XPANDER PRODUCT GUIDE

XPANDER

- XP95 range expansion
- wireless
- eliminates cable problems
- minimises disruption
- enables rapid retrofit

apollo
WORLD CLASS FIRE SOLUTIONS

XPANDER

...wireless detectors from apollo

XPander™ is a range of conventional detectors and associated products developed to enhance the capabilities of XP95. It is an entirely new range which is connected to an XP95 system via an interface wired to the loop. The interface communicates with the field devices by means of radio signals.

XPander can be incorporated into fire detection systems in stately homes and architecturally sensitive buildings where the use of fire cables is either impracticable or undesirable. It may also be used in sites with discrete buildings which need to be connected to a central control panel but where wiring might present problems.

XPander is manufactured in Apollo's factory near Portsmouth, England.

XPander has been tested and approved to the following standards:

EN 54–7: 2000 — optical smoke detector

EN 54–7: 2000 & CEA 4021: 1999-06 — multisensor smoke detector

EN 54–5: 2000 — heat detector

Detectors have been declared as being compliant with the essential requirements of the EMC Directive 98/336/EEC and the Construction Products Directive 89/106/EEC.

LPCB LOSS PREVENTION CERTIFICATION BOARD

CE 0832

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Contact points for enquiries and help

Technical queries	techsales@apollo-fire.co.uk
Resources (literature, photos)	marketing@apollo-fire.co.uk
Sales enquiries	sales@apollo-fire.co.uk
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Range of Products

XPander comprises an interface, an optical smoke detector, a multisensor smoke detector, heat detector types A1R and CS, a wireless base, a manual call point, a sounder and a sounder beacon. A survey tool is also available and this must be purchased in order to carry out a site survey before any system designs are finalised.

Features of XPander™

XPander incorporates entirely new designs with respect to the wireless communication system. A Radio Interface is connected to the loop. It communicates with the control panel using the XP95 two-wire power and communications system. The interface communicates with the detection and alarm signalling devices by means of radio waves.

The detectors are conventional in that they report normal, fire or fault states to the radio base which transmits the information to the interface.

The radio bases and signalling devices are addressable and use a pre-set analogue value to report via the XP95 protocol. Apart from normal and fire the bases can send pre-set analogue values to indicate low battery, detector contaminated, detector tamper and low signal strength fault conditions.

- modern styling
- loop-powered interface operating on 868MHz
- wireless addresses seen by control panel as normal addresses
- radio base with wireless circuitry and battery compartment
- chamber designed to inhibit dirt penetration and thus reduce false alarms
- automatic drift compensation with DirtAlert™ warning
- algorithms for transient rejection
- FasTest™ reduces time taken to test detectors
- remote test facility
- 3-year battery life

The XPander Wireless Range

Wireless Systems

Analogue addressable detection systems have been in use for many years and have proven their worth in countless installations. Apollo Fire Detectors' XP95 range is one of the most popular systems and comprises not only detectors and manual call points but also interfaces, sounders, beacons and special detectors such as beam and flame detectors.

XP95 detectors are often installed in buildings where wiring presents a challenge, most often because the fabric of the building or its design will be negatively affected by the use of cables. It is sometimes very difficult to introduce cable runs into buildings which were not designed for the modern age. It may also be that a collection of buildings, such as an open air museum, requires fire protection but is not suitable for normal wired systems.

It is for buildings of this kind that XPander has been developed. XPander is a wireless extension to a loop-wired XP95 detection and alarm system.

XPander is a system in which individual detectors, call points and alarm devices communicate with the XP95 loop by radio signals. An interface is connected to the loop in the same way as any other interface, such as an Input/Output Unit.

Every XPander device is assigned an address and this address is recognised by the control panel in the same way as is the address of any device connected directly to the loop wiring.

It should be noted that not all installations can be extended by using XPander and it is essential that a site survey be done to check whether XPander can be installed or not.

Polling

XPander detectors and alarm devices are polled in the same way as devices connected directly to the loop. They respond in exactly the same way and provide the same categories of information.

Address Mechanism

XPander detectors are addressed by means of the XPERT card familiar to users of XP95.

