

VESDA VLC-EX

Product Guide

VLC-500-EX

VLC-505-EX

September 2014

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Part Number: 29881

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Scope

The VESDA VLC-EX Product Guide is written to provide you with comprehensive knowledge of the detector.

This guide introduces you to the VESDA VLC-EX detector features and technical specifications and gives an understanding of its components and their function. You will also find instructions on installing, cabling and powering up the detector.




This guide is for anyone involved with the design, maintenance and purchasing of a VESDA system. It is assumed that anyone using this guide has knowledge and the appropriate certification from the local fire and electrical authorities and is fully conversant with the regulations pertaining to the use of such products in hazardous atmospheres.

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
<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, nothing can take precedence over the correct measures to prevent an explosion (ATEX / IECEx - EN 60079): This is mandatory. The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.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 instructions, 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.

Explosion Protection Information

Since the VLC-EX is designed to be applied in an environment where there is potentially a hazardous atmosphere, it is important that all users are aware of and follow the guidance given in the appropriate standards, including in: EN 60079-14:2008, "Explosive atmospheres. Electrical installations design, selection and erection", EN 60079-17:2007, "Explosive atmospheres. Electrical installations inspection and maintenance" and EN 60079-19:2011, "Explosive atmospheres. Equipment repair, overhaul and reclamation" and that they also adhere to the specific rules and regulations for the site where the product is deployed.

The VESDA VLC-EX is certified to :-

ATEX -

⊕ II 3G

EN 60079-0:2009 and EN 60079-15:2010

Ex ic nA nC IIB T5 Gc IP54

$-10^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$

Certificate No.: ITS 14 ATEX 48089X

QAN: ITS 11 ATEX Q7454

IECEx -

⊕ II 3G

IEC 60079-15 Ed4.0

Ex ic nA nC IIB T5 Gc IP54

$-10^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$

Certificate No.: IECEx ITS 14.0050X

QAR: GB/ITS/QAR11.0016/00

The VLC-EX is intended for hazardous area where there is little or no dust i.e. one with no process or activity that could lead to excessive or unfavourable dust passing through the detector in sufficient quantity to generate excessive electrostatic charge in the aspirator. In all installations it is recommended that an inline filter (part number VSP-850-M) is fitted in the pipework upstream of the detector.

Regional regulatory requirements and notices

EN54-20

The base VLC detector, as used in the VLC-EX has been tested and approved to EN 54-20.

The product must use a power supply conforming to EN 54-4.

The product is compliant with EN 54-20 sensitivity requirements provided the following conditions are met:

- For a Class A detector, hole sensitivity must be better than 1.5% obscuration/m and transport time less than 60 seconds
- For a Class B detector, hole sensitivity must be better than 4.5% obscuration/m and transport time less than 90 seconds
- For a Class C detector, hole sensitivity must be better than 10% obscuration/m and transport time less than 120 seconds

These limits should be verified using ASPIRE2 during the design of the sampling pipe network.

The product is compliant with EN 54-20 flow monitoring requirements provided the following conditions are met:

- The minor low and minor high flow thresholds should be set at 85% and 115% respectively
- The flow through the detector predicted by ASPIRE2 should be in the range 20 to 65 lpm

Additional information:

- Class A detectors passed EN 54-20 approvals testing with 30 holes and 0.05% obscuration/m detector sensitivity
- Class B detectors passed EN 54-20 approvals testing with 36 holes and 0.09% obscuration/m detector sensitivity
- Class C detectors passed EN 54-20 approvals testing with 40 holes and 0.165% obscuration/m detector sensitivity

Approvals

The VLC-EX contains a standard VLC-EX detector inside an IP rated enclosure so as to meet the particular requirements of Exn. Refer to the VLC data sheet (Doc no: 09362) for a list of approvals relevant to the standard VLC. While the performance requirements of the VLC-EX have been verified by Xtralis to be equivalent or better than the standard VLC, the VLC-EX is not formally listed as a product variant by these agencies.

The base VLC detector, as used in the VLC-EX, has been tested and approved by the following:

- UL
- ULC
- FM
- LPCB
- VdS
- CCC
- ActivFire
- NF (Système de Sécurité Incendie – www.marque-nf.com)
- VNIPO
- CE
- EN 54-20

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

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1 Introduction

The VESDA VLC-EX is an aspirating smoke detector providing very early warning of fire conditions by drawing air samples through an air sampling pipe network. The detector chamber can detect the presence of smoke at very low concentrations. The embedded and PC software complementing the VESDA VLC-EX provides a wide range of user defined parameters and reporting capabilities. The detector easily interfaces with fire warning and fire suppression release systems, and can be easily integrated into a building management or digital control system.

1.1 Configurations

The VESDA VLC-EX is available as:

- Relays Only (RO) model (VLC-500-EX) - for stand alone VESDA VLC-EX
- VESDAnet (VN) model (VLC-505-EX) - for networked VESDA VLC-EX



Figure 1-1: VESDA VLC-EX detector

1.2 Features

The VESDA VLC-EX features make it an ideal smoke detector for protecting small environments and individual objects in locations containing hazardous atmospheres:

- Wide sensitivity range
- Each detector can cover an area of up to 800 m² (8000 sq. ft.)
- Up to three programmable alarm thresholds
- Programmable relays
- AutoLearn feature
- One pipe inlet that can be split into multiple pipes
- Clean air barrier for optics protection
- Option for inverted mounting
- High efficiency aspirator
- Airflow monitoring
- Optional remote display and relay capability
- Active fault monitoring
- Easy cable termination
- Event log to 12000 events
- RO Version: Relay Only version for stand alone VESDA VLC-EX
- VN Version: VESDAnet (VN) version for networked VESDA VLC-EX
- Remote modules available (VN version only) to meet site specific requirements
- General purpose input with three programmable functions
- PC capable programming and monitoring
- Fully supported by the ASPIRE2 pipe modelling software. Model the VLC-EX as a standard VLC

2 Operation

An air sampling pipe network collects air samples from a protected area. The integrated aspirator draws air into the sampling pipes through a pipe inlet manifold. For further information on air sampling pipe networks please see the Pipe Network Design and Installation Manuals.

Some of this air flows to the dual stage filter. The first stage air filter removes dust and dirt from the sampled air after which the sample flows to the laser detector chamber which is designed to detect the presence of smoke.

Any smoke detected in the laser detection chamber is signaled to the main processor card. If the presence of detected smoke is higher than the set thresholds it is reported as a Pre-Alarm or an Alarm depending upon the alarm thresholds. The second stage filter further filters the air to produce ultra clean air. The ultra clean air is used to clean the optical surfaces in the laser detection chamber.

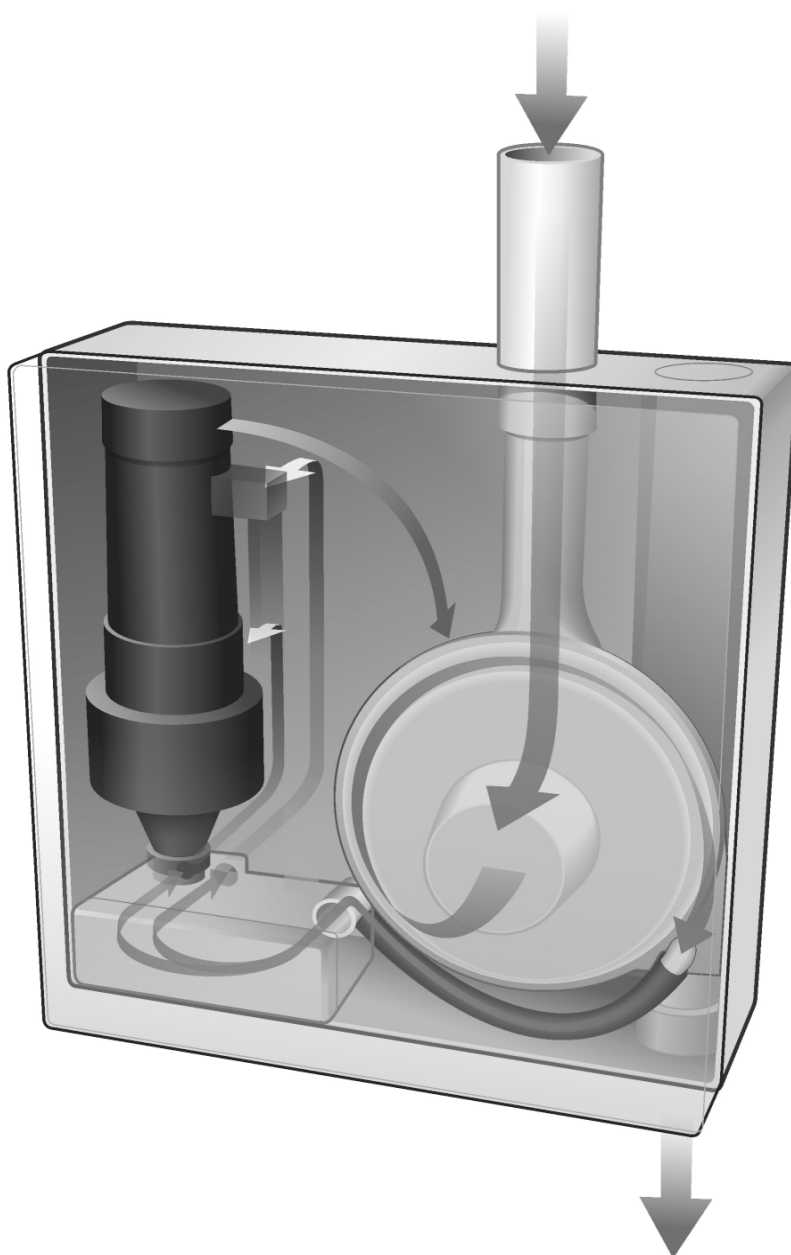


Figure 2-1: Operation and internal air flow of the VESDA VLC-EX Detector

2.1 Display

The VESDA VLC-EX has five LEDs to indicate Alarms, Faults, OK (normal working of the detector) and Reset/Isolate status. The VLC-505-EX offers the option for a remotely mounted Display Module. Refer to Figure 2-2 on page 5 for details.

