

# Nimbus

## Fixed Point Infrared Flammable Gas Detector

### Installation, operating and maintenance instructions

M07208 19/10/99

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Function	The detection of hydrocarbon gases C1 to C5 and ethylene in the 0-100% LEL range by means of infrared absorption
Dimensions	125 X 170 X 210 mm (5 X 6.8 X 8.3 in)
Weight	2.5 kg (5.5 lbs)
Construction	LM25 marine grade alloy polypropylene powder coated
Optical system	Dual wavelength dual detector
Optical performance	Correct operation with up to 90% obscuration
Power consumption	Dirty optics warning above 75% obscuration Heated optics to avoid condensation Operating voltage 10 to 32 V dc (nominal 24V), 180 mA(max)
Typical output signals	4-20 mA @ 24 V, 1.8 W @ 10 V Fail - low concentration - simultaneous sink and source output
Status light	Green - normal function Yellow - fail Red - other conditions indicated by flash rate
Communicating	Modbus RS485 serial link Gas chamber or flow adaptor for gassing
Accuracy	±5% of gas reading Zero stability < 1% LEL
Repeatability	±2% of gas reading
Response time	< 7 seconds - top < 3 seconds - instantaneous high levels of gas
Humidity range	0 to 99% RH non-condensing
Approvals	Ex d IIB+Hydrogen T6 Class 1 Div 1 Groups B, C & D Temp. -40°C to 65°C (-40°F to 149°F)
Standards	UL 1203 EN50014, EN50018 IP66 (jets of water)
Ingress protection	IP66 (jets of water)
Light immunity	Totally immune to external light both constant and modulated (including sunlight, white light, flashing beacons etc)
General immunity	Totally immune to all catalyst poisons
Electromagnetic	Gas detection standard pr EN50270
Compatibility	RF emissions EN50081-2 RF immunity EN50082-2

## 5. SPECIFICATION

## 1. INTRODUCTION

### 1.1 Product overview

Nimbus is a dual wavelength, fixed point, infrared gas detector for the detection of C1 to C5 hydrocarbons in the range 0-100% LEL. It is designed for continuous operation and where speed of response and accuracy are essential. Nimbus is powered by 24V dc and provides a 4-20 mA signal (sink or source) proportional to the gas concentration. This gas detector is certified flameproof and may be fitted in zone 1 or 2 hazardous environments.

### 1.2 Product Description

Nimbus comprises two main parts, the docking station and IR detector. Diagram 1 shows the overall general arrangement of Nimbus. All housings are manufactured from LM25 marine grade alloy, and when assembled form an explosion proof detector for use in zone 1 or 2 hazardous environments. Nimbus is certified EEx d IIB+Hydrogen T6 and UL Class 1 Division 1 Groups B, C & D. All field cables are terminated at the docking station. As standard the docking station is supplied with female M20 entry (alternative entries including 1/2 inch NPT are available upon request). Terminals for up to 2.5 mm<sup>2</sup> cable are provided for all connections.

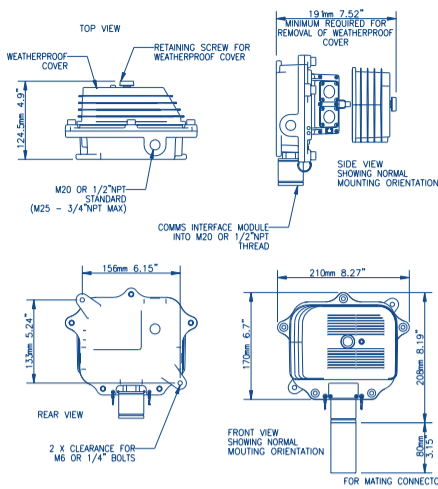


Diagram 1 Nimbus general arrangement

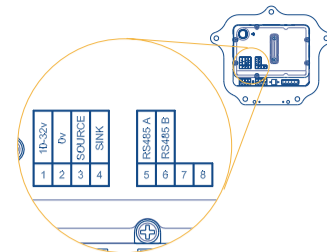


Diagram 2 Nimbus connection arrangement

Diagram 2 shows the Nimbus detector opened up to see the general wiring arrangement.

Provision is made for the attachment of identification tags as required on the hinge rings.

## 2. INSTALLATION

### Warning

*Nimbus is designed for use in zone 1 and 2 hazardous areas and is certified to CENELEC EEx d IIB+Hydrogen T6 and UL Class 1 division 1 groups B, C and D. 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 Nimbus gas detector should be mounted where the flammable gas to be detected is most likely to be present. Note the following points when locating gas detectors:

- To detect gases which are lighter than air (e.g. methane) detectors should be mounted at high level.
- To detect heavier than air gases (e.g. butane) detectors should be mounted at low level.
- Consider the possible damage caused by natural events e.g. rain or flooding.
- Consider ease of access for functional testing and servicing.
- Consider how the escaping gas may behave due to natural or forced air current. 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 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 location of sensors should be recorded. Crowcon would be pleased to assist in the selection and siting of gas detectors.

### 2.2 Mounting

Diagram 1 shows the of Nimbus mounting arrangement. Nimbus is mounted at the designated site with the optical axis of the detector horizontal ( $\pm 15^\circ$ ). The weatherproof cover has been designed to allow maximum gas flow into the optical chamber in this position so providing the best speed of response while ensuring a high degree of water ingress protection. If Nimbus is used with the optional flow adaptor, non-horizontal mounting is sometimes possible.

## 2. INSTALLATION (continued)

### 2.3 Cabling Requirements

Cabling to Nimbus 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.

Nimbus requires a DC supply in the range 10-32 volts. 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.

