



MERLIN GAS DETECTOR X



Installation, Operation & Maintenance

Please read this manual carefully and retain for future use.

At S&S Northern, we supply a full range of remote gas detectors including carbon monoxide (**CO**), natural gas/methane (**NG**), hydrogen (**H**), oxygen (**O₂**) and liquid petroleum gas (**LPG**) that are compatible with our range of Merlin control panels.



The information contained within this manual should be referenced for typical installation and operation only. For specific requirements that may deviate from the information in this guide – contact your supplier.

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IMPORTANT WARNING STATEMENTS

Please take the time to thoroughly read this user's guide which should be retained for future reference.

The expected lifetime of gas sensor is 3-10 years upon initial power up dependant on your target gas and environmental factors.

The device will display a message to indicate this time and should immediately be replaced.

It is recommended that this device be commissioned upon installation and serviced annually.

Do not apply lighter gas or other aerosols to the device – this will cause extreme damage.

High concentrations of alcohol found in many products may damage, deteriorate or affect the gas sensing elements.

This device is designed to detect the gas type displayed on the screen only from any source of combustion or dangerous level. It is NOT designed to detect smoke, fire or other gases and should NOT be used as such.

This device provides early warning of the presence of gas, usually before a healthy adult would experience symptoms. This early warning is possible provided your alarm is located, installed and maintained as described in this guide.

Never ignore your device when in alarm.

This device requires a continual supply of electrical power – it will not work without power.

This device should not be used to substitute proper installation, use and/or maintenance of fuel burning appliances including appropriate ventilation and exhaust systems.

This device does not prevent dangerous gasses from occurring or accumulating.

Actuation of your alarm indicates the presence of dangerous levels of gas.

Seek fresh air supply and contact your local gas emergency service should you suspect a gas leak.

This unit may not fully safeguard individuals with specific medical conditions. If in doubt, consult a doctor/physician.

Your product should reach you in perfect condition, if you suspect it is damaged, contact your supplier.

Manufacturer's Warranty

Three (3) Year Warranty: Carbon Monoxide/Liquid Petroleum/ Methane/Hydrogen Gas Detectors

One (1) Year Warranty: Oxygen Gas Detectors

Warranty coverage: The manufacturer warrants to the original consumer purchaser, that this product will be free of defects in material and workmanship for a period of three (3) years from date of purchase or one (1) years for oxygen detectors.

The manufacturer's liability hereunder is limited to replacement of the product with repaired product at the discretion of the manufacture. This warranty is void if the product has been damaged by accident, unreasonable use, neglect, tampering or other causes not arising from defects in material or workmanship. This warranty extends to the original consumer purchaser of the product only.

Warranty disclaimers: Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and intended operational purpose, are limited in duration to the above warranty period. In no event shall the manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion. This warranty does not affect your statutory rights.

Warranty Performance: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned together with proof of purchase date. The replacement product will be in warranty for the remainder of the original warranty period or for six months – whichever is the greatest.



Information on waste disposal for consumers of electrical & electronic equipment.

When this product has reached the end of its life it must be treated as Waste Electrical & Electronics Equipment (WEEE).

Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Please contact your supplier or local authority for details of recycling schemes in your area.

INSTALLATION

Planning

Our detectors should be installed in hazardous areas only at risk of gas leaks e.g. over boilers, valves or meters. Take in to account the design of the air flow patterns within the zone area.

Detectors should be installed in the correct orientation, as recommended by the manufacturer, and ease of access should be accounted for to allow for any bump tests, recalibration and other forms of maintenance.

Consider the coverage required and function of the area. Emphasis should be placed on airflow patterns and correct placement, not perceived detecting ranges. The target gas will only be identified when contact is made with the sensing element itself.

Maximum Gas Detectors Per Zone

Merlin 'S' panel range '1000S/ S+ / SW+ / 1500S / 2000S / S+ / SW+'	1
Merlin 'GDP2 & GDP4' panel range	3
Merlin 'GDP2X & GDPX+' panel range	4



Multiple detectors may be required to adequately protect property and persons!

Avoid conditions of any other environmental factors that could potentially impede the accuracy and operation of the detectors such as; condensation; vibration; temperature, pressure, the presence of other gases, electromagnetic interference and draft zones!