2.1.1 LED and Reset/Isolate button

The LED indicators and the Reset/Isolate button on the front cover of the VESDA VLC-EX detector display alarms and faults.

Table 2-1: LED Indicators and the Reset/Isolate button

Fire	This (RED) LED is lit when the Fire alarm threshold is reached.
Pre-Alarm	The (RED) Pre-Alarm LED is lit when the Pre-Alarm threshold is reached. This LED flashes when the Alert alarm threshold is reached and Alert Overlay is set to ON.
Fault	This (YELLOW) LED is lit when a fault is detected. It is also lit during airflow normalization.
OK	The OK LED (Green) stays lit during normal operation indicating the unit is functioning normally. This LED flashes twice repeatedly during air flow normalization operation and three times repeatedly when AutoLearn is activated.
Reset / Isolate Reset / Isolate Push Button Switch	The Reset/Isolate LED (Yellow) is lit when VESDA VLC-EX is isolated. While it remains isolated the Pre-Alarm and Fire relays will not work. (The Fault relay will continue to work). <ul style="list-style-type: none"> • To Reset the unit, press this button once. • To Isolate the unit, press and hold the button for 2 seconds. • To de-isolate the unit, press and hold the button for 2 seconds. • While the detector is Isolated, any faults may be cleared by pressing this button once. The button will not operate: <ul style="list-style-type: none"> • if a remote Reset switch has been fitted to the Reset (GPI) terminals and is set to the Isolate position; OR • if the Reset/Isolate button has been locked out during programming.

2.1.2 Remote Display Module

The VLC-505-EX model has the option of being connected to a Remote Display Module mounted into a Mounting Unit or a 19" Subrack, located in the safe area.

Caution: Remote modules are not Ex rated and must be located in a non-hazardous area.

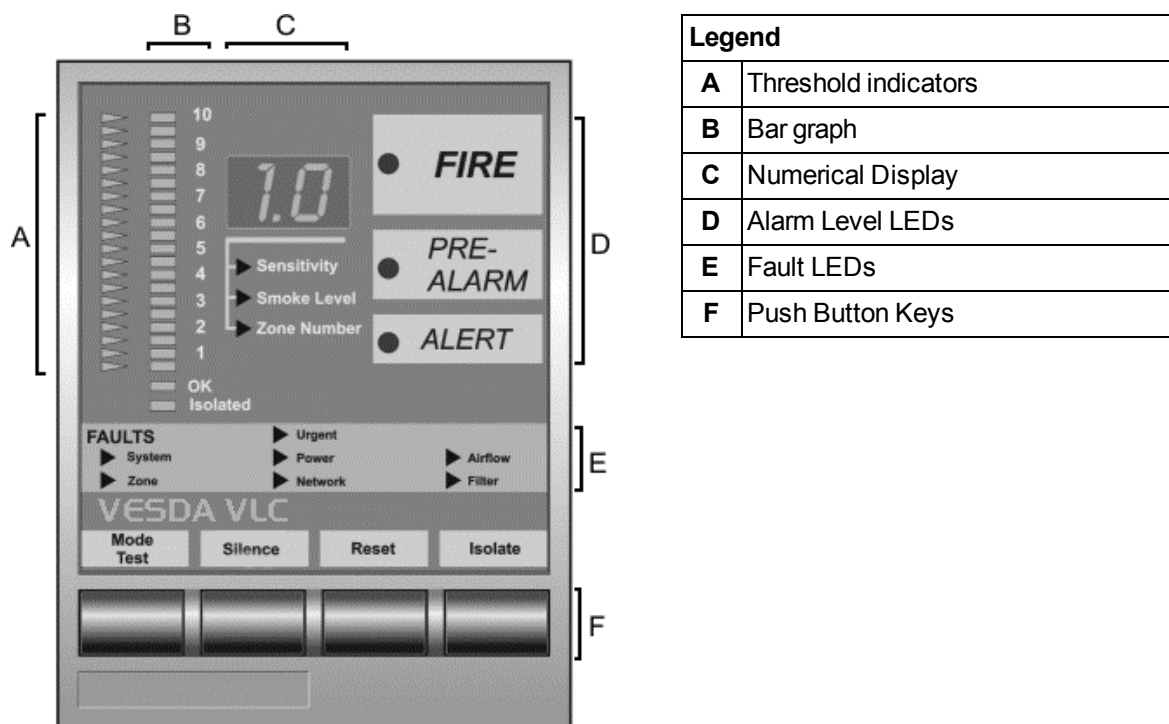


Figure 2-2: VRT-J00 Display Module mounted into a remote unit

Table 2-2: Remote Display Module

OK LED	The OK LED stays lit during normal operation indicating the unit is functioning normally. When this LED is off a warning beep will sound indicating a Fault condition is active.
Isolate LED	This LED is lit when the detector is Isolated and the alarm relays are deactivated disabling the alarm outputs of the detector. A warning sounder will beep every 60 seconds if the display has been programmed to act in this way.
Alarm Levels	<p>ALERT: When illuminated this LED indicates that the smoke level is above the alert threshold. This indicates the detector has identified the very early stages of a fire condition and/or that the smoke level in the area is above normal.</p> <p>PRE-ALARM: When lit this indicates that the detected smoke level has passed the threshold value fixed for Pre-Alarm, but is not intended to initiate a general fire alarm response procedure.</p> <p>FIRE: When lit this indicates that there is enough smoke to initiate a general fire alarm response procedure. This indicates a fire may be imminent or is in progress. When interfaced with a Fire Alarm Control Panel (FACP) it can generate an automatic fire alarm.</p>

Table 2-2: Remote Display Module (continued...)

Bar graph	The Bar graph is a 20 step indicator where each indicator represents an increase in the detected level of smoke, relative to the preset fire alarm level.
Threshold Indicators	The illuminated LEDs represent visual indication of the settings for the ALERT, PRE-ALARM, and FIRE alarm levels.
Fault LEDs	<p>Urgent: Indicates a serious fault requiring immediate attention.</p> <p>System: Indicates a fault in the network.</p> <p>Zone: Indicates a fault in the VESDA Zone monitored by the Display Module.</p> <p>Power: Indicates a fault in the power supply (If the GPI function is used).</p> <p>Network: Indicates a communications fault on VESDAnet.</p> <p>Airflow: Indicates abnormal air flow through the inlet pipe.</p> <p>Filter: This LED illuminates when the air filter requires changing.</p>
Push Button Keys	<p>These buttons enable various systems functions but can not be used to configure the system. The buttons can be disabled by the Systems Administrator.</p> <p>Mode/Test (Dual Function): Selects or toggles between the sensitivity, smoke level and zone number modes. When depressed for more than two seconds it performs a lamp test function.</p> <p>Silence: This button silences any alarm or fault warnings. It also stops the LEDs from flashing to acknowledge a fault or alarm condition.</p> <p>Reset: Resets any latched alarms and faults on the detector. Any active alarms or faults are reported again after the time delays have elapsed.</p> <p>Isolate: Isolates the detector from any external devices or systems (an isolate indication will normally be raised at the Fire Alarm Control Panel (FACP)).</p> <p>Note: It is normal practise to signal the Isolate condition to the Fire Alarm Control Panel (FACP) using the Isolate relay.</p>
Numerical Display	<p>Sensitivity: Shows the level of smoke that must be measured to illuminate the entire bar graph and always corresponds with the fire alarm level.</p> <p>Smoke Level: Indicates the current level of smoke in the relevant VESDA address and is represented as % obs/m or % obs/ft.</p> <p>Zone Number: This is the VESDA Zone number assigned to the Display Module.</p> <p>Note: The Mode Button is used to select the parameters represented by the Numeric Display (sensitivity, smoke level, zone number). The values displayed in the numerical display represent the current readings for that mode.</p>

2.2 LCD Programmer

The LCD Programmer allows configuring, commissioning and maintenance of a VESDA system. For further information please see the LCD Programmer Product Guide. A hand-held programmer can be connected to the VESDA VLC-EX VN Model (VLC-505-EX). The VESDAnet socket and VESDAnet terminals can be found on the termination card and can be accessed by removing the front cover of the detector. A LCD Programmer mounted into a remote unit or a 19" Sub-Rack may also be used (for VLC-500-EX model refer to Section 6.1.3 on page 22).



