


...XP95



- Ionisation Smoke Detector**
- Optical Smoke Detector**
- Temperature Detector**
- Multisensor Detector**
- Manual Call Point**
- Isolating Base**



The XP95 range of analogue addressable 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, temperature 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, isolator, loop sounder and other compatible products are also available.

XP95 detectors replaced the well-proven Series 90 range and are electrically compatible with them.

These detectors have been carefully researched and developed by the Apollo 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.








Apollo Fire Detectors Limited, part of the Halma plc group of companies, operates from one site at Havant, near Portsmouth, England. All departments - Research and Development, Sales and Marketing, Manufacturing and Finance - are located there. Apollo applies the most modern production techniques and has invested in sophisticated manufacturing equipment to ensure consistent high quality of product and fast response to customer requirements. Through planned expansion Apollo has reached a leading position in the market for professional fire detectors and exports over half of its production to countries around the world.



#### Key features

- Address Confirmation
- Automatic Type Identification
- Interrupt Warning
- Analogue Value Report
- Input Bits Reporting
- XP95 Device Flag

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	<b>Application of XP95 Detectors</b>	2
	<b>Addressing and communications</b>	2
	<b>Features of the XP95 Range</b>	3
	<b>Ionisation Smoke Detector</b>	
	Operating principles	4
	Electrical description	5
	Environmental characteristics	5
	Safety note	6
	Technical data	6
	<b>Optical Smoke Detector</b>	
	Operating principles	7
	Electrical description	7
	Environmental characteristics	7
	Technical data	8
	<b>Temperature Detector</b>	
	Operating principles	9
	Electrical description	9
	Environmental characteristics	9
	Technical data	10
	<b>Multisensor Detector</b>	
	Operating principles	11
	Technical data	12
	<b>Manual Call Point</b>	
	Operating principles	13
	Technical data	14
	<b>XP95 Mounting Base</b>	15
	<b>XP95 20D Isolating Base</b>	
	Operating principles	16
	Electrical description	16
	Technical data	16
	<b>Isolator</b>	17
	<b>Loop-powered beam detector</b>	17
	<b>MiniDisc remote indicator</b>	17
	<b>Loop-powered sounders</b>	17
	<b>Flame detector</b>	17
	<b>Maintenance of detectors</b>	17
	<b>Approvals</b>	17

## 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.

## ADDRESSING AND COMMUNICATIONS

Each XP95 device responds to interrogation and command from 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 and Discovery® systems and control equipment to aid maintenance, extension and upgrade of existing systems.

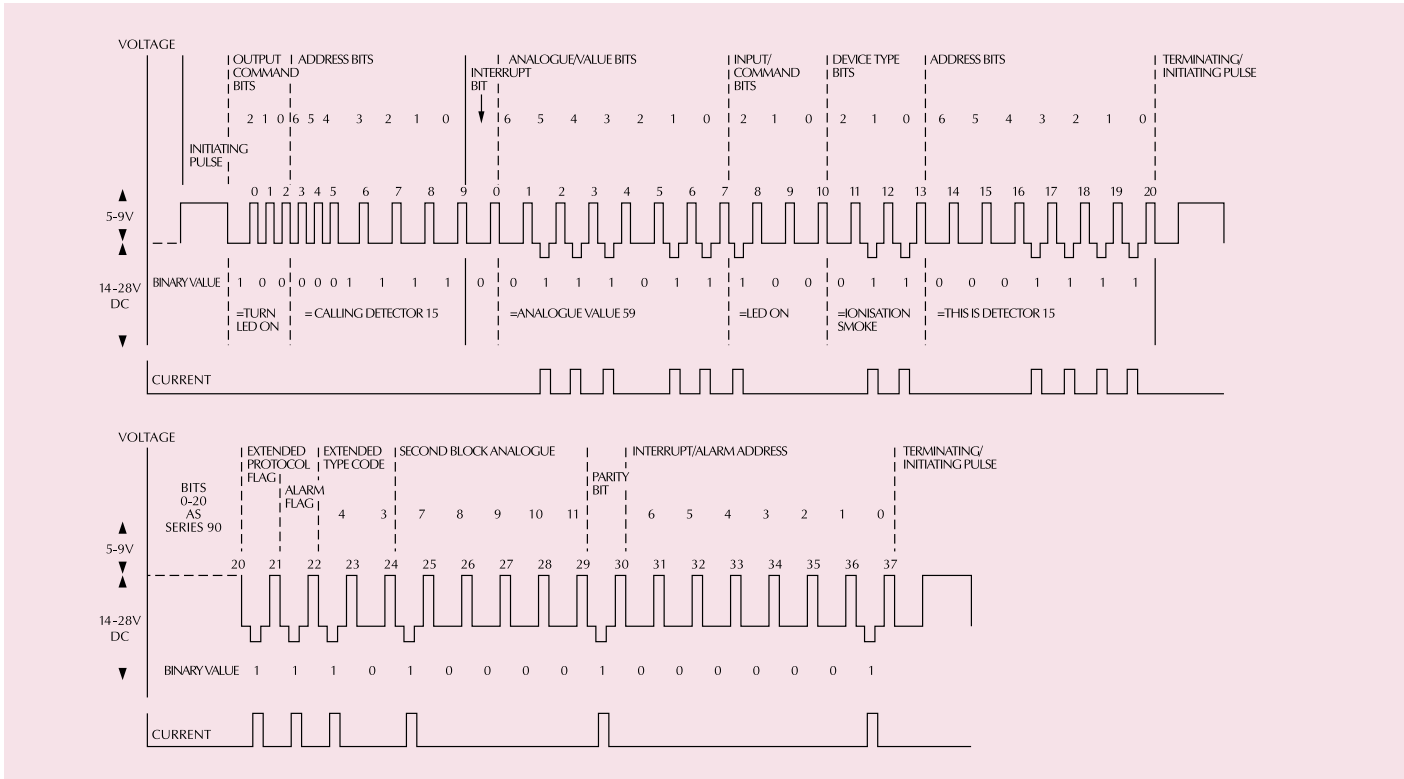
A unique, patented XPERT card provides simple, user friendly and accurate identification of detector location whereby a coded card, inserted in the base, is read by any detector once it is plugged in. All the electronic components are in the detector but the location information is held in the base. 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. A large and growing range of compatible control equipment is available from many sources - details are included in Apollo publication PP1010, which is available on request.

