

PERTRONIC INDUSTRIES LTD



INSTALLATION NOTE

Linear Heat Detection Cable (LHD)

Overview:

Linear Heat Detection Cable (LHD) is designed for use where traditional point Heat detectors are unsuitable. LHD is a fixed temperature sensor capable of initiating an Alarm once its rated temperature has been exceeded. LHD consists of two tri-metallic conductors twisted together to keep them under mechanical tension. Each conductor is individually coated in advanced, temperature sensitive polymer that detects Heat conditions anywhere along its length.

It is not required that a specific length be heated in order to initiate an Alarm and therefore provides the advantage of line coverage with point sensitivity.

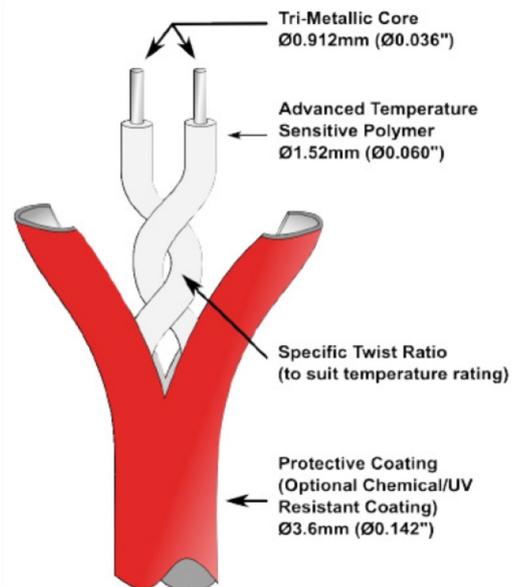
Features:

- Suitable for use with Pertronic NZS4512-2010 conventional zones of Loop Responder, Apartment Module, F16e, F4 and F1
- Simple installation, uses standard 10kΩ EOL resistor and one Alarm resistor (Rs) in series with the LHD cable.
- Can be used for Hazardous areas with Galvanic Isolator and Pertronic Galvanic Isolator Interface
- Four temperature ranges:

68°C	NZS4512-2010 – Red
78°C	NZS4512-2010 – Yellow
88°C	NZS4512-2010 – Green
105°C	NZS4512-2010 – Green (High)

- Protective Outer Coating:
- International Approvals:
- Available:
- Maximum Zone Length:

PVC stocked	- Nylon available by indent
CE marked, RoHS compliant, UL, FM, GOST-R	
200m and 500m drums	
3,000m	



Typical Applications:

Industry Sectors: Tunnels, Mining, Manufacturing, Warehousing, Cold Stores, Communications and General Industry, etc.

Industry Applications: Cable Trays, Conveyor Belts, Rack Storage, Floating Roof Storage Tanks, Area Protection, Cool Store and Freezer to -40°C, Hazardous Areas.

Specifications:

Construction:	Dual insulated, twisted pair of tri-metallic cores	
Insulation:	1kV tested protective outer coat	
Wire Overall Diameter	3.6mm	
Minimum Bend Radius	50mm @ >0°C 100mm @ ≤0°C	
Ambient Temperature:	-40°C to 45°C	- for 68°C or 78°C activating
	-40°C to 70°C	- for 88°C or 105°C activating
Maximum Voltage Rating:	30Vac / 42Vdc	
Resistance	~200Ω/km	
Capacitance	88–150pF/m	
Inductance	540–1050nH/m	
Colour of Outer	Red	

Installation Specifications:

Leader Cable: an approved type of cable, preferably Fire Rated, should be used between the Fire Alarm Panel and the Linear Heat Detector cable.

A secure waterproof (IP66/67) junction box must be used to connect the Leader cable to the LHD cable.

Detection Cable: a very important factor when determining which rating of LHD cable to use is the maximum ambient temperature the cable will be exposed to. To provide the fastest Alarm response with minimum possibility of nuisance Alarms, the LHD cable with the lowest action temperature above the maximum ambient temperature should be selected.

