

DETECTIVEIQ

Area monitoring gas detector with optimal battery life, adaptable sensor tray, and wireless alarm passing

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CONTENTS

	PROLOGUE	4
	SAFETY INFORMATION	5
	SAFETY CERTIFICATIONS	5
	SPECIFIC CONDITIONS OF SAFE USE	5
	WIRELESS CERTIFICATIONS	6
	SPECIFICATIONS	6
	PROPER PRODUCT DISPOSAL AT END OF LIFE	6
1.	UNBOXING	7
	STANDARD BOX CONTENTS	7
2.	OVERVIEW	8
2.1	PRODUCT OVERVIEW	8
2.2	NORMAL DISPLAY OVERVIEW - COMPACT	8
2.3	NORMAL DISPLAY OVERVIEW - FULL	9
2.4	BATTERY INDICATION & CHARGING	10
2.5	QUICK VIEW	11
2.6	SWITCHING ON & OFF	12
2.7	IN THE EVENT OF AN ALARM	13
2.8	FITTING FLOW PLATES	13
3.	OPERATION	14
3.1	START UP	14
3.2	DEVICE INFORMATION SCREENS	16
3.3	SCREEN DISPLAY FOR MULTIPLE ACTIVE SENSORS	17
3.4	STATUS BAR	17
3.5	DIFFUSION MONITORING	18
3.6	PUMPED MONITORING	18
3.7	PUMP TEST	19
3.8	SAMPLING POSSIBLE WATER AREAS	19
3.9	ALARMS	21
3.10	SENSORS	24
3.11	LONG-LIFE OXYGEN SENSOR	24
3.12	ELECTRO-CHEMICAL SENSORS	25
3.13	PELLISTOR SENSORS	25
3.14	PELLISTOR SAVER MODE	25
3.15	MPS FLAMMABLE SENSOR	25
3.16	INFRARED SENSOR	26
3.17	PID	26
3.18	DEVICE MENU	26
3.19	LIVE GAS LEVELS SCREEN	27
3.20	DEVICE & SENSOR INFORMATION	27
3.21	WARNINGS/FAULTS INFORMATION	28
3.22	PEAK REVIEW	28
3.23	MANUAL ZERO	29
3.24	SETTINGS	30
3.25	ADDITIONAL FEATURES	33
3.26	EVENT LOGGING	33
4.	GAS TESTING AND CALIBRATION	34
4.1	INTRODUCTION	34
4.2	BUMP TEST	34
4.3	FAILURE MODES	36
4.4	CALIBRATION PROCESS	37
4.5	FAILURE MODES	39
4.6	SENSOR BIASING	39
5.	ACCESSORIES	41
5.1	APPROVED PARTS ONLY	41
5.2	ACCESSORIES AND SPARE PARTS	41
5.3	DISPOSAL	41
6.	SPECIFICATION	42

7.	TROUBLESHOOTING	43
7.1	PUMP TEST FAILURE	43
7.2	FAULT/WARNING/INFORMATION DESCRIPTIONS	43
7.3	FAULT/WARNING/INFORMATION MESSAGES	44
8.	APPENDICES	48
8.1	SENSOR LIMITATIONS	48
8.2	MPS OPERATIONAL GUIDANCE	48
8.3	CHARGING & RUN TIMES	49
9.	WARRANTY	50
9.1	WARRANTY PROCEDURE	50
9.2	WARRANTY DISCLAIMER	50
	CONTACTS	51

PROLOGUE

Read and understand this manual before use. Check all display pixels, alarm LEDs and sounders function during the start-up procedure, and that the device does not have any mechanical defects before each use. Charge fully before first use. Charge and service in non-hazardous areas.

NOTE: The certification label shows the part number, serial number, relevant certification, and manufacture details. Please reference the serial number as a minimum when contacting Crowcon regarding your product.

Read and understand this manual before use to familiarise yourself and ensure that it is used accordingly for your application. Failure to comply may result in severe injury or loss of life.

Thank you for choosing the DetectiveIQ area monitor. This device is designed for the detection of various gases in industrial and hazardous environments. It provides real-time monitoring and alerts users to the presence of harmful gas concentrations.

SAFETY INFORMATION

Document No. M07052 - Revision Number: 1.1

- This section is version controlled by certification approval bodies.
- The detector is certified for use in hazardous areas and must be operated and maintained in strict compliance with the instructions, warnings, and labelling provided in this manual. It must be used within the specified limitations.
- Carefully read and fully understand all instructions in the operation section of this manual before use.
- Prior to operation, ensure that the equipment is in proper working condition, with the enclosure intact and undamaged.
- If any damage is identified, do not use the device. Instead, contact your local Crowcon office or authorised agent for repair or replacement.
- Do not disassemble the device or replace components, as this may compromise intrinsic safety and invalidate safety certification.
- Only genuine Crowcon replacement parts should be used; the use of substitute components may void both certification and warranty. Refer to the "Service and Maintenance" section for further details.
- Adhere to all warnings and instructions indicated on the unit and within this manual.
- Follow site-specific health and safety protocols related to monitored gases and evacuation procedures.
- Familiarise yourself with the screen display and alarm warnings before use.
- If the device is not functioning correctly, consult the troubleshooting guide or contact your local Crowcon office or authorised agent. Refer to the "Crowcon Contacts" section of the manual for details.
- Ensure that maintenance, servicing, and calibration are conducted in accordance with the procedures outlined in this manual and performed only by trained personnel.

SAFETY CERTIFICATIONS

ATEX IECEX INMETRO (Pending)	CSANe 25ATEX1123X IECEX CSAE 25.0044X INMETRO UL-BR 25.1790X (Pending) ATEX Ex II 1 G Ex ia IIC T4 Ga Tamb -20°C to +55°C (with no pellistor) Ex da ia IIC T4 Ga Tamb -20°C to +55°C (when fitted with pellistor sensor) Certification standards EN IEC 60079-0:2018 IEC 60079-11:2023 Ed 7 ABNT NBR IEC 60079-0:2020 Versão Corrigida:2024 ABNT NBR IEC 60079-11:2013 Versão Corrigida:2017
CE	Complies with RED, RoHS, ATEX EN 50270, EN 301 489 and EN 300 328

SPECIFIC CONDITIONS OF SAFE USE

- The equipment must only be charged in the non-hazardous area using a suitably certified SELV, PELV or ES1 or equivalent charger with the following parameter:
- Charger Connector Um = 10.0V d.c
- The RS485 connection must not be used in a hazardous area and is for use during manufacturing, test, repair or overhaul only.

WIRELESS CERTIFICATIONS

EUROPE & UK	Complies with radio equipment directive.
USA	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Contains FCC ID R7T1201102 & XPYNORAB1
CANADA	Contains IC ID 5136A-1201102 & 8595A-NORAB1
BRAZIL	Contact Crowcon for availability.
UAE	
SINGAPORE	
INDONESIA	
MALAYSIA	
HONG KONG	
SOUTH AFRICA	
AUSTRALIA	
NEW ZEALAND	

SPECIFICATIONS

Size/Weight	29.8 x 53.6 x 26.8cm / 8 kg
Temperature/Humidity	-20 to +55°C / 0-95% RH
IP Rating	IP 66/68
Alarms	Visual, Audible (97dB @ 30cm), Low/High, TWA, STEL
Recharge Time	8 hours
Connections	Bluetooth® Connection to Crowcon Companion App for Live Data and Configuration.
Data Logging	Up to 8460 Event Logs

PROPER PRODUCT DISPOSAL AT END OF LIFE

EU Directive 2012/19/EU: Waste Electrical and Electronic Equipment (WEEE)

The product must not be discarded as general industrial or household waste. Instead, it should be disposed of through appropriate WEEE disposal facilities.

For further information on proper disposal methods, please contact your local authority, distributor, or the manufacturer.

End of Certification Sub Controlled Section.

1. UNBOXING

The device is calibrated and passes quality inspection before leaving our manufacturing facility.

STANDARD BOX CONTENTS

- DetectiveIQ gas detector – calibrated and configured
- Quick start guide
- Calibration report
- Declaration of conformity
- Multi-Region power supply

Pumped DetectiveIQ devices will also be supplied with the following:

- Pumped flow plate
- Water trap (and clip)
- Tubing

Additional accessories should be purchased separately.

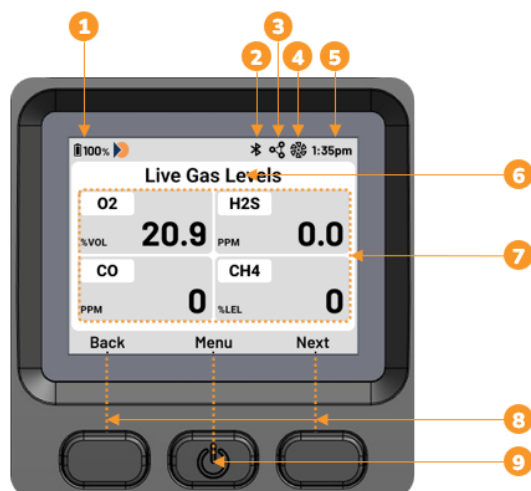
2. OVERVIEW

2.1 PRODUCT OVERVIEW



- | | |
|----|--------------------------|
| 1 | Top handle with grips |
| 2 | Alarm/status bar |
| 3 | Colour display |
| 4 | Power/navigation buttons |
| 5 | Sounder assembly |
| 6 | Gas path |
| 7 | Power inlet |
| 8 | Data connection |
| 9 | Side handles |
| 10 | Rubber boot |

2.2 NORMAL DISPLAY OVERVIEW - COMPACT

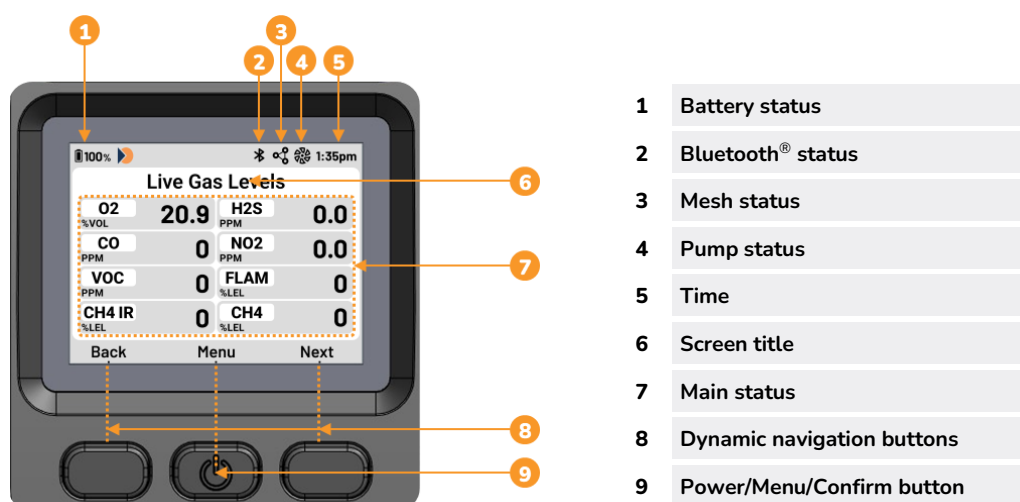


- | | |
|---|----------------------------|
| 1 | Battery status |
| 2 | Bluetooth® status |
| 3 | Mesh status |
| 4 | Pump status |
| 5 | Time |
| 6 | Screen title |
| 7 | Main status |
| 8 | Dynamic navigation buttons |
| 9 | Power/Menu/Confirm button |

	Battery status
	Warning
	Mesh status
	Beacon status
	Pump
	Bluetooth®
	Sounder mute (production/service function only)

2.3 NORMAL DISPLAY OVERVIEW - FULL

For DetectiveIQ devices configured with 5 or more channels, the display will automatically switch to “Full Sensor View” showing all available sensors within the device. This display layout applies to all 5–8 channel configurations.