page  
2

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



**Fig.1** Series 90 Protocol (above) XP95 Protocol Extension (below)

## 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.

## ENGINEERING FEATURES

### 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.



XP95 Ionisation Smoke Detector

▲ Part Number 55000-500

page  
4

## 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 monitor 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 2). 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 3. The ions are attracted to the electrode of the opposite sign, some ions collide and recombine, but the net result

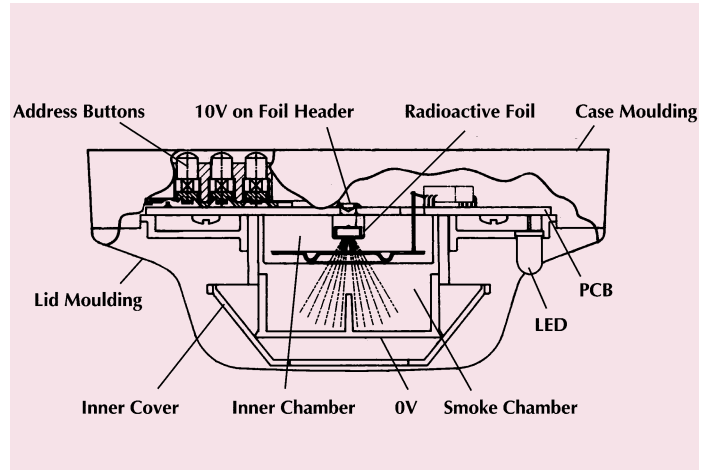


Fig.2 Sectional view - XP95 Ionisation Smoke Detector

is that a small electric current flows between the electrodes. At the junction between the reference and smoke chambers the reference and smoke chambers 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. Full details and specifications are provided in the XP95 Communications System Engineering Design Guide, PP1036.

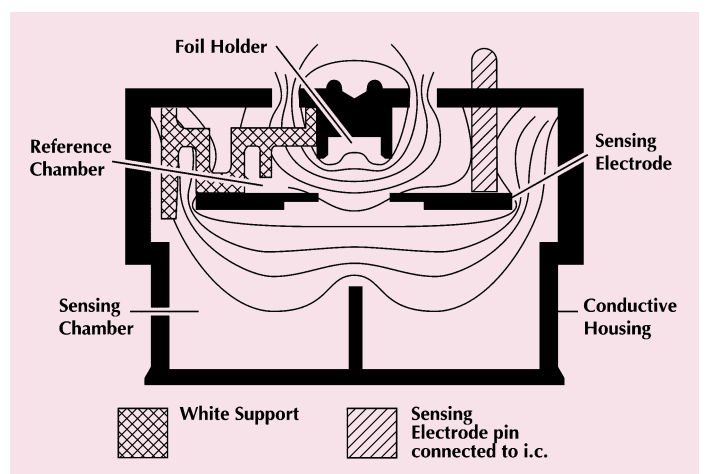


Fig.3 Diagram showing lines of equipotential for the XP95 Ionisation Smoke Monitor

## 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 4. 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.

## ENVIRONMENTAL CHARACTERISTICS

XP95 ionisation smoke detectors are designed to operate in a wide variety of environments (See Figs 5 to 7). There are only small effects from temperature, humidity, atmospheric pressure and wind. Detectors are well protected against electromagnetic interference over a wide frequency range.

