DIM-28

Digital Interface Module

LINESENSE
Fire Detection Ltd

www.Linesense.co.uk

MANUAL

INSTALLATION - COMMISSIONING

& OPERATION

Pt. No. 52101-001-28

SIL 2
IEC 61508

LS0022

Issue	Change	Date	Remarks
1	Introduction	October 2020	
2			
3			
4			

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1. - Introduction

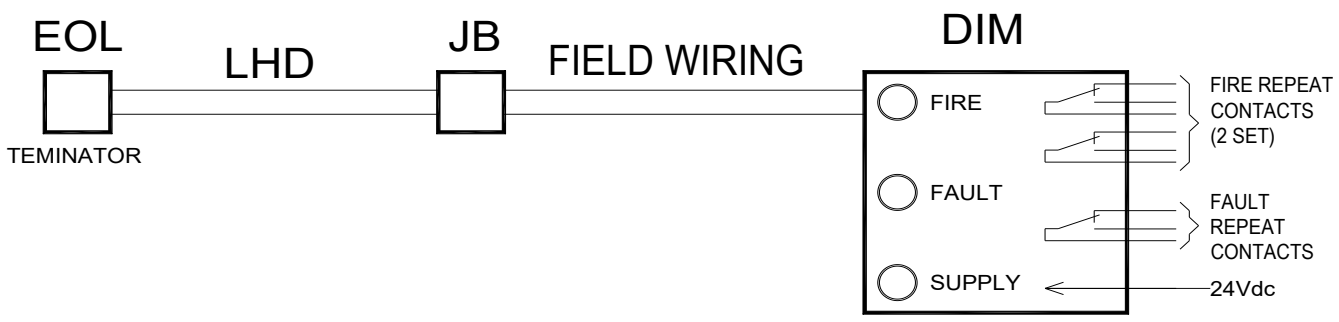
The Digital Interface Module (DIM) monitors a single zone of Linesense Digital Linear Heat Detection (LHD) cable for both Fire and Fault (open circuit) conditions. By the use of an additional series resistor in the field junction box, it can also monitor for a short circuit fault on the interposing field wiring.

With the ability to monitor up to 1,500m of LHD for both Fire and Fault conditions the DIM enhances any fire detection capability. When used with Intrinsically Safety barriers it can be used for hazardous area applications.

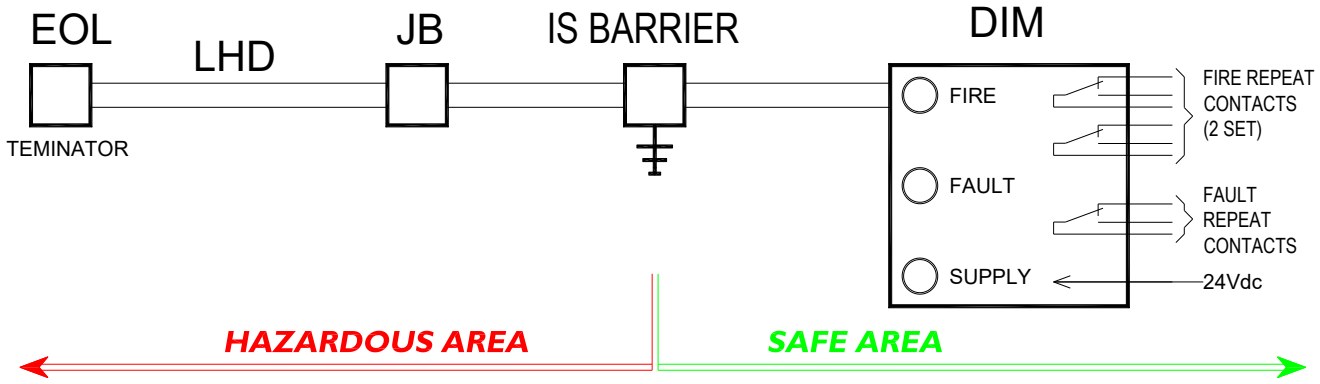
The DIM has volt free relay outputs for Fire and Fault which can be used for connecting directly into a conventional fire alarm panel or addressable interface module.

