CROWCON
Detecting Gas Saving Lives

Xsafe Bright

Gas Detectors with Display and Relays

Installation, Operation and Maintenance Instructions

M077910
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Contents

1. Introduction

1.1 Product overview

Xsafe Bright is a versatile gas detector for monitoring a wide range of flammable and toxic gases and oxygen levels. **Xsafe Bright** incorporates a bright OLED (organic light emitting diode) display and a magnetic wand for easy menu operation.

Xsafe Bright provides analogue 4-20mA and RS-485 Modbus signals as standard, with optional HART interface. Relays are also fitted for activating local alarms or sending digital signals to control systems.

Xsafe Bright may be fitted with electrochemical type toxic or oxygen sensors, PID sensors or infrared (IR) carbon dioxide gas sensors. Please refer to the product identification label to determine the type of sensor fitted.

Xsafe Bright has no hazardous location capability. It may not be installed in a zoned hazardous location. For such applications Xgard Bright is advised.

1.2 Safety information

Safety information relevant to Ex requirements:

- The cable gland must be installed before use and must have an appropriate ingress protection for the application and environment.
- Unused cable entries must be sealed to give appropriate ingress protection.
- Only cables of types specific in these instructions can be used.

General safety information

- **Xsafe Bright** gas detectors must be installed, operated and maintained in strict accordance with these instructions, warnings, label information, and within the limitations stated.
- **Xsafe Bright** detectors are designed to detect gases or vapours in air, and not inert or oxygen deficient atmospheres. **Xsafe Bright** oxygen detectors can measure in oxygen deficient atmospheres. The exception is carbon dioxide **Xsafe Bright** which uses infrared technology and will work with no oxygen present.
- Electrochemical cells used in toxic and oxygen versions of **Xsafe Bright** contain small volumes of corrosive electrolyte. Care should be observed when replacing cells to ensure that the electrolyte does not come into contact with skin or eyes.

- Maintenance and calibration operations must only be performed by qualified service personnel.
- Only genuine Crowcon replacement parts must be used, substitute components may invalidate the warranty of the detector.
- **Xsafe Bright** detectors must be protected from extreme vibration, and direct sunlight in hot environments as this may cause the temperature of the detector to rise above its specified limits and cause premature failure. A sunshade is available for **Xsafe Bright**.

1.3 Storage instructions

Some types of sensor available with **Xsafe Bright** have limited life when left un-powered and/or may be adversely affected by temperature extremes or environmental contamination. Ideal storage conditions are 20°C and 60%RH. It is strongly recommended detectors are installed and powered within 3 months of purchase.

1.4 Product labels

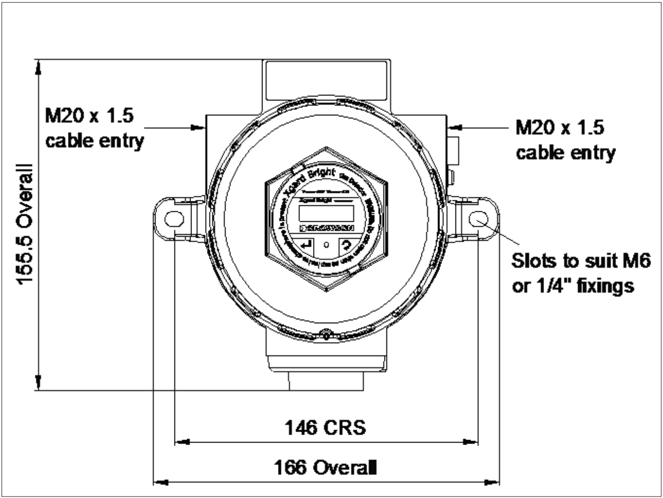
CE 1180,

Xsafe Bright

Crowcon Detection Instruments Limited

172 Brook Drive, Milton Park, Abingdon, OX144SD

1.5 Product dimensions



All dimensions in millimetres

Diagram 1: Xsafe Bright dimension view

1.6 Exploded view

19	M4 WASHER ST-ST
18	M4 SPRING WASHER ST-ST
17	M20-1/2"NPT Crossover sub
16	M4 STUD
15	M4x8 PAN HEAD SCREW
14	CIRCLIP
13	FERRITE
12	TERMINAL PCB ASSEMBLY
11	SENSOR SEALS
10	WIRE GUIDE
9	ENCLOSURE BASE ASSEMBLY
8	SENSOR CHAMBER ASSEMBLY
7	SENSOR ASSEMBLY
6	Certification Label
5	GRUB SCREW
4	MAIN PCB ASSEMBLY
3	M4 STUD
2	ENCLOSURE LID ASSEMBLY
1	GAS LABEL

