

Part No C01457
Flamgard-4/20
(formerly EXD90/FL)

Flameproof
Flammable Gas
Detector

4/20

Installation, operating and
maintenance instructions, M07177

Tel: +44 (0)1235 553057
Fax: +44 (0)1235 553062
email: sales@crowcon.com
internet: http://www.crowcon.com

Crowcon Detection Instruments Ltd
2 Blacklands Way
Abingdon Business Park
Abingdon
Oxfordshire OX14 1DY, UK

Issue 3 03/03

1. INTRODUCTION

1.1 Product overview

Flamgard 4/20 is a flameproof flammable gas detector suitable for use in Zone 1 or 2 hazardous areas. It is designed to detect flammable gas, present in ambient air, at concentrations not exceeding the Lower Explosive Limit (LEL) of the target gas for which it is calibrated. Flamgard 4/20 is powered by 24 V dc (nominally) and provides a 4-20 mA signal (sink or source) proportional to the gas concentration. For a list of flammable gases which Flamgard 4/20 can detect, please contact Crowcon.

1.2 Product description

Flamgard 4/20 comprises three parts; a sensor housing, amplifier and junction box.

Please note: 96HD sensor and amplifier unit (junction box) have been certified separately. 96HD: Sira02ATEX1283X and Amplifier unit (junction box): Baseefa03ATEX0074.

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

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 pellistor 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 upon request. Adaptors for NPTF entries are also available (see Section 4, Spare Parts and Accessories).

Diagram 1 shows the Flamgard assembly with junction box cover removed to show the amplifier and wiring details.

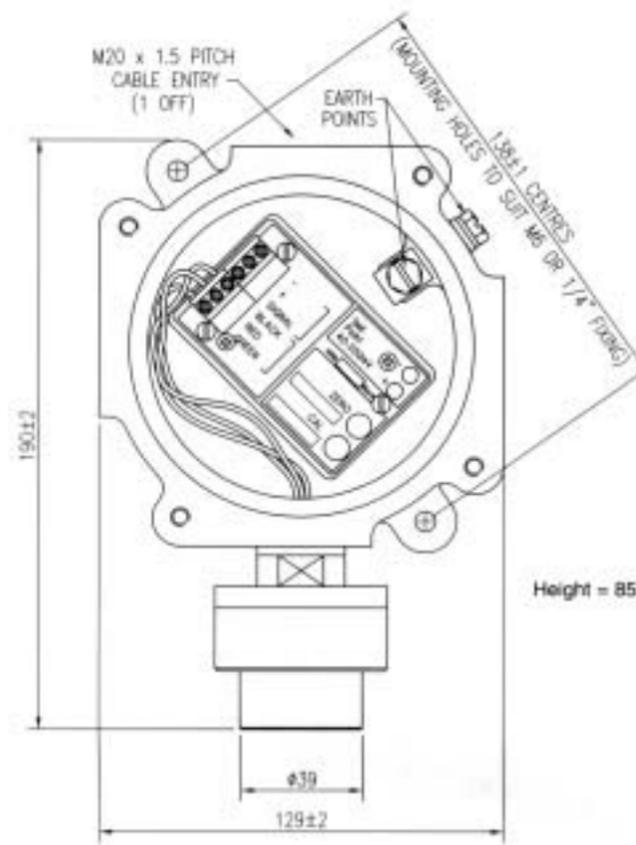


Diagram 1: Flamgard 4/20 assembly

1

2. INSTALLATION

WARNING

Flamgard 4/20 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

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 e.g. 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 e.g. 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

4

air currents. Mount detectors in ventilation ducts if appropriate.

- Consider the process conditions. Butane 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, 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 Flamgard 4/20 is given in Diagram 1. Install Flamgard 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 (**Part No. C01340**) is available to assist in the mounting of the detector if required.

2.3 Cabling requirement

Cabling to Flamgard 4/20 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.

