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GDA 3100
Refrigerant Gas Detector
Operating Manual

Manual Revision: 1.5
Hardware Version: 5.6

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This manual contains information about the method of installation, simple maintenance and troubleshooting of the GDA 3100 gas sensor. Please read it carefully and keep it nearby for further reference.

Note:

The calibration period for a sensor will depend on a number of factors such as the environment in which it is used, operating temperature, humidity, atmospheric pressure and environmental pollutants.

In all cases we recommend sensors are calibrated in line with target market legislation.

In order for these sensors to maintain operational efficiency and performance it is recommended that the sensors are functionality tested on 6 monthly periodic cycle.

Calibration should be carried out every 3 years, to ensure the sensors reliability, by fully trained and authorised technicians approved by GDA.

WARNINGS

The GDA 3100 sensors use critically aligned optical benches and should not be subjected to vibration or mechanical shock. Handle with care.

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1. Overview

1.1. Precautions

To avoid instrument damage and potential dangerous accident; do not use this product before reading the manual.

1.2. Introduction

This sensor/controller detects generally used refrigerant gases within Australia (R22, R123, R134a, R404, R407, R410 etc) within the range 0-1000ppm via diffusion. Each sensor is factory calibrated to a specific gas type and output type and range. It has an analog output which can be one of the following, 4-20mA; 0-20mA; 0-5V; 0-10V. There is also a volt free relay which can be user programmed to operate anywhere within the sensor range. The unit is powered and calibrated to $24V_{DC}$.

[Figure 1. GDA 3100 Dimensions]

1.3. Specifications

Model	GDA 3100
Detectable Gases	Refrigerant (R22, R123, R134a, R404a, R407c, R410a, etc) user specified
Detectable Gas Ranges	0-1000ppm
Detection Type	Diffusion
Sensor Technology	Non Dispersive Infra-Red (NDIR), Dual Wavelength
Response Time	T90 = 45 seconds at STP
Accuracy of Reading	1% Full Scale
Warm Up Time	<2 minutes, Sensor Accurate After: <30 minutes
Zero Drift	2% Full scale p.a
Calibration Drift	2% Full Scale p.a
Calibration Requirement	2 years
Operating Voltage	+12 to 32 V_{DC} ($24V_{DC}$ Recommended)
Output Type	0-20 mA, 4-20 mA, 0-5 V, 0-10 V (4-20 mA Default)
Power Consumption	<300 mW (average)
Connection	4 pin plug connector and 3 screw down Relay contacts NC, NO, C (volt free)
Wiring	3 core cable with overall screen, Screen to be connected to earth at control unit end only
Output Specifications	4-20 mA max 1K at $24V_{DC}$ supply (4-20 mA); Voltage: i/p Z for voltage o/p options 10K > Relay NC NO Comm. 1A at $24V_{DC}$
Default Gas Relay Alarm Point	500 ppm
Operating Temperature	-20 to 40°C (applications below 10°C low temperature version required Order No. 3100-0x-LT)
Operating Humidity	5% to 95% RH peak non condensing
Operating Pressure	800 to 1200 mbar
Cable Entry	User defined
Mounting Height	Approximately 300mm from floor (Ref gas heavier than air)
Enclosure Material	ABS plastic
Dimensions	116 x 130 x 72 mm (L, W, D) Mounting holes 104 x 75 mm
Weight	300g
IP Rating of Enclosure	IP40

[Table 1. GDA 3100 Specification]

Note: The sensor requires a peak current of 400mA at $24V_{DC}$ with a repetition rate of 250msec, please ensure the external power supply can meet this demand.

Sensor Placement

The sensor is suitable for indoor use only. If it is going to be used in external environments seek specialist advice from GDA.

Refrigerant gas is heavier than air, the sensor GDA 3100 should be mounted approximately **300mm from the floor**. Mount the sensor as close as possible to where the leak of the refrigerant gas being detecting may occur as the distance from a potential leek effects the time taken to detect it. The further from the potential leeks the more the gas will be diluted.

Take into account drafts and air movements when mounting the sensor.

