VESDA VLF-500-UL Product Guide



VLF-500-00-UL

VLF-500-02-UL

August 2021
Doc. No. 36286_A2
Part No. AD36286-001

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Scope

This Product Guide describes the features of the VESDA VLF-500-UL, the specifications and functions, installation requirements, commissioning and operation procedures. A schedule for preventative maintenance is also provided.

Document Conventions

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
Italics	**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.
	**Precaution:** This icon is used to indicate that electrostatic precautions must be followed to prevent damage to the equipment.

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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 The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.

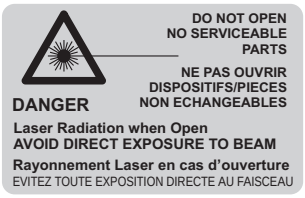
FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures; re-orientate or relocate the receiving antenna, increase the separation between the equipment and receiver, connect the equipment to a power outlet which is on a different power circuit to the receiver or consult the dealer or an experienced radio/television technician for help.

FDA

This Xtralis product incorporates a laser device and is classified as a Class 1 laser product that complies with FDA regulations 21 CFR 1040.10. The laser is housed in a sealed detector chamber and contains no serviceable parts. The laser emits invisible light and can be hazardous if viewed with the naked eye. Under no circumstances should the detector chamber be opened.

The laser chamber is identified by the labels shown below:





Configuring Detector Thresholds for UL 268 Ed7 standard Compliance

OPEN AREA

Introduction of ANSI standard UL268 7th edition, which now includes a nuisance alarm requirement for which the detector is not permitted to signal an alarm during UL defined nuisance fire conditions.

Xtralis VESDA detectors support four configurable alarm thresholds:

- Fire1 Alarm threshold, used to signal the alarm condition, each sampling port must be configured to be:
  - Above the nuisance smoke level
  - Below the smoke alarm level.
- Alert and Action configuration is not subject to the UL 268 Ed7 standard requirement and remain available for signaling at a higher sensitivities.
- Fire 2 configuration is not subject to the UL 268 Ed7 standard requirement and remains available for signaling lower sensitivities.

To correctly set the VLF-500-UL aspirated detector system smoke alarm threshold, the pipework design must be analyzed so that the applicable detector alarm threshold can be calculated to meet both the nuisance and alarm criteria for every sampling port within the system.

ASPIRE

Xtralis provides the Aspire pipe modelling tool to analyze pipework designs to achieve compliance to different standards across the world.

Each sample hole is reported with a transport time and a sensitivity.

For UL 268 Ed7 standard compliance, the pipework design shall ensure that the:

- Transport time for each sampling hole is less than the applicable maximum transport time specified in Table 1.
- Sensitivity of each sampling hole is within the applicable minimum and maximum hole sensitivity specified in Table 1.

The alarm threshold settings generated with Aspire must be applied to the detector configuration to meet this compliance objective.

The design and installation of pipework in any practical site will result in holes with a range of sensitivity dependent on the actual airflow entering the system through each sample hole.

Xtralis recommends a balance of at least 55% to ensure that designed pipework systems include a sufficient safety margin for reliable operation when deployed. This means that the ratio between the minimum sensitive hole and the maximum sensitive hole is not more than 1:2. This ratio allows sufficient flexibility so that installers can install the pipework systems using common drill sizes and techniques appropriate for the job site. Whilst it is recommended to target tighter balance 70% recommended, this is unlikely to be realized in practice.

SPECIAL APPLICATION

Xtralis VESDA detectors may be optionally configured for use in special application environments with higher Fire Alarm sensitivity that is, by default not allowed by the ANSI UL 268 Ed7 standard.

Special application mode is suitable for areas where early warning is paramount, in this mode, the detector may not be compliant with the Nuisance requirement of UL 268 Ed7 standard.

Detectors configured for special applications are not suitable for use in areas where cooking appliances can be used.

If it is possible that cooking appliances can be used within the protected space, the detector configuration should be reverted back to open area mode with the respective alarm threshold settings derived from the Aspire design tool and applied to the detector configuration.

Note: Special application configurations are not for general use and the detector may be prone to false alarms if used in unsuitable environments.

While no list is all-inclusive, some examples of unsuitable environments include:

- Areas with airborne particulate or aerosols including:
  - Sawing
  - Drilling
  - Grinding
  - Textile
  - Agricultural processing,
- Areas with engines that are not vented to the outside.
- A list of common aerosol and particulate sources is available in the applicable Annex of NFPA 72.

Environments suitable for special application use may include early warning for:

- Hospitals
- Museums
- Assisted living
- Data centers
- Areas that do not have airborne particulate or aerosols.

Regional Regulatory Requirements and Notices

UL Installations

For Open Area, Special Application, High Velocity and DUCT installations, ASPIRE software is required to design sampling pipe networks that conform to the performance claims verified by UL refer to Table 1 below.

For Pipe network design including DUCT installations refer to (P/N: 30009) 10193 VESDA pipe network design guide).

Note that the maximum pipe length is dependent on pipe layouts and fittings used.

Ensure that the correct setting for UL7 mode in the Smoke Thresholds setting screen of Xtralis VSC is set correctly for the application, special application modes permit higher sensitivities and must only be used where cooking will not occur.

	Hole Sensitivity				Transport Time (s)		Pipe Network Hole Sensitivity Balance	
	Obscuration							
	%/ft		%/m					
	Max	Min	Max	Min	Max	Min	Max	Min
Open Area 0 to 300 cfm	2.134	3.049	7.00	10.00	24	4	100	60
Open Area High Velocity 300 to 4000 cfm	2.134	3.049	7.00	10.00	21	4	100	60
Special Application High Sensitivity 0 to 300 cfm	0.008	0.457	0.025	1.50	47	4	Refer to ASPIRE and VESDA pipe network design guide for balance recommendation	
Special Application Low Sensitivity 0 to 300 cfm	0.008	3.05	0.025	10.00	24	4		
Special Application High Sensitivity 300 to 4000 cfm	0.008	0.457	0.025	1.50	47	4		
Special Application Low Sensitivity 300 to 4000 cfm	0.008	3.049	0.025	10.00	21	4		
DUCT Applications (Single Pipe) 0 to 4000 cfm	0.503	3.049	1.65	10.00	23	6		

Table 1

Product Listings

- UL
- CSFM
- FDA
- CE
- FCC
- RCM

Regional approvals listings and regulatory compliance vary between VESDA product models. Refer to www.xtralis.com for the latest product approvals matrix.

Document: 36286_A2

Revision:

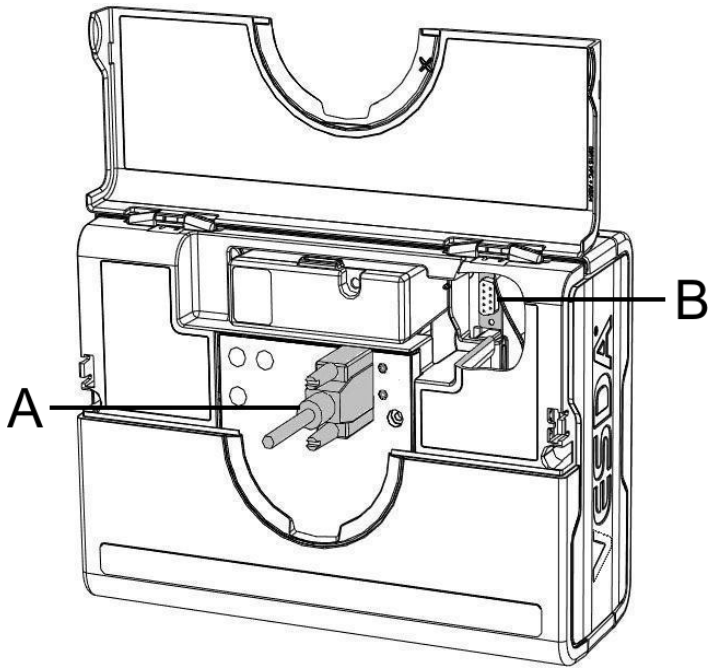
Build:

Part Number: AD36286-001

Electrostatic discharge (ESD) precaution

Note: Several maintenance functions require that the front cover be removed and the system disabled. Prior to carrying out any work or maintenance on the VESDA VLF take the necessary steps to advise the monitoring authority that power may be removed and the system disabled.

Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector otherwise damage may occur to the unit.



Legend	
A	9 Pin DB9 PC COM Serial extension cable (male)
B	Cutaway, exposing the RS232 Serial Port (female)

Figure 2-1: 9 pin connector and RS232 serial port

Remove the Fascia

1. Turn off the 24V DC power to the detector.
2. Remove the two screws along side the door hinge, as shown below in Electrostatic discharge (ESD) precaution.

Product Security Advice

Warning: Failure to comply with the requirements below exposes the system to malicious interference which could disable smoke reporting.

Scan the QR code to access the latest security advice available from: https://xtralis.com/33252

Commissioning Requirements

- All VESDAnet wiring and connection ports must be secured against unauthorized access.
- Ethernet and Wi-Fi ports must ONLY be connected to networks which are secure and physically or logically separate from business IT infrastructure.
- VESDA devices including HLIs must not be accessible from the Internet. Any provision of remote access to VESDA devices must be subjected to a full cyber security risk assessment and regular review.
- WPA-2 encryption must be used whenever Wi-Fi is enabled.
- Restrict access to HLI devices to authorized personnel only.
- Passwords must be chosen in line with the guidelines in the detector user guide and provided to trusted users only.
- Default PIN codes must be changed as part of the initial configuration.

System Maintenance Requirements

- Do NOT use the USB port for long-term monitoring or allow it to be permanently wired to building infrastructure. It is only to be used for configuration and maintenance by authorized personnel.
- If a detector requires firmware upgrade, ensure that the upgrade package is genuine and obtained directly from Xtralis.
- Access to PCs on which Xtralis VSC or VSM configuration software and system configuration information are installed must be restricted to authorized persons if saved passwords are used.
- Xtralis PC software such as VSC or VSM, must only be installed on PCs with current active Windows support from Microsoft.

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1 Introduction

The VESDA VLF-500-UL early warning air sampling smoke detector incorporates world leading VESDA very early warning laser based aspirated smoke detection technology. It provides localized fire risk management solutions for small, critical environments. The VLF-500-UL monitors areas up to 5380 sq. ft. (500 m²) dependant on local codes and standards. The VESDA VLF complements the existing VESDA detector range and has been designed to provide simple installation and commissioning, absolute smoke detection and reliable and consistent response to smoke events without being affected by false alarms.

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2 Installation

The VESDA VLF detector is shipped with all the components necessary for installation with the exception of pipe and associated materials.

Components include:

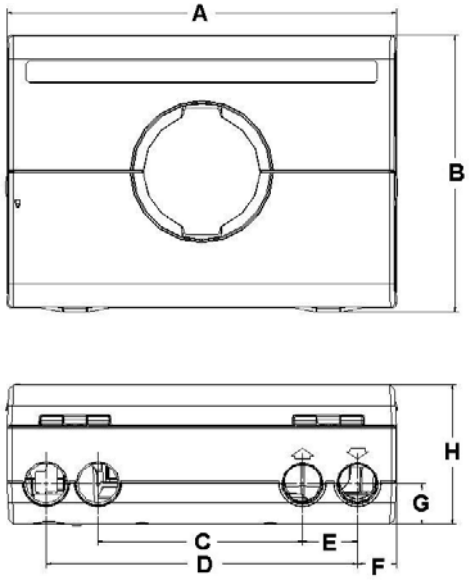
- 1 VESDA VLF detector with fitted exhaust deflector
- 1 Mounting bracket
- 1 End of Line resistor (refer to GPI – General Purpose Input (Terminals 1 & 2) on page 13)
- 2 M4 x 20 mm locking screws
- this Product Guide

Check all components for damage and refer any concerns to your VESDA distributor.

