GASGUARD

ELECTROCHEMICAL DETECTOR UNITS

User Manual

Version: 7, August 2017

User Manual Part #: 177378

Designed and manufactured in Australia by Ampcontrol Pty Ltd

WARNING!

The **warning** symbol highlights a potential risk of **injury or death**.

Please share these warnings with other operators.

CAUTION!

The **caution** symbol highlights a potential risk of **damage to equipment**.

Please share these cautions with other operators.

NOTE

The **note** symbol highlights **key information**.

Please share these notes with other operators.

ENVIRO

The **enviro** (environmental) symbol highlights areas which may have an impact on the surrounding **fauna and/or flora**.

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Before You Begin

Thank you for purchasing from the Ampcontrol GasGuard range.

WARNING!

In the interests of **safety and correct equipment operation**, please take the time to read and understand the content in this manual.

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DEFINITIONS

Term	Definition
Detector	Complete apparatus purchased by end user comprised of a sensor head and amplifier PCB in a stainless steel enclosure that detects gas and converts to a 4-20mA signal as well as displays a reading on the LCD screen
Sensor head	The assembly attached to the bottom of the detector which houses the sensor cell
Sensor cell	The device that senses a particular gas type through a chemical reaction and converts to a small amount of electrical energy
Amplifier PCB	The PCB inside the detector that amplifies the sensor cell signal into a usable 4-20mA loop
CO	Carbon Monoxide
H_2S	Hydrogen Sulphide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
O_2	Oxygen
NATA	National Association of Testing Authorities, Australia

1 SAFETY AND OTHER WARNINGS

For safety reasons, the GasGuard detectors must be installed, operated and serviced only by competent personnel. Please read and understand this instruction manual completely before installing, operating or servicing this equipment. Failure to install or operate these instruments in accordance with the instructions contained in this manual may create hazardous operating conditions.

1.1 Safe Use of Equipment

The equipment supplied has been designed and manufactured to ensure safe operation. The equipment must only be used within the design parameters.
The instructions within this manual must be observed as an aid towards achieving the safest possible installation.

Persons responsible for installation, maintenance, or operation, must observe the following instructions:

1.1.1 Changes to Equipment

Changes in the design and modifications to the equipment are not permitted. Unauthorised changes made to the hardware or operating firmware will void the manufacturer's warranty, and may compromise the integrity of the system into which it is installed and other connected equipment.

1.1.2 Equipment Knowledge

Experience with, or understanding of, this equipment is essential for the safe installation and removal of the equipment. Therefore, please read and understand this manual prior to use. Competency based training courses are recommended and are available on request.

1.1.3 Manual Handling

Precautions have been taken to ensure all equipment is safe to handle and free from sharp edges. However, care should always be taken when handling enclosures and gloves should be worn.

1.1.4 Installation

Correct operation and safety depend on the GasGuard detector and associated equipment being installed correctly. Mechanical and/or electrical installation and maintenance of plant and equipment must only be carried out by appropriately qualified personnel and must be tested thoroughly prior to operation.

1.1.5 Operation

As safety depends on the GasGuard detector functioning correctly it is highly recommended that all safety functions of the product be periodically tested to ensure correct operation.

2 RECEIVING AND STORAGE

2.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment; however, before accepting delivery, check all items against the packing list or bill of loading. If there is evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol immediately in the case of any discrepancies to the packing list. Keep a record of any claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, retain and store any approval documentation for your safety file as applicable prior to wrapping being discarded.

2.2 Inspection

Equipment that is found to be damaged or has been modified away from its published specifications must not be used. Please contact Ampcontrol if the equipment is suspected to be different than that ordered or if it does not match the published specifications.

2.3 Storage after Delivery

When the equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors between 3-20˚C, preferably on shelves and protected from moisture and sunlight.

2.4 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

CAUTION!

Take care when unpacking crates as the **contents may have shifted during transport**.

ENVIRO

The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water.

Ensure that any timber and cardboard used as **packaging is disposed of in a safe and environmentally responsible manner**.

Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.

3 PRODUCT OVERVIEW

Ampcontrol's GasGuard detector range is supplied complete with an amplifier and a Liquid Crystal Display.
The Transmitter/Sensor assembly is an IEC Ex ia Group I certified assembly. The Certification is based on the unit being sealed to IP66 in a stainless steel enclosure and the appropriate checks being made on the Intrinsically Safe Parameters of the overall system the transmitter is connected into.
The Transmitter and Sensor is mounted as an integral device. The sensor is designed to provide a standardised output applicable for the gas range. This signal is not for direct connection to other devices and so the amplifier PCB in the transmitter housing is used to condition the signal, provide calibration functions and produce a 4-20mA signal.
The transmitter and amplifier assembly is configured in the factory for a specific gas range.

