

# CROWCON

# Instructions

Part No C01463  
**Flamgard-EXE**  
 (Formerly DI9 with EEx e Junction Box)

Part No C01464  
**Flamgard-D**  
 (Formerly DI9 with EEx d Junction Box)

## Flammable Gas Detectors

### 1. INTRODUCTION

#### 1.1 Product overview

Flamgard-EXE and Flamgard-D are flammable gas detectors suitable for use in Zone 1 or 2 hazardous areas. They are designed to detect flammable gas, present in ambient air, at concentrations not exceeding the Lower Explosive Limit (LEL) of the target gas for which they are calibrated. Both detectors operate using pellistors as part of a 3 wire mV Wheatstone bridge circuit and must be used with a dedicated control card. For details of suitable control equipment or a list of the gases which may be detected using Flamgard please contact Crowcon.

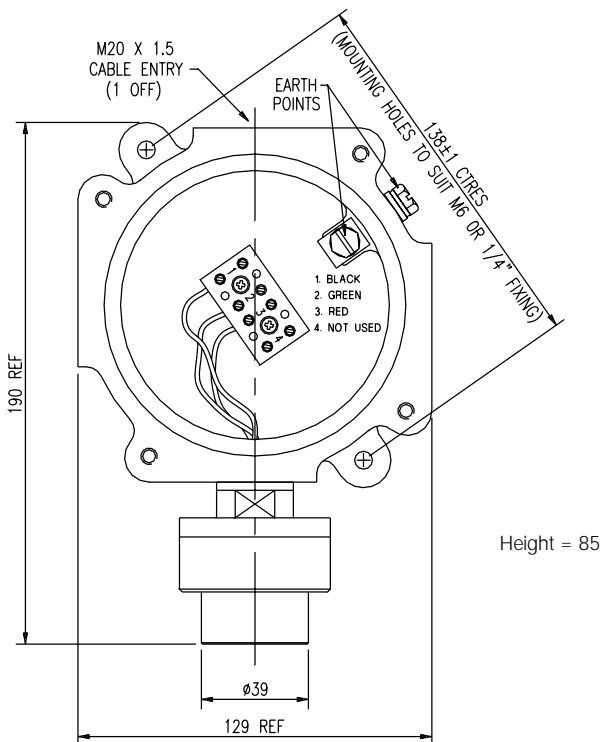


Diagram 1: Flamgard-D general arrangement

#### 1.2 Product description

Each detector comprises two main parts: the 96HD sensor housing and a junction box. These are shown assembled in diagrams 1 & 2 - with junction box covers removed to show the wiring terminal block.

The 96HD sensor housing is a modular stainless steel assembly which dismantles to allow plug in sensors to be replaced easily. The Flamgard-D assembly is certified EEx d IIC T6 and uses a galvanised cast iron junction box which, as standard, includes 1 x M20 cable entry for customer use. Diagram 3 shows an exploded view of the sensor housing.

Flamgard-EXE is supplied with an orange GRP junction box, certified EEx e II T6. As standard, each junction box includes 1 x M20 cable entry for customer use. Alternative entries are available on request. Alternatively suitable adaptors may be used.