2.4 BATTERY INDICATION & CHARGING

All DetectiveIQ devices are shipped with a pre-installed 82Wh battery pack and Crowcon’s multi-region power supply.

2.4.1 CHARGING



The standard DetectiveIQ battery pack can operate the device for up to 101 days.

Battery life will vary depending on device configurations, backlight timeout, confidence mode, operating temperature, sensor types, and pump usage. At operating temperatures between -10°C and -20°C (14°F to -4°F), the battery pack’s capacity decreases by approximately 50–60%. See section 8.3 for battery life estimations by configurations.

Always fully charge the DetectiveIQ before use. It is recommended to perform a balance charge after every 10 charging cycles. Once the battery reaches 100%, keep the charger connected for an additional 4 hours to allow the battery pack to balance. This process helps extend the lifespan of both the DetectiveIQ and its battery.

Only use Crowcon supplied charging cables and docks. All devices ship with a multi-region power supply as default.

Connection: Remove the left dust cap by turning it counterclockwise. Align the charger cable to the left port on the device, press in and then lock in place by turning the ring right until it clicks. Note that the charging cable will only fit in one orientation.

IMPORTANT: Make sure the cable connector is tight. Do not use tools.

It is advised that the DetectiveIQ is turned off while charging. Operating the DetectiveIQ while charging will result in a longer charging time.

WARNING: Do not charge the DetectiveIQ with the DC charger in a hazardous area! Always charge in a (non Ex) safe area only.

NOTE: Once a DetectiveIQ has reached 100% charge state, further charging is automatically disabled until the battery percentage has dropped below 95%.

Whenever a port is not in use, make sure the dust cap is re-fitted. This keeps the contacts clean and prevents inadvertent short-circuiting.

2.4.2 STORAGE

For long-term storage, Crowcon recommends storing the battery/device at 20°C (68°F). It is also recommended that the unit is bump checked every 3 months if in storage and charge added if necessary so that it is ready for use when required.

2.4.3 BATTERY INDICATION

The battery icon can be found in the top left side of the display status bar. The status icons are shown as follows:

	Normal Use (>20%)
	Low Battery (<20%)
	Critical Battery Level (<10%)

IMPORTANT: The DetectiveIQ will automatically charge when a charger is connected and conditions are between 0°C-40°C to prolong the life of the battery. The DetectiveIQ battery will not charge in conditions outside of the specific temperature range. The battery indication icon will change depending on the charge level. The status icons are:

	Charging (>90%)
	Charging (<90%)

2.4.4 BATTERY ALERTS

The DetectiveIQ will provide alerts to the user when the battery level becomes low or critical.

The low battery alert will be displayed to the user when at 20% capacity left. This screen can be cleared using the centre button (the warning LED & sounder tunes will stop upon acknowledgement of the warning screen). The red 'Fault' icon (⚠️) will be displayed in the status bar until the device is sufficiently charged (>20%). The device must be charged as soon as possible.



When the battery level becomes critically low (<2%), the instrument displays a shutdown warning for 20 seconds. It will then automatically power off, and the battery must be recharged before the instrument can be used again. If the instrument is turned on before recharging, it will immediately return to the auto-shutdown state.



2.5 QUICK VIEW

The configuration details of DetectiveIQ can be reviewed even if the device is not powered by momentarily pressing the Power/Confirm button.

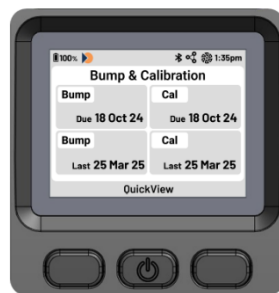
The device will automatically enter Quick View mode, during which it will cycle through multiple display screens. Each screen will remain visible for approximately 5 seconds before advancing to the next. Upon completion of the Quick View sequence, the DetectiveIQ will automatically power off.

The configuration items that may be displayed are as follows:

- Serial number
- Firmware Versions
- Mesh ID
- Instrument Date and Time
- Bluetooth® ID
- Last Bump Date
- Last Calibration Date (earliest sensor calibration date)
- Calibration Due Date (Upcoming Sensor Calibration Date)
- Bump Due Date
- Configured lower alarm levels (alarm 1)
- Configured upper alarm levels (alarm 2)
- STEL configured alarm levels (if a toxic sensor is fitted)
- LTEL configured alarm levels (if a toxic sensor fitted)



Device information



Bump and Calibration dates



Alarm levels



Exposure limits

2.6 SWITCHING ON & OFF

WARNING: The device displays a series of flashing lights and colors during start-up that may affect photosensitive users.

IMPORTANT: Before turning the DetectiveIQ on, ensure it is in 'clean air' (i.e. outside, in normal air, away from any plant process or suspected gas location). This will allow the device to be zeroed using clean air as the base point. If the DetectiveIQ is zeroed in contaminated air, a false gas reading can result, or the zero could fail.

IMPORTANT: DetectiveIQ will not respond to gas until the startup sequence is complete. Warm-up times are dependent on sensor fitment and can range between 60-120 seconds before the sensor reaches its defined accuracy.

In clean air, turn on the DetectiveIQ by holding down the Power/Confirm button for 3 audible short blips followed by one longer tone. DetectiveIQ will warm up and go through a series of automatic processes. See section 3.1. for more information.

At the main measurement screen, press and hold the Power/Confirm button. A 3-second countdown to shutdown begins. You must release the button at the end of the second 5-second countdown to shut off the instrument. The DetectiveIQ will now enter a shutdown process.

If you release the button during the first 3-second countdown, the instrument continues normal operation.



2.7 IN THE EVENT OF AN ALARM

The device will go into alarm when one or more of its sensors detects levels of gas outside normal operation. The display will indicate which channel and alarm type has been activated (channels go red), the LED bars will flash and the sounder will activate. The alarm and sounder patterns differ depending on alarm type. If your device has more than 4 gas channels, it will show them all, and the channel(s) in alarm will go red.

See section 3.9 for more details on alarm functionality.

2.8 FITTING FLOW PLATES

Slide either flow plate into the back of the device. If the DetectiveIQ is configured to be pumped, the pumped flow plate will activate the pump automatically. The gassing flow plate will put the device into Bump mode and will expect gas within 10 seconds.

Bump Plate – Identifiable due to grey gasket



Pump Flow Plate – Identifiable via the gasket cutout showing a "P"



Calibration Plate – Identifiable via the black gasket with grey sticker



3. OPERATION

3.1 START UP

IMPORTANT: Before turning the DetectiveIQ on, ensure it is in 'clean air' (i.e. outside, in normal air, away from any plant process or suspected gas location). This will allow the device to be zeroed using clean air as the base point. If the DetectiveIQ is zeroed in contaminated air a false gas reading can result, or the zero could fail.

NOTE: If a DetectiveIQ is fitted with a pump as standard, the pump will automatically start when switched on, provided that a flow plate is fitted. A DetectiveIQ tests the pump automatically at this point (for more details on this, see Pump test).

IMPORTANT: DetectiveIQ will not respond to gas until the startup sequence is complete.

In 'clean air', turn on the DetectiveIQ by holding down the Power/Confirm button for 3 audible short blips followed by one longer tone. DetectiveIQ will warm up and go through a series of automatic processes as follows:



NOTE: Immediately at startup the DetectiveIQ will perform an audio and visual test, displaying all the possible LCD segments in various colours. The LEDs & Sounders will also operate at this time. Do not operate the unit if any of the sounders, LEDs or display appear to have an error/fault. Return it to be serviced by an approved partner or Crowcon.

1 SPLASH SCREEN	'Crowcon' logo is shown on the display.
2 DEVICE INFORMATION	Device information is displayed, showing; • Serial number • Firmware versions • Mesh ID • Instrument date and time • Bluetooth® ID
3 BUMP AND CALIBRATION DATES	Bump and calibration information is displayed, showing; • Last bump date • Last calibration date • Calibration due date • Bump due date Overdue is highlighted in red. Due is highlighted in orange.
4 ALARM LEVELS	Device's alarm levels for the configured sensors are shown. This includes: Configured lower alarm levels (alarm 1) Configured upper alarm levels (alarm 2)
5 EXPOSURE LIMITS	Device's exposure limits for the configured toxic sensors are shown. This includes: • STEL configured alarm levels (if a toxic sensor is fitted) • LTEL configured alarm levels (if a toxic sensor is fitted)
6 STARTUP CHECKLIST	The device performs a health check during startup. If anything is not within expected parameters, this is highlighted in red. Normal functions are displayed in green.
7 ZERO SENSORS	An Autozero should not be performed unless the DetectiveIQ is in clean air. Press the 'Right' keypad button to proceed with performing an Autozero, otherwise the countdown will progress and will not perform a zero. If the 'Left' keypad button is pressed then this function will be skipped. When the autozero has finished or been skipped, the next screen is the 'Live Gas Levels' screen and displays the gas levels.
8 ZERO SENSORS STATUS	If a Zero is performed, it will display progress and summary screens before continuing to the final startup step.

If the calibration due lockout feature has been enabled, a warning screen will be displayed and the DetectiveIQ will not proceed to the 'Live Gas Levels' screen.

NOTE: Auto-Zero or Front-Panel Zero is disabled for CO2 sensors in DetectiveIQ. Zero for CO2 must only be performed using the Crowcon Companion App. Zeroing must be performed by applying Nitrogen over the sensor. A Zero must not be performed in clean air.

