



Specialist Environments marine, offshore & industrial

Fire Detection Equipment



Why Choose Apollo?

- Largest independent smoke detector manufacturer in the world
- Certified to all key international approvals
- Product Lifetime Guarantee*
- The best people work for Apollo
- Trust, integrity & support
- Localised customer service worldwide
- Ex-stock delivery
- 100% reliability, 100% tested
- Open, digital protocol
- Forwards and backwards product compatibility
- World-class Fire Solutions

** The Product Lifetime Guarantee is subject to terms and conditions.
For further information, please refer to our current General Conditions of Sale.*



By Appointment to
Her Majesty The Queen
Manufacturers of Fire Detection
& Alarm Products
Apollo Fire Detectors Limited
Hampshire

Apollo Key Guide

Quick reference key guide

Applications



Dusty Environments



Marine



Hospitals



Large Vessels



Hazardous Areas



Offshore Platforms



Refineries

Product Types



Optical



Heat



Ionising



Multi-Sensor

Fire Type



Fast Burning Flaming



Slow Burn Smouldering

Product Features



Waterproof



Reduced False Alarms



5 Response Modes



Easy Installation



Remote Test Feature

Apollo

The Partner of Choice

Apollo Fire Detectors Ltd has specialised in the design and manufacture of high quality fire detection products since 1980. In that time, the company has broadened its capability from a straightforward focus on conventional fire detectors to include the manufacture of sophisticated analogue addressable detectors and interfaces for monitoring and controlling equipment in fire protection systems.

Apollo applies the most modern production techniques and has invested in sophisticated manufacturing equipment to ensure consistent high quality products and fast response to customer requirements. Through planned expansion, Apollo has reached a leading global position in the market for professional fire detection. With over 3000 international approvals, regional offices in American, China and Germany along with direct trade into more than 100 countries, Apollo has cemented its position as a world-class fire solutions provider.

Apollo is part of the Halma group of companies. Halma is a FTSE top 250 listed PLC with over 40 subsidiaries worldwide, all engaged in specialist engineering activities.



Need further assistance? Ask our specialist at www.apollo-fire.co.uk

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Marine

Apollo offer both analogue addressable and conventional ranges of smoke and heat detectors which are approved for use in the marine environment. These detectors operate in the same way and carry the same approvals as standard detectors but are subject to additional approvals tests, specific to the marine environment.



DISCOVERY[®] **orbis**[®]

The marine detectors comply with MED and are approved by the following bodies:

- American Bureau of Shipping
- Bureau Veritas
- China Classification Society
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register of Shipping
- Maritime and Coastguard Agency
- Marine Marchande Française

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Find out more about the Orbis and Discovery range at
www.apollo-fire.co.uk



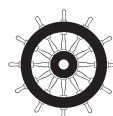
DISCOVERY®



Discovery Marine analogue addressable fire detectors are suitable for larger vessels. The high specification range has been developed to meet the requirements of sophisticated systems. Discovery gives you total reassurance in installations where it is necessary to adapt detection to different operating environments and where protection against unwanted alarms is paramount.

Key features of Discovery Marine include:

- Approved for use in the marine environment
- Five response modes for environmental adaptation
- Day/night switching for increased flexibility
- Drift compensation for false alarm reduction
- User programmability for data retention
- XPERT card addressing for increased security



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Please check the Apollo website on a regular basis for up-to-date approvals information.

Discovery Marine Optical Smoke Detector



58000-600MAR

Discovery Marine Optical Smoke Detector



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Operating principles

The Discovery Marine Optical Smoke Detector has a white moulded polycarbonate case with wind-resistant smoke inlets. The indicator LEDs are colourless when the detector is in quiescent state and red in alarm. Within the case is a printed circuit board which, on one side, has the light-proof chamber with integral gauze surrounding the optical measuring system and, on the other, the signal processing and communications electronics.

An infra-red 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 (Fig 1). In clear air the photo-diode receives no light directly from the IR LED, because of the angular arrangement and the chamber baffles. When smoke enters the chamber it scatters light 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 to provide an analogue value for transmission when the detector is interrogated.

Dimensional Drawings

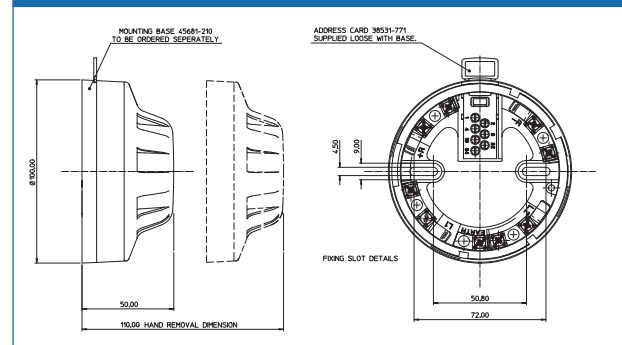
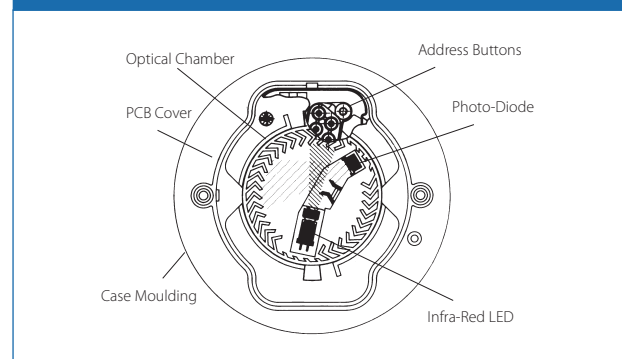


Table 1: Operating Modes

Mode	Alarm threshold %m	dB/m	Minimum time to alarm (sec)
1	1.4	0.06	5
2	1.4	0.06	30
3	2.1	0.09	5
4	2.1	0.09	30
5	2.4	0.11	5

Compensation rate complies with EN54-7:2000

Sectional View (Fig 1)



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Find out more about the Orbis and Discovery range at
www.apollo-fire.co.uk

Apollo devices can be found in the largest lifting vessel in Asia and the Liao Hai roll-on-roll-off ferry (China).

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Photoelectric detection of light scattered in a forward direction by smoke particles
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
Supply wiring:	Two-wire supply, polarity insensitive
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	300μA
Power-up surge current:	1mA
Maximum power-up time:	10s
Alarm current, LED illuminated:	3.5mA
Remote output characteristics:	Connects to positive line through 4.5kΩ (5m maximum)
Clean-air analogue value:	23 +4/-0
Alarm level analogue value:	55
Alarm indicator:	2 colourless Light Emitting Diodes (LEDs); illuminating red in alarm Optional remote LED
Temperature range:	-40°C to +70°C
Humidity:	0 to 95% relative humidity (no condensation or icing)
Effect of atmospheric pressure:	None
Effect of wind:	None
Vibration, impact and shock:	To EN54-7:2000
IP rating:	44 in accordance with BSEN60529
Dimensions:	100mm diameter x 42mm height 50mm (height in base)
Weight:	Detector 105g Detector in base 160g
Materials:	Housing: White polycarbonate V-0 rated to UL94 Terminals: Nickel plated stainless steel

Discovery Marine Multisensor Detector



58000-700MAR

Discovery Marine Multisensor Detector



0729

Operating principles

The Discovery Marine Multisensor Detector construction is similar to that of the optical detector but uses a different lid and optical mouldings to accommodate the thermistor (heat sensor). The sectional view (Fig 1) shows the arrangement of the optical chamber and the thermistor.

The Discovery Marine optical/heat multisensor detector contains an optical smoke sensor and a thermistor temperature sensor whose outputs are combined to give the final analogue value. The way in which the signals from the two sensors are combined depends on the response mode selected. The five modes provide response behaviour which incorporates pure heat detection, pure smoke detection and a combination of both. The multisensor is therefore useful over the widest range of applications.

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 micro-controller processes the two signals according to the mode selected. When the detector is operating as a multisensor (i.e. modes 1, 3 and 4) the temperature signal processing extracts only rate-of-rise information for combination with the optical signal. In these modes 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.

Additional heat sensor information

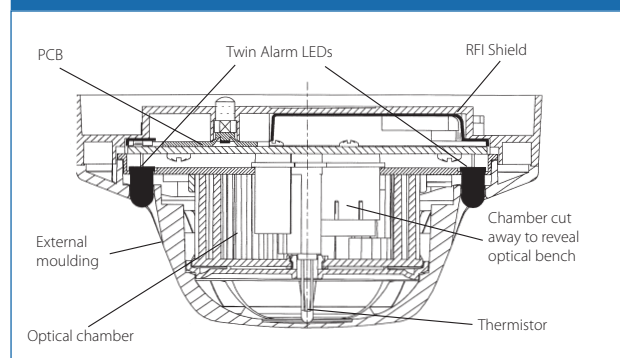
Discovery Marine optical/heat multisensor detectors manufactured from mid 2009 incorporate additional temperature information that is intended for use in signal processing.

Temperature data can be read separately by the control panel (see Note 1) and used to validate an alarm signalled by the multisensor analogue value. An example of this would be a high multisensor analogue value not accompanied by an increase in heat: this would indicate that an agent other than smoke, e.g. steam, had caused the high analogue value.

Table 2: Operating Modes

Mode	Smoke Sensitivity (grey smoke) %/m dB/m	Temperature Sensitivity (relative)	Response Type	Minimum Time to Alarm (seconds)
1	1.1 0.05	High	Multisensor	20
2	2.1 0.09	Not set to heat response	Optical	30
3	2.8 0.12	Low	Multisensor	20
4	4.2 0.19	2.1	Multisensor	20
5	No response to smoke	See mode 5 opposite	Heat A1R	15

Sectional View (Fig 1)



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Characteristics of the response modes

The processing algorithms in modes 1 to 4 incorporate drift compensation.

The characteristics of the five response modes are summarised below.

Mode 1 has very high smoke sensitivity combined with high heat sensitivity. This gives a high overall sensitivity to both smouldering and flaming fires.

Mode 2 has a smoke sensitivity similar to that of a normal optical smoke detector. This mode is therefore equivalent to a standard optical detector. It is suitable for applications in which wide temperature changes occur under normal conditions.

Mode 3 has moderate smoke sensitivity combined with a moderate sensitivity to heat. This combination is considered the optimum for most general applications since it offers good response to both smouldering and flaming fires.

Mode 4 has lower than normal smoke sensitivity combined with high heat sensitivity. This makes it suitable for applications in which a certain amount of fumes or smoke is considered normal.

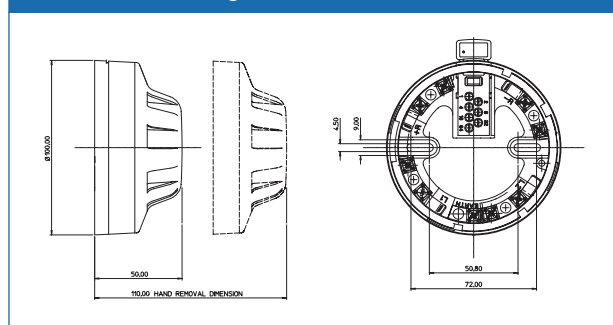
Mode 5 has no smoke sensitivity at all, but gives a pure heat detector response meeting the response time requirements for a Class A1R detector in the European standard EN54-5:2000. In this mode the detector will respond to slowly changing temperatures and has a "fixed temperature" alarm threshold at 58°C. The analogue value in this mode will give the approximate air temperature over the range 15°C to 55°C.

In mode 5, the smoke sensor is still active though it does not contribute to the analogue signal. As a consequence, if the detector is used in a dirty or smoky environment the optical sensor drift flag may be activated in the heat-only mode.

Notes

1. This applies only to panels which have been programmed to read the additional information.
2. In situ testing of the multisensor detector should be carried out as for smoke detectors in response mode 2 and for heat detectors in response mode 5. Both optical and heat sensors must be tested in modes 1, 3 and 4.
3. If the multisensor is to be used in mode 5, heat detector spacing/coverage should be applied.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Smoke	Photoelectric detection of light scattered by smoke particles
	Heat	Temperature-dependent resistance
Supply wiring:	Two-wire supply, polarity insensitive	
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC	
Communication protocol:	Apollo Discovery 5–9V peak to peak	
Quiescent current:	400μA	
Power-up surge current:	1mA	
Maximum power-up time:	10s	
Alarm current, LED illuminated:	3.5mA	
Remote output characteristics:	Connects to positive line through 4.5kΩ (5m maximum)	
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	
Temperature range:	-40°C to +70°C	
Humidity:	0 to 95% relative humidity (no condensation or icing)	
Effect of temperature on optical sensor:	None	
Effect of wind on optical sensor:	None	
Vibration, impact and shock:	To EN54-7:2000	
IP rating:	44 in accordance with BSEN60529	
Dimensions:	100mm diameter x 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	

Discovery Marine

Ionisation Smoke Detector



58000-500MAR

Discovery Marine Ionisation Smoke Detector



Operating principles

The Discovery Marine Ionisation Smoke Detector uses the same outer case as the optical smoke detector and is distinguished by the red indicator LEDs. Inside the case is a printed circuit board which has the ionisation chamber mounted on one side and the signal processing and communications electronics on the other.

The ionisation chamber consists of a reference chamber contained inside a smoke chamber (Fig 1). The outer smoke chamber has inlet apertures fitted with insect resistant mesh.

At the junction between reference and smoke chambers, the sensing electrode converts variations in chamber current into voltage changes.

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

The analogue voltage at the sensor electrode is converted to a digital format which is processed to provide an analogue value for transmission to the control panel when the device is polled.

The Discovery Marine 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.

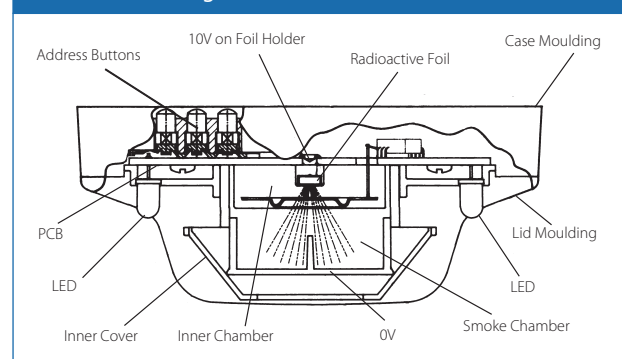
Ionisation smoke detectors are supplied in individual packing with a red lid serving as a dust cover which can be left in place after fitting to prevent ingress of dust and dirt until commissioning of the system takes place. At this point the covers must be removed.

Table 3: Operating Modes

Mode	Alarm threshold γ value	Minimum time to alarm (sec)
1	0.45	5
2	0.45	30
3	0.70	5
4	0.70	30
5	1.0	5

Compensation rate complies with EN54-7:2000

Sectional View (Fig 1)



Safety note

In the United Kingdom, ionisation smoke detectors are subject to the requirements of the Environmental Permitting Regulations 2010 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 Health Protection Agency (HPA), 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 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.

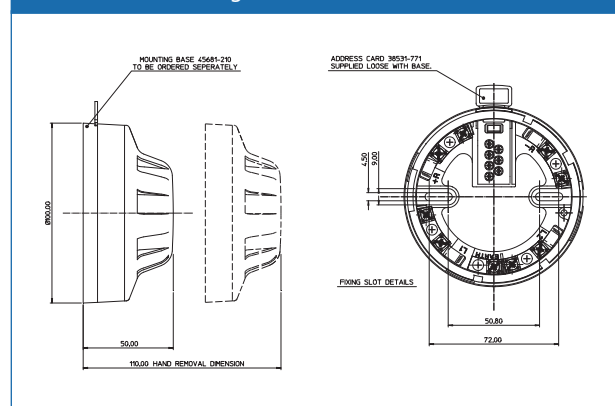
At the end of their recommended working life of ten years, ionisation smoke detectors should be returned to Apollo for safe disposal.

Guidance on storage and handling can be given by Apollo Fire Detectors and full details can be requested from:

Environmental Agency
Swift House
Frimley Business Park
Frimley
GU16 7SQ

Outside the UK, please contact the relevant national agency.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Ionisation chamber	
Chamber configuration:	Twin compensating chambers using one single sided ionising radiation source	
Radioactive isotope:	Americium 241	
Activity:	33.3 kBq, 0.9µCi	
Supply wiring:	Two-wire supply, polarity insensitive	
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC	
Communication protocol:	Apollo Discovery 5–9V peak to peak	
Quiescent current:	300µA	
Power-up surge current:	1mA	
Maximum power-up time:	10s	
Alarm current, LED illuminated:	3.5mA	
Remote output characteristics:	Connects to positive line through 4.5kΩ (5m maximum)	
Clean-air analogue value:	23 +4/–0	
Alarm level analogue value:	55	
Alarm indicator:	2 red Light Emitting Diodes (LEDs) Optional remote LED	
Temperature range:	–30°C to 70°C	
Humidity:	0 to 95% relative humidity (no condensation or icing)	
Effect of temperature:	Less than 10% change in sensitivity over rated range	
Atmospheric pressure:	Operating: Suitable for installation up to 2,000m above sea level	
Effect of wind:	Less than 20% change in sensitivity at speeds up to 10m/s Note: slow changes in ambient conditions will automatically be compensated and will not affect sensitivity	
Vibration, impact and shock:	To EN54–7:2000	
IP rating:	44 in accordance with BSEN60529	
Dimensions:	100mm diameter x 42mm height 50mm (height in base)	
Weight:	Detector	105g
	Detector in base	160g
Materials:	Housing: White polycarbonate V–0 rated to UL94 Terminals: Nickel plated stainless steel	

Discovery Marine Heat Detector



58000-400MAR

Discovery Marine Heat Detector



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Operating principles

Discovery Marine 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 Discovery Marine Heat Detector uses a single thermistor to sense the air temperature at the detector position. The thermistor is connected in a resistor network, which produces a voltage output dependent on temperature. The design of the resistor network, together with the processing algorithm in the microcontroller, gives an approximately linear characteristic from 10°C to 80°C. This linearised signal is further processed, depending on the response mode selected, and converted to an analogue output.

For the European standard version of the detector, the five modes correspond to five "classes" as defined in EN54-5:2001. The classes in this standard correspond with different response behaviour, each of which is designed to be suitable for a range of application temperatures. All modes incorporate "fixed temperature" response, which is defined in the standard by the "static response temperature". The application temperatures and static response temperatures for all response modes are given in Table 4.

In addition to the basic classification, a detector may be given an "R" or "S" suffix. The "R" suffix indicates that the detector has been shown to have a rate-of-rise characteristic. Such a detector will still give a rapid response even when starting from an ambient temperature well below its typical application temperature. This type of detector is therefore suitable for areas such as unheated warehouses in which the ambient temperature may be very low for long periods.

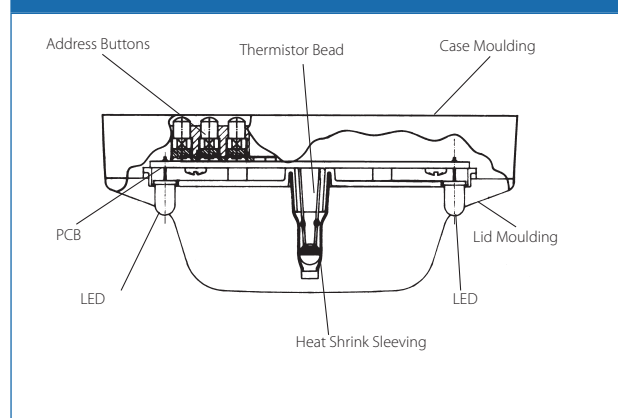
The "S" suffix on the other hand indicates that the detector will not respond below its minimum static response temperature even when exposed to high rates of rise of air temperature. This type is therefore suitable for areas such as kitchens and boiler rooms where large, rapid temperature changes are considered normal.

Table 4: Response Modes

Mode	Class (EN54-5:2001)	Application Temperature		Static Response Temperature °C		
		Typical	Max	Min	Typ	Max
1	A1R	25	50	54	57	65
2	A2R	25	50	54	61	70
3	A2S	25	50	54	61	70
4	CR	55	80	84	90	100
5	CS	55	80	84	90	100

For air temperatures in the range 15°C to 55°C, the analogue value for a detector in mode 1 will correspond approximately to the air temperature.

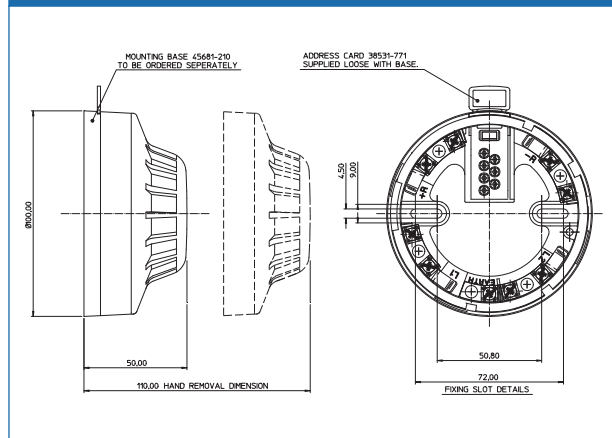
Sectional View



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Dimensional Drawings

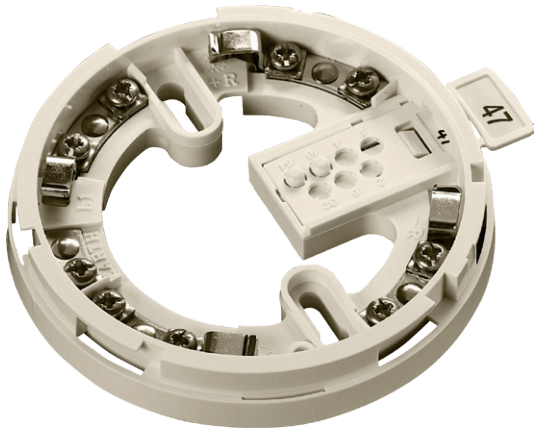


Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Heat sensitive resistance	
Supply wiring:	Two-wire supply, polarity insensitive	
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC	
Communication protocol:	Apollo Discovery 5–9V peak to peak	
Quiescent current:	400μA	
Power-up surge current:	1mA	
Maximum power-up time:	10s	
Alarm current, LED illuminated:	3.5mA	
Remote output characteristics:	Connects to positive line through 4.5kΩ (5m maximum)	
Alarm level analogue value:	55	
Alarm indicator:	2 red Light Emitting Diodes (LEDs) Optional remote LED	
Temperature range:	Maximum operating	see Table 4
	Minimum operating	-40°C
	(no condensation/icing)	
	Storage	-40°C to +80°C
Humidity:	0 to 95% relative humidity (no condensation or icing)	
Vibration, impact and shock:	To EN54–5:2001	
IP rating:	54 in accordance with BSEN60529	
Dimensions:	100mm diameter x 42mm height	
Weight:	Detector	105g
	Detector in base	160g
Materials:	Housing: White polycarbonate V-0 rated to UL94 Terminals: Nickel plated stainless steel	

Discovery Marine Mounting Bases



Technical description

An earth connection is not required for either safety or correct operation of detectors. The ground (earth) terminal is isolated and is provided for tidy termination of grounded conductors or cable screens and to maintain earth continuity where necessary.

All terminals are marked according to their function.

Bases have a wide interior diameter for ease of access to cables and terminals and there are two slots for fixing screws. The slots enable two fixing screws to be located at a spacing of 51 to 69mm.

Detectors fit into bases one way only, without snagging, and require clockwise rotation without push force to be plugged in.

Universal address cards, known as XPERT cards, are supplied with all bases. Consult the coding guide in the installation instructions to determine which pips are to be removed from the card to give the correct address. Lay the card on a flat surface, pips down, insert a screwdriver into the slot on the reverse of the pip to be removed and give a firm twist.

When the card is coded insert it into the slot in the side of the appropriate base, making sure that the card locks itself into place. As a detector is inserted into the base, the remaining pips operate the address buttons on the detector and the detector electronics reads the address.



45681-210MAR

Discovery Marine Mounting Base

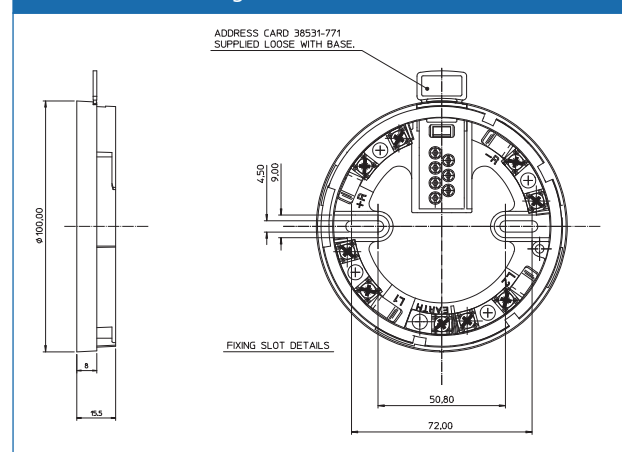


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The bases are of 100mm diameter and have five terminals:

- L1 Negative line in and line out - double terminal
- L2 Positive line in and line out - double terminal
- R Remote LED negative supply - double terminal
- +R Remote LED positive supply - double terminal
- EARTH Earth/ground - single terminal

Dimensional Drawings



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Case Study

Liao Hai Ferry

Summary	
Project Name:	Liao Hai Ferry
Location:	China
Market:	Marine
Products used:	200 Discovery Marine Detectors, Deckhead Mounting Box
Installer:	Shanghai Jin Zhou

The Liao Hai is a roll-on-roll-off ferry. Measuring 115m long and 21m wide, it has the capacity to transport 650 people and approximately 100 lorries. The China Tian jin XinGang shipyard awarded the contract to supply an intelligent fire detection system for the Liao Hai, a new roll-on roll-off ferry, to Apollo's local representative Shanghai Jin Zhou.

The fire detection system includes around 200 Apollo intelligent detectors, including multisensors, which have been approved for marine applications by the China Classification Society following additional tests specific to the marine environment.

Most of the detectors used on the vessel have been fitted using Apollo's Deckhead Mounting Base. This is a robust back box, made from either aluminium or polycarbonate, for use with standard 100mm detector bases. Fixing points are external, enabling a seal to be maintained and therefore providing protection against contaminant ingress into the rear of the base. These boxes are particularly useful when securing bases to rough surfaces or in areas where there may be dripping water.

The Liao Hai fire detection system allows a two minute delay in the event of an alert so that an incident can be investigated. If the alert is genuine, the system then proceeds to raise the alarm. Apollo zone monitors with inbuilt isolators have been installed to enable the fire detection system to interface with other critical equipment on board. A fire alarm triggers a preset sequence of events to ensure that passengers can be evacuated safely. Actions include operating fire doors and dampers and closing down the air conditioning to the passenger and car decks to prevent the spread of smoke.

DISCOVERY®



Discovery Marine

Isolating Base



45681-286

Discovery Marine Isolating Base



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Function

The Isolating Base senses and isolates short circuit faults on XP95 and Discovery loops and spurs.

Features

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.

Protocol compatibility

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

Operation

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 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 fault, every detector should be fitted to an isolating base.

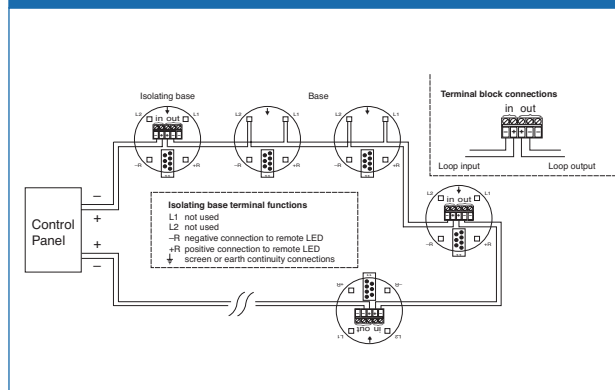
In applications where it is not necessary to use an isolating base for each detector, up to twenty detectors or equivalent surge current may be installed between isolating bases. See PIN sheet PP2090 for full information on loop loading between isolating bases.

Consult engineering guides or PIN sheets for quiescent current values of protected devices.

Mechanical construction

The isolating base is a self-extinguishing polycarbonate moulding with nickel-plated steel terminals for connecting a detector. The associated detector can be locked into the base using the normal locking screw.

Schematic Wiring Diagram — Isolating Base



Technical Data

Minimum supply voltage in normal operating conditions	17V DC
Maximum supply voltage	28V DC plus 9V DC protocol pulses
Isolation indicator	Yellow LED, lit continuously in isolation condition
Current consumption	
at 18V DC	23µA
at 28V DC	43µA
at 18V DC and adjacent sector isolated	4mA
Maximum line current non-isolating continuous	1.0A
transition into isolation	3.0A
EMC	BS 61000-6-3
Emission	To BS EN 50081-1
Immunity	To BS EN 50130-4
Operating temperature	-20° C to +60° C
Storage temperature	-30° C to +80° C
Relative humidity (no condensation/icing)	0%–95%
Design environment	Indoor use only
Dimensions:	100mm diameter x 24mm height 100mm diameter x 60mm height (base with detector fitted)
Weight:	100g

Discovery Marine Manual Call Point



58100-970MAR

Discovery Marine Manual Call Point

58100-971MAR

Discovery Marine Manual Call Point with Isolator



0729

Technical description

The Discovery Marine Manual Call Point (MCP) is based on the KAC conventional MCP range. It is electronically and mechanically compatible with previous Apollo call points based on KAC's World Series product.

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

If a MCP is activated, it interrupts the normal protocol to give a fast response.

A single bi-coloured alarm LED is provided on the manual call point. This LED is controlled, independently of the call point, by the control panel and may be set to flash each time the call point is polled. The red LED is illuminated when the call point has been activated and sent into alarm. On the isolated versions an amber/yellow LED indicates a short-circuit on the loop wiring either side of the call point.

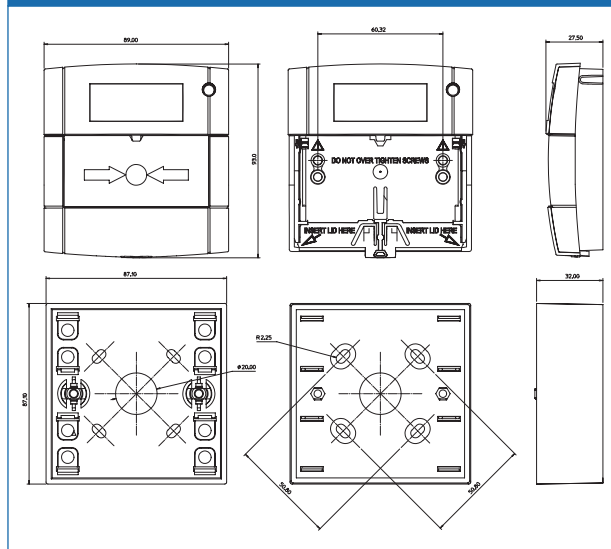
Call points can be remotely tested from the panel by transmission of a single bit in the communications protocol. Call points respond by providing a value of 64 which corresponds to the alarm value. The panel should recognise this response as a test signal and should not raise a general alarm.

Discovery Marine manual call points are available with or without an isolator. Each version is available with a resettable element and a backbox for surface mounting as standard. If a glass option is required, spare glasses are available on request.

For ease of installation Discovery Marine manual call points are supplied with clip-on terminal blocks and a connector which allows continuity testing before call points are commissioned.

To provide additional protection against accidental operation, a transparent hinged cover with a locking tag, part number 26729-152 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.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Call point type:	Deformable element
Call point principle:	Operation of a switch
Alarm indicator:	Red Light Emitting Diode (LED)
Fault indicator:	Amber/Yellow Light Emitting Diode (LED)
Supply wiring:	Two-wire supply, polarity sensitive
Loop connections:	Terminal Block L1 – ve/L2 +ve
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	100µA
Power-up surge current:	1mA
Maximum power-up time:	1s
Alarm current, LED illuminated:	4mA
Normal analogue value:	16
Alarm state value:	64
Temperature range:	–20°C to +60°C
Humidity:	0 to 95% relative humidity (no condensation)
Compliance Standard:	EN54-11:2001; EN54-17:2005 (isolated version)
IP rating:	24D (standard)
Dimensions:	89mm x 93mm x 26.5mm (manual call point) 87mm x 87mm x 32mm (back box)
Weight:	Flush mounted 110g Surface mounted 160g
Materials:	Housing: Red self-coloured polycarbonate/ABS
Hinged cover and locking tag are also available, part number:	26729-152 cover 26729-179 pack of 5 security ties
Discovery glasses are also available, part number:	26729-155 (pack of 5)

Discovery Marine

Waterproof Manual Call Point



58100-975MAR

Discovery Marine Waterproof Manual Call Point

58100-976MAR

Discovery Marine Waterproof Manual Call Point with Isolator



0729

Technical description

The Discovery Marine Waterproof Manual Call Point (MCP) is based on the KAC conventional MCP range. It is electronically and mechanically compatible with previous Apollo call points based on KAC's World Series product.

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

If a MCP is activated, it interrupts the normal protocol to give a fast response.

A single bi-coloured alarm LED is provided on the manual call point. This LED is controlled, independently of the call point, by the control panel and may be set to flash each time the call point is polled. The red LED is illuminated when the call point has been activated and sent into alarm. On the isolated versions an amber/yellow LED indicates a short-circuit on the loop wiring either side of the call point.

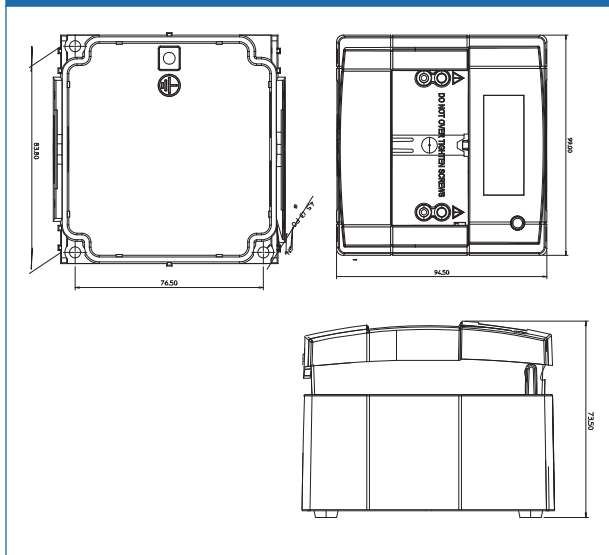
Call points can be remotely tested from the panel by transmission of a single bit in the communications protocol. Call points respond by providing a value of 64 which corresponds to the alarm value. The panel should recognise this response as a test signal and should not raise a general alarm.

Discovery Marine manual call points are available with or without an isolator. Each version is available with a resettable element and a backbox for surface mounting as standard. If a glass option is required, spare glasses are available on request.

For ease of installation Discovery Marine manual call points are supplied with clip-on terminal blocks and a connector which allows continuity testing before call points are commissioned.

To provide additional protection against accidental operation, a transparent hinged cover with a locking tag, part number 26729-152 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.

Dimensional Drawings



Technical Data

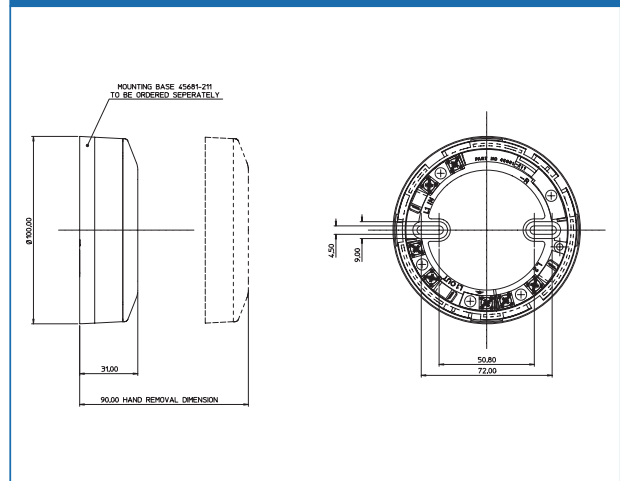
Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Call point type:	Deformable element
Call point principle:	Operation of a switch
Alarm indicator:	Red Light Emitting Diode (LED)
Fault indicator:	Amber/Yellow Light Emitting Diode (LED)
Supply wiring:	Two-wire supply, polarity sensitive
Loop connections:	Terminal Block L1 -ve/L2 +ve
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	100µA
Power-up surge current:	1mA
Maximum power-up time:	1s
Alarm current, LED illuminated:	4mA
Normal analogue value:	16
Alarm state value:	64
Temperature range:	–20°C to +60°C
Humidity:	0 to 95% relative humidity (no condensation)
Compliance standard:	EN54-11:2001; EN54-17:2005 (isolated version)
IP rating:	24D IP67 (weatherproof)
Dimensions:	89mm x 93mm x 26.5mm (manual call point) 87mm x 87mm x 32mm (back box)
Weight:	Flush mounted 110g Surface mounted 160g
Materials:	Housing: Red self-coloured polycarbonate/ABS
Hinged cover and locking tag are also available, part number:	26729-152 cover 26729-179 (pack of 5 security ties)
Discovery glasses are also available, part number:	26729-155 (pack of 5)

Discovery Marine Isolator



Dimensional Drawings



55000-721MAR

Discovery Marine Isolator

(Uses 45681-211MAR Isolator Base)

The Discovery Marine Isolator is placed at intervals on the loop and ensures that, in the case of a short-circuit, only the section between the isolators will be affected. When the short-circuit is removed, the isolators automatically restore power in the isolated section.



0729

Discovery Marine Isolator Base

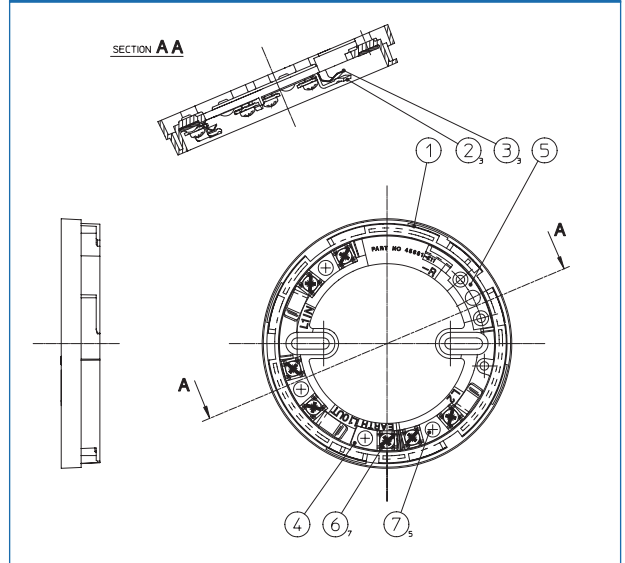


45681-211MAR

Discovery Marine Isolator Base

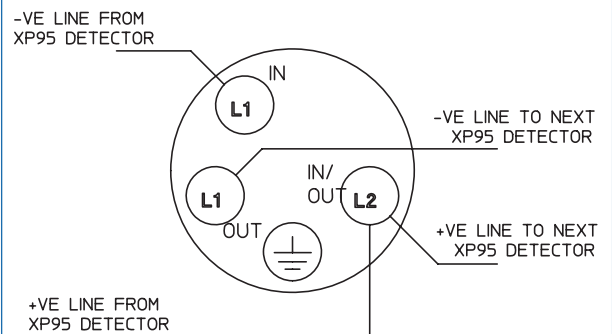
The Discovery Marine Isolator Base is unique and designed to only accept the marine isolator.

Dimensional Drawings



Negative Isolator Schematic Wiring Information

CONNECT POSITIVE LINE TO L2 IN/OUT AND NEGATIVE LINE TO L1 IN & L1 OUT



Discovery Marine

Sounder Visual Indicator Base



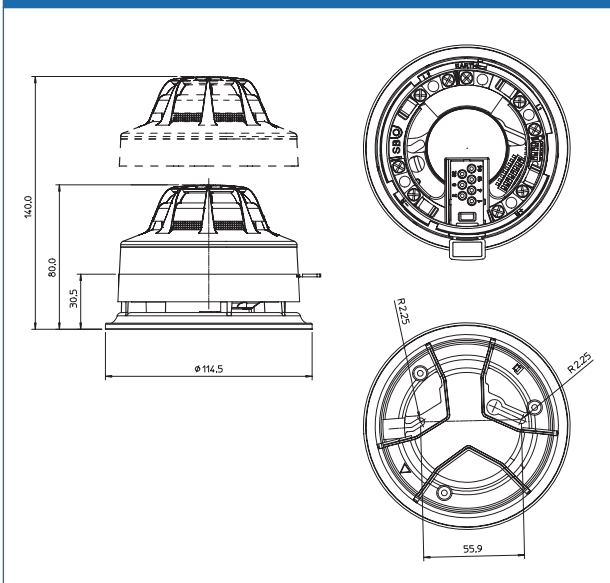
45681-394MAR

Discovery Marine Sounder Visual Indicator Base



0729

Dimensional Drawings



The Discovery Marine Sounder Visual Indicator Base is a multifunctional device comprising a mounting base for Discovery Marine fire detectors, a sounder, a visual indicator and a short-circuit isolator.

Application

The Discovery Marine sounder visual indicator base is used to provide audible and visual warning of fire and is controlled by the fire control panel by means of the Discovery protocol. The particular features of this base are available only when it is being controlled by the full Discovery protocol with the panel programmed accordingly. Information on features should be requested from the panel manufacturer.

The Discovery Marine sounder visual indicator base can be used with a detector fitted or with a cap for operation as a stand-alone alarm device.

The right tone for your installation

The Discovery Marine sounder visual indicator base offers a choice of 15 evacuation tones, including the standard Apollo evacuation tone. One of these tones is selected during commissioning in order to suit local regulations or customs.

The tones include those required by Dutch, Swedish, German, Australian, New Zealand and North American standards as well as the UK.

Whichever evacuation tone is selected there is a secondary tone which may be used for alerting or warning of a possible evacuation.

The right level of sound

The sounder is set during commissioning to one of 7 levels of sound, the highest level being nominally 90dB(A).

At 60dB(A) the lowest level falls outside the scope of the standard, EN54. It has been included to provide a very local warning for the use of personnel in particular environments, such as nurse stations in hospitals.

Flexibility of group addressing

In many installations a fire alarm must be raised by switching more than one sounder visual indicator to alert or alarm simultaneously. This is achieved with Discovery Marine sounder visual indicator bases by assigning devices to groups on commissioning, with the group information being stored in each device. One command will then switch all devices in the group.

Specialist Environments
marine, offshore & industrial

Find out more about the Orbis and Discovery range at
www.apollo-fire.co.uk

Sounder, visual indicator or both

The Discovery Marine sounder visual indicator base normally switches both sounder and visual indicator to provide an alert or evacuation signal. The sounder and visual indicator of the Discovery Marine sounder visual indicator base can, however, be switched independently of each other by the control panel.

Location-specific volume setting

Detectors and sounder visual indicators are installed in many different types of environment.

When configuring the Discovery Marine sounder visual indicators base the adjustment of volume can be done at the point of installation.

The commissioning engineer simply sets the control panel to 'Setup' and then walks from one device to the next to set the required volume, using a magnetic wand, part no 29650-001. When all devices have been set the control panel is used to register all the individual volume settings.