As well as having Fire and Fault indicators built in, it has two pairs of solid state outputs for driving remote LED indicators for Fire and Fault.

Typical Installation



Hazardous area Installation



2. Certifications

FM Factory Mutual - Linear Heat Detection (LHD) cable only.

Certified SIL-2 Capable - Third party assessed to IEC61508

3. Technical Features

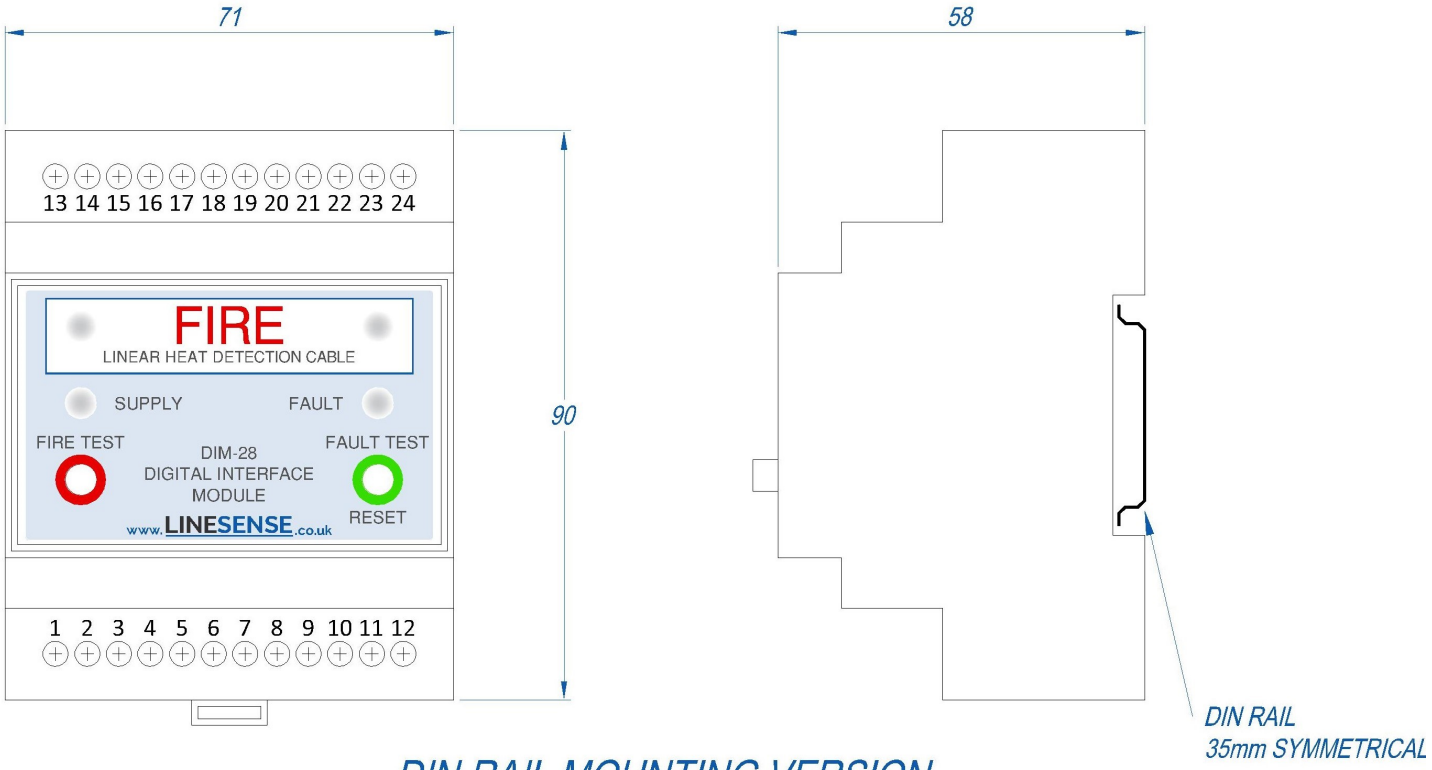
Electrical.