Notes:

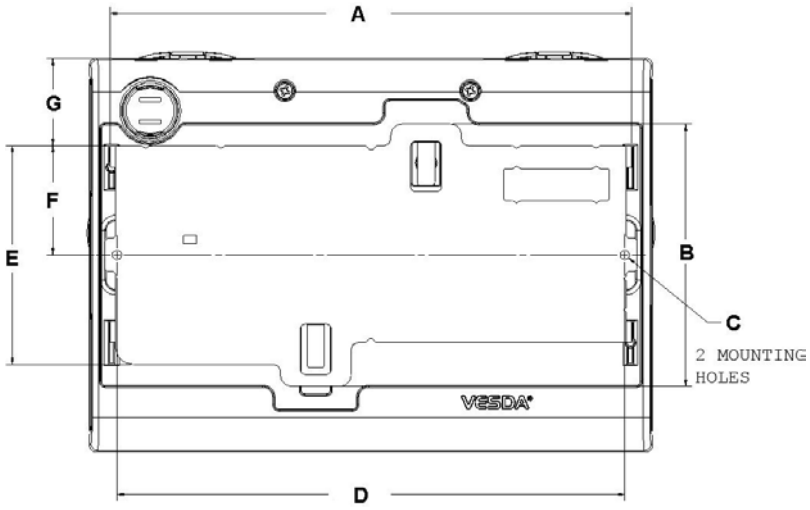
- Removing the rear cover of the detector will void your warranty.
- Opening or removing the sealed laser detection chamber will void your warranty.

2.1 Dimensions



Legend		
	inches	mm
A	10.08	256
B	7.20	182.8
C	5.28	134.0
D	8.03	204.0
E	1.42	36.0
F	1.00	25.5
G	1.06	27.0
H	3.63	92.1
I	7.20	182.8
J	7.09	180.0

Figure 2-1: Dimensions of the Detector



Legend		
	inches	mm
A	9.30	236.3
B	4.72	120.0
C	0.18	4.5
D	9.06	230.0
E	3.94	100.0
F	1.97	50.0
G	1.57	40.0

Figure 2-2: Dimensions of the Detector with Mounting Bracket

2.2 Mounting

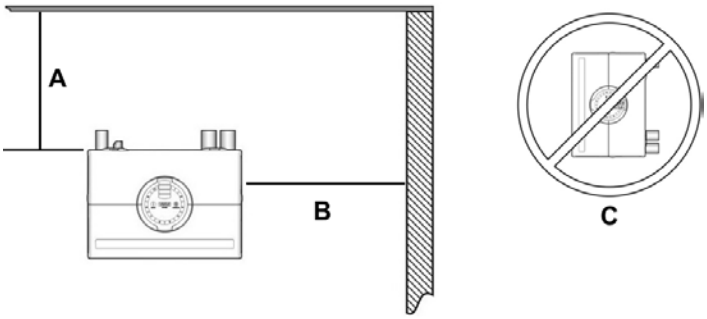
The VESDA VLF can be installed upright, inverted or horizontally.

Note: Ensure the smoke detector is mounted away from obstructions and below ceiling level.

Caution: An exhaust deflector must be fitted for upright mounting, unless the exhaust port is connected to a return air pipe.

Caution: Do not install this unit on its side. There is a risk of particulate and condensation collecting on critical elements of the detector chamber reducing the detectors performance.

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 pipework (air inlet, air exhaust and cable pipes) to allow pipe ends to be easily fitted and removed.



Legend	
A	Min. 8 in. (200 mm) below ceiling level
B	Min. 20 in. (500 mm) from a wall or obstruction to allow access to the security tab
C	Do not install the detector on its side

Figure 2-3: Mounting Location

2.3 Installing the Detector

In all installation cases the mounting bracket must be fitted (upright) as shown in Figure 2-4 on page 8.

Note: Ensure the mounting surface is flat. This will permit an air tight seal to be achieved between the sampling pipe and the tapered air ports on the detector.



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.

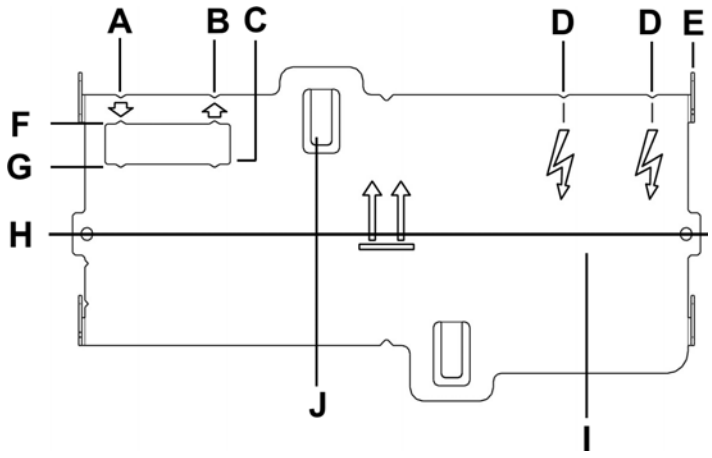
Where the pipe network and cabling are already fitted, the bracket can be used to aid alignment of the detector with the pipes. The Installation procedure below explains this process.

2.3.1 Installation Procedure

Cut the air inlet pipe and exhaust pipe (if used) at 90°, and to the same length (for normal and inverted mounting). Remove all rough edges. This is critical to obtain an air tight seal with the smoke detector.

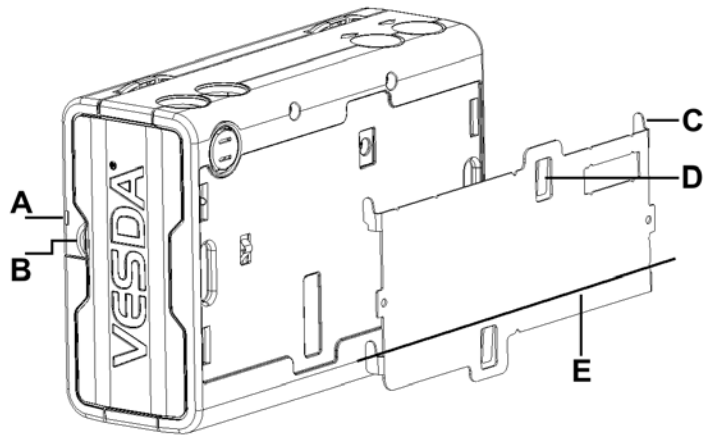
1. Position the air inlet centerline mark (A) of the mounting bracket against the end of the air inlet pipe. Refer to Figure 2-4 below.
2. In the cut out section of the mounting bracket mark a line across the top of the cut out if metric size pipe is used or mark a line across the bottom of the cut out if Imperial size pipe is used.
3. Slide the mounting bracket down (up for inverted mounting) until the top of the bracket aligns with the marked line.
4. Mark off and drill the 2 bracket mounting holes (H).
5. Screw the bracket to the wall.
6. Hook the smoke detector onto the mounting bracket tabs and pull it down into place.
7. Use the two M4 x 20 mm locking screws provided and screw them into the screw holes on the left and right side of the detector. See the items marked (F) in Figure 2-4 below.
8. The air sampling pipe can now be attached and power connected.
   (Refer to Section 2.7 on page 12 for connection information).

For inverted installation, to mark off the location of the mounting holes, follow steps 1 – 4 with the mounting bracket inverted to that shown in Figure 2-4 below. Also refer to Section 2.3.2 on page 9.



Legend	
A	Air inlet port centerline
B	Exhaust air port centerline
C	Cutout
D	Cable entry centerlines
E	Mounting tab
F	Metric OD 25 mm pipe mark
G	Imperial IPS ¾ in. pipe mark
H	Bracket mounting holes
I	Centerline of detector
J	Anti-tamper clip

Figure 2-4: Mounting bracket orientation for upright and inverted mounting



Legend	
A	Security tab
B	Finger clip
C	Mounting tab
D	Anti-tamper clip
E	Centerline of detector

Figure 2-5: Mounting bracket rear view

2.3.2 Inverting the user interface display

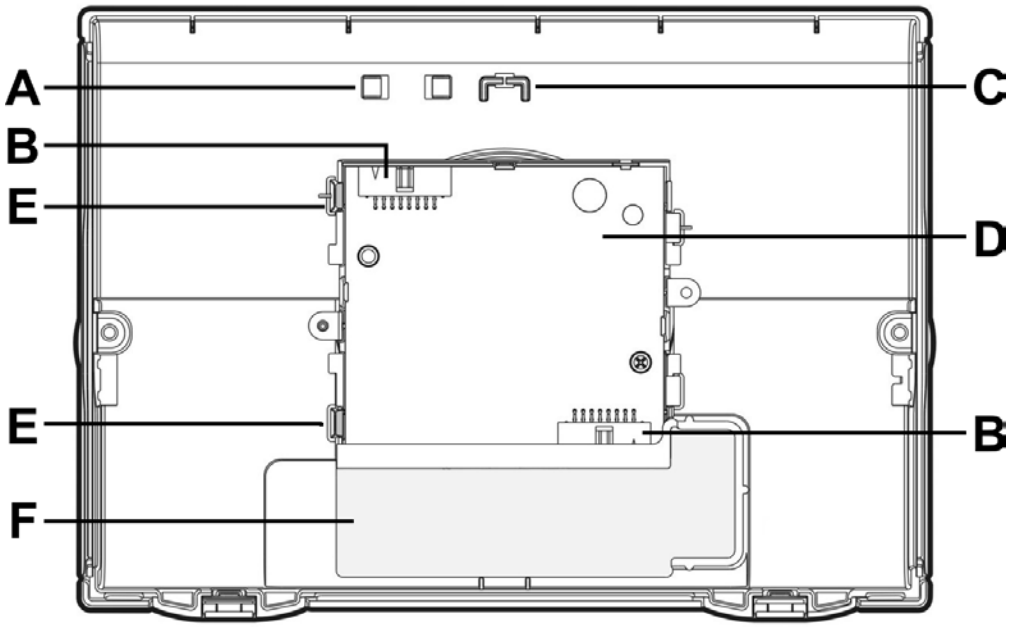
Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector.

For inverted mounting applications, the VESDA VLF will require the user interface display to be turned through 180°. This is carried out prior to installing the detector. Also refer to Figure 2-4 on page 8.

Inverting the user interface display:

1. Place the detector on its back, push in the securing tab and lift up the field service access door. (Refer to Figure 6-3 on page 31).
2. Remove the 2 retaining screws and lift off the main cover.
3. Disconnect the restraining strap from the clip (C) and the ribbon cable from the user interface card (B) and place the cover aside.
4. Open the clips (E).
5. Lift out the user interface display card, carefully turn it through 180° and then clip it back into place.
6. Reconnect the ribbon cable and the restraining strap.
7. Replace the main cover and screw down the 2 retaining screws.
8. Close the field service access door.

The detector is now ready for inverted installation.



Legend			
A	Ribbon cable clip	**D**	Interface card
B	Ribbon cable connector	**E**	Clip
C	Retaining strap clip	**F**	Air filter cartridge cavity

Figure 2-6: Inside view of the front cover (as it would appear inverted)

2.4 Detector Removal

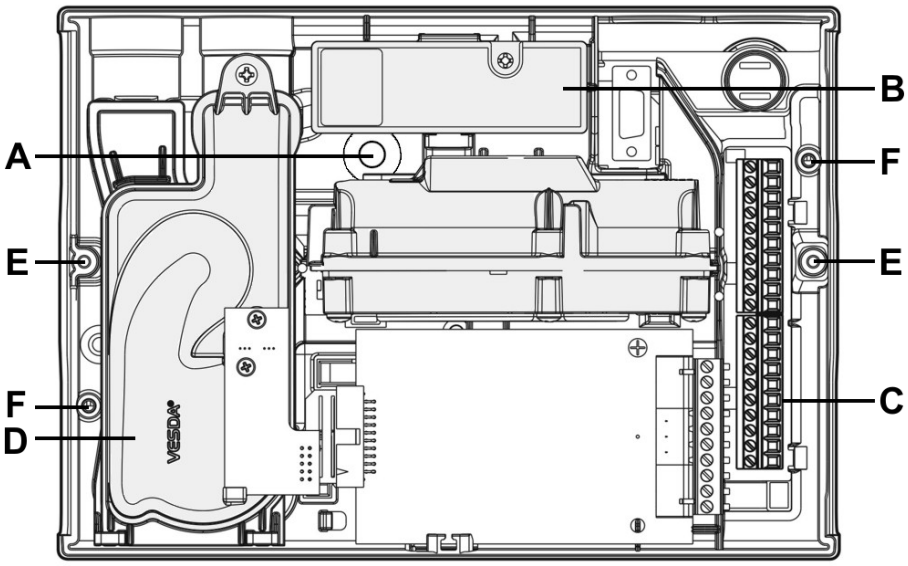
Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector.

Note: Take the necessary steps to advise the monitoring authority of work being carried out and that the system needs to be disabled.

