

STATUS SCIENTIFIC CONTROLS

Issue: 7
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Firmware: V9.4i



FGD 3 Infrared Gas Detector

Stock No. SS412 - Carbon Dioxide
Stock No. SS413 - Hydrocarbon

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Declaration of Conformity

Description of Equipment:

The FGD1-3 Series of Fixed Gas Detectors for the detection of Oxygen, Toxic or Flammable gases.
ATEX Certified intrinsically safe for use in Group IIC hazardous locations.

Directive 2014/34/EU ATEX

The following harmonised standards were used in support of this declaration:

Harmonised Standards:

EN60079-0:2018 Explosive atmospheres - Part 0: Equipment - General requirements.
EN60079-1:2014 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d".
EN60079-11:2012 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i".

Notified Body for Hazardous Area Certification:

SGS Fimko Oy
Särkiniementie 3
Helsinki, 00211
Notified Body Number: 0598

Notified Body for ATEX Quality Assurance Notification:

SGS Fimko Oy
Särkiniementie 3
Helsinki, 00211
Notified Body Number: 0598

Hazardous Area Certificate Number:

Baseefa 01ATEX2300



II 2 G Ex ia IIC
T4 Gb (-20° C < Ta < +60° C)

ATEX Quality Assurance Notification Number:

2056

Place of Manufacture:

Mansfield, Nottinghamshire, UK. Date mark applied – see product

ISO 9001:2015 Quality Management System:

Certificate No. GB93/1938

2014/30/EU – Electromagnetic Compatibility

Harmonised Standards:

EN50270:2006 Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen.

Authorised Signatory to this declaration, on behalf of the manufacturer:

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Signature



Date: 14/10/19

Extract from TD06/110



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1 Firmware Revision History

Version 9.4i 12 Sept 2007

CO2E added to sensor list:
0-100% Volume.

Version 9.3i 29 May 2007

Micro controller replaced, old processor out of program memory space.
Added fault detection for loss of power on sensor side. Fault generated instead of high gas reading.
Enhanced menu items.
Password protection added.

Version 6.83i 03 May 2005

CH4t added to list:
used to select methane scale using the temperature compensated sensor.

Version 6.82i 08 Dec 2004

Default bulb rate of 18, was 14
Default target gas to 40.0

Version 6.81i 26 Nov 2004

New sensor type from Dynament – HCC:
no temperature compensation required.

Version 6.8ir 11 Mar 2004

CO2H sensor added to list bug:
sensor details not actually initialised after selection in menu, fixed

Version v6.7ir 26 Feb 2004

CO2H sensor added to list

Version v6.6ir 9 Sept 2003

Max Xref changed from 150 to 500.

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2. Introduction

The FGD 3 Infrared Gas Detector Head incorporates the latest generation of compact sensors incorporating infrared technology (see section 0).

Warning – Infrared sensors will not detect Hydrogen gas.

There are two current detectors in use, one for Hydrocarbon gases and the other for Carbon Dioxide.

The Hydrocarbon sensor can be set to either methane or general hydrocarbons. These two settings use different calculations to convert the sensor signals in to gas readings, **it is important to select the correct gas type to give accurate readings.**

The detectors use the industry standard 4-20mA current loop to convey the gas levels detected to a control unit. This means that under *zero gas* conditions 4mA is drawn from the supply, and under *full scale* gas conditions 20mA is drawn from the supply. The current varies linearly for gas levels between zero and full scale.

The detector heads require a three-wire connection (see section 3.4). While the loop current supplies the power required by the detector head electronics within the detector head, a second supply must be provided to power the infrared sensor and its associated circuitry.

Additional features of the latest generation of FGD3 Heads include:-

- The terminal block for wire termination is located within an EMC enclosure within the FGD3 Detector Head. This improves the instruments' immunity to radio and electromagnetic interference.
- The software has been redesigned to allow more data to be accessed by the knowledgeable user.

An optional weather guard (Stock No. SS 475) is available for installations exposed to the atmosphere or contaminants and is also suitable for use in other areas where hosing down takes place. The weather guard is attached with tamperproof screws to ensure that it is not inadvertently removed.

2.1 Background

The infrared sensors use the proven non-dispersive infrared principle (NDIR) to detect and monitor the presence of gases. This technique relies upon the target gas having a unique, well-defined absorption signature within the infrared region of the electromagnetic spectrum.

3 Installation

IMPORTANT

The instrument will monitor the gases in the environment after being powered for a few minutes; however it should be left for a minimum of 2hrs before it is calibrated.

