C-Guard™

Intelligent Gas Detector

Part Number 65-1020

Manual Revision v1.09 (updated 18 Feb 2011)
# Table of Contents

1. Introduction .................................................................................................................. 6  
   1.1 Features .................................................................................................................. 6  
2. Installation ................................................................................................................... 7  
   2.1 Mounting .................................................................................................................. 7  
   2.2 Opening the Enclosure ............................................................................................. 8  
   2.3 Wiring ...................................................................................................................... 9  
   2.4 Installation .............................................................................................................. 10  
3. Operation ..................................................................................................................... 11  
   3.1 Normal Running Mode .............................................................................................. 11  
   3.2 Calibration Required Mode ...................................................................................... 12  
   3.3 Running Mode with No Span Gas Detected Warning Mode ....................................... 12  
   3.4 Zero Calibration Mode (Clean Air Adjustment Mode) ............................................... 13  
   3.5 Span Calibration Mode ............................................................................................ 15  
   3.6 Test Mode ............................................................................................................... 17  
4. Advanced Setup ......................................................................................................... 18  
   4.1 Changing the PCB or Sensor ................................................................................... 18  
   4.2 Sensor Selection Rotary Switch .............................................................................. 22  
APPENDIX I. LED Indicator Summary ........................................................................... 24  
APPENDIX II. Spare Parts List ....................................................................................... 26  
APPENDIX III. Specifications ......................................................................................... 27
PROPRIETARY STATEMENT
GasTech Australia owns proprietary rights in the information disclosed within. By receiving this document, the recipient agrees that neither this document nor the information disclosed within nor any part shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorised in writing by GasTech Australia.

COPYRIGHT STATEMENT
Information contained in this document is protected by copyright. No part of this document may be photocopied, reproduced, or translated to another program or system without prior written authorisation from GasTech Australia.

TRADEMARK STATEMENT
Protected through use and/or registration in the United States and many foreign countries are the trademarks and service marks of GasTech Australia. The use of the "®" symbol indicates registration in the United States only and the “™” is in Australia; registrations may not have been issued at present in other countries. All other product names and logos are trademarks of their respective owners.

DISCLAIMER
Under no circumstances will GasTech Australia be liable for any claims, losses, or damages resulting from or arising out of the repair or modification of the equipment by a party other than GasTech Australia or its authorised service representatives, or by operation or use of the equipment other than in accordance with the printed instructions provided by GasTech Australia or if the equipment has been improperly maintained or subject to neglect or accident. Any of the foregoing will void the warranty.

REVISIONS TO MANUAL
All information contained in this manual is believed to be true and correct at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, GasTech Australia reserves the right to make changes at any time without notice. Any revised copies of this manual can be obtained by contacting GasTech Australia.
SERVICE POLICY

GasTech Australia maintains an instrument service facility at the factory as well as authorised service facilities around the world. Should your instrument require service, you may contact us toll free at 1800 999 902 within Australia only or 61-8-6108-0000, or visit our website www.gastech.com.au for authorised service locations.

For non-warranty repairs, you will need to provide a purchase order number. If you need to set a limit to the repairs costs, state a “Not to Exceed” figure. If you need a quotation before you can authorise repair costs, so state, but understand this will incur additional costs and may delay processing of the repair.

If you wish to set a limit to the authorised repair cost, state a “not to exceed” figure. GasTech Australia’s policy is to perform all needed repairs to restore the instrument to full operating condition, including reactivation or replacement of all out-of-warranty electrochemical cells.

You may send the unit, freight prepaid, to: GasTech Australia Pty Ltd, 24 Baretta Rd, Wangara 6065, Western Australia. Attn.: Service Department. Enclose the copy of your contact details. Pack the instrument and all its accessories (preferably in its original packing) and any special instructions. Repairs are warranted for 90 days from the date of shipment. Sensors have individual warranties.

Always include your address, purchase order number, shipping and billing information, and a description of the defect as you perceive it. If this is the first time you are dealing directly with the factory, you will be asked to provide credit references, prepay, or authorise COD shipment.