The DetectiveIQ is now ready for use

3.2 DEVICE INFORMATION SCREENS

After a successful startup sequence the screen will display the 'Live Gas Levels' screen . Cycle between Live Gas Levels, Peak Review, STEL and LTEL screens using the 'Next' & 'Back' navigation buttons. You can clear Peaks (reset to 0, except for O₂ (20.9%) and CO₂ (0.04%vol)) by navigating the sub-menu before navigating back to the Peak reading display.

NOTE: If no buttons are pressed at any of the menu steps for 30 seconds, the instrument reverts to the main gas display.



1 LIVE GAS LEVELS	Default screen. Shows all channels' live gas readings. This will dynamically update depending if you have <=4 or 5<=8 channels configured. Pressing the Power/Confirm button press will re-activate it. The duration of time the display is on for and automatically switches off after can be configured in the service software.
2 PEAK REVIEW AND CLEARING	The highest readings of each channel (lowest for O2) are shown. These can be cleared using the dynamic action buttons.
3 STEL	The Short-Term Exposure Limits (STEL) of each toxic channel are shown. These are a rolling 15 minute calculation.
4 LTEL	The Long-Term Exposure Limits (LTEL) of each toxic channel are shown. By default these are for 8 hours.
5 MENU	Device options show within the menu.

3.3 SCREEN DISPLAY FOR MULTIPLE ACTIVE SENSORS

The DetectiveIQ can accommodate from one to six sensors (supporting up to eight gas channels) on the display. When one or more sensors is removed or unconfigured, the display only shows the installed, active sensors.

The DetectiveIQ display will automatically choose between a 4-channel UI if 4 or less channels are configured on the device or an 8-channel UI if 5 or more channels are configured on the device.



3.4 STATUS BAR

DetectiveIQ features a 'status bar' at the top of the main gas status screen. This is where you will find more information about warnings, battery life, pumped operation and connectivity.



The explanation of each of the icons can be found on next page.

ICON	DESCRIPTION	ICON	DESCRIPTION
	Normal Use (>10%)		Warning
	Critical Battery Level (<10%)		Beacon Status
	Charging (>90%)		Mesh Enabled
	Charging (<90%)		Mesh Provisioning
	Pump Fitted		Mesh Fault
	Pump Fitted & Running		Mesh Connected
	Pump Fitted & Stalled		Bluetooth® Enabled
	On-Screen Confidence		Bluetooth® Connected (to companion app)

3.5 DIFFUSION MONITORING

If you wish to monitor gases in ambient air for dangerous levels, ensure the DetectiveIQ is placed in an open area. In the default, non-alarm state, DetectiveIQ's confidence LEDs will flash green every 30 seconds. The LCD display will indicate it is running by flashing the status icon. ()

In the alarm state, DetectiveIQ's sounder will emit a rapid tone, the alarm LEDs will flash red and the LCD display will also be red and highlight the gas/channel in alarm. The alarm and sounder patterns differ depending on alarm type

3.6 PUMPED MONITORING

NOTE: The following instructions should be observed before using the device in Pumped Mode:

- Prior to fitting, the flow plate's gasket should be checked for any damage.
- Keep the sample tube length as short as possible.
- It is strongly recommended before proceeding that a function check is performed using the pump and sample tube with the gas/vapour to be detected.
- To reduce the risk of adsorption of the gas/vapour in the sample tube, ensure the temperature of the sampling tube is above the flash-point temperature of the target vapour.
- Ensure the monitor is correctly calibrated for the target gas/vapour.
- Only use the sample tube supplied by Crowcon. It is strongly recommended that 'reactive gas tubing' (part no: AC0301) is used for sampling gases/vapours that are likely to be adsorbed (examples: toluene, chlorine, ammonia, hydrogen sulphide, ozone and hydrogen chloride).

- Pump configured devices are supplied with a short amount of tubing and water trap. Use is optional and must be appropriate for the application. The water trap will prevent initial amounts of water being sucked into the pump and damaging it. If there is a risk water could be sucked into the pump, the water trap must be monitored closely and pumped flow plate removed at first signs of water coming into the trap.
- Allow sufficient time for the gas/vapour to reach the sensor. Example times are provided in the table over the page.
- Pumped operation requires the use of the pumped flow plate which automatically activates the pump. If a pumped flow plate is not fitted, the device defaults back to being in Diffused mode. The pump capacity is 0.8l/m and will draw a sample of gas from 30m within 80 seconds. Please note the expected losses for some gases below. These results do not have a water trap fitted to the sampling tube.
- Addition of the water trap adds an approximate 20 seconds to the T90 times of the gases listed below.

3.7 PUMP TEST

In the default configuration, a pumped DetectiveIQ with a flow plate attached (see Fitting a flow plate on page 13) will run a pump test during the start-up process. A pump test will also be run whenever a flow plate is attached during normal operation.

IMPORTANT: Prior to fitting, the flow plate's gasket should be checked for any damage. The pump test ensures accurate sealing as well as monitoring pump performance. The user will need to cover the pump inlet (see below) when prompted to do on the Screen.



When the test has finished, the pump will either pass or fail. A pass is determined by a successful 'block' of the pump inlet. A fail result indicates that the pump system is not sealed. In this case check all seals and tubing condition before re-attempting the pump test.

If the pump test takes place during start-up and the DetectiveIQ passes, the pump will remain on and the start-up process will continue as normal. If the test is passed during normal use, the DetectiveIQ will remain in the pumped mode until the flow plate is removed.

On failing the pump test the fail screen will persist with an audible alert until the button is pressed and the test repeats OR the flow plate is removed and the DetectiveIQ returns to non-pumped operation. For further details on pump test and operation in pumped mode see section 3.8.

3.8 SAMPLING POSSIBLE WATER AREAS

When sampling an area that may contain water, use the ball float probe to reduce the potential for water travelling up the sample line.

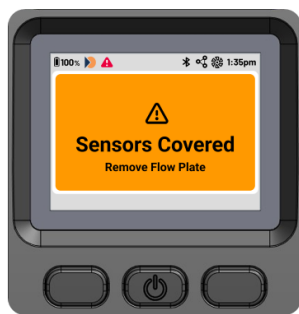
TUBE TYPE		Standard (AC0201/03/05/10/20/30)							
TUBE LENGTH		1 metre		5 metres		10 metres		30 metres	
		Loss	Time	Loss	Time	Loss	Time	Loss	Time
CO (100ppm)	Carbon Monoxide	0ppm	22s	0ppm	24s	0ppm	26s	1ppm	57s
H2S (15ppm)	Hydrogen Sulphide	0ppm	16s	0ppm	17s	1ppm	30s	2ppm	69s
CH4 (50%LEL)	Methane	0%LEL	15s	0%LEL	17s	0%LEL	22s	0%LEL	55s
O2 (18%Vol)	Oxygen	0%Vol	26s	0%Vol	26s	0%Vol	31s	0%Vol	56s

Push the pumped flow plate into the rear of the unit using the guide rails until the flow plate clips into place against the sensor module. Once it is in place the device will go into pumped mode. It will enter this mode from any screen/mode.



1 PUMP STALL CHECK	User fits pumped flow plate. Pump icon in status bar goes green. (🌀) Operator blocks the end of the tube with their thumb until the next screen is displayed.
2 CHECK COMPLETE	If the device recognises that there isn't a leak, the icon will momentarily go red to signify the pump has been blocked successfully and the check is complete. (🔴) The pump should then restart automatically, with the pump icon reverting to green. (🌀) If the pump check wasn't successful, it will highlight this with a failure message. The pump icon will revert to black as the pump stops. (⬛)
3 PUMPED LIVE GAS READINGS	While the pump is active and gas readings are from sampled atmosphere, the display will go back to the Live Gas Reading screen. The pumped icon will continue to stay green. (🌀)
4 DIFFUSED LIVE GAS READINGS	To revert back to diffused mode, remove the pumped flow plate. The pumped icon will revert back to being black to confirm a pump is fitted but not being used. (⬛)

NOTE: If a pumped flow plate is fitted to a diffused-only device, the following fault screen will appear:



Check failed

In the event of a blockage of the pump system while in operation the DetectiveIQ will automatically stop the pump allowing the user to clear any blockages and thus any damages to the system. Upon clearing the blockage, use the 'Power/Confirm' to clear the on-screen message. Upon clearing the message, the pump will restart.



Pump Blocked

3.9 ALARMS

DetectiveIQ has the following types of alarm:

- Low battery
- Instantaneous (low and high alarms)
- Short-Term exposure limit (STEL)
- Long-Term exposure limit (LTEL)

NOTE: Alarms are configured by gas and region, determined at the point of ordering by chosen configuration. Alarm levels should be reviewed for each use case and can be changed using the Crowcon Companion App.

3.9.1 LOW BATTERY ALARM

The DetectiveIQ will provide alerts to the user when the battery level becomes low or critical.

The low battery alert will be displayed to the user when at 20% capacity left. This screen can be cleared using the centre button (the warning LED & sounder tune will stop upon acknowledgement of the warning screen). The red 'Fault' icon  will continue to be displayed in the status bar until the device is sufficiently charged. The device must be charged as soon as possible.

NOTE: This warning should be acknowledged immediately by pressing the 'Power/Confirm' button



3.9.2 INSTANTANEOUS ALARM

The alarm and sounder patterns differ depending on alarm type. If your device has more than 4 gas channels, it will show them all, and the channel(s) in alarm will go red. Examples are below.

DetectiveIQ will go into alarm immediately if the level of any gas configured to be detected, exceeds acceptable limits. A minimum and maximum level is set for oxygen, whilst the remaining gases will cause an alarm for rising gas levels.

DetectiveIQ will indicate an alarm state '1'  or alarm state '2'  according to which configured gas level has been exceeded.

When **DetectiveIQ** is in instantaneous alarm the respective channel on the display will go red with the appropriate 'bell' alarm symbol being shown. The alarm and sounder patterns differ depending on alarm type. If your device has more than 4 gas channels, it will show them all, and the channel(s) in alarm will go red. Examples are on next page.



NOTE: Follow your company's procedures for any alarm event.

Standard alarm levels can be found in the technical notes on Crowcon's website. Each device's alarm configurations can also be seen using the device UI. See section 3.2 for more information.

3.9.3 SHORT-TERM EXPOSURE LIMIT (STEL) ALARM

For each toxic gas being monitored DetectiveIQ stores information about the gas levels detected to determine the average exposure over a 15 minute running period. If the average levels detected over the defined period of time exceed predetermined levels, the device will go into alarm (STEL is not monitored for the duration of a bump test or calibration). The STEL alarm level can be configured via the Crowcon Companion App.

