

Discovery

Optical Smoke Detector



Product overview

Product	Optical Smoke Detector
Part No.	58000-600
Digital Communication	Discovery (XP95 and CoreProtocol® compatible)

Compliance



Product information

The Discovery Optical Smoke Detector works on the light scatter principle and is ideal for applications where slow burning or smouldering fires are likely.

- Responds well to slow burning, smouldering fires
- Well suited for accommodation decks, passages and escape routes
- Unaffected by wind or atmospheric pressure
- Rejection of transient signals
- Remote test feature
- Five EN54 approved response modes

Note: For system compatibility and feature support of this device, please refer to your chosen panel manufacturer.

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24V, 25°C and 50% RH unless otherwise stated.

Detection principle	Photo-electric detection of light scattered in a forward direction by smoke particles						
Chamber configuration	Horizontal optical bench housing an infrared emitter and sensor arranged radially to detect forward scattered light						
Sensor	Silicon PIN photo-diode						
Emitter	GaAlAs infra-red light emitting diode						
Sampling frequency	Once per second						
Supply Wiring	Two wire supply, polarity insensitive						
Terminal functions	<table border="0"> <tr> <td>L1 & L2</td> <td>Supply in & out connections</td> </tr> <tr> <td>+R</td> <td>Remote indicator positive connection (internal 2.2 kΩ resistance to positive)</td> </tr> <tr> <td>-R</td> <td>Remote indicator negative connection (internal 2.2 kΩ resistance to negative)</td> </tr> </table>	L1 & L2	Supply in & out connections	+R	Remote indicator positive connection (internal 2.2 kΩ resistance to positive)	-R	Remote indicator negative connection (internal 2.2 kΩ resistance to negative)
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+R	Remote indicator positive connection (internal 2.2 kΩ resistance to positive)						
-R	Remote indicator negative connection (internal 2.2 kΩ resistance to negative)						
Digital communication	Discovery, (XP95 and CoreProtocol compatible)						
Modulation voltage	5-9 V peak to peak						
Operating voltage	17 V - 28 V dc						
Quiescent current	300 μA						
Power-up surge current	1 mA						
Maximum power-up time	10 seconds						
Alarm indicator	Two clear 360° viewable light emitting diode (LED) illuminating red in alarm. Optional remote LED						
Alarm current, LED illuminated	3.5 mA						
Remote output characteristics	Connects to positive line through 4.5 kΩ (5 mA maximum)						
Clean-air analogue value	23 +4/-0						
Alarm level analogue value	55						
Operating temperature	-40°C to +70°C						
Storage temperature	-40°C to +80°C						
Humidity	0% to 95% RH (no condensation or icing)						
Vibration, impact and shock	EN54 - 7						
IP Rating	IP44						
Standards and approvals	EN 54-7, CPR, LPCB, VdS, BOSEC, SBSC, FG, CCMG, Kazaksthan						
Dimensions	100 mm diameter x 42 mm height (50 mm height with XPERT 7 base)						
Weight	105 g (160 g with XPERT 7 mounting base)						
Materials	<table border="0"> <tr> <td>Housing</td> <td>White flame-retardant polycarbonate</td> </tr> <tr> <td>Terminals</td> <td>Nickel plated stainless steel</td> </tr> </table>	Housing	White flame-retardant polycarbonate	Terminals	Nickel plated stainless steel		
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Terminals	Nickel plated stainless steel						