NOTE: GasTech Australia assumes no liability for work performed by unauthorised service facilities.
WARRANTY STATEMENT

1. Consumers have the benefit of conditions and warranties implied by the Trade Practices Act 1974 (TPA) and similar provisions of State and Territory enactments and nothing in these conditions is intended to exclude, restrict or modify any statutory obligation of GASTECH AUSTRALIA PTY LTD (Company) if that cannot lawfully be effected.

2. This warranty relates only to Equipment manufactured and services supplied by the Company, its related corporations and subsidiaries. Equipment or any part thereof which is returned to the Company, transportation prepaid, within 27 months from the date of dispatch from the Company’s premises or 24 months from the date of shipment to the ultimate user (whichever occurs first) and is found by the Company, after examination, to be defective in workmanship or materials, will be either repaired or replaced as determined by the Company, free of charge. The terms of this paragraph apply unless stated otherwise in this instruction manual.

3. This warranty does not apply to:
   a) replacement or repairs which are required as a results of improper installation, misuse, maladjustment modification or lack of routine maintenance by others;
   b) items subject to deterioration or consumption in normal service, that is, those which must be cleaned, repaired or replaced routinely such as (but not limited to) lamps, bulbs and fuses, pump diaphragms and valves, absorbent cartridges, filter elements and batteries; or
   c) goods, materials or parts supplied or manufactured by unrelated third parties and provided to the Purchaser at the specific request of the Purchaser and such goods, materials or parts will be repaired or replaced only to the extent of the original suppliers warranty.

4. Should the Company be liable for breach of a condition or warranty (other than the pursuant to section 69 of the TPA) implied by Division 2 of Part V of the Act (other than that implied by section 69 of the TPA) the liability of the Company for such breach shall, subject to section 68A(2) of the TPA, be limited to one of the following as determined by the Company.
   a) the replacement of the Equipment or the supply of equivalent Equipment;
   b) the payment of the cost of replacing the Equipment or of acquiring equivalent Equipment.

5. Subject to Clauses 2 and 4 and any legislation to the contrary:
   a) representatives and agreements not expressly contained herein shall not be binding upon the Company as conditions, warranties or representations; all such conditions, warranties, and representations on the part of the Company, whether express or implied, statutory or otherwise, whether collateral or antecedent or otherwise are hereby expressly negativated and excluded;
   b) the Company shall be under no liability to the Purchaser for any loss (including but not limited to loss of profits and consequential loss) or for damage to persons or property or for death or injury caused by any act or omission (including negligent acts or omissions) of the Company or the Company’s agents, wherever occurring, arising from the subject matter of this agreement;
   c) the Purchaser shall indemnify the Company against any claims made against the Company by any third party in respect of any such loss, damage, death or injury as is set out in sub-paragraph b) hereof; the Purchaser further agrees to indemnify the Company against all losses and expenses which the Company may suffer or incur due to the failure of the Purchaser fully to observe its obligations under this contract; and
   d) no warranty is given and no responsibility is accepted by the Company to ensure the Equipment supplied complies with any statutory requirements relating to the marketing of goods. Compliance with such legislation shall be the sole responsibility of the Purchaser.
   e) the Company specifically denies any liability for the overall performance of any plant or the results of any process with which the Equipment is integrated.
MANUAL CONVENTIONS

This instrument is designed to detect toxic gases and to give warning before they reach harmful levels. In order to ensure that it will warn of dangerous concentrations, it is essential that the instructions in this manual, particularly those concerning start up, operation, calibration, and maintenance, be read, understood, and followed.

Notices are used in this operator’s manual to alert you to hazardous conditions to person or instrument and to notify you of additional information. This operator’s manual uses the following notices.

⚠️ NOTE: Notifies you of additional information.

⚠️ CAUTION: Notifies you of potential damage to equipment.