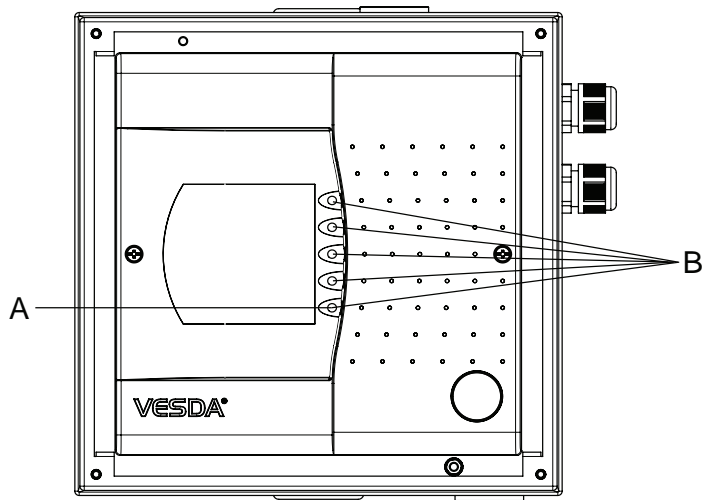
Caution: Before undertaking any work on a VLC-EX detector which would involve opening the outer stainless steel case, the area in which it is installed must be made safe. For example, the atmosphere must be confirmed to be free from potentially combustible gas. In addition, all site specific and local rules and regulations must be followed with regard to obtaining permission to work on the detector.



Legend	
A	Display
B	Keys

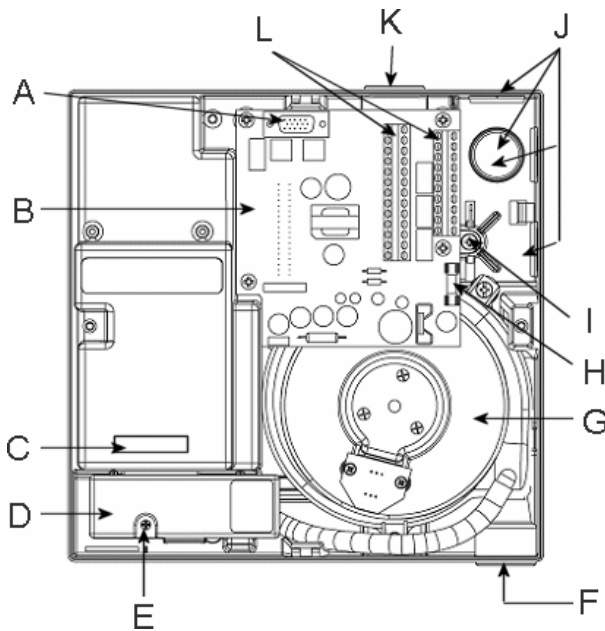
Figure 2-3: LCD Programmer

2.3 Product Configuration



Legend	
A	Reset / Isolate Button
B	LED Indicators

Figure 2-4: Front view of the VESDA VLC-EX detector



Legend	
A	Programming socket 15 Pin for VLC-505-EX 9 Pin for VLC-500-EX
B	Termination card
C	VESDAnet number
D	Air filter cartridge
E	Filter screw
F	Air exhaust port
G	Aspirator
H	1.6 Amp fuse
I	Anti tamper screw
J	Cable entry ports
K	Air inlet port
L	Wire terminal strips

Figure 2-5: View of components in the enclosure box

3 Product Information

3.1 Specifications

Table 3-1: VESDA VLC-EX detector specifications

Supply Voltage	18 to 30 VDC
Power Consumption	5.4 W during normal operation, 5.9 W with alarm on
Current Consumption	225 mA at 24 VDC normal operation, 245 mA with alarm on
Fuse Rating	1.6A
Dimensions (WHD)	270 mm x 270 mm x 97 mm (10 5/8 in x 10 5/8 in x 3 7/8 in)
Weight	4.9kg (10.8 lbs)
Operating Conditions (To operate the VLC-EX detector outside these parameters please contact your nearest Xtralis Office)	<ul style="list-style-type: none"> • Ambient: -10°C to +55°C (14°F to 131°F) • Tested: -10°C to +55°C (14°F to 131°F) • Sampled Air: -20° to 60° C (-4° to 140° F) • Humidity: 10-95% RH, non-condensing
Storage Conditions (Non-operational)	<ul style="list-style-type: none"> • Humidity: dry (<95%) • Temperature: 0° to 85° C (32°F to 185°F) • Must not exposed to sunlight or other radiation sources
Sampling Pipe Network	<ul style="list-style-type: none"> • Maximum area of coverage: 800 m² (8000 sq. ft.) • Maximum Single Pipe Length: 80 m (max. 40 holes) • Maximum branched (2) Pipe Lengths: 50 m each (max. 40 holes) • Computer Design Tool: ASPIRE2
Pipe Size	<ul style="list-style-type: none"> • ID: 15-21 mm (0.874 in) • OD: 25 mm (1.050 in.)
Relays	3 relays, contacts rated 2A @ 30 VDC Programmable to latched or non-latched states
Relays Default Configuration	<ul style="list-style-type: none"> • Fire • Pre-Alarm • Alert/Fault (Maintenance and Isolate) • Programmable 0 - 60 sec. time delay for each relay
IP Rating	IP54
Cable Access	2 x 20 mm (3/4 in) cable entries (cable glands and blanking plugs not supplied). Only use appropriately rated (IP 54 or better) glands.
Cable Termination	Screw terminal blocks (0.2-2.5 sq mm, 30-12 AWG)
Detector Resolution	0.005 to 20.00% obs/m (0.0015 to 6.25% obs/ft.)
Threshold Setting Range	<ul style="list-style-type: none"> • Alert: 0.005 - 1.990% obs/m (0.0015 - 0.6218% obs/ft.) • Pre-Alarm: 0.010 -1.995% obs/m (0.0031 - 0.6234% obs/ft.) • Fire: 0.015 - 20% obs/m (0.0046 - 6.25% obs/ft.)
Key Software Features	<ul style="list-style-type: none"> • Event log: Up to 12000 events stored on FIFO basis. • (Volatile Event Log) Smoke level, alarms and faults with time and date stamp • AutoLearn: Minimum 15 minutes, maximum 15 days. (Recommended minimum period 1 day). • During AutoLearn thresholds are NOT changed from pre-set values.

3.2 Product Dimensions

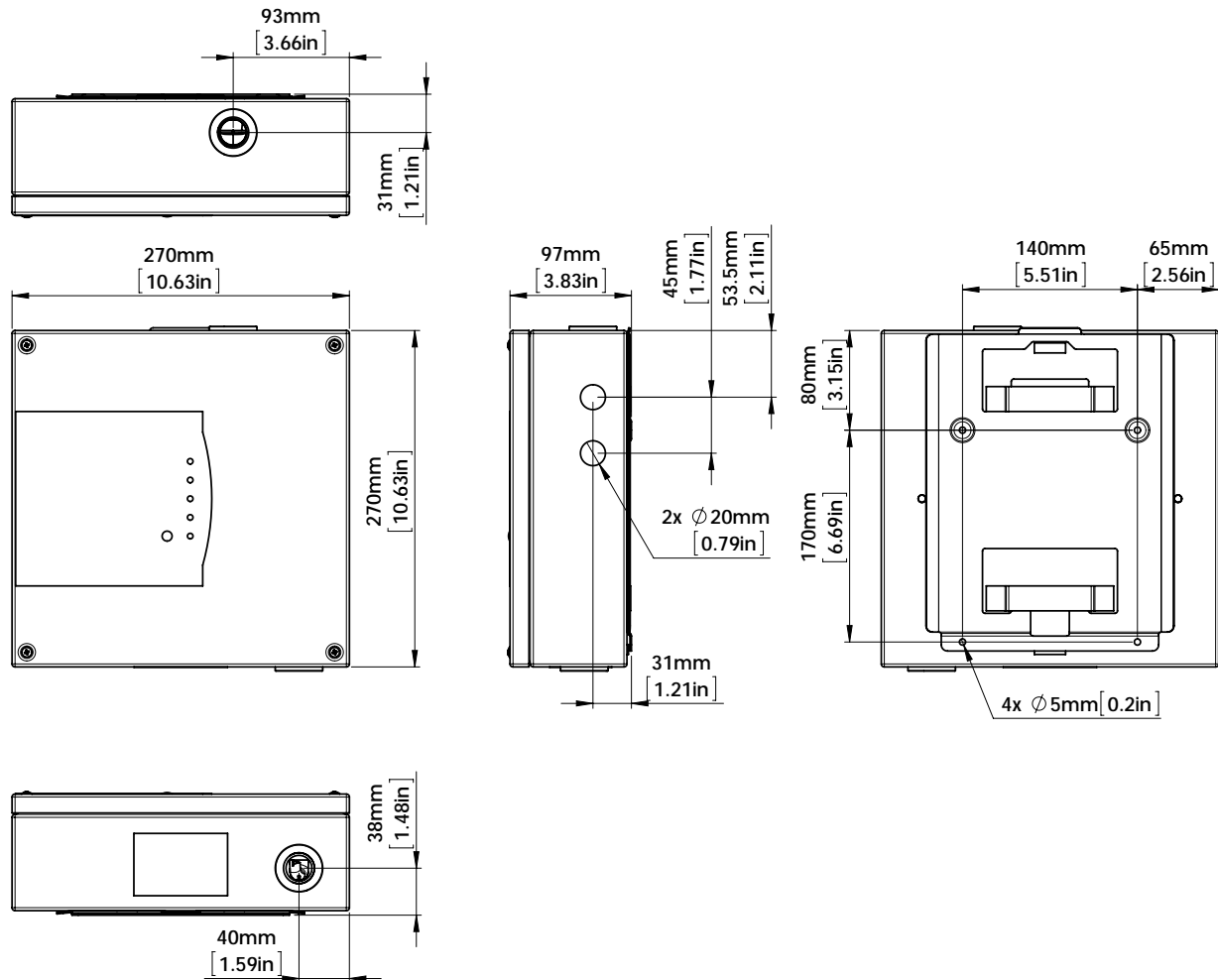


Figure 3-1: VESDA VLC-EX detector dimensions

3.3 Enclosure Materials

In compliance with EN 60079-0:2009 clause 7.1, Table 3-2 below specifies the materials used in the enclosure:

Table 3-2: Material used for the enclosure

Enclosure component	Material
Cover & case-rear	Brushed 304 stainless steel
Cover gasket	Closed Cell expanded EPDM foam
Display decal	125 μ m polyester film
Sampling pipe sealing grommet	Thermoplastic rubber

3.4 Default Settings

Table 3-3: Default values for the VESDA VLC-EX detector

Parameter	Default Values	Range		Access Level
		Minimum	Maximum	
Event Log - Events				
• Smoke Level	Enabled	N/A	N/A	Adm
• Alarms	Enabled	N/A	N/A	Adm
• Faults	Enabled	N/A	N/A	Adm
• User Action	Enabled	N/A	N/A	Adm
Fire Threshold	0.2% obs/m (0.062% obs/ft)	0.015% obs/m (0.0046% obs/ft)	20% obs/m (6.25% obs/ft)	Adm
Pre-Alarm Threshold	0.14% obs/m (0.044% obs/ft)	0.010% obs/m (0.0031 obs/ft)	1.995% obs/m (0.6234% obs/ft)	Adm
Alert Threshold	0.08% obs/m (0.025% obs/ft)	0.005% obs/m (0.0015% obs/ft)	1.990% obs/m (0.6218% obs/ft)	Adm
Alarm Delays...Fire	10 Seconds	0 Seconds	60 Seconds	Adm
Alarm Delays...Pre-Alarm	10 Seconds	0 Seconds	60 Seconds	Adm
Alarm Delays...Alert	10 Seconds	0 Seconds	60 Seconds	Adm
Delay Times	Simultaneous	Simultaneous	Cumulative	Adm
Instantaneous Fire	Disabled	N/A	N/A	Adm
AutoLearn	14 days 0 Hours 0 Minutes	0 days 0 Hours 15 Minutes	15 days 23 Hours 59 Minutes	Adm
Air flow Thresholds:				Adm
• High Urgent	• 130%	• 105%	• 200%	
• High Minor	• 120%	• 105%	• 200%	
• Low Minor	• 80%	• 25%	• 95%	
• Low Urgent	• 70%	• 25%	• 95%	
Communications:				DST
• Open-ended loop	• None	• N/A	• N/A	
• Preferred Port	• A	• N/A	• N/A	
• Network Delay	• 15 seconds	• 10 seconds	• 45 seconds	
• Health Check	• 45 seconds	• 40 seconds	• 60 seconds	
Device ID	Name/Location	N/A	N/A	Adm
Faults Latched	Latched	N/A	N/A	Adm
Filter Service Interval	731 days (2 years)	1 day (Dependent up on environment)	3655 days (10 years)	Adm

3.5 Relay settings and conditions to change states

Table 3-4: Default relay settings and conditions to change state

Relay #	Relay	Condition for relay to change state
1	Fault	<p>This relay is de-energized when one of the following conditions occur:</p> <ul style="list-style-type: none"> • Fault found on detector or on VESDAnet loop • Air flow normalization is initiated • System isolation is initiated <p>When the Overlay Alert function has been selected, this relay is de-energized once the Alert threshold is initiated</p>
2	Pre-Alarm	This relay is energized once the Pre-Alarm threshold is initiated
3	Fire	This relay is energized once the Fire alarm threshold is initiated

3.6 Auxiliary / GPI Terminals

The Bias, Reset (GPI) and LED terminals are located on the termination card (refer to Figure 6-1 on page 19 and Figure 6-2 on page 20). These terminals have the following functions:

- **Bias Terminals:** These output terminals provide a 10 VDC supply to initiate the reset input terminals via a remote reset/isolate switch.
- **LED Terminals:** These output terminals provide a 5 V, 15 mA DC supply via a 220 ohm resistor to power a remote LED.
- **Reset (GPI) Terminals:** These terminals are also known as the General Purpose Input (GPI) and are used for Reset, Mains OK or Standby functions. The input terminals require a voltage supply between 5 V and 24 VDC to operate. The voltage input to these terminals is isolated from the system by an opto-coupler device. Connect the Reset (+) terminal to the positive output and the Reset (-) terminal to the ground output of the external device.

Table 3-5: GPI functions

Function	State Change	
Mains OK	<p>The detector monitors the state of the external power supply and responds to the following conditions.</p> <p>Mains OK ≥ 5 VDC is at this terminal</p> <p>Mains Fail ≤ 2 VDC is at this terminal</p>	
Standby Mode	<p>The detector Isolates and the aspirator turns OFF when ≥ 5 VDC is at this terminal.</p> <p>No Alarms can be generated in this state</p>	
Reset Isolate	<p>While power is applied to the GPI the detector is isolated. In addition, the connection of power to the GPI resets the unit.</p> <p>≥ 5 VDC Detector Isolates</p> <p>≤ 2 VDC Detector Reset</p>	

4 Mounting the Detector

The VESDA VLC-EX can be mounted onto the wall using the mounting bracket on any suitable secure surface.

Since the VLC-EX is designed to be applied in an environment where there is potentially a hazardous atmosphere, it is important that all users are aware of and follow the guidance given in the appropriate standards, including in: EN 60079-14:2008, “Explosive atmospheres. Electrical installations design, selection and erection” and EN 60079-17:2007, “Explosive atmospheres. Electrical installations inspection and maintenance” and that they also adhere to the specific rules and regulations for the site where the product is deployed.

The design of the VLC-EX allows for the detector to be inverted, i.e. with the air inlet at the bottom and the air exhaust port at the top, when viewed from the front. This is made possible since both the internal plastic and external stainless steel front covers can be fitted either way up, so that no matter which way up the detector is mounted, the detector face will have the correct orientation.

Note: The detector can only be mounted using the mounting bracket included in the packaging.



Caution: The VLC-EX is intended for hazardous areas where there is little or no dust. Excessive or unfavorable dust may lead to electrostatic charges occurring within the aspirator. While it is very unlikely that such charges will lead to a high energy discharge it is recommended that little or no dust be present. As a guide, if there is settled dust clearly visible on a surface that was wiped clean a week earlier then further investigations may be necessary.

4.1 Securing the Internal Mounting Bracket

The internal mounting bracket for the VESDA VLC-EX is always mounted in the UP direction. The internal mounting bracket is clearly marked with the word “UP” and an upward pointing arrow.

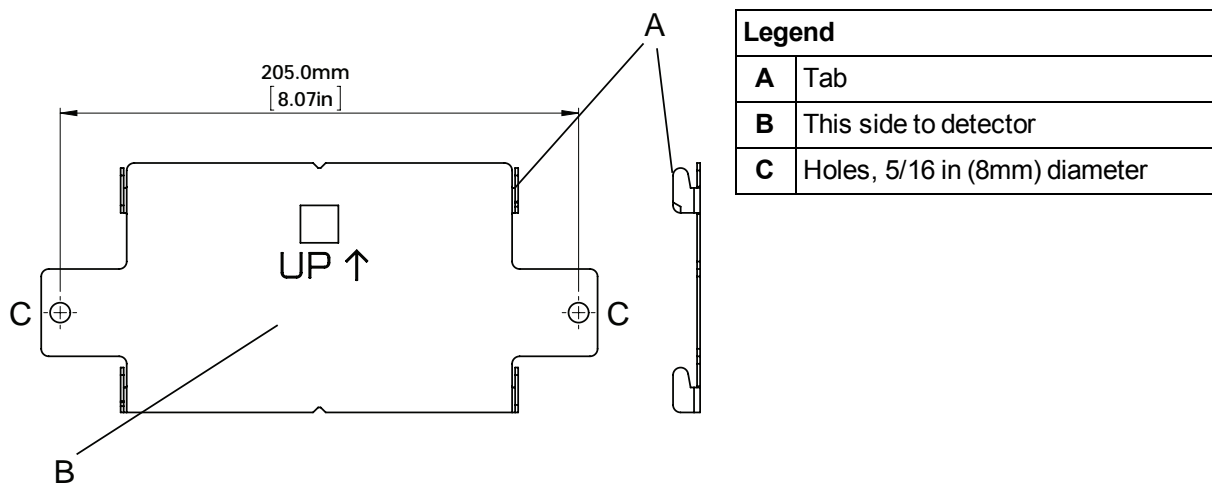
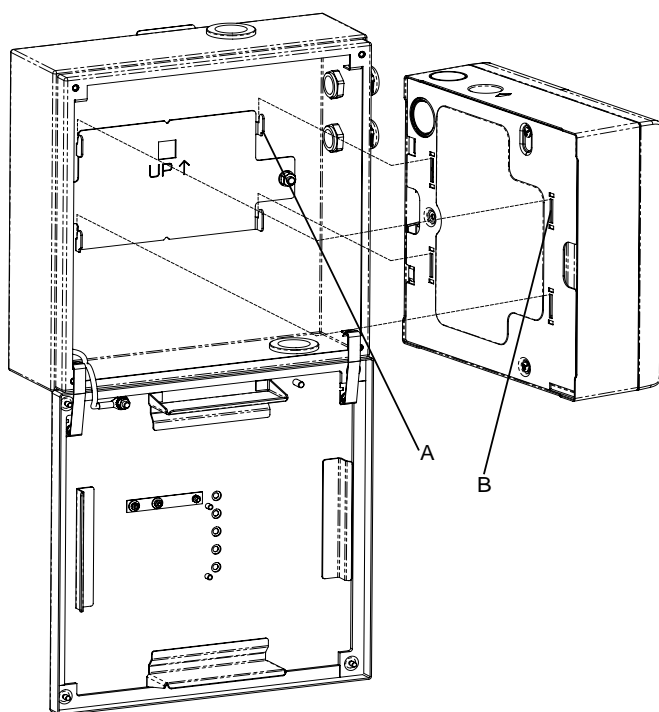


Figure 4-1: The internal mounting bracket for normal and inverted orientations

Secure the internal mounting bracket into the stainless steel VLC-EX case using the fasteners provided, ensuring that the bracket is horizontally straight and sits flush on the surface.



