



Fire detection and evacuation solutions that save lives.



# XP95 Product Guide

MAN3037-6

## Contents

1	Introduction .....	1
2	Application of XP95 Detectors .....	1
3	Addressing and Communications .....	1
4	Approvals & Regulatory Compliance .....	2
5	Protocol Features:.....	4
6	Ionisation Smoke Detector .....	5
6.1	Operating Principles: .....	5
6.2	Electrical Description:.....	6
6.3	Environmental Characteristics: .....	7
6.4	Safety Note: .....	8
6.5	Product Codes .....	8
6.6	Technical Data: .....	9
7	Optical Smoke Detector .....	10
7.1	Operating Principles: .....	10
7.2	Electrical Description:.....	10
7.3	Environmental Characteristics: .....	11
7.4	Product Codes .....	11
7.5	Technical Data:.....	12
8	Heat Detector .....	13
8.1	Operating Principles: .....	13
8.2	Electrical Description:.....	14
8.3	Environmental Characteristics: .....	14
8.4	Product Codes .....	15
8.5	Technical Data .....	15
9	MultiSensor Detector .....	17
9.1	Operating Principles: .....	17
9.2	Product Codes .....	17
9.3	Technical Data:.....	18
10	XP95 Manual Call Point .....	19
10.1	Operating Principles: .....	19
10.2	Product Codes .....	19
10.3	Technical Data:.....	20
11	XP95 Mounting Base .....	21
11.1	XP95 Mounting Bases and XPERT cards.....	21
11.2	Product Codes .....	21
12	XP95 Isolators .....	22
12.1	Electrical Description .....	22
12.2	Product Codes .....	22
13	Intelligent Reflective Beam Detector .....	23
14	Loop-Powered Sounders, Beacons & Sounder Beacons .....	24
15	EMC .....	27
16	Acknowledgement .....	27

## 1 Introduction

The XP95 range of intelligent fire detectors is advanced in design, improved in performance and has unique features that benefit the installer and the end user. The range includes ionisation and optical smoke detectors, heat detectors as well as a multisensor. All have an unobtrusive profile, a zero insertion force base, user friendly addressing and extended data and alarm features. A manual call point, an isolating base, sounders, beacons and other compatible products are also available.

These detectors have been carefully researched and developed by the design team and the range has undergone rigorous testing to ensure that it meets not only European and other standards but also the demands of today's high technology environments.

This Product Guide aims to provide engineers with full information on XP95, in order to be able to design optimum solutions to fire protection problems.

## 2 Application of XP95 Detectors

The choice of detector from the XP95 range follows the well established principles of system design. That is, the optimum detector type will depend on the type of fire risk and fire load, and the type of environment in which the detector is sited.

For general use, smoke detectors are recommended since these give the highest level of protection. Smoke detectors from the XP95 range may be ionisation, optical or multisensor types. It is generally accepted that ionisation types have a high sensitivity to flaming fires whereas optical detectors have high sensitivity to smouldering fires. As a result of this, ionisation types are widely used for property protection, and optical types for life protection. These general principles still apply to XP95 detectors although the availability of a multisensor in the range offers more choice to the system designer.

The multisensor is basically an optical smoke detector and will therefore respond well to the smoke from smouldering fires. The detector also senses air temperature. This temperature sensitivity allows the multisensor to give a response to fast burning (flaming) fires, which is similar to that of an ionisation detector. The multisensor can therefore be used as an alternative to an ionisation detector.

Where the environment is smoky or dirty under normal conditions, a heat detector may be more appropriate. It must be recognised, however, that any heat detector will respond only when the fire is well established and generating a high heat output. Unless otherwise specified, devices described in this guide are suitable for indoor use only.

## 3 Addressing and Communications

Each XP95 device responds to interrogation and commands from the central control equipment. It communicates to the panel information on status, command bits, type, location, and other information that allows an alarm to be raised even when the device is not itself being interrogated. Message error checking is also provided. The devices are compatible with Series 90, Discovery® and XPlorer systems and control equipment to aid maintenance, extension and upgrade of existing systems.

A unique, patented XPERT card provides simple, user friendly and accurate identification of detector location whereby a coded card, inserted in the base, is read by any detector once it is plugged in. All the electronic components are in the detector but the location information is held in the base. The address card simplifies and speeds up installation and commissioning. Addressing errors during maintenance and service are eliminated.

The XP95 manual call point continues to use DIL switch addressing, but its interrupt feature also provides automatic reporting of its location in the interrupt mode.

The XP95 detectors provide an alarm facility that automatically puts an alarm flag on the data stream and reports its address when the pre-set EN54 thresholds are exceeded. The devices provide great flexibility in system design with the control equipment determining the characteristics of the system.

	Ionisation	Optical	Multisensor	Heat
Overheating/thermal combustion	Poor	Very Good	Very Good	Very Poor
Smouldering/glowing combustion	Moderate/Good	Good	Good	Very Poor
Flaming combustion	Very Good	Good	Good	Poor
Flaming with high heat output	Very Good	Good	Very Good	Moderate/Good
Flaming-clean burning	Poor	Very Poor	Moderate/Good	Moderate/Good

Table 1 - Response characteristics of smoke and heat detectors.

## 4 Approvals & Regulatory Compliance

The XP95 range of detectors and manual call points is approved by a large number of third party certification bodies around the world. These include detector approvals to EN54:2000 with LPCB, VdS, DIBT, BOSEC, AS1603 with Activfire, AS7240 with SAI Global and to UL268 and 521 with UL.

XP95 detectors comply with the requirements of a number of European New Approach Directives, such as the EMC Directive 89/336/EEC, the Construction Products Directive 89/106/EEC and the Construction Products Regulations (EU) No 305/2011.

All XP95 products will comply with the marking requirements of the WEEE Directive, 2002/96/EC.

### Australian Standards

Currently there are two standards in Australia for point type smoke detectors, the older AS1603.2 standard, and AS7240.7 – which has been adopted from the ISO7240.7 standard (this standard is heavily based on the European EN54.7 standard).

AS1603.2 requires the nominal sensitivity (S) of the detector to be between 0 and 15 %Obs/m, with the maximum sensitivity being greater than 0.5S or S-2 and a minimum sensitivity being less than 1.5S or S+2. The test method is specified in AS2362.17 – which states the smoke is produced by burning untempered hardboard (masonite) and the spread of the smoke is unassisted. In practise the smoke does not disperse evenly and tends to “clump” together, and therefore it is not uncommon to get a “spread” of obscuration levels.

AS7240.7 does NOT require the sensitivity of the detector to be within a set range. The detector is tested with 4 “test fires” (smouldering wood, smouldering cotton, flaming plastics and flaming heptane) – and the detector must go into alarm before the end of test condition. The end of test condition is an obscuration

level (obscuration level is different for each “test fire” type). The obscuration threshold of the detector is determined (using an aerosol generated from pharmaceutical grade paraffin oil) to verify the repeatability, directional dependence and reproducibility of the detector meets the requirements of the standard. The test apparatus used to determine the sensitivity uses wind to assist the dispersion of the aerosol.

As the composition of the “smoke” between AS1603.2 and AS7240.7 is different and the test apparatus is different – the resulting threshold sensitivities between the two standards differ. Generally, the sensitivities measured under AS1603.2 are higher (up to 5%Obs/m) than measured under AS7240.7. A reason for this is that the smoke spread under AS7240.7 is uniform – as it is wind assisted.

It should be noted that under AS7240.7 – the performance of the detector is determined by the response to the 4 test fires, NOT the threshold sensitivity level.

## 5 Protocol Features:

**Control Unit Interrogation and Command:** 3 bits of command instruction and the 7- bit address are issued by the control equipment following an initiating pulse.

