VESDA Sensepoint XCL – Large Bore Installation Manual



Sensepoint XCL - Large Bore

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The following typographic conventions are used in this document:

Convention	Description
Bold	Used to denote: emphasis Used for names of menus, menu options, toolbar buttons
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.

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Product Listings

Electrical Safety

- UL 61010-1
- CSA C22.2 No. 61010-1
- IEC/EN 61010-1

Electromagnetic Compatibility

- EN 50270:2015

Radio

- RED
- FCC
- BT SIG

Enclosure Protection

- IP65
- Type 4 in accordance with NEMA 250

Gas Performance

- UL 2075 (CO and CH_4), AS 1668.2

Scope

This manual describes the installation, operation and maintenance of the VESDA Sensepoint XCL – Large Bore gas detector when connected to an Xtralis ASD pipe network.

The manual is intended for the operator involved in the installation, maintenance and servicing of the VESDA Sensepoint XCL – Large Bore gas detector and must have a good understanding of the working principles of the Xtralis aspirating smoke detectors (refer to respective ASD Product Guides for details).



Warning:

Positioning of sampling holes for gas detection is dictated by the characteristics of the gas being detected, environmental and operational factors. Seek advice from experts where necessary.

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1 Introduction

1.1 Features

VESDA Sensepoint XCL - Large Bore is a single-sensor aspirated gas detector that connects to the ASD pipe network and supports the following interfaces dependent on the model:

Analog output: VESDA Sensepoint XCL features current loop output, supporting signals in the range 0 to 22 mA. Typically, this interface is referred to as 4 to 20 mA.

Digital output: VESDA Sensepoint XCL supports Modbus RTU digital communications.

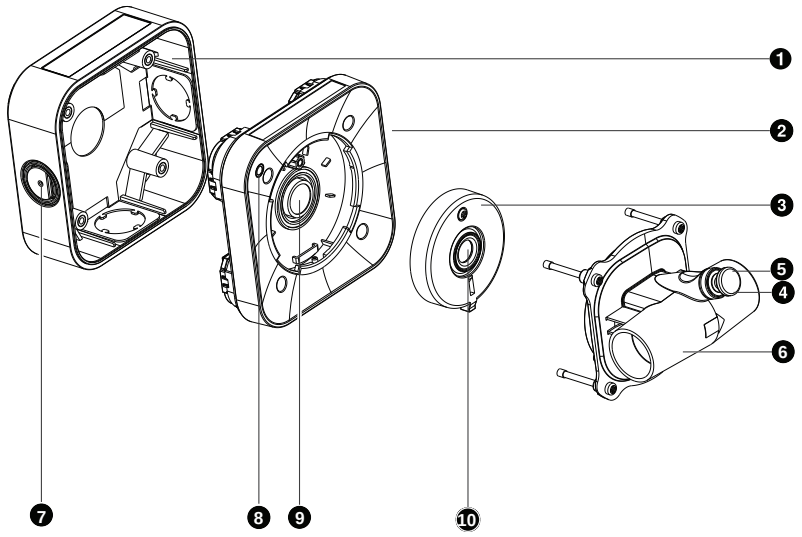
Relay output: VESDA Sensepoint XCL provides two change-over relays for signaling to external control systems or controlling external alarming devices, for example audible and visual alarm indicators.

Mobile app: A mobile app (Sensepoint App) is available to commission, maintain and service the VESDA Sensepoint XCL gas detector.

VSC and VSM4 integration: For remote access to detectors (Modbus version) operating status.

VESDA Sensepoint XCL can be used either indoors or outdoors. If used outdoors, a sheltered location should be chosen, which is protected from direct sunlight and rain.

1.2 Appearance



Legend	
1	Back box
2	Gas detector module
3	Sensor cover
4	Calibration Port
5	Red plug
6	Flow cap
7	Cable entries
8	Status indicator
9	Gas sensor
10	Dust protection membrane

1.3 Accessories

Part number	Description
XCL-LB-CAP	VESDA XCL Large Bore Spare Part Flow Cap
XCL-M20-CG	VESDA XCL Spare Part Cable Glands PK 10
XCL-LB-ELB	VESDA XCL Large Bore Spare Part 60DEG ELB PK 4
XCL-LB-FLT-1	VESDA XCL Large Bore FLT CAT NH_3 CO_2 PK 10
XCL-LB-FLT-2	VESDA XCL Large Bore FLT CO O_2 H_2S NO_2 H_2 PK 10
XCL-LB-COV-1	VESDA XCL Large Bore SENS COV CAT NH_3 CO_2
XCL-LB-COV-2	VESDA XCL Large Bore SENS COV CO O_2 H_2S NO_2 H_2

1.4 Detectable Gases

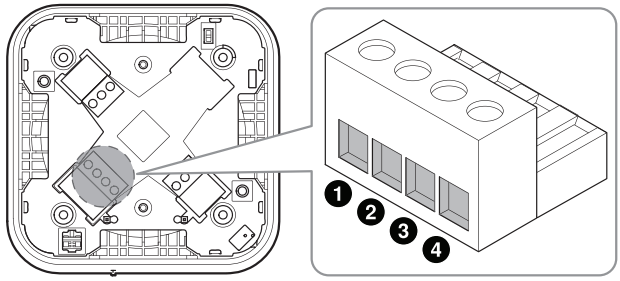
VESDA Sensepoint XCL – Large Bore is available for the detection of the following gases:

- Carbon Monoxide (CO, ppm)
- Flammable (CAT) – Methane, Hydrogen, Propane, Ethanol, Butane, etc. (% LEL)
- Carbon Dioxide (CO_2, ppm, % v/v)
- Hydrogen (H_2, ppm)
- Hydrogen Sulphide (H_2S, ppm)
- Nitrogen Dioxide (NO_2,ppm)
- Ammonia (NH_3, ppm)
- Oxygen (O_2, % v/v)

1.5 Detector Versions

The 4-way terminal block(s) provide connection for both the gas detector output and the power supply. Assignment of the terminals and additional terminal blocks will vary dependent on the version.

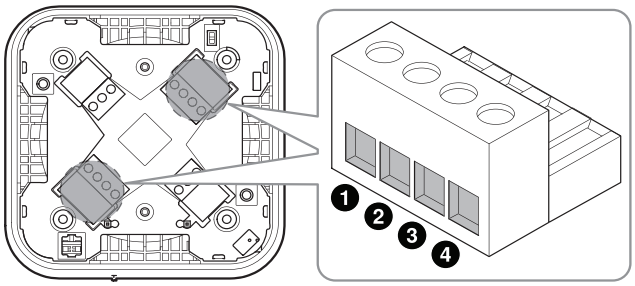
Analog (mA) Output Versions



Legend	
1	+24 V DC or 24 V AC
2	0V or 24V AC
3	4 to 20 mA
4	Common

For details on wiring for the analog output version, see "Wiring of mA Output Versions" and "Current Source/Sink Selection".

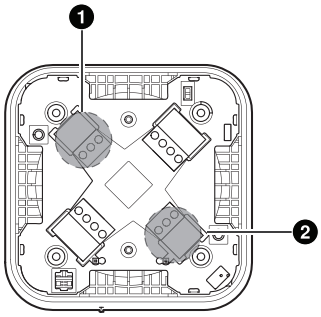
Modbus Output Versions



Legend	
1	+24 V DC or 24 V AC
2	0V or 24V AC
3	A
4	B

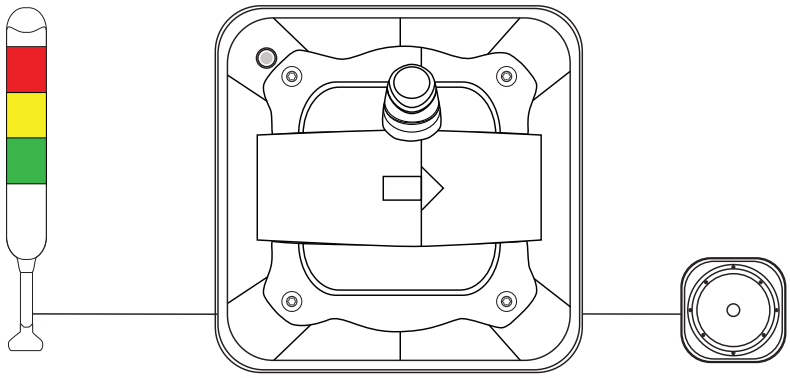
Use of the Sensepoint App is required to change the configuration settings of the Modbus RTU interface.

1.6 Relay Output

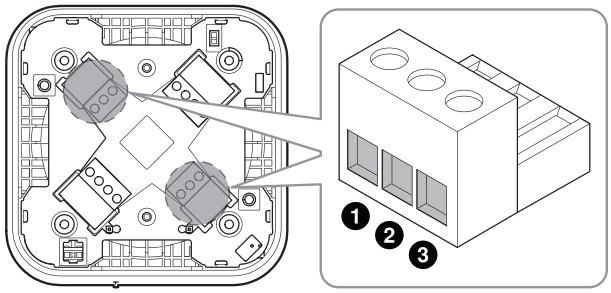


Legend	
1	Relay No. 1
2	Relay No. 2

Where fitted, there are two configurable relays which can be used to control or signal to external devices, such as audible and visual alarms and other control systems.



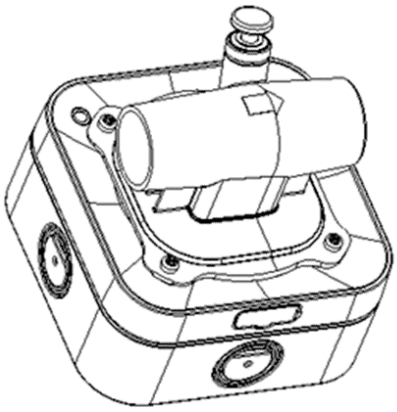
Connection to these relays are made through the two 3-way terminal blocks.



Legend	
1	Normally closed (NC)
2	Common
3	Normally open (NO)

1.7 Specifications

Dimensions and Weight



Specification	Value
Length	113 mm (4.4 in)
Width	113 mm (4.4 in)
Height	59 mm (2.3 in)
Weight	500 g (1.1 lb)

Power Supply

VESDA Sensepoint XCL requires an isolated power supply unit that is certified by a national or international standard, such as UL.

Specification	Value
Nominal DC input voltage	24 V DC[1]
Nominal AC input voltage	24 V AC[2], 50/60 Hz
Inrush current	Less than 850 mA

Outputs

Specification	Value
Analog output	0 to 22 mA sink or source (configurable)
Digital output	Modbus RTU
Relay output	5 A, 250 V AC, 24 V DC

The two relays can be used for fault signaling (normally energized) or for alarm signaling. The relay assignments and operations are configurable using the Sensepoint App.

- **Modbus RTU Default Communication Setting**

Specification	Value
Baud rate	9600 bps
Parity	None
Data bits	8
Stop bits	2
Flow control	None

Refer to Appendix A.6 for details on the Modbus registers. Adjustable Modbus settings:

- Slave ID: 1 to 255
- Baud rate: 9600, 19200 bps
- Parity: None, Even, Odd

- **Relay Default Setting**

Specification	Value
Relay 1	Any faults and initial state is energized.
Relay 2	Gas alarm 1 and initial state is de-energized.

Maximum Power Consumption

The power consumption varies, depending on output version and sensor type. The additional maximum power consumption for the relay output version is 0.6 W.