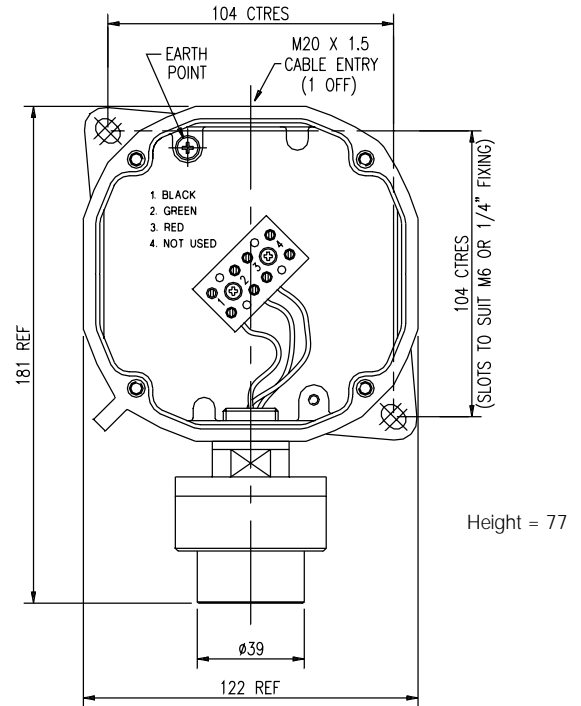


Diagram 2: Flamgard-EXE general arrangement

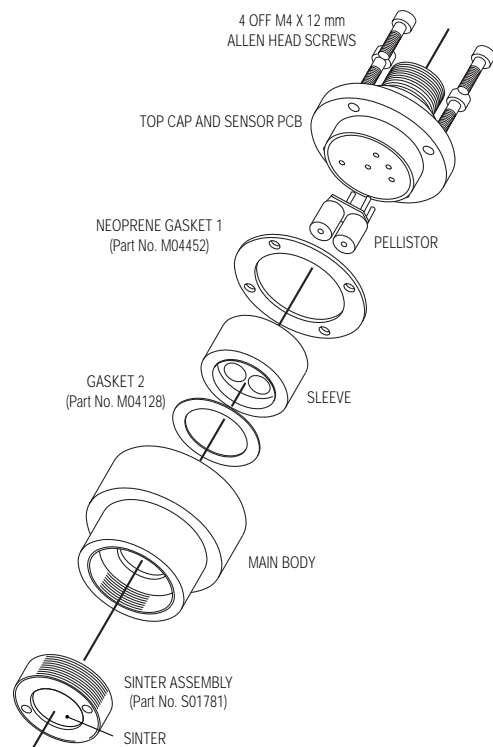


Diagram 3: 96HD sensor housing

## 2. INSTALLATION

### WARNING

Flamgard-EXE and D are designed for use in Zone 1 and 2 hazardous areas. 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

There are no rules which dictate the siting and location of detectors, however, considerable guidance is available from BS6959:1988 – ‘British Standard Code of Practice for the Selection, Installation, Use and Maintenance of Apparatus for the Detection and Measurement of Combustible Gases’. Similar international codes of practice may be used where applicable. In addition certain regulatory bodies publish specifications giving minimum gas detection requirements for specific applications:

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

- To detect gases which are lighter than air (eg 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 (eg butane), 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. Butane, for instance is normally heavier than air, but if released from a process line which is at an elevated temperature and/or under 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, experts having a knowledge of the process plant system and equipment involved, safety and engineering personnel. **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 for detectors are given in Diagrams 1 and 2. Detectors 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 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 3 core steel wire armoured (SWA) cable and suitable explosion proof glands must be used to maintain the overall certification of the detector. The acceptable cross sectional area of cable used is 0.5 to 2.5mm<sup>2</sup>. Alternative cabling techniques, such as a steel conduit may be acceptable provided appropriate standards are met.

Maximum permissible cable lengths depend on the control panel being used, cable resistance and sensor being used. It is important that the correct bridge voltage be applied to the detector. This will vary depending on the part number of the sensor fitted (see Sensor Replacement Label on outside of 96HD housing). Table 1 below summarises the bridge voltage requirements for different sensor types.

Sensor Part No.	Element	Bridge Volts (V dc)	Power Consumption (W max)	Comment
S01-637/A	VQ21T	2.0	0.75	Poison resistant
B	300P	2.0	0.75	Poison resistant alternative
C	VQ8	2.5	1.1	Lead resistant
D	VQ16	2.5	1.1	Early model
E	VQ22	2.0	0.48	Low power for marine applications
F	VQ25	2.0	0.75	For halogens
G	VQ41	2.0	0.75	For ammonia/aviation fuel
H	VQ1	2.0	0.75	Early model

Table 1: Bridge voltage settings

The voltage must be measured in the junction box between the red and black wires and should be +/- 0.1 V dc of the stated value. For set up instructions refer to the original equipment instruction manual.

