

## Fire Zone Monitoring with Actuation Output



The LDM-519-ACT-N module is designed to monitor a zonal length of Resettable Analogue Linear Heat Detection Cable (LHDC) for both an elevated temperature (Fire) condition, and Fault Status (Open & Short Circuit).

The module offers two adjustable levels of Alarm (A1 & A2), one of which may be optionally employed as a "Pre Alarm".

The LDM-519-ACT-N is provided with an output for the initiation of extinguishing media. This Actuation Output is primarily intended for the use with electrically operated chemical protractors (Metrons).

The LDM-519-ACT-N has fault monitoring circuitry appropriate to the series firing of these devices using an "All Fire" actuation loop configuration.

The module provides early warning of hot spots and fire conditions on short sections of the overall LHDC zone length. Maximum LHDC zone length for Resettable Analogue LHDC is 500m.

The modular form of the unit enables it to be provided in a variety of bespoke housings and readily integrated into special control panels.

The unit can be provided fully cased or as a PCB module. Both formats are electrically and mechanically compatible with many existing installations and may be readily used as service replacement spares.

The primary features of the control units are:-

- Linear Heat Detecting Cable Fire & Fault monitoring.
- Two adjustable levels of Alarm Set Point / Pre-Alarm operation.
- Extinguishant Actuation Output, with Loop Analogue & Fault level adjustment.
- Separate LHDC Monitoring & Actuation supplies - Electrically isolated.
- Wide dc supply operation - Monitoring 20V to 60V - Actuation 20V to 130V
- LED indication of Fire, Fault & Supply status.
- Actuation inhibit switch
- Selectable Latching / Auto-reset Operation.
- Integral Test & Reset Push-Buttons - Remote Test & Reset signal inputs.
- Volt free contact outputs for Pre-Alarm (A1), Fire(A2), & Fault conditions.
- Maintenance test meter jacks for both LHDC and Actuation Loop analogue outputs, Alarm set points & Actuation Loop resistance Fault level.
- PCB module readily installed in existing FDS-5 housings.
- Cased unit mounting points identical to FDS-5 enclosures.

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## Principles

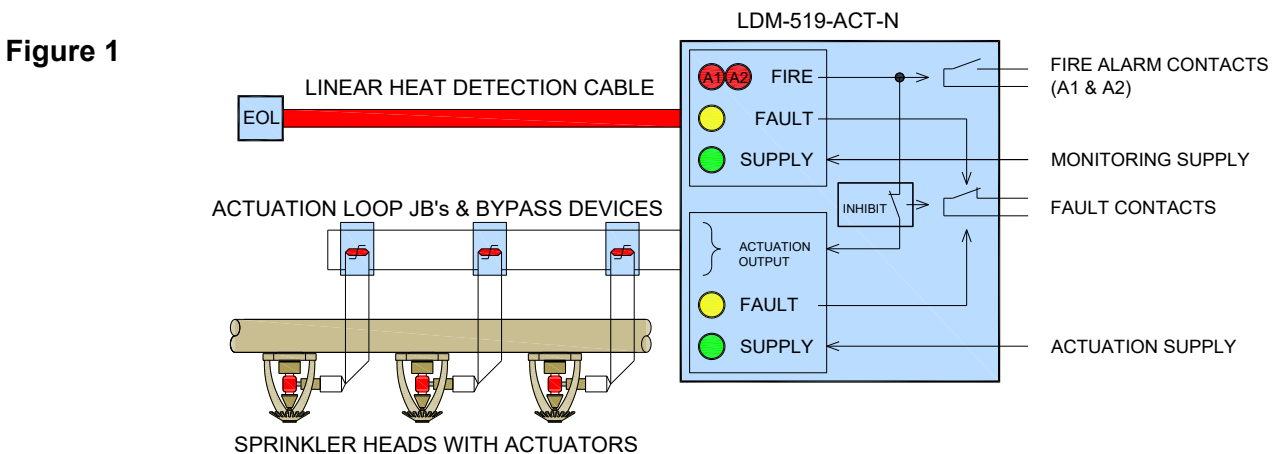
The unit is operated in conjunction with a length of Resettable Analogue Linear Heat Detector Cable (LHDC) and an End Of Line (EOL) functional unit. The LHDC is a coaxial cable which may be installed in considerable lengths whilst maintaining the ability for the monitoring unit to provide early warning of ‘hot spots’ and Fire conditions on short sections of the overall zone length. Reference should be made to the Resettable Analogue LHDC data sheet D1167 for specification of its performance.