Key Features

- Economical Fixed Gas Sensor / Transmitter
- Rugged Construction
- Reliable
- Certified Intrinsically Safe – Ex ia
- LCD Display
- Non-Intrusive Closed Case Calibration

This document covers the electrochemical range of GasGuard detectors. The GasGuard range of detectors consists of electrochemical, catalytic and infrared sensor types and each provides a linear 4-20mA DC current output. The full range consists of:
Electrochemical:

- Oxygen (O_2)
- Carbon Monoxide (CO)
- Hydrogen Sulphide (H_2S)
- Nitric Oxide (NO)
- Nitrogen Dioxide (NO_2)

Catalytic:

- Methane (CH_4)

Infrared:

- Carbon Dioxide (CO_2)

The sensor unit part numbers are unique and are identified in accordance with the following scheme:
Model Number 65-6550XXX series is for electrochemical detector units.
Model Number 65-6551XXX series is for catalytic detector units.
Model Number 65-6552XXX series is for Infrared sensor units.

Where XXX represents the chemical symbols for the gas detected by the unit. For example, 65-6550O2 is the Model number for an electrochemical unit designed to detect Oxygen (O_2).

3.1 Sensors

3.1.1 Toxic Gas Sensors

Electrochemical toxic-gas sensor cells operate on a principle similar to that of a battery. The gas coming in contact with small electrodes at the surface of the sensor cell causes the sensor to generate a small electrical current. The type of gas and its concentration at the sensor surface determines the electrical output of the sensor.
The three-electrode toxic-gas sensor consists of a sensing electrode, a counter electrode and a reference electrode separated by a thin layer of electrolyte. The central feature of the toxic-gas sensor is the gaseous diffusion barrier. This limits the flow of gas to the sensing electrode and ensures that the electrochemical activity of the electrode exceeds the amount of gas with which it has to deal.
Gas diffusing to the sensing electrode reacts at the surface of the electrode either by oxidation or by reduction, depending on the gas the sensor cell is designed to detect. Electrode materials, specially developed and designed for the intended gas, catalyse reactions.

3.1.2 Oxygen Sensor

The Oxygen Sensor is a two-electrode device. Oxygen passes through a permeable membrane and reacts with the electrolyte. An output voltage is then developed which is directly proportional to the partial pressure of the oxygen.

3.1.3 Sensor Cell Cross Sensitivity

The cross sensitivity of the various sensor cells to commonly occurring gases are listed in the tables below.
The Oxygen sensor cell is slightly cross sensitive with CO_2 (Carbon Dioxide), the presence of CO_2 creates an offset in the oxygen sensor reading depending on the CO_2 concentration.
For the Carbon Monoxide (CO) Sensor Cell, the cross-sensitivity to other gases such as Hydrogen Sulphide (H_2S) is significantly reduced by use of a filter, which is part of the sensor cell. In normal use the filter is designed to outlast the sensor cell; however, it is not capable of withstanding continuous high levels, such as 100ppm, or more of interfering gases.

Cross-sensitivity Data

Table 1: Oxygen cross-sensitivity

CO_2 CONCENTRATION	OXYGEN SENSOR OFFSET
5%	2.2%
10%	3.5%

Table 2: Carbon Monoxide cross-sensitivity

Carbon Monoxide		
Gas	**Concentration**	**Reading (ppm)**
Ammonia	20ppm	<0.1
Ehtylene	400ppm	<65
Hydrogen	400ppm	<65
Hydrogen Sulphide	20ppm	<0.1
Nitrogen Dioxide	10ppm	<0.1
Nitrogen Oxide	100ppm	<25
Sulphur Dioxide	20ppm	<0.1

Table 3: Hydrogen Sulphide cross-sensitivity

Hydrogen Sulphide		
Gas	**Concentration**	**Reading (ppm)**
Nitrogen Dioxide	10ppm	<-30
Chlorine	10ppm	<-25
Nitric Oxide	50ppm	<35
Sulphur Dioxide	20ppm	<18
Carbon Monoxide	400ppm	<3
Hydrogen	400ppm	<0.5
Ethylene	400ppm	<0.5
Ammonia	400ppm	<0.1
Carbon Dioxide	5%vol	<0.1

Table 4: Nitric Oxide cross-sensitivity

Nitric Oxide		
Gas	**Concentration**	**Reading (ppm)**
Hydrogen Sulphide	20ppm	<60
Nitrogen Dioxide	10ppm	<5
Chlorine	10ppm	<5
Sulphur Dioxide	20ppm	<4
Hydrogen	400ppm	<0.1
Carbon Monoxide	400ppm	<0.1
Ammonia	20ppm	<0.1
Carbon Dioxide	5%vol	<0.1

Table 5: Nitrogen Dioxide cross-sensitivity

Nitrogen Dioxide		
Gas	**Concentration**	**Reading (ppm)**
Hydrogen Sulphide	20ppm	-100
Nitric Oxide	50ppm	<0.5
Chlorine	10ppm	100
Sulphur Dioxide	20ppm	<-2
Carbon Monoxide	400ppm	<0.1
Hydrogen	400ppm	<0.1
Ethylene	400ppm	<0.1
Ammonia	20ppm	<0.1
Carbon Dioxide	5%vol	0

3.1.4 Humidity

Sensors can operate in a condensing atmosphere. In such an environment, a thin film of water can form across the membrane, effectively sealing it and stopping the passage of gas into the sensor. On evaporation of this water the sensor usually resumes normal operation. Sensors cannot operate continuously below 15% R.H. (relative humidity) because the electrolyte dehydrates. Above 90% R.H. the sensor absorbs excess water vapour and after some time, may appear to leak. Provided the exposure to these extremes of humidity has not been for a long period, the sensors can recover when exposed to R.H. in the range 15% to 90%.