Operating voltage :	18 - 30 VDC
Operating Current	
Normal :	25 mA (Fault relay energised)
Maximum :	56 mA (Fire relay energised)
Indicators :	Fire - Red 2 x off.
	Fault - Yellow
	Power - Green
Outputs	
Fire :	2 x VFCO relays, 1.0 amp 24 VDC / 120 VAC
Fault :	1 x VFCO relays, 1.0 amp 24 VDC / 120 VAC
Remote indicators:	Fire 2 x 100 mA
	Fault 2 x 100 mA
Inputs :	Remote Reset / Fault test
	Remote indicators lamp test.
Linear heat detector :	1,500m max, Single zone, requires 10K ohm end of line resistor.
Mechanical	
Dimensions :	H90 x W71 x D58 mm (DIN Rail version)
Environment :	0-60°C @ 95% max humidity.

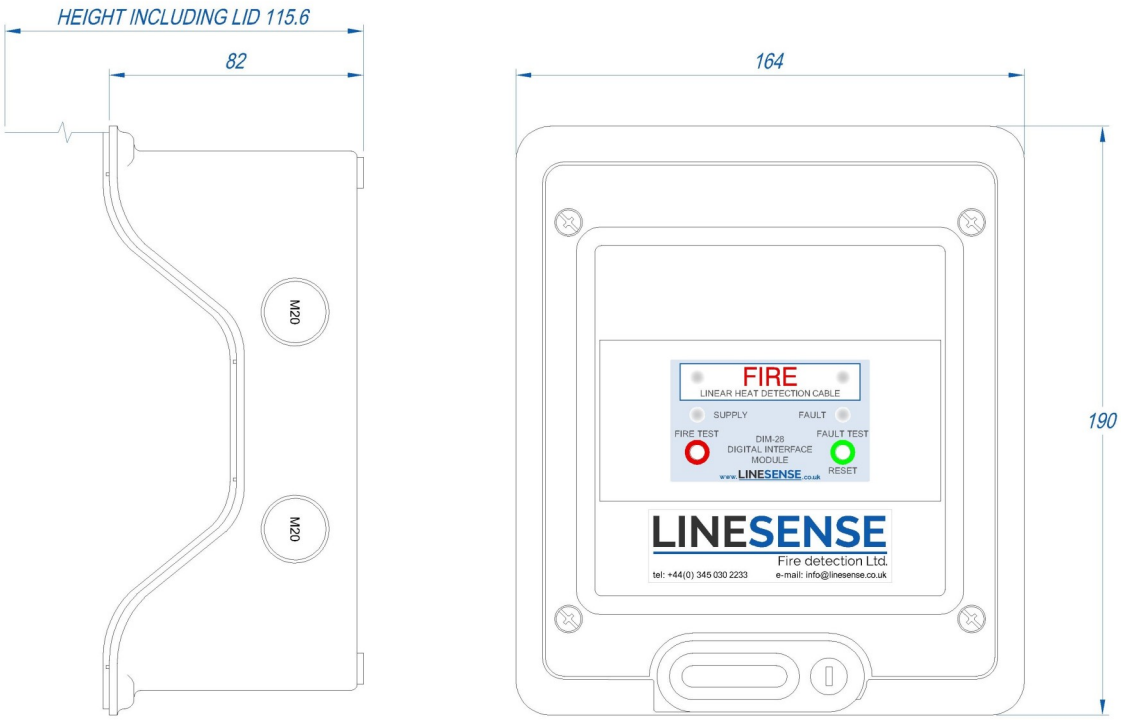
Ordering Information

Part Number	**Description**
52101-001-028	DIM –28Digital Interface Module
53106-001	EOL Junction Box for DIM & DLI - Polycarbonate
53106-003	EOL Junction Box for DIM & DLI - SS316
53106-012	EOL Junction Box for DIM & DLI with internal test switches - Aluminium
53106-013	EOL Junction Box for DIM & DLI with test switch - SS316
53106-014	EOL Junction Box for DIM & DLI with test switch - ABS

