



---

# GASGUARD

## CO2 INFRARED TRANSMITTER / SENSOR UNITS

### User Manual

---

Version: 2, APRIL 2016

Designed and manufactured in Australia by Ampcontrol Pty Ltd



Document Revision History		
Version	Date	Description
0	03-JUN-2008	Original issue
1	04-SEP-2012	Certificate update
2	27-APR-2016	Removed old certificate, updated document formatting

**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**.

## Copyright Notice

The Ampcontrol device described in this document is the property of AMPCONTROL PTY LTD. It is furnished under a license agreement and is to be used only in accordance with the terms of the agreement.

No part of the hardware or documentation may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without prior written permission of AMPCONTROL PTY LTD.

## Disclaimer

While every effort has been made to assure the accuracy and clarity of this document, AMPCONTROL PTY LTD assumes no liability resulting from any omissions in this document, or from misuse of the information obtained herein. The information in this document has been carefully checked and is believed to be entirely reliable with all of the necessary information included. AMPCONTROL PTY LTD reserves the right to make changes to any products described herein to improve reliability, function, or design, and reserves the right to revise this document and make changes from time to time in content hereof with no obligation to notify any persons of revisions or changes. AMPCONTROL PTY LTD does not assume any liability arising out of the application or any use of any product or circuit described herein; neither does it convey license under its patent rights or the rights of others.

## Before You Begin

Thank you for purchasing the Ampcontrol Gasguard CO2 Infrared Transmitter / Sensor.

### WARNING!



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

## Ampcontrol Contact Details

7 Billbrooke Close, Cameron Park, NSW, 2285

P +61 1300 267 373 | F +61 2 4903 4888

EMAIL: [customerservice@ampcontrolgroup.com](mailto:customerservice@ampcontrolgroup.com)

WEB: [ampcontrolgroup.com](http://ampcontrolgroup.com)

## TABLE OF CONTENTS

---

1 SAFETY AND OTHER WARNINGS .....	6
1.1 Safe Use of Equipment .....	6
2 RECEIVING AND STORAGE .....	7
2.1 Receiving .....	7
2.2 Inspection .....	7
2.3 Storage after Delivery .....	7
2.4 Unpacking of Equipment .....	8
3 PRODUCT OVERVIEW .....	9
3.1 Sensor .....	9
3.2 Amplifier PCB .....	10
3.3 Enclosure: Stainless Steel Housing .....	10
3.4 Sensor Wiring Assembly .....	10
4 PRODUCT OPERATION .....	12
5 INSTALLATION .....	13
5.1 General Warnings .....	13
5.2 Mandatory Installation Practices .....	14
5.3 Installation Guidelines .....	14
5.4 Mechanical Installation Information .....	16
5.5 Electrical Installation Information .....	17
6 COMMISSIONING AND CALIBRATION .....	20
6.1 Preliminary Checks .....	20
6.2 System Calibration .....	20
6.3 Zero Calibration .....	21
6.4 Span Calibration .....	22
6.5 Calibration Troubleshooting .....	23
7 SERVICE, MAINTENANCE & DISPOSAL .....	24
7.1 Equipment Service .....	24
7.2 Equipment Maintenance .....	25
7.3 Disposal .....	25
8 SPECIFICATIONS .....	26
9 EQUIPMENT LIST .....	26

## TABLE OF FIGURES

---

Figure 3.1: Anti-Vibration Clip.....	11
Figure 4.1: Sensor / Transmitter User Interface.....	12
Figure 5.1: CO2 IR Sensor / Transmitter Dimensions.....	16
Figure 5.2: Integral Infrared Sensor Wiring Diagram.....	18
Figure 5.3: Remote Infrared Sensor Wiring Diagram.....	19
Figure 6.1: Gasguard CO2 IR Transmitter / Sensor Control Panel.....	21
Figure 6.2: Gasguard CO2 IR Transmitter / Sensor Control Panel.....	22

## TABLE OF TABLES

---

Table 1: Sensor / Transmitter User Interface Descriptors.....	12
Table 2: Gasguard Display Codes.....	12
Table 3: Gas Density Relative to Air.....	15
Table 4: Nominal Resistance Values for Typical Wire Sizes.....	17
Table 6: Corrective Maintenance Checks.....	25

# 1 SAFETY AND OTHER WARNINGS

---

*For safety reasons, the sensor/ transmitter 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 this instrument 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 unit 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 unit functioning correctly it is highly recommended that all safety functions of the unit 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 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 specification 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 0-40°C, preferably on shelves and protected from moisture and sunlight.

