

# Apollo Discovery ASD-1

## Product Guide

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 **DISCOVERY<sup>®</sup> ASD**

  
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WORLD CLASS FIRE SOLUTIONS



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## Document Conventions

The following typographic conventions are used in this document:

| Convention     | Description   |
|----------------|---|
| <b>Bold</b>    | <b>Used to denote:</b> emphasis.<br>Used for names of menus, menu options, toolbar buttons                              |
| <i>Italics</i> | <b>Used to denote:</b> references to other parts of this document or other documents. Used for the result of an action. |

The following icons are used in this document:

| Convention  | Description   |
|---|---|
|  | <b>Caution:</b> This icon is used to indicate that there is a danger to equipment. The danger could be loss of data, physical damage, or permanent corruption of configuration details. |
|  | <b>Warning:</b> This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.   |
|  | <b>Warning:</b> This icon is used to indicate that there is a danger of inhaling dangerous substances. This may lead to death or permanent injury.                                      |

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# 1 Introduction

The Apollo Discovery ASD-1 is an aspirating smoke detection system that utilizes an air-sampling pipe network to draw air towards conventional or analog addressable point detectors in an aspirated enclosure.

The single channel Discovery ASD-1 system has provision for one or two point detectors allowing for single, failsafe redundancy or mixed detection strategies.

Point detectors are wired directly into the signalling circuit connected to the monitoring fire alarm control panel. Any alarms or faults derived from the analog or conventional point detector will be reported directly to monitoring fire panel through the signalling circuit for that detector.

The Discovery ASD-1 system provides airflow monitoring circuitry and an aspiration system that is configurable. The airflow level is displayed on a ten element bar graph with adjustments for flow sensitivity and high/low flow thresholds. Flow failure is reported to the central panel via an internal mini switch module.

**Important Note:** Aspirating Smoke Detectors supplied and installed within the EU from July 2011 must conform to the Construction Products Regulation (EU) 305/2011 (CPR) and the related European Standard EN 54-20.

This unit has been tested and certified to ensure general conformance to the above directive and standard but strict adherence to this Product Guide is required to ensure that the installation meets these requirements in all respects.

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## 2 Installation

The Discovery ASD-1 is provided with the following components:

- 1 detector enclosure fitted with Discovery Optical point detector and Mini Switch Monitor
- 1 corner stud key
- 1 ferrite core
- 1 mounting template
- 1 product guide

Check all components for damage and refer any concerns to your authorized representative.

It is necessary to procure screws and inserts appropriate for the installation location.