The device is not intended/approved for use in potentially explosive atmospheres!

Typical Location and Positioning

Locations for detectors will vary based on the intended application and target gas, they should be located near identified sources of a potential gas leaks/pockets where hazardous gas could quickly accumulate and areas of identified consequential risk.

The composition of the target gas and its density relative to air are used as the basis for the recommended height of sensors. Generally, the installation height of a sensor for a heavy gas (such as propane) would be close to the lowest point in the area, and for a light gas (such as methane) would be close to the highest point in the area.

These recommended heights may vary based on air flow and temperature conditions in addition to the proposed application and location – this is particularly apparent with oxygen depletion sensors, and the target gas that they are used for.

Target Gas

Natural Gas/Methane (NG)
Liquid Petroleum Gas (LPG)
Carbon Monoxide (CO)
Hydrogen (H)
Oxygen (O₂)

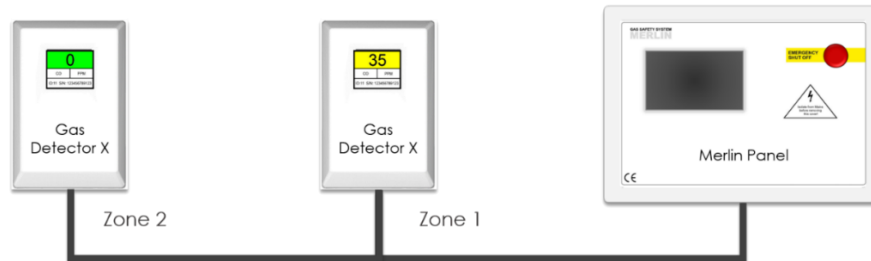
Typical Position

High Level - 300mm (1ft) from ceiling
Low Level - 300mm (1ft) from ground level
Breathing Zone - 1700mm (5ft 6") from ground level
High Level - 300mm (1ft) from ceiling
*Breathing Zone - 1000-1500mm (3 - 5ft) from ground level

* If you are installing and monitoring Oxygen depletion – consider the density of gas for its application and position the detector accordingly i.e. ground level for high density gases.

Typical Installation Arrangement

The Merlin panel should be located outside of the hazardous area that it is monitoring. Easy accessibility is required both for status observation and alarm purposes.



The Gas Detectors are designed around a centralised control panel of which the location also needs to be considered. The Merlin panel should be located outside of the hazardous area that it is monitoring. Easy accessibility is required both for status observation and alarm purposes.



*Where connections may exceed 100 metres from one control panel – Contact your supplier!
The use of sound strobes are highly recommended!*

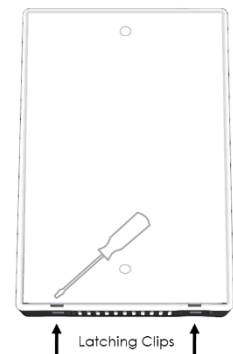
Mounting

Unpack all the parts!

Designed for surface mounting, it must be installed by a licensed, insured contractor.

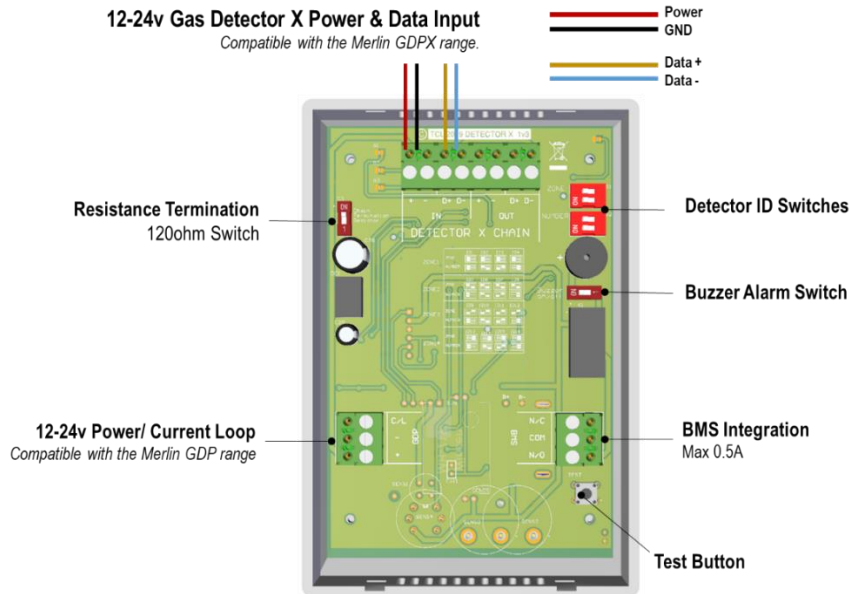
A deeper back case is supplied to accommodate wiring if required.