- **Analog Output Version**

	In normal state	During an alarm
Electrochemical-cell-type sensor (CO, H_2, H_2S, NO_2, NH3, O_2)	0.5 W	1.2 W
Catalytic-type sensors (CAT)	1.0 W	1.7 W
Infrared-type sensors (CO_2)	1.0 W	1.7 W

- **Digital Output Version**

	In normal state	During an alarm
Electrochemical-cell-type sensor (CO, H_2, H_2S, NO_2, NH_3, O_2)	0.3 W	0.7 W
Catalytic-type sensors (CAT)	0.8 W	1.2 W
Infrared-type sensors (CO_2)	0.8 W	1.2 W

[1] mA versions: 11 to 32 V DC, Modbus versions: 9 to 32 V DC

[2] 20 to 27 V A

Operating Environment

Specification	Value
Operating temperature	−20 to 50 °C (−4 to 122 °F)
Storage temperature	0 to 30 °C (32 to 86 °F)
Humidity	0 to 99% (non-condensing)[1]
Atmospheric pressure	90 to 110 kPa
Installation category	II (UL/CSA/IEC/EN 61010-1)
Pollution degree[2]	2 (UL/CSA/IEC/EN 61010-1)

Note: Install VESDA Sensepoint XCL in a sheltered location away from direct UV light and rain.

Recommended Wall-Mounting Screws

Specification	Value
Type	Countersunk, pan head
Size	4 mm (No. 8) diameter × 25 mm (1 in) min

Cable Gland

Specification	Value
Inner knockout	M20 or ½ NPT
Outer knockout	M25 or ¾ NPT

Sampling Pipe

VESDA Sensepoint XCL – Large Bore is designed to be inserted to Xtralis pipe networks with the below dimensions:

Specification	Value
Outer diameter	25 mm (0.98 in) to 27mm (1.06 in)

Gas Test Tube

For Bump test and Calibration, use flexible urethane gas test tubing with the below dimensions to connect gas cylinder to Calibration Port:

Specification	Value
Inner diameter	4 mm (0.16 in)
Outer diameter	6 mm (0.24 in)

[1] Flammable catalytic vesions: 10 to 90% RH. Operating the detector outside this range may result in increased drift and reduction in detector accuracy

[2] VESDA Sensepoint XCL conforms to IP65, Type 4 (in accordance with NEMA 250) making it suitable for use in Pollution Degree 3 environments

2 Installation

2.1 Safety Information

CAUTION:

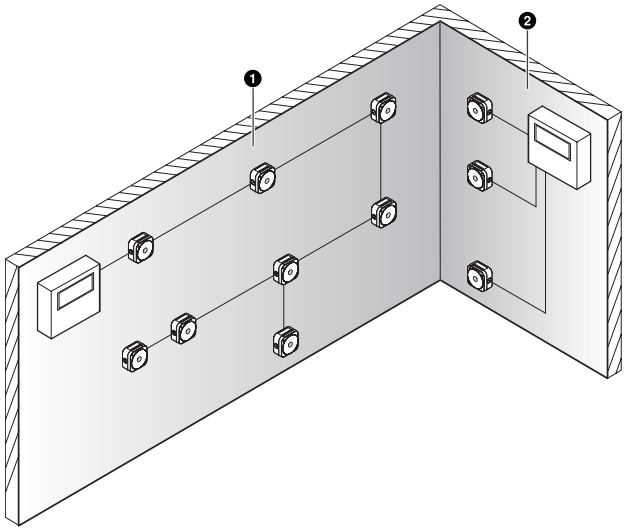
Failure to observe the precautions described in this section can cause injury to persons or damage to property.

Observe these precautions:

- To minimize the risk of electrostatic charge, provision shall be made for adequate grounding and equipment shall be installed in such a manner so that accidental discharge shall not occur.
- When VESDA Sensepoint XCL reaches the end of its life, it should be disposed of in accordance with local regulations.
- Do not use cleaning solvents or abrasives to clean the gas detector.
- Do not attempt to modify the product in any way from the manufacturers design or specification. Warranty will be void and malfunction of the gas detector may result.
- Use only genuine spare parts and accessories with VESDA Sensepoint XCL. Malfunction may result if non-standard parts are used.

VESDA Sensepoint XCL is suitable for ordinary locations only and must not be installed in hazardous locations. Installation must be in accordance with the recognized standards of the appropriate authority in the country concerned. For Europe, see EN60079-14, EN60079-29-2, and EN61241-14. For installations in North America, the National Electrical Code (NFPA 70) should be strictly observed. All the appropriate local and national regulations should be observed.

2.2 Installation Layout

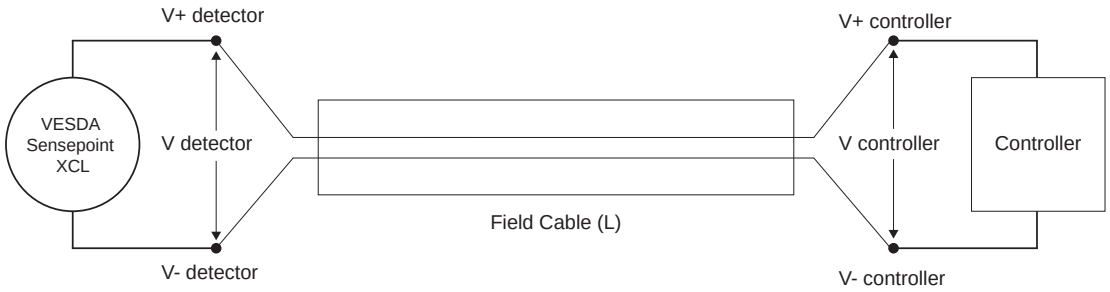


1. Gas detection system using Modbus RTU. Detectors are wired in a daisy chain on a single cable run.
2. Gas detector system using analog current loop principle. Each detector is individually wired to the controller (i.e. Honeywell Analytics “Touchpoint™ Plus” controller) on its own cable.

Note: Additional information on “Touchpoint™ Plus” controller (Data Sheets, User Manuals, Specifications & Quick Start Guide) can be downloaded from Honeywell Analytics website www.honeywellanalytics.com.

2.3 Power Cable Specification

VESDA Sensepoint XCL requires a power supply from the controller of specified supply voltage range in section "1.7 Specifications". Ensure that a minimum supply voltage is measured at the VESDA Sensepoint XCL, taking into account voltage drops due to cable resistance.



The maximum loop resistance ($R_{loop\ max}$) in the field cable is calculated as follows:

$R_{loop\ max} = (V_{controller} - V_{detector\ min}) \div I_{detector\ max}$
$I_{detector\ max} = W_{detector\ max} \div V_{detector\ min}$

Example:

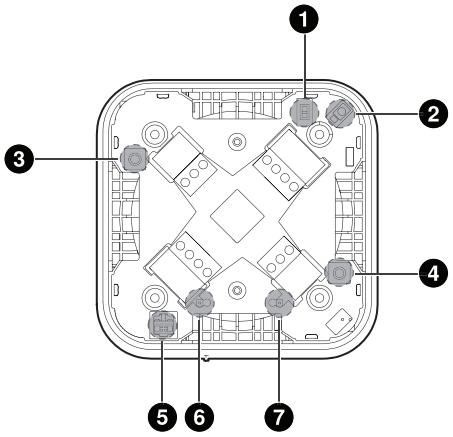
The controller is supplying a nominal 24 V DC ($V_{controller}$), and the minimum allowable voltage of VESDA Sensepoint XCL is 11 V DC ($V_{detector\ min}$). Therefore, the maximum allowable voltage drop across the cable between the controller and the detector is $V_{controller} - V_{detector\ min}$ = 13 V DC.

Power consumption of the detector is maximum 2.3 W ($W_{detector\ max}$). The maximum current required to drive the VESDA Sensepoint XCL at the minimum voltage is 2.3 W ÷ 11 V DC = 209.1 mA ($I_{detector\ max}$). So the maximum field cable loop resistance ($R_{loop\ max}$) is 13 V DC ÷ 0.2091 = 62 Ω. Therefore, the maximum cable length for any given cable type can be found by dividing the maximum allowable cable resistance per core by the cable resistance provided by the cable manufacturer.

The following table shows the typical maximum cable distances for our example.

Cable size (cross sectional areal)	Typical cable resistance	Maximum cable length (L)
0.5 mm^2 (20 AWG[1])	36.8 Ω/km	842 m
1.0 mm^2 (17 AWG)	19.5 Ω/km	1589 m
1.5 mm^2 (16 AWG)	12.7 Ω/km	2440 m
2.0 mm^2 (14 AWG)	10.1 Ω/km	3069 m
2.5 mm^2 (13 AWG)	8.0 Ω/km	3875 m

2.4 Detector Module



Legend	
1	Inhibit switch
2	Status indicator
3	UP button
4	DOWN button
5	Current sink/source selection switch
6	Negative voltage output
7	Positive voltage output

[1]Nearest equivalent.

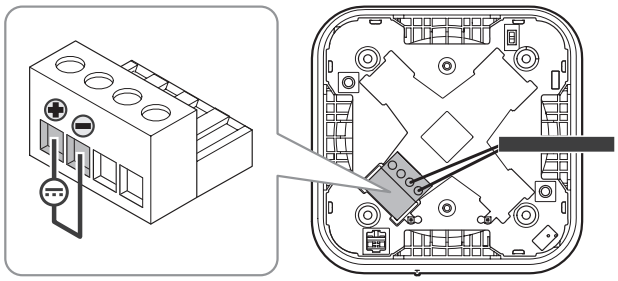
2.5 Wiring of mA Output Versions

CAUTION:

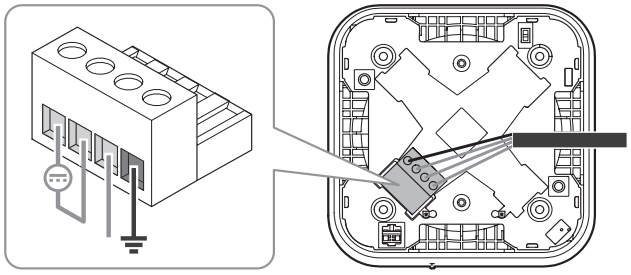
Ensure that the wiring of the detector is correct, and the Current Source/Sink selection switch is correctly set BEFORE applying power. Failure to do so may result in damage to the VESDA Sensepoint XCL detector.

Power Connection

When connecting to DC power, make sure that the polarity is correct.

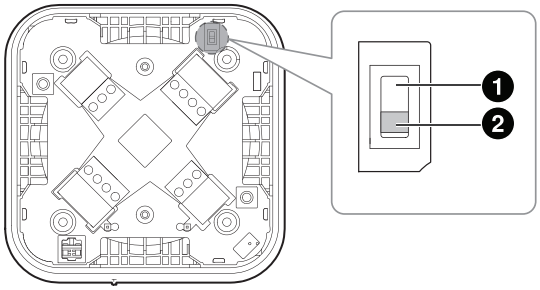


If an external power source is used, ensure that terminal 4 “Common” is used to connect the power and controller grounds together.



Inhibit Level Selection

Use the inhibit switch to set the level of current which is required when inhibit is active.



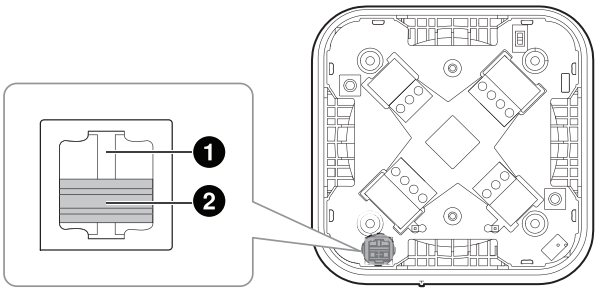
1. With this switch in the upper position, a current of 4 mA is output in inhibit mode.
2. With this switch in the lower position, a current of 2 mA is output in inhibit mode.