The sensor should NEVER be mounted with the sensor head pointing upwards. As gas can pool in the sensor and cause constant high or false readings.

[Figure 2. Sensor Mounting orientations]

* Other mounting orientations are possible but will require recalibration for that position.

DO NOT EXPOSE THE SENSOR FACE TO DIRECT WATER DROPLETS OR CONDENSING ATMOSPHERES

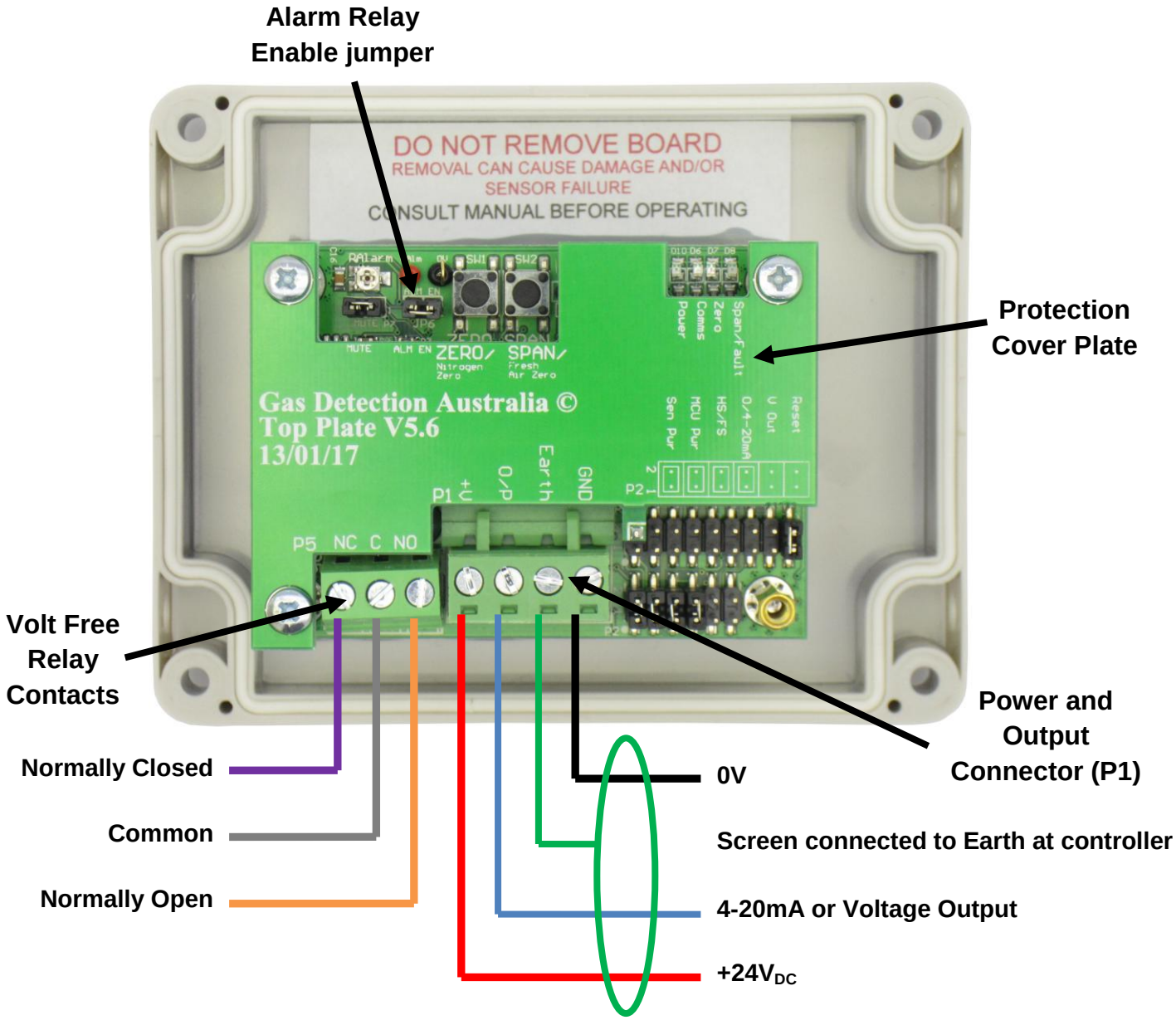
These sensors use critically aligned optical benches and should not be subjected to vibration or mechanical shock. Handle with care.

