

# Tyco Optical Fibre Temperature Sensing

**tyco**



## Features

- High System Integrity - Loop Break Recovery
- Fibre Optic Sensor Loop up to 2km, 4km, 8km
- Programmable Relay Contacts
- Modbus Output Port
- Automatic Failure Mode Analysis
- Diagnostic Capability
- Modem Interface

## Benefits

The system can be set to operate in either single ended or loop mode without any additional hardware. It continuously monitors the integrity of the loop and continues to operate in the event of a cable fault. The system is designed with an automatic loop break recovery operation.

Very long distance (large areas) can be monitored using a single length of heat sensing cable. The hot spot identification on a 2 km length of fibre optic sensing cable, is accurate to within 1.25metres.

Thirty zonal relays ensure that the system can provide sufficient alarm notifications – typically directly to any Fire Alarm Control Panel. Two relay contacts are reserved for system and sensor fault.

Permits connection of the system to any PLC (programmable logic controller) or DCS (distributed control system) using industry standard communications, thereby providing a very flexible system topology.

Cable faults are detected to an accuracy of  $\pm 1.25m$ . The control system is continuously monitoring and a full syntax of fault information is provided with the system.

Enables interrogation of the system to determine system status.

By using a remote PC with a dial up connection to the host PC on site, it is possible for system to be accessed from a remote location to help assist with on-line technical support.



**Features**

- Fibre optic sensor loop up to 2km, 4km or 8km
- Continuous temperature profiles of temperature on a PC
- Programmable functions
- Programmable number of fire detection zones
- Multiple and programmable Alarm levels per fire detection zone
- Variable rate of rise function
- Unrivalled response times
- Optional outputs
- Modbus Serial Data
- Direct to PC
- Volt free contacts
- Insensitive to EMI
- Intrinsically safe sensor
- Uses standard communications grade optical fibre
- Choice of cable construction
- Cable construction for extreme environments
- High System Integrity
- Automatic failure mode analysis
- Loop break recovery operation
- Diagnostic capability
- Fire progression monitoring
- No cable maintenance
- Modem for remote communications

**Specifications**

|                   |  |
|-------------------|--|
| Supply Voltage    | 24Vdc (-6/+12Vdc)                                    |
| Power Consumption | 20W max  |
| Supply Current    | <1A  |
| Fuse Rating       | <2A (anti-surge)                                     |
| Fibre             | 62.5/125 graded index multi-mode                     |
| Operating Temp    | 0°C to +40°C   |
| Storage Temp      | -40°C to +65°C                                       |
| Relative Humidity | 0 to 95% (non-cond.)                                 |
| Compliance        |  |
| Class 3a Laser    | IEC 825 (1990)<br>BS7 192(1989)<br>ANSI Z136.2(1988) |
| EMC               | Directive 89/336/EEC                                 |
| Low Voltage       | Directive 72/2/EEC                                   |

**System Components**

- Control Unit - available as:
  - Cabinet, including 32 relays and PSU in 2km, 4km, 8km models
  - 19in Rack Mounting including 32 relays, in 2km, 4km, 8km models
- Sensor Line thermoplastic sensor cable in 1, 2 or 4.4km reel
- Sensor Tube stainless steel sensor cable in 1, 2 or 4.4km reel

