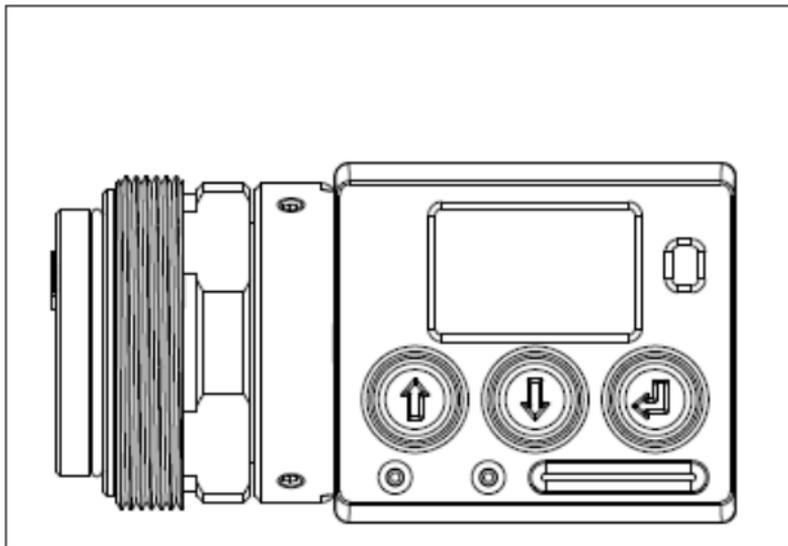


# IR Display

Display module for IRmax infrared hydrocarbon gas detector



Installation, operating and maintenance instructions

**M07061**  
Issue 1 Oct 2010



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# Safety Information

## Safety warnings

The **IR Display** is an intrinsically safe (IS) display accessory for the **IRmax** IR hydrocarbon gas detector. The **IR Display** may be supplied in three formats: a **Fixed IR Display** is assembled into a stainless steel housing which connects directly to the **IRmax** and contains the necessary IS barrier circuits. The **Remote** and **Hand-Held** versions of the **IR Display** must be connected only to **IRmax** detectors fitted with an IS Barrier Module which contains the necessary IS barrier circuits.

The **IR Display** must only be connected to **IRmax** fitted with the appropriate label, shown in Diagram 1 below.

## WARNING

- An IR Display may only be fitted to an IRmax supplied for the purpose. Such IRmax are certified Exd ia, and must be operated either with a Fixed IR Display containing an IS barrier, or with a Remote IR Display or IS Hand-Held Calibrator connected via a Crowcon IS Barrier Module.
- An IRmax supplied without a display is certified Exd IIC and cannot be retro-fitted for use with an IR Display.



Diagram 1 Certification label fitted to *IRmax* compatible with the *IR Display*

# 1. Product Description

## 1.1 General

The **Crowcon IR Display** is an optional accessory for the **IRmax** infrared gas detector. The **IR Display** enables checking and calibration of the **IRmax** without requiring de-classification of the product or hot-work permits.

The **IR Display** can be connected to the **IRmax** in a number of different configurations, all of which maintain the intrinsically safe property of the unit.

Option 1: The **Fixed IR Display** is an IS unit that attaches directly to the **IRmax** (see Diagram 2 below).

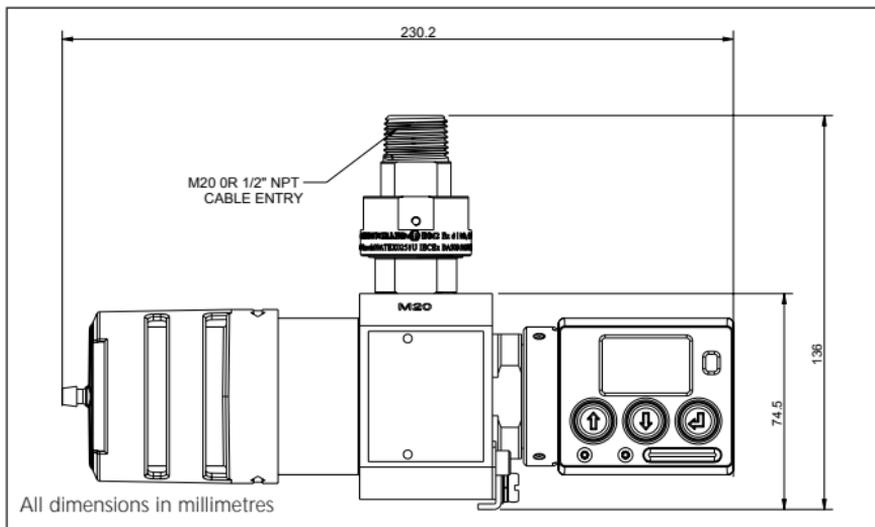


Diagram 2: *IRmax* display connected to detector

Option 2: The **Remote IR Display** can be mounted up to 30 metres away from the **IRmax** when connected via an Intrinsically Safe connecting lead and barrier module. This option is supplied with an anti-static glass reinforced nylon housing and mounting bracket. (See Diagram 12 on page 25). The **IS Hand-Held Calibrator** is available for remote calibration and interrogation of **IRmax** via a temporary connection. With this option, only one unit is required per fleet of **IRmax** detectors.