**Interrupt Warning:** Notification that an XP95 manual call point or XP95 Mini Switch Monitor (interrupt) has been operated.

**Analogue Value Report:** Status continually reported.

**Input Bits Reporting:** Field devices advise control equipment of actions they have taken. For smoke and temperature detectors, these confirm compliance with the output command bits. Bit information depends on device type.

**Automatic Type Identification:** The device being interrogated replies with a 5 bit type code, allowing up to 32 device types.

**Address Confirmation:** The 7- bit address (up to 126 devices per loop) of the detector responding is confirmed back to the control unit.

**XP95 Device Flag:** Tells the control equipment that more information is available.

**Alarm Flag:** For accelerated alarm reporting.

**Parity Error Check:** For received message accuracy.

**Interrupt or Alarm Address:** Provides fast location of a device in alarm state.

**High Level Integration:** ASICs technology for lower component count.

**Zero Insertion Force Base:** For easier installation and maintenance.

**Ease of Maintenance:** Snap lock chambers for easy cleaning.

**Surface Mounted Components:** For long life and high reliability

**Latest Data Reported:** As well as free running data update, device will update data when the preceding device is being interrogated.

**XPERT Card Addressing:** For fast reliable installation and service.

**Unobtrusive Design:** For elegant designs in modern buildings.

## 6 Ionisation Smoke Detector

### 6.1 Operating Principles:



The XP95 ionisation smoke detector has a moulded self-extinguishing white polycarbonate case with wind resistant smoke inlets. Stainless steel wiper contacts connect the detector to the terminals in the mounting base. Inside the detector case is a printed circuit board that has the ionisation chamber mounted on one side and the address capture, signal processing and communications electronics on the other.

The ionisation chamber system is an inner reference chamber contained inside an outer smoke chamber (Fig 1). The outer smoke chamber has smoke inlet apertures that are fitted with an insect resistant mesh.

The radioactive source holder and the outer smoke chamber are the positive and negative electrodes respectively. An Americium 241 radioactive source mounted within the inner reference chamber irradiates the air in both chambers to produce positive and negative ions. On applying a voltage across these electrodes an electric field is formed as shown in Fig 2. The ions are attracted to the electrode of the opposite sign, some ions collide and recombine, but the net result is that a small electric current

flows between the electrodes. At the junction between the reference and smoke chambers is the sensing electrode that is used to convert variations in the chamber currents into a voltage.

When smoke particles enter the ionisation chamber, ions become attached to them with the result that the current flowing through the ionisation chamber decreases. This effect is greater in the smoke chamber than in the reference chamber and the imbalance causes the sensing electrode to go more positive.

The voltage on the sensing electrode is monitored by the sensor electronics and is processed to produce a signal that is translated by the A/D converter in the communications ASIC ready for transmission when the device is interrogated.

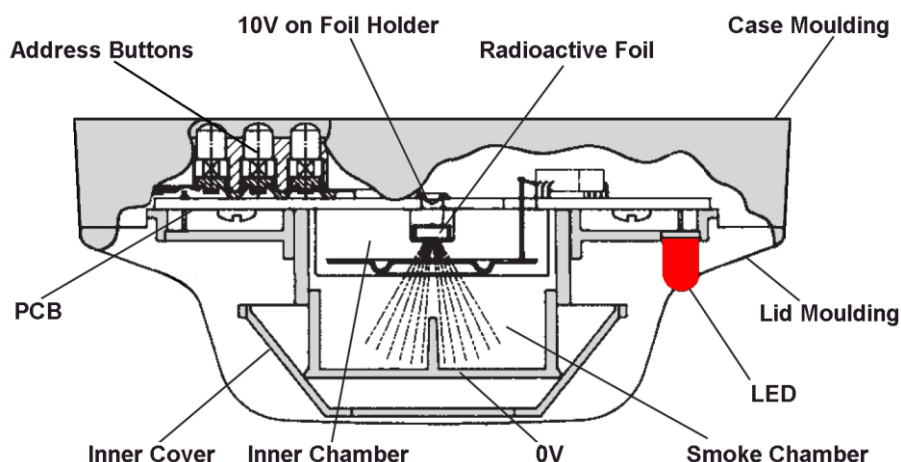


Figure 1 – Sectional View – XP95 Ionisation Smoke Chamber

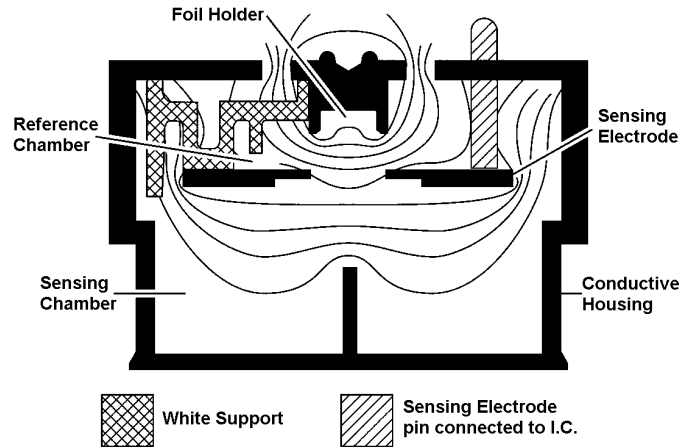


Figure 2 – Diagram Showing Lines of Equipotential for the XP95 Ionisation Smoke Monitor

## 6.2 Electrical Description:

The detector is designed to be connected to a two wire loop circuit carrying both data and a 17V to 28V dc supply. The detector is connected to the incoming and outgoing supply via terminals L1 and L2 in the mounting base. A remote LED indicator requiring not more than 4mA at 5V may be connected between +R and -R terminals. An earth connection terminal is also provided, although this is not required for the functioning of the detector.

When the device is energised the ASICs regulate the flow of power and control the data processing. The ionisation chambers are energised and the ultra low leakage sensor ASIC provides a conditioned analogue signal to the analogue to digital (A/D) converter within the communications and processing ASIC. When smoke enters the ionisation chambers through the integral gauze, the voltage at the sensing electrode increases to produce an analogue signal. An A/D conversion of the signal from the ionisation chambers is carried out once per second or when either the detector or preceding address is being interrogated. Whenever the device is interrogated this data is sent to the control equipment. EN54 threshold alarm levels are calibrated within the processing ASIC. If the device is not addressed within 1 second of its last polling and the analogue value is greater than 55 the alarm flag is initiated and the device address is added to the data stream every 32 polling cycles from its last polling for the duration of the alarm level condition, except when the alarming device is being interrogated. This can provide a location identified alarm from any device on the loop in approximately two seconds.

The detector is calibrated to give an analogue value of  $25 \pm 7$  counts in clean air. This value increases with smoke density. A count of 55 corresponds to the EN54 alarm sensitivity level. See Fig 3. Counts of 8 or less indicate fault conditions. Count levels between 45 counts and 55 counts can be used to provide an early warning of fire.

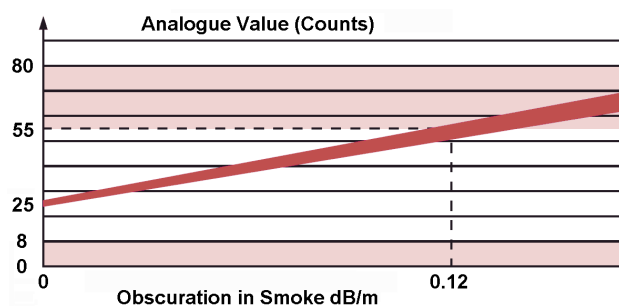


Figure 3 – Typical Response Characteristics – XP95 Ionisation Detector



### 6.3 Environmental Characteristics:

XP95 ionisation smoke detectors are designed to operate in a wide variety of environments (See Figs 4 to 6). There are only small effects from temperature, humidity, atmospheric pressure and wind. Detectors are well protected against electromagnetic interference over a wide frequency range.

