eurofyre LIMITED

fyreline ANALOGUE

Linear Heat Detection

System Guide

Date: December 2015
Document: EF.FLASG
Issue: 1.0

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Scope

The FyreLine Analogue Linear Heat Detection Installation Guide provides a comprehensive description of the FyreLine analogue linear heat detection cable and its accessories.

This guide introduces the FyreLine Analogue features, technical specifications and gives an understanding of its components and their function. You will also find instructions on installing, cabling and testing.

This guide is for anyone involved with the design, maintenance and purchasing of a FyreLine Analogue system. It is assumed that anyone using this product has the knowledge and appropriate certification from local fire and electrical authorities.

Document Conventions

The following typographic conventions are used in this document:

Convention	Description
Bold	**Used to denote:** Emphasis.
Italics	**Used to denote:** References to other parts of this document or other documents.

The following icons are used in this document:

Convention	Description
	**Recommended guideline:** Advising to do so.
	**Caution:** Not appropriate to do so or; care taken to avoid danger or mistakes.

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1 Overview

FyreLine Analogue Heat Detector is a control module and detection cable designed to interface to a standard fire alarm panel or addressable monitor module. The control module monitors the resistance of specially doped polymers within the sensor cable which change as a function of temperature. An abnormal change in resistance along the detection cable triggers either a Pre-alarm or Alarm on the interface module. The unit is intended to be simple and straightforward to install. Commissioning of the controller can be done using a standard laptop computer or a built-in self-programming module. The sensor cable has been designed to be physically and electronically rugged to suite all the intended environments.

2 Features

- Alarm & Pre-alarm temperature ranges from 54°C[1] – 100°C (129°F – 212°F)
- Programmable on-site adjustment of sensitivity.
- Up to 500m (1640ft) continuous length. (Max. 500m/1640ft per zone)
- Alarm hot-spot length equal to 3% of zone length
- Separate Alarm and Pre-alarm volt-free outputs
- No nomograms or other scales to interpret
- Simple, 3-Step Installation: Measure Calibration Resistance, Select Alarm Temperature, Program Settings
- All alarm temperatures available over all zone lengths
- Ambient temperature compensation maintains alarm temperature accuracy
- Calibration resistance eliminates requirement to know zone length
- Self-restorable after fire event up to 257°F (125°C)
- Flexible cable for easy mechanical installation
- Short Circuit Discrimination
- Reliable signalling of open and short circuit conditions
- Remote RESET input
- Analogue Sensing
- Compatible with all central control panels
- Extrusion and Braiding options to satisfy both mechanical and environmental conditions

[1] **NOTE:** 54°C alarm or pre-alarm setting is for use in controlled ambient areas only. Specifically, when the overall sensor cable length is less than 75m (246ft) ensure the humidity and temperature **DO NOT** exceed 75% and 30°C respectively.

3 Product Range

The FyreLine Analogue linear heat detection system consists of a single cable type with different protective outer sheaths plus a control module.

Control Module

Part No	Model No	Description
18-200	FLAC	Programmable Interface including End-of-Line Module
18-201	FLACPC	Programmable Interface, PC Only, including End-of-Line Module
18-202	FLAEOL	(Replacement) End-of Line Module

Sensor Cable

Part No	Model No	Description
Standard PVC Sensing Cable		
18-210	FLA100	Analogue Linear Heat Sensing Cable, 54 to 100°C Alarm Temp. UL 521 - 100m Reel Length
18-211	FLA100	Analogue Linear Heat Sensing Cable, 54 to 100°C Alarm Temp. UL 521 - 200m Reel Length
18-212	FLA100	Analogue Linear Heat Sensing Cable, 54 to 100°C Alarm Temp. UL 521 - 500m Reel Length
Nylon Coating for Outdoor UV Protection & Increased Durability		
18-220	FLA100N	Analogue Linear Heat Sensing Cable, Nylon Coated, 54 to 100°C Alarm Temp. - 100m Reel Length
18-221	FLA100N	Analogue Linear Heat Sensing Cable, Nylon Coated, 54 to 100°C Alarm Temp. - 200m Reel Length
18-222	FLA100N	Analogue Linear Heat Sensing Cable, Nylon Coated, 54 to 100°C Alarm Temp. - 500m Reel Length
Polypropylene Coating for Chemical Protection & Caustic Environments		
18-230	FLA100P	Analogue Linear Heat Sensing Cable, Polypropylene Coated, 54 to 100°C Alarm Temp. - 100m Reel Length
18-231	FLA100P	Analogue Linear Heat Sensing Cable, Polypropylene Coated, 54 to 100°C Alarm Temp. - 200m Reel Length

18-232	FLA100P	Analogue Linear Heat Sensing Cable, Polypropylene Coated, 54 to 100°C Alarm Temp. - 500m Reel Length
Stainless Steel Braided for Enhanced EMC & Mechanical Protection		
18-240	FLA100S	Analogue Linear Heat Sensing Cable, Stainless Steel Braided, 54 to 100°C Alarm temp. - 100m Reel Length
18-241	FLA100S	Analogue Linear Heat Sensing Cable, Stainless Steel Braided, 54 to 100°C Alarm temp. - 200m Reel Length
18-242	FLA100S	Analogue Linear Heat Sensing Cable, Stainless Steel Braided, 54 to 100°C Alarm temp. - 500m Reel Length

Table 1: Product Range

4 Technical Specifications

4.1 Control Module

Approvals	CE Marked, UL Listed	
Dimensions (W x H x D)	182mm x 180mm x 90mm (7 1/8" x 7 1/8" x 3 1/2")	
Enclosure Rating	IP66 (IK08) polycarbonate with removable cover	
Finish	Light grey	
Operating Temperature Range	0°C – 50°C	
Supply Voltage	20 – 28Vdc	
Humidity	0% to 90% RH	
Current Consumption, Normal & Fault	<70mA	
Current Consumption, Pre-alarm OR Alarm	<80mA	
Current Consumption, Alarm (& Pre-alarm)	<100mA	
Current Consumption, Fault	<70mA	
Visual Indicators	**Function**	**Colour**
	ALARM	Red
	PRE-ALARM	Red
	FAULT	Orange
	POWER	Green
Relay Outputs (Latching)	ALARM, PRE-ALARM (all Form C) 2A @ 30Vdc load rating – resistive 0.25A @ 250Vac load rating – resistive	
Fault Output	Opto-isolated Phototransistor Output Max 50V @ 20mA	
Remote Reset	Isolated input for resetting module remotely (20-28Vdc pulse for at least 5s)	
Alarm/Pre-alarm Temperature Range	54°C[2] – 100°C (129°F – 212°F)	

Table 2: Control Module Specification

[2] **NOTE:** 54°C alarm or pre-alarm setting is for use in controlled ambient areas only. Specifically, when the overall sensor cable length is less than 75m (246ft) ensure the humidity and temperature **DO NOT** exceed 75% and 30°C respectively.

4.2 Sensor Cable

FyreLine Analogue Linear Heat Detection cable is constructed using a pair of copper conductors coated in a temperature sensitive polymer whose resistance changes as a function of temperature. A calibration resistance (white) and average ambient temperature sensor (red) core are also twisted with the two original conductors. A foil shield and protective outer coat is extruded over the twisted core.