Flamgard 4/20 requires a dc supply of 10-30 V at up to 350 mA. Ensure the minimum dc supply of 10 V is observed 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 18V. The maximum voltage drop

5

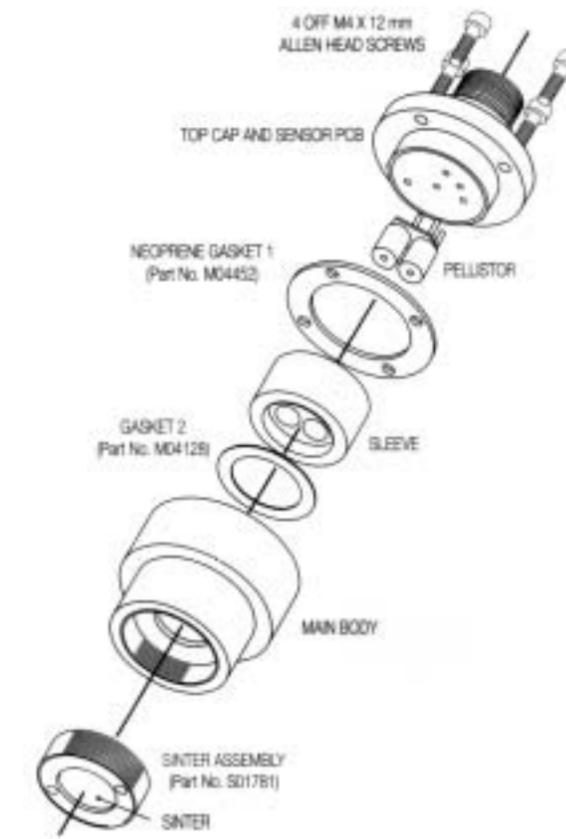


Diagram 2: 96HD assembly

3

allowed is therefore 8V. Flamgard 4/20 can demand up to 350 mA and so the maximum loop resistance allowed is 22 Ohms. A 1.5 mm² cable will typically allow cable runs up to 900 m. Table 1 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	600
1.5	12.1	24.2	900
2.5	7.4	14.8	1400

Table 1: Maximum cable distances for typical cables

Acceptable cross sectional area of cable is 0.5 to 2.5 mm². Table 1 provides 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 6 way terminal block mounted on the amplifier in the junction box. The 3 wires from the 96HD are colour coded and should be terminated in the corresponding colour coded terminal. The remaining terminals marked '+', '-' and 'Signal' are connected to the control equipment. Flamgard 4/20 is factory set as a 4-20 mA source device unless specified otherwise when ordering. This is set via an internal switch in the amplifier and may be changed to 'sink' on site if necessary. Diagram 3 summarises the electrical connections.

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

6

2. INSTALLATION (continued)

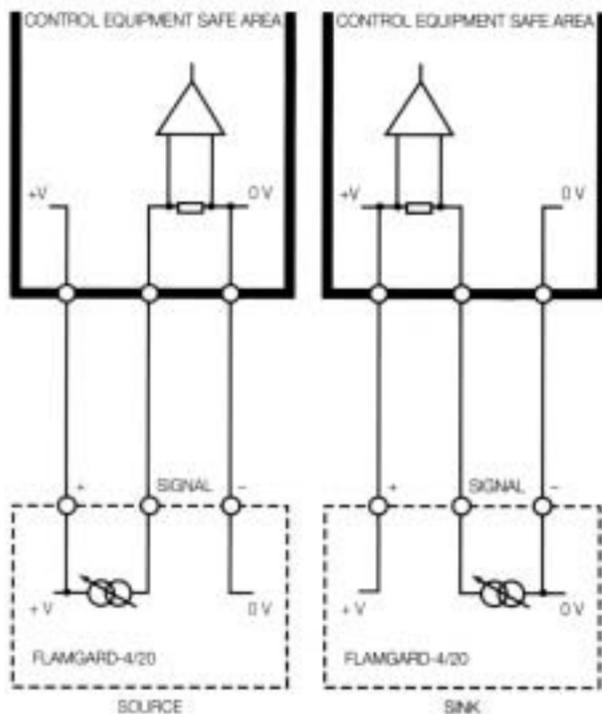


Diagram 3: Electrical connections

7

4. SPARE PARTS AND ACCESSORIES

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
96HD sensor housing complete with sensor	S01749*1
Replacement sensor	S01673*1
Sinter removal tool	M01 614
Loctite No. 243	
Sinter assembly	S01781
Gasket 1	M04452
Gasket 2	M04128
Calibration gas	Contact Crowcon

*1 Flamgard 4/20 may be fitted with a range of pellistor sensors depending on the specific application. The correct spare sensor part number is itemised on the sensor housing label.

