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TITLE	<b>STANDARD FOR AN ADDRESSABLE FIRE DETECTION SYSTEM</b>	REFERENCE	REV
		<b>CP_TSSTAN_059</b>	<b>0</b>
		DATE: <b>MAY 2014</b>	
		PAGE: <b>1</b>	OF <b>21</b>

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## **FOREWORD**

Recommendations for corrections, additions or deletions should be addressed to the:

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2016

## **1. SCOPE**

This standard covers the general technical specifications and components of an analogue addressable fire detection and alarm system.

## **2. GENERAL DESCRIPTION**

The fire detection system shall consist of a central control unit to field devices such as fire detection devices, monitoring and control devices and annunciation devices located throughout the protected area.

The control unit shall continuously monitor the analogue status of all sensing devices and initiate action when a fire or smoke condition is present. The control panel should make all decisions regarding the state of the system from the information received from each field device.

The operation of the system shall be field configurable from the control panel via a keypad or Windows based software to suit the specific application and to permit future changes. This configuration shall be maintained under power failure conditions.

The control unit shall have a front panel comprising of indicating Light Emitting Diode (LED)'s, control keyboard and backlit display screen, as described in detail later. The display screen shall give detail of any event which occurs in the system.

Data ports shall be provided for communicating with remote repeaters, intelligent mimic panel and graphics computers.

The fire panel shall be modular in design and have facilities for operating as stand-alone units, or as part of a network.

## **3. NORMATIVE REFERENCES**

The following national and international standards contain provisions that, through reference in the text, constitute requirements of this document. At the time of publication the editions indicated were valid. All standards are subject to revision and suppliers are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

EN 54 Part 2; *Fire detection and fire alarm systems for buildings. Part 2; Control and indicating equipment*

EN 54 Part 4; *Fire detection and fire alarm systems for buildings. Part 4; Power supply equipment*

SANS/IEC 10139; *Fire detection and alarm systems for buildings — System design, installation and servicing*

SANS/IEC 10400- T; *The application of the national building regulations; Part T: fire protection*

BS 5839. Part 1: *Fire detection and fire alarm systems for buildings. Part 1 Testing and Maintenance Daily Inspection.*

## **4. SYSTEMS OPERATIONS**

The system shall be designed to operate with the minimum operator training. Basic fire alarm functions shall be completely self-explanatory. The occurrence of a fire or fault alarm shall indicate all relevant testing and zone information without operator intervention

In normal condition, the panel shall have the “supply ON” indicator illuminated and the “Processor Running” indicator flashing. The displays screens will show time and date as well as the loop alarm status.

An occurrence of a fire or fault signal or a keyboard operation carried out by an operator shall not inhibit or delay the receipt of an additional alarm. Should any part of the system be isolated or placed in a test mode, an LED on the front panel shall illuminate to indicate the system abnormal status. The condition must also be on the LCD display. The normal operation of the other devices shall not be affected in this state.

#### **4.1. Access levels**

Access to the system shall be protected as follows:

##### **4.1.1. Control Key**

The control key shall be used to enable or disable the keyboard and control keys of the panel.

##### **4.1.2. Access Codes**

Access codes shall be used to prevent unauthorized entry into the programming menus of the panel. Each menu shall be able to have 2 different levels of access.

##### **4.1.3. Door Lock**

The cabinet/panel door lock shall be used to prevent unauthorized entry into the cabinet/panel.

##### **4.1.4. Non – Volatile Memory Switch**

The non-volatile memory switch shall prevent any unauthorized or accidental changes being made to the system configuration data.

#### **4.2. Self-Monitoring**

The control panel shall be designed and programmed to perform self-monitoring. If the control panel detects a fault, it shall result in a fault indication being given by means of a common fault amber LED.

