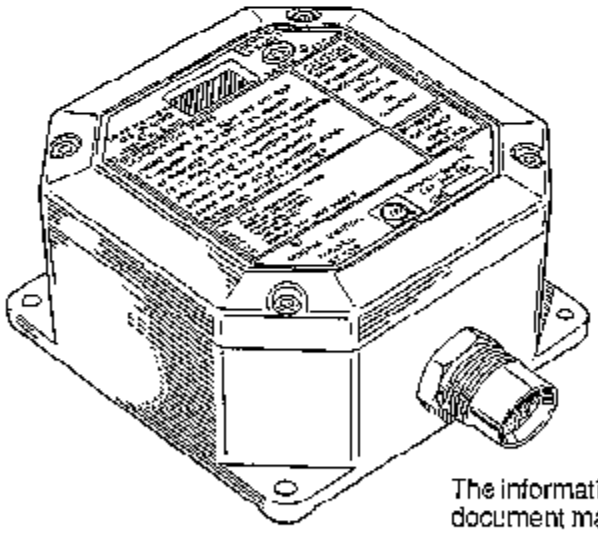
Model ST210
Hydrogen Sulphide Analogue Sensor



Instruction Manual

Part No. 710-040
Rev. C

Warning

1. This instrument should be calibrated at least every 90 days. See sub-section 4-1.
2. Take note of sub-section 3-4 Sensor Poisons.
3. Install and maintain all hazardous area equipment in accordance with the relevant regulations and practices of the country concerned. See Section 3 - Installation.
4. The S-Tec must be protected by an in line 500mA quick acting fuse in the 24VDC supply line. This is necessary to fully comply with approval requirements and good installation practice.

Warranty

General Monitors warrants all of its products to be free from defects in workmanship or material under normal use and service within the periods specified in the individual data sheets.

General Monitors will repair or replace without charge any equipment found to be defective during the warranty period.

Full determination of the nature and responsibility for defective or damaged equipment will be made by General Monitors personnel.

Defective or damaged equipment must be shipped prepaid to the General Monitors plant or distributor from which shipment was made.

Gas detection elements which have been poisoned by contaminants are not included in this warranty.

In all cases this warranty is limited to the cost of the equipment supplied by General Monitors.

The customer will assume all liability for the misuse of the said equipment by its employees or other personnel.

CONTENTS

Section 1 Introduction
Section 2 Specification
Section 3 Installation
Section 4 Operating Instructions
Section 5 Maintenance
Section 6 Trouble Shooting
Section 7 Ancillary Equipment

Section 1
Introduction

	Sub-section
General Description	1-1
Principle of Operation	1-2
Description of Components	1-3
Terminations	1-4
Hydrogen Sulphide Sensor with Integral Temperature Control	1-5
User Information Drawing	1-5

Introduction

1-1 General Description

The General Monitors Model ST210 Analogue Sensor is a self contained, microprocessor controlled Hydrogen Sulphide gas monitor with integral digital readout. It is connected to the user's indicating and shut-down equipment by means of a three-conductor screened cable. The unit draws its 24V (nominal) power from two of the cables conductors and signals gas levels by means of a 4-20mA ground referenced signal on the third conductor.

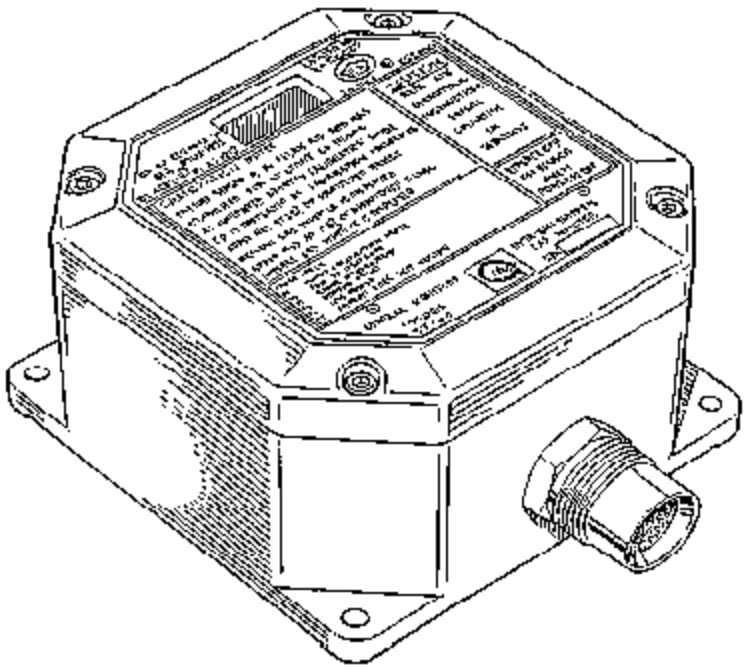
No user-adjustments are required. Calibration values are stored in internal memory. The entire electronics module is fully encapsulated in compliance with international standards.