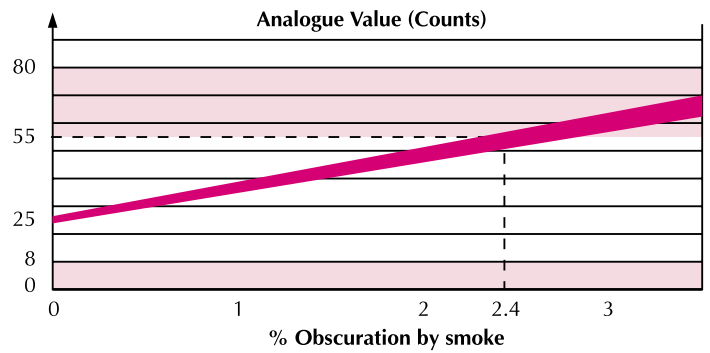


Fig.4 Typical response characteristics - XP95 Ionisation Detector

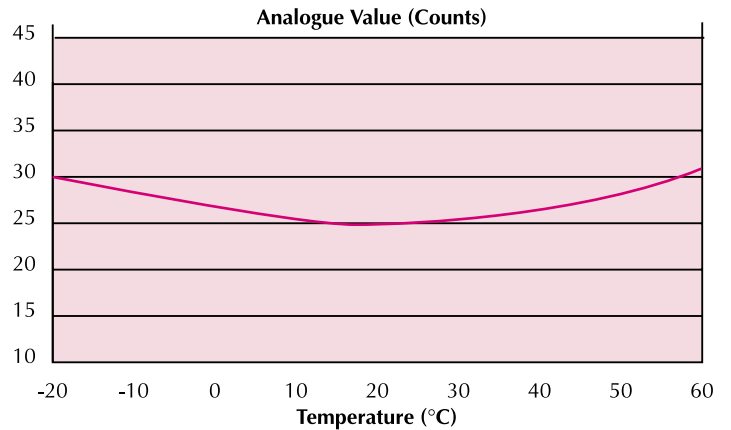


Fig.5 Typical temperature response - XP95 Ionisation Detector

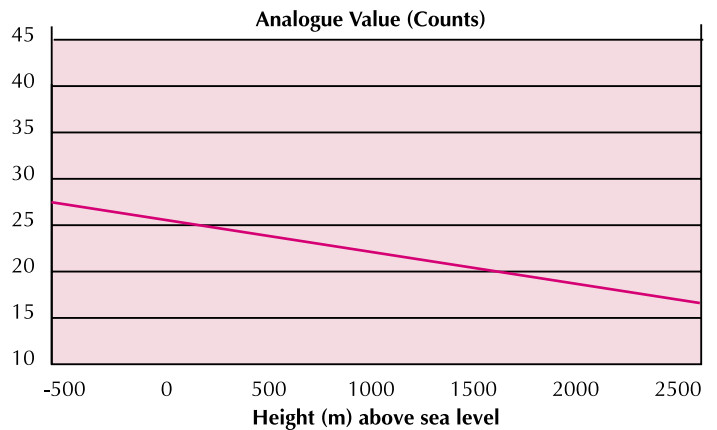


Fig.6 Typical pressure response - XP95 Ionisation Detector

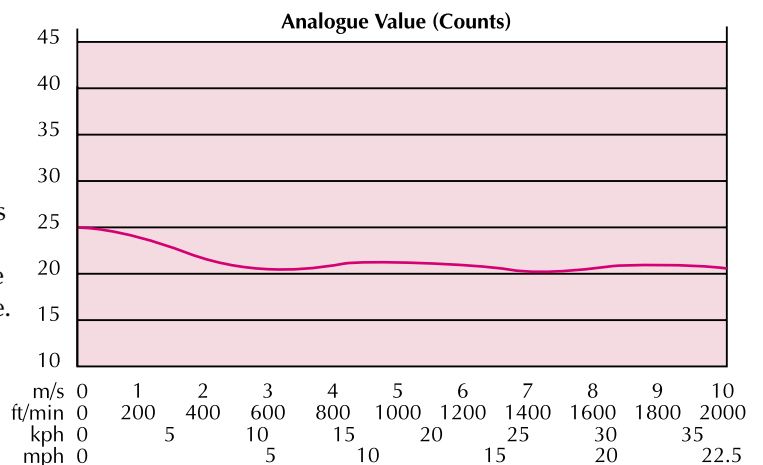


Fig.7 Typical wind speed response - XP95 Ionisation Smoke Detector

## TECHNICAL DATA

**XP95 Ionisation  
Detector Part No 55000-500  
Base Part No 45681-210**

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

**Detector Type:**  
Products of combustion  
(smoke)

**Detection Principle:**  
Ionisation Chamber

**Chamber Configuration:**  
Twin compensating  
chambers using one single  
sided ionising radiation  
source

**Radioactive Isotope:**  
Americium 241

**Activity:**  
33.3k Becquerels, 0.9 $\mu$  Curie

**Sampling Frequency:**  
Continuous

**Supply Wiring:**  
Two wire supply, polarity  
insensitive

### **Terminal Functions:**

L1&L2 supply in and out  
connections (polarity  
insensitive)  
+R remote indicator  
positive connection  
(internal 2.2k $\Omega$   
resistance to supply  
+ve)  
-R remote indicator  
negative connection  
(internal 2.2k $\Omega$   
resistance to supply  
- ve)

**Supply Voltage:**  
17 to 28 Volts dc

**Modulation Voltage at  
Detector:**  
5 to 9 Volts peak to peak  
(see XP95 Communications  
System Design Guide for  
further information)

**Quiescent Current:**  
280 $\mu$ A average, 500 $\mu$ A peak

**Power-up Surge Current:**  
1mA

**Duration of Power-up Surge  
Current:**  
0.3 seconds

**Maximum Power-up Time:**  
4 seconds for communications  
(measured from application of  
power and protocol)  
10 seconds to exceed 10  
counts 15 seconds for stable  
clean air value

**Storage Temperature:**  
-30°C to +80°C

**Operating Temperature:**  
-20°C to +70°C

**Clean Air Analogue Value:**  
25 $\pm$ 7 counts

**Alarm Level 55 Counts:**  
EN54 y value of 0.7

**Alarm Indicator:**  
Red light emitting diode (LED)

**Alarm LED Current:**  
2mA

**Remote LED Current:**  
4mA at 5V (measured across  
remote load)

**Type Code:**  
(210 43) 011 00

**Sensitivity:**  
Nominal threshold y value  
of 0.7 to EN54 Pt 7 1984;  
(BS 5445 Pt 7 1984)

**Guaranteed Temperature  
Range:  
(No condensation or icing)**  
-20°C to +60°C

**Humidity:  
(No condensation or icing)**  
0% to 95% relative humidity

**Wind Speed:**  
10m/s maximum

**Atmospheric Pressure:**  
Automatic compensation by  
dual chambers to maintain  
sensitivity up to a height of  
2000m above sea level

**Vibration, Impact & Shock:**  
To EN54 Pt 7 1984  
(BS5445 Pt 7 1984)

**Electro-magnetic  
Compatibility:**  
CE marked.  
A copy of the relevant  
declaration is available on  
request.

**IP Rating:**  
43

**Dimensions:** (diameter x height)  
Detector: 100mm x 42mm  
Detector in Base:  
100mm x 50mm

**Weights:**  
Detector: 105g  
Detector in Base: 161g

**Materials:**  
Detector Housing: White  
polycarbonate V-0 rated to  
UL 94  
Terminals: Stainless Steel

# technical data

## SAFETY NOTE

In the United Kingdom, ionisation smoke detectors are subject to the requirements of the Radioactive Substances Act 1960 and to the Ionising Radiations Regulations 1985 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.

Storage regulations depend on local standards and the legislation, but, in the UK, up to 500 detectors may be stored in any premises, although there are stipulations on storage facilities if more than 100 ionisation detectors are stored in one building.

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

to the Care, Maintenance and Servicing of Apollo Products", PP2055.

Guidance on storage can be given by Apollo Fire Detectors and full 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.

# XP95 OPTICAL SMOKE DETECTOR



XP95 Optical Smoke Detector

▲ Part Number 55000-600

## 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.

## ELECTRICAL DESCRIPTION

The detector is designed to be connected to a two wire loop circuit carrying both data and a 14V 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.

