

FireNET Vapor VPR-SD2

Product Guide

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The following typographic conventions are used in this document:

Convention	Description
Bold	Used to denote: emphasis Used for names of menus, menu options, toolbar buttons
<i>Italics</i>	Used to denote: 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
	Caution: 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.
	Warning: This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.
	Warning: 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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Codes and Standards Information for Air Sampling Smoke Detection

We strongly recommend that this document is read in conjunction with the appropriate local codes and standards for smoke detection and electrical connections. This document contains generic product information and some sections may not comply with all local codes and standards. In these cases, the local codes and standards must take precedence. The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.

Regional Regulatory Requirements and Notices

UL

The VPR-SD2 is UL Listed as a Smoke Detector for Special Application installations. It is also suitable for Open Area Protection using the following detector sensitivity ranges:

Detector	Sensitivity Range	Air Velocity Range(s)
Hochiki Analog ALK-V	1.00 %/ft - 2.06 %/ft	<ul style="list-style-type: none"> ● 0 - 2000 FPM – 1.00 %/ft – 2.06 %/ft ● 2000 – 3000 FPM – 1.0 %/ft – 1.5 %/ft ● 3000 – 4000 FPM – 1.0 %/ft

Product Listings

- UL-268
- UL-268A

Regional approvals listings and regulatory compliance vary between FireNET Vapor product models.

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1 Introduction

The VPR-SD2 is an aspirating smoke detection system that utilizes an air-sampling pipe network to draw air towards analog addressable point detectors installed inside a sealed enclosure.

The dual channel VPR-SD2 detector enclosure (Figure 1-1) has two pipe inlets and provision for two separate point detectors, each monitoring a separate sampling pipe run, which allows for redundant or double-knock detection. Point detectors are selected according to the needs of the installation. The range of supported point detectors is detailed in Section 2.3.1 on page 11.



Figure 1-1: VPR-SD2 Detector Enclosure

Point detectors are wired directly into the Signaling Line Circuit (SLC), which provides connectivity to the fire alarm control panel for the reporting of alarms or faults originating from a point detector.

The detector enclosure provides a configurable aspiration system and airflow monitoring. Airflow status is displayed on a ten element bar graph with adjustments for flow sensitivity and high/low flow thresholds. Flow faults are indicated on the display interface LEDs, and reported to the fire panel via isolated dry relay contacts.

Note: The VPR-SD2 system has been tested and listed to UL 268 and UL 268A and must be installed in strict compliance with these instructions to maintain the UL listing.

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2 Detector Installation

The VPR-SD2 is provided with the following components:

- 1 detector enclosure
- 1 corner stud key
- 1 blanking baffle
- 1 ferrite core
- 1 installation sheet with mounting template
- 1 product guide

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

It is necessary to procure the following additional items:

- Appropriate point detectors. Refer to Section 2.3.1 on page 11 for further information.
- Appropriate baffle for the selected point detector. Refer to Section 2.3.2 on page 12 for further information.
- Screws and inserts for the mounting bracket appropriate for the installation location.

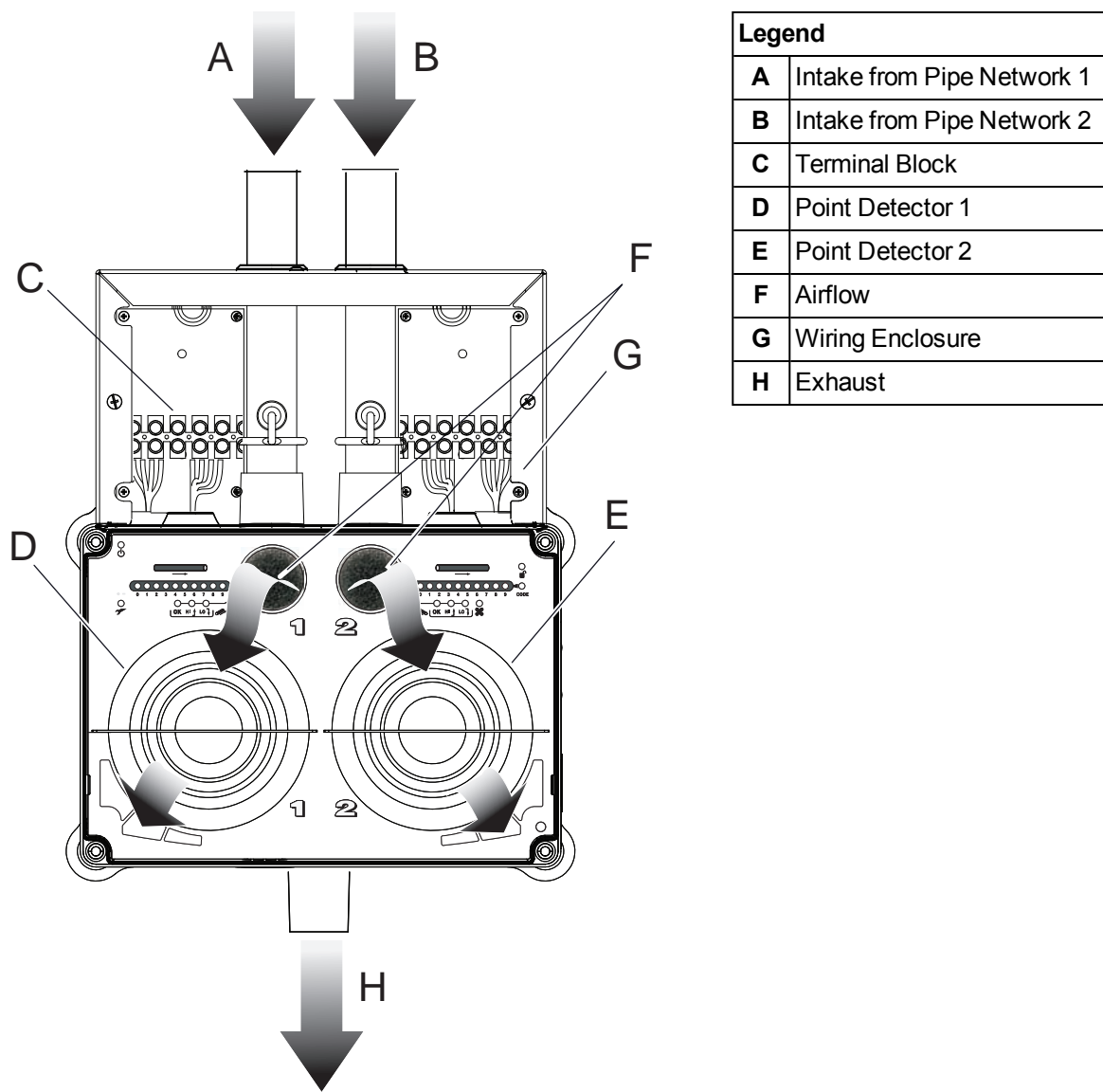


Figure 2-1: Detector Enclosure

2.1 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 (E) 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 unit 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 0.19 in. (5 mm). Typical No. 8 mounting hardware can be used in the mounting holes.

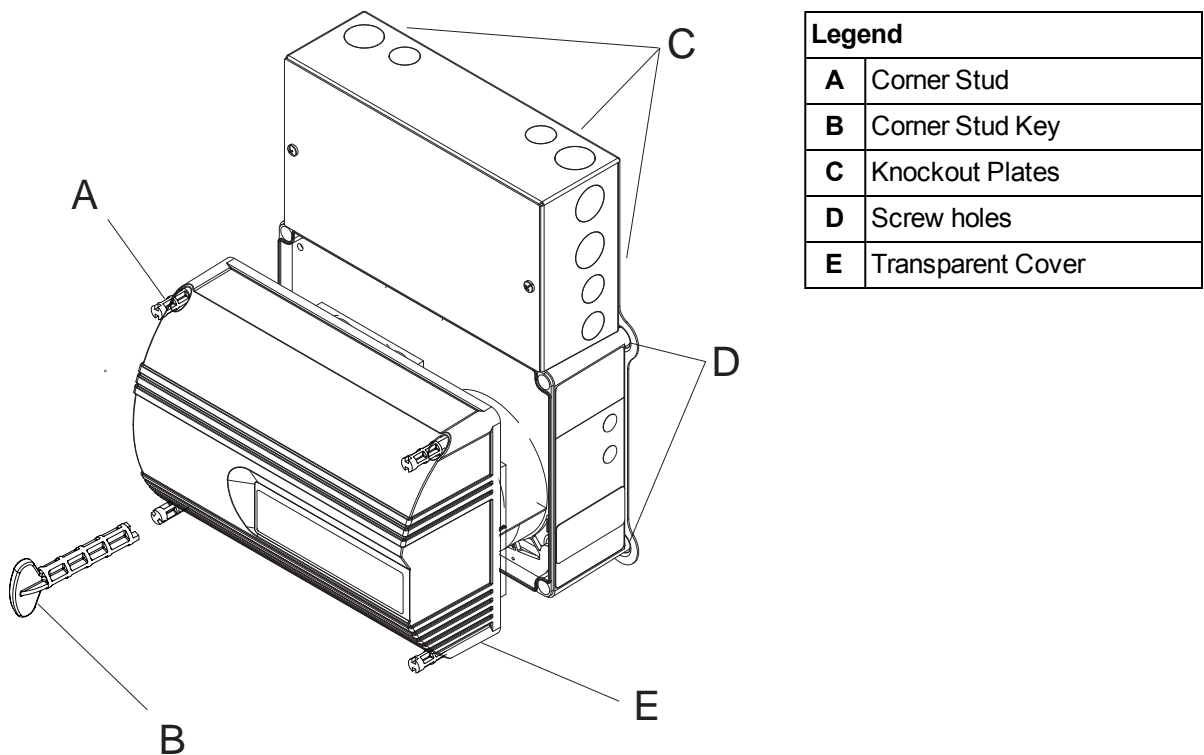


Figure 2-2: Detector Enclosure

Dimensions:

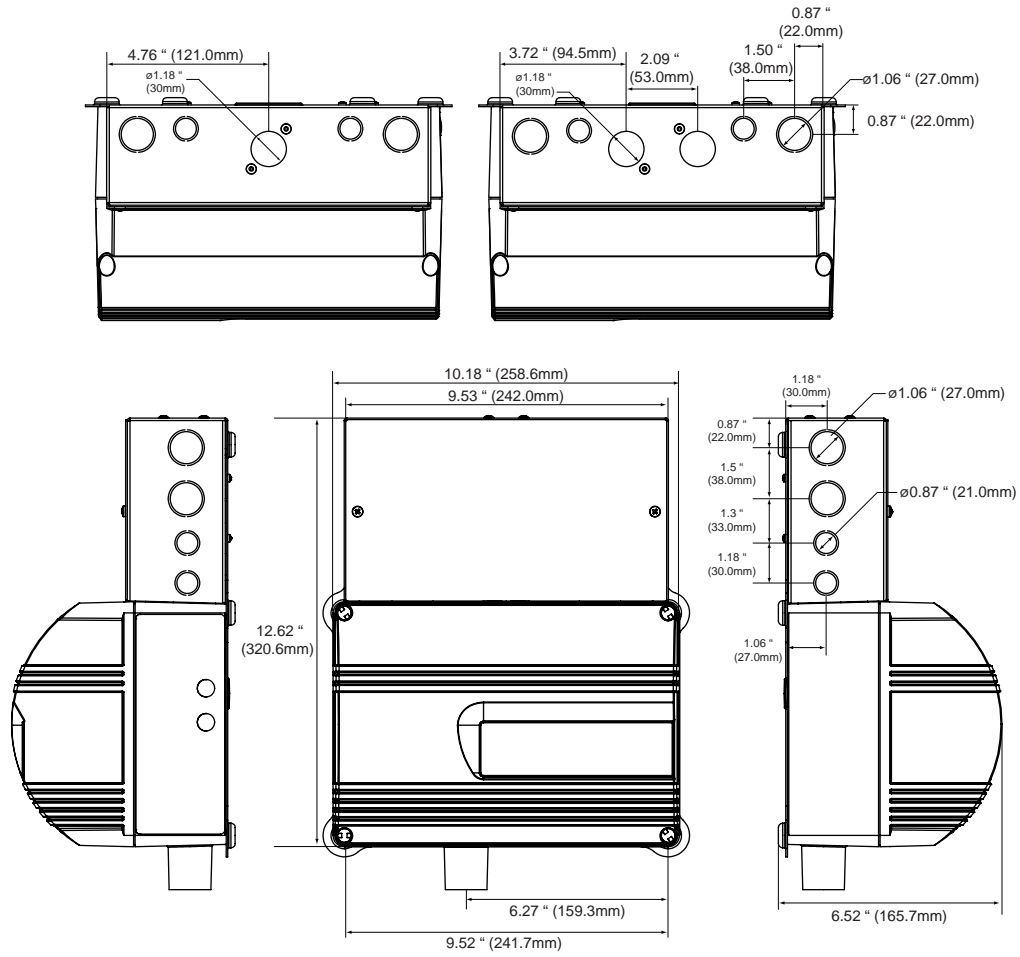


Figure 2-3: Detector Enclosure Dimensions

2.2 Wiring

All wiring connections are made through the terminal blocks (B) in the Wiring Enclosure (A) as indicated on the system wiring diagrams in Section 2.2.3.

Notes:

- Wiring should be installed according to local codes and standards.
- All terminal connections points can accommodate wire sizes up to 14 AWG (2 mm²).
- Where conduit is required, route to the most convenient knockout point, remove the knockout and secure to the assembly using suitable fittings.

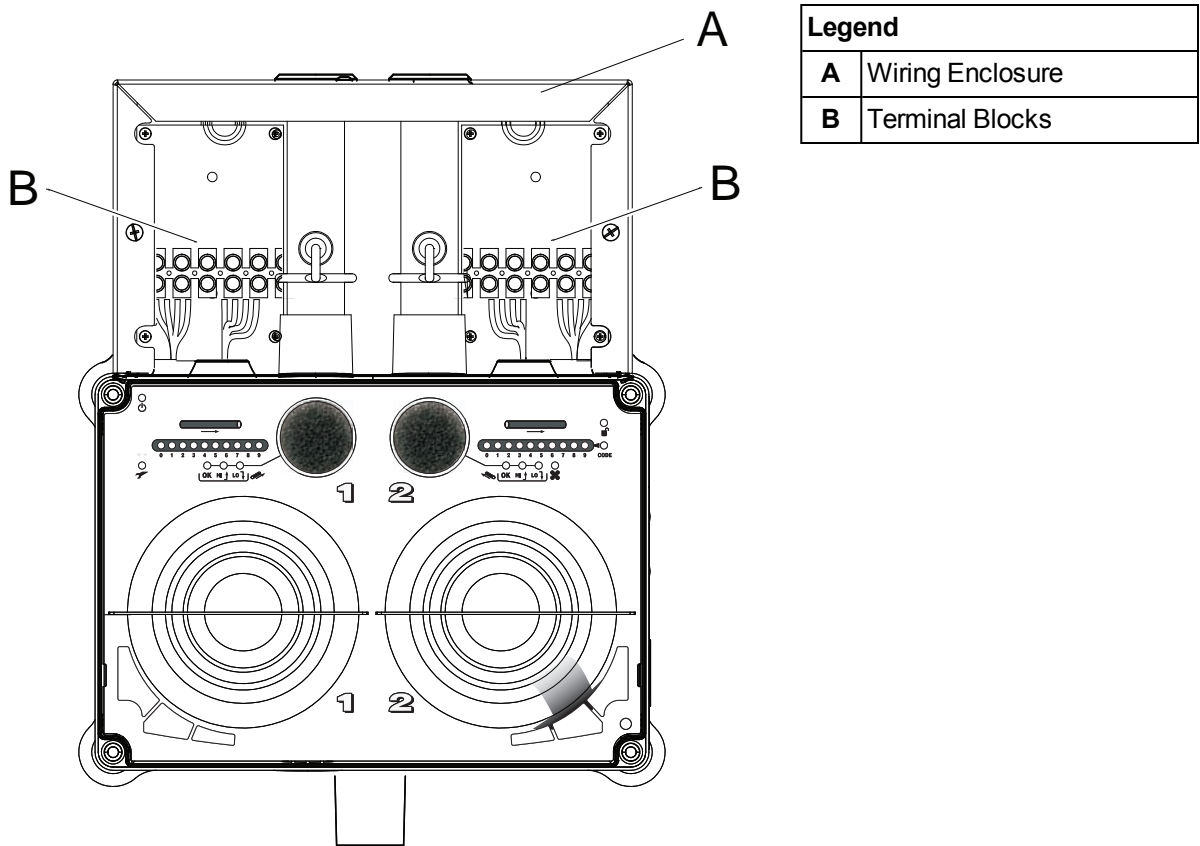


Figure 2-4: Wiring Connection Points



Warning: 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.

2.2.1 24V DC Input

The VPR-SD2 unit is designed to run from a 24 VDC supply. The supply should be connected to the input terminals in the wiring enclosure. The minimum recommended wire size is 18 AWG (0.25 mm), or larger if the supply is further than 15 ft (5 m) from the system.

A ferrite core is provided for EMC compliance. This should be fitted to the supply wiring as shown in Figure 2-5.



Figure 2-5: Ferrite core and battery supply wiring

Power requirements are dependant on the fan speed. Refer to Chapter 8 for further information.