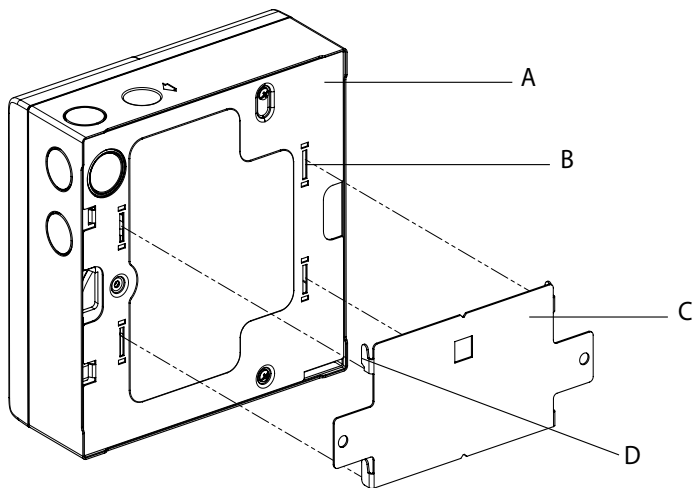
Legend	
A	Tab
B	Rectangle Slots

Figure 4-2: Mounting bracket into the stainless steel case

Determine the ports for cable entry. Press out the tabs for the cable entry, air inlet and air exhaust ports.

4.2 Installing the Detector

Determine the orientation for mounting the VESDA VLC-EX detector. Remove the front cover and if necessary separate it from the enclosure box. The back of the enclosure box is slotted over the four internal mounting bracket tabs. Slide the detector downwards until it slides onto the tabs. Screw in the anti-tamper screw. Check to confirm that the detector does not slide off the internal mounting bracket.



Legend	
A	Back of detector
B	Rectangle Slots
C	Internal Mounting Bracket
D	Bracket Tab

Figure 4-3: Mounting the VESDA VLC-EX detector onto the internal mounting bracket

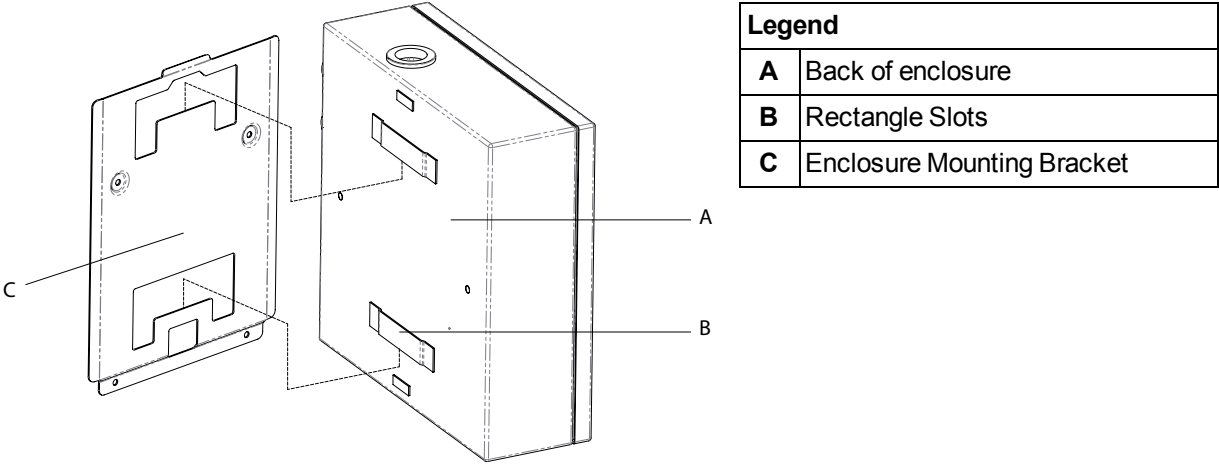


Figure 4-4: Mounting the enclosure onto the enclosure mounting bracket

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5 Connecting the VESDA VLC-EX to the Sampling Pipe Network

5.1 Inlet Pipes

The air inlet port is designed to fit a standard pipe of 25 mm (1 in) OD.

The air inlet port allows the pipe to be inserted up to 15 mm (0.60 in). To connect the detector to the pipe network:

1. Ensure a minimum length of 500 mm (20 in) of straight pipe before terminating the pipe at the air inlet port of the detector.
2. Square off and de-burr the end of the sampling air pipe, ensuring the pipe is free from debris.
3. Insert the pipe into the inlet port ensuring a firm fit. DO NOT glue the inlet pipes to the pipe inlet manifold.

Note: It is recommended that metallic pipe is used, and that a metal inline filter (part number VSP-850-M) is installed in the pipework, upstream of the detector, and earthed all together.



Caution: The VLC-EX is intended for hazardous areas where there is little or no dust. Excessive or unfavorable dust may lead to electrostatic charges occurring within the aspirator. While it is very unlikely that such charges will lead to a high energy discharge it is recommended that little or no dust be present. As a guide, if there is settled dust clearly visible on a surface that was wiped clean a week earlier then further investigations may be necessary.

5.2 Air Exhaust Pipe

If necessary pipe the exhaust back to the relevant VESDA Zone. The maximum suggested length for the exhaust pipe is 4 m (13 ft.).

1. The exhaust from the detector should be arranged to avoid the ingress of dust and water. Extraneous dust is prevented from entering the enclosure due to the natural airflow that is exhausted from the detector. However, high pressure water jets could enter the unit if the exhaust port is not protected by a pipe with a series of suitable bends. A possible arrangement is shown in Figure 5-1.
2. The arrangement of the sampling pipes must also be considered with regard to ingress of dust and water. The pipe runs should be arranged so that water entering the pipe network does not run towards the detector. For example, for the exhaust pipe, use a bend arrangement as in Figure 5-1 below, or a water trap. However, with regard to dust ingress the specific requirements of the application must be thoroughly investigated particularly with regard to the location of sampling points.

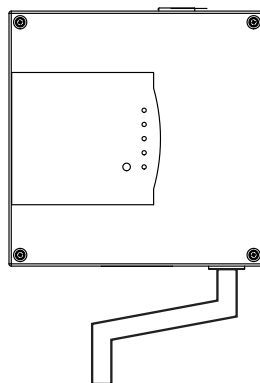


Figure 5-1: A possible exhaust pipe arrangement to maintain an IP54 rating

Notes:

- The pipe used to sample the air in the hazardous area must comply with all relevant codes and standards. It is recommended that metallic pipe is used.
- Even if the air is not to be returned to the sampling point, an exhaust pipe stub must be fitted to the VLC-EX, so that the air sample is expelled from the case and the seal is maintained in the stainless steel enclosure.

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6 Wiring Connections

6.1 Termination Card

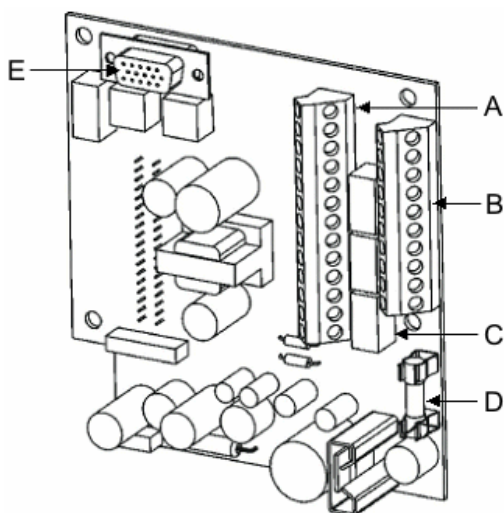
The Termination Card acts as the interface for VESDAnet (VN Model), VESDA Link (RO Model), power supply terminals, relay and relay terminals.

Since the VLC-EX is designed to be applied in an environment where there is potentially a hazardous atmosphere, it is important that all users are aware of and follow the guidance given in the appropriate standards, including in: EN 60079-17:2007, “Explosive atmospheres. Electrical installations inspection and maintenance” and that they also adhere to the specific rules and regulations for the site where the product is deployed.

This requires that the product be used with cable glands which are rated for the environment and are sized correctly for the cables to be used to connect the unit. Care must be taken to terminate and restrain the field wiring, such that it cannot be pulled out of the cable gland or the terminal strip.

Notes:

- All unused cable entries, i.e. those without a cable/cable gland, must be fitted with a suitable blanking plug in order to maintain the case seal.
- The screw terminal blocks on the termination card are designed to accept conductors in the range 0.2–2.5 sq mm (30–12 AWG). In accordance with EN 60079-15:2011, clause 7.2.3, ferrules must be used when multi-strand wire is used.
- The rating of the VESDA VLC-EX include some intrinsic safety concepts (ic) in that the reset switch used is not gas tight but is connected to internal circuits that keep the energy at the switch contacts low enough to avoid any sparking. Thus the ic rating does not require the use of Zener barriers or similar energy limiting devices for the electrical connections (power and signaling) to the VESDA VLC-EX.



