CROWCON

Instructions

TXgard-IS

(Formerly RGD90 and RGD90/OX)

Intrinsically Safe Toxic and Oxygen Gas Detectors

Electrochemical and Galvanic Sensor Types Only

1. INTRODUCTION

1.1 Product overview

TXgard-IS is a 4-20 mA, loop powered, toxic gas or oxygen detector suitable for use in Zone 0, 1 or 2 hazardous areas when used with a suitable Zener barrier or galvanic isolator. TXgard-IS is designed to detect a wide range of toxic gases when fitted with the appropriate electrochemical sensor. For a list of gases which may be detected using TXgard-IS please contact Crowcon.

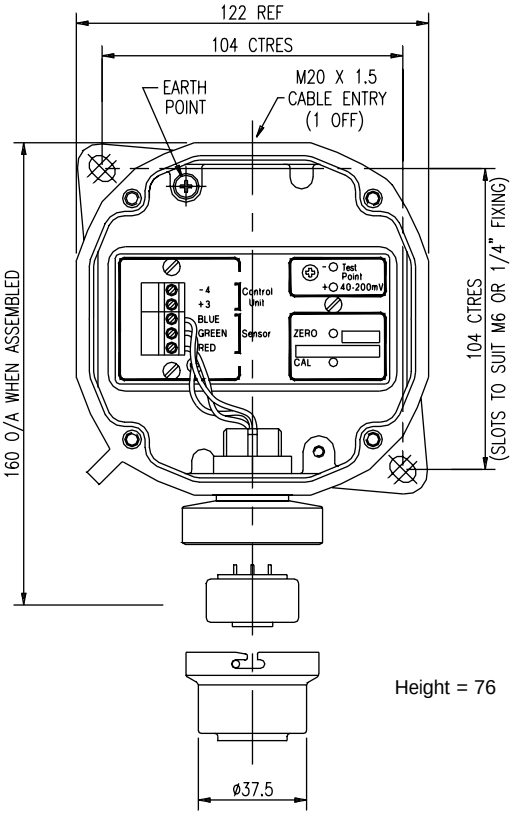

Diagram 1: *TXgard-IS fitted with bayonet type sensor housing*

1.2 Product description

TXgard-IS comprises three main parts; the sensor housing, amplifier and junction box. These are shown assembled in Diagram 1 and 2, with the junction box cover removed to show amplifier and wiring detail.

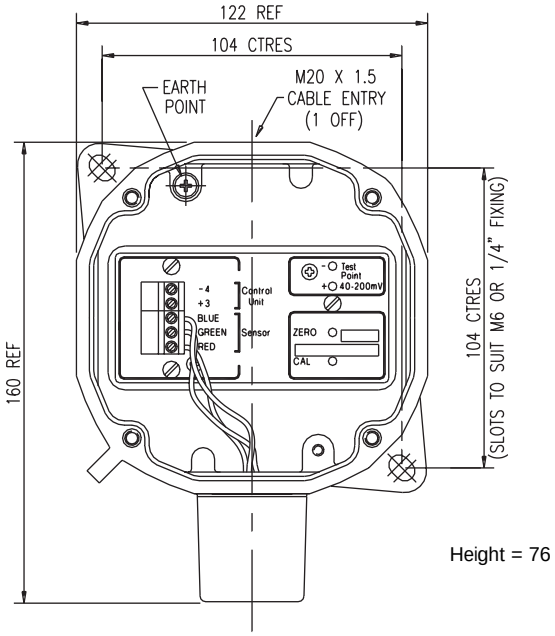

Diagram 2: *TXgard-IS fitted with disposable type sensor housing*

Two types of sensor housing may be used; a disposable type, and a reusable bayonet type. In each case the sensor housing screws into an M20 entry on the junction box.

The amplifier is mounted in an orange GRP junction box. All electrical connections to the detector are made via the terminal block on the amplifier. The amplifier provides power to the sensor and converts the gas reading into a 4-20 mA signal for connection to a control panel.

The junction box is supplied with 1 x M20 cable entry for customer use. When the detector is powered through a suitable zener barrier or galvanic isolator, the system is certified E Ex ia IIC T4.

2. INSTALLATION

WARNING

TXgard-IS is designed for use in Zone 0, 1 and 2 hazardous areas and is certified EEx ia IIC T4 when installed with a suitable isolation device. 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, 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 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. C01338**).
- 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, ammonia is normally lighter than air, but if released from cooling system the gas may fall rather than rise.
- In the case of oxygen depletion consider the nature of the gas displacing the oxygen. For example, carbon dioxide is heavier than air and collects in low lying areas. It will displace oxygen and so detectors should be placed at low level.

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

The mounting detail of TXgard-IS is given in Diagrams 1 and 2. TXgard-IS should be installed at the designated location with the detector pointing down. This ensures that dust or water will not collect on the sinter and stop gas entering the detector. A Swivel Mounting Bracket is available from Crowcon to assist in the mounting of the detector if required (**Part No. C01340**).