1. Carefully remove the rear cover from the unit by releasing the two latching clips located at the bottom of the case.
To do this – use a small flat head screwdriver.
2. Using the rear cover - mark the screw holes to the wall.
Ensure the wall surface is flat to prevent base distortion.
3. There are two pre-fractured areas for cable entry provided on the inside of the rear cover which may be cut away as required.
4. After executing the mounting and the connections – replace the rear cover ensuring the two clips are latched.
5. Make a note of the installation date on the label located on the side of the unit.



*Be careful when creating access for cables – Damage to boards will void any warranty!
Any damage attempting to remove the circuit board parts may void any warranty!
Wiring of different circuits shall be separated by means of routing, clamping or barrier!
If devices are not grounded, they can give false readings or become a safety hazard!
For MODBUS communications, a shielded cable is used!*

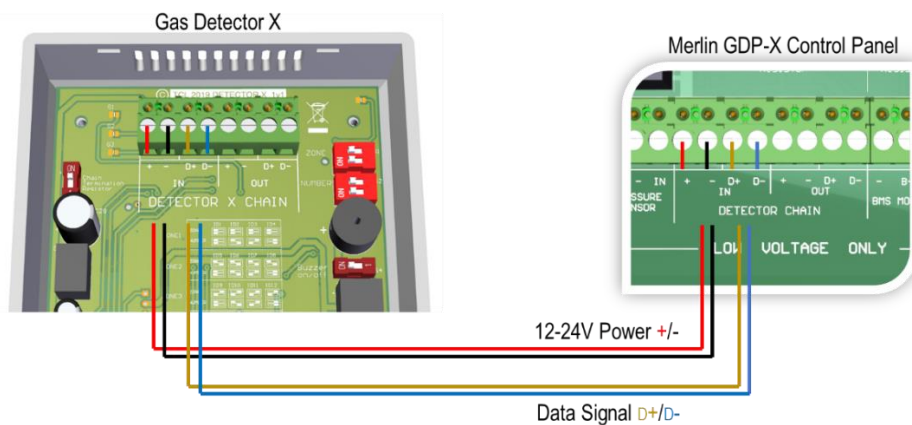
Board Connections Overview



*Wiring of different circuits shall be separated by means of routing, clamping or barrier!
 All Class 2 wiring is to be installed within flexible tubing to maintain segregation between circuits!
 If devices are not grounded, they can give false readings or become a safety hazard!
 For MODBUS communications, a shielded cable is used!*

Wiring your Detector - GDP2X or GDPX+ Panel

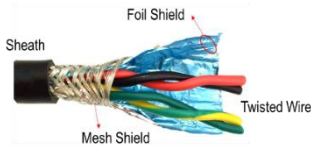
12-24VDC power and Modbus communication data cables are wired to Merlin gas detection panels – GDP2X or GDPX+. Both terminals are identified as [DETECTOR CHAIN + - D+ D-].



*If devices are not grounded, they can give false readings or become a safety hazard!
 Where connections may exceed 100 metres from one control panel – Contact your supplier!
 Ensure the termination resistance switch is turned on at each end of a chain!*

Modbus Connection

For MODBUS communication, a shielded and twisted 2 or 4 core cable is used. Any cable with similar characteristics can be used to connect all the devices together.