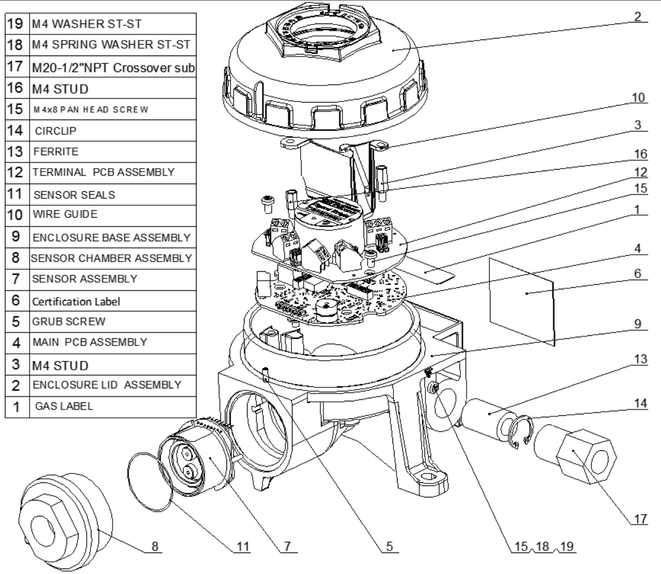


Diagram 2: Xsafe Bright exploded view

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Detecting Gas Saving Lives

WARNING

This detector is designed for use in safe areas. It is not to be used in EX hazardous locations. Installation must be in accordance with the recognized 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, e.g. carbon dioxide, 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. C01052**).
- 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, carbon dioxide is normally heavier than air, but if released from a process which is at an elevated temperature and/or pressure, the gas may rise before falling.
- Location of oxygen sensors requires knowledge of the gas that may displace the oxygen. For example, carbon dioxide is denser than air and therefore is likely to displace oxygen from low levels upwards.
- Sensors should be mounted at head height (1.5m nominally) to detect gases of a similar density to air, assuming that ambient conditions and the temperature of the target gas are nominally 20°C.

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**.

English

2.2 Mounting

Xsafe Bright should be installed at the designated location with the sensor pointing down. This ensures that dust or water will not collect on the sensor and stop gas or solvents being measured entering the cell. Care should be taken when installing the detector to avoid damaging the painted surface of the enclosure. There are two M20x1.5 entry ports on the base. One entry port will be used for power supply input during normal operation. Unused port will be blocked by blind plug, or can be used to connect external alarm device or be used for connecting devices to the multi-drop communications.

Note: Please avoid direct water jets into the sensors, as it is likely to lead to damage.

2.3 Internal Electrical Connections

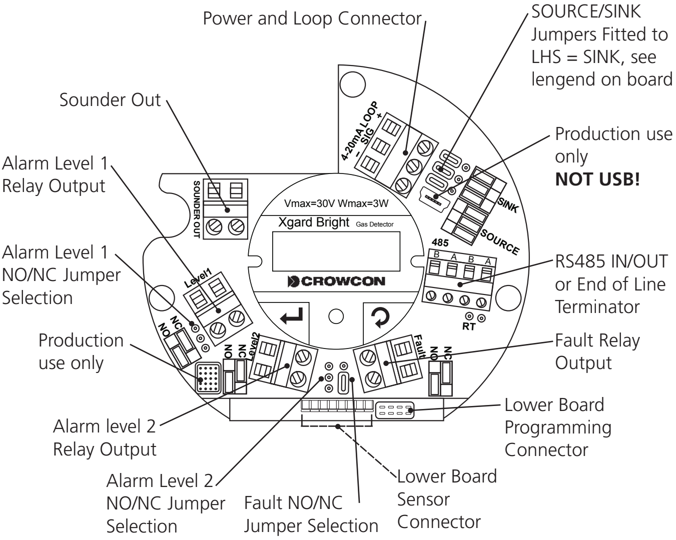


Diagram 3: Xsafe Bright internal electrical connections

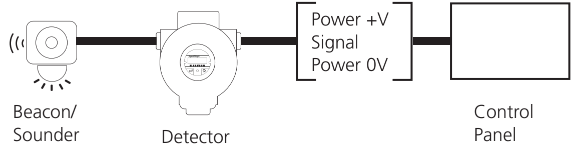
NOTE: the mini USB socket is not intended for customer use, connecting this to a computer is likely to damage both Xsafe Bright and the computer.

2.4 General Cabling Requirement

Cabling to **Xsafe Bright** must be in accordance with the recognised standards of the appropriate authority in the country concerned and meet the electrical requirements of the detector.

2.5 Cabling Requirement 4 to 20 mA Current Loop

Fulfils the requirements for 4 to 20 mA current loop and HART connections, allows for connection and powering of accessory beacon or sounder subject to current consumption, cable resistance and panel voltage. Current consumption should consider worst case e.g. when the accessories are powered.



Example Calculation 1

What is the longest cable for a Bright to operate using point to point connection and powering a sounder with 250mA current consumption. Use parameters of 1.5mm2 cable, where the controller has a guaranteed minimum output voltage of 18V.

This type of cable has resistance of 12.1Ω/km, therefore the there and back cable resistance is 24.2. **Xsafe Bright** has min voltage requirement of 10V.

The alarm 2 current for **Xsafe Bright** (pellistor) is 95mA and the sounder output max current is 0.25 A, so a total current in alarm driving the sounder output is:

Max current = 0.25 + 0.095 = 0.345 A.

18V = 10V + (0.345 x 24.2 x d), where d is distance in km

d = (18 – 10) / (0.345 x 24.2) = 0.958 km

Example Calculation 2

As example calculation 1 but without the sounder.

Xsafe Bright pellistor requires a dc supply of 10-30V, at max current in alarm 2 of 95mA. Ensure there is a minimum of 10V at the detector, taking into account the voltage drop due to cable resistance. For example, a nominal dc supply at the control panel of 24V has a guaranteed minimum supply of 18V. The maximum voltage drop is therefore 8V. **Xsafe Bright** can demand up to 95mA and so the maximum loop resistance allowed is approx 80Ω.

A 1.5mm^2 cable will typically allow cable runs up to 3.3km. Table 1 below shows the maximum cable distances given typical cable parameters for this example calculation.

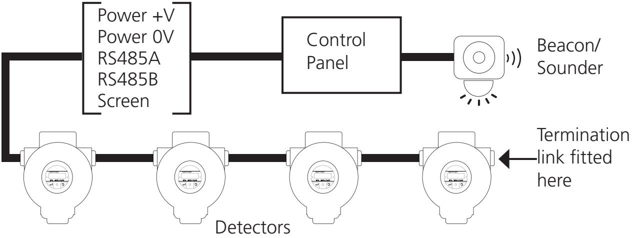
C.S.A.	**Resistance (Ohms per km)**		**Max. Distance (km)**	
mm^2	Awg	Cable	Loop	
1.0	17	18.1	36.2	2.2
1.5	15	12.1	24.2	3.3
2.5	13	7.4	14.8	5.4

Table 1: maximum cable distances for typical cables

2.6 Cabling Requirement Multidrop MODBUS

This fulfils the requirements of multidrop communications back to a compatible addressable control panel. Due to current consumption of multiple detectors powering of accessories via the detector sounder/beacon output or relay contact must be avoided.

