1. Introduction

1.1 Flammable gas detector

**Xsafe** is designed to detect flammable gas present in ambient air, at concentration not exceeding the Lower Explosive Limit (LEL) of the target gas for which it is calibrated. *Xsafe* operates using pellistors and provides a 4-20mA signal (sink or source) proportional to the gas concentration. The junction box is manufactured from marine grade aluminium with a durable polyester coating. It is supplied with 1 x M20, M25, 1/2" or 3/4"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 fixings. Cable gland adaptors are available if required (see Spare parts and accessories section).

2. Installation

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) and accessory adaptor (Part No. M04666).
- To detect heavier than air gases, detectors should be mounted at low level.
- To detect gases which can be released from a process which is at an elevated temperature and/or pressure, the gas may rise above its specified limits and cause premature failure.

The placement of sensors should be determined according to the requirements for gas dispersion, the plant processing equipment as well as safety and engineering issues. The agreement reached on the locations of sensors should be recorded. *Xsafe* would be pleased to assist in the selection and siting of gas detectors.

2.2 Mounting

**WARNING**

*Xsafe* is not designed for use in hazardous areas. Crowcon provide a wide range of gas detectors for use in these locations, please contact Crowcon for further information. Prior to carrying out any installation work ensure local regulations and site procedures are followed.

2.3 Cabling requirement

Cabling to *Xsafe* 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 wired armoured (SWA) cable and suitable glands must be used. Alternative cabling techniques, such as steel conduit, may be acceptable provided appropriate standards are met.

Maximum permissible cable lengths depend on the cable resistance and sensor being used.

**mA version** It is important that the correct bridge voltage be applied to the detector. *Xsafe* mA requires a supply of 24V dc +/− 0.1Vdc, measured at the detector.

**mV version** It is important that the correct bridge voltage be applied to the detector. *Xsafe* mV requires a supply of 24V dc +/− 0.1Vdc, measured at the detector.

<table>
<thead>
<tr>
<th>C.S.A.</th>
<th>Resistance (Ohms per km)</th>
<th>Max. Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm²</td>
<td>Avg</td>
<td>Cable</td>
</tr>
<tr>
<td>1.0</td>
<td>17</td>
<td>16.1</td>
</tr>
<tr>
<td>1.5</td>
<td>16</td>
<td>13.1</td>
</tr>
<tr>
<td>2.5</td>
<td>15</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Table 1: maximum cable distances for typical cables mV version

The acceptable cross sectional area of cable used is 0.5 to 2.5mm² cable (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. mA version operates as part of a 3-wire mV Wheatstone bridge circuit and must be connected to a suitable control card.

Note: The junction box and cable armour must be earthed at the control panel to limit the effects of radio frequency interference. Ensure the earth connection is provided in a safe area only, so as to avoid earth loops.

**Xsafe** mV PCB

**Diagram 1:** Xsafe dimensioned view

**Diagram 2:** Xsafe exploded view

**Diagram 3:** Xsafe mV PCB layout (shown with PCB cover removed)

**Diagram 4:** Xsafe mA PCB layout (shown with PCB cover removed)

**Diagram 5:** Xsafe mV electrical connections

**Diagram 6:** Xsafe 13, 7.4, 14.8, 3.6
2. Installation

2.4 Electrical connections

mA version 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 ‘source’ position, as shown in Diagram 4. Note: The junction box and cable armour must be earthed at the control panel to limit the effects of radio frequency interference. Ensure the earth connection is provided in a safe area only, so as to avoid earth loops.

Xsafe mA PCB

Control Panel

Diagram 6: Xsafe mA electrical connections

3. Operation

3.1 Commissioning procedure-mA version

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 6.
3. Measure the voltage across the ‘+’ and ‘-’ terminals and adjust to 2V dc +/- 0.1V dc.
4. Leave the detector to stabilise for at least 1 hour.
5. Balance the WFC circuit at the control panel if necessary. Refer to the control equipment instruction manual.
6. Check that the control equipment display is equal to 2V dc.
7. Zeroing the detector

1. Zero the detector, disconnect the DVM to the test points marked TP1 and TP2 on the amplifier PCB, as shown in Diagram 4. Note: At the last point, zero will read 40 mA ± 4 mA.
2. Full scale deflection (100% LEL) will read 200 mV = 20 mA. There is a 'TP1' and 'TP2' on the amplifier PCB, as shown in Diagram 4.