The **IR Display** features IP66 ingress protection, has a very wide operating temperature range of  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$ , and is certified for use in Zone 1 or Zone 2 hazardous areas.

## 2. IR Display functions

### 2.1 General

The **IR Display** features a 4-digit LCD with backlight, ultra-bright green, amber and red status LEDs and a key-pad for accessing menus. IS terminals are fitted for connecting HART Hand-Held communicators for calibration and accessing diagnostic information. HART functionality is an option: refer to Section 3.2.3 & HART manual for details.

The **IR Display** shows the %LEL flammable gas concentration, and current operating status (Normal, Alarm or Fault). The key-pad can be used to display the detector signal current, supply voltage, and optical obscuration level.

### 2.2 Using the display

The keys below the screen are made of elastomer. They have a slightly different feel from hard keys. Be sure to press firmly on the 'Up' and 'Down' keys to select options allowing you to operate the display to view data or change settings. Pressing buttons will generate a 'beep' sound, double 'beep' for a double press.

Instructions are accepted in the form of single and double presses.

Use the Enter key to access the MENU.

A password protected menu enables access to further functions: detector zero, detector calibration, output signal simulation, output signal adjustment (see Sections 4 and 5).

For further details on each operation see Sections 6 to 10 below.

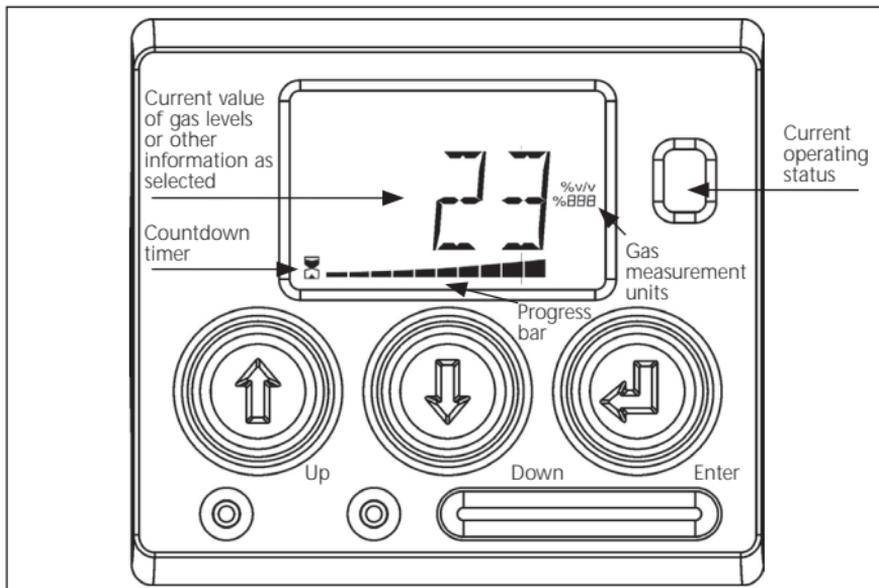


Diagram 3

## 2.3 Alarms and warnings

Conditions needing attention are indicated by the LED (see Diagram 4 below):

LED colour	Indicator status	Refer to
Green (continuous)	OK	page 10
Red (continuous)	Alarm 1	page 13
Red (flashing)	Alarm 2	page 13
Amber (continuous)	Warning	page 14

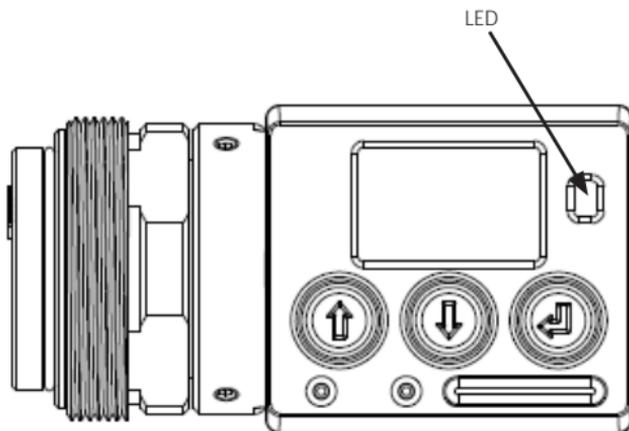
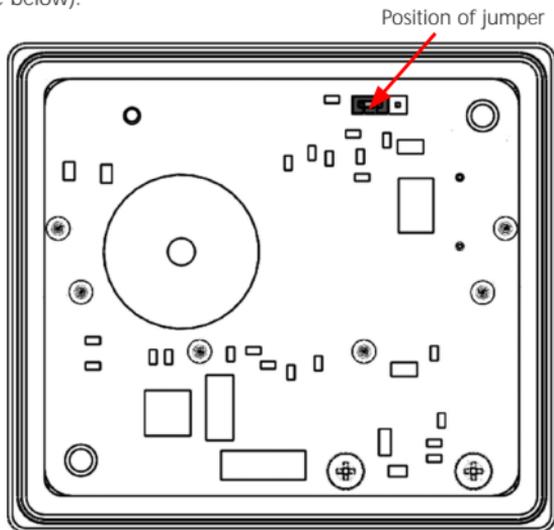


Diagram 4

## 2.4 Disabling the keypad

The key-pad can be disabled if required by changing the position of the jumper on the PCB (see Figure below).