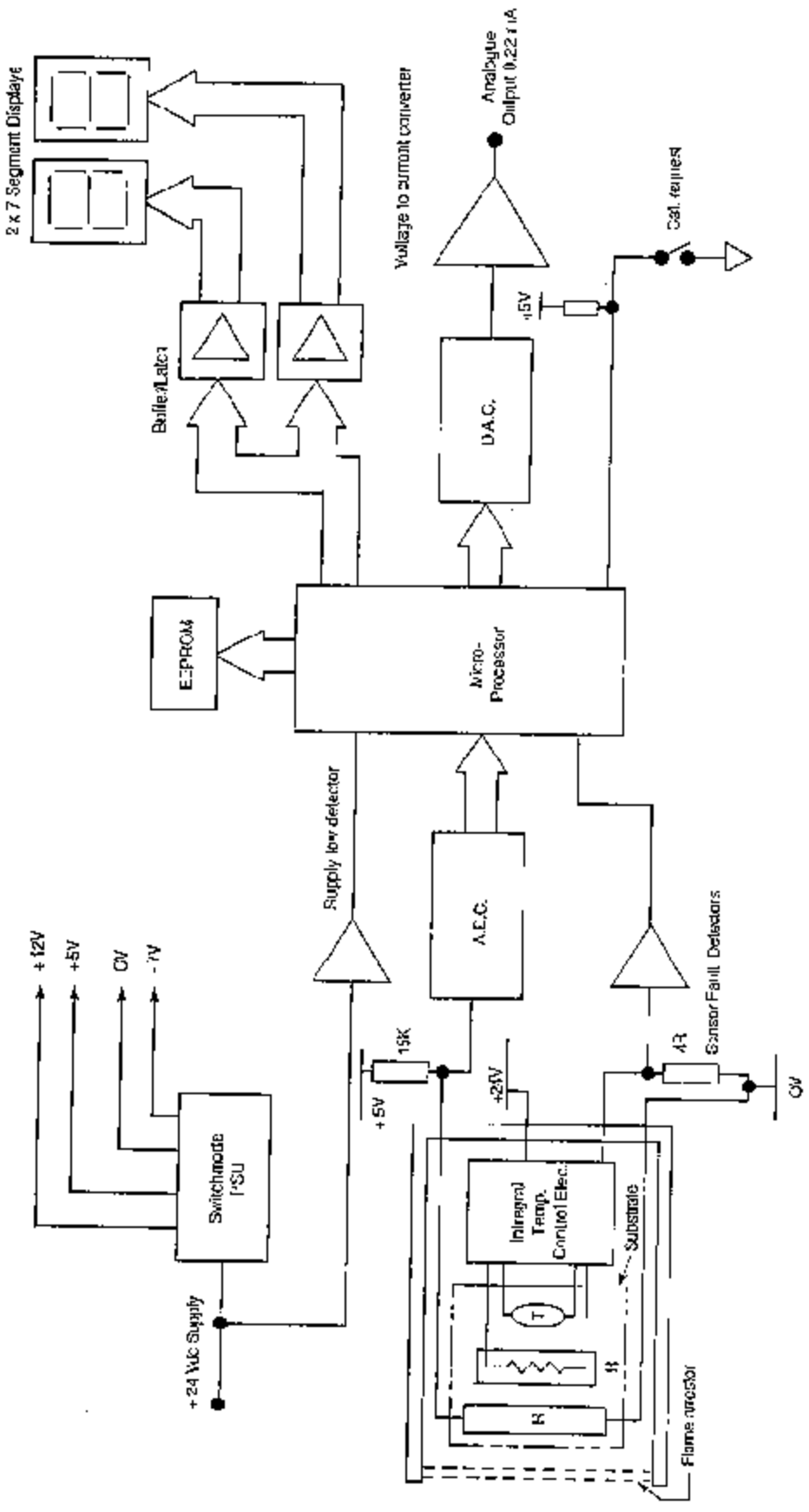
The unit is power efficient, consuming only 3.5 watts typically.

The accuracy of the instrument depends upon routine re-calibration which should be carried out at least every 90 days. This procedure is simple and may be carried out by one person aided by prompts from the unit's digital display. Calibration may be completed in 5 minutes (approximately) by unskilled personnel. Calibration parameters are tested by the unit's advanced software before being accepted. Any errors detected are displayed on the unit's digital readout by means of an appropriate fault code. Abridged user instructions and fault code information are included on the decal affixed to the front of the assembly.

The Model ST210 is designed to measure and display concentrations of Hydrogen Sulphide in three ranges: 0 to 20 ppm, 0 to 50 ppm and 0 to 100 ppm.

General Monitors is recognised as a leader in the field of gas detection and a dedicated team of experts is always available to provide advice or service as required.




2 x 7 Segment Displays
Voltage to current converter
Analogue Output 0-22 mA
Cal. resistor
+5V
Latch/Buffer
D.A.C.
EEPROM
Micro-Processor
Supply low detector
A.E.C.
Sensor Fault Detectors
+12V
+5V
0V
-7V
15K
+5V
+24V
4R
0V
Switchmode PSU
+24 Vdc Supply
Integral Temp. Control Elec.
Substrate
T
R
Flame resistor

1-2 Principle of Operation

The sensor is a solid state, adsorption, diffusion type element. It utilises Hydrogen Sulphide's ability to strongly adsorb onto a very selective proprietary metal oxide semi-conductor 'R' as the basis for measurement.

The semi-conductor is located on a substrate which is temperature controlled by the integral sensor electronic circuitry using heater 'H' and thermistor 'T'.

When air containing Hydrogen Sulphide diffuses into the sensor through the flame arrestor it causes the electrical resistance of the semi-conductor 'R' to decrease. This change in resistance is repeatable and reversible, so that when pure air enters the sensor the semi-conductor resistance returns to its clean-air value.

Because the relationship between Hydrogen Sulphide gas concentration and semi-conductor resistance is non-linear, the ST210 microprocessor program incorporates a linearising routine before the 4-20mA Analogue Output signal is generated.

The ST210 is placed in AUTO CALIBRATE mode by positioning a magnet over the General Monitors logo until '– –' is displayed. This indicates the magnet has been positioned correctly. After approximately 9 seconds 'AC' is displayed. This causes the unit to enter a special calibration routine and the Analogue Output drops to 1.5mA. Hydrogen Sulphide is then applied first at 20% FSD (full scale deflection) until 'LC' is displayed (for LOW COMPLETE). Then Hydrogen Sulphide is applied at 100% FSD until 'CC' is displayed (for CALIBRATION COMPLETE). The entire calibration process may be carried out by one person.