The XP95 ionisation detector, like all ionisation detectors, has some sensitivity to air movement (wind). The extent to which the analogue value will change depends on the wind speed and on the orientation of the detector relative to the wind direction. Relatively small changes in wind direction can cause significant changes in analogue value.

For wind speeds up to 1m/s (200ft/min) the change in analogue value will not exceed 5 counts. Continuous operation in wind speeds greater than 2m/s (400ft/min) is not recommended. However, wind speeds up to 10m/s (2000ft/min) can be tolerated for short periods and will not under any conditions increase the probability of false alarms.

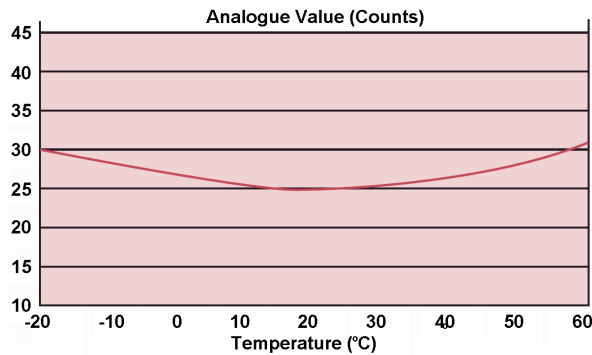


Figure 4 – Typical Temperature Response – XP95 Ionisation Detector

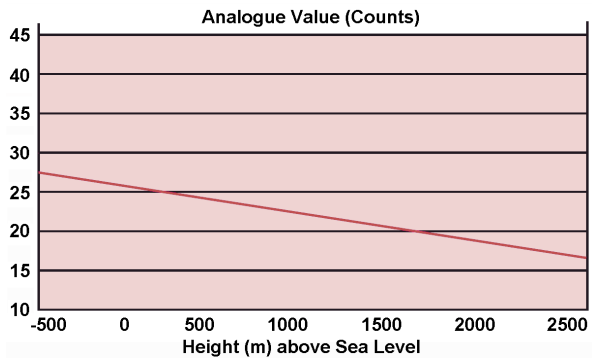


Figure 5 – Typical Pressure Response – XP95 Ionisation Detector

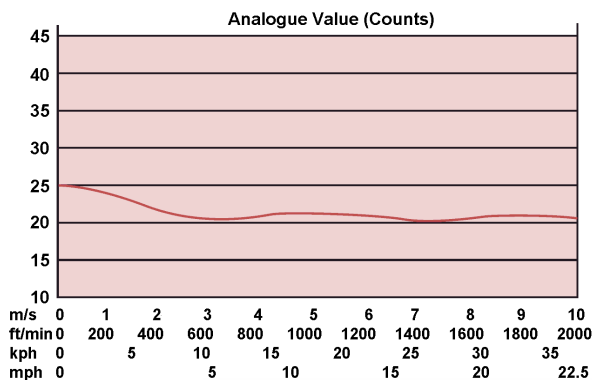


Figure 6 – Typical Wind Speed Response – XP95 Ionisation Smoke Detector

## 6.4 Safety Note:

In the United Kingdom, ionisation smoke detectors are subject to the requirements of the Radioactive Substances Act 1993 and to the Ionising Radiations Regulations 1999 made under the provisions of the Health and Safety at Work Act 1974.

The detectors, independently tested by the National Radiological Protection Board (NRPB), conform to all the requirements specified in the 'Recommendations for ionisation smoke detectors in implementation of radiation standards' published by the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD) 1977.

There is no limit to the number of ionisation smoke detectors which may be installed in any fire protection system within the UK. See Certificate of Approval No. TA1 of 1999 issues by the HSE for further details.

Storage regulations depend on local standards and the legislation, but, in the UK, the number of ionisation smoke detectors in any building or premises shall be less than 500. See Certificate of Approval No. TA3 of 1999 issued by the HSE for further details.

At the end of their recommended working life of ten years, ionisation smoke detectors should be returned to the manufacturer for safe disposal or disposed of in an otherwise locally approved and environmentally safe manner.

Guidance on storage and handling details can be requested from:

Radioactive Substances Regulation Function  
 Environment Agency  
 Rio House, Waterside Drive  
 Aztec West, Almondsbury  
 Bristol BS32 4UD.

Outside the UK, please contact the relevant national agency.

## 6.5 Product Codes

Product Description	(EN54-7)	SAI Global (AS7240-7)	Activfire (AS1603-2)
XP95 Ionisation Smoke Detector	55000-520AMP	4106-2002	201-0002 (55000-530)
XP95 Ionisation Smoke (Black) Detector	55000-560AMP	4106-2011	201-0091 (55000-560)

## 6.6 Technical Data:

Specifications are typical and given at 23°C and 50% relative humidity unless specified otherwise.

<b>Detector Type:</b>	<b>XP95 Ionisation Smoke Detector - Point type smoke detector for fire detection and alarm systems for buildings</b>
<b>Detection Principle:</b>	Ionisation Chamber
<b>Chamber Configuration:</b>	Twin compensating chambers using one single sided ionising radiation source
<b>Radioactive isotope:</b>	Americium 241
<b>Activity:</b>	33.3 kBq, 0.9 $\mu$ Ci
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Terminal Functions:</b>	L1 and L2: supply in and out connections +R remote indicator positive connection (internal 2.2K $\Omega$ resistance to positive) -R remote indicator negative connection (internal 2.2K $\Omega$ resistance to positive)
<b>Supply Voltage:</b>	17 - 28V DC
<b>Modulation Voltage at detector:</b>	5-9V peak to peak
<b>Quiescent Current:</b>	280 $\mu$ A average, 500 $\mu$ A peak
<b>Power-up Surge Current:</b>	1mA
<b>Maximum power up time:</b>	4 seconds for communications, 10 seconds to exceed 10 counts, 15 seconds for stable clean air value
<b>Clean-air analogue value:</b>	25 $\pm$ 7counts
<b>Alarm Level Analogue Value:</b>	55
<b>Alarm Indicator:</b>	Light Emitting Diodes (LEDs); illuminating red in alarm. Optional remote LED
<b>Alarm LED Current:</b>	2mA
<b>Remote LED Current:</b>	4mA at 5V (measured across remote load)
<b>Type Code:</b>	(210 43) 011 00
<b>Storage Temperature:</b>	-30°C to +80°C
<b>Operating Temperature:</b>	-20°C to +70°C
<b>Guaranteed Temperature Range:</b>	-20°C to +60°C (no condensation or icing)
<b>Humidity:</b>	0% to 95% relative humidity (no condensation or icing)
<b>Wind Speed:</b>	10m/s maximum
<b>Atmospheric Pressure:</b>	Automatic compensation by dual chambers to maintain sensitivity up to 2,000m above sea level.
<b>Vibration, Impact &amp; Shock</b>	To EN54-7: 2000
<b>IP Rating:</b>	23D
<b>Dimensions:</b>	Detector: 100mm Dia x 42mm H, Detector in Base: 100mm Dia x 50mm H
<b>Weights:</b>	Detector 105g, Detector in Base:161g
<b>Material:</b>	Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel

## 7 Optical Smoke Detector

### 7.1 Operating Principles:



The XP95 optical detector uses the same outer case as the ionisation smoke detector and is distinguished by the indicator LED which is clear in standby and red in alarm. Within the case is a printed circuit board which on one side has the light proof labyrinth chamber with integral gauze surrounding the optical measuring system and on the other the address capture, signal processing and communications electronics.