#### CAUTION!



The sensors **should not be stored in areas that contain solvent vapours**. Some of these vapours are known to create false "high" zero points and may even damage the sensor electrodes. Similarly, **the sensor should not be exposed to high levels of solvent vapours while in operation**.

## 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 Infrared Carbon Dioxide Sensor / Transmitters are 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 IP 66 and the appropriate checks being made on the Intrinsically Safe Parameters of the overall system the transmitter is connected into.

The Transmitter and Sensor can be mounted as an integral device but there is also an option to mount the sensor separately up to 10m from the transmitter. In the remote configuration the sensor is factory fitted with a type 2S cable which is potted directly into the sensor assembly.

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.

The Gasguard Infrared Carbon Dioxide Sensor / Transmitters operate on the Infrared Absorption principal and provide a linear 4-20mA DC current output.

Unique part numbers in accordance with the following scheme identifies the sensor unit configurations:

Part Number 65-6552XXX series is for Infra-red sensor units.

**Note:** In the part numbers listed above, XXX represents the chemical symbol for the gas detected by the unit. For example, 65-6552CO2-2 is the part number for an Infra-red transmitter unit designed to detect Carbon Dioxide (CO2) in the range of 0 -2%.

### Key Features:

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

## 3.1 Sensor

### 3.1.1 Carbon Dioxide Gas Sensor

The Carbon Dioxide Gas Sensor works on the infra-red gas absorption principle. An infra-red light source illuminates the sensor through a gas pathway with an optical filter that selects the appropriate wavelength for the gas being detected; the presence of this gas reduces the amount of infra-red energy reaching the detector. This difference in infra-red energy with and without gas is used to measure the amount of gas present, and is converted to an electrical output of 4–20mA by the amplifier electronics.

### 3.1.2 Humidity

Sensors cannot 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. Above 90% R.H. the sensor accumulates water vapour and may form condensation to block the infra-red path used for gas detection. Provided the exposure to these extremes of humidity has not been for a long period, the sensors will recover when exposed to R.H. in the range 15% to 90%.

### 3.1.3 Pressure Effects

The infra-red sensors do not exhibit a permanent response to changes of pressure. The CO2 sensor responds to pressure on a directly proportional basis.

### 3.1.4 Operational Restrictions

For proper operation, infra-red detectors need to be in a position which is free from damaging vibration and within the temperature range of -10C to +40C.

## 3.2 Amplifier PCB

The purpose of the Amplifier PCB is to convert the low- level electrical output of the sensor into a signal capable of driving various types of external indicator equipment such as the Ampcontrol Gasguard 4 Channel Controller.

The Amplifier PCB requires a 12VDC operating voltage and transmits a signal of 4-20mA. At the lower end of the range, the 4mA signal level indicates a zero gas concentration. At the upper end of the range the 20mA signal indicates that the sensor has detected a full span gas concentration. ZERO and SPAN adjustment reed relays located on the PCB are used for calibration of the instrument.

## 3.3 Enclosure: Stainless Steel Housing

The standard Stainless Steel Housing incorporates the I/R Sensor 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 sensor are by means of a shielded cable from the Sensor Assembly.

A sensor wiring assembly provides the electrical interface between the sensor and the Amplifier PCB. The sensor wiring plugs into the Amplifier PCB connector J4.

A second wiring assembly connects the customer supply and signal connections from the incoming terminals to the Amplifier PCB connector J5.

The Sensor and Amplifier assemblies are intrinsically safe items and as such are only serviceable by authorised factory personnel.

See Section 5.5 for wiring details.

#### NOTE



Only sensor assembly 105990 may be connected to the main amplifier in this unit. Connection of any other type of sensor head will render the unit non-operational.

#### NOTE



Sensor and Transmitter assemblies are matched together and cannot be replaced or interchanged by unauthorised personnel.

### 3.4.2 Anti-Vibration Clip

An Anti-Vibration clip Pt/No. 121647 is fitted to the connectors J4 & J5 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 1.