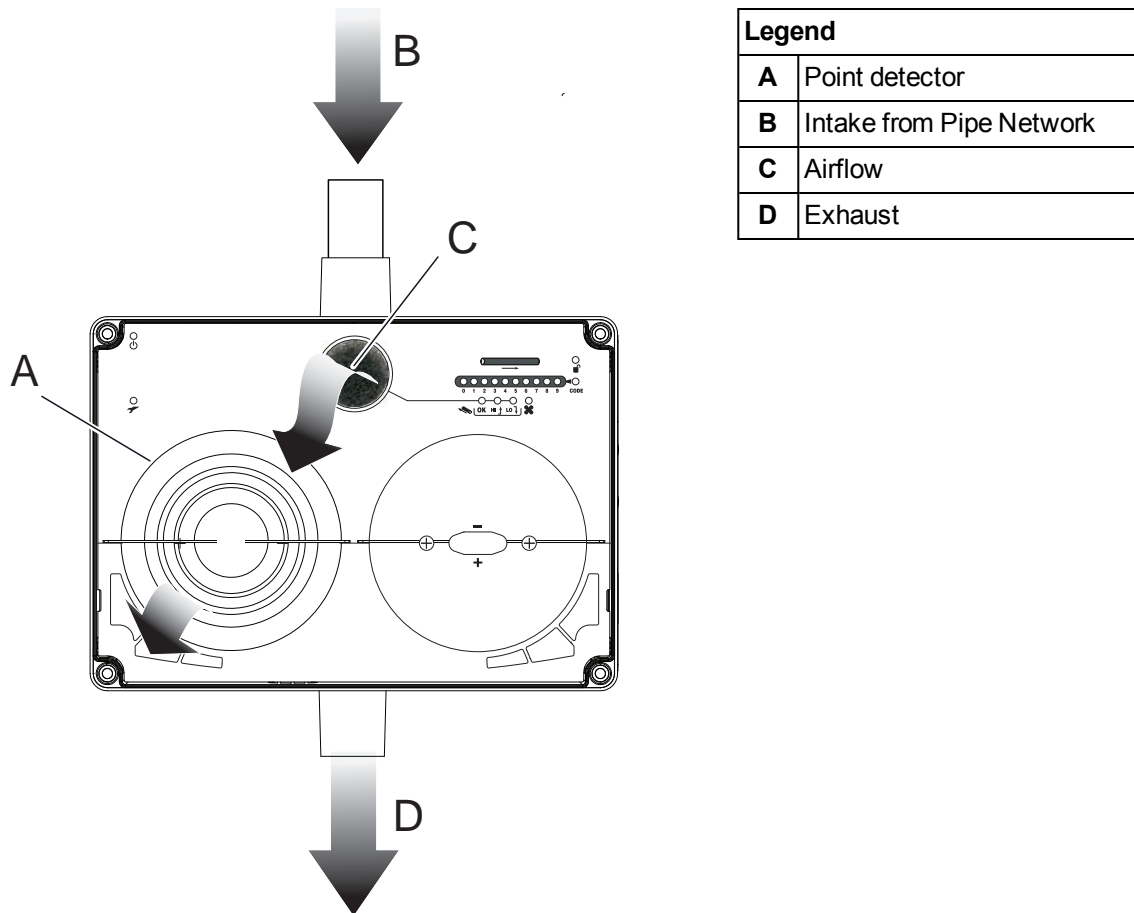


Figure 2-1: Detector Enclosure

### 2.1 Baffles

It is necessary to fit baffles to the Discovery ASD-1 system to ensure that the samples airflow is directed towards the point detector. The baffle is shaped to match the point detector and simply clips into position in the slots provided in the transparent lid.

## 2.2 Mounting the Detector Enclosure

### Notes:

- This equipment must be installed by a qualified installer in accordance with all local and national code requirements.
- The detector assembly must be installed at an accessible position to facilitate maintenance and testing.
- Ensure that there is sufficient clearance to mount the detector, noting the location of air sampling pipes and cable entry points. Owing to the rigid nature of the plastic pipe, installation must provide for sufficient movement in all pipe work (air inlet, air exhaust and cable pipes) to allow pipe ends to be easily fitted and removed.
- Ensure that the exhaust pipe is free from any obstacles at all times.
- Do not mount the detector assembly close to a heat source.
- Mount the detector assembly in a secure location which is accessible only by authorised personnel.



**Warning:** Prior to drilling the attachment holes for the mounting bracket, ensure that all mounting surfaces (i.e. walls, cabinet sides, etc.) are clear of electrical wiring and plumbing.

### Mounting Procedure:

1. Remove the transparent cover (D) by using the corner stud key (B) to unscrew the tamper-proof corner studs (A).
2. Tape the mounting template to the mounting surface and use it to accurately mark the holes corresponding to the four corner fixing points.
3. Drill four holes in the mounting surface.
4. Remove the mounting template.
5. Secure the detector enclosure to the mounting surface through the four corner fixing points. Use appropriate fasteners for the type of surface that the unit is mounted on. The diameter of each mounting hole is 5 mm. Typical No. 8 mounting hardware can be used in the mounting holes.