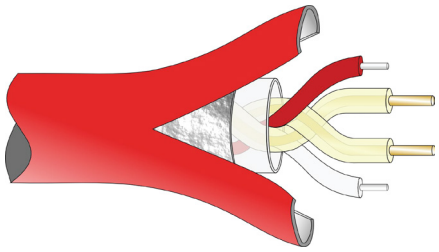


Figure 1: Analogue Linear Heat Detection Cable Construction

Approvals	CE Marked, UL Listed	
Outer Jacket	High temperature Red PVC	
Overall Diameter	4.57mm ± 0.075mm (0.180" ± 0.003")	
Humidity	0% to 99% RH	
RFI Shielding`	Twisted and Foil shielding to reduce inductance and RF susceptibility	
Cores	**Function**	**Colour**
	Calibration Resistance	White
	Sensor Core	Red
	Conductor & Specially Doped Polymer Core	Clear
	Conductor & Specially Doped Polymer Core	Clear
Maximum Continuous Length	500m (1640ft)	
Minimum Continuous Length	30.5m (100ft)	
Operating Temperature Range	-40°C - 125°C	
Continuous Ambient Temperature Range	-40°C - 90°C	

Table 3: Sensing Cable Specification

4.2.1 Chemical Resistance Table

The following table provides a chemical resistance comparison for all the available outer sheath materials on the FyreLine Analogue sensor cable.

Chemical	PVC	Nylon	Polypropylene
Ammonia, Liquid	*****	***	*****
Butane	*****	*****	*
Copper Nitrate	*****	*	*****
Fuel Oils	*****	*****	***
Gasoline	**	*****	**
Hydrofluoric Acid	*	*	*****
Kerosene	*****	*****	*
Diesel Fuel	*****	*****	****
Acetic Acid	**	*****	*****

Table 4: Chemical Resistance Chart

5 Typical System Wiring Configuration

5.1 Conventional Fire Alarm Systems

FyreLine analogue 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 FyreLine controller and the fire alarm control panel if the area requiring protection is some distance away from the control panel.

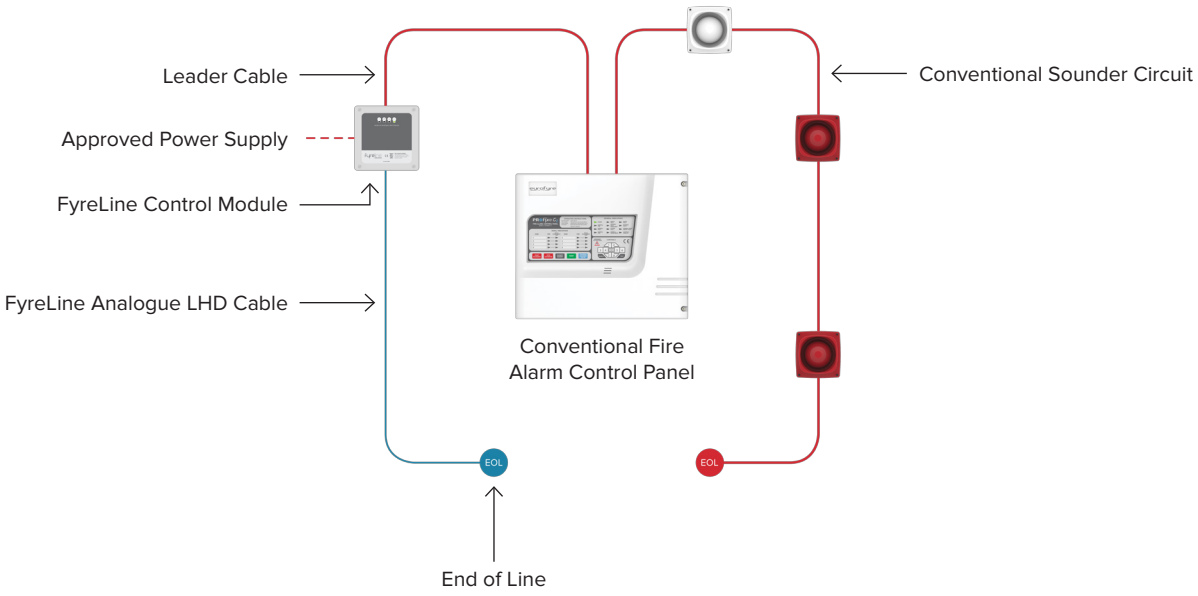


Figure 2: Typical Conventional System FyreLine Analogue Heat Detector Wiring Configuration

5.2 Addressable Fire Alarm Systems

When used as part of an addressable system, FyreLine Analogue Linear Heat Detection system should be connected onto the addressable loop using a switch or zone monitor. An External power supply is required for the Linear Heat Detection controller.

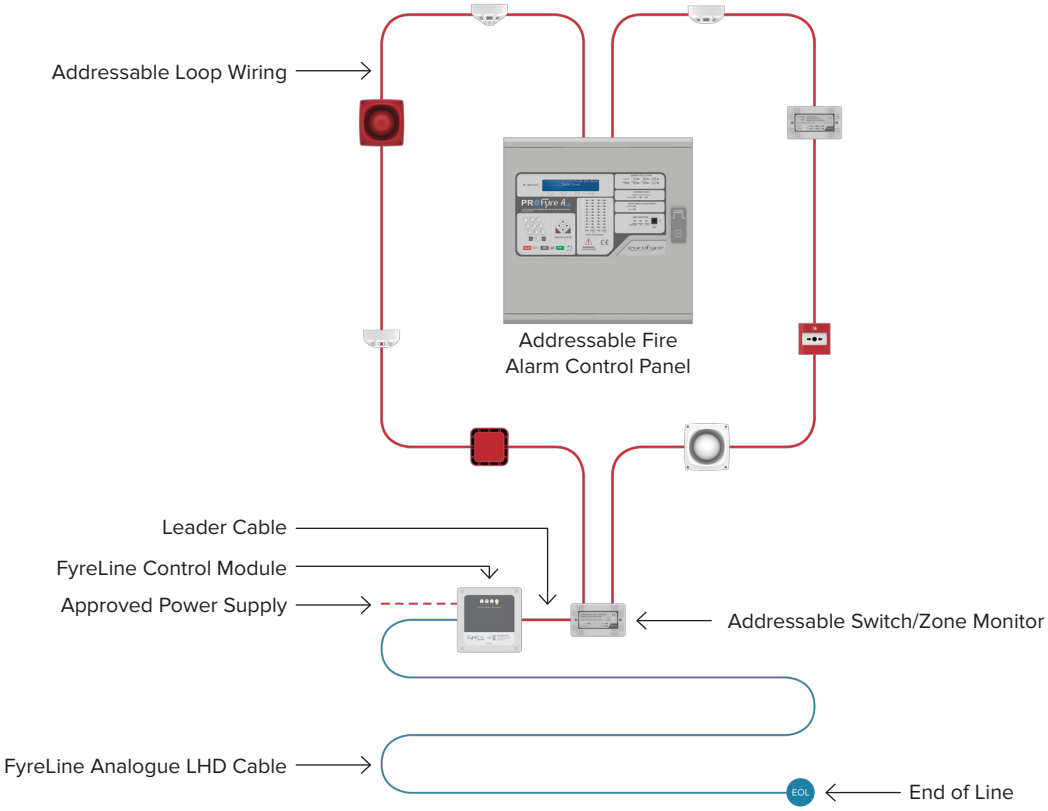


Figure 3: Typical Addressable System FyreLine Analogue Heat Detector Wiring Configuration

6 Application Guidelines

⚠	**The following section is intended to provide a guide in designing a system for protection using FyreLine Analogue Linear Heat Detection cable. Before any installation or design work is carried out however, requirements set by the NFPA, National Electrical Code or any local authority having jurisdiction should be taken into account.**

Several applications are given here as examples using Linear Heat Detection cable including area detection, proximity detection, racking protection, cable trays and conveyors.