The ST210 monitors supply voltage and sensor heater status. In the event of a heater fault or the supply voltage drooping below 15V, the Analogue Output is dropped to 0mA and a relevant fault code is displayed. (See Section 6). During calibration the various parameters are validated before they are written to non-volatile memory (EEPROM). When written they are then verified to ensure that the EEPROM has accepted the correct values. Any failure in the verification or validation cycles results in an Analogue Output signal of 0mA and the relevant fault code being displayed. (See Section 6).

The unit responds to concentrations of Hydrogen Sulphide in excess of 100% FSD by raising the Analogue Output to 22mA and flashing '99' on the display.

To enable all ranges to be covered by one unit, the ST210 firmware incorporates a range re-programming routine. This routine is entered by keeping the magnet in place over the General Monitors logo for a further ten seconds after 'AC' is displayed until 'PE' is displayed (for PROGRAM - MODE ENABLE). The magnet is then removed and the display cycles through the sequence: ...PE, –1, PE, –5, PE, –9, PE.... where '–1', '–5' and '–9' represent 100, 50 and 20 ppm full scale gas concentrations. Selection of the required range is accomplished by re-applying the magnet over the Logo whilst the appropriate digit is being displayed.

Before the Calibration Mode is entered, a Calibration Test mode is available. This mode is entered by placing the magnet over the Logo until the '– –' display begins to flash. Removing the magnet will result in the gas concentration at the sensor being displayed but flashing with the Analogue Output remaining at 1.5mA.

1-3 Description of Components

Item		Note
1	Encapsulated Electronics module	
2	Housing	
3	Earth Continuity Plate	
4	Sensor Assemblies	1
5	Sensor Accessories	2
6	Sensor locknut	
7	Sealing O-ring	
8	Earth Terminal	
9	Terminal Blocks	
10	Instruction Manual, (P/N 710-048)	
11	Calibration Equipment	2

Notes: 1 - Refer to sub-section 1-5
2 - Refer Section 7

Please consult your General Monitors representative for information and advice on special requirements.

1-4 Terminations

The wires emerging from the electronics module are colour coded as follows:

1	Black	Sensor –	Heater return
2	Red	Sensor –	Response element + ve
3	White	Sensor –	Heater + ve supply
4	Brown	+24VDC	Supply
5	Yellow	Analogue Output –	Output signal from ST210
6	Blue	0V Common –	Common for A.O. and supply
7	Green	Sensor –	Response element –ve

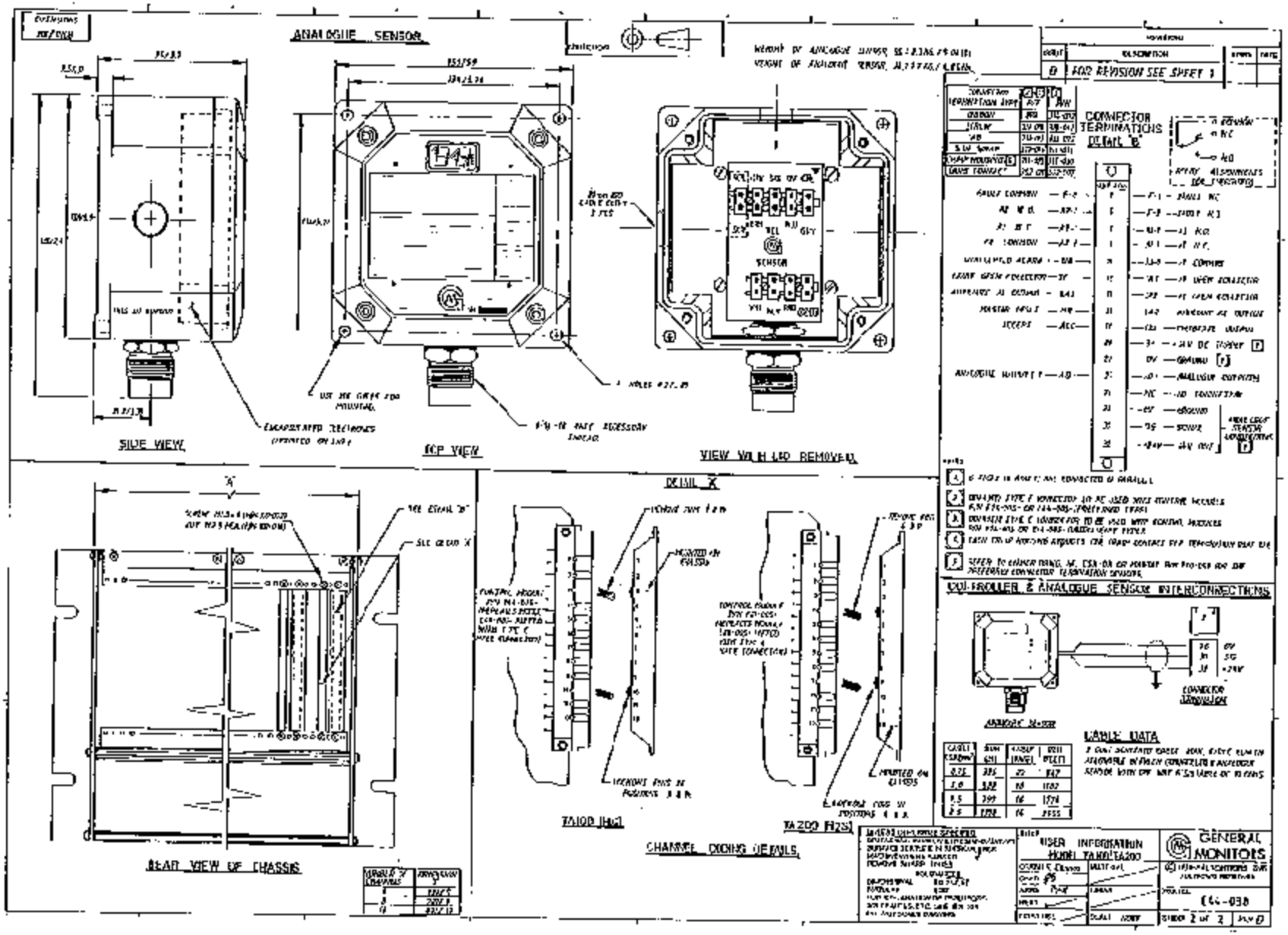
1-5 Hydrogen Sulphide Sensor with Integral Temperature Control