1. Turn off the power to the detector.
2. Disconnect the sampling pipes.
3. Push in the security tab and lift up the field service access door, refer to Figure 6-3 on page 31 for further information.
4. Unscrew the front cover retaining screws (E).
5. Lift off and swing down the front cover, a restraining strap will take the load. For inverted mounted detectors the cover should be removed and placed aside.
6. Disconnect all field wiring from the terminal block.
7. Unscrew the two M4 x 20 mm locking screws on the left and right side of the detector. See the items marked (F) in Figure 2-7 below.
8. Use a screw driver to push down the anti-tamper clip in hole (A), at the same time, push the detector base up.
9. Lift the detector off the mounting bracket.

Once the detector has been removed re-fit the front cover to keep the internal components safe from damage and the electrical cabling safe.

Note: For inverted mounted detectors, the front cover will need to be removed prior to unhooking the detector from the mounting bracket. Disconnect the retaining strap and the ribbon cable from the user interface card and place the cover aside.



Legend			
A	Anti-tamper clip access hole	**D**	Aspirator
B	Air Filter Cartridge	**E**	Retaining screw
C	Terminal block	**F**	Bracket locking screw holes

Figure 2-7: Detector removal

2.5 Air inlet pipe connections

The tapered shape of the air inlet port is designed to accept standard pipes of IPS ¾ in (OD 1.05 in) or OD 25 mm (ID 21 mm) and provide an air tight seal.

Note: Do not glue the air inlet pipe to the detector. This will void your warranty.

2.6 Exhaust air pipe connections

Where the VESDA VLF 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.

In some circumstances, the pre-engineered solutions in this manual may not be suitable and it is recommended that alternate designs are verified by a suitably qualified installer using ASPIRE.

Examples of these circumstances are: where pressure differences exceed 50 Pa; in situations where the detector is located outside the protected area; in cases where there are hazardous substances inside the protected area eg hospital operating theatres, laboratories. In these cases, the exhaust should be returned to the protected area.

Return air pipes need to be as short as possible to minimize the effect of airflow resistance in the return air pipe network. Remove the fitted exhaust deflector and install a return air pipe where required.

The air exhaust port is tapered to accept standard pipes of OD 25 mm (ID 21 mm) or IPS ¾ in. and provide an air tight seal.

Note: Do not glue the exhaust air pipe to the detector. This will void your warranty.

2.7 Wiring Connections

Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector.

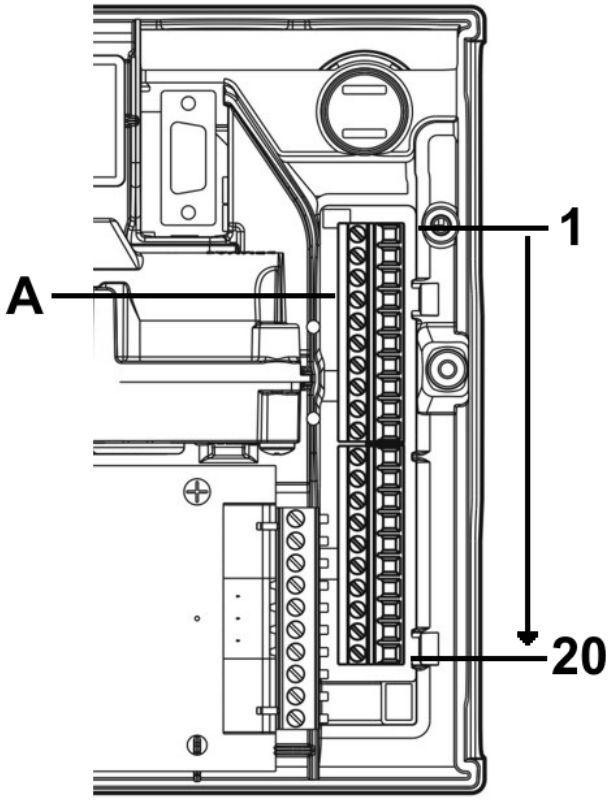
2.7.1 Detector cabling requirements

The screw type terminals located on the termination card within the VESDA VLF will accept wire sizes from 30 – 12 AWG (0.2 mm² to 2.5 mm²).

Refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii for code-specific requirements.

Refer to the VESDA System Design Manual for cabling details.

To reach the terminal block, open the field service access door, refer to Section 6.3 on page 31, and then unscrew the front cover retaining screws. Lift off and swing down the front cover. The terminal block is located on the right hand side of the detector.



Legend	
A	Terminal block, connectors 1-20

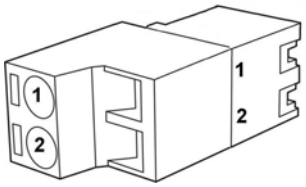
Figure 2-8: Terminal Block

2.7.2 GPI – General Purpose Input (Terminals 1 & 2)

The General Purpose Input (GPI) is a programmable input. When the GPI function parameter is set to external, the detector shall indicate an external equipment fault condition by monitoring the line impedance. An End of Line (EOL) resistor is supplied with the product and must be assembled in parallel with the device to be monitored.

The EOL resistor provides a known termination to the external equipment, this allows the VESDA VLF to detect open or short circuits. The detector monitors the EOL resistor (Figure 2-10) and reports any faults when the GPI function is set to any value, except **None**.

Caution: These terminal blocks come assembled and should NOT be disassembled.



Legend	
A	GPI Pin 1
B	GPI Pin 2

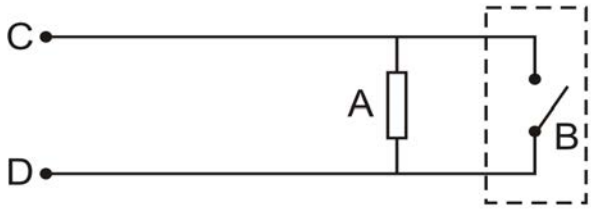
Figure 2-9: Terminal and plug set up, GPI connections

The GPI function parameter can be set to the values shown in the table below to achieve several different functions:

Table 2-1: GPI programming

GPI Function parameter value	Result
None	GPI is disabled. If GPI will not be used we recommend that you leave the EOL resistor assembled.
Reset	Detector is reset on activation of the GPI (closing contact). **Note:** The factory-default value of the GPI function is Reset.
Disable	Detector is disabled while GPI is active (contact closed) and reset on de-activation of the input (contact open).
Standby	Detector is placed in standby (disabled, plus aspirator turned off) while GPI is active (contact closed) and reset on de-activation of the input (contact open).
Alarm set 1	Activation of GPI forces alarm threshold set 1 to be used. It overrides normal selection.
Alarm set 2	Activation of GPI forces alarm threshold set 2 to be used. It overrides normal selection.
External	Detector indicates a fault while the GPI is active (contact closed). Typically this is used to monitor external power supply units. **Note:** If the contact is closed it will raise an Instant Fault Finder No.6 fault. If wire is broken to the monitoring device it will raise an Instant Fault Finder No.8 fault.

The GP input detects a short circuit (e.g. the PSU fault relay) at or below 100 Ohms.

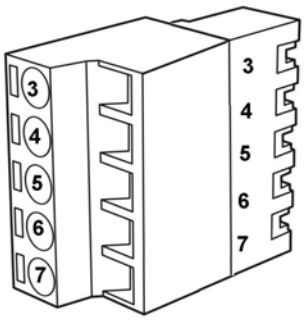


Legend	
A	End of Line Resistor (2.7k)
B	External device (1 to N)
C	GPI Pin 1
D	GPI Pin 2

Figure 2-10: Triggering of GPI

2.7.3 Extra terminals (Terminals 3, 4, 5, 6 & 7)

Terminals reserved for future use.



Legend	
3	Display Tx
4	Display Rx
5	Display Comm Gnd
6	Display Power -
7	Display Power +

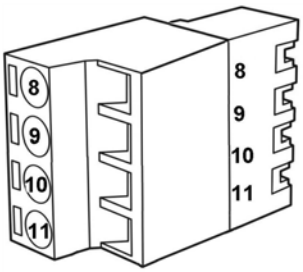
Table 2-2: Terminal block display, spare power terminals

2.7.4 Power supply (Terminals 8, 9, 10 & 11)

Operating voltage:	24 VDC nominal (18 - 30 VDC)
Power consumption:	9.8 W nominal, 11.7 W in alarm
Current consumption:	410 mA nominal, 490 mA in alarm

It is recommended that the power supply be compliant with local codes and standards required by the regional authority. For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

Caution: Check the product termination wiring label during installation and subsequent maintenance visits.

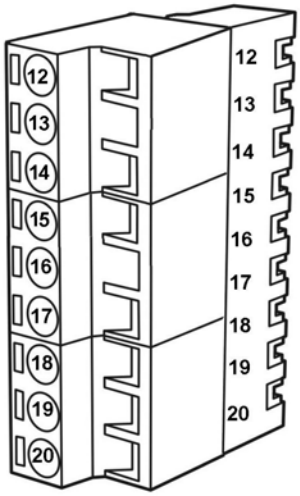


Legend		
8	Power Return 0 VDC	From power supply unit
9	Power in 24 VDC	
10	Power Return 0 VDC	To next detector (if more than 1 detector per Power Supply Unit)
11	Power Out 24 VDC	

Figure 2-11: Terminal block display, power supply

2.7.5 Relays (Terminals 12 - 20)

The relays allow alarm and fault signals to be hard wired to external devices, such as fire alarm control panels and loop interface modules away from the detector (example, sounding a siren at Action threshold). Refer to the appropriate installation manual for connectivity instructions.



Legend		
12	NC	Fault Relay
13	Common	
14	NO	
15	NC	Action Relay
16	Common	
17	NO	
18	NC	Fire 1 Relay
19	Common	
20	NO	

NC	Normally closed contact of relay (with no power applied).
NO	Normally open contact of relay (with no power applied).
Common	Common contact for the relay.

Figure 2-12: Terminal block display, relays

Note: By default, the Fault relay is normally energized when no fault is present. For example when there is no fault present, terminal 12 is held open and terminal 14 is held closed. When there is a fault present, terminal 12 is held closed and terminal 14 is held open.

2.7.6 Typical Wiring To Fire Alarm Control Panel (FACP)

The diagram below shows the correct way to wire VESDA detectors to a conventional fire alarm control panel (FACP). It also shows where an End Of Line (EOL) resistor is correctly installed.

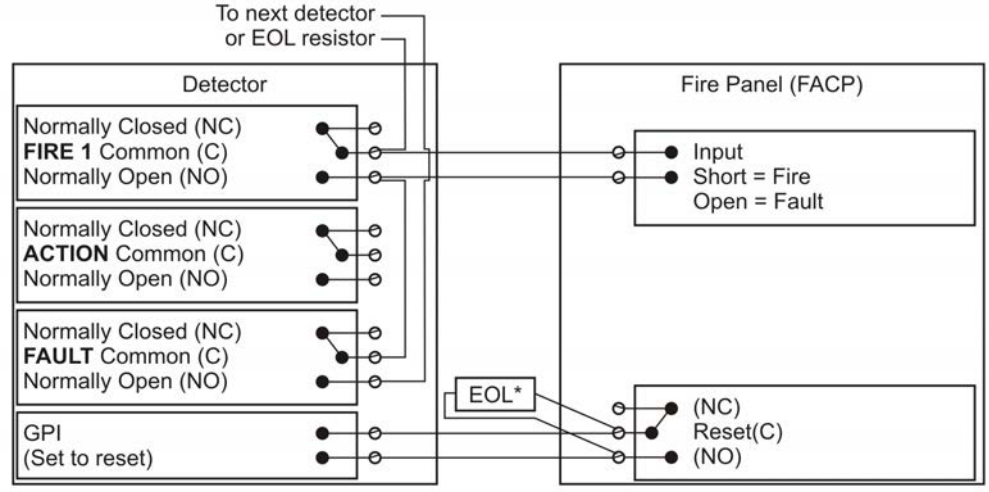


Figure 2-13: Typical wiring to a fire panel with EOL

2.7.7 Wiring to an Address Loop Module

This wiring example is for wiring VESDA detectors to a typical Address Loop module 3 input 1 output. These are example drawings. Refer to the appropriate product manual for the exact wiring details of the third party equipment.

