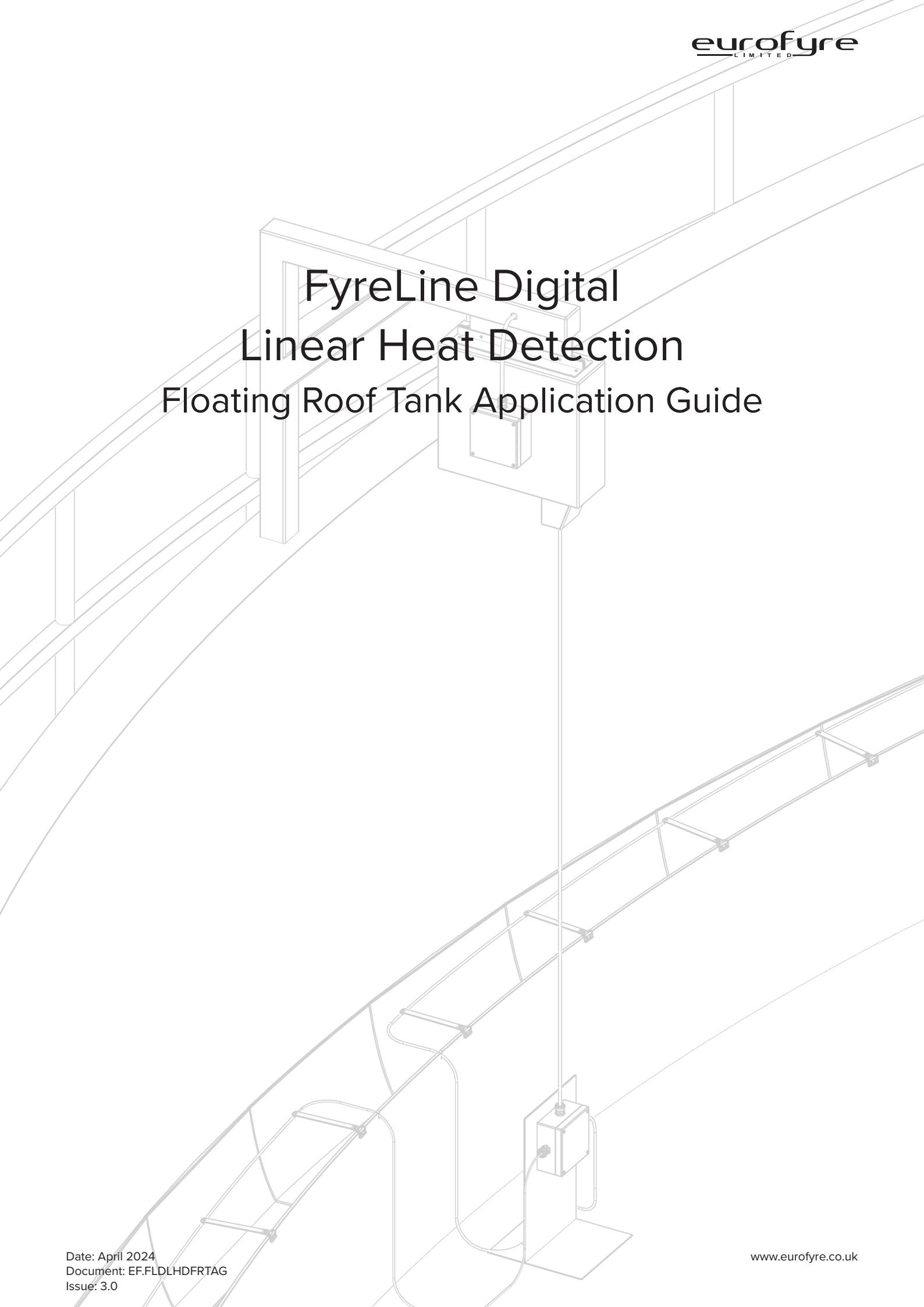
FyreLine Digital
Linear Heat Detection
Floating Roof Tank Application Guide



Date: April 2024
Document: EF.FLDLHDFRTAG
Issue: 3.0

This page is intentionally left blank.

Intellectual Property and Copyright

Disclosure

Any guidelines offered by Eurofyre are provided as general indications of what is deemed suitable for common application environments. It is essential to note that these recommendations might not necessarily be a perfect fit for unique and specific application conditions. Eurofyre has not conducted any specific inquiries, due diligence, or testing to ensure that these recommendations will meet the requirements of a particular application. Consequently, Eurofyre does not warrant the suitability or performance of these guidelines.

Eurofyre has not assessed these recommendations for compliance with any applicable codes or standards, nor have they conducted tests to confirm their appropriateness for specific application environments. Therefore, any person or organisation using these guidelines must, at their own expense, ensure compliance with all relevant legislation, government regulations, rules, by-laws, and orders from competent authorities in the jurisdiction where the recommendations are implemented.

It's crucial to install, configure, and use FyreLine and associated products strictly in accordance with the General Terms and Conditions, Installation Guide, and product documents provided by Eurofyre. Eurofyre disclaims any liability for the performance of the guidelines and any products used in their implementation, except as specified in the General Terms and Conditions, Installation, and product documents.

No statements, drawings, or representations made by Eurofyre in this document or verbally regarding these guidelines should be construed as representations, undertakings, or warranties.

To the extent permitted by law, Eurofyre excludes liability for all indirect and consequential damages, including but not limited to loss of profit, goodwill, financial loss, or payments to third parties, regardless of the circumstances.

These guidelines are provided exclusively to assist in designing, installing, commissioning and maintaining linear heat detection systems using Eurofyre products, and the copyright and associated intellectual property remain the property of Eurofyre.

Scope

This application guide outlines the use of FyreLine Digital systems for a floating roof tank application. The information contained in this document will assist you when designing, installing, commissioning and maintaining a FyreLine Digital Linear Heat Detection system for this type of application.

⚠	The contents of this application guide serves only as guidance, and the diagrams are to be considered indicative only.

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.

Contact Us

Telephone	+44 (0) 1329 835 024
Email	sales@eurofyre.co.uk technical@eurofyre.co.uk
Website	www.eurofyre.co.uk

Table Of Contents

1 Introduction

A floating roof tank is a storage tank that is commonly used for storing large quantities of oil or gas. Floating roof tanks are often large open-topped cylindrical steel shells with a roof that floats on the top of the liquid. The roof falls and rises as the levels of liquid in the tanks change. This means that there is little or low vapour space in the tank, eliminating breathing losses and reducing the evaporative loss of the stored liquid.

1.1 The Risks

There are several fire risks associated with both fixed and floating roof storage tanks, as these tanks often store highly combustible materials that can easily ignite and spread rapidly. Some of the primary causes of fires in these tanks include:

- Lightning
- Maintenance errors
- Operation errors
- Sabotage
- Equipment failure
- Cracks and ruptures
- Static electricity
- Leaks and line ruptures
- Open flames, such as ground fires

1.2 The Challenges

Selecting an appropriate fire detection system for fixed or floating roof storage tanks poses several challenges. The dynamic nature of floating roofs and the constantly changing liquid volumes and positions within the tanks render traditional detection methods ineffective. These environments are often characterised by dirt and oil, which can hinder reliable detection. Additionally, many storage tanks may be exposed to aggressive chemicals and ultraviolet (UV) radiation from the sun, further complicating the selection of a reliable fire detection system.

1.3 The Solution

Linear Heat Detection offers an optimal solution when developing a fire alarm system for both fixed and floating roof tanks. This system delivers cost-effective, straightforward installation, fast response, and reliable fire detection. It excels in accurately pinpointing the location of a fire, even in the presence of the challenges associated with floating roof tanks.

2 FyreLine Digital Linear Heat Detection

FyreLine Digital Linear Heat Detection systems offer a cost-effective and reliable fixed temperature heat detection solution. The FyreLine Fixed Heat Sensing Cable is available with rated temperatures of 68°C, 88°C, 105°C, or 185°C, and each version can be equipped with a nylon outer coating to safeguard the heat sensing cable from hazardous hydrocarbons like fuel oils and the damaging effects of UV radiation.

FyreLine Digital holds approvals from Underwriters Laboratories (UL 521) and bears the CE mark, signifying compliance with all relevant directives, including EMC (Electromagnetic Compatibility), and the Low Voltage Directive (LVD), allowing it to be sold within the common market.