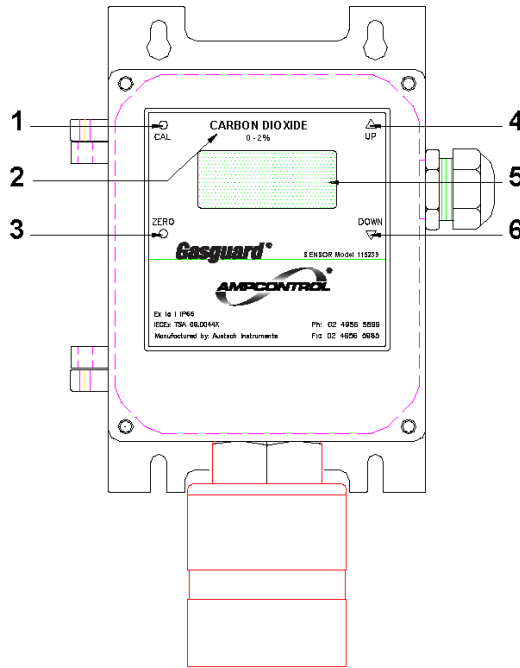


Figure 4.1: Sensor / Transmitter User Interface

Table 1: 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 2).
6	DOWN	Button operated using the magnetic calibration tool.

Table 2: 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/IR	Power Up – Infrared Unit

## 5 INSTALLATION

---

### 5.1 General Warnings

These instructions have been designed to assist users of the Gasguard CO2 IR Transmitter / Sensor with installation.

Before the unit can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the unit 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 unit 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 unit 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 unit will properly perform the required functions within the system design.**

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

#### **5.1.4 Modifications of any form to the unit are prohibited.**

The unit as supplied has been designed and manufactured to comply with the requirements of protection standards. If modifications of any form are made to the unit, the equipment may no longer be fit for use. If any modifications or damage to the unit 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 the Gasguard CO2 IR Transmitter / Sensor. Failure to adhere to this information may give rise to unsafe operation.

Using the unit 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.

- The unit must be powered within the specified voltage range.
- The installation of the unit must be carried out by suitably trained and qualified personnel.
- Identification labels fixed to the unit 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 the unit. 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.
- Confirm the Intrinsically Safe parameters of the transmitter, cables and power supply are suitable for the application.
- Ensure that the Conditions of Use, listed in the certificate, are adhered to.

## 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 3 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 3: 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	
Nitrogen Dioxide	