6.1 Cable Trays

Analogue Linear Heat Detection cable is ideal for protecting overheat conditions in cable trays. A sine wave pattern may be used to lay the detection cable on top of all power and control cables in a tray, spaced no more than 1.8m between peaks or troughs. Any additional cable which is laid in the tray must be laid underneath the LHD cable.

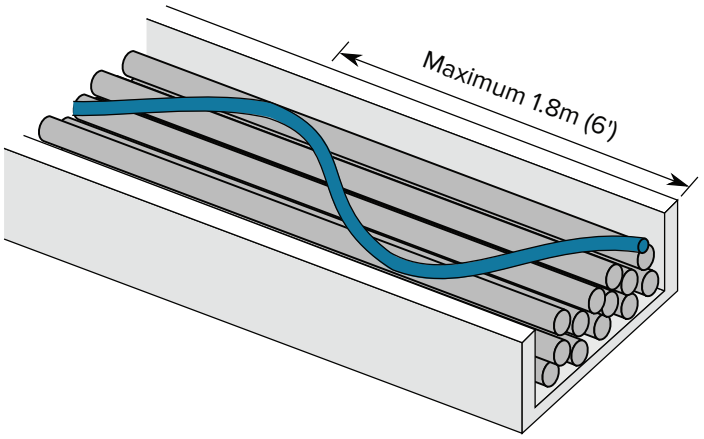


Figure 4: Sine wave pattern layout of LHD cable in a cable tray

"V" clips are ideal supports for cable tray applications where multiple cable trays need protection. Maximum sensitivity to overheat conditions is provided while minimising obstruction to power or signal cables mounted on the tray.

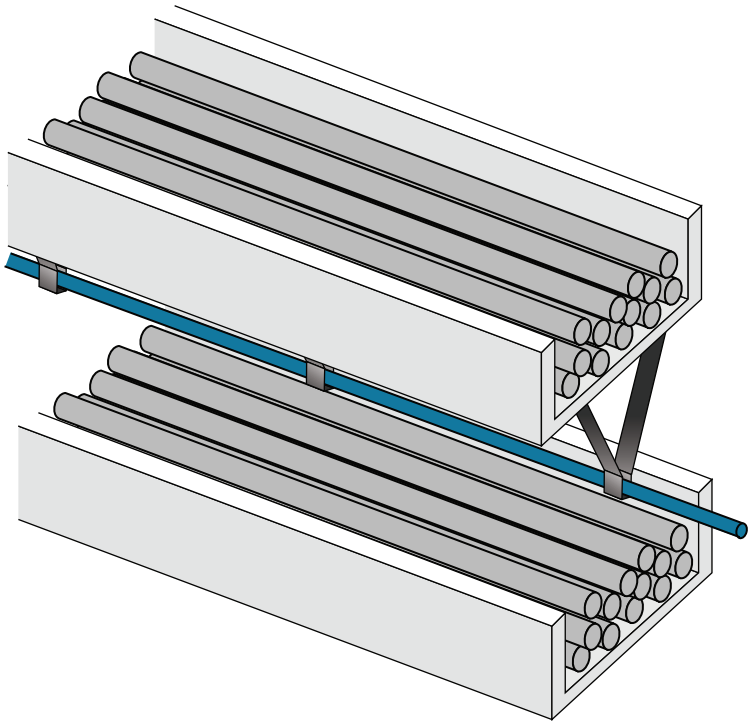


Figure 5: Protecting multiple cable trays using LHD cable

6.2 Conveyor Belts

Conveyor belt systems have several areas which have the potential to overheat and create fires. For example, it is possible for rollers to overheat and ignite the belt or product which may be on the belt or have spilled. Other areas include the hood over the conveyor belt which acts to collect heat.

A guide wire (discussed on page 17) may be required if it is not possible to space brackets close enough together to give the linear heat detection cable adequate support. Care should be taken to prevent the cable from sagging especially to prevent snagging with product on the conveyor belt.

For reliable detection of overheat conditions the linear detection cable placed overhead should be less than 2.5m (8.2ft) above the belt.

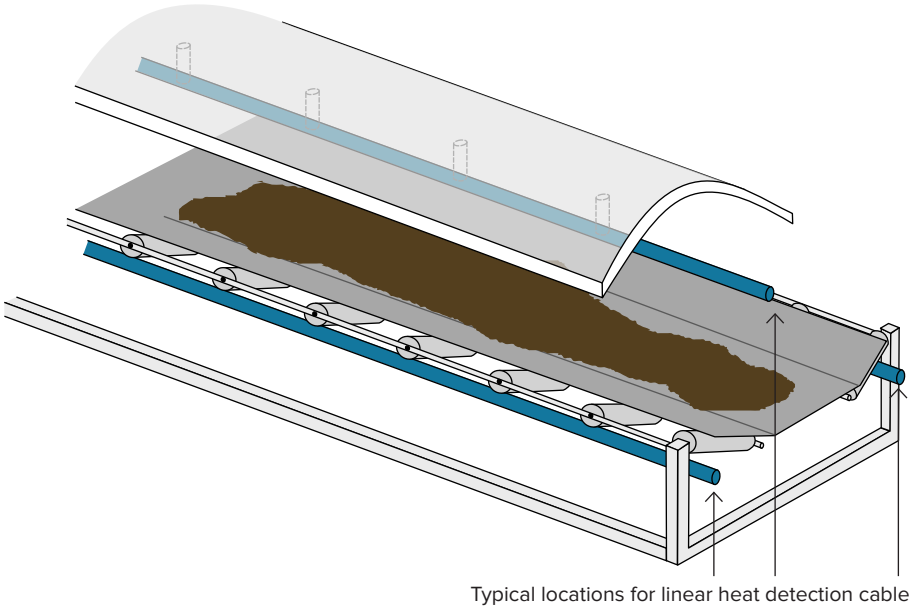


Figure 6: Typical locations for protecting conveyors with LHD cable

6.3 Rack Storage

Many different rack storage systems can be protected using Analogue Linear Heat Detection cable. Because the sensor cable can detect overheat conditions along the entire length of cable, more effective coverage is achieved than when using spot detectors. The sensor cable should be supported either:

1. On the ceiling.
2. Centered over the aisles between racking.
3. Parallel to the sprinkler pipe (if fitted) at the same level.
4. Larger racks (over 4.5m in height) may require multiple runs of detection cable at each sprinkler level and run in the longitudinal flue space.
5. Extra protection may be provided by installing LHD cable at each level if required.