The following shall be continuously monitored by the control panel:

4.2.1. 24V power supply fault ( external power )

4.2.2. Fire brigade/evacuation open circuit

4.2.3. Alarm bell open circuit

4.2.4. Power failure

4.2.5. Watchdog time-out

4.2.6. Low battery

4.2.7. No battery connected

4.2.8. Tamper switch

4.2.9. No printer

4.2.10. Memory lock unlock

4.2.11. Event buffer full

4.2.12. No Communication

4.2.13. Earth fault

4.2.14. Battery over-voltage

4.2.15. RAM memory

4.2.16. EPROM memory check

### **4.3. Fire Alarm Operation**

4.3.1. Any fire alarm will cause the following actions to occur immediately. The display screen shall light up and exhibit the following information;

4.3.1.1. Type of alarm,

4.3.1.2. Zone number,

4.3.1.3. Loop number,

4.3.1.4. Type of sensor

4.3.1.5. Event number

4.3.1.6. Status

4.3.1.7. Number of alarms

4.3.1.8. Time and date

4.3.1.9. Line x 40 characters of user programmable text

4.3.1.10. The common fire indicator and appropriate zone fire indicator shall illuminate;

4.3.1.11. The LED on the affected detector(s) will operate

4.3.1.12. The event shall be logged in memory

4.3.1.13. Programmed relays shall be triggered

4.3.1.14. The fire alarm shall override any fault condition that might be present on the display

4.3.1.15. Bell & fire brigade/evacuation outputs shall become active according to the immediate or delay parameters set

4.3.1.16. Sounders and bell shall continue to operate ( continuous tone ) until silenced by inserting the control key and pushing the silence alarm button

4.3.1.17. If the bells and fire brigade have been silenced they shall become active again for any new fire alarm

4.3.1.18. Sounder circuit controllers shall be sounded as programmed

4.3.1.19. Messages shall be sent to the configured data port and/or printer

4.3.1.20. Coincidence, area and adjacent area devices shall be operated as programmed

4.3.1.21. The programmed I/O's shall be activated ( including inter panel I/O ) and

4.3.1.22. Messages shall be sent to the configured repeater panels, mimic panels and graphic packages.

#### **4.4. Fault Operation**

4.4.1 A fault warning shall cause the following actions to occur immediately. The display screen to light up and display the following information:

4.4.1.1 Type of alarm

4.4.1.2 Loop number

4.4.1.3 Zone number

4.4.1.4 Type of sensor

4.4.1.5 Event number

4.4.1.6 Status

4.4.1.7 Number of alarms

4.4.1.8 Time and date and

4.4.1.9 40 characters of usable programmable

4.4.2 The system fault and appropriate zone fault indicator (LED) shall illuminate.

4.4.3 The "general fault" relay shall be activated.

4.4.4 The panel buzzer shall sound intermittently.

4.4.5 Inputs/outputs configured for the fault shall be operated, if applicable, messages shall be sent to the configured repeater panels, mimic drivers and graphics.

### **5. SYSTEM FEATURES**

The fire panel electronics shall be completely modular offering easy expansion from 2 to 8 loops increments with zone fire and fault indications expandable from 16 to 64 zones in 16 zone increments.

Expanding or adding options shall be by means of plug-in modules that are automatically configured by the system

#### **5.1. Panel Capacity**

Each loop shall be capable of handling a maximum of 126 addressable devices. These devices may be detectors or controllers, monitors and input/output units as described below.

#### **5.2. Device Types**

The panel shall support at least the following type of sensor and monitors:

5.2.1. Fire Sensors

5.2.1.1 Ionization smoke

5.2.1.2 Optical smoke

5.2.1.3 Heat

5.2.1.4 Manual call point (indoor and waterproof)

**5.2.2. Monitoring Controllers**

5.2.2.1 Zone monitoring units; used to interface a conventional zone of detectors to the analogue addressable system

5.2.2.2 Circuit Breaker; for short circuit protection

5.2.2.3 Sounder circuit controller; used to operate sounders in a zone

**5.2.3. Input/output Devices**

5.2.3.1 Input/output Unit: one monitored, and one unmonitored Opto-coupled input and one loop powered relay

5.2.3.2 Output: one loop powered relay

5.2.3.3 Switch monitor: for monitoring normally open or normally closed contacts

5.2.3.4 Switch monitor plus: a standard switch monitor incorporating circuitry to monitor flow switches

5.2.3.5 Mini switch monitor: a switch monitor in a 76 x46 mm molding

5.2.3.6 Mini switch monitor (interrupt): a manual call point monitor incorporating an interrupt facility for fast response

**5.2.4. Gas Units**

5.2.4..1 Gas control unit

5.2.4..2 Gas status unit

5.2.4..3 Gas remote unit

**5.3. Device Identification**

The panel shall automatically identify every device on the address line during initial start-up, and recording this information in memory. Thereafter the panel should check the device type on every scan, and indicate a "wrong device" fault should a device be changed to an incorrect type.