Radio Communications

Fire detection systems are life-saving systems and must, therefore, be highly reliable in use. Radio communications have been developed to a point where high reliability can be guaranteed, provided that the rules for the design of radio systems and installation are carefully observed. Radio communication technology in the detection has matured to the point where a standard has been drawn up as part of the EN54 family of standards for components of a fire detection system. The standard is prEN54 Part 25. At the time of writing this guide the standard has not been voted by the countries concerned but it is sufficiently advanced for the products in the XPander range to be designed to meet its requirements.

Frequency

The frequency used by XPander is 868MHz which is the harmonised European radio frequency.

Signal Integrity

It is of prime importance that the radio signal retain its integrity even if minor changes, such as the rearrangement of furniture, are made to the environment in which XPander is installed. Hence "extra strength" signals are used so that the signals are received clearly even if there is some attenuation.

Interference

It is of equal importance that there be no interference to the detector from signals emanating from other sources, such as police or ambulance radio systems.

To help eliminate interference the XPander signal is a narrow band signal with an additional coding. With the inclusion of the dual band signalling the danger of interference has been reduced to a point of being negligible.

Battery Monitoring

Devices in the XPander range are powered by batteries. While there are two battery packs, one of which acts as a back-up, it is essential that the state of the batteries be known. The following three states have been defined:

State	Condition of batteries
Normal	Good working order
Fault	Batteries need to be changed
Missing	Battery voltage very low or battery pack incorrectly fitted

For the "Fault" state a warning is sent 30 days and for the state "Missing" a warning is sent 7 days before battery failure.
Note: when changing batteries both packs should be replaced

Surveying a site prior to designing and installing a wireless system

All of the elements which make up a wireless fire detection system are connected by means of radio waves. It is essential that the waves are not blocked or attenuated between the different elements of the system.

In order to be sure of the integrity of a proposed wireless detection system a survey of the installation location must be carried out without fail before the final decision to use the wireless system is taken.

This is true for all wireless systems and it applies to XPander as well.

XPander Survey Unit

The XPander Survey Unit, part no XPA-TE-14010, has been developed in order to be able to conduct a full survey and be sure of the integrity of the system in operation.

Full instructions for use of the survey unit are contained in a booklet, PP2323, issued with the unit.

It is important that the results of the survey be recorded and remain with the other design documentation. A sheet, PP2322, is available from Technical Sales for this purpose.

Training in the technique of surveying a site and designing an XPander system is mandatory. Apollo offers this training at the factory free of charge.

Choosing a detector

Optical smoke detectors

Optical detectors have long been recommended as good general purpose smoke detectors. Modern optical detectors incorporate sensors which detect both black and grey smoke and are thus useful over a wide range of fires.

Optical detectors should particularly be used in escape routes such as corridors where the smoke might have aged before it reaches the detector.

Multisensor smoke detectors

Multisensor smoke detectors have a heat sensing element which makes them more sensitive if an incipient fire develops heat as well as smoke. This speeds up the response of the detector in certain fires where heat is generated rapidly, for instance in test fire TF5, which is an open, flaming liquid fire in which n-heptane is burned.

Multisensor smoke detectors are recommended for open flaming fire risks.

If there is any doubt as to whether an optical detector or a multisensor smoke detector should be used it is wise to fit a multisensor smoke detector.

Heat detectors

Heat detectors might be considered if it is not possible to use smoke detectors. This will be the case where normal industrial processes produce substances which could be mistaken for smoke by a smoke detector, eg, flour mills, textile mills or loading bays with diesel-engined vehicles.

Heat detectors classification

EN54 classifies heat detectors according to the ambient temperature in which they will be working and according to whether they may be tested as ‘static’ detectors (changing to alarm at a preset temperature) or ‘rate-of-rise’ (changing to alarm at a preset increase of temperature).

Heat detectors may also be marketed without either classification; but then the detection characteristics are unknown.

All XPander heat detectors are tested and classified as either static or rate-of-rise.

Choosing a heat detector

The more sensitive heat detector, A1R, should be used where the ambient temperature does not exceed 50°C and rapid fluctuations are unlikely. If sudden increases in heat are expected in the environment of the heat detector the CS should be used.