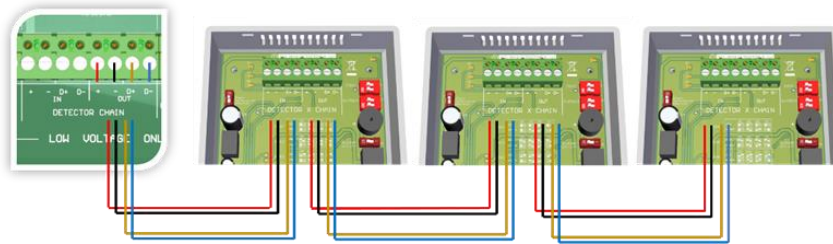
The shielding can be of 2 types: braided [mesh of thin conducting wires] or foil (consisting of a thin sheet of metal covering the twisted wires). One example of such cable is BELDEN 3082A.

If you are encountering noise or irregular problems with a bus link, the problem is likely related to grounding, incorrect shielding or wiring mains power next to Modbus wiring. To ground the data cable, the shield should be connected to [-] of the chain terminals.

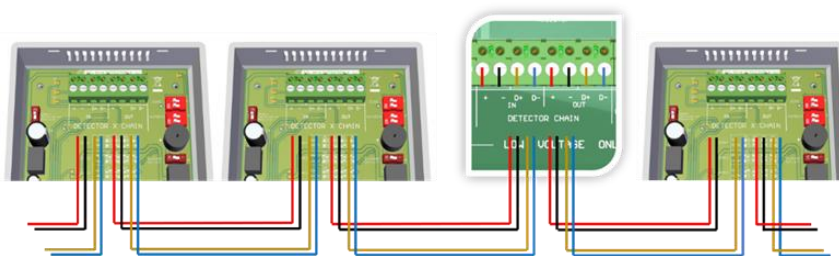
Creating a Detector Chain

Create a detector chain by connecting detectors in a parallel (daisy chain) method. Any other way may cause issues or damage to the overall system.

**Single chain example.



**Split chain example



Reversing the [D+] and [D-] connections of any device can lead to the whole system to stop working owing to reverse polarity found on the terminals. In order to avoid this problem, it is recommended that the cable of same colour should be used to connect all [D+] terminals together and similarly cable of same colour to be used to connect all [D-] terminals together.



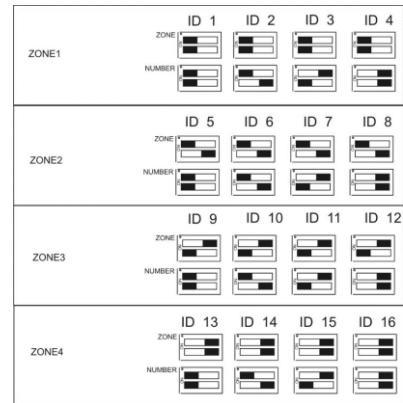
**Where connections may exceed 100 metres from one control panel – Contact your supplier!

Detector Chain ID Switches

When wiring multiple detectors in a chain it is important to identify each and every detector installed for the control panel to receive and display accurate data corresponding with the correct detector type.

The ID configuration diagram is printed onto detector boards for quick reference. All detectors are factory set to ID1.

ID Switches must be configured for each and every detector connected to receive and display accurate data!



We recommend a plan, map and/or marking the detector enclosures detailing ID and location!

120ohm Termination Resistance

Signal communication issues may occur where the bus length is too long, high baud rates are used or signal reflections are occurring.

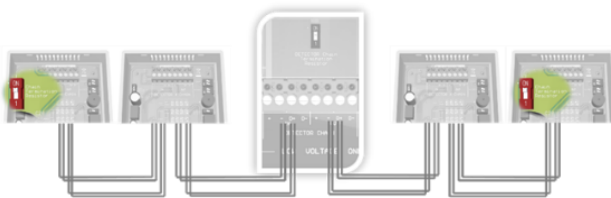
To avoid this, terminating at each end of a chain may help the quality of the data signal by turning on the 120ohm terminal resistor switch.



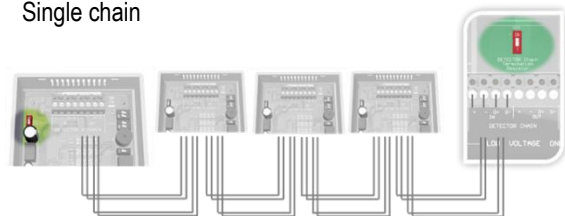
If a split chain is used, terminate the last detector in each chain.