Each detector must be configured with a unique node address when connected in an addressable network.



Four connections are required for multidrop operation: a 24V/0V dc power supply, and RS-485 A and B connections to the appropriate terminals. Two sets of RS-485 terminals and a spare cable gland entry (sealed with a stopping gland by Crowcon) are provided to enable signals to be 'looped' to the next detector easily.

To minimise cable voltage drops (and to maximise the potential total cable length and detector network quantity) large cross-sectional area cable must be used for the 24V/0V power connection. Crowcon recommends cable with 1.5mm^2 conductors is used for the power.

Twisted pair and screened cable is recommended for the RS485 signals. The screen is to be earthed at the control panel only, but continuity must be maintained through the detectors extending to the end of line detector. The end of line detector also needs a terminating resistor link fitted to the top PCB (the terminals labelled RT).

Specialist cables are available combining large cross-sectional area conductors for power and twisted-pair signal cables for RS-485 communications, however in some cases it may be necessary to run separate cables to the detector network. In this instance it may be most practical to terminate the two cables within a junction box near to each detector, and drop and single/combined cable with smaller power conductors locally to the detector.

On large networks, or where long cable runs are required, it may be necessary to power groups of detectors via separate power supplies placed locally around the installation. Where this method is deployed, the 24V/0V cables for each group of detector must be isolated to their dedicated local power supply.

2.6.1 Calculating acceptable cable length and detector quantities

It is essential before attempting installation to calculate the voltage to each detector given the power supply voltage, cable resistance and cable lengths required. The more detectors connected to the linear bus, the greater the power required to run the system. To calculate the power required for a particular setup, it is necessary to know the cable resistance between each pair of detectors. A current of a maximum 0.07A (toxic) must be allowed for each 'hop' between each detector (this assumes the highest power configuration for each detector: pellistor sensor). The voltage to be applied can be calculated by estimating the voltage drop across each detector 'hop' – at the end at least 10V must remain to ensure that the last **Xsafe Bright** detector functions correctly.

Installation

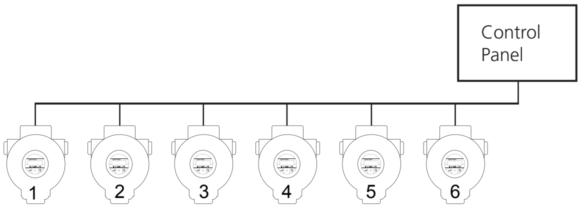
Follow the steps outlined below and the sample calculation shown in the next section to calculate for specific applications.

1. The voltage must not fall below 10V, so start the calculation by setting the voltage at the last detector in the line at that value.
2. Each detector may draw up to 0.070A. Calculate the cable voltage loss of the first 'hop' between detectors by taking the current 0.070A and multiply this by the cable resistance of the 'hop' between the last and the last but one detector.
3. Add this voltage drop to the initial 10V to get the lowest acceptable voltage at the last but one detector. Add 0.070A to the value for the 'aggregate current' to get to 0.14A, the minimum current running through the last but one 'hop' of the bus. Multiply this by the cable resistance for the last but one 'hop' to get the next voltage drop.
4. Repeat this process for each detector, accumulating the voltage losses that will occur between each detector.
5. The maximum detector voltage of 30V must not be exceeded.

Example Calculation using the above rules

How many **Xsafe Bright** can be put on a multidrop cable if:

1. The controller has a guaranteed minimum output voltage of 18V.
2. Cable resistance is 12.1Ω/km.
3. There is 20m between each detector and 20m from the final detector to the controller.
4. The worst case current draw (**Xsafe Bright** toxic) is 70mA.



So consider the voltage to the detector furthest (n=1) from the controller has to be 10V. Each cable segment has a there and back resistance of 12.1 x 2 x 20/1000 = 0.484 ohms.

So the cable volts drop to detector (n=2) is:

Vc = 0.070 x 0.484 = 0.03388V

V(n=2) = V(n=1) + Vc = 10.0338 V

Now the voltage at detector (n=3) is

V(n=3) = V(n=2) + 2Vc (as there is twice the current supplied through this cable segment)

V(n=3) = 10.03388 + 0.06776 = 10.10164 V

Tabulating the results for each detector position we get:

Detector	Voltage at Detector (V)	Cable current (A)	Cable voltage drop (V)
N=1	10	0.070	0.03388
N=2	10.03388	0.14	0.06776
N=3	10.10164	0.21	0.10164
N=4	10.20328	0.28	0.13552
N=5	10.3388	0.35	0.1694
N=6	10.5082	0.42	0.20328
N=7	10.71148	0.49	0.23716
N=8	10.94864	0.56	0.27104
N=9	11.21968	0.63	0.30492
N=10	11.5246	0.7	0.3388
N=11	11.8634	0.77	0.37268
N=12	12.23608	0.84	0.40656
N=13	12.64264	0.91	0.44044
N=14	13.08308	0.98	0.47432
N=15	13.5574	1.05	0.5082
N=16	14.0656	1.12	0.54208
N=17	14.60768	1.19	0.57596

N=18	15.18364	1.26	0.60984
N=19	15.79348	1.33	0.64372
N=20	16.4372	1.4	0.6776
N=21	17.1148	1.47	0.71148
N=22	17.82628	1.54	0.74536
Power Supply	18.57164		

So 22 detectors just exceeds the power supply guarantee voltage, therefore the answer for a safe maximum number of detectors is 21.