3.1 *Siting the Sensors*

Mounting positions for detector heads need to be considered individually, some points for consideration are:

- Ensure all sensors are mounted to allow routine calibration and maintenance to be carried out as required.
- Ensure the proposed site will not interfere with movement of existing equipment, e.g. cranes, doors etc
- Install all cables neatly and securely.
- Sensors for detecting gases that are lighter than air should be positioned at a high level.
- Sensors for heavier than air gases should be located at a low level.
- Avoid siting the sensors adjacent to potential sources of radio frequency interference, e.g. radio transmitters, control switchgear, motors etc.
- Avoid mounting the instrument where it may be subjected to sudden transients in ambient temperature (e.g. above a heater/radiator).

3.2 *Wire Termination*

All connections should be made according to the appropriate sensor or loop diagram for the configuration required. It is advised that 'Bootlace Ferrules' or 'flat blade crimps' be used for tidy and reliable connections of wires into the Detector Head connectors.

3.3 *Cable Routing*

Due to the low signal levels generated by gas detectors it is recommended that all wiring to the sensors be segregated away from AC mains or other high voltage/power lines to avoid interference.

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3.4 Cable & Screening

The use of a screened cable is recommended for the installation of all detector heads. The correct strategy for connecting the screens depends upon the area in which the detector head is to be used (i.e. hazardous/non-hazardous). In all cases the screen should not be connected at the detector head. Refer to the connection diagrams on the following pages for further information.

The FGD3 infrared detector heads require a three-wire connection to the control unit:

Sig +	current loop to head	8.0-28V (25mA max)
0	0V return to control unit	
Pwr +	supply for sensor	5.8-7.5V (60mA approx)

The infrared sensor requires a current of typically 60mA but draws this in pulses at a frequency of 2Hz (approx).

Note:

Sig and + terminals must not be connected together. Although the detector head will appear to function correctly, it will no longer be able to indicate detected gas levels to the control unit.

3.4.1 Connection Instructions

With the head disconnected adjust the control unit output so that 5.8 – 7.5V can be measured at the detector head between the wires '0' and 'Pwr +'. Connect the head and ensure that the voltage remains within the limits, readjust if necessary.

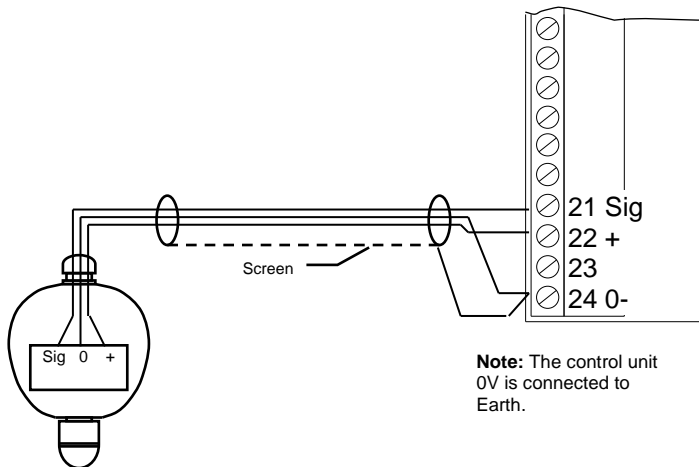
3.5 Installation in a non-hazardous location

When a detector head is installed in an area where there is no potential of an explosive gas hazard present, the cable lengths to the detector are limited solely by the resistance of the cable. The infrared gas detector requires a minimum of 8.0V at its Sig terminals, and 5.8V at its + terminal to allow it to operate correctly.

The maximum current loop resistance can be calculated. For systems operating at 20V, the maximum cable loop resistance (Sig) will be:

$$\begin{aligned} &(\text{Voltage available} - \text{minimum voltage}) / \text{max current} = \text{max loop resistance} \\ &(20-8.0) / 0.025 = 480\Omega. \end{aligned}$$

The voltage at the + supply needs to be 1 volt greater than the required 5.8V minimum for every 16Ω of cable resistance. At all times the voltage measured between the + and 0V terminals at the detector head must fall within the range 5.8-7.5V.



The diagram above shows connection for FGD3 Infrared Detector Head in a non-hazardous location. The pin numbers shown at the control unit refer to pin numbers on the Status Scientific Controls input modules within the MCU Control Units. Refer to the manufacturer if alternative control unit is used.

3.6 Installation in Hazardous Areas

When used in a hazardous area, the FGD3 detector requires an intrinsically safe (I.S.) power supply. This can be provided in two ways:

1. By using the MCU Control Unit incorporating the I.S. Output Module Type FGDIO. The FGDIO module is incorporated within the MCU control unit enclosure and provides intrinsically safe outputs for all versions of the FGD range of gas detectors.
2. By using proprietary safety barriers.

When using barriers to create an I.S. supply, certain restrictions are imposed on the parameters of the interconnecting cables used. These parameters are defined by the manufacturer of the barrier and limit the maximum capacitance, inductance and inductance to resistance ratio of the cable. The installation is only intrinsically safe when the combination of the barrier and connecting cables comply with the manufacturer's specification.