P/N 50454
Standard Hydrogen Sulphide aluminium bodied sensor

P/N 50457
Standard Hydrogen Sulphide stainless steel bodied sensor

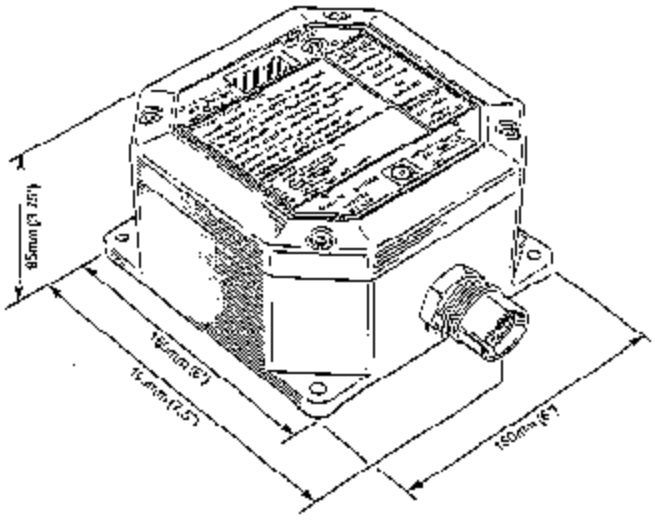
Sensor Ranges:
The above sensors are marked with a dash number to indicate their ranges

Dash Number	Range (ppm Hydrogen Sulphide)
–1	0 – 100
–5	0 – 50
–9	0 – 20


ANALOGUE SENSOR
SIDE VIEW
TOP VIEW
VIEW WITH LID REMOVED
REAR VIEW OF CHASSIS
DETAIL 'X'
TA100 [Hot]
TA200 [Hot]
CHANNEL ORDING DETAILS
CONNECTOR TERMINATIONS
Part 'B'
CONTROLLER & ANALOGUE SENSOR INTERCONNECTIONS
CABLE DATA
RISER INFORMATION
MODEL TA100/TA200
GENERAL MONITORS
644-038

Section 2
Specification

	Sub-section
System specification	2-1
Mechanical Specification	2-2
Environmental Specification	2-3
Electrical Specification	2-4



Specification

System Specification

Sensor type:	Continuous, diffusion, adsorption type
Specificity:	Hydrogen sulphide gas
Built to conform to the requirements of:	
Australian standards:	AS 1593-1982; AS2275, Pt1 - 1979
British standards:	BS 5501 Part 6; 1972
Other standards:	EN50.019, SFA 3009: 1972 Exs e IIB + H2T4 ISA SP12.15 Pt. 1 performance standards for H2S detection instruments
Measuring Range:	0-20, 0-50 or 0-100ppm
Accuracy:	± 2ppm or 10% of applied gas, whichever is greater
Temperature variation:	± 4ppm or 10% of applied gas, whichever is greater over −10°C to + 50°C temperature range
Long term stability:	± 4 ppm or 10% of applied gas, whichever is greater over a 21 day time period
Response time:	T50 ≤ 60 seconds for wire screen flame arrestors and 2 minutes for sintered flame arrestors
Humidity variation:	± 4 ppm or 10% of applied gas, whichever is greater over 15 to 90% RH at ambient temperature

Environmental Specifications

Operating temperature:	−40°C to + 66°C
Humidity range:	0 - 99% RH (non-condensing)
Storage temperature:	−55°C to 85°C

Electrical Specifications

Supply voltage:	20 - 32 VDC
Power consumption:	4.4 watts max. (typically 3.5 watts)
Analogue output:	0 - 22mA (4-20 mA FSD)
Analogue output load:	0 to 300 ohms
Lead length:	**Output Signal:** 9000 feet (3000 metres) max Total loop resistance - 300ohms **Remote Power Supply:** 1500 feet (500 metres) max 10 ohms loop resistance using 16 AWG cable and 24 VDC minimum

Section 3
Installation

	Sub-section
On receipt of your Equipment	3-1
Unit Installation	3-2
Unit Location	3-3
Sensor Poisons	3-4
Electrical Connections	3-5
Initial Power-up	3-6

Installation

3-1 On receipt of your Equipment

All items of equipment shipped by General Monitors are pre-packed in stout containers and enclosed in a shock absorbing filling which affords a considerable degree of protection against physical damage. The contents should be carefully removed and checked against the enclosed packing slip.

Any discrepancies between the contents and the packing slip must be reported to General Monitors within 10 days of receipt of the shipment. General Monitors cannot be held responsible for shortages not reported within this period.