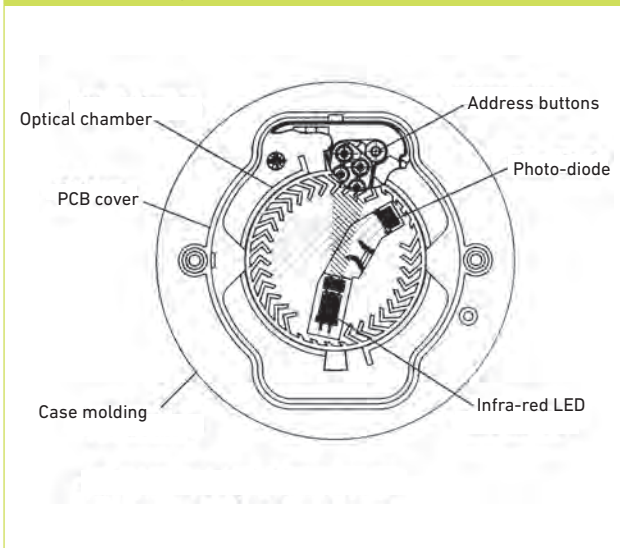
Operation

The Discovery 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 labyrinth chamber with integral gauze surrounding the optical measuring system and on the other the address capture, signal processing and communications electronics.

An infrared light emitting diode within its collimator is arranged at an obtuse angle to the photo-diode. The photo-diode has an integral daylight blocking filter.

The IR LED emits a burst of collimated light every second. In clear air the photo-diode receives no light directly from the IR LED because of the angular arrangement and the 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.

Discovery Optical Smoke Detector schematic diagram



Electrical description

The Discovery Optical Smoke Detector is designed to be connected to a two wire loop circuit carrying both data and a 17 V to 28 V dc supply. The detector is connected to the incoming and outgoing supply via terminals L1 and L2 in the mounting base. A remote LED indicator requiring not more than 4 mA at 5 V may be connected between the +R and -R terminals. An earth connection terminal is also provided. The detector is calibrated to give an analogue value of 23 \pm 4/-0 counts in clean air. This value increases with smoke density. A count of 55 corresponds to the alarm level analogue value.

Features

Response modes

Discovery Optical Smoke Detectors can be operated in any one of five EN54 approved response modes, which can be selected through the fire control panel. Each mode corresponds to a unique response behaviour, which is related to sensitivity to fire. Mode 1 gives a higher sensitivity to fire than Mode 5.

Discovery Optical Smoke Detector Response Times

Mode	Alarm threshold (%/m)	dB/m	Minimum time to alarm (Seconds)
1	1.4	0.08	5
2	1.4	0.08	30
3	2.1	0.12	5
4	2.1	0.12	30
5	2.4	0.14	5

Flashing LEDs

Discovery Optical Smoke Detectors have two integral LED indicators, which can be illuminated at any time by the fire control panel to indicate detectors in alarm. A flashing LED mode can also be programmed to activate each time a detector is polled.

Remote test feature

The remote test feature is enabled from the fire control panel. On receipt of the command signal from the fire control panel, the detector is forced electrically into alarm. An analogue value of 85 is returned to the fire control panel to indicate that the detector is working correctly.

Rejection of transient signals

Discovery detectors are designed to give low sensitivity to very rapid changes in the sensor output, since these are unlikely to be caused by real fire conditions, resulting in fewer false alarms.

Drift compensation

Discovery Optical Smoke Detectors include compensation for signal drift to compensate for changes in the sensor output caused, for example by dust in the chamber, and will therefore hold the sensitivity at a constant level even with severe chamber contamination. This increased stability is achieved without significantly affecting the detectors sensitivity to fire whilst still meeting the requirements of the EN54 standard.

EMC Directive 2014/30/EU

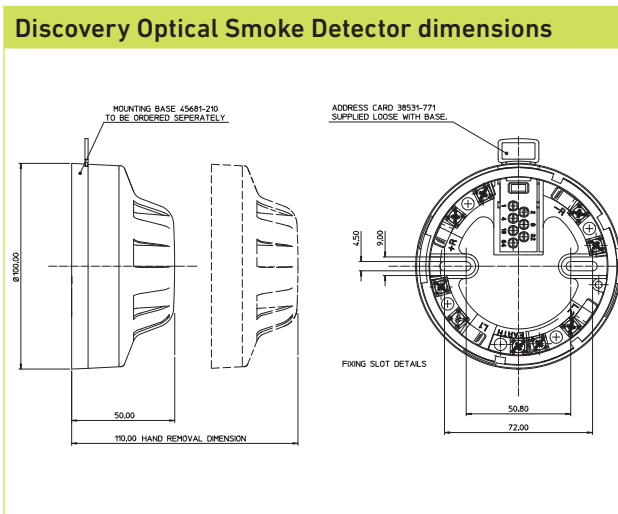
The Discovery Optical Smoke Detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this data sheet.

