ProReact Plus
Digital Linear Heat Detection Cable

Specifications and installation instructions

Thermocable
ProAcademy
Linear Detection Technology Made Simple

Contents:

Important Guidelines

Please read this instruction leaflet thoroughly before commencing installation.

- Install the linear heat detection cable accordingly to meet local and country installation requirements.
- ProReact Plus Digital linear heat detection cable must be installed in accordance with NFPA 70 & 72, NEC 760 (National Electric Code) and Authorities Having Jurisdiction.
- Support the detection cable at 1m (3ft) to 1.5m (5ft) intervals.
- Test the detection cable on the reel, before installation, using a multimeter.
- Ensure the maximum ambient temperature rating of the detection cable will not be exceeded during storage or normal operating conditions.
- Ensure the detection cable is spaced at less than or equal to the maximum approved spacing.
- Ensure the detection cable is not in contact with any material which may conduct heat onto the cable directly. A siliocone insulator or equivalent should be placed between the fixing clip and heat sensing cable.
- Ensure any cable glands used are tightened to form a secure and moisture proof seal around the detection cable.

- **Avoid allowing the detection cable to come in contact with any material which acts as a heat sink. This may delay the activation of the cable in alarm situations.**
- **Do not connect two lengths of detection cable which have different action temperatures.**
- **Do not connect lengths of fixed temperature cable in 'T' connections or spurs.**
- **Do not paint the detection cable**
- **Do not place the detection cable under excessive tension.**
- **Do not bend the detection cable at right angles. The minimum bend radius is 2" or 50mm.**
- **Avoid subjecting the detection cable to mechanical damage which could result in false activation.**
- **Avoid laying the detection cable in areas where heavy traffic may result in the cable being crushed.**

Introduction

Thermocable ProReact Plus Digital Linear Heat Detection Cable uses fixed temperature detection technology to provide an easy method for sensing changes in temperature levels. The cable can offer alternative overheat protection in a vast range of applications and environments, from tunnels, cable trays, warehousing to sensing changes in temperature within escalators and other applications where many risks of fire are hidden from view.

The ProReact Plus digital linear heat detection cable can be directly connected to a single zone of a conventional fire alarm control panel, or, using an addressable zone/switch monitor, the digital linear heat detection cable can easily be interfaced to an addressable loop.

ProReact Plus Digital linear heat detection cable is comprised of a pair of twisted low resistance, tri-metallic conductors, sheathed in advanced temperature sensitive polymers. When the cable reaches the required temperature the two twisted cores will fuse together, commonly with a fire triggering resistor attached to the input interface and a single core of linear heat cable to activate an alarm at the main fire panel (see schematic).

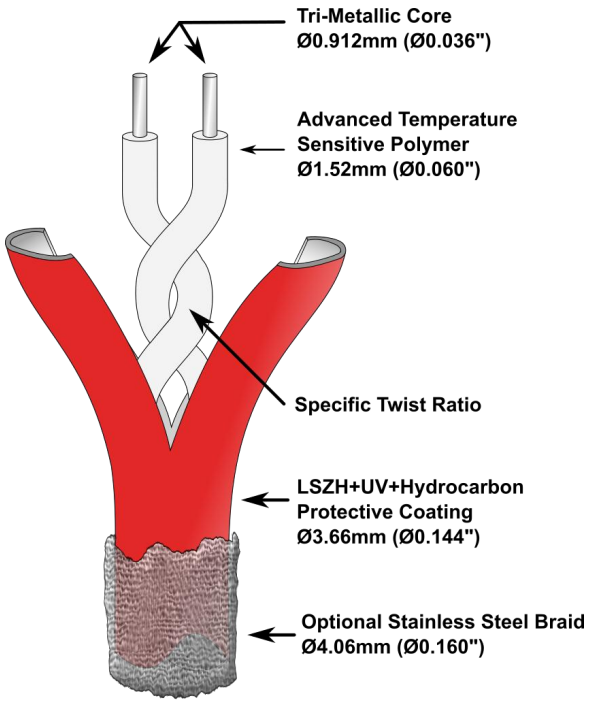


Figure 1: ProReact Plus Digital LHD Cable Construction

Digital Interface Monitor Module

A UL864 10th edition approved Digital Interface Monitor Module is also available and provides additional benefits when used with the ProReact Plus Digital LHD cable. It can simultaneously monitor up to two zones of LHD cable and has separate fault and alarm outputs for each zone. A built in display shows the state of each zone, including the distance in meters and feet to the alarm point if an alarm is triggered. It also includes an RS-485 Modbus RTU output for integration with a PLC or SCADA system.