⚠️ WARNING: Notifies you of potential danger that can result in personal injury or death.
1. Introduction

GasTech Australia is proud to introduce the next step in fixed gas detection equipment. The C-Guard™ is an intelligent gas detector which is designed around the operators requirements. It is an easy to calibrate and setup, highly stable, fixed-point toxic.

The C-Guard™ is an industry standard two wire 24VDC 4-20mA device.

1.1 Features

- Non-intrusive calibration
- No alarms during calibration
- One PCB card for all gases detected
- No tool calibration
- Sensor drift elimination program
- Long-term sensor deterioration drift elimination program
- Automatic zero suppression
- Fail-safe mode
- Non corrosive housing
- High impact housing
- IP65 design
2. **Installation**

⚠️ **WARNING:** Perform all installation procedures in a fresh air environment (known to be free of combustible and toxic gas and having normal oxygen content). The C-Guard™ is not in operation as a system until the start-up procedure is complete.

2.1 **Mounting**

💡 **NOTE:** The packing slip indicates the serial number of your C-Guard™. The serial number is also on a label on the side of the C-Guard™. Please record the serial number on the front of this manual.

The installation should be in the area with most potential to detect the gas as quickly as possible. Take note of the gas density as this will help in finding the best location for the C-Guard™. For example, heavier gases like Hydrogen Sulphide (H₂S) would have the sensor mounted lower than for Carbon Monoxide (CO) which is a lighter gas.

Securely mount the unit to the wall using wall plugs and screws. Dimensions of the two mounting holes on the C-Guard enclosure are shown below.
2.2 Opening the Enclosure

Tasks such as wiring power into the unit require the enclosure to be opened.

1. Remove the 4 housing lid screws using a Phillips screwdriver and gently remove the lid.

2. Turn over the lid to find the green power connector.

3. Perform the required tasks such as adjusting settings or wiring power into the unit. These tasks are described in more detail in the following sections.

4. When finished, fit the lid and tighten the 4 screws using a Phillips screwdriver tightening the housing evenly.
2.3 Wiring
The C-Guard™ sensor can be used with any standard 2 wire, 4 to 20 mA 24VDC controller. Typical controllers include the GasTech Australia Micro Rack™.

1. Open the enclosure as outlined in the previous section.
2. Run the power cables via the cable gland to the green two pin removable plug located on the bottom right corner of the PCB as shown below.
3. Ensure the positive and negative wires are terminated with the correct polarity, which is marked on the PCB.

![Diagram of wiring connections]

When connecting a C-Guard™ unit to a controller such as the GasTech 4100R controller, follow the pin-outs as outlined below. Other third party controllers are also connected in the same manner.

![Diagram of connection pin-outs]
2.4 Installation

Complete the following procedures to place the C-Guard™ into normal operation.

1. Complete the mounting and wiring procedures described in the previous sections.
2. Complete all installation procedures described in this manual.
3. Verify that all wiring connections are correct and secure.
4. Check power being supplied to the unit is correct (24VDC).
5. Turn on the incoming power at the power source.
3. Operation

The C-Guard™ contains no user interface or external switches. However the PCB contains a magnetic sensitive switch (reed switch) which responds to a magnet being swiped over the top panel of the device. This allows the unit to be put into various modes for calibration and testing.

The following modes of operation exist for the C-Guard™ which will be described in the following section:

1. Normal Running Mode
2. Calibration Required Mode
3. Running Mode with No Span Gas Detected Warning Mode
4. Zero Cal / Clean Air Adjustment Mode
5. Span Calibration Mode
6. Test Mode

3.1 Normal Running Mode

On power-up the C-Guard™ will attempt to enter Normal Running Mode. It performs the following:

1. The C-Guard™ starts up in a warm-up isolated mode with the mA locked at 3mA for 20 seconds while the sensor stabilises and the software initialises and completes a series of functional tests. The C-Guard™ loads settings and calibration information from non-volatile memory. The green “Run” LED will flash slowly during this time.

   ![RUN ZERO SPAN](Image)

2. If the C-Guard™ has already been calibrated, it will enter Normal Running Mode at the expiry of the 20 second warm-up timer. The green “Run” LED will stay constantly on, the mA will be released and the system will then be functioning.