3.1.5 Pressure Effects

The toxic-gas sensors do not exhibit a permanent response to changes of pressure. However, when exposed to sudden pressure changes in the presence of a measured gas they give a peak output that decays after a few seconds. The oxygen sensor reacts to pressure changes. It responds to pressure on a directly proportional basis and therefore, should not be exposed to varying pressures.

3.1.6 Operational Restrictions

For proper operation, toxic-gas sensors require a small supply of oxygen to the counter and reference electrodes to allow correct operation. The oxygen is normally provided in the sample stream by air diffusing to the front of the sensor or by diffusion through the sides and rear of the sensor. A few thousand PPM of oxygen is normally sufficient. Continuous exposure to an anaerobic sample gas may cause the sensor to malfunction in spite of the rear oxygen access paths. Because of the need for some oxygen access, sensors should not be totally immersed in an anaerobic gas mixture. Since calibration normally involves exposing the sensor to gas for a relatively short period, the calibration gas need not contain oxygen. Sufficient oxygen is supplied from ambient air through the side and back access paths for a limited time.

3.1.7 Poisoning of Sensors (Contamination)

High levels of or long exposure to certain compounds may poison the catalytically active detector filament thereby reducing or destroying its sensitivity.
Among these compounds are halides, sulphur compounds, leaded petrol, silanes, silicates and other products with silicon. Products such as aerosol sprays, polishes, waxes and lubricants with silicones and non-catalysed silicone rubbers such as “silastic”, phosphate esters, and hydraulic fluids – will all damage catalytic sensors.

3.2 Amplifier PCB

The amplifier is designed as a 2-wire, remote transmitting amplifier circuit for connection between a Carbon Monoxide sensor cell, Hydrogen Sulphide sensor cell or oxygen sensor cell and the external indicating equipment.
The amplifier electronics are powered from the 4-20mA loop current and amplifies the current generated by the sensor cell when gas is detected.

3.3 Stainless Steel Enclosures

The standard stainless steel housing, (shown in Figure 1.1, Page 1), incorporates the sensor cell and amplifier PCB. The housing is robust and is corrosion resistant. It is suitable for almost all applications and provides for easy installation and maintenance. When properly used it gives many years of efficient operation.

3.4 Sensor Wiring Assembly

3.4.1 Connections

Electrical connections for the various sensor cells are by means of connector pins on the top surface of the sensor cells. A sensor wiring assembly provides the electrical interface between the sensor cell and the Amplifier PCB. The sensor cell plugs into the Connector Board on the sensor wiring assembly and the wiring harness connects to the amplifier PCB (connector J6).
A second wiring assembly connects the supply and signal connections from the incoming terminals to the amplifier PCB (connector J7).

NOTE	
	Sensor and Transmitter assemblies are matched together and cannot be replaced or interchanged by unauthorised personnel. Connection of any other type of sensor head will render the unit non-operational.

3.4.2 Anti-Vibration Clip

An Anti-Vibration clip Pt/No. 121647 is fitted to the sensor and power connectors on the rear of the Amplifier PCB.

Figure 3.1: Anti-vibration clip

4 PRODUCT OPERATION

The user interface for the Sensor / Transmitter is shown in Figure 4.1, with the numbered items being explained in Table 6.

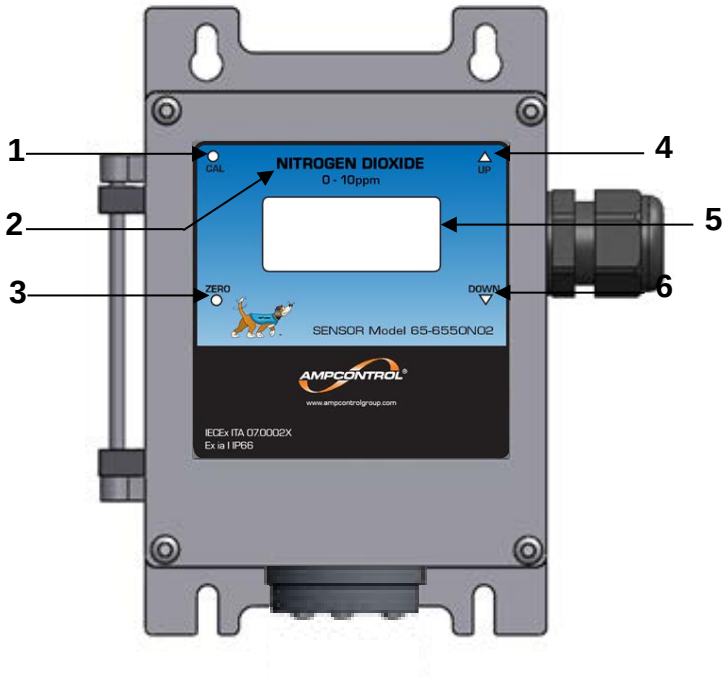

Figure 4.1: Sensor / Transmitter User Interface

Table 6: Sensor / Transmitter User Interface Descriptors

Item	Name	Function
1	CAL	Button operated using the magnetic calibration tool
2	Sensor Type	Label displaying Sensor Type
3	ZERO	Button operated using the magnetic calibration tool
4	UP	Button operated using the magnetic calibration tool
5	Screen	Used to display the detected gas level or display codes (see Table 1)
6	DOWN	Button operated using the magnetic calibration tool

Table 7: GasGuard Display Codes

Display	Description
-777	There is no sensor plugged into the amplifier
-999	Amplifier needs reconfiguration
Er	Error has occurred
CAL	Calibration mode initiated (display blinks when in calibration mode)
SAU	Calibration settings have been saved
PU	Power Up

5 INSTALLATION

5.1 General Warnings

These instructions have been designed to assist users of the GasGuard detector range with installation.