2.1 Key Points

- FyreLine Digital Linear Heat Detection is the preferred choice due to its capability to function even when exposed to a direct flame.
- A 105°C rated activation temperature LHD cable is the preferred option, with a maximum continuous operating temperature of 65°C and a maximum short-term exposure temperature of 90°C.
- The use of the FyreLine Digital Controller is recommended to ensure correct termination and reliable monitoring of Digital LHD cable.
- Installing two Digital LHD cables (interlock mode) reduces the likelihood of false alarms resulting from accidental triggering of a single digital LHD cable.
- It is advisable to specify an additional black Nylon coating as a minimum requirement to enhance mechanical strength and UV stability.
- Stainless Steel braiding may also be specified on the LHD cable to provide extra mechanical protection, particularly during the installation process. These considerations are essential for ensuring the optimal performance and reliability of the system.

3 System Overview

3.1 Product List

The FyreLine Digital Linear Heat Detection system includes a selection of products specifically designed for floating roof tank applications.

Part No	Description
FyreLine Digital Controller	
18-004	FyreLine Digital Controller, 2 Zones
18-371	FyreLine Digital/EN54 Fixed Control Unit Cable Glands, 5 Pack
FyreLine Digital Nylon Coating for Outdoor UV Protection & Increased Durability	
18-041	FyreLine Digital LHD Cable, Nylon, 68°C, 100m
18-042	FyreLine Digital LHD Cable, Nylon, 68°C, 200m
18-043	FyreLine Digital LHD Cable, Nylon, 68°C, 500m
18-044	FyreLine Digital LHD Cable, Nylon, 68°C, 1000m
18-051	FyreLine Digital LHD Cable, Nylon, 88°C, 100m
18-052	FyreLine Digital LHD Cable, Nylon, 88°C, 200m
18-053	FyreLine Digital LHD Cable, Nylon, 88°C, 500m
18-054	FyreLine Digital LHD Cable, Nylon, 88°C, 1000m
18-061	FyreLine Digital LHD Cable, Nylon, 105°C, 100m
18-062	FyreLine Digital LHD Cable, Nylon, 105°C, 200m
18-063	FyreLine Digital LHD Cable, Nylon, 105°C, 500m
18-064	FyreLine Digital LHD Cable, Nylon, 105°C, 1000m
FyreLine Digital Nylon, Stainless Steel Braided for Enhanced EMC & Mechanical Protection	
18-045	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 68°C, 100m
18-046	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 68°C, 200m
18-047	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 68°C, 500m
18-055	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 88°C, 100m
18-056	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 88°C, 200m
18-057	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 88°C, 500m
18-065	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 105°C, 100m
18-066	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 105°C, 200m
18-067	FyreLine Digital LHD Cable, Nylon, Stainless Steel Braided, 105°C, 500m
High Temperature Sensor Cable, 185 Degrees C Alarm	
18-101	Digital Linear Heat Sensing Cable, 185C Alarm Temp, 100m Reel Length
18-102	Digital Linear Heat Sensing Cable, 185C Alarm Temp, 200m Reel Length
18-103	Digital Linear Heat Sensing Cable, 185C Alarm Temp, 500m Reel Length
18-104	Digital Linear Heat Sensing Cable, 185C Alarm Temp, 1000m Reel Length
Stainless Steel Mounting Accessories	
18-310	Stainless Steel L-Clip, Silicone Sleeve, 100 Pack
18-311	Stainless Steel Dual L-Clip, Silicone Sleeve, 100 Pack
18-314	Stainless Steel 200mm L-Clip, 100 Pack
18-315	Stainless Steel Distance Piece, 100 Pack

Beam Clip	
18-344	4 - 8mm Beam Clip, 100 Pack
18-345	10 - 16mm Beam Clip, 100 Pack
Tie Wraps	
18-320	Plastic Cable Tie, 110°C, 100 Pack
18-322	Stainless Steel Cable Tie, 540°C, 100 Pack
18-331	Handtool for Stainless Steel Tie
High Temperature Silicone Sleeve	
18-330	Silicone Sleeve, 100 Pack
Digital Linear Heat Detection Zener Barrier & Enclosures	
18-008	MTL7761AC Safety Barrier, 2 Channel, 9V, 90 Ohm
18-350	Safety Barrier Enclosure, Safe Area Use, IP65, 3 Barriers Max
18-351	Safety Barrier Enclosure, Safe Area Use, IP65, 10 Barriers Max
Digital Storage Tank Accessories	
18-170	ATEX Certified Automatic Retractable Cable Reeler, 316 Stainless Steel
18-353	Stainless Steel Cable Collector
18-354	Retractable Cable, 10m
18-355	Retractable Cable, 15m
18-356	Retractable Cable, 20m
18-357	Retractable Cable, 30m
GRP ATEX Certified Junction Boxes	
18-150	ATEX Certified Box, 1 Entry, GRP, IP66, C/W Brass Cable Glands
18-151	ATEX Certified EOL, 1 Entry, GRP, IP66, C/W Brass Cable Glands
18-152	ATEX Certified LHD to Leader Cable Through Box, 2 Entries, GRP, IP66, C/W Brass Cable Glands
18-153	ATEX Certified Through Box, 2 Entries, GRP, IP66, C/W Brass Cable Glands
18-154	ATEX Certified EOL/ Test Switch, 5 Entries, GRP, IP66, C/W Brass Cable Glands
Stainless Steel ATEX Certified Junction Boxes	
18-160	ATEX Certified Box, 1 Entry, 316 Stainless Steel, IP66, C/W Stainless Steel Cable Glands
18-161	ATEX Certified EOL, 1 Entry, 316 Stainless Steel, IP66, C/W Stainless Steel Cable Glands
18-162	ATEX Certified LHD to Leader Cable Through Box, 2 Entries, 316 Stainless Steel, IP66, C/W Stainless Steel Cable Glands
18-163	ATEX Certified Through Box, 2 Entries, 316 Stainless Steel, IP66, C/W Stainless Steel Cable Glands
18-164	ATEX Certified EOL/ Test Switch, 5 Entries, 316 Stainless Steel, IP66, C/W Stainless Steel Cable Glands

Table 1: Product List

3.2 Product Definitions

3.2.1 FyreLine Digital Controller

The FyreLine Digital Controller is a dual-zone module designed for monitoring up to two zones of Digital Linear Heat Detection (DLHD) Cable.

In the event of an overheat or fire situation triggering either zone of the Digital LHD cable, the control unit automatically calculates and displays the distance along the cable, in both feet and metres, to the alarm point. The two zones can operate independently or in interlock mode, and each zone is equipped with a separate alarm and normally conducting fault output.

The control unit is intended for installation between the FyreLine Digital Linear Heat Detection cable and a conventional or addressable fire alarm control panel. It features power, fault, and alarm indicator lights, as well as volt-free outputs for fault and alarm, corresponding to each zone. Furthermore, it can be integrated into an industrial process control system using the two-wire RS-485 Modbus RTU output.

3.2.2 FyreLine Digital Nylon LHD Cable

A nylon-coated cable is the typical choice when dealing with hazardous hydrocarbons like fuel oils, diesel, kerosene, and similar substances. These nylon-coated cables are typically black and offer effective UV protection when exposed to direct sunlight. Nylon is significantly more robust than PVC, providing an added layer of mechanical protection.

FyreLine Digital Heat Sensing Cable consists of two tri-metallic conductors encased in advanced temperature-sensitive polymers. These two conductors are twisted together, and an outer protective sheath is applied.

When the temperature-sensitive polymer reaches its rated temperature, it melts, causing the two conductors to make contact. This contact creates a short circuit, which signals to the fire alarm control panel that a fire or extreme heat condition has been detected.

In the event of a fire detection or damage to the cable, the affected length of cable can be easily replaced. The damaged section can be removed, and a new section can be spliced in its place, ensuring the system's continued functionality.

3.2.3 FyreLine Mounting Clips & Accessories

The selection of FyreLine Stainless Steel mounting accessories has been done with a specific focus on compliance with the latest requirements outlined in BS 5839-1 (Code of practice for the design, installation, commissioning, and maintenance of fire detection and fire alarm systems for buildings).

Stainless steel mounting accessories are suitable for indoor and outdoor use, and they can withstand environments where the clip may be exposed to harsh chemicals, such as hydrocarbons, or in caustic settings.

3.2.4 Zener Safety Barrier & Enclosure

Zener barriers employ Zener diodes, resistors, and fuses to divert excess electrical energy safely to the ground, thereby preventing sparking or overheating of equipment in hazardous areas. This technology contributes to maintaining a safe working environment and minimises explosion risks for those in proximity.

