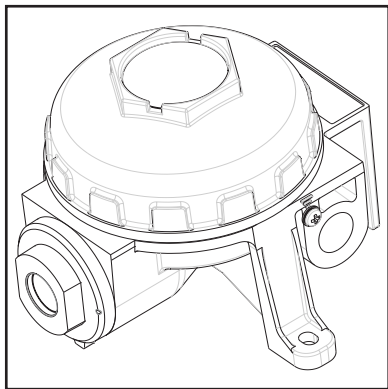


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# **Xgard IR**

## **Gas Detector**

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## **Installation, operating and maintenance instructions**

**M07648**  
Issue 1 June 2007



## Safety information

- **Xgard IR** gas detectors must be installed, operated and maintained in strict accordance with these instructions, warnings, label information, and within the limitations stated.
- The lid on **Xgard IR** must be kept tightly closed until power to the detector is isolated otherwise ignition of a flammable atmosphere can occur. Before removing the cover for maintenance or calibration purposes, ensure the surrounding atmosphere is free of flammable gases or vapours.
- Maintenance and calibration operations must only be performed by qualified service personnel.
- Only genuine Crowcon replacement parts must be used, substitute components may invalidate the certification and warranty of the detector.
- **Xgard IR** detectors must be protected from extreme vibration, and direct sunlight in hot environments as this may cause the temperature of the detector to rise above its specified limits and cause premature failure.
- This equipment must not be used in a Carbon Disulphide atmosphere.
- **Xgard IR** will not detect hydrogen.

### Hazardous area classifications:

- Zone 0: An area classified as Zone 0 will have ignitable concentrations of flammable gases, vapours or liquids either continuously present or present for long periods of time under normal operating conditions. Intrinsically Safe (Exia) detectors are suitable for use in Zone 0, provided they are connected via a suitable zener barrier or galvanic isolator.
- Zone 1: An area classified as Zone 1 is likely to have ignitable concentrations of flammable gases, vapours or liquids present under normal operating conditions. Flameproof (Exd) detectors are suitable for use in Zone 1. Intrinsically Safe (Exia) detectors are suitable for use in Zone 1, provided they are connected via a suitable zener barrier or galvanic isolator.
- Zone 2: An area classified as Zone 2 is not likely to have ignitable concentrations of flammable gases, vapours or liquids present under normal operating conditions. Flameproof (Exd) detectors are suitable for use in Zone 2. Intrinsically Safe (Exia) detectors are suitable for use in Zone 2, provided they are connected via a suitable zener barrier or galvanic isolator.

#### Notes:

In North America 'Divisions' are used to categorise risk where:

Division 1 is equivalent to Zone 0 or 1

Division 2 is equivalent to Zone 2

Under European ATEX rules hazardous area equipment has been re-defined under 'equipment categories' where:

Equipment Category 1 is suitable for Zone 0

Equipment Category 2 is suitable for Zone 1

Equipment Category 3 is suitable for Zone 2

## Product overview

**Xgard IR** is an infrared gas detector, which is available in two versions for the detection of :

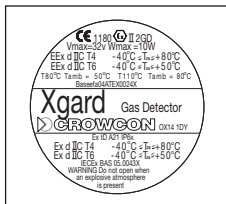
- Common hydrocarbon gases in the range 0-100%LEL.
- Carbon dioxide in the range 0-2% volume or 0-5% volume.

**Xgard IR** is a certified Flameproof (Exd) detector suitable for use in ATEX Zone 1, Zone 2, Zone 21 or Zone 22 hazardous areas.

UL certified versions are suitable for use in Division 1 or Division 2 areas.

Please refer to the certification label on the detector junction box to identify the type of certification that relates to the product supplied. Hazardous area definitions are shown in the Hazardous area classifications section on page 1.

**Note: if no certification label is fitted to the junction box, the detector is not certified for use in hazardous areas.**



ATEX certification label



Xgard UL certification label

Diagram 1: **Xgard IR** certification labels

Each version of **Xgard IR** is identified by a label fitted on the junction box body. Please quote the 'model number', 'gas range' and 'sensor type' when contacting Crowcon for advice or spares.