Before a GasGuard detector can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the detector or the system into which it is installed.

Along with relevant competence, and an understanding of the target application, the following points should be considered:

5.1.1 Ensure that the information provided in this user manual is fully understood.

It is extremely important that the limitations and functionality of the GasGuard detectors are understood to prevent incorrect installation and use from creating a potentially dangerous risk. If in doubt as to the nature of the limitations or their implication, consult a competent authority such as a supervisor or Ampcontrol technical representative.

5.1.2 Ensure that the application into which the GasGuard detector is being installed has been properly defined, designed and approved.

Any system intended to mitigate the risk of injury needs to be properly designed and implemented. Such a system must be the result of structured risk analysis with the outcomes used to define the system requirements. These requirements, in turn, will guide the choice of instrumentation, logic solvers and actuators needed to implement the system. Understanding the needs of the system will ensure proper selection of equipment.

5.1.3 Ensure that the GasGuard detector will properly perform the required functions within the system design.

It is important to understand how a GasGuard detector is intended to interact with other equipment within a system. For safe and reliable use, it is crucial that neither the detector logical operation nor its signalling be compromised by incompatibilities with connected equipment.

5.1.4 Modifications of any form to the GasGuard detector are prohibited.

The GasGuard detector as supplied has been designed and manufactured to comply with the requirements of protection standards. If modifications of any form are made to the detector, the equipment may no longer be fit for use. If any modifications or damage to the detector is evident, do not use the equipment and contact Ampcontrol for advice.

5.2 Mandatory Installation Practices

The following information must be adhered to when installing any GasGuard detector. Failure to adhere to this information may give rise to unsafe operation.

Using the detector in a manner that exceeds its electrical, functional or physical specifications, or in a way that is contrary to its operating restrictions, may create risks to personnel and/or equipment resulting in injury or death.

- All GasGuard detectors must be powered within the specified voltage range.
- The installation of all GasGuard detectors must be carried out by suitably trained and qualified personnel.
- Identification labels fixed to all GasGuard detectors must not be damaged, removed or covered before, during or after installation.
- The installation is to be in accordance with the relevant installation Standards/Codes of Practice.

- Modifications must not be made to any part of any GasGuard detectors. As supplied, the unit is built to, and complies with the relevant standards. Modifications to its construction will render the unit non-compliant.
- Complete and accurate records of the installation must be kept as part of the site installation.

5.3 Installation Guidelines

5.3.1 Mounting Location

To ensure continued reliable operation of the sensor system, the following should be considered when mounting the unit:

- Select a suitable central location for mounting with good access. The location should be as clean and dry as practicable and at a temperature as close to 20°C as practicable.
- Mount the sensor unit in a position that reduces the risk of mechanical damage.
- Mounting should be to a vertical surface, pointing downwards, allowing for easy wiring access and subsequent servicing.
- It is essential that the sensor be positioned to take into account the expected flow of the gas to be measured.
- Allow sufficient space under the sensor for fitting of calibration cups or accessories.
- Ensure to account for the relative density to air of the gas that is being detected.

5.3.2 Relative Density of Gas Type

The relative density or buoyancy of the gas or vapour with respect to air determines its propensity to rise or fall when released into the atmosphere.
Gases or vapours with buoyancy less than air will tend to rise from the source of release.
Conversely, gases or vapours heavier than air will tend to fall and accumulate in concentrations over long periods of time. Normal air movements in and around such gas concentrations will have the inevitable effect of producing zones of highly toxic mixtures.
This knowledge of the characteristics of the gas assists when determining the location of the gas sensor. See Table 8 for gas density values.
For monitoring of heavier-than-air gases, mount the sensor as close as practical to the floor or ground.
For monitoring of lighter than air gases, install the sensor unit as high as practical.
The services of a Risk Assessment Engineer or specialist should be used if additional assistance is required in selecting the position of, or the number of sensors required for the application.