3.2.5 ATEX Junction Boxes

The junction box serves as a rapid and effective solution for interconnecting and joining segments of FyreLine Linear Heat Sensing Cable. It can also function as an in-line junction box for the incoming leader cable. The junction box is available in two material options: either GRP (Glass Reinforced Plastic) or stainless steel, offering flexibility to meet various application needs.

3.2.6 ATEX Automatic Retractable Cable Reeler

The Automatic Cable Reeler is positioned at the upper section of the tank, with the cable linked to a junction box situated on the floating roof. This innovative automatic reeler is designed to accommodate the roof's movement, permitting the cable to uncoil as the roof descends and efficiently winding it back as the roof ascends.

The automatic cable reeler mechanism is encased within a stainless steel 316 cabinet, ensuring durability and resistance to environmental conditions. The 4-core connecting cable spans a length of 23 metres and is engineered to withstand exposure to chemicals and high temperatures. Additionally, it features a removable plate for easy inspection and maintenance.

3.2.7 Stainless Steel Cable Collector

The stainless steel 304 cable collector has been meticulously engineered to operate seamlessly in tandem with retractable cables. As the retractable cable extends and comes into contact with the cable collector, it ensures the cable is gathered neatly, preventing any entanglement as the roof rises.

3.2.8 Retractable Cable

The retractable cable is specifically designed for installation at the upper section of a floating roof tank, where it effectively compensates for the roof's periodic rise and fall. This cable plays a crucial role in ensuring a secure connection between the sensing cable and leader cable, maintaining the system's integrity.

4 Design Guidelines

FyreLine Digital Temperature Linear Heat Detection cable can be safely installed in hazardous areas with the use of intrinsically safe barriers. The controller or conventional fire alarm control panel should be located in the safe area, while intrinsically safe (I.S.) barriers act as a protective boundary separating the safe area from the hazardous area, as illustrated in Figure 13 and 14.

FyreLine Digital Temperature Linear Heat Detection cable is categorised as a "simple product" in compliance with the ATEX Directive 94/9/EC section 5.2.1. This classification is based on the fact that the cable itself does not possess its ignition source, as outlined in ATEX Directive 94/9/EC section 3.7.2. However, it is advisable to verify with the manufacturer of the fire alarm control panel whether the end-of-line device can also be considered a simple product or if it necessitates additional protection in hazardous areas.

It is essential to select the appropriate intrinsically safe barriers that align with the specifications specified in the approval certificates for the particular barrier. This encompasses various factors, such as the Gas Group, Zones, and Load Parameters. For the FyreLine Digital Linear Heat Detection cable, crucial cable parameters are outlined in Table 2. These parameters play a significant role in ensuring the correct selection of intrinsically safe barriers for safe and compliant installation.

The system's installation can be executed following a configuration akin to the one depicted in Figure 1. It's worth noting that interposing, often referred to as leader cable or non-sensing cable, may be introduced between the intrinsically safe barriers and the commencement of the sensor cable. However, it is imperative to calculate the inductance, capacitance, and L/R ratio, as these factors may impact the maximum permissible zone length, as specified in Table 5. This careful consideration ensures the system functions as intended while adhering to safety and performance parameters.

4.1 FyreLine Digital LHD Cable Parameters

Rating	Capacitance	Inductance	L/R Ratio	Loop Resistance
68°C (155°F)	<120pF/m	<1.60µH/m	<17.7AH/Ω	~181Ω/km
88°C (190°F)	<85pF/m	<1.72µH/m	<19.3AH/Ω	~179Ωkm
105°C (221 °F)	<73pF/m	<1.65µH/m	<18.2AH/Ω	~182Ωkm
185°C (365°F)	<90pF/m	<1.62µH/m	<17.9AH/Ω	~182Ω/km

Table 2: FyreLine Digital LHD Cable Parameters

4.2 Maximum Permissible Zone Lengths

For Gas Group IIC applications, the zone length limitation primarily results from the capacitance of the FyreLine Digital LHD Cable. Conversely, for Gas Group IIB and IIA applications, the zone length restrictions are determined by the recommended maximum allowance of sensor cable per controller or conventional zone. These distinctions are vital in understanding and determining the appropriate zone lengths for different gas groups and their associated requirements.

Gas Group	Group IIC	Group IIB	Group IIA
68°C (155°F)	691m	3000m	3000m
88°C (190°F)	976m	3000m	3000m
105°C (221°F)	1136m	3000m	3000m
185°C (365°F)	992m	3000m	3000m

Table 3: Maximum Permissible Zone Lengths

4.3 FyreLine Digital LHD Coatings and Chemical Resistance Chart

Maximum Continuous Ambient Temperature	Maximum Short-term Ambient Temperature	Available Action Temperatures
Up to 45°C (113°F)	Up to 50°C (122°F)	68°C (155°F)
Up to 65°C (149°F)	Up to 70°C (149°F) Up to 90°C (194 °F)	88°C (190°F) 105°C (221°F)
Up to 125°C (257°F)	Up to 140°C (284°F)	185°C (365F)

Table 4: FyreLine Digital LHD Coatings and Chemical Resistance Chart

5 Installation Guidelines

5.1 Important Guidelines

Please read this instruction leaflet thoroughly before commencing installation.

✓	Install the Digital Controller accordingly to meet local and country installation requirements.
✓	Install the Digital Linear Heat Detection Cable accordingly to meet local and country installation requirements.
✓	The FyreLine Digital Linear Heat Detection system must be installed by a qualified professional in accordance with NFPA 70 & 72, NEC 760 (National Electric Code) and authorities having jurisdiction.
✓	Ensure the system is installed, commissioned and maintained by persons according to good engineering practices and who have received sufficient training on the unit.
✓	Only use FyreLine Digital Linear Heat Detection cable with the FyreLine Digital Controller.

✓	Support the detection cable at 0.5m to 1m intervals.
✓	Using a multimeter, test the detection cable on the reel before installation.
✓	Ensure the maximum ambient temperature rating of the detection cable will not be exceeded during transport, storage or normal operating conditions.
✓	Ensure the end of line resistor is securely connected at the end of each linear heat detection cable.
✓	If only one zone is required, leave the end of line resistor connected across the terminals of the unused zone.
✓	Ensure adjacent runs of detection cable are 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 silicone sleeve should be placed between fixing clips and linear heat detection cable.
✓	Ensure any cable glands used are tightened to form a secure and moisture proof seal around the detection cable.

⚠	Do not exceed the maximum operating voltage of the Controller.
⚠	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 100mm (4”).
⚠	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.

5.2 LHD Controller & Associated Equipment Placement

The FyreLine Digital Controller, along with the associated zener barrier and power supply unit, must be situated in a safe zone, separate from the hazardous zone, as a safety precaution.

✓	**Refer to the FyreLine Digital Interface Monitor Module Installation Guide for further details.**

5.3 Leader Cable

An approved type of leader cable, ideally a fire-rated cable with resistance to chemicals, should be employed to connect the FyreLine Digital Controller and Zener Barrier, situated in the safe area, to the initial Junction Box at the top of the roof tank in the hazardous area. It is advisable to use leader cable with a minimum cross-sectional area (CSA) per conductor that meets the requirements, especially when using the maximum length of detection cable. Further guidance and specifications should be sought from the relevant authority having jurisdiction and the fire alarm control panel manufacturer.

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

0.8 mm2 (18AWG) — Up-to 2,500m (8,200ft)
1.3 mm2 (16AWG) — Up-to 3,500m (11,500ft)
2.0 mm2 (14AWG)— Up-to 6,000m (20,000ft)
3.3 mm2 (12AWG) — Up-to 9,500m (31,000ft)

Table 5: Leader Cable

5.4 LHD Cable Placement & Mounting

Installing the FyreLine Digital sensor cable around the perimeter of the floating tank roof's rim seal ensures rapid response through continuous temperature monitoring along its entire length.

	Refer to the FyreLine Digital LHD System Guide for further details.