3.2 Commissioning procedure-mA version

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 6.
3. Measure the voltage across the ‘+’ and ‘-’ terminals and adjust to 2V dc +/- 0.1V dc.
4. Leave the detector to stabilise for at least 1 hour.
5. Before calibration of the detector can commence, the pellistors must be replaced.
6. To replace the detector, the DVM should be set to the range x Gas and the formula can be used to calculate the reading.

4. Spares parts and accessories

Please refer to the Serial Type section on the main junction box label for the correct replacement sensor part number.

<table>
<thead>
<tr>
<th>Description Part</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDS to 1/2 NPTF adapter</td>
<td>M03125</td>
</tr>
<tr>
<td>MDS to 3/8 NPTF adapter</td>
<td>M03289</td>
</tr>
<tr>
<td>Calibration adapter</td>
<td>C03065</td>
</tr>
<tr>
<td>Accupressor</td>
<td>M04006</td>
</tr>
<tr>
<td>Waterproof cap</td>
<td>C01442</td>
</tr>
<tr>
<td>Collector coarse</td>
<td>C01051</td>
</tr>
<tr>
<td>Spray deflector</td>
<td>C01052</td>
</tr>
<tr>
<td>Flow adapter (sampling adapters)</td>
<td>C01339</td>
</tr>
<tr>
<td>Dust mounting kit</td>
<td>M01944</td>
</tr>
<tr>
<td>Sensor retaining sinter</td>
<td>M01814</td>
</tr>
<tr>
<td>Sensor retaining O-ring</td>
<td>M04286</td>
</tr>
<tr>
<td>Junction box lid O-ring</td>
<td>M04109</td>
</tr>
<tr>
<td>Amplifier PCB (mA version)</td>
<td>S011477</td>
</tr>
<tr>
<td>Amplifier PCB (mV version)</td>
<td>S011242</td>
</tr>
<tr>
<td>PCB</td>
<td>M04746</td>
</tr>
<tr>
<td>Replacement sensor module</td>
<td>S011255</td>
</tr>
</tbody>
</table>

4. Specification

Junction box material: 316 marine grade alloy with polyester powder coating
Dimensions: 156 x 166 x 111 mm (6.1 x 6.5 x 4.3 inches)
Weight: 1kg (2.2 lbs)
Operating voltage: mA version 10-30V dc, mV version 24 Vdc ±10%, 0.1 Vdc
Current consumption: mA version 100mA @ 10V dc, 50mA @ 24V dc, mV version 300mA typical
Output: mA version 4-20mA Sink or Source, mV version 0-10mA, ±2% of range
Temperature: 0-85°C (32-185°F), relative humidity 0-95% RH, non condensing
Degree of protection: IP65, IP66 (when fitted with a waterproof cap)
EMC: EN60727

5. Before calibration of the detector can commence, the pellistors must be replaced.
6. To replace the detector, the DVM should be set to the range x Gas and the formula can be used to calculate the reading.

Warranty

This equipment leaves our works fully tested and calibrated. It is warranted for a period of one year from the date of purchase. It is proved to be defective by reason of faulty workmanship or material defect, we undertake, at our option, either to repair or replace it, free of charge, subject to the conditions below.

1. If the purchaser asserts to make any claim for repair or replacement under this guarantee, no work shall begin until the serial number used in the construction information is obtained by the purchaser. The guarantee shall then become null and void if the equipment is altered, modified, dismantled, or tampered with.
2. The purchaser is responsible for making the required adjustments and for keeping the detector clean and in good working order. The guarantee is not valid if the detector is found to have been altered, modified, dismantled, or tampered with.
3. The detector must be covered against air borne damage, including any form of damage or environmental damage (including any loss or damage arising out of the use of the instrument) and all other forms of loss or damage in respect of any third party or property is expressly excluded.
4. The distributor reserves the right to make modifications to the detector without prior notification.
5. The guarantee does not cover the accuracy of the calibration after the system has been altered.
6. The detector does not include the content of the product, and is dependent upon installation and maintenance of the product in accordance with the procedures and instructions contained in the installation, operating and maintenance instructions.
7. The distributor reserves the right to make modifications to the detector without prior notification.
8. Our liability in respect of defective equipment shall be limited to the obligations set out in the guarantee and any further express, implied or statutory conditions, express or implied statutory or otherwise as to the merchantability quality of our equipment and fitness for any particular purpose is expressly excluded as prohibited by statute. This guarantee shall not affect a customer's statutory rights.
9. Detectors that are returned to Crowcon for service are and are subsequently found to be fault-free may be subject to a small handling charge to cover inspection and return shipping costs.

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Gallus Group

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