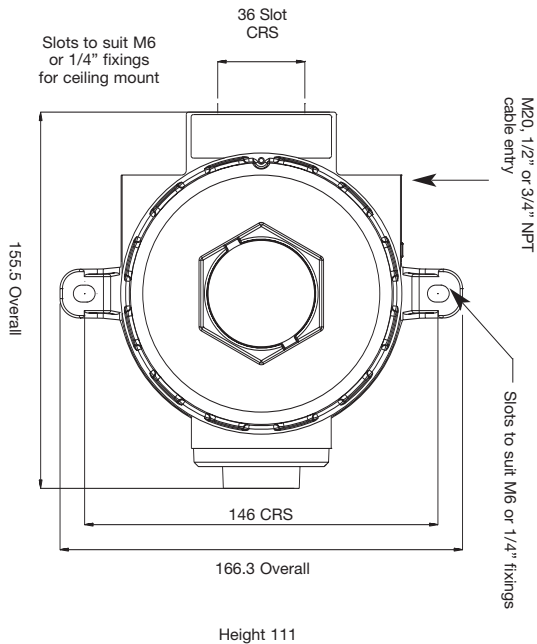
### Product description

**Xgard IR** comprises of a universal assembly to accommodate either HC or CO<sub>2</sub> IR gas sensors. The assembly comprises five main parts; the junction box, junction box lid, amplifier/terminal PCB, sensor PCB and sensor retainer. These are shown in exploded form in Diagram 3.

A cover is fitted over the amplifier PCB to provide protection when the junction box is opened. This cover is designed to allow access to all cable terminals, test points and potentiometers without the need for removal.

The junction box is manufactured from marine grade aluminium with a durable polyester coating (stainless steel option is available). The junction box is supplied with 1 x M20, ½" or ¾" NPT cable gland entry, on the right hand side for customer use. The junction box is suitable for fixing on the wall or ceiling using M6 or ¼" fixings. Cable gland adaptors are available if required (see Spare parts and accessories section).

## Overview



All dimensions in millimetres

Diagram 2: **Xgard IR** dimensioned view

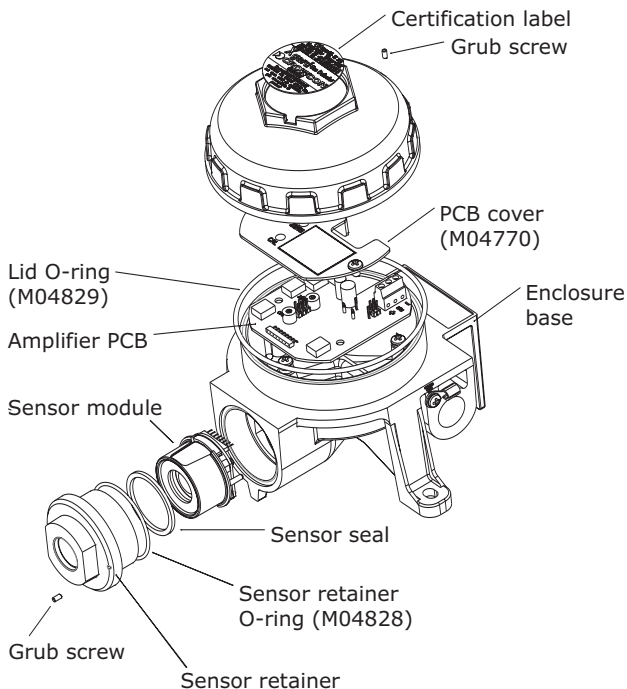


Diagram 3: **Xgard IR** exploded view (part numbers shown in brackets where applicable)

## 1.1 Flameproof flammable gas detector

**Xgard IR** is a flameproof gas detector, designed to detect hydrocarbon gases or CO<sub>2</sub>. **Xgard IR** is powered by 24 V dc (nominally) and provides a 4-20 mA signal (sink or source) proportional to the gas concentration. The detector is certified  $\text{Ex}$  II 2 GD EExd IIC T6, and is suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22 hazardous areas.

Electrical connections to the detector are made via the terminal block on the PCB shown below.