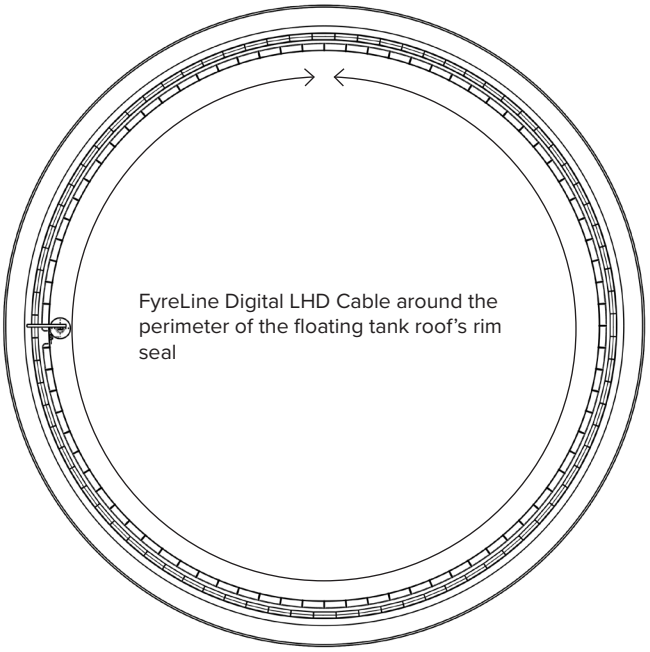


Figure 1: FyreLine Digital LHD around the Perimeter of Tank

To install the sensor cable properly, it should be positioned and secured above the rim seal, midpoint between the tank wall and foam dam (retaining wall). The mounting spacing should be 0.5m to 1m to prevent the linear heat detection sensing cable from sagging.

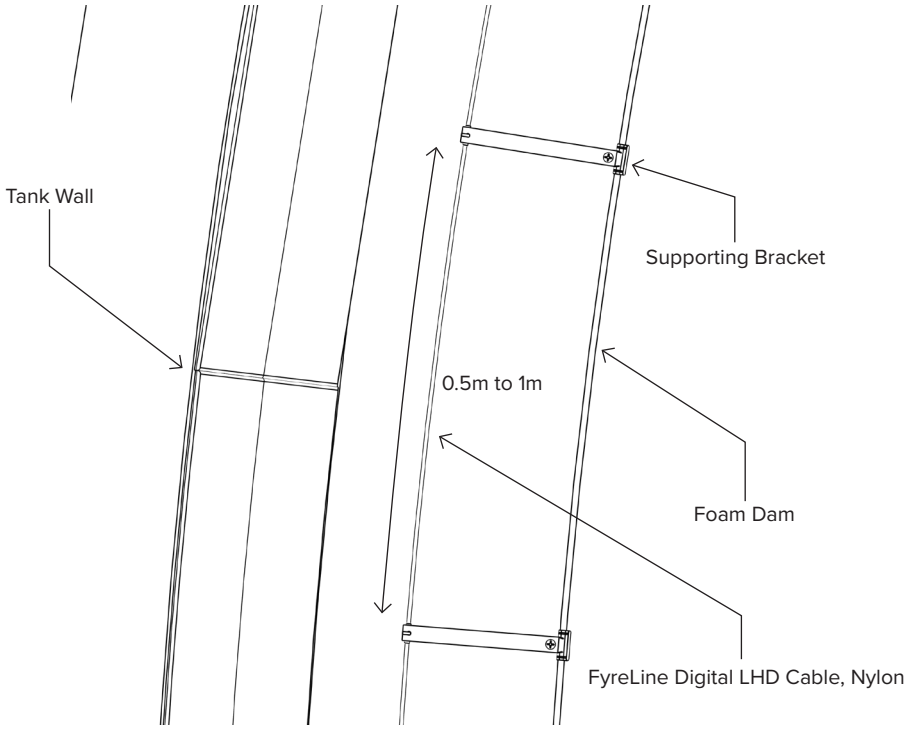


Figure 2: Mounting Bracket Spacing

A suitable beam knock-on clip is positioned with the location lug oriented towards the outside of the tank. To prevent sparking, this clip must be securely “knocked on” into position using a hide or lead hammer.

Once the clips are in place, a distance piece is attached to the clip using a stainless steel nut and bolt. The FyreLine Digital LHD sensor cable is then affixed to the distance piece with a cable tie. An insulating neoprene sleeve is inserted between the clip and the sensor cable to prevent damage or heat transfer. This setup ensures that the sensor cable is positioned above the centre of the rim seal, as required.

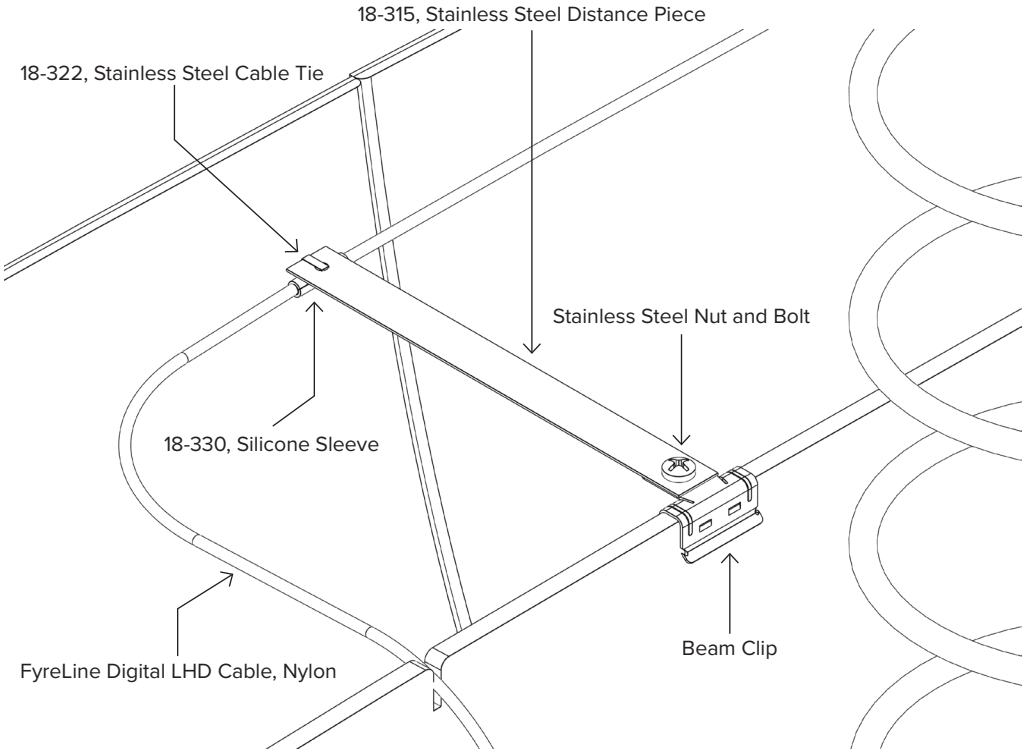


Figure 3: Mounting Bracket Close-up

5.5 Retractable Cable Methods

FyreLine Digital LHD sensor cable, or its connecting wire, should be installed while taking into account the upward and downward movement of the floating roof, ideally utilising a specialist retractable cable source supplied by Eurofyre.

Eurofyre offer two retractable methods:

Retractable Cable with Cable Collector
The cable collector has been designed to work in conjunction with the retractable cable. As the retractable cable extends and contracts, the cable collector will allow the cable to be neatly coiled without getting snagged with the movement of the floating roof.

Automatic Cable Reeler
The Automatic Cable Reeler is installed at the top of the tank with the cable connected to the junction box located on the floating roof. The Automatic Cable Reeler adjusts for the movement of the roof, uncoiling cable when the level falls, and winding the cable when the level rises.