Features

- 15 evacuation tones and 15 secondary or alert tones
- 7 volume levels
- Software-defined group addressing
- Alarm switching by individual device, by group or of all devices on loop
- Independent control of sounder and visual indicators
- Set-up and testing of devices at point of installation
- Isolator status information

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Operating voltage:	17–28V DC (polarity sensitive)	
Protocol pulses:	5–9V	
Current consumption at 24V:	Switch-on surge, <1s quiescent device operated at maximum volume	1.2mA 350µA 8mA
Maximum sound output at 90°:	1mA	
Operating temperature:	–20°C to +60°C	
Humidity:	0 to 95%	
IP rating:	21D	

Interfaces



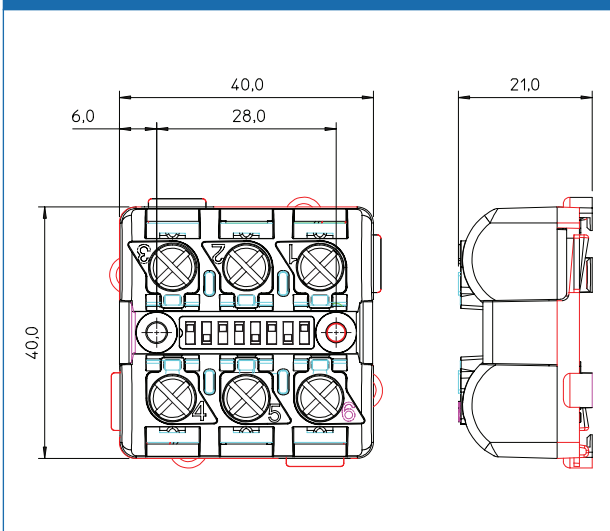
A comprehensive range of interfaces for use with Discovery systems are available from Apollo. They are designed to enable fire protection systems to be engineered simply and effectively without the need for custom-designed equipment.

These Discovery Marine interfaces are available in two types of housing. DIN-rail versions feature enclosures that clip to a standard 35mm DIN-rails (DIN 46277) or are screwed to the base of a larger enclosure. Miniature interfaces use very compact enclosures for installation into other equipment.

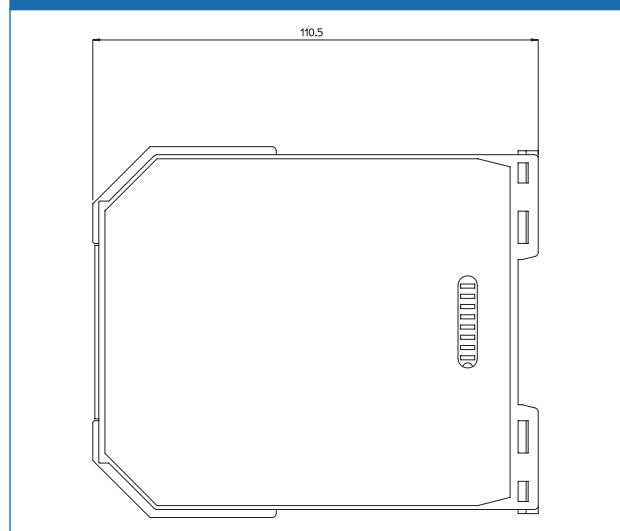
The following interfaces may be incorporated into Discovery Marine systems:

- DIN-Rail Input/Output Unit provides a relay output and one monitored input
- DIN-Rail Output Unit provides one relay output
- DIN-Rail Zone Monitor controls a zone of conventional detectors
- DIN-Rail Switch Monitor monitors the operation of a switch
- Marine Mini Switch Monitor monitors the operation of a switch and is small enough to fit into other equipment
- DIN-Rail Dual Isolator

Dimensional Drawings for Mini Switch Monitor



Dimensional Drawings for DIN-Rail



Specialist Environments
marine, offshore & industrial

Find out more about the Orbis and Discovery range at
www.apollo-fire.co.uk

Marine DIN-Rail Dual Isolator



55000-770MAR

Marine DIN-Rail Dual Isolator



0729

The Marine DIN-Rail Dual Isolator provides, in one housing, two independent isolators which sense and isolate short-circuits on loops and spurs.

The isolators are loop-powered and are polarity sensitive. A maximum of twenty detectors may be installed between isolators.

When a short-circuit condition exists on either side of the isolator, its yellow LED is illuminated.

Under normal operating conditions, a low impedance is present between the two negative terminals of each isolator channel so that power and signals are passed to the next base in line.

If a short-circuit or abnormally low impedance occurs across the loop, the fall in voltage is sensed and the isolator isolates the negative supply in the direction of the fault. In this condition, the yellow LED of the affected channel will be illuminated. The isolated section of loop is tested using a current pulse every five seconds. When the short-circuit is removed the power will automatically be restored.

Technical Data

Maximum loop voltage:	28V DC + 9V Protocol pulses	
Maximum power up time:	10mS	
Isolating voltage:	14V DC supply in and out connections	
Isolation indicator:	Yellow LED, lit continuously in isolation condition	
Current consumption:	At 18V	23µA
	At 28V	47µA
	At 18V in isolated state	4mA
Maximum loop current:	Non-isolating continuous	1.0A
	short-circuit switching	3.0A
	on resistance	0.2Ω
Reset resistance at 18V with short after next isolator:	300Ω	
Operating temperature:	-20°C to +60°C	
Storage temperature:	-30°C to +80°C	
Relative humidity (no condensation/icing):	0% – 95%	
IP Rating:	20	
Design environment:	Indoor use only	

Marine DIN-Rail Output Unit



55000-771MAR

Marine DIN-Rail Output Unit.



0729

The Marine DIN-Rail Output Unit provides a voltage-free, single pole, changeover relay output.

The Marine DIN-Rail output unit returns an analogue value of 16 under all conditions.

The changeover contact is operated by a software command from the panel.

The Marine DIN-Rail output unit is loop-powered and operates at 17–28V DC with protocol voltage pulses of 5–9V.

Technical Data

Loop voltage:	17–28V DC	
Maximum current consumption, at 24V:	Switch-on surge, max 160ms	3mA
	quiescent	21.0mA
	Relay operated (LED enabled)	23.3mA
	Relay operated (LED disabled)	21.0mA
Maximum cable resistance:	50W	
Relay output contact rating at 30V DC, max:	1A (resistive)	
Operating temperature:	-20°C to +70°C	
Humidity (no condensation /icing):	0–95%	
IP rating	20	

Interfaces continued

Marine DIN-Rail Switch Monitor Plus



0729

55000-772MAR

Marine DIN-Rail Switch Monitor Plus

The Marine DIN-Rail Switch Monitor is designed to monitor the state of one or more single pole, volt free contacts connected on a single pair of cables and to report the status to Apollo compatible analogue control equipment.

The Marine DIN-Rail switch monitor provides four input states to the control equipment: 'normal', 'fault', 'pre-alarm' and 'alarm'. The unit has a red LED to indicate an alarm and a yellow LED to indicate a fault condition.

The Marine DIN-Rail switch monitor is loop-powered and operates at 17–28V DC with protocol voltage pulses of 5–9V. The unit is designed to accept a maximum line resistance of 50Ω. The end-of-line resistor required is 20kΩ.

Marine DIN-Rail Zone Monitor



0729

55000-773MAR

Marine DIN-Rail Zone Monitor

The Marine DIN-Rail Zone Monitor powers and controls the operation of a zone of up to 20 conventional fire detectors from a loop of XP95 addressable detectors and ancillary devices.

This unit needs to be installed in a suitable enclosure and secured using end stops, part no 27447-528 or equivalent.

The Marine DIN-Rail zone monitor is factory preset to return an analogue value of 16 when all detectors on the zone are in the quiescent state and 64 when a detector changes to the alarm state. The unit latches in the alarm state.

A 5.1kΩ end-of-line resistor is used to monitor cables for open and short-circuit faults. Alternatively, an active end-of-line monitor may be used in conjunction with diode bases and a capacitor of up to 50μF fitted at the unit wiring terminals.

In either case an analogue value of 4 is transmitted during open or short-circuit faults.

The Marine DIN-Rail zone monitor is fitted with a bi-directional short-circuit isolator and will be unaffected by loop short-circuits on either loop input or output.

Technical Data

Loop voltage:	17–28V DC	
Maximum current consumption, at 24V:	Switch-on surge, max 65ms	2.5mA
	quiescent, 20kΩ EOL fitted	730μA
	input short-circuit	3.5mA
	LED off, switch input closed	1.3mA
	LED on, switch input closed	3.4mA
	LED on, switch input s/c	5.6mA
Switch input monitoring voltage:	9–11V DC	
Maximum cable resistance:	50Ω	
Operating temperature:	–20°C to +70°C	
Humidity (no condensation/icing):	0–95%RH	
Vibration:	To EFGS/F/95/007	
IP rating:	20	
Radiated emissions:	To BS EN50081–1 & 2	
Radiated immunity:	To BS EN50082–1	
Dimensions and weight: of DIN-Rail Switch Monitor:	110 x 107 x 20mm, 95g	

Technical Data

Loop voltage:	17–28V DC	
Zone voltage:	(Loop voltage > 22V)	
	19V	±1V
	(Loop voltage < 22V)	
	loop voltage	–1.5V
Maximum current consumption, at 28V:	Switch-on surge, max 250ms	2.8mA
	quiescent	4mA + detector load
	alarm	11mA
	short-circuit	11mA
Maximum quiescent detector load:	2mA	
Maximum current through isolator:	1A continuous 3A peak	
Isolating voltage:	14V	
End-of-line resistor value:	5.1kΩ + 5% 1/3W	
Stabilisation time on power-up:	4 seconds	
Maximum capacitor on zone terminals:	50μF	
Operating temperature:	–20°C to +70°C	
Humidity (no condensation/icing):	0% – 95%	
IP rating	20	
Dimensions and weight	110 x 107 x 20mm, 95g	

Marine DIN-Rail Input/Output Unit



55000-774MAR

Marine DIN-Rail Input/Output Unit



0729

The Marine DIN-Rail Input/Output Unit provides a voltage-free, single pole, changeover relay output, a single, monitored switch input and an unmonitored, non-polarised opto-coupled input.

The Marine DIN-Rail input/output unit supervises one or more normally-open switches connected to a single pair of cables. It is set to return an analogue value of 4 in the event of an open or short-circuit fault and 16 during normal operation. The status of the inputs is reported by means of two input bits.

The changeover contact is operated by a software command from the panel.

Marine Mini Switch Monitor



55000-775MAR

Marine Mini Switch Monitor



0729

The Marine Mini Switch Monitor is a miniature interface with an entirely new housing. The unit is designed to fit into equipment with limited space or mounted within an enclosure such as a manual call point. The interface can also be fitted onto a standard 35mm DIN-Rail using a twist-click motion. The unit is designed to monitor the state of one or more singlepole, volt-free contacts and reports the contact status to Apollo compatible control panels.

The Marine mini switch monitor features a (20i) short-circuit isolator as standard and can be used as an interrupt or non-interrupt device. The interrupt feature (selected via the DIL Switch) means the unit can be used where a priority response is required, in particular for monitoring an individual or a zone of conventional manual call points.

Please note: When the eighth section of the DIL switch is changed, the mini switch monitor will change the type code it sends to the panel. The panel will have to be programmed to accept this change.

Technical Data

Loop voltage:	17–28V DC	
Zone voltage:	(Loop voltage > 22V) 19V (Loop voltage < 22V) loop voltage	±1V –1.5V
Maximum current consumption, at 28V:	Switch-on surge, max 250ms quiescent EOL fitted 20kΩ switch input s/c, max (LED on) short-circuit LEDs disabled any other condition (max 2 LEDs on)	3.5mA 31.2mA 6mA 11mA 2.2mA 4.5mA
Switch input monitoring voltage (open-circuit condition):	9–11V DC	
Maximum cable resistance:	Voltage max 35V DC impedance 10kΩ	
Relay output contact rating at 30V AC or DC:	Max 1A	
EOL resistor value	5.1kΩ + 5% 1/3W	
Relay output wetting current at 10mV DC:	Min 10μA	
Operating temperature:	–20°C to +70°C	
Humidity (no condensation/icing):	0–95%	
IP rating:	20	
Output:	Resistive loads max 1Amp at 30v	

Technical Data

Loop voltage:	17–28V DC	
Maximum current consumption, at 24V:	Switch-on surge quiescent, 20kΩ EOL fitted LED on remote LED illuminated yellow fault LED illuminated	800μA 200μA + 3.4mA + 2.8mA + 2.8mA
Isolator re-connection voltage:	Vmin r/c = 18V	
Operating temperature:	–20°C to +60°C	
Humidity (no condensation):	0–95%	
Shock:		
Vibration:	To EN54–17/18	
Impact:		
Radiated emissions to BS EN61000–6–3:	To BS EN61000–6–3	
Radiated immunity:	To BS EN50130–4	
Dimension and weight:	39mm x 39mm x 20mm, 30g	
IP rating:	20	

Marine Intelligent Base Mounted Flame Detectors



0729



UV Flame Detector

55000-027MAR

Marine Intelligent Base Mounted UV Flame Detector

The Marine Intelligent Base Mounted UV Flame Detector is designed to protect enclosed indoor areas where open fires may be expected. The detector has a fast acting response to flames up to 25m away and is equipped with a single UV sensor with a narrow spectral response in order to discriminate between flames and most spurious sources of radiation.

- Responds to stationary flames with no flicker
- Sensitive to UV radiation emitted by flames during combustion
- Compact flame detector which fits into Discovery Marine bases
- Loop-powered

UV Dual IR Flame Detector

55000-028MAR

Marine Intelligent Base Mounted UV Dual IR Flame Detector

The Marine Intelligent Base Mounted UV Dual IR Flame Detector is designed to protect open indoor areas where open flaming fires may be expected. The detector has a UV and dual IR sensors responding to different wavelengths in order to discriminate between flames and spurious sources of radiation.

- Responds to stationary flames with no flicker
- Sensitive to UV and low-frequency flickering IR radiation emitted by flames during combustion
- Compact flame detector which fits into Discovery or Marine bases
- Loop-powered
- False alarms due to electrical discharges from lightning or arc welding and flickering sunlight are minimised

IR³ Flame Detector

55000-029MAR

Marine Intelligent Base Mounted UV Flame Detector

The Marine Intelligent Base Mounted IR³ Flame Detector is designed to protect all indoor areas, even in dirty or smoky conditions, where open flaming fires may be expected. The detector has three IR sensors that respond to different IR wavelengths in order to discriminate between flames and spurious sources ~ of radiation.

- Responds to stationary flames with no flicker
- Sensitive to low-frequency flickering IR radiation emitted by flames during combustion.
- Compact flame detector which fits into Discovery Marine bases
- Loop-powered
- False alarms due to factors such as flickering sunlight are avoided by a combination of filters and signal processing techniques



Base Mounted Flame Detector Bracket

29600-458

Base Mounted Flame Detector Bracket

The Base Mounted Flame Detector bracket combines a bracket and deckhead mounting box (45681-217).

Features UV

The detector is sensitive to ultraviolet radiation emitted by flames during combustion. Since it requires only UV radiation the detector responds even to stationary flames with no flicker like cigarette lighters and blue gas flames.

The detector is set to respond to ultraviolet radiation (185–260nm) emitted by almost all flames, including those invisible to the naked eye, e.g. hydrogen fires.

The detector has a single UV sensor with a narrow spectral response in order to discriminate between flames and most spurious sources of radiation and is designed for internal fully enclosed areas.

Caution: The detector will also detect electrical discharges from lightning or arc welding.

UV/Dual IR

The detector is sensitive to ultraviolet and low-frequency, flickering infra-red radiation emitted by flames during combustion. Since it requires both UV and IR radiation the detector can operate in applications where a basic single UV or single IR detector would be inappropriate. The detector is set to respond to ultraviolet (185–260nm) and low-frequency flickering infra-red (0.75–2.7µm) radiation at 1–15Hz in order

to detect all flickering flames, including those invisible to the naked eye, e.g. those emitted by hydrogen fires. The detector has one UV and two IR sensors responding to different wavelengths in order to discriminate between flames and spurious sources of radiation. False alarms due to electrical discharges from lightning or arc welding and flickering sunlight are minimised by combining the UV/IR signals.

IR³

The detector is sensitive to low-frequency, flickering infra-red radiation emitted by flames during combustion. Since it responds to flickering radiation the detector can operate even if the lens is contaminated by a layer of oil, dust, water-vapour or ice. The detector is set to respond to low-frequency radiation at 1–15Hz (0.75–2.7µm) in order to detect all flickering flames, including those invisible to the naked eye, e.g. those emitted by hydrogen fires. The detector has three IR sensors that respond to different IR wavelengths in order to discriminate between flames and spurious sources of radiation. False alarms due to factors such as flickering sunlight are avoided by a combination of filters and signal processing techniques.

Applications for Flame Detectors UV

UV Flame Detectors are used when detection is required to be unaffected by convection currents, draughts or wind. These include engine rooms in ships, factories affected by draughts or wind and warehouses.

They are fast reacting and respond to a flame more than 25m away. The UV flame detector is affected by arc welding, electrical sparks, lightning, nuclear radiation and UV light sources. For applications where these phenomena are present a UV flame detector should not be used.

UV/Dual IR

This detector is not affected by any of the sources mentioned above. They are used in aircraft hangers, generator rooms (diesel and gas turbines) and paint works.

IR³

The IR³ flame detector is also fast reacting but is also tolerant of fumes, vapours, steam, dust and mist, while being unaffected by the phenomena listed above. It may, however, be affected by modulated IR radiation. Triple IR flame detectors are used in waste handling, colour printing and paper manufacturing.

*Full a full list of applications for Apollo flame detectors, please refer to PP2409, available on request.

Protocol compatibility

The detectors operate only with control equipment using the Apollo Discovery digital protocol (or any development of it).

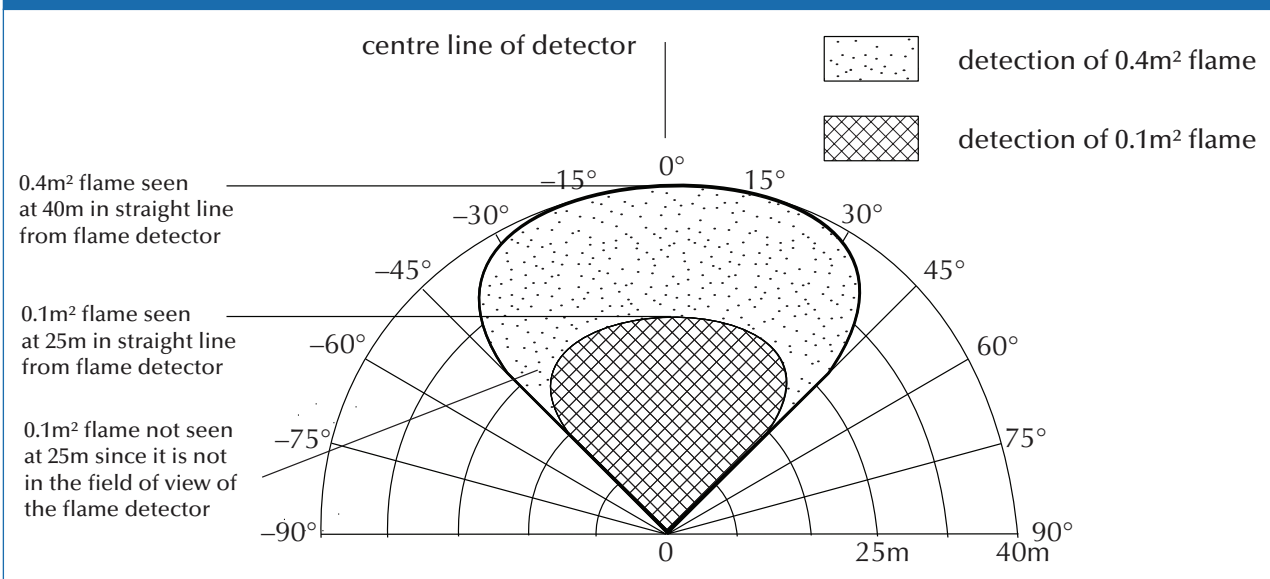
The field of view of the flame detector is shown in the Fig 1. This also provides information on the size of fire detectable at various distances.

The flame detectors can also be ceiling mounted, positioned above the anticipated flame source or at the centre of the area to be protected, perpendicular to the floor below. If the detector cannot see the whole of the area to be protected, one or more additional detectors may be required. Refer to the sectional view drawing to establish the detector performance. The area of detection is dependent on the detectors height above the likely source of flame. The detector has a 90° conical field of view or 45° either side of the viewing axis centre line. The maximum ceiling height is 20m. If the detector is perpendicular to floor and at a height of 10m then the detector will view a circular floor area below with a 10m radius (20m diameter circle).

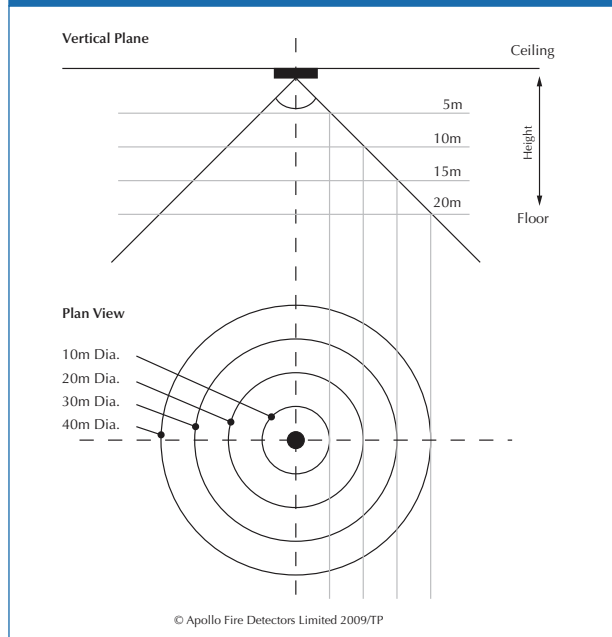
Table 5: Protocol Usage

Output Bits	
2	LED
1	Test
0	Remote LED
Interrupt	
	No
Analogue Value	
Quiescent	25
Alarm	55-64
Fault	4
Input Bits	
2	LED confirmed
1	Test confirmed
0	Remote LED confirmed
Flag Setting	
XP95 Flag	Yes
Alarm Flag	Yes

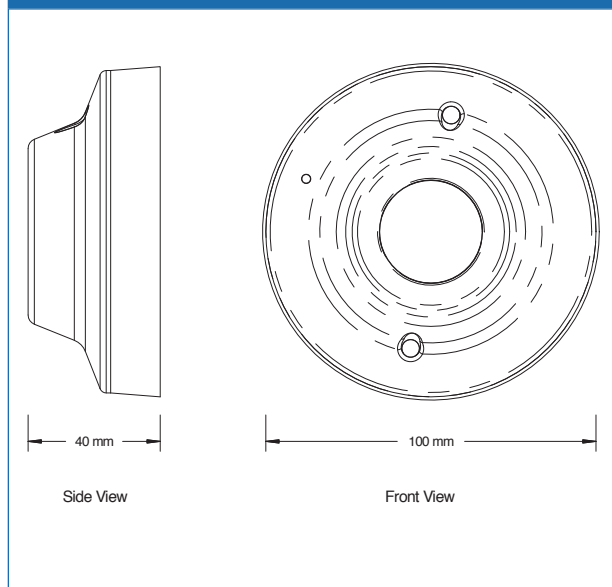
Flame Detector Field of View (Fig 1)



Field of View Discovery Marine Flame Detector (Fig 2)



Dimensional Drawing of Detector



Technical Data

	UV	UV/Dual	IR ³
Supply voltage:	17–28V DC	17–28V DC	17–28V DC
Protocol peak to peak:	5–9V	5–9V	5–9V
Quiescent current:	2.3mA	2.8mA	2.5mA
Alarm current:	4.2mA	4.2mA	4.2mA
Surge current:	9mA (peak) for 110ms	9mA (peak) for 85ms	9mA (peak) for 85ms
Maximum power up time:	4 seconds	4 seconds	4 seconds
Remote output characteristics:	Connects to positive line through 4.5kΩ (5mA maximum)	Connects to positive line through 4.5kΩ (5mA maximum)	Connects to positive line through 4.5kΩ (5mA maximum)
Operating range:	0.1m ² n-heptane at 25m	0.1m ² n-heptane at 25m	0.1m ² n-heptane at 25m
Sensitivity:	Class 1 or 3, EN54-10	Class 1 or 3, EN54-10	Class 1 or 3, EN54-10
Field of view:	90° cone	90° cone	90° cone
Spectral response:	UV 185 to 260nm	UV 185 to 260nm, IR 0.75 to 2.7µm	0.75 to 2.7µm
Operating temperature:	–40°C to +70°C (no condensing or icing)	–40°C to +70°C (no condensing or icing)	–40°C to +70°C (no condensing or icing)
Storage temperature:	–40°C to +85°C	–40°C to +70°C	–40°C to +70°C
Relative humidity:	95%, non-condensing	95%, non-condensing	95%, non-condensing
IP Rating:	66	66	66
Materials:	Housing white polycarbonate, V-0 rated to UL94	White polycarbonate, V-0 rated to UL94	White polycarbonate, V-0 rated to UL94
Sensing window:	2mm quartz	2mm quartz	2mm float glass
Terminals:	Nickel plated stainless steel	Nickel plated stainless steel	Nickel plated stainless steel
Isolator count:			
20D:	7	7	7
20i:	20	20	20

Case Study

Lifting Vessel

Summary	
Project Name:	Lifting Vessel
Location:	Asia
Market:	Marine
Products used:	400 Discovery Marine devices and some IS devices
Installer:	Shanghai Jin Zhou

The largest lifting vessel in Asia is protected using an Apollo-based fire detection system. The vessel – a floating crane has the capacity to lift up to 4,000 tonnes in weight.

Shanghai Jin Zhou were awarded the contract and supplied a six loop fire detection system that includes over 400 Discovery Marine devices as well as soon intrinsically safe fire detectors for hazardous areas.





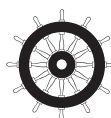
orbis®



Orbis Marine conventional fire detectors offer a wealth of features to save time, enhance reliability and reduce false alarms within the marine environment. These include drift compensation and DirtAlert®, a feature that warns service engineers via a flashing yellow LED that detectors need maintenance; and patented FasTest®, a procedure that takes just four seconds to test smoke detectors and confirm that they are functioning correctly.

Key features of Orbis Marine include:

- Approved for use in marine environments
- Modern, low-profile design
- TimeSaver® base for fast installation
- Transient rejection for false alarm reduction
- High humidity tolerance at up to 98% RH
- Wide operating temperature -40°C to +70°C



0729



Orbis Marine Optical Smoke Detector



ORB-OP 42001-MAR

Orbis Marine Optical Smoke Detector

ORB-OP-42003-MAR

Orbis Marine Optical Smoke Detector with flashing LED



0729

Operating principles

Optical Smoke Detectors have always been recognised as good detectors for general use. They are regarded as particularly suitable for smouldering fires and escape routes.

The performance of Orbis Marine optical detectors is good in black as well as in white smoke. In this respect Orbis is different from traditional optical smoke detectors which perform far better in white smoke than in black.

Orbis Marine optical detectors are also designed to reduce significantly the incidence of false alarms through over-sensitivity to transient phenomena.

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

Orbis Marine Optical Smoke Detector

The sensing technology in the Orbis Marine optical smoke detector is significantly different in design from previous optical detectors. A full description is given in the section 'How do Orbis Marine optical smoke detectors work?' but the advantages of this system and its associated algorithms are:

- improved sensitivity to black smoke
- compensation for slow changes in sensitivity
- extra confirmation of smoke before the alarm signal given

The algorithms are used to verify signals from the sensing chamber, to filter out transients and to decide when the detector should change to the alarm state.

All this combines to increase detection reliability and reduce false alarms.

How does the Orbis Marine optical detector work?

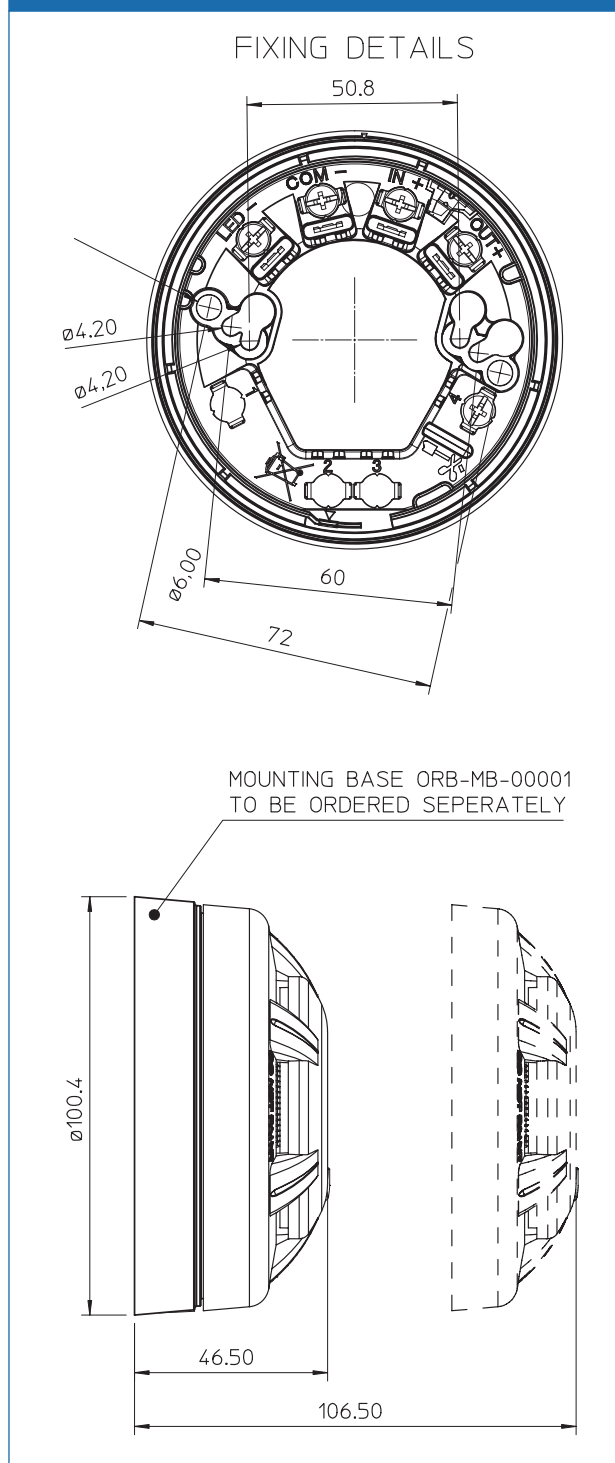
Orbis operates on the well established light scatter principle. The remarkable optical design of the Orbis Marine optical smoke detector allows it to respond to a wide spectrum of fires.

The sensing chamber contains an optical sensor which measures back-scattered light as well as the more usual forward-scattered light. Sensitivity to black smoke is greatly improved.

The detector is calibrated so that Orbis is highly reliable in detecting fires but is much less likely to generate false alarms than earlier smoke detectors.

The stability of the detector—high reliability, 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.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection:

Photoelectric 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.

Sampling frequency: Once every 4 seconds

Electrical

Supply voltage: 8.5-33V DC

Supply wiring: 2 wires, polarity sensitive

Maximum polarity reversal: 200ms

Power-up time: <20 seconds

Minimum 'detector active' voltage: 6V

Switch-on surge current at 24V: 95µA

Average quiescent current at 24V: 95µA

Alarm current: At 12V 20mA
At 24V 40mA

Alarm load: 600Ω

Holding voltage: 5-33V

Minimum holding current: 8mA

Minimum voltage to light alarm LED: 5V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 1.2kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility (See Table 3 on page 13)

Dimensions and weight of detector: 97mm diameter x 31mm
Weight, 75g
(in base) 100mm diameter x 46mm
Weight, 135g

Environmental

Temperature: Operating and storage -40°C to +70°C (no condensation or icing)

Humidity: 0% to 98% relative humidity (no condensation)

Wind speed: Unaffected by wind

Atmospheric pressure: Insensitive to pressure

IP rating to EN 60529: 23D
1992*:

Electromagnetic compatibility: The detector meets the requirements of BS EN 61000-6-3 for emissions and BS EN50 130-4 for susceptibility

*The IP rating is not a requirement of EN 54-7: 2001 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis Marine

Multisensor Smoke Detector



Where to use Multisensor Smoke Detectors

Multisensor Smoke 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 Orbis Marine optical smoke detectors the increased reliability of detection is combined with high immunity to false alarms.

The Orbis Marine multisensor smoke detector has two sensors, one for smoke, one for heat and the alarm decision is derived from either sensor or a combination of both. The multisensor is a development of the Orbis Marine optical detector described in the previous chapter and goes further in its capabilities of fire detection.

The optical sensor is identical to the one in the Orbis optical detector. Its sensitivity is, however, influenced by a heat sensing element which makes the detector more responsive to fast-burning, flaming fires.



ORB-OH-43001-MAR

Orbis Marine Multisensor Smoke Detector

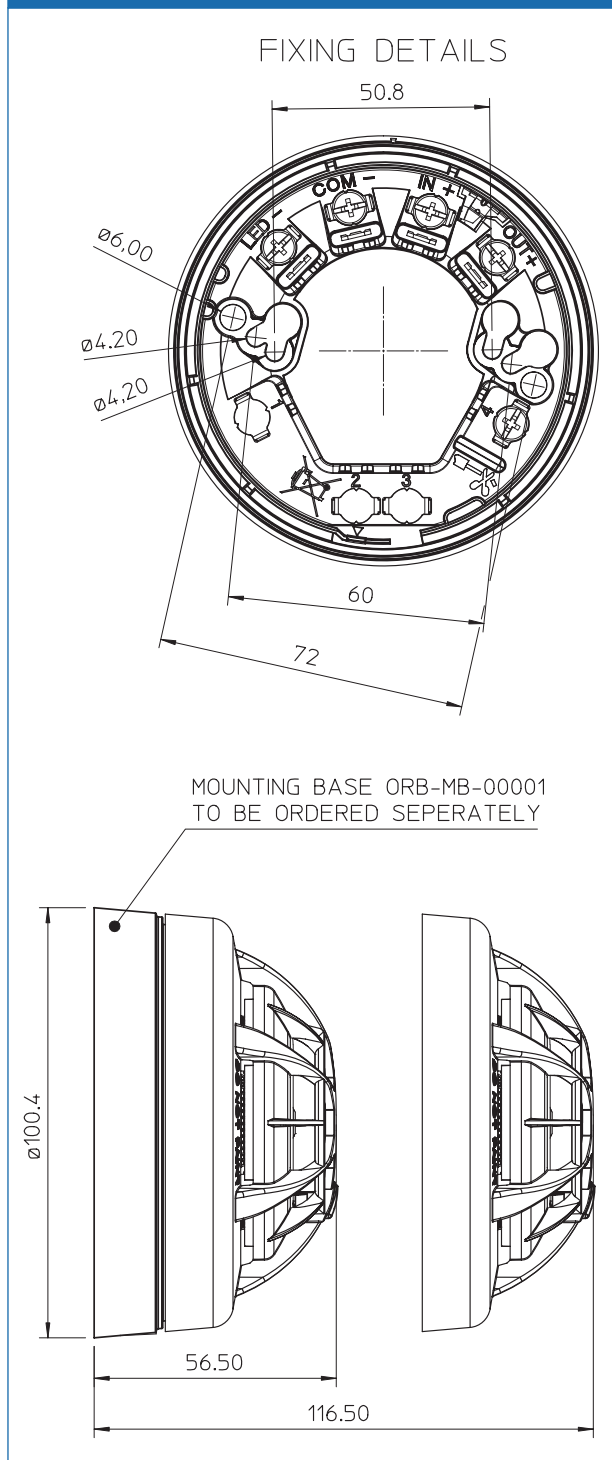
ORB-OH-43003-MAR

Orbis Marine Multisensor Smoke Detector with flashing LED



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Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection:

Photoelectric 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. The heat sensing element increases the sensitivity of the detector as the temperature rises.

Sampling frequency: Once every 4 seconds

Electrical

Supply voltage: 8.5-33V DC

Supply wiring: 2 wires, polarity sensitive

Maximum polarity reversal: 200ms

Power-up time: <20 seconds

Minimum 'detector active' voltage: 6V

Switch-on surge current at 24V: 95µA

Average quiescent current at 24V: 95µA

Alarm current: At 12V 20mA
At 24V 40mA

Alarm load: 600Ω

Holding voltage: 5-33V

Minimum holding current: 8mA

Minimum voltage to light alarm LED: 5V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 1.2kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility

Dimensions and weight of detector: 97mm diameter x 42mm
Weight, 80g
(in base) 100mm diameter x 57mm
Weight, 140g

Environmental

Temperature: Operating and storage -40°C to +70°C
(no condensation or icing)

Humidity: 0% to 98% relative humidity
(no condensation)

Wind speed: Unaffected by wind

Atmospheric pressure: Insensitive to pressure

IP rating to EN 60529: 23D
1992*:

Electromagnetic compatibility: The detector meets the requirements of BS EN 61000-6-3 for emissions and BS EN50 130-4 for susceptibility

*The IP rating is not a requirement of EN 54-7:2001 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis Marine Heat Detector



ORB-HT-41001-MAR A1R standard

ORB-HT-41013-MAR A1R with flashing LED

ORB-HT-41002-MAR A2S standard

ORB-HT-41014-MAR A2S with flashing LED

ORB-HT-41003-MAR BR standard

ORB-HT-41015-MAR BR with flashing LED

ORB-HT-41004-MAR BS standard

ORB-HT-41016-MAR BS with flashing LED

ORB-HT-41005-MAR CR standard

ORB-HT-41017-MAR CR with flashing LED

ORB-HT-41006-MAR CS standard

ORB-HT-41018-MAR CS with flashing LED



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Where to use 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.

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

Orbis Marine Heat Detector

The Orbis range incorporates seven heat detector classes to suit a wide variety of operating conditions in which smoke detectors are unsuitable.

The European standard EN54-5:2001 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 into 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.

All heat detectors in the Orbis range are tested as static or rate-of-rise detectors and are classified as A1R, A1S, A2S, BR, BS, CR and CS.

Choosing the correct class of Heat Detector

Heat detectors have a wide range of response characteristics and the choice of the right type for a particular application may not always seem straightforward. It is helpful to understand the way that heat detectors are classified as explained earlier and to memorise a simple rule: use the most sensitive heat detector available consistent with avoiding false alarms.

In the case of heat detectors it may be necessary to take an heuristic approach, ie, trial and error, until the best solution for a particular site has been found. The flowchart (Fig 1) will assist in choosing the right class of heat detector.

If the fire detection system is being designed to comply with BS 5839-1: 2002 heat detectors should be installed at heights of less than 12 metres with the exception of class A1 detectors, which can be installed at heights up to 13.5 metres.

How do Orbis Marine Heat Detectors work?

Orbis 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 also 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 of heat are part of the normal environment in the area protected by the heat detector.

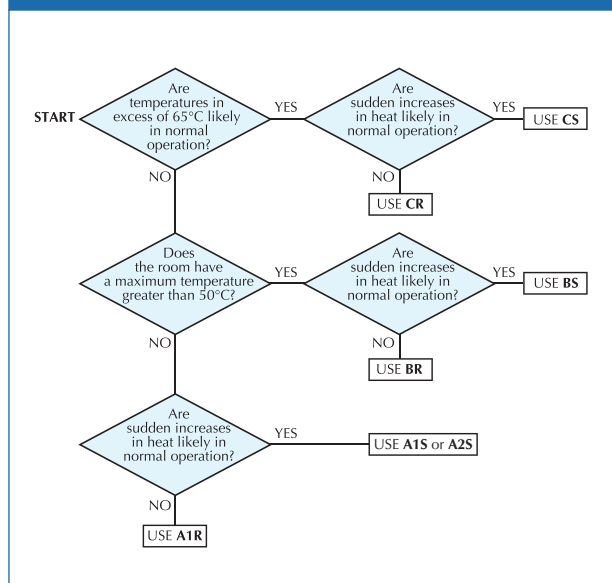
Environmental performance

The environmental performance is similar to that of the Orbis optical smoke detector but it should be noted that heat detectors are designed to work at particular ambient temperatures (See Fig 1).

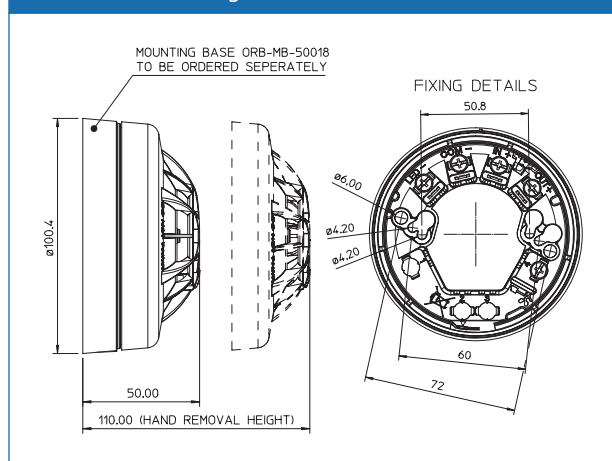
Table 1: Response Modes

Class (EN54-5:2001)	Application Temperature		Static Response Temperature °C		
	Typical	Max	Min	Typ	Max
A1R	25	50	54	57	65
A1S	25	50	54	57	65
A2S	25	50	54	61	70
BR	40	65	69	73	85
BS	40	65	69	73	85
CR	55	80	84	90	100
CS	55	80	84	90	100

Choosing a Heat Detector (Fig 1)



Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection: Measurement of heat by means of a thermistor

Sampling frequency: Once every 4 seconds

Electrical

Supply voltage: 8.5-33V DC

Supply wiring: 2 wires, polarity sensitive

Maximum polarity reversal: 200ms

Power-up time: <20 seconds

Minimum 'detector active' voltage: 6V

Switch-on surge current at 24V: 95µA

Average quiescent current at 24V: 95µA

Alarm current: At 12V 20mA
At 24V 40mA

Alarm load: 600Ω

Minimum holding voltage: 5-33V

Minimum voltage to light alarm LED: 5V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 1.2kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility

Dimensions and weight of detector: 97mm diameter x 36mm Weight, 70g
100mm diameter x 51mm (in base) Weight, 130g

Environmental

Temperature: Operating and storage (see table 3) -40°C to +70°C (no condensation or icing)

Humidity: 0% to 98% relative humidity (no condensation)

Wind speed: Unaffected by wind

Atmospheric pressure: Insensitive to pressure

IP rating to EN 60529: 23D 1992*:

Electromagnetic compatibility: The detector meets the requirements of BS EN 61000-6-3 for emissions and BS EN50 130-4 for susceptibility

*The IP rating is not a requirement of EN54-5:2001 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis Marine

TimeSaver® Base



ORB-MB-00001-MAR

Orbis Marine TimeSaver Base

Installing Orbis

Orbis has been designed to make installation fast and simple. Fig 2 shows the TimeSaver mounting base as it is seen from the installer's point of view.

The E-Z fit fixing holes are shaped to allow a simple three-step mounting procedure:

- Fit two screws to the mounting box or surface
- Place the Orbis base over the screws and slide home
- Tighten the screws

The base offers two fixing centres at 51 and 60mm.

A guide on the base interior indicates the length of cable to be stripped. Five terminals are provided for the cables, four being grouped together for ease of termination.

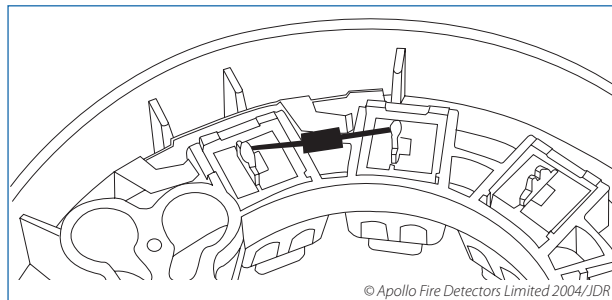
The terminals are:

- positive IN
- positive OUT
- negative IN and OUT (common terminal)
- remote LED negative connection
- functional earth (screen)

The terminal screws are captive screws and will not fall out of the terminals. The base is supplied with the screws unscrewed in order to avoid unnecessary work for the installer.

The end-of-line resistor or active device should be connected between the OUT+ and COM- terminals.

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 marking on the exterior which indicates the position of the LED.



The bases may be connected as shown in Fig 1 where remote LEDs, if required, are connected to the associated base.

Fig 3 shows how to connect one remote LED to more than one base so that an alarm in any of the detectors connected will switch the remote LED.