2. Wiring Instructions

The sensor electrical connection is on the rear of the faceplate via a 4 pin polarised plug on the PCB. A 3 core cable with an overall screen with current carrying capability to suit the length of cable run, Screen must be connected to the Earth connection on the connector P1.

The Protection Cover Plate is used to protect the main PCB from most cases of static shock during installation, please keep this plate on at all time during installation process.

See Table 3. on pg 10 for sensor output configuration.



[Figure 3. Sensor Wiring Diagram]

3. Operation

When power is applied the sensor goes through a power up procedure as detailed below. Please note that the current or voltage o/p is **not valid for approximately 30sec - 2 minutes from the power being applied**. During the 2 minute power up the current/voltage output of the GDA 3100 may reach the full scale of the set output. Ensure that this does not affect external equipment.

LED	State	Function
	ON	Power is present
	OFF	Power is not present
	LEDs CHASE	Sensor is in its initialisation period (approx 30 secs but in some sensors this can be 1-2 seconds) during this period the 4-20mA o/p is 1.2mA
	YELLOW ON , BLUE FLASHING	The sensor is in its warm up period (approx 30 sec to 2 mins) during this period the sensor o/p is 1.2mA
	FLASHING	**Normal operation** the sensor has stabilised and the 4-20mA reflects the amount of gas present
	ON	This indicates a fault associated with the sensor. The o/p current is reduced to 1.2mA

[Table 2. LED status]

LED Indicator Colours: 

[Figure 4. Status LED Location]

4. Sensor Output Operation

4.1. Current or Voltage Configuration

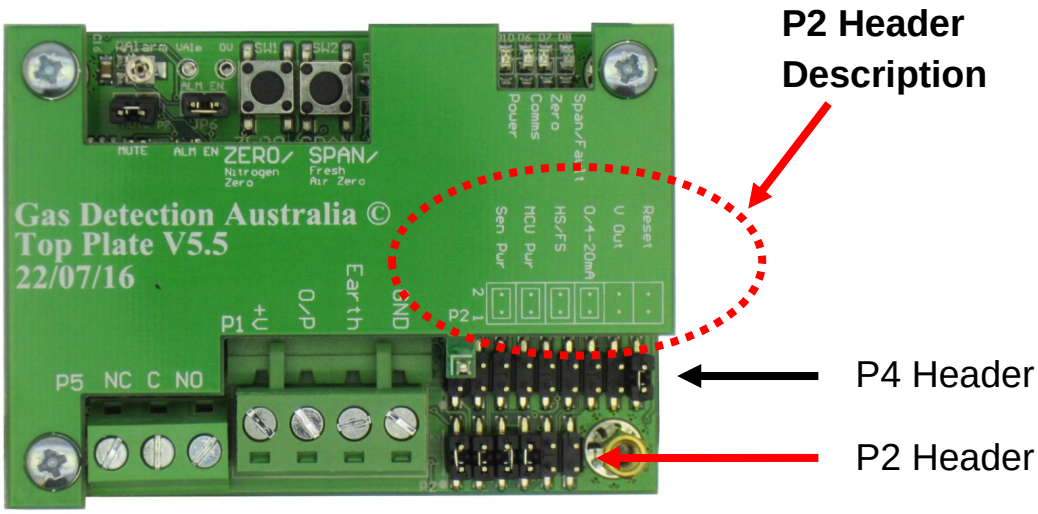
This output will generate a current or voltage output reflecting the full scale of the sensor. This output is factory set and calibrated to the user's specified requirements at point of purchase. If an output type was not specified by the user at time of purchase the default setup is set and calibrated to 4-20mA. This is user adjustable out in field but will not be as accurate to what it was originally calibrated to from factory.
The 4-20mA will drive into a maximum of 680Ω load impedance (line and input impedance) at $24V_{DC}$.