2.2.2 Fault Relays

In the event of a fault condition, the FAULT1 and/or FAULT2 relay will change state. The terminals provide for Normally Open (NO) or Normally Closed (NC) operation and can be wired to terminating resistors to simulate a zone fault on a conventional control panel or a loop interface module for an analog addressable panel.

Note: NO/NC refers to the un-powered state of the relays. Under normal operation (non-fault conditions), NO is closed and NC is open.

Note: Please note that the faults for Channel 1 will actuate the FAULT1 relay and faults for Channel 2 will actuate the FAULT2 relay.

2.2.3 Wiring Examples

The following examples show typical installations for analog addressable point detectors. Please ensure that all wiring complies with manufacturer's instructions and local and national fire detection code requirements.

Notes:

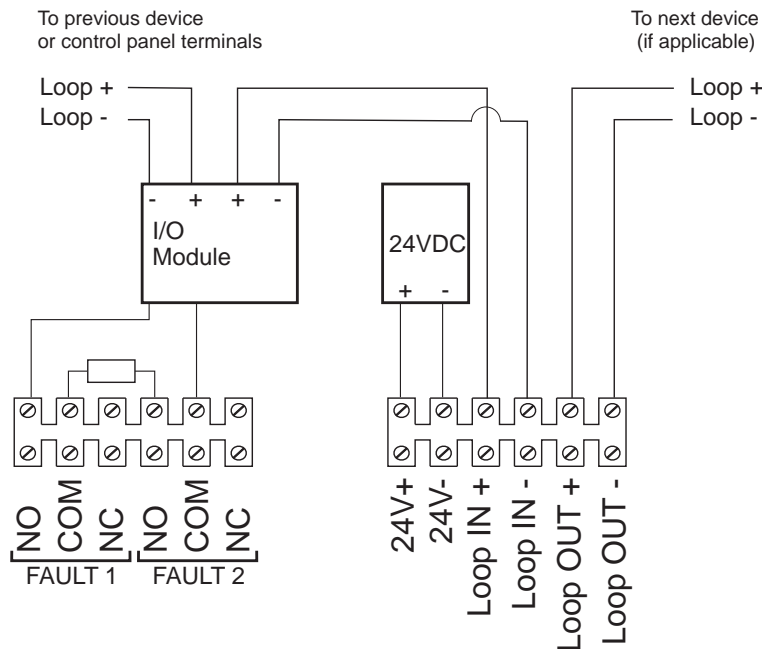


Figure 2-6: Wiring diagram for an VPR-SD2 system with analogue point detectors and one I/O Module

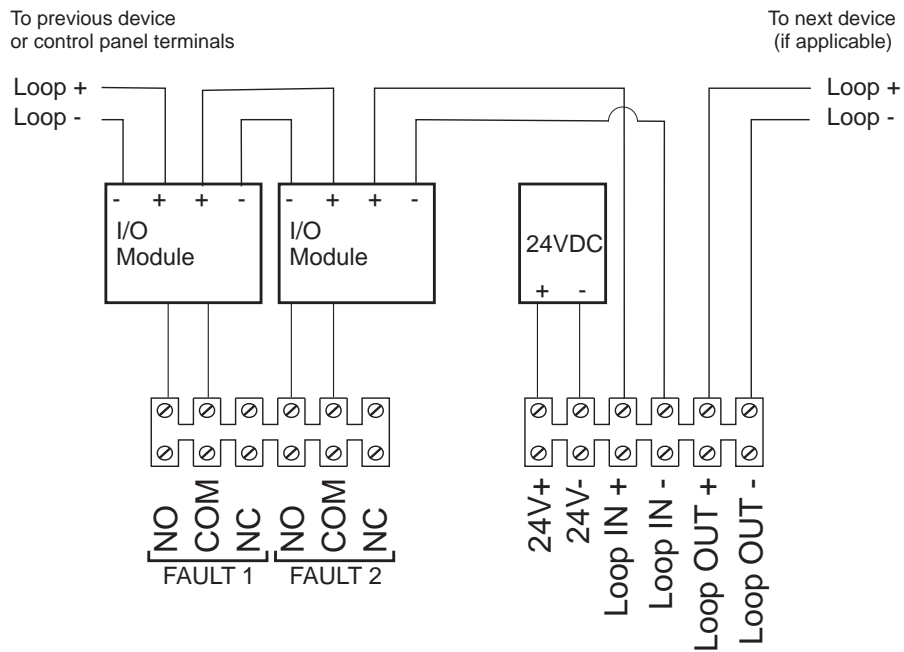


Figure 2-7: Wiring diagram for an VPR-SD2 system with analog point detectors two I/O Modules

2.3 Point Detectors

The supported point detectors have successfully passed required tests to allow use within the VPR-SD2 product and application. Refer to Chapter 3 on page 15 for further details of how dilution affects detector sensitivity.

If the installation is to be done in accordance with NFPA 72, then the detector must have been tested for use in the system. Please refer to the list of approved detectors in Section 2.3.1.

2.3.1 Point Detector Selection

The following detectors have been listed for use in the VPR-SD2 unit and are suitable for installations requiring a UL Listing. The table shows the limits that should not be exceeded if the installation is to conform to requirements. All figures are based on the following configurations:

- Meets standard pipe configurations shown in Section 3.9
- Fan speed of 9 unless otherwise stated
- Low fault threshold = 4
- High fault threshold = 8
- Flexible tube ID = 1/2 in (12.7 mm)

Table 2-1: Tested and Certified Detectors

Detector	Sensitivity	Air Velocity Range(s)	Open Area Holes per Pipe
Hochiki Analog ALK-V	1.00 %/ft - 2.06 %/ft	Open Area 0 – 300 FPM Duct <ul style="list-style-type: none"> • 0 - 2000 FPM – 1.00 %/ft – 2.06 %/ft • 2000 – 3000 FPM – 1.0 %/ft – 1.5 %/ft • 3000 – 4000 FPM – 1.0 %/ft 	<ul style="list-style-type: none"> • 1 hole, 5/16" • 2 holes, 13/64"

Note: For open area protection, all holes must be in the same space without any physical barriers.

2.3.2 Baffles

Baffles are used to direct the sampled air flow through the point detectors. They are shaped to match a particular model or range of detectors and simply clip into position in the slots provided in the transparent lid of the detector housing.

Refer to Table 3-4 on page 22 for ordering information.

2.3.3 Point Detector Installation

- Using the associated 4 inch mounting bases, a pair of conventional or analog addressable point detectors are mounted on the display/mounting board using the screws provided.
- The terminals on the point detectors must be connected to the detector terminals located in the center of the point detector mounts, on the underside of the mounting board. Maintain correct polarity if required by the particular detectors being installed. Refer to manufacturers wiring instructions for details.
- The signal wiring between the point detectors and the terminal blocks in the wiring enclosure has been completed at the factory.

2.3.4 Overlabel Application

The VPR-SD2 detector is provided with a selection of overlabs containing brand, model number and sensitivity range information for each of the point detectors listed previously in Section 2.3.1.

As part of compliance to device listing requirements, the label that corresponds to the point detectors that are being fitted to the VPR-SD2 must be affixed to the markings label found on the right side of the unit contained in this shipping package, as shown below in Figure 2-8. This must be completed by the installer during the time of installation.

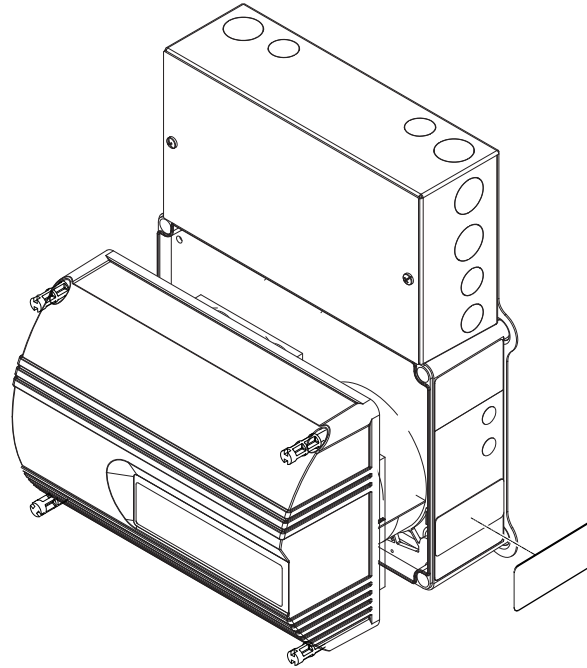


Figure 2-8: Overlabel Application

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3 Pipe Network 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 3.9 on page 19.

Use appropriate CPVC pipe with sampling point holes drilled along its length. The pipe run is terminated with an end cap that may have a sampling hole drilled in its center.

