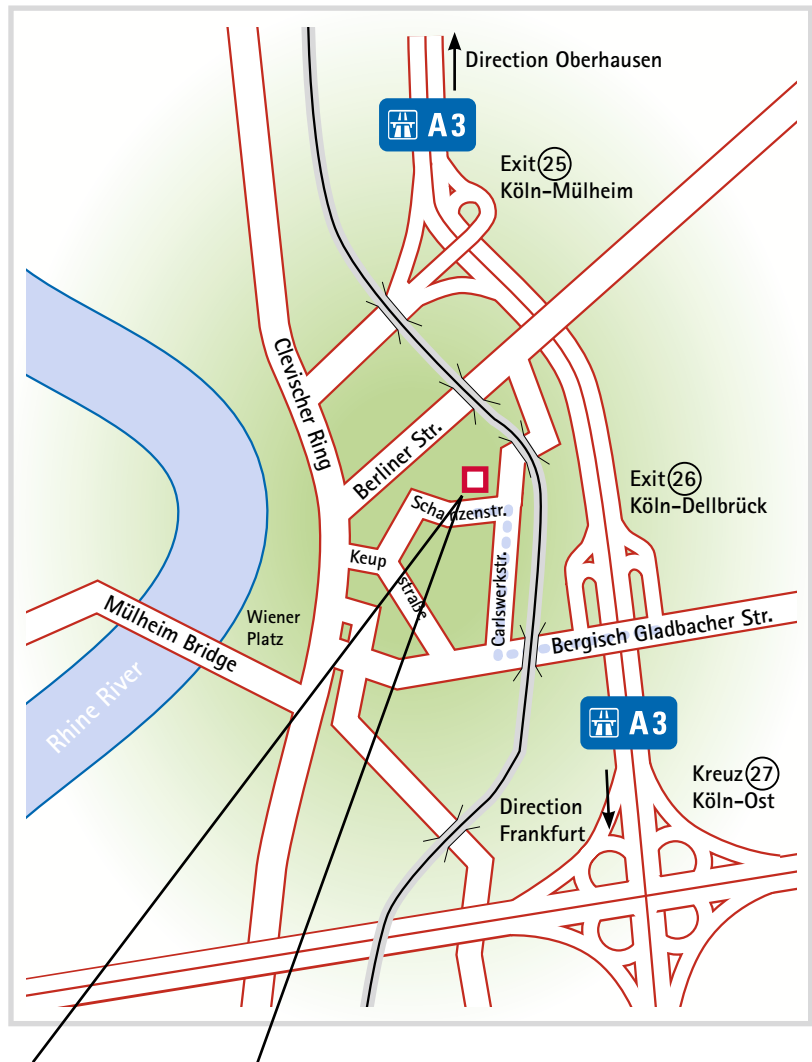
About us

LIOS Technology GmbH – Linear Optical Sensors is the German based, global leader in the development and supply of state of the art frequency domain based distributed linear heat detection. Starting in 1997 LIOS was the first to introduce a „fiber optical linear heat detection“. With more than 2000 installations worldwide, LIOS sets the benchmark in reliability and track record.



LIOS Fire Detection

Scan the QR code with your cell phone to learn more about our optical line type heat detectors.



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