For example, a nominal DC supply at the control panel of 24 volts has a guaranteed minimum supply of 18 volts. The maximum voltage drop allowed is therefore 8 volts. Nimbus can demand up to 180 mA and so the maximum loop resistance allowed is 40 ohms. A 1.5mm<sup>2</sup> cable will typically allow cable runs up to 3200m. 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 mm<sup>2</sup>.

C.S.A. (mm <sup>2</sup> )	Resistance (Ohms per km)	Max distance (m)
1.0	18.1	1270
1.5	12.1	1830
2.5	7.4	3000

Table 1: Max. cable distances (typical cables)

Table 1 is provided for guidance only, actual cable parameters for each application should be used to calculate maximum cable distances.

### 2.4 Electrical Connection

Nimbus has three possible electrical configurations. Current source 4-20 mA, Current sink 4-20 mA, or both of these 4-20 mA loops.

Refer to diagram 2 for terminal layout and diagram 3 for electrical connections. Terminals are designated as:

- 24V dc (nominal)
- 0V
- 4-20mA signal (source)
- 4-20mA signal (sink)

Unused terminals must not be used to terminate spare cores.

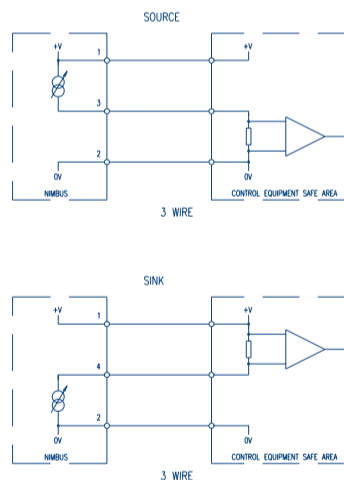


Diagram 3 Nimbus connection arrangement

## 3. OPERATION

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.

*Note: Nimbus is factory calibrated to detect the required flammable gas and provide a 4-20mA output proportional to 0-100% LEL of that gas. The control panel which is used to indicate the gas concentration should be pre-configured to accept 4-20 mA input prior to connection of Nimbus. Please contact the supplier of the control panel being used for assistance.*

### 3.1 Initial Start Up

Prior to switching on, Nimbus for the first time, inhibit any local control functions from the control panel to which Nimbus is connected. Once field cabling is complete and connections have been checked, the 24V dc supply may be switched on. After switch on, Nimbus performs a self check routine, and must be allowed to warm up for approximately 10 seconds.

After the warm up period, Nimbus is fully operational and the output signal is proportional to the concentration of hydrocarbon gas or vapour present at the detector, relative to the calibration gas concentration.

## 3. OPERATION (continued)

As standard, Nimbus provides a 4-20mA signal proportional to 0-100%LEL methane (for calibration purposes 5%v/v = 100%LEL methane). Other calibrations are available and the specification for each instrument should be consulted to discern the correct operation. If the output reads other than 4-20mA please refer to Section 3.3 'Fault Diagnosis'.

### 3.2 Normal Operation

Nimbus includes a tricolour LED visible through the light pipe of the detector through the weatherproof cover. The LED gives the user basic information concerning the state of the detector. This is summarised in Table 2.

### 3.3 Fault Diagnosis

Nimbus is designed to provide user free operation and included a number of diagnostic routines which are transparent to the user. Two types of fault condition may occur, one is 'dirty optics' indicated by a 2 mA signal and the other is an unrecoverable fault or beam block signalled by 0 mA. Nimbus continuously checks that the optics are clean. Should the optics become blocked or obscured by more than 75% the 4-20 mA output is clamped to 2mA signalling a beam obscured or 0 mA signalling a beam blocked condition. This may be cleared by removing the Weatherproof Cover and

cleaning the optics with an IPA impregnated lint free cloth. It is advisable to inhibit the control panel before cleaning the optics. Beam block may also be cleared in this way. For other types of fault, remove power from the detector, wait 10 seconds and reconnect the power. If after carrying out the self check routine (10 seconds) the output remains at 0 mA, it is worthwhile checking the supply voltage is correct and that the operating temperature is between -40°C and +65°C. If these are correct then leave the detector continuously powered for more than 24 hours and its internal fault correction routines may sort out the fault. If after this time, it is still a 0 mA signalled fault, then the Nimbus may be damaged and the operator should contact Crowcon for advice on repair or servicing.

### 3.4 Functional Testing

Prior to testing Nimbus, inhibit any local control functions from the control panel to which Nimbus is connected.

Site procedures may dictate that the system be tested periodically with the target gas. Gas may be piped into the gas cell present in each Nimbus. The pipe has a 5mm fitting on the inlet for a 3mm ID pipe. Test gas may be plumbed to the cover and gas applied at a flow rate of up to 0.5 litres/minute. 100% v/v of the target gas is required.

### 3.5 Maintenance

There are no user serviceable parts in Nimbus. Maintenance is limited to the cleaning of optics as and when required. For this operation lint free cloth is recommended.

Operational State	LED indication	Detector Output	Comment
Start up	O G O G	2mA	10 seconds
Normal	G - - -	4.0-7.2mA	-6%-20%
Normal	R R - -	7.2-10.4mA	20%-40%
Normal	R - R -	10.4-21mA	40%-106%
Dirty optics	O - - -	2mA	Recoverable fault
Recoverable fault	O - O -	0 mA	See user manual
Unrecoverable fault	O O O -	0 mA	See user manual
Over range	R R R -	24 mA	

Table 2 LED status indication

## 4. SPARE PARTS & ACCESSORIES

Description	Part Number
Weatherproof cover	C01 743
Calibration cove	C01 744
Pellistor mimic	C01 648
European docking box	M01 704
USA docking box	M01 705
Nimbus	S01951
USA allen key	
European allen key	
Calibration gas	Contact Crowcon