In many installations bases with diodes are specified in order that an active end-of-line device may be fitted. Diode bases are marked 'OD'. Loop continuity testing is facilitated as there is a continuity device in the base. The continuity device enables power to pass through every base in a loop to ensure that each is connected correctly.

Once a detector is fitted to the base the continuity device is automatically locked permanently open so that the power flows through the detectors.

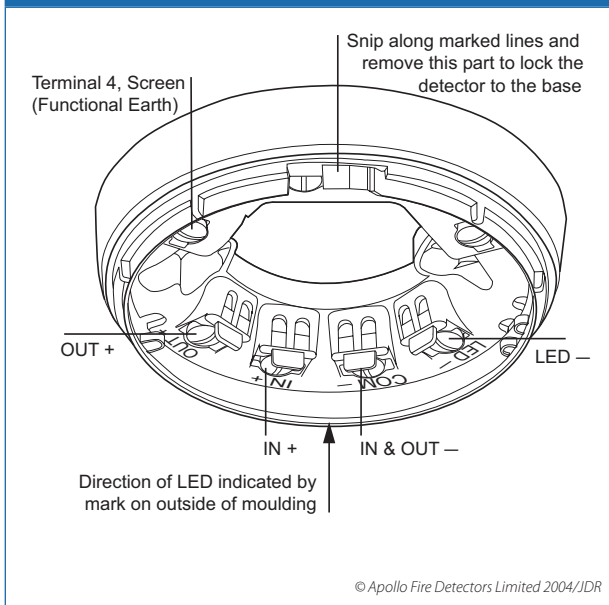
Fitting Orbis Detector Heads

When the bases have been installed and the system wiring tested, the detector circuits can be populated.

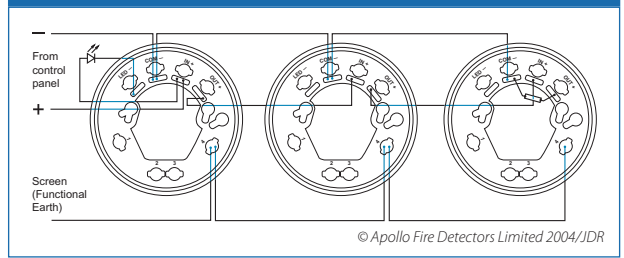
Two methods are suggested:

1. Apply power and fit the detectors one by one, starting at the base nearest the panel and working towards the end of the circuit. As each detector is powered up it will enter 'StartUp' and flash red (see next page for a full description of this feature). If the LED does not flash, check the wiring polarity on the base and ensure there is power across IN+ and COM-. If the LED is flashing yellow the detector is not operating correctly and may require maintenance or replacing (see DirtAlert and SensAlert® and the section 'Maintenance and servicing' in the Orbis product guide)
2. Fit all detectors to the circuit, apply power and check detectors by observing the LED status of each device. The StartUp feature lasts for 4 minutes so it may be necessary to reset or de-power the circuit to allow all detectors to be observed. The LED status is the same as method 1

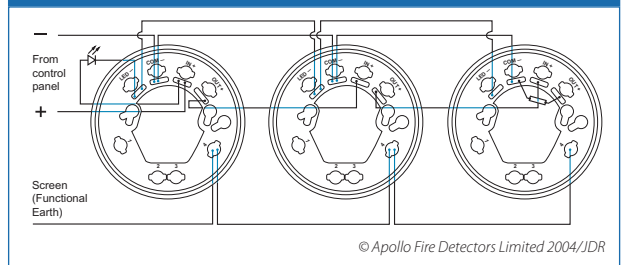
TimeSaver® Base (Fig 1)



Base Wiring Diagram (Fig 2)

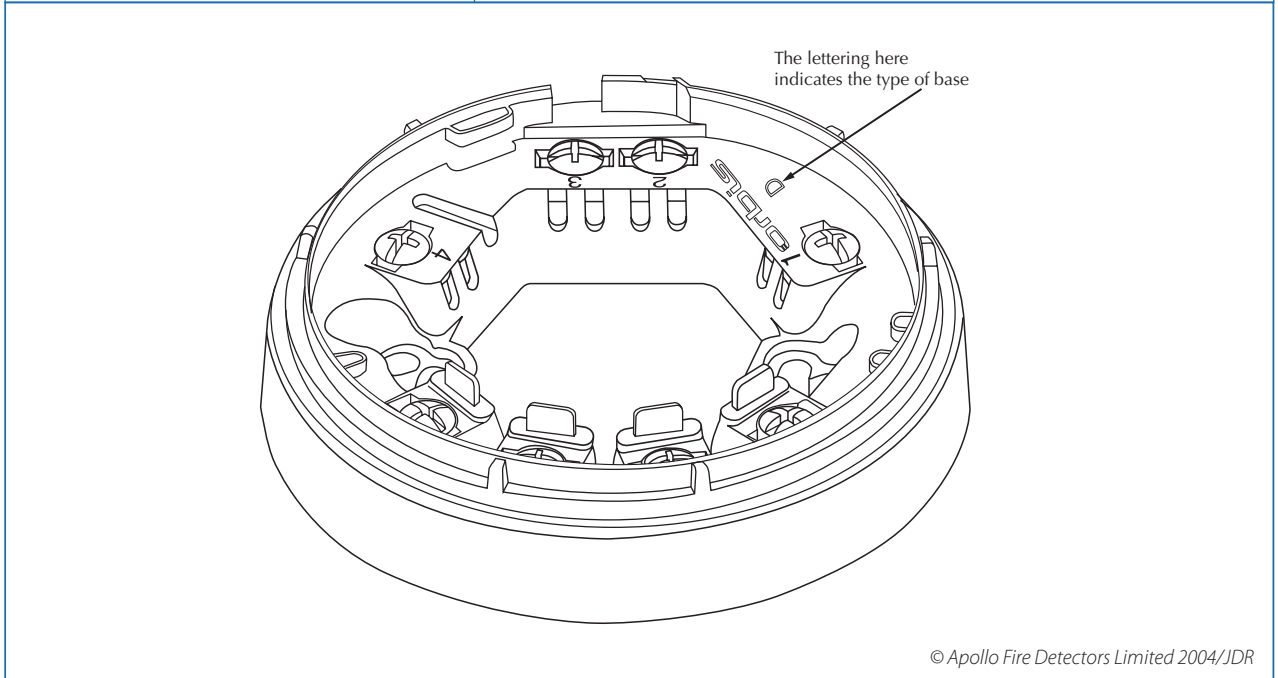


3 Bases Wired with a Common LED (Fig 3)



Identifying Base Marking Codes

Product Description	Base Marking Code
Orbis TimeSaver Base	OB
Orbis TimeSaver LX Base	OL
Orbis TimeSaver Diode Base	OD
Orbis TimeSaver Relay Base	OR
Savwire Base	OS
TimeSaver Diode Base LX	DX
Orbis LX Base	XL
Orbis Timesaver Base - Deep	EB
Orbis Heater Base	HB



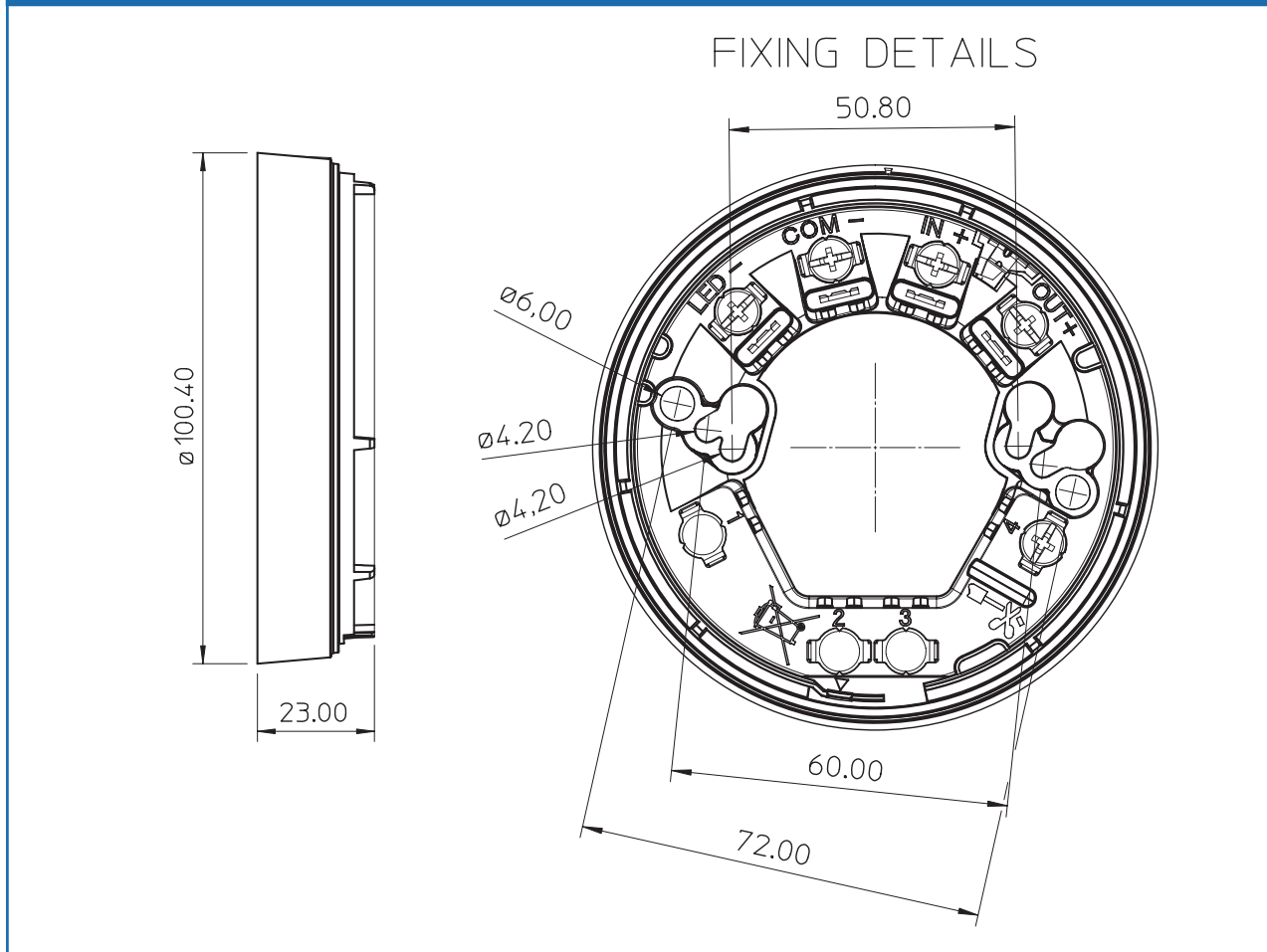
Orbis Marine

TimeSaver® Base continued

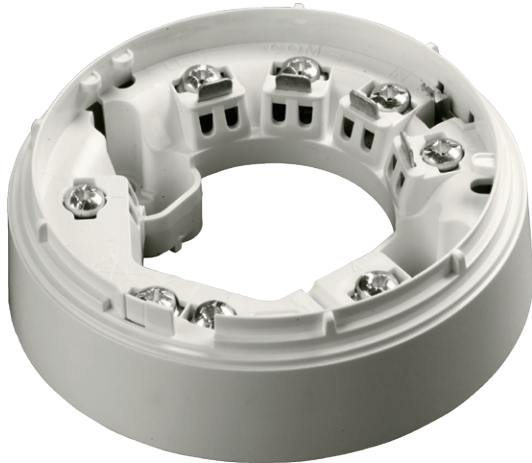
Table 2: Identifying Base Marking Codes

Feature	Description of Feature	Red LED Status	Yellow LED Status
StartUp™	Confirms that the detectors are wired in the correct polarity	Flashes once per second	No flash
FasTest®	Maintenance procedure, takes just 4 seconds to functionally test and confirm detectors are functioning correctly	Flashes once per second	No flash
DirtAlert™	Shows that the drift compensation limit has been reached	No flash	Flashes once per second in StartUp (Stops flashing when StartUp finishes)
SensAlert®	Indicates that the sensor is not operating correctly	No flash	Flashes every 4 seconds (Flashes once per second in StartUp)
Normal Operation	At the end of StartUp and FasTest (without flashing LED as standard)	No flash	No flash
Flashing LED Version	Detector's red LED flashes in normal operation (at the end of FasTest)	Flashes every 4 seconds	No flash

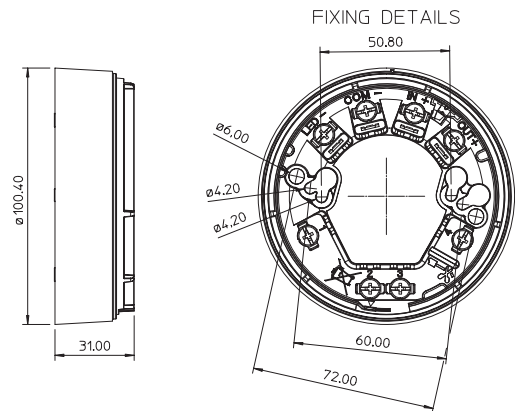
Dimensional Drawings



Orbis Marine Relay Base



Dimensional Drawings



ORB-RB-40004-MAR

Orbis Marine Relay Base

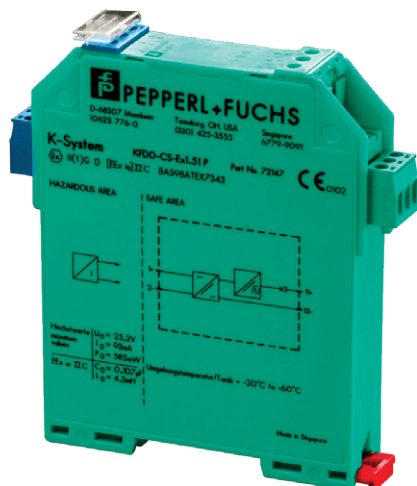


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The Orbis Marine Relay Base incorporates a singlepole voltage-free change-over contact for switching ancillary equipment. When the detector changes to the alarm state, the relay is energised, causing the contact to change state. The contact will remain in this condition until the detector is reset.

- Grouped terminals to make wiring easy
- Multiple fixing centres
- LED alignment mark
- Cable stripping guide
- Continuity link for voltage testing of zone wiring prior to commissioning
- Detector locking mechanism
- Contact Rating 1Amp at 30V

Conventional Galvanic Barrier



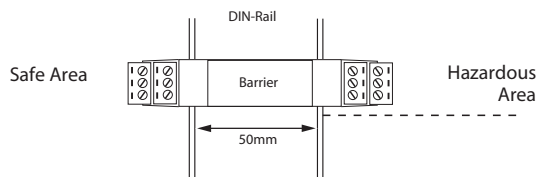
29600-378

Conventional Galvanic Barrier

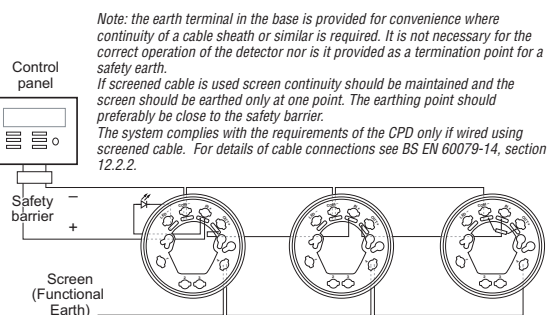
The Conventional Galvanic Barrier is installed in the safe area and ensures system integrity.

- Enables compliance with the ATEX directive

Conventional IS Configuration

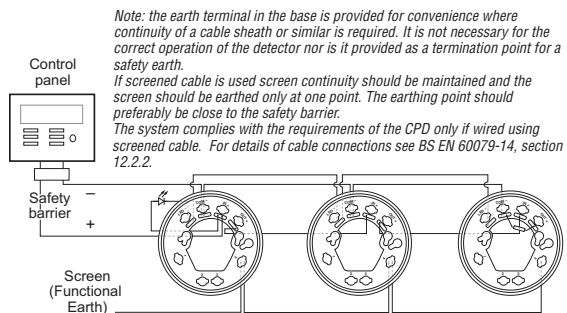


Base Wiring Diagram (Fig 2)

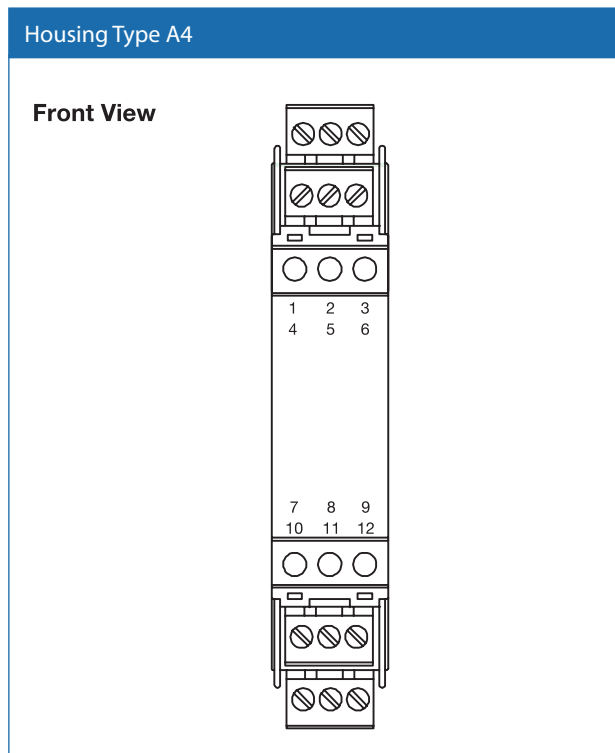
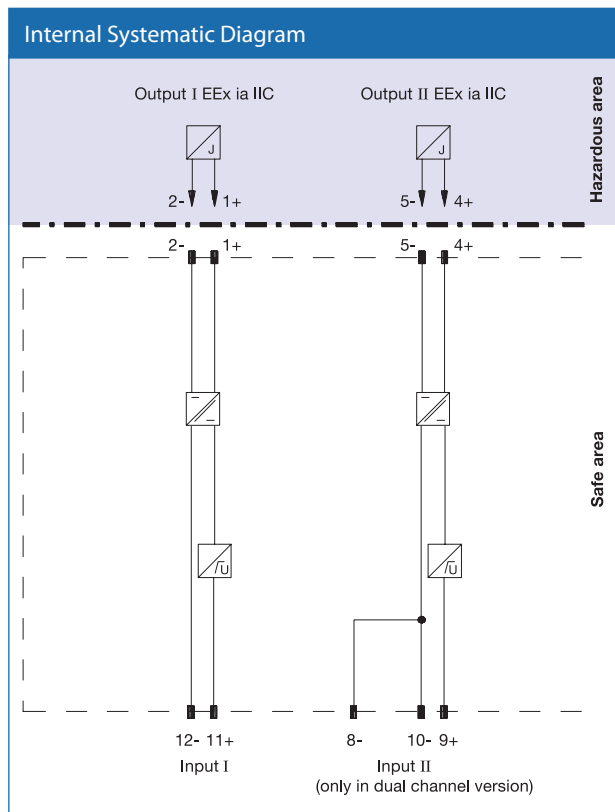


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3 Bases Wired with a Common LED (Fig 3)



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Technical Data

Inputs (Not intrinsically safe)	Terminals 12-, 11+; 8-, 10-, 9+
Nominal voltage	DC 4 V ... 35 V
Max. current consumption	0 mA ... 40 mA
Max. power dissipation at 40 mA and $U_E < 23.7 V$ at 40 mA and $U_E > 23.7 V$	< 700 mW per channel < 1.2 W per channel
Fail-safe maximum voltage	Um 250 V
Field circuit (Intrinsically safe)	Terminals 1+, 2-, 4+, 5-
Min. output voltage for $3 V < U_E < 23.7 V$ for $U_E > 23.7 V$	$U_E - (0.4 \times \text{current in mA}) - 0.7$ $23 V - (0.4 \times \text{current in mA})$
Max. short-circuit current at $U_E > 23.7 V$	$\leq 65 \text{ mA}$
Max. transfer current	$\leq 40 \text{ mA}$
Details of Certificate of Conformity	BASEEFA No. Ex-88.B.2331 Other international approvals
Voltage U_0	28 V
Current I_0	93 mA
Power P_0	0.65 W
Permissible circuit values ignition protection class, category	[EEx ia]
Explosion group	IIA IIB IIC
Max. external capacitance	1.04 μF 0.39 μF 0.13 μF
Max. external inductance	33.6 mH 12.6 mH 4.2 mH
Fail-safe maximum voltage U_m	
Power supply	250 V
Entity parameters	FM No. 1Z2A1.AX
	Terminals 1+, 2-, 4+, 5-
Voltage V_{OC}	26.71 V
Current I_{SC}	88.8 mA
Voltage V_t	- V
Explosion group	A&B C&E D, F&G
Max. external capacitance	0.16 μF 0.48 μF 1.28 μF
Max. external inductance	4.60 mH 18.32 mH 37.55 mH
	CSA No. LR65756-13
Safety parameters	Terminals 1+, 2-, 4+, 5-
KFD0-CS-Ex1.51	
Voltage V_{OC}	28.0 V
Current I_{SC}	93.3 mA
Explosion group	A&B C&E D, F&G
Max. external capacitance (C_a)	0.14 μF 0.42 μF 0.42 μF
Max. external inductance (L_a)	3.1 mH 16.8 mH 16.8 mH
Transfer characteristics	
Calibrated accuracy at 20 °C (68 °F)	$\leq \pm 200 \mu\text{A}$ inclusive calibration, linearity, hysteresis and load fluctuations at the output up to 1 kOhm load
Temperature drift	$\leq 2 \mu\text{A} / \text{K}$ (273 K ... 323 K) $\leq 5 \mu\text{A} / \text{K}$ (253 K ... 333 K)
Rise time	$\leq 20 \text{ ms}$ at 20 ms and 250 Ohm load
Conformity to standard	
Isolation co-ordination	to EN 50 178
Galvanic isolation	to EN 50 178
Climatical condition	to IEC 721
EMC	to EN 50 081-2, EN 50 082-2, NAMUR NE 21
Weight	$\approx 100 \text{ g}$ ($\approx 3.5 \text{ oz}$)
Ambient temperature	-20 °C ... +60 °C (-4 °F ... 140 °F)
Max. wire size	2.5 mm ² (14 AWG)

The right to make modifications is reserved and no guarantee of the accuracy of the information herein is given Copyright by Pepperl+Fuchs.

Electronic Solenoid Bell

24 Volts DC, Red



29600-534

Electronic Solenoid Bell 24 Volts DC, Red

A unique, patented alarm bell designed for use in fire, security and other signalling systems. The combination of a miniature solenoid with an integrated control circuit allows excellent sound coverage, minimum current consumption and increased reliability. The improved aesthetics make the bell suitable for all applications including the most prestigious locations.

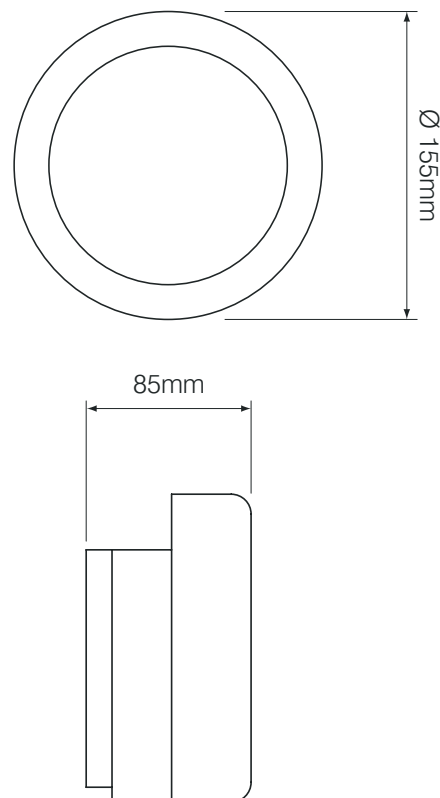
Features

- 155mm (6") gong
- High sound output
- Low current consumption
- Simple installation
- No backbox required for surface wiring
- Weatherproof (WP) kit available

Technical Data

Voltage:	12Vdc	24Vdc	230Vac
Current:	12 Vdc	55 - 65mA	
	24 Vdc	25 - 35mA	
	230 Vac	20 - 30mA	
Sound output:	93 - 95dB(A)		
Monitoring:	Reverse polarity (dc only)		
Temperature:	- 25°C to + 70°C		
Protection:	IP21C / IP33C (WP)		
Construction:	Gong – Steel, base – Polycarbonate		
Weight:	12 Volt	1.1Kg	
	24 Volt	1.1Kg	
	230 Volt	1.2Kg	
Colour:	Gong – Red, base – black		

Dimensional Drawings



Weatherproof Electronic Solenoid Bell

24 Volts DC, Red



29600-535

Weatherproof Electronic Solenoid Bell 24 Volts DC, Red

A unique, patented alarm bell designed for use in fire, security and other signalling systems. The combination of a miniature solenoid with an integrated control circuit allows excellent sound coverage, minimum current consumption and increased reliability. The improved aesthetics make the bell suitable for all applications including the most prestigious locations.

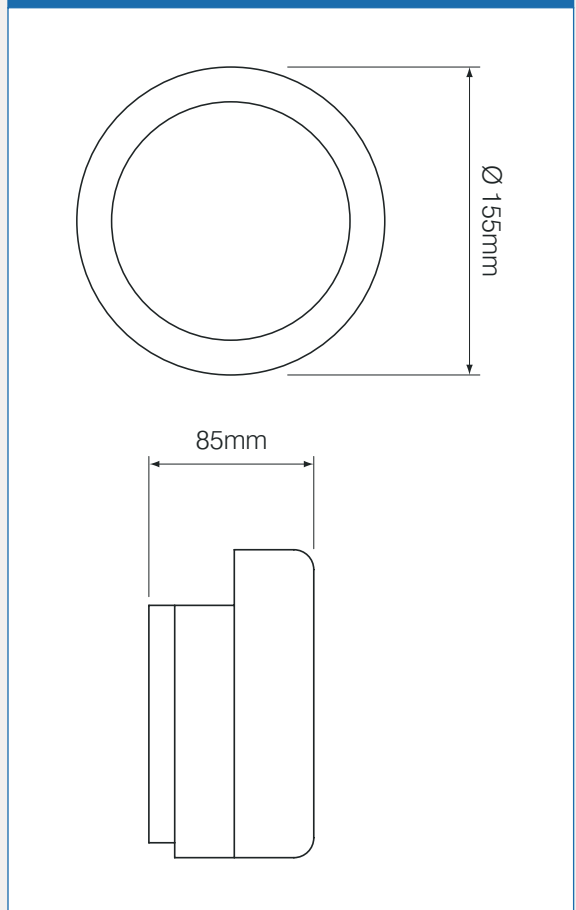
Features

- 155mm (6") gong
- High sound output
- Low current consumption
- Simple installation
- No backbox required for surface wiring
- Weatherproof (WP) kit available

Technical Data

Voltage:	12Vdc	24Vdc	230Vac
Current:	12 Vdc	55 - 65mA	
	24 Vdc	25 - 35mA	
	230 Vac	20 - 30mA	
Sound output:	93 - 95dB(A)		
Monitoring:	Reverse polarity (dc only)		
Temperature:	- 25°C to + 70°C		
Protection:	IP21C / IP33C (WP)		
Construction:	Gong – Steel, base – Polycarbonate		
Weight:	12 Volt	1.1Kg	
	24 Volt	1.1Kg	
	230 Volt	1.2Kg	
Colour:	Gong – Red, base – black		

Dimensional Drawings



6" Motorised Bell

24Vdc, Red (Centrifugal)



29600-536

6 Inch Motorised Bell 24Vdc, Red (Centrifugal)

Bells still remain a popular choice for many applications such as schools where they can sometimes be used as a signal for non fire purposes such as class change. All CF bells incorporate highly efficient rotary centrifugal movements combining high sound output with low current consumption.

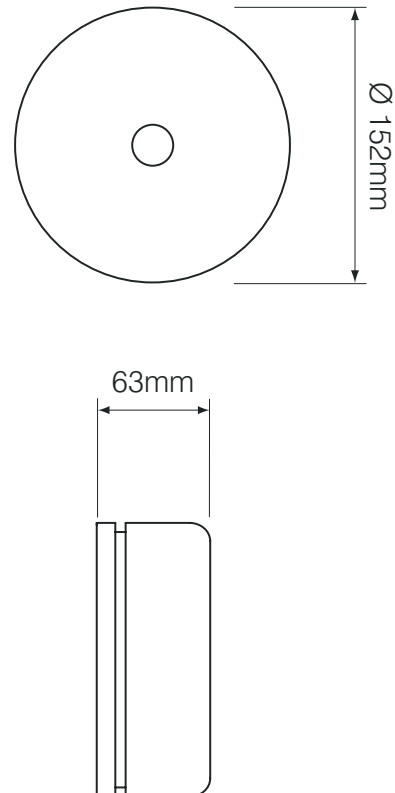
Features

- 3 gong sizes
- High sound output
- Low current consumption
- Simple installation
- Multifixing baseplate

Technical Data

Voltage:	110mm (4")	20-28Vdc
	150mm (6")	20-28Vdc
	200mm (8")	20-28Vdc
Current:	110mm (4")	18mA (Typical)
	150mm (6")	25mA (Typical)
	200mm (8")	28mA (Typical)
Current:	110mm (4")	84dB(A) (Typical)
	150mm (6")	95dB(A) (Typical)
	200mm (8")	97dB(A) (Typical)
Monitoring:	Reverse polarity	
Temperature:	-10°C to +55°C	
Protection:	IP21C	
Construction:	Gong – Steel, base – Polycarbonate	
Weight:	0.45kg	
Colour:	Gong – Red, base – black	

Dimensional Drawings



Marine Deep Base Visual Indicator (10CD)



29600-537

Marine Deep Base Visual Indicator (10CD)

The Solex range of xenon visual indicators are a replacement for the earlier BE and Inergi (IB) visual indicators. The increased functionality of the Solex permits a much reduced range of products and therefore allows a simplified stock holding and easier choice for the installer. The wide operating voltage, increased efficiency and automatic synchronisation of the Solex make them a universal solution for all types of alarm and monitoring system.

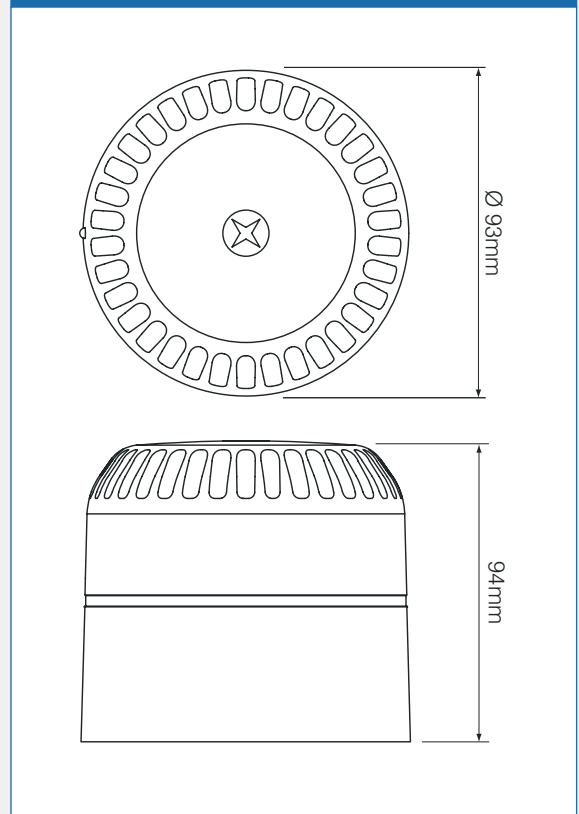
Features

- Wide operating voltage up to 60Vdc
- Current surge suppression
- Automatic synchronisation
- High efficiency
- Constant performance over voltage range
- Locking base
- Tamper switch for security applications
- 3 light output options
- 5 lens colours
- Suitable for outdoor use

Technical Data

Voltage:	9-60Vdc 110-230Vac with powered base	
Current:	40-240mA @ 24Vdc (dependant on model)	
Light source:	Xenon	
Light output:	2.5Cd, 10Cd, 15Cd (dependant on model)	
Flash rate:	1Hz	
Synchronisation:	10ms over 30mins	
Monitoring:	Reverse polarity	
Temperature:	-25°C to +70°C	
Protection:	Shallow base Deep & U base	IP54 IP65
Construction:	ABS FR, PC lens	
Weight:	0.15kg Shallow base 0.18kg Deep & U base	
Lens colours:	Red, amber, blue, green & clear	
Colour:	Red or white base	

Dimensional Drawings



Marine Deep Base Visual Indicator

with Flashing LED (15CD)



29600-538

Marine Deep Base Visual Indicator with Flashing LED (15CD)

The Solex range of xenon visual indicators are a replacement for the earlier BE and Inergi (IB) visual indicators. The increased functionality of the Solex permits a much reduced range of products and therefore allows a simplified stock holding and easier choice for the installer. The wide operating voltage, increased efficiency and automatic synchronisation of the Solex make them a universal solution for all types of alarm and monitoring system.

Features

- Wide operating voltage upto 60Vdc
- Current surge suppression
- Automatic synchronisation
- High efficiency
- Constant performance over voltage range
- Locking base
- Tamper switch for security applications
- 3 light output options
- 5 lens colours
- Suitable for outdoor use

Technical Data

Voltage:	9-60Vdc 110-230Vac with powered base
Current:	40-240mA @ 24Vdc (dependant on model)
Light source:	Xenon
Light output:	2.5Cd, 10Cd, 15Cd (dependant on model)
Flash Rate:	1Hz
Synchronisation:	10ms over 30mins
Monitoring:	Reverse polarity
Temperature:	-25°C to +70°C
Protection:	Shallow base IP54 Deep & U base IP65
Construction:	ABS FR, PC lens
Weight:	0.15kg Shallow base 0.18kg Deep & U base
Lens Colours:	Red, amber, blue, green & clear

Marine Solista Maxi Shallow Base



29600-539

Marine Solista Maxi

The Solista Maxi is an enhancement of the standard Solista LED visual indicator which allows the user the choice between economy or performance. In the economy modes the Solista MAXI performs extremely efficiently requiring as little as 3mA, but it can be switched to attain much higher light outputs where visibility is the prime objective. For even greater effectiveness a double flash sequence can be selected.

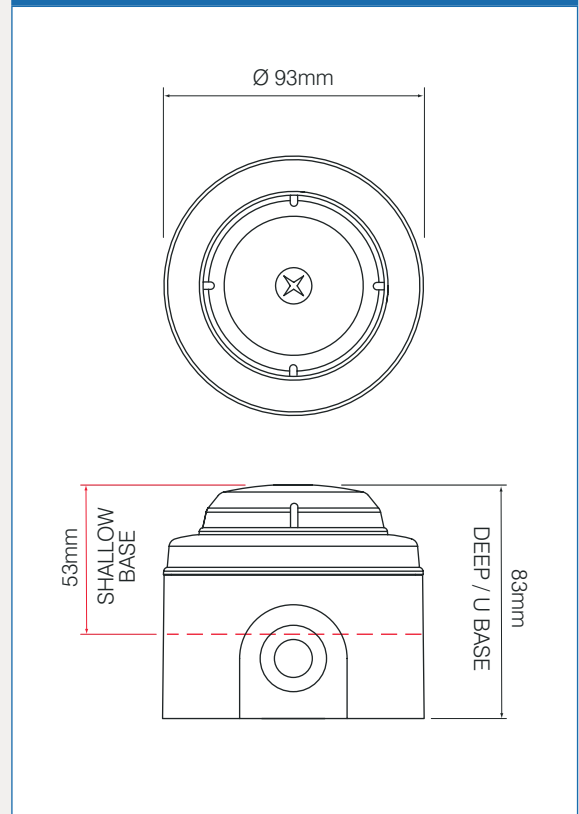
Features

- 3 user selectable output settings
- Wide operating voltage range
- Synchronised flash
- High efficiency
- Single or double flash & continuous
- Long service life
- High reliability
- Locking bases

Technical Data

Voltage:	9-60Vdc 110-230Vac with a powered base
Current:	3mA/5mA/10mA (user selectable)
Light source:	LED
Flash rate:	1Hz, Single flash, Double flash or Continuous (user selectable)
Flash colour:	Red, amber, white, green or blue
Monitoring:	Reverse polarity
Temperature:	-10°C to +55°C
Protection:	IP21C
Construction:	ABS FR, PC Lens
Weight:	0.1kg
Lens colours:	Red, amber, blue, green & clear
Colour:	Red or white

Dimensional Drawings



Marine Solista Maxi Deep Base



29600-540

Marine Solista Maxi Deep Base

The Solista Maxi is an enhancement of the standard Solista LED visual indicator which allows the user the choice between economy or performance. In the economy modes the Solista MAXI performs extremely efficiently requiring as little as 3mA, but it can be switched to attain much higher light outputs where visibility is the prime objective. For even greater effectiveness a double flash sequence can be selected.

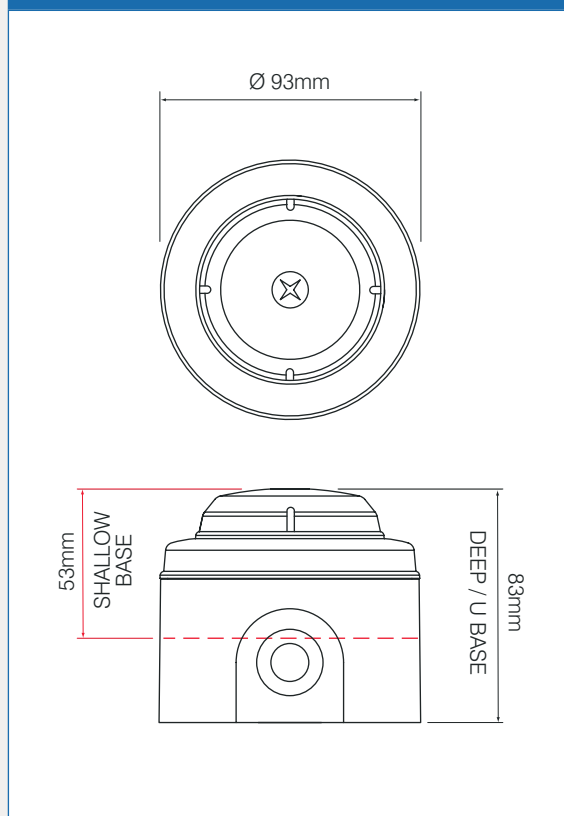
Features

- 3 User selectable output settings
- Wide operating voltage range
- Synchronised flash
- High efficiency
- Single or double flash & continuous
- Long service life
- High reliability
- Locking bases

Technical Data

Voltage:	9-60Vdc 110-230Vac with a Powered base
Current:	3mA/5mA/10mA (user selectable)
Light source:	LED
Flash rate:	1Hz, Single flash, Double flash or Continuous (user selectable)
Flash colour:	Red, amber, white, green or blue
Monitoring:	Reverse polarity
Temperature:	-10°C to +55°C
Protection:	IP65
Construction:	ABS FR, PC lens
Weight:	0.1kg
Lens colours:	Red, amber, blue, green & clear
Colour:	Red or white

Dimensional Drawings



Marine Asserta Sounder



29600-541

Marine Asserta Sounder 24v Red 110dB

29600-543

Marine Asserta Sounder 24v Red 120dB

The Asserta Midi Sounder is a versatile, compact unit that has been designed for industrial environments or areas where there is a requirement for a physically robust and well protected alarm. A range of supply options permit use with a wide range of fire and process systems.

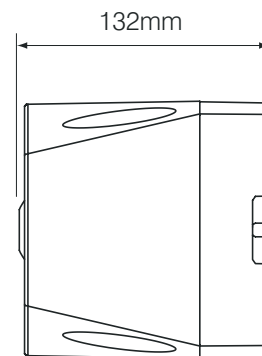
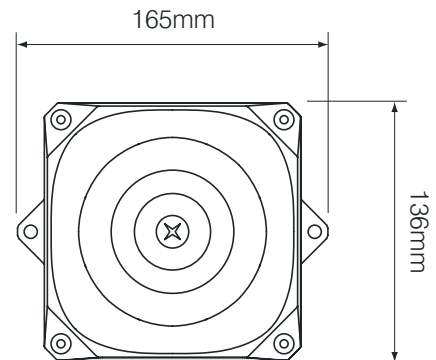
Features

- 108 dB output
- Simple first & second fix installation
- 32 alarm tones
- 2 stage alarm

Technical Data

Voltage:	9-60Vdc
Current:	24mA @ 24Vdc (Typical Tone 3)
Sound output:	108dB(A) @ 24Vdc (Typical Tone 3)
Tones:	32
Alarm stages:	2
Monitoring:	Reverse polarity
Temperature:	-25°C to +70°C
Protection:	IP66
Construction:	ABS, PC
Weight:	0.7kg
Colour:	Red or grey

Dimensional Drawings



Marine Asserta

Sounder Visual Indicator



29600-542

Marine Asserta Sounder Visual Indicator 24v Red 110dB Red Lens

29600-544

Marine Asserta Sounder Visual Indicator 24v Red 120dB Red Lens

The Asserta Midi Sounder Visual Indicator is a versatile and rugged audio-visual alarm designed for industrial environments or areas where there is a requirement for a physically robust and well protected unit. A range of supply options permit use with a wide range of fire and process systems.

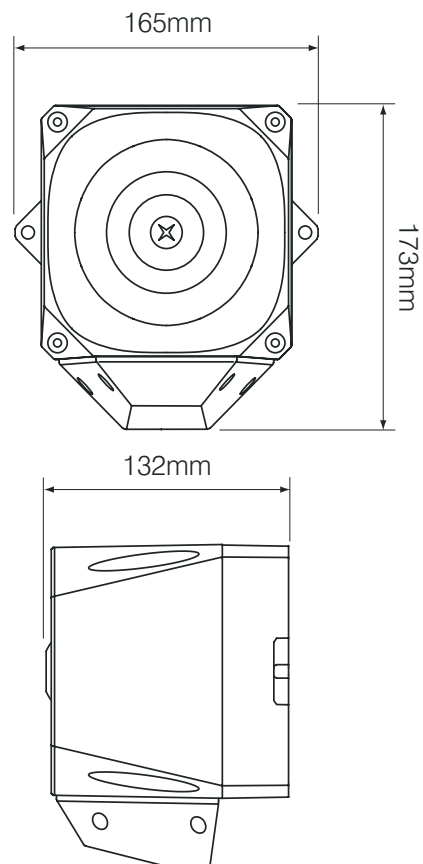
Features

- Simple first & second fix installation
- Fully integrated high efficiency visual indicator
- 32 alarm tones
- 2 stage alarm

Technical Data

Voltage:	9-60Vdc
Current sounder:	24mA @ 24Vdc (Typical Tone 3)
Current visual indicator:	200mA @ 24Vdc (Typical Tone 3)
Sound output:	108dB(A) @ 24Vdc (Typical Tone 3)
Tones:	32
Alarm stages:	2
Flash power:	2.5j
Flash rate:	1Hz
Monitoring:	Reverse polarity (dc version)
Temperature:	-25°C to +70°C (dc version)
Protection:	IP66
Construction:	ABS, PC Lens
Weight:	0.8kg
Lens colours:	Red, amber, blue & clear
Colour:	Red or grey

Dimensional Drawings



Series 65 Marine

Base Mounted UV Flame Detector



55000-026MAR

Series 65 Marine Base Mounted UV Flame Detector



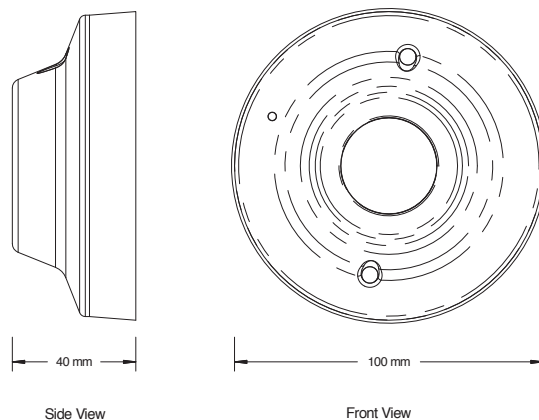
0729

The Marine Series 65 Base Mounted UV Flame Detector is designed to protect enclosed indoor areas where open flaming fires may be expected. The detector has a fast acting response to flames up to 25m away and is equipped with a single UV sensor with a narrow spectral response in order to discriminate between flames and most spurious sources of radiation.