If a single chain is used, terminate the first device (Panel) and last device (Detector).

Split chain



Single chain



Quick Circuit Test

When the test button on the detector board is pressed and held – the detector will simulate an open circuit to ensure all configured systems, outputs, alarms, indications and other external devices operate as intended in response to gas. This does not test the gas sensing element itself.

When the test button is released – the test sequence will terminate and return to normal operation.



It is recommended testing your detectors with a certified calibrated gas!

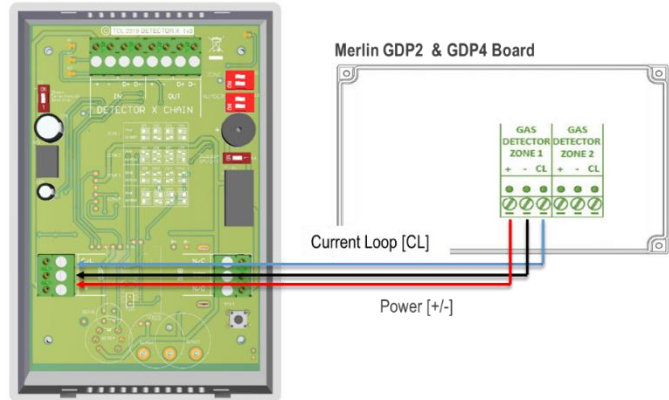
For more information refer to section: *Maintenance & Testing*.

Gas Detector Setup – GDP2 or GDP4 Panel

12-24V power supply via Power Input [+ / -] and GDP panel [GAS DETECTION ZONE] terminal.
 If you are using our ‘GDP’ range you will need to use the [C/L] terminal as an alarm relay.

This relay will change state when in alarm or when gas is detected.

BMS terminals can be used in conjunction with other external relays that affect other devices and controls such as purge fans and audible alarms etc.



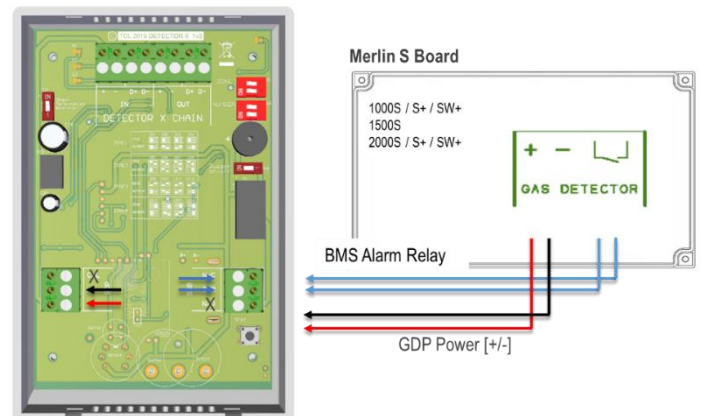
Gas Detector Setup – Merlin S Panel

12-24V power supply via terminal: GDP [+ -] and ‘S’ panel [GAS DETECTOR] terminal.
 Connections should be made to the BMS relay [COM] and [NC] and Panel open/close.

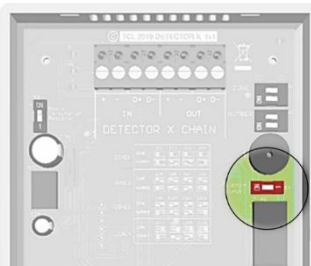
These are volt free connections to building management systems.

A relay will change state when in alarm or when gas is detected.

BMS terminals can be used in conjunction with other external relays that affect other devices and controls such as purge fans and audible alarms etc.



Audible Alarm Switch



There is a switch on the detector board [Buzzer On/Off].
 The user can choose whether to have an audible alarm when dangerous gas levels are detected.

The alarm will continuously sound – there are no provisions to silence the alarm, gas levels must drop to a safe value for the alarm to stop.

Factory Set Condition

Buzzer On/Off Switch	ON
Chain Termination Resistor	OFF
Detector ID Switches	ID 1

Quick Tips

CONNECTION

The best way to connect devices in a MODBUS RTU communication is a DAISY CHAIN method.