As with a non-I.S. installation, the cable length is restricted by the cable loop resistance. With the introduction of a barrier or the FGDIO module (refer to the MCU System Installation and Hardware Configuration Manual), the cable loop resistance is reduced because of the internal resistance of the barrier. The end-to-end resistance of the barrier must therefore be subtracted from the overall cable loop resistance when calculating cable lengths.

Barriers must be selected to restrict the parameters of the I.S. supply to the gas detectors within the following limits:

Terminals	U_{max}	I_{max}	P_{in}	C_i	L_i
0V and SIG	30V	0.15A	0.81W	10nF	0
0V and +	7.5V	0.75A	1.4W	9.7 μ F	0

When considering the capacitance and inductance allowable across the barrier output terminals, note:

There is 10nF and zero inductance between terminals 0V and SIG on any model of FGD Detector head.

There is an equivalent of 9.7 μ F capacitance and zero inductance between terminals 0V and + on the FGD3 Infrared gas detector.

Guidance on the correct installation of I.S. systems is provided by EN60079-14:2014

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3.6.1 Installations using Proprietary Safety Barriers.

For wiring details refer to manufacturers specific data sheets.

4 Relative Response Characteristics

This section is applicable to FGD3 gas detectors fitted with an infrared **Hydrocarbon** sensor.

Unless otherwise specified, the FGD3 infrared hydrocarbon gas detector is calibrated to provide an output signal linearised for methane (CH₄) during manufacture.

However, the gas detector will also respond to a range of hydrocarbon gases. The characteristics shown on the following page demonstrate the relative response to some of the common hydrocarbons.

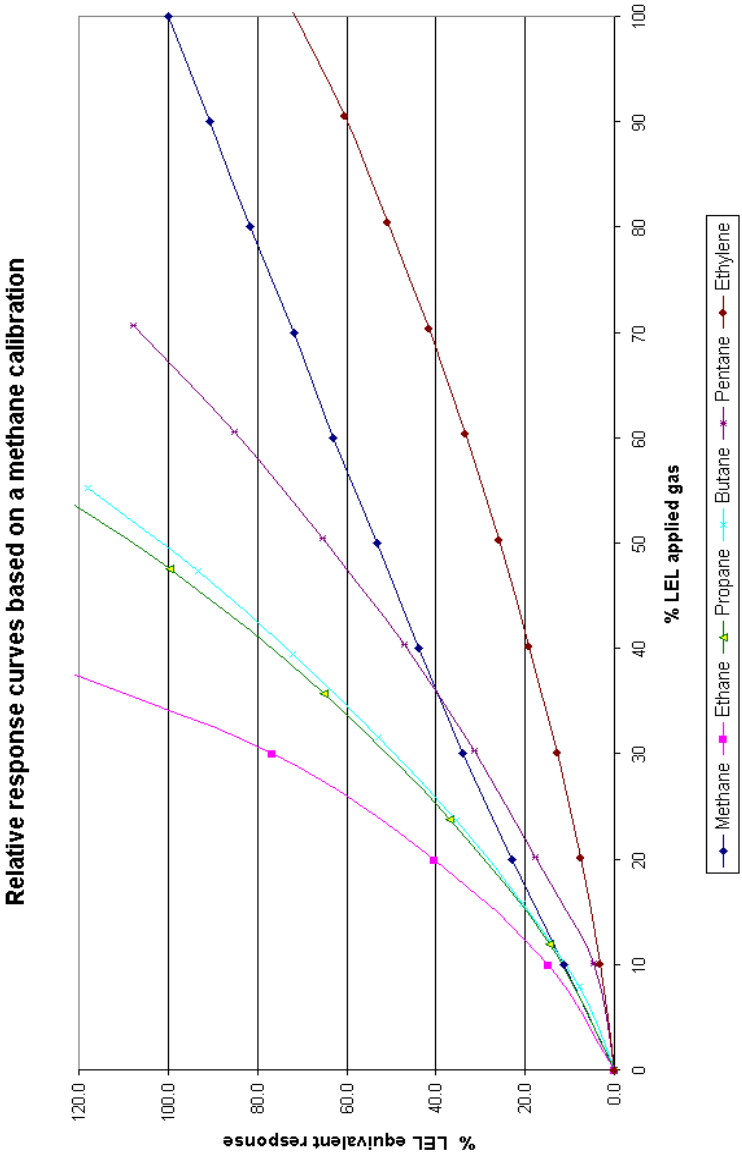
If the expected target gas is other than methane then either:-

- a) The characteristics can be used as a guide when setting up the alarm levels in the associated control unit, e.g. where a general hydrocarbon response is required.
- b) The FGD3 can be calibrated using a test gas for any of the gases shown in the characteristic, using the span setting procedure as described in Section 5.2.2

Note: the correct sensor type must be used to match the gas type.