If this is not a convenient solution then there is scope for increasing the number by changing the power supply or using thicker (lower resistance) cable.

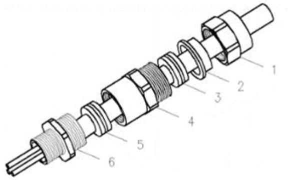
2.7 Earthing requirements

Earth terminals are provided on the outside of the **Xsafe Bright** enclosure adjacent to the top-right cable entry, and internally adjacent to the left-hand sounder out cable connector.

2.8 Cable glands

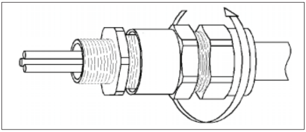
Instructions for installing appropriate glands is given below.

Unarmoured cable

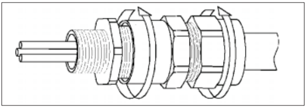


Allow sufficient length of cable to the detector, fit shroud if required, pass the cable through cable gland.

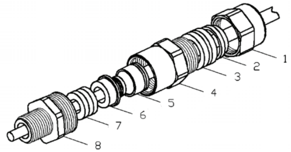
1. Screw the gland Entry into the **Xsafe Bright** M20 cable Entry. Using two spanners or wrenches, hold the gland Entry in position to prevent rotation and tighten the Middle Nut until resistance is felt between the Seal and cable. Then turn the Middle Nut through a further half to one full turn to complete the Inner Seal.



2. Hold the Middle Nut in position to prevent rotation and tighten the Backnut until resistance is felt between the Seal and cable, then turn the Middle Nut through a further half to one full turn to complete the Outer Seal.

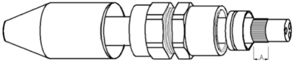


Armoured cable



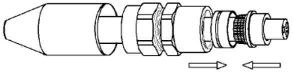
1. Backnut
2. Compression Spigot
3. Compression seal
4. Middle Nut
5. Reversible Armour Clamping Ring
6. Armour Spigot
7. Inner seal
8. Entry

1. Expose the armour/braid “A” by stripping the cable's armoured / woven layer and removing the cable filler.



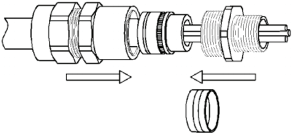
A=15mm

2. Push the cable through the Armour Spigot. Spread armour/braid over the Armour Spigot until the end of the armour/braid is up against the shoulder of the armour cone. Position the Armour Clamping Ring.

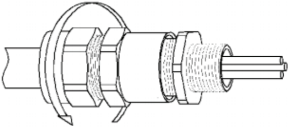


Installation

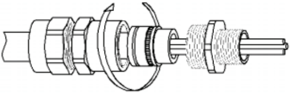
3. Remove the Inner seal from the Entry. Place the Entry over the Armour Spigot. Move the Middle Nut to meet the Entry.



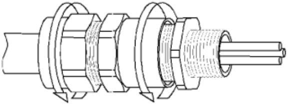
4. Hold the Entry in position with a spanner/wrench to prevent rotation. Hand tighten the middle Nut to the Entry and turn a further half to one full turn with a spanner/wrench.



5. Unscrew the Middle Nut and visually inspect that the armour/braid has been successfully clamped between the Armour Spigot and the Armour Clamping Ring. If armour/braid not clamped, repeat assembly.



6. Remove Entry and refit Inner Seal, replace Entry and re-assemble Middle Nut onto the entry component. Tighten up the Middle Nut by hand then using a wrench/spanner a further 1 to 4 turns until fully tight.



Notes:

1. These instructions are provided for general guidance only. It is essential that the instructions provided by the cable gland manufacturer are strictly adhered to.
2. Cable glands must have a minimum ingress protection rating of IP66.

2.9 Fitting accessories

Collector cone (product code C01051)

Aids detection of lighter than air gases such as hydrogen or methane. Includes a pipe spigot for application of bump test gas.

Spray deflector (product code C01052)

For outdoor installations and sensor protection from water sprays.

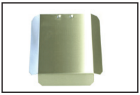
Weatherproof cap (product code C01442)

For use offshore or very wet environments.

Flow adaptor (product code C01339)

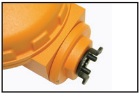
For use in sampling applications.

Sun shield (product code C011063)



Prevents against excessive heat build-up due to direct sunlight.

Calibration adaptor (product code C03005)



Enables application of calibration gas to the sensor.

3. Operation

English

WARNING

Prior to carrying out any work ensure local regulations and site procedures are followed. Never attempt to open the detector or enclosure base when flammable gas is present. Ensure that the associated control panel is inhibited so as to prevent false alarms.

3.1 Operation panel

The **Xsafe Bright** operation panel comprises an OLED screen, a three-colour status LED and two magnetically operated Hall Effect switches. The screen displays white characters on a black background and can be viewed clearly even in bright sunlight. Reversed white screen saver will be activated in normal detection condition while long time no operation.

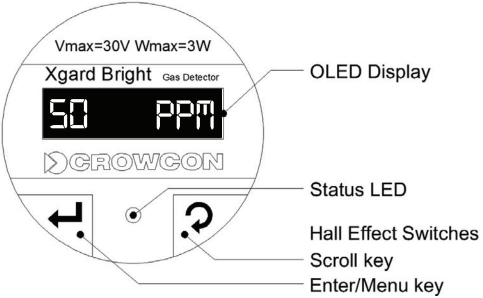


Diagram 4: Xsafe Bright operation panel

LED Indication

The Tri-Colour LED provides the following indications:

GREEN	ORANGE	RED
Normal Operation	Fault Condition	Detector in Alarm

3.2 Key Operation

Key response has time dependency, two kinds of action would be generated depend on how long time the key was hold.