### 2.4 Electrical connections

The 3 wires from the 96HD are colour coded and should be terminated as shown in diagrams 1 and 2. Diagram 4 summarises the electrical connections to a conventional control panel.

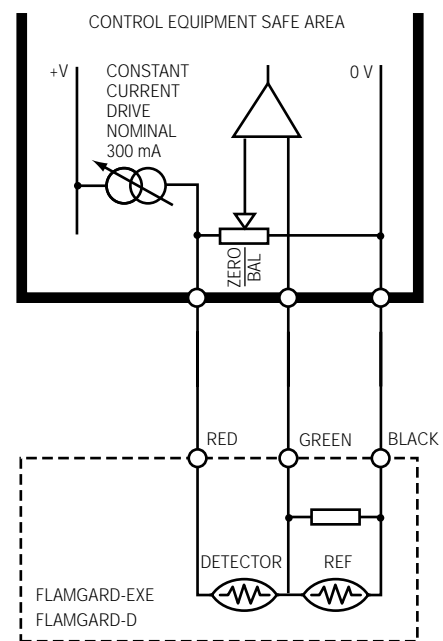


Diagram 4: Electrical connections

**Note:** The detector and junction box must be earthed for electrical safety and to limit the effects of radio frequency interference. An earth continuity plate can be supplied with the EEx e junction box.

### 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.

#### 3.1 Setting up

Please refer to the control equipment instruction manual as this procedure may vary depending on the type of equipment the detector is connected to.

#### 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 refer to the original equipment instruction manual.

Pellistors can suffer from loss of sensitivity when there is a presence of poisons or inhibitors such as silicones, sulphides, chlorine, lead or halogenated hydrocarbons. Crowcon use poison resistant pellistors to maximise the operational life of Flamgard. In applications where such compounds are present continuously we recommend the use of CIRRUS, Crowcon's fixed point infrared flammable gas detector, which is immune to such poisons and inhibitors. Please contact Crowcon for further details.

#### 3.3 Sensor replacement/servicing of detectors

The 96HD sensor housing allows the user to replace the sensors, gaskets and sinter if necessary. An exploded view of the 96HD sensor housing is given in Diagram 3. The following procedure may be followed when servicing the 96HD sensor of a Flamgard 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 x M6 Allen head screws.
- c Disconnect the 3 sensor wires from the terminal block.
- 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. Flammable sensors have an extra black sleeve which may be separate from the sensor. This is normal and the sleeve may be re-used.
- 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 head 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

Description	Part Number
Flammable sensor (0-100% LEL)	S01637//letter See sensor replacement label on detector
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

<b>Overall dimensions</b>	<i>Flamgard-EXE:</i>	181 x 122 x 77 mm (7.1 x 4.8 x 3 inches)
	<i>Flamgard-D:</i>	190 x 129 x 85 mm (7.3 x 5 x 3.4 inches)
<b>Material</b>		
<i>96HD:</i>	Stainless steel	
<i>Flamgard-EXE junction box:</i>	GRP	
<i>Flamgard-D junction box:</i>	Galvanised cast iron	
<b>Weight</b>		
<i>Flamgard-EXE complete:</i>	1.1 kg (2.4 lbs)	
<i>Flamgard-D complete:</i>	3.9 kg (8.6 lbs)	
<b>Electrical output</b>	3-wire mV bridge. Typically 1 mV per % LEL CH <sub>4</sub>	
<b>Operating temperature</b>	-10–55°C (14–131°F)	
<b>Temperature drift</b>	Typically +/- 1 mV per 10°C	
<b>Humidity</b>	0–99% RH, non condensing	
<b>Degree of protection</b>	IP66 (when fitted with weatherproof cap)	
<b>Explosion protection</b>	Flameproof	
<b>Approval code (overall)</b>	<i>Flamgard-EXE:</i> EEx e(d) IIC T6 <i>Flamgard-D:</i> EEx d IIC T6	
<b>Standards</b>	EN50014, EN50018, EN50019	
<b>Zones</b>	1 or 2	
<b>Gas groups</b>	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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