When DetectiveIQ is in alarm state, the respective channel on the display will go red with the STEL symbol shown  on the screen indicating the STEL levels have been exceeded. The sounder will emit a tone, alarm LEDs will flash red. Example is below.



3.9.4 LONG-TERM EXPOSURE LIMIT (LTEL) ALARM

For each toxic gas being monitored DetectiveIQ stores information about the gas levels detected to determine the average exposure over an 8 hr running period. If the average levels detected over the defined period of time exceed predetermined levels, the device will go into alarm (LTEL is not monitored for the duration of a bump test or calibration). The LTEL alarm level can be configured via the Crowcon Companion App.

When DetectiveIQ is in alarm state, the respective channel on the display will go red with the LTEL symbol shown  on the screen indicating the LTEL levels have been exceeded. The sounder will emit a tone, alarm LEDs will flash red.

Example is below.



3.9.5 ALARM & STATUS ICONS

The alarm status is represented by the icons shown in the table below:

ICON	DESCRIPTION	ACTION
	Status OK	No Action Required
	Warning/Fault Status	Refer to Section 7 for troubleshooting
	Long term exposure alarm (LTEL)	Follow site procedure
	Short term exposure alarm (STEL)	Follow site procedure
	Alarm 1	Follow site procedure
	Alarm 2	Follow site procedure

3.9.6 ACCEPTING & CLEARING ALARMS

The operation of alarms in terms of how they are cleared is dependent upon the alarm type and also the configuration option, which can be changed using the Crowcon Companion App. The options are 'latched' and 'non-latching' and the functionality is described in the table below.

NOTE: Alarm 2 cannot be configured and behaves only as a latched alarm.

ALARM 1 TYPE	DESCRIPTION	ACTION
Latched	An instantaneous alarm 1  can be cancelled by pressing the operator button but only when the gas level has dropped below the alarm level.	An instantaneous alarm 2  can be cancelled by pressing the operator button but only when the gas level has dropped below the alarm level.
Non-Latching	An instantaneous alarm 1  will not be latched and will return to a non-alarm state without user acceptance once the gas level has dropped below the alarm level.	An instantaneous alarm 2  can be cancelled by pressing the operator button but only when the gas level has dropped below the alarm level.

NOTE: While in alarm, DetectiveIQ will continue to record levels of all the gases being monitored.

3.9.7 PRIORISATION OF ALARMS

For DetectiveIQ devices configured for 5 or more channels/gases, the UI is designed to prioritise alarms being displayed. For example, STEL & LTEL alarms are considered higher priority than active instantaneous alarm 1 & 2.

If instantaneous alarm 1 or 2 or both are only active, then they will be indicated as per the UI below.

If either STEL or LTEL alarms are active for a respective channel then they will be prioritised on the UI and the appropriate icons being shown as per the screen image below.

The alarm and sounder patterns differ depending on alarm type.



3.10 SENSORS

DetectiveIQ is available with the following sensor options:

- Long-life oxygen sensor
- Carbon monoxide sensor (electro-chemical)
- Hydrogen sulphide sensor (electro-chemical)
- Flammable gases sensor (Pellistor)
- Flammable gases sensor (MPS)
- Inert flammable gases sensor (IR) (Pending)
- Photoionization detector (PID)

3.11 LONG-LIFE OXYGEN SENSOR

This sensor's technology is different to traditional O2 sensors, so needs to be continuously powered to maintain its accurate readings, known as being 'biased'. This means that it draws power even when turned off, so it is ready to accurately detect when turned back on.

To ensure the sensor is always reading accurately, always keep the DetectiveIQ charged and avoid it from shutting down with low battery.

Once the device shuts down from low battery, there will be approximately 45 days before the sensor loses its bias. If the sensor loses its bias, it will need to be left to charge for about 3 hours to fully regain its bias (known as 'soak') and for the O2 readings to settle and be accurate.

If the device is switched on after the sensor has lost its bias, but before the bias period, the DetectiveIQ will continue to monitor the O2 bias level until the sensor is fully settled. This will be displayed as  under the gas name for the O2 channel.

3.12 ELECTRO-CHEMICAL SENSORS

Electrochemical gas sensors measure the volume of a target gas by oxidising or reducing the target gas at an electrode and measuring the resulting current.

3.13 PELLISTOR SENSORS

Pellistor sensors (or catalytic beads) are specifically designed to sense explosive gases. The detecting element consists of small “beads” of catalyst loaded ceramic whose resistance changes in the presence of gas.

DetectiveIQ flammable gas sensor (pellistor) is configured and calibrated at the factory to detect methane, however other target gas calibrations are available.

DetectiveIQ does not offer cross-correction functionality.

3.14 PELLISTOR SAVER MODE

Pellistor sensors can suffer degradation if powered while exposed to flammable gas concentrations greater than 100% LEL, and also if exposed to high levels of H₂S or silicones. To reduce degradation DetectiveIQ employs a Pellistor saver mode.

When the flammable gas exceeds the pellistor saver threshold, the detector will turn off the sensor for a minimum period of 200 seconds. This will be displayed as 100%LEL under the gas name for the CH₄ channel.

When pellistor saver mode is activated the user must immediately move to a clean air environment.

After the defined period the sensor may be re-activated once the instrument is in a clean air environment. User must clear the ‘Pellistor Saver’ pop-up warning. The sensor will then enter its warm-up period whereby the  will be displayed under the gas name for the CH₄ channel.

After a stabilisation time, if the gas level still exceeds the threshold then the sensor will be turned off and the cycle starts again.

As the sensor has been exposed to a gas level sufficient to cause a sensor over-range the DetectiveIQ should be gas tested to ensure no lasting damage has occurred. 

3.15 MPS FLAMMABLE SENSOR

Crowcon has introduced a new flammable sensor with industry leading technology that your applications demand into its DetectiveIQ Temporary Area Monitor.

MPS™ sensor in DetectiveIQ enables customers with portable fleets to improve their workers’ safety by having a device that accurately detects more than 15 flammable gases at once including hydrogen without cross calibration or setting changes, while not being poisoned or requiring further calibration, unlike existing flammable gas detection technologies.

Calibration & Bump Testing

Please ensure the correct gas cylinder compositions are used for bump testing or calibration to ensure full accuracy is maintained throughout the detector’s lifetime.

It is important to adhere to the guidance outlined below, failure to do so will affect the accuracy of the sensor to all gases. Please see section 4.3.1 Calibration of the MPS Flam Sensor.

Refer to appendix 11.2 for operational guidance notes on use of MPS sensor in DetectiveIQ.

3.16 INFRARED SENSOR

Gas is pumped or diffuses into the sample chamber, and gas concentration is measured electro-optically by its absorption of a specific wavelength in the infrared (IR).

3.17 PID

PID sensors are configured and calibrated to Isobutylene when manufactured.

DetectiveQ does not currently support the ability to configure the detection of other Volatile Organic Compounds (VOC) other than Isobutylene through the correction factor functionality. The PID sensor in DetectiveQ 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.

Please refer to Crowcon application note PID-AN-001 for further details on maintenance and cleaning of the PID sensor.

3.18 DEVICE MENU

The following menu functions on the DetectiveQ display can be selected:

- 1 Device Information
- 2 Zeroing the Device
- 3 Bump Test (if enabled)
- 4 Calibration
- 5 See/Change Setting

If navigating to and selecting 'Back', the user will be taken to the Live Gas Levels Screen.



3.19 LIVE GAS LEVELS SCREEN

If navigating to and selecting 'Back', the user will be taken to the Live Gas Levels Screen.



3.20 DEVICE & SENSOR INFORMATION

The information screens display the DetectiveIQ status/configuration.

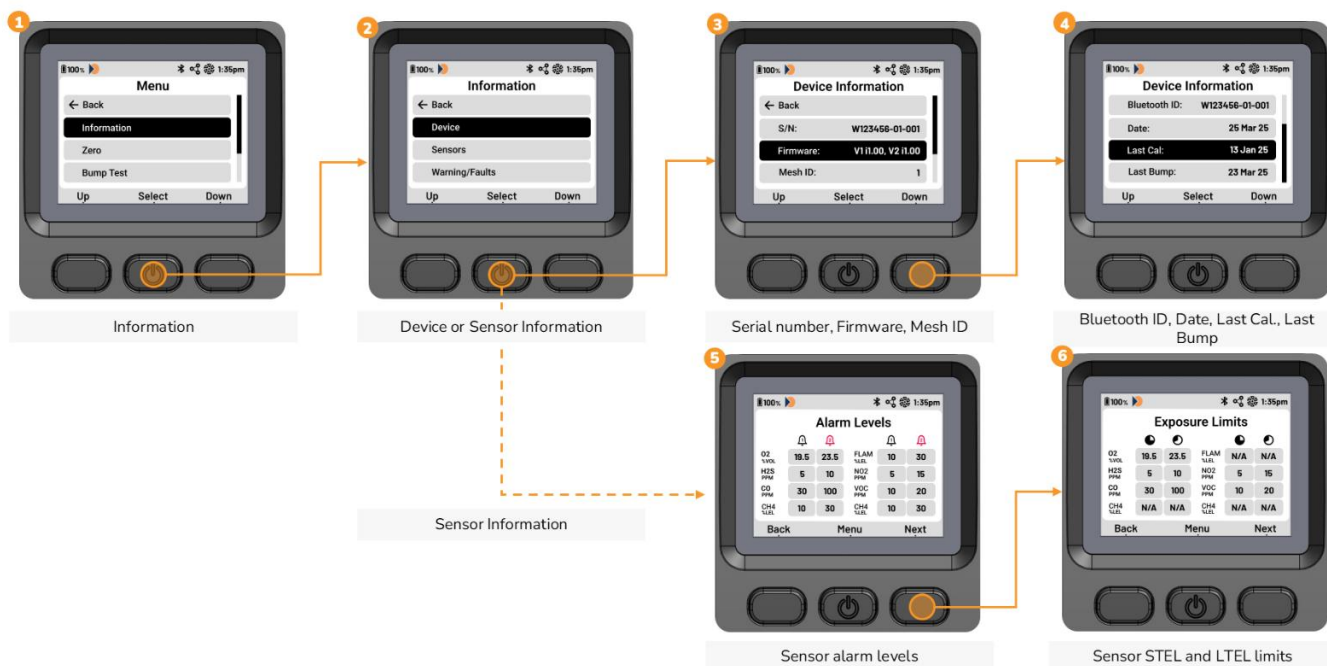
- With the home screen displayed, press the center 'Power/Confirm' button to access the menu functions screen.
- Single click the 'Power/Confirm' button to access the 'Information' screen.
- The user can now access either sensor or device specific information

The information pages show device and sensor information across several screens. The device specific information accessible via the UI is as follows;

- Device serial number
- Firmware versions
- Mesh ID (used for knowing what wireless alarm passing group it is in)
- Bluetooth® ID (used for connecting to the device from a mobile device)
- Date
- Last bump
- Last Calibration date

The sensor specific information accessible via the UI is as follows;

- Alarm Levels
- STEL & LTEL Exposure Limits (Toxic sensor only)



3.21 WARNINGS/FAULTS INFORMATION

The 'Warnings/Faults' information screens display the DetectiveIQ active warnings that may be present on the device. Use the left & right keypad buttons to scroll between the active warnings. Press the centre keypad button to navigate back the Menu.