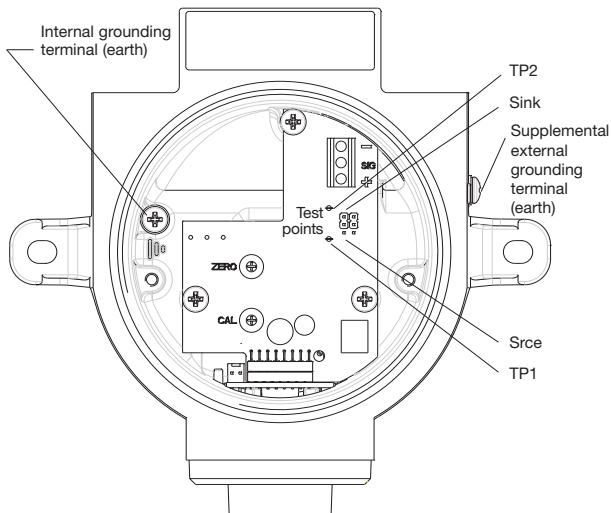



Diagram 4: **Xgard IR** PCB layout  
(Shown with PCB cover removed).



**WARNING**

This detector is designed for use in Zone 1, Zone 2, Zone 21 and Zone 22 hazardous areas, and is certified  II 2 GD EExd IIC T6. Installation must be in accordance with the recognised standards of the appropriate authority in the country concerned.

For further information please contact Crowcon. Prior to carrying out any installation work ensure local regulations and site procedures are followed.

## 2.1 Location

The detector should be mounted where the gas to be detected is most likely to be present. The following points should be noted when locating gas detectors:

- To detect gases which are lighter than air, such as methane, detectors should be mounted at high level and Crowcon recommend the use of a collector cone (**Part No. C01051**).
- To detect heavier than air gases, such as flammable vapours or CO<sub>2</sub>, detectors should be mounted at low level.
- When locating detectors consider the possible damage caused by natural events e.g. rain or flooding. For detectors mounted outdoors Crowcon recommend the use of a Spray Deflector (**Part No. C01052**).
- Consider ease of access for functional testing and servicing.
- Consider how the escaping gas may behave due to natural or forced air currents. Mount detectors in ventilation ducts if appropriate.
- Consider the process conditions. For example, butane is normally heavier than air, but if released from a process which is at an elevated temperature and/or pressure, the gas may rise rather than fall.

The placement of sensors should be determined following advice of experts having specialist knowledge of gas dispersion, the plant processing equipment as well as safety and engineering issues. **The agreement reached on the locations of sensors should be recorded.** Crowcon would be pleased to assist in the selection and siting of gas detectors.

## 2.2 Mounting

**Xgard IR** should be installed at the designated location with the sensor pointing down. This ensures that dust or water will not collect on the sensor and stop gas entering the cell. The mounting detail is shown in Diagram 2. Care should be taken when installing the detector to avoid damaging the painted surface and screw threads of the junction box and sensor retainer.

## 2.3 Cabling requirement

Cabling to **Xgard IR** must be in accordance with the recognised standards of the appropriate authority in the country concerned and meet the electrical requirements of the detector.

Crowcon recommend the use of steel wire armoured (SWA) cable and suitable explosion proof glands must be used. Alternative cabling techniques, such as steel conduit, may be acceptable provided appropriate standards are met.

**Xgard IR** requires a dc supply of 10-30 V, at up to 100 mA. Ensure there is a minimum of 10 V at the detector, taking into account the voltage drop due to cable resistance. For example, a nominal dc supply at the control panel of 24 V has a guaranteed minimum supply of 18 V. The maximum voltage drop is therefore 8 V. **Xgard IR** can demand up to 100 mA and so the maximum loop resistance allowed is 80 Ohms.

A 1.5 mm<sup>2</sup> cable will typically allow cable runs up to 3.3 km. Table 1 below shows the maximum cable distances given typical cable parameters.

C.S.A.		Resistance (Ohms per km)		Max. Distance
mm <sup>2</sup>	Awg	Cable	Loop	(km)
1.0	17	18.1	36.2	2.2
1.5	15	12.1	24.2	3.3
2.5	13	7.4	14.8	5.4

*Table 1: maximum cable distances for typical cables*

The acceptable cross sectional area of cable used is 0.5 to 2.5 mm<sup>2</sup> (20 to 13awg). **The table is provided for guidance only, actual cable parameters for each application should be used to calculate maximum cable distances.**

## 2.4 Electrical connections

All connections are made via the screw terminal block mounted on the PCB in the junction box. The terminals are marked '+', 'sig' and '-' and correct polarity should be observed when connecting the detector to control equipment. **Xgard IR** is factory set as a 'current sink' device unless otherwise specified when ordering. To reset to 'current source', open the junction box and move the two links on the amplifier PCB from the 'sink position to the 'srce' position, as shown in Diagram 4.