<p>By default, the jumper on the PCB will be set with one hole on the centre pin. In this position, all keys and menus are fully enabled.</p>	
<p>Place the jumper over the centre and right pins and there will be no response from any key press. The keys will not beep, nor will there be any way to turn on the backlight.</p>	
<p>Alternatively, if the jumper is placed on the left and centre pins, the menus cannot be entered. The Up and Down keys will work normally and pressing the Enter key will turn the backlight on and generate a beep.</p>	

**NOTE: Alarms do not override other operations.**

## 3. Installation

### 3.1 Fixed IR Display

Install the **IRmax** following instructions in the **IRmax** manual (M07706). Mount using the bracket provided or connect to an auxiliary junction box via a spigot gland.

The **IR Display** attaches to the **IRmax** via the threaded collar (Diagram 5). Before bringing the two units together, link the PCBs installed in the units using the Molex connector.

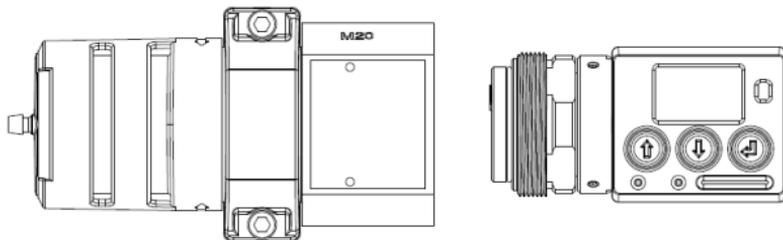


Diagram 5

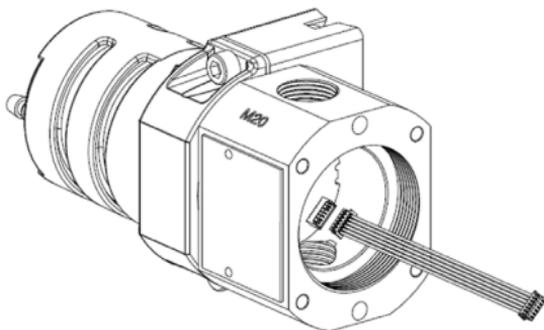


Diagram 6

First disconnect the field cable connector from the **IRmax** PCB. Then attach the Molex connector to the Molex socket on the PCB. Do not forget to replug the field connector into the PCB.

Carefully supporting the **IR Display** module if not yet fully installed, connect the other end of the Molex lead to the **IR Display** Module (Diagram 7).

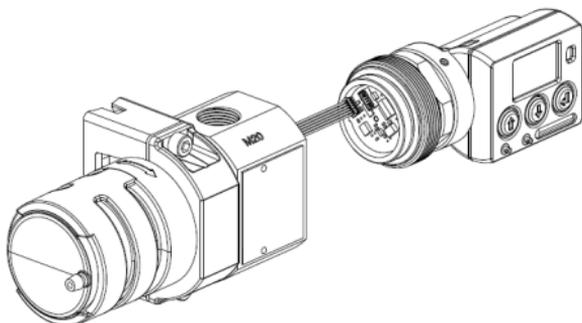


Diagram 7

Bring the **IRmax** and **IR Display** together.

**Never twist the display by more than 45° from the normal vertical plane.** Doing so will result in damage to the connecting cable.

Holding the display housing still, tighten the joint by rotating the threaded collar clockwise.

Once the **IR Display** is firmly attached, its orientation can be adjusted by gently turning the housing.

Add the bracket shown below.

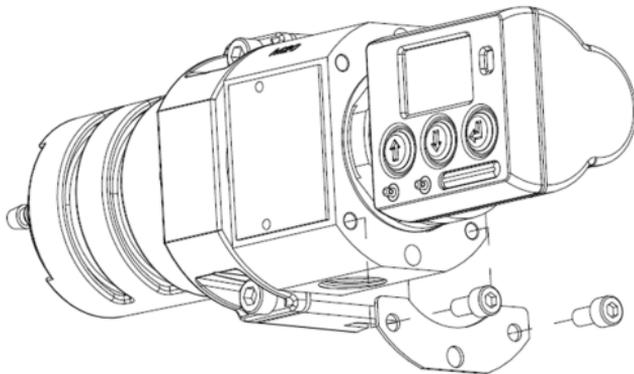


Diagram 8

## 3.2 Remote display options

The **IR Display** can be used remotely from the **IRmax**, or alternatively it can be temporarily connected to one or a number of **IRmax** detectors in turn. This mode of use is possible only if the detector is purchased with an IS Barrier Module attached.