   ![RUN ZERO SPAN](Image)

3. At the expiry of the 20 second warm-up timer, if the C-Guard™ has not been calibrated it will enter Calibration Required Mode. The C-Guard™ also compares the last recorded position of the internal rotary switch setting with its current position. If the setting switch has changed position, the defaults are loaded for the current setting and the C-Guard™ is also forced into Calibration Required Mode.
3.2 Calibration Required Mode
The unit will enter **Calibration Required Mode** if any of the following occurs:

- If the C-Guard™ has not been calibrated at the expiry of the 20 second warm-up timer.
- If the internal rotary switch setting has changed position compared to the units last recorded position.
- If the C-Guard™ detects calibration gas during calibration mode, but then fails calibration because the final sensor response is unacceptable.

The yellow “Zero” and red “Span” LED’s will flash quickly in this mode. The C-Guard™ will remain in this mode until a service person successfully calibrates the detector (see **Span Calibration Mode**).

```
RUN   ZERO   SPAN
  OFF   FAST   FAST
       FLASHING  FLASHING
```

3.3 Running Mode with No Span Gas Detected Warning Mode
This is a feature of **Normal Running Mode** that warns the user that the C-Guard™ was not successfully calibrated on the last attempt. An incomplete Span Calibration can be the result of attempting a calibration when:

- A sensor is not present.
- A sensor is expired or has insufficient output.
- The wrong type or concentration of calibration gas is used.

In this mode, the C-Guard™ slowly flashes the green “Run” and red “Span” LED’s for a period of 5 minutes.

```
RUN   ZERO   SPAN
 SLOW   OFF   SLOW
FLASHING OFFFLASHING
```

After 5 minutes, the C-Guard™ will return to **Normal Running Mode** with the green “Run” LED turned constantly on.

```
RUN   ZERO   SPAN
 ON    OFF    OFF
```
3.4 Zero Calibration Mode (Clean Air Adjustment Mode)

This mode is used to set the baseline for the C-Guard™.

1. The C-Guard™ should initially be in Normal Running Mode with the green “Run” LED turned constantly on.

2. The C-Guard™ must be in a clean air environment or have a Zero gas applied before continuing.

   RUN   ZERO   SPAN
   ON     OFF     OFF

3. Using a magnet, swipe the front of the C-Guard™ from left to right in the area shown below to enter Zero Calibration Mode.

4. The green “Run” LED will flash slowly for 5 seconds.

   RUN   ZERO   SPAN
   SLOW FLASHING  OFF  OFF

5. After the 5 second timer has expired and the green “Run” LED stops flashing, the yellow “Zero” LED will begin to flash for up to 6 seconds while the C-Guard™ waits for the sensor to stabilize. The yellow “Zero” LED will flash slowly if the sensor detects the air is clean. The yellow “Zero” LED will flash fast if it detects the air is not clean.

   RUN   ZERO   SPAN
   OFF   SLOW FLASHING  OFF
6. During the 6 second timer whilst the yellow “Zero” LED is flashing, the C-Guard™ will check that the sensor output is acceptable within +/- 20% of the expected maximum full scale output.

7. If the sensor output is not acceptable and the C-Guard™ has not previously passed calibration, the unit will enter Calibration Required Mode.

8. If the sensor output is acceptable and passes Zero Calibration, the C-Guard™ will record the output of the sensor as its Zero-point and save the value in memory.

9. The C-Guard™ will turn on the yellow “Zero” LED and wait for the user to swipe the unit with a magnet in order to optionally enter Span Calibration Mode.

<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

10. If the user swipes the C-Guard™ once with a magnet at this point, the unit will enter Span Calibration Mode. See the next section for details on this.

11. If the user does not swipe the C-Guard™ with a magnet and the detector has previously passed calibration, the C-Guard™ will return to Normal Running Mode with the green “Run” LED turned on constantly.