**Note:** The internal grounding terminal (see diagram 4) shall be used as the grounding means of the Xgard gas detector. The external grounding terminal is only to be used where local authorities permit or require such a connection. Where possible, to limit radio frequency interference, the junction box and cable armour should be grounded at the control panel (safe area) only to avoid earth loops.

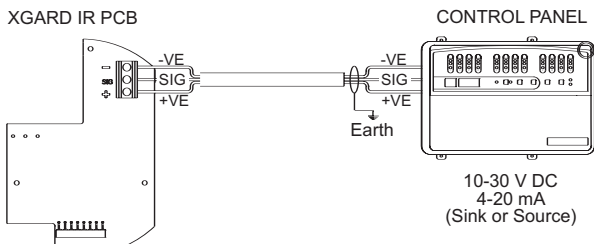


Diagram 5: **Xgard IR** electrical connections

**WARNING**

**Prior to carrying out any work ensure local regulations and site procedures are followed. Never attempt to open the detector or junction box when flammable gas is present. Ensure that the associated control panel is inhibited so as to prevent false alarms.**

**3.1 Commissioning procedure**

1. Open the junction box of the detector by unscrewing the lid in an anti-clockwise direction (having loosened the retaining grub-screw first).
2. Check that all electrical connections have been made and are correct, as shown in Diagram 5.
3. Measure the voltage across the '+' and '-' terminals and check a minimum supply of 10 V d.c. is present.
4. Leave the detector to stabilise for at least 45 minutes.
5. To zero the detector, connect the DVM to the test points marked 'TP1' and 'TP2' on the amplifier PCB, as shown in Diagram 4.

Note: At the test points, Zero will read 40 mV = 4 mA.

Full scale deflection will read 200 mV = 20 mA. There is a current clamp of 25 mA on the 4-20 mA output.

**Zeroing the detector**

6. **Ensure you are in clean air.** Adjust the 'ZERO' pot on the amplifier (which is accessible via a hole in the PCB cover) until the DVM reads 40 mV. Check that the control equipment display reads zero.

**Calibrating the detector**

7. Apply calibration gas (concentration should ideally be at least 50% of full scale concentration) to the detector at a flow rate of 0.5–1 litre/minute via a flow adaptor (**Part No. C03005**). Contact Crowcon for the supply of calibration gas.
8. Allow the gas reading to stabilise (usually 30 to 60 seconds) and adjust the 'CAL' pot until the DVM reads the appropriate reading (eg for a hydrocarbon gas detector 120 mV = 12 mA = 50% LEL). If the concentration of the calibration gas used is not 50% of scale, the following formula can be used to calculate the reading:

$$\left( \frac{160}{\text{Range}} \times \text{Gas} \right) + 40 = \text{mV setting}$$

Example: calibrating a 0-5% CO<sub>2</sub> detector using 3% CO<sub>2</sub> test gas

$$\left( \frac{160}{5} \times 3 \right) + 40 = 136 \text{ mV}$$

9. If the control equipment display requires adjustment consult the operating manual for the equipment.
10. Remove the gas and allow the sensor to completely settle before re-checking the zero setting.
11. Close the junction box of the detector ensuring that the lid is securely tightened, and the grub-screw is secured.
12. The detector is now operational.

**Note:** ATEX Certified **Xgard IR** detectors will be supplied calibrated for compliance with EN61779 (where, for example, 100% LEL Methane = 4.4% volume). UL\CSA certified detectors will be supplied calibrated for compliance with ISO10156 (where 100% LEL Methane = 5% volume).

### 3.2 Routine maintenance

Site practices will dictate the frequency with which detectors are tested. Crowcon would recommend that detectors be gas tested at least every 6 months and re-calibrated as necessary. To re-calibrate a detector follow the steps given in 3.1.