If no warnings or faults are present on the device then the 'Warnings/Faults' information screens will not be accessible.



3.22 PEAK REVIEW

Navigate to the 'Peak Review' screen via the main screens. This may be used to see the highest level of each gas detected during the session. DetectiveIQ displays the peak gas level since the device was powered up. There is also an option to clear current peak readings back to clean air values. The peaks are cleared when DetectiveIQ is turned off.



3.23 MANUAL ZERO

- NOTE:** The Zero process means the sensors read zero at the level of background gas detected (or 20.9% vol for O₂ and 0.04%vol for CO₂)
- NOTE:** CO₂ zero must only be performed with Nitrogen. Zero is disabled via the menu, and only accessible via the Crowcon Companion App.
- NOTE:** A manual Zero should only be carried out in 'clean air' where there are no background gas contaminants.
- NOTE:** If the instrument has been in alarm recently then let it stand in clean air for 2 minutes before initiating a zero operation.

This function should only be carried out in 'clean air' and allows the DetectiveIQ to be zeroed at any time. The zero menu option can be disabled on the device via Crowcon Companion App. (Appropriate Licencing is required). If disabled, the 'Zero' function will not be visible on the display.



1 MENU	To Zero a device, select the Zero mode through the menu
2 CONFIRM	Follow the on-screen prompt to confirm you want to perform a Zero. If you don't, return to the menu by clicking 'No'.
3 PROGRESS	Once confirmed, an automated process will start.
4 ZERO STATUS	Once complete, each of the gas channels will display its status.
5 LIVE GAS LEVELS	If all channels are successful, they will go green and the screen will revert to the Live readings screen after 3 seconds.
6 FAILURE PROMPT	If any channels are unsuccessful, they will go red. After 3 seconds there is a warning screen to clear the message.
7 LIVE GAS LEVELS	If Cleared, the display will revert to the Live Readings, with the affected channel displaying a Zero error. If Retried, the Zero sequence will be tried again.

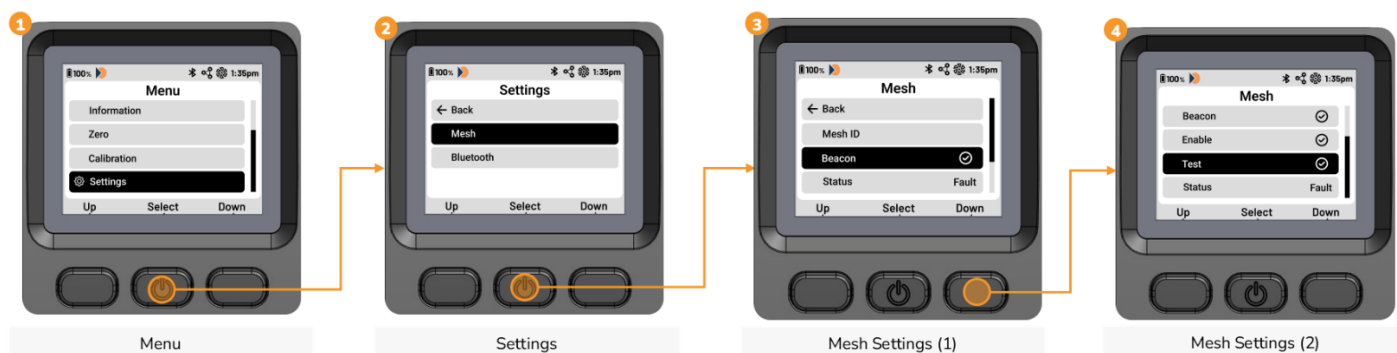
NOTE: If a Zero is retried, double check that it is done in clean air where there are no background gas contaminants.

3.24 SETTINGS

The following settings can be altered by the user:

3.24.1 MESH/WIRELESS ALARM PASSING

Mesh connectivity can be enabled/disabled through the settings menu. See section 4.7 for Mesh functionality.



3.24.2 MESH SETTINGS

DetectiveIQ is equipped with built-in wireless alarm passing uses Mesh technology to connect up to 250 devices across 10 groups. Each group of 25 devices can cover 2.5 km, with up to 100m line-of-sight spacing between units.

When a unit connected in the same mesh system detects a gas alarm it will initiate an alarm in all units. The unit detecting the alarm will indicate the alarm in the normal manner as previously described. The other units in the system will indicate an alarm with the light bars flashing amber & red. This permits the user(s) to determine at which point the gas alarm is occurring.

NOTE A mesh network uses all available devices to send and transmit messages. Unlike linear networks, if one beacon stops communicating, the mesh network automatically re-routes itself across available beacons to keep the network communicating.

NOTE: Words to know:

- Mesh – The network type that is used in the DetectiveIQ. Range is 100m (33ft) line of sight.
- Mesh ID – Each group of devices in a mesh network are part of the same Mesh ID. You can have up to 25 devices per mesh ID. Only devices on the same mesh ID will pass alarms to each other. You can set what group a device is set to by using the device UI. Once a device has a Mesh ID, it will keep it until it is changed. Mesh ID number increments to 10 on 'select' button press.
- Beacon – a device that send and receives messages to and from the mesh network group.
- Encrypted – All Mesh communication is encrypted, authenticated and obfuscated for data integrity and security.

See section 3.6.1 for information on Mesh setup on the DetectiveIQ.

When you step through the main menu, as shown in section 3.6.1, contains the wireless settings and status. Settings include;

- Mesh Active (Enable/Disable)
- Mesh ID (0-10)
- Beacon (Enable/Disable)
- Test (Enable/Disable)
- Status (view only)

Using either the Crowcon Companion App or on-device settings menu, setup all the DetectiveIQs mesh settings. This includes;

- Mesh Active – Enabling Mesh functionality.
- Beacon – Assigning one of the DetectiveIQs within the mesh to be a beacon.
- Mesh ID – Assign all DetectiveIQs within the mesh to the same Mesh ID. Ensure Mesh is disabled when changing the Mesh ID of an active Mesh. Re-enable Mesh after the change has been made.

Successful Mesh connection will take between 20-30seconds, depending on number of devices being setup at a given time.

The following are shown on the DetectiveIQ display;

- Mesh Active 
- Beacon Assigned 

ICON	ACTION
	Beacon Assigned
	Mesh Enabled
	Mesh Connected
	Mesh Fault
	Mesh Provisioning

NOTE: Via the menu system, a 'test' option is accessible to perform a communication test of a recently setup mesh network. This test lasts 20seconds.

3.24.3 BLUETOOTH®

Bluetooth® connectivity can be enabled/disabled through the settings menu. See section 4.8 for Bluetooth® operations.



3.24.4 BLUETOOTH® CONNECTIVITY

The Crowcon Companion App allows easy management of DetectiveIQ settings and features from your mobile device. Once paired, you can adjust configurations, manage firmware, review data logs, initiate bump and calibration and more.

Download the free Connect Companion App from the application store and follow the on-screen installation instructions.

Go to the 'Available Devices' List to see available devices than can be paired. Automatic scanning is underway. Once your device is listed on the App, select. You will now be navigated to the Device Information screen.

You can disconnect from a paired device by clicking 'Disconnect' on the Mobile App.

ICON	ACTION
	Bluetooth® Enabled
	Bluetooth® Enable and Connected to App

NOTE: Bluetooth® will automatically disable after 300 seconds idle state. Follow section 3.6.2 to re-enable Bluetooth® connectivity.

3.25 ADDITIONAL FEATURES

3.25.1 BACKLIGHT TIMEOUT

The DetectiveIQ routinely powers off the display backlight as a means of saving power while in normal operation. The backlight timeout is defaulted to 30 seconds. Use the centre keypad button to wake up the display.

In the event of an alarm, warning or fault, the display will automatically switch back on and remain on until the condition is cleared.

Please note the continued backlight operation will degrade the battery life faster.

3.26 EVENT LOGGING

The detector is equipped with an integrated event logging function designed to capture and store significant operational activities and system events. This feature enhances traceability and supports effective device monitoring and diagnostics.

The event log can store a maximum of 8640 individual entries. Logged events include, but are not limited to, the following:

- Device power on/off
- Activation of Alarm 1
- Activation of Alarm 2
- STEL (Short-Term Exposure Limit) alarm activation
- TWA (Time-Weighted Average) alarm activation
- Operator acknowledgements
- Calibration events and status updates
- Bump test events and status updates
- Zeroing events and status updates
- Low battery warnings
- User assignments and changes
- Changes to configuration
- Upload of the event logs
- System faults.

The data log records gas levels for all sensors and has capacity for 45,000 logs (125hrs @10 sec intervals). Threshold levels can be set using the Crowcon Companion App, extending log capabilities. The data log interval is set as part of the DetectiveIQ configuration and can be adjusted using Connect Service Application.

4. GAS TESTING AND CALIBRATION

4.1 INTRODUCTION

Crowcon recommends regular gas tests (also known as bump tests) to confirm sensor operation. This involves applying a known composition of the correct gas to each sensor to verify sensor response and alarm function. Organisational specific Health and Safety regulations should be adhered to.

DetectiveIQ offers integral bump testing capability through a speedy bump test which is a gas test to the first alarm level only. DetectiveIQ can be configured to automatically perform the following options:

- No Calibration or Bump (default configuration)
- Bump (Speedy Only)
- The configuration items differ per region and can be set with Crowcon Companion App to match user requirements.
- This bump test and calibration functionality can be performed using a 'bump' or 'calibration' flow plate.

If any channel fails speedy bump then DetectiveIQ should be calibrated, please refer to Section 4.4.

4.2 BUMP TEST

NOTE: Bump tests performed through the device menu must be performed using quad gas containing CO, H₂S, O₂ and CH₄ for a standard 4-gas device.

NOTE: The applied test gas must contain gas concentrations capable of exceeding the configured alarm level 1 for each gas.

NOTE: Bump strategy must be enabled for the bump test to operate via the menu function, this can be configured utilising the Crowcon Companion App.

NOTE: Bump testing can also be performed through the IQhub (when available), Service Software and mobile app.

NOTE: The gas outlet must be >20cm/8" further from the calibration/bump plate as this may result in incorrect test results.