Maximum Ambient Temperature	Available Action Temperatures
≤ 45°C	68°C or 78°C
45°C ≤ 70°C	88°C or 105°C

Guide Lines for Linear Heat Detection Cable Installation:

Important **Do's and Don'ts** - please read thoroughly before commencing work

- ✓ Installation of Linear Heat Detection Cable to conform to NZS4512-2010 and AS/NZS3000
- ✓ Ensure the maximum ambient temperature of the selected detection cable will not be exceeded during storage or normal operating conditions
- ✓ Support the detection cable at 1m to 1.5m intervals
- ✓ Ensure Linear Heat Detection Cable bend radius is:
 - 50mm minimum for ambient = warm ($>0^{\circ}\text{C}$)
 - 100mm minimum for ambient = cold ($\leq 0^{\circ}\text{C}$)
- ✓ Ensure the detection cable is not in contact with any material, which may conduct heat onto the cable directly
- ✓ A neoprene insulator or equivalent should be placed between the fixing clip and heat sensing cable
- ✓ Ensure cable glands used are tightened to form a secure and moisture proof seal around the detection cable
- ✓ Use appropriate junction boxes (or other approved method) to house Linear Heat Detection Cable connections
- ✓ To avoid damage to the cable, use a drum reel when drawing LHD cable from the drum.
- X Avoid allowing the detection cable to come into contact with any materials which may act as a heat sink. This may delay the activation of the cable in alarm situations
- X Do not perform the installation work at temperatures below -10°C
- X Do not exceed the maximum voltage of the detection cable (48Vdc or 32Vac)
- X Do not connect two lengths of detection cable which have different activation temperatures
- X Do not connect lengths of fixed temperature cable in 'T' connections or Spurs
- X Do not paint the detection cable
- X Do not place the detection cable under excessive tension
- X Do not bend the cable at right angles, the minimum bend radius is 50mm or 100mm as applicable
- X Avoid subjecting the detection cable to mechanical damage which could result in false activation
- X Avoid laying the detection cable in areas where heavy traffic may result in the cable being crushed
- X Do NOT solder Linear Heat Detection cable

Installation Hardware:

cable supports should be placed every 1m and no more than 1.5m apart to support LHD cable and prevent sagging. Extra supports may be necessary around corners and other transition areas.

Care should be taken when mounting the cable in clips (or equivalent) to ensure they do not crush the cable. The LHD should be held firmly, but without deformation. Avoid placing excessive tension on the cable, NO GREATER than 50N. Ensure that the minimum bend radius (50mm in normal temperatures, 100mm below 0°C) is observed at all times.

It is particularly important to use a neoprene insulator between the LHD cable and the fixing clip if the metal clip is exposed to the sun or attached to equipment which may get hot and transfer heat to the cable.

Where possible, install LHD cable in one continuous run of cable with as few splices as practical.

Use a reel stand when pulling the LHD cable from a reel. DO NOT pull the cable off the reel vertically with the reel stationary as this may twist and damage the cable. A wire guide (Catenary cable) may be required for installations where supporting the cable at the recommended spacing is not practical. Ensure the diameter or gauge of the catenary wire is adequate for the distance being spanned. 2mm stainless steel wire is generally suitable.

Connections into junction boxes and other enclosures must use strain relief connectors which provide dust and moisture protection (IP65 or greater). The standard diameter of LHD cable is 3.6mm to 4.5mm.

'L' Brackets: suitable for general support of cable, with various sizes, position and fixing holes available

'V' Clips: for use on cable trays. Use a neoprene insulator when clipping the detection cable into the clip

Other Support Brackets: are available for use in a wide variety of applications

Note: Pertronic Industries supplies LHD cable only, not the boxes, brackets or clips which should be obtained from an electrical wholesaler.