The position of each individual sampling point should be in accordance with the rules for the positioning of point detectors. It is important to note that the concentration of smoke on an individual sample point will be diluted by the clean air from the other sampling points.

3.1 Pipe Specification

CVPC Pipes

For compliance, the pipe should have a nominal outer diameter (OD) of 1.05 in. (26.7 mm). The sample pipe is normally supplied in boxes of 15 ft (4.57 m) lengths and is cut as required and joined by solvent welded sockets (permanent), or socket unions (removable). Refer to Table 1-1 on page 1 for ordering information.

The pipe shall be orange and be marked with descriptions such as "CAUTION - Smoke detector sampling tube - Do not disturb" as required by NFPA 72.

Note: The VPR-SD2 inlet ports are tapered to allow a push fit of the sampling pipe. The pipes should be cut squarely to ensure a good, airtight seal. Solvent adhesive should not be used for this joint. Using adhesive on the inlet and outlet port connections will void the warranty of the detector enclosure.

Use pipe cutting shears or a wheel type plastic tube cutter to cut pipes to the required length as per the sampling network design. Ensure that cuts are square.

Flexible Tubes

Flexible tubes may be used in duct applications or in places where conventional pipes cannot be easily installed. It is recommended that 3/4" (19mm) OD, 1/2" (12.7mm) ID Polyethylene flexible piping is used with an adapter to enable connection into the inlet port of the detector enclosure. Flexible tubing is available in 50 ft (15 m) and 25 ft (7.5m) coils. Refer to Section 3.10.1 on page 25 for ordering information.

3.2 Fixings

The normal fixing methods are pipe clips, saddle clamps or even tie wraps. Fixing centers are typically 5 ft (1.5 m) apart.

3.3 Sampling Holes

Sampling holes can either be pre-drilled or drilled in situ. Use a low speed drill with a sharp drill bit to prevent debris from entering the pipe. Always blow compressed air through the pipe after drilling to clear any debris before final connection to the equipment.

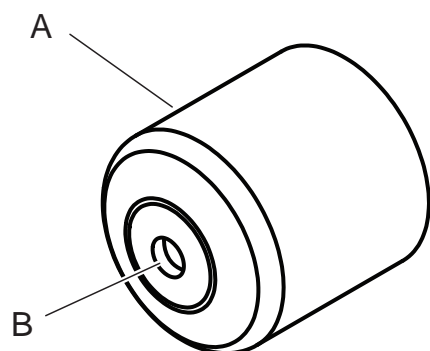
Sampling Holes for Open Area Applications

- The installer can drill the necessary holes in sampling probes and exhaust pipes either prior to or during installation, as per the sampling pipe network design.
- In standard configuration, with pipe hanging from ceiling, holes should be placed underneath, so the smoke can easily rise up into the hole.
- It is important that the correct diameter sampling holes be drilled, as this affects system performance and efficiency.
- Sampling holes must be drilled at 90 degree angles to the pipe.
- Attach adhesive labels to identify the sampling points.

Sampling Holes for Duct Applications

- The installer can drill the necessary holes in sampling probes and exhaust pipes either prior to or during installation, as per the sampling pipe network design.
- Sampling holes must be oriented facing away from the airflow.
- Sampling probes and exhaust tubes must be matched with the same number of holes, each with the same diameter.

3.4 End Cap



Legend	
A	End Cap
B	Sampling Hole

Figure 3-1: End cap with hole drilled in center

End Cap for Open Area Applications

- The end of the pipe must be capped with an end cap and not be left open.
- The end cap typically has a sampling hole drilled in its center to control airflow. For pipes with only a few sampling holes, it is recommended that the end cap hole be same size as the sampling holes along the pipe. The hole in the endcap is included in the total number of holes.

Refer to Section 3.9 on page 19 for approved configurations.

End Cap for Duct Applications

- End caps without sample holes are required for both sample and exhaust tubes.

3.5 Bends

90 degree elbows may be used for making turns in the 3/4" CPVC sample pipe network. The total number of 90 degree elbows in a single pipe run must be kept to 10 or less to maintain acceptable system performance.

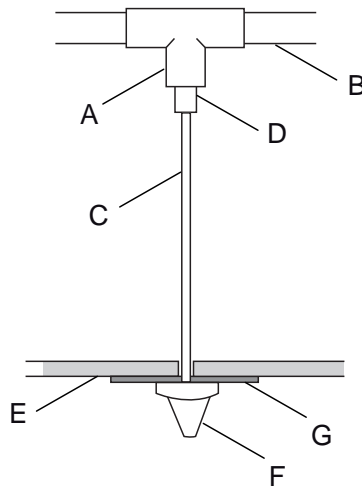


Figure 3-2: 90° elbow bend

3.6 Capillary Tubes

For above ceiling or concealed open area applications, capillary tube air sampling can be used.

Note: The maximum allowable length for a capillary tube is 10 feet.



Legend	
A	Pipe Tee
B	Sampling Pipe
C	Capillary Tube
D	Capillary Tube Connector
E	Ceiling Tile
F	Sampling Point
G	Label

Figure 3-3: Capillary Tube

3.7 Exhaust

Where the VPR-SD2 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 30 ft (10 m) 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.

3.8 Filters



Figure 3-4: Filter at inlet of system

The sampled air is passed through a filter (order code VPR-SDFILTER) before entering the detector chamber.

3.9 Open Area Applications

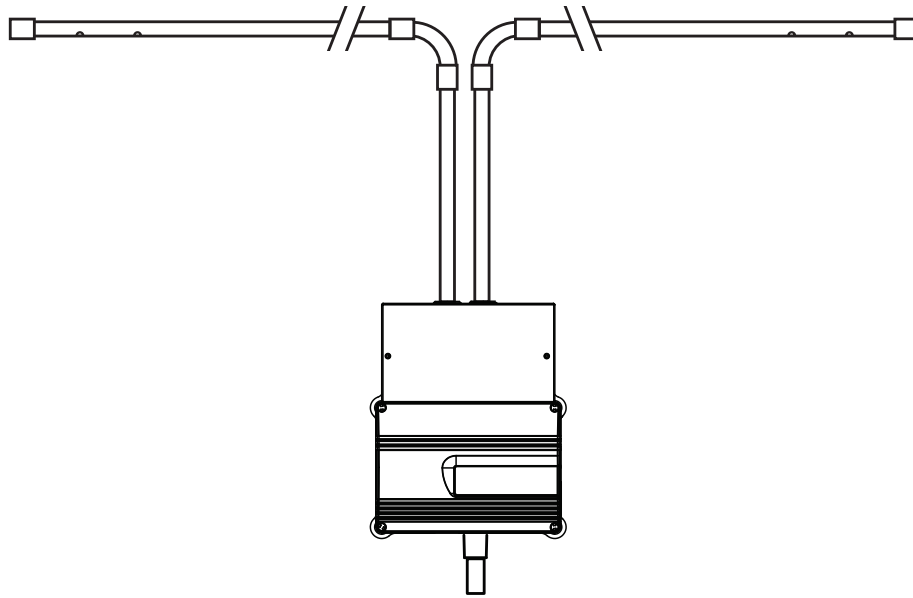


Figure 3-5: Example of VPR-SD2 system with two pipes

For this standard configuration, the pipes should be balanced, i.e. be of equal length and have equal size and number of holes.

The use of additional bends as described in Section 3.5 on page 17 will have a minimal effect on performance (response time).

Note: Please see the table in Section 2.3.1 on page 11 for hole and pipe length limits for certified detectors. These limits describe pre-tested and acceptable system design values for the standard pipe configurations described in this section, for each type of certified detector.

3.9.1 Open Area Sampling Pipe Network Design

The VPR-SD2 supports a number of pre-engineered pipe network designs. These designs incorporate suction pressure and transport time considerations.



Caution: The performance of this system is dependent upon the pipe network. Any extensions or modifications to the designed installation may cause improper operation. The operational effects of such changes shall be verified. Any changes must be carried out in accordance with the pre-engineered pipe networks defined in this document.

The pre-engineered designs assume the following constraints:

1. All sampling points are open holes.
2. For branched designs, the pipes should be balanced, be of equal length and have an equal number of sampling holes along each branch.

The pre-engineered pipe network designs provide:

- **Transport Times:** <120 Seconds
- **Suction Pressure:** Greater than or equal to 115 Pa
- **Sampling Point Sensitivity:** $\leq 3\%$ /ft (10%/M)

The information below shows the parameters for pre-engineered designs.