Ensure that when securing the detection cable to the racking the cable does not have the potential to be damaged by incorrectly loaded pallets or forklift operation.

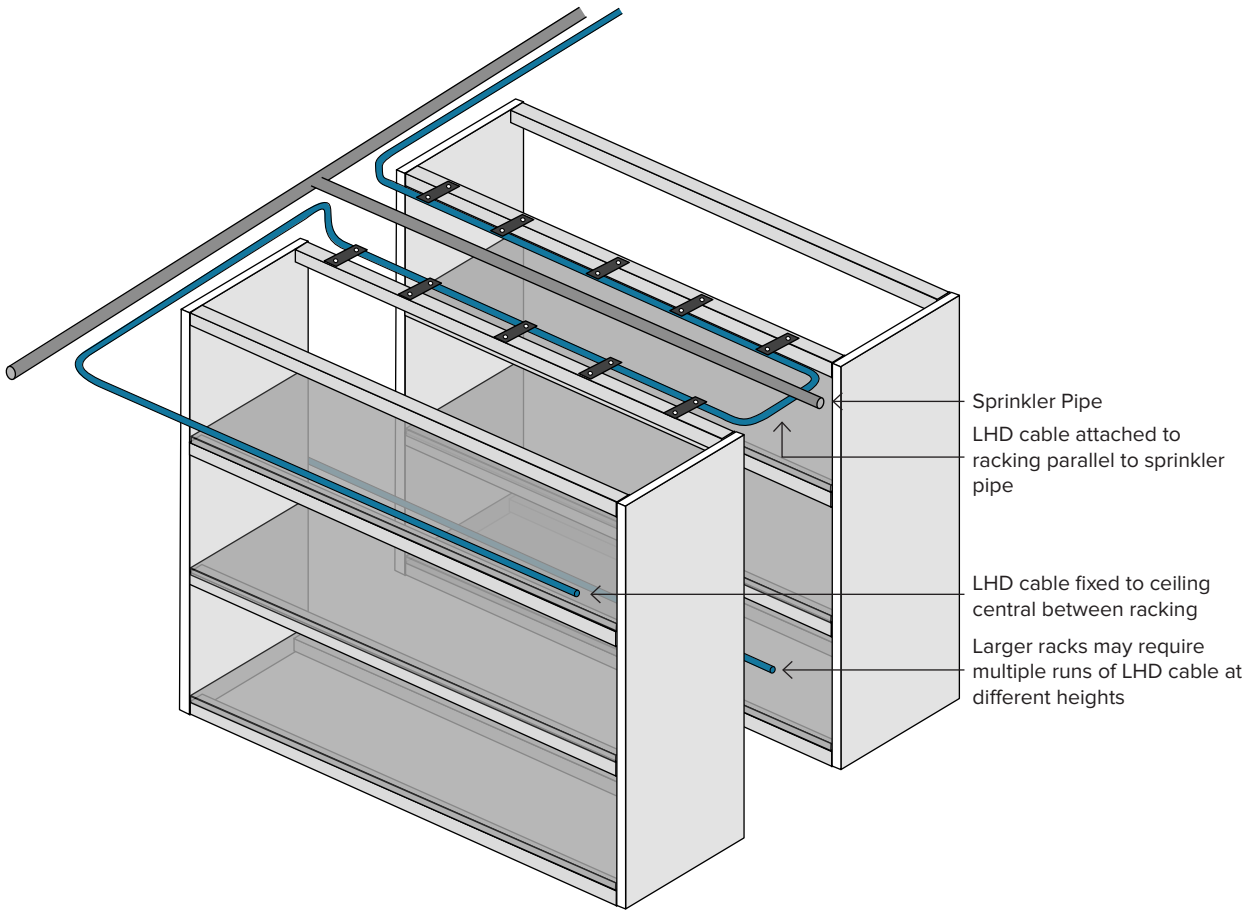


Figure 7: Typical locations for protecting racked storage with LHD cable

6.4 Floating Roof Storage Tanks

FyreLine Analogue Linear Heat Detection cable is suitable for the early warning of overheat or fire conditions on floating roof storage tanks. Best practice states that the LHD cable should be attached as close as possible to the highest point of the weather seal assembly on the roof – no more than 50mm (2") away from it.

The cable should be located to allow for visual inspection and maintenance. Clips should be provided which are fit for purpose and securely hold the LHD cable in position. Of significant importance is the use of a retractable cable between the roof and the connection to the external control panel or junction box. Care should be taken to ensure the LHD cable cannot become snagged or placed under excessive tension with the rise and fall of the roof.

FyreLine Nylon coated Analogue Linear Heat Detection cable is the preferred choice for use with floating roof storage tanks due to the increased chemical resistance and UV stability. Take note of high ambient conditions which may also occur on top of floating roof storage tanks. Refer to page 6 for suitable rated detection cables with respect to ambient temperatures.

⚠	**The FyreLine Analogue Controller must be installed in the safe area. The end-of-line module may be installed in zone 1 or 2 if it is mounted inside a suitably rated Ex 'e' enclosure otherwise it should be mounted in the safe area.** **All wiring MUST be carried out in accordance with EN 60079-14:2014 Clause 9.** **The FyreLine Analogue Sensing Cable may be run from the controller into a zone 0, 1 or 2 area and then to the end-of-line unit. No intrinsically safe barriers between the controller and sensing cable are required.** **An interconnecting/leader cable may be used between the controller and end-of-line unit and the sensing cable. The junction box between the sensing cable and end-of-line unit or controller must be Ex 'e' certified and suitable for the zone it will be located in. The cable glands on the junction box must also be barrier glands which means they seal around the individual cores of the sensing cable.** **For increased protection it is recommended to power the FyreLine Analogue Controller with an isolated, power limited (24VDC) power supply.**

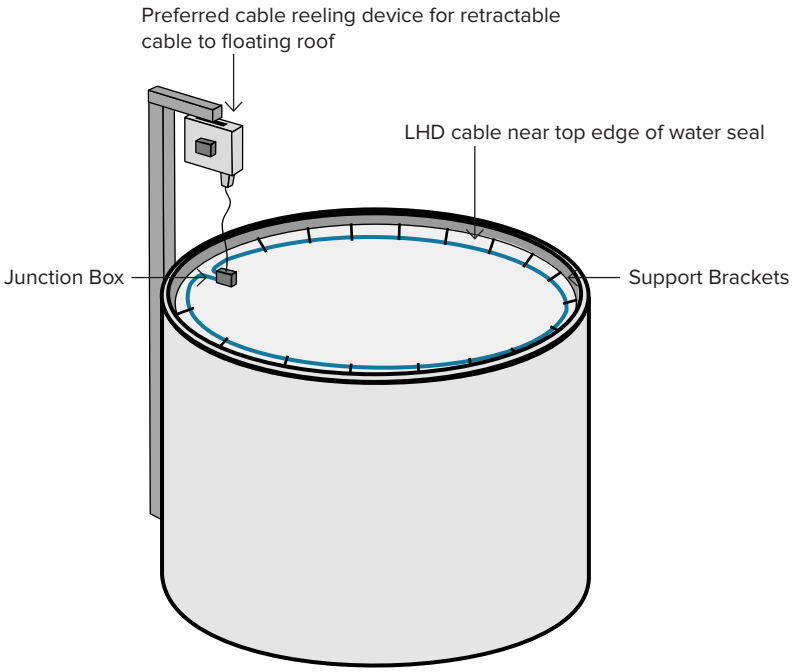


Figure 8: Typical locations for protecting floating roof storage tanks with LHD cable

7 Design Guidelines

7.1 Area Protection

FyreLine Analogue 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 (refer to page 18) 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.