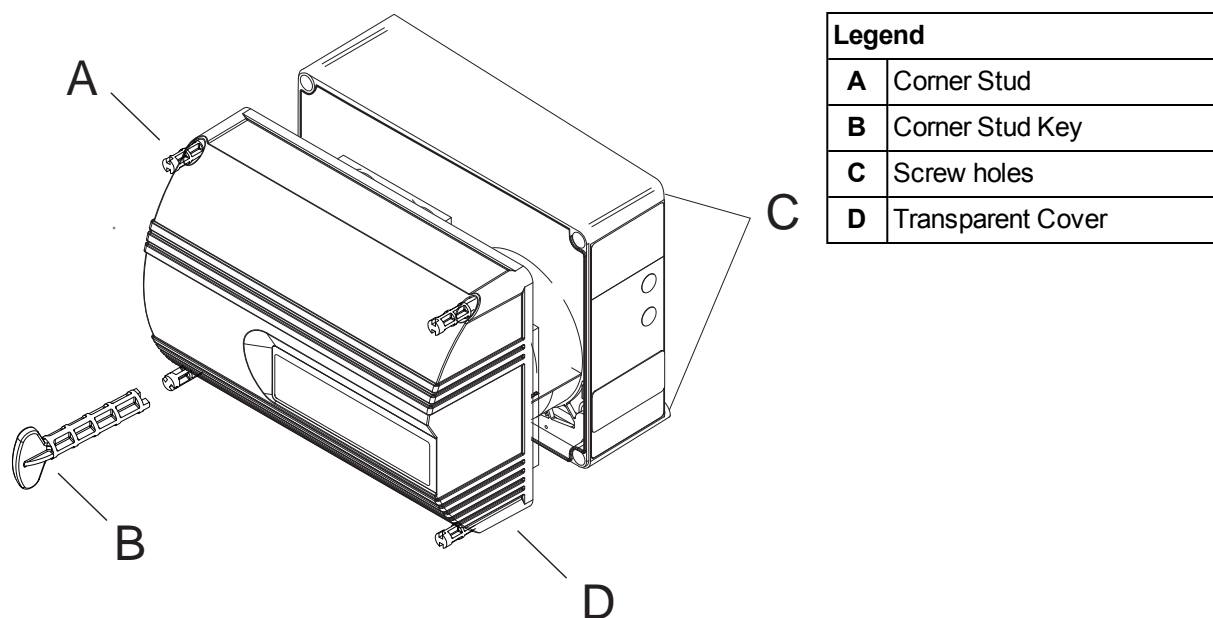


Figure 2-2: Detector Enclosure

Dimensions:

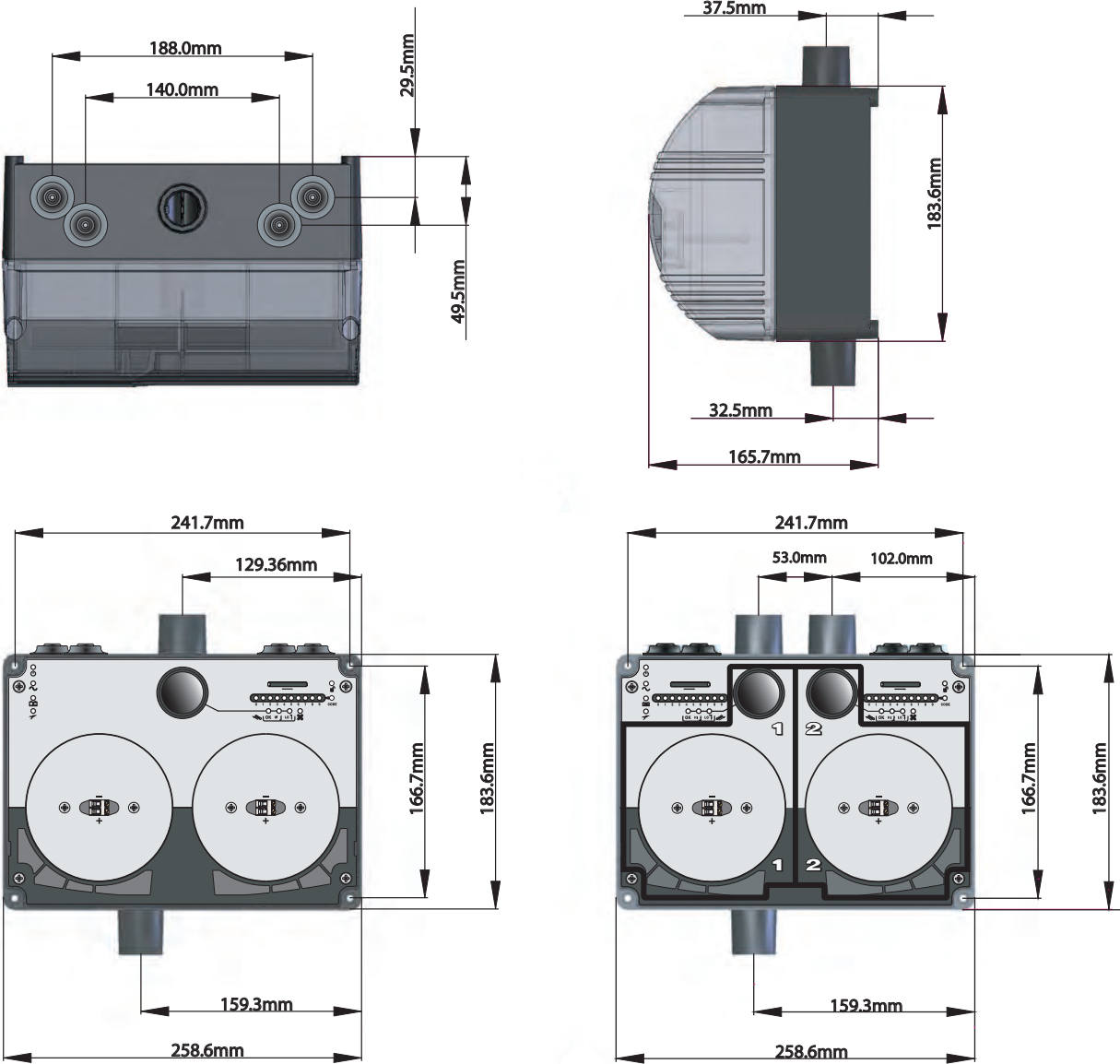


Figure 2-3: Detector Enclosure Dimensions

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## 3 Wiring

The following wiring connections must be made to the detector housing:

- 24V DC Power Supply. Refer to Section 3.3 for further information.