NOTE: For MPS devices, do not bump test device using a standard methane cylinder with a balance gas composition of 20.9% Vol O₂ balanced in Nitrogen. This cylinder does not contain required level of oxygen and will result in incorrect gas bump test readings. Refer to section 4.4.1 for Calibration of MPS Flam sensor for guidance on suitable gas mixtures.

NOTE: Refer to IEC EN 60079-29-2 for further information on determining an appropriate interval for undertaking a functional check with gas.

This bump test and calibration functionality can be initiated with any of the following options:

Bump Plate

DetectiveIQ can also be tested simply by using the bump plate and applying gas.

Menu

Navigating via the menu system to 'Bump' will allow the user to begin the bump testing process.

The bump test function allows DetectiveIQ to be bump tested at anytime.

- Upon a successful bump test of all channels in the device the bump test due date will increment by the defined time period.
- If the bump test (for one or more channels) was not successful the bump due date will be set to due.



1 MENU	To Bump a device, scroll through the menu system to the 'Bump' option. NOTE: If the 'Bump' option does not appear in the menu system, then Bump has not been enabled on the device configuration. Bump can be enabled via the Crowcon Companion App. Using the Crowcon Companion App, select the sensors you would like to bump test.
2 CONFIRM	NOTE: If this step has not been performed the bump process will not continue and the device will revert back to the 'Live Gas Levels' screen. Follow the on-screen prompt to confirm the action has taken place. If this action hasn't taken place or you'd no longer like to perform a test, click 'No'.
3 APPLY TEST GAS	When DetectiveIQ detects the applied test gas, the screen will be replaced with the bump test gas reading screen, this will continue to show the gas readings until the bump test result is displayed. NOTE: The process will timeout after a 15 seconds (sensor dependent) and report 'Bump Test Failed' on the display. NOTE: If the test gas is not supplied before the end of the countdown the bump test will fail, the bump test date will be set to due.
4 GAS ON	In this instance, only O2 & CO have been configured for bump. Bump symbol is shown and the progress bar/timer continues. NOTE: Channels not being bump tested will show 'N/A' on the display.
5 GAS ON (IN ALARM)	During the bump test as gas is applied the instantaneous alarms will be activated as the gas level exceeds the configured alarm level. This will be indicated by the appropriate 'bell' alarm and channel will change red. NOTE: Channels not being bump tested will show 'N/A' on the display.
6 SUMMARY	Once complete, each of the gas channels will display its status. Channels in green have passed, ones in red have failed. In this instance, O2 & CO have passed. The Gas Off message appears informing the user to remove the gas/flow plate. NOTE: If the bump test has failed for any channel, the bump test date will be set to due.
7 COMPLETE	The 'Bump Test Complete' screen will then be displayed, the test gas must be turned off and the bump plate removed. If you do not remove the flow plate within 4 seconds, a reminder is shown.
8 LIVE GAS LEVELS	The device now returns back the live gas screen.

4.3 FAILURE MODES

The bump test function for one or more sensors may fail due to;

- No gas applied
- Gas applied does not exceed alarm 1 threshold
- Alarm 1 threshold not met
- Sensor degradation/failure

If gas is not applied upon the 'Apply gas now' screen, the bump test will fail and message appear as screen .

If a bump test is proceeded however, Alarm 1 threshold is not met/exceeded then the bump test will fail. The 'Fail' message will appear in the respective channel. See screen .



1 BUMP TEST FAILED	Appears after Apply Test Gas stage due to no gas being applied. This is could be gas supply has not been attached or switched on, a lack of gas in the bottle, or an issue with the gas path between the bottle and sensors.
2 SUMMARY WITH FAILED SENSOR(S)	Summary with what sensor(s) have failed bump test. In this instance, only O2 & CO have been configured for bump and the CO has failed.

4.4 CALIBRATION PROCESS

- NOTE:** Calibration via the menu must be performed using the pre-configured gas levels set on the device.
- NOTE:** Bump strategy must be enabled for the bump test to operate via the menu function, this can be configured utilising Crowcon Companion App.
- NOTE:** Bump testing can also be performed through the IQhub (when available), Service Software and mobile app.
- NOTE:** If utilising gas extraction do not place the extraction outlet closer than 20cm to the calibration plate as this may result in an incorrectly calibrated DetectiveIQ.
- NOTE:** For MPS devices, do not calibrate the device using a standard methane cylinder with a balance gas composition of 20.9%Vol O₂ balanced in Nitrogen. This cylinder does not contain required level of oxygen and will result in incorrect gas bump test readings.
Refer to section 4.4.1. Calibration of MPS Flam sensor for guidance on suitable gas mixtures.
- NOTE:** It is recommended to read the procedures described in IEC EN 60079-29-2 to define an appropriate calibration interval.
- NOTE:** Allow product to warm-up for 1 hour before calibration.

The calibration functionality can be initiated with any of the following options.

Calibration Plate

DetectiveIQ can also be tested simply by using the flow plate and applying gas.

Menu

Navigating via the menu system to 'Calibration' will allow the user to begin the calibration process.

Crowcon Companion App: Crowcon's servicing software can be used to drive the 'Calibration' testing process on DetectiveIQ resulting in less user intervention on the product display. The mobile app will report ongoing status updates as well as the final result.

The Calibration function allows DetectiveIQ to be calibrated at anytime.



1 MENU	To Calibrate a device, scroll through the menu system to the 'Calibration' option.
2 ZERO CONFIRM	Confirm whether to proceed with the zero/calibration process. Pressing 'No' will revert back to the 'Live Gas Screen'. Pressing 'Yes' will proceed with the zero process first. NOTE: Ensure the device is in clean air.
3 ZERO PROGRESS	Once confirmed, an automated process will start.
4 ZERO STATUS	Once complete, each of the gas channels will display its status.
5 CONFIRM	Using the Crowcon Companion App, select the sensors you would like to bump test. NOTE: If this step has not been performed the bump process will not continue and the device will revert back to the 'Live Gas Levels' screen. Follow the on-screen prompt to confirm the action has taken place. If this action hasn't taken place or you'd no longer like to perform a test, click 'No'.
6 CALIBRATION IN PROGRESS	The 'Progress' screen will now appear with the 'Gas On' message. Connect the gas cylinder and flow plate to the device. NOTE: The process will timeout after a 15 seconds (sensor dependent) and report 'Calibration Failed' on the display. NOTE: If the test gas is not supplied before the end of the countdown the bump test will fail, the bump test date will be set to due. NOTE: Channels not being bump tested will show 'N/A' on the display.
7 SUMMARY	During the calibration process, the instantaneous alarms will be de-activated (both LEDs and Sounder) as the gas level exceeds the configured alarm level. Once complete, each of the gas channels will display its status. Channels in green have passed, ones in red have failed. In this instance, all channels have passed. The Gas Off message appears informing the user to remove the gas/flow plate. NOTE: Channels not being bump tested will show 'N/A' on the display.
8 LIVE GAS LEVELS	Once the gas level has dropped to below alarm level 1 threshold, the device will return back to the live gas screen. NOTE: If the calibration has failed for any channel, the calibration due date will be set to the date of the failure.

DetectiveIQ calibration due dates are automatically updated upon a successful calibration; the factory default interval is set at 183 days (6 months). Calibration should be undertaken with the appropriate Crowcon supplied gas cylinder or equivalent.

NOTE: The flammable sensor (Pellistor) should always be calibrated with target gas.

NOTE: The flammable sensor (MPS) should always be calibrated with quad gas. Refer to section 4.4.1 Calibration of MPS Flam sensor for guidance on suitable gas mixtures.

- Upon a successful calibration of all channels in the device calibration date will automatically set to the test date and calibration due automatically increment by the pre-configured interval.
- If the calibration (for one or more channels) was not successful the calibration due date will be set to due.

If the calibration fails this may be indicative of a more serious sensor issue, including the need to replace sensors. The DetectiveIQ should then be serviced.

4.4.1 CALIBRATION OF THE MPS FLAM SENSOR

Cylinder Compositions Suitable for Calibration & Bump Test

To calibrate or bump test the DetectiveIQ devices, only one of the following cylinder compositions must be used.

Failure to use a cylinder with compositions listed below may result in an incorrectly calibrated device or an incorrect bump test reading. Scaling may be applied to MPS calibration level (% LEL) depending on ATEX or UL local directive.

Defined levels below:

Quad Gas Mix – EN & ISO Concentrations

- 2.2% Vol Methane
- 18% Vol Oxygen
- 15ppm Hydrogen Sulphide
- 100ppm Carbon Monoxide
- Balanced in Nitrogen

Quad Gas Mix – EN & ISO Concentrations (Alternative Mix)

- 2.5% VOL Methane
- 18% VOL Oxygen
- 15ppm Hydrogen Sulphide
- 100ppm Carbon Monoxide
- Balanced in Nitrogen

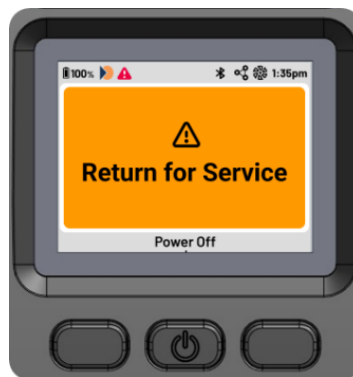
2.2% Vol CH₄ = 50% LEL (EN/ATEX)/44% LEL (ISO/UL)

2.5% Vol CH₄ = 57% LEL (EN/ATEX)/50% LEL (ISO/UL)

4.5 FAILURE MODES

If any of the gas channels fail a calibration, the device cannot be used and must be returned for service. The following message will be displayed. Press the center 'Power/Confirm' button to power off the device.

A retry of a field calibration is advised. If persistent failure, a sensor replacement is required.

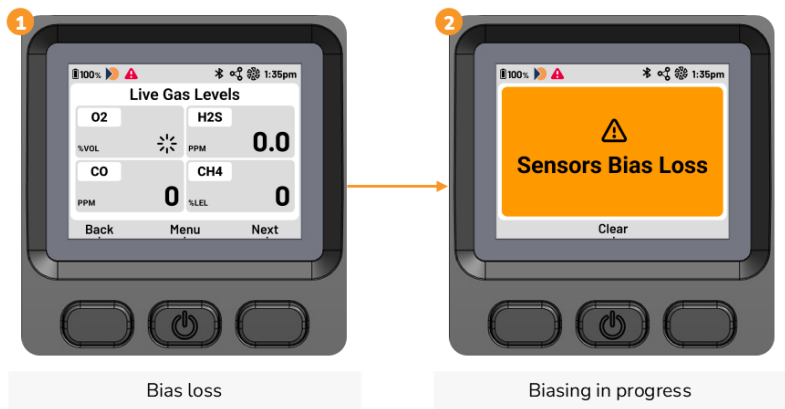


4.6 SENSOR BIASING

Some sensors need to have a certain voltage for the electrochemical reactions with their target gases to be reliable and accurate. This is known as a 'bias'. If a sensor does not have a voltage applied to it, it can lose this voltage and readings won't be accurate. When a voltage is re-applied to it, it needs time for the readings to settle again before it can have accurate readings. This is known as 'biasing'.