Current Source/Sink Selection

CAUTION:

Always disconnect power before changing the position of this switch. Failure to do so may result in damage to the VESDA Sensepoint XCL detector.

Use the current source/sink switch to choose between source mode and sink mode.



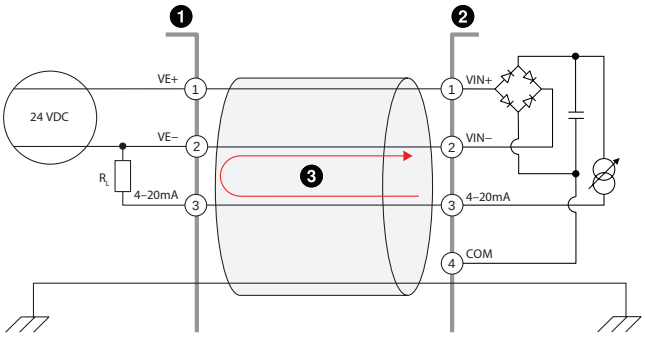
1. **Detector sink mode:** With this switch in the upper position, the analog output drives current through the controller sensing circuit.
2. **Detector source mode:** With this switch in the lower position, the analog output draws current through the controller sensing circuit.

mA Output	Status Indicator
1 mA	Fault
2/4 mA	Inhibit
4-20 mA	0 to 100% Full Scale
>21 mA	Over range

Notes: The load resistance of the controller must be between 33 Ω and 250 Ω. When the mA output is not being used, a 33 Ω, 0.125 W load resistor should be connected between terminal 3 (4–20 mA) and terminal 2 (0 V) for source mode or terminal 1 (+24 V DC) for sink mode. Failure to do so will cause the unit to enter a fault condition.

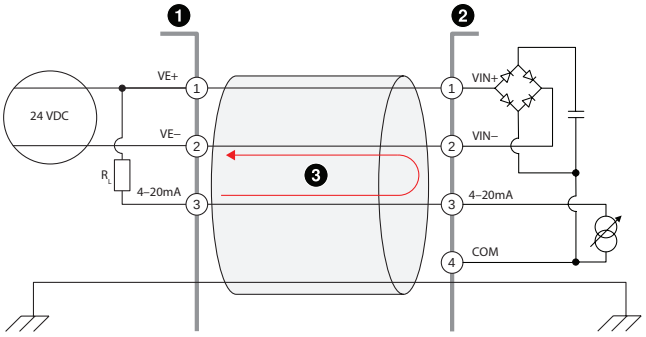
When operating the detector from an AC power supply, the current loop (mA) wiring should be connected between terminals 3 (4-20 mA) and 4 (COM).

Detector Source Mode with DC Power



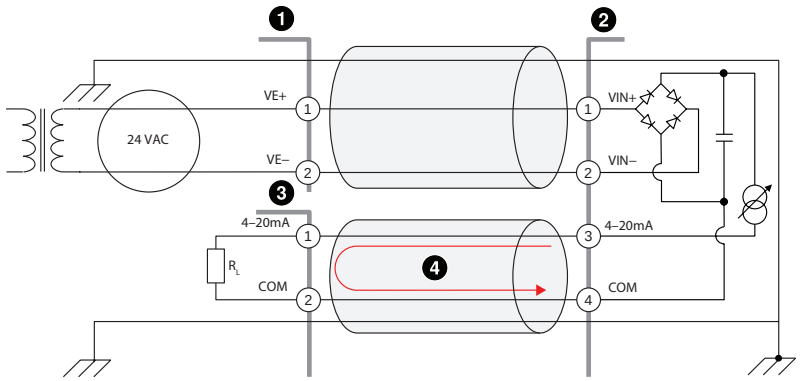
Legend	
1	System controller
2	VESDA Sensepoint XCL detector
3	Current flow

Detector Sink Mode with DC Power



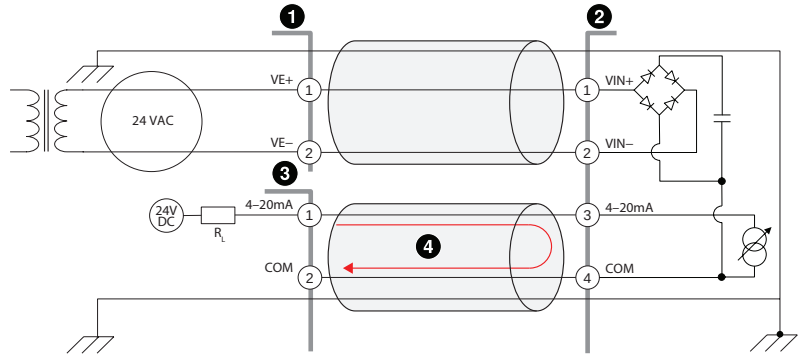
Legend	
1	System controller
2	VESDA Sensepoint XCL detector
3	Current flow

Detector Source Mode with AC Power



Legend	
1	External power supply
2	VESDA Sensepoint XCL detector
3	System controller
4	Current flow

Detector Sink Mode with AC Power



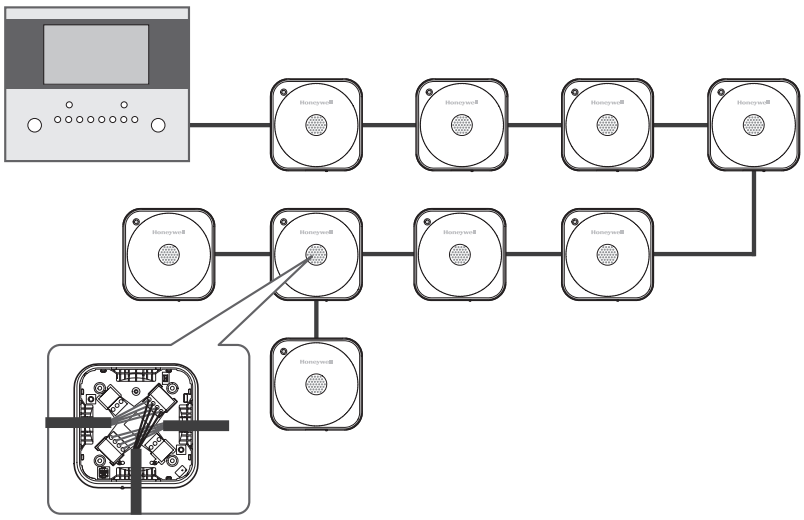
Legend	
1	External power supply
2	VESDA Sensepoint XCL detector
3	System controller
4	Current flow

2.6 Wiring of Modbus Output Versions

Modbus Connection

For Modbus versions, up to 32 VESDA Sensepoint XCL detectors can be connected in a daisy chain arrangement as shown in the diagram below.

For detection of networked detectors for VSC/VSM4 or gas controller panel integration, assign a unique Slave ID (1 to 32) to each VESDA Sensepoint XCL from the Sensepoint App.



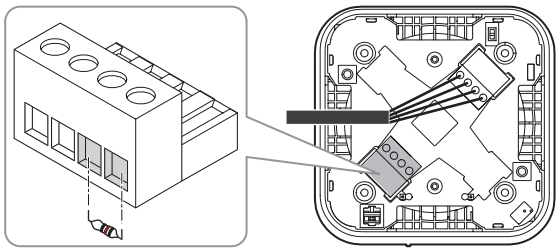
Note: Where possible, spur or 'T' connections should be avoided. Always keep the spur connection as short as possible.

Cable Specification for Modbus Connection

Type	Cable Spec	Max Length
Modbus	0.5 mm^2 to 2.5 mm^2 twist pair shied cable	1000 m

Terminal Resistor

Connect a 120 Ω, 0.25 W terminal resistor between the A and B terminals at the end of the line.

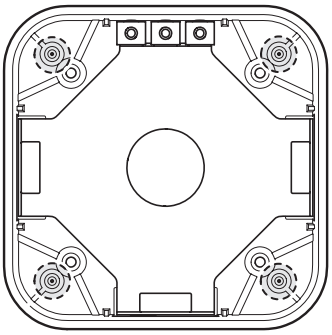


2.7 Securing the Back Box to a Wall

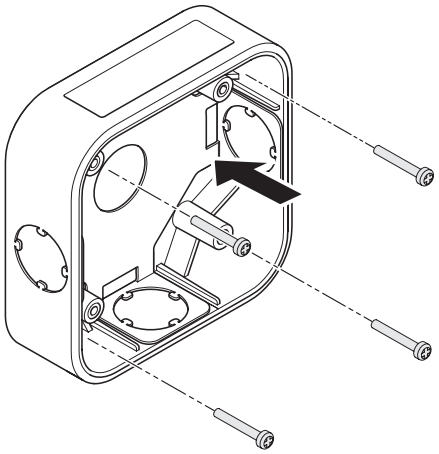
CAUTION:

Before starting installation, make sure that the system controller or external power source is switched off.

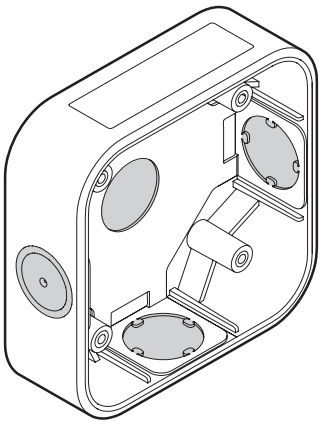
1. There are four screw positions in the rear of the back box for mounting purposes. Punch the required screw positions or drill using a 4 mm drill.



2. Secure the back box in its mounting position with suitable fixings appropriate to the mounting surface. Do not over-tighten.

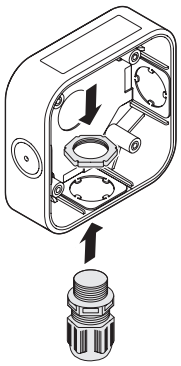


3. There are four cable entry knock-outs on three sides of and on the rear face of the back box. Drill or punch the entries as required.

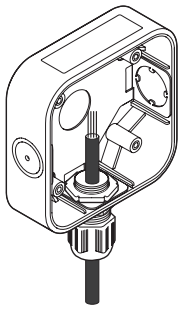


2.8 Cable Connections

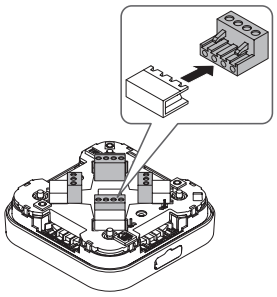
1. Fit suitable cable glands appropriate to the application and type of cable being utilized to the opened cable entries.



2. Feed the cable through the cable gland.



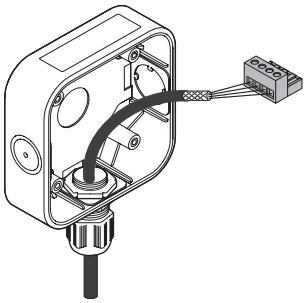
3. Turn over the detector module and locate the terminal blocks on the back. Remove the terminal blocks by pulling them toward the center of the module.



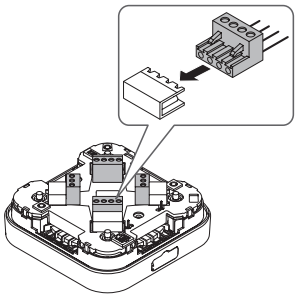
4. Connect the cable to the appropriate terminal block, referring to the relevant wiring diagram. Strip and insert the end of each wire into the corresponding terminal hole. Using a flat-blade terminal screwdriver, tighten the terminal screw until the wire is secured. Use a ferrule on the wire where necessary.