4. Mechanical Installation.

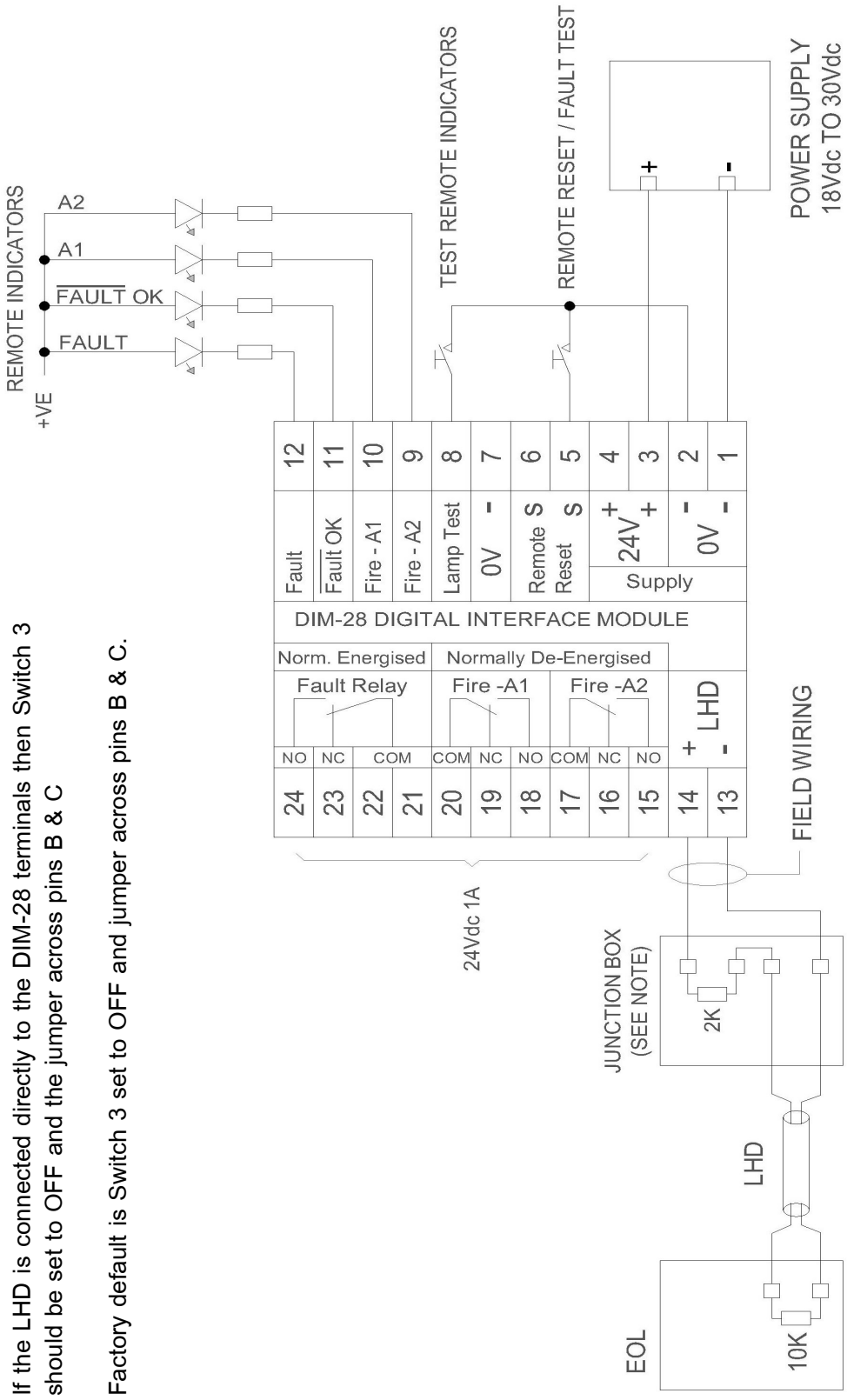


DIN RAIL MOUNTING VERSION



OPTIONAL POLYESTER ENCLOSURE

5. Electrical Installation.



Note: Field wiring short circuit monitoring.