The DetectiveIQ has a dedicated auxiliary power-supply in the sensor module to power these sensors during service intervals when the device is switched off. This power-supply will drain if left out of DetectiveIQ for excessive periods of time.

IMPORTANT: Do not remove the sensor module while the device is operational/switched-on. Ensure DetectiveIQ is in standby mode/switched off before removing the sensor module. Failure to follow will result in excessive degradation in the lifetime of the backup bias power source.



While in operational mode, when the bias is lost initially for a sensor the alert screen immediately appears 2. The DetectiveIQ will continuously monitor the sensor bias until the deemed biased. After which the display returns to the Live Gas Readings screen. The channel(s) that are biasing do not have a Live Readings and instead show a static icon until the sensor has biased and accurate readings are displayed as normal 1. In this example the O2 channel has lost bias.

DetectiveIQ also actively monitors the bias level of the fitted sensors during the sensor startup check. The DetectiveIQ will continuously monitor the sensor bias until the deemed bias. After which the remainder of the startup process will continue.



5. ACCESSORIES

5.1 APPROVED PARTS ONLY

IMPORTANT: Use only Crowcon-approved accessories and spare parts with this detector. Substitution of components may impair intrinsic safety, will invalidate the product certification (ATEX / IECEx / UKEX / [others as applicable]), and will void the warranty.

The detector's hazardous area certification applies to the instrument as a complete assembly, including the battery, sensor, sensor tray and enclosure seals. Fitting any non-approved part, or any part not intended for this model and gas configuration, means the instrument no longer conforms to its certificate and must be withdrawn from use in hazardous areas.

5.2 ACCESSORIES AND SPARE PARTS

Accessories may be updated periodically as the product range develops. For the current list of approved accessories, spare parts and sensor options, including ordering codes, refer to:

- Accessories from the relevant product page on www.crowcon.com / your Crowcon distributor / regional Crowcon office
- Spare parts from your authorised Crowcon service centre

Always quote the serial number of your detector when ordering, so the correct variant is supplied.

The following accessories are approved to be used with the unit. Consult with the manufacturer if you are in doubt what accessories you can use and in what applications.

NOTE: Store the below accessories in environments with the following conditions: 10°C to 40°C

PART NUMBER	DESCRIPTION
S01298	Pumped Flow Plate Assembly
S01299	Bump Plate Assembly
S01300	Calibration Plate Assembly (PC Calibration Only)
E01111	DetectiveIQ 10V 2A Multi-Region Power Supply
E07615	DetectiveIQ RS-485 Communications Cable

5.3 DISPOSAL

Replaced parts, including sensors and batteries, must be disposed of in accordance with local regulations. Do not dispose of lithium batteries in general waste. More information is available within the Safety Information section of the manual.

6. SPECIFICATION

SIZE	298 x 536 x 268mm
WEIGHT	8.1kg
MATERIAL	ASA & Pebax
RESPONSE TIME (T90)	<20s (Standard 4 gas configuration Diffused - O ₂ , FLAM/MPS, H ₂ S, CO) (Response time for other sensor types may vary – contact Crowcon)
ALARMS	Visual, audible (97dB at 30cm), low/high, TWA, STEL
DISPLAY	Colour LCD display
DATA LOGGING	Up to 8640 event logs
POWER & BATTERY	Up to 101 days
SAMPLING	Up to 30m sampling with optional pumped module
OPERATING TEMPERATURE RANGE	-20°C to +55°C (-4°F to +131°F)
STORAGE TEMPERATURE RANGE	0°C to +40°C (32°F to 104°F)
HUMIDITY	0 to 95% RH (non-condensing)
ORIENTATION	Use when mounted on floor. Slope of up to 55 degrees.
PRESSURE	800 – 1100 mbar
INGRESS PROTECTION	IP66 and IP68
APPROVALS*	Please refer to the Safety Information section.
CALIBRATION & MAINTENANCE	6 monthly calibrations (Default interval set from factory for all sensors)
ACCESSORIES	Bump flow plate, Pumped flow plate, Calibration Flow Plate, Communication cable; Power cable; Water trap & tubing (pumped device kit)
CONNECTIVITY	Bluetooth® for connection to Crowcon Companion App. Mesh Networking for Wireless Alarm Passing.
SENSORS	Electrochemical, IR, MPS™, Pellistor, PID and Long life O ₂
LANGUAGES	English
WARRANTY	2 years (sensor warranty separate)

* Contact Crowcon for availability.

7. TROUBLESHOOTING

7.1 PUMP TEST FAILURE

In the event of a pump test failure, check the following:

- Ensure a pumped flow plate was used for the test
- Remove the flow plate and check the gasket for damage (scratches, tears, etc.)
- Run the test again and ensure the test is carried out in the required time.

If the pump still fails the test it may require servicing.

7.2 FAULT/WARNING/INFORMATION DESCRIPTIONS

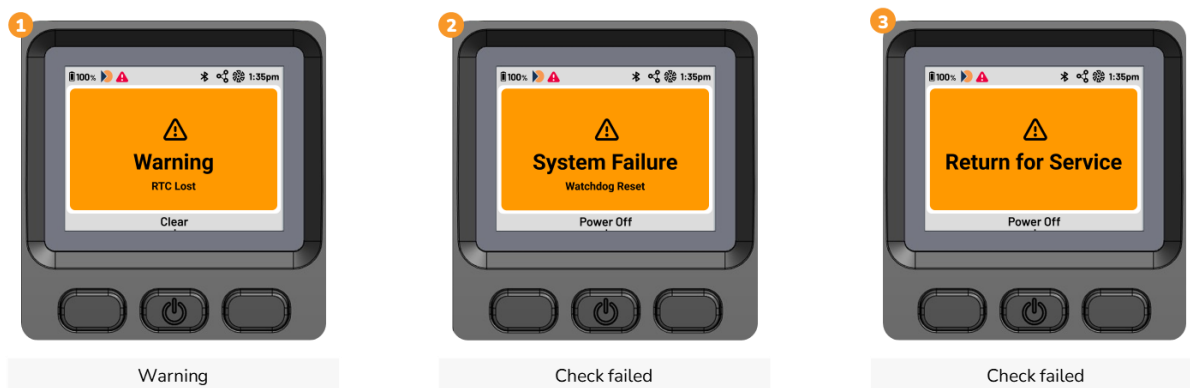
7.2.1 SERVICE FAULTS

If DetectiveIQ detects an internal fault that requires the device to be returned for servicing 'Service' message as shown will be displayed on the screen.

If the device displays a service fault message, the DetectiveIQ will not operate normally and must be returned to a service centre for further investigation and repair. No user intervention is possible.

A warning or fault screen (as below example) overwrites the normal screen. The warning screen ¹ indicates faults that can be rectified by the user. The symbol is accompanied by the text 'Warning' below. The user is presented with the option to 'Clear' the warning prompt. Note the warning LED & sounder tunes will stop upon acknowledgement of the warning screen.

The 'Warning' text is replaced by 'System Failure' for faults which require service or further investigation by a trained engineer.



7.2.2 BUMP & CALIBRATION DUE WARNINGS

On start-up the DetectiveIQ informs the user on the calibration and bump schedule of the device.

Bump and Calibration information is displayed, showing;

- Last Bump Date
- Last Calibration Date
- Calibration Due Date
- Bump Due Date

Overdue instances are highlighted in Red. Due instances are highlighted in Orange.

Within the calibration schedule of the device, the DetectiveIQ informs/alerts the user if either its Calibration becomes Due or OverDue. The intervals for each warning are available within the configuration of the device.

Within the Bump Test schedule of the device, the DetectiveIQ informs/alerts the user only once the Bump becomes Overdue. The interval is available within the configuration of the device.

As per section 7.2.1, additional warning prompts will appear on the DetectiveIQ display once the device has completed the start-up process.



7.3 FAULT/WARNING/INFORMATION MESSAGES

DetectiveIQ may indicate a fault or warning that requires user to intervention to resolve, or the DetectiveIQ may provide additional information on instrument status. See section 4.21 on 'Warnings/Faults Information screens.

The table below provides further details on these faults, warnings and information messages including the fault message/symptom, the cause and the user action required.

WARNING/FAULT	STATUS/CAUSE	OPERATOR ACTION
No Battery Detected	Battery Not Detected Communication has been lost.	Power-cycle DetectiveIQ. DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Low Battery	Battery Exhausted DetectiveIQ battery low. Please charge.	Recharge DetectiveIQ battery. Click operator button to clear warning. Charge DetectiveIQ as soon as possible.
Auto-Shutdown	Auto-Shutdown DetectiveIQ battery is exhausted & device will auto shutdown 15 seconds.	Recharge DetectiveIQ battery.
Auto-zero Failed	Auto-zero Failed Zeroing in a contaminated atmosphere.	Switch off and restart in clean air.

WARNING/FAULT	STATUS/CAUSE	OPERATOR ACTION
Zero Failure	Zero Failed Zeroing in a contaminated atmosphere.	Ensure device is in clean air and re-zero.
Bump Test Failed/Remove Flow Plate	Bump Test Failed DetectiveIQ has failed a bump test.	Re-attempt the bump test through the user menu. If persistent failure, DetectiveIQ must be returned to a service centre for further investigation and repair.
Calibration Failed	Calibration Failed DetectiveIQ has failed a field calibration.	Re-attempt the field calibration. If persistent failure, DetectiveIQ must be returned to a service centre for further investigation and repair.
Return for Service	Return for Service One of more errors occurred.	DetectiveIQ must be returned to a service centre for further investigation and repair.
Sensor Module Has Changed	Sensor Module Has Changed DetectiveIQ has registered a change in Sensor Module.	Clear warning on DetectiveIQ and power-cycle device.
Sensor Has Changed	Sensor Has Changed DetectiveIQ has registered a sensor change in the Sensor Module.	Clear warning on DetectiveIQ and power-cycle device.
Sensor Gas Type Changed	Gas Type Has Changed DetectiveIQ has registered a change of gas type within the Sensor Module.	Clear warning on DetectiveIQ and power-cycle device.
RTC Lost	Time & Date Lost DetectiveIQ has detected its internal time and date has been lost.	DetectiveIQ time and date must be reset to ensure correct operation. This can be reset utilising the Crowcon Companion App.
Sensors Covered/Remove Flow Plate	Sensors Covered The sensors are blocked by the flow plate.	Clear the blockage by removing the flow plate.
Bump Overdue	Bump Overdue The DetectiveIQ has not been gas tested in the defined period.	Perform a bump test action.
Calibration Overdue	Calibration Overdue Connection to Mesh Network has been lost.	Move DetectiveIQ back into range of Mesh Network and re-connect.
Mesh Lost	Mesh Lost The calibration due date has passed.	Send DetectiveIQ to authorised service agent for calibration.
High Temperature	High Temperature Exceeded The Sensor measured temperature is greater than the defined maximum temperature.	Return device to normal operating conditions.
Low Temperature	Low Temperature Exceeded The Sensor measured temperature is lower than the defined minimum temperature.	Return device to normal operating conditions.
Pump Is Open Circuit	Pump is Open-Circuit Pump Failure.	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Pumped Blocked	Pump is Blocked Block in pump system.	Clean all filters and ensure there are no blockages in the pump system.
Under Range	Under-Range Raw gas ADC reading value at bottom of ADC range.	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Over Range	Over-Range Raw gas ADC reading value at top of ADC range.	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.