A copy of the Declaration of Conformity is available from the Apollo website: www.apollo-fire.co.uk.

Construction Products Regulation 305/2011/EU

The Discovery Optical Smoke Detector complies with the essential requirements of the Construction Products Regulation 305/2011/EU.

A copy of the Declaration of Performance is available from the Apollo website: www.apollo-fire.co.uk



Response characteristics of Discovery Optical Smoke Detectors

Type of fire	Response
Overheating/thermal combustion	Very Good
Smouldering/glowing combustion	Moderate/Good
Flaming combustion	Good
Flaming with high heat output	Good
Flaming - clean burning	Poor

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Discovery

Heat Detector



Product overview

Product	Heat Detector
Part No.	58000-400
Digital Communication	Discovery (XP95 and CoreProtocol® compatible)

Compliance



Product information

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 micro-controller, gives an approximately linear characteristic from 10°C to 80°C. This linearised signal is further processed, depending upon the response mode selected, and converted to an analogue output.

- Unaffected by wind or atmospheric pressure
- Ideal for environments that are dirty or smoky under normal circumstances
- Well suited to kitchens and smoking rooms
- Five EN54 approved response modes
- Remote test feature

Note: For system compatibility and feature support of this device, please refer to your chosen panel manufacturer.

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24V, 25°C and 50% RH unless otherwise stated.

Detection principle	Heat sensitive resistance
Sensor	Single NTC thermistor
Sampling frequency	Once per second
Supply Wiring	Two wire supply, polarity insensitive
Terminal functions	L1 and L2 Supply in and out connections +R Remote indicator positive connection (internal 2.2 kΩ resistance to positive) -R Remote indicator negative connection (internal 2.2 kΩ resistance to negative)
Operating voltage	17 - 28 V dc
Communication protocol	Discovery (XP95 and CoreProtocol compatible)
Modulation voltage	5 V to 9 V peak to peak
Quiescent current	400 μA
Power-up surge current	1mA
Maximum power-up time	10 seconds
Alarm indicator	Two red light emitting diodes (LEDs) Optional remote LED
Alarm level analogue value	55
Alarm LED current	3.5 mA
Remote output characteristics	Connects to positive line through 4.5 kΩ (5 mA maximum)
Storage temperature	-40°C to +80°C
Operating temperature	See table overleaf response mode temperatures
Humidity (no condensation or icing)	0% to 95% RH
Effect of atmospheric pressure	None
Effect of wind speed	None in fixed temperature use
Vibration, impact and shock	EN 54-5
IP Rating	IP44
Standards and approvals	EN 54-5, CPR, LPCB, VdS, BOSEC, SBSC, CCMG, Kazakhstan
Dimensions	100 mm diameter x 42 mm height
Weight	105 g
Materials	Housing: White flame-retardant polycarbonate Terminals: Nickel plated stainless steel

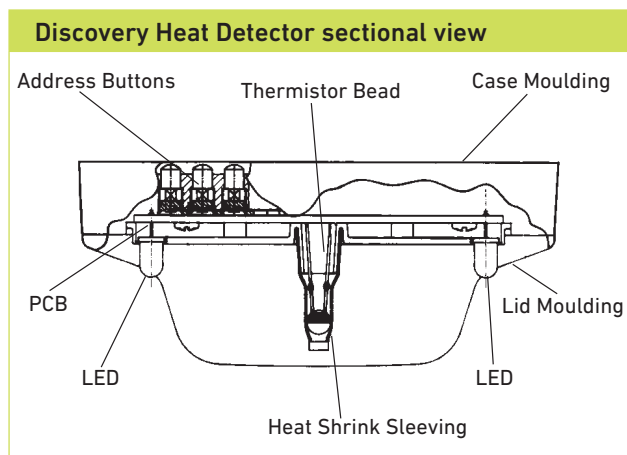
Operation

In the Discovery Heat Detector, the five response modes correspond to the five 'classes' as defined in EN 54-5. The classes in this standard correspond to different 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 the table on the right.