Table 8: Gas Density Relative to Air

Gas	Density
Hydrogen	Lighter than Air
Ammonia	
Methane	
Carbon Monoxide	
Carbon Dioxide	Heavier than Air
Nitric Oxide	
Oxygen	
Hydrogen Sulphide	
Chlorine	

5.4 Mechanical Installation Information

5.4.1 Enclosure Dimensions

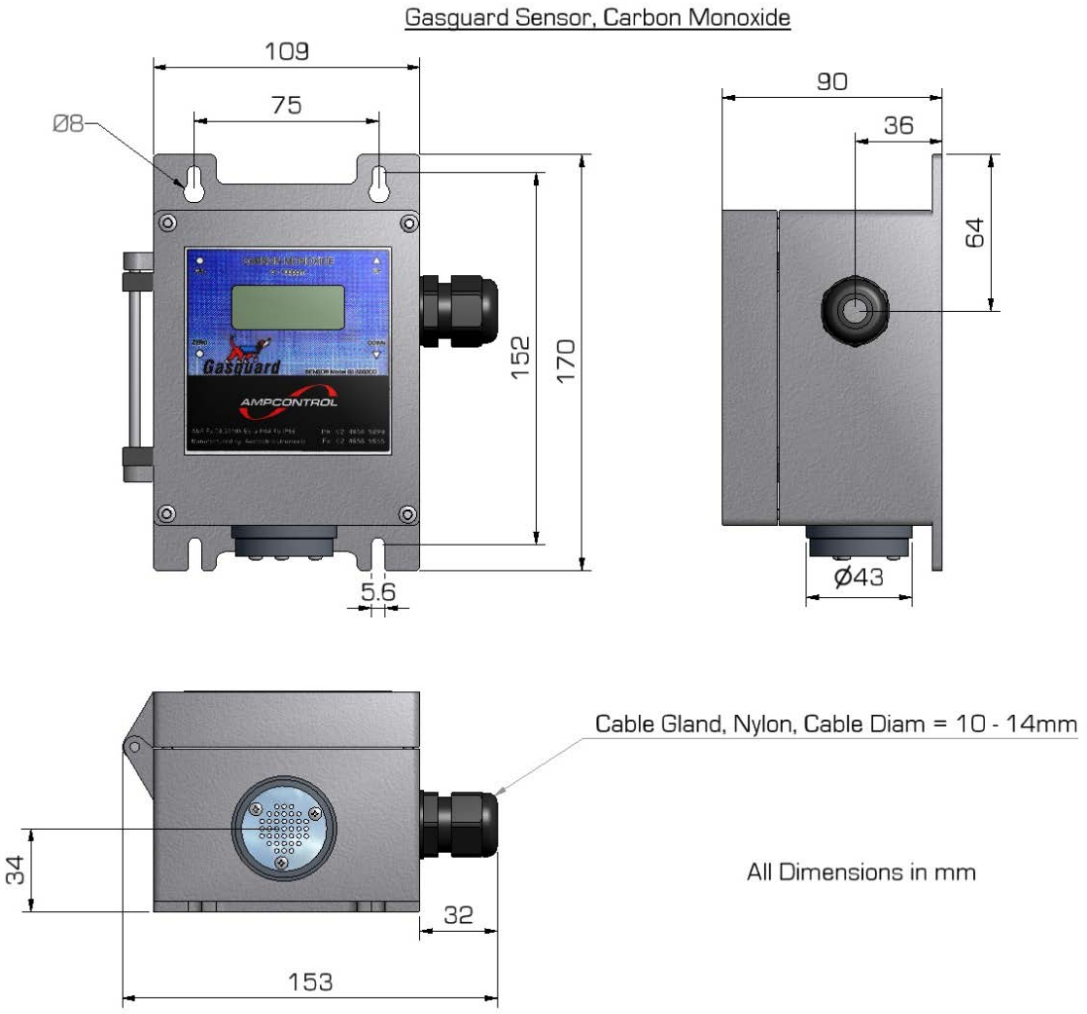

Figure 5.1: Electrochemical detector dimensions

5.4.2 Mounting Arrangements

All GasGuard detectors are panel mounted units. See Figure 5.1 for hole centre locations.

5.4.3 Terminal Layout

The connection terminals for GasGuard detectors are located within the enclosure. In order connect the incoming cable to the unit the cable must be feed through the side mounted cable gland.

5.5 Electrical Installation Information

5.5.1 Cable Resistance Considerations

The electrochemical amplifier PCB requires no other operating power except the 4-20mA-loop current. The voltage available to the amplifier must be a minimum of 10VDC. The maximum resistance in the 4-20mA signal to ground at 12V DC supply is 150 Ohms. See Table 9 for typical cable resistance values.

Table 9: Nominal Resistance Values for Typical Wire Sizes

Conductor Area (mm^2)	Resistance (Typical) Loop Per 500m
0.5	39Ω
1.0	21.2Ω
1.5	13.6Ω
2.5	8Ω
4.0	4.95Ω

5.5.2 Earthing Procedures

Consideration should be given to the earthing of the transmitters and cable screens of the incoming customer cables.
Normal practice would be to isolate the cable screens at the Transmitter and connect the screens to earth adjacent to the Control units or power supply to the system.
Remote sensor cable screens should be earthed at the transmitter.