WARNING/FAULT	STATUS/CAUSE	OPERATOR ACTION
Sensor Bias Loss	Sensor Warm-Up Sensor warm-up in progress.	Allow sensors to stabilise. Ensure device is sufficiently charged.
Gain Warning	Gain Warning Calibration gain is near maximum permissible threshold.	Re-calibrate device. DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Pellistor Saver Activated	Pellistor Switched Off Pellistor is switched off due to pellistor saver function.	Return to clean air environment and power cycle device.
Watchdog Reset	Watchdog Watchdog restart, other than powerup	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Pellistor Saver Disabled	Pellistor saver disabled.	Return to clean air environment and power cycle device.
Sensor Failure	Sensor Failure Failure of a gas sensor within the device.	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Sensor Reading Zero	Under-Range Gas level below configured zero error level.	Re-Zero & Calibrate Device.
Sensor Reading Too Low	Sensor Reading Too Low Gas level below configured zero error level	Re-Zero & Calibrate Device.
Sensor Reading Too High	Sensor Reading Too High Gas level above the configured measuring range.	Re-Zero & Calibrate Device.
Comms Failure (Digital Sensor)	Digital Sensor Communication Failure	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Hardware Failure (Digital Sensor)	Digital Sensor Hardware Failure	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Range Failure (Digital Sensor)	Digital Sensor Range Failure	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Condensation Fault (Digital Sensor)	Digital Sensor Condensation Failure MPS sensor can detected an increase in condensation within the environment.	Return DetectiveIQ to normal environment. MPS sensor will automatically reset after 60secs.
Initialization Failure (Digital Sensor)	Digital Sensor Initialisation Failure	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Analogue Output Warning (Digital Sensor)	Digital Sensor Analogue Output Warning	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.
Analogue Output Fault (Digital Sensor)	Digital Sensor Analogue Output Failure	DetectiveIQ must be returned to a service centre for further investigation and repair if the message is seen persistently.

7.3.1 ADDITIONAL ERRORS

The following fault messages are not fixable by the user and the instrument should be sent to an authorised service agent:

- Sensor Module Comms Failure
- File System Failure
- NVM Read-back Failed
- Configuration Load Failure
- CPU Config
- CPU Self-test Failure
- RAM Self-test Failure
- ROM Self-test Failure
- ADC Failure
- Watchdog H/W Failure
- Assertion Fault
- Software Fault
- Watchdog Reset
- Stack Overflow Reset
- ROM Check Failed – Sensor Module
- RAM Check Failed – Sensor Module
- CRC Error in Config – Sensor Module
- Supply Voltage Low
- Supply Voltage High
- Software Fault
- NVM Read-Back Failed
- Configuration Failure
- NVM to RAM copy Failure
- Production Data Failure
- First Poll
- Detector Below Reference
- Detector Above Reference
- Sensor Obscured
- Temperature Calibration Failure
- Hardware Failure
- Lamp Failure
- Calibration Data
- Characterisation Data
- Too Many Readings Dropped
- Lin/Temp Compensation Invalid
- Hardware Mismatch
- Over Gassed
- Bias Battery Failure

8. APPENDICES

8.1 SENSOR LIMITATIONS

The detector is not suitable for use in ambient temperatures above 55°C and electrochemical toxic gas sensors may be degraded, reducing life at these temperatures. Water should not be allowed to collect on the sensors as this may impede gas diffusion. Use with care in wet or humid environments where water may condense on the sensors, and check response after use.

Persistent exposure to high levels of toxic gas can shorten the life of toxic sensors. Toxic sensors may also be cross-sensitive to gases other than their specific target gas, and hence the presence of other gases may cause the sensor to respond. If unsure, contact Crowcon or your local agent.

Use of high power radio transmitters in close proximity to the detector may exceed RFI immunity levels and cause erroneous indications. If such problems are experienced, remove antennae to a reasonable distance from the detector (e.g. 30 cm).

Standard units detect flammable gases using a catalytic flammable sensor which operates in the presence of oxygen. It is advisable to check the oxygen concentration as well as the flammable gas concentration before entering a confined space. Oxygen levels below 10% will reduce a flammable gas reading.

The performance of catalytic sensors may be permanently degraded if exposed to silicones, sulphur containing gases (such as H₂S), lead or chlorine compounds (including chlorinated hydrocarbons).

Because the MPS performs an analysis of the molecular properties of a given “air” sample, large-scale fluctuations in the relative concentrations of the components in the air can affect accuracy. Normal air has an O₂ concentration of 20.95% by volume. Higher ambient O₂ concentrations up to ~21.8%VOL have little to no effect on the sensor. Oxygen levels below 15% will introduce an error of up to -6% LEL, with an error increasing to approximately -12% LEL with a local O₂ concentration of 5% VOL.

The MPS sensor is extremely poison resistant and unaffected when exposed to silicones, sulphur containing gases (such as H₂S), lead or chlorine compounds (including chlorinated hydrocarbons).

8.2 MPS OPERATIONAL GUIDANCE

Please note the following guidance for correct operation of DetectiveIQ MPS

SCENARIO	DO NOT
Calibration	Do not calibrate the device using a standard methane cylinder with a balance gas composition of 20.9% Vol O ₂ balanced in Nitrogen. This cylinder does not contain required level of oxygen and will result in incorrect calibration (air indicated on cylinders is not typically atmospheric air).
Calibration	Do not calibrate with gas other than methane, within the cylinder compositions detailed.
ISO Calibrated Levels	Ensure ISO calibration level set correctly, 2.2% VOL CH ₄ = 44% LEL, 2.5% VOL CH ₄ = 50% LEL
EN Calibrated Levels	Ensure EN calibration level set correctly, 2.2% VOL CH ₄ = 50% LEL, 2.5% VOL CH ₄ = 57% LEL.
Calibration	Do not perform zero with synthetic air as this will adversely affect accuracy – use ambient air only.
Bump testing. If ‘bump testing following operation in ‘ambient air	Do not bump test device using a standard methane cylinder with a balance gas composition of 20.9% Vol O ₂ balanced in Nitrogen. This cylinder does not contain required level of oxygen and will result in incorrect gas bump test readings.

SCENARIO	DO
Calibration & Bump Test	Do only use cylinder compositions detailed in this technical note.
Calibration	Do ensure actual level of applied calibration gas (stated on cylinder calibration certificate) is entered into calibration software for optimum accuracy.
Calibration	Do use ambient clean air only to perform 'zero' - synthetic air will adversely affect accuracy
Bump Test & Calibration	Do ensure gas is applied for correct stabilisation time.
Calibration	Do only use methane as calibration gas, within the cylinder compositions detailed.
Calibration & Bump Test	Do use recommended flow rate of 0.5 l/m.

8.3 CHARGING & RUN TIMES

The table below indicates run times which can be expected following a full charge discharge cycle.

CONFIGURATION	RUN TIME
O ₂ , CO/H ₂ S, MPS™	101 Days
O ₂ , CO/H ₂ S, MPS™ Pumped	34 Days
O ₂ , CO/H ₂ S, Pellistor	21 Days
O ₂ , CO/H ₂ S, Pellistor Pumped	15 Days
O ₂ , CO/H ₂ S, SO ₂ , MPS™, CH ₄ (IR)	19 Days
O ₂ , CO/H ₂ S, SO ₂ , MPS™, CH ₄ (IR), CL2	19 Days

Run time is equal to the expected operating time following a full charge/discharge cycle.

Should the DetectiveIQ completely discharge, the device will maintain the internal clock for 45 days. Storage life with a fully charged battery is 38 weeks. (Based upon a O₂, CO/H₂S, MPS Diffused configuration).

The storage life of sensor module backup cell is 1 year (when in sleep mode).

9. WARRANTY

For information regarding instrument and sensor warranty, please refer to the technical note, GEN067. This can be found on the Crowcon website, in the technical note library: www.crowcon.com/support/technical-notes/.

9.1 WARRANTY PROCEDURE

To facilitate efficient processing of any claim, please visit www.crowcon.com/support/warranty/contact. Alternatively, you can contact your local Crowcon agent/distributor, a Crowcon regional office or our global customer support team (English working language) on +44 (0)1235 557711 or customersupport@crowcon.com to obtain a returns form for identification and traceability purposes. This form requires the following information:

- Your company name, contact name, phone number and email address.
- Description and quantity of goods being returned, including any accessories.
- Instrument serial number(s).
- Reason for return.

The unit will not be accepted for warranty without a Crowcon Returns Number (CRN). It is essential that the address label is securely attached to the outer packaging of the returned goods.

The guarantee will be rendered invalid if the detector is found to have been altered, modified, dismantled, tampered with, or has not used Crowcon spares for replacement parts (including sensors) or has been serviced or repaired by any party not authorised and certified by Crowcon to do so. The warranty does not cover misuse or abuse of the unit including use outside of specified limits.

9.2 WARRANTY DISCLAIMER

Crowcon accept no liability for consequential or indirect loss or damage howsoever arising (including any loss or damage arising out of the use of the detector) and all liability in respect of any third party is expressly excluded. This warranty does not cover the accuracy of the calibration of the unit or the cosmetic finish of the product. The unit must be maintained in accordance with the instructions in this manual.

The warranty on replacement consumable items supplied under warranty to replace faulty items, will be limited to the unexpired warranty of the original supplied item.

Crowcon reserves the right to determine a reduced warranty period or decline a warranty period for any sensor supplied.

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