- Short-time action event, magnet applied and removed in 2 seconds.
- Long-time action event, magnet applied and hold for more than 2 seconds, a short beep will indicate 2 seconds is complete.

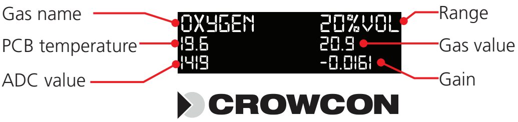
3.3 Start up

When the **Xsafe Bright** is powered up, the unit will perform internal diagnostic checks whilst the display will show a Crowcon logo. This procedure will be displayed for about 45 seconds followed by displaying a warming up status for about 120 seconds.

Diagram 5: Start up and Warming up

If the diagnostic checks were successful, the gas status screen will be displayed. In normal operation the gas level will be indicated on the display.

Use the supplied magnetic wand to select the Scroll key to move between the information screens shown below.



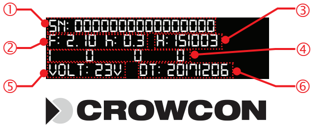


Diagram 6: Gas status screen

1. Serial number
2. Firmware version, Hardware version
3. HART ID
4. Detector 485 Address, 485 packets received, 485 packets address match, Polling address
5. Detector supply voltage
6. Due time in format YYYYMMDD

3.4 Menu functions

Enter/Menu key Scroll key

From the gas display screen, use the supplied magnetic wand to select the Enter/Menu key to show password screen.

Enter the password: '0000' to display the following menu. Select the Scroll key to change the displayed number, and the Enter/Menu key to move to the next integer. Hold the Enter/Menu key for two seconds to enter the menu.

Use Scroll key to move down the menu options list and to change the numbers in any screen. Hold the scroll key for 2 seconds to move up the menu options.

1. Zero: to zero the sensor.
2. Cal gas: to calibrate the sensor.
3. To main menu: returns the display to the main gas screen.
4. Set Alarm 1: to adjust the first alarm threshold.
5. Set Alarm 2: to adjust the second alarm threshold.

   Note: When Alarm 2 threshold is set lower than the Alarm 1 threshold both alarms are falling, e.g. for oxygen when Alarm level 1 = 19.0 and Alarm level 2 = 17.5.
   When Alarm 1 is less then Alarm 2, both alarms are rising.
6. Clr Loc Alarm: to de-activate the 'Sounder Out' output (used to silence alarms even if the gas level remains above the alarm thresholds).
7. Chn/Eng: switch between Chinese and English display.
8. Set 485 Addr: sets the node address of the detector for Modbus operation.
9. Test Relay: adjust the analogue output signal: Dec/OK to decrease, Add/Back to increase. The alarm relays will activate at the appropriate point.
   a. Adj Loop mA: errors in the zero-level analogue output signal can be adjusted by up to +/-2mA.

Hold Enter/Menu key for 2 seconds to enter menu or confirm changes to (eg) alarm levels. After applying the magnet a short beep will indicate when 2 seconds is complete and the magnet can be removed. A long beep will then confirm the change.

Hold the Enter/Menu key for 2 seconds to exit the menu from any point.

3.5 Zero

Note: Purge sensor with the appropriate gas before zeroing.

This function should only be carried out in 'clean air' and allows the **Xsafe Bright** to be zeroed at any time.

To carry out the zero function, press 'Next'. The zeroing screen will be displayed.

When zeroing is complete a pass or fail screen will be displayed. Press 'OK' to return to the Main menu.

Note: Calibration of oxygen channels: Zeroing is not required for an oxygen instrument and selecting zero will not function.

3.6 Calibrate

In main menu status chose 'Cal gas', the calibration level screen will be displayed.

To cancel the calibration, long press the right key '/Back', The Main menu will be displayed. Adjust the value shown to match the calibration gas concentration, to continue, long press left key '/OK' to accept the calibration level.

Connect the calibration cap to the **Xsafe Bright** and then connect the appropriate gas cylinder to the adapter. When the gas reading is stable press the right key 'Mark'. To complete calibration press left key 'DONE'.

If the calibration was successful the success symbol will be displayed and return to the main menu.

3.7 Routine maintenance

Warning: prior to carrying out any work ensure local regulations and site procedures are followed. Ensure the associated control panel is inhibited so as to prevent false alarms.

Service and maintenance work should be carried out by Crowcon, an approved service centre or by suitably qualified and trained personnel.

Site practices and conditions will dictate the frequency with which detectors are tested and calibrated. Crowcon recommends that detectors are gas tested at least every 6 months and re-calibrated as necessary.

Do not use damaged components or damaged electrochemical cells.

The sinter should be inspected regularly, and replaced if it has become contaminated. A blocked sinter may prevent gas from reaching the sensor.

Ensure that the sensor retainer and junction box lid O-rings are present and in good condition in order to maintain the ingress protection of the product.

3.8 Sensor replacement

The operational life of sensors depends on the application and amount of gas to which the sensor has been exposed. Under normal conditions (6 monthly calibration with periodic exposure to test gas) the typical life expectancy of sensors is as follows:

- Oxygen sensors: 2 years.
- Electrochemical toxic gas sensors: 2-3 years.
- PID sensors 2 years.
- IR sensors: 10+ years.

Please note: if the sensor is subjected to a direct water jet, it should be gas tested in order to ensure correct operation is maintained.

Toxic and flammable gas sensor modules should be replaced when they fail to calibrate or show a very low response to test gas. PID and Oxygen sensors must be replaced every two years.