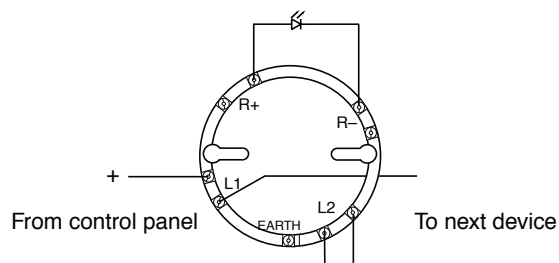
- Responds to stationary flames with no flicker
- Sensitive to UV radiation emitted by flames during combustion
- Compact flame detector which fits into 45681-200MAR base (Fig 2)
- Zone-powered

For application and features see page 33.

Dimensional Drawings

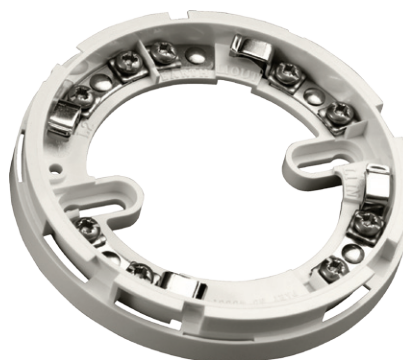


Marine UV Flame Detector Base Connections (Fig 2)



© Apollo Fire Detectors Limited 1997-2010/RHD/TB

Marine Series 65 Standard Base, 45681-200MAR



Intrinsically Safe

Apollo offer both analogue addressable and conventional smoke and heat detector ranges designed to be intrinsically safe, as they meet the requirements of the ATEX directive.



XP95 **orbis**

There are many places where an explosive mixture of air and gas or vapour may be present continuously, intermittently or as a result of an accident. These are defined as hazardous areas by BS EN 60079, the code of practice for installation and maintenance of electrical apparatus in potentially explosive atmospheres.

Hazardous areas are common in petroleum and chemical engineering plants and in factories processing and storing gases, solvents, paints and other volatile substances.

Electrical equipment for use in these areas needs to be designed so that it cannot ignite an explosive mixture, not only in normal operation but also in fault conditions. There are a number of methods available to achieve this but one of the most common is intrinsic safety.

Apollo's IS ranges comply with MED 94/9/EC.

Introduction to intrinsic safety

There are many places where an explosive mixture of air and gas or vapour is or may be present continuously, intermittently or as a result of an accident. These are defined as hazardous areas by BS EN 60079, the code of practice for installation and maintenance of electrical apparatus in potentially explosive atmospheres.

Hazardous areas are common in petroleum and chemical engineering plants and in factories processing and storing gases, solvents, paints and other volatile substances.

Electrical equipment for use in these areas needs to be designed so that it cannot ignite an explosive mixture, not only in normal operation but also in fault conditions. There are a number of methods available to achieve this—oil immersion, pressurised apparatus and powder filling, for example, but the two in most common use are flameproof enclosures and intrinsic safety.

Flameproof equipment is contained in a box so strong that an internal explosion will neither damage the box nor be transmitted outside the box. The surface must remain cool enough not to ignite the explosive mixture.

When flameproof equipment is interconnected, flameproof wiring must be used. This method is most valuable when high power levels are unavoidable but it is not acceptable for areas in which an explosive gas/air mixture may be continuously present or present for long periods.

For this reason Apollo fire detectors are made intrinsically safe rather than flameproof. Intrinsically safe equipment operates at such low power and with such small amounts of stored energy that it is incapable of causing ignition:

- In normal conditions
- With a single fault (for ib classification)
- With any combination of two faults (for ia classification)

In any of these conditions every component must remain cool enough not to ignite the gases for which it is approved.

Classification of hazardous areas

BS EN 60079-10:2003 defines a hazardous area as one in which explosive gas/air mixtures are, or may be expected to be, present in quantities such as to require special precautions for the construction and use of electrical apparatus.

The degree of risk in any area is a function of:

- The probability of an explosive mixture being present
- The type of gas which may be present
- The temperature at which a gas might ignite spontaneously

These are defined in Table 1, Zone Classification, Table 2, Subdivision of Group II Gases and Table 3, Temperature Classification, respectively.

Table 1: Zone Classification

Zone	Definition	Intrinsically Safe Equipment Approval Required
Zone 0	in which an explosive gas/air mixture is continuously present or present for long periods	Ex ia
Zone 1	in which an explosive gas/air mixture is likely to occur in normal operation	Ex ia or Ex ib
Zone 2	in which an explosive gas/air mixture is not likely to occur in normal operation and if it occurs it will exist only for a short time	Ex ia or Ex ib

XP95 detectors are approved to Ex ia and are suitable for all zones

Table 2: Subdivision of Group II Gases

Zone	Definition	Intrinsically Safe Equipment Approval Required
Hydrogen	Carbon Disulphide Acetylene	IIC
Ethylene	Butadiene, Formaldehyde, Diethylether	IIB or IIC
Methane	Acetaldehyde, Acetone, Benzene, Butane, Ethane, Hexane, heptane, Kerosene, Naphtha, Petroleum, Styrene, Xylene	IIA or IIB or IIC

XP95 detectors are approved to IIC and may be used for all gases listed in PD IEC 60079-20:2000.

Table 3: Temperature Classification

Temperature Class	Maximum Surface Temperature (°C)	Gases, Liquids and Vapours	Intrinsically Safe Approval Required
T6	85		T6
T5	100	Carbon Disulphide	T5 or T6
T4	135	Acetaldehyde, Diethylether, IsopropylNitrate	T4 or T5 or T6
T3	200	Hexane, Heptane	T3 or T4 or T5 or T6
T2	300	Butane, Butadiene, Ethylene	T2 or T3 or T4 or T5 or T6
T1	450	Acetone, Ammonia, Benzene, Carbon Monoxide, Ethane, Hydrogen, Methane, Propane, Ethylene	T1 or T2 or T3 or T4 or T5 or T6

XP95 detectors are approved to T5 at 40°C and are suitable for all gases listed in PD IEC 60079-20:2000.



XP95



XP95 Intrinsically Safe (IS) detectors are a development of the well established analogue addressable XP95 range from Apollo. XP95 IS detectors feature all the benefits of the standard range, but are developed specifically for use in hazardous areas. The addresses of XP95 IS detectors are set by means of the patented XPERT card.



XP95 IS

Optical Smoke Detector



55000-640

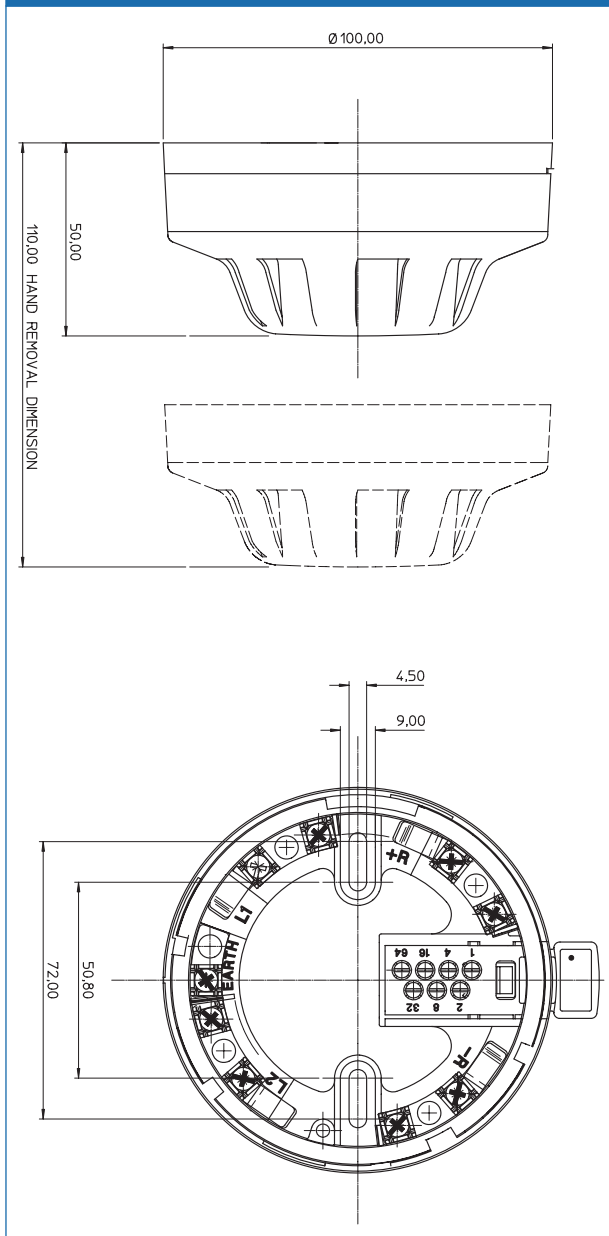
XP95 IS Optical Smoke Detector



Optical smoke detectors incorporate a pulsing LED located in a labyrinth within the housing of the detector. The labyrinth is designed to exclude light from any external source. At an angle to the LED is a photo-diode which, in clear air conditions, does not receive light directly from the LED. The detector transmits a clear air signal to the control panel. When smoke enters the labyrinth, light is scattered onto the photo-diode and the signal to the panel increases. The signal is processed by the electronic circuitry and transmitted to the control equipment in exactly the same way as in the case of the ionisation smoke detector.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS detectors have the same operating characteristics as the standard versions.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS optical detector is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive.
2. There is no requirement for series resistance on remote LED line.
3. The remote LED characteristic differs from XP95.

Supply voltage:	14-22 DC
Quiescent current:	Alarm current LED on 340µA
Operating temperatures (ambient):	-20°C to +60°C
	-20°C to +45°C (T5) -20°C to +60°C (T4)
Remote LED current:	1mA (internally limited)
Guaranteed temperature range:	(No condensation or icing) -20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	Ex ia IIC T5 -20°C ≤ Ta 45°C (T4 ≤ 60°C) Ga

XP95 IS

Ionisation Smoke Detector



55000-540

XP95 IS Ionisation Smoke Detector



Operating principles

The sensing part of the detector consists of two chambers – an open, outer chamber and a reference chamber within.

Mounted in the reference chamber is a low-activity radioactive foil of Americium 241 which enables current to flow across the inner and outer chambers when the detector is powered up.

As smoke enters the detector, it causes a reduction of the current flow in the outer chamber and hence an increase in the voltage measured at the junction between the two chambers. This analogue voltage signal is converted to a digital signal by the electronic circuitry and transmitted to the control panel on interrogation. The micro-processor in the control equipment then compares the signal with stored data and initiates a pre-alarm or fire alarm as smoke density increases. When a fire condition exists, the panel instructs the detector to switch on its indicator LED.

Full details of the principles of operation and electrical description are published in the XP95 Engineering Product Guide. Information on the performance of XP95 in adverse environmental conditions is also given in this guide. XP95 IS detectors have the same operating characteristics as the standard versions.

Safety note

In the United Kingdom, ionisation smoke detectors are subject to the requirements of the Environmental Permitting Regulations 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 Health Protection Agency (HPA), 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 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.

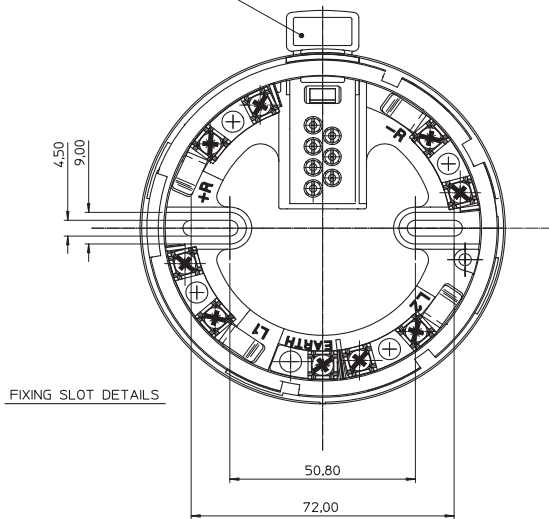
Guidance on storage and handling can be given by Apollo Fire Detectors and full details can be requested from:

Radioactive Substances Regulation Function
Environmental Agency
Swift House
Frimley Business Park
GU16 7SQ

Outside the UK, please contact the relevant national agency.

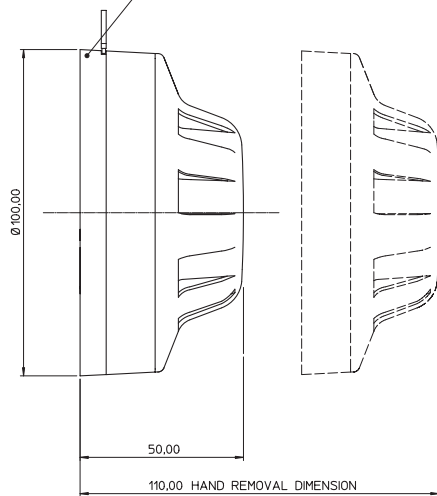
Dimensional Drawings

ADDRESS CARD 38531-771
SUPPLIED LOOSE WITH BASE.



FIXING SLOT DETAILS

MOUNTING BASE 45681-210
TO BE ORDERED SEPERATELY



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS ionisation detector is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive.
2. There is no requirement for series resistance on remote LED lines.
3. The remote LED characteristic differs from XP95.

Supply voltage:	14-22 DC
Quiescent current:	300µA
Alarm LED on:	1.3mA
Operating temperatures (ambient):	-20°C to +70°C
	-20°C to +45°C (T5)
	-20°C to +60°C (T4)
Remote LED current:	1mA (internally limited)
Guaranteed temperature range:	(No condensation or icing)
	-20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	Ex ia IIC T5 -20°C≤Ta 45°C (T4≤60°C)Ga

XP95 IS

Heat Detector



55000-440

XP95 IS Heat Detector

The XP95 IS Heat Detector is distinguishable from XP95 IS smoke detectors by its low air-flow resistance case which allows good contact between the sensing thermistor and the surrounding air.

The device monitors temperature by using a single thermistor network which provides a voltage output proportional to the external air temperature. The voltage signal is processed and transmitted to the control equipment in the same way as in the case of the ionisation smoke detector.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS detectors have the same operating characteristics as the standard versions.

XP95 IS Base

The XP95 IS base for the intrinsically safe range is not identical with that for the standard range. This ensures that standard detectors cannot inadvertently be fitted to an intrinsically safe system. For full details of the XP95 address mechanism refer to the XP95 Engineering Product Guide PP1039.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS heat detector is identical to that for the standard version, except for the information below.

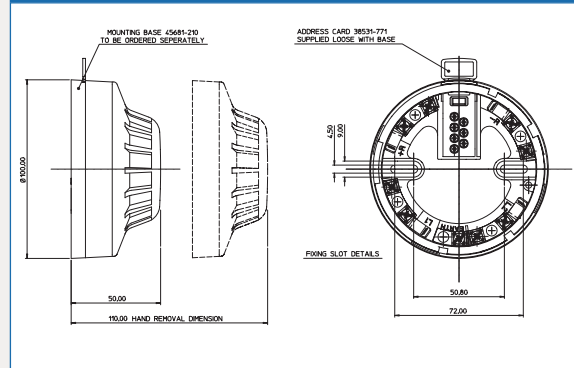
Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive.
2. There is no requirement for series resistance on remote LED lines.
3. The remote LED characteristic differs from XP95.

Supply voltage:	14-22 Volts DC
Quiescent current:	300µA
Alarm LED on:	1.3mA
Operating temperatures (ambient):	-20°C to +70°C
	-20°C to +45°C (T5) -20°C to +60°C (T4)
Remote LED current:	1 mA (internally limited)
Guaranteed temperature range:	(No condensation or icing)
	-20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	Ex ia IIC T5 -20°C ≤ Ta 45°C (T4 ≤ 60°C) Ga

Dimensional Drawings



XP95 IS Mounting Base



45681-215
XP95 IS Mounting Base

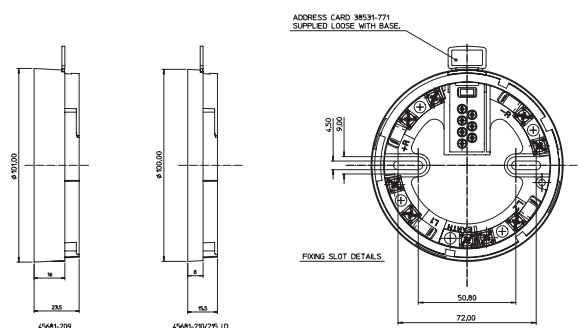
The XP95 IS Mounting Base has been designed to accept only IS products. This ensures that standard detectors cannot inadvertently be fitted into an intrinsically safe system. XPERT cards are supplied with all bases.

- XPERT addressing
- One way fit
- Only accepts IS detectors

XP95 IS Base

The XP95 IS Base for the intrinsically safe range is not identical with that for the standard range. This ensures that standard detectors cannot inadvertently be fitted to an intrinsically safe system. For full details of the XP95 address mechanism refer to the XP95 Engineering Product Guide PP1039.

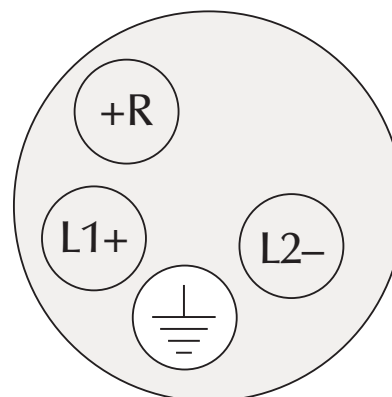
Dimensional Drawings



SCHEMATIC WIRING INFORMATION

TERMINAL	FUNCTION
-R	NEGATIVE LINE TO REMOTE INDICATOR (LED)
+R	POSITIVE LINE TO REMOTE INDICATOR (LED)
L2	SUPPLY 10 TO 24V DC NOT POLARIZED
L1 OUT	SUPPLY 500/XP95 PROTOCOL
⏏	EARTH CONNECTION

Table 4: Terminal Connections



XP95 IS

Manual Call Point – Standard



55100-940 Red

55100-942 Yellow*

55100-944 Blue*

When activated, the intrinsically safe call point not only interrupts the polling cycle to indicate to the control panel that it has been operated, but also reports its address. Thus an alarm and its location can be reported in less than 0.2 seconds.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS manual call points have the same operating characteristics as the standard versions. They are available in two types of housing and in a number of versions.

The standard red IS manual call point is EN54-11:2001 compliant and has a resettable element. The range uses an IP67 weatherproof polycarbonate housing and is available in colours other than red. A transparent hinged cover part no: 26729-152 is available for protection against accidental operation.



0729

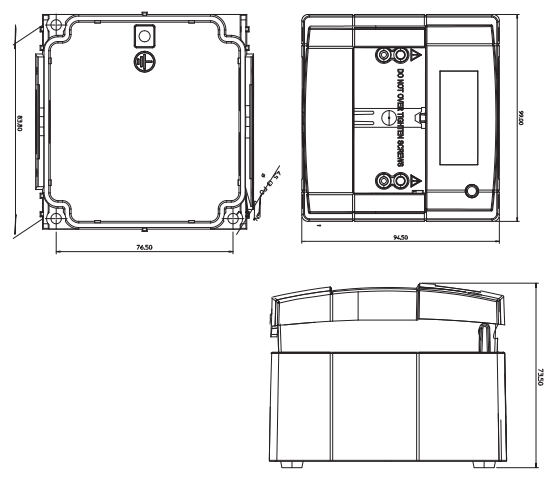
* Does not have LPCB or CPD approval, or comply with EN54-11.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS manual call point is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply
Note:	IS devices are polarity sensitive	
Supply voltage:	14-22 Volts DC	
Quiescent current:	300µA	
Alarm LED on:	1.3mA	
Operating temperatures (ambient):	-20°C to +70°C	
	-20°C to +45°C (T5)	
	-20°C to +60°C (T4)	
IP rating:	67	
BASEEFA Certificate No:	BAS02ATEX1290	
Classification:	E Ex ia IIC T5 (T4 at Ta ≤ 60°C)	
Dimensions	97.5mm x 93mm x 71mm (HxWxD)	
	Weight: approx. 240g	

XP95 IS Manual Call Point – Standard (55100-940)



XP95 IS

Manual Call Point – MEDC Style



Break-glass:

- 55000-960** Red
- 55000-962** Yellow*
- 55000-964** Blue*
- 55000-966** Black/yellow stripes*

Break-glass with flap:

- 55000-961** Red
- 55000-963** Yellow*
- 55000-965** Blue*
- 55000-967** Black/yellow stripes*

Push-button:

- 55000-970** Red
- 55000-971** Yellow*
- 55000-972** Blue*
- 55000-973** Black/yellow stripes*

XP95 IS Manual Call Point - MEDC Style for heavy-duty applications a robust manual call point based on a model by MEDC is available. This model is made of glass-reinforced polyester and may be ordered as a break-glass or push-button call point and in a variety of colours. Break-glass models may be supplied with or without a stainless-steel protective flap.

MEDC-based break-glass units have two M20 cable entries on the bottom face of the back box. Push-button units have one M20 cable entry on the bottom face and one on the top face. Other cable entry configurations can be provided to special order.

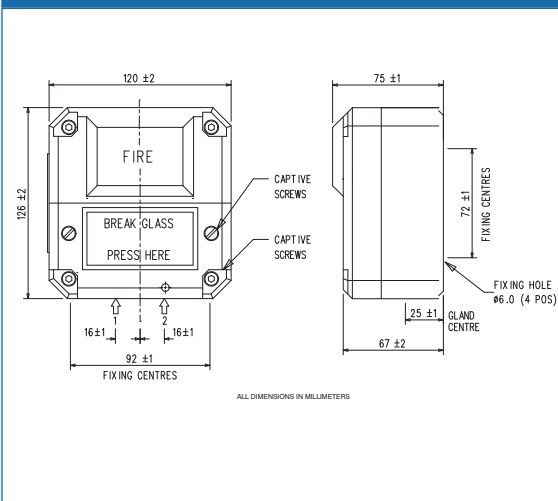
* Does not have LPCB or CPD approval, or comply with EN54-11.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS manual call point is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply
Note:	IS devices are polarity sensitive	
Supply voltage:	14-22 Volts DC	
Quiescent current:	300µA	
Alarm LED on:	1.3mA	
Operating temperatures (ambient):	-20°C to +70°C	
	-20°C to +45°C (T5)	
	-20°C to +60°C (T4)	
IP rating:	66	
BASEEFA Certificate No:	BAS02ATEX1290	
Classification:	E Ex ia IIC T5 (T4 at Ta ≤ 60°C)	
Dimensions break-glass:	126mm x 120mm x 67mm (HxWxD)	
	Weight: approx. 240g	
Push-button:	126mm x 120mm x 67mm (HxWxD)	

Dimensional Drawings



XP95 IS

Protocol Translator



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Supply wiring:	Two wire supply, polarity sensitive
Supply voltage:	19 to 28 Volts
Modulation voltage at translator:	5 to 9 Volts peak to peak.
Input current (no load condition):	1 mA max (single channel) 2 mA max (dual channel)
Output voltage (to barrier):	16.5 to 19 Volts
Output modulation voltage (to barrier):	5 to 6.5 Volts
Output current (to barrier):	0.2 to 30mA
Input pulse current (from barrier):	8 to 12mA
Output pulse current (drawn from loop):	17 to 23mA
Operating temperature:	-20°C to +60°C
Humidity (no condensation):	10 to 95% relative humidity
Dimensions:	92.5 x 110 x 20mm
Weights:	Approx. 100g
Materials (housing):	Makrolon 6485 V-0 rated to UL94



55000-855

XP95 Protocol Translator (single channel)

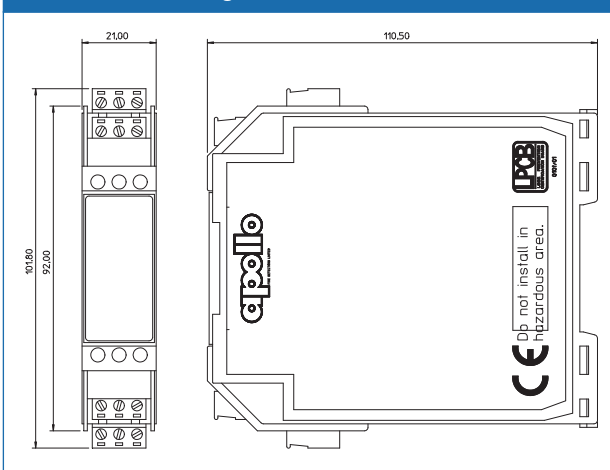
55000-856

XP95 Protocol Translator (dual channel)



0729

Dimensional Drawings



Specialist Environments
marine, offshore & industrial

Find out more about the XP95 IS range at
www.apollo-fire.co.uk/xp95is

XP95 IS Galvanic Barrier

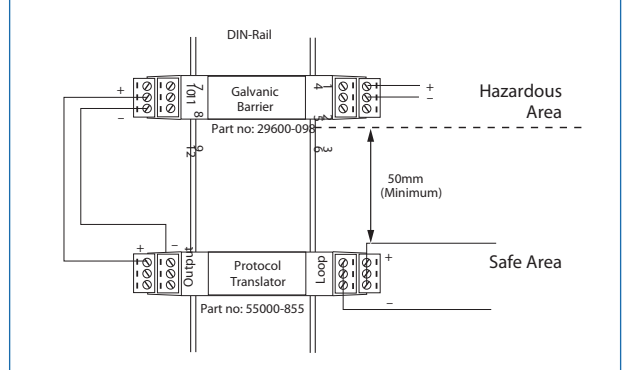


29600-098
XP95 IS Galvanic Barrier

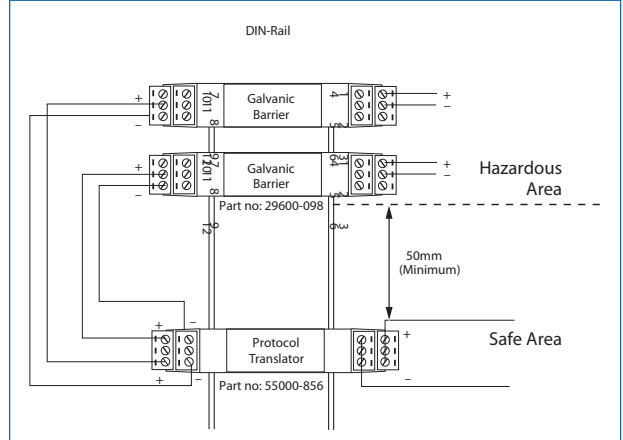
The XP95 IS Galvanic Barrier is installed in the safe area and ensures system integrity.

- Enables compliance with the ATEX directive

Analogue Addressable IS Configuration for 29600-239



Analogue Addressable IS Configuration for 29600-240



XP95 IS Galvanic Barrier *continued*

Technical Data

KFD0-CS-Ex1.54

Input (intrinsically safe)

Connection type	Terminals 1+, 2-, 4+, 5-
Transmission range	Voltage: 4 ... 26 V DC/0 ... 6 VSSAC current: 1 ... 20 mA
Short-circuit current	65 mA

Details of certificate of conformity

Certification number	BAS No. Ex 95C2064; for additional certifications refer to the approval list
Group, category, ignition protection method	[EEx ia] IIC (T _{amb} = 60°C)
Voltage U _o	28 V
Current I _o	93 mA
Power P _o	653 mW

Allowable circuit values

Ignition protection class, category [EEx ia]			
Explosion group	IIA	IIB	IIC
External capacitance	1.03 F	0.38 F	0.12 F
External inductance	33.6 mH	12.6 mH	4.2 mH

Entity parameter

Certification number	4Z6A5.AX		
FM control drawing	No. 116-0129		
Suitable for installation in division 2	Yes		
Connection type	Terminals 2, 1		
Voltage V _{OC}	28.5 V		
Current I _{SC}	95 mA		
Explosion group	A&B	A&B	D, F&G
Max. external capacitance C _a	0.13 F	0.41 F	1.1 F
Max. external inductance L _a	4.09 mH	16.02 mH	32.82 mH

Safety parameter

CSA control drawing	LR 65756-13		
Control drawing	No. 116-0132		
Connection type	Terminals 2, 1		
Safety parameter	28 V / 300 Ohm		
Voltage V _{OC}	28 V		
Current I _{SC}	93.3 mA		
Explosion group	A&B	C&E D,	F&G
Max. external capacitance C _a	0.14 F	0.42 F	1.14 F
Max. external inductance L _a	3.1 mH	16.7 mH	34.0 mH
Approved for zone 2	TÜV 99 ATEX 1499 X (observe conformity statement) Ⓢ II 3 G EEx n A II T4		

Output (not intrinsically safe)

Connection type	Terminals 11+, 12-, 9+, 10-
Voltage	0 ... 26 V for 4 V U _{in} , 26 V: U _n - (0.38 x current in mA) - 0.5
Current	1 ... 20 mA

Transfer characteristics

Deviation	
After calibration	-1,6 mA ... 0 mA (incl. non-linearity, hysteresis, load and DC quiescent current)
Temperature	20 A / K
Rise time	50 s (load current 1 mA)

Galvanic isolation

Input/Output	Available
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Ambient conditions

Ambient temperature	-20 ... +60 °C (253 ... 333 K)
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Standard conformity

Coordination of insulation	Accord. to DIN EN 50178
Galvanic isolation	Accord. to DIN EN 50178
Electromagnetic compatibility	Accord. to EN 50081-2 / EN 50082-2, NAMUR NE 21

Mechanical specifications

Mass	Approx. 100 g
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DIN-Rail Interface Enclosures



29600-239

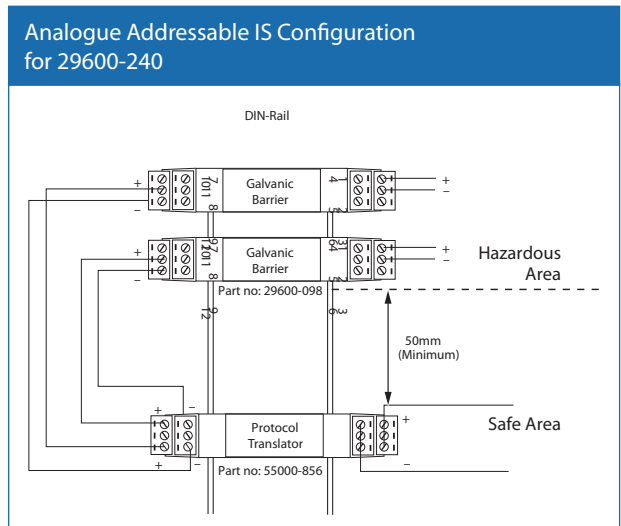
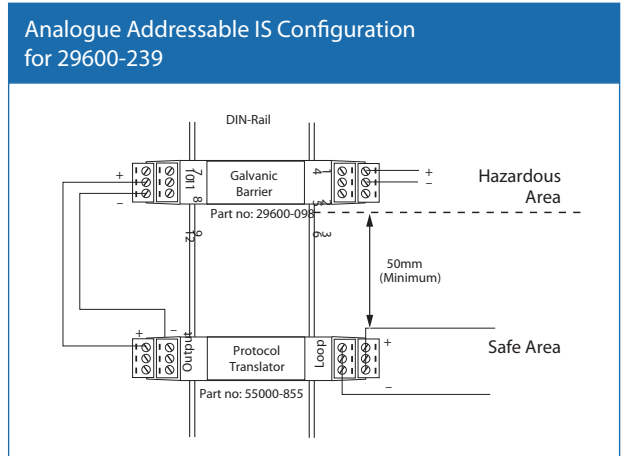
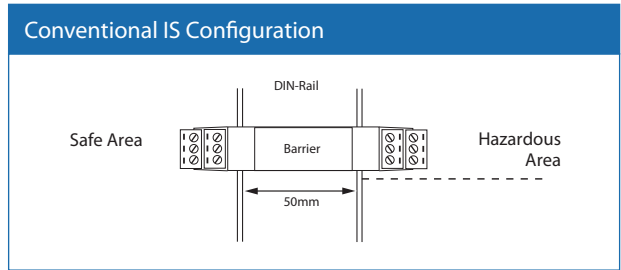
DIN-Rail Interface Enclosure (4 units)

29600-240

DIN-Rail Interface Enclosure (10 units)

DIN-Rail Interface Enclosures are available in two sizes and can be used for housing Intrinsically Safe (IS) barriers or DIN-Rail mounted interfaces. A multi-purpose label that features a section for use with IS systems is supplied. For non-IS systems, the part referring to IS can simply be removed.

- Allows multiple interfaces to be housed together
- IP67 rated



About XP95 IS

XP95 Intrinsically Safe communications protocol

The standard XP95 communications protocol is designed to be very robust and to give the maximum flexibility to designers of loop driver circuits. The current and voltage levels used are chosen to be well above noise levels and to operate in adverse conditions with the minimum of errors. The maximum voltage and current levels used are, however, outside the limits of intrinsically safe systems and it has been necessary to apply lower limiting values for both current and voltage in the IS range.

The voltage limitation arises because of the need for safety barriers. The barriers used with Apollo IS detectors are rated at 28 volts, the highest rating that is commercially available. These are used to limit the voltage inside the hazardous area to a (practical) maximum of about 26V DC. Although this is within the standard XP95 protocol specification, it is lower than that provided by most loop drivers.

The safety barrier is also responsible for the current limitation because the 28V barriers have a series resistance of at least 300 ohms. This resistance results in unacceptable voltage drops if the normal 20mA current pulses are used. It has therefore been necessary to reduce the amplitude of the current pulses to 10mA.

The differences between the standard protocol and the intrinsically safe are summarised in Table 5.

Table 5: Protocol Variance Data		
Parameter	XP95 Standard	XP95 IS
DC input voltage	17 – 28V	14 – 22V
Pulse voltage peak to peak	5 - 9V	5 - 9V
DC + pulse voltage	37V max	26.5V max
Current pulse amplitude	18 – 22mA	9 – 11mA
Input voltage polarity	polarity insensitive	L1 positive L2 negative

XP95 protocol translator

In order to enable the use of standard control and indicating equipment in intrinsically safe systems, Apollo has developed a device to 'translate' voltage levels from any loop driver operating within the XP95 limits to levels compatible with the IS requirements. The translator also 'boosts' the current pulses returned by the IS detectors from 10mA to 20mA, thereby ensuring compatibility with standard loop driver thresholds.

The translator is a loop-powered device which draws a low quiescent current and is therefore transparent to both the loop driver and the IS detectors. Since the translator is used within the safe area, i.e., before the safety barrier, no certification is necessary. The translator falls within the generic description 'Safe Area Apparatus' on the certified system diagram.

The translator is housed in a moulded plastic enclosure which can be either clipped onto a standard 35mm DIN-Rail (DIN 46277) or panel mounted by using pull-out latches in the base. The translator is available in single-channel or dual-channel versions. Each channel should only be connected to a single intrinsically safe circuit through an appropriate safety barrier. Each channel is thus capable of supplying up to twenty XP95 IS devices.

A block schematic of the dual-channel translator, showing terminal designations, is given in Fig 1. In the single-channel unit the Channel 2 circuit is not fitted and terminal 12 is not used.

The input to the unit consists of the normal XP95 signal, that is a d.c. voltage on which is superimposed the protocol pulses.

Translator operation

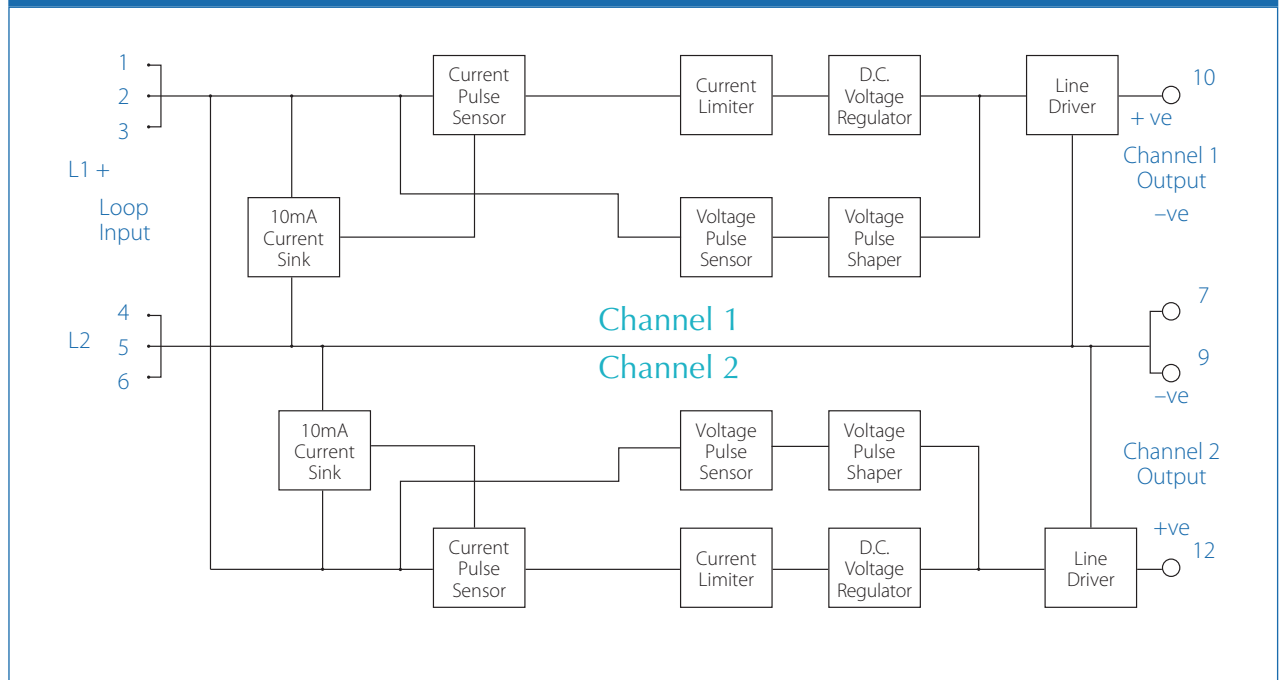
The translator first regulates the d.c. level to 18V. The incoming protocol pulses are then sensed and re-generated and shaped with a fixed amplitude of 6V, and superimposed on the 18V d.c. output level.

The 10mA current pulses drawn by the IS devices are detected by the current pulse sensor whose output is used to switch the 10mA current sink across the input terminals synchronously with the device current pulse. The current boosting mechanism is inhibited during the protocol pulses so that when low resistance loads are connected to the translator output the protocol current is not boosted.

A separate current limiting circuit is incorporated in each channel which limits the maximum (peak) output current to 35mA. This level of current will ensure that safety barrier fuses are not blown in the event of a short-circuit on the barrier output.

When the dual-channel unit is used it must be remembered that the loop input, and the negative side of the output, is common to the two channels. It is not possible, therefore, to connect the two channels to different loops. Although the two channels have a common input, their outputs are individually current-limited to 35mA (nominal). Hence, a short-circuit on one channel will cause the loop current to increase by 35mA and as long as the panel is able to support this load the second channel will continue to operate normally.

Schematic Diagram – XP95 Protocol Translator (Fig 1)



System design

The design of an intrinsically safe fire detection system should only be undertaken by engineers familiar with codes of practice for detection systems and hazardous area electrical systems. In the UK the relevant standards are BS5839-1:2002 + A2:2008 and BS EN 60079-14:2008 respectively.

The fire detection performance of the XP95 IS range is the same as that of its standard counterparts. Performance information given in the XP95 Engineering Product Guide is therefore applicable to the IS range.

The BASEEFA certification of the IS devices covers their characteristics as components of an intrinsically safe system and indicates that they can be used with a margin of safety in such systems. The precise way in which the system can be connected and configured is covered by an additional, 'system' certification. The System Diagram, Z20982, see page 19 of the XP95 product guide details cable parameters and permissible configurations of detectors, manual call points and safety barriers which are certified by BASEEFA. Any user wishing to install a system outside the parameters given on this system diagram cannot make use of the Apollo certification and should seek independent certification from a competent certification body.

The BASEEFA system Certificate Number is Ex94C2444.

Any system installed within the parameters specified in Z20982 should be marked in accordance with BS EN 60079-25:2010. The marking should include at least 'Apollo XP95 IS Fire Detection System, BASEEFA No Ex94C2444 SYST'.

In safe area (standard) applications it will be normal practice to connect the wiring as a loop, with both ends terminated at the control panel. In the event of an open-circuit fault it is then possible to drive both ends simultaneously. In a hazardous area it is not possible to use a loop configuration because the potential to feed power from each end of the loop would double the available energy in the hazardous area and contravene the energy limitations of the IS certification. All XP95 IS circuits must therefore be connected as spurs from the safe area loop or as radial connections from the control panel.

It is recommended, for the highest system integrity, that each IS circuit be restricted to a single zone and that the connection from the safe area loop to the IS spur be protected on each side by XP95 isolators. The DIN-Rail dual isolator (55000-802) is particularly suited to this application. This configuration, shown in Fig 3 of the XP95 product guide, will conform fully with the requirements of BS5839-1:2002 + A2:2008 and with the European Guidelines DD CEN/TS 54-14:2004 since a single wiring fault will result in the loss of only one zone of detection.

In certain circumstances it may be possible for the simpler configuration, shown in Fig 4 of the XP95 product guide to be used. This arrangement may include single or dual-channel translators, housed, together with the critical wiring, in a robust mechanical housing such as the Apollo DIN-Rail enclosures part no. 29600-239 (1xIS circuit) or part no. 29600-240 (up to 5x1.5 circuits). For further advice, please contact the Technical Sales department at Apollo.

Types of Safety Barrier

The certified system configurations allow for three types of safety barrier, each of which has its own advantages and disadvantages. A brief outline of their characteristics is given below.

Single Channel 28V/300 Ω Barrier

This is the most basic type of barrier and therefore the lowest in cost. Being passive devices, they also impose the minimum of restrictions on the operation of the fire detectors. Thus, single channel barriers are available either as positive or negative polarity where the polarity refers to the polarity of the applied voltage relative to earth. The significance of this is that one side of the barrier must be connected to a high-integrity (safety) earth. Although this earth connection has no effect on the operation of the XP95 IS devices and is not needed for their correct operation, it may not be acceptable to the operation of the control and indicating equipment. This is particularly true if the control equipment incorporates earth-leakage monitoring and even without this feature the earthing of the loop may cause unwanted cross-talk between loops.

If the earth connection is not acceptable then the AC or isolating barriers should be used.

Star-connected AC Barrier

AC barriers are also passive devices and must still be connected to a high-integrity safety earth. However, they are designed to allow either positive or negative voltages with respect to earth and under normal conditions provide a connection to earth via a reverse-biased diode, rather than directly.

The disadvantage of this type of barrier is that the end-to-end resistance is nominally 1200 ohms compared with the 300 ohms of the single channel type. This high resistance results in an extra voltage drop in the circuit.

This type of barrier is not recommended for general use.

Galvanically Isolated Barrier

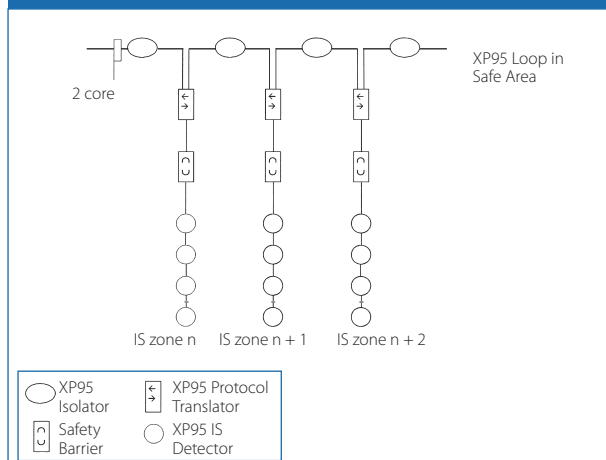
Galvanically isolated barriers (also known as transformer isolated barriers) differ from conventional shunt zener barriers in that they provide electrical isolation between the input (safe area) and the output (hazardous area). This is achieved by the use of a DC converter on the input side which is connected to the hazardous area through a voltage-and power-limiting resistor/zener combination similar to a conventional barrier.