An infrared light emitting diode within its collimator is arranged at an obtuse angle to the photo-diode. The photo-diode has an integral daylight-blocking filter. The IR LED emits a burst of collimated light every second. In clear air the photo-diode receives no light directly from the IR LED because of the angular arrangement and the dual mask. When smoke enters the chamber it scatters photons from the emitter IR LED onto the photo-diode in an amount related to the smoke characteristics and density. The photo-diode signal is processed by the optical ASIC and passed to the A/D converter on the communications ASIC ready for transmission when the device is interrogated.

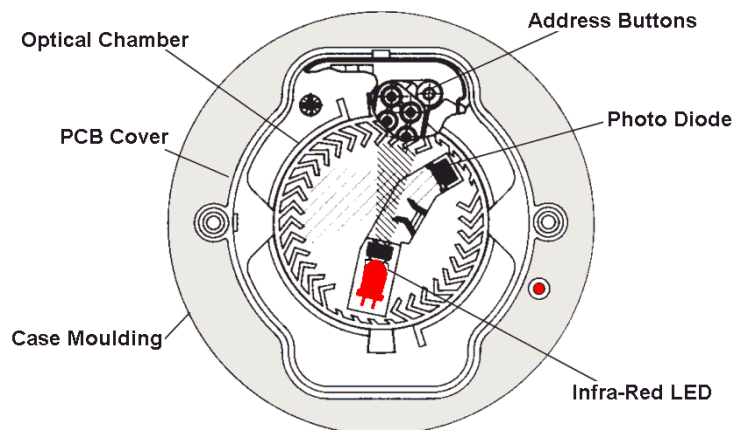


Figure 7 – Top Section – XP95 Optical Smoke Detector

### 7.2 Electrical Description:

The detector is designed to be connected to a two wire loop circuit carrying both data and a 17V to 28V dc supply. The detector is connected to the incoming and outgoing supply via terminals L1 and L2 in the mounting base. A remote LED indicator requiring not more than 4mA at 5V may be connected between the +R and -R terminals. An earth connection terminal is also provided.

When the device is energised the ASICs regulate the flow of power and control the data processing. The optical ASIC is controlled by the communications ASIC and pulses the IR LED. The signal from the photo-diode is processed by the optical ASIC and transferred to the A/D converter in the communications ASIC where it is then stored. When smoke enters the chamber the photo-diode signal increases. The information to the A/D converter is updated once per second or when either the monitor or the preceding address is interrogated. Whenever the device is interrogated this data is sent to the control equipment. EN54 threshold alarm levels are calibrated within the processing ASIC. If the device is not addressed within 1 second of its last polling and the analogue value is greater than the EN54 alarm level the alarm flag is

initiated and the device address is added to the data stream every 32 polling cycles from its last polling for the duration of the alarm level condition, except when the alarming device is being interrogated. This can provide a location identified alarm from any device on the loop in approximately 2 seconds.

The detector is calibrated to give an analogue value of  $25 \pm 7$  counts in clean air. This value increases with smoke density. A count of 55 corresponds to the EN54 alarm sensitivity level. See Fig.10.

### 7.3 Environmental Characteristics:

The XP95 optical smoke detector is unaffected by wind or atmospheric pressure and operates over the temperature range  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ . See Fig. 10.

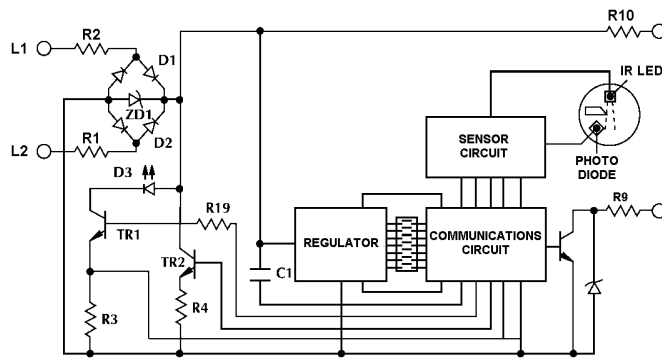


Figure 8 – Schematic Diagram – XP95 Optical Smoke Detector

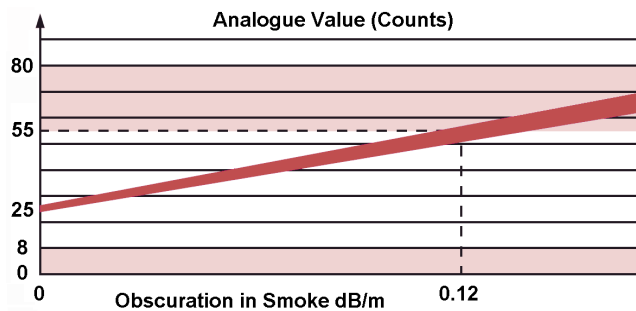


Figure 9 – Typical Response Characteristic – XP95 Optical Smoke Detector

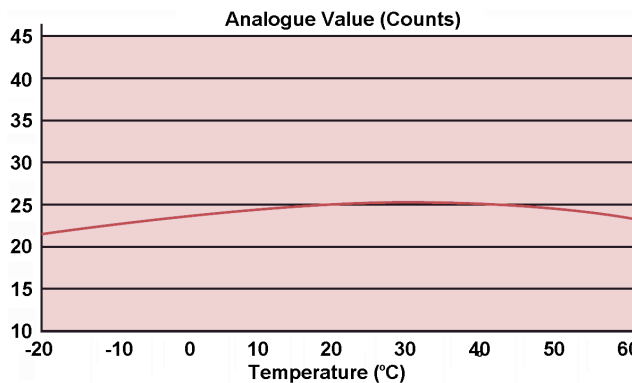


Figure 10 – Typical Temperature Response – XP95 Optical Smoke Detector

### 7.4 Product Codes

Product Description	(EN54-7)	SAI Global (AS7240-7)	Activfire (AS1603-2)
XP95 Optical Smoke Detector	55000-620AMP	4106-2001	201-0003 (55000-630)
XP95 Optical Smoke (Black) Detector	55000-660AMP	4106-2010	201-0092 (55000-660)

## 7.5 Technical Data:

Specifications are typical and given at 23°C and 50% relative humidity unless specified otherwise.

<b>Detector Type:</b>	<b>XP95 Optical Smoke Detector - Point type smoke detector for fire detection and alarm systems for buildings</b>
<b>Detection Principle:</b>	Photo-electric detection of light scattered in a forward direction by smoke particles
<b>Chamber Configuration:</b>	Horizontal optical bench housing an infra-red emitter and sensor arranged radially to detect forward scattered light
<b>Sensor:</b>	Silicon PIN photo-diode
<b>Emitter:</b>	GaAs Infra-red light emitting diode
<b>Sampling Frequency:</b>	1 per second
<b>Sensitivity:</b>	Nominal response threshold value of 0.2 dB/m when measured in accordance with EN54-7:2000
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Terminal Functions:</b>	L1 and L2: supply in and out connections +R remote indicator positive connection (internal 2.2KΩ resistance to positive) -R remote indicator negative connection (internal 2.2KΩ resistance to positive)
<b>Supply Voltage:</b>	17 - 28V DC
<b>Quiescent Current:</b>	340μA average 600μA peak
<b>Power-up Surge Current:</b>	1mA
<b>Duration of Power-up Surge Current:</b>	0.3s
<b>Maximum Power-up Time:</b>	4 seconds for communications, 10 seconds to exceed 10 counts, 35 seconds for stable clean air value
<b>Alarm Current, LED on:</b>	3.5mA
<b>Alarm Level Analogue Value:</b>	55
<b>Clean-air Analogue Value:</b>	25 ±7 counts
<b>Alarm Indicator:</b>	Clear Light Emitting Diodes (LEDs); illuminating red in alarm. Optional remote LED
<b>Alarm LED Current:</b>	4mA
<b>Remote LED Current:</b>	4mA at 5V (measured across remote load)
<b>Type Code:</b>	(210 43) 101 00
<b>Storage Temperature:</b>	-30°C to +80°C
<b>Operating Temperature:</b>	-20°C to +60°C
<b>Guaranteed Temperature Range:</b>	-20°C to +60°C (no condensation or icing)
<b>Humidity:</b>	0% to 95% relative humidity (no condensation or icing)
<b>Effect of Atmospheric Pressure:</b>	Unaffected
<b>Effect of Wind Speed:</b>	Unaffected by wind
<b>Vibration, Impact &amp; Shock</b>	To EN54-7: 2000
<b>IP Rating:</b>	23D
<b>Dimensions:</b>	Detector: 100mm Dia x 42mm H, Detector in Base: 100mm Dia x 50mm H
<b>Weights:</b>	Detector 105g, Detector in Base:157g
<b>Material:</b>	Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel

## 8 Heat Detector

### 8.1 Operating Principles:



The XP95 heat detectors have a common profile with ionisation and optical smoke detectors but have a low air flow resistance case made of self-extinguishing white polycarbonate.

The devices monitor heat by using a single thermistor network which provides a voltage output proportional to the external air temperature.

The standard heat detector will respond to increasing air temperature in such a way that it is classified as an A2S device providing 55 counts at 55°C. See figure 13.

A high temperature CS heat detector which can be installed in a typical ambient temperature of 55°C is available. See figure 14. This device will give 55 counts at 90°C.

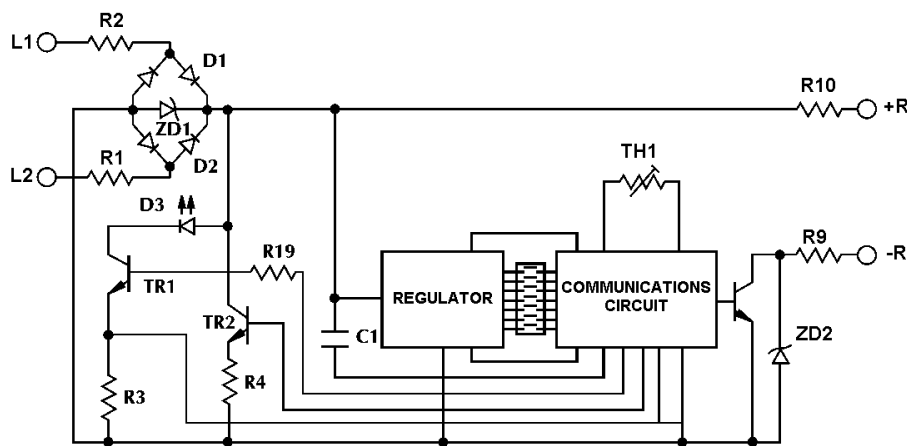


Figure 11 – Schematic Diagram – XP95 Heat Detector

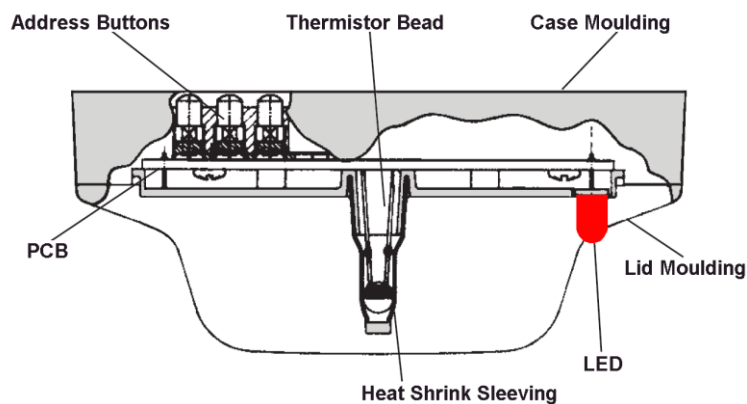


Figure 12 – Sectional View – XP95 Heat Detector

### 8.2 Electrical Description:

The detectors are designed to be connected to a two wire loop circuit carrying both data and a 17V to 28V dc supply. The detectors are connected to the incoming and outgoing supply via terminals L1 and L2 in the mounting base. A remote LED indicator requiring not more than 4mA at 5V may be connected between +R and -R terminals. An earth connection terminal is also provided.

When a device is energised the ASIC regulates the flow of power and controls the data processing. The thermistor provides an output over normal operating ranges that is proportional to the external air temperature. This voltage output is processed in the A/D converter and stored by the communications ASIC. It is transmitted to control equipment when the device is interrogated. When a count of 55 is exceeded the alarm flag is initiated and the device address is added to the data stream every 32 polling cycles from its last polling for the duration of the alarm level condition, except when an alarming device is being interrogated.

This can provide a location identified alarm from any device on the loop in approximately two seconds. The detector is calibrated to give an analogue value of  $25 \pm 5$  counts at  $25^{\circ}\text{C}$ .

### 8.3 Environmental Characteristics:

XP95 Standard Heat Detectors operate over the range  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , the High Temperature Heat Detectors operate over the range  $-20^{\circ}\text{C}$  to  $+120^{\circ}\text{C}$ . The detectors are unaffected by atmospheric pressure.

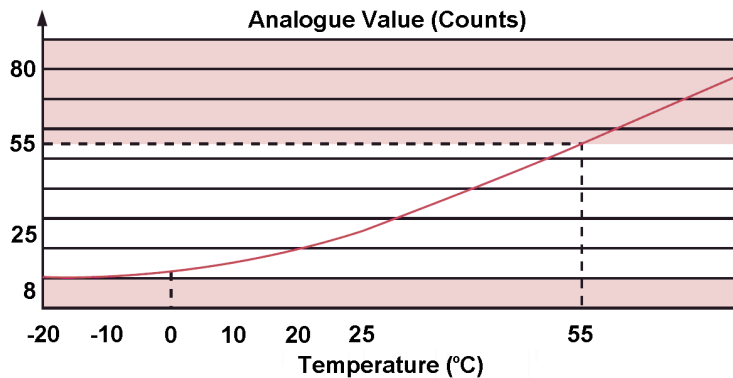


Figure 13 – Typical Response Characteristic – XP95 Standard Heat Detector A2S (55°C)

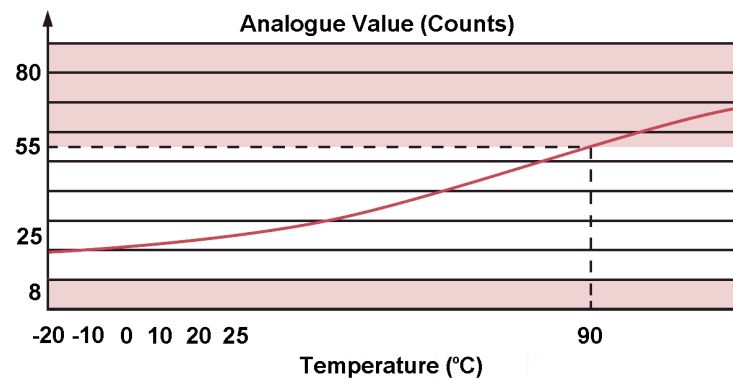


Figure 14 – XP95 High Temperature Heat Detector CS (90°C)



## 8.4 Product Codes

Product Description	(EN54-5)	SAI Global (AS7240-5)	Activfire (AS1603-1)
XP95 Heat Detector (Type A & B) A2S (55°C)	55000-420AMP	4106-2003	201-0001 (55000-430)
XP95 Heat Detector High Temp CS (90°C)	55000-401APO	N/A	N/A

## 8.5 Technical Data

Specifications are typical and given at 23°C and 50% relative humidity unless otherwise stated.