### 3.2.1 Remote IR Display

For use remotely from the detector, the **IR Display** is supplied in a glass-reinforced nylon housing. Install the display permanently using a mounting bracket. Connect the display to the IS Barrier Module via an IS cable using the pre-moulded 4-pin connector (see Diagram 9 below). A range of cables is available from 5 to 30 metres in length.

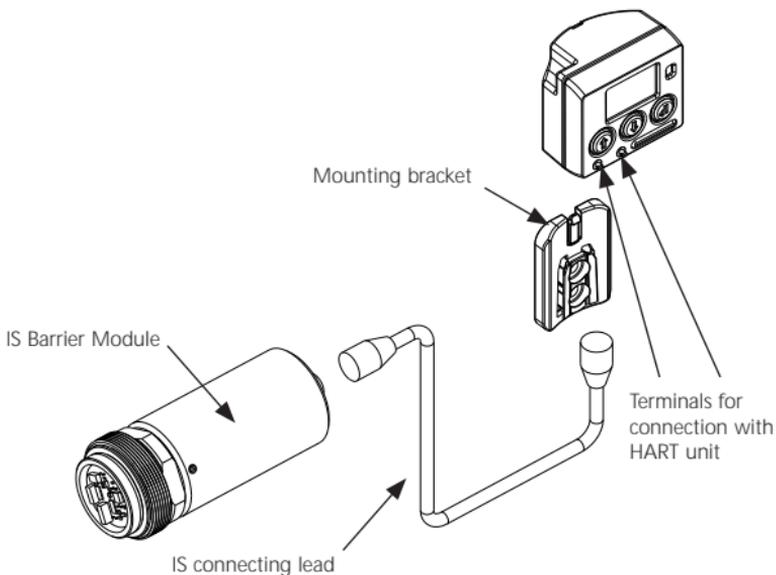


Diagram 9

### 3.2.2 IS Hand-Held Calibrator

The **IR Display** can be used as a field calibration tool. Supplied with a 1.5 m IS connecting lead, the **IS Hand-Held Calibrator** can be temporarily connected to **IRmax** fitted with an IS Barrier Module to enable gas testing and calibration. Connect the **IR Display** to the **IRmax** when required via the 4-pole connectors as shown in Diagram 9. The dust-cap must always be re-fitted to the IS Barrier Module after the **IR Display** has been disconnected.

### 3.2.3 Use of HART communications

Test terminals are provided on all **IR Display** units. HART units can be connected to these terminals. HART communications enable the use of portable terminals to monitor and control detectors. Instructions for connecting the HART unit with the **IR Display** are given in Section 11 on page 25.

## 4. Start-up

The display detects the host **IRmax**. If the display has just been connected to a new **IRmax**, it may take a few seconds to pick up the identifying address of the **IRmax**.

The LED at the right of the LCD goes momentarily to green, then to red and back to green. The display shows:

The **name** of the **IRmax** will display, scrolling if necessary, for 3 seconds

The **target** gas - e.g. CH<sub>4</sub> - will display briefly.

The progress bar will then be displayed until the **IRmax** has warmed up.

If the host detector needs attention, appropriate warnings or status messages will be displayed during or at the end of the warm-up phase. See Section 7, on page 14, for further details.

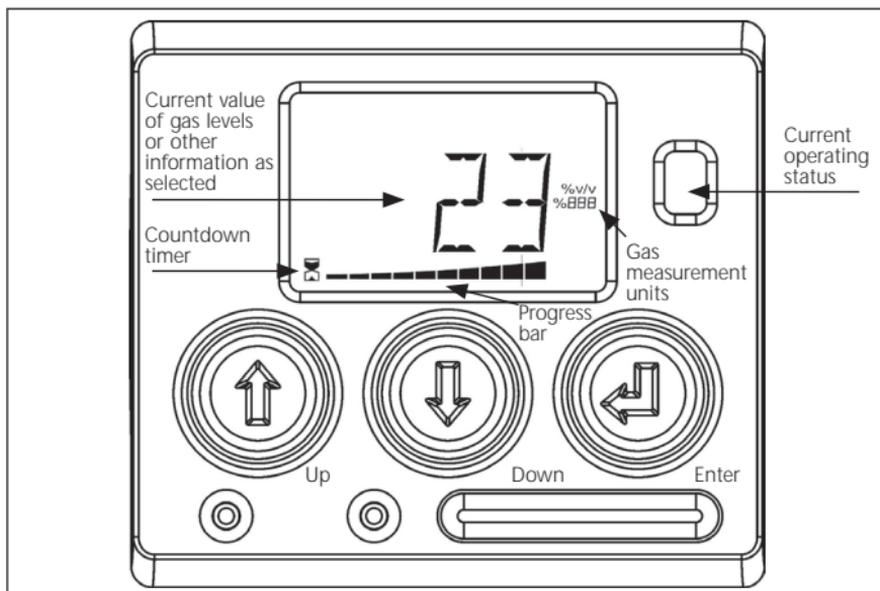


Diagram 10

Custom strings can be configured during commissioning using the optional **IREX/IRmax** PC communications kit.