CAUTION:

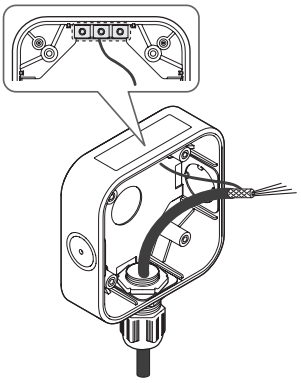
Do not over-tighten the terminal screw.



5. Replace the terminal blocks in their correct positions.



2.9 Ground Connections



Effective grounding is crucial to ensure stable Modbus communications and to limit the effects of radio frequency interference. Ground points are provided inside the back box. In order to prevent false readings or alarms as a result of ground loops, ensure that the shield of all cables are grounded at a single point, preferably at the controller. Consideration should also be given to how conduit, glands and the internal earth plate are also grounded.

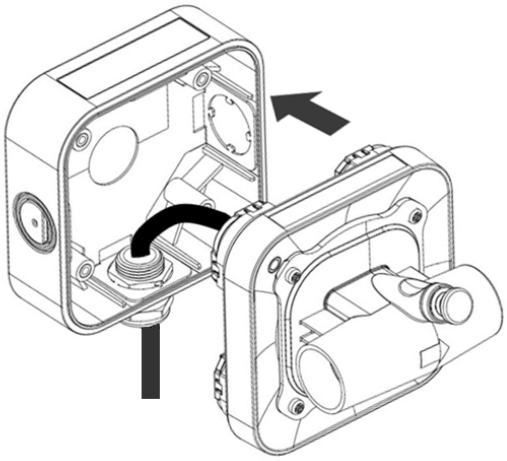
Note: Any earth regime must avoid earth loops.

2.10 Securing the Detector Module and Flow Cap

1. Position the detector module with Flow Cap onto the back box ensuring that the status indicator is in the top left-hand corner when viewed from the front. Tighten the four retaining screws using a No. 2 Phillips screwdriver to secure.

CAUTION:

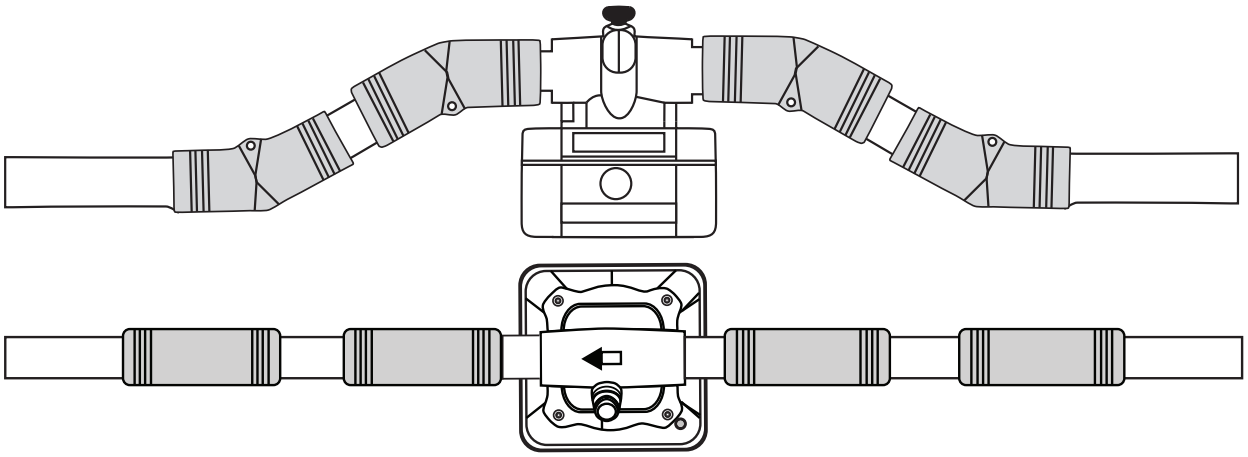
Do not over-tighten the screws. If required, the current sink/source selection switch can be set at this point.



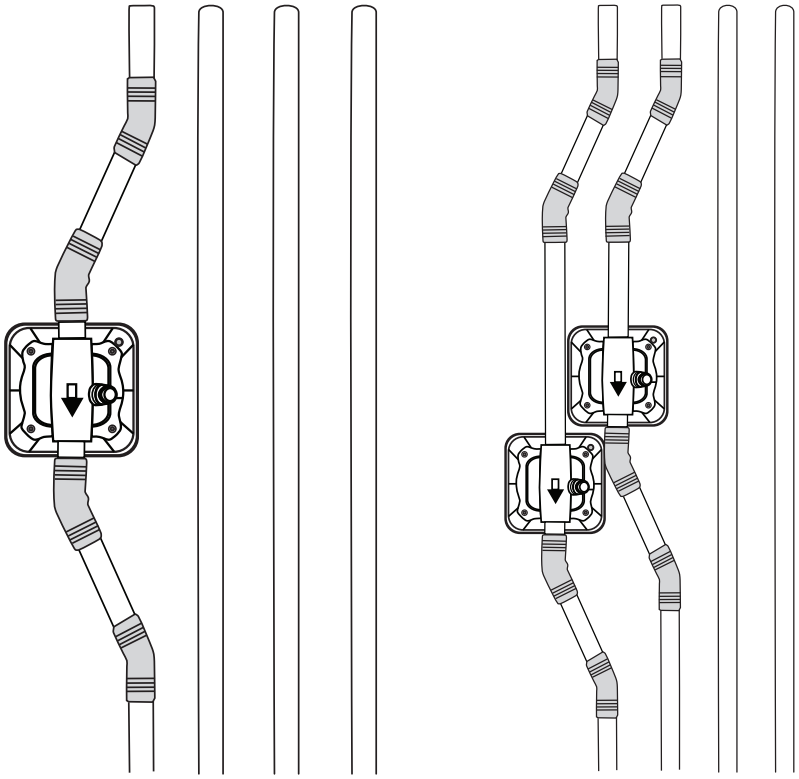
2. Where used, tighten the sealing nut of the cable gland to secure the cable.

2.11 Connecting to Pipe Network

1. Take note of pipe flow direction and align with arrow on VESDA Sensepoint XCL Flow Cap.
2. Create a **vertical offset** in the pipe run to direct flow to the Flow Cap using 4x60° elbows (supplied) as shown below. Do not glue the pipes to the Flow Cap.

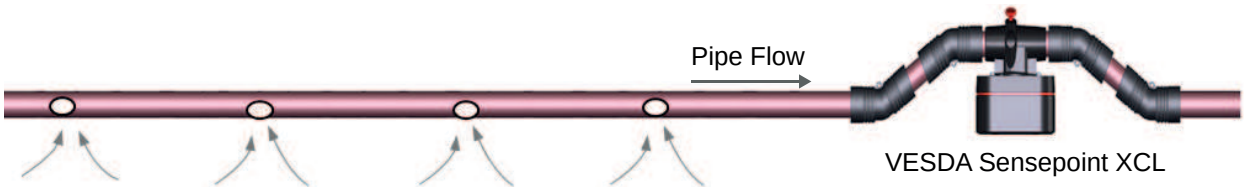


3. Where VESDA Sensepoint XCL is mounted close to the smoke detector ensure a 0.5m (1.64ft) minimum linear pipe length between detectors.
4. Where VESDA Sensepoint XCL is mounted adjacent to pipes, introduce a **vertical & horizontal offset** in the pipe run using the 4x60° elbows (supplied) as shown below:

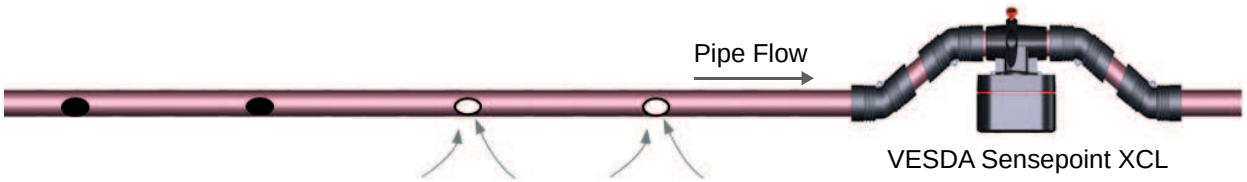


2.12 Installation Practices

1. Ensure arrow on VESDA Sensepoint XCL Flow Cap is aligned to pipe flow.
2. Install in-line components (particulate filter / water trap) upstream VESDA Sensepoint XCL. With water trap installation, ensure to slope installation pipe toward water trap.
3. Ensure 0.5m (1.65ft) linear pipe length to ASD inlet when mounting VESDA Sensepoint XCL close to ASD.
4. Follow the below practices for the flow monitoring of VESDA Sensepoint XCL upstream holes:
   a. Do not allocate sample holes downstream VESDA Sensepoint XCL (recommended).
   b. If downstream sample holes are required, ASD flow fault threshold is set to the difference in flow values of the following ASPIRE design scenarios (i) & (ii):
      i. Upstream sample holes open, i.e. Pipe flow = 50L/min (ASD flow normalized 100%)



      ii. Upstream sample holes blocked (2 sample holes), i.e. Pipe flow = 40L/min



ASD Low Flow Fault threshold = 80% (Difference between pipe flow, 50 - 40 = 10L/min, 20% flow loss).

Note: Where VESDA Sensepoint XCL is sampling sticky gases i.e. NO_2, NH_3, H_2S, ensure distance from VESDA Sensepoint XCL detector to last sampling hole is:
PVC pipes: ≤ 40m
CPVC and ABS pipes: ≤ 20m

Note: All pipe network designs incorporating VESDA Sensepoint XCL detectors must be verified by the Xtralis Pipe Network Modelling Tool, ASPIRE.

2.13 Setting Alarm Thresholds

The VESDA Sensepoint XCL – Large Bore gas detector provides multiple hole (multi-point) gas sampling. Setting the appropriate detector alarm level will depend on the following parameters:

1. Target gas concentration
2. Number of sample holes upstream the detector
3. Flow contribution of upstream holes
4. Detector lowest alarm level

Refer to Application Note (Doc. No. 35616) and Calculator (Doc. No. 35758) for guideline to set VESDA Sensepoint XCL – Large Bore gas detectors alarm levels.

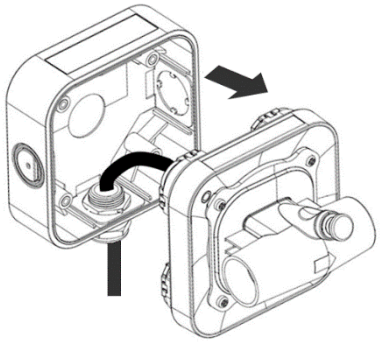
3 Commissioning

Note: The VESDA Sensepoint XCL gas detector is supplied from the factory pre-calibrated. However, it is strongly recommended that the detector response is checked and if necessary, re-calibrated before placing it into service. Refer to section "4.3 Calibration" for details on the correct calibration procedure.

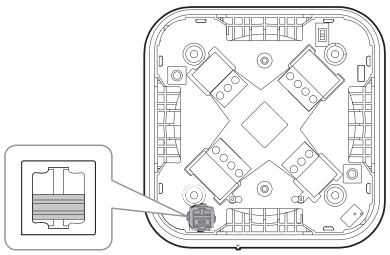
3.1 Commissioning the Detector

The following procedure should be followed carefully and only be performed by suitably-trained personnel.