5.5.1 Retractable Cable with Cable Collector

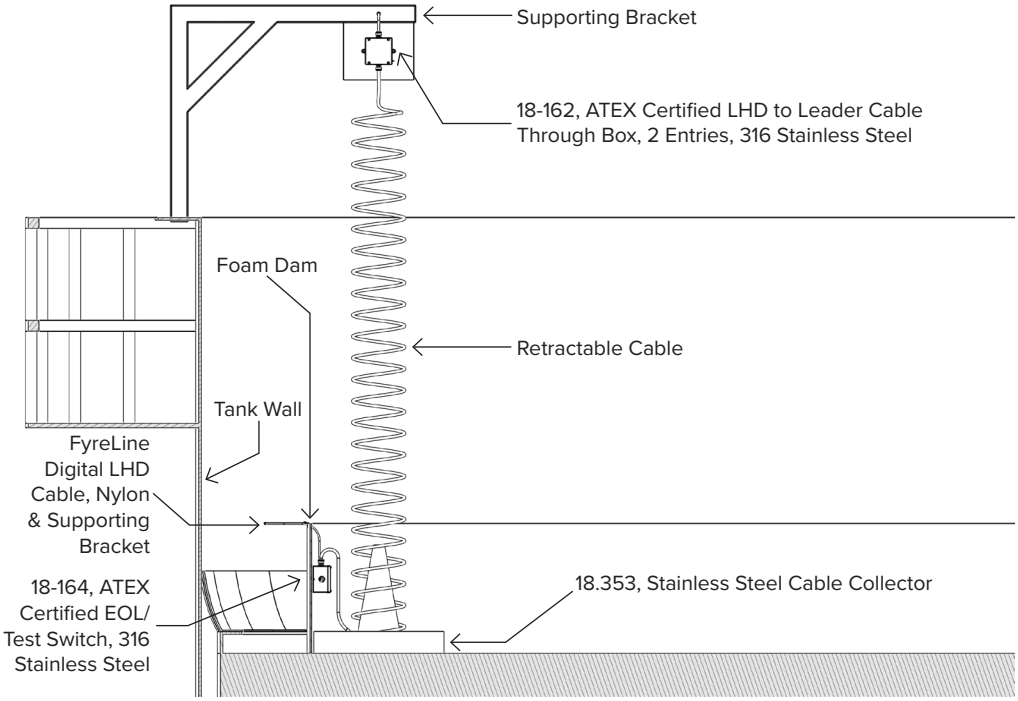


Figure 4: Retractable Cable Front View Layout

Retractable cables come in various shapes, designs, sizes, and specifications tailored to specific applications, ranging from telephone handset cords to extensive coils used in industries. These cables facilitate the extension and retraction of electrical cables from a fixed position, ensuring neat containment when retracted to their shortest travel position. To achieve this functionality, retractable cables, also known as coils, are equipped with a memory feature. Once extended vertically, the cable will naturally revert to its coiled form at the base level when the tension above is released and it returns to a resting state.

In larger applications like the fire industry, where retractable cables are utilised for LHD cable routing, it's common for the coils to appear to stretch or straighten out as the cable ascends from the coil below. This occurrence is normal. However, the memory or spring effect of the coil is only minimal, and this stretching effect becomes more pronounced with increased length. It's most noticeable at the uppermost part of the cable where the weight and tension are highest due to the rising cable's increased weight with height.

⚠	Extreme caution is necessary during the installation of retractable cables to prevent damage or tangling if certain engineering principles are disregarded. As mentioned earlier, retractable coils rely more on a memory effect than a spring effect. Therefore, it's crucial to ensure that the top of the cable precisely aligns with the center of the collection point below. This alignment is typically achieved by using a weighted plumb line dropped from the top fixing point to the bottom, ensuring perfect alignment of the collector's center. Failing to align the cable properly will cause it to rest off-center, leading to unpredictable gathering and potential entanglement issues. In such cases, any subsequent extension of the functional cable during use can further stretch the cable above as it tries to lift and support the tangled portion's weight.

Retractable Cable Lengths

18-354	Retractable Cable, 10m
18-355	Retractable Cable, 15m
18-356	Retractable Cable, 20m
18-357	Retractable Cable, 30m

Table 6: Retractable Cable Lengths

Choose the appropriate cable or coil length for the task, ensuring that the cable can extend sufficiently to accommodate the most extreme conditions while retaining spare coils at the base level for consistent collection when extended.

The cable collector should be positioned on a flat surface close to the tank roof's edge and firmly anchored to prevent any shifting or displacement.

The retractable cable should have unobstructed central entry into the collector. This means that the cable should descend vertically into the collector from a suitable support, which should be attached externally to the tank wall at the highest point via an overhanging support bracket fabricated by others.

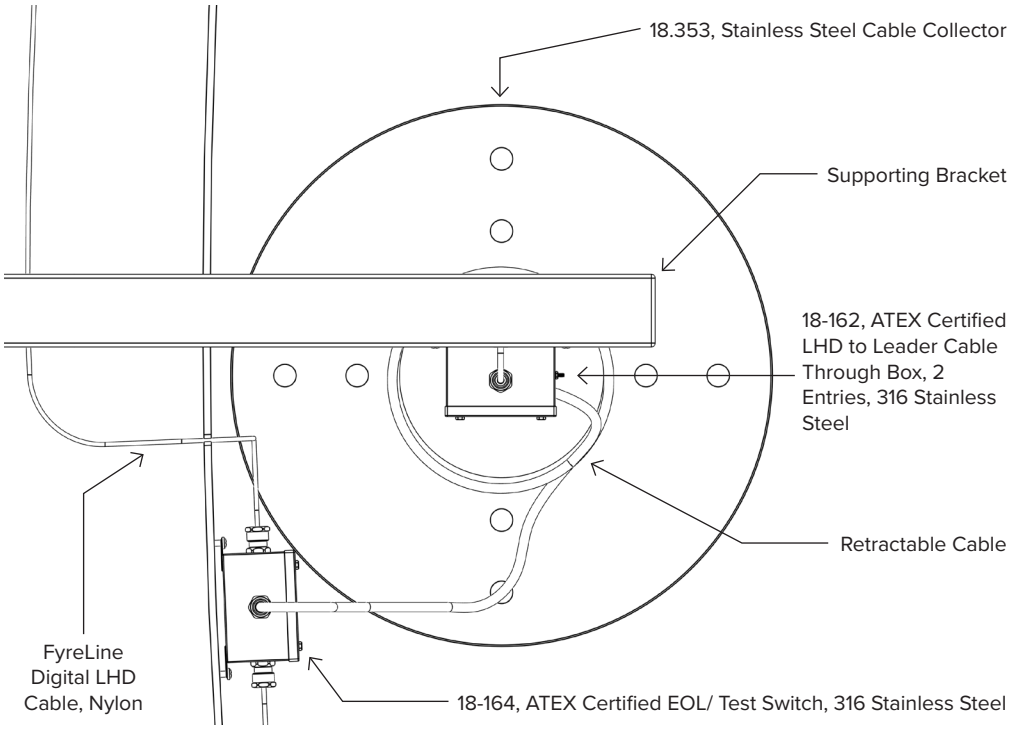


Figure 5: Retractable Cable Plan View Layout

The secure termination of the retractable cable is achieved by employing a suitable ATEX certified gland, which is connected to a ATEX certified Junction Box attached locally to the overhanging support bracket.

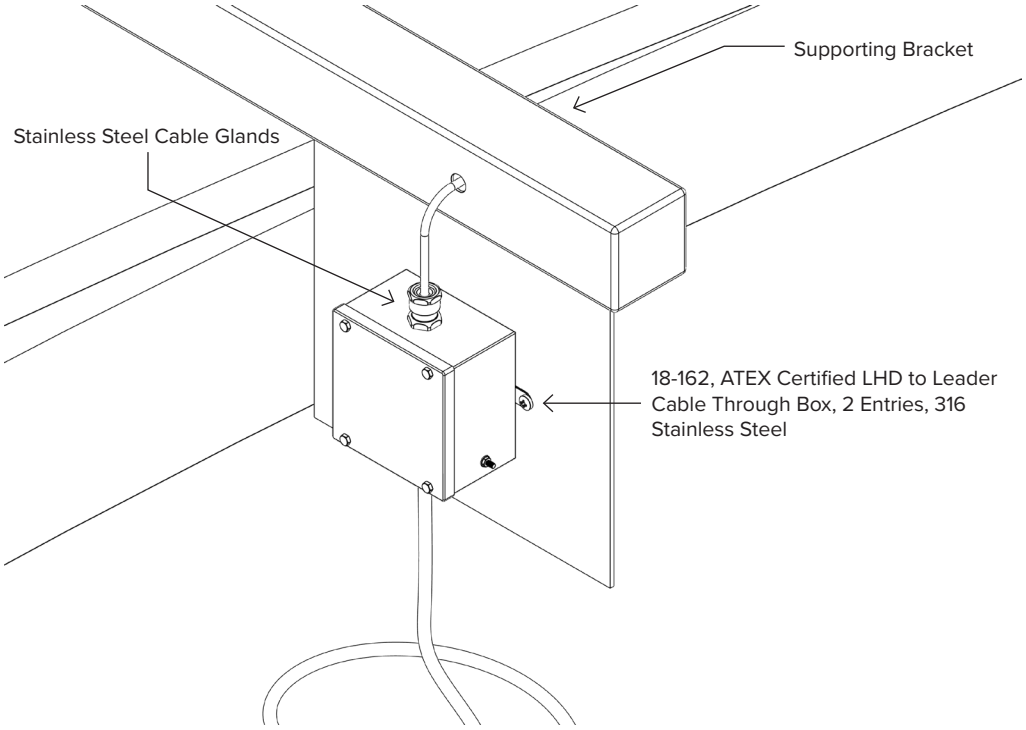


Figure 6: Retractable Cable Termination at the Supporting Bracket

1. Once you've determined the precise fixing point for the cable, lower a weighted line (plumb line) vertically to the base plate below, which marks the final resting point. It's advisable to do this when the cable's travel distance is at its maximum, as it significantly improves overall accuracy
2. Secure the cable gathering container horizontally and align it precisely with the plumb line's final resting position.
3. Carefully unpack the cable coil, ensuring it is not stretched, tangled, or disrupted from its natural arrangement. Gently place the coils over the collection cone, allowing them to return to their original shape without becoming tangled.
4. Lower a rope or line from the highest fixing point and fasten it to the end of the cable.
5. Gently and cautiously draw the cable up to its ultimate fixing point, ensuring that there are no entanglements throughout the process. Adjust as needed.
6. Verify the assembly by slowly lowering the cable back to its initial resting position.
7. The opposite end of the retractable cable should be securely terminated using an appropriate ATEX certified gland, connecting it to either an ATEX certified Junction Box or an EOL/Test Switch, which can be mounted locally on the dam wall or a prefabricated mounting plate provided by others.