While the custom string is showing, pressing the keys below the panel will have no effect.

When 'OK' shows at the top right of the screen, the display can be used to show information.

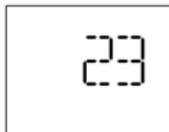
At any key press, the backlight will come on for 10 seconds.

If a custom string has been assigned to identify the **IRmax** from which data is being displayed, it may also show, possibly scrolling, at this time.

## 5. Accessing data

### 5.1 The operational menu

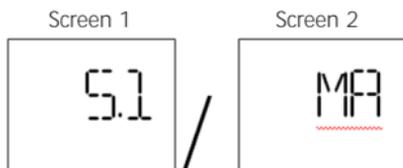
The gas concentration will be displayed after startup is completed. The screen below will show when the **IRmax** is measuring gas as 23% of the \*LEL.



To see other data, click or hold the 'Up' key to cycle through the options. The gas display will be restored 10 minutes after the last key press.

Other items in the operational menu are shown in the Table below.

Data showing	Units	Screen 1 alternates with...	Screen 2
Gas concentration	1% resolution, *LEL or volume, as set at Host	[Gas level]	
Obscuration of detector optics	%	[Obscuration level]	OBSC
Supply voltage	V, to one decimal place	[Voltage level]	V
Output current	mA, to resolution of 0.1 mA	[Signal level]	MA



\* Lower Explosive Limit, the minimum concentration in air at which ignition can occur.

For data other than the gas level the screens alternate to show the number and the unit as in the table below. The two screens above would be shown if the analogue output is 5.1 mA.

If the LED changes from green to red, the **IRmax** is detecting a potentially dangerous level of gas. \*

### Alarm 1

If the gas level reaches 20% (of LEL or by volume according to the choice made at the host **IRmax**), the red LED will show.

If the gas level subsequently falls, the alarm will clear when the gas level falls below 19%.

### Alarm 2

If the gas level reaches 40%, the red LED will flash.

If the gas level later falls, the alarm will clear when the gas level falls below 39%.

In either case, the backlight will be on while the **IRmax** is in alarm status.

\* Alarm levels are factory set to 20/40 per cent LEL.

**NOTE: Alarms do not override other operations.**

## 7. Warnings

During operation, the amber LED will light if warnings are present

The **IR Display** will show alerts that indicate the host instrument needs attention.

The keys will still operate as normal when warnings are shown.

Warnings take precedence over alarm conditions. They indicate that the detector is not functioning properly, so immediate action should be taken to correct the problem.

Message	Action required
IMODULE CHANGED	Occurs only on start-up, when the target gas of the <b>IRmax</b> has been changed. Switch off and on again.
OPTICS OBSCURED	Clean the optics, then zero. Recalibrate if necessary.
CLEAR OBSCURATION	Check the optics for obscuration and clear or clean as necessary. After a successful zero the calibration should be checked.
SERVICE THEN ZERO	The service condition needs to be cleared before zeroing.
ZERO ERROR TOO BIG	This message indicates an attempt to zero <b>IRmax</b> when the gas reading is too far from zero. Before re-attempting to zero, check there is no gas present and that nothing is obscuring <b>IRmax</b> .
SERVICE THEN CALIBRATE	The service condition needs to be cleared before calibrating.
SERVICE REQUIRED	Clean, zero and calibrate the <b>IRmax</b> . If the warning persists, send the <b>IRmax</b> for servicing at <b>Crowcon</b> or approved service centre

## 8. Troubleshooting

### 8.1 Working with the IRmax

The **IR Display** shows other messages that provide useful information about the **IRmax** to which it is connected

Message	Meaning	Action required
SEARCHING FOR IRMAX	May occur when the instrument is establishing connection when first connected to an <b>IRmax</b> .	Wait until progress bar shows search is completed.
NO IRMAX FOUND	<b>IRmax</b> may not be able to connect with display because it is absent or has a fault; may show when search for the <b>IRmax</b> as above fails.	Contact <b>Crowcon</b>
IMODULE MISSING	The i-module in the <b>IRmax</b> is not present or there is some other fault preventing data from arriving at the <b>IR Display</b> .	Contact <b>Crowcon</b>

### 8.2 Operational messages

Message	Meaning	Action required
RAMP ENABLED	The <b>IRmax</b> is not outputting a loop current representative of the detected gas level. Occurs when HART communications initiates manual mode.	None. <b>IRmax</b> will automatically time out of this mode after 5 minutes or use HART communicator to cancel RAMP mode.
INHIBIT ENABLED	The <b>IRmax</b> is not outputting a loop current representative of the detected gas level. Occurs when HART communications initiates inhibit mode.	Use HART communications to change mode. Otherwise <b>IRmax</b> will time out of this mode after 5 minutes.