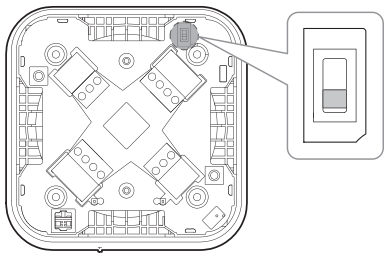
1. Remove the detector module.



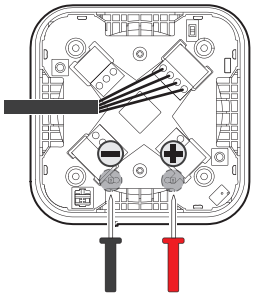
2. Configure the sink/source mode of the detector. Refer to "Current Source/Sink Selection" on details of how to do this.



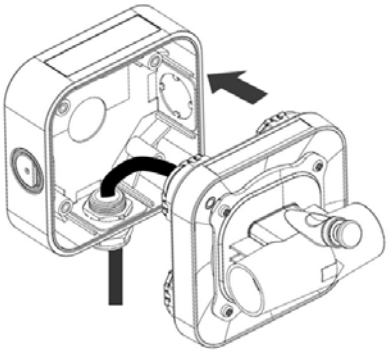
3. Configure the required inhibit level of the detector. Refer to section "Inhibit Level Selection" on details of how to do.



4. Check that all electrical connections are terminated correctly according to the connector terminal assignments.
5. Switch on the power supply to the VESDA Sensepoint XCL.
   a. For DC operation, use a voltmeter set to measure DC voltage at the detector. Check that the power supply voltage between terminals 1 (+V) and 2 (0 V) is between 9 V DC and 32 V DC for Modbus versions and 11 V DC and 32 V DC for analog versions.
   b. For AC operation, use a voltmeter set to measure AC voltage to check that the power supply voltage between terminals 1 and 2 is between 20 V AC and 27 V AC.



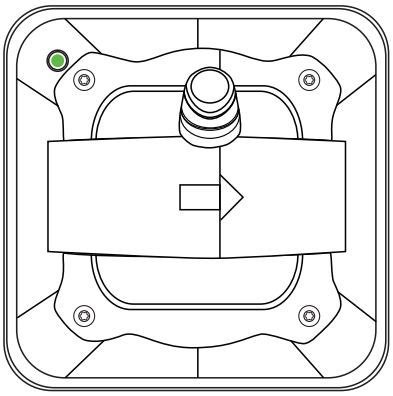
6. Remove power and refit the detector module to the back box.



7. Apply power. The VESDA Sensepoint XCL will enter a warm-up mode during which time the status indicator will be steady yellow and the output (mA version) will be held in an inhibited state.
8. After the warm-up has been completed, the VESDA Sensepoint XCL will enter it's normal operating state.

3.2 Status Indicator

There is a status indicator on the face of the gas detector. The operating state of the detector is indicated by one of four colors, either steady or flashing.



	Normal	The indicator is on steady green when the concentration of the target gas is within normal range. **Note:** Using the Sensepoint App, you can change how the green indicator behaves during normal operation. Select between steady green (default setting), confidence flash every 20 seconds or off.
	Warning	The indicator alternatively flashes green and yellow when the gas detector is in a warning state.
	Fault	The indicator flashes yellow when the gas detector is in a fault state.
	Inhibited	The indicator is on steady yellow when the user has placed the detector into the inhibit state for maintenance or repair.
	Alarm	The indicator flashes red when the gas concentration is beyond the alarm-level threshold.
	Out-of-range alarm	The indicator rapidly flashes red when the gas concentration is beyond the full scale deflection of the detector.
	Bluetooth pairing	The indicator flashes blue when Bluetooth pairing between the gas detector and a smart device is in progress.
	Bluetooth connected:	The indicator is on steady blue when a Bluetooth connection is established with the smart device and the detector is in a normal condition.

3.3 Target Gas Selection (flammable catalytic versions only)

The target flammable (combustible) gas of the VESDA Sensepoint XCL can be changed using the Sensepoint App where the user can select from a range of flammable gases. Refer to the Sensepoint App User Manual Doc. No. 35245 for full details on how to do this.

Note: Before changing the target gas a zero calibration should be performed in clean air.

The VESDA Sensepoint XCL gas detector operates on a Star Rating system where gases are grouped depending on the response of the sensor to them. The higher the star rating, the more responsive the sensor is to the gas. The table below shows the Star Ratings for a range of gases.

Gas	Equivalent Star Rating
Acetone	2*
Ammonia	6*
Benzene	2*
Butanone	2*
Butane	3*
Butyl acetate	1*
Cyclohexane	1*
Cyclohexanone	<1*
Diethyl ether	2*
Ethane	4*
Ethanol	3*
Ethyl acetate	2*
Ethylene	4*
Heptane	2*
Hexane	2*
Hydrogen	6*
Methane	6*
Methanol	4*
M IBK	2*
Octane	2*
Pentane	2*
Propane	3*
Propan-2-ol	2*
Styrene	1*
Tetrahydrofuran	3*
Toluene	2*
Xylene	1*

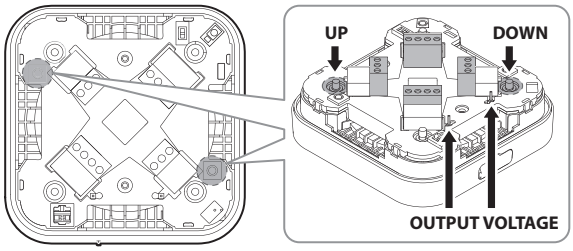
For maximum accuracy, the VESDA Sensepoint XCL catalytic sensor should be calibrated using a known calibration gas (with an air balance) equal to 50% of the actual target gas intended to be monitored.

4 Maintenance

4.1 Using the Control Buttons

It is possible to perform basic maintenance functions on the VESDA Sensepoint XCL gas detector without the use of the Sensepoint App. This is achieved through the use of two control buttons inside the detector. Familiarize yourself fully on the operation of these buttons before attempting to use them.

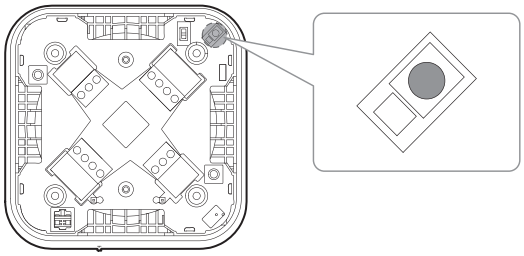
Note: Make sure that the inhibit level is set to the desired level. See "Inhibit Level Selection".



- **To inhibit the detector output:** Press and hold the UP button for 2 seconds.
- **To increase the output voltage:** Briefly press the UP button. Pressing once increases by 0.01 V. To increase by 0.1 V, press and hold the button.
- **To decrease the output voltage:** Briefly press the DOWN button. Pressing once decreases by 0.01 V. To decrease by 0.1 V, press and hold the button.
- **To move to the next stage:** Press and hold the UP button for 2 seconds. If a change has been made, it is saved automatically before proceeding to the next stage.
- **To escape and discard all changes:** This escape function can be used at any time during the procedures detailed in the following sections. Press and hold the DOWN button for 5 seconds.

4.2 Maintenance Status Indicator

There is another indicator on the rear of the detector module for easier maintenance. When performing maintenance, such as calibration or sensor replacement, using the control buttons, refer to the indicator to determine the status of the detector.



Inhibit mode

While in inhibit mode, the indicator is on steady yellow.

Sensor replacement mode

While in sensor replacement mode, the indicator slowly flashes yellow. When in warm-up, the indicator is on steady yellow.

Zero calibration

During zero calibration, the indicator flashes long yellow followed by two short yellow flashes. First short yellow flash indicates zero status and second flash indicates span status. The indicator flashes long yellow followed by short green flash and short yellow flash when the zero calibration is successfully completed, but flashes long yellow followed by short red flash and short yellow flash if it fails.

Span calibration

During span calibration, the indicator flashes yellow. The indicator flashes green with two short pauses when the span calibration is successfully completed, but flashes red with two short pauses if it fails.

Calibration gas purge

While the calibration gas is purged, the indicator is on steady yellow.

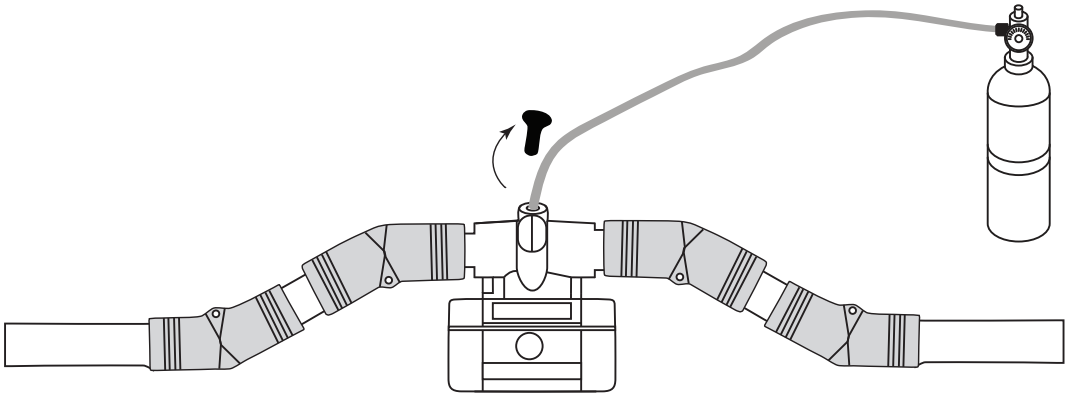
Cancel

When a task is cancelled, the indicator flashes yellow with three short pauses.

4.3 Calibration

The following steps describe the calibration of VESDA Sensepoint XCL detector using the Sensepoint App (for details refer to section “5 Sensepoint App”):

1. Connect VESDA Sensepoint XCL detector to the Sensepoint App and set “Purge Time” to 180 sec.
2. Power OFF the smoke detector or switch to standby mode.
3. Remove the (red) Calibration Port plug and connect to calibration gas cylinder having a fixed flow regulator (FFR) rated at 0.5 L/min[1]. Refer to the regulator manufacturer for instructions on how to start and stop the gas flow from the cylinder.



4. Follow the on-screen instructions on the Sensepoint App for Calibration:
   a. Zero calibration: Expose VESDA Sensepoint XCL to ambient air – if there is doubt of the quality of the ambient air, use a cylinder with clean air.
   b. Span calibration: Expose VESDA Sensepoint XCL to the calibration gas. Where greatest accuracy is required, the gas concentration should be around the alarm set point or 50% of the detector range. If at the end of the purge cycle detector reading does not return to zero, repeat calibration with detector disconnected from the pipe.
5. Following calibration replace the (red) Calibration Port plug.
6. Power ON the smoke detector or revert to normal mode.

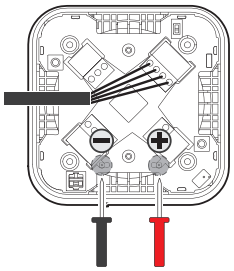
CAUTION:

Always use a gas cylinder that is within its expiration date.

This section describes how to perform calibration using the control buttons of the VESDA Sensepoint XCL detector. Before starting calibration, make sure that the VESDA Sensepoint XCL detector is powered ON.