<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>
3.5 Span Calibration Mode

To calibrate the C-Guard™ you will need certified calibration gas, which is in date and is the same gas and concentration as specified on the specification label on the side of the detector being calibrated.

Calibration intervals are completely site and local regulation dependant. They will vary widely between different countries, states and sites safety regulations for fixed gas detection systems. The type of sensor will also have an effect on the calibration intervals. An industry recommendation on calibration interval is 4 times a year. The C-Guard™ design has been made to extend the calibration intervals by monitoring and adjusting the sensor outputs. We recommend following regulatory guidelines over manufacture recommendations when regulatory guidelines recommend shorter intervals. Manufacturers recommendation on the C-Guard™ for calibration is twice a year with only extending to once a year on low risk gases. Shorter intervals might be recommended depending on selected sensor.

**WARNING:** The gas detection equipment is a safety system designed to protect your life and the plant operations. Not calibrating or extending the calibration intervals to save costs, could have a detrimental effect on the accuracy of the system as sensors might not respond.

1. To enter Span Calibration Mode, you will need to follow the directions in the Zero Calibration Mode section above and successfully pass a Zero Calibration. After the C-Guard™ has passed Zero Calibration, the yellow “Zero” LED will be on constantly.

   ![LED States](image)

   RUN | ZERO | SPAN
   --- | --- | ---
   OFF | ON | OFF

2. Swipe the C-Guard™ with a magnet to enter Span Calibration Mode. The red “Span” LED will flash quickly for 60 seconds. This indicates that the C-Guard™ is waiting for the calibration gas to be applied.

   ![LED States](image)

   RUN | ZERO | SPAN
   --- | --- | ---
   OFF | OFF | FAST FLASHING

3. You must apply calibration gas before the 60 second timer expires. A calibration plug (Part Number: 81-1125) will be required to apply the calibration gas directly to the sensor.

4. Press the calibration plug into the socket and connect the calibration gas to one of the pipes.

5. Apply the gas at a flow rate of 500cc to 1000cc per minute (1/2Lpm to 1Lpm) to the sensor using the calibration plug.
6. At the expiration of the 60 second timeout, if no gas is detected and the C-Guard™ was previously calibrated, the C-Guard™ will enter **Running Mode with No Span Gas Detected Warning Mode** for 5 minutes. This allows for continued operation after a situation where **Span Calibration Mode** was unintentionally entered.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOW FLASHER</td>
<td>OFF</td>
<td>SLOW FLASHER</td>
</tr>
</tbody>
</table>
```

7. If the sensor output rises above the minimum expected output for the expected concentration of gas, the red “Span” LED will start flashing slowly and a timer is started with a duration equal to the T90 time of the sensor.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>SLOW FLASHER</td>
</tr>
</tbody>
</table>
```

8. At the expiration of the T90 timer the red “Span” LED will turn on for 5 seconds.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>
```

9. The C-Guard™ then checks if the sensor output is within the allowable range for the given concentration of calibration gas.

10. If the sensor output is not within the allowed range, the C-Guard™ is forced into **Calibration Required Mode**. The yellow “Zero” and red “Span” LED’s will flash quickly in this mode.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>FAST FLASHER</td>
<td>FAST FLASHER</td>
</tr>
</tbody>
</table>
```

11. If the sensor output is within the allowed range, the C-Guard™ will enter an isolated mode while the sensor stabilises for a time dependent on the sensors T90 time. This allows the user to remove the Span calibration gas and for the sensor to return to its zero point. The green “Run” LED will flash slowly during this time.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOW FLASHER</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>
```

12. After the T90 timeout expires, the C-Guard™ will return to **Normal Running Mode** with the green “Run” LED turned constantly on.