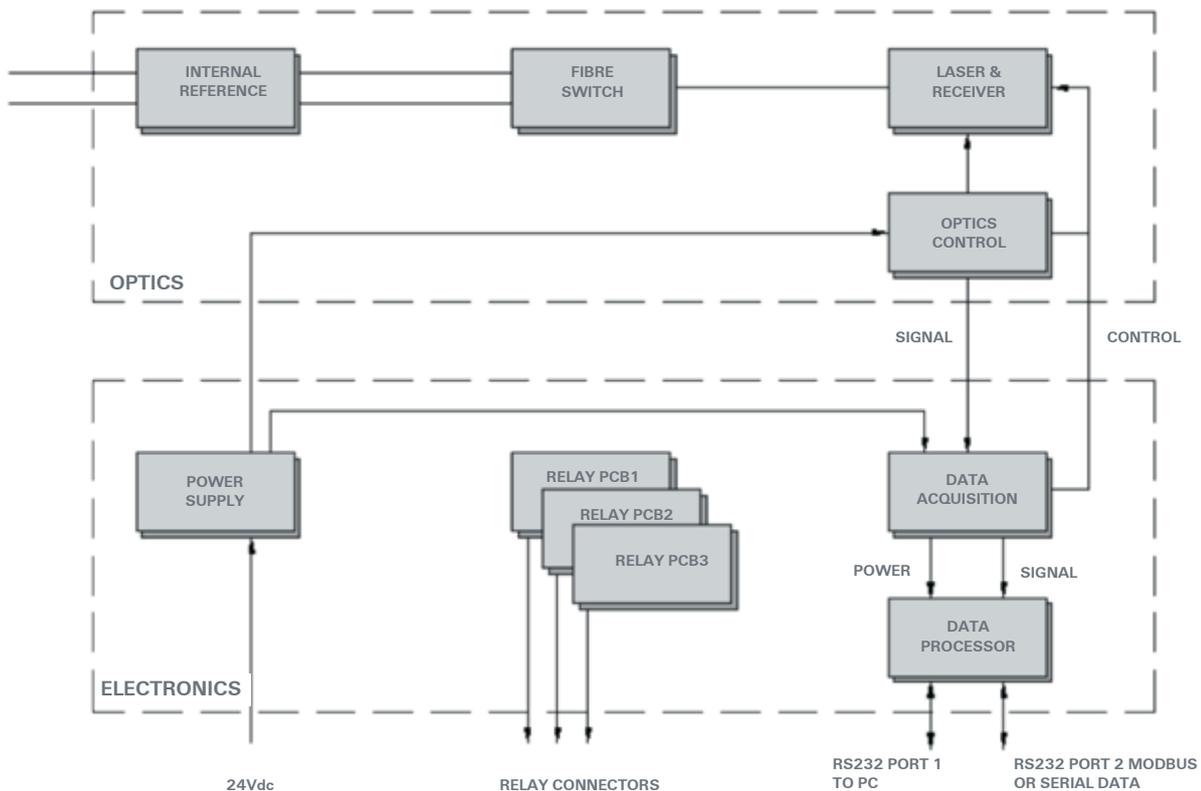
This new technology uses a laser light source to launch light signals into an optical fibre. As pulses travel down the fibre, energy is lost through scattering. A fraction of the scattered signal is retained within the fibre. A portion of this is directed back along the fibre towards the laser source - this signal is called backscatter. Part of the back scatter signal (Raman Scattering) is used to provide accurate remote temperature measurements at hundreds of points along the fibre.

The system uses standard communications grade optical fibre of the 62.5/125 graded index multimode type. The temperature range is predominantly a function of the coating used to protect the optical fibre as the fibre itself is well behaved over a temperature range from -50°C to approximately 300°C.

Optical fibre itself offers several advantages as a sensing medium. The signals are immune to electromagnetic interference thereby ensuring integrity of readings from electrically noisy areas. As no electrical current is used in the sensing fibre and the fibre is relatively inert and dielectric (non-conducting) medium, it is safe technology to use in hazardous environments.

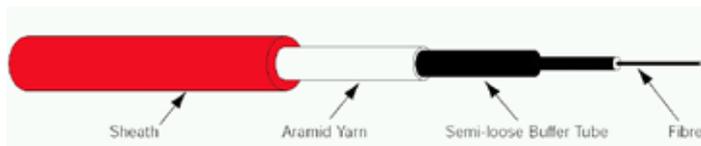
**Important** The Fibre Optic Linear Heat Detection products are the single highest value stock coded fire detection products available from Tyco Fire Protection Products. The Control Unit contains complex high precision components including a single-mode laser which can be seriously damaged or misaligned if subjected to undue mechanical shock or ingress of dust etc.

**Functional Block Diagram**



## Cable Options

Standard communications grade optical fibre of the 62.5/125 graded index multimode type is used. The temperature range is predominantly a function of the coating used to protect the optical fibre as the fibre itself is well behaved over a wide temperature range. Special coatings have been tested down to -190°C and up to 460°C (metallic - available upon request) performance of the standard type is detailed overleaf. Optical fibre itself offers several advantages as a sensing medium. The signals are immune to electromagnetic interference thereby ensuring integrity of readings from electrically noisy areas. As no electrical current is used in the sensing fibre and the fibre is a relatively inert and dielectric (non-conducting) medium, it is safe technology to use in hazardous environments.