1. Remove the detector module from the back box.
2. Activate inhibit mode by pressing and holding the UP button for 2 seconds. Make sure that the yellow indicator is on.
3. Connect the positive probe of a voltmeter to the positive terminal, and connect the negative probe to the negative terminal of the output voltage monitor.

[1]For example: FFR Calgas 715 Regulator "www.calgaz.com/pages/700-series-regulator"



4. Perform zero calibration.
   a. Hold the UP button for 2 seconds.
   b. If there is any doubt of the quality of the ambient air, connect a cylinder of fresh air to the detector.
   c. Apply fresh air to the detector, and wait for a few minutes until the reading is stable.
   d. Using the UP and DOWN buttons, adjust the output voltage so that the voltmeter is reading slightly above zero, and then decrease the reading slowly so that it reads zero.
   e. When the output voltage is adjusted close to zero, accept the zero calibration by holding UP button for 2 seconds.
5. If a span calibration is required, after successful zero calibration it will move to span calibration automatically. If a span calibration is not required, exit from calibration by holding DOWN button for 5 seconds. This will cancel a span calibration while zero calibration result sustains.
   a. Hold UP button for 2 seconds.
   b. Connect a cylinder of span gas to the detector. Where the greatest accuracy is required, the cylinder concentration should be usually around the alarm set point or 50% of the range of the detector.
   c. Apply the span gas to the detector, and wait for a few minutes until the reading is stable.
   d. Using the UP and DOWN buttons, adjust the output voltage until it reaches the target value. Use the formula below to calculate what the correct voltage should be:

      Vout = Gas concentration ÷ detector range

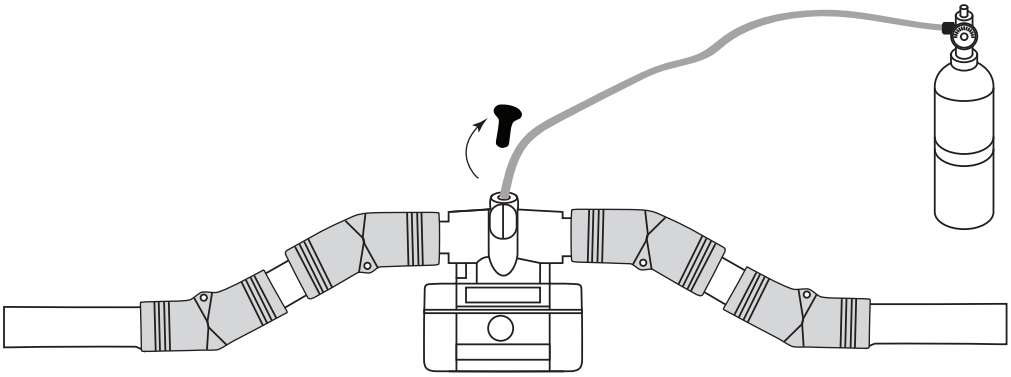
      For example, if you are applying 45% LEL gas with a 100% LEL detector range, you would need to adjust the voltage output so that the reading on the voltmeter shows: 45 ÷ 100 = 0.45 V.

   e. When the output voltage is adjusted close to target gas concentration, accept the span calibration by holding UP button for 2 seconds.
6. Purge the gas sensor.
   a. Hold the UP button for 2 seconds.
   b. Remove the span gas from the detector and make sure that the reading voltage out returns to zero. If there is any doubt that the detector is not in clean air, apply cylinder air. Otherwise, an alarm may occur.
7. Use the cancel function to return to normal monitoring mode.
8. Assemble the detector module to the back box.

Note: Perform calibration (i) after installation, (ii) after sensor cover or gas sensor replacement, (iii) every 6 months (strongly recommended), (iv) when detector fails bump test. See section “4.8 Troubleshooting”.

4.4 Bump Test

1. Connect VESDA Sensepoint XCL detector to the Sensepoint App.
2. Power OFF the smoke detector or switch to standby mode.
3. Remove the (red) Calibration Port plug and connect to bump test gas cylinder having a fixed flow regulator (FFR) rated at 0.5 L/min[1]. Ensure bump test gas concentration is above alarm set points. Refer to the regulator manufacturer for instructions on how to start and stop the gas flow from the cylinder.



4. Apply bump test gas and check gas reading and transmission signals. Gas readings must be within the accuracy of the listed gas sensor (see “A.1 Detector Parameters”).
5. Following bump test replace the (red) Calibration Port plug.
6. Power ON smoke detector or switch to normal mode.

CAUTION:

For CO versions operating in UL 2075 alarm mode, apply 100 ppm of carbon monoxide for 3 minutes.

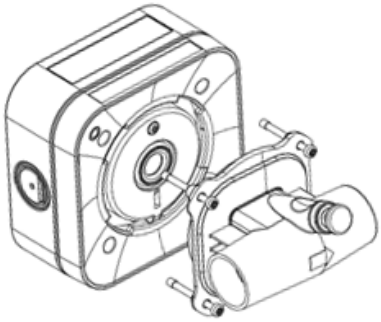
Note: Perform a bump test in between calibration intervals.
If detector fails the bump test check and if necessary, calibrate the detector. Follow steps outlined in section “4.8 Troubleshooting”.

[1]For example: FFR Calgas 715 Regulator "www.calgaz.com/pages/700-series-regulator"

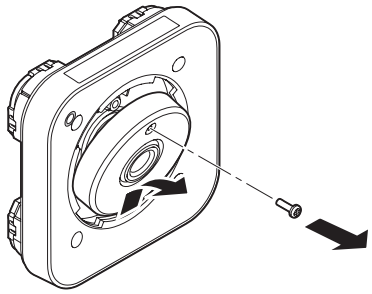
4.5 Replacing the Sensor Cover

Warning: Use only genuine replacement sensor cover specifically for use with VESDA Sensepoint XCL. Attempting to use non-genuine sensor cover could result in malfunction of the product.

1. Disable smoke detector to prevent the transmission of potential flow fault alarm.
2. Disconnect both sampling pipes and remove the Flow Cap from the detector.



3. Remove the sensor cover (loosen the screw on the top of the sensor cover).

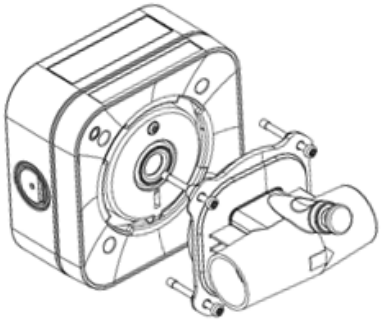


4. Replace the sensor cover and secure with the screw, taking care not to over-tighten it.
5. Secure the sampling pipe and the Flow Cap to the detector.
6. Enable the smoke detector.
7. Perform calibration (section “4.3 Calibration”).

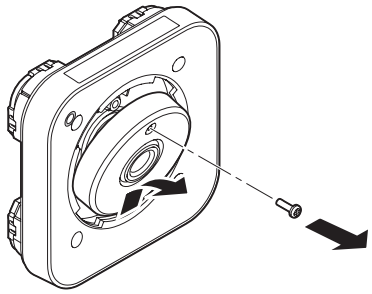
4.6 Replacing the Gas Sensor

Warning: Use only genuine replacement sensors specifically for use with VESDA Sensepoint XCL. Attempting to use non-genuine sensors could result in malfunction of the product.

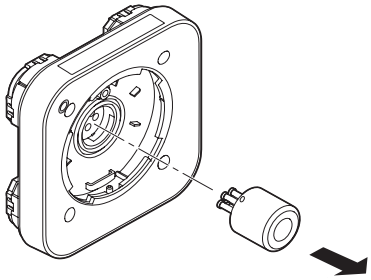
1. Disable smoke detector to prevent the transmission of potential flow fault alarm.
2. Disconnect both sampling pipes and remove the flow cap from the detector.



3. Remove the sensor cover (loosen the screw on top of the sensor cover).



4. In Sensepoint App, choose Change Sensor from Maintenance menu.
5. Pull out the gas sensor.



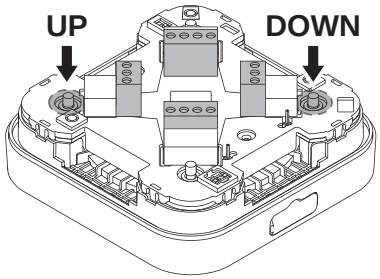
6. Insert a new sensor ensuring that the sensor pins are correctly aligned.

CAUTION:

Do not force the sensor into the socket, otherwise it may be damaged.

7. Reinsert sensor cover and flow cap and connect to the sampling pipe.
8. Enable the smoke detector.
9. Perform calibration (section “4.3 Calibration”)

To replace gas sensor using the detector buttons, remove detector module from back box. Before removing the gas sensor press and hold the UP button for 10 seconds to switch to sensor replacement mode. In this mode, the detector output is inhibited, and the sensor circuits are internally isolated.



After replacing the sensor, press and hold the UP button for 2 seconds to activate warm-up mode. In this mode, the output continues to be held in its inhibit state.

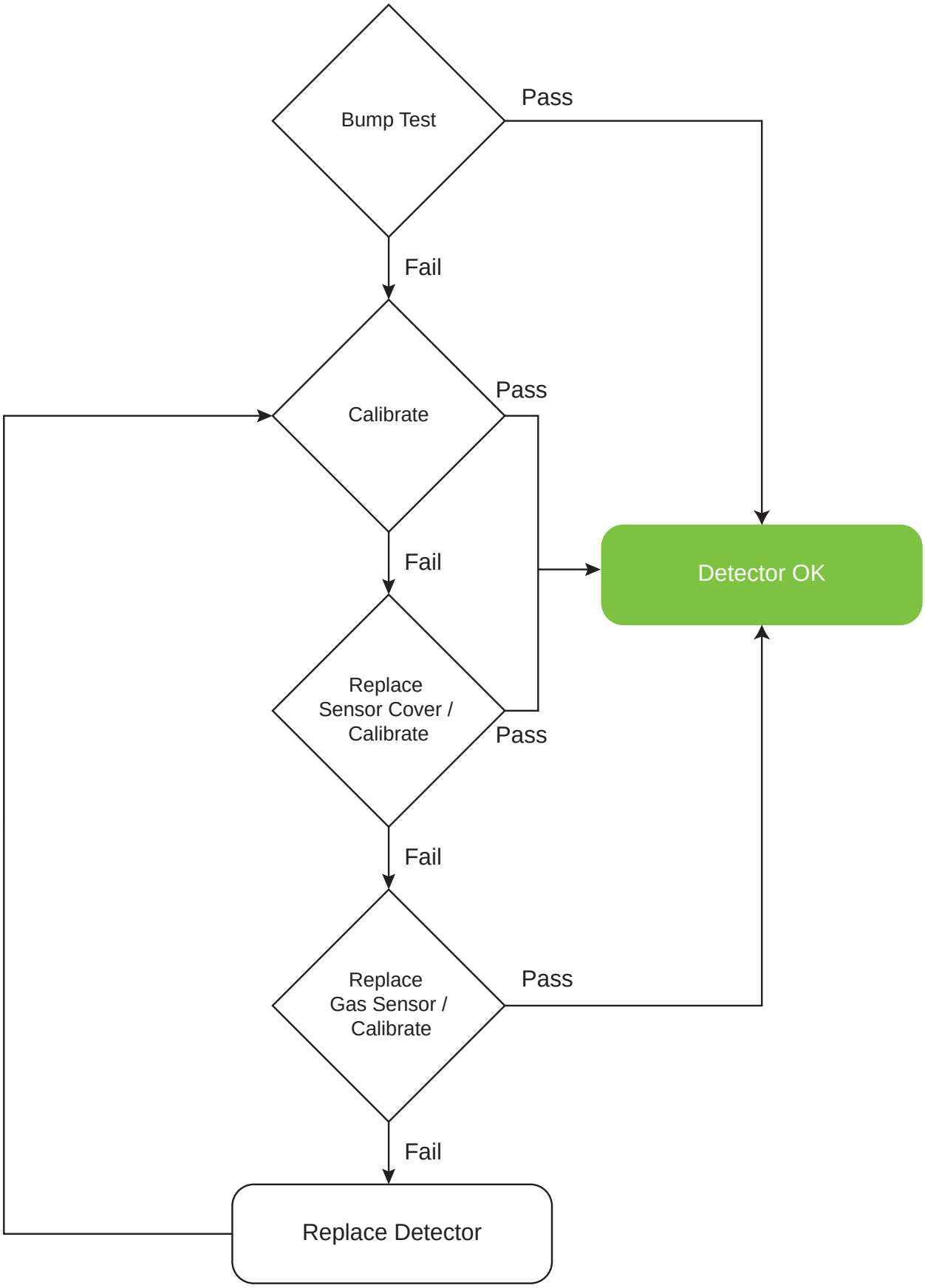
To switch to normal monitoring mode press and hold the DOWN button for 5 seconds.