MAXIMUM DISTANCE

You may encounter problems when powering gas sensors beyond 100 metres from one control panel, in this instance, contact your supplier.

TERMINAL RESISTANCE

Signal communication issues may occur where the bus length is too long, high baud rates are used or signal reflections are occurring. To avoid this, terminating at each end of a chain may help the quality of the data signal by turning on the 120ohm terminal resistor switch of the last device in the chain.

GROUNDING

If you are encountering noise or irregular or abnormal problems with a Modbus link, the problem is likely related to grounding, incorrect shielding or wiring main power next to Modbus wiring.

CABLES TO USE

For MODBUS communications, a shielded and twisted pair cable is used. The shielding can be of 2 types: braided [like a mesh of thin conducting wires] or like a foil [consisting of a thin sheet of metal covering the twisted wires].

PROTECTION

High concentrations of alcohol found in many products may damage, deteriorate or affect the gas sensing elements of Detectors – such as; wine; deodorants; stain removers; thinners etc.

IDENTIFICATION

Remember to individually ID each connected detector by configuring the ID switches on the circuit board. Make a plan, map and/or note of the location of all connected detectors for tracing and locality purposes.

BUZZER ALARM

There are no provisions to silence the alarm buzzer when high gas levels are detected. Gas levels must return to safe level for the buzzer to stop. The audible buzzer is optional via a switch on the circuit board.

Specification

Product:	Gas Detector X		
Model:	CO / NG / LPG / H / O2		
Visual Indicators	Green, Yellow & Red Visual Reading Indication Gas Level / Measuring Value / Detector ID No / Detector Serial No End of Life / Sensor Fault / Service		
Display	1.8" TFT – Thin Film Transistor		
Screen Brightness	Non- adjustable		
Initial Stabilisation Time	60 Seconds approx.		
Power Input Voltage	12-24V / 7-30VDC		
Relay Output	0.5A Switching Current (resistive load).		
Consumption	90mA Max (24V)		
Accuracy @ 25°C / 77°F	± 10%		
Fuses	N/A		
Operating Temp	0 – 50°C 30-80% RH Non-Condensing		
Intended Use	Indoor / Non-Hazardous Area		
Ingress Protection	IP40		
Audible Alarm Buzzer (dB)	65 dB (300mm distance in quiet conditions)		
EOL Battery	CR2032 - 3V 220mA Radial Lithium		
Wire ratings	18AWG min / Copper		
Test & Calibration Conditions	25° ±5°C / 77° ±41°F 40-70% RH		
Calibrated to: (±10%)	CO: 120ppm NG: 0.5% BV Methane LPG: 0.2% BV Propane O2: Fresh Air H: 4000ppm		
Gas Sensor Type	NG: Semi-conductor	Measuring Range	NG: 300-10,000 PPM
	LPG: Semi-conductor		LPG: 300-10,000 PPM
	H: Semi-conductor		H: 100-10,000 PPM
	CO: Electro-Chemical		CO: 10-10,000 PPM
	O2: Electro-Chemical		O2: 0-30%
Gas Level Pre- Alarm	NG: 8% LEL	Gas Level Alarm	NG: 10% LEL
	LPG: 8% LEL		LPG: 10% LEL
	H: 8% LEL		H: 10% LEL
	CO: 20 PPM		CO: 20 PPM @ 2 HOURS
	O2: 18.5 – 19.5%		50 PPM @ 1 HOUR
			100 PPM @ 10 MINS
Expected Sensor Life	NG: 10 Years		300 PPM @ 1 MINS
	LPG: 10 Years		O2: < 18.5% / >23%
	H: 10 Years		
	CO: 5 Years		
	O2: 3 Years		
Dimensions (H x W x D)	140 x 95 x 30mm / 5.51 x 3.74 x 1.18"		
EEE Weight	0.05Kg		
Compliance Approval	2014/30/EU EMC Directive 2014/35/EU LVD Directive 2011/65/EU RoHS Directive		

