

**INSTRUCTION MANUAL**

**ED816 16-ZONE FIRE DETECTOR**

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**ED816 16-ZONE FIRE DETECTOR**  
**AND ED816R REPEATER UNIT**

**APPROVED TO LLOYD'S ENV1, 2 AND 3,**  
**AND BY U.K. DEPARTMENT OF TRANSPORT**

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## **ED816 16-ZONE FIRE DETECTOR AND ED816R REPEATER UNIT**

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### **1. GENERAL**

The ED816 Control Unit provides a conventional Fire Detection System capable of driving nominal 24V detection heads and call points. The open circuit stabilised zone voltage is 20V and each zone is driven via a 470ohm inbuilt resistor. All items of equipment supplied by Electronic Devices Ltd are fully compatible with the Control Unit. Other makes of detection head, call point and audible alarm may also be compatible but a competent technician should ensure that this is the case. If in doubt, ask for guidance from Electronic Devices Ltd.

Please note that only competent and experienced technicians should install and service this equipment.

No modifications should be made to any item of equipment, since such modification may invalidate the Department of Transport and/or Lloyd's Register approval.

It is possible to convert zones or part zones to be certified suitable for hazardous areas, using the intrinsic safety concept by incorporating an Interface Unit fitted with appropriate Zener Barriers and/or Intrinsically Safe Relays. For particularly onerous hazardous area applications, a certified intrinsically safe Voltage Monitor may be incorporated to ensure that the necessary voltages are present in the area concerned. For this application please consult Electronic Devices Ltd.

### **2. BRIEF SPECIFICATION**

#### **2.1 Control Unit Front Panel Facilities**

- Individual zone fire alarm indicators.
- Individual zone isolate switches and indicators.
- Common fault indication. (Individual O/C and S/C indicators are permanently available on base board).
- Main and emergency power indicators.

- ❑ Lamp and alarm test.
- ❑ Delayed alarm indicator.
- ❑ Lamp dim facility.
- ❑ Zone reset switch.
- ❑ Alarm accept switch.

On initial alarm the appropriate zone(s) flash, but on operation of the alarm accept switch the light becomes steady and the main alarm relays reset.

If, after alarm acceptance, another zone goes into alarm state, the alarms will retrigger.

### **3. GENERAL FUNCTIONS**

#### **3.1 Control Unit - ED816**

##### **3.1.1. Power Supply**

The Control Unit power supply requires a nominal 24V DC for Main and Emergency inputs. The fully approved Power Supply Type 3 provides both power supply and charging facilities for the integral sealed lead acid standby batteries. The PSU will accept 110, 120, 220, 240 and 254V 50/60Hz mains supplies.

The maintained supply is used to drive the Control Unit, associated Repeater Panel and external 24V DC alarms. To facilitate fault finding, the base board has individual zone indication for both open circuit and short circuit faults in addition to the front panel indicator.

##### **3.1.2 Alarm Output**

Internal acceptable audio alarms for both fire alarm and fault condition. Voltage free 250V 5A. DPCO contacts for both immediate and delayed fire alarm. SPCO 250V 5A for fault alarm.

Optional fault signal on mains or emergency power failure and/or alarm extension.

Fused output supply to drive external alarms.

##### **3.1.3 Fault Monitor**

Continuous monitoring of zone, power and alarm facilities. Internal diagnostic facilities to assist in servicing.

### 3.1.4 Repeater Unit – ED816R

- ❑ Individual zone alarm indicators.
- ❑ Common fault indicator.
- ❑ Common zone isolate indicator.
- ❑ Main and emergency power indicators.
- ❑ Lamp dim facility.
- ❑ Lamp and alarm test.
- ❑ Delayed alarm indicator.

## 4. PRINCIPLE OF OPERATION

The ED816 and ED832 Fire Detectors use the standard principle of monitoring the centre point,  $V_z$ , of a potential divider network, supplied with a regulated voltage and having a fixed resistor, i.e. one side of the potential divider for each zone within the Control Unit.

The other side of the potential divider is a resistance which varies depending on the external zone conditions. The extremes of the Point  $V_z$  are:

0V - when either the voltage supplied has disappeared  
or the zone line is short-circuited,

or

20V - when the zone line is open-circuit.

In normal operation an end of line resistor draws a small current so that  $V_z$  is close to the regulated supply voltage. Any alarm device operating, e.g. a smoke detector, heat detector, call point, etc., electrically connects a resistor across the line, so that  $V_z$  falls to approximately half of the regulated supply voltage. It is common practice to connect resistors in the bases of each detecting head so that the correct  $V_z$  is obtained.