This wiring enters the detector housing via cable seals and is connected to the appropriate terminals on the main circuit board or display board. The terminals allow wire with a maximum diameter of 2.5mm<sup>2</sup>.



**Warning:** To prevent risk of electric shock or possible injury from the rotation of the high performance fan, the system should be isolated from the power supply when the display board is removed.



**Caution:** When installing or servicing the unit, ensure that the operator is safely grounded so as to prevent electro-static discharge (ESD) damage to the unit.

### 3.1 Wiring Access

For correct operation of the unit it is essential that the case is fully sealed so that air can only be drawn into the system through the aspirating pipe. For this reason, all wiring must pass through the cable seals provided and no additional holes should be made in the detector housing.

In order to pass a cable through a seal, make a small hole in the centre of the seal with a pointed implement (e.g. small screwdriver) and then force the cable through the hole into the box. The small hole should expand to accommodate any cable diameter from 4 to 10 mm (0.16 to 0.43 in.). If the seal is not airtight, then it may be necessary to use a non-reactive resin or glue to create an airtight seal in order to maintain an IP65 rating, to ensure that air is only drawn through the air sampling pipe network.

### 3.2 Connect Wiring

In order to gain access to the main circuit board for connection of the wiring, remove the display/detector mounting board which is held in place by the clear top cover. To fully remove the display/detector mounting board, disconnect the ribbon cable from the rear of the board.



**Caution:** Care should be taken when removing the board to ensure that the ribbon cable on the underside is not strained.



**Caution:** Due to the failsafe relay, opposite switch positions are printed on the PCB.



**Warning:** To prevent risk of electric shock or possible injury from the rotation of the high performance fan, the system should be isolated from the power supply when the display board is removed.

All connections to the main circuit board are to pluggable terminals that can accommodate wire sizes up to 2.5mm<sup>2</sup>.

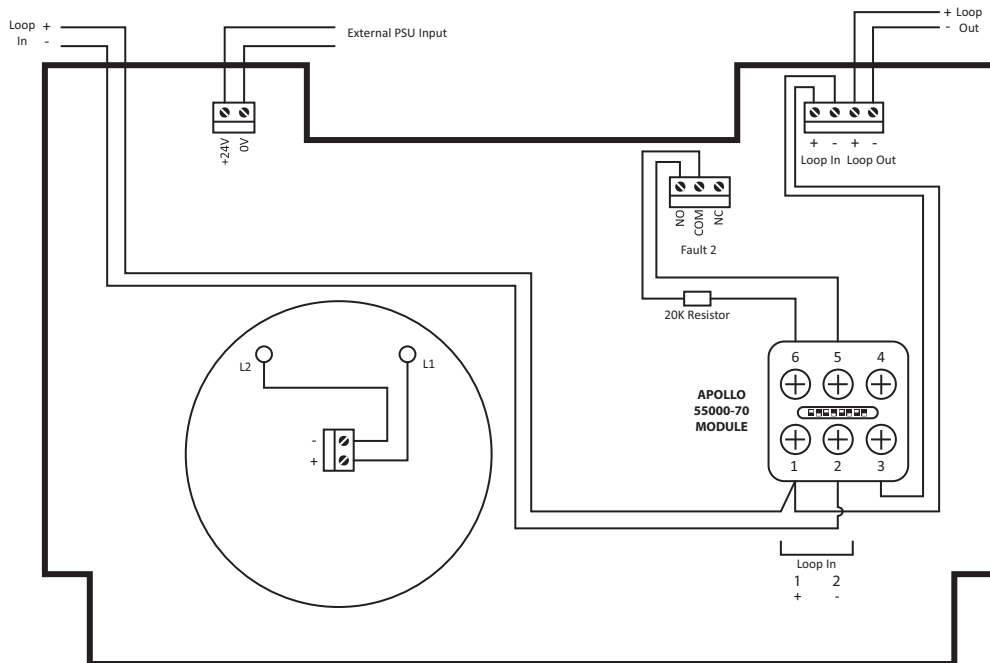


Figure 3-1: Field connectors for the Discovery ASD-1 detector

### 3.3 Battery Terminal



Figure 3-2: Ferrite core and battery supply wiring

The Discovery ASD-1 unit is designed to run from a 24 VDC supply. The supply should be connected to the two way BATTERY connector on the main circuit board ensuring that the wires are correctly orientated. The minimum recommended wire size is 16 x 0.25 mm (18 AWG), or larger if the supply is further than 5 m (16.4 ft) from the system.

A ferrite core is provided for EMC compliance. This should be fitted to the supply wiring as shown in Figure 3-2.