Damage to the contents of a shipment should be brought to the attention of the carrier immediately and a claim filed.

All subsequent correspondence with General Monitors must specify the equipment part numbers and serial numbers.

3-2 Unit Installation

The Model ST210 should be mounted in accordance with the relevant regulations and practices of the country concerned. The mounting should be as free from shock and vibration as possible and must be accessible for calibration purposes using a FIELD CALIBRATOR, (see Sub-section 7-7).

The ST210 should be mounted with the sensor pointing downwards so as to avoid the accumulation of moisture and particulate deposits.

Under no circumstances must a sensor be connected to or disconnected from an instrument which is powered up. This will seriously damage or destroy the sensor. Sensors damaged in this manner are not covered under warranty.

Various sensor accessories are available to minimise the effects of rain, wind and particulate matter. Refer to Section 8 – Ancillary Equipment.

3-3 Unit Location

Due to the many variables involved, there are no hard and fast rules defining the optimum location for the unit. The following suggestions should however, be borne in mind.

1 Ensure that the location is accessible for calibration purposes and that sufficient clearance exists to allow the use of the FIELD CALIBRATOR (P/N CC0-C00).

2 Locate the ST210 where prevailing air currents contain the maximum concentration of gas.

3 Consider how the gas will disperse. Generally, the ST210 should not be located too far away from a potential leak point. Remember that Hydrogen Sulphide is heavier than air but do not rely on this property when selecting a sensor position.

4 Observe the temperature limitations quoted for the ST210. If a sampling or pre-conditioning system is to be employed, always ensure that vapours will not condense in the piping of the system.

3-4 Sensor Poisons

Sensors may be adversely affected by prolonged exposure to certain atmospheres. These in the main are chemical poisons although other substances such as silicones coat the sensor element, thus rendering it insensitive to Hydrogen Sulphide gas.

Such loss of sensitivity may be gradual, if the poisons are present in very low concentrations, or rapid in the event of large concentrations of poisons being present.

The more important poisons are:

Halides:	Compounds containing fluorine, chlorine, bromine and iodine
Glycol, Sulphur, Heavy Metals:	e.g. Tetraethyl lead

Strong oxidising agents

Silicones contained in grease or aerosols, are the most common 'coating' agents, which are not true sensor poisons, but reduce sensor response.

Other materials which have a deleterious effect include mineral acid vapours and caustic vapours which attack the sensor physically.

The presence of such poisons and damaging vapours does not imply that the adsorption type sensor may not be used in these locations. A careful analysis of ambient air conditions should be undertaken and the customer should be aware that sensor calibration may need to be repeated at shorter intervals.

3-5 Electrical Connections

The ST210 may be powered from any suitable 24VDC supply or from the General Monitors Trip Amplifier (Model TA200).

The ST210 must be protected by an in-line 500mA Char 'T' fuse in the 24VDC supply line. This is necessary to fully comply with approval requirements and good installation practice.

The + 24 VDC supply line is connected to the Exe terminal block opposite to the BROWN lead from the encapsulated module.

The 0V common line is connected to the Exe terminal block opposite to the BLUE lead from the encapsulated module.

The Signal line is connected to the Exe terminal block opposite to the YELLOW lead from the encapsulated module.

NOTE; The maximum line resistance permitted with the ST210 is 10 ohms per line.

The other Exe terminal block accommodates the sensor BLACK, RED and WHITE leads and these should not be disturbed except when replacing the sensor.

The grey (CAL) connection is not used on the ST210.

For applications where the sensor is mounted remotely from the transmitter, the screens of the sensor cable and transmitter cable may be commoned on the 'SCR' terminal block. There must be no electrical connection between the screen and the ST210 electronics.

The above connections are shown on the internal label.

3-6 Initial Power-up

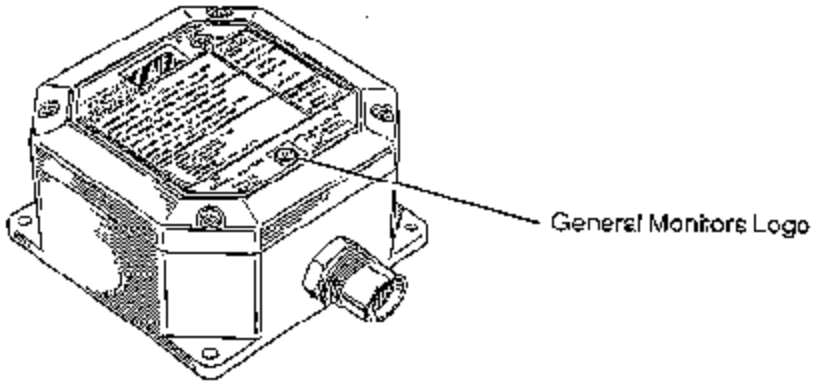
When all wiring has been completed and checked, the system may be powered-up.

The unit should then be allowed to stabilise for 24 hours. The display should read '0' if there is no Hydrogen Sulphide gas present at the sensor.

If the above does not occur then refer to the Trouble Shooting, Section 6 for an explanation of the Fault Codes.

Section 4
Operating Instructions

	Sub-section
Calibration	4-1
Calibration Check	4-2



Operating Instructions

The General Monitors Model ST210 will normally be mounted in the hazardous environment and communicate with the control room over a three-conductor screened cable.

4-1 Calibration

Calibration is extremely simple and may be carried out as follows:

1 Ensure that the ST210 has stabilised for at least 24 hours, and that there is no Hydrogen Sulphide gas present at the sensor. If background levels of Hydrogen Sulphide are suspected, the sensor should be purged with clean air before calibrating the unit.