## 5.4 Mechanical Installation Information

### 5.4.1 Enclosure Dimensions

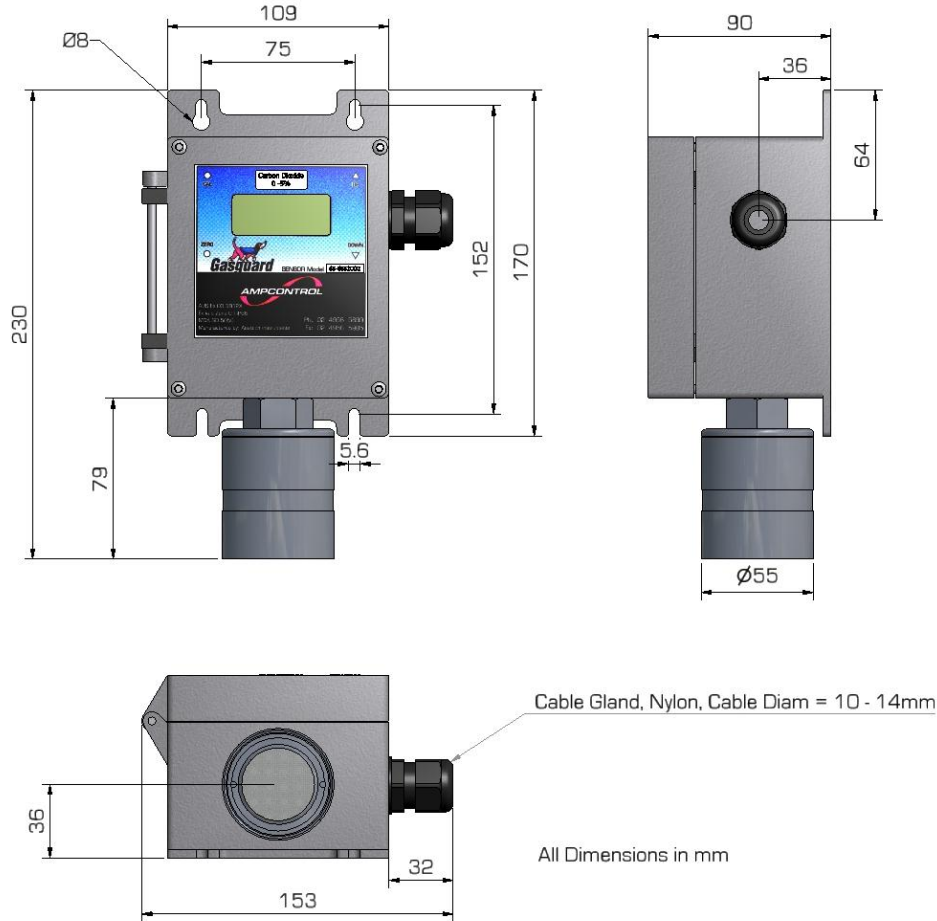


Figure 5.1: CO2 IR Sensor / Transmitter Dimensions

### 5.4.2 Mounting Arrangements

The Gasguard CO2 IR Sensor / Transmitter is a panel mounted unit. See Figure 5.1 for hole centre locations.

### 5.4.3 Terminal Layout

The connection terminals for the Gasguard CO2 IR Sensor / Transmitter 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 Infrared Amplifier PCB output is 4-20mA current. The voltage available to the amplifier must be a minimum of 10VDC. With a supply voltage of 12VDC the maximum cable resistance, both +ve & -ve leads combined, is 16 Ohms. The maximum resistance in the 4-20mA signal to ground at 12V DC supply is 200 Ohms. See Table 4 for typical cable resistance values.

*Table 4: Nominal Resistance Values for Typical Wire Sizes*

Conductor Area (mm <sup>2</sup> )	Loop Resistance (Typical)
0.5	6.71Ω
1.0	3.36Ω
1.5	2.24Ω
2.0	1.72Ω
2.5	1.38Ω