XPANDER LOOP INTERFACE

XPander Loop Interface ▲ **Part Number XPA-IN-14007-APO**

TECHNICAL DATA

All data is supplied subject to change without notice. Specifications are given at 23°C and 50% relative humidity unless otherwise stated

Supply voltage:
24V DC + voltage pulses

Current consumption:
15mA
Mechanical

Material:
Zintec (zinc-coated steel)

Dimensions and weight of interface:
130mm width x 185mm height x 45mm depth, 1100 grams

Environmental

Operating and storage temperature:
-10°C to +55°C

Humidity:
0% to 95% relative humidity (no condensation)

Electromagnetic Compatibility:
The interface meets the requirements of BS EN 50 081-1 for emissions and BS EN50 130-4 for susceptibility.

Note: the XPander interface aerial must be installed at least 400mm away from any metal object. The recommended minimum distance to any electrical equipment is 2metres in all three dimensions.

technical data

The XPander interface is connected to the loop and provides communications from the control panel to the wireless devices and vice versa. It is powered from the loop. A maximum of five interfaces can be connected to a loop. Up to 15 radio devices can be logged on to each interface. The current drawn from the interface should be taken into consideration when calculating the total load of a loop.

The connections on the interface are accessed by removing the front plate of the Interface. Two cable entry knockouts are provided on each side of the interface and two each at the back and on the base.

An 8-segment DIL switch is provided for the address of the interface to be set. When polled by the control panel, the XPander Interface returns a pre-set analogue value of 16 in normal condition.

The XPander interface has an integral LCD display which gives information on the state of the wireless detectors.

The interface transmits and receives signals via a short, integrated antenna which requires no adjustment or maintenance. Two special-purpose aerials are also available, details of which can be found on page 17.

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XPander Optical Smoke Detector with Radio Mounting Base
▲ **Part Number XPA-CB-12034-APO**

TECHNICAL DATA

All data is supplied subject to change without notice. Specifications are given at 23°C and 50% relative humidity unless otherwise stated.

Supply voltage:
Regulated 3V from radio base

Sampling frequency:
Once every 4 seconds

Alarm Indicator:
Integral indicator with 360° visibility

Material:
Detector and base moulded in white polycarbonate.

Dimensions and weight of detector:
100mm diameter x 30mm height, 100 grams

Dimensions and weight of detector in base
105mm diameter x 75mm height, 500 grams

Environmental

Operating temperature:
—10°C to +50°C

Humidity:
0% to 95% relative humidity (no condensation)

Wind speed:
Unaffected by wind

Atmospheric pressure
Insensitive to pressure

IP rating to EN 60529: 1992:*
23D

Electromagnetic Compatibility:
The detector meets the requirements of BS EN 50 081-1 for emissions and BS EN50 130-4 for susceptibility. CE marked.

*The IP rating is not a requirement of EN 54 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

technical data

The sensing technology in the XPander optical detector is adapted from that of the Orbis optical detector.

Where to use optical detectors

XPander optical detectors are recommended for use as general purpose smoke detectors for early warning of fire in most installations.

XPander optical detectors operate on the well established light scatter principle. The optical design of the XPander optical detector allows it to respond to a wide spectrum of fires.

The detector is calibrated so that XPander is highly reliable in detecting fires but has enhanced immunity to false alarms.

The stability of the detector in terms of high reliability and low false alarm rate is further increased by the use of algorithms to decide when the detector should change to the alarm state. This removes the likelihood of a detector producing an alarm as a result of smoke from smoking materials or from another non-fire source.

Detector operating principles

Photo-electric detection of light scattered by smoke particles over a wide range of angles. The optical arrangement comprises an infra-red emitter with a prism and a photo-diode at 90° to the light beam with a wide field of view. The detector's microprocessor uses algorithms to process the sensor readings.

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XPander Multisensor Smoke Detector with Radio Mounting Base
▲ Part Number XPA-CB-13032-APO

TECHNICAL DATA

All data is supplied subject to change without notice. Specifications are given at 23°C and 50% relative humidity unless otherwise stated.

Supply voltage:
Regulated 3V from radio base

Sampling frequency:
Once every 4 seconds

Alarm Indicator:
Integral indicator with 360° visibility

Material:
Detector and base moulded in white polycarbonate.