In addition to the basic classification, each detector mode has 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 unheated areas 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 of detector is therefore suitable for areas such as galleys and engine rooms where large, rapid temperature changes are considered normal.



Electrical description

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

Features

Response modes

Discovery Heat Detectors can be operated in any one of five EN54 approved response modes, which can be selected through the fire control panel. Each mode corresponds to a unique response behaviour, which is related to sensitivity to fire. Mode 1 gives a higher sensitivity to fire than Mode 5.

Discovery Heat Detector response modes						
Mode	Class EN54- 5	Application temperature		Static Response Temperature °C		
		Typ	Max	Min	Typ	Max
1	A1R	25°C	50°C	54°C	57°C	65°C
2	A2R	25°C	50°C	54°C	61°C	70°C
3	A2S	25°C	50°C	54°C	61°C	70°C
4	CR	55°C	80°C	84°C	90°C	100°C
5	CS	55°C	80°C	84°C	90°C	100°C

Flashing LEDs

Discovery Heat Detectors have two integral LED indicators, which can be illuminated at any time by the fire control panel to indicate detectors in alarm. A flashing LED mode can also be programmed to activate each time a detector is polled.

Remote test feature

The remote test feature is enabled from the fire control panel. On receipt of the command signal from the fire control panel, the detector is forced electrically into alarm. An analogue value of 85 is returned to the fire control panel to indicate that the detector is working correctly.

Rejection of transient signals

Discovery detectors are designed to give low sensitivity to very rapid changes in the sensor output, since these are unlikely to be caused by real fire conditions, resulting in fewer false alarms.

EMC Directive 2014/30/EU

The Discovery Heat Detector complies with the essential requirements of the EMC Directive 2014/30/EU provided that it is used as described in this data sheet.

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

Conformity of the Discovery Heat Detector with the EMC Directive, does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation 305/2011/EU

The Discovery Heat Detector complies with the essential requirements of the Construction Products Regulation 305/2011/EU.

A copy of the Declaration of Performance is available from Apollo upon request.

Discovery

Optical/Heat Multisensor Detector



Product overview

Product	Optical/Heat Multisensor Detector
Part No.	58000-700
Digital Communication	Discovery (XP95 and CoreProtocol® compatible)

Compliance



Product information

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.

- Ideal for a wide range of applications
- Enhanced false alarm management
- Unaffected by wind or atmospheric pressure
- Well suited to sensitive environments
- Five EN54 approved response modes
- Heat only and optical only options
- Remote test feature

Note: For system compatibility and feature support of this device, please refer to your chosen panel manufacturer.

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24V, 25°C and 50% RH unless otherwise stated.

Detection principle	Smoke: Photo-electric detection of light scattered by smoke particles Heat: Temperature-dependent resistance
Supply Wiring	Two wire supply, polarity insensitive
Terminal functions	L1 & L2 Supply in & 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 - 28 V dc
Communication protocol	Discovery (XP95 and CoreProtocol compatible)
Modulation voltage	5 - 9 V peak to peak
Quiescent current	400 μA
Power-up surge current	1 mA
Maximum power-up time	10 seconds
Alarm current, LED illuminated	3.5 mA
Remote output characteristics	Connects to a positive line through 4.5 kΩ (5 mA maximum)
Clean air analogue value	23 +4/-0
Alarm level analogue value	55
Alarm indicator	Two white diffused LEDs, illuminated red in alarm. Optional remote LED
Operating temperature	-40°C to +70°C
Storage temperature	-40°C to +80°C
Humidity	0% to 95% RH (no condensation or icing)
Effect of temperature on optical sensor	Less than 15% change in sensitivity over rated change. Slow changes in ambient conditions will automatically be compensated and will not affect sensitivity
Effect of wind speed on optical sensor	None
Vibration, impact and shock	EN 54-7
IP Rating	IP44
Standards and approvals	EN 54-5, EN 54-7, CPR, LPCB, VdS, BOSEC, SBSC, FG, CCMG, Kazakhstan
Dimensions	100 mm, diameter x 50 mm height
Weight	105 g
Materials	Housing: White flame-retardant polycarbonate 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	Once per second

Operation

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 detector 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 detectors 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

The Discovery Optical/Heat Multisensor detector incorporates additional temperature information intended for use in signal processing.