Table 3-1: Pipe Length to Fan Speed

Pipe Length	Fan Speed
164 ft (50 m) (single pipe)	9
82 ft (25 m) (single pipe)	6

Table 3-2: Number of Holes to Diameter

No. Holes	Hole Diameter
1	5/16"
2	13/64"

Table 3-3: Sampling Hole Positioning

Hole Type	Notes
Endcap Hole (optional)	The distance between an endcap hole and the next hole is less than or equal to 30 feet (10 meters). Refer to the holes labelled A in Figure 3-6.
Sampling Holes	The distance between sampling holes is less than or equal to 30 feet (10 meters). Refer to the holes labelled B-F in Figure 3-6.

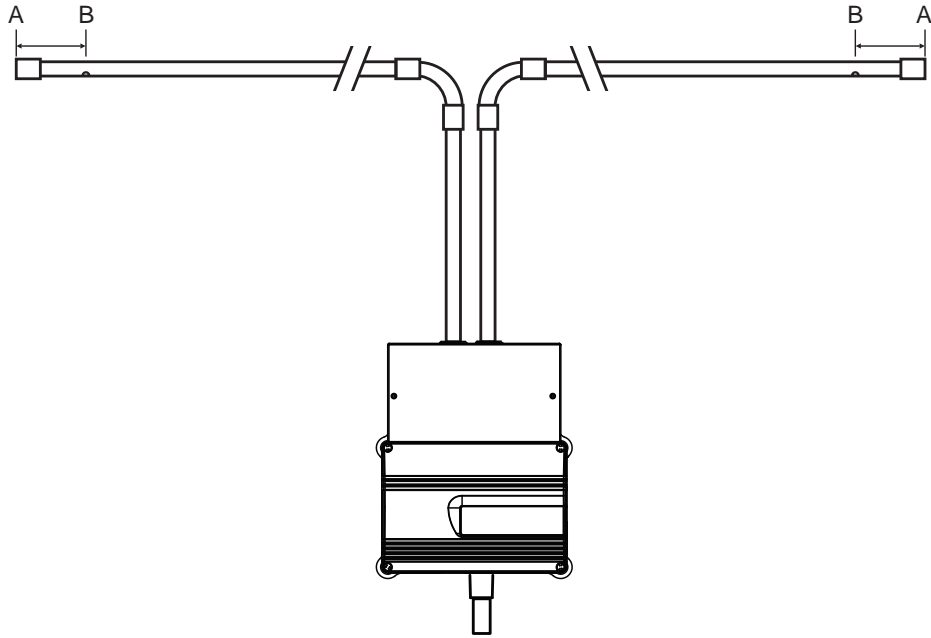


Figure 3-6: Predesigned Pipe Network Example

Pipe network components required for open area applications are ordered separately. Refer to Table 3-4 for further information.

Table 3-4: VPR-SD2 Open Area Application Accessories List

Name	Part Number	Description
CPVC Pipe	VPR-STS-210	Diameter = 3/4", Length = 210', Orange CPVC Pipe
CPVC Pipe	VPR-STS-420	Diameter = 3/4", Length = 420', Orange CPVC Pipe
Union	VPR-UNION	Diameter = 3/4", Qty.= 15
Coupling	VPR-COUP	Diameter = 3/4", Qty.= 15
45° Elbow	VPR-ELB-45	Diameter = 3/4", Qty.= 10
90° Elbow	VPR-ELB-90	Diameter = 3/4", Qty.= 20
Tee	VPR-PT	Diameter = 3/4", Qty.= 15
Pipe End Cap	VPR-END	Diameter = 3/4", Qty.= 25
Solvent Cement	VPR-CEMENT	1 Pint
Baffle	VPR-BAFFLE-HA	Baffle for Hochiki Point Detector. Refer to Section 2.3.1 on page 11 for further information.
Blanking Baffle	VPR-BAFFLE	Baffle for unused VPR-SD2 chamber
Air Inlet Filter	VPR-FILTER-B20	Filter element coarse (10 pack)
Sampling Hole Label	VPR-SPL-R	
Fuse	VPR-FUSE	1.25 A, Anti-surge fuse
Capillary Tube Air Sampling Components		Refer to Section 3.6 for further information.
Sampling Point	VPR-SP-M	
Capillary Tube	VPR-TUBE-50	Inside Diameter = 3/8"
Capillary Tube Connector	VPR-CAPKIT-P	
FPT Pipe Tee	VPR-TEE-FPT	
Corner Studs	VPR-CSTUDS	
Corner Stud Key	VPR-SD1/2-CRT	
Rubber Grommet	VPR-GROM	
Pipe Cutter	VPR-CUT	

Note: For open area protection, parts are ordered as follows:

- VPR-SD2 unit
- required length of 3/4" CPVC pipe
- fittings as required for application
- sample points and capillary tubing required for application
- cement for CPVC pipe + fittings

3.10 Duct Applications

Although flexible tubes are typically used in duct installations, CPVC pipes may also be used together with flexible tubes. The total length of the flexible tube and CPVC pipe must not exceed the specified maximum length. Refer to Chapter 8 for further information.

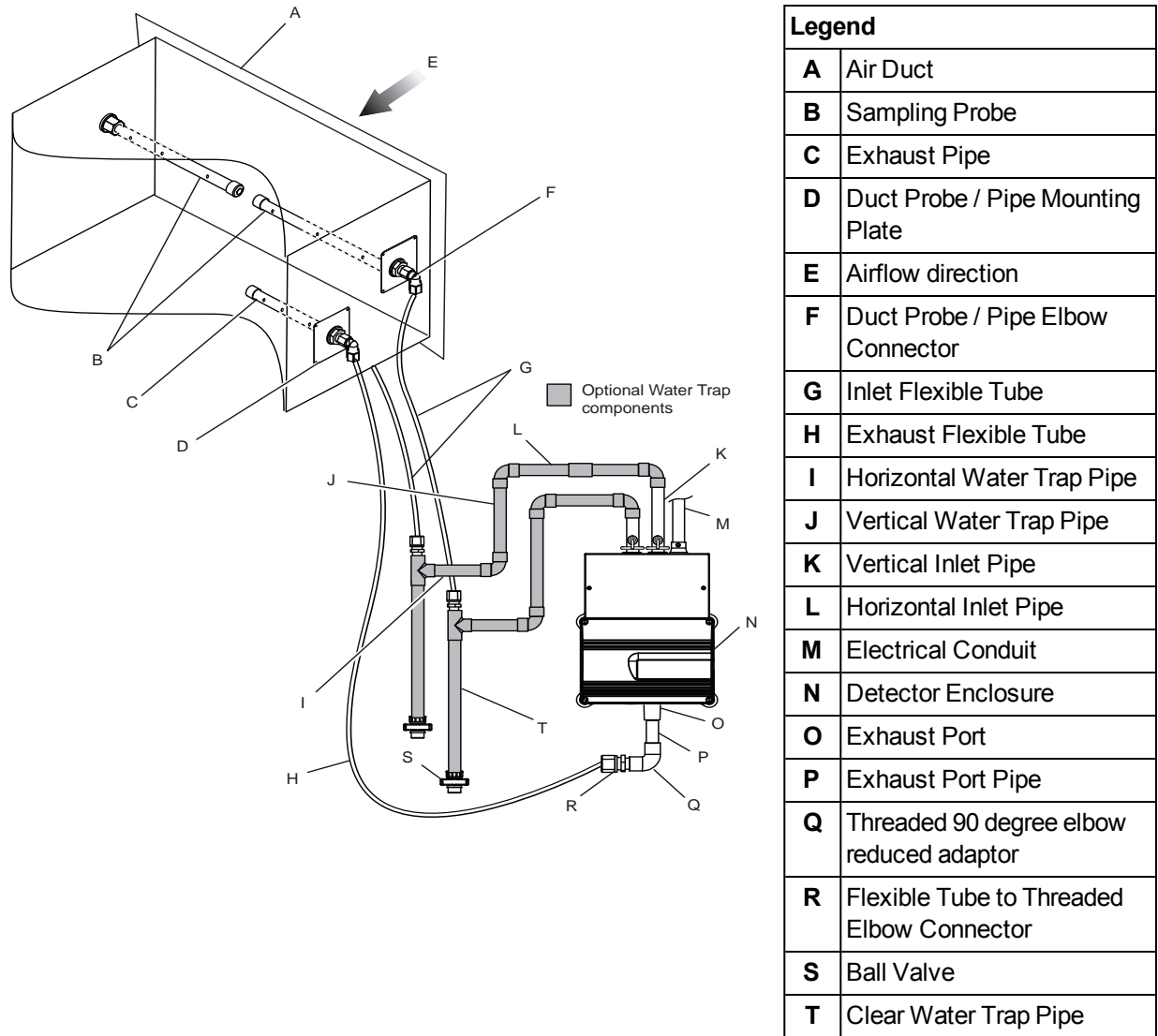


Figure 3-7: Example of a Duct Application with Water Trap

Note: If the optional Water Trap is fitted, connect the Flexible Tube to the CPVC Pipe Connector, otherwise connect it directly to the Vertical Inlet Pipe.