Voltage mode accuracy is dependent on the amount of signal lost due to line lose of cable. For long distances it is recommended that Current mode is used with a terminating resistor of appropriate value for the voltage range required.

Be cautious when handling the GDA 3100 as there are delicate components that can easily be damaged by static discharge. Always observe anti static precautions.

To change the output option:

1. Isolate the GDA 3100 by removing the incoming power source connector (P1) from the rear of the board
2. Adjust jumper pins to the desired output configuration (see Table below)
3. Ensure controller is configured for the changed output option
4. Revert to normal operation



P2 Header Jumper Location: 1 2 3 4 5 6

[Figure 5. Status LED Location]

Output Type	P2 Jumper Configuration (IN or OUT)					
P2 Jumper Location	**1** Sen Pwr	**2** MCU Pwr	**3** HS/FS	**4** 0/4-20mA	**5** V Out	**6** Reset
4-20 mA (Default)	**IN**	**IN**	**IN**	**IN**	OUT	OUT
0-20 mA	**IN**	**IN**	**IN**	OUT	OUT	OUT
0-5 V	**IN**	**IN**	OUT	OUT	**IN**	OUT
0-10 V	**IN**	**IN**	**IN**	OUT	**IN**	OUT

[Table 3. Output Configuration]

4.2. Relay Switching O/P on Alarm Configuration

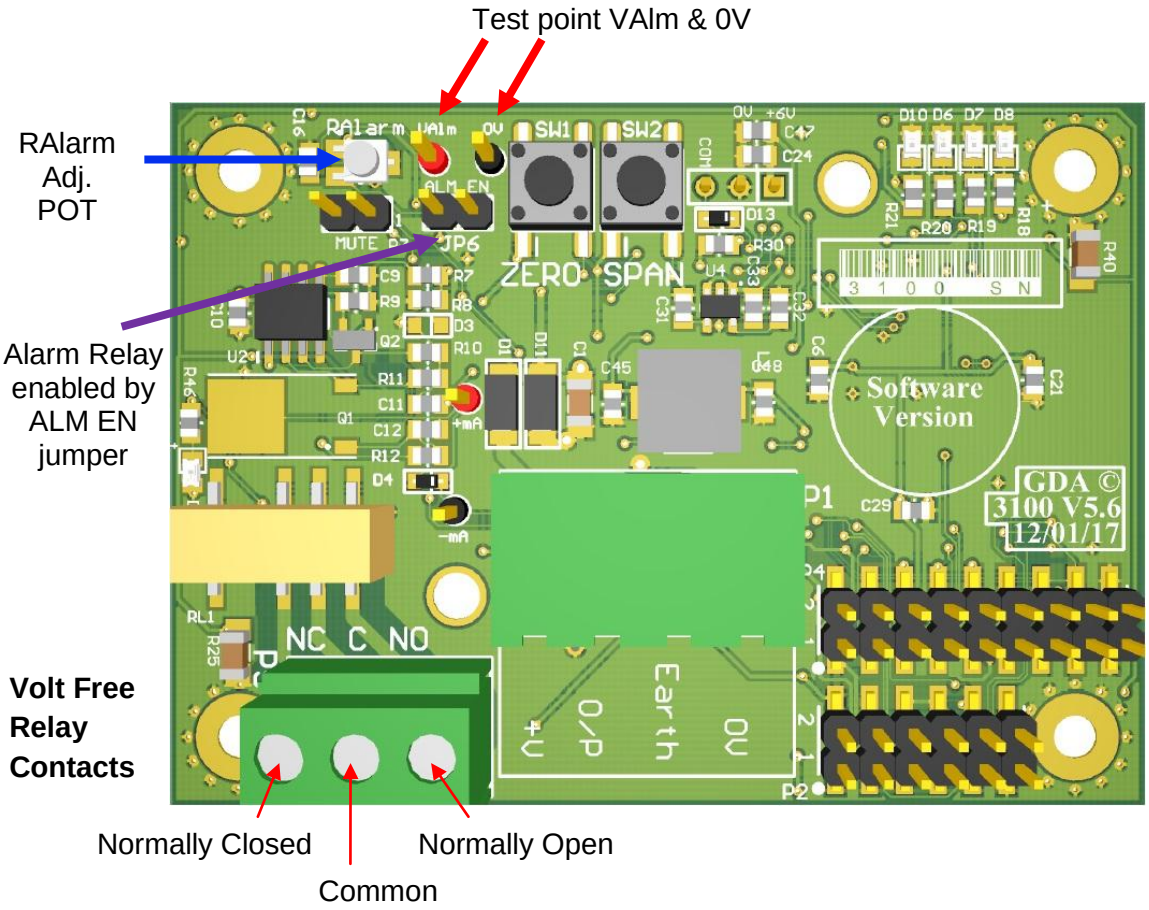
This output will operate a relay that actives when the set alarm point is triggered by an increased gas concentration. From factory the default set alarm point is 500ppm or set to the value requested by the user at purchase. The alarm point is user adjustable.
Be cautious when handling the GDA 3100 as there are delicate components that can easily be damaged by static discharge. Always observe anti static precautions.