Dimensions and weigh of detector:
100mm diameter x 50mm height, 100 grams

Dimensions and weigh

of detector in base:
105mm diameter x 80mm height, 500 grams

Environmental

Operating temperature:
—10°C to +50°C

Humidity:
0% to 95% relative humidity (no condensation)

Wind speed:
Unaffected by wind

Atmospheric pressure:
Insensitive to pressure

IP rating to EN 60529: 1992:*
23D

Electromagnetic Compatibility:
The detector meets the requirements of BS EN 50 081-1 for emissions and BS EN50 130-4 for susceptibility.

*The IP rating is not a requirement of EN 54 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

technical data

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The XPander multisensor smoke detector is a thermally enhanced smoke detector and as such will not give an alarm from heat alone. It is a development of the XPander optical detector described in the previous chapter and goes further in its capabilities of fire detection.

Where to use multisensor smoke detectors

Multisensor detectors are recognised as good detectors for general use but are additionally more sensitive to fast burning, flaming fires–including liquid fires– than optical detectors.

They can be readily used instead of optical smoke detectors but should be used as the detector of choice for areas where the fire risk is likely to include heat at an early stage in the development of the fire.

As with XPander optical smoke detectors the increased reliability of detection is combined with high immunity to false alarms.

Although the XPander multisensor detector relies on both smoke and heat sensors it is not possible to switch from smoke detection to heat detection.

Detector operating principles

Photo-electric detection of light scattered by smoke particles over a wide range of angles. The optical arrangement comprises an infra-red emitter with a prism and a photo-diode at 90° to the light beam with a wide field of view. Heat sensitive thermistor. The detector's microprocessor uses algorithms to process the sensor readings.

XPander Heat Detector with Radio Mounting Base
▲ Part Number A1R XPA-CB-11170-APO
▲ Part Number CS XPA-CB-11171-APO

The XPander range incorporates two heat detectors to suit operating conditions in which smoke detectors are unsuitable.

The European standard EN54-5 classifies heat detectors according to the highest ambient temperature in which they can safely be used without risk of false alarm. The classes are identified by the letters A to G. (Class A is subdivided in A1 and A2.) In addition to the basic classification, detectors may be identified by a suffix to show that they are rate-of-rise (suffix R) or fixed temperature (suffix S) types.

Heat detectors in the XPander range are tested as rate-of-rise detectors or static. The A1R detector is a rate-of-rise detector and the CS is classified as static.

Where to use XPander heat detectors

Heat detectors are used in applications where smoke detectors are unsuitable. Smoke detectors are used wherever possible since smoke detection provides earlier warning of fire than heat detection. There are, however, limits to the appication of smoke detectors.

Heat detectors should always be considered if there is a danger of nuisance alarms from smoke detectors.

Choosing the correct class of heat detector

The choice of the right type for a particular application is important. Use A1R in areas with normal ambient temperature of less than 50°C and in which sudden increases of heat do not occur in normal circumstances. Otherwise use CS.

How do XPander heat detectors work?

Heat detectors have an open-web casing which allows air to flow freely across a thermistor which measures the air temperature every 2 seconds. A microprocessor stores the temperatures and compares them with pre-set values to determine whether a fixed upper limit–the alarm level–has been reached.

In the case of rate-of-rise detectors the microprocessor uses algorithms to determine how fast the temperature is increasing.

Static heat detectors respond only when a fixed temperature has been reached. Rate-of-rise detectors have a fixed upper limit but they also measure the rate of increase in temperature. A fire might thus be detected at an earlier stage than with a static detector so that a rate-of-rise detector is to be preferred to a static heat detector unless sharp increases in temperature are part of the normal environment in the area protected by the heat detector.

Detector operating principles

Measurement of heat by means of a thermistor.

TECHNICAL DATA

All data is supplied subject to change without notice. Specifications are given at 23°C and 50% relative humidity unless otherwise stated.

Supply voltage:
Regulated 3V from radio base

Sampling frequency:
Once every 2 seconds

Alarm Indicator:
Integral indicator with 360° visibility

Material:
Detector and base moulded in white polycarbonate.

Dimensions and weight of detector:
100mm diameter x 30mm height, 80 grams

Dimensions and weight of detector in base:
50mm diameter x 80mm height, 400 grams

Environmental

Operating temperature:
—10°C to +50°C

Humidity:
0% to 95% relative humidity (no condensation)

Wind speed:
Unaffected by wind

Atmospheric pressure:
Insensitive to pressure

IP rating to EN 60529: 1992:*
23D

Electromagnetic Compatibility:
The detector meets the requirements of BS EN 50 081-1 for emissions and BS EN50 130-4 for susceptibility.
*The IP rating is not a requirement of EN 54 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

technical data

XPander Detector Base

The base is supplied with 2 packs of 3 'AA' alkaline batteries which provide a working life of typically 3 years.