5.5.3 Electrochemical Sensor Unit Wiring Diagram

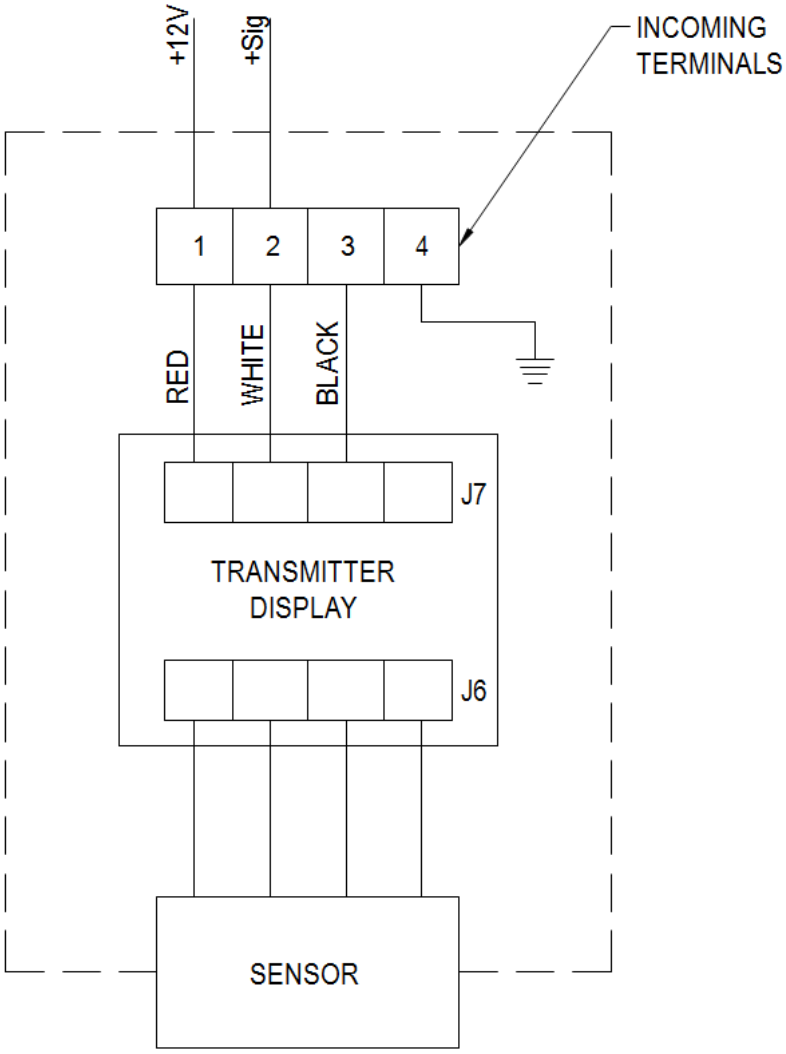

Figure 5.2: Electrochemical sensor unit wiring diagram

6 COMMISSIONING AND CALIBRATION

Commissioning is the performance of initial checks, adjustments and calibration prior to placing the system in operation for the first time. Calibration; however, is not limited to performance of commissioning. Calibration is also performed throughout the life of the system on a periodic basis and after major repairs to the system.

During commissioning and subsequent re-calibration, it is vital to ensure that procedures are followed to prevent any abnormal sensor signal from initiating any fault, warning or alarm status indicator, or equipment control function on auxiliary equipment connected to the transmitter. Consult the relevant control unit manual for details of how to do this.

The instruments supplied are NATA calibrated prior to delivery. However, before putting the system into operation, it is recommended to check the calibration. This is especially important if the instruments are commissioned sometime after delivery.

6.1 Preliminary Checks

Perform the following preliminary checks:

1. Verify that all connections are correct and installation complete as detailed in Section 5.
2. Check that voltage available to the amplifier is 12VDC.
3. Apply power to the system.

6.2 System Calibration

Before the start of calibration, the system should be left in a powered-up operational (no fault) state for one hour to allow the gas sensors to stabilise. However, if such a delay is not practical, observe the display indications with the sensor in a gas free atmosphere, until there is no appreciable display movement for a period of time. The system should then be sufficiently stable to allow calibration. During calibration, avoid breathing over the unit, since carbon dioxide from exhaled breath will affect the readings.

Calibration of sensors can only be achieved by using the appropriate gas. That is the gas that the sensor is designed to detect. A calibration gas should ideally be about 50% of full scale of the relevant monitor. However, sometimes, due to practical restraints and safety reasons, the gas may be 20% or less of full scale. While calibration at such a low level is not ideal, the resulting inaccuracies are usually within the safety tolerances for the system.

For toxic-gas detection, if reading inaccuracies cannot be avoided, they should always be on the high side for safety reasons. For example, with an actual gas density of 50 PPM, the system may safely display 53 PPM. The opposite is true of oxygen detection; the inaccuracies should always be on the low side. For example with an actual oxygen density of 20.9% in volume of air, the system may safely display 20% Vol. As calibration gases have a tolerance, it is advisable to adjust the system to the highest reading (toxic-gases) or lowest reading (oxygen) in this tolerance to maintain an assured safety margin.

Calibration gas should be applied to the sensor at a rate of approximately 0.5 to 1.0 litres per minute. It is not advisable to leave the gas flow on the sensor any longer than is needed for the output to stabilise and the calibration adjustment to be made. Note that, with some gases, the sensor takes considerable time to reach zero after the gas has been removed. While the output should drop to less than 10% of the applied gas level within several minutes, the last drop to zero could take hours under some conditions. Because of this, do not readjust the zero for some hours after span calibration.