The sinter should be inspected regularly, and replaced if it has become contaminated. A blocked sinter may prevent gas from reaching the sensor.

When performing maintenance on **Xgard IR**, ensure that the sensor retainer and junction box lid O-rings are present and in good condition to maintain the ingress protection of the product. See the 'Spare parts and accessories' section for the part numbers of replacement O-rings.

The sensor used in **Xgard IR** should provide in excess of 5 years trouble-free operation. In the event of a sensor failure, the sensor module should be replaced.

### 3.3 Changing Gas Types.

Each **Xgard IR** detector is supplied pre-calibrated for a particular type of gas (for example methane, propane or CO<sub>2</sub>). If re-calibration for a different gas type is required, the Xgard IR detector should be returned to Crowcon for modification. Please contact Crowcon for further details.



### 3.4 Sensor replacement/servicing of detectors

**Xgard IR** uses a modular design, which makes replacement of sensors, or sinters extremely simple. Replacement sensors are supplied fitted to a sensor PCB to allow simple plug-in installation. An exploded view of **Xgard IR** is given in Diagram 3. The following procedure may be followed when servicing a **Xgard IR** detector.

**WARNING**

**This work should be carried out by Crowcon or an approved service centre unless suitable training has been received.**

1. Switch off and isolate power to the detector requiring attention.
2. Open the junction box of the detector by unscrewing the lid in an anti-clockwise direction (having loosened the retaining grub-screw first).
3. Unscrew the sensor retainer and remove the sensor and sensor PCB (having also removed its grub screw).
4. Fit the replacement sensor (having checked that the part number matches that stated on the detector junction box label), taking care to align the locating pins correctly with the slots in the junction box.
5. Re-fit the sensor retainer having first inspected the sinter to make sure that it has not become contaminated. Contaminated items should be replaced (see Spare Parts section for replacement part numbers), as any blockages may result in slow sensor response to gas, and reduced sensitivity.
6. Follow the Commissioning Procedure given in 3.1.

Junction box material	A356 marine grade alloy with polyester powder coating 316 Stainless Steel (optional)
Dimensions	156 x 166 x 111 mm (6.1 x 6.5 x 4.3 inches)
Weight	Alloy: 1 kg (2.2 lbs) Stainless Steel: 3.1 kg (6.8 lbs) approx.
Operating voltage	10-30 V dc
Current consumption	67 mA @ 10 V, 50 mA @ 24 V
Output	4-20 mA Sink or Source (Selected by Links)
Fault Signal	< 3 mA
Maximum cable loop resistance	40 Ohms @ 18 V (power) +ve terminal 450 Ohms @ 18 V (signal) sig terminal Relative to -ve terminal (common)
Operating temperature	-20°C to +55°C (-4°F to +131°F)
Humidity	0-95% RH, non condensing
Degree of protection	IP65, IP66 (when fitted with a weatherproof cap)
Explosion protection	Flameproof
Approval code	ATEX  II 2 GD EExd IIC T6 Tamb = -40°C to 50°C ATEX  II 2 GD EExd IIC T4 Tamb = -40°C to +80°C UL Class I, Division 1, Groups B, C & D IECEX Exd IIC T6 , Exd IIC T4
Safety certificate no.	Baseefa 04ATEX0024X and IECEX BAS05.0043X
Standards	EN50014, EN50018, UL1203
Zones	Certified for use in Zone 1 or Zone 2 (see hazardous area classifications section)
Gas groups	IIA, IIB, IIC, (UL groups B,C,D)
EMC	EN50270



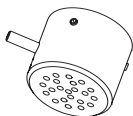
<b>Description</b>	<b>Part Numbers</b>
Sensor retainer with sinter (aluminium)	M01814
Sensor retainer with sinter (stainless steel)	M01913
Sensor seal (stainless steel retainer)	M04971
Sensor seal (aluminium retainer)	M04885
Sensor retainer O-ring	M04828
Junction box lid O-ring	M04829
Amplifier PCB	S011242/2
PCB cover	M04770
Calibration adaptor	C03005
Duct mounting kit	S011918
Spare Sensor Module	Contact Crowcon



**Accessory adaptor**  
C011061



**Spray deflector**  
C01052



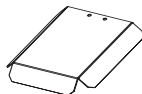
**Weatherproof cap**  
C01442



**Flow adaptor**  
C01339



**Collector cone**  
C01051



**Sun Shade**  
C011063

## Warranty

This equipment leaves our factory fully tested and calibrated. If within the warranty period of two years from Despatch, the equipment is proved to be defective by reason of faulty workmanship or material, we undertake at our option either to repair or replace it free of charge, subject to the conditions below.