Terminal A		Terminal B	
1	Bias (-) (GND)	1	Shield
2	Reset (-) (GPI)	2	VESDAnet A (-)
3	Reset (+) (GPI)	3	VESDAnet A (+)
4	Bias (+)	4	Shield
5	LED (-) (GND)	5	VESDAnet B (-)
6	LED (+)	6	VESDAnet B (+)
7	FIRE (NO)	7	Power (-)
8	Fire (C)	8	Power (+)
9	Pre-Alarm (NO)	9	Power (-)
10	Pre-Alarm (C)	10	Power (+)
11	Fault (NO)	NC = Normally Close NO = Normally Open C = Common	
12	Fault (C)		
13	Fault (NC)		

Legend			
A	Terminal A	D	1.6 Amp Fuse
B	Terminal B	E	VESDAnet Socket
C	Relays		

Figure 6-1: VESDA VLC-EX termination card VN Model (VLC-505-EX)

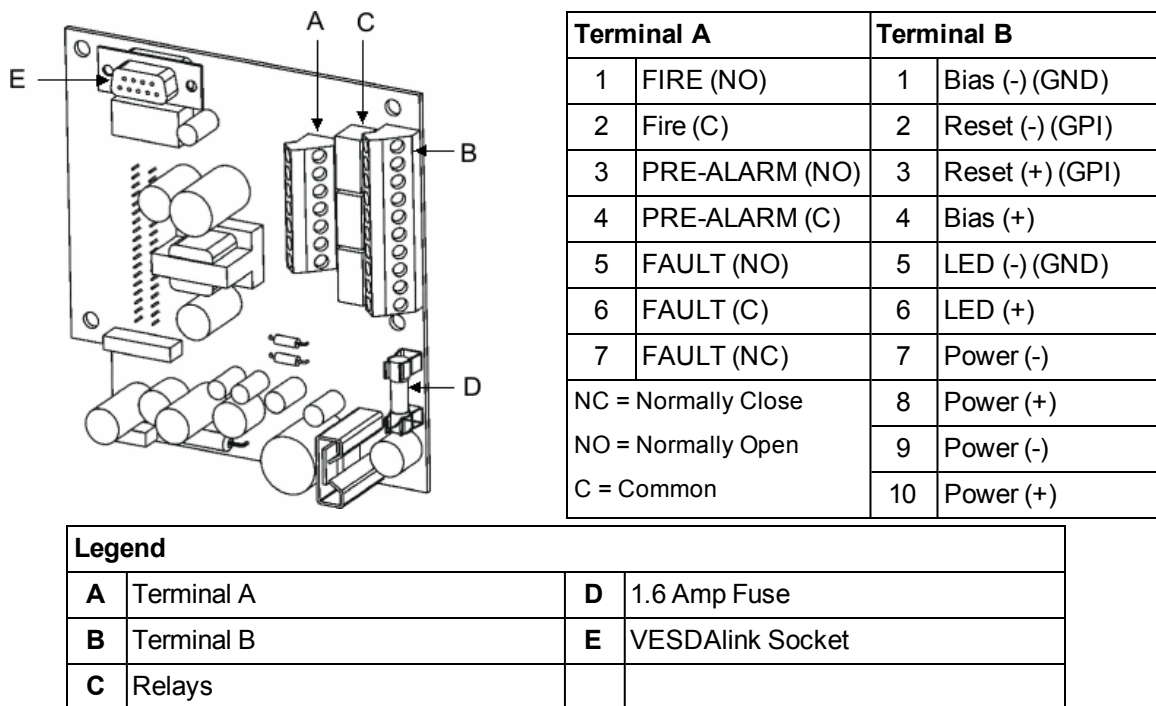


Figure 6-2: VESDA VLC-EX termination card RO Model (VLC-500-EX)

6.1.1 VESDAnet Terminals (VN Model only)

The VESDA VLC-EX detector can be connected to VESDAnet through the VESDAnet terminals on the Termination Card. The terminals enable VESDAnet communication cables to be brought into the detector and then looped out to another device. Data communication between the detector and other devices on VESDAnet are bidirectional. The polarity of the data wires must be maintained throughout the network. It is recommended that RS-485 (BELDEN 9841 - 120 Ohm) twisted pair cables (or similar) be used.

Note: The VESDA VLC-EX is shipped without the VESDAnet A and B channels looped. If the detector is not to be networked with other devices, then loop the A and B channels, as shown in Figure 6-3.

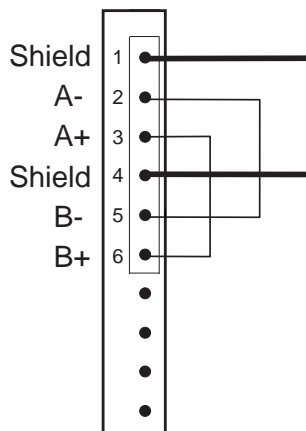


Figure 6-3: Stand-alone VESDAnet connection for VESDA VLC-EX

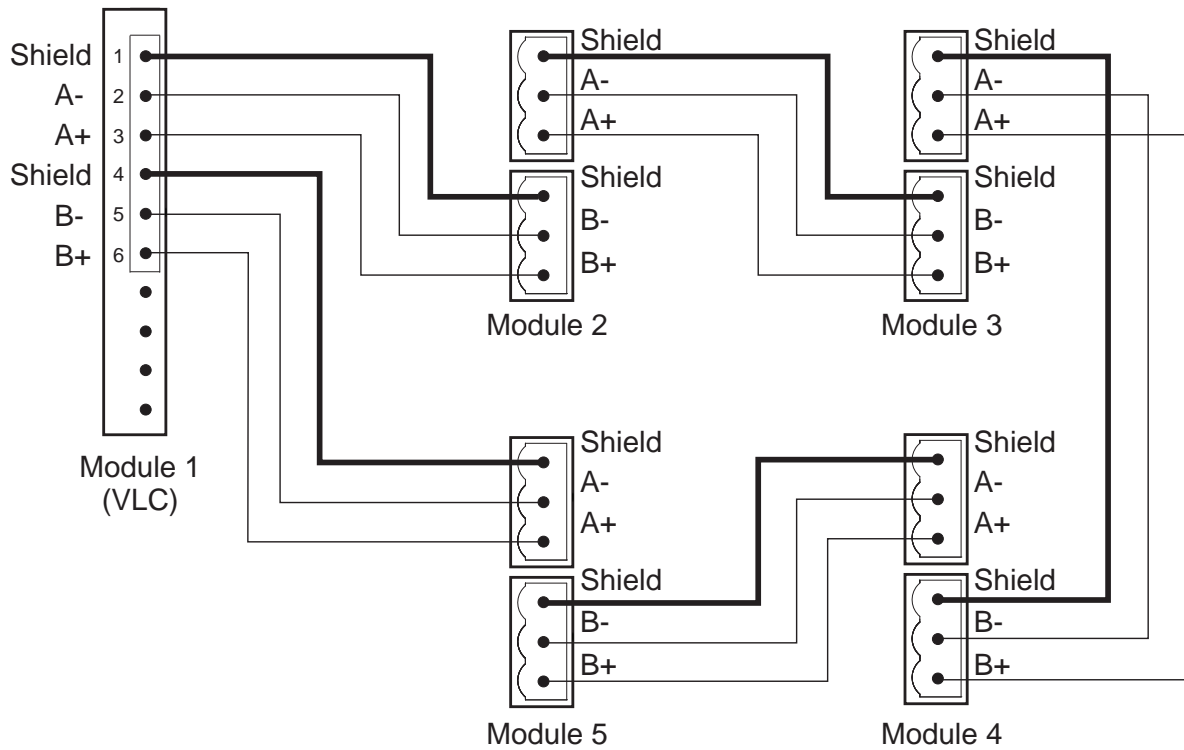


Figure 6-4: An example of the wire connection for VESDAnet (closed loop)

6.1.2 Relay terminals

There are three relays designated Fault, Pre-Alarm and Fire. The relays can be used to connect to a Fire Alarm Control Panel (FACP) or to activate external devices. The default relay states are non-energized except for the fault relay, which is set to the energized state on power up.

6.1.3 Programming socket

The 15 pin or 9 pin programming socket on each termination card provides the communication interface between the detector and a LCD Programmer or PC. Use the information listed below to determine the type of programming device required to program a VN or RO detector.

- **VN model (VLC-505-EX):**

- The programming socket on the termination card has 15 pins. Use a LCD Programmer and connect the programmer cable to the 15 pin VESDAnet programming socket.

OR

- Use a PC with a VESDA PC-Link HLI and the appropriate data cables to connect to the 15 pin VESDAnet programming socket.

- **RO model (VLC-500-EX):**

- The programming socket on the termination card has 9 pins. The RO model is programmed using PC software only. Connect the PC to the detector using an RS-232 data cable directly to the 9 pin VESDAlink programming socket.

Note: Connection to the programming socket shall only be made when the area is confirmed to be safe. Refer to Section 11.1.1 for further information.