## 5. ZONE CIRCUITRY

The diagram shows the regulated +20V supply connected via the resistor to Pins 11 or 12 for Zones 1 or 2 respectively, so that Pin 11 represents  $V_{z1}$ . To facilitate connection to the standard 5V supply, integrated circuits representing six comparators (each is a dual open loop op-amp) provide interface from analogue to digital for Zones 1 and 2. This circuitry, including the programmable array logic device IC4, is repeated for each multiple of two zones.

The output lines of IC1-3 inclusive are digital signals that are decoded by combinational logic IC4 and produce appropriate outputs to give the alarm, open-circuit or short-circuit fault indication for each zone. Z1 block is repeated for Z2, and the whole is repeated for multiples of two zones.

## **6. OUTPUT SWITCHING**

Fault outputs are diode OR gated to show a common fault lamp on the display panel, and operate the fault relay RLF/2 to provide external indication via voltage-free contacts. Individual zone lamps are provided on the display for each zone and, upon alarm, an immediate signal is given via the IMM relays and a timing circuit is started via IMM2/1 contacts that will operate further voltage-free contacts DEL1/1 etc. unless the alarm accept switch is operated.

For maintenance purposes, each zone may be individually isolated using the isolate switch, with isolation lamps indicating this situation on the front panel. A common isolate signal is sent to the Repeater as a warning, but individual zone isolation information is not repeated. With the isolate switch operative, a 0V signal is placed upon the gate of the Zone SCR to prevent triggering main alarms, but the transistor driver for zone alarm lights is still enabled to facilitate fault finding.

When the immediate alarm relays IMM1 and IMM2 operate, a 0V signal is placed upon the 'immediate' terminal in the display unit via IMM2/2, thus operating the flasher unit and the audio alarm. RL1 pulses in sympathy so that the supply to alarm lamps will also pulse. Operating the alarm accept button operates RL5 so that IMM and DEL relays release. The flashing unit and RL2 are disabled so that the zone lights will remain steady. If the alarm accept button is not pressed before the timer output goes positive, SCR1 fires, thus operating the DEL relay so that main ship alarms will activate via voltage-free contacts.

When the reset switch is operated, the contacts of RLR disconnect the supply to the anodes of all SCRs so that, if the zone line conditions allow, the Control Unit will assume the normal condition.

Note that operating the alarm test switch connects 0V to the cathodes of all front panel LEDs, with the exception of main and emergency green indicators, to provide a lamp and alarm test facility.

## **7. MAIN AND EMERGENCY SUPPLIES**

The Control Unit accepts nominal 24V for both main and emergency inputs, between Terminals 83 and 84 for the main supply and 81 and 82 for the emergency supply. If the equipment is required to be operated from AC mains supply, the Type 3 Power Supply will provide all necessary facilities.

When connected, the main supply operates RLM1 and RLM2, which remain operated continuously. The contacts of RLM1 switch both the positive and 0V lines of the main supply to provide a maintained supply to the equipment. Note that RLE is disconnected at RLM1/2. F1 provides the necessary protection. If the main supply fails, the contacts of RLM1 revert to normal and the emergency supply is connected to the maintained supply via F2. Note that the maintained supply is fed via F3 to Terminals 78 and 80, with the corresponding 0V supplies on Terminals 77 and 79. The maintained supply is available to drive repeaters and external alarms. Terminals 73 to 76 inclusive provide the necessary signals to external devices to indicate both main and emergency supply status.

The maintained supply is also fed to the fixed voltage regulators, providing both 5V and 20V to internal equipment and zone lines. The positive lead is interrupted by the contacts of RLR to allow disconnection of the supplies for reset purposes.

Voltages W, X and Y, generated by individual potential dividers across the 20V regulated output, provide the reference voltages for comparators IC1, 2 and 3, thus ensuring that, if the 20V supply varies, both voltage references and zone line voltages will vary in sympathy.

The maintained supply is also fed via F4 to the dimmer regulator circuit LM317. With the dimmer switch as shown, the full maintained supply is fed to all front panel LEDs. When the front panel dimmer switch is operated, the voltage to the LEDs is reduced, thus dimming the lamps. This variable supply is marked VAR on the diagram.

## **8. EXTERNAL ALARM MONITOR CIRCUIT**

The diagram shows the two identical comparator circuits which, used together with a diode fitted at the end of the line, monitors external IMM and DEL alarm circuits.

In the non-alarm condition, the maintained positive is fed via IMM2/1 round the alarm cable, the EOL diode to Terminal 29 and hence to the comparator circuit. The comparator output is then low and RLF does not operate. If the line goes open circuit, the positive supply to Terminal 29 fails and the comparator output goes positive and hence RLF operates. During an alarm, the polarity on the alarm line reverses and the EOL diode acts as a backswing diode, reducing RFI, etc.

The DEL alarm circuit is identical to the IMM circuit.