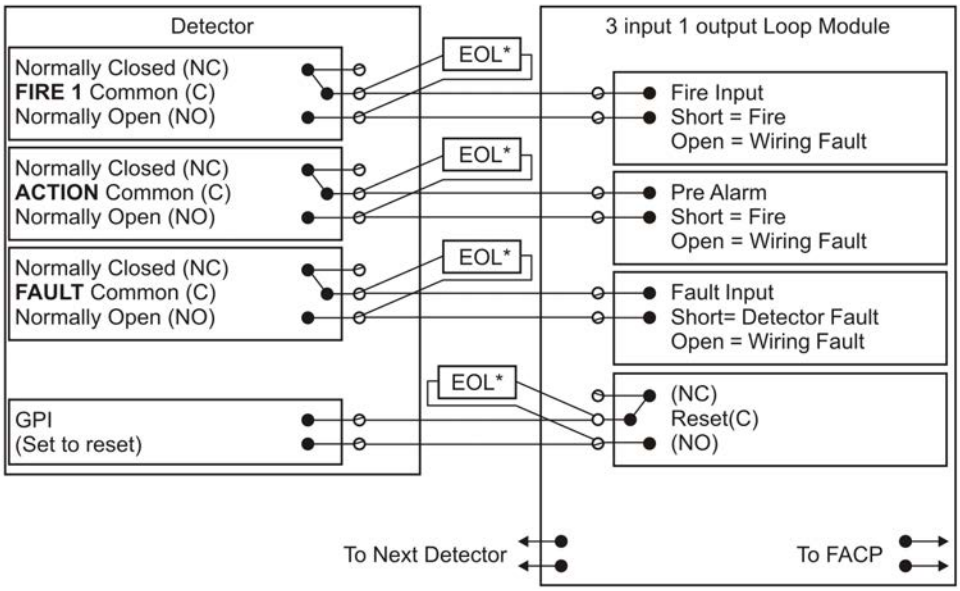


Figure 2-14: Addressable Loop Module with EOL

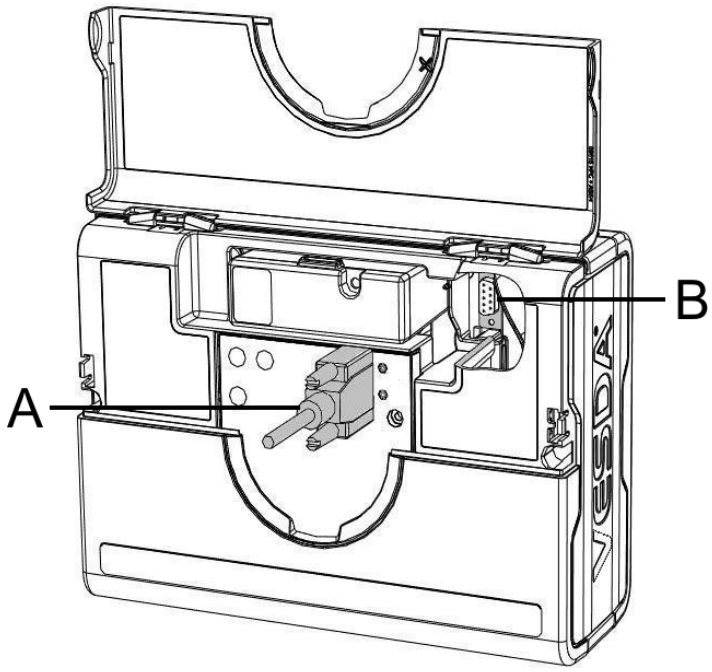
2.7.8 Interface Card

The VESDA VLF allows for the installation of a variety of interface cards. Refer to the specific interface card installation sheet, product guide, or your local VESDA support person for further information regarding installation and configuration of this card.

2.8 RS232-compatible serial port

The RS232 serial port requires a standard 9-pin DB9 PC COM serial extension cable (male to female) for configuring the detector using a PC with Xtralis VSC software installed, for status monitoring and command input, and for event log extraction and software upgrades.

For code specific information, see Codes and Standards Information for Air Sampling Smoke Detection on page iii.



Legend	
A	9 Pin DB9 PC COM Serial extension cable (male)
B	Cutaway, exposing the RS232 Serial Port (female)

Figure 2-15: 9 pin connector and RS232 serial port

2.9 Installation Checklist

Site Name	
Address	
Detector Serial Number(s) and Date of Manufacture	
Interface Card Serial Number and Date of Manufacture	
Name of Installer	
Signature	
Date	

Perform the following checks listed below to ensure that all the necessary items are completed before handing over to a commissioning engineer.

Installation Checks	**Yes**	**No**
Were the detector and the mounting bracket intact in the box?		
Is the detector securely locked onto its mounting bracket? Note that the two mounting bracket securing-screws are provided in a separate bag with the detector.		
Is the sampling air pipe firmly connected to the air inlet port? Ensure the pipe is NOT glued.		
Have the power wires been connected to the correct terminals on the detector?		
If required, has the end of line resistor been connected?		
Have the alarm signaling wires been terminated to the correct terminals of the detector?		
Has the Interface card been correctly installed according to the instructions provided (if applicable)?		
Has the plug at the exhaust port been removed and the exhaust pipe (if fitted) not glued?		
Has the front cover been replaced correctly?		
Has AutoLearn Flow and AutoLearn Smoke been performed? Please state the AutoLearn Smoke period: _____		
Is the air sampling pipework installed and checked as per the site plans?		

3 Sampling Pipe Network Design

The VESDA VLF supports a number of pre-engineered pipe network designs to simplify installation. The pre-engineered pipe networks have been designed with pressure, flow and transport time considerations. They have been verified and are shown below. For setup details refer to the VESDA System Design Manual.

The pre-engineered designs assume the following constraints:

1. There must be no mixing of open hole and capillary tubes in a pipe network design. All sampling points must be of the same type.
2. All sampling points must be evenly spaced in a pipe network design.
3. Branched designs must use the same number of sampling points along each branch.
4. Open hole designs must use the same size hole throughout the design.
5. Capillary tube designs must use the same size and length of capillary tube throughout the design.
6. The distance from the detector to the first sampling point must be 1 to 2 times the distance between sampling points. For example, if the sampling points are 4 meters apart, then the distance from the detector to the first sampling point must be between 4 and 8 meters.

Given the constraints detailed above, the pre-engineered pipe network designs will provide:

Parameter	**Value**
Transport times	less than 60 seconds for open holes less than 90 seconds for capillary tubes
Suction pressure	greater than or equal to 25 Pa across holes and capillary tubes
Detector pressure	greater than 70 Pa
Flow rate	12 - 54 L/min

For alternate or complex pipe network designs including end caps with sampling holes use the ASPIRE pipe modeling software to verify pipe performance. For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

3.1 Single Pipe Network

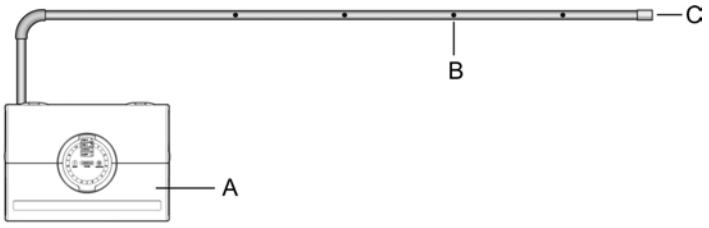
The table below shows the appropriate hole sizes for pre-engineered designs for a single pipe set up.

Table 3-1: Single pipe hole numbers and sizes

Single Pipe Network – max. length 150 ft. (50 m)				
Sampling holes	**IPS ¾ in. Pipe**		**ID 21 mm Pipe**	
	Open Hole	3/8 inch Capillary* with 1/8 inch hole	Open Hole	Open Hole 5.2 mm Capillary* with 5 mm hole
	Hole Size (in.)	**Length (ft.)**	**Hole Size (mm)**	**Length (m)**
5		0 – 12	4.0 – 5.0	0 – 1.8
6		0 – 12	3.5 – 4.5	0.3 – 1.8
7		0 – 12	3.5 – 4.0	0.5 – 2.0
8		0 – 12	3.5 – 4.0	0.8 – 2.2
9-24*	Use ASPIRE to calculate hole sizes in this range*			

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

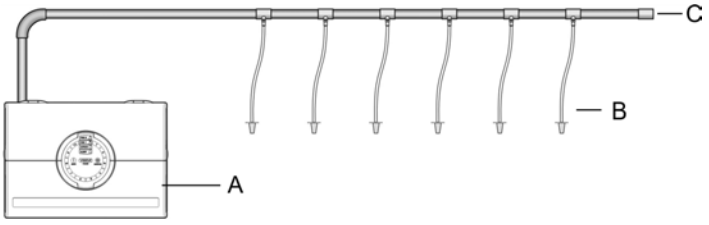
The set up below shows a single pipe arrangement with 4 sampling holes and a fitted end cap without a sampling hole.



Legend					
A	Smoke Detector	**B**	Sampling Hole	**C**	End cap (no hole)

Figure 3-1: Open hole, single pipe

The set up below shows a single pipe arrangement with 6 capillary drop pipes and a fitted end cap without a sampling hole.



Legend					
A	Smoke Detector	**B**	Capillary Tube	**C**	End cap (no hole)

Figure 3-2: Capillary tubes, single pipe

3.2 Branched Pipe Network

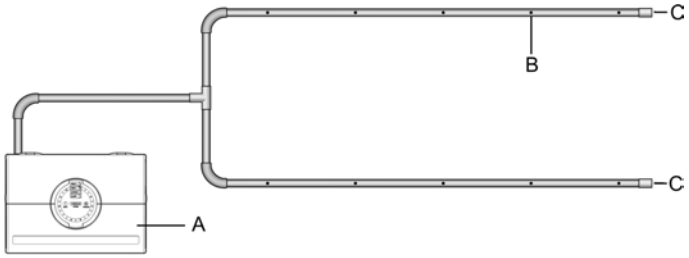
The table below shows the appropriate hole sizes for pre-engineered designs for a branched pipe set up.

Table 3-2: Branched pipe hole numbers and sizes

Branched Pipe Network – (2 branches)	**max. length 90 ft. (30 m)** **max. distance from detector to branch 15 ft. (5 m)**			
Sampling Holes per Branch pipe	**IPS ¾ in. Pipe**		**ID 21 mm Pipe**	
	Open Hole	3/8 inch Capillary* with 1/8 inch hole	Open Hole	5.2 mm Capillary* with 5 mm hole
	Hole Size (in.)	**Length (ft.)**	**Hole Size (mm)**	**Length (m)**
3		0 – 12	3.5 – 5.5	0 – 2.0
4		0 – 12	3.0 – 5.0	0 – 3.0
5		0 – 12	3.0 – 4.0	0 – 3.0
6		0 – 12	3.0 – 4.0	0.2 – 3.0
7-12*	Use ASPIRE to calculate hole sizes in this range*			

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

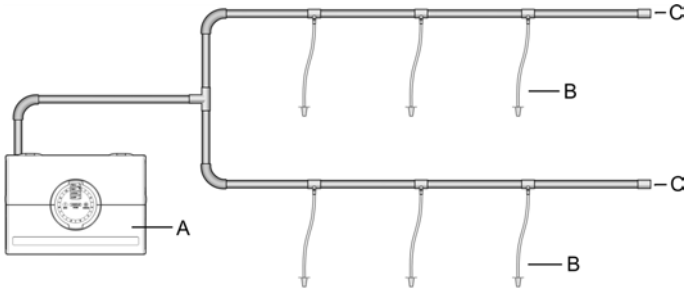
The set up below shows a branched pipe arrangement with 5 sampling holes per branch and fitted end caps without sampling holes.



Legend					
A	Smoke Detector	**B**	Sampling Hole	**C**	End cap (no hole)

Figure 3-3: Open hole, branched pipe

The set up below shows a branched pipe arrangement with 3 capillary drop pipes per branch and fitted end caps without sampling holes.



Legend					
A	Smoke Detector	**B**	Capillary Tube	**C**	End cap (no hole)

Figure 3-4: Capillary pipes, branched pipe

3.3 Return air sampling (return grilles)

The VESDA VLF is suitable for air sampling across return air grilles of Air Handling Units. The recommended coverage of the VESDA VLF is 4 sq. ft. (0.4 m²) per sampling hole. This should be considered in conjunction with local codes and standards.

Note: Rotate the air sampling hole approximately 45° away from the direction of the incoming airflow and towards the grille surface. This will minimize the risk of a Low Flow Fault being recorded in situations where air flow changes (e.g. where the Air Handling Unit is turned off).

