Linear Heat Detection

Systems Specification

GUIDE LINES FOR THE INSTALLATION OF FIRESENSE®2000 LINEAR HEAT DETECTION CABLE.

IMPORTANT NOTE:
Before installing FIRESENSE®2000 Linear Heat Detection Cable reference should be made to the zone layout drawings, fixing arrangement drawings and the following points should be observed:

The cable should not be in contact with any material that will act as a heat sink and delay the sensing of temperature increase in the area being protected.

The FIRESENSE®2000 End of line unit (part no. 100637) and Junction boxes (part no. 100012) should be employed as these are supplied with the correct type and size of cable gland.
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FIRESENSE®2000 Linear Heat Detection Cable should be installed so that it is not severely compressed and is not adjacent to sharp objects that may damage the outer sheath.

The minimum bend radius of 6mm should be adhered to carefully.

Cable ties should not be use directly on the cable – a neoprene sleeve should always be employed (part no. 500020). These and other proprietary fixings are available from Tyco Fire & Integrated Solutions.

Whilst FIRESENSE®2000 Linear Heat Detection Cable has a high tensile strength care should be taken not to place it under too much tension especially where there is a change of direction at a fixing.

The distance between fixings should be between 0.6 and 1.2m dependent upon fixing positions available.

The routing of FIRESENSE®2000 Linear Heat Detection Cable should be chosen to avoid any local sources of heat such as light fittings, steam pipes etc.

The minimum number of joints should be made in any run of FIRESENSE®2000 Linear Heat Detection Cable and any joint should always be made in the FIRESENSE® junction box (part no. 100012) available from Tyco Fire & Integrated Solutions.

Adjacent zones should overlap by a minimum of 50mm.

All interposing cable between FIRESENSE®2000 Linear Heat Detection Cable and its controller should have an integral metallic screen/braid/sheath/armour as part of its construction and this should be connected to earth to improve RFI and EMI immunity. The connections should

be made using a FIRESENSE®2000 interposing junction box (available from Tyco Fire & Integrated Solutions). For further details see Interposing Cables in the next section of this manual.

Where a number of zones of FIRESENSE®2000 Linear Heat Detection Cable are remote from their controllers a multi-core cable should not be used for interconnections. Individual coaxial or screened pair cables should be used which meet the criteria above.

SPECIAL GUIDE LINES FOR CABLE WAY PROTECTION

IMPORTANT NOTE:
In addition to the above recommendations 1-12, the following should be observed:

FIRESENSE®2000 Linear Heat Detection Cable should be installed to cover each cable tray or ladder rack intended for supporting cables. Generally one run of sensing cable should be installed centrally above each tray or ladder rack with a further two runs of cable below the bottom level. (one on the outer edge and one on the support edge).

On horizontal cable routes where cables are mounted vertically the FIRESENSE®2000 Linear Heat Detection Cable should be routed level with the top edge of the support system on the cable side.

On lengths of vertical racking less than 1m, used for carrying cables between horizontals, FIRESENSE®2000 Linear Heat Detection Cable should be located across the top of the rising group of cables. Where the riser does not start at floor level a loop of FIRESENSE®2000 Linear Heat Detection Cable should be provided at the top and bottom of the rising group of cables.

In case of flumes and risers FIRESENSE®2000 Linear Heat Detection Cable should be run across the top of the rising group of cables and diagonally from side to side across the support system on the vertical sections. The distance between supports should be between 0.6 and 1.2m.

FIRESENSE®2000 Linear Heat Detection Cable should be installed such that it can rapidly respond to convected and/or radiated heat from any event. In general it should be between 150 and 250mm above the cables that are being protected.

Where there are many levels of cable support and there is tray or ladder racking that is over twice the width of the cable below, the wider level should be provided with a run of FIRESENSE®2000 Linear Heat Detection Cable below the overhanging edge. This should be in addition to the run protecting the level immediately below.

SPECIAL GUIDE LINES FOR SPACE PROTECTION ON CEILINGS

FIRESENSE®2000 Linear Heat Detection Cables should in general be spaced on the ceiling above the area to be monitored such that the cable is between 0.5 and 2.0m from any zone boundary, wall or beam having a depth greater than 10% of the ceiling height. The distance between adjacent runs should be no more than 7m.

In Plan view no point should be more than 5.3m perpendicular to the sensing cable. (As specified in BS 5839 Part1 1998)

The sensing cable should not traverse other zones to reach control equipment or end of line units; a fire resisting cable should be used for interconnection together with an interposing junction box. (part number 100012)

FIRESENSE®2000 Linear Heat Detection Cable should be installed such that it is between 25 and 150mm from the ceiling.