2 Place the magnet over the General Monitors logo until '– –' is displayed. This indicates that the magnet has been positioned correctly. 'AC' is displayed after 9 seconds.

'AC' = AUTO-CALIBRATION

3 'PE' = Program-mode Enable

This mode is entered to enable the range to be reprogrammed to suit the sensor being used, i.e. -1, -5, or -9. This mode is entered by positioning the magnet over the General Monitors logo after 'AC' is displayed for a further 10 seconds. 'PE' is then displayed and the magnet is then removed. When the required range code appears on the display it is elected by applying the magnet over the logo again.

'-1' Applying the magnet when '-1' is displayed selects 100ppm range
'-5' Applying the magnet when '-5' is displayed selects 50ppm range
'-9' Applying the magnet when '-9' is displayed selects 20ppm range

4 Put an ampoule corresponding to 20% FSD (± 10%) Hydrogen Sulphide concentration into a General Monitors Field Calibrator and place the calibrator over the sensor on the ST210. Ensure that it is a snug fit. Tighten the breaker until the ampoule shatters. The display will change to 'CP' (CALIBRATION IN PROGRESS) when the instrument responds to the rising gas concentration. Wait until the display reads 'LC' (LOW COMPLETE).

5 Remove the field calibrator from the sensor and discard all glass fragments.

6 Put an ampoule corresponding to 100% FSD (± 10%) Hydrogen Sulphide concentration into the Field Calibrator and place the calibrator over the sensor on the ST210. Ensure that it is a snug fit. Tighten the breaker until the ampoule shatters. After a short period the display should change to 'CP' (CALIBRATION IN PROGRESS). Wait until the display reads 'CC' (CALIBRATION COMPLETE).

7 Remove the field calibrator and discard all glass fragments.

8 As the gas disperses from the sensor, the ST210 will leave CALIBRATION MODE and return to a normal monitoring condition. The display should read '0' when the calibration gas has dispersed.

9 If the above does not occur as described and a different code is displayed, refer to the TROUBLE SHOOTING section for assistance.

4-2 Calibration Check

1 Position the magnet over the General Monitors logo. The symbol '– –' will be displayed for three seconds and then will begin to flash.

2 Remove the magnet and the display will now flash the gas concentration at the sensor. The Analogue Output will be held at 1.5mA regardless of gas concentration at the sensor.

3 If gas is not applied within six minutes the Analogue Output will fall to 0mA and the display will read 'F2'. To recover from this position, replace the magnet over the logo and repeat steps 1 and 2 and proceed to step 4 within the timeout period.

4 Place an ampoule corresponding to 50% of full scale gas concentration in the field calibrator. Place the field calibrator in position on the sensor. Rotate the breaker screw in a clockwise direction to shatter the ampoule and observe that the gas reading settles at 50% (±10% FSD PLUS ampoule tolerance of 15% of nominal value). Should the final response fall outside the above limits, a full calibration is required. (See sub-section 4-1).

5 The display will continue to flash and the Analogue Output will remain at 1.5mA until the gas has been removed and the level at the sensor drops below 3% FSD. Normal monitoring will then be resumed, i.e. the display will give a steady reading and the Analogue Output will follow the gas concentration at the sensor.

Section 5
Maintenance

	Sub-section
Maintenance	5-1
Storage	5-2

Maintenance

5-1 Maintenance

Once correctly installed, systems require very little maintenance other than ROUTINE RE-CALIBRATION (see Sub-section 4-1) and periodic inspection.

Sensor heads exposed to the elements may require a little grease on the accessory mounting threads occasionally. The grease used must be free from silicones, (Refer Sub-section 3-4 SENSOR POISONS), and have a high melting point. Alternatively, P.T.F.E. tape may be used.

The removal of particulate matter from sensor accessories may be facilitated by the use of an appropriate halogen-free solvent. Water or ethanol are examp es of suitable solvents. The accessories should be thoroughly dried with compressed air, if necessary, before refitting to the sensor body.

General Monitors strongly recommends that the complete system, including all alarm circuitry, be tested at least annually and that the following checks be incorporated.

CHECK

1 All ST210 units for effectiveness of mounting positions so that modifications to plant layout have not affected this.
2 Security of mounting of ST210 units.
3 Sensor flame arrestors for clogging due to water, oil, dust or paint.
4 Sensor accessories, where fitted.
5 Condition and fastening of cables.
6 Connections for tightness and damage.
7 Cooling air filters, where fitted. Ensure that replacement filters are clean and dry.
8 Operation of complete system on stand-by supplies, where fitted, for the full prescribed time.

5-2 Storage

Electronic modules should be stored in a clean dry area and within the temperature range quoted in the Specification (Refer to Section 2).

When prolonged storage is anticipated, modules should be sealed, together with a desiccant, into plastic bags and double wrapped for protection.

Hydrogen Sulphide Sensors should be stored as above, but note that the RED CAP supplied with the Sensor should be in position throughout the storage period.

Section 6
Trouble Shooting

	Sub-section
Fault Codes and Checks	6-1

Trouble Shooting

REPAIRS TO THE ELECTRONICS MODULE SHOULD ONLY BE UNDERTAKEN BY GENERAL MONITORS PERSONNEL OR AUTHORISED REPRESENTATIVES. UNAUTHORISED INTERFERENCE WITH THE ELECTRONICS MODULE MAY INVALIDATE THE WARRANTY AND CERTIFICATION.

6-1 Fault Codes and Checks

'F1' = Invalid Calibration Range
This fault will occur if the unit cannot plot a valid response curve due to any of the following:

1 The H2S applied to the sensor does not correspond to 20% and 100% FSD
2 Incorrect sensor type (see sub-section 1-5)
3 Sensor fault

'F2' = Fail to calibrate
Latches until magnet is placed over the General Monitors logo.