The DIM-28 has the ability to monitor for a short circuit on the interposing field wiring prior to the LHD cable. To do this place a 2K ohm resister in series with the LHD in the field junction box and set Switch 3 to ON and the jumper across pins A & B.

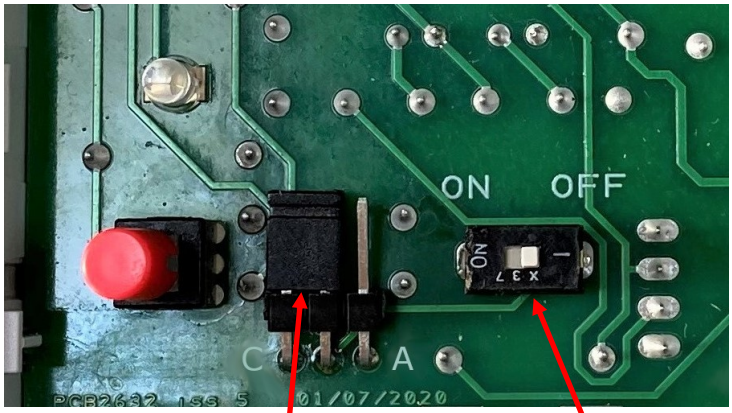
If the LHD is connected directly to the DIM-28 terminals then Switch 3 should be set to OFF and the jumper across pins B & C

Factory default is Switch 3 set to OFF and jumper across pins B & C.

Switch 3 and jumper location

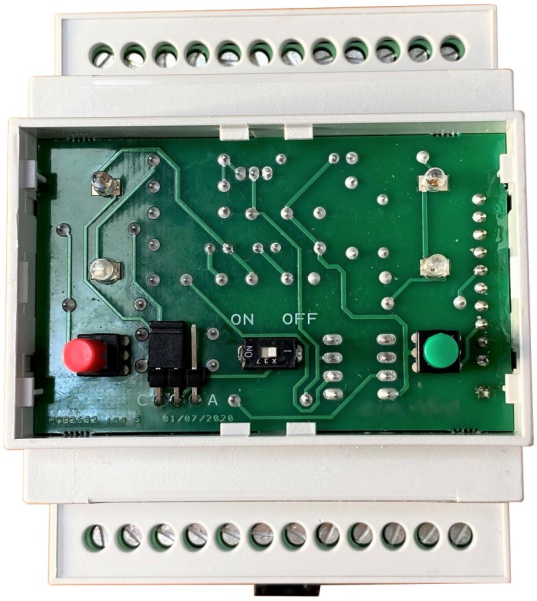
Switch 3 on the PCB is accessed by lifting and removing the front fascia from the main housing. This is done by gently inserting a small screw driver into the sockets at each side of the fascia.

Fascia release points



Jumper

Switch 3.



6. Hazardous Areas

The LHD may be installed in an Hazardous Area when connected via a suitable Intrinsically Safe Barrier. This ensures that under fault conditions the LHD circuit has insufficient electrical energy to produce a spark initiated explosion. Both Barrier and DIM-28 module must be located in a 'Safe Area' or 'Explosion Proof' enclosure.

Each Barrier type specifies maximum parameters for cable located in the Hazardous Area. These parameters are:- Capacitance (C), Inductance (L) & Inductance to Resistance Ratio (L/R). The whole of the hazardous area circuit, both LHD and interposing cable, must comply in all three aspects.