6.1.4 Auxiliary / GPI Terminals

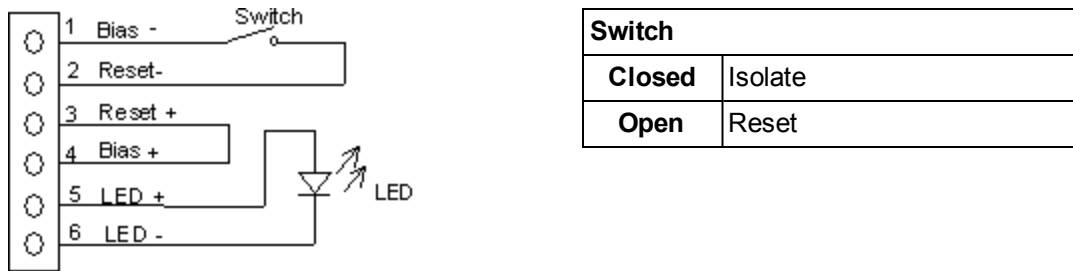


Figure 6-5: Wire connection for Auxiliary / GPI Terminals

For further information refer to Section 3.6 on page 12.

6.1.5 Typical Wiring to a 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.

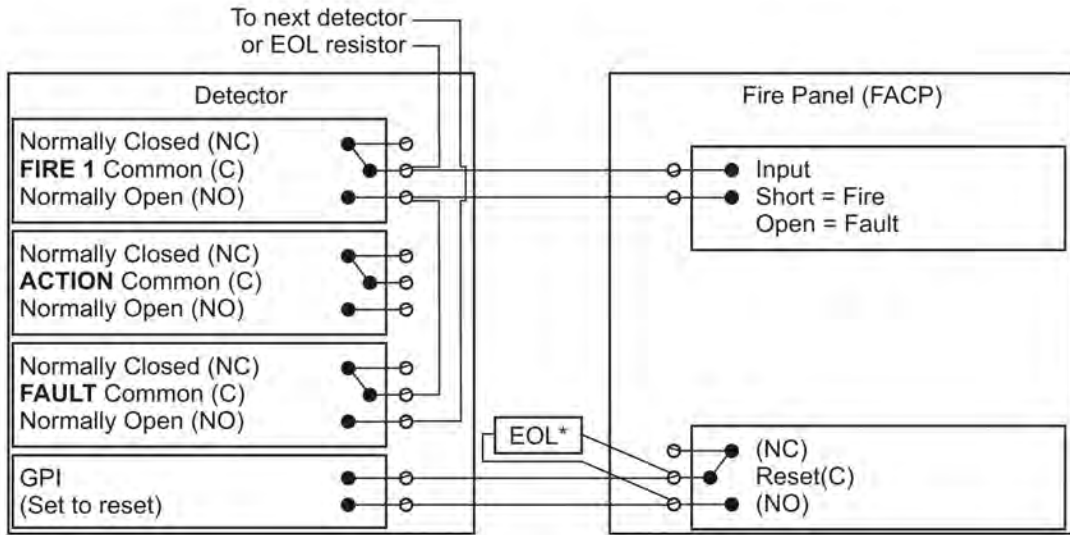


Figure 6-6: Typical wiring to a Fire Alarm Control Panel (FACP) with EOL

6.1.6 Wiring to an Addressable Loop Module

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

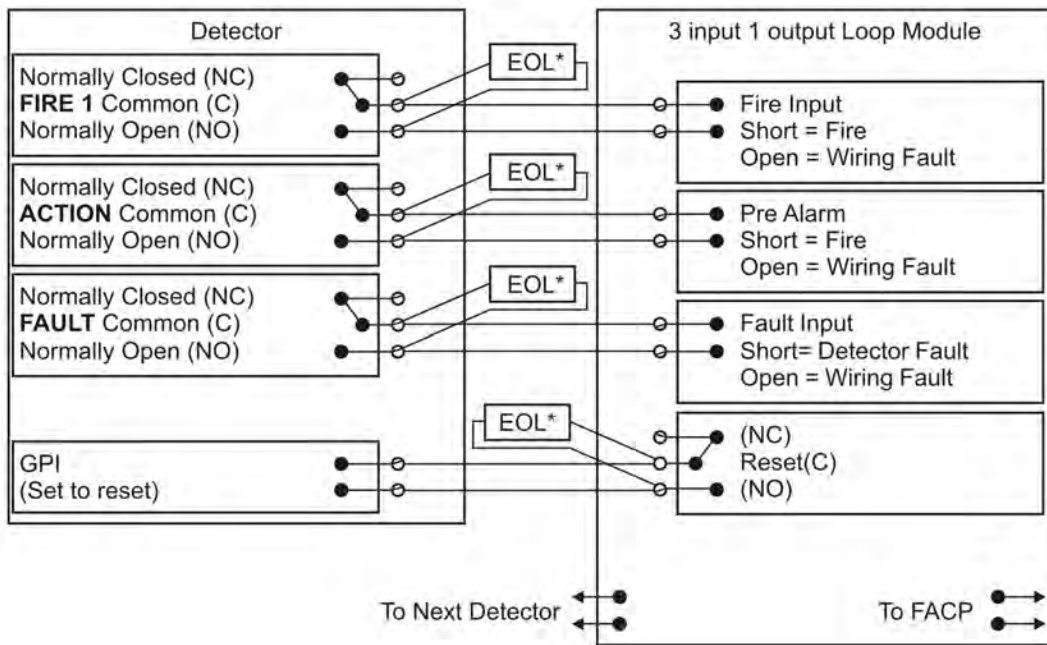


Figure 6-7: Addressable Loop Module with EOL

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7 Power Source

The power terminals on the termination card connect to a 24 VDC power supply. The detector has reverse polarity protection to minimize the risk of damaging the detector.

Notes:

- The VESDA VLC-EX detector will not operate when the power supply is reversed.
- Operating the detector outside the DC supply voltage range of 18 VDC and 30 VDC may cause damage to the device.
- The VESDA VLC-EX is provided with an additional transorb wired into the power terminals as shown in Figure 7-1. This transorb must have a clamping voltage of 55V or less and an breakdown voltage of 33V or more (Part number 3KP33CA from Littelfuse is a suitable example). This transorb must be fitted to ensure compliance with Clause 13 of EN60079-15:2010.

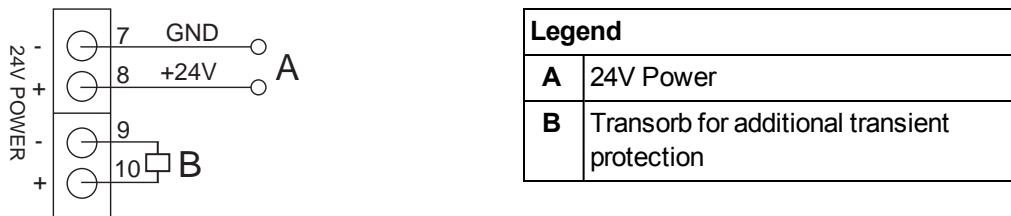


Figure 7-1: Wire connection details for the power terminals on the VN and RO model termination card

Note: The PSU is usually located in a non-hazardous area and may supply power via a Zener barrier (or other similar energy limiting device) but this is not required for safe operation of the VESDA VLC-EX in normal operation. Refer to the notes in Section 6.1 for further information.

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8 Battery Backup

The power supply for the VESDA VLC-EX detector may be switched to a back up battery in the event of the supply being disrupted. The size of the battery back up is determined by local standards and codes, the total power required by the system, back up time required, allowance for reduction in capacity with age and expected temperature variations.

Note: It is recommended that batteries be changed as per the battery manufacturer's specifications or as per the relevant local codes and standards.

8.1 Backup battery size calculation sheet

Table 8-1: Calculating the size of backup battery

Equipment	Normal Load @ 24 VDC			Full alarm load @ 24 VDC		
	Load mA	Number	Total	Load mA	Number	Total
Detector	225			245		
Remote Display	90			110		
Remote Programmer	50 (backlight off)			110 (backlight on)		
Hand-held Programmer	50 (backlight off)			110 (backlight on)		
Other 24 V loads						
	Total mA			Total mA		
			X			X
	Standby hours			Alarm hours		
			=			
	Standby capacity			Alarm capacity		
	Total capacity = Standby + Alarm capacity					
	Divided by 1000 for standby capacity					
	Multiplied by battery factor (Normally 1.25)					

Note: The PSU is usually located in a non-hazardous area and may supply power via a Zener barrier (or other similar energy limiting device) but this is not required for safe operation of the VESDA VLC-EX in normal operation. Refer to the notes in Section 6.1 for further information.

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9 Starting Up

Note: The VESDA VLC-EX detector must be powered up by VESDA accredited personnel only.

After installing the VESDA VLC-EX detector it is necessary to power up the system. The system takes approximately 15 seconds to power up. If the system fails to power up, check all power wires are secured to the terminals and the polarities of the power wires are correct.

On power up:

- The aspirator starts up
- The LED indicators on the VESDA VLC-EX front cover:
 - Will light up and cycle on and off
 - If a fault has been detected the Fault LED indicator will remain lit
 - If the system is functioning normally the OK LED indicator will remain lit
- If a Remote Display Module is connected the following indicators are lit:
 - Fire alarm threshold indicators
 - Smoke threshold levels on bar graph
 - Two digit numerical display
 - Various fault indicators if there are any faults
 - System OK indicator if there are no faults

If any of the above does not happen, contact your commissioning engineer or distributor to troubleshoot the problem.

Note: It is normal for the detector to display faults immediately after power up. Reset the detector by pressing the reset button on the front cover of the detector to unlatch the relays and fault LEDs. Proceed with the preliminary systems check.

