Gas Detection (Australia) Pty Ltd

GDA 3160

3100 V5.5 HARDWARE AND ABOVE Refrigerant Gas Detector Operating Manual



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Precautions:

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

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 24VDC.

Specifications:

| Power Requirements: | 24V~32V DC (24V recommended) | | | | | |
|--------------------------------|--|--|--|--|--|--|
| Wiring Requirements: | 3 core with 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. | | | | | |
| Power Consumption: | <300mW (average) | | | | | |
| Output Types: | 4-20mA(Standard), 0-20mA, 0-5v, 0-10v (User Specified) | | | | | |
| Target Gas: | Refrigerant (R22, R123, R134a, R404a, R407c, R410a, etc) user specified | | | | | |
| Target Gas Range: | 0-1000ppm | | | | | |
| Gas supply: | By diffusion (atmospheric pressure) | | | | | |
| Alarm Relay: | Adjustable alarm level with on board buzzer, 5 second alarm validation period | | | | | |
| Fault/ Alarm Warning: | Fault; Red LED, Alarm; Red LED and on board buzzer | | | | | |
| Operating Temperature: | 0 to 40 °C | | | | | |
| Operating Air Pressure: | 800 to 1200 hPa | | | | | |
| Operating Humidity: | 0 % to 95 % rel. humidity (not condensing) | | | | | |
| Accuracy of Reading: | 1% FS ⁽¹⁾ | | | | | |
| Sensor Start Up Time: | <2 minutes | | | | | |
| Sensor Accurate After: | <30 minutes | | | | | |
| Response Time: | Approx. 30secs | | | | | |
| Zero Drift: | ≤2% FS ⁽¹⁾ p.a | | | | | |
| Span Drift: | ≤2% FS ⁽¹⁾ p.a | | | | | |
| Enclosure Size: | Clipsal single gang switch plate (116 x 76mm) | | | | | |
| | In wall dimensions 73 x 53 x 48 (L, W, D) | | | | | |

Note: 1. FS = Full Scale

The sensor requires a peak current of 400mA at 24V DC with a repetition rate of 250msecs, please ensure the external power supply can meet this demand.

Installation:

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

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.

IT IS VERY IMPORTANT THAT THE GDA 3160 IS INSTALLED IN THE MOST UPRIGHT POSITION AGAINST VERTICAL STRUCTURE



GDA 3160 SENSOR INSTALLATION 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.

Electrical installation:

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.



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 3160 may reach the full scale of the set output. Ensure that this does not affect external equipment.

| LED | STATE | FUNTION |
|-----|------------------------------|--|
| | 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 |

LED Indicators Location:

Colours:





Output Operation:

Current or Voltage 0-20mA, 4-20mA, 0-5V, 0-10V 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.

Be cautious when handling the GDA 3160 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 3160 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 output is configured for the changed output option
- 4. Revert to normal operation



| Output Type | P2 Jumper Configuration | | | | | | |
|--------------------|-------------------------|-----------------|-------------------|------------------|------------|-------------------|--|
| P2 lumper location | 1 Sen | 2 MCU | 3 HS/FS | 4 0/4- | 5 V Out | 6 Reset | |
| | Pwr | Pwr | | 20mA | | | |
| 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 | |

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 100ppm or set to the value requested by the user at purchase. The alarm point is user adjustable.

Be cautious when handling the GDA 3160 as there are delicate components that can easily be damaged by static discharge. Always observe anti static precautions.

Ensure that the alarm enable jumper (Orange) is on JP6.

(The alarm enable jumper has been factory set to on for ver 5.5.)

If the "*MUTE*" link (**Purple**) is in it will mute the on board buzzer. If the optional mute button is installed the on board buzzer can be muted by pressing the button which is located on the front panel (see location of the mute button in the picture on page 4).

To set the relay activation alarm point:

1. Remove the GDA 3160 from the wall to access the back of the sensor unit;

2. Place a volt meter between test points 1 & 2 (RED);

3. Adjust "RAlarm" POT (**BLUE**) 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.



Refrigerant Gas Relay Alarm Point Formula:

Vin = Alarm point Concentration / 204.8 *Example; Alarm level set point required at 250ppm 250/204.8= 1.22 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 Vpc 0.5 A non inductive. If heavier loads require switching a slave

3. The alarm relay contacts are rated 50 V_{DC} 0.5 A non inductive. If heavier loads require switching a slave relay must be used.

Calibration:

The GDA 3160 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.

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 3160 from the wall to access the back of the sensor unit;

2. Add a jumper to pins 1 and 3 of **P4** see picture below, This enters Manual Calibration Mode (see table for LED sequence);

3. Press and hold the ZERO calibration button **SW1** for one second (see table for LED sequence):

- If the zero was successful a short beep will be heard (see table for LED sequence)
- If the zero was **not** successful a two sec beep will be heard (see table for LED sequence). Repeat step 3 after ensuring that the sensor is in fresh air and stable.

4. When successfully zeroed remove the Manual Calibration jumper from header **P4** 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 | |





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| Notes | |
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Gas Detection (Australia) Pty Ltd



Gas Detection (Australia) Pty Ltd is a Queensland-based company specialising in the design and manufacture of gas sensor and gas detection systems.

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