The Alarm Relay is factory set to enabled by ALM EN jumper in, remove ALM EN jumper to disable Alarm Relay.

If the "MUTE" link is in it will mute the add on buzzer board, GDA 3160 only.

To set the relay activation alarm point:

1. Remove the GDA 3100 from the wall to access the back of the sensor unit;
2. Place a volt meter between test points VAlm & 0V;
3. Adjust “RAlarm” POT with a small screw driver, to the calculated voltage corresponding to the desired alarm point (see formula information below); and
4. Revert to normal operation.



[Figure 6. Alarm Relay configuration]

4.2.1. Refrigerant Gas Relay Alarm Point Formula

The voltage seen across the test points VAlm and 0V is calculated by inserting the alarm point concentration into the following equation;

Alarm point Concentration / 204.8 = Voltage at VAlm

Example; Alarm level set point required at 500ppm

500ppm / 204.8 = 2.44 V

1. The alarm switch point is preset with 10% hysteresis to prevent relay “chatter”;
2. The relay is non-latching and will turn off when the gas level falls to below 10% of the alarm point; and
3. The alarm relay contacts are rated 50 VDC 0.5 A non inductive. If heavier loads require switching a slave relay must be used.

5. Calibration

5.1. Functional testing

The GDA 3100 are factory calibrated to 0-1000ppm of the users required target gas and are sent out with a certificate of calibration stating target gas information.

Functional testing may be carried out with a suitable test gas to ensure that the 4-20mA o/p corresponds with the gas level. This should be undertaken when the unit is fully assembled and using a flow rate of ~0.5L/min of the target gas. Test gas and equipment are available from Gas Detection Australia.

When in service, if the sensor falls below a minimum working standard the o/p current will fall to <3.00mA which will be detected at the control unit has a sensor fault.