The galvanic isolation technique means that the circuit does not need a high integrity (safety) earth and that the intrinsically safe circuit is fully floating. Earth leakage problems for control and indicating equipment are therefore eliminated if this type of interface is used.

Note: Although the circuit does not require a high-integrity earth, it is permissible to earth either priority of the hazardous area circuit if required by other system considerations.

Although galvanically isolated barriers are widely used with conventional fire detectors the pulse response of standard products has been too slow to allow their use in analogue addressable systems. Apollo has worked closely with Pepperl + Fuchs in the development of a special galvanically isolated

Schematic Wiring Diagram of XP95 IS Circuit to BS5839-1:2002 + A2:2008



barrier which freely transmits the XP95 protocol pulses without introducing severe voltage drops.

This interface is available as single or dual channel versions and is recommended for any application in which direct earth connections are not acceptable. The Pepperl + Fuchs type numbers are KFD0-CS-Ex1.54 Apollo part no. 29600-098 and KFD0-CS-Ex2.54 for the single and dual channel devices respectively. Both versions are BASEEFA certified under Certificate Number BAS00ATEX7087. (The KFD0- types have replaced the earlier KHD0- types.)

The galvanically isolated barrier is a two-wire device which does not need an external power supply. Current drawn from the XP95 loop by the barrier itself is less than 2mA when loaded as specified by the manufacturer. The housing is a DIN-Rail mounting, identical to that used for the protocol translator.

Approved Safety Barriers

The system certification includes a generic specification for barriers, two additional, individually approved barriers and two transformer isolated current repeaters (galvanic barriers).

The generic specification is:

Any shunt zener diode safety barrier certified by BASEEFA or any EEC approved certification body to

E Ex ia IIC

Having the following or lower output parameters:

$U_z = 28V$

$I_{max:out} = 93.3mA$

$W_{max:out} = 0.67W$

In any safety barrier used the output current must be limited by a resistor 'R' such that

$$I_{max:out} = \frac{U_z}{R}$$

A number of single-channel barriers meet this specification and examples are given below:

The two individually approved barriers are:

1. Pepperl & Fuchs Z978
Star connected shunt zener diode safety barrier, 28V/600V, dual channel. BASEEFA Certificate No. Ex 93C2412, BAS01ATEX7005.
2. Measurement Technology Ltd. MTL 778
Star connected shunt zener diode safety barrier, 28V/600V. BASEEFA Certificate No. Ex 832452, BAS01ATEX7202.

The transformer isolated current repeaters are described on page 13 of the XP95 product guide

Safety earth

Single channel and star connected AC safety barriers must be connected to a high integrity earth by at least one and preferably two copper cables, each of cross sectional area of 4mm² or greater. The connection must be such that the impedance from the connection point to the main power system earth is less than one ohm.

Intrinsically safe circuits in the hazardous area should be insulated from earth and must be capable of withstanding a 500V RMS AC test voltage for at least one minute. When using armoured or copper sheathed cables, the armour or sheath is normally isolated from the safe area busbar.

Wiring and cable types

It is not permitted to connect more than one circuit in the hazardous area to any one safety barrier and that circuit may not be connected to any other electrical circuit.

Both separate and twin cables may be used. A pair contained in a type 'A' or 'B' multicore cable (as defined in clause 12.2.2 of BS EN 60079-14:2004) may also be used, provided that the peak voltage of any circuit contained within the multicore does not exceed 60V.

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the parameters specified in Table 7. The reason for this is that energy can be stored in a cable and it is necessary to use cable in which energy stored is insufficient to ignite an explosive atmosphere.

To calculate the total capacitance or inductance for the length of cables in the hazardous area, refer to Table 8, which gives typical per kilometre capacitance and inductance for commonly used cables. (Note: All XP95 IS devices have zero equivalent capacitance and inductance.)

Maximum loading of IS Circuit

Because of the finite resistance of the safety barrier, there will be a limit to the current drain which can be tolerated before the voltages on the circuit fall outside the specified limits for XP95 IS devices. Two components of the current drain must be considered, namely the standing current of the devices by themselves and the maximum drain caused by alarm LEDs being illuminated. The standing current of the devices can be calculated by taking the sum of the individual device currents on the circuit, as given in the section 'Technical data' for each product.

The maximum number of LEDs that can be illuminated simultaneously should ideally be limited by the panel software. Because the LED load is often the limiting factor in determining the voltage drop, the later versions of the XP95 IS detectors are fitted with high efficiency LEDs. This has allowed a reduction from 2mA to 1mA in the LED current. It is important when fitting remote LEDs that high efficiency types are used.

In the XP95 product guide, Table 9 shows the maximum device standing current which can be supported for varying numbers of LEDs illuminated.

Installation

It is important that the XP95 IS detectors are installed in such a way that all terminals and connections are protected to at least IP20 when the detector is in the base. Special care must be taken with the rear of the mounting base where live metal parts (rivets) may be accessible. Flush mounting of the base on a flat surface will provide the required degree of protection.

If the base is mounted on a conduit box (e.g. BESA box or similar) whose diameter is less than 85mm then the base should be fitted with a Series 60/XP95 Backplate (Apollo part number 45681-233). Use of the backplate will prevent access to the metal parts and will also protect the rear of the base from water ingress. The conduit box available from Apollo, part no. 45681-204, is also acceptable for mounting IS bases. Apollo also supply a range of deckhead mounting boxes. For more information, please refer to PP1089, bases and accessories brochure.

Fig 6 shows permissible methods of installing intrinsically safe detector bases.

Note that the earth terminal in the base is provided for convenience where continuity of a cable sheath or similar is required. It is not necessary for the correct operation of the detector nor is it provided as a termination point for a safety earth.

Table 6: Examples of Electrical Characteristics of Cables Commonly used in Fire Protection Systems

Cable Type	Core	Size mm ²	Conductor Resistance ohm/km/ core	Inductance mH/km	Capacitance $\mu\text{F}/\text{km}$		Sheath Resistance ohm/km
					core to core	core to sheath	
MICC Pyrotenax light duty	2	1.5	12.1	0.534	0.19	0.21	2.77
MICC Pyrotenax heavy duty	2	1.5	12.1	0.643	0.13	0.17	1.58
Pirelli FP200	all	1.5	12.1		0.08	0.15	
PVC sheathed and insulated to BS 6004	all	1.5	12.1	0.77	0.09		

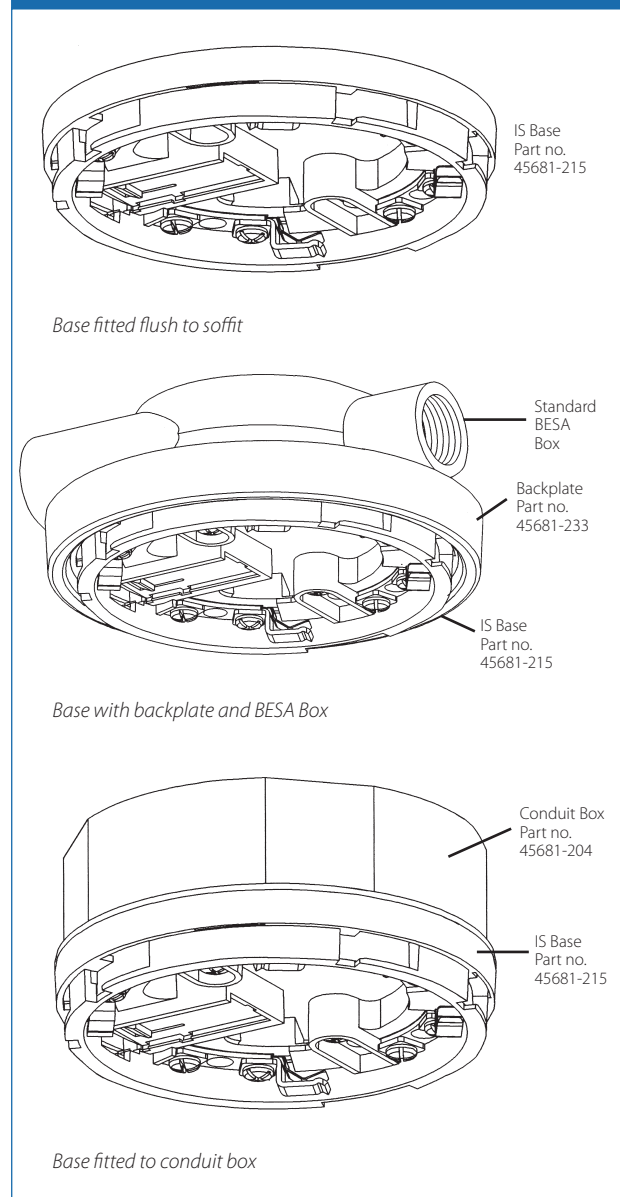
Table 7: Limits for Energy Stored in Cables

Group	Capacitance μF	Inductance mH	L/R Ratio $\mu\text{H}/\text{ohm}$
IIC	0.083	4.2	55
IIB	0.65	12.6	165
IIA	2.15	33.6	440

Table 8: Maximum Loading (28V/300V Single Channel Barrier)

Max. Number of LEDs Illuminated	Max (Total) Device Load (mA)
1	7.0
2	6.0
3	5.0
4	4.0
5	3.0

Permissible Methods of Mounting IS Bases (Fig 6)



Remote Led connection

A drive point is provided on each of the XP95 IS detectors for a remote LED indicator. For connection details see Fig 5. The indicator must be a standard high-efficiency red LED and does not require a series limiting resistor since current is limited within the detector to approximately 1mA. The remote LED cannot, as in the standard XP95 range, be controlled independently from the integral LED since it is effectively connected in series with the integral LED. The benefit of this configuration is that illumination of the remote LED does not increase the current drawn from the loop.

The system certification allows for the use of any LED indicator having a surface area between 20mm² and 10cm² which covers all commonly used case styles from T1 (3mm) upwards but would exclude some miniature and surface mounted types. Additional requirements of the certification are that the LED and its terminations must be afforded a degree of protection of at least IP20 and must be segregated from other circuits and conductors as defined in BS EN 60079-14:2003.

The Apollo MiniDisc Remote Indicator (53832-070) is suitable.

Servicing

Servicing of IS fire detectors may be carried out only by a BASEEFA authorised body. In practical terms this means that Apollo XP95 IS fire detectors may be serviced only by Apollo at its factory. Servicing of the fire protection system should be carried out as recommended by the code of practice BS 5839-1:2002+A2:2008 or other local regulations in force. For more information on servicing Apollo detectors, please refer to the care, service and maintenance guide, PP2055

Approvals

XP95 IS detectors have been approved by LPCB to EN54 and the XP95 IS manual call point, part no 55100-940, is LPCB approved to EN54-11:2001. These products have also been approved for marine use by the following bodies:

- American Bureau of Shipping
- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyds Register of Shipping
- Maritime and Coastguard Agency

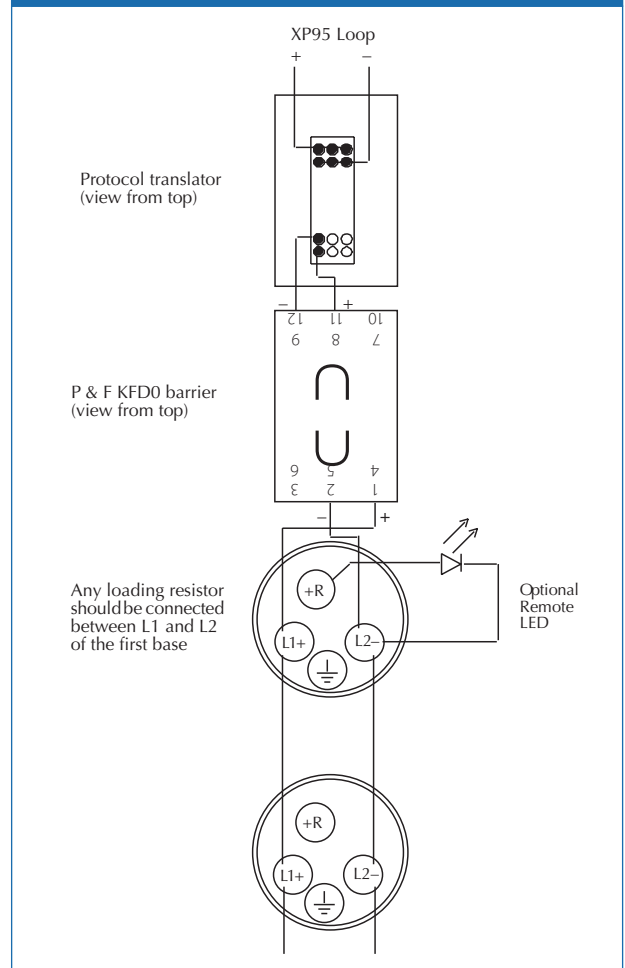
Details of approvals held are available on request.

The product certification technical files for the XP95 IS range are held by BASEEFA in accordance with the requirements of the ATEX Directive 94/9/EC. All detectors and manual call points are

CE marked.

1180

Detail of Schematic Wiring Diagram of IS Zone (Fig 5)



XP95 IS System Drawing

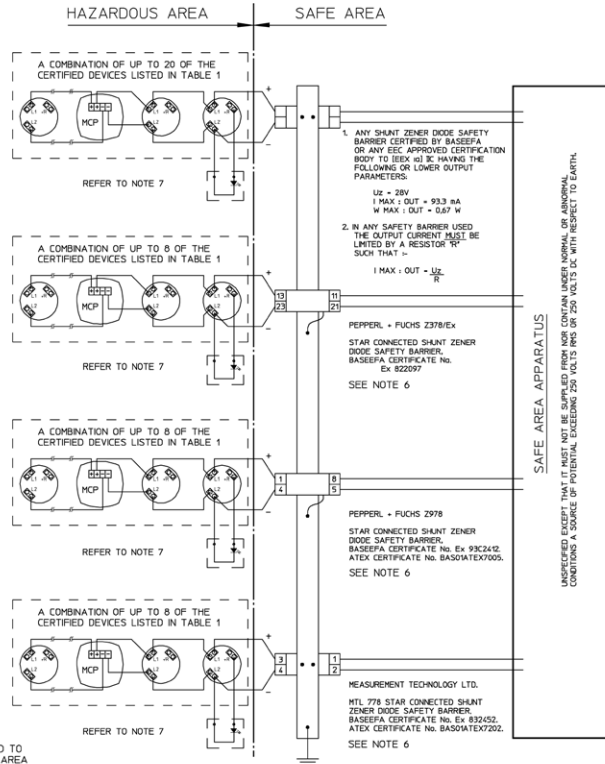
TABLE 1

DEVICE	TYPE	CERTIFICATE No.
OPTICAL SMOKE MONITOR	55000-640	Ex 94C2406 BASO2ATEX1289
ION CHAMBER SMOKE MONITOR	55000-540	Ex 94C2406 BASO2ATEX1289
HEAT MONITOR	55000-440	Ex 94C2406 BASO2ATEX1289
MANUAL CALL POINT	55000-960 TO 945 INCL. 55000-960 TO 967 INCL. 55000-970 TO 973 INCL.	Ex 94C2443 BASO2ATEX1290

TABLE 2

GROUP	CAPACITANCE µF	INDUCTANCE mH OR µH/ohm	L/R RATIO
IC	0.083	4.2	55
IB	0.65	12.6	165
IIA	2.15	33.6	440

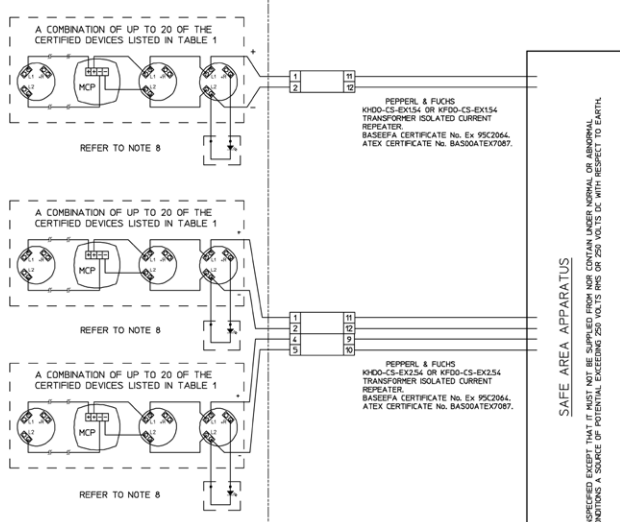
- NOTE 1. EACH BARRIER FED CIRCUIT MUST BE A SEPARATE CIRCUIT & MUST NOT BE INTERCONNECTED WITH ANY OTHER ELECTRICAL CIRCUIT.
- NOTE 2. THE ELECTRICAL CIRCUIT IN THE HAZARDOUS AREA MUST BE CAPABLE OF WITHSTANDING AN a.c. TEST VOLTAGE OF 500 VOLTS RMS TO EARTH OR FRAME OF THE APPARATUS FOR ONE MINUTE.
- NOTE 3. THE INSTALLATION MUST COMPLY WITH NATIONAL INSTALLATION REQUIREMENTS (e.g. IN THE UK BS5345-4:1977).
- NOTE 4. THE CAPACITANCE & EITHER THE INDUCTANCE OR THE INDUCTANCE TO RESISTANCE (L/R) RATIO OF THE HAZARDOUS AREA CABLES MUST NOT EXCEED THE PARAMETERS SPECIFIED IN TABLE 2.
- NOTE 5. THE CABLE MAY BE SEPARATE CABLES OR A TWIN PAIR OR A PAIR CONTAINED IN A TYPE 'A' OR A TYPE 'B' MULTICORE CABLE (AS DEFINED IN CLAUSE 5.3 OF BS5501-9:1992, EN50039) PROVIDED THAT THE PEAK VOLTAGE OF ANY CIRCUIT CONTAINED WITHIN THE MULTICORE DOES NOT EXCEED 60 VOLTS.
- NOTE 6. SPECIAL CONDITIONS MAY APPLY WHEN USING a.c. BARRIERS, CONSULT APOLLO FOR FURTHER INFORMATION.
- NOTE 7. AN EXTERNAL LIGHT EMITTING DIODE (LED) MAY BE FITTED TO TERMINALS L2 AND R OF A FIRE MONITOR. THE SURFACE AREA OF THE LED MUST LIE BETWEEN 20mm² AND 10cm². THE LED AND ITS TERMINATIONS MUST BE AFFORDED A DEGREE OF PROTECTION OF AT LEAST IP20, AND MUST BE SEGREGATED FROM OTHER CIRCUITS AND CONDUCTORS AS DEFINED IN CLAUSE 5 OF EN50020:2002.



SAFE AREA APPARATUS

SAFE AREA APPARATUS

HAZARDOUS AREA SAFE AREA



NOTE 8. IF REQUIRED A LOADING RESISTOR OF NOT LESS THAN 3KΩ, 0.5W AND HAVING A SURFACE AREA BETWEEN 20mm² AND 10cm² MAY BE CONNECTED BETWEEN L1 & L2 OF ANY SINGLE MOUNTING BASE OR BETWEEN UNUSED + AND - TERMINALS OF ANY SINGLE MANUAL CALL POINT.

Note: P + F Z378/Ex has been superseded by P + F Z978



orbis™



Orbis IS is a range of conventional detectors which have been developed from the standard Orbis smoke and heat detectors. Orbis IS is a range with modern styling and is electronically compatible with Apollo Series 60 Intrinsically Safe conventional detectors. Orbis IS is a demonstration of Apollo's commitment to the market for high quality conventional detectors for use in small to medium size installations. In developing this range, Apollo has put ease of installation and reliability in daily operation at the forefront of considerations.

Key features of Orbis IS include:

- TimeSaver® Base
- Patented FasTest® enabling functional testing in four seconds
- DirtAlert® indicates limit of drift compensation
- Tolerates extreme operating conditions: -40°C to +70°C
- False alarm reduction
- Flashing LED option



Orbis IS

Optical Smoke Detector



ORB-OP-52027-APO

Orbis IS Optical Smoke Detector

ORB-OP-52028-APO

Orbis IS Optical Smoke Detector with flashing LED



Where to use Optical Smoke Detectors

Optical smoke detectors have always been recognised as good detectors for general use. They are regarded as particularly suitable for smouldering fires and escape routes.

The performance of Orbis IS optical detectors is good in black as well as in white smoke. In this respect Orbis IS is different from traditional optical smoke detectors which perform far better in white smoke than in black.

Orbis IS optical detectors are also designed to reduce significantly the incidence of false alarms through over-sensitivity to transient phenomena.

Orbis IS optical detectors are recommended for use as general purpose smoke detectors for early warning of fire in most areas.

Orbis Optical Smoke Detector

The sensing technology in the Orbis IS Optical Smoke Detector is significantly different in design from previous optical detectors. A full description is given in the section 'How do Orbis optical smoke detectors work?' but the advantages of this system and its associated algorithms are:

- Improved sensitivity to black smoke
- Compensation for slow changes in sensitivity
- Extra confirmation of smoke before alarm signal given

The algorithms are used to verify signals from the sensing chamber, to filter out transients and to decide when the detector should change to the alarm state.

All this combines to increase detection reliability and reduce false alarms.

How does the Orbis IS Optical Detector work?

The Orbis IS Optical smoke detector operates on the well established light scatter principle. The remarkable optical design of the Orbis IS optical smoke detector allows it to respond to a wide spectrum of fires.

The sensing chamber of the Orbis IS optical smoke detector contains an optical sensor which measures back-scattered light as well as the more usual forward-scattered light. Sensitivity to black smoke is greatly improved.

The detector is calibrated so that it is highly reliable in detecting fires but is much less likely to generate false alarms than ionisation smoke detectors.

The stability of the detector – high reliability, 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.

The sensing chamber has been designed to keep out dust and other airborne contaminants.

Environmental performance

The operating temperature for intrinsically safe detectors is restricted by the gas temperature class. See technical data for full details.

Classification

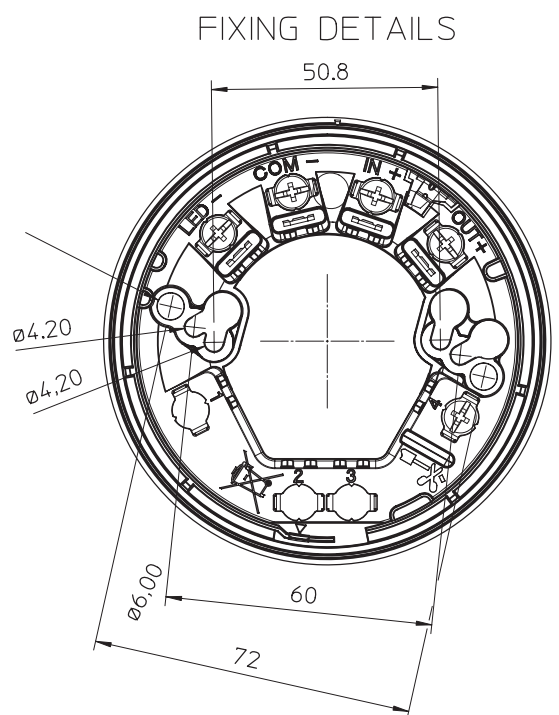
Ex ia IIC T5 –40°C < Ta < +45°C (T4 < 60°C) Ga

BASEEFA Certificate Number

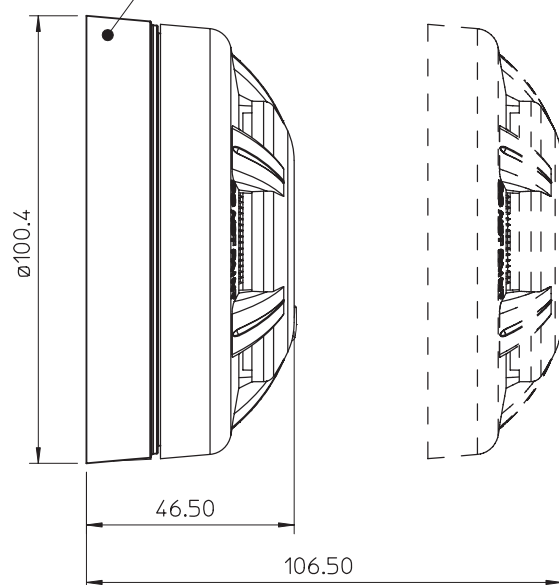
ATEX – BASEEFA 06 ATEX 0007X

IECEX – IECEX BAS 06.0002X

Dimensional Drawings



MOUNTING BASE ORB-MB-00001
TO BE ORDERED SEPERATELY



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection:

Photoelectric 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.

Sampling frequency: Once every 4 seconds

Electrical

Supply voltage: 14—28V DC

Supply wiring: 2 wires, polarity sensitive

Polarity reversal: Not allowed

Power-up time: <20 seconds

Minimum 'detector active' voltage: 12V

Switch-on surge current at 24V: 105µA

Average quiescent current at 24V: 85µA

Alarm load: 325Ω in series with a 1.0V drop

Minimum holding voltage: 5V

Minimum voltage to light alarm LED: 6V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 4.7kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility

Dimensions and weight of detector: 100mm diameter x 42mm Weight, 75g (in base) 100mm diameter x 50mm Weight, 135g

Environmental

Operating and storage temperature: -40°C to +70°C
Operating temperature is restricted by the intrinsic safety gas classification.
Class T5: -40°C to +45°C
Class T4: -40°C to +60°C
The detector must be protected from conditions of condensation or icing.

Humidity: 0% to 98% 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 61000-6-3 for emissions and BS EN50 130-4 for susceptibility

*The IP rating is not a requirement of EN 54-7: 2001 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis IS

Multisensor Smoke Detector



ORB-OH-53027-APO

Orbis IS Multisensor Detector

ORB-OH-53028-APO

Orbis IS Multisensor Detector with flashing LED

CE
0832
1180

Where to use Multisensor Smoke Detectors

Orbis IS Multisensor Smoke 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 Orbis IS optical smoke detectors the increased reliability of detection is combined with high immunity to false alarms.

Orbis IS Multisensor Smoke Detector

The 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 Orbis IS optical detector described in the previous chapter and goes further in its capabilities of fire detection.

How Does the Orbis IS Multisensor Detector work?

The optical sensor is identical to the one in the Orbis IS optical detector. Its sensitivity is, however, influenced by a heat sensing element which makes the detector more responsive to fast-burning, flaming fires.

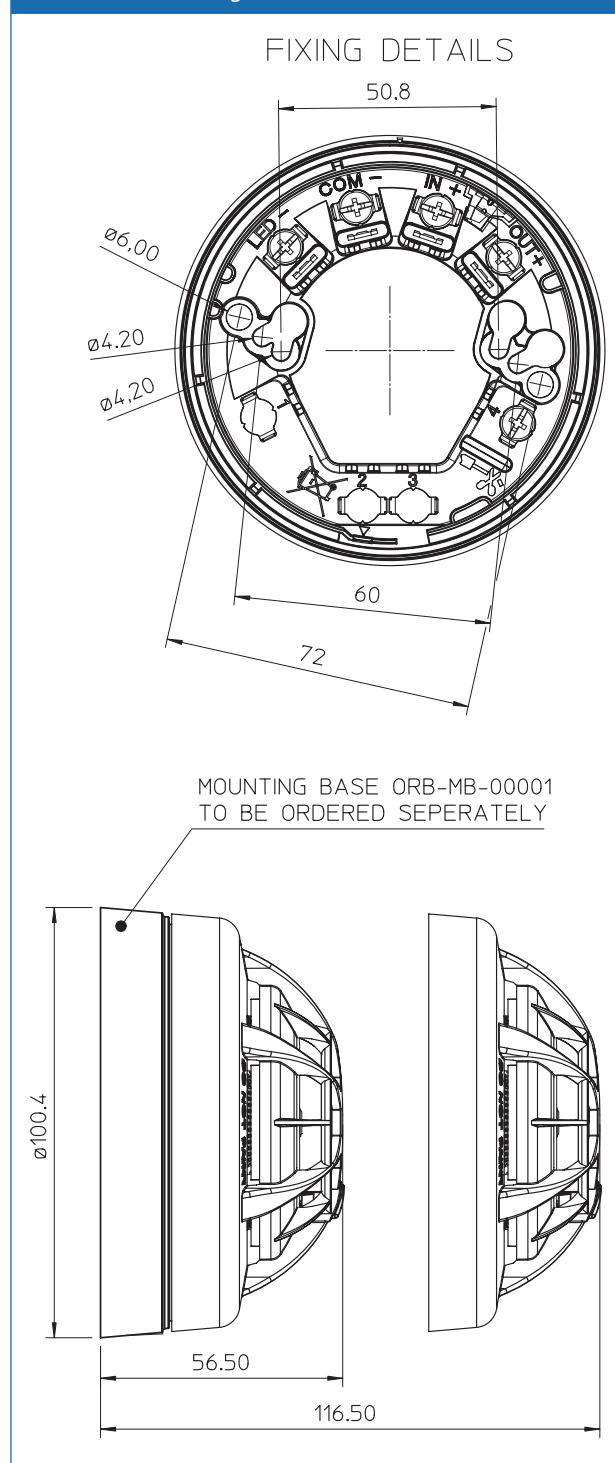
It should be noted that the detector is a smoke detector. Although the Orbis IS multisensor relies on both smoke and heat sensors it is not possible to switch from smoke detection to heat detection.

Environmental performance

The environmental performance of the multisensor detector is the same as that of the Orbis IS optical smoke detector.

Also classification and BASEEFA Certificate Number are the same as for the optical smoke detector.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection:

Photoelectric 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. The heat sensing element increases the sensitivity of the detector as the temperature rises.

Sampling frequency: Once every 4 seconds

Electrical

Supply voltage: 14—28V DC

Supply wiring: 2 wires, polarity sensitive

Polarity reversal: Not allowed

Power-up time: <20 seconds

Minimum 'detector active' voltage: 12V

Switch-on surge current at 24V: 105µA

Average quiescent current at 24V: 85µA

Alarm load: 325Ω in series with a 1.0V drop

Minimum holding voltage: 5V

Minimum voltage to light alarm LED: 6V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 4.7kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility (See Table 1 on page 55 for details of flash rate)

Dimensions and weight of detector: 100mm diameter x 50mm Weight, 80g (in base) 100mm diameter x 60mm Weight, 140g

Environmental

Operating and storage temperature: -40°C to +70°C
Operating temperature is restricted by the intrinsic safety gas classification.
Class T5: -40°C to +45°C
Class T4: -40°C to +60°C
The detector must be protected from conditions of condensation or icing.

Humidity: 0% to 98% relative humidity (no condensation)

Wind speed: Unaffected by wind

Atmospheric pressure: Insensitive to pressure

IP rating to EN 60529: 23D 1992*

Electromagnetic compatibility: The detector meets the requirements of BS EN 61000-6-3 for emissions and BS EN50 130-4 for susceptibility.

*The IP rating is not a requirement of EN 54-7: 2000 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis IS

Heat Detector



ORB-HT-51145-APO A1R
ORB HT 51157 APO A1S
ORB-HT-51147-APO A2S
ORB-HT-51149-APO BR
ORB-HT-51151-APO BS
ORB-HT-51153-APO CR
ORB-HT-51155-APO CS

With flashing LED:

ORB-HT-51146-APO A1R
ORB HT 51158 APO A1S
ORB-HT-51148-APO A2S
ORB-HT-51150-APO BR
ORB-HT-51152-APO BS
ORB-HT-51154-APO CR
ORB-HT-51156-APO CS



Where to use 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 application of smoke detectors and these are described in the section 'Choosing a detector' in Fig 1.

Heat detectors may be used if there is a danger of nuisance alarms from smoke detectors.

Orbis IS Heat Detector

The Orbis IS range incorporates seven heat detector classes to suit a wide variety of operating conditions in which smoke detectors are unsuitable.

The European standard EN54-5:2001 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 into 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.

All heat detectors in the Orbis IS range are tested as static or rate-of-rise detectors and are classified as A1R, A1S, A2S, BR, BS, CR and CS.

Choosing the correct class of Heat Detector

Heat detectors have a wide range of response characteristics and the choice of the right type for a particular application may not always seem straightforward. It is helpful to understand the way that heat detectors are classified as explained earlier and to memorise a simple rule: use the most sensitive heat detector available consistent with avoiding false alarms.

In the case of heat detectors it may be necessary to take an heuristic approach, ie, trial and error, until the best solution for a particular site has been found. The flowchart (Fig 1) will assist in choosing the right class of heat detector.

If the fire detection system is being designed to comply with BS5839-1:2002 + A2:2008 heat detectors should be installed at heights of less than 12 metres with the exception of class A1 detectors, which can be installed at heights up to 13.5 metres.

How do Orbis IS Heat Detectors work?

Orbis IS 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.

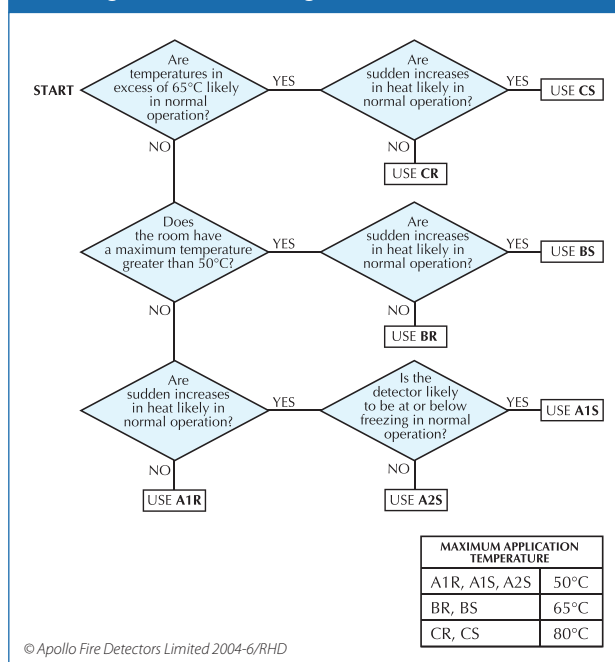
Static heat detectors respond only when a fixed temperature has been reached. Rate-of-rise detectors have a fixed upper limit but they also measure the rate of increase in temperature. A fire might thus be detected at an earlier stage than with a static detector so that a rate-of-rise detector is to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

Environmental performance

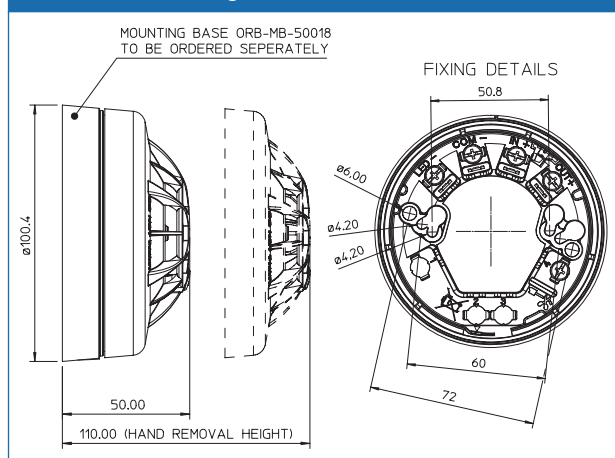
The environmental performance is similar to that of the Orbis IS optical smoke detector but it should be noted that heat detectors are designed to work at particular ambient temperatures (see Fig 1).

Also classification and BASEEFA Certificate Number are the same as for the optical smoke detector.

Choosing a Heat Detector Fig 1.



Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Principle of detection: Measurement of heat by means of a thermistor.

Sampling frequency: Once every 2 seconds

Electrical

Supply voltage: 14—28V DC

Supply wiring: 2 wires, polarity sensitive

Polarity reversal: Not allowed

Power-up time: <20 seconds

Minimum 'detector active' voltage: 12V

Switch-on surge current at 24V: 105µA

Average quiescent current at 24V: 80µA

Alarm load: 325Ω in series with a 1.0V drop

Minimum holding voltage: 5V

Minimum voltage to light alarm LED: 6V

Alarm reset voltage: <1V

Alarm reset time: 1 second

Remote output LED (-) characteristic: 4.7kΩ connected to negative supply

Mechanical

Material: Detector and base moulded in white polycarbonate

Alarm indicator: Integral indicator with 360° visibility (See Table 1 on page 55 for details of flash rate)

Dimensions and weight of detector: 100mm diameter x 42mm Weight, 70g (in base) 100mm diameter x 50mm Weight, 130g

Environmental

Operating and storage temperature: -40°C to +70°C
 Operating temperature is restricted by the intrinsic safety gas classification.
 Class T5: -40°C to +45°C
 Class T4: -40°C to +60°C
 The detector must be protected from conditions of condensation or icing.

Humidity: 0% to 98% relative humidity (no condensation)

Wind speed: Unaffected by wind

Atmospheric pressure: Insensitive to pressure

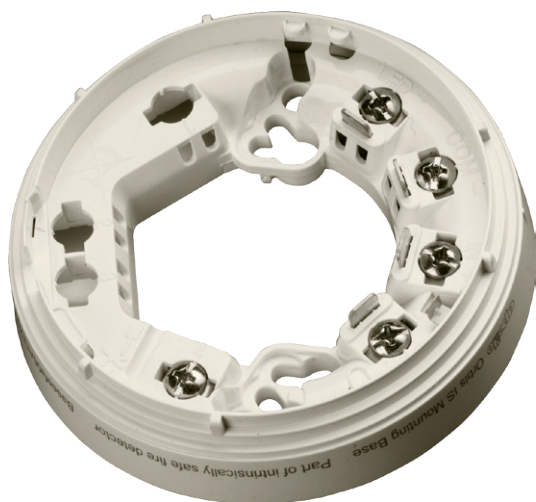
IP rating to EN 60529: 23D 1992*:

Electromagnetic compatibility: The detector meets the requirements of BS EN 61000-6-3 for emissions and BS EN50 130-4 for susceptibility

*The IP rating is not a requirement of EN 54-5 2001 since smoke detectors have to be open in order to function. An IP rating is therefore not as significant as with other electrical products.

Orbis IS

Timesaver® Base



ORB-MB-50018-APO

Orbis IS Timesaver® Base

Installing Orbis IS

Orbis IS has been designed to make installation fast and simple. Fig 1 shows the TimeSaver® Base as it is seen from the installer's point of view.

The E-Z fit fixing holes are shaped to allow a simple three-step mounting procedure:

- Fit two screws to the mounting box or surface
- Place the Orbis IS base over the screws and slide home
- Tighten the screws

The base offers three fixing centres at 51, 60 and 72mm.

A guide on the base interior indicates the length of cable to be stripped. Five terminals are provided for the cables, four being grouped together for ease of termination.

The terminals are:

- Positive IN
- Positive OUT
- Negative IN and OUT (common terminal)
- Remote LED negative connection
- Functional earth (screen)

The terminal screws are captive screws and will not fall out of the terminals. The base is supplied with the screws unscrewed in order to avoid unnecessary work for the installer.

The end-of-line resistor should be connected between the OUT+ and COM- terminals.

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 marking on the exterior which indicates the position of the LED.

The bases may be connected as shown in Fig 2 where remote LEDs, if required, are connected to the associated base.

Fig 3 shows how to connect one remote LED to more than one base so that an alarm in any of the detectors connected will switch the remote LED.

Fitting Orbis Detector Heads

When the bases have been installed and the system wiring tested, the detector circuits can be populated.

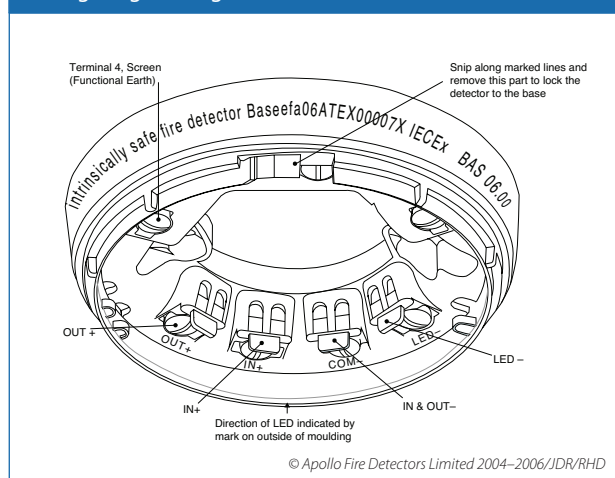
Two methods are suggested:

1. Apply power and fit the detectors one by one, starting at the base nearest the panel and working towards the end of the circuit. As each detector is powered up it will enter 'StartUp' and flash red (see Table 1 on page 85). If the LED does not flash, check the wiring polarity on the base and ensure there is power across IN+ and COM-. If the LED is flashing yellow the detector is not operating correctly and may require maintenance or replacing (see DirtAlert and SensAlert® and the section 'Servicing' in the Orbis product guide)
2. Fit all detectors to the circuit, apply power and check detectors by observing the LED status of each device. The StartUp feature lasts for 4 minutes so it may be necessary to reset or de-power the circuit to allow all detectors to be observed. The LED status is the same as method 1.

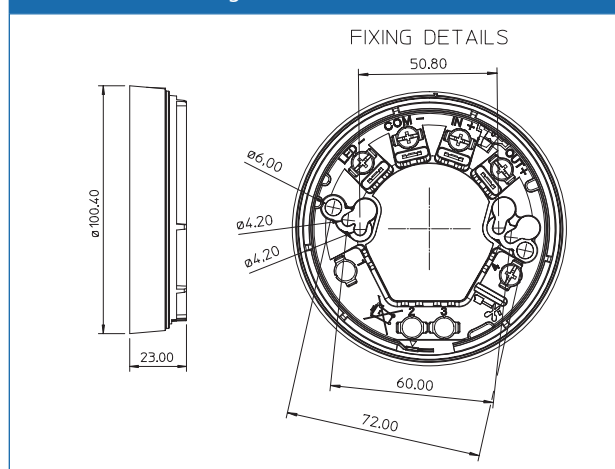
Table 1: Limits for Energy Stored in Cables

Feature	Description of Feature	Red LED Status	Yellow LED Status
StartUp™	Confirms that the detectors are wired in the correct polarity	Flashes once per second	No flash
FasTest®	Maintenance procedure, takes just 4 seconds to functionally test and confirm detectors are functioning correctly	Flashes once per second	No flash
DirtAlert™	Shows that the drift compensation limit has been reached	No flash	Flashes once per second in StartUp (stops flashing when StartUp finishes)
SensAlert®	Indicates that the sensor is not operating correctly	No flash	Flashes every 4 seconds (flashes once per second in StartUp)
Normal Operation	At the end of StartUp and FasTest (without flashing LED as standard)	No flash	No flash
Flashing LED Version	Detector's red LED flashes in normal operation (at the end of FasTest)	Flashes every 4 seconds	No flash

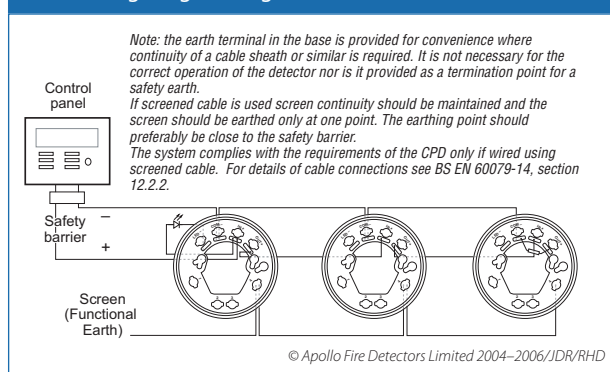
Wiring Diagram (Fig 1)



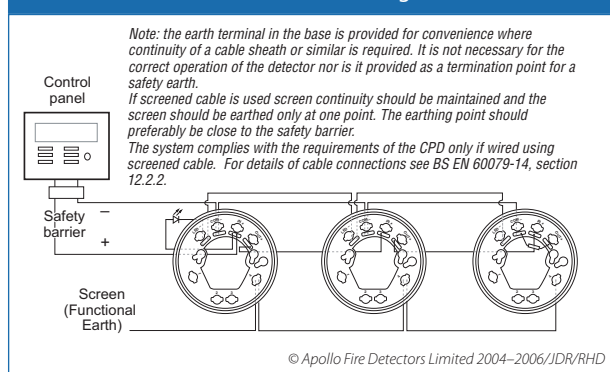
Dimensional Drawings



Base Wiring Diagram (Fig 2)



3 Bases Wired with a Common LED (Fig 3)



Orbis IS

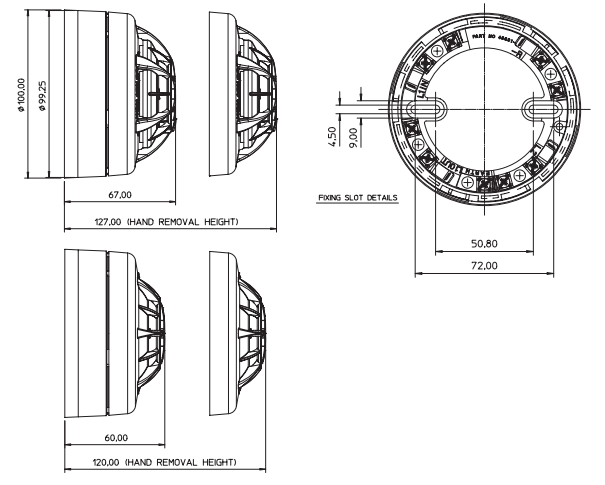
Adaptor

An adaptor is available which enables Orbis detector heads to be fitted to existing Series 60 IS bases in order to upgrade systems with minimal disruption.