## 8.3 IR Display faults

Fault	Meaning	Action
Keys not responding or incapable of entering menu system		Check position of key disable link and adjust if required. If links are changed remember to power-cycle instrument to ensure that the IR-Display reads the new link configuration.
Display flashes when adjusting TRIM or SPAN	Adjustment has reached the allowed limit, further adjustment is not possible.	Check accuracy of loop current.

# 9. Controlling the IRmax

## 9.1 Menus and password

The **IR Display** can be used to adjust the **IRmax** as necessary.

To access the functions available (see table below), press and hold the Enter key. The screen will display the word 'MENU'. The backlight will light at the same time.

Press the 'Enter' key again. At the password (PWD) prompt, enter a combination of the three buttons below the display.

The default password is 'Up', 'Down', 'Enter' – press each button once going from left to right.

Once the password is accepted, the 'ZERO' function is indicated.

If the password is incorrectly entered or not entered in time, the display will return to the normal gas level screen.

After an operation is complete, the display should show the name of a menu function. After 5 minutes, the function menu will time out. The display will then revert to showing the gas level.

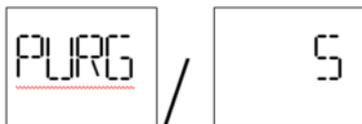
## 9.2 Functions available on the IRmax menu.

Use the 'Down' key to scroll through the functions. Press 'Enter' to select a particular function	Name	Function	See
	ZERO	Zero the <b>IRmax</b> .	page 18
	CAL	Calibrate the <b>IRmax</b> while a reference gas is applied.	page 19
	TRIM	Zero adjustment of the analogue output.	page 20
	SPAN	Adjust the output level with gas applied.	page 22
	RAMP	Set the analogue output to a particular value for a control panel test.	page 23
	VER	Display the version number of the software installed in the iModule, Host or Display.	page 23
	EXIT	Select this option when you have finished using the menu functions.	

For more details on how to use each function see below.

## 9.3 Zero

On pressing 'Enter' at the 'ZERO' screen, the display will scroll between the two screens below.



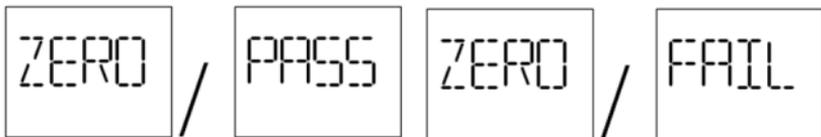
Make sure the **IRmax** is in clear air.

Press the 'Enter' key to continue with zeroing. A 'double-click' on the key will abort the zero option.



While the zeroing proceeds, the display will show the screen below:

The progress bar will count down in about 5 seconds. Once it has started, the zero operation cannot be aborted.



When zeroing is complete, the display will indicate the result of the operation. If the zero has been successful, the screen will scroll between 'ZERO' and 'PASS' (above left). If not, the screen will scroll between 'ZERO' and 'FAIL' (above right).

Possible reasons for failure of calibration zero:

- Lamp or **IRmax** failure.
- Zero gas reading is out of acceptable range.

Press the 'Enter' key to revert to the menu options.

## 9.4 Calibration (CAL)

During calibration, the **IRmax** is exposed to gas at a known concentration. The output reading is set at the correct level, so that subsequent readings will represent an accurate measurement of the gas present in the air surrounding it.

To start the process, select 'CAL' as described in the table shown on page 17. Then press 'Enter'.

The next screen will show the default calibration set-point (e.g. 50% LEL).



To change the setting of the gas calibration set point (i.e. to suit the calibration gas being used), use the 'Up' and 'Down' keys. As soon as one of these is pressed, the display will stop flashing and show only the value. Alter the value as required.

When the correct level is displayed, press 'Enter'.

Preparing for the calibration, **IRmax** will go into 'inhibit mode' \*, so the calibration gas does not trigger an alarm. The output from **IRmax** will be zero unless a different level of the 'operational inhibit' has been set on **IRmax**.

Apply calibration gas to the detector as described in Section 3.1 of the main manual.

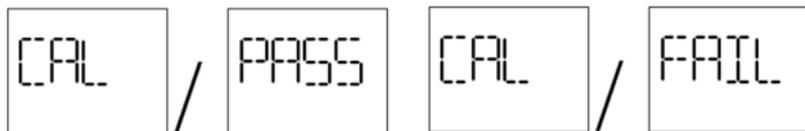
When the gas reading levels off, click on the 'Enter' key to proceed with the calibration.

To exit from the process at this point, double click on the 'Enter' key.