Table 3-5: Duct Application Parts List

Name	Part Number	Quantity
VPR-SD2	VPR-SD2	1
Duct Installation Kit	VPR-KIT-DS-DZ	1
Female Elbow for elbow of duct probe	KIT-DS-SZ-FE	3
Male Connector for inlet pipe and exhaust pipe	KIT-DS-SZ-MC	3
Reducer / Adaptor for inlet port	KIT-DS-SZ-RA	2
Threaded 90 Elbow Reducer Adaptor for exhaust port	KIT-DS-SZ-90E	1
Duct Mount Plate Assembly	KIT-DS-SZ-DMP	3
Smoke Test Port Pipe 8" (280 mm)	KIT-DS-DZ-PP	1
Smoke Test Port Pipe 7 7/8" (200 mm)	KIT-DS-SZ-PP	1
Smoke Test Port Rubber Plug	KIT-DS-SZ-RP	2
Exhaust Port Pipe	KIT-DS-SZ-EP	1

Table 3-6: Water Trap Kit Parts List (VPR-KIT-WT-DZ)

Name	Part Number	Quantity
90 Degree Bend (Box of 20)	VPR-ELB-90	6
Transparent Pipe (imperial for US)	KIT-WT-SZ-TP	2
Ball Valve	KIT-WT-SZ-BV	2
Tee Pipe (Box of 15)	VPR-PT	2
Horizontal Inlet Pipe (160 mm)	KIT-WT-SZ-HP	2
Vertical Water Trap Pipe 7 7/8" (200 mm)	KIT-WT-SZ-VWP	4
Horizontal Water Trap Pipe (100 mm)	KIT-WT-SZ-HWP	1
Couplings (Box of 15)	VP-COUP	1

3.10.1 Duct Application Accessories List

The following accessories can be ordered.

Name	Part Number	Description
Flexible Tube Pairs		
50' Flexible Tube Pair	VPR-FTUBE-50D	OD = 3/4", ID = 1/2" ID, Length = 50'
25' Flexible Tube Pair	VPR-FTUBE-25D	OD = 3/4", ID = 1/2" ID, Length = 25'
Flexible Tubes		
50' Flexible Tube	VPR-FTUBE-50S	OD = 3/4", ID = 1/2" ID, Length = 50'
25' Flexible Tube	VPR-FTUBE-50S	OD = 3/4", ID = 1/2" ID, Length = 25'
Probe Kits		
18" Probe Kit	VPR-KIT-18DZ	2x Probe OD = 1/2", Length = 18", Hole Dia = 3/16", Holes = 2 Exhaust Probe OD = 1/2", Length = 8", Hole Dia = 3/16", Holes = 2 3x End Caps
36" Probe Kit	VPR-KIT-36DZ	2x Inlet Probe OD = 1/2", Length = 36", Hole Dia = 5/32", Holes = 3 Exhaust Probe OD = 1/2", Length = 8", Hole Dia = 5/32", Holes = 3 3x End Caps
60" Probe Kit	VPR-KIT-60DZ	2x Inlet Probe OD = 1/2", Length = 60", Hole Dia = 1/8", Holes = 4 Exhaust Probe OD = 1/2", Length = 8", Hole Dia = 1/8", Holes = 4 3x End Caps
Miscellaneous		
Pipe End Cap	VPR-DS-CAP	Duct sampling probe/exhaust pipe end cap
Pipe Label	VPR-LABEL-P	
Detector and Pipe fittings		Refer to Table 1-1 for the Open Area Applications Accessories List.

Note: Order parts as follows for Duct applications:

- VPR-SD2
- Duct Kit - VPR-KIT-DS-DZ
- flexible tube in length required
- sample and exhaust tube required for application

3.10.2 Duct Pipe Network Installation

Rules

- While not mandatory, it is recommended that when possible locate probes a minimum of six duct widths downstream from bends or inlets. Such locations ensure that air flow is non-turbulent and that smoke is properly mixed with air in the duct for maximum detector/sensor efficiency.
Note: Installation of a duct detector/sensor to a round duct is the same as shown in Figure 3-9 and Figure 3-10.
- Position the probes so that dampers do not restrict air flow at the probe location (Figure 3-8).

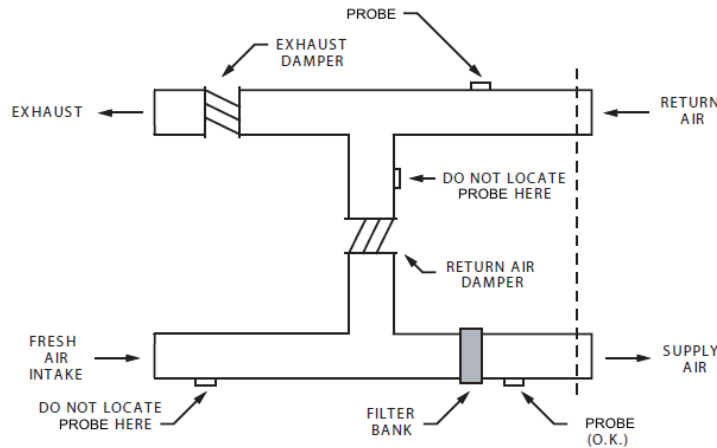


Figure 3-8: Probe Placement - Location of Dampers

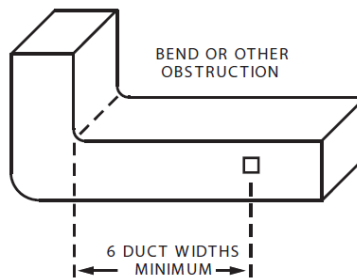


Figure 3-9: Probe Placement - Bend or Inlet Locations

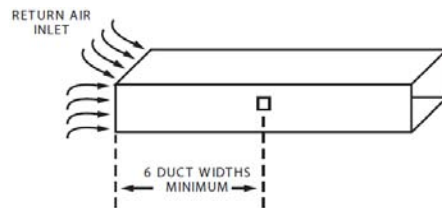


Figure 3-10: Probe Placement - Air Return Inlet Locations

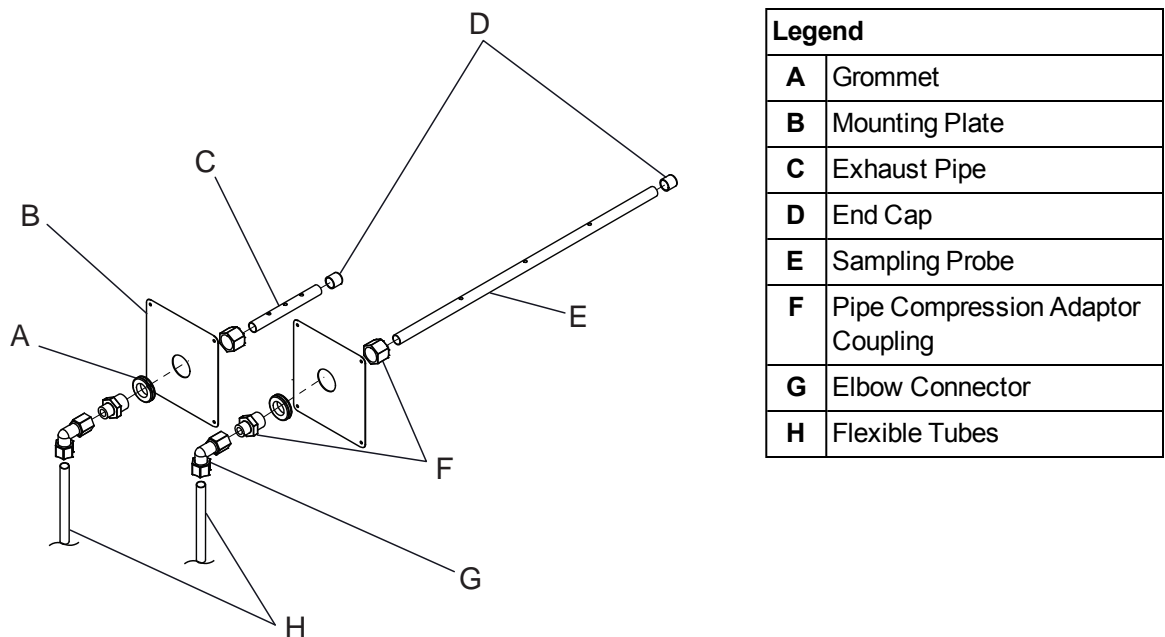
- Position the probes on the return or supply duct of the equipment's air handling system. However, probes should NOT be installed in the return air damper branch (Figure 3-8).
- Position the probes on branch lines if close identification of the alarm source is required.
- Position the probes on the downstream side of filters to sense fire in filters. However, should the filters block, sufficient air flow may not be available for proper detector/sensor operation (Figure 3-8).
- Whenever possible, position the probes where they can be conveniently observed.
- Position the probes in return air ducts ahead of mixing areas.
- Do not position the probes next to outside air inlets unless you want to monitor smoke entry to the handling system from an adjacent area.
- Position the probes upstream of air humidifiers and cooling coils.