Also connected to the unit is electrically initiated extinguishing equipment. The unit is primarily intended to interface with the extinguishing equipment by means of electrically operated chemical actuators (protractors). These devices, often known as Metrons ® (ICI Nobel), are in effect small chemical charges that are initiated when an appropriate firing current is applied. On firing, the devices protract a steel pin which may be used to shatter the quartzoid bulbs of sprinkler heads & multiple jet controllers (MJC), or rupture the frangible disks of extinguishant cylinder valves. The devices are “one shot” and on operation the electrical element becomes open circuit.

Often the requirement is to operate a number of these devices simultaneously, this especially in the case of sprinkler heads, where a number may be resident within the zone of LHDC detection. As the actuators require a (short term) current application in excess of 1A the most efficient configuration, both in respect of cabling and electrical load, is a series loop.

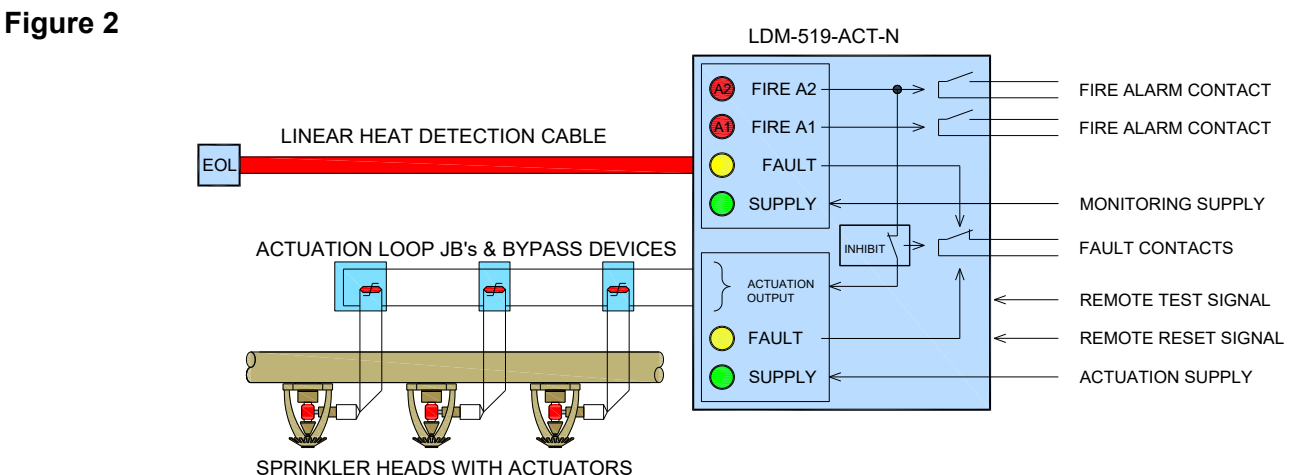
However, with a series configuration if any element is ruptured prematurely (either prior to, or during firing) the rest of the actuators within the zone may be disabled. In order to obviate this, non linear bypass devices are connected across each actuator. The LDM-519 ACT-N module incorporates the specialist circuitry that enables the reporting of a single element failure whilst retaining the ability to operate all other serviceable actuators. (Contact Patol Ltd. for more detail on “All Fire” actuation loop configurations)

**Figure 1** shows a typical minimum system where a single alarm level is employed by adjusting the A2 set-point less than that for A1. Thus both A1 & A2 trips occur simultaneously - **At the A1 set point**.