FyreLine Analogue LHD Action Temperature	UL
54°C (129.2°F) 64°C (147.2°F), 71°C (159.8°F), 72°C (161.6°F)	10m (35ft)
79°C (174.2°F), 86°C (186.8°F), 93°C (199.4°F), 100°C (212°F)	10m (35ft)

Table 5: Cable Support Allowance

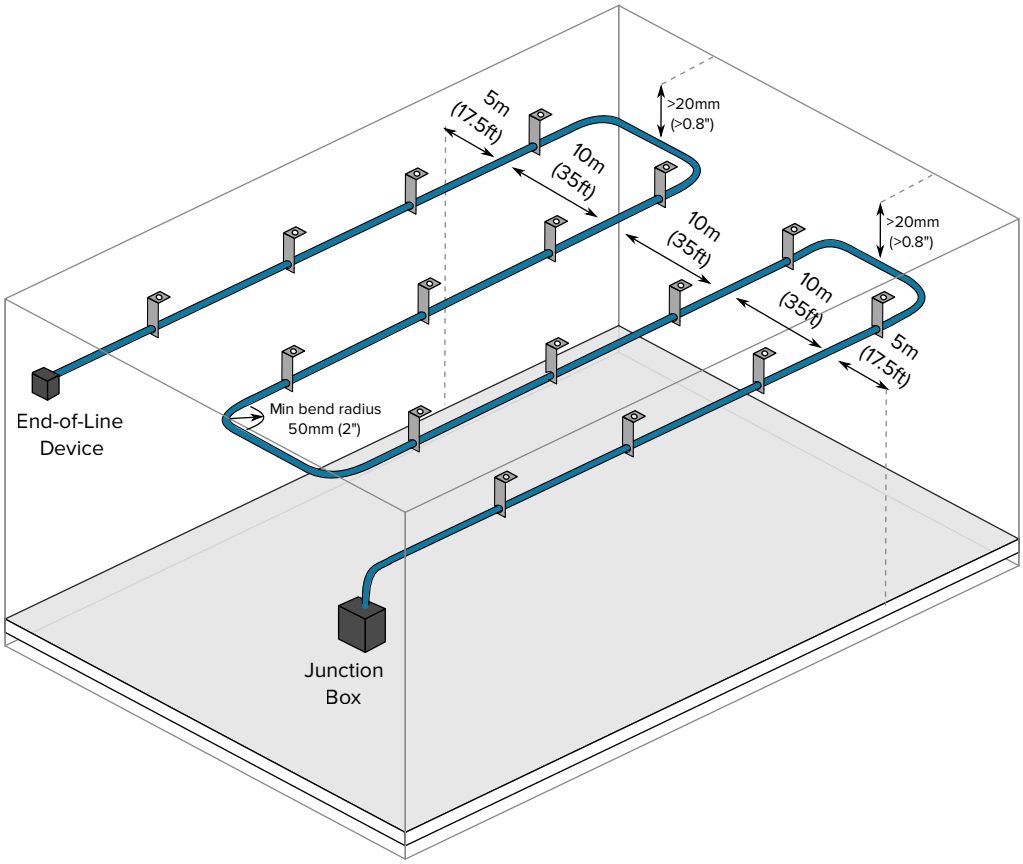


Figure 9: Protecting large areas with LHD cable

7.2 Low Temperature Installation Considerations

FyreLine Analogue Linear Heat Detection cable is suitable for use in ambients down to -40°C (-40°F). Such conditions occur in cold storage freezer warehouses and outdoors for example.

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

Do not install the LHD cable when the ambient temperature is below -10° C (14°F). The materials within the cable will become less flexible and are more prone to damage. 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 -40°C (-40°F).

A neoprene insulator 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.

8 Installation Specifications

8.1 Leader Cable

An approved type of shielded 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 (IP66/67) 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 Shielded Leader Cable Length and CSA for copper conductors (with maximum length of Linear Heat Detection Cable 500m/1.64kft)
0.5mm^2 (20AWG) — Upto 1,000m (3,280ft)

Table 6: Leader Cable Maximum Length

8.2 Sensor Cable

A very important factor in determining which action temperature of analogue linear heat detection (LHD) cable to use is the maximum ambient temperature the cable will be exposed to. To provide the fastest alarm response but lowest possibility for false alarms the lowest action temperature above the maximum ambient temperature should be chosen. For example, if the maximum ambient temperature is determined to be 55°C (131°F), an action temperature of 86°C (186.8°F) should be chosen (if the fastest possible response time is required).

Maximum Ambient Temperature	**Available Action Temperatures**
Up to 30°C (68°F)	54°C (129.2°F) [1]
Up to 47°C (113°F)	64°C (147.2°F), 71°C (159.8°F) Pre-alarm, 72°C (161.6°F) Alarm, 79°C (174.2°F)
Up to 69°C (158°F)	86°C (186.8°F) Alarm, 93°C (199.4°F) Pre-alarm, 100°C (212°F) Alarm

Table 7: Maximum Ambient Temperature for Action Temperature (in accordance with NFPA 72 5.6.2.1.1)

[1] **NOTE:** 54ºC alarm or pre-alarm setting is for use in controlled ambient areas only. Specifically when the overall sensor cable length is less than 75m (246ft) ensure the humidity and temperature **DO NOT** exceed 75% and 30ºC respectively.

9 Installation Hardware

There are many applications which Linear Heat Detection cable is used to provide protection for. The following section intends to provide a guideline and recommendation on the types of fittings which should be used. The list is not exhaustive however, any fitting not mentioned here which may be used should be evaluated to ensure it is fit for purpose. Consult the authority having jurisdiction and NFPA 72 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 neoprene insulator 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 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 4.5mm (0.177") to 6.05mm (0.238"). Suitable cable glands are shown opposite which fit an M16 standard knockout.

9.1 “L” Brackets

For general support of cable. Various sizes available. Position and number of fixing holes variable.

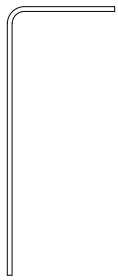


Figure 10: Typical “L“ Bracket for supporting Linear Heat Detection cable

9.2 “V” Clips

For use on cable trays. A neoprene insulator should be used when clipping the detection cable into the clip. Made from spring steel.