Temperature data can be read separately by the control panel* 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.

Electrical description

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

Features

Response modes

Discovery Optical/Heat Multisensor detectors can be operated in any one of five EN54 approved response modes, which can be selected through the fire control panel. Each mode corresponds to a unique response behaviour, which is related to sensitivity to fire. Mode 1 gives a higher sensitivity to fire than Mode 5.

Discovery Optical/Heat Multisensor detector operating modes

Mode	Smoke sensitivity (grey smoke)		Temp sensitivity (relative)	Response type	Minimum time to alarm (seconds)
	%/m	dB/m			
1	1.1	0.06	High	Multisensor	20
2	2.1	0.12	Not set to heat response	Optical	30
3	2.8	0.16	Low	Multisensor	20
4	4.2	0.24	2.1	Multisensor	20
5 [†]	No response to smoke		See Mode 5 [†]	Heat A1R	15

Characteristics of the response modes

The processing algorithms in modes 1 to 4 incorporate drift compensation. The characteristics of the five response modes listed above are summarised as follows:

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 flaming and smouldering 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 EN 54-5. 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 the control panels that have been programmed to read the additional information.*
2. *In-situ testing of a multisensor detector should be done as for smoke detectors in response Mode 2 and for heat detectors in response Mode 5. Both optical and heat modes should be tested in Modes 1, 3 and 4.*
3. *If the multisensor detector is to be used in Mode 5, heat detector spacing/coverage should be applied.*

Flashing LEDs

Discovery Optical/Heat Multisensor detectors have two integral LED indicators, which can be illuminated at any time by the fire control panel to indicate detectors in alarm. A flashing LED mode can also be programmed to activate each time a detector is polled.

Remote test feature

The remote test feature is enabled from the fire control panel. On receipt of the command signal from the fire control panel, the detector is forced electrically into alarm. An analogue value of 85 is returned to the fire control panel to indicate that the detector is working correctly.

Rejection of transient signals

Discovery detectors are designed to give low sensitivity to very rapid changes in the sensor output, since these are unlikely to be caused by real fire conditions, resulting in fewer false alarms.

Drift compensation

Discovery Optical/Heat Multisensor detectors include compensation for signal drift to compensate for changes in the sensor output caused, for example by dust in the chamber, and will therefore hold the sensitivity at a constant level even with severe chamber contamination. This increased stability is achieved without significantly affecting the detectors sensitivity to fire whilst still meeting the requirements of the EN54 standard.

EMC Directive 2014/30/EU

The Discovery Optical/Heat Multisensor detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this data sheet.

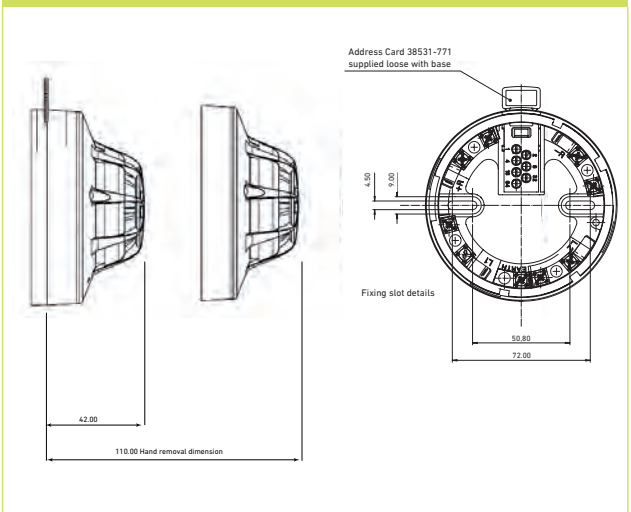
A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation 305/2011/EU

The Discovery Optical/Heat Multisensor detector complies with the essential requirements of the Construction Products Regulation 305/2011/EU.