```
<table>
<thead>
<tr>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>
```
3.6 Test Mode
Test mode is used to test the gas monitoring system to ensure the controller activates when the C-Guard™ indicates a high reading. When in this mode the C-Guard™ sets the loop output to 12mA to indicate 50% of full scale. To activate Test Mode:

1. The C-Guard™ should initially be in **Normal Running Mode** with the green “Run” LED turned on constantly.

   ![Image of LED states](image1)

2. Using a magnet, swipe the front of the unit to enter **Zero Calibration Mode**. The green “Run” LED will flash slowly for 5 seconds.

   ![Image of LED states](image2)

3. Swipe the unit with a magnet again 3 times during these 5 seconds and the detector will enter **Test Mode**. The green “Run”, yellow “Zero” and red “Span” LED’s will all flash quickly in this mode.

   ![Image of LED states](image3)

4. If you do not swipe the unit 3 times within the 5 seconds, the detector will automatically enter **Zero Calibration Mode**.

5. The detector will remain in **Test Mode** for 5 minutes, or until the user swipes the C-Guard™ once again with a magnet. It will then return to **Normal Running Mode** with the green “Run” LED on constantly.

   ![Image of LED states](image4)
4. **Advanced Setup**

One of the key features of the C-Guard™ is its ability to be easily serviced and calibrated in the field. The unit will need to be calibrated and/or reconfigured if you are performing any of the following tasks:

- Replacing a PCB
- Replacing a sensor
- Changing to a different sensor
- Scheduled calibration or maintenance
- Reactivation after prolonged shutdown

All of the C-Guard™ calibration values are stored in the non-volatile memory, but as no monitoring of the sensor operation is performed during the shutdown period, the sensor might have been poisoned and might not respond as expected.

4.1 **Changing the PCB or Sensor**

1. Isolate the sensor back at the control panel so an open circuit fault will not trip or create any alarms.
2. Open the enclosure as outlined earlier in the manual.
3. Turn over the lid and remove the green power connector and the C-Guard™ will power down.

4. Move to a clean location
5. Gently remove the 4 Phillips head screws holding the PCB in place

6. Gently remove the PCB which will expose the sensor.

7. If you are replacing the PCB, gently remove the sensor and install it into the new PCB. The sensor will pull apart from the PCB. (Take note of orientation of pins to help on the reinstallation of new sensor – it must go in the correct way to work)

8. If you are replacing the sensor, remove the old sensor and plug in the new one. Confirm the new sensor is the same as the old sensor.

9. The C-Guard™ supports 2 pin sensors such as part number 65-8001-ECO as well as 3 pin sensors. The diagram below shows how the different sensors are plugged into the PCB.
10. Gently press the new sensor back into place.

11. If replacing a sensor, you should also replace the sensor filter and gasket at the same time.

12. The sensor filter and gasket need to be ordered separately to the sensor.

**NOTE:** The sensor filter part number is 33-1020 and the gasket part number is 07-1020
13. Remove the old gasket with a small screw driver. The gasket has double-sided tape holding the filter and gasket in place.

14. Fit new gasket and filter the same way as previously fitted. Use the sticky side to stick to the plastic enclosure.

15. Gently fit the PCB with new sensor back onto the lid and gently tighten the 4 Phillips head screws until the PCB comes flush with the mounting posts.

16. If you have just replaced the PCB, or have replaced the sensor with a different model, skip to the next section as the PCB may need some rotary switch settings changed.

17. If you are replacing the sensor with the exact same model as previous, the enclosure can be screwed back together as follows.

18. Reconnect the power socket to the PCB and ensure the unit powers up.