The C-L-L/R parameters for the barrier depend on the configuration and 'gas group'. When considered together with the LHD & interposing cable specification they will determine the compliance of an installation and/or define maximum cable lengths.

For use with the DIM-28 Linesense requires a Dual Channel Shunt Diode AC Zener Barrier, 15V - 150mA - 124R per channel, type MTL7765ac or Galvanic isolators MTL5561 or P+F KFDØCS Ex2.5 IP.

ZENER BARRIER - COMBINED CHANNEL CONFIGURATION

Whilst the supply 0V must be maintained within a few volts of earth to avoid barrier leakage currents, by employing both channels of the barrier the circuit is isolated from earth at the IS Barrier, thus avoiding multiple earth points on Fire Panel signalling systems such as addressable loops.

EXAMPLE: The parameters for the MTL7765 in a combined channel configuration for a group IIC gas are:

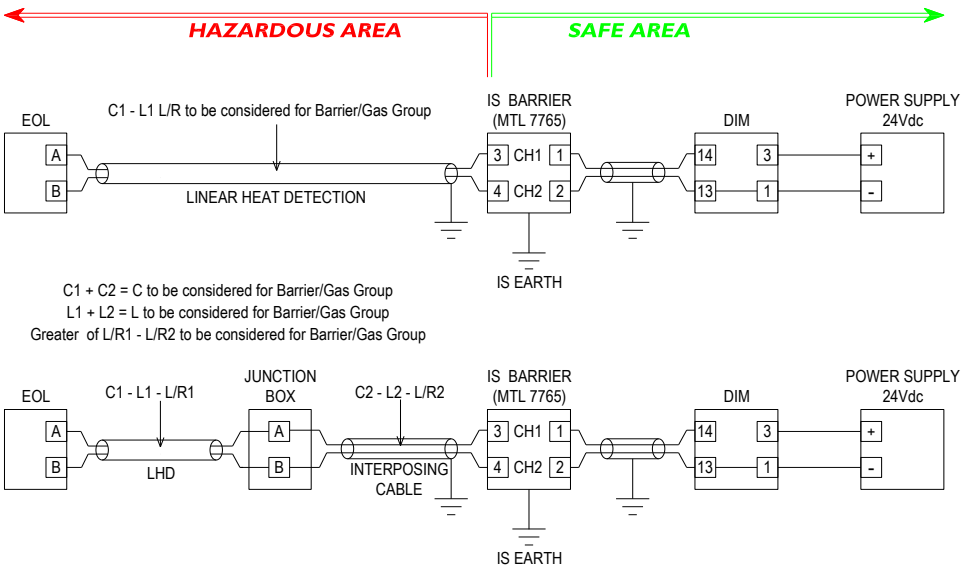
Maximum Capacitance - C=0.58uF

Maximum Inductance - L=0.32mH

Maximum Inductance to Resistance Ratio - L/R=22uH/ohm.

Linesense Model H8040N (68ºC) LHD has C = 130pF/m , L = 1.3uH/m , L/R= 6.5uH/ohm.

With no interposing field cable the predominating factor in this case is inductance which limits the LHD length to 246m (0.32 / 0.0013).



ZENER BARRIER - SINGLE CHANNEL CONFIGURATION

Another arrangement is a single channel circuit which permits greater lengths of LHD to be installed.

The configuration below shows one side of the LHD circuit “returned to earth”.