The power requirements are dependant on the fan speed. Refer to Section 10.1 on page 25.

## 4 Pipe Installation

This section provides a simple guide to pipe installation and should contain all the information required for simple installations based on the standard configurations shown in Section 4.7.

More information on achieving an EN54-20 compliant pipe installation can be found in Chapter 8.

Use appropriate pipe with a sampling point hole drilled along its length. The pipe run is terminated by a closed end cap unless the end cap is the sampling point. The position of the sampling point should be in the accordance with the rules for the positioning of a point detector.

### 4.1 Pipe Specification

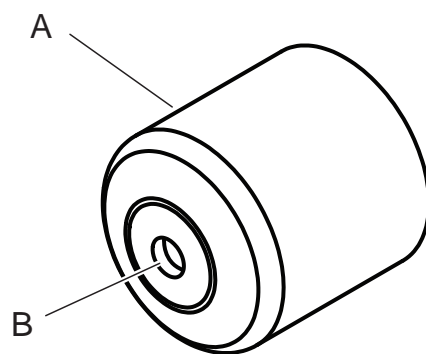
For EN54-20 compliance, the pipe should be Red ABS to EN 61386-1: 2004 (Crush 1, Impact 1, Temp 31) with a nominal diameter of 25 mm (or 0.98 in.). The sample pipe is normally supplied in 3 m lengths and is cut as required and joined by solvent welded sockets (permanent), or socket unions (removable).

**Note:** The Discovery ASD-1 inlet port is tapered to allow a push fit of the sampling pipe. The pipe should be cut squarely to ensure a good, airtight seal. Solvent adhesive should not be used for this joint.

### 4.2 Fixings

The normal fixing methods are pipe clips, saddle clamps or even tie wraps. Fixing centers are typically 1.5 m (4.9 ft) apart.

### 4.3 End Cap with Sampling Hole



| Legend |                   |
|--------|-------------------|
| A      | End Cap           |
| B      | 8mm Sampling Hole |

Figure 4-1: End cap with 8mm hole drilled in center

### 4.4 Bends

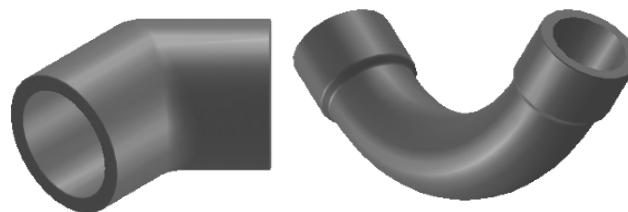


Figure 4-2: 45° bend and 90° swept bend

Bends are either 45° or 90°. For 90° bends, it is important that swept bends are used and not sharp elbows, as this will introduce unnecessary pressure losses, and increase the response times from holes beyond the bend.

## 4.5 Exhaust

Where the Discovery ASD-1 is located outside the protected area, consideration must be given to returning the exhaust air to the protected environment to balance pressure differences that may exist between the two areas. In the majority of applications, this is not necessary as pressure differences are minimal.

Examples of where the exhaust should be returned to the protected area include:

- where pressure differences exceed 50 Pa from where the detector is located outside the protected area.
- where there are hazardous substances inside the protected area, for example hospital operating theatres, laboratories.

Pipe of the same specification as the sampling pipe runs should be used and its length limited to a maximum of 10 m (30 ft) to avoid significant reduction in the airflow. Care should be taken to position the new exhaust outlet where it cannot be accidentally or deliberately blocked.

Return air pipes need to be as short as possible to minimize the effect of airflow resistance in the return air pipe network.

## 4.6 Filters



Figure 4-3: Filter at inlet of system

The sampled air is passed through a filter (order code 29600-946APO) before entering the detector chamber.

