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ANALOGUE LINEAR HEAT DETECTION

- Flexible in installation
- Recoverable after operation
- Monitors precise point of risk
- Sensitive to small temperature variations
- Mechanical/environmental protection options

Alarmline Analogue sensor consists of a 4-core cable. Two of the four colour-coded conductors are insulated with a Negative Temperature Coefficient material. The other two conductors have normal PVC insulation. The cores are twisted together and protected by an outer sheath of high temperature, flame-retardent PVC insulation (see Fig. 1.).

At one end of the sensor cable, the four conductors are connected to an associated electronic interface unit (optionally via a junction box). At the outer end, the conductors are joined and hermetically sealed to form two loops (see Figs. 2a and 2b). Both loops are continuously monitored for open and short circuit faults. A breakage or disconnection of either loop initiates a FAULT signal in the control unit.

Extra mechanical or environmental protection can be provided by the addition of a nylon coating or bronze braiding.

Fig. 1

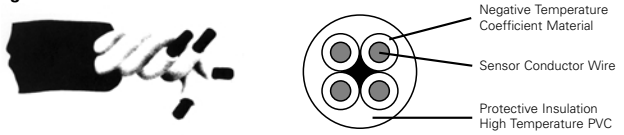


Fig. 2a

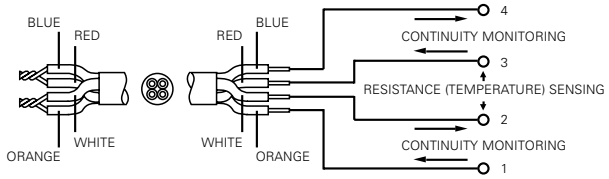


Fig. 2b

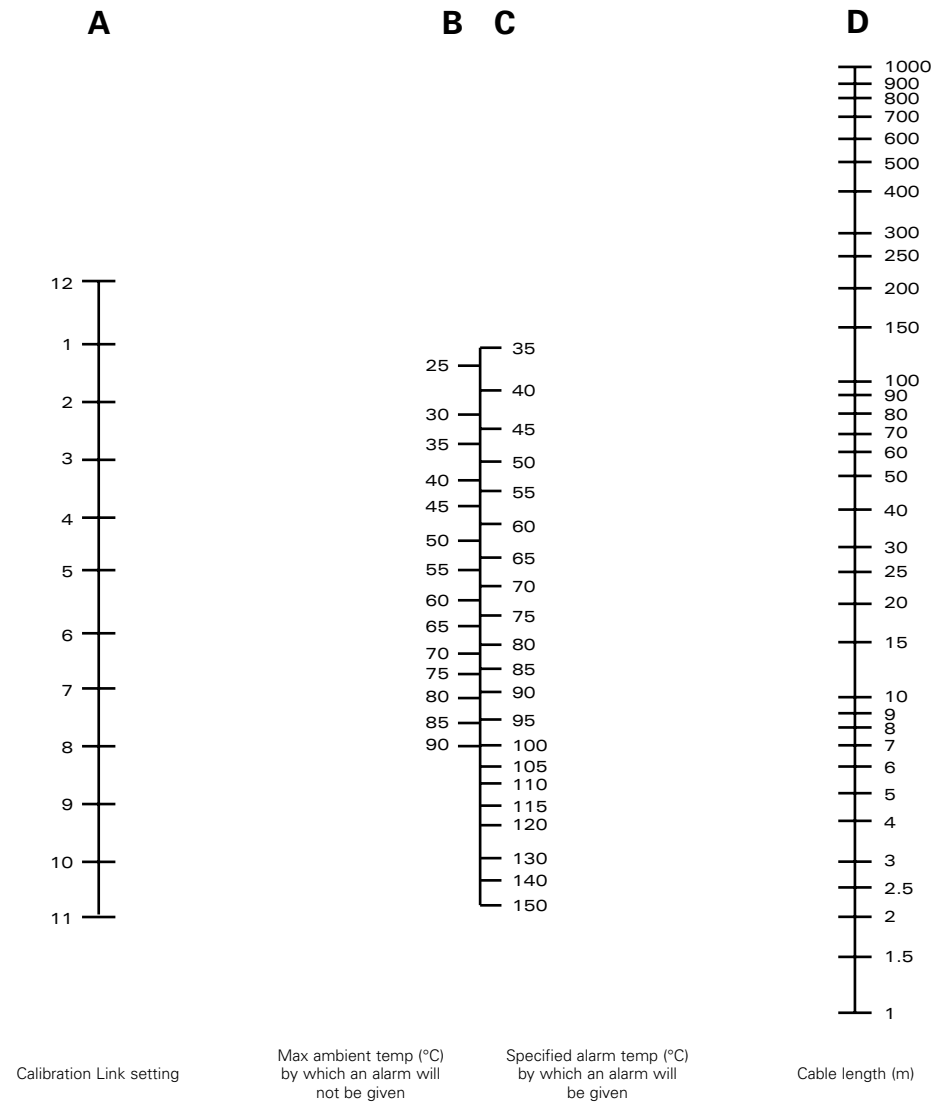
Operation

Alarmline Analogue sensor cable senses temperature variations by continuously monitoring the resistance of specially doped N.T.C. polymeric insulation, by the Alamline LHD4 Control Unit. A change in temperature produces a relative change in resistance between the two loops within the sensor cable – as temperature increases, resistance is lowered.

This change is monitored by the LHD4 control unit, which actuates an alarm signal at a pre-determined level. The integrating effect of Alamline sensor cable enables it to detect either a localised hot spot or a lower level of temperature increase over its total length.

Provided the sensor cable has not been directly subjected to temperatures greater than 120°C for excessive periods, it will recover to an alert condition after activating an alarm. Upon destruction, Alarmline fails permanently into the alarm state.

Fig. 3 HIGH RESISTANCE SENSOR NOMOGRAM (FOR SERIES 4 LHD TYPE 'T' CABLE ONLY)



System Design

The maximum ambient temperature must be identified. This depends on climatic and working conditions. Two other variables must be established:

1. The maximum length of sensor cable to be employed in the risk area
2. The calibration resistance to be set at the control unit.

When the maximum length has been selected, the calibration resistance can be identified using the Nomogram, and the corresponding alarm temperature identified.