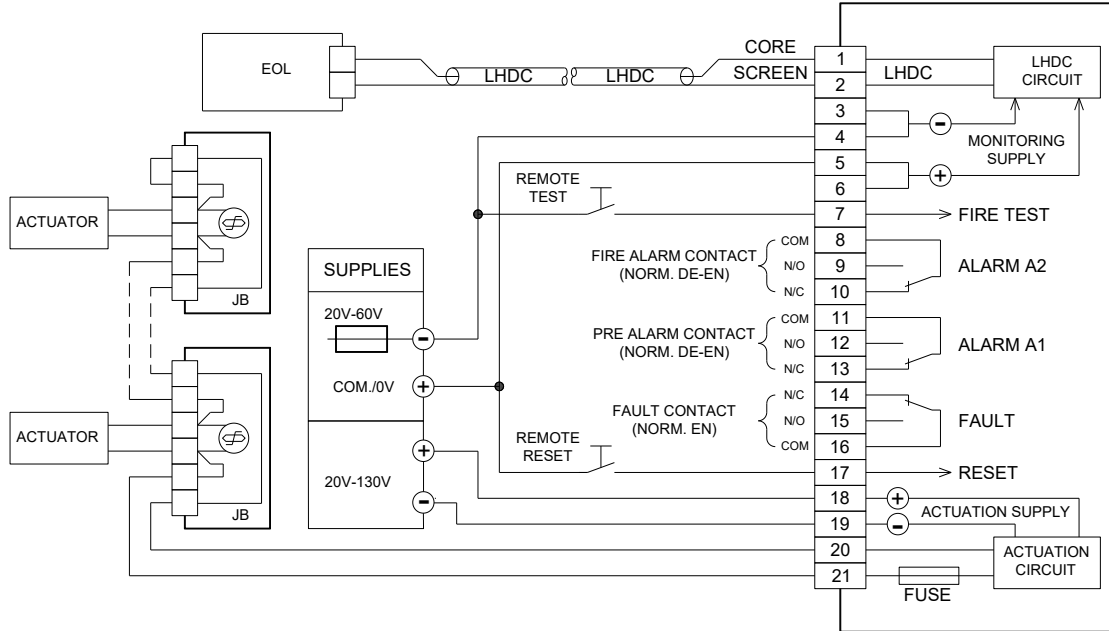
In some applications abnormal ambient conditions can arise that must be notified, but for which immediate extinguishant operation would not be appropriate. By using A1 Pre-Alarm (e.g. A1 contacts combined with A2 - Fire signal) operators are provided with an “abort” period prior to extinguishant release.

**Figure 2** shows a more comprehensive configuration including Pre Alarm.



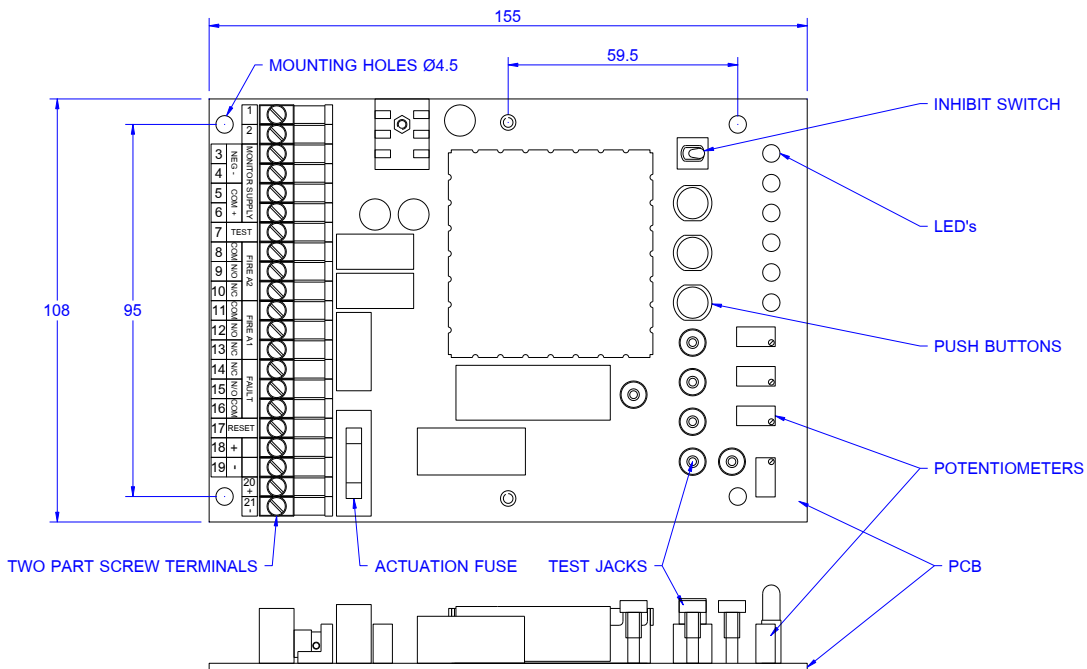
## Connections.