## 4.7 Standard Configurations

### 4.7.1 Configuration with Single Pipe

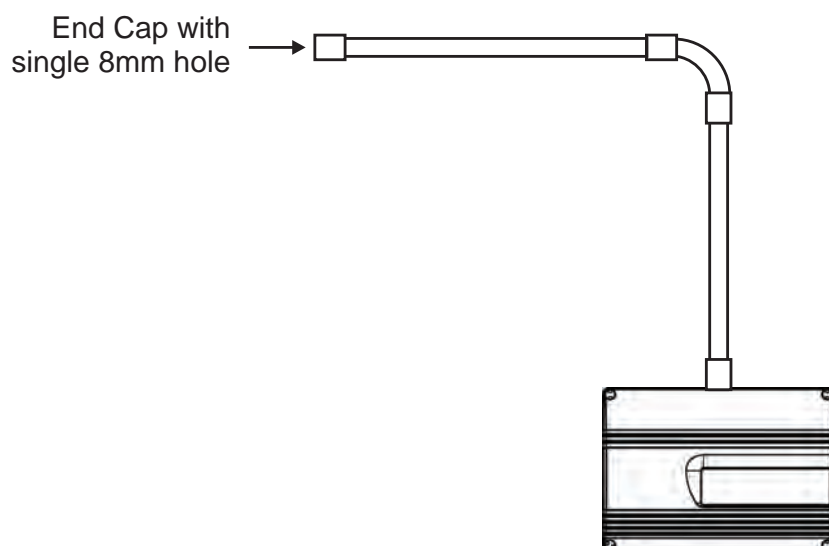


Figure 4-4: Example of the Discovery ASD-1 system with one pipe

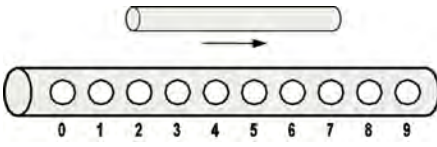
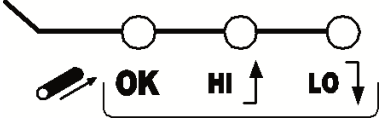







**Note:** Please see the table in Chapter 8 for EN54-20 hole and pipe length limits for certified detectors.



## 5 Set-up

### 5.1 Display Functions

The icons that are present on the system display are shown below.

- |         |   |                                       |
|---------|---|---------------------------------------|
| 1       |    | BARGRAPH of AIRFLOW SPEED             |
| 2, 3, 4 |    | AIRFLOW OK, HIGH AIRFLOW, LOW AIRFLOW |
| 5       |    | POWER ON                              |
| 6       |    | GENERAL FAULT (Mains PSU Option Only) |
| 7       |    | MAINS FAILURE (Mains PSU Option Only) |
| 8       |  | BATTERY LOW (Mains PSU Option Only)   |
| 9       |  | FAN FAULT                             |
| 10      |  | CODE ENTRY                            |
| 11      |  | UNLOCK                                |

## 5.2 User Functions

Press and hold SELECT and CHANGE keys simultaneously for 1 sec to initialize function selection.

Press and release SELECT key to sequentially step through functions.

Press and release CHANGE key to modify setting.

The relevant LED flashes continuously to indicate the function selected.



To enable updates to the system, enter the three digit access code (510). To enter numbers into the system, each number must be sequentially selected in turn. For example to select 5, press the CHANGE key six times to illuminate the number 5 LED on the display then press the SELECT button. During this operation, the CODE LED flashes, then the UNLOCK LED illuminates on successful entry.

A description of Discovery ASD-1 user functions are shown in the following table.

Table 5-1: User Functions for the Discovery ASD-1 System

| <b>Function</b>   | <b>Display</b>                      | <b>Special Instructions</b>  |
|---|-------------------------------------|--|
| Set fan speed   | POWER LED flashes                   | -  |
| Set sensitivity of bar graph to changes in airflow velocity                       | FLOW OK flashes                     | -  |
| Select the BARGRAPH LED segment above which the FLOW HIGH LED will be illuminated | FLOW HIGH flashes                   | -  |
| Select the BARGRAPH LED segment below which the FLOW LOW LED will be illuminated  | FLOW LOW flashes                    | -  |
| Set FLOW DELAY time of both channels  | FLOW HI and FLOW LO LEDs both flash | Please see Section 5.3 for information on flow delays.   |
| Calibrate flow sensors  | FAN FAULT LED flashes               | CHANGE key must be pressed for at least 2 seconds to initiate the flow calibration process. FAN and POWER LEDs flash to indicate calibration in progress. Fan is temporarily stopped as part of the calibration process. The system will reset and revert to normal operating mode when flow calibration is completed. |

Pressing the SELECT key for longer than 1 second when the unit is unlocked will cause the unit to revert to normal operating mode.

## 5.3 Set-up Notes

The Fan Speed, Flow Limits and Flow Sensitivity need to be set for each installation prior to Flow Calibration and testing. It is not possible to provide the settings for all possible installations but the following guidelines should assist in the commissioning of the unit.

### 5.3.1 Fan Speed

The Fan Speed should be set as high as possible to achieve the fastest transport time from the sampling point to the detectors, this is especially important for longer pipe lengths and for installations that must conform to the requirements of EN54-20 (refer to Chapter 8). There is, however, a balance to be achieved between performance and the power requirements for the system and reference should be made to the current consumption figures in the specifications prior to setting this value.

### 5.3.2 Flow Delays

By default, an increase or decrease in flow beyond the FLOW HIGH and FLOW LO limits will result in a FLOW FAULT after a delay of approximately 30 seconds. Once the flow is returned to a normal level, the fault condition will be cleared within 18 seconds.