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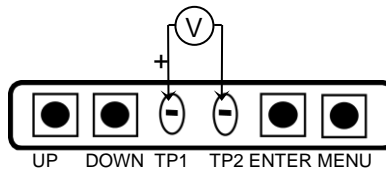
5 Calibration and Menu System

The recommended calibration interval is 6 months. Under no circumstances should it exceed 12 months.

Important

Whenever the menu system is entered the instrument will cease to indicate the gas levels that it detects to the control unit. However normal operation is always returned following a period of keypad inactivity (or when the menu system is exited).

In order to gain access to the calibration switches and test points, release the screw situated between the letters A and T of the chrome STATUS label on the Detector Head front panel. The screw does not need to be completely removed, only release it far enough so that the STATUS label can rotate revealing the calibration switches and test points. The buttons and test points are designated as follows:



The keypad has the following functionality:

Button	Function	Alternate Function
MENU	Open / Close Menu	PASSword
UP	Next / Increase	1
DOWN	Previous / Decrease	2
ENTER	Accept selection	3

Note:

Where possible, disable the channel at the control unit so that the calibration feature used does not cause an alarm condition to be indicated. Refer to control unit manufacturers' user manual for further details.

5.1.1 Calibration Gas Flow Rates

The infrared sensors are known to be sensitive to pressure transients and therefore it is important that the flow rate of gas into the sensor housing is not excessive during calibrations. Care must also be taken to ensure the exhaust from the sensor housing is not restricted. The recommended flow rate of calibration gases is 500 - 750cc/min.

5.2 Menu Mode Selection

The FGD3 uses a password system to restrict the end user from carrying out certain changes that may compromise the use of the equipment.

If the password system is enabled then the user only has access to calibrate the sensor and set the 4 - 20 mA without a password.

If the password system is disabled or the Engineer password is entered then complete access is allowed which gives the user access to every aspect of the system to be changed.

Note : The password is a pre-set six digit number which can be obtained from Status Scientific Controls Ltd.

Several calibration modes exist in the FGD3 and these are accessible via the instruments simple menu system. To select a calibration mode follow this procedure:

- Press the MENU button, either **PASS** or **C: 1** appears on the display. If **PASS** appears on the display then either press MENU again or the 6-digit password.
- Press UP or DOWN until the required menu option is displayed.
- Press ENTER to select the calibration mode.
- To exit the menu press MENU.

While the instrument is in menu mode – any data displayed on the screen will alternate between the menu number and the reading.

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The following features are available via the 'FGD3' menu system: -

Menu item	Function	Section
1	Zero Sensor	5.2.1
2	Span Sensor	5.2.2
3	Set FSD	5.2.3
4	Set 4mA loop current	5.2.4
5	Set 20mA loop current	5.2.5
6	Set Display mode	5.2.6
7	Display Firmware Version	5.2.7
8	Restore data	5.2.8
9	View Engineer/Diagnostic data	5.2.9
10	Sensor frequency	5.2.10
12	Set cross reference	5.2.11
19	Set Positive zero suppression	5.2.12
20	Set Negative zero suppression	5.2.13
25	Set zero temperature compensation	5.2.14
30	Password control	5.2.15
34	Set span temperature compensation	5.2.16
44	Set signal conditioning	5.2.19
46	Set response window	5.2.20

Note: Menu modes 1,2,4 & 5 are always available. The remaining menu items are under the password control. If the password is enabled then a valid password is required to gain access to the extra menu items, including the password menu.

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5.2.1 C: 1 - Zero Sensor

This is a calibration feature. It allows the instrument to determine the sensor output under zero gas conditions.

- Apply zero gas to the sensor inlet and allow enough time for the sensor to respond and all the gas to be purged (typically 2 minutes minimum dependent upon flow rate).
- Select menu mode **C: 1** (refer to section 5.2) and press ENTER.
- Press ENTER to perform the ZERO calibration. Pressing MENU instead of ENTER aborts the calibration (the ZERO factor will still be displayed on exit).
- Press MENU – the display will show the ZERO factor for the instrument before returning to its standard mode of operation.

The ZERO factor should be recorded on any calibration certificates completed.

Note: For Hydrocarbon sensors

If there is 0% Hydrocarbon gas present in the atmosphere then the instrument can be zeroed in air.

Note: For Carbon Dioxide sensors

There is Carbon Dioxide gas present in the atmosphere and as such zero gas must be applied before the instrument can be zeroed.

5.2.2 C: 2 - Span Sensor

This is a calibration feature. It allows the instrument to determine the sensor output when it is exposed to a known concentration of gas.