**5.4. Device Status**

The control panel shall poll all devices attached to the system within 5(five) seconds. The analogue value must be read and stored in memory on every scan. The status of a device, once polled, must be assessed by the control panel which should indicate the following conditions:

5.4.1. Fire

5.4.2. Pre-condition

5.4.3. Fault



- Communication

- Wrong device

- Device removed

5.4.4. Maintenance

5.4.5. Device statistics as detailed in paragraph 9.4

## **5.5. Alarm Threshold**

The alarm threshold level of each analogue device shall be individually adjustable from the control panel. Four levels shall be available each having a fixed pre- and fire alarm threshold.

## **5.6. Automatic Compensation**

The system shall automatically raise the alarm threshold of all devices as their quiescent analogue value increases as a result of environmental contamination.

When the maximum level of compensation is reached for a sensor the panel must indicate a "Maintenance" condition for that specific sensor.

## **5.7. Maintenance Conditions**

Maintenance conditions shall be generated either through self-test at pre-programmable times or once maximum level of compensation has been reached.

## **5.8. Alarm Verification**

The control panel shall employ methods to eliminate false alarms from occurring. Alarm verification of automatic devices must be programmable on a zone by basis. Alarm verification shall be selectable as normal, one detector confirmed, or two devices simultaneously in alarm.

Fire alarm response times shall be within the parameters of EN54 Part 2. The reporting of manual call point to the control panel shall be done on interrupt basis. Once devices are in a pre-condition state, the scan rate shall be increased in order to decrease the reaction time.

## **5.9. Line Monitoring**

The control panel shall monitor the loops for short-circuit, open circuit and physical removal of devices from the system. Faults of this nature shall be indicated visibly and audibly within the time period specified in EN54 Part 2.

## **5.10. Memory Allocation**

The control panel shall allow for the allocation of system memory to suit individual site applications. For this purpose system memory shall be able to be allocated to the following functions:

5.10.1. Input/output programming, including Boolean logic

5.10.2. Text

5.10.3. Event buffer

## **6. SIGNALLING AND ANNUNCIATION**

### **6.1. Panel Display**

The control panel shall contain an 8 x 40 character backlit alphanumeric display screen. Two lines x 40 character text shall be provided for field devices; 40 characters only shall be provided for zone, areas and inputs/outputs.

The panel display shall be as specified in EN54 Part 2.

### **6.2. Panel Control**

6.2.1 The control panel shall have the following controlling key as a minimum:

6.2.1.1 Alpha/numeric key with scroll and arrow keys

6.2.1.2 Silence Buzzer

6.2.1.3 Disable Function

6.2.1.4 Test Function

6.2.1.5 Reset

6.2.1.6 Test 3<sup>rd</sup> Source

6.2.2 Sounder

6.2.2.1 Sound Alarms

6.2.2.2 Delay ON/OFF Toggle

6.2.2.3 Fault/Disable

6.2.2.4 Stop Fire Brigade

6.2.3 General Outputs

6.2.3.1 The control panel shall provide, as a minimum, the following general outputs:

6.2.3.2 Common Fire Relay

6.2.3.3 Common Fault Relay

6.2.3.4 Supervised Alarm Bell Relay Supervised Fire Brigade/Evacuation Relay

6.2.3.1 All relays shall operate on 24 VDC

6.2.4 Programmable Outputs

A minimum of 4 programmable output relays shall be provided internally to the panel. It shall be possible to expand this via a current loop connecting to remote fireman's panels which shall provide either 8, 16, 32 or 64 open collector outputs.