### 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 Integral Infrared Sensor Unit Wiring Details

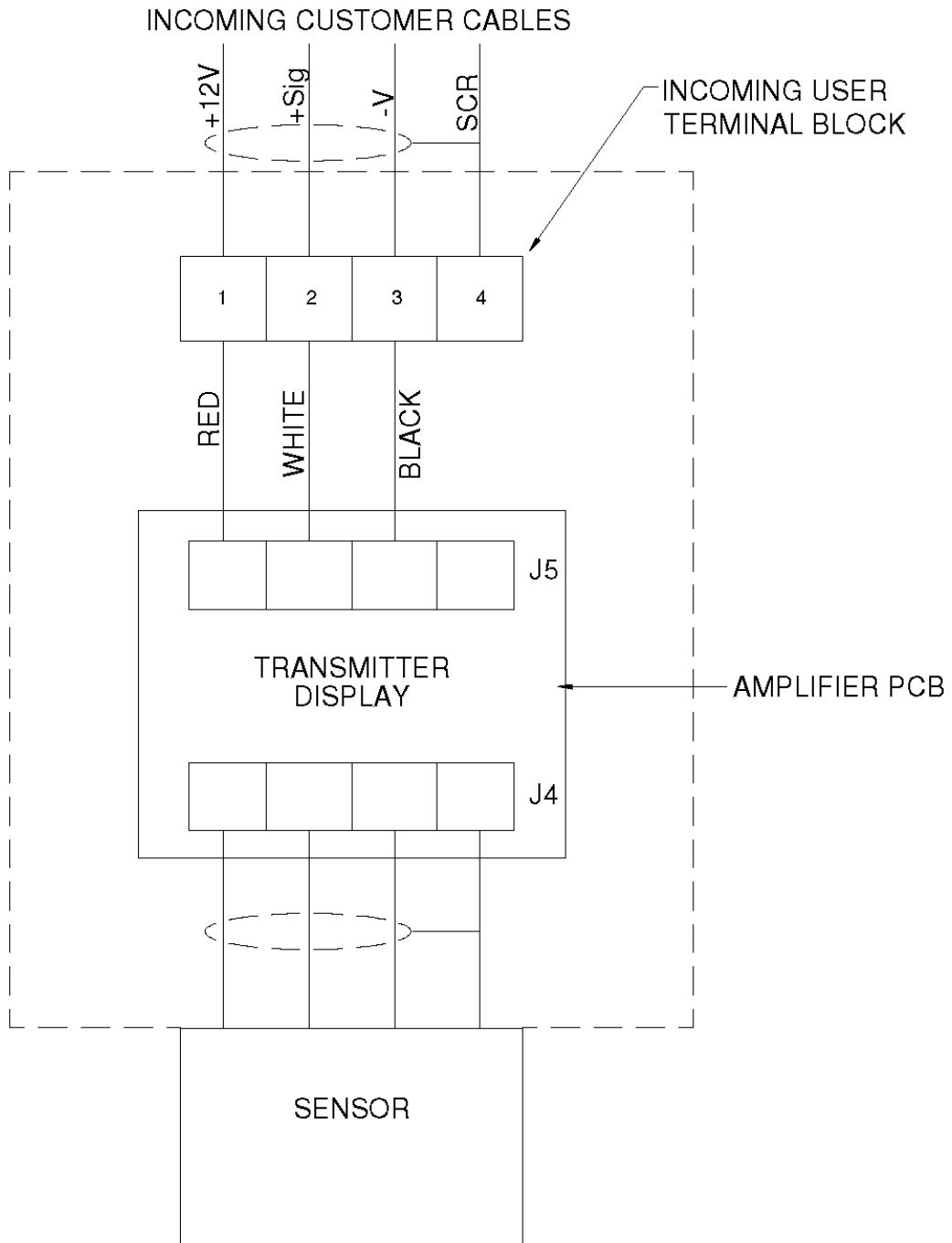


Figure 5.2: Integral Infrared Sensor Wiring Diagram

### 5.5.4 Remote Infrared Sensor Unit Wiring Details

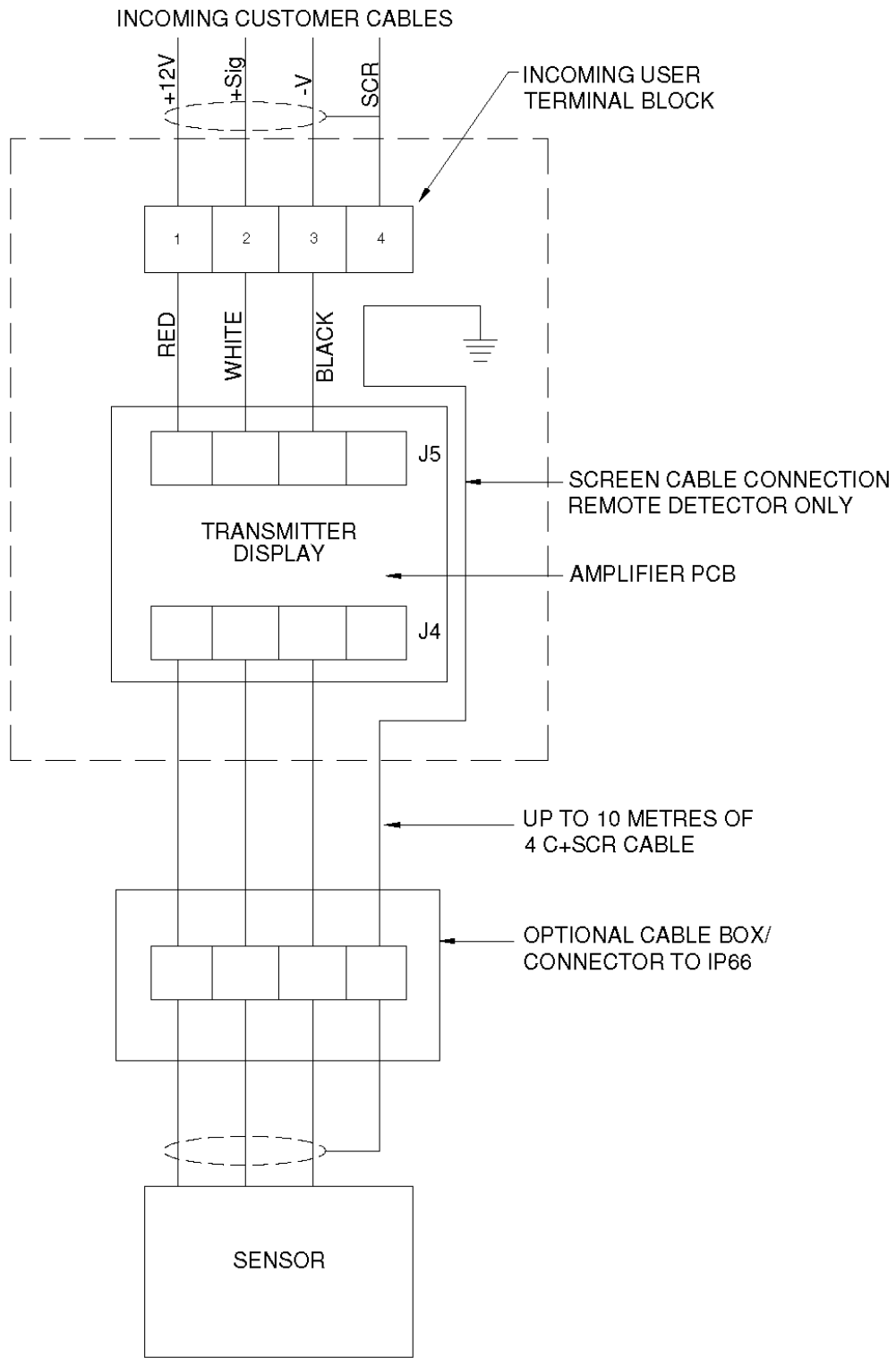


Figure 5.3: Remote Infrared Sensor Wiring Diagram

## 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, warn 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.

**Note:** Following initial application of input power the display will alternate between PU & Ir for approx. 10 secs while it warms up, to show the unit is Infra-red. The output is held at a nominal 4mA during this period, after which it displays -0.46 for up to 30 seconds before reading zero  $\pm 0.05\%$  (Providing no gas is present).

### 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 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 be at least 50% of full scale of the relevant monitor.

For gas detection, if reading inaccuracies cannot be avoided, sensors should always be calibrated on the high side for safety reasons.