In environments where the sampled airflow may be affected by sudden temperature or pressure changes, or if there is a risk of physical interference of the sampling point (e.g. prison cell applications) then it may be necessary to increase the delay between when flow limit has been exceeded and instigating a FLOW FAULT condition.

Table 5-2: Flow Delay Settings for the Discovery ASD-1 system

| Bargraph LED | Flow into Fault Delay (Seconds) | Flow out of Fault Delay (Seconds) |
|--------------|---------------------------------|-----------------------------------|
| 0            | 15                              | 2                                 |
| 1            | 30                              | 18                                |
| 2            | 60                              | 18                                |
| 3            | 90                              | 18                                |
| 4            | 120                             | 18                                |
| 5            | 150                             | 18                                |
| 6            | 180                             | 18                                |
| 7            | 210                             | 18                                |
| 8            | 240                             | 18                                |
| 9            | 270                             | 18                                |

**Note:** Timings are approximate.

**Note:** The default flow delay setting is 1.

### 5.3.3 Flow Sensitivity

This setting determines the units responsiveness in reporting blocked sampling points or broken pipes.

The default flow sensitivity value of 9 will configure the unit to declare a flow fault whenever there has been a change in volumetric airflow of  $\pm 20\%$  from the calibrated reading for at least the duration of the flow delay, see Section 5.3. For most installations, especially if compliance with EN54-20 is required, the default setting should be used.

In certain circumstances, such as rapid changes in ambient air pressures due to air handling units, doors opening/closing etc. the default setting may appear to be too sensitive. Under these conditions, the flow delay setting should be increased to allow time for the air pressures to stabilize after the temporary event.

Only under extreme environmental conditions or non standard pipe configurations should decreasing the flow sensitivity be considered.

## 6 Testing

**Note:** Testing should only be carried out by qualified personnel. Ensure that the proper authorities have been informed and that the unit has been isolated from the fire system if necessary to prevent unwanted alarms.

### 6.1 Point Detectors

- With the unit powered up and top cover removed the detectors can be tested for alarm functionality using methods described by the manufacturer (e.g. aerosol spray).
- An airflow test may also be performed at this time as the detector should report a low flow fault with the top cover removed.

### 6.2 System

The installed system must be checked with the top cover securely fitted.

If it is possible to get close to the sampling point then a basic, functional check can be carried out with smoke matches or lighted paper etc.

Ensure that the system complies with manufacturer's instructions and all local and national code requirements.

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## 7 Maintenance

Maintenance should only be carried out by qualified personnel. To prevent unwanted alarms, ensure that the proper authorities have been informed and that the unit has been isolated from the fire system.



**Caution:** When installing or servicing the unit, ensure that the operator is safely earthed so as to prevent electro-static discharge (ESD) damage to the unit.

### 7.1 Air Inlet Filter Replacement

With normal use, the filter element will eventually become contaminated with dust particles, impeding airflow, and it is recommended that the filter element (order code 29600-946APO) is changed every six months or as necessary. In special cases where the detector is placed in extreme environmental conditions, the filter should be changed every three months.

1. Remove the transparent cover using the special tool provided to unscrew the tamper proof fasteners.
2. Lift out the foam filter element from the filter tube using tweezers or long nosed pliers
3. Fit a new filter element ensuring that the filter is not compressed during fitting and that it is positioned flush with the top of the filter tube.
4. Replace the top cover.

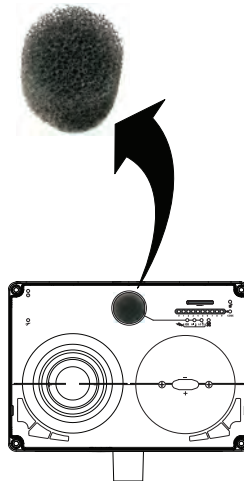


Figure 7-1: Filter Replacement

### 7.2 Point Detector Replacement

Point detectors should be serviced in accordance with the manufacturer's recommendations.

**To remove and replace the point detector:**

1. Disconnect power from the Discovery ASD-1.
2. Loosen the four screws that secure the clear plastic cover to the housing base.
3. Refer to the point detector manufacturer instructions for the correct release procedure. Rotate the sensor counter-clockwise to remove it from the base.
4. Remove dust cover from the replacement point detector.
5. Insert the point detector into the base and rotate until fully seated. Continue rotation until lock has been engaged.
6. Secure the clear plastic cover to the housing using the four screws.

**Notes:**

- An audible “snap” indicates proper contact engagement.
- System will not operate with dust cover in place.
- Refer to the point detector manufacturer instructions for further information.