Notes:

- The sample and exhaust tubes should be installed in a location of relatively non-turbulent air flow and within the intended opening velocity range of 0-4000 feet per minute (0 to 1220 m/minute). It is recommended that measurements of airflow and examination of engineering specifications that define expected duct air velocities under all conditions and that measured velocities do not exceed the airspeed rating of the detector to be used. This is done to determine if a location is suitable for duct sampling operation. An Alnor Instrument Co. (Chicago) Model 6000P Velometer or equivalent (not supplied) may be used to check the duct air velocity.
- The sampling and exhaust holes must be oriented facing out of the airflow. Refer to Section 3.3 on page 16 for further information.
- There must be at least 1 hole for every 1 foot of the inlet probe.
- The inlet probe and outlet probe must have equal number of same diameter of holes in order to have a balanced airflow in the pipe network.
- Do not drill holes in the flexible tubes.

3.10.3 Duct Inlet Probe and Exhaust Pipe Installation

1. Mark the location of the mounting plates.
2. Drill or cut-out 2.0" in - 2.2" (50 mm - 55 mm) holes in the duct wall.
3. Cut the flexible tubes to the correct length. If longer than 3 feet, ensure the opposite end is supported on the duct wall. This will maintain sample probe integrity across all duct air velocities.
4. Install the duct mounting plate - insuring that the plate covers the hole cut in duct in step 2 above.
5. Install the end caps to the inlet sampling probe and exhaust pipe.
6. Insert the sample probe through the compression fitting in the duct probe mounting plate.
7. Loosen the pipe compression adaptor coupling and insert the end of the sample tube. Tighten the compression nut until the elbow is secure to the sample tube.
8. Repeat steps 2 thru 6 for the exhaust probe.
9. Insert the flexible tube to the elbow connector for the inlet and exhaust tubes. Tighten until the tube is secure.

**Figure 3-11: Duct inlet probe and exhaust pipe installation**

3.10.4 Inlet Tube Selection

Ensure that the sample and exhaust tube has a secure end cap or rubber plug to the end tube.

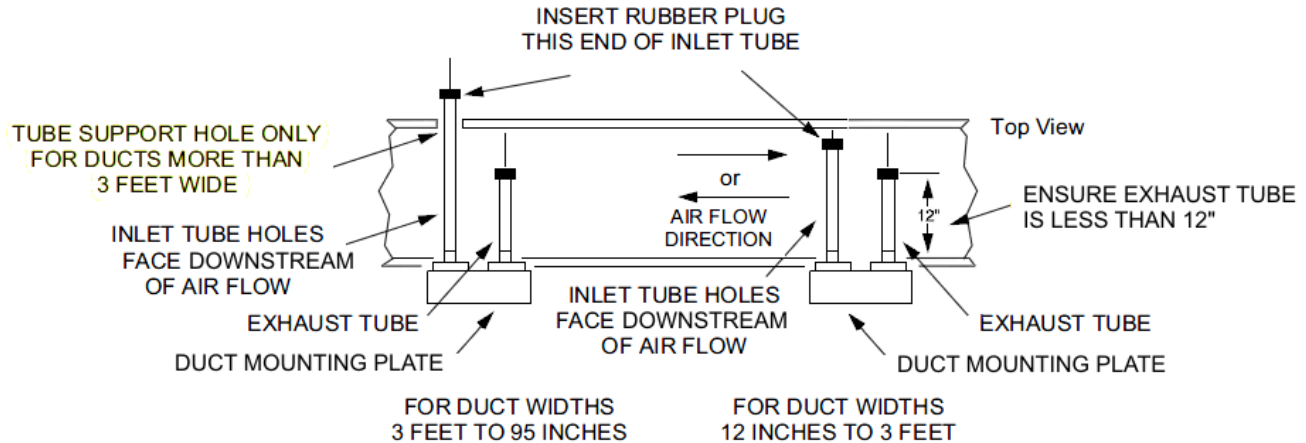


Figure 3-12: Inlet Tube Orientation

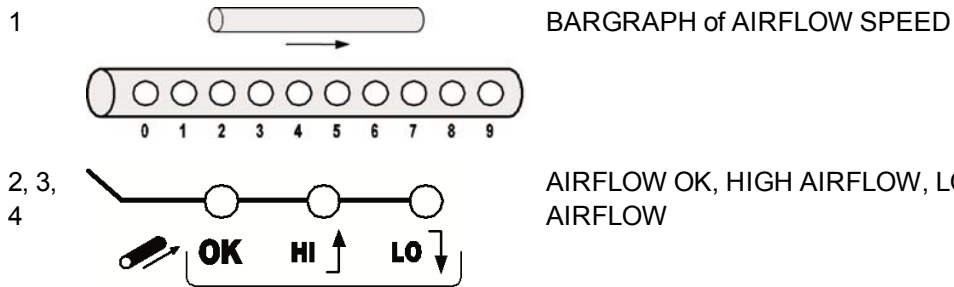
3.10.5 Flexible Tube / CPVC Pipe Installation

1. Check the pipe network design documents of the given application to gather the size, configuration and mounting specification of the pipes.
2. Measure and mark the spots specified for the pipe mounting clips.
3. Secure the mounting clips to the specified locations.
4. Temporarily join the flexible tubes/CPVC pipes and secure them on the mounting clips.
5. Insert the inlet and exhaust pipe to the VPR-SD2.
6. Test the operation of the system.
7. After successful completion of the test, tighten all the flexible tube connectors until secure. If CPVC pipes are used, bond the pipes together using suitable adhesive. Do not use adhesive on the VPR-SD2 inlet and outlet port connections.

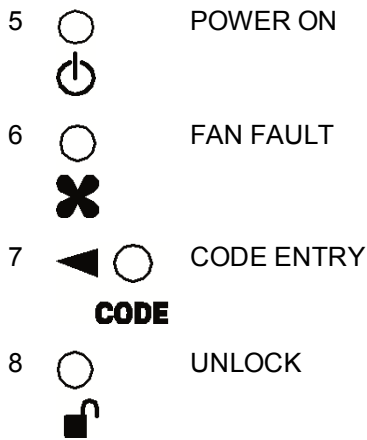
4 Configuration

4.1 Display Functions

Each channel has the following functional LEDs.



The following LEDs are common to both channels.



Note: Other indicators present on the system display are not used with this product.

4.2 User Interface

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 VPR-SD2 user functions are shown in the following table.

Table 4-1: User Functions for the VPR-SD2 System

Function	Display	Special Instructions
Set fan speed	POWER LED flashes	-
Set sensitivity of bar graph in Channel 1 to changes in airflow velocity	FLOW1 OK flashes	-
Set sensitivity of bar graph in Channel 2 to changes in airflow velocity	FLOW2 OK flashes	-
Select the BARGRAPH 1 LED segment above which the FLOW HIGH LED will be illuminated	FLOW HIGH 1 flashes	-
Select the BARGRAPH 1 LED segment below which the FLOW LOW LED will be illuminated	FLOW LOW 1 flashes	-
Select the BARGRAPH 2 LED segment above which the FLOW HIGH LED will be illuminated	FLOW HIGH 2 flashes	-
Select the BARGRAPH 2 LED segment below which the FLOW LOW LED will be illuminated	FLOW LOW 2 flashes	-
Set FLOW DELAY time of both channels	FLOW HI and FLOW LO LEDs both flash	Please see Section 4.3 on page 4.3 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.

4.3 Parameters

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.

4.3.1 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 NFPA 72 - a transport time of 120 seconds (max). 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.

4.3.2 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 4-2: Flow Delay Settings for the VPR-SD2 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.

4.3.3 Flow Sensitivity

This setting determines the system's responsiveness in reporting blocked sampling points or broken pipes. The number of sampling points and fan speed are the main factors to consider for this setting.

The following table shows typical settings for a variety of standard fan speed and hole quantity combinations. Other speed and hole combinations should be verified by testing during commissioning.

Table 4-3: Typical Flow Sensitivity Settings

Sampling Method	Holes	Recommended Fan Speeds	Flow Sensitivity
Open Area	1 - 2 sample holes per pipe	6 - 9	5
Duct	2 - 3 sample holes	6 - 9	5
Duct	4 - 5 sample holes	6 - 9	7
Duct	5 or more sample holes	6 - 9	9

Notes:

1. Fan speeds must be adjusted to suit specific pipe networks to transport requirements (max 120 seconds).
2. Duct Applications must have inlet and exhaust probes matched for number of holes.