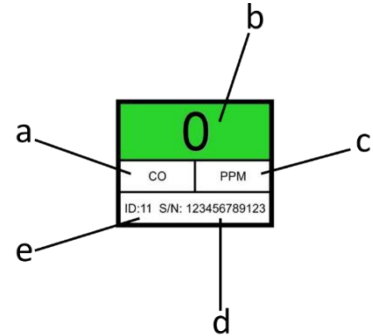
OPERATION

First Power Up

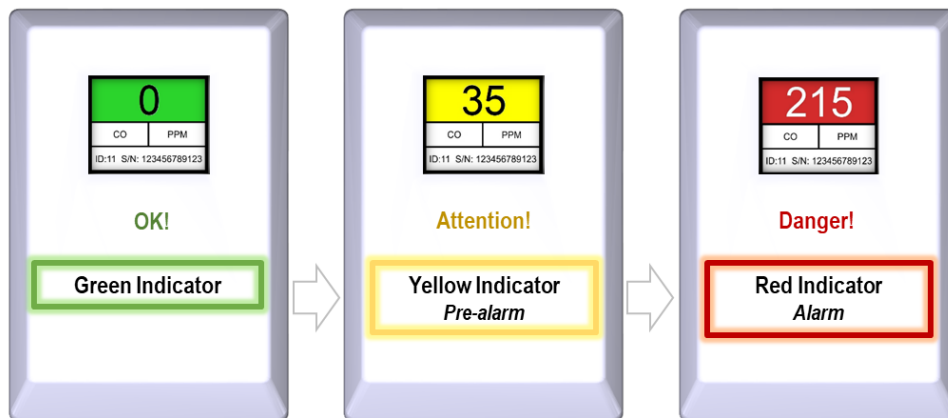
On connecting power, the detector enters 'sensor stabilisation' phase for approximately 60 seconds – during this period the screen will display an 'initialisation' message indicating that the device is not yet ready for gas detection.

After the sensor has stabilised – the screen will display;

- a. Target gas.
- b. Target gas concentration.
- c. Target gas Measurement (parts per million or % LEL).
- d. Unique detector serial number.
- e. Configured ID number.



Gas Level Indication



Gas Alarm Levels

GAS

Hydrogen Gas (H)
 Methane/Natural Gas (NG)
 Liquid Petroleum Gas (LPG)
 Oxygen (O₂)

PRE-ALARM State

> 8% LEL
 > 8% LEL
 > 8% LEL
 18.5 – 23%

ALARM State

> 10% LEL
 > 10% LEL
 > 10% LEL
 < 18.5% & >23%

Carbon Monoxide (CO)

20 PPM

Two (2) hours @ 20ppm
 One (1) hour @ 50ppm
 Ten (10) minutes @ 100ppm
 One (1) minute @ 300ppm



At dangerous gas levels, the alarm will continuously sound if the buzzer dip-switch is on!
 There are no provisions to silence the alarm buzzer when high gas levels are reached!
 Only when gas levels are at a safe level will the audible alarm stop!

MAINTENANCE & TESTING

Cleaning

Keep your gas detector in good working order - follow these basic principles;

- Remove any dust/debris from the outer enclosure regularly using a slightly damp cloth.
- Never use detergents or solvents to clean your device.
- Never spray air fresheners, hair spray, paint or other aerosols near the device.
- Never paint the device. Paint will seal vents and interfere with the device.



High concentrations of alcohol found in many products may damage, deteriorate or affect the gas sensing elements – such as; wine; deodorants; stain removers; thinners!



Other gases and substances to avoid; Corrosives (i.e. chlorine & hydrogen chloride); Alkali metals; Basic or acidic compounds; Silicones; Tetraethyl lead; Halogens and halogenated compounds!

Service



A service screen will intermittently flash every 30 seconds after one year of service.

The detector will still operate as intended during this time.

Contact your supplier immediately.

Manual Operation Test

When the test button on the detector board is pressed and held – the detector will simulate an open circuit to ensure all configured systems, outputs, alarms, indications and other external devices operate as intended in response to gas. This does not test the gas sensing element itself.

When the test button is released – the test sequence will terminate and return to normal operation.



It is recommended testing your detectors with a certified calibrated gas!

End of Life (EOL)



This message indicates that the detector has reached its expected operational lifecycle. No gas levels will be displayed. Contact your supplier and replace the unit immediately.