Programmable outputs shall also be able to be added at any point the loop taking up one address

6.2.5 Data Outputs

6.2.5.1 The following data outputs shall be provided by the control panel:

6.2.5.1.1 Two RS232 ports which can be assigned to text, graphics, external printer or modem

6.2.5.1.2 Single or Dual RS485 ports available for networking of up to 31 control panels

6.2.5.2 Current loop to drive up to a combination of 15 fireman's panels and repeaters

6.2.6 Programmable Inputs

6.2.6.1 It shall be possible to program inputs and outputs from any of the following sources:

6.2.6.1.1 Panel Inputs

6.2.6.1.2 Panel Relays

6.2.6.1.3 Field I/O devices

6.2.6.1.4 System I/O devices

6.2.6.1.5 Inter-panel I/O by means of networking

6.2.6.2 Programming facilities shall include the use of Boolean algebra.

6.2.7 Networking

The networking capabilities of the system shall be such that up to 32 control panels may be connected via RS 485 medium or optical medium. The system shall ensure rugged, reliable and peerless operation in that no master panel shall be required for the system to operate. It shall be possible to remove and add to the network to allow for easy expansion of the system.

The network shall use an industry standard protocol such as ARCNET or ETHERNET to ensure that no data is corrupted.

6.2.7.1 The network shall be able to provide:

6.2.7.2 Inter-panel Input/output Programming

6.2.7.3 Remote Uploading/Downloading of System Configurations to individual panels

6.2.7.4 Remote Maintenance Features

6.2.7.5 RS232 Nodes for connection to Graphics Packages, Building Management System (BMS) and modems

6.2.7.6 Global Repeater Panel

6.2.7.7 LCD Repeater

## **7. PERIPHERAL PANELS**

### **7.1. Global Repeater Panel**

A global repeater panel shall be provided to display all data, and to provide control of all the control panels on the network at a central point. From the global repeater panel it shall be possible to upload/download and configure any control panel connected to the network.

### **7.2. Fireman's Panel**

7.2.1. The fireman's panel PC board is provided as an open collector repeater in order to accommodate mimic panels and to provide remote zone fire and fault outputs or remote freely programmable outputs. Each output shall drive at least 10ma.

7.2.2. The repeater shall have the following output:

7.2.2.1 Either 8, 16, 32, or 64 freely programmable open collector outputs

7.2.2.1 General alarm

- General fault
- In service/Processor running
- Communication failure

7.2.3. This board shall have inputs for local silence buzzer and LED test. The fireman's PCB shall connect directly to the current loop of the control panel.

### **7.3. Graphics Terminal**

The system shall be capable of operating with colour graphic packages residing on personal computers. The personal computer shall connect directly to the control panel via a RS232 port or to the network via a RS232 node.

## **8. PROGRAMMING**

8.1. Programming shall be possible from the keypad at the front of the panel or by downloading data from a PC. All programming shall be menu-driven and protected by access codes and memory lock. The programming shall allow for at least the following functions:

9.1.1.1 Programming output Relays

9.1.1.2 Programming Detectors

9.1.1.3 Programming Inputs/Outputs

9.1.1.4 Uploading/Downloading of configuration data

8.2. It shall be possible to programme all the above also from a PC by downloading information to the panel. This shall allow the installer/user to have a copy of the complete system's programme in magnetic medium (CD).

8.3. It shall be possible at all time to upload the stored programme to a PC in order to maintain updates.

## **9. MAINTENANCE FUNCTIONS**

### **9.1. Automatic Monitoring**

9.1.1 Every addressable device shall be continuously monitored by the control panel for the following:

9.1.1.1 Removal of Device

9.1.1.2 Quiescent Value

9.1.1.3 Contamination

9.1.1.4 Circuit failure

9.1.1.5 Device Type

9.1.1.6 Communication Quality

9.1.1.7 Short Circuit

9.1.1.8 Open Circuit

9.1.2 Should any of the above parameters be out of specification the panel shall give a fault indication visually and audibly.

9.1.3 A description of the nature of the fault as well as the location of the faulty device shall also be displayed.

9.1.4 The control pane shall also monitor all loops for earth fault which shall be reported as described.

### **9.2. Visual Monitors**

9.2.1. It shall be possible to visually monitor, on a real time basis, the status of each device connected to the system.