The existing system should conform to ATEX Certificate No. Ex97D2054 SYST. The IS Adaptor is distinguished by the markings 'part of intrinsically safe fire detector BASEEFA 06 ATEX0007X'.



Dimensional Drawings



ORB-BA-50008-APO
Orbis IS Adaptor



MiniDisc

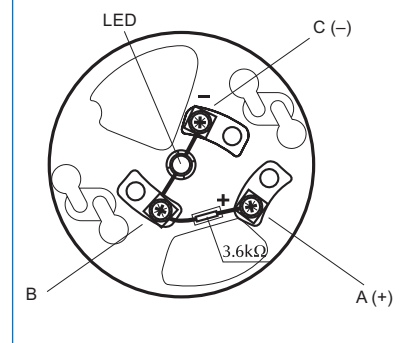
Remote Indicator

53832-070
MiniDisc Remote Indicator

The MiniDisc Remote Indicator is a light-weight, compact red LED indicator for use in fire protection systems.

- Small and discrete
- Anti-tamper screw to protect against unauthorised removal

Wiring Diagram



About Orbis IS

System design

The design of an intrinsically safe fire detection system should only be undertaken by engineers familiar with codes of practice for detection systems and hazardous area electrical systems. The relevant standards are BS5839:1, BS EN 60079-14:2001 respectively.

The fire detection performance of the Orbis IS range is the same as that of its standard counterparts but some electrical parameters are different. Please use the technical data given in this guide for Orbis IS devices. Performance information given in the Orbis Product Guide is applicable to the Orbis IS range.

The BASEEFA certification of the IS devices covers their characteristics as components of an intrinsically safe system and indicates that they can be used with a margin of safety in such systems.

Types of Safety Barrier

The certified system configurations allow for two types of safety barrier, each of which has its own advantages and disadvantages. A brief outline of their characteristics is given below.

Single Channel 28V/300Ω Barrier

This is the most basic type of barrier and therefore the lowest in cost. Being passive devices, they also impose the minimum of restrictions on the operation of the fire detectors. Thus, single channel barriers are available either as positive or negative polarity where the polarity refers to the polarity of the applied voltage relative to earth. The significance of this is that one side of the barrier must be connected to a high-integrity (safety) earth. Although this earth connection has no effect on the operation of Orbis IS devices and is not needed for their correct operation, it may not be acceptable to the operation of the control and indicating equipment. If the earth connection is not acceptable then the isolating barriers should be used.

Galvanically Isolated Barrier

Galvanically isolated barriers. These are also referred to as 'transformer isolated d.c. repeaters', 'isolating interfaces' and 'transformer isolated current repeaters'. They differ from conventional shunt zener barriers in that they provide electrical isolation between the input (safe area) and the output (hazardous area). This is achieved by the use of a DC/DC converter on the input side which is connected to the hazardous area through a voltage and power-limiting resistor/zener combination similar to a conventional barrier.

The galvanic isolation technique means that the circuit does not need a high integrity (safety) earth and that the intrinsically safe circuit is fully floating. Earth leakage problems for control and indicating equipment are therefore eliminated if this type of interface is used.

Note: Although the circuit does not require a high-integrity earth, it is permissible to earth either polarity of the hazardous area circuit if required by other system considerations.

Galvanically isolated barriers are available as single or dual channel versions and are recommended for any application in which direct earth connections are not acceptable. Table 3 shows details of available barriers. The galvanically isolated barrier is a two-wire device which does not need an external power supply.

Table 2: Transformer Isolated (Galvanic) Barriers

Manufacturer	Type see Table on AZ20984	No of Channels	Certificate No.
Pepperl & Fuchs	KFDO CS EX 1.51P	1	BAS00ATEX 7087
MTL	MTL4061	2	Ex94C2040X
MTL	MTL5061	2	Ex94C2040X

Approved Safety Barriers

The system certification includes a generic specification for barriers.

The generic specification is:

Any shunt zener diode safety barrier certified by BASEEFA or any EEC approved certification body to

[Ex ia] IIC

Having the following or lower output parameters:

$$U_z = 28V \frac{U_z}{R}$$

$$I_{\text{max:out}} = 93.3\text{mA}$$

$$W_{\text{max:out}} = 0.67\text{W}$$

In any safety barrier used the output current must be limited by a resistor 'R' such that

$$I_{\text{max:out}} =$$

A number of shunt zener diode barriers meet this specification and examples are given below:

Table 3: 28V/300Ω Single Channel Safety Barriers

Manufacturer	Type	Polarity	Mounting
Pepperl & Fuchs	Z728	+ve	DIN-Rail
Pepperl & Fuchs	Z828	-ve	DIN-Rail
Pepperl & Fuchs	Z428/Ex	+ve	DIN-Rail/surface
Pepperl & Fuchs	Z528/Ex	-ve	DIN-Rail/surface
MTL	MTL728+	+ve	Busbar
MTL	MTL7028+	+ve	DIN-Rail
MTL	MTL7128+	+ve	DIN-Rail

Safety earth

Shunt zener diode safety barriers must be connected to a high integrity earth by at least one and preferably two copper cables, each of cross sectional area of 4mm² or greater. The connection must be such that the impedance from the connection point to the main power system earth is less than one ohm.

Intrinsically safe circuits in the hazardous area should be insulated from earth and must be capable of withstanding a 500V RMS AC test voltage for at least one minute. When using armoured or copper sheathed cables, the armour or sheath is normally isolated from the safe area busbar.

Wiring and cable types

It is not permitted to connect more than one circuit in the hazardous area to any one safety barrier and that circuit may not be connected to any other electrical circuit. Both separate and twin cables may be used. A pair contained in a type 'A' or 'B' multicore cable (as defined in clause 12.2.2 of BS EN 60079-14:2008) may also be used, provided that the peak voltage of any circuit contained within the multicore does not exceed 60V.

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the parameters specified in Table 4. The reason for this is that energy can be stored in a cable and it is necessary to use cable in which energy stored is insufficient to ignite an explosive atmosphere.

To calculate the total capacitance or inductance for the length of cables in the hazardous area, refer to Table 5, which gives typical per kilometre capacitance and inductance for commonly used cables. (Note: All Orbis IS devices have zero equivalent capacitance and inductance.)

Maximum loading of IS circuit

Because of the finite resistance of the safety barrier, there will be a limit to the current drain which can be tolerated before the voltages on the circuit fall outside the specified limits for Orbis IS devices. The system certification allows up to 20 Orbis IS detectors to be connected to a single barrier circuit with an end-of-line resistor of not less than 1.8kΩ. However, it must be ensured that the voltage available at each detector is above the minimum specified in the quiescent condition. It is also important to ensure that the alarm load is suitable for the control and indicating equipment. The system certification also allows the use of remote LED indicators. These may be connected to individual detectors or may use a connection common to two or more detectors.

Installation

It is important that the Orbis IS detectors be installed in such a way that all terminals and connections are protected to at least IP20 when the detector is in the base. Special care must be

taken with the rear of the mounting base where live metal parts may be accessible. Flush mounting of the base on a flat surface will provide the required degree of protection.

The conduit box available from Apollo, part no. 45681-204, is also acceptable for mounting IS bases. Apollo also supply a range of deckhead mounting boxes. For more information, please refer to PP1089, bases and accessories brochure.

Note that the earth terminal in the base is provided for convenience where continuity of a cable sheath or similar is required. It is not necessary for the correct operation of the detector nor is it provided as a termination point for a safety earth.

Accessories

DIN-Rail Interface enclosures

Two DIN-Rail interface enclosures are available for housing intrinsically safe (IS) barriers. The enclosures have a frosted polycarbonate lid through which LEDs can be viewed. A multi-purpose label, that features a section for use with IS systems is supplied. Part nos 29600-239 (2-way enclosure); 29600-240 (8-way enclosure).

When using these enclosures with intrinsically safe systems, it is important that segregation be provided between the IS and non-IS circuits. A distance of at least 50mm must be preserved between live conducting parts of IS and other circuits.

If the enclosure is used as part of an IS circuit, then it must always be installed inside the safe area. Never install these enclosures in the hazardous area.

Remote LED connection

A drive point is provided on each of the Orbis IS detectors for a remote LED indicator. The indicator must be a standard high-efficiency red LED and does not require a series limiting resistor since current is limited by the detectors.

The system certification allows for the use of any LED indicator having a surface area between 20mm² and 10cm² which covers all commonly used case styles from T1 (3mm) upwards but would exclude some miniature and surface mounted types. Additional requirements of the certification are that the LED and its terminations must be afforded a degree of protection of at least IP20 and must be segregated from other circuits and conductors as defined in BS EN 60079-14:2008.

The Apollo MiniDisc remote indicator (53832-070) may be used with Orbis IS detectors.

The MiniDisc remote indicator 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 fitting.

An anti-tamper screw in the lid locks the unit together. A 1.5mm hexagonal driver, part number 29600-095, is available from Apollo.

Two pairs of keyholes are provided—one for 50mm and the other for 60mm fixing centres.

Portable Flame Detector Test Unit

A Portable Flame Detector Test Unit is available, part number 29600-226.

Adjustable Mounting Bracket, part number 29600-458 (comes complete with Deckhead Mounting Box).

Deckhead Mounting Box, part number 45681-217.

Table 4: Limits for Energy Stored in Cables

Group	Capacitance μF	Inductance mH	L/R Ratio μH/ohm
IIC	0.083	4.2	55
IIB	0.65	12.6	165
IIA	2.15	33.6	440

Table 5: Examples of Electrical Characteristics of Cables Commonly used in Fire Protection Systems

Cable Type	Core	Size mm ²	Conductor Resistance ohm/km/core	Inductance mH/km	Capacitance μF/km		Sheath Resistance ohm/km
					core to core	core to sheath	
MICC Pyrotenax light duty	2	1.5	12.1	0.534	0.19	0.21	2.77
MICC Pyrotenax heavy duty	2	1.5	12.1	0.643	0.13	0.17	1.58
Pirelli FP200	all	1.5	12.1		0.08	0.15	
PVC sheathed and insulated to BS 6004	all	1.5	12.1	0.77	0.09		

Hazardous Area Devices

Apollo offer a number of devices suitable for use in Hazardous Areas.



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marine, offshore & industrial

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www.apollo-fire.co.uk



Flame Detectors

Flame detectors are effective in protecting areas where flaming fires may be expected.

There is a choice of detection techniques – ultraviolet (UV), infra-red (IR) or a combination of both:

- IR2: High immunity to false sources (indoor areas)
- IR3: Excellent immunity to false sources (indoor or outdoor areas)
- UV/IR2: Highest immunity to false sources (indoor or outdoor areas)

UV flame detectors are generally used in engine rooms, factories and warehouse applications.

IR flame detectors are able to tolerate dirtier environments which may block UV radiation and are generally used in applications such as waste handling, colour printing and paper manufacturing.

Apollo's range of flame detectors comply with EN54-10.



Intelligent IR³ Flame Detector



55000-020

Intelligent IR³ Flame Detector

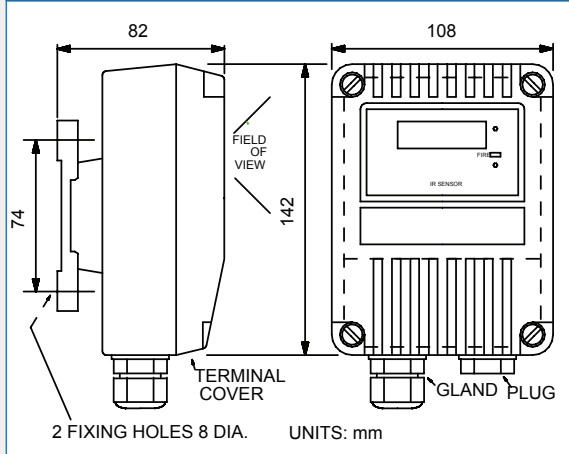
The Intelligent IR³ Flame Detector is designed for harsh environments in either indoor or outdoor applications. It is sensitive to low-frequency, flickering infra-red radiation emitted by flames during combustion.

- Loop-powered
- Detects through films of oil, dust, water and ice
- Responds to flickering flames, including those invisible to the naked eye
- False alarms due to lighting or flickering sunlight are minimised
- Compatible with Discovery and XP95 protocols
- 90° field of view
- Up to 40m coverage
- IP65 rated
- Operating Temp -10oc to 55oc

Technical Data

Supply voltage	17–28V DC
Quiescent current	2.2mA
Maximum power-up time	4 seconds
Remote LED current	Limited to 2mA
Range of view	0.1m ² n-heptane at 25m 0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° cone
Spectral response	1.0 to 2.7µm
Sensitivity (EN54-10)	High—Class 1 Low—Class 3
Operating temperature	–10° C to +55° C
Storage temperature	–20° C to +65° C
Relative humidity	95%, non-condensing
IP rating	65
Housing material	Die-case zinc alloy
Housing colour	Blue
Weight	2kg
Cable gland entries	2x20mm

Dimensional Drawings



Intelligent (Exd) Flameproof IR² Flame Detector



55000-295

Intelligent Flameproof IR² Flame Detector

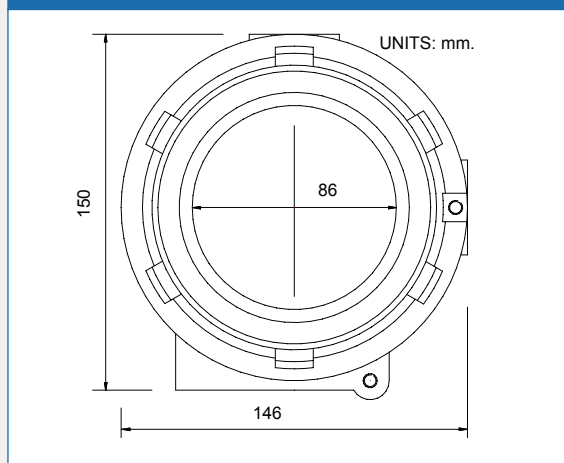
The Intelligent Flameproof IR² Flame Detector is designed for hazardous environments in indoor applications. The detector has two sensors which respond to different IR wavelengths to discriminate between flames and spurious sources of radiation. These detectors are BASEEFA approved and meet the requirements of ATEX Directive 94/9/EC.

- ATEX certified: II 2 G D
- CENELEC/IEC certified: EEx d – IIC T6- [Zones 1, 21, 2 and 22]
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- Highest optical interference immunity
- Sensitive to flickering IR radiation
- Detects through films of oil, dust, water and ice
- Responds to flickering flames, including those invisible to the naked eye
- Compatible with Discovery and XP95 protocols
- Remote optical self-test function
- 90° field of view
- Up to 40m coverage
- IP66 rated
- Operating temperature
-10°C to +55°C

Technical Data

Supply voltage	17–28V DC
Quiescent current	2.2mA
Maximum power-up time	2 seconds
Remote LED current	Limited to 2mA
Range of view	0.1m ² n-heptane at 25m 0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° cone
Spectral response	1.0 to 2.7µm
Sensitivity (EN54-10)	High—Class 1 Low—Class 3
Operating temperature	-10° C to +55° C
Storage temperature	-20° C to +65° C
Relative humidity	95%, non-condensing
IP rating	66
Housing material	Copper free aluminium alloy LM25
Housing colour	Red
Weight	2.5kg
Cable gland entries	3x20mm

Dimensional Drawings



Flameproof (Exd) UV/IR² Flame Detector



55000-065

Flameproof (Exd) UV/IR² Flame Detector

The Flameproof UV/IR² Flame Detector is designed for hazardous environments in either indoor or outdoor applications where open fires may be expected. False alarms from flickering sunlight, arc welding or lightning are avoided by the combination of UV and dual IR signal processing techniques. It detects almost all flames, including those invisible to the naked eye, e.g. hydrogen fires. Certified by ISSOP for compliance with standards EN50014, EN50018 and EN50281.

- ATEX certified: II 2 G D
- CENELEC/IEC certified: EEx d – IIC T6- [Zones 1, 21, 2 and 22]
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- Highest optical interference immunity
- Selectable output options: Conventional two-wire, 4-20mA, Relay Contacts – Fire/fault, pre-alarm, latching or non-latching
- Selectable response speed
- Remote control self-test
- Low power consumption
- IP66 rated
- Supply voltage 14 to 30Vdc
- Operating temperature -10°C to +55°C

Technical Data

Mechanical

Housing material	Copper free aluminium alloy LM25
Housing colour	Red
Weight	2.5kg
Cable gland entries	3 x 20mm

Electrical

Supply voltage	14 to 28Vdc
Supply current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 30Vdc
Relay contact ratings	Current 0.25Amp. Max. Voltage 30Vdc. Max.
Resistive loads only	Power 3.0W Max.

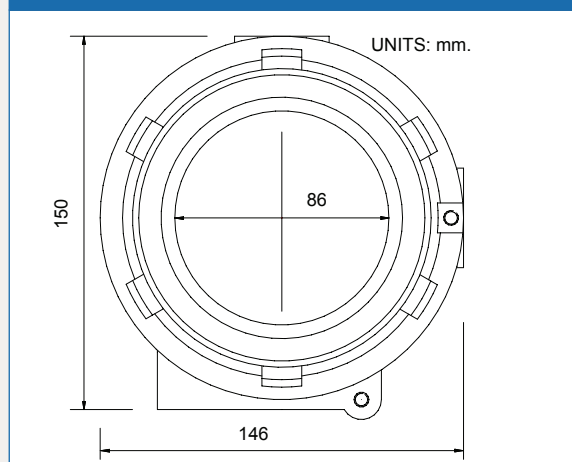
Performance

Range	0.1m ² n-heptane at 25m (See EN54-10) 0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° min. Cone
Spectral response	UV 185 to 260nm IR 0.9 to 1.7µm
Sensitivity	High = Class 1 (See EN54-10) Low = Class 2

Environmental

ATEX	II 2 G D
Approval category	- Category 2 or 3
CENELEC / IEC	EEx d IIC T6 (85°C)
Marking	- Zone 1 or 2
ISSeP	Notified body No. 492
Apparatus Certificate No.	ISSeP 03ATEX012
Operating temperature	-10°C to 85°C (14°F to 185°F)
Storage temperature	-20°C to 85°C (-4°F to 185°F)
IP rating	IP66 (NEMA 4)
EMC immunity	EN 50081-1, EN 50081-2 EN 50082-2, EN 50082-2 EN 50130-4, EN 55022

Dimensional Drawings



Intelligent (Exd) Flameproof IR³ Flame Detector



55000-021

Intelligent Flameproof IR³ Flame Detector

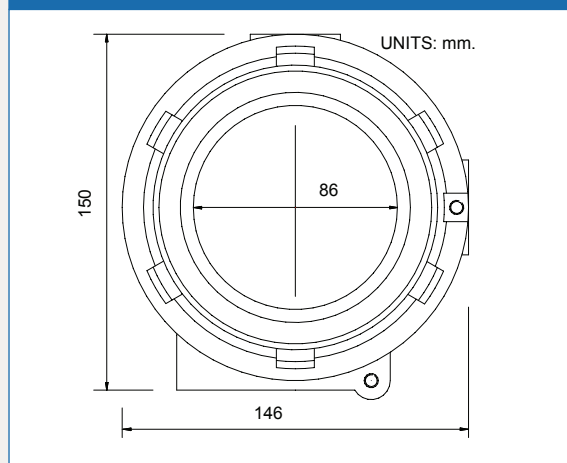
The Intelligent Flameproof IR³ Flame Detector is designed for hazardous environments in either indoor or outdoor applications. It is sensitive to low-frequency, flickering infra-red radiation emitted by flames during combustion. These detectors are BASEEFA approved and meet the requirements of ATEX Directive 94/9/EC.

- Loop-powered
- Detects through films of oil, dust, water and ice
- Responds to flickering flames, including those invisible to the naked eye
- Compatible with Discovery and XP95 protocols
- 90° field of view
- Up to 40m coverage
- IP66 rated

Technical Data

Supply voltage	17–28V DC
Quiescent current	2.2mA
Maximum power-up time	2 seconds
Remote LED current	Limited to 2mA
Range of view	0.1m ² n-heptane at 25m 0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° cone
Spectral response	0.75 to 2.7µm
Sensitivity (EN54-10)	High—Class 1 Low—Class 3
Operating temperature	–10° C to +55° C
Storage temperature	–20° C to +65° C
Relative humidity	95%, non-condensing
IP rating	66
Housing material	Copper free aluminium alloy LM25
Housing colour	red
Weight	2.5kg
Cable gland entries	3x20mm

Dimensional Drawings



Flameproof (Exd) IR² Flame Detector



55000-061

Flameproof (Exd) IR² Flame Detector

The Flameproof (Exd) IR² Flame Detector is designed for use in hazardous environments in indoor applications. The combination of filters and signal processing allows the sensor to be used with a very low risk of false alarms in difficult situations characterised by factors such as flickering lights. BASEEFA has certified the detector for compliance to standards EN 60079-0, EN 60079-1 and EN 61241-1.

- ATEX & IECEx certified:
II 2GD Ex d IIC T4 Gb
Ex tb IIIC T135°C Db IP66 A21 [Zones 1, 21, 2 and 22]
- Selectable output options: Conventional 2 wire, 4-20mA, latching or non-latching, relay contacts – fire/fault, pre-alarm
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- High optical interference immunity
- Selectable response speed
- Optical self-test
- Low power consumption
- IP66 rated
- Supply voltage 14 to 30Vdc
- Operating temperature
-10°C to +55°C

Technical Data

Mechanical

Housing material	Copper free aluminium alloy LM25
Housing colour	Red
Weight	2.5kg
Cable gland entries	3 x 20mm

Electrical

Supply voltage	14 to 30Vdc
Supply current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 30Vdc
Relay contact ratings	Current 1.0Amp. Max. Voltage 50Vdc. Max.
Resistive loads only	Power 30W Max.

Performance

Range	Class 1 0.1m ² n-heptane at 25m
(Sensitivity setting See EN54-10)	Class 3 0.1m ² n-heptane at 12m
Field of view	90° min. Cone
Spectral response	IR 0.75 to 2.7µm
Sensitivity	High = Class 1 Low = Class 3

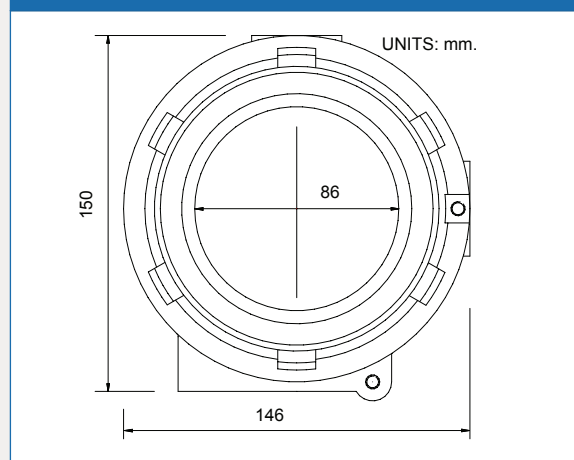
Environmental

ATEX	II 2GD Ex d IIC T4 Gb
Marking ISSeP	Ex tb IIIC T135°C Db IP66 A21
IECEX	Ex d IIC T4 Gb
Marking	Ex tb IIIC T135°C Db IP66 A21
Operating temperature	-10°C to +55°C
Storage temperature	-20°C to +65°C
IP rating	IP66
EMC immunity	EN61000-6-1, EN61000-6-2,
Emissions:	EN61000-6-3, EN61000-6-4, EN 50130-4, EN 55022

Product Approvals

BASEEFA ATEX	Certificate No. BASEEFA 08 ATEX0270
BASEEFA IECEx	Certificate No. IECEx BAS 08.0073
LPCB	Standard EN54-10 Certificate No. 729a/10
CPD	Certificate No. 0832-CPD-0824

Dimensional Drawings



Flameproof (Exd) IR³ Flame Detector



55000-062

Flameproof (Exd) IR³ Flame Detector

The Flameproof IR³ Flame Detector is designed for use in hazardous environments in indoor and outdoor applications. It is sensitive to low-frequency flickering infra-red radiation emitted by flames during combustion. The sensor operates even through a layer of oil, dust, water vapour or ice. BASEEFA has certified the detector for compliance to standards EN 60079-0, EN 60079-1 and EN 61241-1.

- ATEX & IECEx certified:
II 2GD Ex d IIC T4 Gb
Ex tb IIIC T135°C Db IP66 A21 [Zones 1, 21, 2 and 22]
- Selectable output options: Conventional 2 wire, 4-20mA, latching or non-latching, relay contacts – fire/fault, pre-alarm
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- High optical interference immunity
- Selectable response speed
- Optical self-test
- Low power consumption
- IP66 rated
- Supply voltage 14 to 30Vdc
- Operating temperature
-10°C to +55°C

Technical Data

Mechanical

Housing material	Copper free aluminium alloy LM25
Housing colour	Red
Weight	2.5kg
Cable gland entries	3 x 20mm

Electrical

Supply voltage	14 to 30Vdc
Supply current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 30Vdc
Relay contact ratings	Current 1.0Amp. Max. Voltage 50Vdc. Max.
Resistive loads only	Power 30W Max.

Performance

Range	- Class 1 0.1m ² n-heptane at 25m
(Sensitivity setting See EN54-10)	- Class 3 0.1m ² n-heptane at 12m
Field of view	Horizontal ±35° (70%), ± 45°max.
(Range 100% on centre line) vertical	20°/-35°(70%), +30°,-45°max.
Operating wavelength Band: IR	0.75 to 2.7µm
Sensitivity	High = Class 1 Low = Class 3

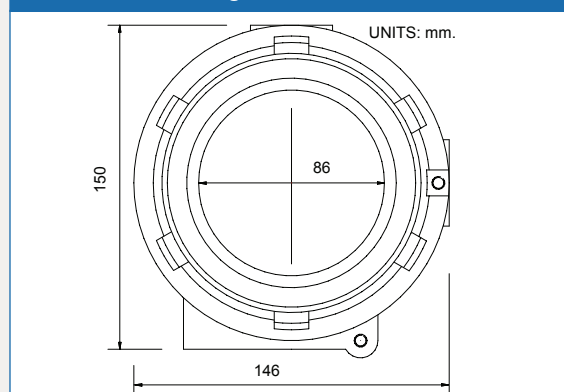
Environmental

ATEX	II 2GD Ex d IIC T4 Gb
Marking	Ex tb IIIC T135°C Db IP66 A21
IECEx	Ex d IIC T4 Gb
Marking	Ex tb IIIC T135°C Db IP66 A21
Limit	
Storage temperature	- 20°C to +65°C
Relative humidity	95% Non condensing
IP rating	IP66
EMC immunity / emissions	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN 50130-4, EN 55022

Product Approvals

BASEEFA ATEX	Certificate No. Baseefa08ATEX0270
BASEEFA IECEx	Certificate No. IECEx BAS 08.0073
LPCB	Standard EN54-10 Certificate No. 729a/10
CPD	Certificate No. 0832-CPD-0824

Dimensional Drawings



IS IR³

Flame Detector



55000-063

IS IR³ Flame Detector

The IS IR³ Flame Detector is designed for harsh environments in either indoor or outdoor applications. It is sensitive to low-frequency flickering IR radiation emitted from flames during combustion. The sensor operates even through a layer of oil, dust, water vapour or ice. These detectors have been approved by BASEEFA to EN50014, EN50020 and EN50284. The requirements of Directive 94/9/EC, the Atmosphere Explosives ATEX Directive have also been met.

- ATEX certified: II 1 G
- CENELEC/IEC certified: Ga Ex ia IIC T4
- Selectable output options: Conventional two-wire, 4-20mA, latching or non-latching, relay contacts – fire/fault, pre-alarm
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- High optical interference immunity
- Selectable response speed
- Optical self-test
- Low power consumption
- IP65 rated
- Supply voltage 14 to 30Vdc
- Operating temperature -10°C to +40°C (T4)

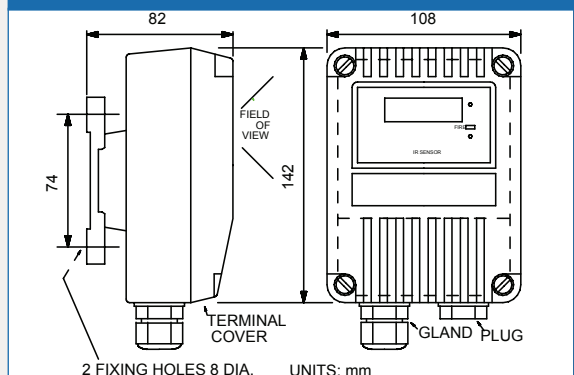
Technical Data

Mechanical	
Housing material	Die cast zinc alloy
Housing colour	Blue
Weight	2kg
Cable gland entries	2 x 20mm
Electrical	
Sensor supply voltage	14 to 30Vdc
Terminals 1 & 2 current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 30Vdc
Relay contact ratings	
RL1 terminal 5 & 6	Current 0.25Amp. Max.
RL2 terminal 7 & 8	Voltage 30Vdc. Max.
Resistive loads only	Power 3.0W Max.
Sensor input parameters	
Terminal 1 with respect to 2	Ui 30V
Terminal 3 with respect to 4	Ii 100mA
	Pi 0.65W
	Ci 0.03µF
	Li 0
Terminal 5 with respect to 6	Ui 30V
Terminal 7 with respect to 8	Ii 100mA
Performance	
Range	- Class 1 0.1m ² n-heptane at 25m
(Sensitivity setting see EN54-10)	- Class 3 0.1m ² n-heptane at 12m
Field of view	90° min. Cone
Spectral response	UV 185 to 260nm
	20°/-35°(70%), +30°,-45°max.
Operating wavelength Band: IR	0.75 to 2.7µm
Sensitivity	High = Class 1
	Low = Class 3

Environmental	
ATEX	II 1 G
Approval category	Category 1, 2 or 3
CENELEC / IEC	Ga Ex ia IIC T4
Marking	- Zone 0, 1 or 2
Operating temperature	- 10°C to +40°C (T4)
	- 10°C to +55°C Sensor Limit
Storage temperature	- 20°C to +65°C
Relative humidity	95% Non condensing
IP rating	IP65
EMC immunity/emissions	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN 50130-4, EN 55022

Product Approvals	
BASEEFA	
Apparatus	Certificate No. BA502ATEX1001
System	Certificate No. Baseefa08Y0078
LPCB	Standard EN54-10
	Certificate No. 729a/03
CPD	Certificate No. 0823-CPD-0597

Dimensional Drawings



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UV/IR² Flame Detector



55000-064

UV/IR² Flame Detector

The combination of UV and IR² detection, plus signal processing allows the sensor to be used without risk of false alarms in difficult situations characterised by factors such as flickering blackbody by radiation or arc welding.

- Selectable output options: Conventional two-wire, 4-20mA, latching or non-latching, relay contacts – fire/fault, pre-alarm
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- High optical interference immunity
- Selectable response speed
- Optical self-test
- Low power consumption
- IP65 rated
- Supply voltage 14 to 30Vdc
- Operating temperature -10°C to +55°C

Technical Data

Mechanical

Housing material	Die cast zinc alloy (ZA12)
Housing colour	Blue
Weight	1kg
Cable gland entries	2 x 20mm

Electrical

Supply voltage	14 to 28Vdc
Supply current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 30Vdc
Relay contact ratings	Current 0.25Amp. Max. Voltage 30Vdc. Max.
Resistive loads only	Power 3.0W Max.

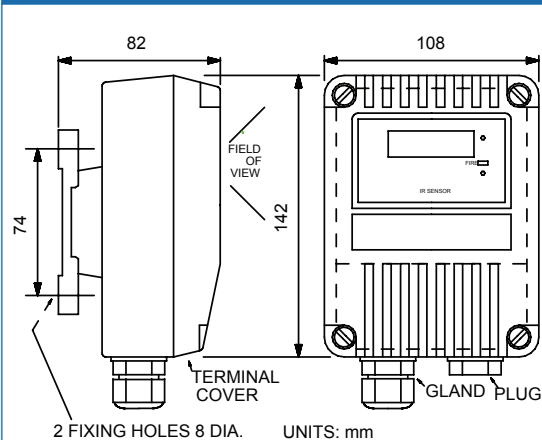
Performance

Range	0.1m ² n-heptane at 25m
(See EN54-10)	0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° min. Cone
Spectral response:	UV 185 to 260nm IR 0.9 to 1.7µm
Sensitivity	High = Class 1 (See EN54-10) Low = Class 2

Environmental

Operating temperature:	-10°C to +85°C
Storage temperature:	-20°C to +65°C
Relative humidity:	95% non-condensing
IP rating:	IP65
EMC immunity	EN 50081-1, EN 50081-2 EN 50082-2, EN 50082-2 EN 50130-4, EN 550

Dimensional Drawings



Stainless Steel Intelligent IR³ Flame Detector



55000-034MAR

Stainless Steel Intelligent IR³
Flame Detector

Function

The Stainless Steel Intelligent IR³ Infra-red (IR) Flame Detector is designed to protect areas where open flaming fires may be expected.

Features

The Intelligent IR³ flame detector is sensitive to low-frequency, flickering infra-red radiation emitted by flames during combustion. Since it responds to flickering radiation the IR³ flame detector can operate even if the lens is contaminated by a layer of oil, dust, water-vapour or ice.

The Intelligent IR³ flame detector is set to respond to low-frequency radiation at 1 to 15Hz (1 to 2.7µm) in order to detect all flickering flames, including those invisible to the naked eye, eg, those emitted by hydrogen fires.

The Intelligent IR³ flame detector has three IR sensors that respond to different IR wavelengths in order to discriminate between flames and spurious sources of radiation. False alarms due to such factors as flickering sunlight are avoided by a combination of filters and signal processing techniques.

This detector has a heavy duty, stainless steel housing, which is highly resistant to corrosion. The housing has been electro-polished to give a natural silver finish and has no need to be painted, making it ideal for marine applications.

Protocol compatibility

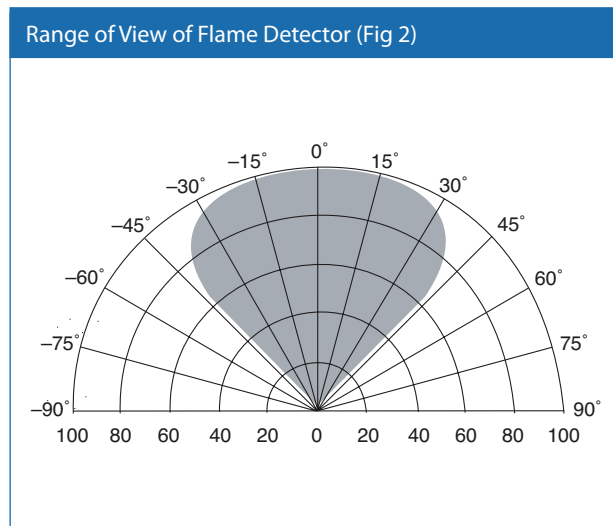
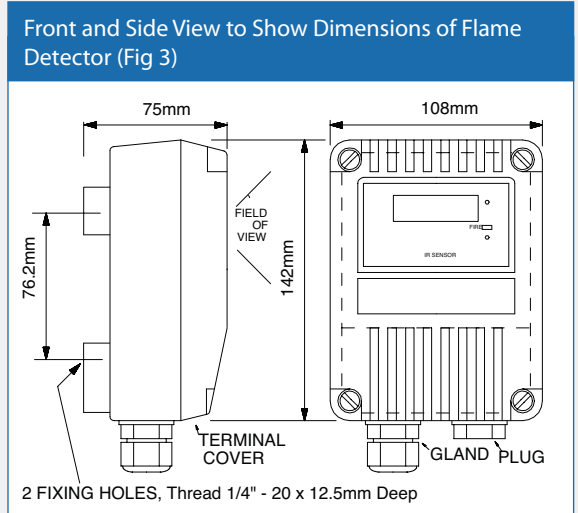
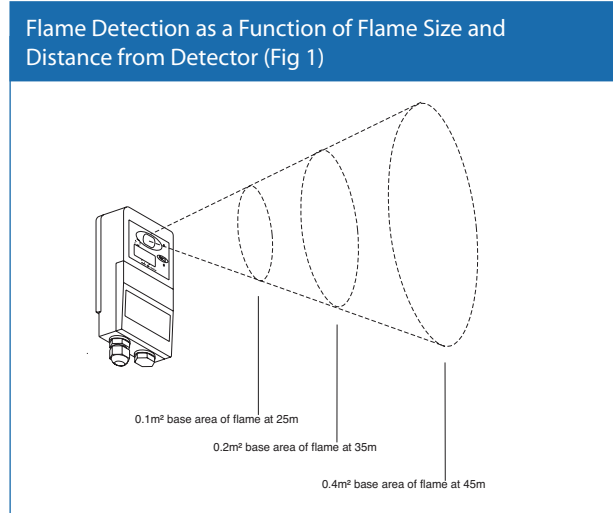
The Intelligent IR³ flame detector operates only with control equipment using the Apollo XP95 or Discovery digital protocol (or any development of it).

Electrical considerations

The Intelligent IR³ flame detector is loop-powered and needs no external supply. A remote LED alarm indicator may be connected to the flame detector.

Protocol Bit Usage	
Output Bits	
2	LED
1	Test
0	Remote LED
Interrupt	No
Analogue value	
Quiescent	25
Alarm	55-64
Fault	4
Input Bits	
2	LED confirmed
1	Test confirmed
0	Remote LED confirmed
Flag Setting	
XP95 Flag	Yes
Alarm Flag	Yes

Technical Data	
Supply voltage	17–28V DC
Quiescent current	2.2mA
Maximum power-up time	4 seconds
Remote LED current	Limited to 2mA
Range of view (EN54-10)	0.1m ² n-heptane at 25m 0.2m ² n-heptane at 35m 0.4m ² n-heptane at 45m
Field of view	90° cone
Spectral response	1.0 to 2.7µm
Sensitivity	High—Class 1 Low—Class 3
Operating temperature	–10° C to +55° C
Storage temperature	–20° C to +65° C
Relative humidity	95%, non-condensing
IP rating	65
Housing material	316 Grade Stainless Steel
Housing colour	Silver
Dimensions	See Fig 3
Weight	2.1kg
Cable gland entries	2x20mm



IR²

Flame Detector

**55000-060**IR² Flame Detector

The IR² Flame detector is designed for harsh environments in indoor applications. The detector has two sensors which respond to different IR wavelengths to discriminate between flames and spurious sources of radiation.

- Selectable output options: conventional two-wire, 4-20mA, latching or non-latching, relay contacts – fire/fault, pre-alarm
- Class 1 sensitivity to EN54-10 detects 0.1m² fire at 25m
- High optical interference immunity
- Selectable response speed
- Optical self-test
- Low power consumption
- IP65 rated
- Supply voltage 14 to 30Vdc
- Operating temperature -10°C to +55°C

Technical Data**Mechanical**

Housing material	Die cast zinc alloy (ZA12)
Housing colour	Blue
Weight	2kg
Cable gland entries	2 x 20mm

Electrical

Sensor supply voltage	14 to 30Vdc
Terminals 1 & 2 current	See DIL switch settings
Power up time	2 seconds max.
Test signal voltage	14 to 28Vdc
Relay contact ratings	Current 1.0Amp. Max. Voltage 50Vdc. Max.
Resistive loads only	Power 30W Max.

Performance

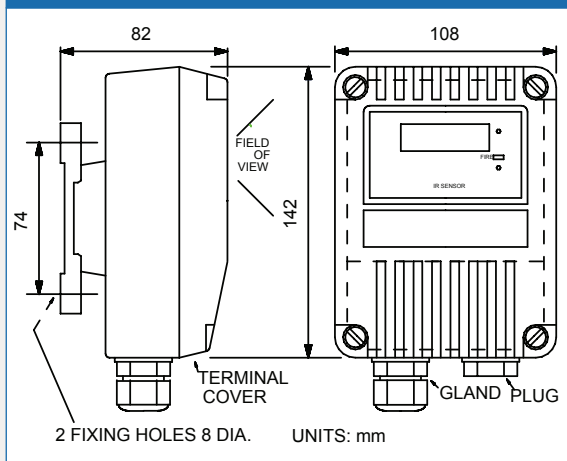
Range	- Class 1 0.1m ² n-heptane at 25m
(Sensitivity setting (See EN54-10))	- Class 3 0.1m ² n-heptane at 12m
Field of view	90° min. Cone
Spectral response:	IR 0.75 to 2.7µm
Sensitivity	High = Class 1 (See note 2) Low = Class 3

Environmental

Operating temperature:	- 10°C to +55°C
Storage temperature:	- 20°C to +65°C
Relative humidity:	95% non-condensing
IP rating:	IP65
EMC immunity	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN 50130-4, EN 55022

Product Approvals

LPCB	Standard	EN54-10
	Certificate No.	729a/07
CPD	Certificate No.	0832-CPD-0821

Dimensional Drawings

SIL Approved Devices

Apollo Fire Detectors is pleased to announce that it has a range of devices independently evaluated and certified to SIL2 (Safety Integrity Level) with respect to their primary function (Detection, Manual Call Point, Audio, Visual etc) under IEC61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems.

SIL2

CE
0832


0729

Discovery

Sounder Visual Indicator Base



45681-393SIL

Sounder Visual Indicator Base



0832

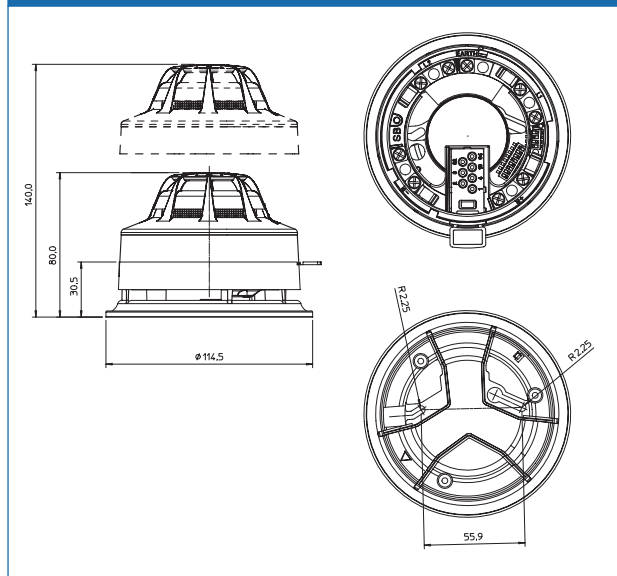
The Discovery Sounder Visual Indicator Base is a multifunctional device comprising a mounting base for Discovery® fire detectors, a sounder, a visual indicator and a short-circuit isolator.

