

CROWCON

Instructions

Part Nos

C01458 (TXgard-D/HS)

C01459 (TXgard-D/CO)

C01460 (TXgard-D/AM)

C01461 (TXgard-D/OX)

TXgard-D

(Formerly EXD90/TX)

Flameproof Toxic and Oxygen Gas Detectors

1. INTRODUCTION

1.1 Product overview

TXgard-D is a 4-20 mA, loop powered, flameproof toxic and oxygen gas detector suitable for use in Zone 1 or 2 hazardous areas. It is designed to detect the following toxic gases when fitted with the appropriate electrochemical sensor:

Gas	Range	Part Number	Type
Hydrogen sulphide	0-25 ppm	C01458	Toxic
Carbon monoxide	0-250 ppm	C01459	Toxic
Ammonia	0-50 ppm	C01460	Toxic
Oxygen	0-25% v/v	C01461	Oxygen

1.2 Product description

TXgard-D comprises three parts: the 96HD sensor housing, amplifier and junction box. These are shown assembled in Diagram 1.

The 96HD sensor housing is a modular stainless steel assembly which dismantles to allow plug in sensors to be replaced easily. The assembly is certified EEx d IIC T6 and screws into the junction box. Diagram 2 shows an exploded view of the sensor housing.

The amplifier is mounted in the 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 manufactured from galvanised cast iron and is certified EEx d IIC T6. The junction box is supplied with 1 x M20 cable entry for customer use. Alternative cable entries are available on request. Adaptors for NPTF entries are also available (see Section 4, Spare Parts and Accessories).

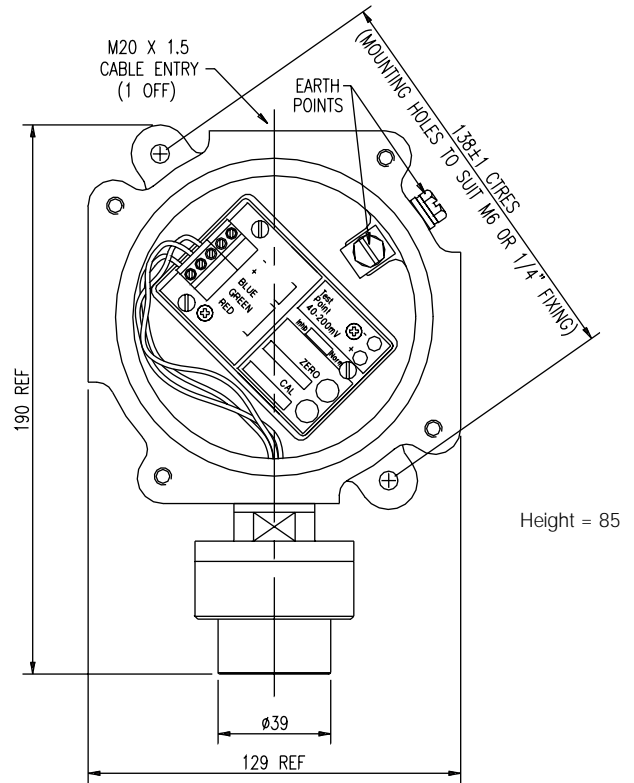


Diagram 1: TXgard-D assembly

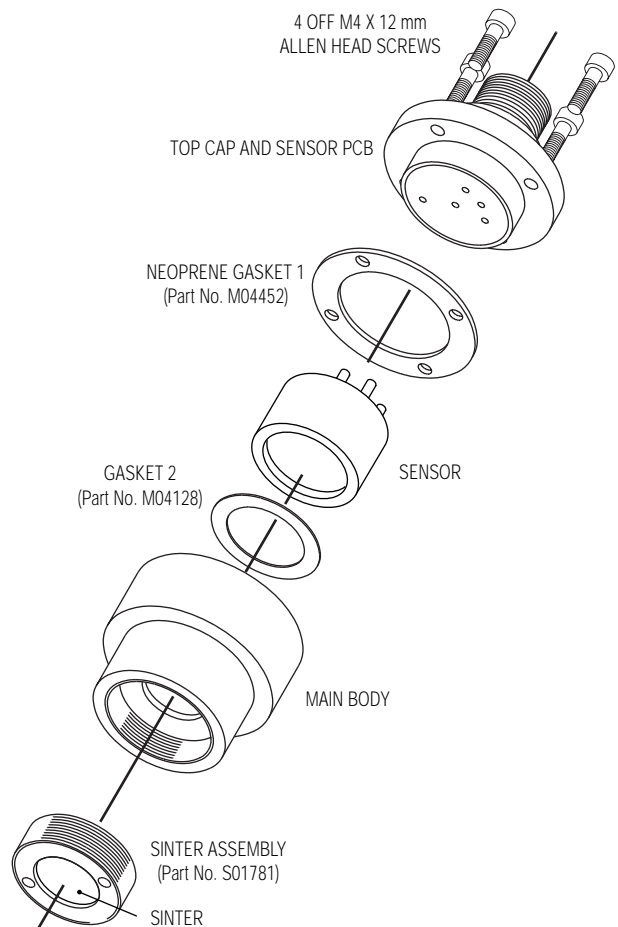


Diagram 2: 96HD assembly

2. INSTALLATION

WARNING

TXgard-D is designed for use in Zone 1 and 2 hazardous areas and is certified EEx d 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, 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 Weatherproof cap (Part No. C01442).
- 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-D is given in Diagram 1. TXgard-D 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-D 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.