The base is fitted to the ceiling by means of a mounting plate. The plate itself is fixed to the ceiling by two screws. The fixing holes are shaped to offer two fixing centres at 51 and 60mm. If it is required that all detectors be fitted with their LEDs facing the same direction the bases must be fitted to the ceiling observing the position of the XPERT address card.

The heads of the screws used to fix the mounting plate to the ceiling must be flush or sub-flush with the inner surface of the mounting plate. If they are standing proud the batteries may be damaged.

The power jumper next to the tamper-evident spring on the PCB should be taken out with a pair of snipe-nosed pliers and refitted to make the power connection.

Finally, the detector base with the head should be offered up to the mounting plate and plugged in, turning it clockwise until it locks home.

XPANDER MANUAL CALL POINT

Xpander Manual Call Point ▲ **Part Number XPA-MC-14006-APO**

TECHNICAL DATA

All data is supplied subject to change without notice. Specifications are given at 23°C and 50% relative humidity unless otherwise stated

Supply voltage
Regulated 3V from radio base

Call Point Principle:
Operation of a switch

Alarm Indicator:
Red Light Emitting Diode (LED)

Alarm State Value:
64

Electro-magnetic Compatibility:
The call point meets the requirements of BS EN 50 081-1 for emissions and BS EN50 130-4 for susceptibility.

Environmental

Operating temperature
—10°C to +50°C

Humidity
0% to 95% relative humidity (no condensation)

Compliance Standard:
EN54–11:2001 EN54–17:2005

Materials:
Red ABS

Dimensions:
89mm x 93mm x 26.5mm

Weight:
151g

technical data

The Apollo XPander EN54-11:2001 compliant manual call point (MCP) is based on the KAC conventional MCP range. The call point is supplied with 2 packs of 3 'AA' alkaline batteries which provide a working life of typically 3 years.

The address of each call point is set at the commissioning stage by means of an XPERT card.

An 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.

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.

XPander Manual Call Points are supplied with a resettable element as standard.

The call point uses the "priority interrupt" feature to give a fast response on operation.

XPander Sounder and Sounder Base
▲ Part Number XPA-CB-14001-APO

XPander Sounder Beacon and Sounder Base
▲ Part Number XPA-CB-14003-APO

XPander includes a range of audio visual signalling devices. The range comprises sounders and sounder beacons.

Sounders

XPander sounders can be wall or ceiling mounted and use a bi-directional radio platform to communicate. They feature 32 selectable tones, including the Apollo tone, and a self test which causes a fault signal to be sent if the sounders fail to operate.

The address of a sound or a sounder/beacon is set at the commissioning stage by means of an XPERT card.

The sounders and sounder/beacons are powered by two packs of batteries, one with three "AA" and one with three "C" size alkaline batteries which provide a working life of typically 3 years. The three-year life includes weekly tests and a half-hour sounding in a fire condition.

Sound output: 100dB(A)

Part Number	Description
XPA-CB-14001-APO	Red Sounder with red base
XPA-CB-14002-APO	White Sounder with white base
XPA-CB-14003-APO	Red Sounder Beacon with red base
XPA-CB-14004-APO	Amber Sounder Beacon with white base
XPA-CB-14005-APO	Clear Sounder Beacon with white base

Sounder Beacons

These devices incorporate audio and visual signalling within one unit. Like the sounders, they feature 32 selectable tones.

Sound output: 100dB(A)

Individual parts may be ordered separately

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Part Number	Description
XPA-SB-10023-APO	Red base
XPA-SB-10024-APO	White Base
XPA-SO-14001-APO	Red Sounder
XPA-SO-14002-APO	White Sounder
XPA-SN-14003-APO	Red Sounder Beacon
XPA-SN-14004-APO	Amber Sounder Beacon
XPA-SN-14005-APO	Clear Sounder Beacon

Installation of an XPander system

By its nature the XPander wireless system requires a different installation regime from detectors which are designed to be connected to cables, whether they are analogue addressable or conventional detectors.