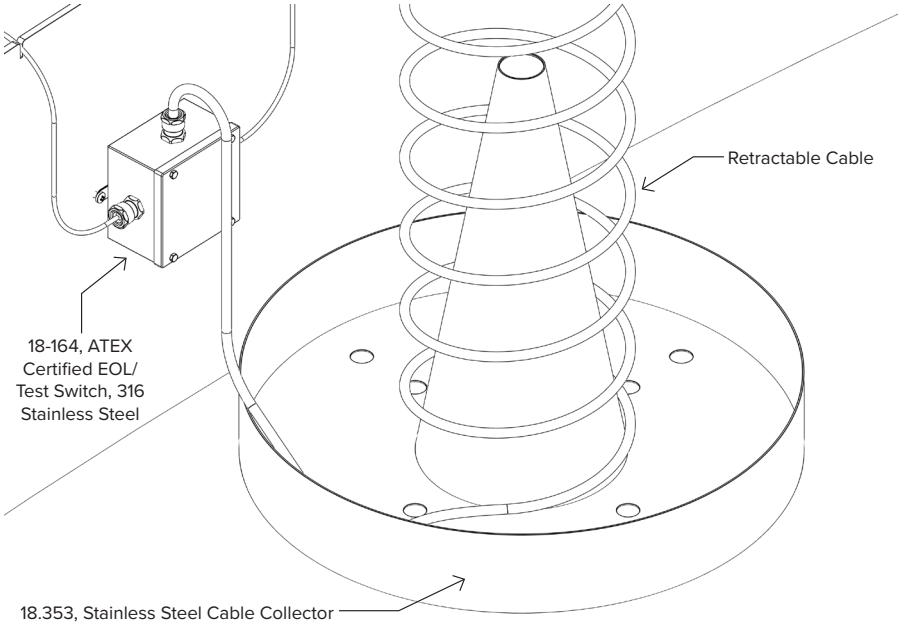


Figure 7: Retractable Cable Termination at the Cable Collector

The FyreLine Digital LHD cable will be directed out from the Junction Box or EOL/TEST Switch and installed as below.

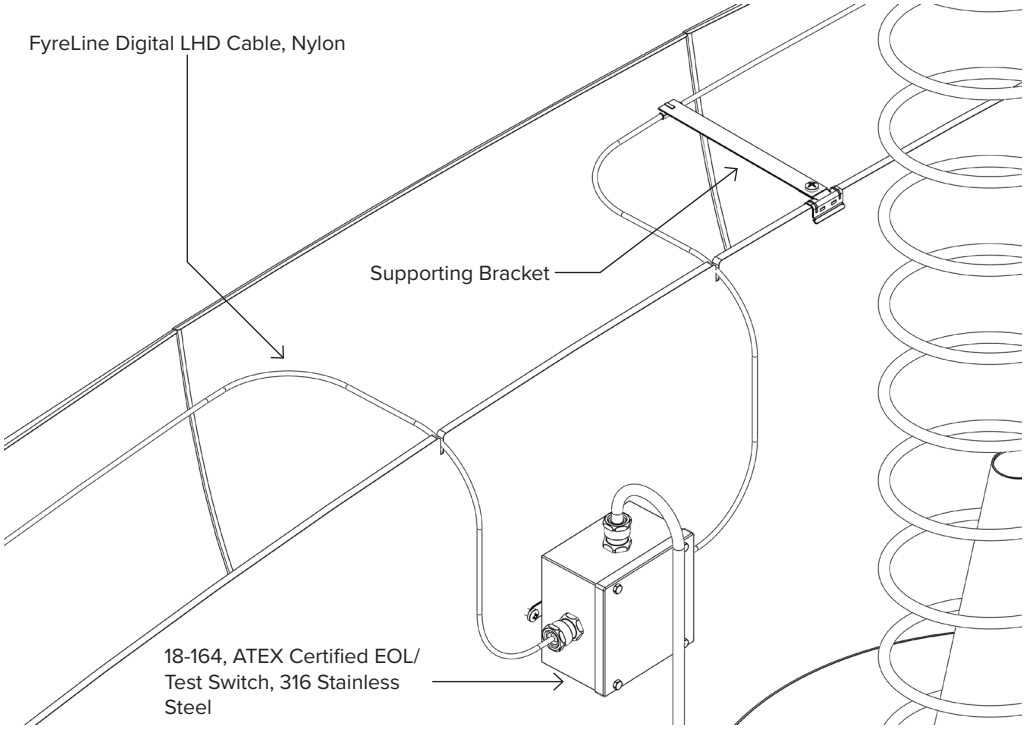


Figure 8: FyreLine Digital LHD Cable Leaving EOL/Test Switch

5.5.2 Automatic Cable Reeler

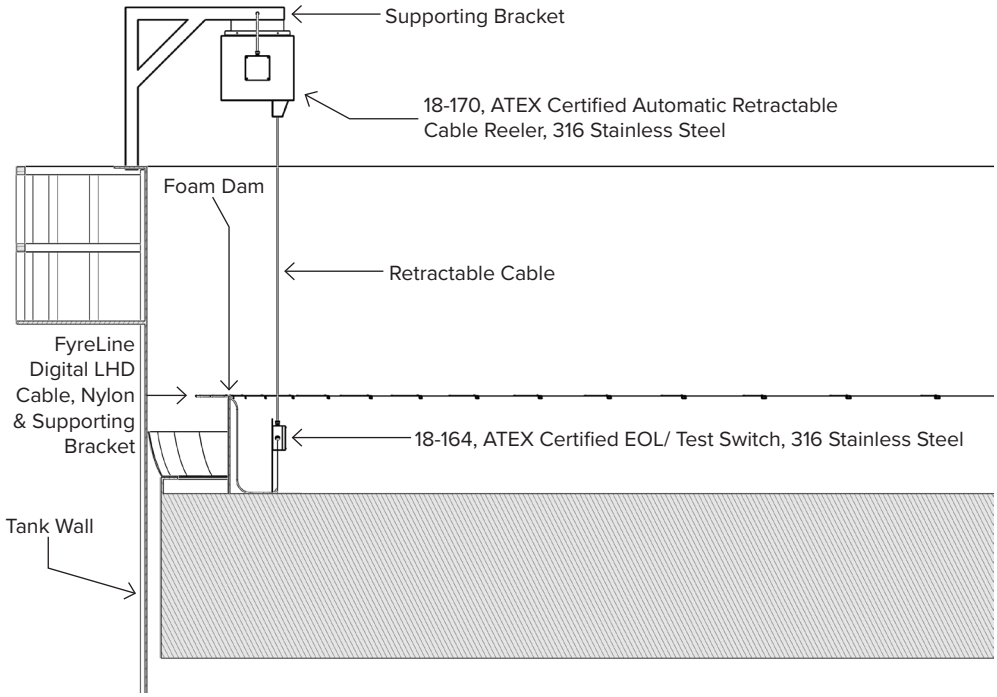


Figure 9: Automatic Cable Reeler Front View Layout

The Automatic Cable Reeler will require the assembly and installation of a suitable overhanging support bracket supporting a weight of 25kg (supplied and fabricated by others). Due to the moving parts contained within the cable tensioner, the cable reeler is ATEX approved and suitable for installations utilising intrinsically safe circuits Ex IA.