Calibration gas should be applied to the sensor at a rate of approximately 0.5 to 1.0 litres per minute, using the Calibration Cup. Allow sufficient time, usually about 2 minutes, for sensor to stabilize before adjustment.

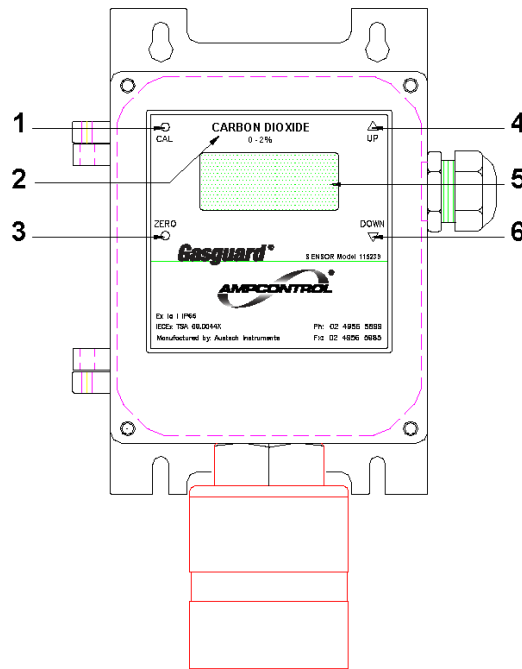


Figure 6.1: Gasguard CO2 IR Transmitter / Sensor Control Panel

### 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 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.

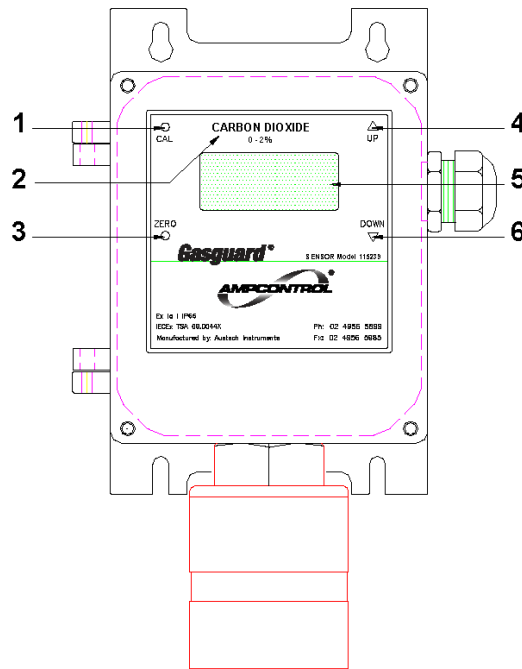


Figure 6.2: Gasguard CO2 IR Transmitter / Sensor Control Panel

## 6.4 Span Calibration

Perform Span Calibration as follows:

1. Apply CO2 calibration gas to the sensor at the rate of 0.5 to 1 litres per minute. Use a calibration gas of suitable concentration between 1% to 2% CO2 for the 2% range unit or 2.5% to 5.0% for the 5% range 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.