9.2.2. Furthermore graphics screens shall be available for zones and individual sensors where the following may be visually monitored:

9.2.2.1 Actual Value

9.2.2.2 Average Value

9.2.2.3 Maximum and Minimum Values

9.2.2.4 Contamination Levels

9.2.2.5 Communication Quality

9.2.3. Each of the above screens shall be able to be printed on demand by means of a printer screen facility.

### **9.3. Archive Facility**

9.3.1. The control panel shall have an archive facility capable of storing the last 999 events. The events shall be stored on a first in, first out basis. It shall be possible to print these events selectively as follows:

9.3.1.1 All Events

9.3.1.2 Fire Events Only

9.3.1.3 Fault Events Only

9.3.1.4 Conditions/Maintenance Events Only

9.3.1.5 Soak Test Results

9.3.1.6 Actions (i.e. Reset/Sound Bell, etc.)

9.3.1.7 Last x Events From A Given Date/Time

#### **9.4. Statistics**

9.4.1. The system shall be able to supply the following statistics per device:

9.4.1.1 Maximum and Minimum Value with Data

9.4.1.2 Average Value

9.4.1.3 Number of Alarms

9.4.1.4 Communication Quality

#### **9.5. System Maintenance Reports**

9.5.1. The following system maintenance reports shall be available on demand:

9.5.1.1 Event Buffer Data

9.5.1.2 Soak Test Results

9.5.1.3 Test Reports

9.5.1.4 Exception Reports

#### **9.6. Service / Commission Mode**

A service/commission mode switch shall be available to assist the installer with the commissioning and servicing of the system. In the service/commission mode all panel outputs shall be disabled in order to prevent false alarms from being raised during the service/commissioning of the system.

#### **9.7. Zone Test Mode**

The control panel shall be able to enter a test mode which shall allow a one person walk test for up to 4 zones simultaneously. When in this mode, the control panel shall not operate any relays or alarms based on the data received from the zones in test. However the panel shall log all alarms occurring in this zone in order to generate a report at the end of test period.

Should an alarm occur in any zone other than those being tested, then the panel is to respond to the alarm in the normal manner.

#### **9.8. Sensor Test**

A self-test feature shall be incorporated in all analogue sensors. The control panel shall initiate the self-test for each sensor and monitor the results obtained from each sensor. After the test is complete the control panel shall evaluate the results and pass or fail each respective sensor. A printout of all sensors failing the test shall be provided.

## **9.9. Soak Test**

Should problems be experienced with a particular sensor, it shall be possible to put that specific sensor into a soak test mode. The soak test feature shall provide the facility to monitor and log, at programmable intervals, all data received from the sensor under test for analysis at a later stage. In this mode the control panel shall not generate any alarms or faults based on the data received from a sensor in soak test mode.

## **9.10. Remote Maintenance**

Remote maintenance of the system shall be able to be performed via modem connection to the network. All control panels on the network shall be able to be accessed remotely via the modem. Entry into the system shall be password protected and it shall be impossible to change any site configurable data without operator intervention at the respective control panel.

It shall be possible, once connected to the site to emulate any panel as if the operator were standing at the panel; Upload/Download the site configuration; selectively retrieve all or part of the event buffer.

The system shall also operate in 'central station' mode whereby the panels may dial to a central station for fires, faults and conditions. The telephone numbers for the central station must be configured in the panel. It shall be possible to dial different stations for fires and faults.

# **10. DETECTORS AND LOOP DEVICES**

- 10.1 All automatic detectors must be formally approved by at least two (2) of the internationally recognized testing laboratories listed below:

10.1.1. Underwriters Laboratories, USA (U.L.)

10.1.2. Verband der Sachschadensekurer, Germany (VDS)

10.1.3. Loss Prevention Certificate Board, Great Britain (LPC)

10.1.4. British Standards, Great Britain (BS)

10.1.5. Underwriters Laboratories, Canada (ULC)

The detectors shall be suitable for connecting to a two-wire 24V central system and operate satisfactorily within the supply voltage range of 17V – 28V DC, and shall be polarity insensitive.

A red indicator LED shall be provided on the detector which illuminate when the detector has reached a pre-set alarm level. The indicator shall be operated independently of the detector from the central control panel. The indicator shall illuminate when there is a fire in the building.

Provision shall be made for an output from the detector suitable for operating a remote indicator or other device with a current limitation of 4 milli amps. The output shall be operated independently of the smoke detector from the central control panel.

Data transmission to and from the control panel from the detector shall be via communications circuitry which is factory fitted to the detector by the original detector manufacturer and forms a complete and integral part of the detector.