2.3 Cabling requirement

Cabling to TXgard-IS 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 2-core screened cable and suitable weatherproof glands must be used. cable should be suitably identified as being intrinsically safe (eg. Coloured blue). Alternative cabling techniques, such as steel conduit, may be acceptable provided appropriate standards are met.

TXgard-IS requires a DC supply of 10-30 volts and is loop powered. Care should be taken to ensure the minimum DC supply of 10 volts is observed at the detector taking into account the voltage drop due to cable resistance and the sense resistance of the control panel to which it is connected.

For example, a nominal DC supply at the control panel of 24 volts has a guaranteed minimum supply of 18 volts. The circuit may demand up to 24 mA. Given a sense resistor in the control panel of 250 Ohm the maximum voltage drop allowed due to cable resistance is 2.0 volts. The maximum loop resistance allowed is 80 Ohms (approx.). A 1.5 mm^2 cable will typically allow cable runs up to 3.3 km. Table 1 below shows maximum cable distances given typical cable parameters.

C.S.A. (mm^2)	Resistance (Ohms per km)		Max. Distance (km)
	Cable	Loop	
1.0	18.1	36.2	2.2
1.5	12.1	24.2	3.3
2.5	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^2.
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 5 way terminal block mounted on the amplifier in the junction box. The 2/3 wires from the sensor housing are colour coded and should be terminated in the corresponding colour coded terminal. The remaining terminals marked '+/3' and ' -/4' are connected to the control equipment. TXgard-IS is a 4-20 mA sink /loop powered device. Diagrams 3 and 4 summarise the electrical connections.

Note: The junction box and cable armour must be earthed at either the detector or control panel to limit the effects of radio frequency interference. It is good practice to provide the earth connection at the safe area only, so as to avoid earth loops.

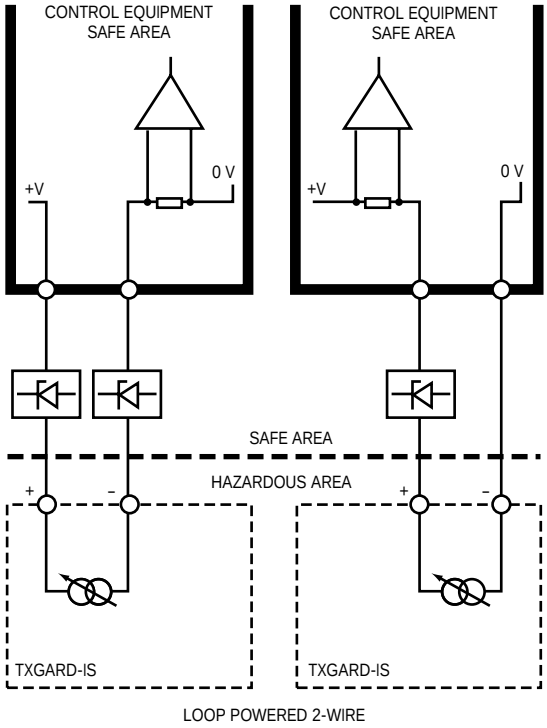

***Diagram 3:** Electrical connections - using zener barrier*

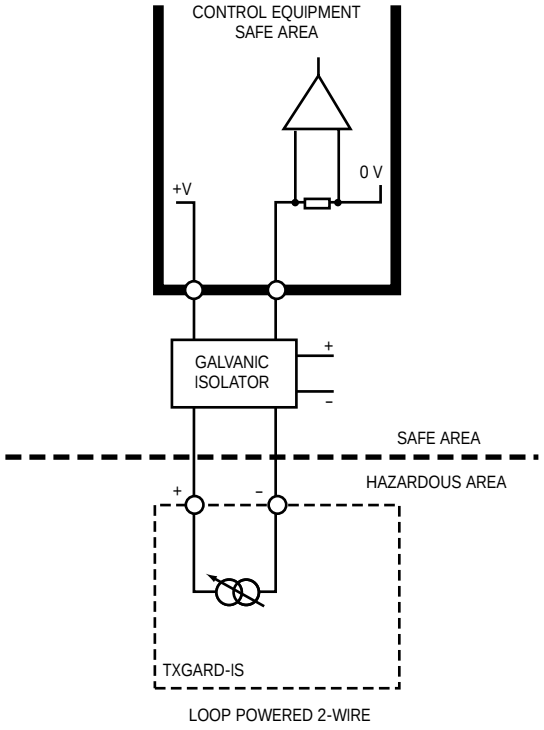

***Diagram 4:** Electrical connections - using galvanic isolator*

3. OPERATION

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.