Figure 3 - LDM-519-ACT-N Module terminals showing typical external connections.



## Module Arrangement

Figure 4 - PCB Module - shown without Fascia Plate

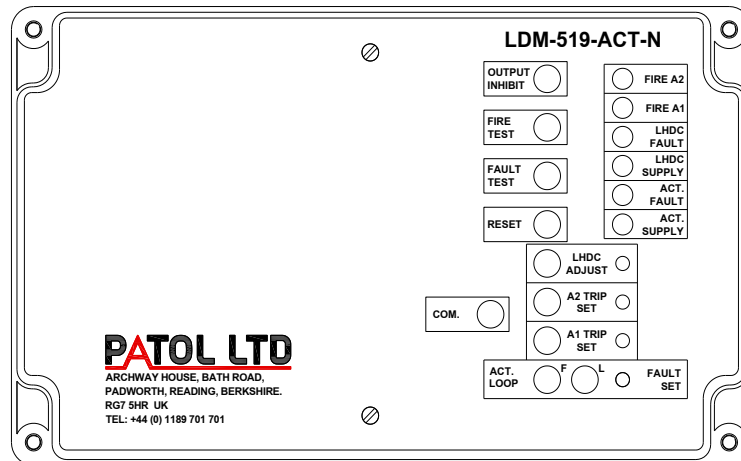


## Cased Units - Enclosures

The design of the LDM-519-ACT-N module is such that it may be fitted into a variety of enclosures. Demands in respect of environmental, aesthetic or project specific requirements are readily accommodated by the ease with which the module may be fitted to virtually any enclosure type or control panel configuration. Patol should be consulted with regard to special housing provisions.

Figure 5 shows a 'standard' polycarbonate cased module with a clear polycarbonate lid.

**Figure 5 - Enclosure with Front Cover Removed**



## Operational Specifications.

**Monitoring Supply:** +ve common to LHDC screen

Voltage -20 Vdc to -60 Vdc

Current: Quiescent - < 18 mA  
Max (Alarm) - < 60 mA

**Actuation Supply:** Fully isolated from Mon. Supply

Voltage: 20 Vdc to 130 Vdc

Current: Quiescent - < 10 mA  
Firing Pulse - 4 A (nom)  
Dependant on actuation load.

**LHDC Input:** Two levels of alarm - A1 & A2  
Fault monitored. - O/C & S/C

**Actuation Output:** Thyristor switched - > 8A  
Fuse protected - 2A 20mm  
Relay isolated Fault monitoring  
Loop increment Fault set point.  
Earth / Common mode Fault.

**Relay Contacts:** 1 A @ 24 Vdc / 120 Vac  
Fire Alarm A2: 1 set - One pole change over  
Fire Alarm A1: 1 set - One pole change over  
Fault: 1 set - One pole change over

## Indications:

Fire Alarm: 2 off - A1(pre) & A2 (full)  
Red LEDs  
Fault: 2 off - LHDC & Actuation loop  
Yellow LEDs  
Supply: 2 off - Monitoring & Actuation.  
Green LEDs

## Controls:

Fire Test P.B. : Simulates LHDC Fire condition  
Fault Test P.B. : Simulates LHDC Fault warning  
Reset P.B. : Resets Fire Alarm  
Inhibit Switch: Inhibits Actuation  
Enables Fire Relay

## Adjustments & Test Points:

LHDC Analogue: 2mm meter probe socket  
A1 Trip Set: Potentiometer & 2mm socket  
A2 Trip Set: Potentiometer & 2mm socket  
Loop Analogue: 2mm meter probe socket  
Loop Fault Set: Potentiometer & 2mm socket  
Meter Common: 2mm meter probe socket