5.2. Zero point Calibration

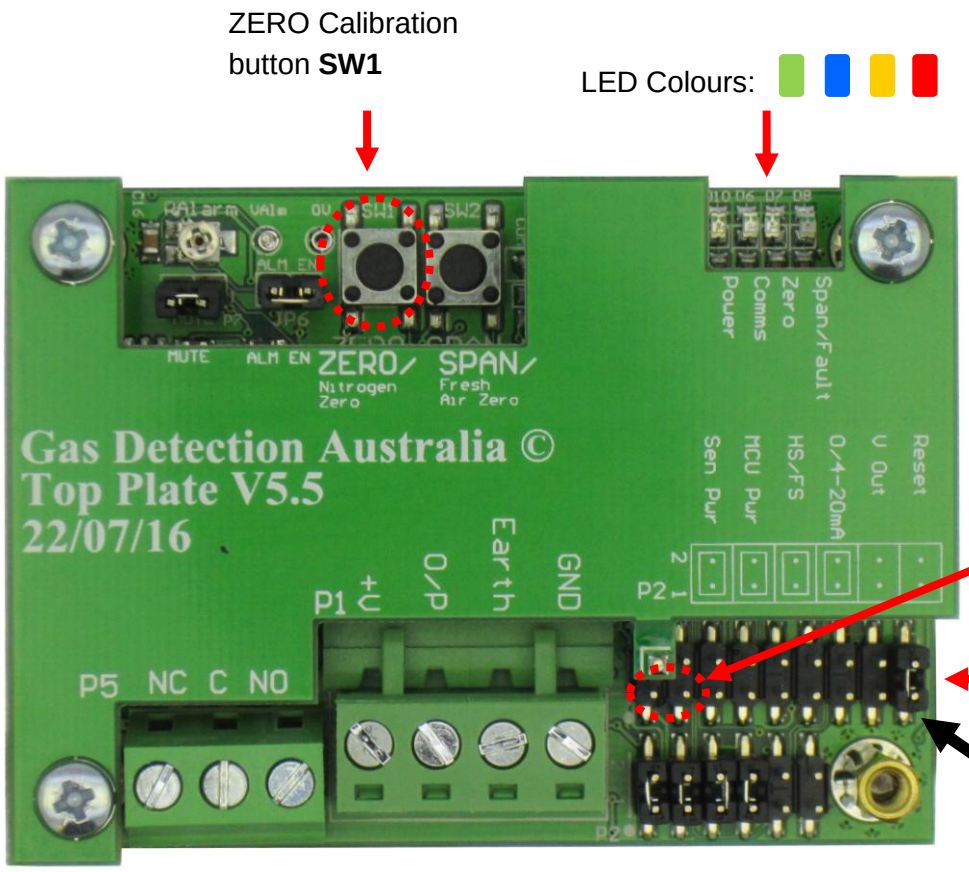
A manual zeroing of the sensor can be performed when the sensor has been powered for a minimum of one hour. The zero can be performed when the sensor is in a known fresh air, **Non refrigerant gas** environment or gassed with Nitrogen. The sensor must be in one of the three above conditions for a minimum of five minutes or until the output has reached a stable point.

To perform a manual zero:

1. Remove the GDA 3100 from the wall to access the back of the sensor unit;
2. Please ensure that the GDA 3100 is in the exact orientation as it will be when finally installed on the wall.
3. Add a jumper to pins 1 and 3 of P4 see Figure 7. (Use supplied jumper on pins 18 and 17 of P4 for Manual Calibration Mode, return jumper to this location only, see Figure 7.),
4. This enters Manual Calibration Mode (see table 4 for LED sequence);
5. Press and hold the ZERO calibration button SW1 for one second :
    a. If the zero was successful the amber LED will flash (see table for LED sequence)
    b. If the zero was not successful the yellow and red LEDs will stay on for 2sec (see table for LED sequence). Repeat step 4 after ensuring that the sensor is in fresh air and stable output.
6. When successfully zeroed remove the Manual Calibration jumper from P4 header and return to normal operation.

Mode	LED Light Sequence	
Manual CAL Mode	0.5 sec	Alternate Blinking at once per second
Performing Zero	0.5 sec	Alternate Blinking at once per second for ~ 4 sec
Zero Successful	0.1 sec	Fast Blink for ~ 2 sec
Zero Failed		Solid for > 2 sec

[Table 4. Manual calibration LED sequence]



[Figure 7. Manual Calibration setup]

Notes:

6. Revision History

Version	Contents	Date
1	Initial revision of the Manual HW: V5.6	19 Apr, 2017
1.1	Factory default alarm point revised	10 Jul, 2017
1.2	Enclosure photos and dimensions	02 Nov, 2017
1.3	Calibration description	03 Jul, 2018
1.4	Relay specifications update	12 Sep, 2018
1.5	Test and Calibration periods updated	10 Oct, 2018

This product and operating manual are subject to change without prior notice for the improvement of product performance and ease of use.

GAS DETECTION FOR AUSTRALIA

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