- Apply a known concentration of gas to the sensor inlet and allow enough time for the sensor to respond.
- Select menu mode **C: 2** (refer to section 5.2) and press ENTER.
- Using the UP and DOWN buttons, adjust the displayed reading so that it matches the calibration gas concentration.
- Press ENTER to perform the SPAN calibration. Pressing MENU instead of ENTER aborts the calibration (the SPAN factor will still be displayed on exit).
- Press MENU – the display will show the SPAN factor for the instrument before returning to its standard mode of operation.

The SPAN factor should be recorded on any calibration certificates completed.

5.2.2.1 Suggested calibration gas levels.

Hydrocarbon sensor: (refer to section 1)

20 to 50%LEL Methane
20 to 50%LEL Propane
20 to 50%LEL Pentane

Carbon Dioxide sensor

1 to 2% vol. Carbon Dioxide

5.2.2.2 Calibration Factors

During the ZERO sensor and SPAN sensor calibrations a factor is displayed that allows the calibration personnel to have confidence with their calibration.

The ideal ZERO and SPAN factors are as follows:-

Sensor	Factor	MIN	TYP	MAX
HC	Zero	TBA	1.850	TBA
HC (Pentane)	Span	TBA	0.660	TBA
HC (Methane)	Span	TBA	0.140	TBA

Carbon Dioxide	Zero	TBA	0.75	TBA
	Span	TBA	0.42	TBA

5.2.3 C: 3 - Select FSD

Menu mode **C: 3**

This option should only be used after advice from Status Scientific Controls. Changing this value will affect the 4 to 20mA output and possibly make the FGD3 unsuitable for its intended use.

5.2.4 C: 4 - Set 4mA Loop Current

This is a calibration feature. It allows the instrument to simulate a condition of zero gas so that the 4mA output can be set.

- Attach a multimeter (set to measure DC voltage) between test points TP1 and TP2.
- Select menu mode **C: 4** (refer to section 5.2) and press ENTER.
- Using the UP and DOWN buttons, adjust the reading displayed on the multimeter to $40\text{mV} \pm 0.5\text{mV}$
- Press ENTER to store the 4mA calibration data. Pressing MENU instead of ENTER aborts the feature.
- Press MENU – the display will show the DAC 4mA calibration factor for the instrument before returning to its standard mode of operation.

5.2.5 C: 5 - Set 20mA Loop Current

This is a calibration feature. It allows the instrument to simulate a condition of full-scale gas so that the 20mA output can be set. A control unit connected will indicate full-scale gas also and may enter its alarm state.

- Attach a multimeter (set to measure DC voltage) between test points TP1 and TP2.
- Select menu mode **C: 5** (refer to section 5.2) and press ENTER.
- Using the UP and DOWN buttons, adjust the reading displayed on the multimeter to $200\text{mV} \pm 0.5\text{mV}$
- Press ENTER. Pressing MENU instead of ENTER aborts the feature.
- Press MENU – the display will show the DAC 20mA calibration factor for the instrument before returning to its standard mode of operation.

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5.2.6 C: 6 - Display mode

This option is used to set the display to match the type of sensor fitted.

- Select menu mode **C: 6** (refer to section 5.2) and press ENTER.
- Use the UP and DOWN button to move the decimal point to the desired setting.
- Press ENTER. Pressing MENU instead of ENTER aborts the feature.
- Press MENU to return the instrument to its standard mode of operation.

Note: changing the decimal point will not result in a more accurate reading.

5.2.7 C: 7 - Display Firmware Version

This option is used to view the processor firmware version.

- Select menu mode **C: 7** (refer to section 5.2) and press ENTER.
- The display shows 9.3Ai.
- Press MENU to return the instrument to its standard mode of operation.

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5.2.8 C: 8 - Restore

The firmware for the detector head is common to both CO₂ and HC instruments. This feature allows the type of sensor fitted to be selected.

IMPORTANT

The instrument supplied with this manual has either an infrared HC sensor or an infrared CO₂ sensor installed.

Changing the setting within this menu will not change the gas to which the sensor is sensitive.

This menu option allows the sensor type to be selected. The available sensor options are listed below:

OPTION	TYPE	RANGE	COMMENTS
CH4L	Infrared	0-100%LEL	Methane
CH4t	Infrared	0-100%LEL	Methane
CH4H	Infrared	0-100%Vol	Methane
HC	Infrared	0-100%LEL	General hydro carbons
HCtC	Infrared	0-100%LEL	General hydro carbons
HCC	Infrared	0-100% LEL	General hydro carbons
HHC	Infrared	0-100% Vol	General hydro carbons
HHCC	Infrared	0-100% Vol	General hydro carbons
CO2L	Infrared	0-5%Vol	Carbon Dioxide
CO2t	Infrared	0-5%Vol	Carbon Dioxide
CO2H	Infrared	0-25%Vol	Carbon Dioxide
CO2P	Infrared	0-10000 ppm	Carbon Dioxide
ACET	Infrared	0-100%LEL	Acetone

The sensor type is selected as follows:

- From the menu system select menu option: **C: 8** and press ENTER.
- Using the NEXT and PREVIOUS buttons, select the required sensor.
- Press ENTER.