## 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. 11.

page  
7

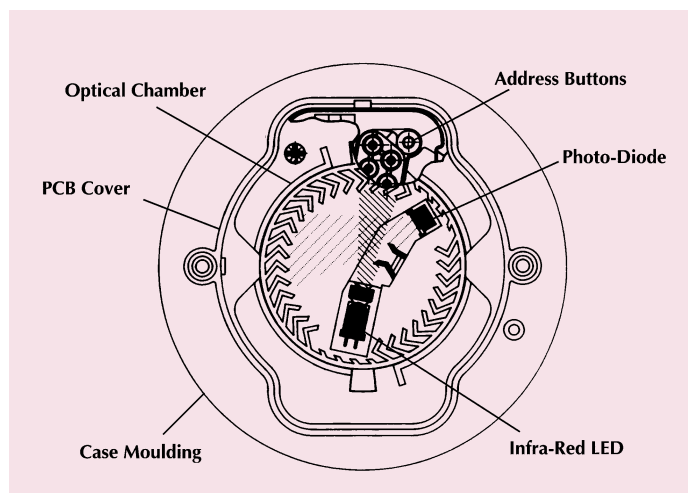


Fig.8 Top section - XP95 Optical Smoke Detector

## TECHNICAL DATA

**XP95 Optical Smoke Detector**  
**Detector Part No 55000-600**  
**Base Part No 45681-210**

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

**Detector Type:**

Products of combustion (smoke) detector

**Detection Principles:**

Photo-electric detection of light scattered in a forward direction by smoke particles

**Chamber Configuration:**

Horizontal optical bench housing an infrared emitter and sensor arranged radially to detect scattered light

**Sensor:**

Silicon PIN photo-diode

**Emitter:**

GaAs Infra-red light emitting diode

**Sampling Frequency:**

1 second

**Supply Wiring:**

Two wire supply, polarity insensitive

**Terminal Functions:**

L1&L2 supply in and out connections (polarity insensitive)  
 +R remote indicator positive connection (internal 2.2kΩ resistance to supply +ve)  
 -R remote indicator negative connection (internal 2.2kΩ resistance to supply -ve)

**Supply Voltage:**

17 to 28 Volts dc

**Quiescent Current:**

340µA average, 600µA peak

**Power-up Surge Current:**

1mA

**Duration of Power-up Surge Current:**

0.3 seconds

**Maximum Power-up Time:**

4 seconds for communications (measured from application of power and protocol)  
 10 seconds to exceed 10 counts  
 35 seconds for stable clean air value

**Storage Temperature:**

-30°C to +80°C

**Operating Temperature:**

-20°C to +60°C

**Alarm Level Analogue Value:**

55

**Clean Air Analogue Value:**

25±7 counts

**Alarm Indicator:**

Clear light emitting diode (LED) emitting red light

**Alarm LED Current:**

4mA

**Remote LED Current:**

4mA at 5V (measured across remote load)

**Type Code:**

(210 43) 101 00

**Sensitivity:**

Nominal threshold of 2.4% light grey smoke obscuration per metre

**Guaranteed Temperature Range:**

(No condensation or icing)  
 -20°C to +60°C

**Humidity:**

(No condensation or icing)  
 0% to 95% relative humidity

**Wind Speed:**

Unaffected by wind

**Atmospheric Pressure:**

Unaffected

**Vibration, Impact & Shock:**

To EN54 Pt 7 1984  
 (BS5445 Pt 7 1984)

**Electro-magnetic Compatibility:**

CE marked.  
 A copy of the relevant declaration is available on request.

**IP Rating:**

43

**Dimensions:** (diameter x height)

Detector: 100mm x 42mm  
 Detector in Base: 100mm x 50mm

**Weights:**

Detector: 105g  
 Detector in Base: 157g

**Materials:**

Detector Housing: White polycarbonate V-0 rated to UL 94  
 Terminals: Stainless Steel