The detector shall be supplied complete and fully tested and calibrated. All detectors shall come standard with a locking mechanism.

Separate mounting bases shall be required which enable ready removal of the detector for maintenance. The fitting of a detector into a base shall be a simple one-hand operation without risk of damage to the base or detector. The detector shall click home clearly which shall also be an indication that the detector is fitted correctly. The address of a base shall remain undisturbed and unchanged by the removal or the replacement of a detector. The base shall be electronics free.

Each base shall be provided with a durable tag on which a number or mark is displayed which shall identify the address of the monitor. The bases shall be fitted with dual finger steel receptacles.

The unique address of the detector shall be set by the installer by means of coded plastic card fitted to the detector base. The base shall be electronics.

The detector shall be capable of being remotely tested from the control panel by the transmission of a 3-bit code. The control panel shall raise a maintenance alarm should this test fail.

### **10.1. Optical Smoke Detector**

The photoelectric (optical) smoke detectors shall be suitable for detecting visible smoke such as is produced by slow smouldering fires including burning PVC.

They shall be of the light scattering type using a pulsed internal LED light source and a photo-diode sensor.

The detector shall be capable of operating within the following environmental limits:

Temperature operating range: - 20 degrees Celsius to + 60 degrees Celsius

Humidity operating range: 0% to 95% RH (no condensation)

Wind: Not affected

The construction of the detector and bases shall be white self-extinguishing polycarbonate plastic. All circuitry must be protected against moisture and fungus. Smoke entry points must be protected against dust and insect ingress by corrosion resistant gauze. The optical chamber must be of conductive plastic and have a snap-lock fit for ease of removal when cleaning. The detectors must be non obstructive when installed, having a dimension not exceeding 50mm x 100mm diameter maximum including the mounting base.

The detector shall be capable of protecting an area up to 100 square meters at a height of up to 12m. The installation and siting of the detectors must conform to BS 5839 1988 or similar standards.

### **10.2. Heat Detectors**

The device shall monitor ambient temperature by means of an NTC thermostat.

The detector shall be capable of operating within the following environmental limits:

Temperature operating range: - 200°C to + 600°C

Humidity operating range: 0% to 95% RH (no condensation)

Wind: Not affected

The construction of the detector and bases shall be in white self-extinguishing polycarbonate plastic. Full circuitry must be protected against moisture and fungus. The detectors must be unobstructive when installed, having a dimension not exceeding 50mm x 100mm diameter maximum including the mounting base.



Each detector shall be suitable for protecting an area up to 50m<sup>2</sup> at a height of up to 7.5m. The installation and siting of the detectors must be BS 5839.

### **10.3. Optical Beam Detectors**

An optical beam smoke detector system shall consist of a transmitter unit, a receiver unit and a control unit. Each transmitter unit shall project a modulated infra-red beam on to a receiver unit. Each receiver unit shall analyze the signal, and if smoke is detected an alarm signal shall be transmitted to the control unit. The control unit shall link all sets of beams together for single point control of the entire system.

Unless the unit is addressable and communicates through the system protocol the detector unit shall provide a fire alarm signal in the form of a set of N/O volt free relay contacts which close under alarm conditions and reset when alarm conditions cease to exist.

The unit shall be capable of operating on a 24V DC supply system even when supply voltage drops to a value as low as 17V.

The beam shall be effective over a range of from 9m to 100m and lateral detection shall be effective up to 7.6m either side of the centre line of the actual beam

The unit shall be provided with a self-check function and automatic compensation for dust accumulation, component ageing and temperature changes.

### **10.4. Infra Red and UV flame detector**

#### **10.4.1. Infra-red flame detector**

The flame detector must be of the dual infra-red type, solar blind.

Both alarm and fault relays must be incorporated with the option for use on 4-20mA systems

The spectral response must be between 1.00 and 2.8µm.

The detector must be suitable for 2 or 4 wire operation.

The detector must be capable of detecting hydrogen flame.

#### **10.4.2. UV Flame detector**

The UV flame detector must have a spectral response of 185 to 260 nm.

Both alarm and fault relays must be incorporated.

The detector must be of the non-flameproof type.

The facility must exist to switch out the fault relay for 2 wire operation.

The minimum field of view must not be less than 100°.