EXAMPLE : The max parameters for the MTL7765 for a group IIC gas are :-

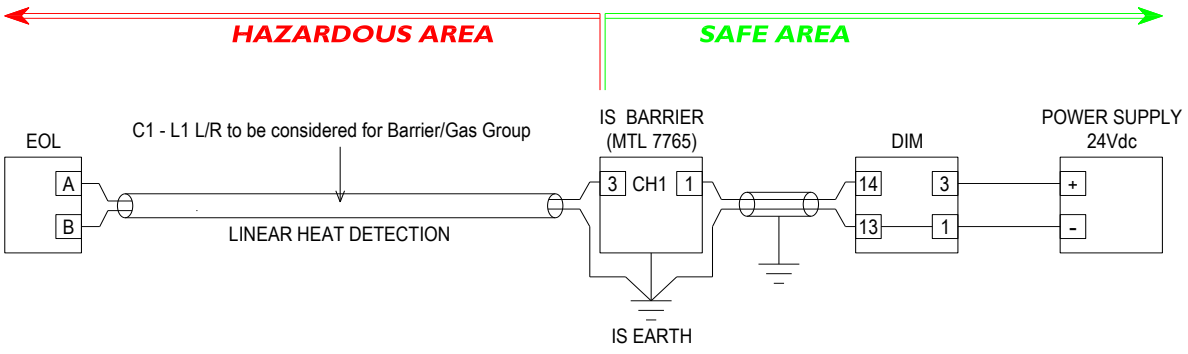
Maximum Capacitance - C=0.58uF

Maximum Inductance - L=1.45mH

Maximum Inductance to Resistance Ratio - L/R=66uH/ohm.

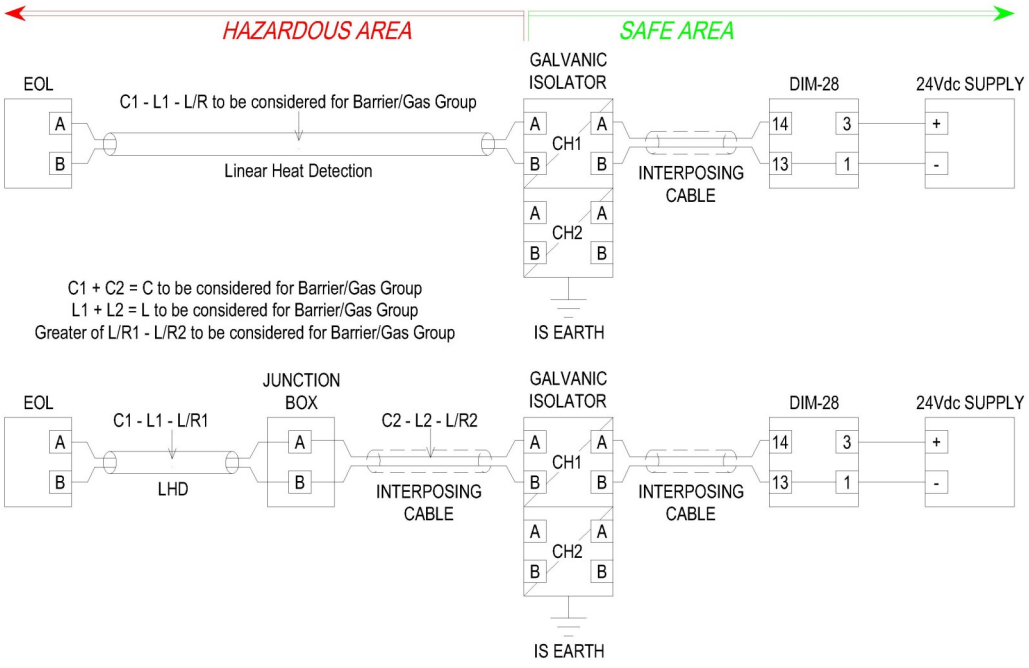
Linesense Model H8040N (68ºC) LHD has C = 130pF/m , L = 1.3uH/m , L/R= 6.5uH/ohm.

With no interposing cable the predominating factor in this case is inductance which limits the LHD length to 1115m (1.45/ 0.0013).



Hazardous Areas - Galvanic Isolator

Galvanic Isolators do not require an I.S. earth. Shown below are two examples of a Galvanic Isolator arrangement. The calculations for an installation varies between products and/or environments. Galvanic Isolator specifications and site requirements must be observed.