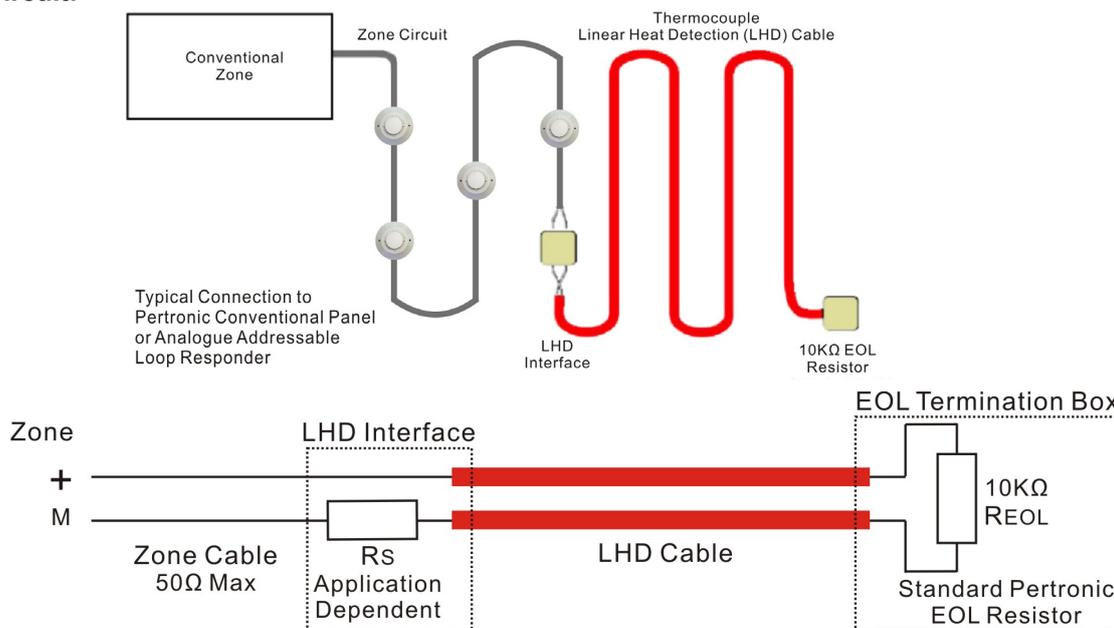
Typical System Configuration

LHD Cable Spacing:

Ceiling Height	Maximum Distance from Wall/Partition	Maximum LHD Spacing	Minimum Distance Below Ceiling	Maximum Support Spacing
$\leq 10\text{m}$	4m	8m	25mm	1.0 to 1.5m
10m > 20m	2.67m	5.3m	25mm	1.0 to 1.5m
>20m	Refer to NZS4512-2010, Section 405.5			1.0 to 1.5m

Refer to NZS4512-2010, Section 405.3.2 and Appendices C & D for further information.

Basic Circuit:



The following Table can be used to select the Series Resistor (Rs) value:

Conventional Circuit : 2003/2010	Rs (Heat Mode)	Rs (Smoke Mode)
Loop Responder : FW >v3.00	Rs = 100Ω LHD = 0m to 300m	Rs = 330Ω LHD = 0m to 3000m
Apartment Module : all versions		
F16e : all versions		
F16 : FW >v7.0		
F4 : FW >v2.26		
F1 : FW >v2.3		
Galvanic Isolator behind Galvanic Isolator Interface	N/A	
To operate in Heat mode, LHD length is limited to 300m. If this cable length is exceeded, the circuit may operate in Smoke Mode, therefore the outputs should be configured as for Heat mode operation		

Notes:

- 1) Selection of the Series Resistor (Rs) determines whether activation of the LHD cable causes the conventional circuit to operate within the Heat or Smoke band.
Because LHD cable functions as a Heat detector, it is important that the subsequent configuration of the conventional circuit produces the Alarm outputs required of a Heat detector.
Operation of the LHD within the Smoke band is provided to allow lengths of LHD greater than 300m to be used or with a length of LHD less than 300m and a value for the Series Resistor (Rs) less than 100Ω, to allow Smoke detectors to be installed on the Leader cable where desired.
Configuring the LHD to activate the Fire Alarm System correctly is the responsibility of the engineer.
- 2) If required, smoke detectors may be installed on standard Zone Leader cable only, not on the Linear Heat Detection cable.
- 3) Linear Heat Detection cable must be continuous from Rs to REOL, though lengths of similarly rated LHD cable may be spliced together in series to extend the length of the detection system.
- 4) Contact Pertronic Technical Support for assistance calculating the maximum length of LHD if more than 300m is required in Heat mode.

Connecting LHD Cable



DO NOT SOLDER

Always use terminal blocks to connect LHD cable as the heat generated while soldering can damage the heat sensitive insulation.