<b>Detector Type:</b>	XP95 Heat Detector (Standard Temperature) - Point type heat detector for fire detection and alarm systems for buildings
<b>Detection Principle:</b>	Linear approximation over temperature range 25°C to 90°C
<b>Sensor:</b>	Single NTC Thermistor
<b>Sampling Frequency:</b>	Continuous
<b>Sensitivity:</b>	25°C to 90°C: 1°C/count. -20°C returns 8 counts
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Terminal Functions:</b>	L1 and L2 supply in and out connections, polarity insensitive +R remote indicator positive connection (internal 2.2KΩ resistance to positive) -R remote indicator negative connection (internal 2.2KΩ resistance to positive)
<b>Supply Voltage:</b>	17 - 28V DC
<b>Communication Protocol</b>	5-9V peak to peak
<b>Quiescent Current:</b>	250μA average, 500μA peak
<b>Duration of Power-up Surge Current:</b>	0.3 seconds
<b>Power-up Surge Current:</b>	1mA
<b>Maximum power up time:</b>	4 seconds
<b>Analogue Value at 25°C:</b>	25 ± 5 counts
<b>Alarm Level 55 Counts:</b>	55°C when measured under static conditions
<b>Alarm Indicator:</b>	Light Emitting Diodes (LEDs); illuminating red in alarm. Optional remote LED
<b>Alarm LED Current:</b>	2mA
<b>Remote LED Current:</b>	4mA at 5V (measured across remote load)
<b>Type Code:</b>	(210 43) 110 00
<b>Storage Temperature:</b>	-30°C to +80°C
<b>Operating Temperature:</b>	-20°C to +70°C
<b>Guaranteed Temperature:</b>	-20°C to +70°C (no condensation or icing)
<b>Operating Humidity:</b>	0 to 95% relative humidity (no condensation)
<b>Wind Speed:</b>	Unaffected in fixed temperature use
<b>Atmospheric Pressure:</b>	Unaffected
<b>Vibration, Impact &amp; Shock</b>	To EN54-5: 2001
<b>IP Rating:</b>	53 in accordance with BSEN60529
<b>Dimensions:</b>	Detector: 100mm Dia x 42mm H, Detector in Base: 100mm Dia x 50mm H
<b>Weights:</b>	Detector 105g, Detector in Base:157g
<b>Material:</b>	Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel

<b>Detector Type:</b>	<b>XP95 Heat Detector (High Temperature) - Point type heat detector for fire detection and alarm systems for buildings</b>
	Specifications are the same as those for the standard detector, apart from the following points:
<b>Detector Principles:</b>	Linear approximation designed to give 25 counts at 25°C and 55 counts at 90°C
<b>Sensitivity:</b>	25°C to 90°C: 2.17°C/count. -20°C returns 20 counts

## 9 MultiSensor Detector

### 9.1 Operating Principles:



The XP95 multisensor detector contains an optical smoke sensor and a thermistor temperature sensor whose outputs are combined to give the final analogue value.

The multisensor construction is similar to that of the optical detector but uses a different lid and optical mouldings to accommodate the thermistor temperature sensor. The sectional view (Fig.15) shows the arrangement of the optical chamber and thermistor.

The signals from the optical smoke sensing element and the temperature sensor are independent, and represent the smoke level and the air temperature respectively in the vicinity of the detector. The detector's microcontroller processes the two signals. The temperature signal processing extracts only rate of rise information for combination with the optical signal. The detector will not respond to a slow temperature increase - even if the temperature reaches a high level. A large sudden change in temperature can, however, cause an alarm without the presence of smoke, if sustained for 20 seconds.

The processing algorithms in the multisensor incorporate drift compensation. The control panel must not have a drift compensation algorithm enabled.

The sensitivity of the detector is considered the optimum for most general applications since it offers good response to both smouldering and flaming fires.

Note: in situ testing of the multisensor should be carried out as for smoke detectors.

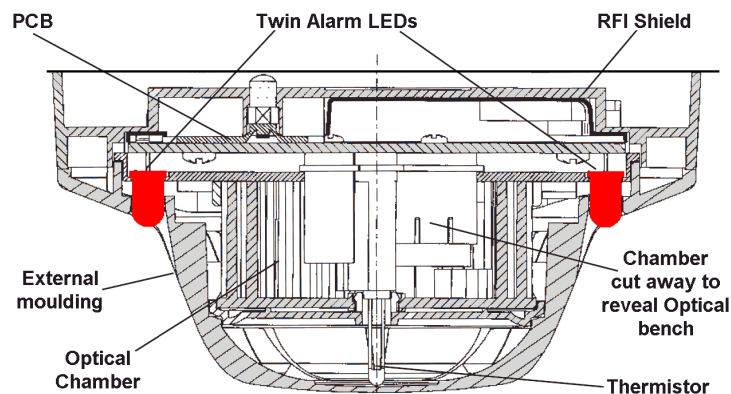


Figure 15 – Sectional View – XP95 Multisensor Detector

### 9.2 Product Codes

Product Description	(CEA4021)	SAI Global (AS7240-15)
XP95 Multisensor Detector	55000-885AMP	4106-2004

### 9.3 Technical Data:

Specifications are typical and given at 23°C and 50% relative humidity unless otherwise stated.

<b>Detector Type:</b>	<b>XP95 Multisensor Detector - Point type heat detector for fire detection and alarm systems for buildings</b>
<b>Detection Principle:</b>	Smoke: Photo-electric detection of light scattered in a forward direction by smoke particles Heat: Temperature dependant resistance
<b>Type Code:</b>	(210 43) 10111
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Terminal Functions:</b>	L1 and L2: supply in and out connections +R remote indicator positive connection (internal 2.2KΩ resistance to positive) -R remote indicator negative connection (internal 2.2KΩ resistance to positive)
<b>Supply Voltage:</b>	17 - 28V DC
<b>Communication Protocol</b>	XP95 5-9V peak to peak
<b>Quiescent Current:</b>	500μA average 750μA peak
<b>Power-up Surge Current:</b>	1mA
<b>Maximum power up time:</b>	10s
<b>Alarm Current, LED on:</b>	3.5mA
<b>Remote LED Current:</b>	4mA at 5V (measured across remote load)
<b>Clean-air analogue value:</b>	23 +4/-0
<b>Alarm level analogue value:</b>	55
<b>Alarm Indicator:</b>	2 colourless Light Emitting Diodes (LEDs); illuminating red in alarm. Optional remote LED
<b>Temperature range:</b>	Max. continuous operating +60°C Min. continuous operating 0°C Min. operating (no condensation/icing): -20°C Storage: -30°C to +80°C
<b>Humidity:</b>	0% to 95% relative humidity (no condensation or icing)
<b>Effect of Temperature on Optical Detector:</b>	Less than 15% change in sensitivity over rated range. Slow changes in ambient conditions will automatically be compensated and will not affect sensitivity.
<b>Effect of Atmospheric Pressure:</b>	None
<b>Effect of Wind Speed:</b>	None
<b>Vibration, Impact &amp; Shock</b>	To EN54-7: 2000 and EN54-5: 2000
<b>IP Rating:</b>	23D
<b>Dimensions:</b>	Detector: 100mm Dia x 50mm H, Detector in Base: 100mm Dia x 58mm H
<b>Weights:</b>	Detector 105g, Detector in Base:160g
<b>Material:</b>	Detector housing: White polycarbonate rated V-0 in accordance with UL 94. Terminals: Nickel plated stainless steel
<b>Smoke element only:</b>	
<b>Chamber confirmation:</b>	Horizontal optical bench housing infra –red emitter and sensor, arranged radially to light detect forward scattered
<b>Sensor:</b>	Silicon PIN photo diode
<b>Emitter:</b>	GaAIAs infra red light emitting diode
<b>Sampling frequency:</b>	1 per second

## 10 XP95 Manual Call Point

### 10.1 Operating Principles:



The XP95 EN54- 11:2001 compliant Manual Call Point (MCP) is based on the KAC conventional MCP range. The address of each call point is set at the commissioning stage by means of a seven-segment DIL switch.