This fault will occur if the unit is put into either calibration or test modes but no Hydrogen Sulphide gas has been applied within six minutes.

'F3' = Range insufficient
Latches until magnet is placed over the General Monitors logo.

This fault may occur during calibration for either of the following reasons:

Low Gas	If the gas concentrations applied to the unit do not give sufficient response to enable a smooth curve to be plotted.
ACTION	Use correct gas concentrations i.e. 20% FSD and 100% FSD.
Bad sensor	If the sensor response has gone below an acceptable level
ACTION	Replace sensor

'F4' = Sensor heater not pulsing
Latches until power-down.

This fault occurs if:
a The sensor heater circuit goes open circuit, or
b The sensor heater locks on continually

ACTION	Check BLACK and WHITE wires or replace sensor

'F6' = Power low
This fault occurs if the supply voltage between the BROWN and BLUE leads drops below 15V DC approximately. Ensure that supply is at least 20V DC. Remember that with long supply leads, a considerable voltage drop may occur due to the electrical resistance of these leads. The maximum resistance per lead is 10 ohms.

ACTION	Correcting fault restores normal monitoring

'F7' = EEPROM fails to verify
This fault occurs during calibration when an attempt to verify the calibration parameters just written to non-volatile memory fails. The usual cause of this is electrical interference corrupting the data. (On rare occasions it may indicate a problem within the electronics module).

ACTION	Place the magnet over the General Monitors logo and the unit will attempt another EEPROM write and verify.

Other Display Codes

'AC' = Auto Calibrate
This mode is entered if the magnet is placed over the General Monitors logo for more than nine seconds. The ST210 is awaiting gas to be applied to the sensor.

'– –'
Indicates that the magnet has been correctly positioned over the General Monitors logo.

'– –' Flashing
Calibration test mode may be entered by removing the magnet while '– –' is flashing.

'CP' = Calibration in Progress
This indicates that gas has been detected and the unit is now waiting for the sensor response to stabilise.

'LC' = Low Calibration Complete
This indicates that the 20% FSD gas level has stabilised and the unit is now awaiting the application of 100% FSD gas.

'CC' = Calibration Completed
This indicates that the 100% FSD reading from the sensor has now stabilised and valid calibration values have been recorded, verified and stored in non-volatile memory. In addition the range parameter has been stored in non-volatile memory if it was changed during the calibration.

'99' (flashing) = Overrange
A concentration of Hydrogen Sulphide in excess of 100% FSD has been detected.

Numbers between 0 and FSD indicate Hydrogen Sulphide in ppm at the sensor.

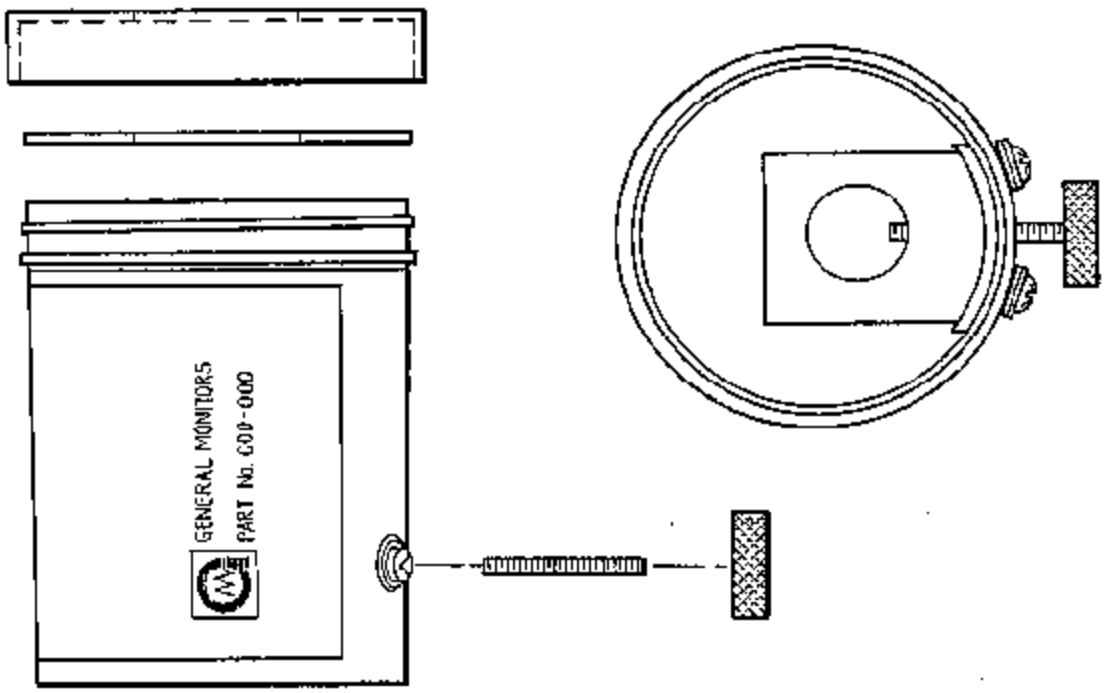
Numbers between 0 and FSD flashing, indicate Hydrogen Sulphide in ppm at the sensor but with the Analogue Output held at 1.5mA.

'PE' = Program mode enable
This mode is entered to enable the range to be reprogrammed to suit the sensor being used, i.e. –1, –5, or –9. This mode is entered by positioning the magnet over the General Monitors logo after 'AC' is displayed for a further 10 seconds. 'PE' is then displayed and the magnet is then removed. When the required range code appears on the display, it is selected by applying the magnet over the Logo again.