6.2.1 Stabilisation Time

When first powered up the following stabilisation times should be allowed.

Table 10: Detector stabilisation times

Gas type	Short disconnection	Long disconnection or new sensor cell
H_2S	10 minutes	2 hours
CO	10 minutes	2 hours
NO	12 hours	12 hours
NO_2	10 minutes	2 hours
O_2	10 minutes	24 hours

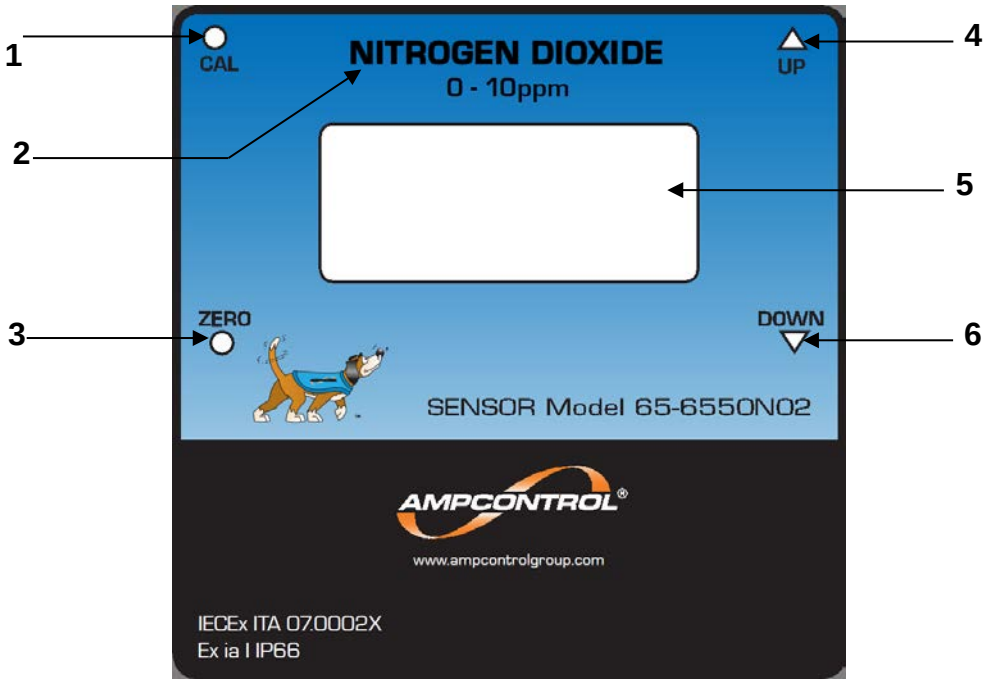

Figure 6.1: GasGuard detector control panel

6.3 Zero Calibration

Perform Zero Calibration as follows:

1. Ensure that the sensor is in a fresh air environment, and apply High Purity Nitrogen for O_2 detectors or Instrument Air for others via the Calibration Cup.
2. Place the magnetic tip of the calibration pen over the CAL symbol (1) for 5 seconds. The display will flash every 1-2 seconds while in calibration mode.
3. Now that the CAL mode is accessed place the magnetic tip over the ZERO symbol (3) for 2-3 seconds.
4. The display should have changed to a zero reading. To save the zero setting place the magnetic tip over the CAL symbol (1) for 5 seconds.
5. The sensor display (5) will show SAU to confirm that it has saved the zero setting. The display will cease to flash.

6.4 Span Calibration

Perform Span Calibration as follows:

1. Apply appropriate calibration gas to the sensor at the rate of 0.5 to 1 litres per minute. Use a calibration gas of suitable concentration between 50-100% of the range of the unit.
2. To adjust the display so that it reads the correct value for the gas applied enter Calibration Mode by placing the magnetic tip of the Calibration pen over the CAL symbol (1) for 5 seconds. The display will flash every 1-2 seconds.
3. Place the magnetic tip of the pen over the UP symbol (4) to increase the display reading and over the DOWN symbol (6) to decrease the display reading.
4. Place the magnetic tip over the CAL symbol (1) for 5 seconds once the display reads the correct value for the gas applied. The display will cease to flash.
5. Shut off the calibration gas. If the Zero calibration is to be checked, wait for the sensor to stabilise before proceeding.

7 SERVICE, MAINTENANCE & DISPOSAL

7.1 Equipment Service

A number of external system based checks should be completed on a regular basis. These 'routine inspections' must be carried out by suitably trained people with knowledge of the GasGuard range and the systems into which it is fitted. Routine inspections may take the form of either visual-only checks, or visual and 'hands-on' checks.

7.1.1 Visual Only Inspections

A basic visual inspection focuses on looking at the installation for signs of physical damage, water or dust ingress and the condition of cables and labels. This type of inspection may involve opening cabinets to gain access to the units and other equipment. This level of inspection may also include cleaning display windows that have become obscured by dirt.

Observations would typically be:

- Check that equipment enclosures, cable trays, conduits, etc. are in good order with no physical damage.
- Check that sealed wall boxes are free from water and dust ingress internally. Door seals are in good condition.
- Check that connected cables are free from cuts, abrasions and obvious signs of damage. Cable restraints are in good order and correctly fitted.
- Check that labels on equipment, wall boxes and cables are present and in good condition (especially certification labels).
- Check that no modifications have been carried out to installed equipment.