The detector must be capable of operating from 12 or 24V DC.

### **10.5. Manual Call Points**

The call point shall be manufactured from self extinguishing red polycarbonate plastic.

The overall size of the call point shall not exceed 87mm x 87mm x 52mm.

The call point shall be based upon a standard product manufactured by a reputable call point manufacturer. The manual call point shall then be modified by the manufacturer of the heat and smoke detectors to incorporate a communications module within the call point.

No external alterations to the call point shall be made other than the fixing of a flush mounted LED to be located to the right of the word "Fire" which shall appear in black letters across the top of the call point on the vertical face. The LED shall be red in colour.

The LED shall illuminate when the call point is activated. However, the illumination of the LED shall be by command from the control panel.

Manual call point units shall be protected against ingress of dust and water to IP65, if so required. A unit mounted outside buildings shall be provided with a hood mounted over the unit.

A call point shall be addressable and compatible with the central control panel. The unit shall be provided with a means of testing. It shall be capable of responding when polled by the fire panel by transmitting its address and status code. It shall be capable of handling the central control panel poll system.

The call point shall be polarity insensitive and shall be capable of operating by means of a 2-wire looped system.

The communication module shall incorporate a special interrupt facility which shall override any other data transmissions taking place in order to inform the central panel that the manual call point has been activated.

#### **10.6. Loop Isolators**

The Loop isolator shall be designed to connect into the loop circuit and monitor the loop for short circuit. In the event of a short circuit occurring the loop isolators on each side of the short circuit is to disconnect and isolate that portion of loop from the system enabling the remainder of the system to function normally.

A light emitting diode (LED) must illuminate when an isolator is in an open condition.

#### **10.7. Zone Monitor Unit**

The zone monitor unit shall interface a zone of conventional, non-addressable detectors and call points to the analogue addressable system. This unit shall connect to the 2-wire loop. The device shall power the conventional zone from the analogue addressable loop and supervise the zone for short circuit and open circuit by means of an end-of-line resistor.

The device shall report fire alarms and faults to the panel under a single address common for all the conventional detectors. The alarm LED on the detectors shall light up in alarm condition. The unit shall have an output to drive a remote LED.

The zone monitor unit shall be available in a flush mount and surface mount version with maximum dimensions 150 x 90 x 48mm.

#### **10.8. Input / Output Unit**

The input/output unit shall provide a programmable voltage-free, single pole, change-over relay output; a single, monitored switch input and an unmonitored, non-polarized opto-coupled input.

The unit shall be loop-powered and operate at between 14 – 28 VDC.

The output relay rating shall be 1A at 30 VAC or DC maximum.

A flush mount and surface mount version shall be available with maximum dimensions 150 x 90 x 48mm.

### **10.9. Output Unit**

The output unit shall provide a voltage-free, single pole; change-over relay output rated at 30 VAC or DC maximum.

The unit shall be loop powered and operate between 14 – 28 VDC.

A flush mount and surface mount version shall be available with maximum dimensions 150 x 90 x 48mm.

### **10.10.Switch Monitor Unit**

The switch monitor unit shall be designed to monitor the state of one or more single pole, volt free contacts connected on a single pair of cables and to report the status to the analogue control panel. The unit shall provide four input states to the control panel: 'Normal', 'Fault', 'Pre-alarm' and 'Alarm'.

The switch monitor unit shall be loop powered and operate between 14 – 28 VDC.

A flush mount and surface mount version shall be available with maximum dimensions 150 x 90 x 48mm.

### **10.11.Switch Monitor plus Unit**

The switch monitor plus unit shall be identified in appearance to the standard switch monitor unit but shall incorporate additional circuitry to monitor flow switches and provide a time delay in so doing. It shall also contain circuitry which can be used to reset a beam detector.

### **10.12.Mini Switch Monitor Unit**

The function of the mini switch monitor shall be identical to that of the standard switch monitor but it shall be housed in a moulding of 76 x 47mm allowing it to be easily incorporated into other equipment. The unit shall have 6 fly leads for connection to the analogue addressable loop, the switch circuit and a remote LED.

### **10.13.Mini Switch Monitor**

The mini switch monitor (interrupt) shall perform the same task as a manual call point and shall incorporate an interrupt facility.