3.1a Commissioning procedure – toxic type only

a Open the junction box of the detector by removing the 4 M6 Allen head screws.
b Check that all electrical connections have been made and are correct as per Diagram 3 and 4.
c Apply power to the detector and ensure the minimum supply voltage of 10 Vdc is available at the detector across terminal '+' and '-'.
d Leave the detector to stabilise for at least 2 hours.
e Connect a digital volt meter (DVM) to the test points on the amplifier in the junction box. Note: The test points read 40 mV = 4 mA = zero up to 200 mV = 20 mA = 100% of scale.
f With clean air present at the detector adjust the 'ZERO' pot on the amplifier until the DVM reads 40 mV.
g Apply calibration gas (typically half scale) to the detector at a flow rate of 0.5 litre/minute (contact Crowcon for the supply of calibration gas).
h Allow the gas reading to stabilise and adjust the 'CAL' pot until the DVM reads the appropriate reading (120 mV = 50% of scale if used).
i If the control equipment display requires adjustment consult the operating manual for the equipment.
j Close the junction box of the detector ensuring the 4 M6 Allen head screws are securely fastened.
k The detector is now operational.

3.1b Commissioning procedure – oxygen type only

a Follow steps (a.) to (e.) given in 3.1a .
b Unplug the connector from the sensor to the amplifier.
c Adjust the 'ZERO' pot on the amplifier until the DVM reads 40 mV.
d Remake the sensor connections to the amplifier.
e Wait 5 minutes before proceeding.
f With normal clean air present at the detector adjust the 'CAL' pot until the DVM reads 175 mV (20.9% O_2)
g Follow steps (i.) to (k.) given in 3.1a.

3.2 Routine maintenance

The operational life of the sensors depends on the application, frequency and amount of gas being seen. Under normal conditions (6 monthly calibration with periodic exposure to test gas) the life expectancy of the toxic sensors is 2-3 years and oxygen sensors is 12 to 18 months:

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.

3.3 Sensor replacement/servicing of detectors

Due to the large range of toxic sensors available, spares are supplied with a matched header which is plugged into the amplifier during servicing. This ensures sensor compatibility given changes in technology over the years of operation. Oxygen detectors use a dedicated amplifier and so do not need a header.

WARNING
The following work should be carried out by Crowcon or an approved service centre unless suitable training has been received.

3.3a Detectors with bayonet type sensor housings

a Switch off and isolate power to the detector requiring attention.
b Open the detector junction box by removing the 4 x M6 Allen head screws.
c Open the sensor housing by pushing in and turning anti-clockwise simultaneously to release the bayonet fitting and expose the sensor.
d Remove the sensor from the sensor housing.
e Fit the replacement sensor checking the part number is correct. This part number is labelled on the main body of the detector. Observe correct pin alignment with PCB.
f Re-assemble the sensor housing.
g *Toxic sensors only:* - Remove the amplifier lid in the junction box.
h *Toxic sensors only:* - Replace the matched header, ensuring correct alignment.
i Follow the Commissioning Procedure given in 3.1.

3.3b Detectors with disposable type sensor housings

a Switch off and isolate power to the detector requiring attention.
b Open the detector junction box by removing the 4 x M6 Allen head screws.
c Unscrew the complete sensor housing from the junction box.
d Fit the replacement housing complete with sensor checking the part number is correct. This part number is labelled on the main body of the detector.
e Reconnect the sensor wires to the amplifier ensuring the colour coded wires are terminated correctly.
f *Toxic sensors only:* - Remove the amplifier lid in the junction box .
g *Toxic sensors only:* - Replace the matched header, ensuring correct alignment.
h Follow the Commissioning Procedure given in 3.1.

4. SPARE PARTS AND ACCESSORIES

Please contact Crowcon for details of the latest replacement sensors Please quote part number given on 'Sensor Replacement Label' mounted on the outside of the sensor housing.

Description	Part Number
M20 to 1/2" NPTF adaptor	M02125
M20 to 3/4" NPTF adaptor	M02281
Ceiling mounting bracket	M01401
Collector cone	C01051
Spray deflector	C01338
Swivel mounting bracket	C01340
728 Zener barrier for use with 24 V dc systems	C03221
715 Zener barrier for use with 12 V dc systems	C03220
5041 galvanic isolator	C03278
Mounting box for 2 Zener barriers	C03224
Mounting box for 5 Zener barriers	C03225
Mounting box for 12 Zener barriers	C03226
Mounting box for 4 galvanic isolators	C01560
Mounting box for 8 galvanic isolators	C01561
Mounting box for 12 galvanic isolators	C01562
Calibration gas	Contact Crowcon

5. SPECIFICATION

Dimensions	160 x 122 x 76 mm (7.3 x 5 x 3.4 inches)
Weight	1.3 kg (2.8 lbs)
Operating voltage	7.5–32 V dc, loop powered 4-20 mA
Operating temperature	-20–40°C (-4–104°F)
Humidity	0–99% RH, non condensing
Cable loop resistance	300 Ohm @ 22 V signal terminal (4–20 mA)
Degree of protection	IP66 (when fitted with Weatherproof Cap)
Explosion protection	Intrinsically safe
Approval code	EEx ia IIC T4
Safety certification no.	Oxygen Ex90C2356 Toxic Ex90C2357
Standards	EN50014 and EN50020
Zones	0, 1 or 2
Gas groups	IIA, IIB, IIC

This product has been tested and found to comply with the European Directive on EMC 89/336/EEC

CE
89/336/EEC

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