Some points to consider for setting up a pipe network are:

- sampling holes should be evenly spaced (within 20% of the separation distance to each other)
- an un-vented end cap should be fitted to the end of the sampling pipe
- during installation, consideration should be given to the future maintenance requirements of the air handling unit. Access to filters should not be restricted and pipe network should be easily removable by the use of socket unions

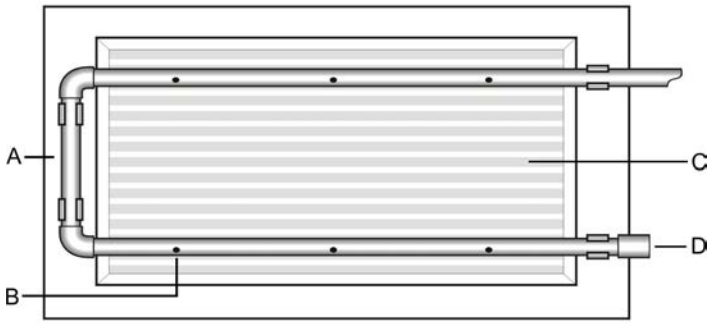
For full details concerning return air grille sampling pipe network design, consult the VESDA System Design Manual.

The table below shows the appropriate hole sizes for pre-engineered designs for return air grille set ups.

Table 3-3: Return air sampling pipe hole numbers and sizes

Return Air Sampling – U Shaped design with equal holes on each side		
Sampling Holes	IPS ¾ in. Pipe Hole Size (in.)	ID 21 mm Pipe Hole Size (mm)
8	–	3.0 – 4.5
10	–	3.0 – 4.0
12		3.0 – 3.5
14		3.0

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.



Legend			
A	Sampling pipe	**C**	Return grille
B	Sampling hole	**B**	End cap (no hole)

Figure 3-5: Return air sampling over an air handling unit grille

3.4 Installation Considerations

Note: For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

The VESDA VLF provides very early warning smoke detection specifically for small environments.

The pre-engineered pipe network designs can support up to 8 sampling holes for single pipes and 12 sampling holes for branched pipe arrangements. The number of sampling holes used can be increased to 24, however, ASPIRE will need to verify that the additional sampling holes can be supported. Sampling holes are positioned according to the standards relating to conventional point detector placement.

The pre-engineered pipe network solutions described in Section 3.1 on page 20 and Section 3.2 on page 21 achieved transport times of less than 60 seconds for open hole sampling and less than 90 seconds for capillary sampling.

Where the VESDA VLF is located outside the protected area (e.g. in a corridor outside the room), consideration must be given to returning the detector exhaust air to the protected environment to balance the pressure differences that may exist. In the majority of applications, this is not necessary as pressure differences are minimal. The exhaust should also be returned to the protected area in cases where there are hazardous substances inside the protected area, eg hospital operating theatres. Where practical considerations fall outside pre-engineered designs or where pressure differences exceed 50 Pa, in situations where the detector is located outside the protected area, the solutions presented in this manual may not be suitable and it is recommended that alternate designs are verified by a suitably qualified installer using ASPIRE.

The following points should be considered when installing the sampling pipe:

- minimize flexing in sampling pipes by supporting the pipe every 5 ft. (1.5 m) or less, or at a distance described in local codes and standards
- evenly arrange the sampling pipe network over return air grilles
- sampling pipe fits firmly into the tapered detector port, **DO NOT** glue this connection
- allow sufficient movement at the detector to permit pipe removal for maintenance
- keep the exhaust deflector fitted to prevent foreign objects falling into the detector
- keep the return air pipe as short as possible to minimize airflow resistance in the pipe
- pipe ends must be made smooth for bonding
- sampling holes must be drilled in line and perpendicular to the pipe
- sample holes must be clear of rough edges and debris
- pipes are free of debris
- all joints must be bonded except the endcaps and pipes entering the detector

Notes:

- In protected areas sampling holes should face into the direction of airflow, or point downwards in static airflow situations. When variable flows are present, position the sampling holes at 30° to the airflow.
- You should try to keep the sampling holes evenly spaced.
- For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

3.5 Air sampling in a duct

For air sampling in a duct please refer to the VESDA System Design Manual for duct probe design. For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

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4 Commissioning

4.1 General

The VESDA VLF has been designed to simplify commissioning processes. The AutoLearn function allows the unit to assess its environment and setup appropriate alarm and flow thresholds. The unit may also be programmed through Xtralis VSC software, for all programmable settings. For further information refer to Chapter 7 on page 37.

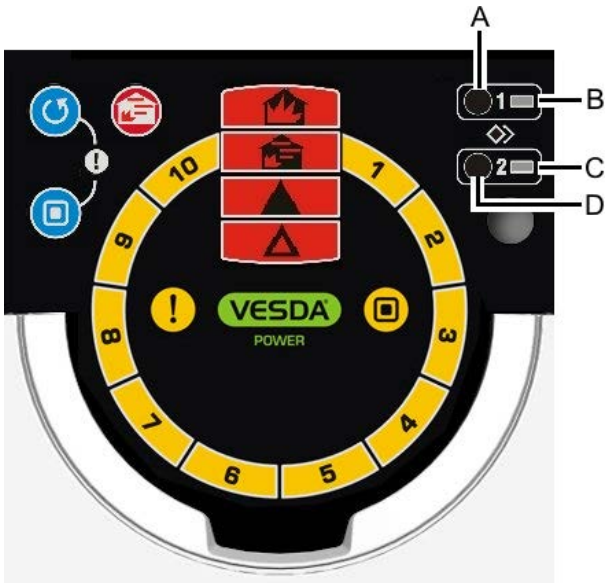
Note: Detectors should be commissioned with a smoke test.

Flow rates outside the detector's operating limits will cause overflow or underflow faults and prevent normalization from occurring.

Prior to commissioning the detector, check:

1. That the power is connected and on.
2. That the pipe network is clean and correctly fitted with all joints correctly seated and sealed (except the endcaps and pipe which enters the detector which must not be glued).
3. That the exhaust deflector is fitted (unless exhaust is returned to the protected environment).

For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.



Legend	
A	AutoLearn Smoke button
B	AutoLearn Smoke indicator
C	AutoLearn Flow indicator
D	AutoLearn Flow button

Figure 4-1: Interface display

Notes:

- It is important that the protected area is working under normal operating conditions when operating the AutoLearn processes.
- AutoLearn functions can be de-activated by a second press of the appropriate button. This will leave the thresholds at their default settings and not at the settings prior to AutoLearn.

4.2 AutoLearn Smoke

AutoLearn Smoke is initiated by pressing the recessed button numbered 1, which is located under the field service access door.

During the AutoLearn Smoke process, the VESDA VLF determines the average smoke and peak smoke obscuration levels and sets suitable alarm thresholds for the operating environment. This process will minimize false alarms due to normal environment smoke variations.

The AutoLearn Smoke LED will remain on for the duration of the AutoLearn process. At the start of the process the alarm thresholds are set to the default values. During this learning cycle, alarm conditions can be reported. If an alarm condition occurs (Alert or higher alarm) AutoLearn will not complete its cycle. In this situation restart the AutoLearn process. If AutoLearn is stopped by you or due to an alarm condition, the alarm thresholds will be left at the default settings.

Conditions during learning are assumed to be representative of normal operating conditions.

The AutoLearn Smoke learning times range from above 15 minutes to 15 days, with the default being set to 14 days.

If AutoLearn is running during the changeover period from Day and Night Thresholds function, make sure that AutoLearn runs for at least an hour in both the Day and Night.

AutoLearn Smoke is not available for UL268 Ed7 Open Area mode because AutoLearn Smoke may calculate sensitivities that exceed the nuisance smoke limit of the UL268 Ed7 standard.

Table 4-1: AutoLearn Smoke range

Alarm Level	AutoLearn Smoke Range
Alert	0.008 - 0.125 %obs/ft (0.025 - 0.4 %obs/m)*
Action	0.014 - 0.219 %obs/ft (0.044 - 0.7 %obs/m)*
Fire1	0.020 - 0.313 %obs/ft (0.063 - 1.0 %obs/m)*
Fire2	0.100 - 0.563 %obs/ft (0.313 - 5.0 %obs/m)*

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

4.3 AutoLearn Flow

AutoLearn Flow process is initiated by pressing the recessed button numbered 2, which is located under the field service access door. During the AutoLearn Flow process, the VESDA VLF determines the average and peak air flow levels monitored over time and sets suitable air flow thresholds that will not give rise to false flow rates due to normal flow variations (such as might arise through air-conditioning related false alarms). The system will normalize the flow and then monitor the flow trend to set the flow fail thresholds.

The AutoLearn Flow indicator LED will remain on for the duration of the AutoLearn process. At the start of the process the flow thresholds are set to the default values. During this learning cycle, alarm conditions can be reported. If a flow fault is reached, AutoLearn will not complete its cycle. In this situation restart the AutoLearn process. If AutoLearn is stopped by you or due to a flow fault condition, the flow thresholds will be left at the default settings.

Conditions during learning are assumed to be representative of normal operating conditions.

The AutoLearn Flow learning times range from 15 minutes to 15 days, with the default being set to 14 days.

4.4 Xtralis VSC

Xtralis VSC is an optional software application that allows all VESDA detectors to be configured. All parameters can be set manually or previously saved configuration settings may be applied. Refer to the Xtralis VSC online help for details regarding the setting of these thresholds.

4.5 Commissioning smoke test

It is recommended that a smoke test be carried out to prove the integrity of the pipe network, to demonstrate that the system is working and to measure the transport time to the detector.

This test involves introducing a smoke sample at the furthest sampling hole and then measuring the time taken for the smoke to travel to the detector. Results are logged and compared to subsequent tests to note variations of the system.

Refer to the VESDA System Design Manual for details of the commissioning smoke test.

5 Detector Overview

5.1 Features

- Laser Based Absolute Smoke Detection
- Wide Sensitivity Range
- Programmable Alarm Thresholds
- Clean Air Barrier for Optics Protection
- Instant Recognition Display
- Instant Fault Finder™
- AutoLearn™ Smoke
- AutoLearn™ Flow
- Ultrasonic Flow Sensing
- Referencing (requires a VESDAnet Interface Card)
- Field Service Access Door
- Separate Event Logging
- Pipe Modeling Support Software – ASPIRE™
- Xtralis VSC software for field support

5.2 Description

The Instant Recognition Display of the VESDA VLF smoke detector shows alarm levels and detector status information. The Smoke Dial, (see (F) in Figure 6-1 on page 29), a part of the Instant Recognition Display, provides clear information of a smoke event, relative to the Fire 1 Alarm Threshold. This display also identifies system and operational faults, when using the Instant Fault Finder function. Each segment of the Smoke Dial also corresponds to a specific fault condition.

A Field Service Access Door is provided to allow easy access to AutoLearn functions for detector commissioning. It provides access for filter replacement and connecting a PC for comprehensive configuration and diagnostics processes.

The detector uses Ultrasonic Flow Sensing to monitor the integrity of the sampling pipe network by detecting pipe air flow change. Ultrasonic flow sensing is not affected by temperature, humidity or pressure.

Detector history is provided by the non-volatile Event Logging feature. Smoke trend data, flow trend data, fault events, configuration events and operational events are recorded. Using Xtralis VSC these event types can be filtered individually.

5.3 Applications

The VESDA VLF can be used for open areas, return air grilles, or for cabinet protection in many small areas including:

- telecommunication facilities
- computer rooms
- control rooms
- storage facilities
- electrical and switching cabinets

For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

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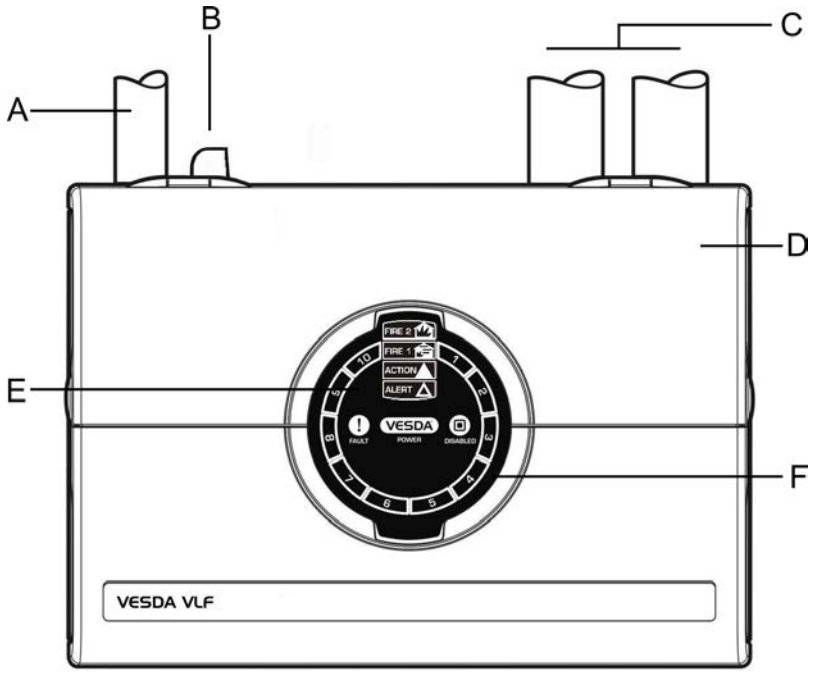
6 Product Interface

The VESDA VLF provides the following information and control options without the need for additional configuration tools.