technical data

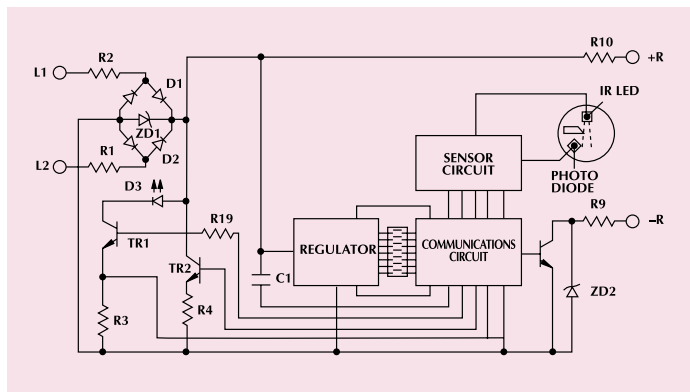


Fig.9 Schematic diagram - XP95 Optical Smoke Detector

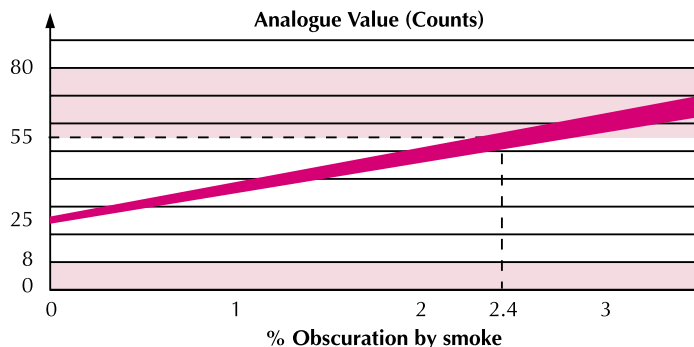


Fig.10 Typical Response Characteristic - XP95 Optical Smoke Detector

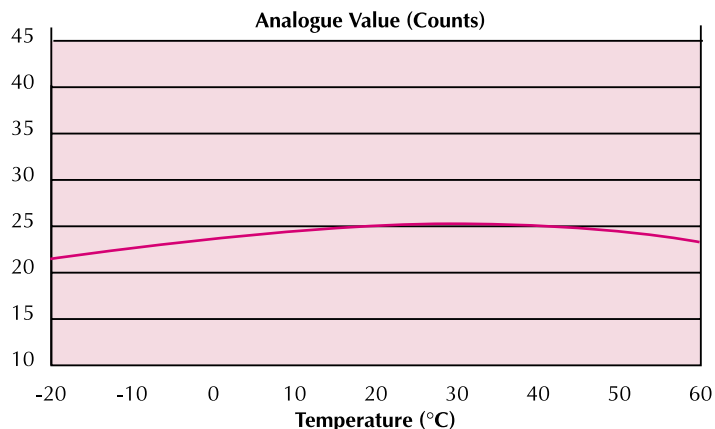


Fig.11 Typical Temperature Response - XP95 Optical Smoke Detector

# XP95 TEMPERATURE DETECTOR



XP95 Temperature Detector

▲ Part Number 55000-400

## OPERATING PRINCIPLES

The XP95 temperature 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 temperature by using a single thermistor network which provides a voltage output proportional to

the external air temperature. The response to temperature increases of the standard temperature detector, Part No: 55000-400, enables the detector to be utilised as an EN54 Grade 2 heat detector. To provide a device for use in ambient temperatures of up to 50°C a high temperature detector, Part No: 55000-401, which has similar characteristics at 25°C but reaches a 55 count at 90°C, has been developed. See Figs. 14 to 15.

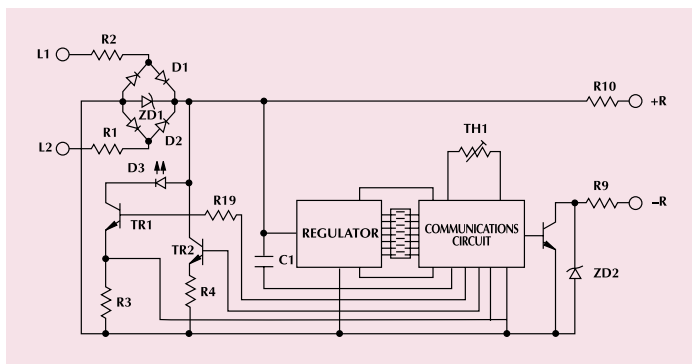


Fig.12 Schematic diagram - XP95 Temperature detector

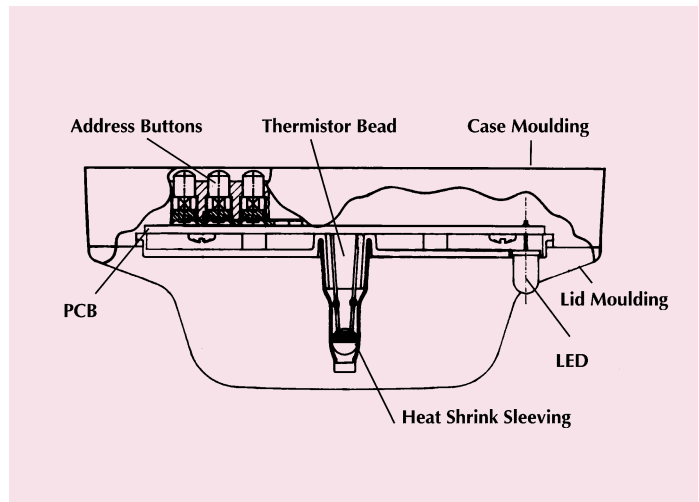


Fig.13 XP95 Heat Detector

## 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°C.

## ENVIRONMENTAL CHARACTERISTICS

XP95 Standard Temperature Detectors operate over the range -20°C to +70°C, the High Temperature Detectors operate over the range -20°C to +120°C. The detectors are unaffected by atmospheric pressure.

## TECHNICAL DATA

**XP95 Temperature Detector (Standard)**  
**Detector Part No 55000-400**  
**Base Part No 45681-210**

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

**Detector Type:**  
 Fixed Temperature Heat Detector (software algorithm may be used for Grade 1 response)

**Detector Principle:**  
 Linear approximation over temperature range 25°C to 90°C

**Sensor:**  
 Single NTC Thermistor

**Sampling Frequency:**  
 Continuous

**Supply Wiring:**  
 Two wire supply, polarity insensitive

**Terminal Functions:**  
 L1&L2 supply in and out connections (polarity insensitive)  
 +R remote indicator positive connection (internal 2.2kΩ resistance to supply +ve)

-R remote indicator negative connection (internal 2.2kΩ resistance to supply - ve)

**Supply Voltage:**  
 17 to 28 Volts dc

**Modulation Voltage at Detector:**  
 5 to 9 Volts peak to peak (see XP95 Communications System Engineering Design Guide for further information)

**Quiescent Current:**  
 250µA average, 500µA peak

**Power-up Surge Current:**  
 1mA

**Duration of Power-up Surge Current:**  
 0.3 seconds

**Maximum Power-up Time:**  
 4 seconds

**Storage Temperature:**  
 -30°C to +80°C

**Operating Temperature:**  
 -20°C to +70°C

**Analogue Value at 25°C**  
 25± 5 counts

**Alarm Level 55 Counts:**  
 55°C

**Alarm Indicator:**  
 Red light emitting diode (LED)

**Alarm LED Current:**  
 2mA

**Remote LED Current:**  
 4mA at 5V (measured across remote load)

**Type Code:**  
 (210 43) 110 00

**Sensitivity:**  
 25°C to 90°C: 1°C/Count.  
 -20°C returns 8 counts

**Guaranteed Temperature Range:**  
 (No condensation or icing)  
 -20°C to +70°C

**Humidity:**  
 (No condensation)  
 0% to 95% relative humidity

**Wind Speed:**  
 Unaffected in fixed temperature use

**Atmospheric Pressure:**  
 Unaffected

**Vibration, Impact & Shock:**  
 To EN54 Pt 5 1984 (BS5445 Pt 5 1984)

**Electro-magnetic Compatibility:**  
 CE marked.  
 A copy of the relevant declaration is available on request.

**IP Rating:**  
 53

**Dimensions:** (diameter x height)  
 Detector: 100mm x 42mm  
 Detector in Base: 100mm x 50mm

**Weights:**  
 Detector: 105g  
 Detector in Base: 157g

**Materials:**  
 Detector Housing: White polycarbonate V-0 rated to UL 94  
 Terminals: Stainless Steel

**XP95 High Temperature Detector**

**Detector Part No:**  
**55000-401**

Specifications are the same as those for the standard temperature, apart from the following points:

**Detector Type:**  
 Fixed Temperature

**Detector Principles:**  
 Linear approximation designed to give 25 counts at 25°C and 55 counts at 90°C

**Sensitivity:**  
 25°C to 90°C: 2·17°C/Count  
 -20°C returns 20 counts.

technical data

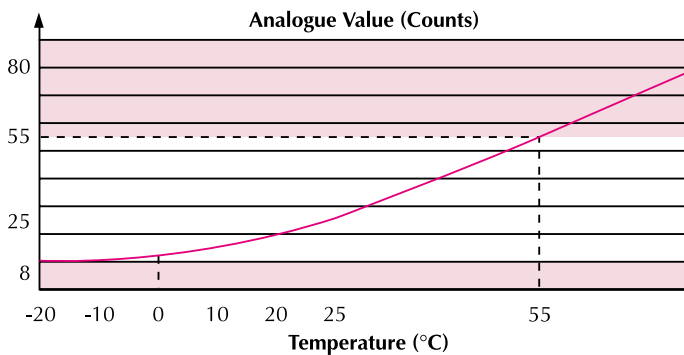


Fig.14 Typical response characteristic - XP95 Standard temperature detector

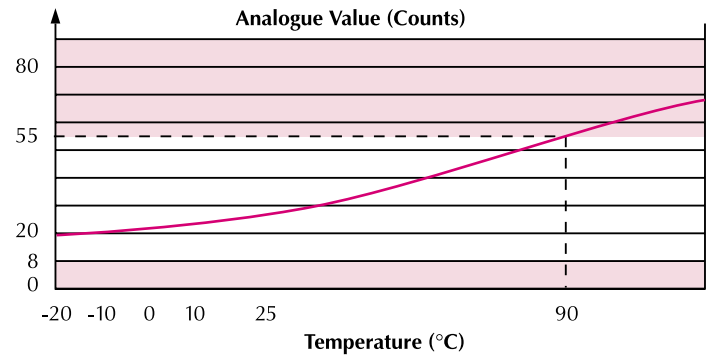


Fig.15 Typical response characteristic - XP95 High temperature detector

# XP95 MULTISENSOR DETECTOR



XP95 Multisensor Detector

▲ Part Number 55000-885

## 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.16) 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 drift compensation.

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.

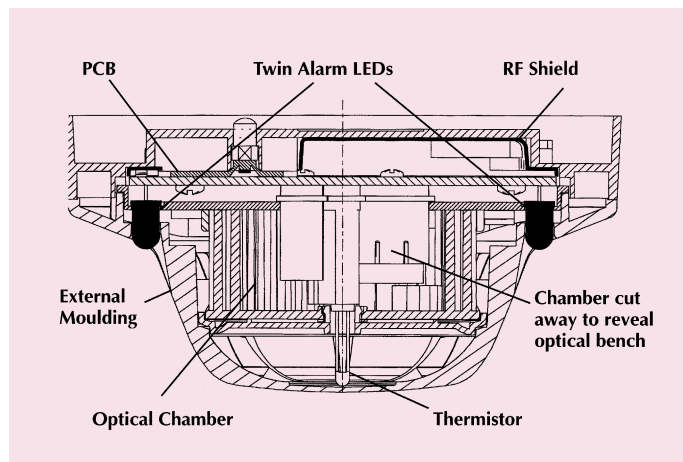


Fig.16 Sectional view - XP95 Multisensor Detector

## TECHNICAL DATA

**XP95 Multisensor Detector**  
**Detector Part No 55000-885**  
**Base Part No 45681-210**

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

### Detector principle:

Smoke: Photoelectric detection of light scattered by smoke particles  
Heat: Temperature-sensitive resistance

### Type code:

Bits (2 1 0 4 3)  
1 0 1 1 1

### Supply wiring:

Two-wire supply, polarity insensitive

### Terminal functions:

L1&L2 supply in and out connections (polarity insensitive)  
+R remote indicator positive connection (internal 2.2kΩ resistance to positive remote indicator negative connection)

-R remote indicator negative connection (internal 2.2kΩ resistance to negative)

### Operating voltage:

17-28V DC

### Communications protocol:

Apollo Series 90/XP95 5-9V peak to peak

### Quiescent current:

500µA average 750µA peak

### Power-up surge current:

1mA

### Maximum power-up time:

10s

### Alarm LED current:

3.5mA

### Remote LED current:

4mA at 5V (measured across remote load)

### Clean air analogue value:

23 +4/-0

### Alarm level analogue value:

55

### Alarm indicator:

2 colourless Light Emitting Diodes (LEDs); illuminated red in alarm  
Optional remote LED

### Electro-magnetic compatibility:

CE marked.

A copy of the relevant declaration is available on request

### Temperature range:

Max. continuous operating: +60°C  
Min. continuous operating: 0°C

Min. operating (no condensation/icing): -20°C  
Storage -30°C to +80°C

### Humidity:

(No condensation)

0 to 95% relative humidity

### Effect of temperature on optical detector:

Less than 15% change in sensitivity over rated range. Slow changes in ambient conditions will automatically be compensated and will not affect sensitivity

### Effect of atmospheric pressure on optical sensor:

None

### Effect of wind on optical sensor:

None

### Vibration, Impact and Shock:

To prEN54-7

### IP rating:

43

### Dimensions:

100mm diameter  
50mm height  
58mm (height in base)

### Weight:

Detector: 105g  
Detector in base: 160g

### Materials:

Housing: White polycarbonate V-0 rated to UL94

Terminals: Nickel plated stainless steel

### Smoke element only:

### Chamber configuration:

Horizontal optical bench housing infra-red emitter and sensor, arranged radially to detect forward scattered light

### Sensor:

Silicon PIN photo-diode

### Emitter:

GaAlAs infra-red light emitting diode

### Sampling frequency:

1 per second

# technical data

**WARNING:** if the control panel incorporates a drift compensation algorithm, this should be disabled when polling the XP95 Multi-Sensor detector.