7.1.2 Hands-On (Detailed) Inspections

A more detailed inspection would include all of the elements of a visual inspection, plus some checks that cover the integrity of connections, fixtures and fittings.

In addition to basic visual observations, more detailed integrity checks would involve:

- Verify that equipment housings, wall boxes and other mechanical fixtures are secured in place. This includes terminal box lids, tightness of cable glands, integrity of wall-box mountings, security of equipment fixing to walls/DIN rails etc.
- Verify all electrical connections are secure with no loose screw terminals or DIN rail terminals not fitted to rails etc.

7.2 Equipment Maintenance

WARNING!

The GasGuard electrochemical range of detectors has no user-serviceable parts.

All repairs must be carried out by Ampcontrol only.

If a fault develops, return the unit to Ampcontrol for repair. It is essential that **no attempt be made to repair any product in the GasGuard range** as any attempt to dismantle or repair the unit can **seriously compromise the safety of the unit and voids product warranty**.

7.2.1 Periodic Maintenance

Periodic maintenance consists mainly of scheduled checks to ensure the instrument remains in adjustment and gives the required response to sampled gas. For recommended maintenance tasks and schedules, refer to AS/NZS 2290.3.

7.2.1 Corrective Maintenance

During maintenance it is vital to ensure that suitable procedures are followed to prevent any abnormal sensor signal from unintentionally operating any fault, warning or alarm status indicator, or equipment control function. Consult the relevant control unit manual for details as to how to do this.
There are no user serviceable parts. If a fault develops, the detector must be returned to an accredited repair facility.

Table 11: Corrective Maintenance Checks

Fault	Checks
No 4-20mA Output	a) Check that voltage applied to the Amplifier PCB is 12VDC and that the polarity is correct. b) Check for loose plug and terminal connections.
Sensor cannot be Spanned or Zeroed	a) Check that voltage and polarity applied to the amplifier is correct. b) Check for loose plug and terminal connections.
Erratic Output	a) Check that voltage and polarity applied to the Amplifier PCB is correct. Also, check that there are no severe voltage swings, indicating an intermittent fault in the field wiring or control unit. b) Check for loose plug and terminal connections.

7.3 Disposal

ENVIRO

The electronic equipment discussed in this manual **must not be treated as general waste**. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment which could otherwise be caused by incorrect waste handling of this product.

8 SPECIFICATIONS

Electrical					
Supply Voltage	10 – 16.5 VDC				
Analogue Output	4-20mA DC				
Maximum Current	100mA				
Mechanical and Environment					
Housing Material	Cast Stainless Steel				
Ingress Protection	Housing: IP66 Gas Inlet Port: IP66				
Weight	3.8kg (approximately)				
Dimensions	See Figure 5.1: Electrochemical detector dimensions				
Cable Gland Entry Size	8 to 13mm O.D.				
GAS	**CO**	**H_2S**	**NO**	**NO_2**	**O_2**
Calibrated Range	0-50ppm 0-100ppm	0-100ppm	0-50ppm	0-10ppm	0-25%
Absolute Maximum Gas	5000ppm	200ppm	250ppm	20ppm	30%
Accuracy	<± 2% FSD	< 5% FS	< 5% FS	< 5% FS	< 0.2% absolute FS
Zero Drift	<0.1ppm per year	<0.05ppm per year	<0.3ppm per year	<0.03ppm per year	<5% signal loss per year
Sensitivity Drift	<3% per year	<3% per year	<5% per year	<6% per year	
Resolution	0 to 50ppm: 0.1ppm 1 to 100ppm: 1ppm	0.1ppm	0.1ppm	0.1ppm	0.1% Oxygen
Repeatability	<± 1 % of Reading				
Sensing element life	>2 Years In Clean Air				
Operating temperature range	-20 to +40˚C				
Humidity (RH non-condensing)	15 – 90%				15 – 99%
Storage temperature	+3 to +20 ˚C				
Certifications					
Electrochemical Sensors (CO, H_2S, O_2)					
IECEx	IECEx ITA 07.0002X – Ex ia I IP66				
DPI	MDR 086760 GD (Design Registration)				
Electrochemical Sensors (NO, NO_2)					
IECEx	IECEx ITA 07.0002X – Ex ia I IP66				

9 EQUIPMENT LIST

Part Number	*Description*
Carbon Monoxide CO	
101770	CO Detector 0-50ppm 4-20mA
101769	CO Detector 0-100ppm 4-20mA
Hydrogen Sulphide H_2S	
101771	H2S Detector 0-50ppm 4-20mA
Oxygen O_2	
101772	O2 Detector 0-25% Vol. 4-20mA
Nitric Oxide NO	
173670	NO Detector 0-50ppm 4-20mA
Nitrogen Dioxide NO_2	
173668	NO2 Detector 0-10ppm 4-20mA
Accessories	
101702	Calibration cup for electrochemical sensors
140225	Calibration magnetic tool
105703	Allen key

NOTE

Customised gas panels and systems are also available as well as sample draw panels. These can be designed specifically to your gas sensing needs.

For more information call customer service on 1300 267 373