Design lengths should consider the most likely exposure under identified overheat or fire risks.

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Using the Nomogram

When Alarmline Analogue cable is installed, the calibration switch setting on the LHD 4 control unit must be set to suit the conditions of the installation. This setting is determined using the Nomogram (Fig 3) as in the following example:

1. On **Scale D**, mark the sensor cable length in the risk area (100 metres in this example).

2. **On Scale B**, mark the maximum ambient temperature allowed, which must not give an alarm (45°C).

3. Draw a line from the mark on **Scale D**, through the mark on **Scale B**, to **Scale A**. The point at which the line intercepts **Scale A** will show the correct calibration switch setting (6).

This is the switch setting that **will not** cause a false alarm at the maximum ambient temperature of 45°C. The point where the line crosses **Scale C** indicates the temperature required **along the entire cable length** to give an alarm (57.5°C).

If a localised hot spot were to occur anywhere along the cable length, the Nomogram will indicate how hot this would need to be to give an alarm. For a 10 metre hot spot, take a line from the 10 metre mark on **Scale D** to switch setting 6 on **Scale A**. The temperature required to give an alarm from a 10 metre hot spot can then be read on **Scale C** (84°C)

Similarly, a 2.5 metre hot spot would require a temperature of 103°C to alarm.

Ordering Data

Alarmline sensor cable is supplied on terminated reels (in multiples of 100 metres).

High Resistance (blue)*	K82017
High Resistance Nylon coated (black)	K82021
High Resistance Bronze Braided	K82078
In-line jointing kit (pack of 10)	K82024
End-of-line termination kit (pack of 10)	K82023

TECHNICAL SPECIFICATION

Description	High Temperature PVC (blue)	Nylon coated (black)	Bronze Braid	Nylon + Stainless Steel Braid
Part Number	K82017	K82021	K82078	K98166
External Diameter (nominal)	3.25 mm	4.25 mm	4.25 mm	5 – 6 mm
Weight (200 m)	3.2 kg	4.3 kg	8.3 kg	10 kg
Minimum Tensile Strength	100 N	+100 N	1000 N	1000 N
Conductor Diameter	0.46 mm			
Dielectric Thickness	0.34 mm			
Outer Sheath Thickness	0.25 mm			
Twist Turns of Inner Conductors	90 ±5 per m			
Conductor Material	Copper			
Insulation	Cores 2 and 4: Specially Doped NTC Polymer, Cores 1 and 3: PVC			
Core Colours	1: Orange, 2: White, 3: Red, 4: Blue			
Service Life	Up to 100°C: Unlimited			
Voltage Proof	10 kV between outer sheath and a conductor			

Note: Stainless steel braid over nylon high resistance sensor cable, Part No. K98166, is available for chemical and petro-chemical applications.