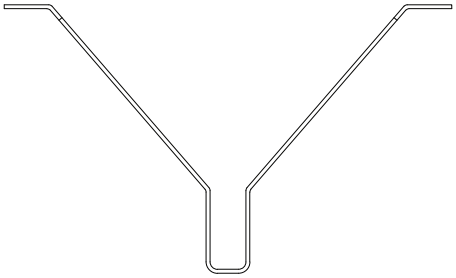


Figure 11: Typical “V“ Bracket for supporting Linear Heat Detection cable

9.3 Other Support Brackets

For use in a wide variety of applications. Available in mild and stainless steel. Variable sizes. Position and number of holes variable.

⚠	**Ensure any brackets or clips chosen to hold the Linear Heat Detection Cable are fixed securely and meet the criteria specified in this instruction manual.**

10 Sensor Cable Installation

10.1 Sensor Cable Installation Guidelines

Please read this instruction leaflet thoroughly before commencing installation.

Install the linear heat detection cable accordingly to meet local and country installation requirements.

FyreLine Analogue 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 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 (-40°C to +90°C).
✓	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 neoprene 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 lengths of FyreLine Analogue Linear Heat Detection 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.

10.2 Sensor Cable Calibration Resistance Measurements

Before the configuration of the FyreLine Control Module, it is vital that the calibration resistance is recorded before proceeding any further.

To measure the calibration resistance of the sensor cable, ensure that the End of Line module has been terminated correctly (see page 20) as per the description on the PCB. The sensor cable must stripped back exposing the conductors and not connected to the control module.

1. Connect an multimeter/ohmmeter to either of the clear cores and red core. If the resistance measured is greater than 3MΩ switch the clear core. The measured resistance should be:

Clear <-> Red	0.10 - 2.20KΩ
Actual Resistance (to be checked if within valid range)	

Table 8: Clear to Red Calibration Resistance

2. Connect an multimeter/ohmmeter to either of the clear cores and white core. If the resistance measured is greater than 3MΩ switch the clear core. The measured resistance should be:

Clear <-> White	0.52 - 8.40KΩ
Actual Resistance (to be recorded for control module configuration)	

Table 9: Clear to Red Calibration Resistance

10.3 Sensor Cable Splicing

If the analogue linear heat detection cable gets damaged or has exceeded the maximum restorable temperature of 125˚C (257˚F), 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.

11 End Of Line Module Wiring

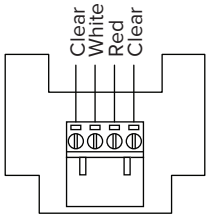


Figure 12: PCB Wiring Diagram

12 Control Module Installation

12.1 Control Module Mounting

The FyreLine Analogue Heat Detector control module should be wall-mounted (or equivalent) using four screws in each corner of the base of the enclosure. The fixing dimensions are shown in figure 1.

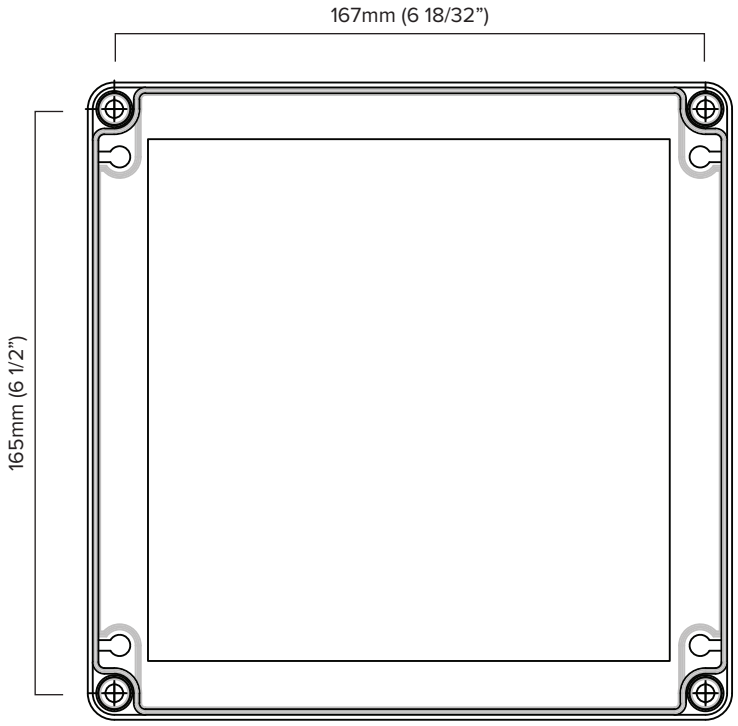
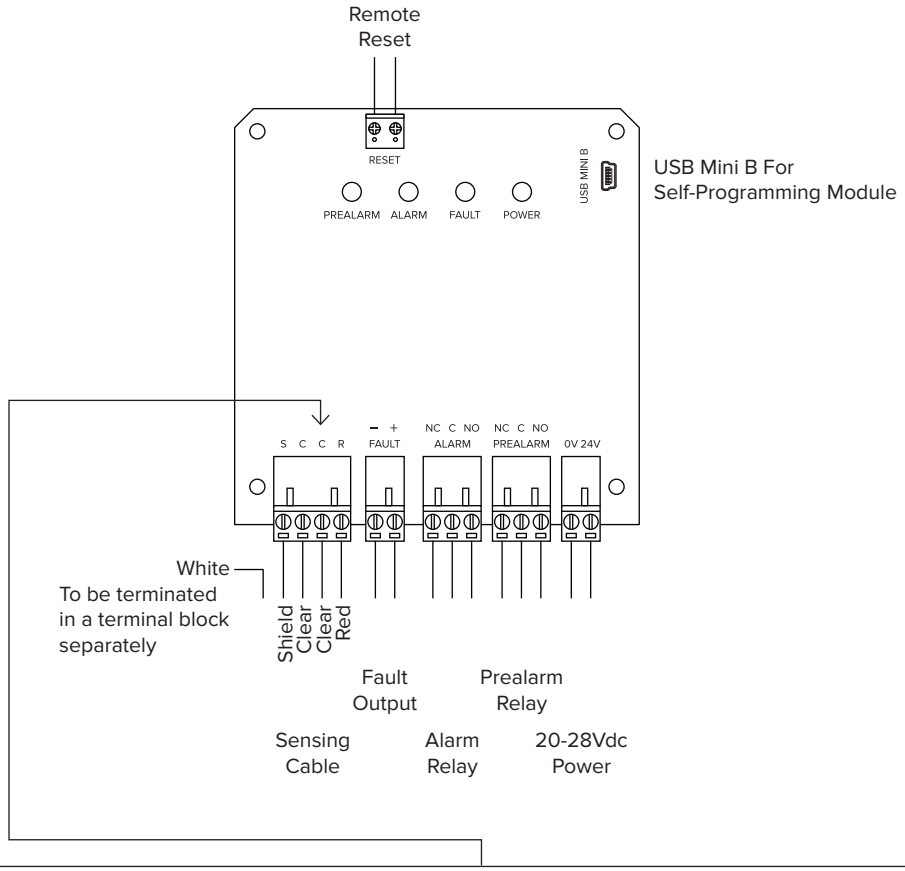


Figure 13: Fixing Dimensions for mounting FyreLine Analogue Heat Detector Controller

12.2 Control Module Wiring

The FyreLine Analogue Heat Detector control module is designed to be connected to any standard fire alarm control panel or addressable monitor module. It is intended to be powered via the 24Vdc switched power output which is interrupted when the control panel is reset. Figure 13 shows the typical connections to the PCB.