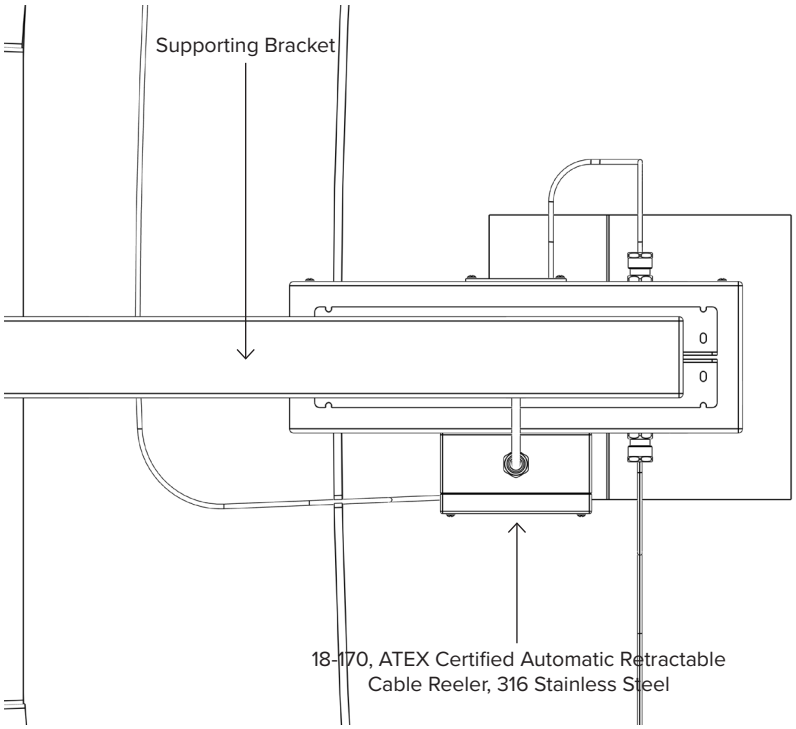


Figure 10: Automatic Cable Reeler Plan View Layout

The opposite end of the retractable cable should be firmly terminated by utilising a suitable ATEX certified gland, which is connected to a ATEX certified Junction Box or EOL/Test Switch mounted to a prefabricated plate/bracket centrally below the reeler.

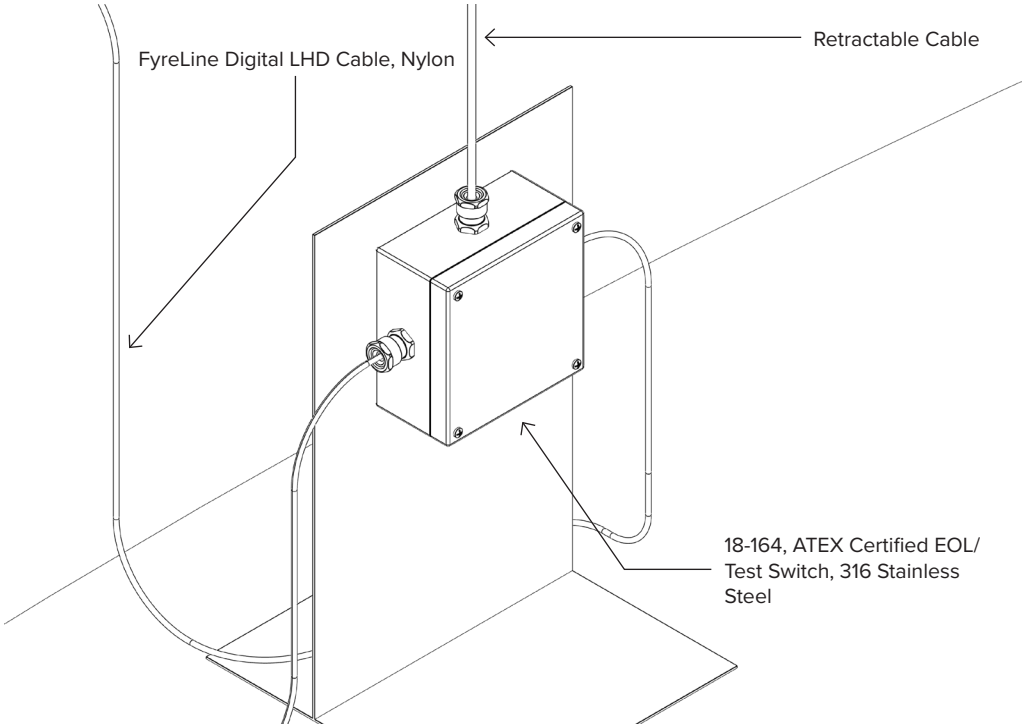


Figure 11: Retractable Cable Termination at the EOL/Test Switch

The FyreLine Digital LHD cable will be directed out from the Junction Box or EOL/TEST Switch and installed as below.