XP95 Manual Call Point (MCP)

▲ 55000-905 ▲ 55000-906

## OPERATING PRINCIPLES

The XP95 call point is based on the KAC World Series.

The address of each call point is set at the commissioning stage by means of a seven-segment DIL switch.

A single alarm LED is provided on the call point. This LED is controlled, independently of the call point, by the control and indicating equipment (CIE).

Call points can be remotely tested from the CIE 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 CIE should recognise this response as a test signal and should not raise a general alarm.

The XP95 Manual Call Point is available in two versions:

**Part number: 55000-905** for surface mounting, incorporating the call point assembly, (part no. 55000-900), and a back box, (part no. 26729-107)

**Part number: 55000-906** for flush mounting, incorporating the call point assembly, (part no. 55000-900) and a terminal tray, (part no. 26729-110)

For flush mounting, an outlet (pattress) box with a minimum depth of 25mm is also needed.

A weatherproof manual call point is also available, part number: 55000-950.

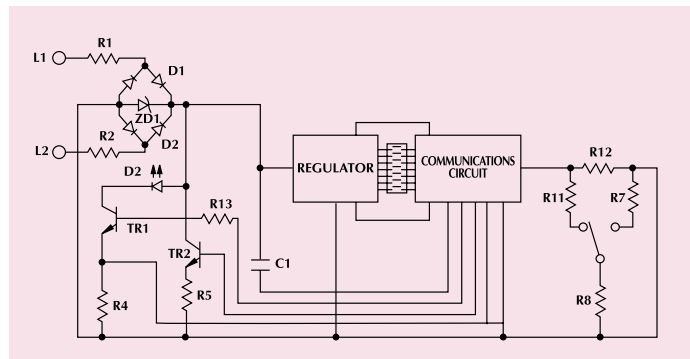


Fig.17 Schematic diagram - XP95 Manual Call Point

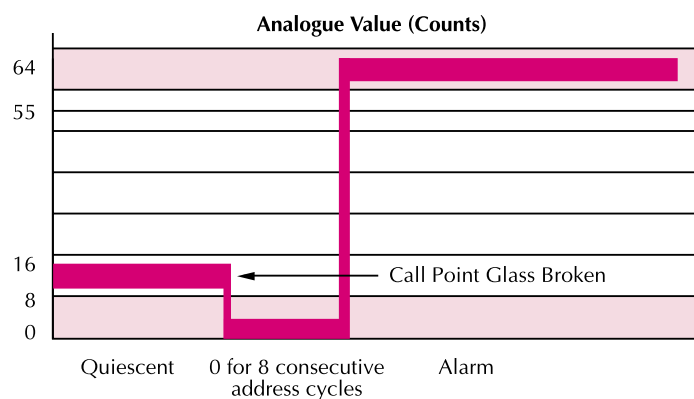


Fig.18 Typical response characteristic - XP95 Manual Call Point

## TECHNICAL DATA

### XP95 Manual Call Point

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

**Call Point Type:**  
Break Glass

**Part No:**  
**55000-905**; surface mount assembly  
Weight 190g  
**55000-906**; flush mount assembly  
Weight 180g  
**55000-900**; call point only  
Weight 120g  
**26729-107**; back box  
**26729-110**; terminal tray

**Call Point Principle:**  
Operation of a switch

**Alarm Indicator:**  
Red Light Emitting Diode (LED)

**Type Code:**  
(2 1 0 4 3)  
1 1 1 1 1

**Supply Wiring:**  
Two-wire supply, polarity insensitive

**Loop connections L1/L2:**  
Flying leads with spade terminals

**Operating Voltage:**  
17V-28V dc

**Communication Protocol:**  
5V-9V peak to peak  
(see XP95 Communications System Engineering Design Guide for further information)

**Quiescent Current:**  
230µA average 300µA peak

**Power-up Surge Current:**  
1mA

**Maximum Power-up Time:**  
4 seconds

**Alarm Current, LED illuminated:**  
2mA

**Normal Analogue Value:**  
16

**Alarm State Value:**  
64

**Electro-magnetic Compatibility:**  
CE marked.

A copy of the relevant declaration is available on request

### Temperature Range:

Max. continuous operating:  
+60°C

Min. continuous operating:  
0°C

Min. operating:  
(no condensation/icing)  
-20°C

Storage: -30°C to +80°C

**Humidity:**  
**(No condensation)**  
0 to 95% relative humidity

**LPCB Certified:**  
To BS5839: Part 2

**IP Rating:**  
53

**Dimensions:**  
87mm x 87mm x 52mm  
(surface mount version)  
87mm x 87mm x 31mm  
(flush mount version)

**Materials:**  
Housing: Red self-coloured Polycarbonate/ABS  
(Also available in white, yellow, green and blue. Hinged cover and tag are also available.)

# XP95 MOUNTING BASE



XP95 Mounting Base

▲ Part Number 45681-210

## 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, part number: 29600-095.

For more information on Apollo's range of bases, please refer to the Range of Bases & Mounting Accessories brochure, PP1089.