⚠	**The clear cores are polarity sensitive once the End of Line module has been terminated. Ensure that the clear cores have been terminated correctly by following the steps below:** **1. Test between Clear <-> Red. The resistance should be between 0.10 - 2.20KΩ. If this is correct, terminate the tested clear core in the furthest clear terminal to the right.** **2. Terminate the remaining clear core in the left hand-side clear core terminal.**

Figure 14: PCB Wiring Diagram

12.3 Remote Reset

The remote reset function allows the FyreLine Analogue Heat Detector controller to be reset from a remote point. In order to trigger a reset supply 20-28Vdc (approx 10mA) for at least 5s to the remote reset input.

13 Control Module Configuration

The control module allows for on-site adjustment of response sensitivity to allow the sensor cable to be suited to the local environmental conditions. This **MUST** be done to commission the system and should therefore be performed immediately after system installation.

The control module will output a fault signal until programming has been completed.

13.1 Control Module Setup (Laptop)

If no self-programming module is installed the FyreLine Analogue Heat Detector control module must be programmed using a laptop computer. To commission the control module first ensure the minimum connections have been connected to the unit (see Figure 13). Follow the steps below to commission FyreLine Analogue Heat Detector:

1. Install and run the commissioning software **before** connecting the control module to the laptop. The software is supplied on a CD or USB key with the FyreLine Analogue Heat Detector control module. Alternatively the software can be provided electronically by emailing technical@eurofyre.co.uk

2. Power up the FyreLine Analogue Heat Detector control module.

3. Go to File > Connect or click the green connect icon.
4. At this point, connect the control module to the laptop via the USB cable and turn the control module on.
5. After powering up the control module, click the “Get Port List” button.
6. The selected COM port should be the controller. Click the “Connect button” then click “Ok”.
7. Enter the calibration resistance (see page 19).
8. **Check the Calculated zone length matches the installed sensor cable length.**
9. Select alarm/pre-alarm temperature(s).
10. Select pre-alarm enabled with the checkbox.
11. Click “Update Settings” to upload settings – the status bar at the bottom of the screen shows the current status of the FyreLine Analogue Heat Detector controller.
12. Click “Get Current Settings” to download the settings from the control module to the laptop. This is useful to check which settings are currently loading on a particular module.
13. To save these settings go to File > Save Configuration. This will save a file with the necessary settings (calibration resistance etc) to re-commission the module.
14. Click “Erase Settings” to wipe the settings on the control module. **Warning: Do not leave the control module operating after erasing the settings. NO ALARM OR PRE-ALARM WILL TRIGGER.** The control module will trigger the fault output and light the fault indicator.
15. Click the “Update” button in the diagnostics frame to display diagnostic information from the control module. This should only be carried out by trained service personnel.
16. **Ensure the “PTC Temp” field in the diagnostics frame closely matches the ambient temperature around the cable (within ± 2.5°C / ± 4.5°F). If the “PTC Temp” value is outside this tolerance re-measure the calibration resistance and return to step 7. If the calibration resistance is the same as previous, add or subtract 0.017 kohms to the value and repeat from step 7.**

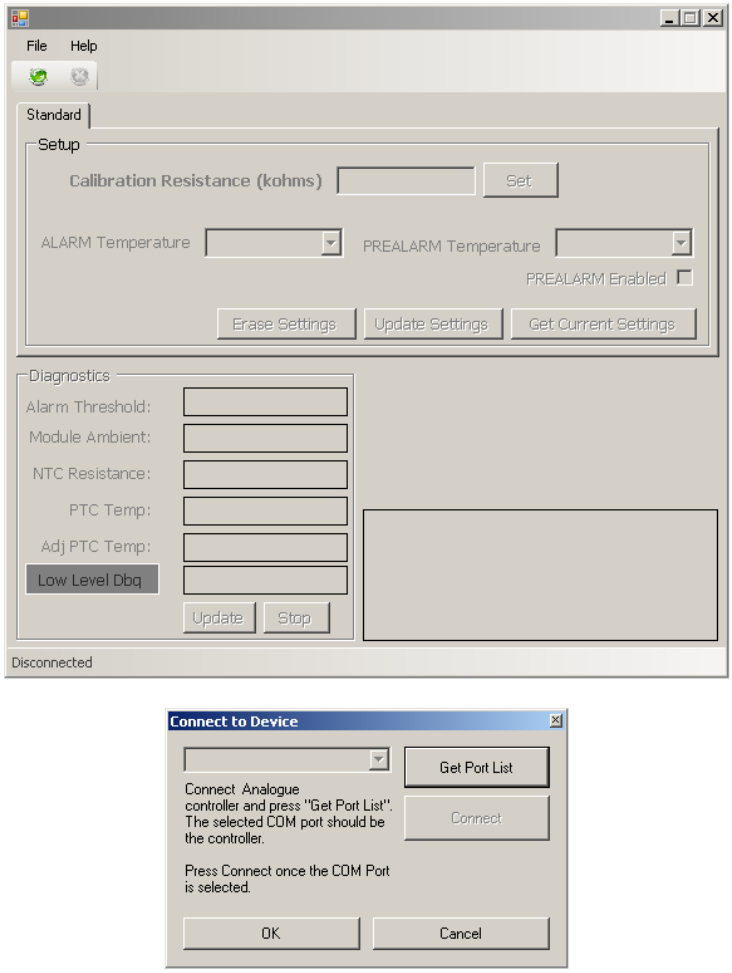


Figure 15: FyreLine Analogue Heat Detector Laptop Programming Software

13.2 Control Module Setup (Self-Programming Module)

If the self-programming module is installed, the FyreLine Analogue Heat Detector control module can be installed without the use of a laptop computer. Once the necessary connections have been made to the PCB (see page 21) the system should be powered on.

1. Power up the FyreLine Analogue Heat Detector controller with the sensor cable connected. On an un-commissioned controller, the fault light and output will be set until the setup is completed.

2. Navigate to 'Commission' on the programming module by pressing SELECT (black button). Then press the SET (red button) to continue.

Figure 16: Choose Function Screen

3. Enter the calibration resistance (10.2 Sensor Cable Calibration Resistance Measurements on page 19) using SELECT (black button) to change the value and SET (red button) to accept and move to the next value.

Figure 17: Calibration Resistance Screen

4. Once the calibration resistance has been selected press SET (red button) and the programming module will ask if the value is correct. If the value is correct enter 'Yes' by pressing SELECT (black button) followed by SET (red button) to accept.

Figure 18: Calibration Resistance Check Screen

5. The programming module will then calculate and show the zone length. Confirm the value by pressing SELECT (black button) followed by SET (red button) to accept.

Figure 19: Zone Length Check Screen

6. Select the desired alarm temperature by cycling through the options using SELECT (black button) followed by SET (red button) to accept (see page 25 for alarm temperatures) .