A single bi-coloured alarm LED is provided on the call point. This LED is controlled, independently of the call point, by the control panel. The red LED is lit when the call point has been activated. An amber/yellow LED indicates a fault.

Call points can be remotely tested from the panel by transmission of a single bit in the communications protocol. Call points respond by providing a value of 64 which corresponds to the alarm value. The panel should recognise this response as a test signal and should not raise a general alarm.

XP95 Manual Call Points incorporate an integral short circuit isolator and are provided with a resettable element. A backbox, for surface mounting is also provided as standard. If a glass or flush mounting tray is required, these are available on request. Versions with a pattress box are also available.

To provide additional protection against accidental operation, a transparent hinged cover with a locking tag, is available, which can be fitted to the manual call point. *Please note that the call point does not conform to EN54-11:2001 when this lid is fitted and secured with the locking tag.*

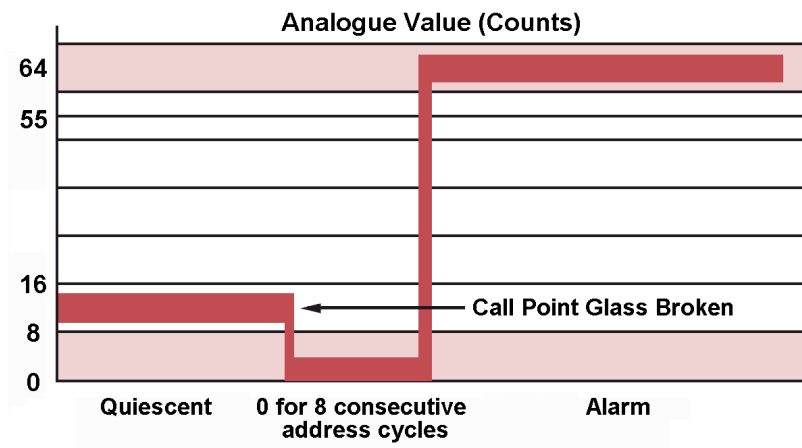


Figure 16 – Typical Response Characteristics – XP95 Manual Call Point

### 10.2 Product Codes

Product Description	Part Number	Item Number
XP95 Manual Call Point with Isolator - Red (Surface)	55100-908AMP	213-0051
XP95 Manual Call Point - Red (Surface)	55100-905AMP	213-0050

### 10.3 Technical Data:

Specifications are typical and given at 23°C and 50% relative humidity unless otherwise stated.

<b>Call Point Type:</b>	<b>Deformable element</b>
<b>Detection Principle:</b>	Operation of a switch
<b>Weight:</b>	151g
<b>Alarm Indicator:</b>	Red Light Emitting Diode (LED)
<b>Fault Indicator:</b>	Amber/Yellow Light Emitting Diode (LED)
<b>Type Code:</b>	(210 43) 111 11
<b>Supply Wiring:</b>	Two wire monitored supply, polarity insensitive
<b>Loop Connections:</b>	Terminal Block L1 and L2
<b>Operating Voltage:</b>	17 - 28V DC
<b>Communication Protocol:</b>	5-9V peak to peak
<b>Quiescent Current:</b>	100µA at 24V DC
<b>Power-up Surge Current:</b>	1mA
<b>Maximum power up time:</b>	1s
<b>Alarm Current, LED on:</b>	4mA
<b>Normal analogue value:</b>	16
<b>Alarm State Value:</b>	64
<b>Temperature Range:</b>	Maximum continuous operating +60°C Minimum continuous operating 0°C Minimum operating -20°C (no condensing/icing) Storage -30°C to +80°C
<b>Humidity:</b>	0 to 95% relative humidity (no condensation)
<b>Compliance Standard:</b>	To EN54-11: 2001, EN54-17:2005 (isolated version)
<b>IP Rating:</b>	24D
<b>Dimensions:</b>	89mm x 93mm x 26.5mm (manual call point) 87mm x 87mm x 32mm (back box)
<b>Material:</b>	Housing: Red self-coloured polycarbonate/ABS

## 11 XP95 Mounting Base

### 11.1 XP95 Mounting Bases and XPERT cards.



The XP95 smoke and heat detectors all fit the XP95 mounting base. The base is a zero insertion force base with dual finger receptacles of stainless steel into which the detector terminals slide. Cable connections of up to 2.5mm diameter are made via captive cable clamps.

There are four double terminals and one single one,

- L1 line IN and OUT, double terminal
- L2 line IN and OUT, double terminal
- +R remote LED positive supply, double terminal
- R remote LED negative supply, double terminal

The remaining single terminal is isolated and can be used to provide continuity of an earth or shield.

Universal address cards, known as XPERT cards are supplied with all bases. Consult the coding guide to determine which pips are to be removed. Pre-printed and pre-punched address cards that save time and increase accuracy during commissioning are available in sets, part number: 38531-771. The base has a 'one way only' fit and detectors can be locked into the base by a grub screw with the aid of a 1.5mm hexagonal driver.

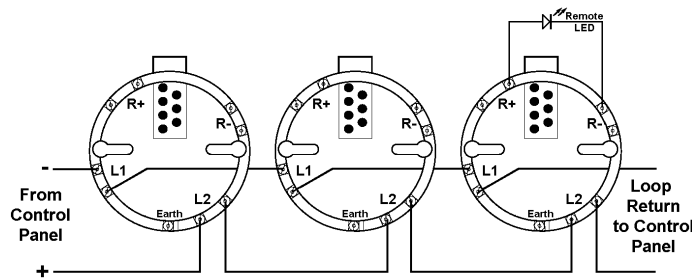


Figure 17 – Schematic Wiring Diagram – XP95 Mounting Base

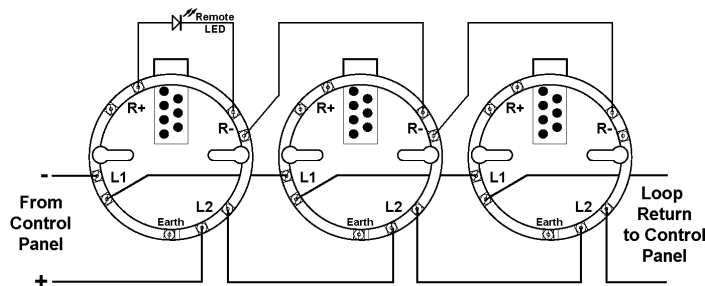


Figure 18 – Schematic Wiring Diagram of XP95 Detector Circuit with a Common Remote LED

### 11.2 Product Codes

Product Description	Part Number	Item Number
XP95 Detector Base with Xpert Card	45681-210AMP	201-0004
XP95 Detector Base with Xpert Card (Black)	45681-361APO	201-0093

## 12 XP95 Isolators



The isolating base senses and isolates short circuit faults on XP95 and Discovery loops and spurs. The base is loop powered, polarity sensitive and accepts the XPERT card to set the associated device address.

In short-circuit conditions the integral yellow LED is illuminated. The detector associated with the base remains active under short circuit conditions. Power and signals to the affected section are restored automatically when the fault is cleared.

The isolating base is intended for use with equipment using the Apollo XP95 and Discovery communication protocol.

### 12.1 Electrical Description

Under normal operating conditions, a low impedance is present between the –IN and the –OUT terminals of the base, so that power and signals pass to the next base in line.