EXAMPLE:

The parameters for the P+F KFDØCS Ex2.5 IP in a combined channel configuration for a group IIC gas are:-

Maximum Capacitance:- C = 0.107uF Maximum Inductance:- L = 4.3mH

Maximum Inductance to Resistance Ratio:- L/R = 60uH/Ω.

The parameters for the MTL5561 in a combined channel configuration for a group IIC gas are:-

Maximum Capacitance:- C = 0.083uF Maximum Inductance:- L = 4.2mH

Maximum Inductance to Resistance Ratio:- L/R = 56uH/Ω.

Linesense model H8040N LHD used in this example:-

C1 = 130pF/m, L1 = 1.3uH/m, L/R = 6.5uH/Ω.

Interposing FP400 cable specification used in this example:-

C2 = 130pF/m, L2 = 0.322uH/m, L/R = 31uH/Ω.

Interposing FP400 Cable length = 150m

Linear heat Detection Cable length = 450m

Calculations:

Capacitance per total length:- C = C1 + C2 (130pF x 450) + (130pF x 150) = 58.5nF + 19.5nF = 0.078uF

Inductance for total length:- L = L1 + L2 (1.30uH x 450) + (0.322uH x 150) = 585.0uH + 48uH = 633.3uH

The above information is a guidance note. National / Local Regulations, Standards and Barrier Specifications MUST take precedence in any system design and implementation. Ensure enclosure earth stud should be suitably grounded with a recommended minimum 10mm² cable.

6. Operation

Normal	**LHD & Supply Voltage Normal** • Green Supply LED on. • Fire & Fault LEDs off • Remote Fire & Fault Indicator outputs - Off, (Not Fault / OK output - On) • Fire relays A1 & A2 - De-energised • Fault relay - Energised
Fault	**LHD Open Circuit** • Yellow 'Fault' LED - On • Fault relay - De-energised • Remote Fault Indicator output - On (remote Not Fault / OK output - Off) • **Note:** The unit will automatically return to Normal on rectification of the Fault condition.
Fire	**LHD Activated (short circuit due to Fire)** • Red Fire LEDs - On • Fire relays A1 & A2 - Energised • Remote Fire Indicator outputs A1 & A2 - On
Fire Test	**Fire Test push-button operated** • Red Fire LEDs, Fire relays and Fire indicator outputs latch on as for Fire above.
Fault Test / Reset	**Fault Test & Reset push-button operated** • A LHD Fault condition is simulated during push button operation. Non-latching. • Remote Fault indicator output - On (remote Not Fault / OK output - Off) • Red Fire LEDs, Fire relays A1 & A2 and remote Fire indicator outputs reset. • **Note:** After a true Fire, damaged section of LHD requires replacement before Reset.
Remote Fault Test / Reset	**Remote Fault Test / Reset input activated** • As per Fault Test / Reset above
Remote Indicator Test	**Remote Lamp Test input activated** • Remote Fire Indicator outputs A1 & A2 - On • Remote Fault Indicator - On • Remote Not Fault indicator - On

Notes

1 For LHD cables with low alarm temperatures, physical signs of operating may not always be obvious when inspected.

2. Always store the LHD cable in a clean dry location out of direct sun light. Temperatures not to exceed the maximum ambient rating of the cable.

3. Where cable ties and clamps are used to fix the LHD in place, ensure they are not over tightened to prevent damage. It is recommended to use silicone sleeves around the LHD at each fixing point.

4. Installation should always be in accordance with this manual, local codes and regulations. While every precaution has been taken during the preparation of this manual to ensure the accuracy of its contents, Linesense assumes no responsibility for errors or omissions.

Ordering Information

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53106-013	EOL Junction Box for DIM & DLI with test switch - SS316
53106-014	EOL Junction Box for DIM & DLI with test switch - ABS
700-701	Zener Barrier type MTL 7765
700-706	Galvanic Barrier type P+F KFDØCS Ex2.5 IP

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