ProReact Plus Digital Features

- **cUL/UL 521 Approved (File No. S8976)**
- **CE Marked**
- **Up to 3000m (10,000ft) per zone**
- **Detection along the entire length of sensor cable**
- **UV Stable for indoor/outdoor use**
- **Low smoke, zero halogen construction**
- **Flame retardant**
- **Highly oil and extra fuel resistance**
- **Maintains flexibility at low temperatures**
- **Optional stainless steel over-braiding for additional mechincal protection**

Technical Data

Construction:	Overall insulated, twisted pair of tri-metallic cores
Insulation:	1kV tested protective LSZH outer coat
Additional Insulation Options:	Stainless Steel over-braiding
Approvals:	CE Marked, RoHS compliant, cUL & UL
Maximum Zone Length:	3,000m (10,000ft)
Wire Overall Diameter:	3.66mm to 4.06mm (0.144" to 0.160")
Minimum bend radius:	50mm (2")
Ambient Temperature Range: (dependent upon action temperature)	-60°C to + 69°C (-76°F to +156°F)

Technical Specifications

Parts

Part No	Type	Colour	Action Temperature
TH65+	Normal+UV+Hydrocarbon resistant	Red	65°C (149°F)
TH65SS+	Normal+UV+Hydrocarbon resistance+Stainless Steel braid	Silver	65°C (149°F)
TH75+	Normal+UV+Hydrocarbon resistant	Red	75°C (167°F)
TH75SS+	Normal+UV+Hydrocarbon resistance+Stainless Steel braid	Silver	75°C (167°F)
TH85+	Normal+UV+Hydrocarbon resistant	White	85°C (185°F)
TH85SS+	Normal+UV+Hydrocarbon resistance+Stainless Steel braid	Silver	85°C (185°F)
TH110+	Normal+UV+Hydrocarbon resistant	White	110°C (230°F)
TH100SS+	Normal+UV+Hydrocarbon resistance+Stainless Steel braid	Silver	100°C (212°F)

Electrical Specifications

Operating Voltage Range	0-30Vac, 0-42Vdc
Resistance	~100Ω/km (~30.4Ω/kft) per leg
Velocity of Propagation	Approx 55%
Capacitance	88 - 150pf/m
Inductance	540 - 1050nH/m

Environmental Specifications

Maximum ambient temperature	
TH65+, TH65SS+	47°C (116°F)
TH75+, TH75SS+	47°C (116°F)
TH85+, TH85SS+	69°C (155°F)
TH110+, TH100SS+	69°C (155°F)
Humidity	0% to 100% RH
Min. Operating temperature	-60°C (-76°F)

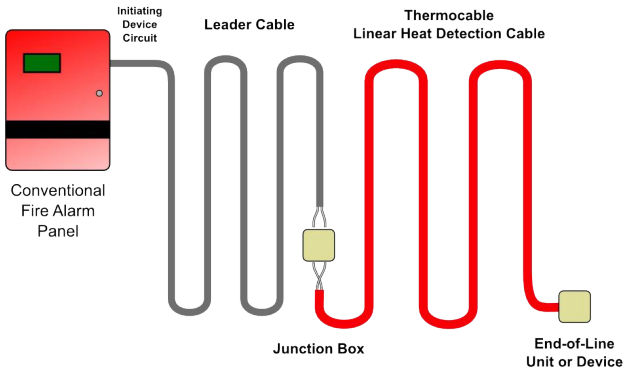
Mechanical Specifications

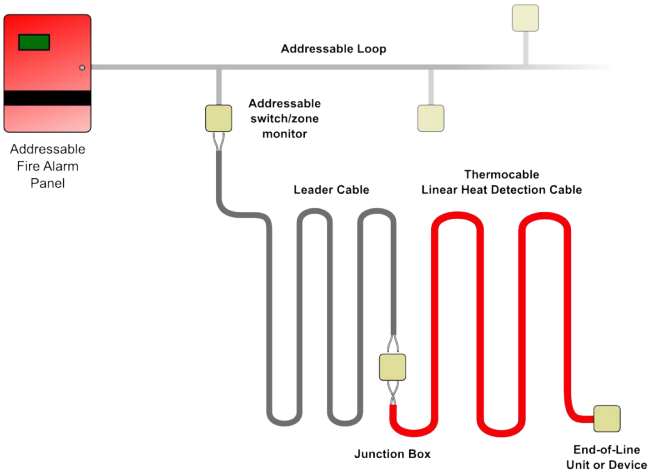
Diameter (all)	
Normal cable	3.66mm +/- 0.12mm (0.144" +/- 0.005")
...with additional Stainless Steel Braid	4.06mm +/- 0.12mm (0.160" +/- 0.005")