The unit shall be used to monitor contacts and report fire with fast response.

### **10.14.Sounder Control Unit**

The sounder control unit shall be designed to control the operation of a group of externally powered sounders.

The unit shall allow the sounders to be operated continuously or be pulsed, 1 second on; 1 second off.

It shall be possible for sounder control units at different addresses, to be controlled individually or in selectable groups. A facility to synchronise the outputs when being pulsed, shall be available.

The rating of the sounder circuit output shall be 1 A at 30 VDC maximum.

### **10.15.Loop Powered Sounder**

The loop sounder shall connect directly to the analogue addressable loop with its own unique address. The sounder shall be able to be operated in a continuous or pulsed mode. It shall be possible to connect a maximum of 32 sounders to an analogue addressable loop.

The loop sounder shall have an output of 85 dB (A) at 1 metre at a current consumption of only 3mA.

The unit shall be able to be supplied as a sounder base, or a sounder base with cap, for use as a standalone sounder.

### **10.16. Gas Discharge Control Units**

The gas control unit shall be designed to interface a gas protected area to the analogue addressable control panel. The unit shall provide evacuate facilities and shall control the safe discharge of gas.

The self-contained unit shall have key switches for automatic or manual selection, as well as an isolate switch for maintenance and resetting the system after activation.

Indicating dual LED's are to be provided for Auto, Manual, Isolate, Gas Discharge and Fault. A buzzer shall be sounded for fault warning. A lamp test push button shall also be provided.

A dual-action (lift flap break glass) manual gas release device is to be provided on the gas control unit.

Supervised relay contacts are to be provided for the Bell, Siren, Evacuate Sign and Gas discharge. These contacts shall be monitored for short circuit, open circuit and fuse failure. The door interlock mode shall provide a warning buzzer when the door is locked and the gas control unit is in manual mode, or when the door is unlocked and the gas control unit is in the automatic mode.

Internal LED's shall be provided for the various fault conditions to allow for quick maintenance.

Should the protected area have a second entrance, a remote gas unit shall be provided.

The remote gas unit shall provide an indication of the status of the main gas control unit by means of dual LED's as well as a manual call point discharge facility.

A gas status unit shall be provided to indicate the status of the gas control unit. Dual LED's provide indication for Auto, Manual, Isolate, Gas Discharge and Fault.

## **11. SOFTWARE CONTROL**

### **11.1. Reliability of the system,**

11.1.1. In order to ensure the reliability of the system, the following requirements for software design shall apply:

11.1.1.1 The software shall have a modular structure.

11.1.1.2 Measures shall be included in the program to prevent the occurrence of a deadlock in the system.

11.1.1.3 The execution of the program shall be monitored.

11.1.1.4 The memory contents containing program and configuration data shall be checked automatically at intervals not exceeding 1 hour.

### **11.2. Operating Programmes**

All executable code and data shall be held in memory which is capable of continuous, reliable, maintenance free operation, for a period of at least 10 years. The program shall be held in non-volatile memory which can only be written to at access level 4.

### **11.3. Configuration Data**

The site-specific data shall be protected against power loss by a back-up energy source which can only be separated from the memory at access level 4. The back-up battery shall be capable of maintaining the memory contents for at least 5 years.

## **12. POWER SUPPLY AND CHARGER UNIT**

The power supply and charger unit shall form an integral part of the control unit and shall operate from mains power of  $230V \pm 10\%$ .

Each power supply and charger unit shall contain over-voltage protection to prevent any malfunction or damage due to power line surges.

In the event of a failure of the normal mains supply to the central panel there shall be an automatic switch-over to the standby battery supply without disturbing the sound operation of the fire detection system.

The control panel shall be able to house the standby battery of nominally 24V DC rated to maintain operation for a minimum of 24 hours of which at least 1 hour is at alarm status.

The standby battery shall be automatically maintained in a charged condition by the charger unit.

When the AC power is restored the power supply shall automatically revert to battery power, and the system shall remain fully operational.

The power supply and charger unit, including all fuses, shall be entirely supervised. Any malfunction or blown fuse shall result in a fault indication on the control panel.

**ANNEXURE A - Revision information**

DATE	REV. NO.	NOTES
May 2014	0	First issue