**Remote Fire Test:** Switch to -ve Monitoring Supply

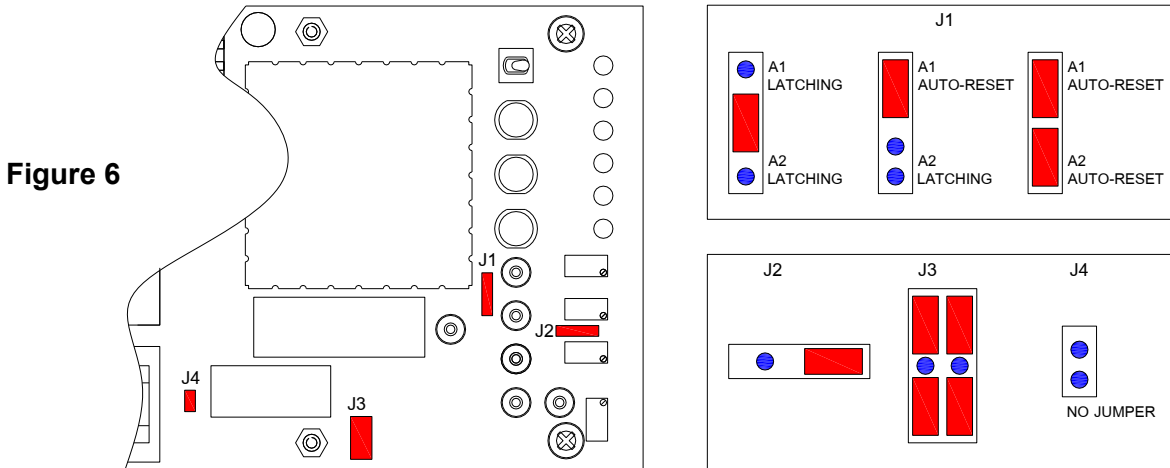
**Remote Reset I/P** Switch to +ve Monitoring Supply

## Module Selector Links

The LDM-519-ACT-N module is fitted with a number of jumper links which permit selection of operating parameters.

J1 permits the selection of Latching or Auto-Resetting modes for both A1 & A2 alarms. J2, J3 & J4 are related to the operation of the “Actuation” output.

Figure 6 shows the Latching / Auto-Reset options as set by J1 and the Standard (default) settings of J2, J3 & J4 for unit use in conjunction with a series “loop” of chemical actuators.



## Installation.

The LHDC should be installed in a manner that complies with the recommendations provided in the “D1224 Guidelines for Routing of Resettable Analogue Linear Heat Detection Cable” application note. This is to ensure that a reliable and easy to maintain installation is achieved.

Patol supply a range of mounting clips and brackets that are suitable for most applications. Please refer to “D1183 Clips and Fixings” for information on each particular mounting clip/bracket. It is of particular importance that LHDC is not fixed to any material that can act as a heat sink as this will impair its sensitivity. Therefore, protective sleeves should be used around the LHDC when it is in contact with metal clips and brackets.

As Resettable Analogue LHDC is a high impedance system, care must be taken at all enclosure cable entry points, to ensure protection against the ingress of dirt or moisture is maintained.