During calibration the screen below will be displayed.



When the calibration is complete, the display will indicate the result of the calibration.



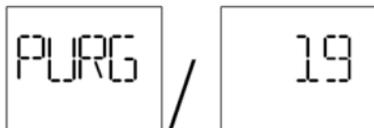
# Controlling the IRmax

Possible reasons for failure of calibration:

- Lamp or detector failure.
- Instrument requires zeroing first (e.g. zero shift due to obscuration fault).
- Gas reading is out of acceptable range.

Click the 'Enter' button.

Clear the **IRmax** of the calibration gas. The display will track the level of gas present in the gas chamber.



When the level has returned to 'normal', click the 'Enter' key to return the display to the menu.

The inhibit mode will be removed, and the gas level will display as in normal operation.

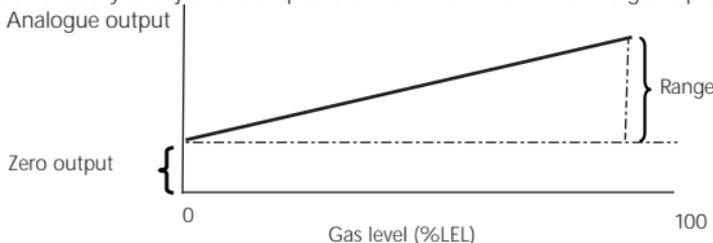
\*Inhibit mode suppresses the output signal while the **IRmax** is being calibrated to avoid triggering alarms on a control system while significant levels of gas are applied. The 'operational inhibit', the default output of the **IRmax** in inhibit mode, is usually 0 %LEL.

## 9.5 Adjusting the analogue output

The display allows two adjustments to be made to the analogue output of the **IRmax**. Use the TRIM function to **shift** the analogue output at **zero gas**. The SPAN function changes the **range** of the analogue output i.e. the difference between output at **zero gas** concentration (%LEL) and the output at maximum gas concentration (%LEL).

### 9.5.1 Adjust the zero output (TRIM)

It may be necessary to adjust the output level from the **IRmax** when no gas is present (e.g.



if 0% LEL is indicated on the display, but the output is registered at the controller as 4.1 mA instead of 4.0mA. Select the TRIM option to make the correction. This will not affect the gas calibration.

Press the 'Enter' key to display the current analogue output.

Use the 'Up' and 'Down' keys to adjust the reading.

If the operation times out before the change is accepted, the analogue output will revert to the original value.

Click the 'Enter' key to accept the change.

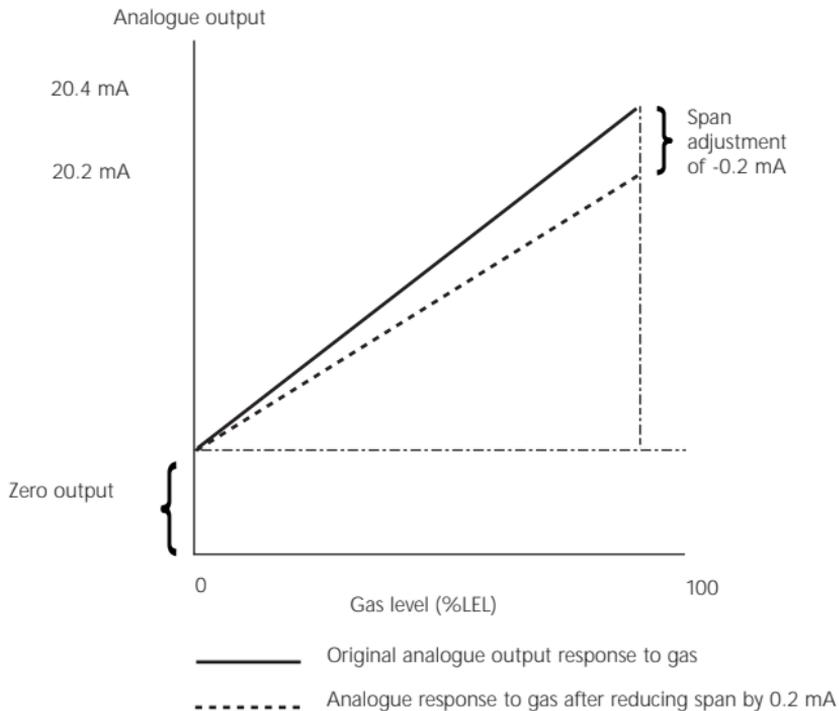
As the output changes, the display's reading of the analogue output may take a few seconds to settle down to the new level. Check that the trim is now at the correct value by reading the zero value of the analogue output at the control panel.

# Controlling the IRmax

## 9.5.2 Adjust the range of the output (SPAN)

The SPAN adjustment alters the gain of the analogue output.

