![Kidde Fire Systems — A UTC Fire & Security Company]
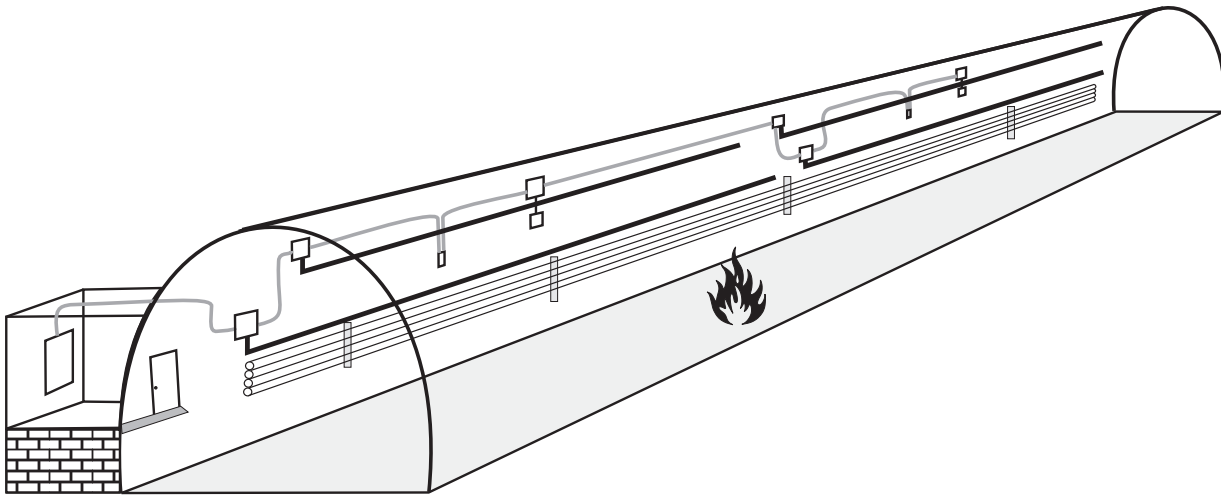
Intelligent Linear Heat Detection Systems

Fire Alarm Zone Identification and Output Control

INTRODUCTION

Kidde provides two choices of Linear Heat Detectors: (a) Shorting type LHS™, and (b) Integrating type Alarm-Line™.

LHS is a fixed temperature sensor whose special insulation melts at its specific alarm temperature and allows its two conductors to short together and create an alarm condition at the fire control panel.

AlarmLine is an integrating type system that consists of the AlarmLine sensor cable and an Interface module. The cable is constructed with a negative temperature coefficient material, where a change in temperature results in an exponential decrease in resistance of the sensor. The interface module interprets this resistance change and provides an output to a control panel once the field programmable alarm set point is exceeded. AlarmLine is typically used when features such as programmable alarm threshold, pre-alarm, short-circuit trouble discrimination and ability to reset after overheat condition are required.

An Intelligent LHD System is recommended for multi-zone applications where fire zone location requires zone output control for Notification, Suppression control, Annunciation and auxiliary functions such as breaker tripping, emergency power, HVAC control, etc. *It is the preferred design method over traditional multi-zone conventional, hard-wired linear heat detection and provides the added benefit of zone output control, text location indicator and installation cost savings.* An Intelligent Linear Heat Detection System using the ARIES FACP may consist of:

- ARIES FACP:
    - Microprocessor based intelligent Fire Alarm-Suppression control panel with 1 Signaling Line Circuit (255 addresses)
- Addressable LHD zones:
    - SmartOne Addressable Input Modules (AI) each with a maximum of 820 feet (250 m) directly wired LHS, OR
    - SmartOne Addressable AlarmLine Module (AAM) each with a maximum of 3,280 feet (1,000 m) directly wired AlarmLine
- Other Input Devices:
    - SmartOne smoke detectors, water-flow switches, manual releases, etc., as required.
- Other Output Devices:
    - SmartOne Addressable Output Modules (AO), Remote Release Modules (RRM), Addressable Signal Modules (ASM), etc., as required.