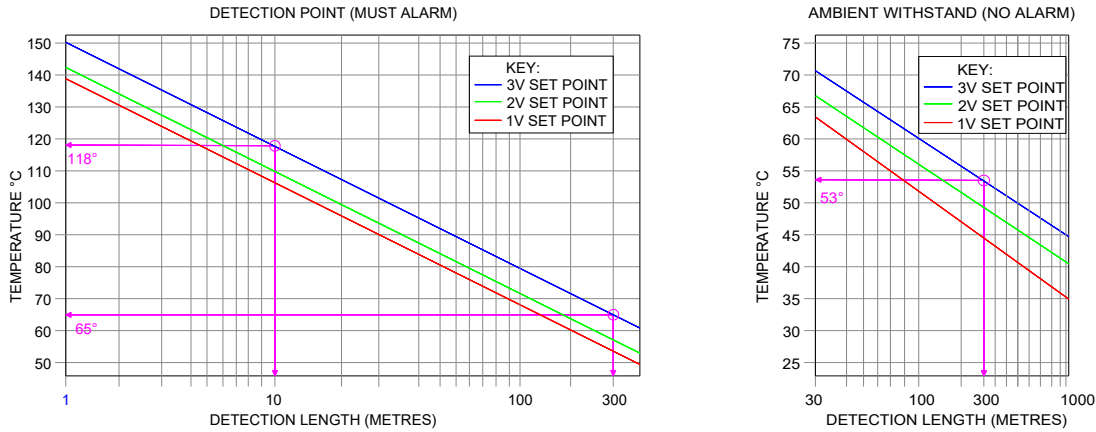
The LHDC Monitor can easily connect to a Fire Alarm panel or process control system using the relay contacts. For further details please contact Patol Ltd.

## Commissioning.

Commissioning of a Patol Resettable Analogue LHDC system is a simple operation that will give many years of reliable operation when performed correctly.

The only tools required are a high impedance Voltmeter and a small screwdriver to adjust the potentiometers on the fascia. For information relating to jumper link settings on LHDC Monitors, please refer to Figure 6 above .

Using the graphs on page 6 to find the trip level Voltage that suits the required Alarm detection level and also meets the requirements of the LHDC zone length and maximum ambient temperature for the zone.



## ISOLATE COMMISSIONING ZONE BEFORE MAKING ADJUSTMENTS

### Zero Level Adjustment

1. Disconnect LHDC.
2. Connect the End of Line functional unit directly to the LHDC Monitor so that the LHDC is out of circuit.
3. Connect the Voltmeter probes between the “COM” terminal and the “LHDC ADJUST” terminal.
4. Adjust the “LHDC ADJUST” potentiometer until the Voltmeter reads 0V.
5. Operate the “Fire Test” Push Button and note whether the Voltmeter indicates a positive or negative Voltage swing. Operate the “Reset” Push Button to return to the normal condition.

### Setting Alarm / Trip Levels

6. All Alarm/Trip level adjustments must be set to the same polarity as indicated by the “Fire Test” operation in step 4.
7. Connect the Voltmeter between “COM” terminal and the “A1 TRIP SET” terminal.
8. Adjust the “A1 TRIP SET” potentiometer to the required trip level determined from the graph above.
9. Connect the Voltmeter between the “COM” terminal and the “A2 TRIP SET” terminal.
10. Adjust the “A2 TRIP SET” potentiometer to the required trip level determined from the graph above.

Care must be taken to avoid undesired Alarms or trigger/release of interconnected extinguishant during commissioning of the LHDC system, which could occur whilst making Alarm level adjustments.

If a single trip level is required A1 should be set to the required trip level. A2 should be set slightly less than A1.

A1 Alarm, A2 Alarm & Actuation will occur at the A1 set point.

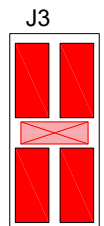
### Loop Analogue and Fault Level

The readings should be made using a high impedance volt meter with respect to the common (com) socket.

The reading at “L” is an analogue of the actuation loop resistance. The scaling is approximately 30mV per Ohm. The Fault level at “F” should be set approximately 12Ω above the normal loop resistance. i.e. 360mV.

### Sense Only Operation

A Sense Only version of the unit is available which is of the same general format to the LDM-519-ACT-N, but is not equipped with the actuation circuitry. Refer to D1170 data sheet. However, in certain circumstances such as to minimise site spares holding, it may be desirable to operate the LDM-519-ACT-N in a “sense only” mode. This is readily accomplished by linking the actuation supply terminals to the monitoring supply and making NO connection to the actuation loop. An additional jumper must be inserted at J3 in order to inhibit the Actuation Fault warning.



### Solenoid Outputs and Special Configurations.

The unit can be configured to operate solenoids, contactors and other special functions from the “actuation” circuit whilst maintaining Fault monitoring. These configurations are covered in separate application sheets which include the special J2, J3 & J4 settings required. Contact Patol Limited.