NB: THIS GRAPH IS NOT DRAWN TO SCALE



**NOTE: 3mA of adjustment is available for the span signal output.**

For example, if, when calibrated, a 50% LEL gas reading is displayed but the output signal does not register as exactly half-scale (e.g. 12mA), the SPAN function can be used to modify the signal.

Press the 'Enter' key to display the current analogue output.

Use the 'Up' and 'Down' keys to adjust the reading.

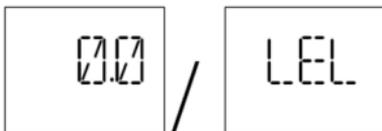
If the operation times out before the change is accepted, the analogue output will revert to the original value.

## 9.6 Simulating the gas level for control panel testing (RAMP)

**WARNING:** Using this function will generate an output signal and thus may force control equipment into alarm.

Select RAMP to generate an analogue output to check that the control panel will register an alarm.

Use the 'Up' and 'Down' keys to change the value. As the value is changed, the analogue output will reflect the gas level shown on the display.



Click the 'Enter' key to return to the menu.

The output signal reverts to the ambient gas to the ambient gas level once the RAMP functions is exited.

## 9.7 Verify the software version number (VER)

Showing software version numbers

Use the 'Down' key to scroll through the functions. Press 'Enter' to select a particular function '	Name	Show the version number of the software installed in the <b>IRmax</b>
	IMDL	iModule
	HOST	Host
	DSPY	Display
	EXIT	Select this option when you have finished looking at the version numbers

## 9.8 Backlight

The backlight is off during normal operation. It lights if any key is pressed or if the gas level exceeds the first alarm threshold. The backlight remains on whilst any menus are active.

# 10. Menu structure

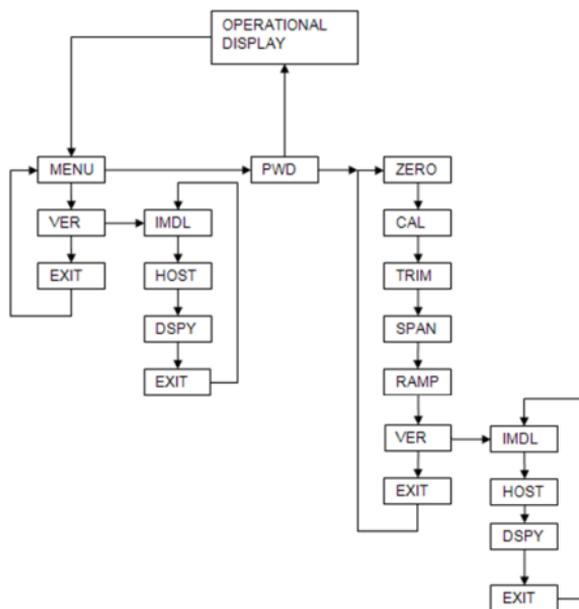


Diagram 11

To break out of menu loops, double click on the ENTER button.

# 11. HART communications

A HART terminal can be connected to the **IR Display** as shown in Diagram 12 below.

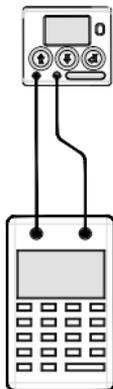


Diagram 12

**IR Display** can be supplied ready for use with a HART Communicators. Do not use a HART Communicator with an **IR Display** that has not been so configured.

For further information, obtain a HART Communications manual from **Crowcon**.

This equipment leaves our factory fully tested and calibrated. If within the warranty period of three years from despatch, the equipment is proved to be defective by reason of faulty workmanship or material, we undertake at our option either to repair or replace it free of charge, subject to the conditions below.

## Warranty Procedure

To facilitate efficient processing of any claim, contact our customer support team on +44 (0)1235 557711 with the following information:

Your contact name, phone number, fax number and email address.

Description and quantity of goods being returned, including any accessories.

Instrument serial number(s).

Reason for return.

Obtain a Returns form for identification and traceability purposes. This form may be downloaded from our website 'crowconsupport.com', along with a returns label. Alternatively we can 'email' you a copy.

**IR Display 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 instrument is found to have been altered, modified, dismantled, or tampered with. The warranty does not cover misuse or abuse of the unit.

## 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 instrument) 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 (such as the mirror) 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 for use in an environment or for an application known to carry risk of degradation or damage to the sensor.

Our liability in respect of defective equipment shall be limited to the obligations set out in the guarantee and any extended warranty, condition or statement, express or implied statutory or otherwise as to the merchantable quality of our equipment or its fitness for any particular purpose is excluded except as prohibited by statute. This guarantee shall not affect a customer's statutory rights.

**Crowcon** reserves the right to apply a handling and carriage charge whereby units returned as faulty, are found to require only normal calibration or servicing, which the customer then declines to proceed with.

For warranty and technical support enquiries please contact:

## Customer Support

**Tel: +44 (0) 1235 557711**

**Fax: +44 (0) 1235 557722**

**Email: [customersupport@crowcon.com](mailto:customersupport@crowcon.com)**

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