- Detector status: Normal, Alarm, Disabled and Fault.
- Alarm levels: Alert, Action, Fire 1 and Fire 2.
- Smoke levels relative to Fire 1.
- Detector fault types (Instant Fault Finder).
- Test, Reset and Disable.
- AutoLearn Smoke (setting alarm thresholds).
- AutoLearn Flow (setting baseline for normalizing air flow and flow thresholds).

6.1 Front View

Front view of the detector as installed and operating. This view shows cable and air sampling pipe entry points, the Instant Recognition display and the fitted exhaust deflector.

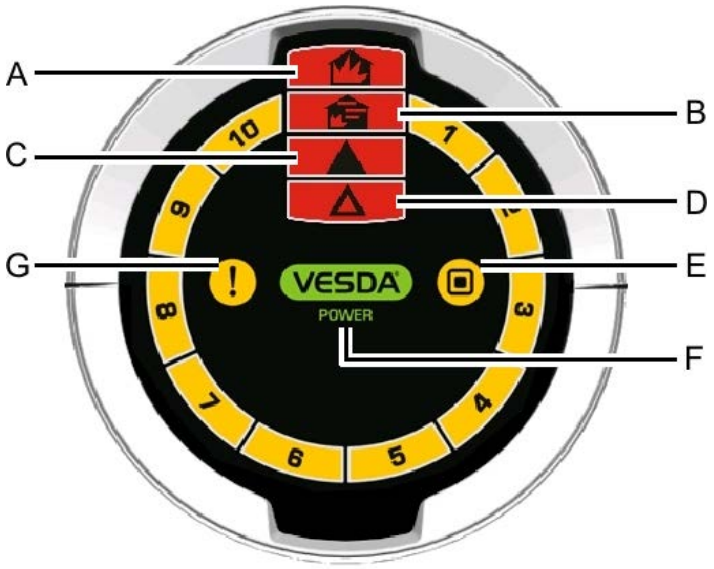


Legend			
A	Air inlet port	**D**	Rear cable entry (not shown)
B	Exhaust deflector	**E**	Instant Recognition Display
C	Cable entry ports (x2)	**F**	Smoke Dial (includes Instant Fault Finder)

Figure 6-1: VESDA VLF detector front view

6.2 Instant Recognition Display

The Instant Recognition display provides you with an immediate understanding of smoke levels relative to Fire 1 alarm threshold.



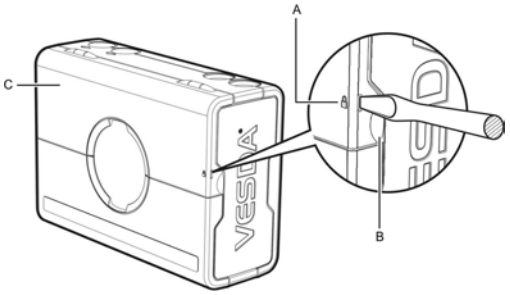
Legend			
	Option	**Definition**	**LED Color**
A	FIRE 2	Indicates the Fire 2 threshold has been reached.	Red
B	FIRE 1	Indicates the Fire 1 threshold has been reached.	Red
C	ACTION	Indicates the Action condition has been reached.	Red
D	ALERT	Indicates the Alert condition has been reached.	Red
E	DISABLED	Indicates the unit has been disabled (solid) or is in standby mode (flashing).	Yellow
F	POWER	Illuminates when the detector is powered.	Green
G	FAULT	Fault light continuously on indicates a Major Fault. When flashing indicates a Minor fault.	Yellow

Figure 6-2: Instant Recognition Display

Note: There are two sets of Instant Recognition display icons; both are shown throughout this manual. The international icon set can be identified by the lack of English text beside the icons.

6.3 Controls and Indicators

Control buttons are accessed by opening the field service access door. This door is opened by pressing in the security tab, on the right side of the detector, with a flat screw driver and then lifting the door by the finger clips on each side of the door (refer to Figure 6-3 below).

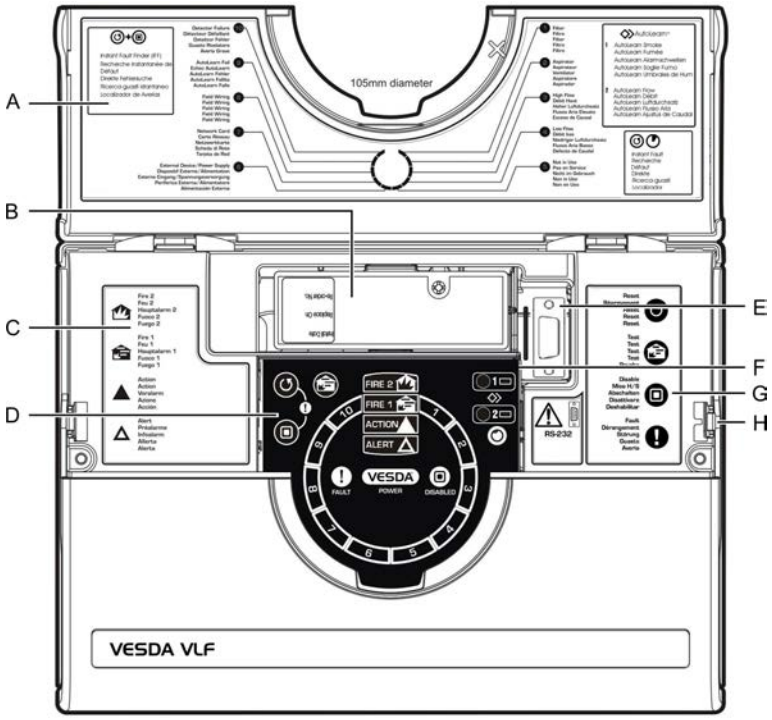


Legend	
A	Security tab
B	Finger clip
C	Field service access door

Figure 6-3: Field Service Access Door security tab and clip

6.3.1 Interface information and control buttons

Interface information and control buttons are located behind the field service access door.



Legend	
A	Instant Fault Finder fault descriptions.
B	Air filter cartridge.
C	Alarm level definitions.
D	Control buttons - Reset, Disable, (Instant Fault Finder) & Test.
E	RS232 DB9F serial port.
F	Control buttons - AutoLearn Smoke, AutoLearn Flow.
G	Control button definitions.
H	Security tab.

Figure 6-4: VESDA VLF with field service access door open

6.3.2 Detector control buttons

Table 6-1: Detector Buttons

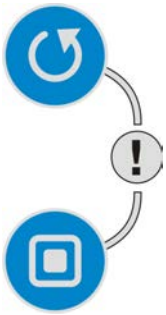
Icon	Button	Use	Description
	Reset	Resets the system and resumes normal operation.	Press and hold down this button to test the function of LEDs on the unit. To enable or lockout this button Xtralis VSC software is required. Release this button to clear latched faults and alarms. Alarm and fault lights will switch off, and if the system is still in alarm or fault mode, the lights will reappear after the appropriate delay.
	Disable	Disables the fire relay outputs from actuating and reports a fault. Pressing Disable for 6 seconds will put the detector into Stand-by mode.	This button allows the operator to toggle between disable and normal modes. When disabled smoke and air flow are not reported to the system (e.g. FACP). To enable or lockout this button Xtralis VSC software is required. The fan continues to run when VESDA VLF is disabled but stops when it is in stand-by mode.
	Instant Fault Finder	Indicates current active faults on the detector.	Pressing and holding in the Reset button and the Disable button together will show the fault type, by number, on the Smoke Dial. Refer to Section 6.4.3 on page 34 for the fault definitions.
	Fire 1 Test	Simulates a Fire 1 condition and the alarm relay is activated after the appropriate delay. **Note:** This will initiate a Fire 1 Alarm.	By default this button is locked out. To activate this button Xtralis VSC software is required. **Note:** Notify the monitoring authority before testing commences. To activate, press and release the Fire 1 Test button. All the segments of the Smoke Dial, and alarm conditions up to Fire 1 are activated (after the configured delay period). Press the Reset button to stop the test and clear any latched alarms. **Note:** Remember to return the system to normal mode after the test is complete.

Table 6-1: Detector Buttons (continued...)

Icon	Button	Use	Description
	AutoLearn Smoke	Automatically sets alarm threshold values based on the normal operating environment. Refer to Section 4.2 on page 25.	Pressing the recessed AutoLearn Smoke button initiates the automatic smoke alarm set-up mode. The LED, beside the button, will remain on for the duration of the AutoLearn process (up to 14 days which is also the default period). During this period the unit is online, alarms are communicated and default thresholds are active. To deactivate this function, press the AutoLearn Smoke button again.
	AutoLearn Flow	The detector automatically measures air flow to the pipes and sets the air flow threshold values. Refer to Section 4.3 on page 26.	Pressing the recessed AutoLearn Flow button sets the airflow fault thresholds as well as normalizing the detector's airflow. The LED, beside the button, will remain on for the duration of the AutoLearn process (up to 14 days which is also the default period). To deactivate this function, press the AutoLearn Flow button again.

6.4 Smoke level & Instant Fault Finder displays

Under normal operating conditions the circular Smoke Dial displays smoke levels in sampled air. Through Instant Fault Finder, the Smoke Dial temporarily changes the segments into fault indicators, with each segment corresponding to a specific fault condition.

6.4.1 Smoke level display

The smoke level is displayed on the Smoke Dial (A) and provides incident information essential for effective response in very early warning situations. This display provides you with an instant understanding of the smoke event relative to the Fire 1 Alarm Threshold. Between 1 and 10 segments may illuminate. Each segment is equivalent to 1/10 of a Fire 1 warning.



Legend			
A	Smoke Dial and Fault Type indicator.	**C**	Disable button.
B	Reset button.	**D**	Fault light.

Figure 6-5: Smoke level and fault condition display

6.4.2 Instant Fault Finder

When a fault is registered on the detector, the fault light (D) remains on for Major Fault situations and flashes for Minor Fault.

The Instant Fault Finder function is operated by pressing the Reset and Disable buttons together. Instant Fault Finder provides rapid fault diagnosis and is an additional function of the Smoke Dial display. One or more segments of the Smoke Dial will illuminate, indicating the fault by number. The table below provides fault details and recommended actions.

6.4.3 VESDA VLF Troubleshooting with Instant Fault Finder

The Instant Fault Finder function aids rapid diagnosis of faults.

Table 6-2: Instant fault finder diagnosis

Fault	Type	Explanation	Action
1	Filter	Air filter needs replacement due to dust or smoke contamination or has reached the end of its life.	Replace the air filter with a new unit remembering to reset the filter fault.
2	Aspirator	Aspirator fault has occurred.	Initially replace the aspirator. If the fault remains replace the unit.

Table 6-2: Instant fault finder diagnosis (continued...)

Fault	Type	Explanation	Action
3	High flow	High flow fault present (urgent or non-urgent). Flow readings are above user set flow limits or the detector maximum flow	Check the pipe network for breakages. Also check the suitability of the pipe network in ASPIRE.
4	Low flow	Low flow fault present (urgent or non-urgent). Flow readings are below user set flow limits or the detector maximum flow	Check the pipe network for blockages. Also check the suitability of the pipe network in ASPIRE.
5	Not in use		
6	External Device / Power Supply Unit	External equipment signaling a fault via the General Purpose Input.	Inspect the external device and also check that the GPI is set to the correct mode. Also check that the EOL resistor is correctly connected.
7	Interface card	Interface Card needs replacement.	Replace the Interface Card.
8	Field wiring	General Purpose Input or Interface Card wiring.	If no interface card is installed check the GPI wiring for an open circuit. If an interface card is installed refer to the card manual. Refer to Section 2.7.2 on page 13 for further information.
9	AutoLearn fail	AutoLearn Smoke or Flow failed.	Repeat AutoLearn Smoke or Flow process. Inspect logs if repeated failures occur. AutoLearn Flow will fail if there is an airflow fault on the detector. Fix airflow fault and restart AutoLearn.
10	Detector failure	A fault has occurred that cannot be fixed.	Contact the supplier and replace the detector.