# XP95 20D ISOLATING BASE



XP95 20D Isolating Base

▲ Part Number 45681-321

## TECHNICAL DATA

### XP95 20D Isolating Base

**Device Part No:**  
45681-321

**Maximum Loop Operating Voltage:**  
28V DC plus 9V protocol pulses

**Minimum Normal Loop Operating Voltage:**  
17V DC

**Power-up Time:**  
>10mS

**Isolation time, 2Ω load at 28V:**  
20μs

**Isolation Voltage:**  
14V

**Isolation Indicator:**  
Yellow LED, lit continually in isolation condition

**Current Consumption:**

at 18V	23μA
at 28V	43μA
at 18V and adjacent sector isolated	4mA

**Maximum Line Current:**  
Non-isolating continuous 1.0A  
Transition into isolation 3.0A

**On Resistance:**  
<0.2Ω

**Device Reset Resistance:**  
300Ω

**EMC:**  
CE marked.  
A copy of the relevant declaration is available on request

**Operating Temperature:**  
-20°C to +60°C

**Storage Temperature:**  
-30°C to +80°C

**Relative Humidity (no condensation/icing):**  
0% to 95%

**Dimensions:**  
100mm (diameter) x 24mm (height)  
100mm (diameter) x 60mm (height) base with detector fitted

**Weight:**  
100g

page  
16

## OPERATING PRINCIPLES

The XP95 20D isolating base senses and isolates short circuit faults on XP95 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.

## ELECTRICAL DESCRIPTION

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

In applications where it is not necessary to use an isolating base for each detector, up to twenty devices (detectors and XP95 interfaces) may be installed between isolating bases, provided that

their total switch-on surge current does not exceed 20mA.

Circuits may include spurs, which should be connected between the spare -OUT terminal and the base L1 terminal. Spurs connected in this way appear directly across the loop on the output side of the isolating base. Short-circuit faults on the spur therefore short circuit the loop and vice versa. The effect of such short circuits must be taken into account in the system design and may require the use of extra isolating bases.

For further information on the use of XP95 isolators, please refer to PP2090 Short Circuit Isolation in XP95 and Discovery Fire Systems.

**XP95 Isolator**

**Part Number: 55000-700**  
**Base Part Number: 45681-211**

'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.

**XP95 Loop-Powered Beam Detector**

**Part Number: 55000-265**

The XP95 optical beam detector has been designed to protect large open spaces such as museums, churches, warehouses and factories. It consists of three main parts: the transmitter, which projects a beam of infra-red light, the receiver, which registers the light and produces an electrical signal, and the interface, which processes the signal and generates alarm or fault signals.

The transmitter and receiver are designed to be fitted on opposite walls approximately 30cm to 60 cm below the level of the ceiling. They can protect an area up to 100m long and 15m wide, a total of 1500m<sup>2</sup>.

The interface contains the electronic circuitry needed to control the beam detector and communicate with the control panel via the XP95 loop.

The beam detector is loop-powered and needs no separate 24V supply. This not only eliminates the need for additional equipment, it also saves both cost and time in installation.

**MiniDisc Remote Indicator**

**Part Number: 53832-070**

A light-weight, compact indicator for use in fire protection systems. The indicator may be used in all installations incorporating Series 60, XP95, Discovery and Intrinsically Safe detectors. It is only 20mm high and 80mm in diameter. It comprises two parts – the base, which is installed onto a wall or soffit and the lid, which is fitted to the base with a bayonet lock.

**Loop-powered Sounders**

**Low-Profile Loop Sounder**  
**Part Number: 45681-261**  
**Sounder only**

**45681-262 Sounder for use with isolating base**

**55000-259 Sounder with white cap**

**55000-260 Sounder with red cap**

**100dB(A) Loop Sounder**  
**Part Number: 55000-261**

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.

Both sounders are powered by the loop and controlled by a control panel using the XP95 protocol. Both have low current consumption – typically 3 to 4.5mA in alarm. Both sounders are designed to comply with BS5839, Part 1:1998.

**XP95 Flame Detector**

**Part Number: 29600-075**

**Operating Principles**

An infrared sensor designed to detect specific types of flame, making it immune to solar radiation and other nuisance sources of infrared. The detector is rated at IP65, uses XP95 protocol and is loop powered – eliminating the need for a separate power supply.

**Maintenance of Detectors**

Apollo Fire Detectors has published a guide to the care, maintenance and servicing of Apollo products, PP2055, which is available on request. This guide outlines the maintenance routines recommended for optimum detector performance and the services available from Apollo's factory-based Service Department.

**Approvals**

XP95 detectors comply with EN54-5: 1984 (heat) and EN54-7: 1984 (smoke). Detectors also comply with EMC Directive 89/336/EEC and are CE marked.

Each detector type is designed to be approved by approval and regulatory bodies world-wide, including LPCB in the UK and VdS in Germany.

The XP95A range, specially modified to comply with US approval procedures, is UL listed.

For more information on any of the products mentioned in this engineering guide, please refer to the following literature which is available on request.

Publication Name	Publication Number
Compatible Panel Manufacturers PIN Sheet	PP1010
Range of Bases & Mounting Accessories Brochure	PP1089
XP95 20D Isolating Base PIN Sheet	PP2039
A Guide to the Care, Maintenance and Servicing of Apollo Products	PP2055
XP95 Range of Interfaces Brochure	PP2025
XP95 Switch Monitor PIN Sheet	PP2015 (std enclosure) PP2048 (DIN-rail enclosure)
Mini Switch Monitor PIN Sheet	PP2021
Mini Switch Monitor with Interrupt PIN Sheet	PP2020
Switch Monitor Plus PIN Sheet	PP2014 (std enclosure) PP2047 (DIN-rail enclosure)
Zone Monitor PIN Sheet	PP2016 (std enclosure) PP2049 (DIN-rail enclosure)
Sounder Control Unit PIN Sheet	PP2019 (std enclosure) PP2050 (DIN-rail enclosure)
Input/Output Unit PIN Sheet	PP2017 (std enclosure) PP2045 (DIN-rail enclosure)
Output Unit PIN Sheet	PP2018 (std enclosure) PP2046 (DIN-rail enclosure)
Dual Isolator PIN Sheet	PP2051 (DIN-rail enclosure)
MiniDisc Remote Indicator PIN Sheet	PP2074
Loop Sounder Sales Leaflet	PP2031
XP95 Loop-Powered Beam Detector Sales Leaflet	PP2078
XP95 Loop-Powered Beam Detector Installation Guide	PP2079
XP95 Flame Detector Installation Guide	PP2080
Short Circuit Isolation in XP95 and Discovery Fire Systems	PP2090



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