4.7 Resetting Alarms and Faults

When there is latched gas alarm or faults, reset them by pressing the UP or DOWN button shortly. This will reset latched alarms and faults and initiate a self diagnostics to make sure there is no warning or fault in the detector.

4.8 Troubleshooting

The following flow chart describes the troubleshooting process of VESDA Sensepoint XCL detector during Calibration and Bump testing:



5 Sensepoint App

Use the Sensepoint App to allow your smart device to configure and maintain the VESDA Sensepoint XCL. The general procedure of using the Sensepoint App is as follows:

1. Download **Sensepoint App** from Google Play Store or Apple App Store. Install and launch the app.
2. Create and register a user account, and log on with the created account information.
3. To associate with one or more gas detectors, scan the QR code on the sheet included in the box or enter its Activation Key and Device Serial Number.
4. Complete the installation of the detectors.
5. On the app's home screen, tap **DETECTORS** to scan for available detectors.
6. Select a detector from the detector list to pair with.
7. Look for the detector whose Status Indicator is flashing blue.
8. Tap **Confirm Detector** to pair with that detector. Otherwise, tap **Return to list** to select one of the others.
9. To connect to detectors that are not added to your user account, you will need registration sheet containing the device QR code. This can also be found on a label on the rear of the electronics module.

When a Bluetooth connection is established, the detector's reading is displayed on the app interface with the gas type.

For details, how to use the Sensepoint App, refer to the Sensepoint App User Manual Doc. No. 35245.

A Appendices

A.1 Detector Parameters

Gas	Detector Type	User Selectable Range	Default Range	User Selectable Cal Gas Range	Default Cal Point	Response Time T_{90} (s) – Standalone	Resolution	Accuracy (greater of ppm or % of applied gas)
Carbon Monoxide (ppm)	XCL-LB-CO..	50 to 1000ppm	300ppm	20 to 70% of selected full scale range	100ppm	<30	1ppm	< ±2ppm or ±10%
Flammable CAT (% LEL)	XCL-LB-CH4..	20 to 100% LEL	100% LEL		50% LEL	<30	1% LEL	< ±3%LEL or ±10%
Hydrogen (ppm)	XCL-LB-H2..	1000ppm (Fixed)	1000ppm		500ppm	<120	1ppm	< ±15ppm or ±20%
Carbon Dioxide (% v/v)	XCL-LB-CO2VV..	1.0 to 5.0% v/v	5.0% v/v		2.5% v/v	<30	0.1% v/v	< ±0.2% v/v or ±20%
Carbon Dioxide (ppm)	XCL-LB-CO2PP..	1000 to 5000ppm	5000ppm		2500ppm	<30	10ppm	< ±30ppm or ±20%
Hydrogen Sulphide (ppm)	XCL-LB-H2S..	10 to 50ppm	50ppm		25ppm	<30	0.1ppm	< ±0.3ppm or ±10%
Nitrogen Dioxide (ppm)	XCL-LB-NO2..	5 to 50ppm	20ppm		5ppm	<120	0.1ppm	< ±0.2ppm or ±20%
Ammonia (ppm)	XCL-LB-NH3..	50 to 200ppm	100ppm		50ppm	<200	1ppm	< ±4ppm ±20%
Oxygen (% v/v)	XCL-LB-O2..	25.0% v/v (Fixed)	25.0% v/v		20.9% v/v	<30	0.1% v/v	< ±0.5 % v/v

Gas	Operating Temperature		Default Alarm Points & Types						LAL[1]	LDL[2]
	Min	Max	A1	Default A1 Type	A1 Options	A2	Default A2 Type	A2 Options		
Carbon Monoxide(ppm)	-20°C	50°C	30ppm	Rising	Rising/Disabled	100ppm	Rising	Rising/Disabled	5ppm	5ppm
Flammable CAT (% LEL)			20% LEL			50% LEL			5% LEL	5% LEL
Hydrogen (ppm)			200ppm			400ppm			100ppm	30ppm
Carbon Dioxide (% v/v)			0.4% v/v			0.8% v/v			0.2% v/v	0.1% v/v
Carbon Dioxide (ppm)			1500ppm			3000ppm			500ppm	300ppm
Hydrogen Sulphide (ppm)			10ppm			20ppm			1ppm	0.8ppm
Nitrogen Dioxide (ppm)			0.7ppm			2ppm			0.2ppm	0.2ppm
Ammonia (ppm)			20ppm			50ppm			5ppm	5ppm
Oxygen (% v/v)			23.5% v/v			19.5% v/v	Falling	Falling/Disabled	5.0% v/v	3.0% v/v

[1] LAL Lower Alarm Level (lowest alarm level that user can set)

[2] LDL Lower Detection Limit (lowest detectable level that device can display)

Note: Performance figures are based on the following:

- The humidity of the test gas is 50% RH. The performance values given are valid between 10% and 90% RH.
- Are measured using test units calibrated at 50% of full scale.
- Measurements are based on gas being applied at a rate of 300 ml/min for a period of 3 minutes (oxygen, flammable (CAT), carbon monoxide, hydrogen sulphide) and 5 minutes (hydrogen, nitrogen dioxide and ammonia), at a rate of 500ml/min for a period of 3 minutes (carbon dioxide).
- Response time (T_{90}) may increase when operating in lower temperature conditions.
- The accuracy for all sensors except oxygen and flammable (CAT) is ±30%. The accuracy of oxygen is ±0.9% v/v. The accuracy of the flammable (CAT) version is ±5% LEL. All figures are valid over the temperature range -20°C to 50°C.
- The flammable (CAT) and oxygen (O_2) versions may experience zero level drift in high humidity environments. Recalibrate the unit in the environment in which it is going to be used.
- Maximum accuracy of the flammable (CAT) version will be achieved after the unit has been operating for 48 hours.
- For H_2 version, it is recommended to recalibrate the detector when used in low temperature environments (< -10°C).
- Deadband range for oxygen (O_2) version is 20.6 – 21.2% v/v. Deadband is ON (default).

A.2 Troubleshooting

1. Warning

Description	Troubleshooting
Warning 1 Calibration Overdue	Calibrate the unit.
Warning 3 BLE failure (BLE version only)	Power-cycle the unit. If same warning occurs again, contact manufacturer.
Warning 4 Time/date not set (RTC not set) / RTC reset abnormally	Configure unit time. If same warning occurs again, contact manufacturer.
Warning 5 Log memory corrupted (CRC not matched)	Power-cycle the unit. Event log might be lost.
Warning 6 Certificate is corrupted or missing certificate	Contact manufacturer.
Warning 7 Over-range warning	Calibrate the unit.
Warning 8 Under-range warning	Calibrate the unit.

2. Fault

	Description	Troubleshooting
Fault 1	Internal communication failure	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 2	Cell failure	Check the sensor connection. If same fault occurs again, replace sensor.
Fault 3	Cell is producing a negative reading	Calibrate the unit.
Fault 4	EEPROM is corrupted	Reconfigure the unit by using Sensepoint App. If same fault occurs again, contact manufacturer.
Fault 5	MCU operating voltage failure	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 6	RAM read/write fault	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 7	Flash memory corrupted	Reconfigure the unit by using Sensepoint App.
Fault 8	Code memory failure	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 9	mA output failure (mA output version only)	Check whether loopback resistor is connected correctly.
Fault 10	Supplied voltage failure	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 11	Internal HW Fault	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 12	Internal SW Fault	Power-cycle the unit. If same fault occurs again, contact manufacturer.
Fault 13	Calibration Overdue	Calibrate the unit.

A.3 Ordering Information

1. Detectors

Part Number	Description
XCL-LB-CH4-RA	VESDA XCL LB CH_4 0-100%LEL 4-20mA REL
XCL-LB-CH4-RM	VESDA XCL LB CH_4 0-100%LEL MODBUS REL
XCL-LB-O2-RA	VESDA XCL LB O_2 25% V/V 4-20mA REL
XCL-LB-O2-RM	VESDA XCL LB O_2 25% V/V MODBUS REL
XCL-LB-CO-RA	VESDA XCL LB CO 300PPM 4-20mA REL
XCL-LB-CO-RM	VESDA XCL LB CO 300PPM MODBUS REL
XCL-LB-H2-RA	VESDA XCL LB H_2 1000PPM 4-20mA REL
XCL-LB-H2-RM	VESDA XCL LB H_2 1000PPM MODBUS REL
XCL-LB-H2S-RA	VESDA XCL LB H_2S 50PPM 4-20mA REL
XCL-LB-H2S-RM	VESDA XCL LB H_2S 50PPM MODBUS REL
XCL-LB-NO2-RA	VESDA XCL LB NO_2 50PPM 4-20mA REL
XCL-LB-NO2-RM	VESDA XCL LB NO_2 50PPM MODBUS REL
XCL-LB-NH3-RA	VESDA XCL LB NH_3 200PPM 4-20mA REL
XCL-LB-NH3-RM	VESDA XCL LB NH_3 200PPM MODBUS REL
XCL-LB-CO2PP-RA	VESDA XCL LB CO_2 5000PPM 4-20mA REL
XCL-LB-CO2PP-RM	VESDA XCL LB CO_2 5000PPM MODBUS REL
XCL-LB-CO2VV-RA	VESDA XCL LB CO_2 5% V/V 4-20mA REL
XCL-LB-CO2VV-RM	VESDA XCL LB CO_2 5% V/V MODBUS REL

2. Accessories

Part Number	Description
XCL-LB-CAP	VESDA XCL LB SP FLOW CAP
XCL-LB-ELB	VESDA XCL LB SP 60DEG ELB PK 4
XCL-M20-CG	VESDA XCL SP CBL GLNDS PK 10

3. Consumables

Part Number	Description
XCL-SC-O2	VESDA XCL RPL SENS O_2 25% V/V
XCL-SC-NH3	VESDA XCL RPL SENS NH_3 200PPM
XCL-SC-NO2	VESDA XCL RPL SENS NO_2 50PPM
XCL-SC-H2S	VESDA XCL RPL SENS H_2S 50PPM
XCL-XRL-SC-H2	VESDA XCL XRL RPL SENS H_2 1000PPM
XCL-XRL-SC-CO	VESDA XCL XRL RPL SENS CO 300PPM
XCL-SC-CO2VV	VESDA SP XCL RPL SENS CO_2 5% V/V
XCL-SC-CO2PP	VESDA SP XCL RPL SENS CO_2 5000PPM
XCL-SC-CH4	VESDA SP XCL RPL SENS CH_4 0-100% LEL
XCL-LB-FLT-1	VESDA XCL LB FLT CAT NH_3 CO_2 PK 10
XCL-LB-FLT-2	VESDA XCL LB FLT CO O_2 H_2S NO_2 H_2 PK 10

4. Spares

Part Number	Description
XCL-LB-COV-1	VESDA XCL LB CAT NH_3 CO_2 SENS COV
XCL-LB-COV-2	VESDA XCL LB CO O_2 H_2S NO_2 H_2 SENS COV

A.4 Warranty

Xtralis warrants the VESDA Sensepoint XCL gas detector against defective parts and workmanship.