Note:

Pressing ENTER whilst in menu option **C: 8** will reset the factory defaults for the displayed sensor. A calibration must be performed even if the sensor type was not changed. Fault message 'F 6' will be displayed.

- Press MENU to close the menu system.

Note:

It is important that the sensor selected via this menu option corresponds to the sensor that is installed. Incorrect settings here may result in the inability of the instrument to detect gas.

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5.2.9 C: 9 - View Engineer/Diagnostics Data

This feature is a *view-only* feature. No configuration changes are possible from within this menu.

This information is for the use of Status Scientific Controls.

- Select menu mode **C: 9** (refer to section 5.2) and press ENTER.
- The display will alternate between the current value and code **C: 9x**: where x is:
 - 0 Sensor reading.
 - 1 Zero Calibration temperature, °C.
 - 2 Span Calibration Temperature °C.
 - 3 Sensor temperature, °C.
 - 4 Detector AtoD counts.
 - 5 Reference AtoD counts.
 - 6 Fractional absorbance.
- The mode of operation can be selected by pressing the UP button.
- Press MENU to return the instrument to its standard mode of operation.

5.2.10 C:10 - Sensor Frequency

This menu option is used by Status Scientific Controls personnel only and allows the frequency at which the infrared sensor bulb is flashed. This setting must not be changed from the factory set value without first contacting Status Scientific Controls.

Warning

Changing this value may limit the instruments performance and in extreme cases, the instrument may no longer detect gas.

5.2.11 C:12 - Cross Reference

This option is used to allow the user to calibrate the sensor with a commonly available gas (e.g. methane or propane) but use the unit to detect a different gas (e.g. methanol or acetone etc.). This is achieved by adjusting the cross-reference factor according to the difference in signal that is detected for the calibration gas compared to the target gas.

- From the menu system select menu option: **C: 12** and press ENTER.
- Using the INCREASE and DECREASE buttons, set the required cross-reference factor.
- Press ENTER to store the new value.
Note:
Pressing MENU rather than ENTER exits the cross-reference feature without saving any changes.
- Press MENU to close the menu system.

Infrared sensor

Target gas	Internal sensor setting	Calibration gas	Cross Reference Factor
Methane	CH4	Methane	1.00
Propane	HC	Propane	1.00
Toluene	CH4	Methane	1.30
Ethanol	HC	Propane	1.20
IPA	HC	Propane	1.72
Hexane	HC	Propane	1.00
Acetic Acid	CH4	Methane	2.00
Methanol	HC	Propane	1.00
Acetone	ACET	Acetone	1.00
Acetone	CH4	Methane	1.50

5.2.12 C: 19 - Positive Zero Suppression

This option is used to allow the user to suppress small amounts of positive sensor zero drift. The setting can be set between 0 and 10% of the sensor range as set by the FSD value.

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:19**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required zero suppression value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.13 C: 20 - Negative Zero Suppression

This option is used to allow the user to suppress small amounts of negative sensor zero drift. The setting can be set between 0 and 10% of the sensor range as set by the FSD value.

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:20**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required zero suppression value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.14 C: 25 – Positive Zero Temperature Compensation

This option is used to apply temperature compensation to the sensor, a zero value results in no applied compensation.

The value can be either positive or negative, depending upon the type of sensor fitted. The value is best selected by first calibrating the sensor at 20°C then raising the FGD3 to 50°C. When the temperature is stable, usually after 2 hours, the value is set such that an accurate zero reading is displayed.

Note: **changing this value from the factory setting may make the readings inaccurate – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:25**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required temperature compensation value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.15 C: 30 - Set Password

Use this menu option to enable / disable the password feature.
Place the FGD9 in the password menu as follows:

- Press the MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:30**
Note: if the password system is already enabled the user must enter the 6-digit password to get to this menu.
- Press ENTER.
- The display shows either **On** or **OFF**
- Press the UP button to select the desired setting.
- Press ENTER to accept the setting.
Note:
Pressing MENU instead of ENTER leaves the unit without change.
- Press MENU to return the instrument to its standard mode of operation.

Note: if the password is in operation then the user will be prompted with PASS when ever the menu key is pressed. Pressing the MENU key again will result in the restricted user access, i.e. only the zero and span options will be available. Entering the correct password will give access to the full menu facility.