To replace a sensor module:

1. Switch off and isolate power to the detector.
2. Loosen the grub-screw and unscrew the sensor retainer.
3. Carefully withdraw the sensor module by grasping the top and bottom of the moulding.
4. Fit the replacement sensor (having checked that the part number matches that stated on the detector junction box label). Take care to align the locating pins correctly with the slots in the **Xsafe Bright** enclosure.
5. Re-fit the sensor retainer having first inspected the sinter to make sure that it has not become contaminated. Contaminated sinters must be replaced as any blockages may prevent gas from reaching the sensor. Ensure the grub-screw is re-secured.
6. Zero and calibrate the new sensor.

Warning: Xsafe Bright sensor modules are NOT compatible with Xgard or Xsafe sensor Modules.

3.9 IR Carbon Dioxide

It is unlikely an infrared sensor will need replacement however if it is damaged or more than 10 years old it may be replaced using the following procedure:

1. Switch off and isolate power to the detector.
2. Loosen the grub-screw and unscrew the sensor retainer.
3. Carefully withdraw the sensor module by grasping the top and bottom of the moulding.
4. Fit the replacement sensor (having checked that the part number matches that stated on the detector junction box label). Take care to align the locating pins correctly with the slots in the **Xsafe Bright** enclosure.
5. Re-fit the sensor retainer having first inspected the sinter to make sure that it has not become contaminated. Contaminated sinters must be replaced as any blockages may prevent gas from reaching the sensor. Ensure the grub-screw is re-secured.
6. Zero and calibrate the new sensor.

3.10 PID

PID sensors are configured and calibrated to Isobutylene when manufactured. The PID sensor can be configured to detect Volatile Organic Compounds (VOC) other than Isobutylene by changing the correction factor in the PID sensor type options. Details of how to change the VOC correction factor:

Gas detectors fitted with a PID sensor may require periodic cleaning and calibration of the sensor to ensure correct performance in normal use.

The sensor may need maintenance if any of the following occur:

- The baseline is climbing after zeroing the sensor
- The sensor becomes sensitive to humidity
- The baseline is unstable or shifts when the sensor is moved
- Sensitivity of the sensor has dropped

3.11 Maintenance and cleaning of the PID sensor:

For cleaning and maintenance of the PID please refer to Crowcon Application Note PID-AN-001.

4. Specifications

Enclosure material	ADC 12 aluminium alloy
Dimension	156 x 166 x 109mm (6.1 x 6.5 x 4.3inch)
Weight	Aluminium alloy 1kg (2.2lbs)
Cable entry	2x M20 (stopping plug fitted to left-side entry) or supplied with ½” NPT adapters
Power	10-30Vdc. 3W max
Electrical output	4-20mA current sink or source RS-485 Modbus RTU HART (optional)
Relays	Alarm 1, Alarm 2, Fault SPDT contacts rated 1A 24Vdc
Sounder Out:	MOSFET open-collector drive. 24Vdc (nominally), 250mA maximum load
Operating temperature	-40°C to +70°C (-40°F to 158°F) Note: sensor operating temperatures vary. Refer to the sensor module datasheet or contact Crowcon for specific sensor data.
Humidity	0 to 95% RH, non-condensing
Repeatability	+/- 2% FSD
Zero drift	+/- 2% FSD per year maximum
EMC compliance	EN50270:2015

5. Spare parts

Part No	Description
C01647	Xgard Bright Spare/Replacement M4 Earth Stud Assembly
M04885	Xgard Bright Spare Sensor Seal
M03871	Xgard Bright Threaded Hex Spacer 15mm (M4)
M03870	Xgard Bright Threaded Hex Spacer 10mm (M4)
M03760	Xgard Bright Spare M4 x 8 Posi Pan Head Screw (Customer may require 7)
M03810	Xgard Bright M3x6 Grub Screw (Customer may require 2)
M02125	Xgard Bright Spare M20 to 1/2" NPT Adapter
C03756	Xgard Bright Cro-Mag
MIS99033	Xgard Bright Allen Key
S015132/S	XGB Spare Sensor Module PID 0-100ppm
S015124/S	XGB Spare Sensor Module Ammonia 0-50ppm
S015125/S	XGB Spare Sensor Module Ammonia 0-100ppm
S015133/S	XGB Spare Sensor Module Chlorine 0-5ppm
S015134/S	XGB Spare Sensor Module Chlorine 0-10ppm
S015127/S	XGB Spare Sensor Module SO2 0-10ppm
S015126/S	XGB Spare Sensor Module Ozone 0-1ppm

6. Warranty

Product Use:

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement Crowcon Detection Instruments Limited reserves the right to make product changes without notice. The products are routinely subject to a programme of testing which may result in some changes in the characteristics quoted. Technical information contained in this document or otherwise provided by Crowcon are based upon records, tests, or experience that the company believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Many factors beyond Crowcon Detection Instruments' control and uniquely within user's knowledge and control can affect the use and performance of a Crowcon product in a particular application.