19. Fit the lid and tighten the 4 Phillips head screws tightening the housing evenly.

20. Recalibrate the sensor as described earlier in this manual.
4.2 Sensor Selection Rotary Switch

If fitting a replacement PCB or changing the sensor to a different model, there is a rotary switch that may need adjustment.

1. Isolate the sensor back at the control panel so an open circuit fault will not trip or create any alarms.
2. Open the enclosure as outlined earlier in the manual.

3. Using a small flat blade screwdriver, make sure the rotary switch is pointing to the correct position as outlined in the following table:

<table>
<thead>
<tr>
<th>Rotary Position</th>
<th>Gas</th>
<th>Range</th>
<th>Calibration Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CO</td>
<td>100ppm</td>
<td>100ppm</td>
</tr>
<tr>
<td>1</td>
<td>CO</td>
<td>150ppm</td>
<td>100ppm</td>
</tr>
<tr>
<td>2</td>
<td>CO</td>
<td>200ppm</td>
<td>100ppm</td>
</tr>
<tr>
<td>3</td>
<td>NO₂</td>
<td>10ppm</td>
<td>5ppm</td>
</tr>
<tr>
<td>4</td>
<td>NO₂</td>
<td>20ppm</td>
<td>10ppm</td>
</tr>
<tr>
<td>5</td>
<td>H₂S</td>
<td>100ppm</td>
<td>25ppm</td>
</tr>
<tr>
<td>6</td>
<td>HCN</td>
<td>100ppm</td>
<td>10ppm</td>
</tr>
<tr>
<td>7</td>
<td>SO₂</td>
<td>10ppm</td>
<td>5ppm</td>
</tr>
<tr>
<td>8</td>
<td>NH₃</td>
<td>100ppm</td>
<td>25ppm</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. The following sensors are supported in the C-Guard™:

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
<th>Maximum Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-8001-ECO</td>
<td>CO Sensor 0-500ppm cell ECO-SURE 2 pin</td>
<td>1000ppm</td>
</tr>
<tr>
<td>65-8001-4CF</td>
<td>CO Sensor 0-500ppm cell 3 pin</td>
<td>1000ppm</td>
</tr>
<tr>
<td>65-8004-4ND</td>
<td>NO2 Sensor 0-20ppm cell</td>
<td>200ppm</td>
</tr>
<tr>
<td>65-8008-4HS</td>
<td>H2S Sensor 0-100ppm cell</td>
<td>500ppm</td>
</tr>
<tr>
<td>65-9094-HCN-4</td>
<td>HCN Sensor 0-100ppm cell</td>
<td>200ppm</td>
</tr>
<tr>
<td>65-8003-4S</td>
<td>SO2 Sensor 0-10ppm cell</td>
<td>50ppm</td>
</tr>
<tr>
<td>65-9094-NH3-5</td>
<td>NH3 Sensor 0-100ppm cell</td>
<td>500ppm</td>
</tr>
</tbody>
</table>
# APPENDIX I. LED Indicator Summary

The front panel contains three LED indicators which show the status of the unit as follows:

<table>
<thead>
<tr>
<th>LED State</th>
<th>Detector State</th>
<th>Loop Current</th>
<th>State Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green LED Flashing Slowly</td>
<td>RUN (SLOW FLASHING)</td>
<td>ZERO OFF</td>
<td>SPAN OFF</td>
</tr>
<tr>
<td>Green LED On</td>
<td>RUN</td>
<td>ZERO OFF</td>
<td>SPAN OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green LED Flashing Slowly</td>
<td>RUN (SLOW FLASHING)</td>
<td>ZERO OFF</td>
<td>SPAN OFF</td>
</tr>
<tr>
<td>All LED’s On</td>
<td>RUN</td>
<td>ZERO ON</td>
<td>SPAN ON</td>
</tr>
<tr>
<td>Yellow LED Flashing Slowly</td>
<td>RUN</td>
<td>ZERO SLOW FLASHING OFF</td>
<td>SPAN OFF</td>
</tr>
<tr>
<td>Yellow LED On</td>
<td>RUN</td>
<td>ZERO ON</td>
<td>SPAN OFF</td>
</tr>
<tr>
<td>Red LED Flashing Fast</td>
<td>RUN</td>
<td>ZERO OFF</td>
<td>SPAN FAST FLASHING</td>
</tr>
<tr>
<td>Red LED Flashing Slowly</td>
<td>RUN</td>
<td>ZERO OFF</td>
<td>SPAN SLOW FLASHING</td>
</tr>
</tbody>
</table>

© 2011 Gastech Australia Pty Ltd
Page 24
<table>
<thead>
<tr>
<th>LED Status</th>
<th>RUN</th>
<th>ZERO</th>
<th>SPAN</th>
<th>Description</th>
<th>Current</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red LED On</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>Adjusting the calibration parameters after a successful calibration.</td>
<td>4mA</td>
<td>2 seconds</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green &amp;</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>No calibration gas or sensor response was detected during the last attempted</td>
<td>4mA</td>
<td>20 to 200</td>
</tr>
<tr>
<td>Red LED’s</td>
<td>SLOW</td>
<td>OFF</td>
<td>SLOW</td>
<td>Span Calibration</td>
<td></td>
<td>seconds</td>
</tr>
<tr>
<td>Flashing</td>