This warranty does not cover consumable, batteries, fuses, normal wear and tear, or damage caused by accident, abuse, improper installation, unauthorized use, modification or repair, ambient environment, poisons, contaminants or abnormal operating conditions.

This warranty does not apply to sensors or components that are covered under separate warranties, or to any 3rd-party cables and components.

In no event shall Xtralis be liable for any damages or injury of any nature or kind, no matter how caused, that arise from incorrect handling or use of this equipment.

In no event shall Xtralis be liable for any equipment malfunction or damages whatsoever, including (without limitation) incidental, direct, indirect, special, and consequential damages, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss, resulting from the incorrect installation or use of this equipment.

Any claim under the Xtralis Product Warranty must be made within the warranty period and as soon as reasonably practicable after a defect is discovered. Please contact your local Xtralis Service representative to register your claim.

A.5 Safety Information for Wireless Devices

1. FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



CAUTION:

Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This device has very low levels of RF energy that it is deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated keeping the radiator at least 20 cm or more away from person's body.

2. IC Compliance

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device

3. RED Compliance

Honeywell Analytics Asia Pacific Co., Ltd. hereby declares that this gas detector, VESDA Sensepoint XCL, is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

A.6 Modbus Registers

The Modbus version of VESDA Sensepoint XCL allows interaction with the gas detector using Modbus/RTU over an RS-485 physical layer. The Modbus interface provides a means to monitor and interrogate the detector with the addition of being able to reset alarms remotely. The Modbus registers for VESDA Sensepoint XCL are given in the following table.

Note: Functions associated with the relays (if fitted) is limited to the viewing of their associated parameters. It is not possible to set or control the relays over the Modbus interface.

INCOM Register Map: Assuming that PLC base = 0

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
30001	Main SW Version of Instrument	R	u16	1	The first two numbers of SW version. For example, V2.16.1 -> 0x0210 -> 2 and 16 (last digit is omitted)	Upper Byte : Major version Lower Byte : Minor version
30002	EEP Version of Instrument	R	u8	1		
30003 to 3009	Reserved	R	u16	14		
30010	Modbus Slave ID	R	u8	1		
30011	Device Monitoring Status	R	u16	1	To check the device is monitoring the gas or not. *Do not use this for alarm/fault check.	• 1: Normal • 2: Warm up after power on • 3: Inhibit • 12: Calibration
30012 to 30013	Reserved	R	u16	2		
30014 to 30015	Active Alarm	R	u32	2	Active Alarm details	• Bit 0 Alarm 1 is active • Bit 1 Alarm 2 is active • Bit 2 Alarm 3 is active (not in use)
30016 to 30017	Latched Alarm	R	u32	2	Active latched alarm details	• Bit 0 Alarm 1 is latched • Bit 1 Alarm 2 is latched • Bit 2 Alarm 3 is latched (not in use)
30018 to 30019	Active Fault	R	u32	2	Active fault details	• Upper two bytes: fault • Lower two bytes: warning • Bit 0 to Bit 15: warning • Bit 16 to Bit 31: fault

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
30020 to 30021	Latched Fault	R	u32	2	Value is fixed to 0x00	Not used (always non-latched)
30022 to 30034	Location Tag	R	string [26]	13		Location tag for BLE scanning
30035 to 30036	Gas reading (by status)	R	f32	2	Gas reading value calculated by device status (i.g negative value in fault status) 1. If device is in Inhibit state, return value is base concentrate of sensor data (In case of ECC, Noramlly 0) 2. If device is in fault state, return value is : return = f32_gas_full_scale / 16 * (fault current value of configuration - 4.0); 3. If device is in warning state, return value is : return = f32_gas_full_scale / 16 * (warning current value of configuration - 4.0);	same as '40133 to 40134'
Holding Registers						
40101	System ID Code	R	u16	1	MSB always 0x26 to facilitate automatic identification LSB repeat of Modbus address.	• UpperByte: Type Code: 0x26 • LowerByte: My address
40102	System ID Code	R	u16	1	Identical to 40101.	• Upper Byte : Type Code : 0x26 • Lower Byte : My Address
40103 to 40104	Gas Reading	R	f32	2	The reported gas concentration in current measurement units. For example, methane at 50% LEL would be reported as 50.0 here. This concentration is forced to last reading before switching into inhibit mode during inhibit mode.	
40105	Fault and Warning ID	R	u8	1	This is the integer representation of the fault status. If any fault exists this will take a value in the range 1200 to 1999. Otherwise, if any warning exists, this will take a value in the range 1 to 999. Normally, this has the value zero.	• Fault = 1200 + Number • Warning = Number as is

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
40106	Alarm, Fault and Warning State	R	u8	1	Current device alarm, fault, warning status. The same operation as the LED on the device.	The bit assignments are as follows: • Bit 0: AL1 active • Bit 1: AL2 active • Bit 4: Warning active • Bit 6: Fault Active • All others: For future expansion
40107	Device Monitoring Status	R	u8	1	To check the device, not for sensor monitoring. *Do not use this for alarm/fault check.	• 1: Normal • 2: Warm up after power on • 3: Inhibit • 12: Calibration
40108	Heart Beat	R	u16	1	This Heartbeat is provided to facilitate detection of communications problems in programming environments where the transport layer communication error information is unavailable. This increments approximately every 5 seconds. It is the responsibility of the system integrator to notify plant personnel if a Modbus master fails to communicate with the Incom. This register can facilitate this notification.	
40109 to 40110	Calibration Due	R	f32	2	This indicates the time remaining days before the ECC sensor must be calibrated or replaced. Calibration interval - DaysPassedSinceLastSuccessfulCal	
40111	Measuring Unit	R	u8	1		• 0x00 : blank (no measurement unit) • 0x01 : %LEL • 0x02 : mA • 0x03 : mg/m3 • 0x04 : g/m3 • 0x05 : %Vol • 0x06 : ppm • 0x07 : kppm • 0x08 : LEL•m • 0x09 : A • 0x0A : dB • 0x0B : dBA • 0x0C : ppm•m
40112 to 40113	Peak Reading	R	f32	2	Gas reading peak value during sensor reading gas conc.	Peak Reading

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
40114	Relay Fitted	R	u16	1		0x00: Relay not fitted, 0x01: Relay fitted
40115	BLE Fitted	R	u16	1		0x00: BLE not fitted, 0x01: BLE fitted
40116	Reserved	R	u16	1		
40117	Temperature (°C)	R	s16	1	Transmitter temperature	
40118 to 40122	Reserved					
40123 to 40131	Date and Time	R	string[18]	9	Format is “mm/dd/yy hh:mm:ss”	
40132	Sensor Technology	R	u8	1	Sensor type only, not a specific gas type	• 0x00 :ECC • 0x01: FL CAT • 0x02: IR • 0x03: PID (not in use) • 0x04: MOS (not in use)
40133 to 40134	Gas reading (by status)	R	f32	2	Gas reading value calculated by device status (i.g negative value in fault status) 1. If device is in Inhibit state, return value is base concentrate of sensor data (In case of ECC, Noramlly 0) 2. If device is in fault state, return value is : 3. return = f32_gas_full_scale / 16 * (fault current value of configuration - 4.0); 4. If device is in warning state, return value is : return = f32_gas_full_scale / 16 * (warning current value of configuration - 4.0);	same as '30035 to 30036'
40135 to 40136	Reserved					
40137 to 40138	Microcontroller Operating Voltage	R	f32	2	Operating voltage of MCU	
40139 to 40140	Microcontroller Reference Voltage	R	f32	2	Reference voltage	
40141	BLE Connection Status	R	u8	1	Connection status with BLE module	0x00: Not connected, 0x01: Connected
40142 to 40145	Reserved					

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
40146 to 40152	Gas Name String	R	string[14]	7	String of gas name which is configured by user	
40153	Temperature (°C)	R	s16	1	Transmitter temperature, duplicate	
40154	Temperature (°F)	R	s16	1		
40155	Calibration Due	R	s16	1	This indicates the time remaining days before the ECC sensor must be calibrated or replaced. Calibration interval - DaysPassedSinceLastSuccessfulCal	
40156	Relay Status	R	u8	1		• High nibble : Relay 2 status • Low nibble : Relay 1 status • 1 : Energized, 0 : De-energized
40157 to 40158	SuppliedVoltage	R	f32	2	The voltage supplied to the device at the nominal 24.0 volt input, in millivolts.	
40159	Calibration Interval	R	u16	1	Gas calibration interval in days	
40160	Alarm type	R	u8	1	For example: If A1:rising/A2:rising -> 0x11, 0b00010001 If A1:rising/A2:falling -> 0x21 0b00100001	• High nibble : Alarm 2 Type • Low nibble : Alarm 1 Type • 0: Disable, 1: Rising, 2:Falling
40161	Reserved					
40162	Relay Configuration	R	u8	1	For example: Relay1 to Alarm 1 (01) Relay2 to Alarm 2 (10) Initial relay1 status to De-energized (0) Initial relay2 status to Energized (1) Then, the bits are 0b00101001, which is 0x29	• Bit: 0 to 1: Relay Type 1 (0: Fault, 1: Alarm1, 2: Alarm2) • Bit: 2 to 3: Relay Type 2 (0:Fault, 1: Alarm1, 2: Alarm2) • Bit: 4 : Initial Relay Status 1 (0: De-energized, 1: Energized) • Bit: 5 : Initial Relay Status 2 (0: De-energized, 1: Energized) • Bit:7 ~8: not in use
40163	Relay On Delay Time	R	u16	1	Delay between allocated trigger occuring and actual relay activation	Unit : seconds
40164	Relay Off Delay Time	R	u16	1	Delay between allocated trigger ceasing and actual relay release	Unit : seconds
40165 to 40166	User configured full scale range	R	f 32	2	Display Range (Fulls Scale)	
40167 to 40168	Alarm Threshold 1	R	f 32	2		

Modbus Register Address	Information	R/W	Type	Size	Description	Notes
40169 to 40170	Alarm Threshold 2	R	f 32	2		
40171 to 40172	Target Calibration Gas Concentration	R	f 32	2		
40173	Gas Type	R	u16	1		• 0x00: Flammable • 0x01: Toxic • 0x02: O2 • 0x03: VOC
40174 to 40175	Voltage Output	R	f 32	2	Device's voltage output value corresponding gas conc. (i.g, if gas conc. Is reached to full scale, voltage output value is 1.0)	
40176 to 40183	Device SN	R	string[16]	8		
40184 to 40188	BLE FW Version	R	string[10]	5	BLE FW Version	
40189 to 40200	Reserved					
40201	Reset Alarms & Faults	W	u16	1		
40202 to 40207	Reserved					
40208 to 40213	Raw A/D Counts	R	u16[6]	6		

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