If a short circuit or abnormally low impedance occurs, the fall in voltage is sensed and the base isolates the negative supply in the direction of the fault. The isolated section is tested using a current pulse every five seconds. When the short circuit is removed, the power will automatically be restored.

If it is a requirement that no device is lost in the event of a single short circuit, every detector should be fitted to an isolating base.

In applications where it is not necessary to use an isolating base for each detector, up to twenty (20) or equivalent surge current may be installed between isolating bases.

Stand-alone isolators, which have their own bases, may be used instead of isolating bases. The isolators are wired to a loop between detectors or other devices.

For further information on the use of isolators in XP95 systems refer to Ampac Product Data sheet PDS201-9001.

### 12.2 Product Codes

Product Description	Product Number	Item Number
XP95/Discovery Isolating Base with Xpert Card	45681-284AMP	201-0125
XP95/Discovery Isolator	55000-720APO	201-0172
XP95/Discovery Isolator Base (for above)	45681-211AMP	201-0006



## 13 Intelligent Reflective Beam Detector



The intelligent reflective beam detector is a compact detector for detecting smoke in large open areas such as atria, warehouses, theatres and churches.

The transmitter and receiver form a single unit mounted to a wall of the building. A reflector which returns the IR beam from the transmitter to the receiver is mounted on the opposite wall. In the event of smoke partially obscuring the light an imbalance between the transmitted and received light will occur. On interrogation by the control panel the detector will then transmit an alarm value.

The intelligent reflective beam detector is supplied in two versions: one for use at distances of 5–50m from detector to reflector and the other for distances of 50–100m. Both units incorporate a short

circuit isolator.

The detector is non-latching and resets 30 seconds after an alarm event ceases and in 3 seconds after the removal of a fault. A termination backbox, part no 29600-241, is available. This allows easy first fixing of the cabling and terminations to the intelligent reflective beam detector. The termination backbox can be surface or flush mounted.

Product Description	Product Number	Item Number
XP95 Reflective Beam (5-50M) Detector	55000-268APO	201-1074
XP95 Reflective Beam (50-100M) Detector	55000-273APO	201-0171

## 14 Loop-Powered Sounders, Beacons & Sounder Beacons

There are two types of loop powered sounder available, allowing fire engineers to specify not only the sound output but also the functionality of individual sounders.

The 85dB(A) Low-Profile loop sounder is intended for use in confined spaces such as hotel rooms and corridors. It is designed to have a base and detector mounted upon it, but can also be used as a stand-alone sounder. The 100dB(A) loop sounder is intended as an open-space sounder, where a higher output is required.

Alarms may be signalled visually by means of a flashing beacon. Combined sounder beacon units are available where both audible and visual signalling is required.

The following types of device are available:

### Ancillary Base Sounder



A local-area sounder with an integral base for a detector head. The sounder is switched by the detector remote output and needs no address of its own. Sound output 85dB(A) at 1 metre.

Product Description	Product Number
XP95 Ancillary Base Sounder	45681-276AMP

### Integrated Base Sounder



A sounder with two volume ranges 55–75dB(A) and 75–91dB(A) which incorporates a detector base. It is supplied with ‘alert’ and ‘evacuate’ tones. The low tone range is useful in areas such as hospitals where a fire alert is initially intended to warn staff only. The sounder is set to high range for general use. Synchronisation of tones ensures the integrity of the signal tones from different sounders do not merge into one signal that could be mistaken for a different tone.

Product Description	EN54-3	AS1670-4	NZS4512
XP95 Integrated Base Sounder	45681-278APO	201-0110	45681-304AMP
XP95 Integrated Base Sounder with Isolator	45681-277AMP		
White Base Sounder Cap	45681-292	201-0114	45681-292
Red Base Sounder Cap	45681-293	201-0119	45681-293

## Open Area Loop Powered Sounders



The Intelligent Open Area Sounder is a loop powered, wall mounted device offering a choice of three tones, Australian (AS1670-4), New Zealand (NZS4512) and Europe (EN54-3) and incorporates synchronisation of continuous and pulsed tones. This ensures the integrity of the alert signals – tones from different sounders do not merge into one signal that could be mistaken for an Evacuate signal.

A nominal sound output of 96dB is achieved at a current consumption of 5mA while the acoustic self test feature enables the sounder to listen to itself when switched on and if no sound is detected, a fault signal will be transmitted to the control panel. A yellow Fault LED will also be illuminated when a detection loop short circuit is detected.

Product Description	EN54-3	AS1670-4	NZS4512
XP95 Open Area Red Sounder	55000-001AMP	205-0100	55000-003AMP
XP95 Open Area White Sounder	55000-002AMP	205-0101	55000-004AMP

## Loop-powered Beacon



The beacon has been developed to alert those with hearing difficulties and to be used in areas with a high background noise level. The beacon is fitted to any XP95 or Discovery base.

Product Description		AS1670-4
XP95 Loop Powered Beacon Red	55000-877AMP	201-0118
XP95 Loop Powered Beacon Clear (Red Flash)	55000-878AMP	201-0157
XP95 Loop Powered Beacon Amber	55000-879AMP	201-0156

## Sounder Beacon Base



This device combines a local-area sounder and a flashing beacon. It has an integral isolator and base for a detector head. Detection is thus co-located with both audible and visual alarms and short circuit isolation.

Product Description	EN54-3	AS1670-4	NZS4512
XP95 Sounder Beacon Base	45681-331AMP	201-0116	45681-338AMP
XP95 Sounder Beacon Base with Isolator	45681-330AMP		
White Base Sounder Cap	45681-292	201-0114	45681-292
Red Base Sounder Cap	45681-293	201-0119	45681-293

## Multi-tone Open-area Sounder Beacons



The Intelligent Open Area Sounder Beacon is a loop powered, wall mounted device offering a choice of three tones, Australian (AS1670-4), New Zealand (NZS4512) and Europe (EN54-3) and incorporates synchronisation of continuous and pulsed tones.

A nominal sound output of 100dB is achieved at a current consumption 8mA. The beacon is activated whenever the sounder is active and cannot be controlled separately. The acoustic self test feature enables the sounder to listen to itself when switched on and if no sound is detected, a fault signal will be transmitted to the control

panel.

Product Description	EN54-3	AS1670-4	NZS4512
XP95 Open Area Sounder Beacon Red	55000-005AMP	205-0102	55000-007AMP
XP95 Open Area Sounder Beacon White / Clear	55000-006AMP	205-0103	55000-008AMP

## 15 EMC

All XP95 detectors and manual call points comply with the requirements of the following EMC standards:

**Generic Emission Standard EN 61000-6-3**

Emission standard for residential, commercial and light industrial environments.

**Generic Emission Standard EN 61000-6-4** Emission standard for industrial environments.

**EN 50130-4 : Alarm Systems** Electromagnetic compatibility - product family standard Immunity requirements for components of fire, intruder and social alarm systems

**EN 6100-4-2** Electrostatic discharge

**EN 6100-4-3** Radiated immunity

**EN 6100-4-4** Fast transient bursts

**EN 6100-4-5** Surge immunity

**EN 6100-4-6** Conducted immunity

In addition, all of the XP95 detectors have been assessed to the additional VdS EMC requirements, which are shown below and have been demonstrated full compliance.

Additional VdS requirements: 30V/m with 80% Am sine and 100% pulse modulation depth over the frequency ranges 415 to 467MHz and 890 to 960MHz.

## 16 Acknowledgement

The XP95 range of detectors and products are manufactured for Ampac by Apollo Fire Detectors Ltd.

### UNCONTROLLED DOCUMENT

NOTE: Due to AMPAC's commitment to continuous improvement specifications may change without notice.