IMPORTANT NOTE:
The above are general recommendations for guidance only. There may be conditions at site or clients' requirements where some of the above criteria needs' to be varied. As well as providing cover as detailed above, additional runs of cable may be employed directly over specific risks.

I NTERPOSING CABLES FOR FIRESENSE®2000 INTERCONNECTIONS

In many installations it may be necessary to mount the FIRESENSE®2000 controller remotely from the 'zone' where the FIRESENSE®2000 Linear Heat Detection Cable is installed. It is also possible to have separate lengths of FIRESENSE®2000 Linear Heat Detection Cable covering different risks in a 'zone' connected to the same controller. In each of these cases it is necessary for the Interposing cable used for these interconnections to meet certain requirements to ensure trouble free installation.

FIRESENSE®2000 Linear Heat Detection Cable is of a coaxial construction with an outer screen of tinned copper wire braid. This arrangement ensures the highest possible electrical noise immunity and therefore it is essential that any Interposing cables also have some form of 'screen' in their construction.

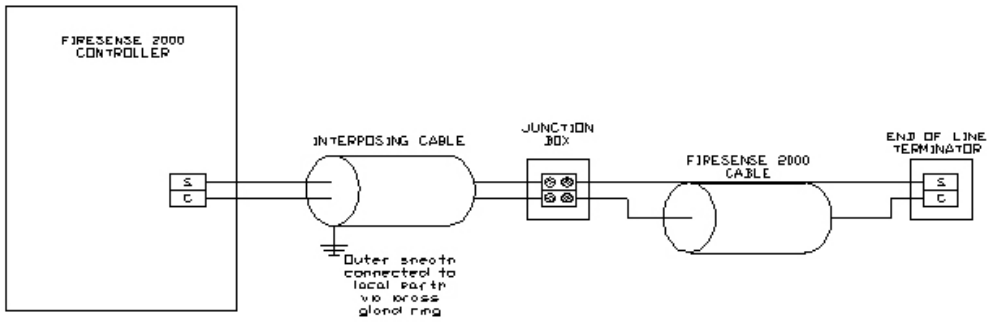
The Interposing cable should also have fire resisting qualities and dependant upon the Fire Regulations for the particular site one of the following types of cable may be used:
Mineral insulated copper covered (MICC) – Copper sheath.
Steel wire armoured (SWA) – Outer wire armouring.
Pirelli 'FP200' – Internal alloy laminate with drain wire.
Delta 'Firetuf' – Internal aluminium foil with drain wire.

In all installations it is important to ensure that there is no reversal of the ‘core’ and ‘screen’ connections, as this will greatly increase the susceptibility of the system to electrical noise.

As these cables are readily available in 2-core construction, in order to optimise the noise immunity the connections should be made in one of two ways.

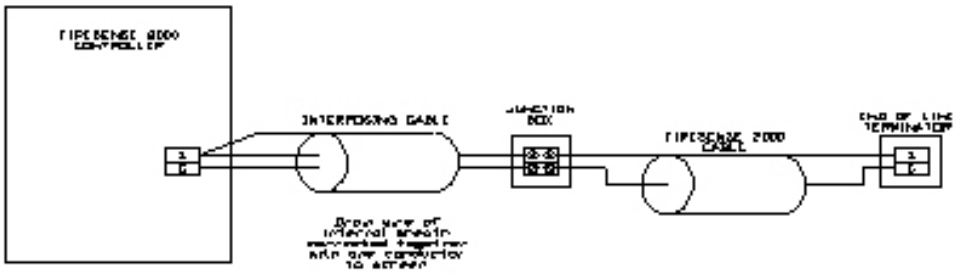
METHOD 1
Outer sheath/screen bonded to local earth

For this method the two cores of the Interposing cable are designated for core (C) and screen (S) connection to the FIRESENSE®2000 Linear Heat Detection Cable and the outer sheath/screen is connected to earth at one end. (This arrangement is generally better suited to MICC and SWA installations).



METHOD 2
Outer sheath/screen connected to ‘screen’ connection of the FIRESENSE® 2000 control

For this method one of the conductors of the Interposing cable is designated ‘Screen’ (S) and the other ‘Core’ (C). The ‘Core’ connection is straight forward, however the conductor designated ‘Screen’ must be connected both to the ‘Screen’ connection at the Firesense® Controller end and to the outer sheath/screen. (This arrangement is generally better suited to FP200 and Firetuff installations).