5.2.16 C: 34 – Positive Span Temperature Compensation

This option is used to apply temperature compensation to the sensor, a zero value results in no applied compensation.

The value can be either positive or negative, depending upon the type of sensor fitted. The value is best selected by first calibrating the sensor at 20°C then raising the FGD3 to 50°C. When the temperature is stable, usually after 2 hours, the value is set such that an accurate gas reading is displayed.

Note: **changing this value from the factory setting may make the readings inaccurate – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:34**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required temperature compensation value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.17 C: 35 – Negative Zero Temperature Compensation

This option is used to apply temperature compensation to the sensor, a zero value results in no applied compensation.

The value can be either positive or negative, depending upon the type of sensor fitted. The value is best selected by first calibrating the sensor at 20°C then lowering the FGD3 to -10°C. When the temperature is stable, usually after 2 hours, the value is set such that an accurate zero reading is displayed.

Note: **changing this value from the factory setting may make the readings inaccurate – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:35**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required temperature compensation value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.18 C: 36 – Negative Span Temperature Compensation

This option is used to apply temperature compensation to the sensor, a zero value results in no applied compensation.

The value can be either positive or negative, depending upon the type of sensor fitted. The value is best selected by first calibrating the sensor at 20°C then lowering the FGD3 to -10°C. When the temperature is stable, usually after 2 hours, the value is set such that an accurate gas reading is displayed.

Note: **changing this value from the factory setting may make the readings inaccurate – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:36**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required temperature compensation value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.19 C: 44 - Signal conditioning

This option is used to apply averaging to the sensor output. This option is available so that the FGD3 can be set for optimum response time while maintaining a stable reading.

The value can be increased to obtain stable readings at the expense of increasing the time taken to read gas.

Note: **changing this value from the factory setting may make the readings unstable – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:44**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required averaging value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.

5.2.20 C: 46 – Response window

This option is used in conjunction with the averaging values. This option is available so that the FGD3 can be set for optimum response time.

The value can be increased to obtain a quicker response to gas at the expense of decreasing the gas readings stability.

Note: **changing this value from the factory setting may make the readings unstable – consult Status Scientific Controls Ltd before making any changes.**

- Press MENU to open the menu system.
- Using the NEXT and PREVIOUS buttons, select menu option: **C:46**
- Press ENTER.
- Using the INCREASE and DECREASE buttons, set the required averaging value.
- Press ENTER to store the new value.
Note: Pressing the MENU button rather than the ENTER button exits without any change.
- Press MENU to close the menu system.



5.3 FGD3 Head Indications

The FGD3 Infrared Detector Head will flash 'F xx' if fault is detected. This will coincide with the head drawing a current of less than 2.0mA from the control unit, thus ensuring the control unit is aware of the fault condition.

Note: xx is a number that defines a particular fault as follows:

- 1 Checksum error.
- 2 Zero calibration error.
- 4 Span calibration error.
- 8 Sensor reference low output.
- 16 Sensor reference high output.
- 32 Sensor detector low output.
- 64 Sensor detector high output.

When multiple fault conditions occur the xx is the combination of the above fault numbers, e.g. 'F 6' indicates that the FGD3 requires both a zero gas and span gas calibration.

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5.4 Sensor Replacement

Sensor replacement should only be performed by Status Scientific Controls field service personnel, or a trained engineer. Consult Status Scientific Controls for further details.

Following sensor replacement:-

- The sensors electronics must be set-up.
- A full calibration must be performed, (refer to section 5)

5.4.1 Sensor Electronics Verification.

Select menu mode **C:9** (refer to section 5.2.9)

Select engineer code C:9 - 3 and verify that the sensor temperature is approximately 7°C above ambient, @ 25 °C.

Select engineer code C:9 - 4 and verify that the detector output corresponds with the table below.

Select engineer code C:9 - 5 and verify that the reference output corresponds with the table below.

SENSOR		MIN	TYP	MAX
HC	Ref.	TBA	400	TBA
	Det.	TBA	700	TBA
Carbon Dioxide	Ref.	750	800	850
	Det.	550	600	650

Note:

- 1) The sensor must be powered for at least 10 minutes before any readings are taken.
- 2) The sensors must be in zero gas.



6 Trouble Shooting

The FGD3 Infrared detectors have been extensively tested and have been found to provide reliable monitoring of target gas levels.

Problems encountered by customers are usually found to be caused by:

- Failure to adhere to recommended calibration intervals.
- Failure to use Nitrogen for ZERO calibrations, or insufficient purge times allowed.
- Sensor aperture obstructions
- Incorrect control unit configuration.
- Power supply requirements not met.
- Instrument raising alarms and considered faulty - but found to be responding correctly to the gas concentration that it is detecting.