Figure 1 illustrates an Intelligent Linear Heat Detection System in a tunnel application. The tunnel is divided into 30 foot fire zones. Each zone has an LHD (AlarmLine or LHS) cable zone, manual pull station, horn and strobe. A zone alarm initiates a shut down of air supply to reduce the spread of smoke and inhibit fire growth, activates the notification appliances and opens the water valves for pre-action sprinklers.
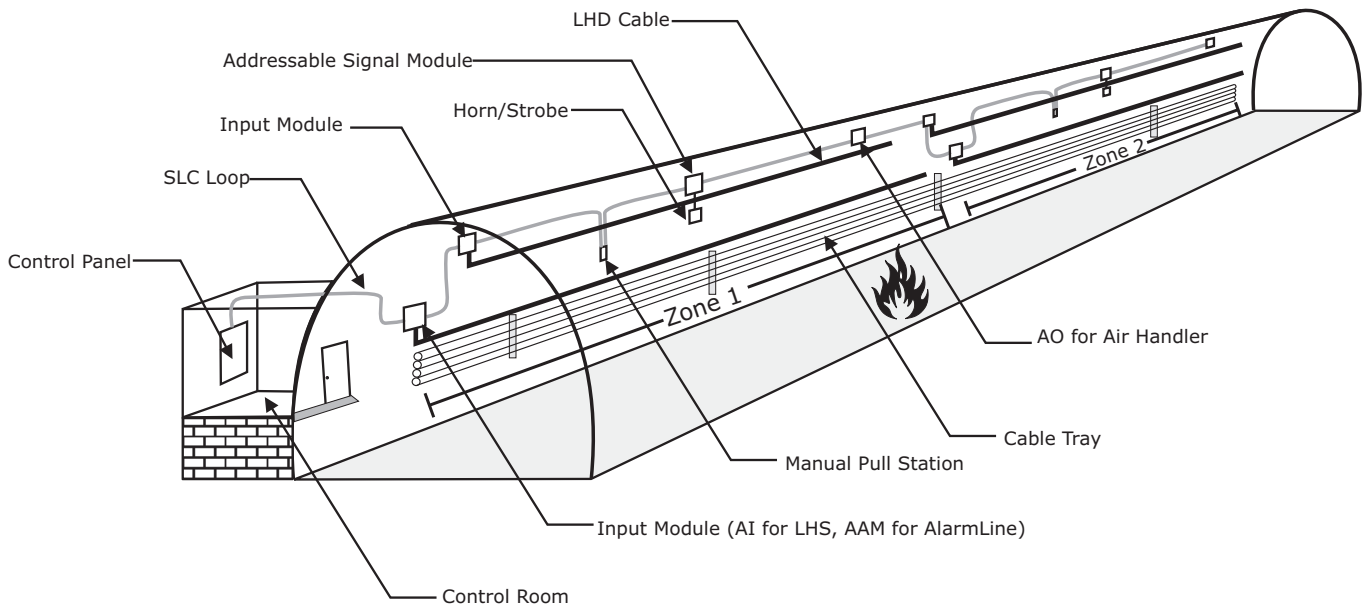

Figure 1. Tunnel Application

ADDRESSABLE LHS ZONES

For many applications, local code requires location of initiating devices to be indicated by fire zone or other approved subdivision. Zoning cannot be accomplished with a point locator and single continuous run of linear heat detector. Each zone must report individual alarms to the panel for use in zone output control of signal notification and suppression.

Zoning is simple and easy with an Intelligent Linear Heat Detection System. Each zone is created with an Addressable Input Module AI or AAM as appropriate, depending on the sensor used, LHS or AlarmLine, respectively. Up to 255 devices (any mix of devices including LHD zones, smoke detectors, manual pull stations, waterflow switches, etc.) can be connected to a single ARIES addressable loop.

ZONING VERSUS POINT LOCATION

Traditional linear heat detector point locators display the alarm point location in feet or meters from the start of the linear heat detector zone to the heat actuated alarm point. This method requires proper calibration, accurate and available layout drawings to reliably find the location of the fire event. In fact, a point locator is actually designed for service and maintenance purposes, not fire location, to find the section of cable where a fire event or damage to the cable requires a new piece of cable to be spliced in. Actual fire event location requires **zone output control** capability where the fire alarm panel can initiate programmed notification or suppression response based on a zone alarm. Point locators are unable to translate an event location for use in an automatic fire alarm and suppression system.