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Approvals

Alarmline sensor cables are approved for use by UK Power Generation and Distribution Authorities under their Reference: EPA215 High Resistance Sensor

Factory Mutual Approvals FM.0M3A0.AY and FM.OR5A4.AY

Chinese Approval Ref: NSTCFEPQ (Appr) 92005

Control Unit

Alarmline Analogue cable must be used in conjunction with a Series 4 LHD Control Unit (Fig. 4).

The electronic unit is housed within a IP55 rated polycarbonate enclosure, with a hinged transparent lid.

Electronic compatability with BS 5839 pt. 4 control/indicating equipment is achieved by a simple resistor change within the LHD Control Unit.

IMPORTANT NOTE
Before connecting conductors 1 (orange) and 3 (red) to the LHD Unit, the polyester enamelling on the copper cores MUST be removed by scraping with a knife at both ends of the cable. This will ensure a good electrical connection.

Features

- Sensor Cable monitoring by highly stable and sensitive electronics
- 2-wire operation fully compatible with BS 5839 part 4 fire alarm control units
- Fault relay energised/ unenergised. Please specify when ordering
- Monitors Alarmline cable for open circuit and short circuit FAULT conditions
- Optional FIRE and FAULT relay output
- Fully monitored for internal fault conditions
- Can be used with BASEEFA approved Zener Barriers in all gas groups
- Wide operating voltage range.

Fig. 4

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CONTROL UNIT TECHNICAL SPECIFICATION

Series 4 LHD	
Enclosure (for connection to a conventional system)	Polycarbonate IP55 rated 170H x 105W x 111D Colour RAL 7035 Weight 0.55 Kg
Supply Voltage	8 to 30 VDC
Quiescent Current Consumption	60 to 180 µA depending upon alarm trip setting
Fire Alarm Current Consumption	15 to 70mA, pre-set by means of internal resistor (see note 1)
Fault Alarm Current Consumption	180 µA maximum

Series 4 LHD with Relays (for connection to an analogue addressable system)	
Quiescent Current Consumption	20mA
Fire Alarm Current Consumption	85mA
Fault Alarm Current Consumption	16mA
Radio Interference Susceptibility	Will withstand 5% rms 50Hz supply voltage noise, and 1Vrms sensor noise with negligible performance change. RFI immunity at 10V/metre field strength over band 20-500MHz. For 'abnormally' high operating levels of RFI/EMI (as in power/instrumentation cable switching areas) a special filtered version of the LHD is available.

Indicators:	
Fire Alarm	Panel mounted continuous Red LED. Terminals for connection of remote LED.
Fault Alarm	Panel mounted flashing Yellow LED. Fault output may be wired in series for normal 2 wire operation or connected separately (see note 2).
Operating Temperature Range	-25°C to +55°C

Controls:	
Test Switch	Fault and Fire positions verify operation in both modes
Calibration setting	12 position pre-calibrated pin switch (internally mounted)
Notes	1. In the FIRE condition the minimum voltage across the detector should be not less than 5V 2. When the fault output is used separately it must be referred to the 0V supply line
Type Approval	The Alarmline LHD unit is approved for use by UK Power Generation companies under their reference 5117-P-11* * Electrical Environment Class-X (Mild)
Hazardous Areas	Alarmline high resistance sensor cable may be installed within hazardous environments as it is regarded by BASEEFA as a simple electrical apparatus. Approved Zener Barrier Configurations for use with the sensor electronic interface units (installed within a classified safe area) allows installation within Group IIC and less arduous environments.

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TECHNICAL SPECIFICATION EUROCARD VERSION CONTROL UNIT

Supply Voltage	Nominal 24V d.c. Limits 20 to 30V d.c.
Current Consumption:	
Quiescent	With FAULT relay normally energised: 20mA With FAULT relay normally de-energised: 100 to 200 µA depending on alarm trip setting
Fire Alarm	With FAULT relay normally energised: 60mA With FAULT relay normally de-energised: 40mA
Fault Alarm	With FAULT relay normally energised: 100 to 200 µA depending on alarm trip setting With FAULT relay normally de-energised: 20mA
Noise Performance	Will withstand 1V rms 50Hz supply voltage and 1V rms 50Hz sensor noise with negligible performance change.

ORDERING DATA

K82012	Alarmline Series 4 LHD
K82013	Alarmline Series 4 LHD (pcb only)
	Alarmline Series 4 LHD with relays
K82194	Fault unenergised
K82194-02	Fault energised
K82033	Alarmline Series 4 Eurocard
K82098	Alarmline Analogue portable demonstration kit

Alarmline is a registered trade mark.

Kidde Fire Protection

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