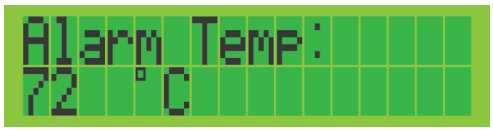


Figure 20: Alarm Temperature Screen

7. Pre-alarm can be enabled by pressing SELECT (black button) followed by SET (red button) to accept. Alternatively if a Pre-alarm is not required select 'No' and SET (red button) to accept and skip to point 9.

Figure 21: Pre-alarm Enable Screen

8. Select the desired Pre-alarm temperature by cycling through the options using SELECT (black button) followed by SET (red button) to accept (see page 25 for pre-alarm temperatures).

Figure 22: Pre-alarm Temperature Screen

9. The controller is now ready to accept the settings from the programming module. If the controller is not connected to the programming module then do so now using a Micro USB A to Micro USB B Lead otherwise The display will show 'Device not connected'.

Figure 23: Connection Screen

10. The settings will start to transfer automatically.

Figure 24: Transferring Screen

11. Once the transfer is complete, the display will show 'Settings transferred ok'. Press SET (red button) to accept.

Figure 25: Settings Transferred Screen

12. The display will automatically switch to show the diagnostic information such as the current resistance and ambient temperature. Ensure that these values are as expected. This is useful for trained service personnel when diagnosing a problem or confirmed the commissioning has been performed correctly.

Figure 26: Diagnostics Screen

13. **Ensure the temperature in the bottom left of the display during diagnostics closely matches the ambient temperature around the cable (within ± 2.5°C / ± 4.5°F). If the value is outside this tolerance re-measure the calibration resistance and return to step 1. If the calibration resistance is the same as previous, add or subtract 0.017 kohms to the value and repeat from step 1.**

14. In normal operation the USB cable should be removed. The display will then read "FyreLine Normal Operation".

15. To return to the beginning once the diagnostic information is shown hold down SET (black button) and SELECT (black button) for several seconds.

16. If 'Get settings' has been selected, connect the USB cable to the control module and self-programming module and press SET (red button). The display will show the current settings in the control module including the zone length, alarm and pre-alarm temperatures. These should be written down if they are to be required later. Press SET (red button) again to return to the diagnostic information.

17. If 'Erase Settings' has been selected, connect the USB cable to the control module and self-programming and press SET (red button). The self-programming module will erase any commissioning information on the control module. **This will put the control module into a fault condition. Do not leave the control module operating in this situation. NO ALARM OR PRE-ALARM WILL TRIGGER.**

14 Alarm/Pre-alarm Temperatures

FyreLine Analogue Heat Detector is designed such that when a section, equal to 3% in length of the overall sensor cable length, reaches a user-defined action temperature an alarm is triggered.

For example, for a 30m/100ft cable if a 64°C/147°F action temperature is chosen an alarm will be activated when 0.91m/3ft of the sensor cable reaches 64°C/174°F.

For a greater proportion of sensor cable subject to an abnormal temperature the activation temperature will be lower.

For a smaller proportion of sensor cable subject to an abnormal temperature the activation temperature will be greater.

Table 1 lists the activation temperatures when a 1%, 2%, 3% or 5% length of the sensor cable is subject to an overheat condition.

Temperature (deg C) for percentage length of sensor cable subject to overheat				
5%	**3% (UL Tested)**	**2%**	**1%**	
50	**54**	57	63	
60	**64**	68	74	
67	**71**	75	83	(Pre-alarm only)
68	**72**	76	84	(Alarm only)
74	**79**	84	95	
80	**86**	93	103	(Alarm only)
86	**93**	100	108	(Pre-alarm only)
93	**100**	106	113	

Table 10: Alarm/Pre-Alarm Temperatures for Percentage Length of Sensor Cable

15 Pre-alarm Condition

The FyreLine Analogue Heat Detector control module continuously monitors the sensor cable for changes in resistance. During installation a response sensitivity was selected which programmed the control module to look for a specific threshold resistance.

If an overheat or fire condition arises along the cable length which matches the pre-selected temperatures an ALARM or PRE-ALARM signal will be initiated by the control module. The corresponding indicator light will be lit and relay activated. Once the alarm condition has been cleared the unit can be reset remotely using the remote reset connections (see PCB drawing) or will reset automatically once the temperature drops below the alarm temperature.

The available Pre-alarm temperature range is calculated once the alarm temperature has been selected either on the self-programming module or in the laptop software. In both cases the Pre-alarm must be enabled to select a pre-alarm temperature. Table 11 shows the available pre-alarm temperatures for a given alarm temperature.

Selected Alarm Temperature	Available Pre-alarm Temperature(s)
54°C / 129.2°F	NOT AVAILABLE
64°C / 147.2°F	54°C
72°C / 161.6°F	54°C, 64°C
79°C / 174.2°F	54°C, 64°C, 71°C
86°C / 186.8°F	54°C, 64°C, 71°C, 79°C
100°C / 212°F	54°C, 64°C, 71°C, 79°C, 93°C

Table 11: Available Pre-alarm Temperatures for Selected Alarm Temperatures

16 Maintenance

16.1 Functional Testing

Analogue Linear Heat Detection Cable is restorable upto 125˚C (257˚F) and therefore can be functionally tested to ensure it is working correctly.

For functional testing the system should be set to the lowest action temperature given the ambient conditions at the time of testing. Using a suitable device heat between 0.5% and 2% of detection cable up to a maximum of 125˚C (257˚F). Once the action temperature (including any tolerances) has been reached the system should alarm.

Ensure the action temperature is reset to the required value before placing the system back into normal operation.

16.2 Sensor Cable Testing And Verification

Routine maintenance 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 visual checked for damage to the outer or inner insulation. Check to make sure the neoprene insulators 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 any junction boxes should be checked to ensure they are correctly installed.

Electrical tests should be carried out to determine the circuit created by the conductors is working. Remove the conductors from the interface unit and place a shorting wire between the two clear cores in the EOL unit leaving the other cores connected as normal in the EOL of unit. The resistance at the end just disconnected from the interface unit between the respective conductors should be as follows:

Measuring Points	Approx Ohms/m
Red <-> Clear	3.5
Clear <-> Clear	0.2
White <-> Clear	16.9

Table 12: Cable Testing

To test in circuit with a fire alarm control panel or addressable switch monitor reattach the LHD cable to the interface unit. Disconnecting the red core or either clear core from the end of line device should put the system into fault. Placing a 1MΩ resistor across the two clear cores at the EOL unit should put the system into alarm.

17 RFI Testing

Substantial RF immunity testing has been carried out on the FyreLine Analogue Heat Detector system (interface module and cable).

The following tests were performed:
- Horizontal & vertical polarized
- Amplitude modulated (80% 1khz sine wave)
- No modulation (carrier wave only)
- 20V/m field strength
- 27Mhz
- 150-174Mhz
- 450-467Mhz
- 850-870Mhz
- 900-920Mhz

All results were independently verified.

No spurious false alarms or false fault conditions were generated in any of the tests.

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