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Limitation of Liability:

Except where prohibited by law, Crowcon will not be liable for any loss or damage arising from the Crowcon product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

English

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List of VOC chemicals measured by **Xsafe Bright** PID

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Acetaldehyde	C2H4O	10.23	5.5
Acetone	C3H6O	9.69	1.17
Acrolein	C3H4O	10.22	3.2
Allyl alcohol	C3H6O	9.63	2.3
Allyl chloride	C3H5Cl	10.05	4.5
Ammonia	H3N	10.18	8.5
Amyl acetate, n-	C7H14O2	9.9	1.8
Amyl alcohol	C5H12O	10	2.6
Aniline	C6H7N	7.7	0.5
Anisole	C7H8O	8.21	0.59
Asphalt, petroleum fumes	9	1	
Benzaldehyde	C7H6O	9.49	0.7
Benzene	C6H6	9.24	0.5
Benzene thiol	C6H5SH	8.32	0.7
Benzonitrile	C7H5N	9.62	0.7
Benzyl alcohol	C7H8O	8.26	1
Benzyl chloride	C7H7Cl	9.14	0.7
Benzyl formate	C8H8O2	9.32	0.8
Biphenyl	C12H10	8.23	0.4
Bromobenzene	C6H5Br	8.98	0.32
Bromoethane	C2H5Br	10.29	1.6
Bromoethyl methyl ether, -2	C3H7OBr	10	2.5
Bromoform	CHBr3	10.48	2.8
Bromopropane, -1	C3H7Br	10.18	1.5
Butadiene, 1, 3-	C4H6	9.07	0.8
Butadiene diepoxide, 1,3 -	C4H6O2	10	4
Butanol, -1	C4H10O	10.04	3.9

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Butene, -1	C4H8	9.58	1.5
Butoxyethanol, -2	C6H14O2	8.6	1.1
Butyl acetate,	C6H12O2	9.91	2.5
Butyl acrylate,	C7H12O2	~9.6	1.5
Butyl mercaptan	C4H10S	9.15	0.5
Butylamine, n-	C4H11N	8.71	1
Camphene	C10H16	8.1	0.5
Carbon disulfide	CS2	10.08	1.4
Carbon tetrabromide	CBr4	10.31	3
Chloro-1,3-butadiene, -2	C4H5Cl	8.79	3.2
Chlorobenzene	C6H5Cl	9.07	0.45
Chloroethyl methyl ether -2	C3H7ClO	9	2.6
Chlorotoluene, o-	C7H7Cl	8.83	0.5
Chlorotoluene, p-	C7H7Cl	8.69	0.4
Cresol, m-	C7H8O	8.36	2.2
Cresol, o-	C7H8O	8.14	1.1
Cresol, p-	C7H8O	8.31	1.1
Crotonaldehyde	C4H6O	9.73	1
Cyclohexane	C6H12	9.98	1.3
Cyclohexanol	C6H12O	10	1.6
Cyclohexanone	C6H10O	9.16	1
Cyclohexene	C6H10	8.95	0.9
Cyclohexylamine	C6H13N	8.37	0.98
Cyclopentane	C5H10	10.52	10
Decane, n-	C10H22	9.65	1.2
Diacetone alcohol	C6H12O2	9	0.9
Dibromochloromethane	CHBr2Cl	10.59	10
Dibromoethane 1,2-	C2H4Br2	9.45	2

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Dichloro-1-propene, 2,3-	C3H4Cl2	10.5	1.4
Dichlorobenzene o-	C6H4Cl2	9.06	0.5
Dichloroethene, 1,1-	C2H2Cl2	10	1
Dichloroethene, cis-1,2-	C2H2Cl2	9.66	0.8
Dichloroethene, trans-1,2-	C2H2Cl2	9.65	0.4
Dicyclopentadiene	C10H12	7.74	0.9
Diesel Fuel	8	0.8	
Diethyl ether	C4H10O	9.53	1.1
Diethyl sulphide	C4H10S	8.43	0.6
Diethylamine	C4H11N	8.01	1.4
Diethylaminopropylamine, -3	C7H18N2	9	5
Diisobutylene	C8H16	8.91	0.7
Diisopropyl ether	C6H14O	9.2	0.92
Diisopropylamine	C6H15N	7.73	0.7
Diketene	C4H4O2	9.6	2.2
Dimethoxymethane	C3H8O2	9.7	2.8
Dimethyl disulphide	C2H6S2	8.46	0.2
Dimethyl ether	C2H6O	10.03	1.3
Dimethylamine	C2H7N	8.24	1.5
Dimethylaniline, NN-	C8H11N	7.12	0.6
Dimethylethylamine, NN	C4H11N	7.74	1.6
Dimethylformamide	C3H7NO	9.13	1.3
Dimethylhydrazine, 1,1-	C2H8N2	8.05	1
Dioxane 1,4-	C4H8O2	9.13	1.45
Diphenyl ether	C12H10O	8.09	1.5
Divinylbenzene	C10H10	8.2	0.4
Epichlorohydrin	C3H5ClO	10.2	5
Epoxypropyl isopropyl ether 2, 3-	C6H12O2	10	1.2

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Ethanolamine	C2H7NO	10.47	3
Ethoxyethyl acetate, -2	C6H12O3	10	3
Ethyl acetate	C4H8O2	10.01	4.5
Ethyl acrylate	C5H8O2	10.3	2.3
Ethyl benzene	C8H10	8.76	0.56
Ethyl butyrate	C6H12O2	9.9	1.4
Ethyl hexyl acrylate, -2	C11H20O2	9	1
Furfural	C5H4O2	9.21	0.8
Furfuryl alcohol	C5H6O2	9.9	2
Gasoline	9.9	0.9	
Glutaraldehyde	C5H8O2	9.6	0.9
Heptan-2-one	C7H14O	9.33	0.85
Heptan-3-one	C7H14O	9.02	0.73
Heptane n-	C7H16	9.92	2.2
Hexan-2-one	C6H12O	9.34	0.8
Hexane n-	C6H14	10.13	3
Hexene, -1	C6H12	9.44	0.9
Hydrazine	H4N2	8.93	3
Hydrogen sulfide	H2S	10.46	4
Hydroquinone	C6H6O2	7.94	0.8
Iminodiethanol 2,2'-	C4H11NO2	9	1.6
Indene	C9H8	8.81	0.5
Iodine	I2	9.31	1.5
Iodoform	CHI3	9.25	1.5
Iodomethane	CH3I	9.54	0.4
Isobutane	C4H10	10.57	8
Isobutanol	C4H10O	10.12	3
Isobutyl acetate	C6H12O2	9.9	2