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7 Factory Defaults

Table 7-1: Factory defaults

Parameter	Allowed values	Default values
Alert Smoke Threshold 1 & 2	0.008% - 0.625% obs/ft.* (0.025% - 2.0% obs/m)	0.025% obs/ft. (0.08% obs/m)
Action Smoke Threshold 1 & 2	0.008% - 0.625% obs/ft.* (0.025% - 2.0% obs/m)	0.0448% obs/ft. (0.14% obs/m)
Fire-1 Smoke Threshold 1 & 2	0.008% - 6.25% obs/ft.* (0.025% - 20% obs/m)	0.0625% obs/ft. (0.2% obs/m)
Fire-2 Smoke Threshold 1 & 2	0.008% - 6.25% obs/ft.* (0.025% - 20% obs/m)	0.625% obs/ft. (2.0% obs/m)
Alert Verification Delay 1 & 2	0 - 60 seconds	10 seconds
Action Verification Delay 1 & 2	0 - 60 seconds	10 seconds
Fire 1 Verification Delay 1 & 2	0 - 60 seconds	10 seconds
Fire 2 Verification Delay 1 & 2	0 - 60 seconds	10 seconds
Alarm Latching Enable	Enabled or Disabled	Enabled
Fault Latching Enable	Enabled or Disabled	Disabled
Airflow – Major High Flow Fault	100% - 150%	130%
Airflow – Major Low Flow Fault	50% - 100%	70%
Airflow – Minor High Flow Fault	100% - 150%	120%
Airflow – Minor Low Flow Fault	50% - 100%	80%
UL Mode**	Open Area - Special Applications	Open Area
AutoLearn Smoke	15 min. – 15 days	14 days
AutoLearn Flow	15 min. – 15 days	14 days
Smoke Test Button	Enabled or Disabled	Disabled
Threshold set 1 and 2	Day (1) & Night (2) / Disabled	Disabled

* For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.
** AutoLearn smoke not avaliable when used in Open area mode.

Note: If installing the detector as a UL compliant system the alarm signal connected to the control panel for the fire evacuation shall not be less than 0.64 %obs/ft. (2.0 %obs/m).

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8 Specifications

8.1 Power Supply

Supply Voltage	24 VDC nominal (18 - 30 VDC)*
Power Consumption @ 24 VDC	9.8 W nominal, 11.7 W in alarm*
Current Consumption @ 24 VDC	410 mA nominal, 490 mA in alarm*

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

8.2 Case

Dimensions (WHD)	10 1/16in x 7 1/5 in x 3 2/3 in (256 mm x 183 mm x 92 mm)
Weight	Approx. 4.4 lbs (2 kg)
IP Rating	IP30
Mounting	Upright, inverted or horizontal with appropriate mounting bracket
Maintenance access	Instant Fault Finder, Filter and Programming Port

8.3 Operating Conditions

Detector Ambient	32°F to 103°F (0°C to 39°C)
Tested to (EN54-20)	14°F to 131°F (-10°C to 55°C)
Sampled Air *	-4°F to 140°F (-20°C to 60°C)
Humidity (non-condensing)	5% to 95%

* Sampled Air temperature shall reach Ambient Detector temperature upon entry into Detector. Refer to Xtralis Design Guides & Application Notes for sampled air pre-conditioning.

8.4 Sampling Network

Air inlet pipe	IPS ¾ in. (OD 1.05 in.)/ OD 25 mm (ID 21 mm) Alternate pipe sizes can be modelled with ASPIRE
Single pipe length	150 ft. (50 m) max.
Single pipe - Sampling holes	5-8 sampling holes pre-engineered For 9-24 sampling holes model with ASPIRE*
Branch (2) pipe length	90 ft. (30 m) max. per branch
Branch (2) - Sampling holes per branch	3-6 sampling holes pre-engineered For 7-12 sampling holes model with ASPIRE
Return Air Sampling – U Shaped design per branch	8-14 sampling holes pre-engineered For 9-24 sampling holes model with ASPIRE

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

8.5 Area Covered

VLF-500-UL	5380 sq. ft. (500 m²)

8.6 Field Wiring

Access	1 in. (3 x 25 mm) Cable entries (1 rear entry)
Terminals	30 - 12 AWG (0.2 mm² - 2.5 mm²)

8.7 Interfaces

- Power In/Out.
- Fire 1 Relay (changeover, 2A @ 30 VDC).
- Action Relay (changeover, 2A @ 30 VDC).
- Fault Relay (changeover, 2A @ 30 VDC).
- General Purpose Input (clean contact).
- External display port (with power limited output).
- RS232 programming port.

8.8 Alarm Ranges

Alert, Action	0.008 – 0.625% obs/ft. (0.025 – 2.0% obs/m)*
Fire 1, Fire 2	0.008 – 6.25% obs/ft. (0.025 – 20% obs/m)*
Individual Delays	0 - 60 seconds
2 Threshold sets (1 & 2)	Day and night

*For code-specific information, refer to Codes and Standards Information for Air Sampling Smoke Detection on page iii.

8.9 Display

- 4 Alarm State Indicators (Alert, Action, Fire 1 and Fire 2).
- Fault and Disabled Indicators.
- 10-sector Smoke Level Indicators.
- 10-sector Instant Fault Finder.
- Reset, Disable and Test Controls.
- Smoke and Flow AutoLearn Controls and Indicators.

8.10 Event Log

- Up to 18 000 events stored.
- Smoke trend, flow trend, faults events, configuration events and operational events.
- Date and time stamp.

8.11 AutoLearn Smoke and Flow

- Minimum 15 minutes, maximum 15 days (default 14 days).
- During AutoLearn, thresholds are NOT changed from pre-set values.

8.12 Referencing

- Reference smoke level source for networked detectors (requires a VESDAnet Interface card).

8.13 Ordering Information

VESDA VLF-500-UL	VESDA VLF-500-00-UL	European language set, English display labels.
	VESDA VLF-500-02-UL	VESDA VLF-500 DET DISP ICON+ENG ASIAN UL. International display labels.
Filter Cartridge	VSP-005	
Aspirator for VLF-500-UL	VSP-715	
VESDAnet Interface Card	VIC-010	
Multifunction Control Card (MCC)	VIC-020	
Multifunction Control Card (MCC) with Monitored Power Output (MPO)	VIC-030	

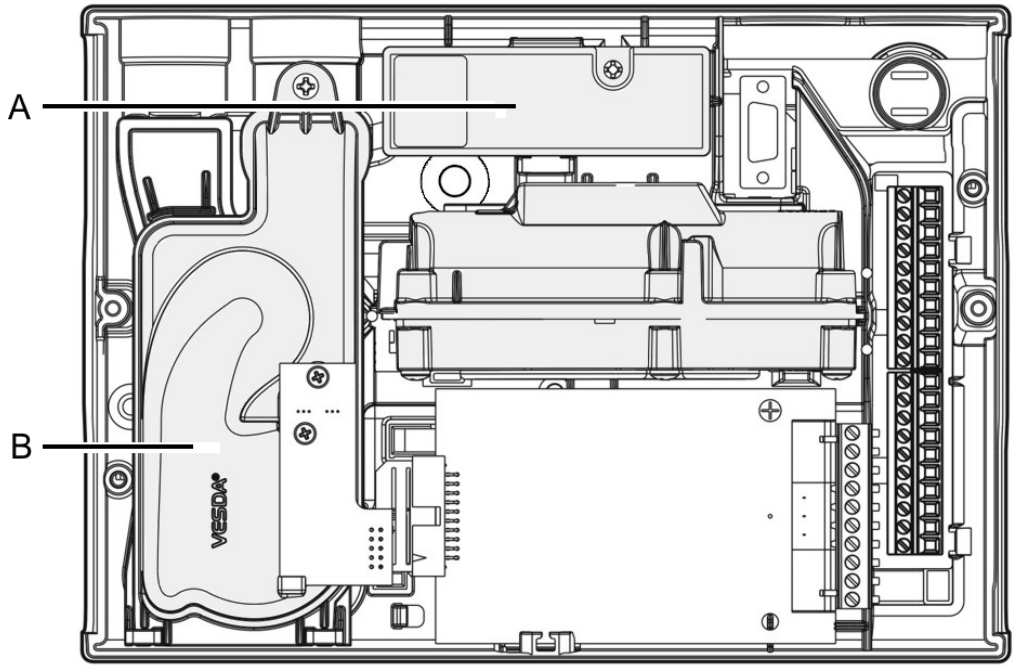
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9 Maintenance

9.1 Overview

The VESDA VLF continuously monitors its own operation and conducts frequent health checks. There are two serviceable items, the air filter cartridge and the aspirator.

Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector.



Legend	
A	Air filter cartridge
B	Aspirator

Figure 9-1: Maintenance - replaceable items

9.2 Maintenance Schedule

To maintain the VESDA VLF-500-UL in peak working order follow the maintenance standards for your region and where no recommended standard exists see the table below. Please note, for environments that experience high levels of contamination, the frequency of maintenance will need to be increased. Maintenance should be conducted by a qualified service contractor.

Table 9-1: Maintenance schedule

Action	Frequency	Details
Check pipe network	6 monthly	Check pipe connections to ensure all pipe runs are intact and that pipe supports and joints are firm.
Airflow	Yearly	Check air flow via Xtralis VSC software. Compare the current reading with previous reading to determine if the flow rate has reduced.
Smoke test	Yearly	Conduct smoke tests and verify detector performance (refer to the VESDA System Design Manual). Compare response times with those previously recorded and investigate any discrepancies.
Check power supplies	Yearly	Test in accordance with suppliers instructions.
Filter replacement	2 Yearly	Recommended change out period. The filter status can be checked via Xtralis VSC software. Depending on the environment, the filter may require more frequent checking.
Clean sampling holes	As necessary	If frequent low flow faults occur clean the sampling pipe network by back flushing (refer to the VESDA System Design Manual).

9.3 Replace the Filter Cartridge

The VESDA VLF smoke detector uses a disposable air filter cartridge. This filter removes dust contamination from sampled air and provides a clean air bleed to preserve the detector chamber optics. The detector constantly monitors filter efficiency. To maintain the operational integrity of the smoke detector, it is recommended that the filter be replaced every 2 years, or when a filter fault occurs or more often for environments that experience high levels of contamination.

A fault is raised on the detector, when the filter needs to be replaced. During the replacement process the detector needs to be informed that a new filter has been installed. The detector must remain powered while the filter is replaced.

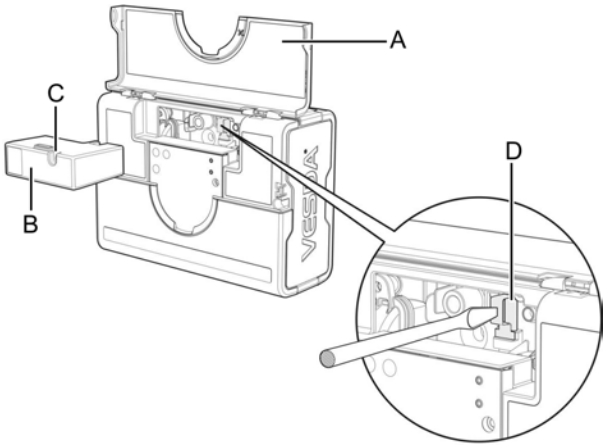
Notes:

- Prior to any work or maintenance being carried out on the VESDA VLF take the necessary steps to advise the monitoring authority that power may be removed and the system disabled.
- Ensure the area surrounding the filter is clear of dirt and debris prior to replacement.
- The filter is for single use only, it cannot be cleaned and re-used.

9.3.1 Filter Replacement Steps

Ensure the detector remains powered up during filter replacement and a new filter cartridge is available:

1. Push in the security tab and lift up the field service access door (A).
2. Set the detector to 'Standby' mode by pressing the Disable button for 6 seconds. The Disabled LED begins to flash. After releasing the Disable button the disabled LED will slowly flash.
3. Undo the recessed retaining screw (C) and pull out the old filter (B).
4. Using your finger, firmly press the filter switch (D) (in the filter recess of the detector) 5 times within 5 seconds to confirm to the detector that a new filter is about to be installed (see inset). A LED next to the serial interface will flash each time you push the filter switch, and will continue flashing once you have successfully pressed the switch 5 times in 5 seconds.
5. Insert the new filter (VSP-005) and tighten the retaining screw.
6. Press the Disable button for 6 seconds to return the detector to normal operation.
7. Record the filter replacement date on the filter.
8. Close the field service access door.