Application

The Discovery sounder visual indicator base is used to provide audible and visual warning of fire and is controlled by the fire control panel by means of the Discovery protocol. The particular features of this base are available only when it is being controlled by the full Discovery protocol with the panel programmed accordingly. Information on features should be requested from the panel manufacturer.

The Discovery sounder visual indicator base can be used with a detector fitted or with a cap for operation as a stand-alone alarm device.

Dimensional Drawings



Features

- 15 evacuation tones + 15 secondary or alert tones
- 7 volume levels
- Software-defined group addressing
- Alarm switching by individual device, by group or of all devices on loop
- Independent control of sounder and visual indicator
- Set-up and testing of devices at point of installation
- Isolator status information
- Unique acoustic self-test

Consultant's Specification

The sounder visual indicator base shall be an Apollo Discovery sounder visual indicator base with 15 selectable tone pairs and 7 volume settings and connected to a loop of fire detection and alarm devices controlled by a panel using the Apollo Discovery protocol.

The sounder visual indicator base shall be synchronised by polling a synchronising address.

The advantages of the sounder visual indicator base

The right tone for your installation

The Discovery sounder visual indicator base offers a choice of 15 evacuation tones, including the standard Apollo evacuation tone. One of these tones is selected during commissioning in order to suit local regulations or customs.

The tones include those required by Dutch, Swedish, German, Australian, New Zealand and North American standards as well as the UK.

Whichever evacuation tone is selected there is a secondary tone which may be used for alerting or warning of a possible evacuation.

The right level of sound

The sounder is set during commissioning to one of 7 levels of sound, the highest level being nominally 90dB(A).

At 60dB(A) the lowest level falls outside the scope of the standard, EN54. It has been included to provide a very local warning for the use of personnel in particular environments, such as nurse stations in hospitals.

Flexibility of group addressing

In many installations a fire alarm must be raised by switching more than one sounder visual indicator to alert or alarm simultaneously. This is achieved with Discovery sounder visual indicator bases by assigning devices to groups on commissioning, with the group information being stored in each device. One command will then switch all devices in the group.

Sounder, visual indicator or both

The Discovery sounder visual indicator base normally switches both sounder and visual indicator to provide an alert or evacuation signal. The sounder and visual indicator of the Discovery sounder visual indicator base can, however, be switched independently of each other by the control panel.

Location-specific volume setting

Detectors and sounder visual indicators are installed in many different types of environment.

When configuring the Discovery sounder visual indicator base the adjustment of volume can be done at the point of installation.

The commissioning engineer simply sets the control panel to 'Setup' and then walks from one device to the next to set the required volume, using a magnetic wand, part no 29650-001. When all devices have been set the control panel is used to register all the individual volume settings.

Technical Data

Operating voltage:	17–28V DC (polarity sensitive)	
Protocol pulses:	5–9V	
Current consumption at 24V:	Switch-on surge, <1s quiescent device operated at maximum volume	1.2mA 450µA 8mA
Maximum sound output at 90°:	90±3dB(A) Sound pressure level data is published in PIN sheet PP2203 available from Apollo	
Operating temperature:	–20°C to +60°C	
Humidity (no condensation):	0 to 95%	
IP rating:	21D	

Discovery

Heat Detector



58000-400SIL

Discovery Heat Detector



Operating principles

Discovery 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 Discovery heat detector uses a single thermistor to sense the air temperature at the detector position. The thermistor is connected in a resistor network, which produces a voltage output dependent on temperature. The design of the resistor network, together with the processing algorithm in the microcontroller, gives an approximately linear characteristic from 10°C to 80°C. This linearised signal is further processed, depending on the response mode selected, and converted to an analogue output.

For the European standard version of the detector, the five modes correspond to five 'classes' as defined in EN54-5:2001. The classes in this standard correspond with different response behaviour, each of which is designed to be suitable for a range of application temperatures. All modes incorporate 'fixed temperature' response, which is defined in the standard by the 'static response temperature'. The application temperatures and static response temperatures for all response modes are given in Table 1.

In addition to the basic classification, a detector may be given an 'R' or 'S' suffix. The 'R' suffix indicates that the detector has been shown to have a rate-of-rise characteristic. Such a detector will still give a rapid response even when starting from an ambient temperature well below its typical application temperature. This type of detector is therefore suitable for areas such as unheated warehouses in which the ambient temperature may be very low for long periods.

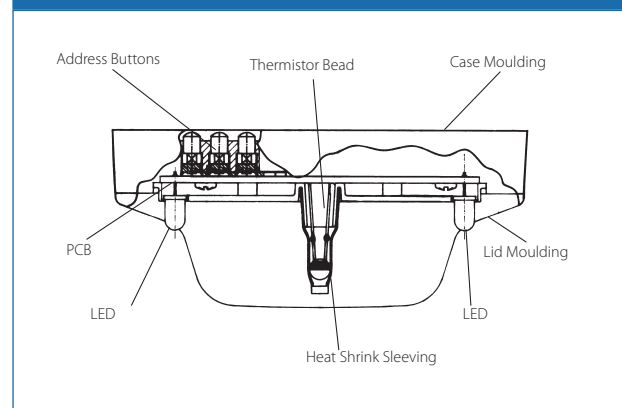
The 'S' suffix on the other hand indicates that the detector will not respond below its minimum static response temperature even when exposed to high rates of rise of air temperature. This type is therefore suitable for areas such as kitchens and boiler rooms where large, rapid temperature changes are considered normal.

Table 1: Response Modes

Mode	Class (EN54-5:2001)	Application Temperature		Static Response Temperature °C		
		Typical	Max	Min	Typ	Max
1	A1R	25	50	54	57	65
2	A2R	25	50	54	61	70
3	A2S	25	50	54	61	70
4	CR	55	80	84	90	100
5	CS	55	80	84	90	100

For air temperatures in the range 15°C to 55°C, the analogue value for a detector in mode 1 will correspond approximately to the air temperature.

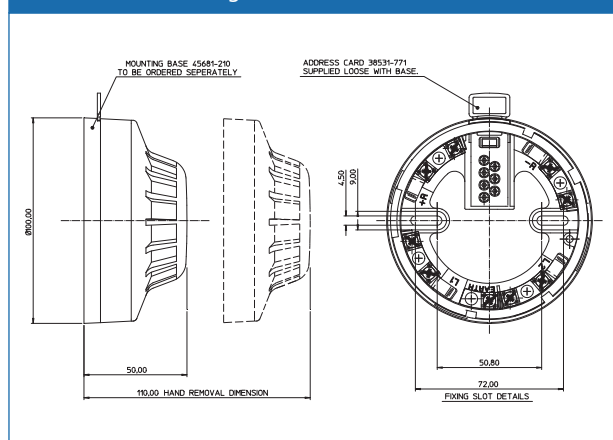
Sectional View



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Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Heat sensitive resistance
Supply wiring:	Two-wire supply, polarity insensitive
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	400μA
Power-up surge current:	1 mA
Maximum power-up time:	10s
Alarm current, LED illuminated:	3.5mA
Remote output characteristics:	Connects to positive line through 4.5kΩ (5mA maximum)
Alarm level analogue value:	55
Alarm indicator:	2 red Light Emitting Diodes (LEDs) Optional remote LED
Temperature range:	Maximum operating see Table 6 Minimum operating -40°C (no condensation/icing) Storage -40°C to +80°C
Humidity:	0 to 95% relative humidity (no condensation)
Vibration, impact and shock:	To EN54–5:2001
IP rating:	54 in accordance with BSEN60529
Dimensions:	100mm diameter x 42mm height
Weight:	Detector 105g Detector in base 160g
Materials:	Housing: White polycarbonate V-0 rated to UL94 Terminals: Nickel plated stainless steel

Discovery

Ionisation Smoke Detector



58000-500SIL

Discovery Ionisation Smoke Detector



Operating principles

The Discovery Ionisation Smoke Detector uses the same outer case as the optical smoke detector and is distinguished by the red indicator LEDs. Inside the case is a printed circuit board which has the ionisation chamber mounted on one side and the signal processing and communications electronics on the other.

The ionisation chamber consists of a reference chamber contained inside a smoke chamber (Fig 1). The outer smoke chamber has inlet apertures fitted with insect resistant mesh.

At the junction between reference and smoke chambers, the sensing electrode converts variations in chamber current into voltage changes.

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

The analogue voltage at the sensor electrode is converted to a digital format which is processed to provide an analogue value for transmission to the control panel when the device is polled.

The Discovery 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.

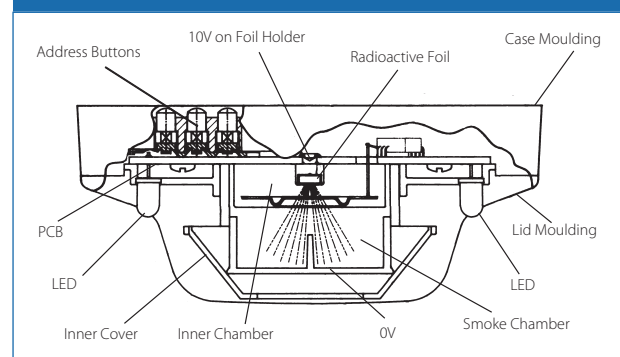
Ionisation smoke detectors are supplied in individual packing with a red lid serving as a dust cover which can be left in place after fitting to prevent ingress of dust and dirt until commissioning of the system takes place. At this point the covers must be removed.

Table 2: Operating Modes

Mode	Alarm threshold y value	Minimum time to alarm (sec)
1	0.45	5
2	0.45	30
3	0.70	5
4	0.70	30
5	1.0	5

Compensation rate complies with EN54-7:2000

Sectional View (Fig 1)



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 Health Protection Agency (HPA), 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 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.

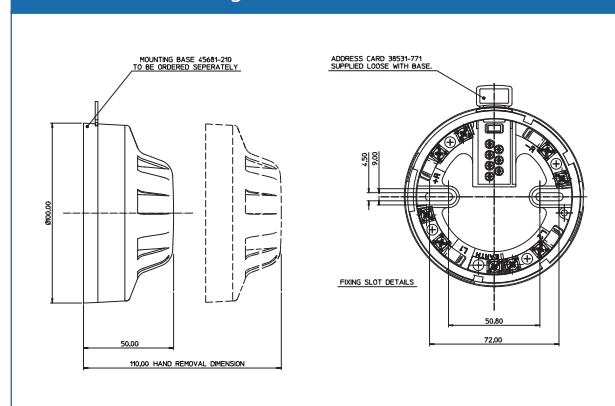
At the end of their recommended working life of ten years, ionisation smoke detectors should be returned to Apollo for safe disposal.

Guidance on storage and handling can be given by Apollo Fire Detectors and full details can be requested from:

Radioactive Substances Regulation Function Environment
Environmental Agency
Swift House
Frimley Business Park
GU16 7SQ

Outside the UK, please contact the relevant national agency.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Ionisation chamber	
Chamber configuration:	Twin compensating chambers using one single sided ionising radiation source	
Radioactive isotope:	Americium 241	
Activity:	33.3 kBq, 0.9µCi	
Supply wiring:	Two-wire supply, polarity insensitive	
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC	
Communication protocol:	Apollo Discovery 5–9V peak to peak	
Quiescent current:	300µA	
Power-up surge current:	1mA	
Maximum power-up time:	10s	
Alarm current, LED illuminated:	3.5mA	
Remote output characteristics:	Connects to positive line through 4.5kΩ (5mA maximum)	
Clean-air analogue value:	23 +4/–0	
Alarm level analogue value:	55	
Alarm indicator:	2 red Light Emitting Diodes (LEDs) Optional remote LED	
Temperature range:	–30°C to 70°C	
Humidity:	0 to 95% relative humidity (no condensation or icing)	
Effect of temperature:	Less than 10% change in sensitivity over rated range	
Atmospheric pressure:	Operating: Suitable for installation up to 2,000m above sea level	
Effect of wind:	Less than 20% change in sensitivity at speeds up to 10m/s Note: slow changes in ambient conditions will automatically be compensated and will not affect sensitivity	
Vibration, impact and shock:	To EN54–7:2000	
IP rating:	44 in accordance with BSEN60529	
Dimensions:	100mm diameter x 42mm height 50mm (height in base)	
Weight:	Detector	105g
	Detector in base	160g
Materials:	Housing: White polycarbonate V–0 rated to UL94 Terminals: Nickel plated stainless steel	

Discovery

Optical Smoke Detector



Operating principles

The Discovery Optical Detector has a white moulded polycarbonate case with wind-resistant smoke inlets. The indicator LEDs are colourless when the detector is in quiescent state and red in alarm. Within the case is a printed circuit board which, on one side, has the light-proof chamber with integral gauze surrounding the optical measuring system and, on the other, the signal processing and communications electronics.

An infra-red 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 (Fig 1).

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 chamber baffles. When smoke enters the chamber it scatters light 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 to provide an analogue value for transmission when the detector is interrogated.



58000-600SIL

Discovery Optical Smoke Detector

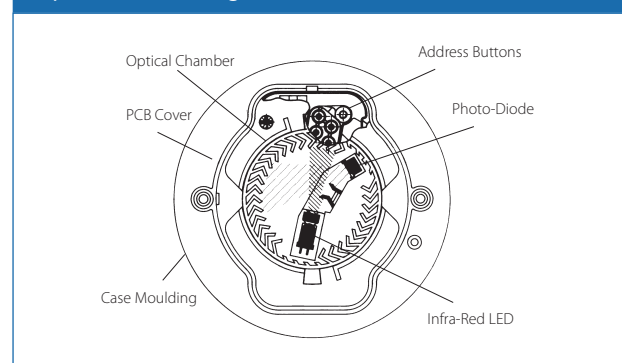


Table 3: Operating Modes

Mode	Alarm threshold %m	dB/m	Minimum time to alarm (sec)
1	1.4	0.06	5
2	1.4	0.06	30
3	2.1	0.09	5
4	2.1	0.09	30
5	2.4	0.11	5

Compensation rate complies with EN54-7:2000

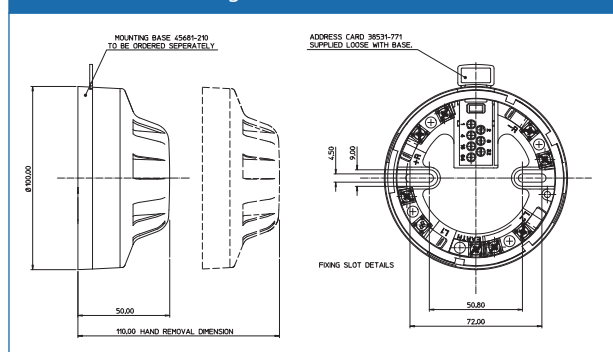
Top Section View (Fig 1)



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Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Photoelectric detection of light scattered in a forward direction by smoke particles
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
Supply wiring:	Two-wire supply, polarity insensitive
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	300μA
Power-up surge current:	1mA
Maximum power-up time:	10s
Alarm current, LED illuminated:	3.5mA
Remote output characteristics:	Connects to positive line through 4.5kΩ (5m maximum)
Clean-air analogue value:	23 +4/-0
Alarm level analogue value:	55
Alarm indicator:	2 colourless Light Emitting Diodes (LEDs); illuminating red in alarm Optional remote LED
Temperature range:	-40°C to +70°C
Humidity:	0 to 95% relative humidity (no condensation or icing)
Effect of atmospheric pressure:	None
Effect of wind:	None
Vibration, impact and shock:	To EN54-7:2000
IP rating:	44 in accordance with BSEN60529
Dimensions:	100mm diameter x 42mm height 50mm (height in base)
Weight:	Detector 105g Detector in base 160g
Materials:	Housing: White polycarbonate V-0 rated to UL94 Terminals: Nickel plated stainless steel

Discovery

Multisensor Detector

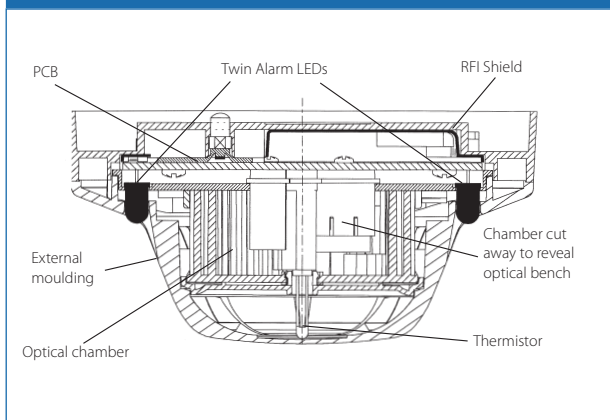


58000-700SIL

Discovery Multisensor Detector

CE
0832

Sectional View (Fig 1)



Operating principles

The Discovery Multisensor Detector construction is similar to that of the optical detector but uses a different lid and optical mouldings to accommodate the thermistor (heat sensor). The sectional view (Fig 1) shows the arrangement of the optical chamber and the thermistor.

The Discovery optical/heat multisensor detector contains an optical smoke sensor and a thermistor temperature sensor whose outputs are combined to give the final analogue value. The way in which the signals from the two sensors are combined depends on the response mode selected. The five modes provide response behaviour which incorporates pure heat detection, pure smoke detection and a combination of both. The multisensor is therefore useful over the widest range of applications.

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 micro-controller processes the two signals according to the mode selected. When the detector is operating as a multisensor (i.e. modes 1, 3 and 4) the temperature signal processing extracts only rate-of-rise information for combination with the optical signal. In these modes 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.

Additional heat sensor information

Discovery optical/heat multisensor detectors manufactured from mid 2009 incorporate additional temperature information that is intended for use in signal processing.

Dimensional Drawings

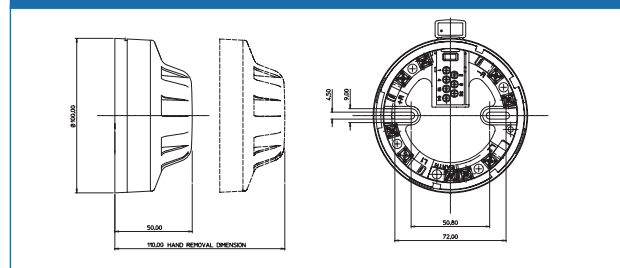


Table 4: Operating Modes

Mode	Smoke Sensitivity (grey smoke) %/m dB/m	Temperature Sensitivity	Response Type	Minimum Time to Alarm (seconds)
1	1.1 0.05	>15°C increase	Multisensor	20
2	2.1 0.09	Not set to heat response	Optical	30
3	2.8 0.12	>21°C increase	Multisensor	20
4	4.2 0.19	>15°C increase	Multisensor	20
5	No response to smoke	See mode 5 opposite	Heat A1R	15

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Temperature data can be read separately by the control panel (see Note 1) and used to validate an alarm signalled by the multisensor analogue value. An example of this would be a high multisensor analogue value not accompanied by an increase in heat: this would indicate that an agent other than smoke, e.g. steam, had caused the high analogue value.

The exact method of polling to make use of this feature is described in a Technical Sales document available to panel partners.

This feature offers protection from false alarms.

Characteristics of the response modes

The processing algorithms in modes 1 to 4 incorporate drift compensation.

The characteristics of the five response modes are summarised below.

Mode 1 has very high smoke sensitivity combined with high heat sensitivity. This gives a high overall sensitivity to both smouldering and flaming fires.

Mode 2 has a smoke sensitivity similar to that of a normal optical smoke detector. This mode is therefore equivalent to a standard optical detector. It is suitable for applications in which wide temperature changes occur under normal conditions.

Mode 3 has moderate smoke sensitivity combined with a moderate sensitivity to heat. This combination is considered the optimum for most general applications since it offers good response to both smouldering and flaming fires.

Mode 4 has lower than normal smoke sensitivity combined with high heat sensitivity. This makes it suitable for applications in which a certain amount of fumes or smoke is considered normal.

Mode 5 has no smoke sensitivity at all, but gives a pure heat detector response meeting the response time requirements for a Class A1R detector in the European standard EN54–5:2000. In this mode the detector will respond to slowly changing temperatures and has a 'fixed temperature' alarm threshold at 58°C. The analogue value in this mode will give the approximate air temperature over the range 15°C to 55°C.

In mode 5, the smoke sensor is still active though it does not contribute to the analogue signal. As a consequence, if the detector is used in a dirty or smoky environment the optical sensor drift flag may be activated in the heat-only mode.

Notes

1. This applies only to panels which have been programmed to read the additional information.
2. In situ testing of the multisensor detector should be carried out as for smoke detectors in response mode 2 and for heat detectors in response mode 5. Both optical and heat sensors must be tested in modes 1, 3 and 4.
3. If the multisensor is to be used in mode 5, heat detector spacing/coverage should be applied.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Detection principle:	Smoke	Photoelectric detection of light scattered by smoke particles
	Heat	Temperature-dependent resistance
Supply wiring:	Two-wire supply, polarity insensitive	
Terminal functions:	L1 & 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 negative)
Operating voltage:	17–28V DC	
Communication protocol:	Apollo Discovery 5–9V peak to peak	
Quiescent current:	400µA	
Power-up surge current:	1mA	
Maximum power-up time:	10s	
Alarm current, LED illuminated:	3.5mA	
Remote output characteristics:	Connects to positive line through 4.5kΩ (5mA maximum)	
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	
Temperature range:	-40°C to +70°C	
Humidity:	0 to 95% relative humidity (no condensation or icing)	
Effect of temperature on optical sensor:	None	
Effect of wind on optical sensor:	None	
Vibration, impact and shock:	To EN54–7:2000 & EN54–5:2000	
IP rating:	44 in accordance with BSEN60529	
Dimensions:	100mm diameter x 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		

Discovery

Manual Call Point



58100-910SIL

Discovery Manual Call Point (surface)

58100-908SIL

Discovery Manual Call Point with Isolator (surface)



0832

Operating principles

The Apollo Discovery Manual Call Point EN54–11:2001 compliant (MCP) is based on the KAC conventional MCP range. It is electronically and mechanically compatible with previous Apollo call points based on KAC's World Series product.

The address of each call point is set at the commissioning stage by means of a seven-segment DIL switch. If an MCP is activated, it interrupts the normal protocol to give a fast response.

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 and may be set to flash each time the call point is polled. The red LED is lit when the call point has been activated and sent into alarm. On the isolated versions an amber/yellow LED indicates a short-circuit on the loop wiring either side of the call point.

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.

Discovery manual call points are available with or without an isolator. Each version is available with a resettable element and a backbox for surface mounting as standard. If a glass option is required, spare glasses are available on request. For all part numbers please refer to the table below.

For ease of installation Discovery manual call points are supplied with clip-on terminal blocks and a connector which allows continuity testing before call points are commissioned.

To provide additional protection against accidental operation, a transparent hinged cover with a locking tag, part number 26729-152 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.

Table 5: Part Numbers

	Colour	Deformable Element	Backbox for surface wiring	Isolated	Non-Isolated	Waterproof / IP67 Rated
58100-910	Red	●	●		●	
58100-908 (surface)	Red	●	●	●		
58100-926	White	●	●		●	
58100-927	Yellow	●	●		●	
58100-928	Blue	●	●		●	
58100-929	Green	●	●		●	
58100-950	Red	●	●		●	●
58100-951	Red	●	●	●		●
58100-953	Yellow	●	●	●		●

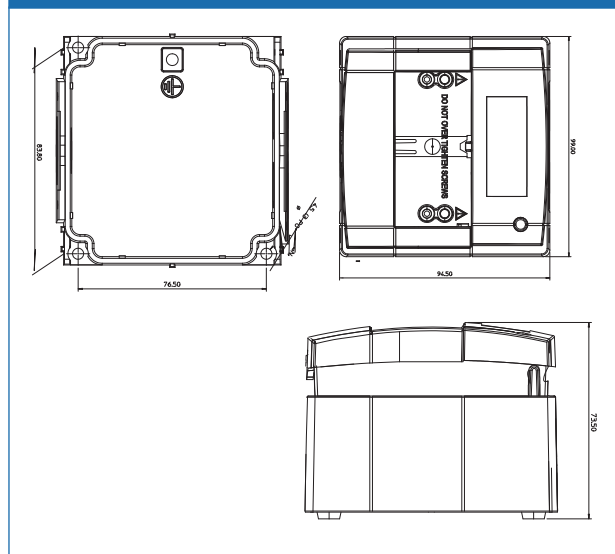
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Waterproof and non-standard manual call points

Discovery waterproof (IP67) manual call points are available in red or yellow. For special purposes, such as initiating a 'Hazard' alarm, specially coloured call points can be used on the fire system. However, these do not conform to EN54-11:2001 requirements.

Dimensional Drawings



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated.

Call point type:	Deformable element
Call point principle:	Operation of a switch
Alarm indicator:	Red Light Emitting Diode (LED)
Fault indicator:	Amber/Yellow Light Emitting Diode (LED)
Supply wiring:	Two-wire supply, polarity sensitive
Loop connections:	Terminal Block L1 -ve/L2 +ve
Operating voltage:	17–28V DC
Communication protocol:	Apollo Discovery 5–9V peak to peak
Quiescent current:	100µA
Power-up surge current:	1mA
Maximum power-up time:	1s
Alarm current, LED illuminated:	4mA
Normal analogue value:	16
Alarm state value:	64
Temperature range:	–20°C to +60°C
Humidity:	0 to 95% relative humidity (no condensation)
Compliance standard:	EN54-11:2001; EN54-17:2005 (isolated version)
IP rating:	24D IP67 (weatherproof)
Dimensions:	89mm x 93mm x 26.5mm 0(manual call point) 87mm x 87mm x 32mm (backbox)
Weight:	Flush mounted 110g Surface mounted 160g
Materials:	Housing: Red self-coloured polycarbonate/ABS
Hinged cover and locking tag are also available, part number:	26729-152 cover 26729-179 (pack of 5 security ties)
Discovery glasses are also available, part number:	26729-155 (pack of 5)

XP95 IS

Heat Detector



55000-440SIL

XP95 Heat Detector

CE
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The XP95 IS Heat Detector is distinguishable from XP95 IS smoke detectors by its low air-flow resistance case which allows good contact between the sensing thermistor and the surrounding air.

The device monitors temperature by using a single thermistor network which provides a voltage output proportional to the external air temperature. The voltage signal is processed and transmitted to the control equipment in the same way as in the case of the ionisation smoke detector.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS detectors have the same operating characteristics as the standard versions.

XP95 IS Base

The base for the intrinsically safe range is not identical with that for the standard range. This ensures that standard detectors cannot inadvertently be fitted to an intrinsically safe system. For full details of the XP95 address mechanism refer to the XP95 Engineering Product Guide PP1039.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS heat detector is identical to that for the standard version, except for the information below.

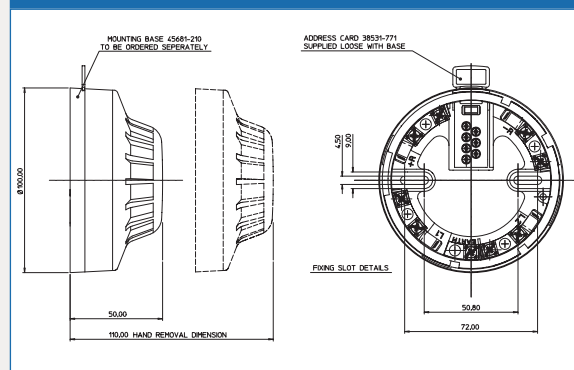
Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive.
2. There is no requirement for series resistance on remote LED lines.
3. The remote LED characteristic differs from XP95.

Supply Voltage:	14-22 Volts DC
Quiescent current:	300µA
Operating temperatures (ambient):	-20°C to +40°C (T5) -20°C to +60°C (T4)
Remote LED current:	1 mA (internally limited)
Guaranteed temperature Range:	(No condensation or icing) -20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	E Ex ia IIC T5 (T4 at Ta≤60°C)

Dimensional Drawings



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XP95 IS

Optical Smoke Detector



55000-640SIL
XP95 IS Optical Smoke Detector

CE
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XP95 IS Optical Smoke Detectors incorporate a pulsing LED located in a labyrinth within the housing of the detector. The labyrinth is designed to exclude light from any external source. At an angle to the LED is a photo-diode which, in clear air conditions, does not receive light directly from the LED. The detector transmits a clear air signal to the control panel. When smoke enters the labyrinth, light is scattered onto the photo-diode and the signal to the panel increases. The signal is processed by the electronic circuitry and transmitted to the control equipment in exactly the same way as in the case of the ionisation smoke detector.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS detectors have the same operating characteristics as the standard versions.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS optical detector is identical to that for the standard version, except for the information below.

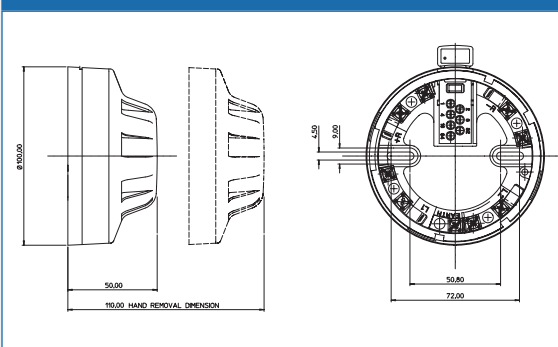
Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive
2. There is no requirement for series resistance on remote LED line.
3. The remote LED characteristic differs from XP95.

Supply Voltage:	14-22 DC
Quiescent current:	340µA
Operating temperatures (ambient):	-20°C to +40°C (T5)
	-20°C to +60°C (T4)
Remote LED current:	1mA (internally limited)
Guaranteed temperature range:	(No condensation or icing)
	-20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	E Ex ia IIC T5 (T4 at Ta ≤ 60°C)

Dimensional Drawings



XP95 IS

Ionisation Smoke Detector



55000-540SIL

XP95 IS Ionisation Smoke Detector

CE
0832

Operating principles

The sensing part of the detector consists of two chambers – an open, outer chamber and a reference chamber within.

Mounted in the reference chamber is a low-activity radioactive foil of Americium 241 which enables current to flow across the inner and outer chambers when the detector is powered up.

As smoke enters the detector, it causes a reduction of the current flow in the outer chamber and hence an increase in the voltage measured at the junction between the two chambers. This analogue voltage signal is converted to a digital signal by the electronic circuitry and transmitted to the control panel on interrogation. The micro-processor in the control equipment then compares the signal with stored data and initiates a pre-alarm or fire alarm as smoke density increases. When a fire condition exists, the panel instructs the detector to switch on its indicator LED.

Full details of the principles of operation and electrical description are published in the XP95 Engineering Product Guide. Information on the performance of XP95 in adverse environmental conditions is also given in this guide. XP95 IS detectors have the same operating characteristics as the standard versions.

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.

Storage regulations depend on local standards and 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.

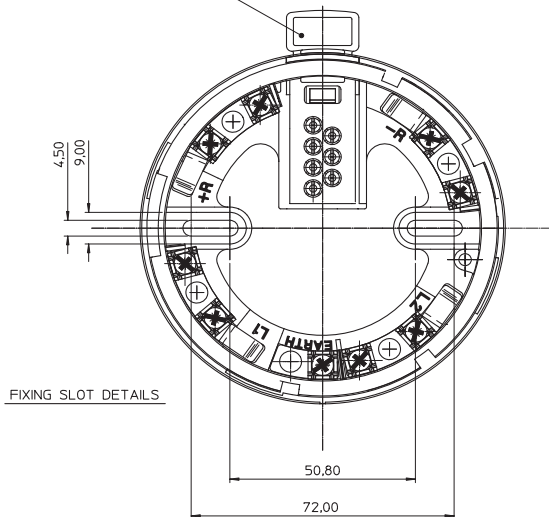
Guidance on storage and handling can be given by Apollo Fire Detectors and full details can be requested from:

Environmental Agency
Swift House
Frimley Business Park
Frimley
GU16 7SQ

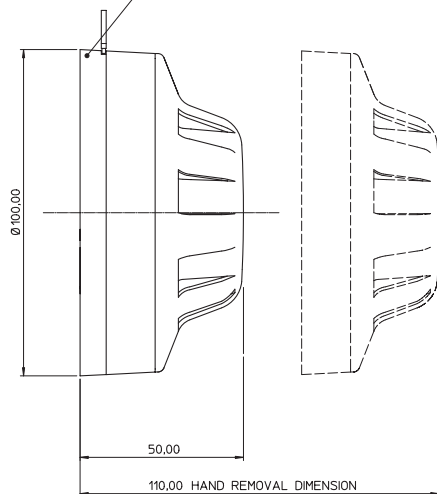
Outside the UK, please contact the relevant national agency.

Dimensional Drawings

ADDRESS CARD 38531-771
SUPPLIED LOOSE WITH BASE.



MOUNTING BASE 45681-210
TO BE ORDERED SEPERATELY



Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS ionisation detector is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply and remote LED negative
	+R	Remote LED positive

Notes:

1. IS detectors are polarity sensitive.
2. There is no requirement for series resistance on remote LED lines.
3. The remote LED characteristic differs from XP95.

Supply Voltage:	14-22 DC
Quiescent current:	300 μ A
Operating temperatures (ambient):	-20°C to +40°C (T5)
	-20°C to +60°C (T4)
Remote LED current:	1mA (internally limited)
Guaranteed temperature range:	(No condensation or icing)
	-20°C to +60°C
BASEEFA Certificate No:	BAS02ATEX1289
Classification:	E Ex ia IIC T5 (T4 at T _{as} ≤60°C)

XP95 IS

Manual Call Point – Standard



55100-940SIL Red

55100-942SIL Yellow*

55100-944SIL Blue*



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When activated, the intrinsically safe call point not only interrupts the polling cycle to indicate to the control panel that it has been operated, but also reports its address. Thus an alarm and its location can be reported in less than 0.2 seconds.

Full details of the principles of operation and the electrical description are published in the XP95 Engineering Product Guide. XP95 IS manual call points have the same operating characteristics as the standard versions. They are available in two types of housing and in a number of versions.

The standard call point is based on the KAC waterproof model and is a red, break-glass call point, part no: 55000-940. This model is also available in other colours and a protective lift-up flap is available.

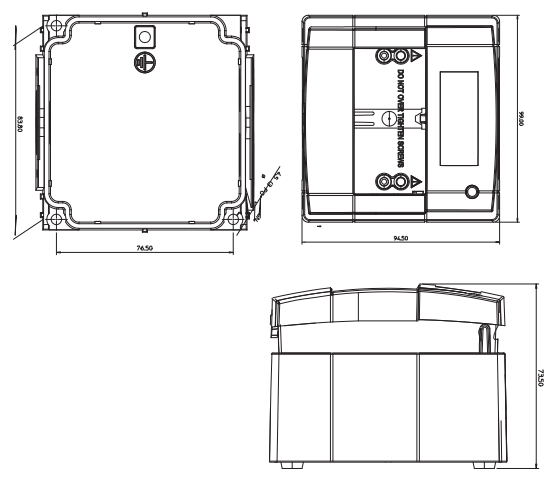
* Does not have LPCB or CPD approval, or comply with EN54-11.

Technical Data

Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS manual call point is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply
Note:	IS devices are polarity sensitive	
Supply voltage:	14-22 Volts DC	
Quiescent current:	230µA	
Operating temperatures (ambient):	-20°C to +40°C (T5)	
	-20°C to +60°C (T4)	
IP rating:	65	
BASEEFA Certificate No:	BAS02ATEX1290	
Classification:	E Ex ia IIC T5 (T4 at Ta ≤ 60°C)	
Dimensions	124mm x 124mm x 60mm (HxWxD)	
	Weight: approx. 400g	

XP95 IS Manual Call Point – Standard (55100-940)



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XP95 IS

Manual Call Point – MEDC Style



Break-glass:

- 55000-960SIL** Red
- 55000-962SIL** Yellow*
- 55000-964SIL** Blue*
- 55000-966SIL** Black/yellow stripes*

Break-glass with flap:

- 55000-961SIL** Red
- 55000-963SIL** Yellow*
- 55000-965SIL** Blue*
- 55000-967SIL** Black/yellow stripes*

Push-button:

- 55000-970SIL** Red
- 55000-971SIL** Yellow*
- 55000-972SIL** Blue*
- 55000-973SIL** Black/yellow stripes*

For heavy-duty applications a robust manual call point based on a model by MEDC is available. This model is made of glass-reinforced polyester and may be ordered as a break-glass or push-button call point and in a variety of colours. Break-glass models may be supplied with or without a stainless-steel protective flap. Table 5 gives part numbers and full details of MEDC-based call points.

MEDC-based break-glass units have two M20 cable entries on the bottom face of the back-box. Push-button units have one M20 cable entry on the bottom face and one on the top face. Other cable entry configurations can be provided to special order.

* Does not have LPCB or CPD approval, or comply with EN54-11.

Technical Data

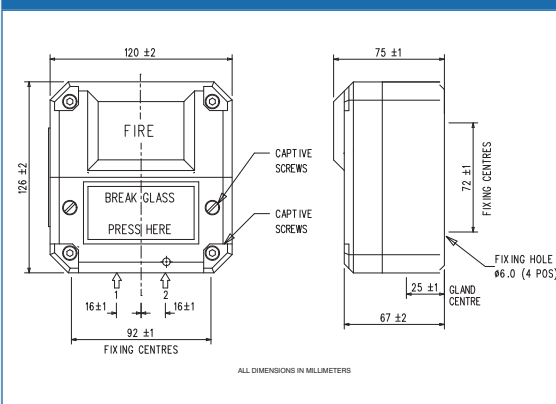
Specifications are typical at 24V, 23°C and 50% relative humidity unless otherwise stated. Technical data for the IS manual call point is identical to that for the standard version, except for the information below.

Supply wiring:	Two wire supply, polarity sensitive	
Terminal functions:	L1	Positive supply
	L2	Negative supply
Note:	IS devices are polarity sensitive	
Supply voltage:	14-22 Volts DC	
Quiescent current:	230µA	
Operating temperatures (ambient):	-20°C to +40°C (T5)	
	-20°C to +60°C (T4)	
IP rating:	66	
BASEEFA Certificate No:	BAS02ATEX1290	
Classification:	E Ex ia IIC T5 (T4 at Ta ≤ 60°C)	

Dimensions	
XP95 Manual Call Point – MEDC Style (break-glass):	126mm x 120mm x 67mm (HxWxD) Weight: approx. 1.20kg

XP95 Manual Call Point – MEDC Style (push-button):	126mm x 120mm x 114mm (HxWxD) Weight: approx. 1.20kg
----------------------------------------------------	---------------------------------------------------------

Dimensional Drawings



XP95

Manual Call Point



55100-905SIL

XP95 Manual Call Point (surface)

55100-908SIL

XP95 Manual Call Point with Isolator (surface)



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Technical description

Function

The XP95 Manual Call Point has been designed to operate on a loop of intelligent fire detection devices and when activated interrupts the polling cycle for a very fast response.

The XP95 Manual Call Point is intended for indoor applications and is available in two versions, with and without isolator.

Features

The XP95 Manual Call Point has an easily resettable element rather than a break-glass.

It also features a unique 'Plug and Play' installation concept designed specifically to reduce installation time. The call point utilises a terminal block, where all installation cabling is terminated.

The XP95 Manual Call Point is approved to EN54-11.

Electrical considerations

The XP95 Manual Call Point is loop-powered and operates at 17–28V DC.

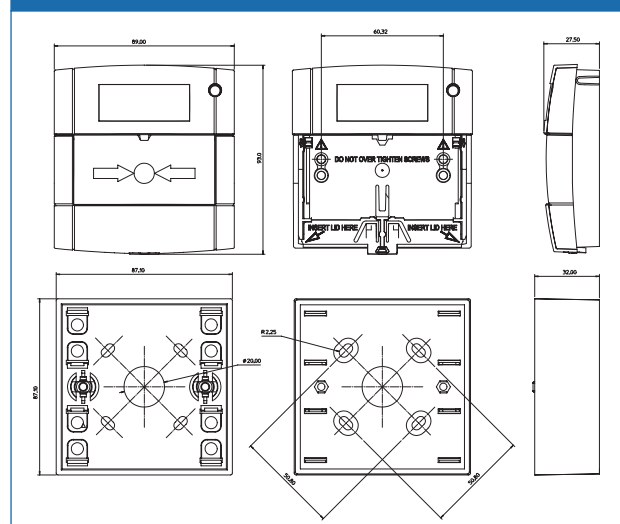
Protocol compatibility

The XP95 Manual Call Point will operate only with control equipment using the Apollo XP95 digital protocol.

Mechanical construction

The component parts of the call point are moulded in polycarbonate or ABS, depending on their function.

Dimensional Drawings



Operating principles

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 LED is illuminated red when the call point has been activated. The LED is illuminated amber/yellow LED to indicate a short-circuit.

This manual call point helps reduce installation time as all the initial installation cabling is wired to a terminal block which fits neatly in the back of the call point.

Once activated, the XP95 manual call point can be reset by inserting the test key into the bottom of the unit until the key clicks into position. Remove the test key and push the front cover up until it clicks home.

The isolated version of the XP95 manual call point incorporates a short-circuit isolator which will ensure its operation in the event of a short-circuit fault on the loop. Full details of the isolator can be found in the PIN Sheet PP2090, available on request.

EMC Directive 2004/108/EC

The XP95 manual call point complies with the essential requirements of the EMC Directive 2004/108/EC, provided that it is used as described in this PIN sheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Conformity of the XP95 manual call point with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it

Technical Data

Supply voltage:	17–28V DC	
Communications protocol:	5–9V peak to peak	
Maximum current consumption, at 24V:	Quiescent	100µA
	power-up surge, 1 second typical	1mA
	Alarm LED on	4mA
Operating temperature:	–20°C to +60°C	
Humidity (no condensation):	0–95%RH	
IP rating:	45	
Complies with:	EMC Directive 2004/108/EC EN54–11:2001 and EN54–17:2005 (isolated version)	
Dimensions and weight	93mm x 89mm x 59.5mm / 160g	

Input/Output Unit with Isolator



55000-847SIL

Input/Output Unit with Isolator



Technical description

Function

The Input/Output Unit with Isolator provides two voltage-free, single pole, change-over relay outputs, a single monitored switch input and an unmonitored, polarised opto-coupled input.

Features

The Input/Output Unit supervises one or more normally open switches connected to a single pair of cables.

The Input/Output Unit is fitted with a bi-directional short-circuit isolator and will be unaffected by loop short-circuits on either loop input or output.

Electrical considerations

The Input/Output Unit is loop-powered and operates at 17-28V DC with protocol voltage pulses of 5-9V.

Protocol compatibility

The unit will operate only with control equipment using the Apollo XP95® or Discovery® protocol.

Protocol bit usage

See Table 7, p131

Mechanical construction

The Input/Output Unit is normally supplied with a backbox for surface mounting. It is also available without the backbox for flush mounting. Both versions are designed for indoor use only.

Four LEDs, two red and two yellow, are visible through the front cover of the enclosure.

One red LED is illuminated to indicate that the relay is set. The second red LED is illuminated to indicate that the switch input is closed.

One yellow LED is illuminated whenever a fault condition (open or short-circuit) has been detected

The other LED is illuminated whenever the built-in isolator has sensed a short-circuit loop fault.