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Isobutyl acrylate	C7H12O2	9.5	1.2
Isobutylene	C4H8	9.24	1
Isobutyraldehyde	C4H8O	9	1.2
Isooctane	C8H18	9.86	1.1
Isopentane	C5H12	10.32	6
Isoprene	C5H8	8.85	0.8
Isopropanol	C3H8O	10.17	4
Isopropyl acetate	C5H10O2	9.99	2.2
Isopropyl chloroformate	C4H7O2Cl	10.2	1.6
Jet Fuel	JP-4	~9	0.8
Jet Fuel	JP-5	~9	0.7
Jet Fuel	JP-8	~9	0.7
Kerosene	~8	0.8	
Ketene	C2H2O	9.62	3
Methacrylic acid	C4H6O2	10.15	2.3
Methoxyethanol, -2	C3H8O2	9.6	2.7
Methoxyethoxyethanol, -2	C5H12O3	10	1.4
Methoxymethylethoxy-2-propanol	C7H16O3	9.3	1.3
Methoxypropan-2-ol, 1-	C4H10O2	9.6	1.6
Methoxypropyl acetate	C6H12O3	9	1.6
Methyl acetate	C3H6O2	10.27	7

English

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Methyl acrylate	C4H6O2	10.25	3.6
Methyl bromide	CH3Br	10.54	1.9
Methyl ethyl ketone	C4H8O	9.51	0.96
Methyl isobutyl ketone	C6H12O	9.3	0.9
Methyl isothiocyanate	C2H3NS	9.25	0.6
Methyl mercaptan	CH4S	9.44	0.7
Methyl methacrylate	C5H8O2	9.7	1.31
Methyl propyl ketone	C5H10O	9.39	0.79
Methyl sulphide	C2H6S	8.69	0.8
Methyl tert-butyl ether	C5H12O	9.24	1
Methyl-2-propen-1-ol, -2	C4H8O	9.24	1.3
Methyl-2-pyrrolidinone, N-	C5H9NO	9.17	0.9
Methyl-5-hepten-2-one, -6	C8H14O	9.4	0.63
Methylamine	CH5N	8.97	1.5
Methylbutan-1-ol, -3	C5H12O	9.8	2.3
Methylcyclohexane	C7H14	9.85	1.1
Methylcyclohexanol, -4	C7H14O	9.8	2.4
Methylcyclohexanone -2	C7H12O	9.2	1
Methylheptan-3-one, -5	C8H16O	9.1	0.77
Methylhexan-2-one, -5	C7H14O	9.28	0.7
Methylhydrazine	CH6N2	8	1.3

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Methylpent-3-en-2-one, -4	C6H10O	9.1	0.6
Methylpentan-2-ol, -4	C6H14O	9.8	1.4
Methylpentane-2,4-diol, -2	C6H14O2	9	4
Methylstyrene	C9H10	8.2	0.5
Mineral spirits	9	0.8	
Naphthalene	C10H8	8.14	0.4
Nitric oxide	NO	9.27	8
Nitroaniline -4	C6H6N2O2	8.85	0.8
Nitrobenzene	C6H5NO2	9.92	1.7
Nitrogen trichloride	NCl3	10.22	1
Nonane, n-	C9H20	9.72	1.4
Octane, n-	C8H18	9.8	1.6
Octene, -1	C8H16	9.43	0.7
Pentan-2-one	C5H10O	9.38	0.99
Pentan-3-one	C5H10O	9.31	0.77
Pentandione, 2,4-	C5H8O2	8.85	1.2
Pentane, n-	C5H12	10.35	7
Phenol	C6H6O	8.51	1.2
Phenyl-2,3-epoxypropyl ether	C9H10O2	8.6	0.8
Phenylenediamine, p-	C6H8N2	6.89	0.6
Picoline, -3	C6H7N	9.04	0.7
Pinene, alpha	C10H16	8.07	0.34
Pinene, beta	C10H16	8.1	0.5
Piperylene	C5H8	8.6	0.9
Propene	C3H6	9.73	1.4
Propionaldehyde	C3H6O	9.95	1.7
Propionic acid	C3H6O2	10.24	8
Propyl acetate, n-	C5H10O2	10.04	3

VOC	Formula	Ionisation Potential eV	Crowcon Correction Factor (10.6ev Lamp only)
Propylene oxide	C3H6O	10.22	6
Propyleneimine	C3H7N	9	1.4
Pyridine	C5H5N	9.25	0.7
Pyridylamine -2	C5H6N2	9	0.8
Styrene	C8H8	8.4	0.45
Terpinolene	C10H16	8.1	0.6
Tert-butanol	C4H10O	9.8	1.6
Tetrabromoethane, 1,1,2,2-	C2H2Br4	10	2
Toluene	C7H8	8.82	0.56
Toluene-2,4-diisocyanate	C9H6N2O2	8.82	1.6
Trichloroethylene	C2HCl3	9.45	0.6
Trimethylbenzene mixtures	C9H12	8.41	0.4
Turpentine	C10H16	8	0.6
Undecane, n-	C11H24	9.56	1.1
Vinyl acetate	C4H6O2	9.19	1.5
Vinyl bromide	C2H3Br	9.8	1.5
Vinyl chloride	C2H3Cl	9.99	2.1
Vinyl-2-pyrrolidinone, -1	C6H9NO	9	4.5
Xylene mixed isomers	C8H10	8.56	0.54
Xylene, m-	C8H10	8.56	0.5
Xylene, o-	C8H10	8.56	0.5
Xylene, p-	C8H10	8.44	0.55
Xylidine, all	C7H11N	7.5	0.7

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