Splicing LHD Cable

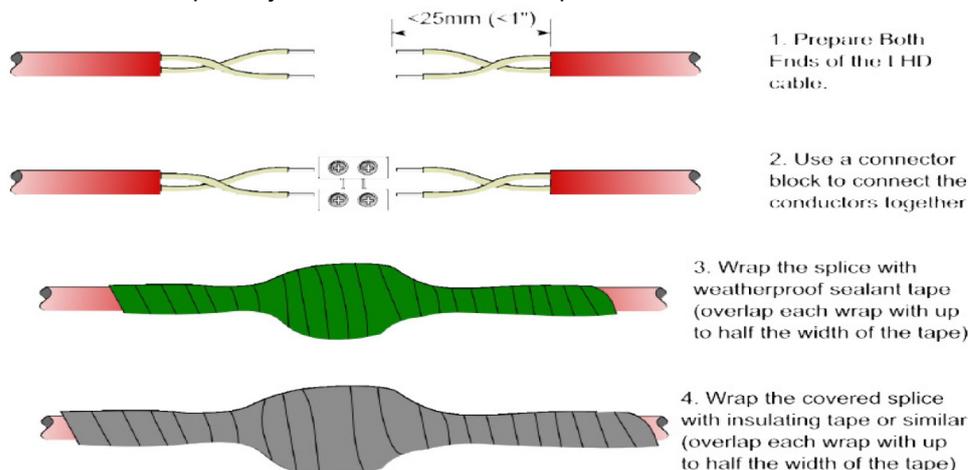
If the fixed LHD cable is damaged or has triggered, remove the damaged section plus 3m either side.



When replacing a section of the detection cable due to an overheat condition having occurred, the section including at least 3m (10ft) either side of the known event should be replaced.

Preferred method: use a junction box with screw terminals to make the join

Alternative method: splice two ends of detection cable together using a connection box and seal the splice using sealant tape. Care should be taken to ensure the two core conductors do not contact each other at any point and that the final spliced joint is secure and waterproof.



Low Temperature Installation:

Fixed temperature LHD cable may be used in ambient environments down to -40°C (eg. cold storage warehouses, outdoors, etc.). Do not proceed when the ambient temperature is below -10°C , because the cable may become less flexible and so prone to damage during installation.

The cable can shrink in length by 12% at -40°C , so if the temperature is likely to drop significantly after installation, cable shrinkage must be taken into account when attaching support brackets.

To reduce the heat sink effect of the clip and avoid damage to the cable, place a neoprene insulator around the cable before clipping it into the support bracket.

Increase the minimum bend of the detection cable to 100mm to account for the reduced flexibility. The maximum distance between support brackets should not exceed 1m and it is important to support the cable close to either side of any bend. Ensure any junction boxes or other enclosures are waterproof and suitable for the expected operating environment.

Hazardous Area Installation:

LHD cable is suitable for Hazardous areas when interfaced with a Galvanic Isolator and Pertronic Galvanic Isolator Interface.

Commissioning and Maintenance:

After installation and during routine maintenance, check the system to ensure the LHD cable is not damaged and functions as expected.

- verify that the LHD cable is free of damage to the outer or inner insulation.
- inspect all support brackets and other aspects of the physical installation are appropriate.
- ensure neoprene insulators are correctly installed around the cable clips.
- verify that the cable cannot be damaged due to activity in the area of installation.
- check all joints, sealant and insulation tape are secure. Apply new sealant or tape, where required.
- perform electrical tests to determine the circuit created is functioning correctly:
 - remove the conductors from the Fire Alarm Panel and measure the resistance across them.
 - the resistance value should equal the End of Line resistance ($10\text{k}\Omega$) plus approximately $100\Omega/\text{km}$ for each leg of the cable ($200\Omega/\text{km}$ for the length of the cable).
 - record this value for later reference.
- test the system in-circuit with the Fire Alarm Panel by reattaching the LHD cable:
 - short out the EOL resistor to activate an Alarm
 - disconnect either leg from the EOL resistor to activate a Defect.

Functional Testing:

If a functional test is required, use a left over section of the LHD cable installed.

- Attach a short section (1m) of cable between the end of the LHD cable run and the EOL resistor.
- Using a suitable device, heat the length of test cable.
- Once the action temperature (including tolerances) has been reached, the system should Alarm.
- Use the panel's manual to verify correct operation
- Ensure the length of Test cable is removed before placing the system back into operation.