11

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 Commissioning procedure

The following procedure should be followed carefully, and carried out only by suitably trained personnel:

- 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 V dc 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 = 0% up to 200 mV = 20 mA = 100% LEL gas. There is a current clamp of 25 mA on the 4-20 mA output.
- With no flammable gas present at the detector adjust the 'ZERO' pot on the amplifier until the DVM reads 40 mV.
- Apply calibration gas to the detector at a flow rate of 0.5 litres per minute. Crowcon recommend 50% LEL gas for calibration purposes (contact Crowcon for the supply of calibration gas).
- Allow the gas reading to stabilise and adjust the 'CAL' pot until the DVM reads the appropriate reading (120 mV = 50% LEL if used).
- If the control equipment display requires adjustment consult the operating manual for the equipment.

8

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
Current consumption	140 mA @ 10 V, 50mA @24V
Operating temperature	-10-55°C
Humidity	0-99% RH, non condensing
Cable loop resistance	60 Ohm @ 22 V +ve terminal (power) 600 Ohm @ 22 V signal terminal (4-20 mA)
Degree of protection	IP66 (when fitted with Weatherproof Cap)
Explosive protection	Flameproof
Approval code	⊕ II 2 G EEx d IIC T6
Safety certification no.	Amplifier unit (Junction Box): Baseefa03ATEX0074 96HD: Sira02ATEX1283X
Standards	EN50014, EN50018
Zones	Certified for use in Zone 1 or Zone 2 areas. (see area classifications section)
Gas groups	IIA, IIB, IIC
EMC	EN50270
Detector output	Source or sink selected by internal switch

12

- Close the junction box of the detector ensuring the 4 x M6 Allen head screws are securely fastened.
- The detector is now operational.

3.2 Routine maintenance

The operational life of the pellistor sensor depends on the application. Crowcon expect that such a device will work satisfactorily for up to 5 years in ideal conditions. Site practices will dictate the frequency with which detectors are tested. Crowcon recommends that detectors be gas tested at least every 6 months and re-calibrated as necessary. To re-calibrate a detector follow steps 3.1 (a.), (e.) to (k.) above.

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-4/20. In applications where such compounds are present continuously we recommend the use of CIRRUS or NIMBUS, Crowcon's fixed point infrared flammable gas detectors, which are immune to such poisons and inhibitors. Please contact Crowcon for further details.

3.3 Sensor replacement/servicing of detectors

WARNING

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

Flamgard 4/20 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 for reference. The following procedure may be followed when servicing the detector:

9

NOTES

Area Classifications:-

- Zone 0: An area classified, as Zone 0 will have ignitable concentrations of flammable gases, vapours or liquids present continuously or for long periods of time under normal operating conditions.
- 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.
- 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.

10

- Switch off and isolate power to the detector requiring attention.
- Open the junction box by unscrewing the 4 M6 Allen head screws.
- Disconnect the 3 sensor wires from the terminal block of the amplifier.
- Unscrew the complete 96HD sensor housing from the junction box.
- Open the 96HD sensor housing by removing the four Allen head screws from the Top Cap with a 3mm Allen Key.
- 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.
- 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.
- Inspect the gaskets and replace if necessary.
- The sinter assembly will only need to be replaced if it has become blocked by dust or oil. Such blockages cause 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 sinter assembly threads to maintain certification.
- Re-assemble the 96HD housing taking time to ensure that the four Allen head screws are securely fixed into position.
- Fit the 96HD sensor housing to the junction box ensuring that the colour coded wires are terminated correctly.
- Remove the amplifier fixing screws and rear lid.
- Connect a DVM to TP2 on the amplifier PCB.
- Switch on power and adjust VR3 until DVM reads 0 mV.
- Re-assemble the amplifier.
- 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.

11

12