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

Discovery Optical/Heat Multisensor detector dimensions



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XPERT 8 Intelligent Mounting Base



Technical Data

Terminal functions <i>(Note: With reference to Figures 1,2 & 3, L1 & L2 are polarity sensitive when used with a Soteria detector)</i>	+L2	Loop in & out positive
	-L1 in	Loop (isolated) negative
	-L1 out	Loop (isolated) negative
		Functional earth
	+R	Remote indicator positive connection
	-R	Remote indicator negative connection
Dimensions	100mm diameter x 20mm height (Base with Soteria Optical Smoke Detector 48mm height)	
	Weight	63g

Product Overview

Product Type	Mounting Base
Part No.	SA5000-200

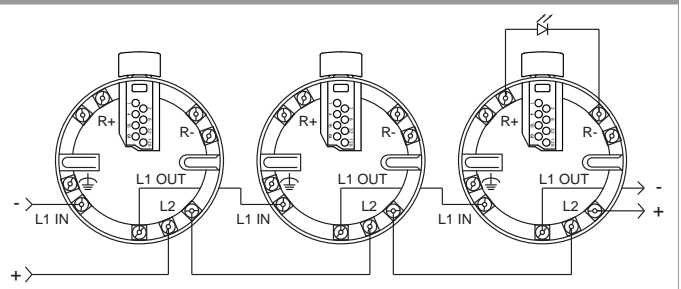
Product Information

All detectors in the Soteria®, Discovery® and XP95® range fit into the XPERT 8 Intelligent Mounting Base. The base has a wide interior diameter for ease of access to cables and terminals. The 'E-Z Fit' feature allows you to fit the base screws, place the XPERT 8 Intelligent Mounting Base over the screws, slide it into place and tighten the screws. The detector requires a clockwise rotation into the base for fitting. Additionally the detector can be locked into the base for increased security, by a grub screw using a 1.5mm hexagonal driver. The XPERT 8 card, Part Number 38532-064, supplied with the base, has pre-punched pips to remove to set the address. Refer to the XPERT 8 Intelligent Mounting Base Installation Guide 39215-005 for details on how to set the address.

- Compatibility with Soteria, Discovery and XP95 detectors
- Isolated and Non-isolated devices supported
- Isolated wiper - maintains loop connectivity during temporary removal of devices
- Supplied with XPERT 8 Card for CoreProtocol® *
- 'E-Z Fit' allows for simple mounting of the detector base after wiring
- Base mark allows for LED detector alignment

* Note: XPERT 8 card increases the address capacity to 254 when using Soteria detectors and CoreProtocol enabled fire control panels.

Figure 1 Wiring Diagram for Detectors with Isolator*



*Note: Detectors without isolators will work with the above connections, however if there are no isolators in the system or it is a retrofit application, the arrangement below is recommended.

Figure 2 Wiring Diagram for Detectors without Isolator

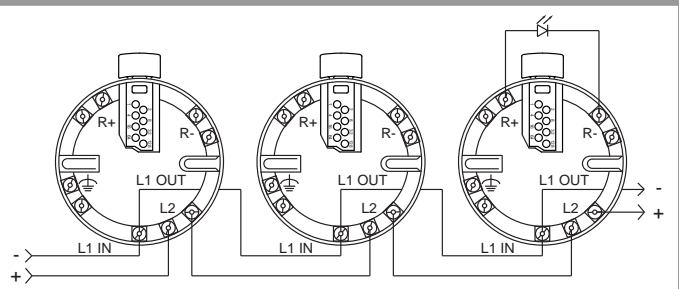


Figure 3 Wiring Diagram for Detectors without Isolator with common Remote LED