Legend	
A	Field service access door
B	Air filter cartridge
C	Retaining screw
D	Filter switch

Figure 9-2: Filter replacement

9.4 Aspirator Replacement

Note: Prior to replacing the aspirator advise the monitoring authority that power will be removed and the system disabled.

Precaution: Electrostatic discharge precautions need to be taken prior to removing the front cover from the detector.

Aspirator removal (assumes normal mounting, refer to Figure 9-3):

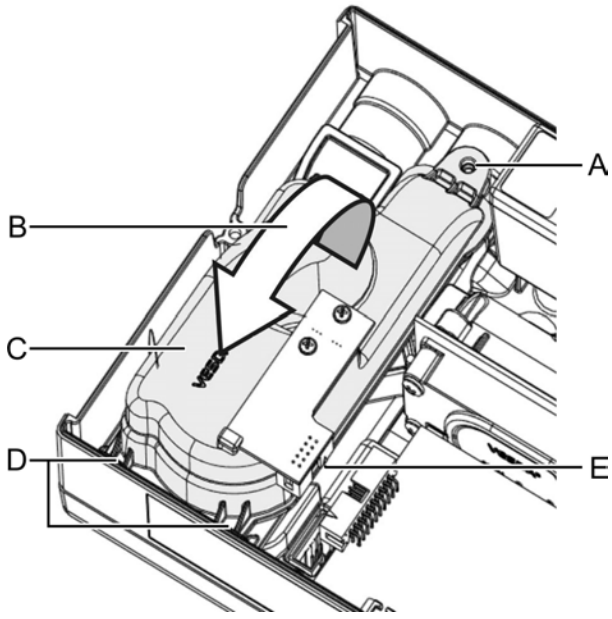
1. Disconnect power to the detector.
2. Push in the security tab and lift up the field service access door.
3. Unscrew the two front cover retaining screws, lift and swing down the front cover.
4. Only disconnect the fan wiring loom from the connection point (E) at the aspirator.
5. Undo the retaining screw on the aspirator (A).
6. Swing out the aspirator, then lift and remove it from the detector.

Notes:

- Any time the aspirator is removed ensure the area surrounding the aspirator is clear of dirt and debris prior to replacement.
- Care must be taken during aspirator replacement. The aspirator must be correctly seated; this is essential so that gaskets are not damaged or dislodged from the underside of the aspirator.

9.4.1 Aspirator Replacement Steps

1. Clip the aspirator (VSP-715) into the retaining clip (D) and swing it back into the detector.
2. Tighten the retaining screw (A) (**do not over tighten**).
3. Reconnect the fan loom to the aspirator (E).
4. Replace the front cover and screw it into place.
5. Close the field service access door.
6. Reconnect power to the detector.



Legend	
A	Aspirator securing screw
B	Swing aspirator out to remove
C	Aspirator
D	Retaining clip points
E	Fan loom connector **must** be disconnected here

Figure 9-3: Aspirator replacement

10 Commissioning Forms

10.1 VESDA Commissioning Form

This is the main commissioning form for each customer site.

Customer Name	
Site Address	
Installer (Name & Contact)	
Commissioner (Name & Contact)	

Checks	**Date:**
1. Wiring Checked 2. Detector Diagnostics 3. Display Diagnostics 4. Test Relay	1. 2. 3. 4.

Client Representative Name	
1. Test witnessed by:	**Date:**

Hand Over Documents	
1. Copy of this form 2. ASPIRE Installation Data Pack 3. ASPIRE Bill of Materials 4. Commissioning form for each detector 5. Commissioning form for each interface card 6. Ancillary devices form 7. Smoke test results 8. Forms to comply with the local codes and standards	

Customer's Signature	**Date:**
Commissioner's Signature	**Date:**

10.2 VLF-500-UL Detector Commissioning Form

While connected via Xtralis VSC, for all VESDAnet systems, highlight the device, the zone or VESDAnet then select File > Print to file.

Address (VESDA Zone)	
VESDA Zone Name	
Module Type	VLF-500-UL
Firmware Version	
Card Inserted	VESDAnet Interface Card or Multi-relay card or None

Alarm Thresholds			**Significant Smoke**		
Day	Alert		**Instant Fire**	Enable / disable	
	Action		**Filter**	Service Period:	
	Fire 1		**Reference Detector**	Address Zone:	
	Fire 2			Dilution%	
Day/Night Changeover	Enable / Disable			Delay (seconds)	
	Day starts:		**Flow Threshold**	High Major%	
	Night starts:			High Minor%	
Night	Alert			Low Minor%	
	Action			Low Major%	
	Fire1			Delay (seconds) Networked	
	Fire2			Flow Averaging Period (sec) Networked	
Delay	Alert		**Airflow**		
	Action		**Raw Flow**		L/min
	Fire1		**% Flow**		%
	Fire2		**Maximum Transport Time observed**		sec.

10.3 Display/Relay Configuration

Button Lockout	Enabled/Disabled
Smoke Test	
Reset	
Isolate	
AutoLearn Smoke	
AutoLearn Flow	
Relays Connected	Yes/No
GPI Connected	Yes/No
GPI Function	

10.4 Relay Configuration

Relay	**1**	**2**	**3**	**Start-up**	**Latching**
Fault	✔				
Action		✔			
Fire 1			✔		

D= Normally De-energized; E= Normally Energized

10.5 VESDAnet Interface Card (VIC-010) (plug-in)

VESDAnet Interface Card Installed	Yes/No
Card Serial Number	
Preferred Port	Port A/Port B
Loop Open Ended on this card	Yes/No

10.6 VESDAnet Multi-Function Relay Card (VIC-020/VIC-030)

Relay	**Relay 1**	**Relay 2**	**Relay 3**	**MPO**	**GPI**	**Startup**	**Latching**
Alert	✔			✔			
Fire 2		✔					
Disabled							
Standby							
Disable MPO							
Monitor External Device							

10.7 Ancillary Devices

Ancillary devices includes any remote displays, remote relay cards, AOM and SRM assigned to this VESDA VLF detector.

Device Name			
Device Serial No.			
Firmware Version			
Location			

10.8 ASPIRE Data

	Group 1	Group 2	Group 3	Group 4
Aggregate Sensitivity				
Balance				
Suction Pressure (least)				
Endcap Sensitivity Factor				
Pipe Flow Rate (L/min)				

10.9 Smoke Test

Test Results	
Test Method	
Type of Smoke	
Test Date	

10.10 Air Sampling Test Results

		Pipe or Branch 1	Branch 2
	Transport Time from End Cap Hole		
Test 1	Initial Response		
	Alert		
	Action		
	Fire 1		
	Fire 2		
	Peak Smoke		
Test 2	Initial Response		
	Alert		
	Action		
	Fire 1		
	Fire 2		
	Peak Smoke		

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11 Glossary

A	Aspirator	Impeller type fan used to draw sampled air into the detector.
C	Capillary Tubes	Flexible tubes attached to the sampling pipe network for sampling specific areas or objects away from the sampling pipe.
D	Disable	Disables the fire relay outputs from actuating (previously known as Isolate) and indicates a fault.
E	Event Log	All VESDA detectors provide internal data logging of events which have occurred in the protected zone.
F	FCC Compliance	Federal Communications Commission.
	Fire 1	This indicates a serious situation and may lead to automatic generation of a normal fire alarm.
	Fire Alarm Control Panel (FACP)	A panel which all fire detection products report their status to.
G	General Purpose Input (GPI)	The General Purpose Input is a programmable input.
H	High Airflow Environment	Where there are 10 or more air exchanges per hour.
I	Instant Fault Finder	Illuminates one or more segments of the Smoke Dial with corresponding fault numbers.
O	Obscuration	The reduction in light passing through a uniform length due to the presence of particulates.
R	Relay	The connection on a VESDA detector which allows external equipment to be hard wired to it and be triggered when various conditions occur (example, sounding a siren at Alert threshold).
S	Sampling Network	The pipe network constructed to allow the VESDA detector to draw air for sampling.
	Sensitivity	Relative degree of response (i.e. activation of alarm condition) of a detector. A high sensitivity denotes response to a lower concentration of smoke than a low sensitivity, under identical smoke build-up conditions.
V	VESDA	Brand name for the range of smoke detectors.
	VESDA VLF	An air sampling smoke detector using light scattering to report smoke obscuration.
	Xtralis VSC	A PC based program tool.

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12 Frequently Asked Questions (FAQ)

Note: For FAQs not specifically related to VESDA VLF, please visit www.xtralis.com.

What are the order numbers for the VESDA VLF detectors?

Part Numbers can be found on the datasheets (visit www.xtralis.com to download datasheets).

Where do I obtain an approval certificate for my VESDA VLF?

Visit the approval website or www.xtralis.com for the latest information.

What do the buttons on the VESDA VLF front panel do?

The RESET button resets all latching faults.

The DISABLE button disables the fire relay outputs and reports a fault.

Pressing the DISABLE button for 6 seconds will put the detector into Stand-by mode.

Pressing RESET and DISABLE simultaneously accesses the Instant Fault Finder function. A number flashes on the round display to indicate which fault, if any, is present. The user interface is described in the user panels beneath the service door.

The TEST button simulates a Fire 1 alarm condition and the alarm relay is activated after the appropriate delay. Before pressing this button, you must ensure that the reporting device is isolated to prevent the initiation of FIRE response actions.

AutoLearn Flow and AutoLearn Smoke will start the environment study to create specific thresholds for the area being covered, assuming that the environmental conditions during the study period are comparable to normal operating conditions. The default period for AutoLearn is 14 days. Pressing the **AutoLearn Flow** button also normalizes the detector's airflow.

Pressing an **AutoLearn** button a second time aborts the AutoLearn function.

What are the permissible flow normalisation limits for VESDA VLF detectors?

VESDA VLF-500-UL: minimum = 12 liters per minute, maximum = 54 liters per minute

What do I do if my VESDA VLF is showing a flow rate of 0 l/min?

Check whether the unit is in standby mode on the front panel. Pressing the standby button for 6 seconds will cancel this mode, however, it is advisable to first identify the reason for the detector being in standby mode. Xtralis VSC will also indicate standby mode, usually with a blue box that surrounds the detector in the Xtralis VSC device tree. Check if there is a FLOW SENSOR FAIL fault. If there is, you will need to return the detector for repair.

Why did VESDA VLF AutoLearn Flow fail?

If the flow rate is outside of the detector operating limits, AutoLearn Flow will not work.

Why is VESDA VLF AutoLearn Smoke having problems?

If a FIRE is detected, AutoLearn is aborted and the appropriate alarm raised. Environments with a high background smoke or pollution level, where this background exceeds the original threshold levels, will also cause AutoLearn to abort. AutoLearn should be run when the environment is displaying typical operating conditions. The default AutoLearn period is 14 days.

When the Instant Fault Finder is pressed (Reset + Isolate buttons together), why do the AutoLearn Flow and AutoLearn Smoke LEDs start flashing instead of the fault numbers lighting up? The flashing stops when the blue buttons are released.

You have not pressed BOTH the RESET button and the DISABLE buttons simultaneously, you have ONLY pressed the DISABLE button. To put the VESDA VLF into STANDBY you press and hold down the DISABLE button until the AutoLearn LEDS and DISABLED LED blink. This means keeping the button pressed for about 6 seconds. You do the same again to take the detector out of STANDBY. So, what you are doing is the 1st stage of putting the detector into/out of STANDBY. To make IFF work reliably, you need to press the RESET button BEFORE the DISABLE BUTTON. Several seconds can elapse between pressing these buttons but take care that you do not RESET the detector by accident.

Can the deflector be removed from the VESDA VLF exhaust?

It is a tight fit but it can be removed. With all VESDA detectors, we recommend returning all sampled air from the exhaust into the sampled environment.

How do I change the filter on my VESDA VLF?

Refer to the VESDA Maintenance Guide, available on the website under www.xtralis.com for full details. VESDA VLF detectors need to have the front cover lifted. Secure the replacement filter and acknowledge the action via a configuration tool (Xtralis VSC or programmer).

What do you recommend that the four VESDA VLF alarm relays be used for?

'Alert', 'Action', 'Fire 1' and 'Fire 2'. Check whether your local codes require specific relays to be fixed. VESDA VLF has action and fire set to specific relays.

What are the order numbers for the VESDA VLF demo kits?

All model numbers provided are Xtralis model numbers, check with your local distributor.

VKT-050 is the VLF-500-00-UL Demo Kit.

VKT-051 is the VLF-500-01-UL Demo Kit.

VKT-052 is the VLF-500-02-UL Demo Kit.

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www.xtralis.com
Doc. No. 36286_A2
Part No. AD36286-001
August 2021

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