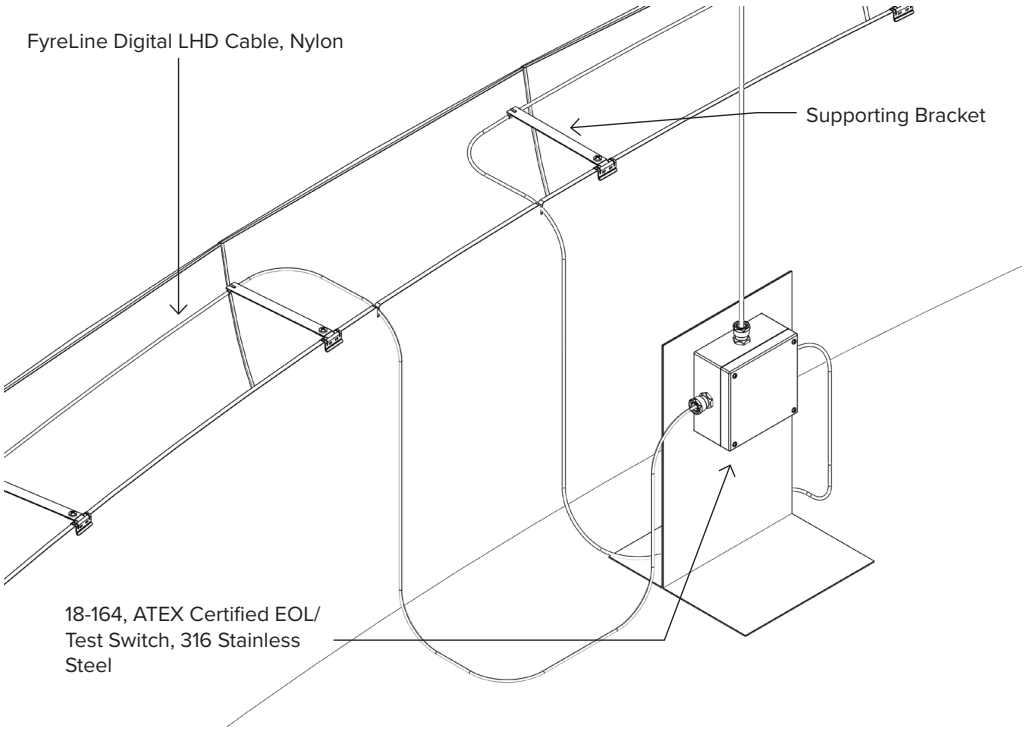


Figure 12: FyreLine Digital LHD Cable Leaving EOL/Test Switch

5.6 Wiring Schematics

5.6.1 Retractable Cable with Cable Collector Wiring Layout

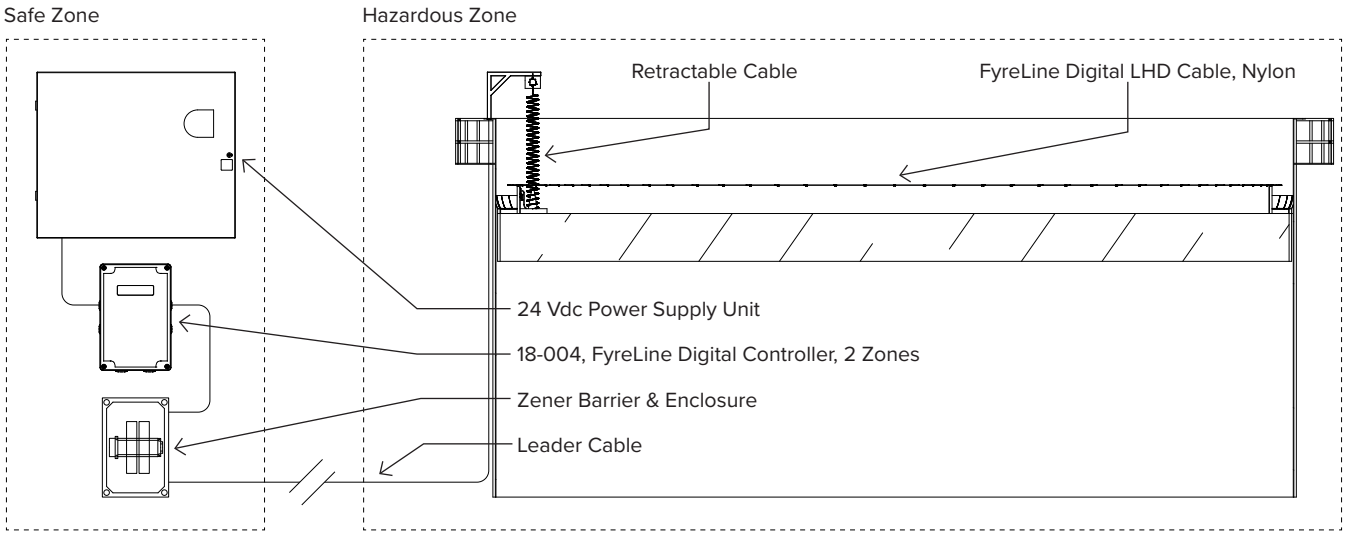


Figure 13: Retractable Cable with Cable Collector Wiring Layout

5.6.2 Automatic Cable Reeler Wiring Layout

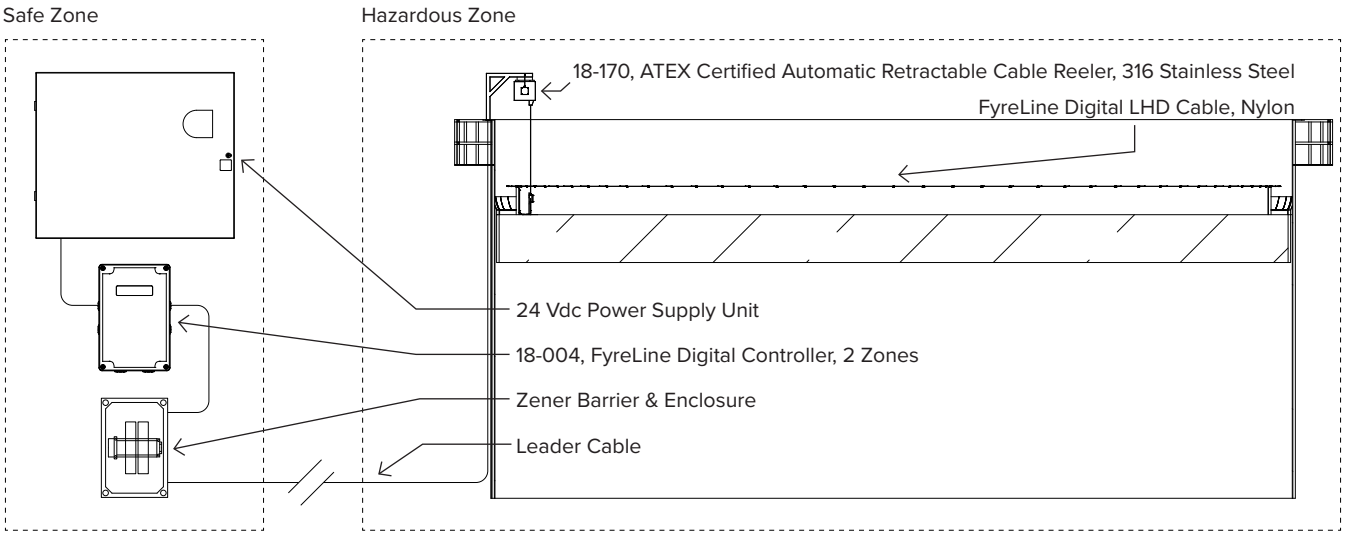


Figure 14: Automatic Cable Reeler Wiring Layout

5.7 Termination Schematics

Refer to the FyreLine Digital Interface Monitor Module Installation Guide for further details.

5.7.1 Independent Mode Termination Schematic

This is when FyreLine Digital Linear Heat Detection is used as a one to two zone system. When a fault or overheat condition occurs on a LHD zone, the corresponding fault or alarm output is triggered. The two zones operate independently and both sets of outputs should be connected to a fire alarm control panel.

In this mode, each zone can contain either identical rated temperature LHD cables or two different rated temperature LHD cables. The example below shows a single LHD zone.

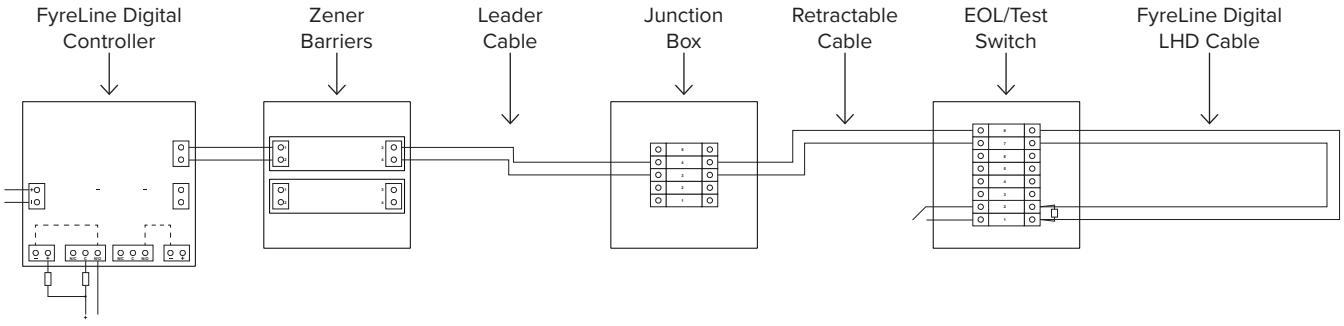


Figure 15: Independent Mode Termination Schematic

5.7.2 Interlock Mode Termination Schematic

Interlock Mode, sometimes known as coincidence detection, is for applications which require a fail-safe guarantee that an alarm is only triggered when an overheat condition has been detected. In this case, the same rated temperature Digital LHD cable should be used for both zones and the alarm output is only activated when both LHD cables trigger an alarm due to an overheat condition. If one Digital LHD cable zone input registers an alarm but the second does not, the alarm output will not be activated. This is to prevent an alarm if a mechanical or other issue has caused one of the sensing cables to trigger an alarm.

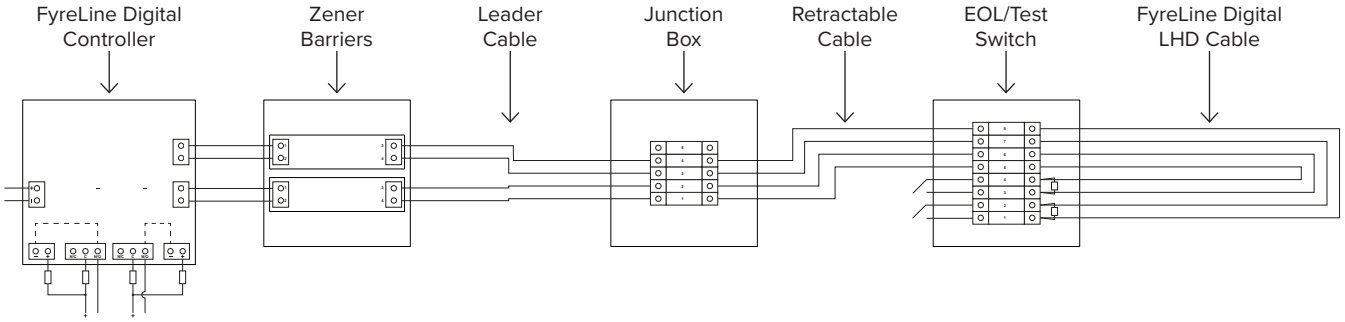


Figure 16: Interlock Mode Termination Schematic

6 Commissioning Guidelines

	Refer to the FyreLine Digital Interface Monitor Module Installation Guide for further details. • **Section 9 - Commissioning** • **Section 10 - Normal Operation** • **Section 11 - Fault/Alarm Conditions** • **Section 12 - Testing & Verification** **Refer to the FyreLine Digital LHD System Guide for further details.** • **Section 9 - Sensor Cable Testing and Verification**

7 Maintenance Guidelines

	Refer to the FyreLine Digital Interface Monitor Module Installation Guide for further details. • **Section 12 - Testing & Verification** **Refer to the FyreLine Digital LHD System Guide for further details.** • **Section 10 - Function Testing**

Blank Page

Back Page