TXgard-D 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.).

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

A 1.5 mm² cable will typically allow cable runs up to 3.3 km. Table 1 below shows maximum cable distances given typical cable parameters.

The acceptable cross sectional area of cable used is 0.5 to 2.5 mm². 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 96HD are colour coded and should be terminated in the corresponding colour coded terminal. The remaining terminals marked '+' and '-' are connected to the control equipment. TXgard-D is a 4-20 mA sink device. Diagram 3 summarises the electrical connections.

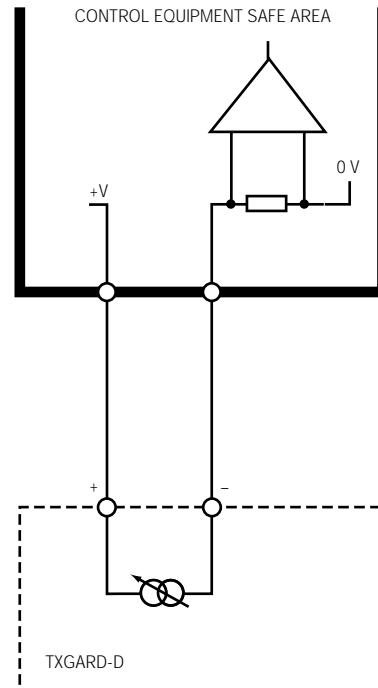


Diagram 3: Electrical connections

Note: The junction box and cable armour must be earthed at the detector and control panel to limit the effects of radio frequency interference and to maintain electrical safety.

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

- Open the junction box of the detector by removing the 4 M6 Allen head screws.
- Check that all electrical connections have been made and are correct as per Diagram 3.
- Apply power to the detector and ensure the minimum supply voltage of 10 Vdc is available at the detector across terminal '+' and '-'.
- Leave the detector to stabilise for 1–2 hours.
- 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 1 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 above.
- b Unplug the connections from the 96HD to the amplifier.
- c Adjust the 'ZERO' pot on the amplifier until the DVM reads 40 mV.
- d Remake the 96HD 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% O₂).
- g Follow steps (i.) to (k.) given in 3.1a above.

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 CAL gas) the life expectancy of the detectors are :

Sensor	Expected life
Hydrogen sulphide	18 to 24 months
Carbon monoxide	18 to 24 months
Ammonia	24 months
Oxygen	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 above.

3.3 Sensor replacement/servicing of detectors

TXgard-D uses the 96HD sensor housing which allows the user to replace the sensors, gaskets and sinter if necessary. An exploded view of the 96HD sensor housing is given in Diagram 2. The following procedure may be followed when servicing a TXgard-D detector.

WARNING

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

- a Switch off and isolate power to the detector requiring attention.
- b Open the detector junction box by removing the 4 M6 Allen head screws.
- c Disconnect the sensor wires from the terminal block of the amplifier.
- d Unscrew the complete 96HD sensor housing from the junction box.
- e Open the 96HD sensor housing by removing the four Allen head screws from the Top Cap with a 3mm Allen key.
- f Remove the sensor from the Top Cap PCB.
- g Fit the replacement sensor checking the part number is correct. This part number is labelled on the main body of the detector. Observe pin alignment with PCB.
- h Inspect the gaskets and replace if necessary.
- i The sinter assembly will only need to be replaced if it has become blocked by dust or oil. This causes the response time of the detector to be slow and may affect sensitivity. To remove the sinter a removal tool (**Part No. M01614**) is required. Loctite No 243 must be used on the sinter assembly threads to maintain certification.
- j Re-assemble the 96HD housing taking time to ensure that the four Allen screws are securely fixed into position.
- k Fit the 96HD sensor housing to the junction box ensuring that the colour coded wires are terminated correctly.
- l Follow the Commissioning Procedure given in 3.1 above.

If a spare 96HD sensor housing complete with new sensor is available, ignore steps (e.) to (j.) and return the old 96HD to Crowcon or an approved service centre for repair.

4. SPARE PARTS AND ACCESSORIES

Please refer to the Sensor Replacement Label mounted on the outside of the 96HD housing for the correct replacement sensor part number.

Description	Part Number
Complete sensor housing and sensor units:	
- 96HD/HS (hydrogen sulphide sensor)	S01750
- 96HD/CO (carbon monoxide sensor)	S01751
- 96HD/AM (ammonia sensor)	S01752
- 96HD/OX (oxygen sensor)	S01753
Replacement hydrogen sulphide sensor	E01229
Replacement carbon monoxide sensor	E01344
Replacement ammonia sensor	E01618
Replacement oxygen	E01488
M20 to 1/2" NPTF adaptor	M02125
M20 to 3/4" NPTF adaptor	M02281
Ceiling mounting bracket	M01401
Collector cone	C01051
Weatherproof cap	C01442
Swivel mounting bracket	C01340
Sinter removal tool	M01614
Loctite No. 243	
Sinter assembly	S01781
Gasket 1	M04452
Gasket 2	M04128
Calibration gas	Contact Crowcon

5. SPECIFICATION

Dimensions	190 x 129 x 85 mm (7.3 x 5 x 3.4 inches)
Weight	4.0 kg (8.8 lbs)
Operating voltage	10–30 V dc, loop powered 4-20 mA
Operating temperature	-10–55°C (14–131°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	Flameproof
Approval code	EEx d IIC T6 BASEEFA
Safety certification no.	BAS Ex 98D1103
Standards	EN50014, EN50018
Zones	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



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