<td>SLOW</td>
<td>OFF</td>
<td>SLOW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slowly</td>
<td>SLOW</td>
<td>OFF</td>
<td>SLOW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green LED</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>Waiting for sensor to come back online after span calibration, the time</td>
<td>4mA</td>
<td>20 to 200</td>
</tr>
<tr>
<td>Flashing</td>
<td>SLOW</td>
<td>OFF</td>
<td>SLOW</td>
<td>required depends on the sensor type.</td>
<td></td>
<td>seconds</td>
</tr>
<tr>
<td>Slowly</td>
<td>SLOW</td>
<td>OFF</td>
<td>SLOW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red &amp;</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>Fault condition: Calibration required or the detector failed to calibrate</td>
<td>3.5mA</td>
<td>Continuous</td>
</tr>
<tr>
<td>Yellow</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td>during the last attempt to calibrate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED’s</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flashing</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green,</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>System Test Mode, the loop output is locked to 12mA to test the controller</td>
<td>12mA</td>
<td>5 mins</td>
</tr>
<tr>
<td>Yellow &amp;</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td>as if gas is present. Swipe faceplate to return to running mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red LED’s</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flashing</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast</td>
<td>OFF</td>
<td>FAST</td>
<td>FAST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No LED’s</td>
<td>RUN</td>
<td>ZERO</td>
<td>SPAN</td>
<td>Power failure or PCB failure</td>
<td>0mA</td>
<td>Continuous</td>
</tr>
<tr>
<td>On</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© 2011 Gastech Australia Pty Ltd
A variety of spare parts are available for the C-Guard™ unit.

<table>
<thead>
<tr>
<th>Number</th>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>29-1020</td>
<td>Lexan C-Guard</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>81-1125</td>
<td>Cal Plug D-Guard, C-Guard (Not included in supply)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>21-1020</td>
<td>C-Guard housing set Lid and Base</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>33-1020</td>
<td>Filter 21mm Polypropylene Disc each MyGuard +C-Guard</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>07-1020</td>
<td>Gasket, Sensor 21mm MyGuard, C-Guard</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>65-8001-ECO</td>
<td>CO Sensor 0-500ppm cell ECO-SURE (CO versions only)</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>57-1020</td>
<td>C-Guard PCB fully populated</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>10-1020</td>
<td>Screw 10mm x 3mm coarse thread C-Guard pack of 4</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>18-7000-16</td>
<td>Cable Gland non EXD M16 white C-Guard</td>
</tr>
</tbody>
</table>
APPENDIX III. Specifications

Note: Specifications subject to change without any notice.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gases</td>
<td>Carbon Monoxide (CO), Hydrogen Sulphide (H₂S), Nitrogen Dioxide (NO₂), Oxygen (O₂)</td>
</tr>
<tr>
<td>Response time</td>
<td>90% full response time as determined by the sensor T90 specification plus the time delay as a result of the averaging sensor output typically, less than 30 seconds.</td>
</tr>
<tr>
<td>Signal</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td>Voltage input</td>
<td>24 VDC nominal (10-30 VDC)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20° to +55°C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 to 95% RH non-condensing</td>
</tr>
<tr>
<td>Enclosure IP rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Dimensions</td>
<td>140mm x 125 x 55mm Including standard cable gland and mounting lugs</td>
</tr>
<tr>
<td>Weight</td>
<td>250g</td>
</tr>
</tbody>
</table>