ZONE OUTPUT CONTROL

The ARIES Intelligent Fire Alarm Control Panels are completely field programmable through the proprietary Event Output Control (EOC) programming language.

EOC is a simple language that relates addressable input devices to addressable output devices or modules. Typical fire alarm system designs such as cross-zones, counting zones, time delays, etc. can be implemented through EOC.

Figure 2 illustrates sample EOC programming code for the tunnel example in Figure 1. Any zone alarm in the tunnel will activate the notification appliances and release water into the sprinkler system. If a fire is detected in any zone, the air supply is turned off in that zone only. (See Table 1 for address descriptions.)

```
(1001 # 1002) + 1005 = 1006, I001
(1003 # 1004) + 1008 = 1009, I002
I001 + I002 = MP01,1007,1010
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Figure 2. Sample EOC Code

Table 1: Input/Output Addresses

INPUT/OUTPUT ADDRESSES	
1001	Zone 1 Tunnel Ceiling (LHD Sensor)
1002	Zone 1 Cable Tray (LHD Sensor)
1005	Zone 1 Manual Release
1006	Zone 1 Air Handler
1007	Zone 1 ASM Zone 1
1003	Zone 2 Tunnel Ceiling (LHD Sensor)
1004	Zone 2 Cable Tray (LHD Sensor)
1008	Zone 2 Manual Release
1009	Zone 2 Air Handler
1010	Zone 2 ASM Zone 2
MP01	Pre-Action Valve Actuation
I001	Identifier - Zone 1
I002	Identifier - Zone 2 Alarm

TEXT ZONE LOCATION INDICATOR

The ARIES Configuration Software allows each addressable LHD zone to be assigned a descriptive, 80 character text location. (Figure 3) Text indication is an easier means of identifying the zone in alarm; traditional point location indicators display the alarm location in feet or meters from the start of the linear heat detector zone.
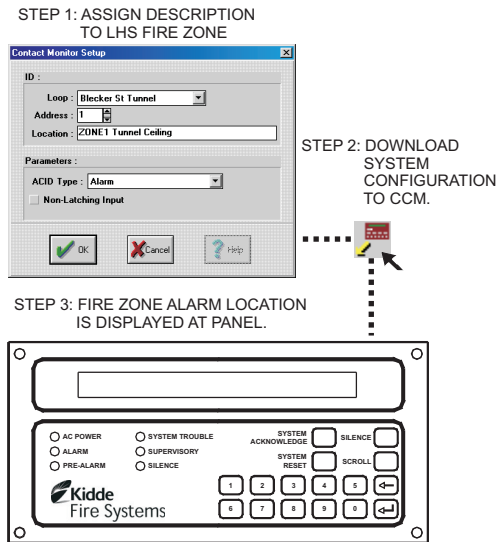

Figure 3. Zone Location

INSTALLATION COST SAVINGS

Installing an Intelligent Linear Heat Detection System results in substantial installation cost savings over traditional hard wired linear heat detection systems. With conventional fire alarm panels, each initiating zone must be home run back to the fire alarm panel, thus increasing wiring requirements and installation time and cost. Conversely, an addressable system, such as the ARIES intelligent fire alarm panel requires only a 2-wire signaling line circuit to interface to all initiating devices, zones and output devices.

A Kidde Intelligent Linear Heat Detection system, designed with a ARIES fire alarm panel is a cost-effective, clean and simple fire alarm system design for typical large linear heat detection applications.

ADDITIONAL INFORMATION

Additional information on the Intelligent Linear Heat Detection System components mentioned in this guide can be found at *www.kiddefiresystems.com*. Components include:

- LHS™ Sensor Cable
- ARIES Intelligent Suppression Control System (panel and modules)
- AlarmLine™ Linear Heat Detector
- Addressable AlarmLine Module

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