The installation must conform to a Code of Practice for the Installation of Fire Detection Systems, such as BS 5839 : 1.

The steps to be taken when installing XPander are:

1. First carry out a site survey and ensure that a wireless system may be satisfactorily installed.
2. Install the interface in a suitable location and connect it to the XP95 loop. Installations guides are provided and should be read carefully before starting work.
3. Selection of radio operating channels is done automatically.
4. Add devices, ie, detectors, call points or alarm devices, to the interface.
5. Install mounting plates and fitting bases with detector heads. Manual call points have mounting plates which are screwed to the wall.

Warning: Fit XPander detectors to XPander bases only. They will be damaged if fitted to any other type of base and will become inoperable.

Installing the interface

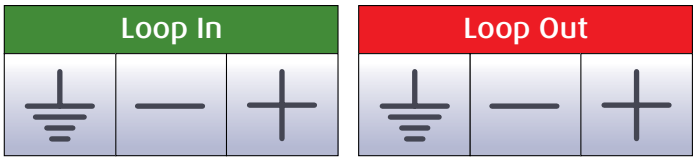
The Interface is connected to the XP95 loop in the same way as any other interface would be.

Note that the XPander Interface is suitable for indoor use only.

The address of the unit must be set by means of the DIL switch. It is recommended that the loop address number is allocated prior to the unit being installed.

The Interface should be sited in accordance with the survey and design details. The recommended minimum distance between metal objects or equipment from the aerial is 400mm. Also the recommended minimum distance to any electrical equipment is 2 metres in all three dimensions.

The Interface has six connections:



The connections are accessed by removing the front plate of the Interface. 20mm knockouts are provided for cable entry.

Full installation instructions are given in the installation guide PP2280.

Selecting radio operating channels

The XPander interface uses two 868MHz channels to communicate with the wireless detectors and other devices.

The two channels are selected automatically by the interface when it is first powered up with no devices logged on to it.

The Interface will scan available channels and choose the two most suitable frequencies, ie, the two with the least background signal.

Adding devices to the XPander interface

Up to 15 wireless detectors or alarm signalling devices may be assigned to a single interface.

Prior to adding devices to the Interface batteries must be inserted, the power jumper positioned correctly and the mounting plates fitted.

During the device log-on routine the interface will request confirmation of the device serial number. This is to be found on the side of the radio module.

The XPERT address card must be fitted prior to assigning a device to the interface.

In the case of sounders or sounder beacons the tone must be selected using the 5-segment DIL switch on the base of the sounder or sounder beacon.

A detailed commissioning manual, PP2286, is supplied with the interface.

Selecting an aerial

The XPander interface is supplied with an aerial which is adequate for most normal purposes. There are, however, circumstances in which it is necessary to use a special-purpose aerial.

Note: in this guide the term "aerial" is used. In some parts of the world this is known as an "antenna".

External Omnidirectional Aerial

This aerial can be used outdoors and is supplied with 3m of co-axial cable so that it can be situated remotely from the interface. It can be used where the integral aerial is affected by high background noise levels.

Part no XPA-AE-14008-APO

External Directional Aerial

This aerial is used for improving signal strength between the interface and a selected outbuilding where it is necessary to avoid interference from other radio devices.

Part no XPA-AE-14009-APO

Maintenance and Servicing

Detectors should be checked regularly at the intervals indicated by the locally applicable code of practice. Apollo recommends that the detectors be checked at least once a year.

If detectors appear not to be functioning correctly they should be returned to Apollo for testing.

If detectors are externally dirty they can be cleaned carefully with a damp cloth using a small amount of industrial alcohol.

Signal strengths and battery levels

These should be checked during service visits to ensure continued correct operation until the next service visit. This information can be viewed on the LCD screen of the interface.

DirtAlert®

XPander detectors have drift compensation to compensate for changes caused by the environment. The most usual change is contamination.

If the detector is dirty to the point where it can no longer compensate a 'detector dirty' fault will be reported to the control panel.

Dirty detectors can be returned to Apollo for cleaning and recalibration.

Battery replacement

If any device transmits a battery warning message all the batteries should be changed without delay. Apollo guarantees battery life only if Duracell Pro-Cell AA alkaline batteries are used.

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