Typical System Configurations

Conventional Fire Alarm Systems

Thermocable ProReact Plus Linear Heat Detection (LHD) cable should be connected to the initiating device circuit on a conventional fire alarm control panel. Leader cable may be used between the beginning of the LHD cable and the fire alarm control panel if the area requiring protection is some distance away from the control panel. A junction box should be used to connect the leader cable to the linear heat detection cable to ensure a secure, waterproof electrical connection.



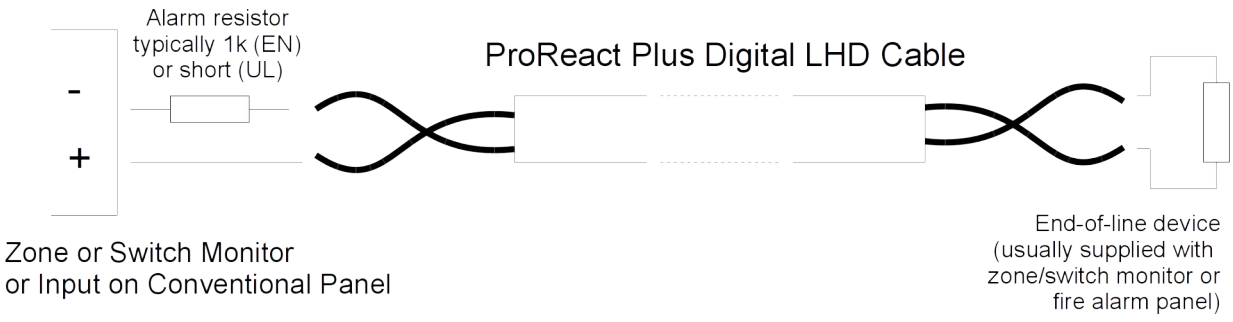


Addressable Fire Alarm Systems

When used as part of an addressable system, Thermocable ProReact Plus Linear Heat Detection cable should be connected onto the addressable loop using a switch or zone monitor. External power is not required for the Linear Heat Detection cable. Leader cable may be used between the beginning of the LHD cable and the addressable switch or zone monitor if the area requiring protection is some distance away. A junction box should be used to connect the leader cable to the linear heat detection cable to ensure a secure, waterproof electrical connection.

Typical Wiring Connection

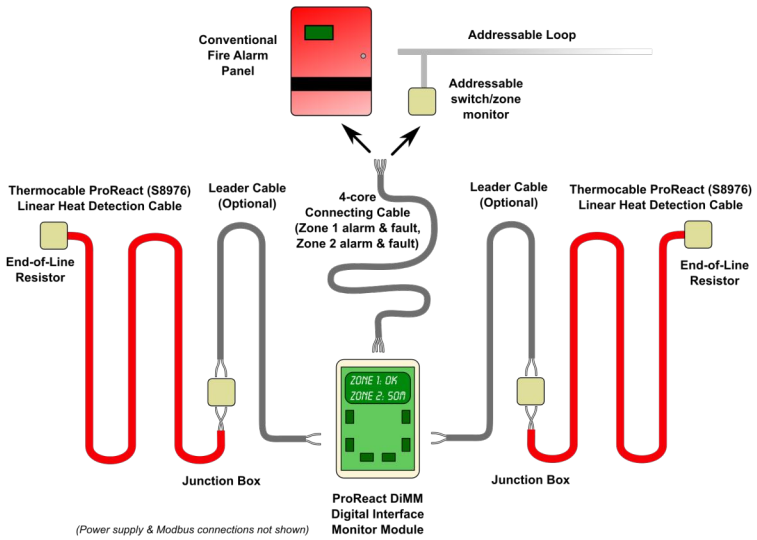
Open circuit on LHD cable = fault
Overheat/Fire on LHD cable = alarm



Typical System Configurations (cont.)