The expected lifecycle is approximate from the first operation and power is continuously supplied.

The expected lifecycle will depend on the type of gas your detector is targeting and may vary depending on environmental conditions!

Gas Testing Overview

A detector may visually appear in good order, but its sensitivity can be inhibited by external factors such as dust; humidity; temperature fluctuations; cleaning products; contaminants or sensor drift (ageing). All can cause a decline in sensitivity and eventual failure.

Regular 'bump' tests are important to make sure a device is able to detect a release of gas as early as possible. We recommend that gas tests are carried out at least annually from the date of installation, however the frequency should be determined following a risk assessment by the end user and in accordance with any applicable law/code.

The aim of the bump test is to make sure a gas detector is working at its optimum by briefly exposing the unit to a known concentration of the target gas. If the detector goes into alarm and all system outputs/relays activate, then it is working safely.

If the system fails to operate as intended in an alarm state, the gas detector must not be used until a full inspection and service has been conducted.

For more information on this, contact us.

Gas Sensor Types & Reaction Times

The time for gas sensors to react to their target gas will vary dependant on the type of gas detector/gas sensing element. You should always refer to the appropriate specification for information including sensor type and alarm levels i.e. electro-mechanical sensors (such as Carbon Monoxide) will react to its target gas slower than semi-conducting sensor types (such as methane, LPG and Hydrogen).

Gas Testing Kits

S&S provide a range of test gas kits traceable to appropriate standards and usually consist of:

- Certified gas cylinder
- Flow control regulator
- Tube pipe & applicator cone



All certified test gases are classified as non-flammable and non-toxic, however, they do contain gas under pressure and may explode if heated to extreme temperatures and cause asphyxiation in high concentrations.

Test Gas Storage & Handling

All test gases are classified as non-flammable and non-toxic, however, they do contain gas under pressure and may explode if heated to extreme temperatures and cause asphyxiation in high concentrations.

- Cylinders should be stored in a vertical position secured to prevent them falling over.
- Keep away from all sources of ignition.
- Store in well ventilated areas.
- Do not lift single cylinders by the valve device unless they are designed for that purpose.
- Ensure valve/regulators are screwed and secured tight.
- Always remove the regulator/valve after use and at the end of each working day.
- Do not remove or deface cylinder labels.

Use all equipment in accordance with the Safety Data Sheet - available on request.

Gas Testing Procedure

Recommended** gas concentrations for testing your detector.

CO - Carbon Monoxide	400-500ppm balance in air.
NG - Methane	6000-8000ppm balance in air (0.6%-0.8% BV)
LPG - Liquid Petroleum Gas	3000-4000ppm balance in air (0.3%-0.4% BV)
H - Hydrogen	5000-6000ppm balance in air (0.5%-0.6% BV)
O ₂ - Oxygen	15% balance in Nitrogen

**Reference should always be given to any applicable national/ local law and industry codes.



GAS TEST PROCEDURE

1. Ensure you have the correct gas for the device type prior to application.
2. Screw the regulator/valve into the gas cylinder outlet.
3. Once sealed, the regulator pressure gauge (if available) will indicate cylinder pressure.
4. Offer up the applicator hose/cone and apply to the top vents of the device.
5. Open the valve/regulator to allow the gas to be delivered at a pre-set flow rate.
6. Apply gas.
7. The device will enter alarm status after a short period of time.
8. The device will activate all configured outputs/relays.

At this point...

9. Remove applicator hose/ cone and turn the gas cylinder regulator/valve off.
10. Wait for the device to return to normal.
11. Test complete.
12. Record your test details. (There is a provision for this in control panel manuals).

End.



Always remove the regulator/valve after use!

All cylinders will re-seal upon removal of the regulator/valve!

QUICK TIPS

To increase reaction time, cover the escape vents at the top of the device.

Alternatively, enclose the device and apply gas i.e. in an air tight bag or container.

Always give at least five (5) minutes between testing the same unit.

If in doubt, contact your supplier.

Installation Details

Please pass this manual to the system owner / user.

Date of Installation:	
Installation Location:	
Organisation:	
Stamp/Signature of the installer:	
Replacement Date:	

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