### Sensor-Line

Outer sheath 3.6mm dia., Aramid fibres for strength, Optical fibre in gel filled tube

#### Specifications

|                              |               |
|------------------------------|---------------|
| Nominal Cable Dia.           | 5mm           |
| Weight                       | 2.3kg/m       |
| Min. Bending Radius          | 63mm          |
| Max. Tensile Load            | 100N          |
| Operating Temp. (continuous) | -20° to +70°C |
| Installation Temp.           | >10°C         |



### Sensor-Tube

Stainless steel tube 3.2mm dia. / 6.4mm dia.

#### Specifications

|                              | 3.2 mm                     | 6.4 mm    |
|------------------------------|----------------------------|-----------|
| Nominal Cable Dia.           | 3.2 mm                     | 6.4 mm    |
| Wall Thickness               | 0.5 mm                     | 0.9 mm    |
| Weight                       | 33 kg/km                   | 121 kg/km |
| Min. Bending Dia.            | 150 mm                     | 150 mm    |
| Max. Tensile Load            | 1971N                      | 7080N     |
| Operating Temp. <sup>1</sup> | -40° to +90°C (continuous) |           |
| Max. Length (2 fibre)        | 2 km                       | 10 km     |

1. For 125µm multimode fibre with acrylate coating, max. temp. is 150°C for 48 hrs. For polyimide coating, operating temp. is -185°C to +400°C.

## FEATURES

### HIGH SYSTEM INTEGRITY - LOOP BREAK RECOVERY

### FIBRE OPTIC SENSOR LOOP UP TO 2km or 4km

### PROGRAMMABLE RELAY CONTACTS

### MODBUS OUTPUT PORT

### AUTOMATIC FAILURE MODE ANALYSIS

### SAFE LASER SOURCE

### DIAGNOSTIC CAPABILITY

### MODEM INTERFACE

## BENEFITS

The system can be set to operate in either single ended or loop mode without any additional costly hardware. The system continuously monitors the integrity of the loop and continues to operate in the event of a cable fault. The system is designed with an automatic loop break recovery operation.

Very long distance (large areas) can be monitored using a single length of heat sensing cable. The hot spot identification on a 2km length of fibre optic sensing cable is to within 1.25metres.

30 zonal relays ensure that the system can provide sufficient alarm notifications – typically directly to any Fire Alarm Control Panel. 2 relay contacts are reserved for system and sensor fault.

Permits connection of the system to any PLC (programmable logic controller) or DCS (distributed control system) using industry standard communications, thereby providing a very flexible system topology.

Cable faults are detected to an accuracy of ±1.25m. The control system is continuously monitoring and a full syntax of fault information is provided with the system.

In the event of a cable failure, where the laser light source may be exposed, the laser light is determined a safe source in accordance with IEC825.

Enables\* interrogation of the system to determine system status.

By using a remote PC with a dial up connection to the host PC on site, it is possible for system to be accessed from a remote location to help assist with on-line technical support.

## Summary of Cable Features

- Low thermal mass for rapid response to temperature
- Low smoke halogen free jacket, with excellent flame retardancy. Suitable for all indoor applications
- Stainless steel clad fibre optic cable suitable for all harsh area applications
- Strong, lightweight and flexible
- Designed for ease of installation



# Tyco Optical Fibre Temperature Sensing

---

Copyright © 2013 Tyco Australia Pty Limited. All rights reserved. Tyco reserves the right to make changes to any aspect of this publication at any time without notice.

VIGILANT is a trademark of Tyco New Zealand Limited or its affiliates; *MX TECHNOLOGY* and *MINERVA* are trademarks of Thorn Security Limited or its affiliates; *SIMPLEX* is a trademark of ADT Services GmbH.  
TYCO is a trademark of Tyco International Services GmbH.

MXFbroTFPP1310

---

**Australia** | **Phone** +61 3 9313 9700 | **Email** [tfppcustservice.au@tycofp.com](mailto:tfppcustservice.au@tycofp.com)

**New Zealand** | **Phone** +64 9 635 0760 | **Email** [tsp.sales.nz@tycoint.com](mailto:tsp.sales.nz@tycoint.com)

**Website** | [www.tycosafetyproducts-anz.com](http://www.tycosafetyproducts-anz.com)