### Warranty Procedure

To facilitate efficient processing of any claim, contact our customer support team on +44 (0)1235 557711 with the following information:

Your contact name, phone number, fax number and email address.

Description and quantity of goods being returned, including any accessories.

Instrument serial number(s).

Reason for return.

Obtain a Returns form for identification and traceability purpose. This form may be downloaded from our website 'crowconsupport.com', along with a returns label, alternatively we can 'email' you a copy.

**Instruments will not be accepted for warranty without a Crowcon Returns Number ("CRN"). It is essential that the address label is securely attached to the outer packaging of the returned goods.**

The guarantee will be rendered invalid if the instrument is found to have been altered, modified, dismantled, or tampered with. The warranty does not cover misuse or abuse of the unit.

Any warranty on batteries may be rendered invalid if the use of an unauthorized charger is proven. Non-rechargeable batteries are excluded from this warranty.

Warranties on sensors assume *normal* usage, and will be rendered invalid if the sensors have been exposed to excessive concentrations of gas, extended periods of exposure to gas or have been exposed to 'poisons' that can damage the sensor, such as those emitted by aerosol sprays

### Warranty Disclaimer

Crowcon accept no liability for consequential or indirect loss or damage howsoever arising (including any loss or damage arising out of the use of the instrument) and all liability in respect of any third party is expressly excluded.

This warranty does not cover the accuracy of the calibration of the unit or the cosmetic finish of the product. The unit must be maintained in accordance with the Operating and Maintenance Instructions.

The warranty on replacement consumable items (such as sensors) supplied under warranty to replace faulty items, will be limited to the unexpired warranty of the original supplied item.

Crowcon reserves the right to determine a reduced warranty period, or decline a warranty period for any sensor supplied for use in an environment or for an application known to carry risk of degradation or damage to the sensor.

Our liability in respect of defective equipment shall be limited to the obligations set out in the guarantee and any extended warranty, condition or statement, express or implied statutory or otherwise as to the merchantable quality of our equipment or its

## Warranty

fitness for any particular purpose is excluded except as prohibited by statute. This guarantee shall not affect a customer's statutory rights.

Crowcon reserves the right to apply a handling and carriage charge whereby units returned as faulty, are found to require only normal calibration or servicing, which the customer then declines to proceed with.

For warranty and technical support enquiries please contact:

**Customer Support**

**Tel +44 (0) 1235 557711**

**Fax +44 (0) 1235 557722**

**Email [warranty@crowcon.com](mailto:warranty@crowcon.com)**

### **UK Office**

**Crowcon Detection Instruments Ltd,**  
2 Blacklands Way,  
Abingdon Business Park,  
Abingdon,  
Oxfordshire OX14 1DY, UK  
Tel: +44 (0)1235 557700  
Fax: +44 (0)1235 557749  
email: sales@crowcon.com  
internet: <http://www.crowcon.com>

### **USA Office**

**Crowcon Detection Instruments Ltd,**  
21 Kenton Lands Road  
Erlanger  
Kentucky 41018-1845  
USA  
Tel: +1 859 957 1039 or  
1-800-527 6926  
1-800-5-CROWCON  
Fax: +1 859 957 1044  
email: salesusa@crowcon.com  
internet: <http://www.crowcon.com>

### **Rotterdam Office**

**Crowcon Detection Instruments Ltd,**  
Vlambloem 129  
3068JG, Rotterdam  
Netherlands  
Tel: +31 10 421 1232  
Fax: +31 10 421 0542  
email: eu@crowcon.com  
internet: <http://www.crowcon.com>

### **Singapore Office**

**Crowcon Detection Instruments Ltd,**  
Block 194, Pandan Loop  
#06-20 Pantech Industrial Complex  
Singapore 128383  
Tel: +65 6745 2936  
Fax: +65 6745 0467  
email: sales@crowcon.com.sg  
internet: <http://www.crowcon.com>