FIRESENSE®2000 INTRINSICALLY SAFE APPLICATIONS

We recommend that the MTL760 AC barrier is used on FIRESENSE®2000 applications for hazardous areas.

This barrier is chosen because of its low end-to-end resistance (85 ohm) and its high permissible cable capacitance, (3.0 µF).

The end of line diode is considered as “Simple Apparatus” and has capacitance, inductance and L/r ratio of such small values as to be insignificant compared to the cable.

While the FIRESENSE®2000 cable is considered as a detector rather than a cable it is important that any length of FIRESENSE®2000 used in an I.S. circuit is well within the recommended maximum cable parameters.

SETTING UP PROCEDURE for FIRESENSE®2000 SYSTEMS

The FIRESENSE®2000 coaxial cable exhibits a reduction in the resistance of the insulation between the core and the braid when subject to increases in temperature.

As the resistance of the cable (as monitored by the controller) is also a function of the overall length of the cable, the setting up procedure simply requires a switch within the controller to be set to the position appropriate to the length of cable installed. (see Table A).

If the length of cable connected to a controller is not known then it can be measured electrically with the aid of a multimeter in the following way:

1. Disconnect the FIRESENSE®2000 cable from the controller.
2. Replace the end of line terminator with a short circuit.
3. Measure the resistance of the of the core to the braid at the controller end. Let this value = R ohm.
4. As the resistance of the core to the braid per metre is 0.2 Ohm the approximate length of cable L metre can be calculated from L = R/0.2

The parameters for FIRESENSE®2000 cable are:

- Capacitance 400 picoFarad/metre
- Inductance 0.5 microHenry/metre
- L/R ratio 2.5 microHenry/ohm

The MTL760 parameters for the most onerous gas group (IIC) are:

- 3.0 microFarad
- 0.95 milliHenry
- 72.0 microHenry/Ohm

As can be seen from these values the permitted length of FIRESENSE®2000 cable is well in excess of 1500m which in turn is more than the maximum length that can be connected to a controller.

It is obviously important to consider the parameters of any interposing cable used in the FIRESENSE®2000 circuit but generally these cables have much lower values than the FIRESENSE®2000 cable.
It is recommended that a cable calculation be carried out for each circuit and recorded in the installation manual.

Once the cable length is known then the switch in the controller is set as in the table below:

Cable length in meter	Switch setting
1 – 30	1
30 – 100	2
100 – 200	3
200 – 300	4
300 – 400	5
400 – 500	6
500 – 700	7
700 - 900	8

To test the response of the cable it is necessary to heat 1 metre of cable to above the set point. If a much shorter length of cable is heated to generate an alarm this may involve using a very high temperature in excess of the cable destruct temperature which could damage the cable.

A simple in situ test can be achieved by taking a 1 metre length of plastic tube of say 50 to 75mm diameter and arranging a slot along its length. The FIRESENSE®2000 cable can then be placed inside the tube through the shot. A hot air gun or steam lance can the be directed inside the tube to heat the cable to the alarm level.

For more precise testing, cable ovens with temperature controlled elements can be supplied by Tyco Fire & Integrated Solutions.

A fault condition may be simulated by disconnection of the FIRESENSE®2000 cable at the controller or end of line terminator.

If an end of line terminator with test switches is fitted, Fire and Fault conditions can be simulated from that point.

FS2000 ACCESSORIES

- Waterproof cable glands with an insert to seal on to FIRESENSE®2000 cable.

- Junction boxes for jointing FIRESENSE®2000 or connecting it to interposing cable. These can be supplied fitted with the appropriate gland or drilled to the clients requirements.

LOCATION
In normal applications FIRESENSE®2000 should be run at specified spacing advised for point heat detectors

For cable tray protection it should be run above each tray to be protected and 2 runs below the lowest tray to detect rubbish fires

By adding the parallel resistance combination of the overall cable length at it's maximum ambient temperature with the 1 metre length at a specific temperature we arrive at a value which we can compare with a known value.

The commissioning switch sets this known value, and if the resistance of the cable combination falls further the circuitry is arranged to generate an alarm condition.

If the cable value falls to a very low level a short circuit fault is generated and similarly a very high level will give an open circuit fault. Due to the very low impedance of the cable in long lengths, the alarm temperature is set at a lower value for ease of short circuit fault discrimination and advised switch settings should be followed.