9.1 Installation Checklist

Site Name	
Address	
Detector Serial Number(s) 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?		
Is the sampling air pipe firmly connected to the air inlet port? Ensure the pipe is <u>NOT</u> 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 on the detector?		
Are the VESDAnet terminals looped back on a standalone VESDAnet enabled detector? Refer to Section 6.1.1 on page 20 for further information.		
Is the exhaust pipe firmly fitted to the exhaust port? Ensure the pipe is <u>NOT</u> glued.		
Have both the plastic and stainless steel front covers been replaced correctly?		
Has AutoLearn Smoke been performed? Please state the AutoLearn Smoke period _____		
Is the air sampling pipework installed and checked as per the site plans?		

10 Preliminary Systems Check

A preliminary systems check is required after installing the VESDA VLC-EX detector, before it is commissioned for use. The check can be conducted by connecting the detector to a LCD Programmer or by using the Xtralis VSC software. The preliminary systems check includes:

- Conducting a VESDAnet communications check
- Accepting factory default configurations, or changing to site requirements
- Normalizing the air flow
- Conducting a basic pass/fail smoke test

For details on the preliminary systems check refer to the LCD Programmer or the relevant software manuals. Refer to the VESDA LCD Programmer and Commissioning Guides for further details.

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11 Maintaining and Servicing the Detector

To maintain the VESDA VLC-EX detector at its peak performance the maintenance schedule given below should be followed. Maintenance can be conducted by the original installer, a VESDA distributor, or an authorized service contractor. To work effectively the VESDA VLC-EX detector needs to be supported by a well designed pipe network. The VESDA Maintenance Guide contains a schedule for pipe network maintenance. More frequent maintenance may be necessary for harsh environments or be required by the local fire authority.

Table 11-1: Maintenance schedule for VESDA VLC-EX detector

Maintenance Check	Quarterly	Six Monthly	Annually	Biennial
Power Supply	X			
Visually Inspect Pipe Network		X		
Filter Inspection			X	
Pipe Integrity Smoke Test			X	
Check Pipe Flow			X	
Clean Sampling Point				X
Flush Pipe Network				X



Caution: When a VESDA VLC-EX detector has been isolated, no fire warnings will be issued by the VESDA VLC-EX and any fire will go undetected. Prior to any maintenance or testing:

- Inform appropriate supervising authority about the risk associated with isolating a VESDA detector.
- Ensure that any ancillary devices dependent on the VESDA VLC-EX is/are isolated before work is begun.

Note: Since the VLC-EX is designed to be applied in an environment where there is potentially a hazardous atmosphere, it is important that all users are aware of and follow the guidance given in the appropriate standards, including in: EN 60079-17:2007, "Explosive atmospheres. Electrical installations inspection and maintenance" and that they also adhere to the specific rules and regulations for the site where the product is deployed.

11.1 Opening and Closing the Detector

11.1.1 Opening the detector



Caution: Before undertaking any work on a VLC-EX detector, which would involve opening the outer stainless steel case, the area in which it is installed must be made safe, i.e. the atmosphere must be confirmed to be free from potentially combustible gas. In addition, all site specific and local rules and regulations must be followed with regard to obtaining permission to work on the detector.

1. Undo the four screws on the stainless steel front cover.
2. Open the front cover and allow the cover to hang by the attached plastic straps.
3. Undo the two screws on the plastic front cover.
4. Open the front cover and allow it to hang on the attached plastic strap.

11.1.2 Closing the Detector

1. Replace the front cover ensuring that the plastic strap and the cable loom are not wedged between the cover and the detector body.
2. Tighten the two screws.
3. Replace the stainless steel front cover ensuring that the plastic straps and the earth cable are not wedged between the cover and the detector body.
4. Tighten the four screws.

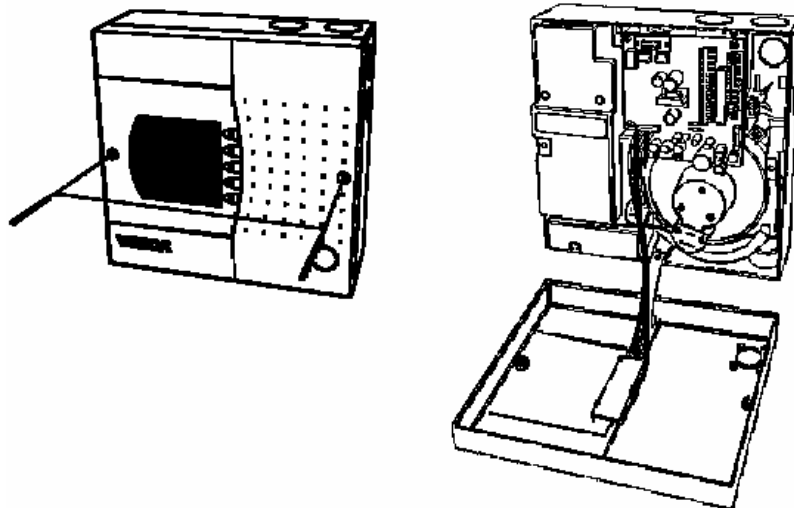


Figure 11-1: Opening and closing a VESDA detector inside the VLC-EX enclosure

11.1.3 Replacing the Filter

1. In order that the VLC-EX recognises that the filter has been replaced, the unit needs to be powered up during this maintenance operation, so that the microprocessor recognises the change.
2. Having the unit powered up is in conflict with the requirements of working in a potentially hazardous atmosphere. Therefore, this maintenance task is only possible by obtaining a permit to work in the potentially hazardous atmosphere, in accordance with the site rules for conducting such work.
3. It is important that steps are taken to ensure that the area is made safe and remains so throughout the maintenance operation.
4. If it is not possible to power the unit up in the potentially hazardous area, the unit needs to be removed to a safe area, where the unit can be powered and the filter changed.

11.2 Replacing the Aspirator

1. Remove the 4 screws securing the termination card (A)
2. Disconnect the wires on the aspirator (B)
3. Gently pull out termination card (A) from the interface card (the interface card is not visible, it is connected to the back of the termination card). Leave the termination card suspended by its wires.
4. Pull off the air hose from aspirator pipe (C)
5. Undo the (captive) screws securing aspirator (D)
6. Lift the aspirator out

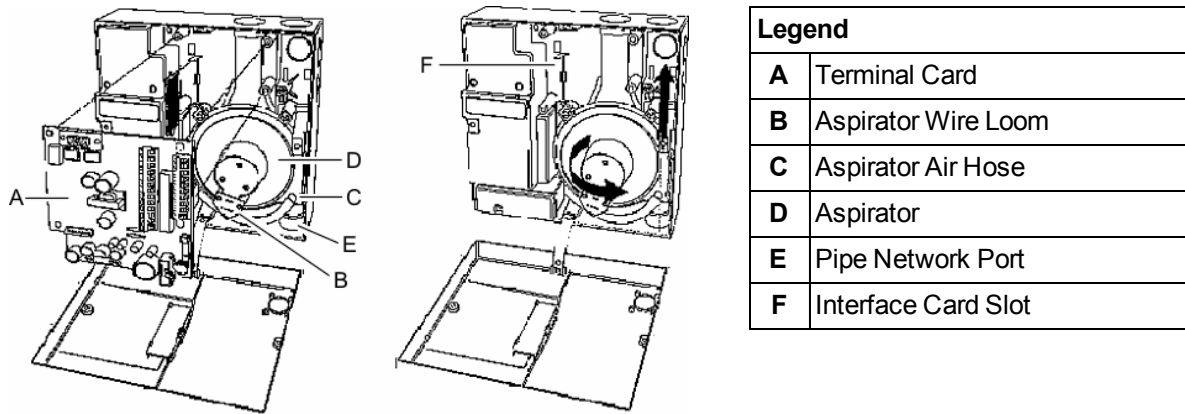


Figure 11-2: Illustration for replacing the aspirator

11.2.1 Assembly

1. Put the aspirator pipe inlet into the hole leading to the pipe network (E).
2. Tighten the screws securing the aspirator (D).
3. Connect the air hose to the aspirator pipe (C). Ensure a tight fit over the pipe.
4. Insert the termination card (A) into the interface card slot (F).
5. Tighten the termination card screws (A).
6. Reconnect the wires to the aspirator (B).
7. Put the front cover back on and tighten the screws.
8. Replace the stainless steel front cover and tighten the screws.
9. Power ON the detector and check the aspirator is running.
10. Resolve all Fault conditions.

11.3 Internal Wiring

The table below provides the cable loom interconnecting details inside the detector.

Table 11-2: Interconnecting loom details

From	To	Connector Name on CPU	Cable Name	# Pins
CPU card	Detection chamber	Pre-amp or X9	Pre Amp	6 Wire ribbon
CPU card	Detection chamber	Laser or X10	Laser	6
Termination card	LED PCB	LED card or X11	LED cable	7
Termination card	Aspirator	Aspirator or X12	Aspirator cable	3

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12 Spare Parts

On larger sites having multiple detectors it is advisable to stock certain critical spare parts. A list of spare parts is given below:

Table 12-1: Recommended spare parts stock

Part No.	Description
VSP-005	Filter Cartridge
VSP-501	Aspirator
VSP-502	VLC VN Remote Display Module
VSP-510	VLC RO Termination Card (CTC-RO)
VSP-515	VLC VN Termination Card (CTC-VN)
VSP-850-M	Metal Inline Filter

Note: Since the VLC-EX is designed to be applied in an environment where there is potentially a hazardous atmosphere, it is important that all users are aware of and follow the guidance given in the appropriate standards, including in: EN 60079-17:2007, "Explosive atmospheres. Electrical installations inspection and maintenance" and EN 60079-19: 2011, "Explosive atmospheres. Equipment repair, overhaul and reclamation" and that they also adhere to the specific rules and regulations for the site where the product is deployed.

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