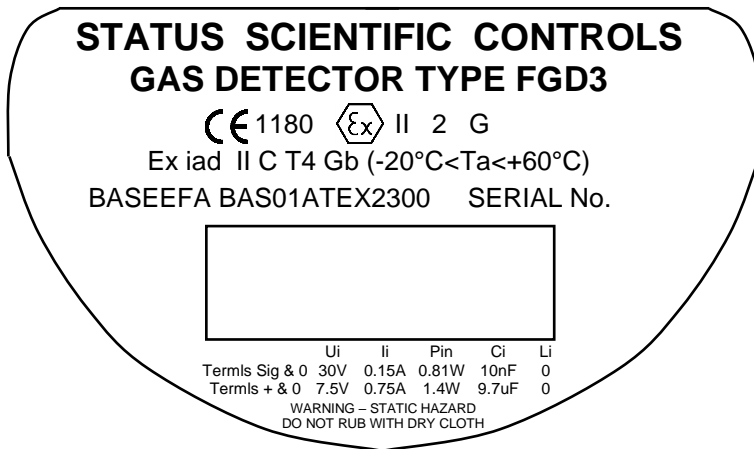
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FGD3 Infrared Gas Detector Heads



7 Certification

The FGD3 infrared gas detector carries the following markings:



Note – Equipment manufactured before 10.08.2012. has the following certification coding on line 4 the above label:-

EEx iad II C T4 (-20°C < Ta < +60°C)

8 Specification

Size	122 x 142 x 75mm nominal	
Sensor Type	NDIR Infrared, temperature compensated, dual element	
Sensor MTBF	10 years	
Operating voltage	8.0 – 28V DC	(for 4-20mA Signal)
	5.8 – 7.5V DC	(for Sensor supply)
Operating Temperature	-20°C to +60°C (-4°F to 140°F)	
Storage Temperature	-20°C to +60°C (-4°F to 140°F)	
Humidity range	0-95% RH non-condensing	
Operating pressure	Ambient ± 10%	
Cable loop resistance	Signal	480 Ohms at nominal 20v
	Sensor	41 Ohms at 8.0V DC
Degree of protection	IP65	

8.1 Hydrocarbon

Measurement range	0-100% LEL
Response Time	T ₉₀ <30 sec (methane, 50% LEL)
Measurement Resolution	1% LEL

Note: 100% LEL is based on the following:

Gas	%v/v
Methane	5.0
Propane	2.0
Pentane	1.4

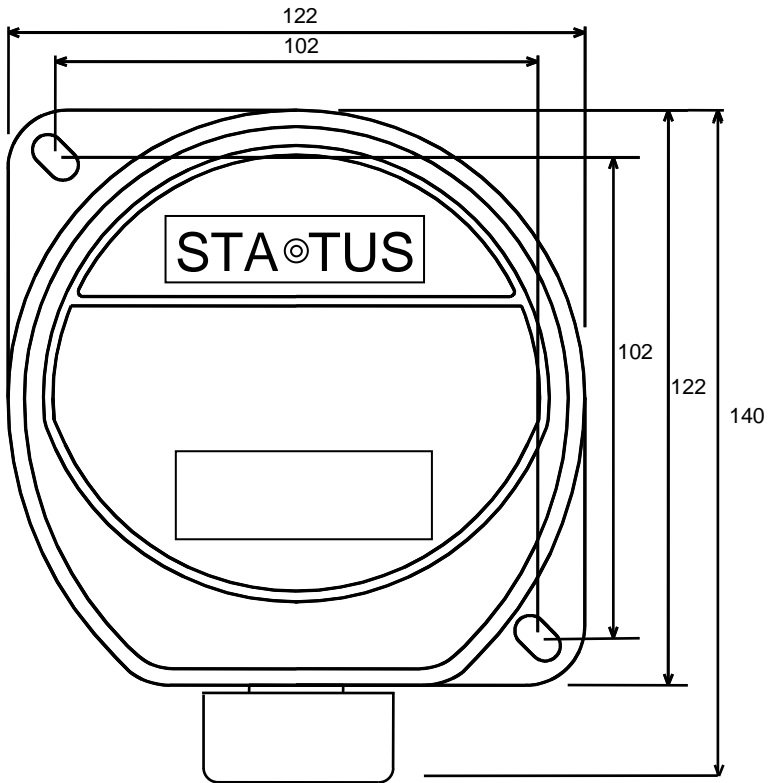
8.2 Carbon Dioxide low range

Measurement range	0-5% Vol.
Response Time	T ₉₀ <40 sec
Measurement Resolution	0.1% Vol.

8.3 Carbon Dioxide high range

Measurement range	0-100% Vol.
Response Time	T ₉₀ <60 sec
Measurement Resolution	1% Vol.

9 Outline Dimensions



Depth = 75mm