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## 8 EN54-20 Certified Detectors

The Discovery Optical point detector has been independently tested and certified for use in the Discovery ASD-1 system and is suitable for EN54-20 approved Class C installations.

The following table shows the limits that should not be exceeded if the installation is to conform to Class C requirements. All figures are based on the standard configurations shown in Section 4.7 with a fan speed of 9 unless otherwise stated.

Table 8-1: Tested and Certified Class C Detectors

| Point Detector Brand | Point Detector Model               | Sampling Hole Limits | Maximum Pipe Length (m) | Maximum # Holes |
|----------------------|------------------------------------|----------------------|-------------------------|-----------------|
| APOLLO               | DISCOVERY Optical<br>(Mode 1 only) | 1 x 8 mm End Hole    | 50                      | 1               |

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## 9 Problem Solving

| Problem   | Possible Solutions  |
|---|---|
| Power light flashing.   | Ensure supply to BATTERY connector within limits.   |
| No lights on display.<br>Fan not running.                     | Ensure supply leads correctly orientated. Ensure that BAT FUSE correctly seated in socket and fuse not blown.   |
| No lights on display.<br>Fan running OK.                      | Ensure ribbon cable fully seated into main & display boards.  |
| FLOW HI or FLOW LO light on.                                  | Ensure sampling pipes correctly installed, lid fitted and box fully sealed.<br>Ensure flow calibration procedure has been carried out (Section 5.2).<br>Ensure filters are clean (Chapter 7).   |
| Flow reading on Bargraph display moves erratically.           | Decrease Flow sensitivity setting and re-calibrate air flows (Section 5.2).   |
| Flow reading on Bargraph unresponsive to broken/blocked pipe. | Increase Flow sensitivity setting and re-calibrate air flows (Section 5.2).   |
| Detector(s) unresponsive to smoke tests.                      | Ensure sampling pipe installed correctly and undamaged (Chapter 4).<br>Ensure that holes and pipe length do not exceed limits for detector (Chapter 8).<br>Ensure that the baffles are fitted.<br>Ensure that recommended test method is used (Section 6.2).<br>Increase fan speed and re-test. |

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## 10 Specifications

|                                  |   |
|----------------------------------|---|
| <b>Number of Point Detectors</b> | 1 Discovery Optical   |
| <b>Dimensions</b>                | 258.6 mm x 165.7 mm x 320.6 mm  |
| <b>Filtration</b>                | Single stage dust particle filter   |
| <b>Flow Monitoring</b>           | <ul style="list-style-type: none"> <li>• Thermal device, high and low thresholds.</li> <li>• 10 element bar graph indication.</li> <li>• Relay fault reporting.</li> </ul>  |
| <b>Supply Voltage</b>            | 18 - 30 VDC (24 VDC Nominal)  |
| <b>Relay Contact Ratings</b>     | 1 A @ 30 VDC  |
| <b>Maximum Supply Current</b>    | 350 mA @ 24 VDC with no aspirating pipe. See table below for typical Currents/Fan Speeds  |
| <b>Maximum Pipe Length</b>       | Up to 50 m per pipe   |
| <b>Aspirator</b>                 | <ul style="list-style-type: none"> <li>• <b>Control:</b> 10 programmable speeds</li> <li>• <b>Pressure:</b> 250 Pa</li> </ul>   |
| <b>Environmental Protection</b>  | IP65 with exhaust fitted (IP23 without)   |
| <b>Operating Conditions</b>      | <ul style="list-style-type: none"> <li>• <b>Tested to:</b> -10 to 55 °C</li> <li>• <b>Recommended Detector Ambient:</b> 0 to 38 °C</li> <li>• <b>Sampled Air:</b> -20 to 60 °C</li> <li>• <b>Humidity:</b> 10 to 95% RH (non-condensing)</li> </ul> |
| <b>Operating Humidity</b>        | 10 to 95% RH (non-condensing)   |
| <b>Approvals</b>                 | EN54-20 by VdS (G213105)  |
| <b>Certification</b>             | EN61000-6-3:2001(+A11:2004) (EMC)<br>EN60950-1:2006 (Safety)<br>CPR (CD0010/ASD)  |

### 10.1 Typical Supply Current & Fan Speed

|                       |     |     |     |     |     |     |     |     |     |     |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Bargraph Value</b> | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
| <b>Fan Speed</b>      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
| <b>Current (mA)</b>   | 110 | 120 | 130 | 150 | 170 | 190 | 220 | 235 | 265 | 300 |

**Note:** Typical current consumption figures for different fan speeds. Results are based upon an Discovery ASD-1 installation with 10 m (33 ft) of standard, 25 mm (0.98 in.) aspirating pipe per channel. The unit was powered from a 24 VDC power supply.

Xtr D/N 26327\_00

Xtr P/N 30497