Digital interface monitor module

A Digital Interface Monitor Module (DiMM) is available for use with Thermocable ProReact Plus Digital Linear Heat Detection Cable. The DiMM can simultaneously monitor up to two zones of ProReact Plus Digital LHD cable and provides additional benefits to using LHD cable, including:



- Ability to provide a pre-alarm and alarm signal to a fire alarm panel (using two LHD cables with different action temperatures)

- Fail-safe alarm activation (using two LHD cables with the same action temperature, both must alarm for the fire alarm system to trigger an alarm)

- RS-485 Modbus RTU output for connection to a PLC or SCADA system.

- The DiMM has a built in display which shows the state of each zone and automatically displays the distance in metres and feet to the alarm point if an alarm is triggered.

Leader cable between the DiMM and the Linear Heat Detection cable can be calibrated out at the commissioning stage. Refer to the DiMM manual for more information. Mapping of the system is important when using a Digital interface Monitor Module. During installation draw a map to associate distances along the detection cable to locations within a building/warehouse etc. This will aid in locating the area requiring attention in an alarm condition.

Installation Specifications

Leader Cable

An approved type of leader cable, preferably Fire Rated cable, should be used between the fire alarm control panel or addressable switch/zone monitor and the Linear Heat Detection cable. A secure waterproof (IP65 or greater) junction box must be used to connect the leader cable to the detection cable. It is recommended that leader cable with the following minimum cross sectional area (CSA) per conductor is used when using the maximum length of detection cable. Consult with the authority having jurisdiction and the fire alarm control panel manufacturer for further information.

Recommended Maximum Leader Cable Length and CSA for copper conductors
(with maximum length of Linear Heat Detection Cable 3km/10kft)

0.8 mm (18AWG) — Upto 500m (1,640ft)
1.3 mm (16AWG) — Upto 1000m (3,280ft)

Installation Hardware

There are many applications where Linear Heat Detection cable is used to provide protection. Please refer to the ProReact Linear Heat Detection Applications Guide for more information on the types of fittings which should be used. The list is not exhaustive, however, any fitting not mentioned in the Application Guide which may be used should be evaluated to ensure it is fit for purpose. Consult the authority having jurisdiction for more information.

The linear heat detection cable should be adequately supported to prevent sagging. Ideally cable supports should be placed every 1m (3ft) and no more than 1.5m (5ft) apart. It may be necessary to place more supports around corners and other transition areas.

Care should be taken when mounting the cable in clips (or equivalent) that they are not done so tight as to crush the cable. The detection cable should be held firmly without deformation. Avoid placing excessive tension in the cable, no greater than 50N. Ensure also that the minimum bend radius is observed at all times – 50mm (2").

It is of particular importance to use a silicone pad between the heat sensing cable and the fixing clip if the metal clip is exposed to the sun or attached to a piece of equipment which may get hot and transfer the heat to the cable.

Where possible, it is preferable to install the linear heat detection cable in one continuous run of cable with as few splices as possible.

When pulling the detection cable from a reel, a reel stand must be used. Do not pull the cable off the reel vertically with the reel stationary as this will twist and damage the cable. A guide wire may be required for installations where supporting the cable at the recommended spacing is not practical. Ensure the diameter or gauge of the guide wire is adequate for the distance which is being spanned. Commercially available stainless steel wire with a diameter of approximately 0.9mm-2mm is suitable for use as a guide wire.

Connections into junction boxes and other enclosures must use strain relief connectors which provide dust and moisture protection (IP65 or greater protection). The standard diameter of detection cable is 3.66mm (0.144") to 4.06mm (0.160"). Suitable cable glands are shown below which fit an M12 or M16 standard knockout.