**Note:** Human breath contains a high concentration of CO2 and this may cause the instrument to read above zero.

## 6.5 Calibration Troubleshooting

If during calibration or zero of the Gasguard CO2 Transmitter the fault indication on the local display is shown as “ERR” then possible reasons are as follows:

### 6.5.1 Calibration Error

If the fault code appears during calibration it will normally be when adjustment by the Up or Down arrows is attempted. The code indicates that the output of the sensor is insufficient and some basic fault diagnosis is required.

Several things should be checked before committing the detector for repair.

- a) Check the calibration gas. It should be a correct range in air mixture although other trace gases may be present. Lower percentage gas mixtures will reduce the output leading to unnecessary change out of the sensor.
- b) Check the gas flow to ensure it is within 0.5 to 1.0 litres/min.
- c) Check the surrounding airflow. If the ambient air flow is above 1.5 metres/sec it can dilute the calibration gas. Use a shield or bag over the sensor if there is a high wind speed.
- d) Check sensor is not blocked with dust or mud. The sensor can be washed out and calibration carried out after drying.

### 6.5.2 Zero Error

The sensor zero balance is required to be within a pre-set level and if the sensor is damaged the zero shift may take it outside the limit. Once this occurs the “ERR” indication is shown when trying to zero the instrument, and the sensor should be replaced.

If during a calibration or zero procedure the instrument fails to complete the process, the original settings prior to entering Cal mode will be retained. If left in Cal mode the instrument will revert to normal mode after about 5 minutes, retaining its last settings.

### 6.5.3 Erratic Readings

Check the tightness of screw terminals on the connectors and check connectors are pushed fully home. Fit anti vibration clip if the problem persists.

## 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 CO2 IR Transmitter / Sensor 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 unit 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

### 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, warn 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 5: 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

<b>Electrical</b>	
<i>Supply Voltage</i>	10 – 16.5 VDC
<i>Analogue Output</i>	4-20mA DC
<i>Maximum Current</i>	100mA
<b>Mechanical and Environment</b>	
<i>Humidity Range</i>	0-95% RH, non-condensing
<i>Temperature Range</i>	-10°C to + 40°C
<i>Housing Material</i>	Cast Stainless Steel
<i>Ingress Protection</i>	Housing: IP66 Gas Inlet Port: IP66
<i>Weight</i>	3.8kg (approximately)
<i>Dimensions</i>	See Figure 5.1
<i>Cable Gland Entry Size</i>	8 to 13mm O.D.
<b>Sensor</b>	
<i>Detection Method</i>	Non-Dispersive Infrared
<i>Calibrated Range</i>	0 to 2% Carbon Dioxide (CO <sub>2</sub> ) 0 to 5% Carbon Dioxide (CO <sub>2</sub> )
<i>Accuracy</i>	0 to 2% <± 2% FSD 2 to 4% <± 4% FSD 4 to 5% <± 5% FSD
<i>Drift</i>	<± 100ppm per month
<i>Repeatability</i>	<± 0.05% CO <sub>2</sub>
<i>Sensing Element Life</i>	>5 Years in Clean Air
<i>Resolution</i>	0.01% Carbon Dioxide (CO <sub>2</sub> )
<b>Certification</b>	
<i>IECEX</i>	IECEX TSA 06.0044X – Ex ia I IP66
<i>DPI</i>	MDR 087482 GD ( Design Registration )

## 9 EQUIPMENT LIST

<b>Part Number</b>	<b>Category</b>	<b>Description</b>
115239	2%	CO2 Sensor / Transmitter - 2% - Integral Sensor Head
141569	2%	CO2 Sensor / Transmitter - 2% - 5 Metre Remote Sensor Head
141570	2%	CO2 Sensor / Transmitter - 2% - 10 Metre Remote Sensor Head
115240	5%	CO2 Sensor / Transmitter - 5% - Integral Sensor Head
141574	5%	CO2 Sensor / Transmitter - 5% - 5 Metre Remote Sensor Head
141579	5%	CO2 Sensor / Transmitter - 5% - 10 Metre Remote Sensor Head
140225	Accessory	Calibration Magnetic Tool
141578	Accessory	Calibration Cup
105703	Accessory	Allen Key