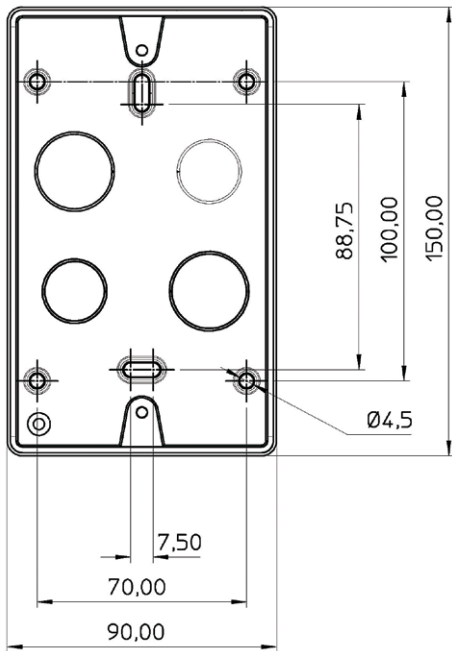
The enclosure is moulded from the same polycarbonate as Apollo detectors.

Table 6: Input Conditions and Status

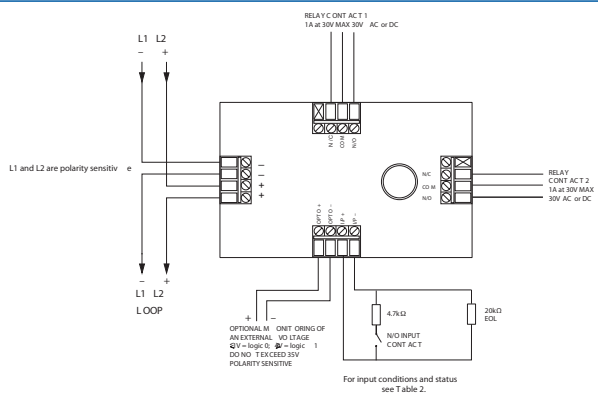
Resistance Status across input	Status	Analogue Value	2	1	0
<100Ω	Short-circuit fault	4	0	†	0
100–200Ω	Indeterminate	4 or 16	0	†	0 or 1
200–11kΩ 4.7kΩ	Switch closed	16	0	†	1
11–15kΩ	Indeterminate	16	0	†	0 or 1
15–25kΩ 20kΩ	Normal (switch open)	16	0	†	0
25–30kΩ	Indeterminate	4 or 16	0	†	0

The values in italics are recommended values. † See "input bit 1"

Dimensional Drawing



Schematic Diagram and Wiring Connections



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Table 7: Protocol Bit Usage

Protocol Bits	Function
Output Bit 2	Not used
Output Bit 1	Not used
Output Bit 0	1 = relay set
Analogue value Bits	4 = open or short-circuit fault 16 = normal operation
Input Bit 2	Not used
Input Bit 1	0 = opto input <1V 1 = opto input >4V (1-4V = indeterminate)
Input Bit 0	0 = switch open or fault 1 = switch closed
Interrupt	Not used
XP Flag Set	Yes
Alarm Flag Set	No

Technical Data

Minimum loop operating voltage in normal conditions:	17V DC	
Maximum loop operating voltage:	28V DC	
Maximum current consumption at 28V DC no protocol:	Switch-on surge, max 150ms	3.5mA
	Quiescent, 20kΩ EOL fitted	1.25mA
	Switch input closed 'switch closed' LED on	2.5mA
	Switch input closed (LED disabled)	1.5mA
	Any other condition (max 2 LEDs on)	3.5mA
Relay operated	2mA	
Switch input monitoring voltage:	9-11V DC (open-circuit condition)	
Switch input conditions and status:	See Table 6	
Maximum cable resistance:	50Ω	
Opto-coupled input:	Maximum voltage (polarity sensitive)	35V DC
	Impedance	10kΩ
Relay output:	Contact rating	1A at 30V AC or DC (inductive or resistive)
	Wetting current	10µA at 10mV DC
	On resistance:	0.2Ω
Maximum continuous current:	1A	
Maximum switching current:	3A	
Maximum load:	20 XP95/Discovery detectors	
Operating temperature:	-20°C to +70°C	
Humidity (no condensation):	0-95%	
Shock, vibration and impact:	to GEI 1-052	
IP rating	54	
Dimensions and weight	150 x 90 x 48mm / 240g	
Low voltage directive 73/23/eec	No electrical supply greater than 50V AC rms or 75V DC should be connected to any terminal of this Input/Output Unit.	
EMC DIRECTIVE 89/336/EEC	The Input/Output Unit complies with the essential requirements of the EMC Directive 89/336/EEC, provided that it is used as described in this data sheet and that it is not operated more than five times a minute or twice in any two seconds.	

Output Unit with Isolator



55000-849SIL

Output Unit with Isolator



Technical description

Function

The XP95 Output Unit with Isolator provides two voltage-free, single pole, change-over relay outputs.

Features

The Output Unit returns an analogue value of 16 under all conditions.

The Output Unit is fitted with a bi-directional short-circuit isolator and will be unaffected by loop short-circuits on either loop input or output.

Electrical considerations

The XP95 Output Unit is loop-powered and operates at 17-28V DC with protocol voltage pulses of 5-9V.

The Output Unit is designed to accept a maximum line resistance of 50Ω.

Mechanical construction

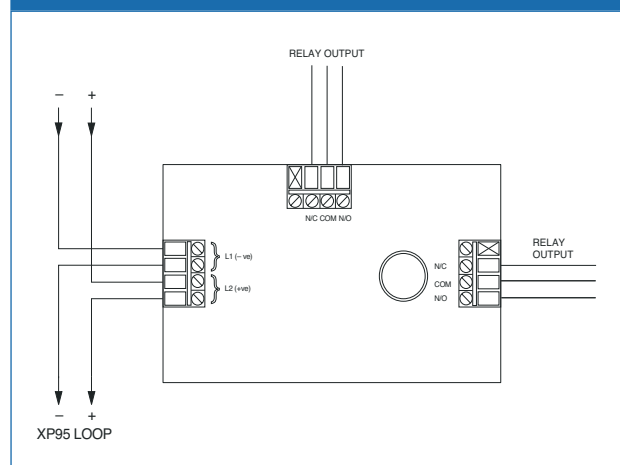
The Output Unit is normally supplied with a back box for surface mounting. It is also available without the back box for flush mounting. Both versions are designed for indoor use only.

One red LED and one yellow LED are visible through the front cover of the enclosure. The red LED is illuminated to indicate that the relay is set.

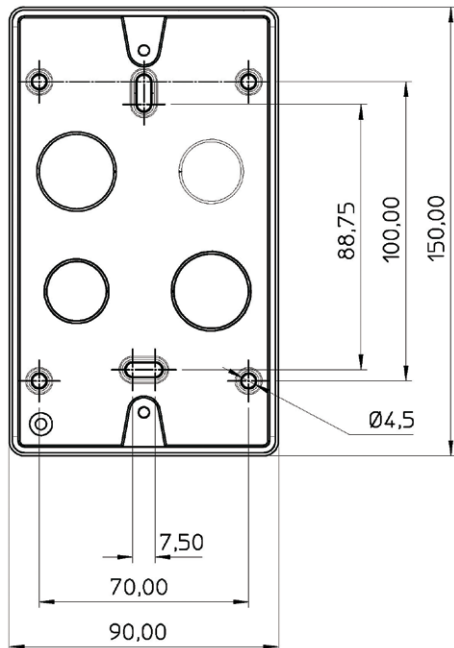
The yellow LED is illuminated whenever the built-in isolator has sensed a short-circuit loop fault.

The enclosure is made from white polycarbonate.

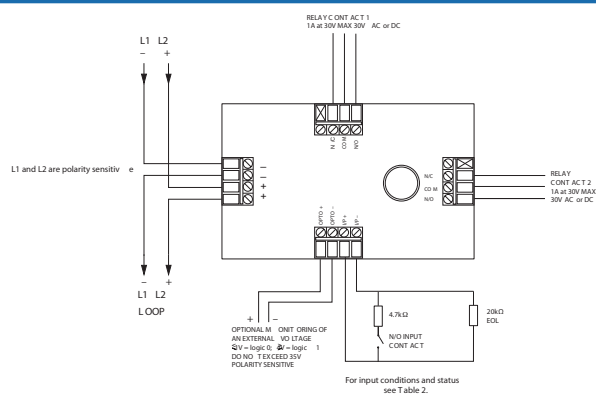
Schematic Diagram and Wiring Connections



Dimensional Drawing



Schematic Diagram and Wiring Connections

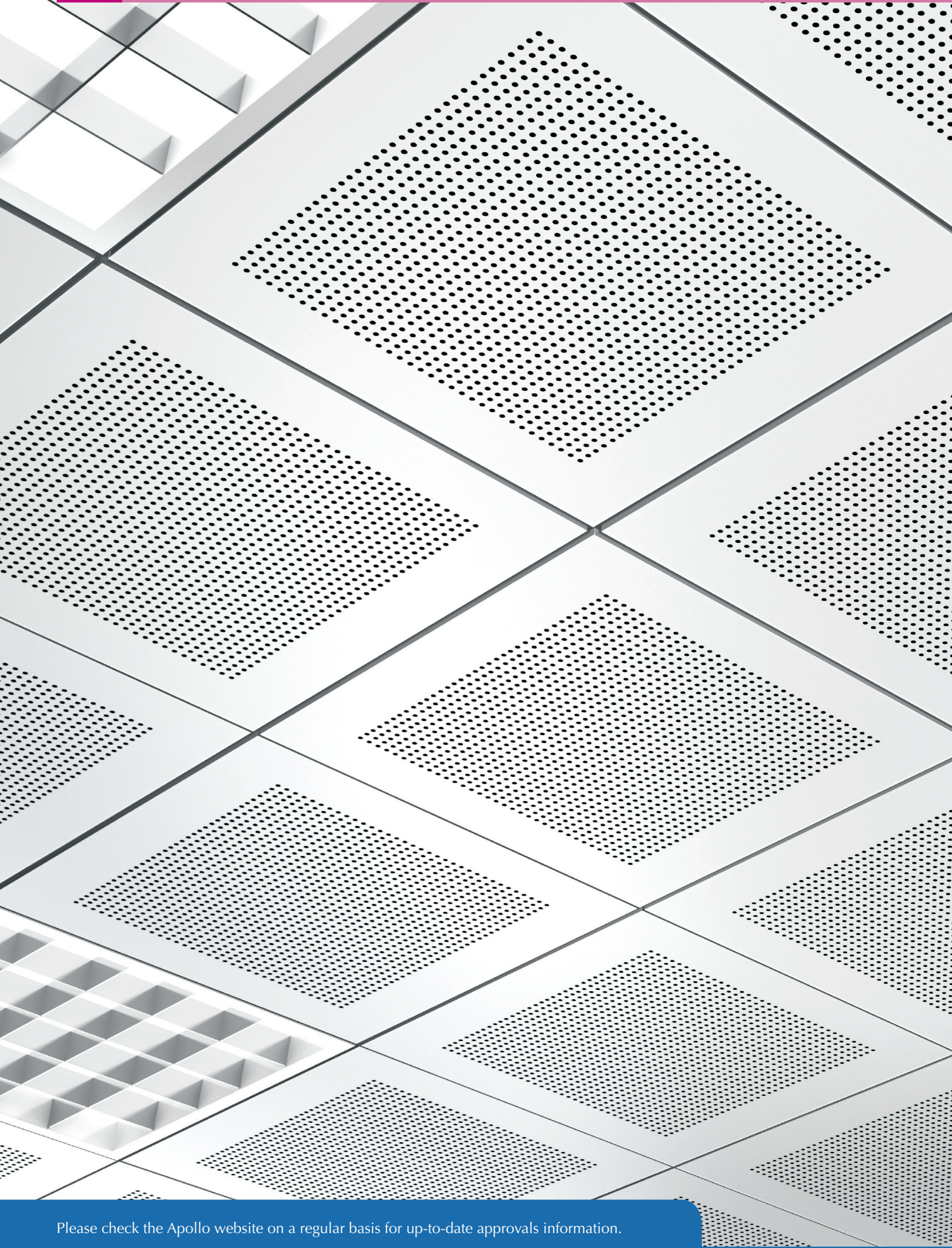


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Technical Data

Minimum loop operating voltage in normal conditions:	17V DC	
Maximum loop operating voltage:	28V DC	
Maximum current consumption at 24V DC no protocol:	Switch-on surge, max 100ms	3mA
	Quiescent	400µA
	Relay operated	1.8mA
	Relay operated (LED disabled)	1.8mA
Relay output:	Contact rating	1A at 30V AC or DC (inductive or resistive)
	Wetting current	10µA at 10mV DC
On resistance:	0.2Ω	
Maximum continuous current:	1A	
Maximum switching current:	3A	
Maximum load:	20 XP95/Discovery detectors	
Operating temperature:	-20°C to +70°C	
Humidity (no condensation):	0-95%	
Shock, vibration and impact:	to GEI 1-052	
IP rating	54	
Radiated and conducted RF emissions:	To BS EN 61000-6-3:2001	
Radiated and conducted RF immunity:	To BS EN 50130-4:1996	
Dimensions and weight	150 x 90 x 48mm / 240g	

Low Voltage Directive 73/23/EEC. No electrical supply greater than 50V AC rms or 75V DC should be connected to any terminal of this Isolated Output Unit. A copy of the Declaration of Conformity is available from Apollo on request.



Please check the Apollo website on a regular basis for up-to-date approvals information.

Mounting Accessories

Apollo offer a selection of accessories that can be used when installing Apollo's detectors, sounders and interfaces. These include backplates providing a high degree of protection from the ingress of water or dust, weatherproof visual indicator enclosures for installation outside and in high moisture environments such as swimming pools and ceiling tile mounting boxes which make installation easy prior to the fitting of a false ceiling.

Backplate



45681-233

Backplate

The Backplate provides a high degree of protection against the ingress of water or dust into the back of the detector mounted directly onto a mounting box. When the backplate is used with an XP95 device, the number tab of the XPERT card must be snapped off and placed in one of the knockout slots provided in the backplate.

- Protects against water ingress
- Improved performance
- Fits Discovery, XP95, Orbis, Series 65 and AlarmSense bases

Base Cover



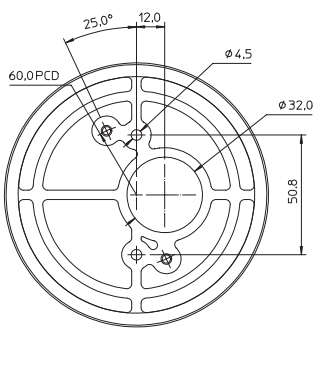
45681-370 Series 65 Base Cover

45681-380 XP95 Base Cover

Base Covers are available as part of the Series 65 and XP95 ranges.

- Protects base when detector not in place
- Aesthetically pleasing

Dimensional Drawings



Please check the Apollo website on a regular basis for up-to-date approvals information.

Conduit Box



45681-204

Conduit Box

The Conduit Box is a versatile accessory for surface mounting Apollo bases. The box has knockouts to accept PG16 or M20 cable glands, conduit or mini-trunking. Self-tapping screws are included to fit the detector base to the conduit box.

- Easy to install
- Aesthetically pleasing
- Colour matched to detector and base

Sounder Ceiling Plate



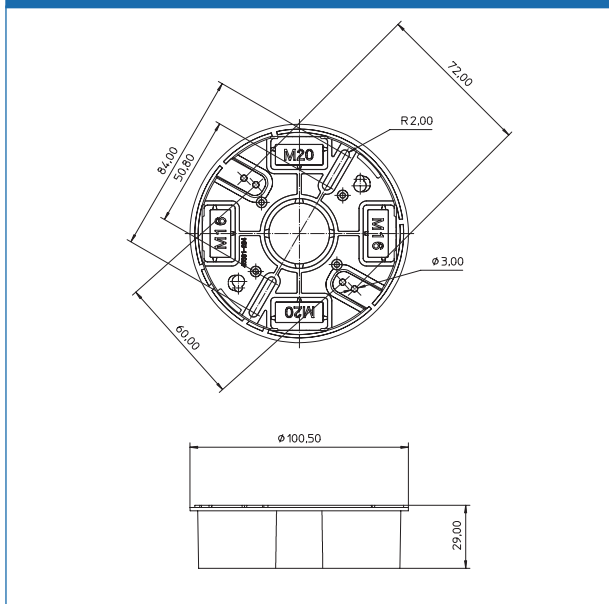
45681-311

Sounder Ceiling Plate

The Sounder Ceiling Plate allows surface mounted cabling to be fitted to a loop-powered sounder base.

- Ease of installation

Dimensional Drawings



Module Base



38531-822

Module Base

The Module Base is an accessory which can be secured to a standard base allowing customers to fit their own electronics.

- 5mm in depth

Ceiling Tile Mounting Box



45681-309

Detector Ceiling Tile Mounting Box

45681-310

Sounder Ceiling Tile Mounting Box

The Ceiling Tile Mounting Box has been designed to make the installation of detectors and sounders quick and easy prior to the fitting of a false ceiling. Detector and sounder bases can be fitted, wired and if necessary, tested and commissioned before the installation of a false ceiling.

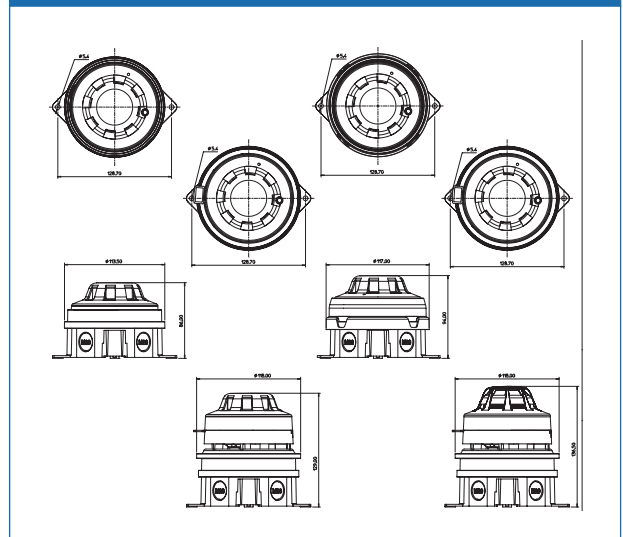
- No need for separate backbox
- Can be used with tiles up to 25mm thick
- Quick and easy installation

Please check the Apollo website on a regular basis for up-to-date approvals information.

Deckhead Mounting Box



Dimensional Drawings



45681-217

Deckhead Mounting Box

29600-131

Metal Deckhead Mounting Box (has access ports threaded to fit PG16 glands)

45681-218

Deckhead Mounting Box Accessory Kit

29600-139

Metal Deckhead Mounting Box (has access ports threaded to fit M20 components)

27249-005

Deckhead Adaptor (for use with 29600-196 – converts cable glands from PG16 to M20)

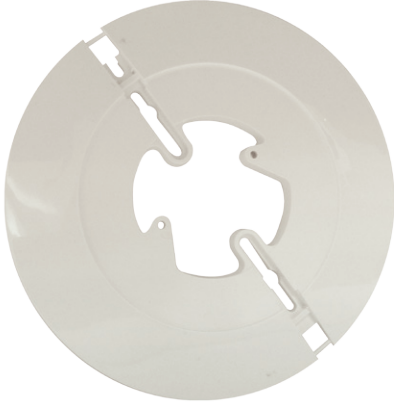
31523-857

O'Ring

The Deckhead Mounting Box gives extra protection to devices to be fitted in areas where there is the possibility of moisture or condensation ingressing through the rear of the base. The new version is suitable for a wider range of detector bases as well as Apollo's AV bases.

- Protects against water ingress
- Improved performance
- Available in polycarbonate or metal
- Polycarbonate Deckhead Mounting Box (45681-217) also fits Apollo Audio Visual bases when used with the Accessory Kit (45681-218)

6" Mounting Plate



45681-600

6" Mounting Plate

The 6" Mounting Plate is an accessory that allows sounder bases to be surface mounted.

- Can be surface mounted
- Aesthetically pleasing
- Disguises any blemishes or marks left beneath

Visual Indicator Enclosure



29600-318

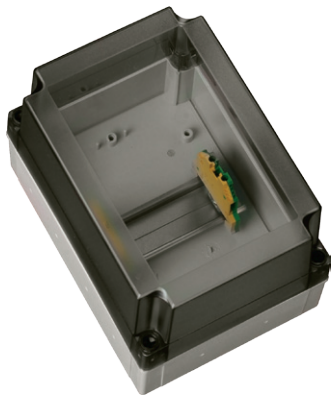
Visual Indicator Enclosure

The Visual Indicator Enclosure is weatherproof allowing a loop-powered visual indicator to be installed outside and in high moisture environments such as swimming pools. The enclosure is supplied with a mounting bracket to accept a Discovery or XP95 base.

- Protects against water ingress
- Allows visual indicator to be used outdoors
- Accepts MiniDisc remote indicator
- IP67 rated

Please check the Apollo website on a regular basis for up-to-date approvals information.

DIN-Rail Interface Enclosures



29600-239

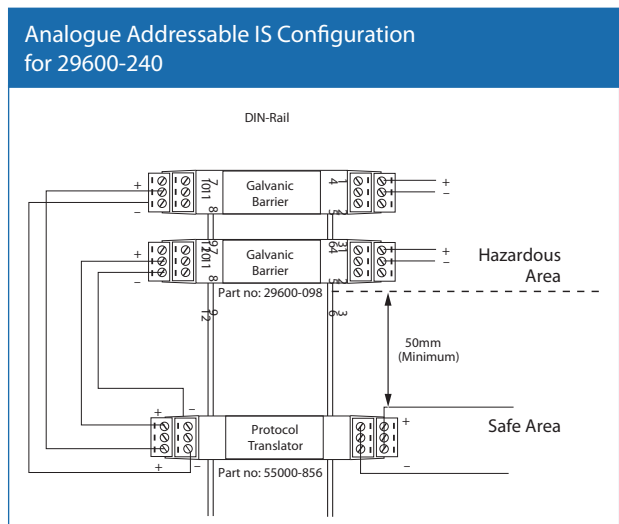
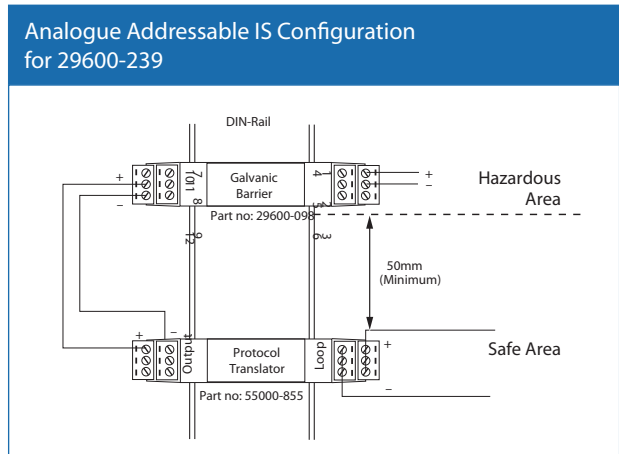
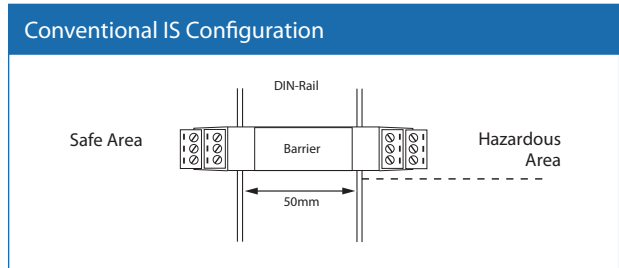
DIN-Rail Interface Enclosure (4 units)

29600-240

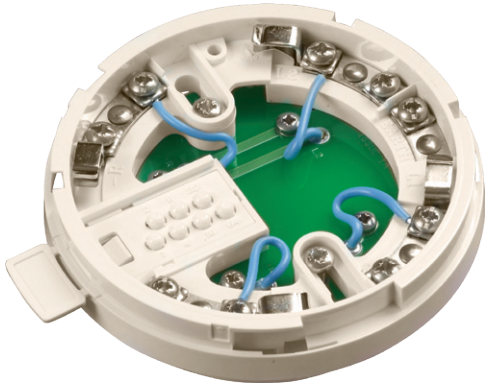
DIN-Rail Interface Enclosure (10 units)

DIN-Rail Interface Enclosures are available in two sizes and can be used for housing Intrinsically Safe (IS) barriers or DIN-Rail mounted interfaces. A multi-purpose label that features a section for use with IS systems is supplied. For non-IS systems, the part referring to IS can simply be removed.

- Allows multiple interfaces to be housed together
- IP67 rated



Series 90 to XP95 Base Adapter



45681-238

Series 90 to XP95 Base Adaptor

The Series 90 to XP95 Base Adaptor is designed to allow XP95 detectors to be fitted to an existing Series 90 base. The adaptor eliminates the need to rewire an existing Apollo intelligent system.

- Allows an existing range to be updated with ease
- Eliminates the need for re-wiring

Series 65 to Orbis Base Adaptor



ORB-BA-10008-APO

Series 65 to Orbis Base Adaptor

The Series 65 to Orbis Base Adaptor is designed to allow Orbis detectors to be fitted to an existing Series 60 or Series 65 base. The adaptor eliminates the need to rewire an existing Apollo conventional system.

- Allows an existing range to be updated with ease
- Eliminates the need for re-wiring

1.5mm Hexagonal Driver

29600-095

1.5mm Hexagonal Driver

The 1.5mm Hexagonal Driver is used to turn the locking screw fitted to Discovery, XP95 and Series 65 detectors, locking the detector to the base.

- Allows detectors to be secured to the base with ease



Please check the Apollo website on a regular basis for up-to-date approvals information.

Test Equipment & Maintenance

To keep a fire detection system in good working order, it should be subject to a routine maintenance programme in accordance with locally applicable regulations. Over the course of a year, every detector in the system should be functionally tested at least once, using recommended equipment. Apollo offers a range of test equipment for both conventional and intelligent systems to enable you to do this.

CE

XP95 Test Set



55000-870EUR

XP95 Test Set

The XP95 Test Set is a self-contained, portable test unit capable of providing a number of useful functions in relation to individual detectors, ancillary devices or complete circuits of analogue addressable devices in the Apollo intelligent ranges. The main function of the test set is to help the engineer guarantee correct loop configuration before an active control panel is installed.

- User friendly LCD information display
- Speedy commissioning
- No unnecessary site visits
- Significant cost reductions

Discovery Programmer



53832-030

Discovery Programmer

The Discovery Programmer is a portable test and configuration tool for Discovery smoke and heat detectors.

- Look up the date of manufacture
- Check the drift compensation value
- Display and change the operating mode
- Select/de-select LED flash mode
- Tests detectors
- Reads approval codes

Please check the Apollo website on a regular basis for up-to-date approvals information.

Conventional Test Set



53832-020

Conventional Test Set

The Conventional Test Set is an invaluable tool designed to give a thorough on-site check of conventional fire detectors within the Apollo Series 65 and AlarmSense ranges. Each test set is supplied with a link head, mains adaptor and carrying case with shoulder strap.

- Easy to use
- 2 button select/accept options
- LCD for clear display

Flame Sensor Test Unit and Case



29600-226

Flame Sensor Test Unit and Case

The Flame Sensor Test Unit is a tool which is designed to test flame detectors without the need of real flames.

- Mimics the characteristics of real flames

Equipment

In addition to the main test kits, Apollo provide a range of equipment to enable you to keep your system in good working order.

Detector installation and removal

Detector Extract Tool

29600-102 Detector Extract Tool

Extension Pole, 1.13m

29600-103 Extension Pole, 1.13m

Telescopic Pole, 1.26m to 4.5m

29600-104
Telescopic Pole, 1.26m to 4.5m

1.5mm Hexagonal Driver (locks detectors to bases)

29600-095
1.5mm Hexagonal Driver
(locks detectors to bases)

In situ functional testing of individual detectors Solo™ Testifire®

Smoke Dispenser Head

29600-100 Smoke Dispenser Head

Aerosol Test Gas

29600-225 Aerosol Test Gas

Heat Detector Test Pole

29600-229
Heat Detector Test Pole (240V)
29600-231
Heat Detector Test Pole (110V)

Cordless Heat Tester Kit

29600-212 Cordless Heat Tester Kit

Cordless Heat Detector Tester

29600-213
Cordless Heat Detector Tester

CO Test Gas

29600-235 CO Test Gas

Detector Duster

29600-449 Detector Duster

Battery Baton

29600-183 Battery Baton

Battery Charger

29600-214 Battery Charger*

Smoke/Heat Unit

29600-459 Smoke/Heat Unit

Smoke/Heat Kit

29600-460 Smoke/Heat Kit

Smoke/Heat/CO Unit

29600-461
Smoke/Heat/CO Unit

Smoke/Heat/CO Kit

29600-462
Smoke/Heat/CO Kit

Replacement Smoke Capsule

29600-463
6-Pack Replacement Smoke Capsule
29600-464
3-Pack Replacement Smoke Capsule

Replacement CO Capsule

29600-465
6-Pack Replacement CO Capsule
29600-466
3-Pack Replacement CO Capsule

Battery Baton

29600-183 Battery Baton

Battery Charger

29600-214 Battery Charger*

* When ordering please state if you require an EU lead or UK lead.

Please check the Apollo website on a regular basis for up-to-date approvals information.

For all your fire detection products www.apollo-fire.co.uk +44 (0) 2392 492 412

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General Conditions of Sale

PP2102/2012/Issue 12

Apollo Fire Detectors Limited ('the Company') General Conditions of Sale

All contracts of sale by the Company shall be on and subject to these Conditions. "The Customer" is the person, firm or company set out on the reverse of these conditions.

"The Goods" are the goods of / or Services provided by the Company, details of which are set out on the reverse of these Conditions.

- 1.1 INFORMATION ABOUT GOODS Any description, specification or drawing published by the Company in relation to the Goods shall not form part of any contract of sale by the Company.
- 1.2 The Customer in assessing whether the goods are reasonably fit for any particular purpose for which it is purchasing them has not relied on the skill or judgement of the Company.
- 2.1 ORDERS No order shall be binding on the Company unless and until expressly accepted by the Company in writing.
- 2.2 No order given may be cancelled or amended unless agreed by the Company in writing.
- 3.1 CONTRACT The Company shall sell and the Customer shall purchase the Goods in accordance with the written order of the Customer accepted by the Company in writing ("the Order") and with these Conditions (together "the Contract").
- 3.2 The Contract represents the entire understanding and supersedes any previous agreement between the Company and the Customer in relation to their subject matter.
- 3.3 The Contract shall not in any circumstances whatsoever be or be deemed to be affected by any previous dealings with the Company and any previous terms and/or conditions issued by the Company are superseded.
- 3.4 Where the Order Acceptance is on terms which vary from those set out in these Conditions, those terms shall prevail, but otherwise these Conditions shall be deemed to be part of the Contract.
- 4.1 PRICE The Price payable for the Goods shall be the price specified in the Order, provided that the Company may at any time before delivery, without notice, increase the Price.
- 4.2 The Price is exclusive of Value Added Tax and the Customer shall pay value Added Tax in respect of the Price at the standard rate prevailing at the date of delivery, together with all other taxes, duties or imports arising in connection with the sale.
- 5.1 PAYMENT Payment of the Price shall be made in pounds sterling at the office of the Company within 30 days from the date of invoice. All payments shall be made in full without deduction in respect of any right of set-off or counter-claim.
- 5.2 If the Customer fails to make due payment under the Contract, the Company shall be entitled to interest at the rate of 4% above the base rate of National Westminster Bank PLC from time to time on all outstanding sums from the date that payment fell due until payment is received.
- 5.3 If the Customer fails to make due payment under the Contract the Company shall be entitled to treat the Contract as repudiated by the Customer.
- 6.1 DELIVERY The Customer shall promptly, on request made at any time by the Company, provide the Company with any information or instruction it may require in order to supply the Goods.
- 6.2 Normal delivery terms are ex-works, despatch from Company works (where applicable) shall be deemed to be delivered to the Customer unless the Contract states otherwise.
- 6.3 Confirmed delivery dates are subject to credit being available at the proposed date of despatch. We will contact you if we are unable to ship because your available credit limit has been exceeded.
- 6.4 Where the Contract provides that delivery is the Company's responsibility:
 - 6.4.1 Any delivery time indicated by the Company is an estimate only and not an essential term of the Contract.
 - 6.4.2 The Company shall deliver the Goods to the agreed delivery address. Delivery shall be deemed to take place when the Goods arrive at the Delivery Address (before unloading).
 - 6.4.3 The Company shall not be liable for any damage to, deterioration in, or partial loss of the Goods in transit if the matter should have been apparent on a reasonable examination on delivery, unless the Company receives written notice thereof from the Customer within 7 days of delivery.
 - 6.4.4 Where the Company has made part delivery of the Goods it will not be taken under any circumstances to have agreed to waive any lien or right of retention on the remainder of the Goods or to give up possession of the whole of the Goods unless expressly so agreed in writing.
- 6.5 Where Customer has rejected any of the Goods or notified any damage or

deterioration under this Condition 6, the Customer shall, if requested to do so by the Company, return the Goods to the Company within 7 days of such request.

- 7.1 RISK All risk in the Goods shall pass to the Customer on delivery.
- 8.1 TITLE - RETENTION OF TITLE CLAUSES Notwithstanding delivery and the passing of risk, property in and title to the Goods shall remain with the Company and shall not pass to the Customer until the Company has received payment of the full price of (a) all Goods the subject of this contract and (b) all other Goods supplied by the Company to the Customer under any contract whatsoever. Payment of the full price shall include, without limitation, the amount of any interest or other sum payable under the terms of this and all other contracts between the Company and the Customer.
- 8.2 During such time as the property in the Goods remains in the Company the Customer shall store the Goods separately from all other goods and in such a way as clearly to indicate at all times that the said property remains in the Company. The Company's representatives shall be allowed to enter at all reasonable times upon any land or buildings on or in which the Goods may be situated for the purpose of inspecting the way in which the Goods are being kept.
- 8.3 During such time as the property in the Goods remains in the Company, the Customer in possession of the Goods shall hold the Goods as bailee of the Company and shall have power to deal with the Goods in normal course of its business.
- 8.4 If the Customer shall sell any of the Goods it shall hold all the proceeds of sale as trustee for the Company and shall (until payment of such proceeds to the Company) place such proceeds in a separate bank account and hold the same to the order of the Company.
- 9.1 INTELLECTUAL PROPERTY All patent, design, trademark, service mark, copyright and other industrial or intellectual property rights of the Company of whatever nature in respect of the Goods, any of their constituent parts, their packaging or other material supplied with the Goods shall remain the absolute property of and vested in the Company.
- 9.2 The Customer shall indemnify and keep indemnified the Company against any and all loss, damage, claims costs and expenses whatsoever suffered or incurred by the Company in connection with any infringement of any patent, design, trademark, service mark, copyright or other industrial or intellectual property right of any other person in connection with the Company's use or application in relation to the Goods or possession of any material or information or instruction supplied by the Customer in relation to the Goods.
- 10.1 WARRANTY The Company warrants that save only as provided in the Conditions the Goods will on delivery correspond with the Company's specification in respect of them current at the time of delivery.
- 10.2 Provided that any defect in the condition or performance of the Goods is notified to the Company by the Customer within 10 years (5 years for carbon monoxide detectors) from the date of manufacture, the Company shall correct such defect or replace the Goods (at the Company's discretion) subject to the Customer consenting or procuring consent for access to the Goods by the Company's employees or sub-contractors to carry out any work under this clause. This undertaking is given and shall be accepted by the Customer in lieu of any other remedy.
- 10.3 The Company shall not be liable under clause 10.2 above if:
 - 10.3.1 The Customer makes any further use of the Goods after giving notice in accordance with clause 10.2;
 - 10.3.2 The defect arises because the Customer failed to follow the Company's oral or written instructions as to the installation, use, maintenance or cleaning of the Goods or (if there are none) good trade practice;
 - 10.3.3 The Customer alters or repairs the Goods without the Company's prior written consent;
 - 10.3.4 The defect arises as a result of fair wear and tear, wilful damage, negligence or abnormal storage or working conditions. For example, the Customer will be responsible for replacing parts that are expected to have a limited working life, such as batteries and rubber seals;
 - 10.3.5 The defect arises as a result of electrical or power supply failure;
- 10.4 Any notice of defect in the condition or performance of the Goods given by the Customer under clause 10.2 shall be made in writing to the Company within a reasonable time of discovery.
- 10.5 The benefit of the warranty under clause 10.2 is not transferable.
- 11.1 LIABILITY The implied terms in the Sale of Goods 1979 are excluded in respect of Customer's dealing otherwise than as consumer, except the implied terms about title.
- 11.2 Save only as provided in these Conditions the Company shall not be liable for any defect in the Goods caused by the manufacture of the Goods in

- accordance with any material, information or instruction supplied or provided by the Customer. The Customer shall indemnify and keep indemnified the Company against any and all loss, damage, claims, costs and expenses suffered or incurred by the Company in connection with any such defect.
- 11.3 Save only as provided in these Conditions the Company shall not in any event be liable for any special, indirect or consequential loss. Damage, costs or claims including but not limited to loss or damage resulting from negligence and loss of profit or revenue.
- 11.4 The Company's aggregate liability to the Customer in respect of any and all causes of action arising at any time in connection with the Goods, the Contract or its other subject-matter shall not exceed 125% of the price of the defective goods, which sum the Customer agrees is reasonable.
- 11.5 These Conditions shall not exclude, restrict or limit any liability the exclusion, restriction or limitation of which is for the time being prohibited by legislation or any right or remedy in respect of any such liability.
- 11.6 Each of the exclusions, restrictions and limitations of the Company's liability in these Conditions shall be separate and severable from every other such exclusion, restriction or limitation. If a court or competent jurisdiction finds any such exclusions, restrictions and limitations to be unenforceable to any extent the exclusions, restrictions and limitations shall save to such extent remain in full force and effect.
- 12.1 USE AND SAFETY The Goods are designed only for use in accordance with the Company's operating and maintenance instructions in relation to the Goods at the time of delivery. The Company warns that use, repair or adaptation of the Goods in any other manner may result in damage to the Goods or other property and/or affect the safety of the Goods.
- 12.2 No undertaking is given by the Company that goods will not infringe the Letters Patent or any other industrial property rights of any third party and the Customer accepts the goods on this understanding and agrees not to pursue any claim against the Company and to hold the Company harmless in respect of any alleged or actual infringement of such third party rights.
- 12.3 Save only as provided in these Conditions the Company shall not be liable for any loss or damage caused wholly or partly by the fitment to the Goods of any part, accessory or item of equipment which has not been manufactured or approved by the Company or by misuse of the Goods or failure to follow operating or maintenance instructions supplied by the Company. The Customer shall indemnify and keep indemnified the Company against any and all claims whatsoever in respect of any such loss or damage.
- 13.1 GOODS PURCHASED FOR RESALE In respect of any goods which are purchased by the Customer for resale, the Customer shall not apply its own trade or other marks to the Goods or their packaging without the written consent of the Company.
- 13.2 In respect of any Goods which are purchased by the Customer for resale, the Customer shall not alter or interfere with the Goods and shall comply with all applicable legislative and other requirements and standards and the Company's instructions in relation to the storage, handling and safety of the Goods. The Customer shall indemnify and keep indemnified the Company against any and all loss, damage, claims, costs and expenses suffered or incurred by the Company arising from any failure by the Customer to comply with this Condition.
- 14.1 DEFAULT AND TERMINATION If any of the events specified in Condition 14.2 occurs all monies accrued owing under the Contract shall become immediately due and payable and the Company shall be entitled at any time thereafter to terminate the Contract and any other contract between the Company and the Customer by notice and/or to suspend further deliveries of Goods the subject of any or all such contracts.
- 14.2 The events referred to in clause 14.1 are:
- 14.2.1 the Customer makes default in or commits a breach of the Contract;
- 14.2.2 any distress or execution is levied upon the Customer's property or assets;
- 14.2.3 the Customer makes or offers or proposes to make any arrangement or composition with its creditors, any resolution or petition to wind up the Customer is passed or presented, any petition for an administration order in respect of the Customer is presented, a petition for a bankruptcy order is made against the Customer, or a receiver or manager of the Customer's undertaking, property or assets or any part thereof is appointed; or
- 14.2.4 the Customer fails to provide any letter of credit, bill of exchange or other security requested by the Company.
- 15.1 FORCE MAJEURE Should the Company be prevented from or hindered or delayed in performing any of its obligations under the Contract by reason of strike, lock-out or trade dispute, acts of national or local government or other authority, Act of God, storm, tempest, fire, flood, explosion, accident, theft, civil disturbance, insurrection or war or by any other cause whatsoever beyond the Company's reasonable control then the Contract may be suspended and/or cancelled (whether or not while suspended) by the Company without notice and the Company shall have no liability in relation to any failure by it caused by such prevention, hindrance or delay, or any such delay, suspension or cancellation.
- 16.1 ANTI-BRIBERY CLAUSE The Customer will:
- 16.1.1 Comply with all applicable laws, regulations, codes and sanctions relating to anti-bribery and anti-corruption including, but not limited to:
- 16.1.1.a Local and national laws in the territories in which it operates.
- 16.1.1.b The UK Bribery Act 2010.
- 16.1.1.c The US Foreign Corrupt Practices Act 1977.
- 16.1.1.d The UN Convention Against Corruption.
- 16.1.2 Comply with the Halma plc Group Code of Conduct relating to bribery and corruption which may be found on the Halma website (www.halma.com).
- 16.1.3 Have in place its own policies and procedures to ensure compliance with this Clause.
- 16.1.4 Ensure that all parties with which it is associated or who are providing goods or services in connection with this Contract (including subcontractors, agents, consultants and other intermediaries) are aware of and comply with the requirements of this Clause.
- 16.1.5 Maintain complete and accurate records of all transactions and payments related to this Contract and, on reasonable request, disclose details of those transactions and payments to the Company.
- 16.1.6 On reasonable request confirm in writing to the Company that it has complied with the requirements of this Clause and, if so requested, allow the Company to verify this compliance by way of an audit of its records.
- 16.1.7 Immediately inform the Company if it suspects or becomes aware of any breach of this Clause by one of its employees, subcontractors, agents, consultants or other intermediaries and provide detailed information about the breach.
- 16.2 The Customer will indemnify, keep indemnified and hold harmless (on a full indemnity basis) the Company against all costs, expenses and losses that the Company incurs or suffers as a result of any breach by the Customer of any of its obligations under this Clause. This indemnity will not apply to any fine levied on the Company as a result of the Company's criminal liability.
- 16.3 If the Customer breaches this Clause the Company shall have the right to terminate this Contract without notice and with immediate effect and will be in no way liable to the Customer in respect of such termination for payment of damages or any other form of compensation.
- 17.1 GENERAL Each of the rights and remedies conferred on the Company by these Conditions shall be in addition and without prejudice to any other right or remedy which the Company may have under these Conditions or otherwise and in particular to any right to payment of all sums due or to become due in respect of the Goods.
- 17.2 No failure by the Company to enforce any of its rights under the Contract, or delay by the Company in enforcing any such rights, whether or not after knowledge of any breach of the Customer, shall constitute waiver thereof.
- 17.3 If any of these Conditions shall be held unenforceable, the remaining Conditions shall not be prejudiced thereby and shall continue in full force and effect.
- 17.4 Save only as provided in these Conditions time shall not be or be deemed to be of the essence of the Contract.
- 17.5 The Contract shall be personal to the Customer and the Customer shall not assign any of its rights under the Contract without the prior written consent of the Company.
- 17.6 Any notice under the Contract shall be given by letter or by telex, facsimile transmission or cable confirmed by letter.
- 17.7 Any reference in these Conditions to any provision of legislation shall be construed as a reference to that provision as amended, re-enacted or extended at the relevant time. Words in the singular include the plural and vice versa. The headings in these Conditions are for convenience only and shall not affect their interpretation.
- 17.8 The Contract shall be governed by and construed in all respects in accordance with English law and the Customer shall submit to the jurisdiction of the Supreme Court of justice in England in respect of any matters which may arise in connection with the Contract.
- 17.9 The Contract represents the entire understanding between the parties and supersedes any previous agreement between the Company and the Customer in relation to the subject matter.

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