5 Testing

Note: Testing 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 alarm system.

Note: In cases where the control panel provides an alarm test facility, this may be used in place of the following alarm tests.

5.1 Point Detectors

Open Area Application Testing

- With the unit powered up and top cover removed the detectors can be tested for alarm functionality using methods described by the manufacturer (for example, 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.

Duct Application Testing

1. Unplug the test port plug (A).
2. Spray 3 to 5 second bursts of smoke from the aerosol smoke tester.
3. The point detector must go into alarm within 10 seconds. If the detector fails to go into alarm, perform troubleshooting. Refer to Chapter 7 for further information.
4. Insert the rubber plug back into the test port hole to avoid an airflow fault.

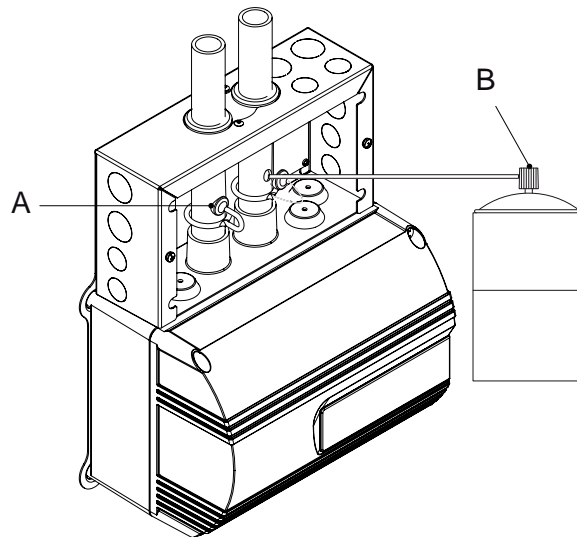


Figure 5-1: Smoke Test Port

5.2 System

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

For open area applications, smoke should be introduced to the furthest sampling point from the VPR-SD2 system on each branch of the pipe.

The choice of smoke source is dependant on the installation but in all cases the smoke must be present for the duration of the test - some aerosol sprays for point detectors may not work on aspirated systems. Manufacturers recommended test method(s) for the specific detector mounted in the VPR-SD2 should be followed.

If it is possible to get close to the sampling point then a basic "Go / No-Go" functional test 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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6 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 grounded so as to prevent electro-static discharge (ESD) damage to the unit.

Notes:

- Prior to carrying out any work or maintenance on the VPR-SD2, take the necessary steps to advise the monitoring authority that power may be removed and the system disabled.
- Point detectors should be serviced in accordance with the manufacturer's recommendations.
- The system must be tested in accordance with inspection, test and maintenance specifications as stated in NFPA 72.

6.1 Air Inlet Filter Replacement Procedure

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 VPR-SDFILTER) is changed every six months or as necessary.

The frequency of filter replacement depends on environmental conditions. For example, 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. Ensure that the filter is not compressed during fitting and that it is positioned flush with the top of the filter tube.
4. Replace the transparent cover.

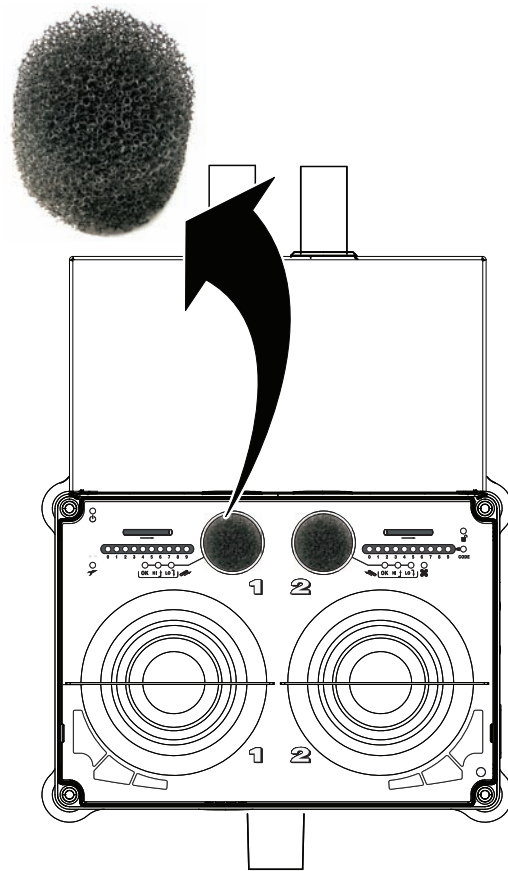


Figure 6-1: Air Inlet Filter Removal

6.2 Point Detector Replacement

To remove and replace the point detector:

1. Disconnect power from the VPR-SD2.
2. Loosen the four screws that secure the clear plastic cover to the housing base.
3. Insert a small blade screwdriver into the lock release slot in the base. Rotate the sensor counterclockwise 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. Torque screws to 8-10 inch-pounds.

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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7 Troubleshooting

Problem	Possible Solutions
Power light flashing.	Ensure supply to BATTERY connector within limits.
No lights on display. Fan not running.	Ensure supply leads correctly orientated. Ensure that BAT FUSE correctly seated in socket and fuse not blown.
No lights on display. Fan running OK.	Ensure ribbon cable fully seated into main & display boards.
FLOW HI or FLOW LO light on.	<p>Ensure sampling pipes correctly installed, lid fitted and box fully sealed.</p> <p>Ensure flow calibration procedure has been carried out (Section 4.2).</p> <p>Ensure filters are clean (Chapter 6 on page 35).</p> <p>Ensure that the fan is operating normally.</p> <p>In applications that use flexible tubing, verify that the tubes are not pinched or kinked..</p> <p>In duct applications, verify that the inlet and exhaust tube holes are not obstructed by debris.</p>
Flow reading on Bargraph display moves erratically.	Decrease Flow sensitivity setting and re-calibrate air flows (Section 4.2 on page 30).
Flow reading on Bargraph unresponsive to broken/blocked pipe.	Increase Flow sensitivity setting and re-calibrate air flows (Section 4.2 on page 30).
Detector(s) unresponsive to smoke tests.	<p>Ensure sampling pipe installed correctly and undamaged (Chapter 3 on page 15).</p> <p>Ensure that recommended baffles are fitted (Section 2.3.2 on page 12).</p> <p>Ensure that recommended test method is used (Section 5.2 on page 33).</p> <p>Increase fan speed and re-test.</p>

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8 Specifications

Number of Detectors (not supplied)	2 Analog Addressable
Dimensions (L x W x H)	10.2 in x 6.52 in x 12.6 in (258.6 mm x 165.7 mm x 320.6 mm)
Weight	7.5 lbs (3.4 kg)
Filtration	Single stage dust particle filter. Optional external filter.
Flow Monitoring	<ul style="list-style-type: none"> • Thermal device, high and low thresholds. • 10 element bar graph indication. • Relay fault reporting.
Supply Voltage	18 - 30 VDC (24 VDC Nominal)
Relays	<ul style="list-style-type: none"> • Fault 1: 1 A @ 30 VDC • Fault 2: 1 A @ 30 VDC
Maximum Supply Current	350 mA @ 24 VDC with no aspirating pipe. See table below for typical Currents/Fan Speeds
In-Rush Current	680 mA for 30 milliseconds
Maximum Pipe Length	Up to 50 m per pipe dependant on detector type & application
Air Inlet Pipe	Accepts both metric and American standard pipe sizes. <ul style="list-style-type: none"> • Metric: 25mm (1.05 in.) • American Pipe: ¾ in. I.D (21mm) • Flexible tubing: ¾ in.O.D (19mm)
Aspirator	<ul style="list-style-type: none"> • Control: 10 programmable speeds • Pressure: 250 Pa
Environmental Protection	<ul style="list-style-type: none"> • Wiring enclosure: IP30 • Detector enclosure: IP65
Operating Conditions	<ul style="list-style-type: none"> • Tested to: 14 to 131 °F (-10 to 55 °C) • Recommended Detector Ambient: 32 to 100 °F (0 to 38 °C) • Sampled Air: 4 to 140 °F (-20 to 60 °C) • Humidity: 10 to 95% RH (non-condensing)
Certification	UL-268 UL-268A This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: <ol style="list-style-type: none"> 1. This device may not cause harmful interference, and 2. This device must accept any interference received, including interference that may cause undesired operation

8.1 Typical Supply Current & Fan Speed

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

Typical current consumption figures for different fan speeds. Results are based upon an VPR-SD2 installation with 33 ft (10 m) of standard, 1in. (25 mm) aspirating pipe per channel. The unit was powered from a 24 VDC power supply.