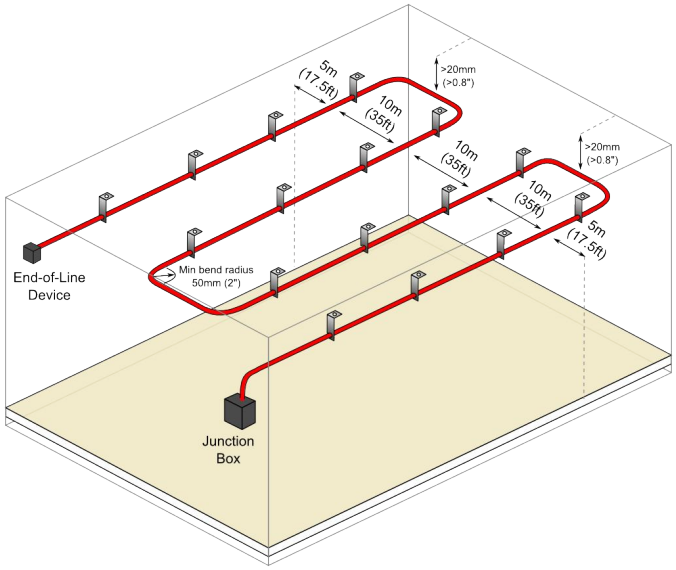
Figure 1: Typical Cable glands for connecting Linear Heat Detection cable into an enclosure

Area Protection

ProReact Plus Digital Linear Heat Detection cable is suitable for broad or wide area detection of overheat or fire conditions, e.g. warehouses etc. The LHD cable should be installed with a minimum distance between the cable and the ceiling of 20mm to allow hot gases rising from an event to trigger the detection cable.

Maximum support spacings should be followed (see illustration right) and the cable securely attached to the ceiling or beams.For ceilings up 9m (30ft) in height maximum spacing between runs should be as in the table below. For ceilings over 9m (30ft) in height the spacings should be halved. The corresponding value in the table below should be halved for spacing between walls/partitions etc. and a run of detection cable.

ProReact Plus Digital LHD Cable	**UL/cUL**
All models	35ft (10m)



Low Temperature Installation Considerations

ProReact Plus Digital Linear Heat Detection cable is suitable for use in ambients down to -60°C (-76°F). Such conditions occur in cold storage freezer warehouses and outdoors for example.

Take special care when installing LHD cable in low ambients or for use in low temperature conditions careful consideration of the conditions and environment should be undertaken.

If the ambient temperature is likely to drop significantly after installing the cable take into account linear shrinkage of the cable when attaching support brackets. The cable can shrink in length by 12% at -60°C (-76°F).

A silicone pad should be placed around the cable before clipping into the support bracket. This prevents damage to the cable and reduces the heat sink effect of the clip.

The minimum bend radius of the detection cable should be increased to 100mm (4") to account for the reduced flexibility. The maximum distance between support brackets should be no more than 1m (3ft) and it is important to support the cable close to either side of any bend.

Ensure any junction boxes other enclosures are waterproof and suitable for the expected operating temperatures.

Splicing

If the fixed temperature linear heat detection cable gets damaged or has triggered due to an overheat condition, the section can be removed and a new section spliced in its place.

Care should be taken during splicing to ensure the core conductors do not come into contact with each other at any point and the final spliced joint is secure and made waterproof. A junction box must be used to connect the newly installed sensor cable to the existing sensor cable.

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.

Testing and Verification

Routine maintainence and checking should be carried out to ensure the Linear Heat Detection cable will function as expected and has not been damaged etc.

A visual inspection should be performed to ensure all support brackets and other aspects of the physical installation are suitable. The cable should also be visually checked for damage to the outer or inner insulation. Check to make sure the silicone pads are correctly installed around the cable in the clips.

Any joints which have been made should be checked to make sure they are secure and waterproof if required by the operating environement.

Electrical tests should be carried out to determine the circuit created by the conductors is working. Remove the conductors from the fire alarm control panel or addressable switch monitor and measuring the resistance across them. The resulting value should equal the end-of-line resistance plus approximately 90Ω/km for each leg.

To test in circuit with a fire alarm control panel or addressable switch monitor re-attach the LHD

Shorting out the End of Line device should put the system into alarm. Disconnecting either leg from the end of line device should put the system into fault.

Functional Testing

ProReact Plus Digital Linear Heat Detection Cable is non-restorable – any section which has alarmed must be cut out and replaced. Therefore functional testing of the installed cable will not normally be carried out.

However, if required, any LHD cable leftover after installation can be used to periodically perform a functional test. A 1m (3ft) section of cable should be attached between the end of the LHD cable run and the end-of-line device.

Using a suitable device heat the test length of detection cable up. Once the action temperature (including any tolerances) has been reached the system should alarm.

Ensure the test length is removed before placing the system back into normal operation.