'–1' Applying the magnet when '–1' is displayed selects 100 ppm range
'–5' Applying the magnet when '–5' is displayed selects 50 ppm range
'–9' Applying the magnet when '–9' is displayed selects 20 ppm range

Section 7
Ancillary Equipment

	Sub-section
Dust guard assembly	7-1
Sintered stainless steel dust guard	7-2
Splash guard	7-3
Sensor flow chamber	7-4
Duct mounting plate	7-5
Field calibrator	7-6
Ampoules of Hydrogen Sulphide	7-7



H_2S FIELD CALIBRATOR

7-6 Field Calibrator (P/N C00-000)

The General Monitors Field Calibrator provides a simple and efficient means of calibrating H2S sensors in the field.

It consists of a plastic jar fitted with a removable lid and a seal which fits snugly over the sensor cap. An integral aluminium block with external thumb screw performs the dual functions of retaining and breaking replaceable glass ampoules.

Operating Instructions

a Ensure that the calibrator is clean and dry and that all fragments of broken glass have been removed.

b Insert an ampoule of the desired concentration into the hole in the aluminium block, with its base resting on the bottom of the jar. Replace lid and seal.

c Place calibrator in position on sensor. If a background gas level is suspected, purge the calibrator with clean air and seal the opening in the lid until just before the calibrator is slipped onto the sensor.

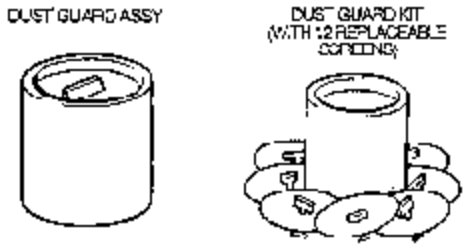
d Screw thumb screw until ampoule shatters.

e Leave the calibrator in position until either 'LC' or 'CC' is displayed.

f Remove the calibrator and dispose of the glass fragments safely.

Ancillary Equipment

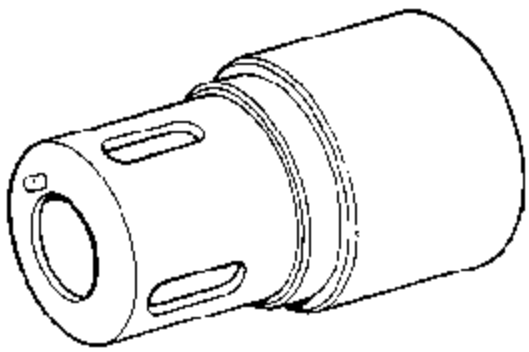
7-1 Dust Guard Assembly (P/N 10-110)



The dust guard is a simple, threaded (1 3/16-18 UNEF 2B) stainless steel (type 303) cylinder with a wire screen at one end. It is easily unscrewed for cleaning and/or replacement of the disposable screen. The screen material is stainless steel (type 316) with a nominal 40 micron mesh. This General Monitor accessory is specially designed to prevent dust and particulate matter from reaching the sensor flame arrestor. Such debris can plug the screen and limit the amount of gas reaching the active surface of the sensor, thereby creating a potentially hazardous situation. When the dust guard is installed, this problem is eliminated and sensor response is virtually unchanged. The dust guard is also available in a kit (P/N 10-044) with twelve replaceable screens. It can be used as an effective windscreen, and is recommended for corrosive, windy or high temperature environments. A typical application would be in the area surrounding a drying oven.

7-2 Sintered Stainless Steel Dust Guard (P/N 16-00-822-1)

The construction of this accessory is similar to P/N 10-110, but with 3mm (1/8") thick sintered stainless steel (type 316) disc at one end. The body material is type 303 stainless steel with an internal 3/16 UNEF 2B thread for installation on the sensor body. This dust guard provides protection from fine particulates and windy environments. It should be used only in dry locations because of the tendency of the sintered disc to absorb water which would then act as a gas diffusion barrier until the disc dried out again.



7-3 Splash Guard (P/N 10395-1)

The Splash Guard is a rugged thermoplastic polyester (Valox) plastic cylinder which screws into place over the sensor body. It contains a series of internal baffles which are designed to deflect water spray away from the sensor flame arrestor. The splash guard is recommended for areas where heavy rain or frequent equipment hosedowns occur. It also makes an effective barrier against high winds. Sensor response time is affected by the splash guard. It should not be removed during sensor calibration.

7-4 Sensor Flow Chamber (P/N 10-066)

The General Monitors Sensor Flow Chamber is constructed of 2024T aluminium (optional stainless steel type 316, P/N 10066-SS). The chamber has an internal thread 1 3/16-18 UNEF 2B, into which a sensor may be screwed, and two threaded ports (1/8-27 NPT L1 NOM) which accept 1/4" tube fittings (P/N 925-029). The chamber is designed for insertion into a sampling system and the recommended flow rate is 0.47 litres per minute (1cu. ft/hr.).

7-5 Duct Mounting Plate (P/N 10-041)

The Duct Mounting Plate is a rectangular plate measuring 73 x 116mm (2.83" x 4.56") containing four captive mounting screws (6-32 UNC), and fitted with a Neoprene O-ring seal. The sensor is mounted in a 1 3/16-18 UNEF threaded hole in the centre of the plate. The assembly is ideally suited to the monitoring of ducted air for living quarters in large offshore modules. Note that the sensor should be mounted pointing down, protected for excessive air velocity and in a position to facilitate recalibration.

7-7 Ampoules of Hydrogen Sulphide (P/N 50-004)

These glass ampoules are manufactured under strict quality control procedures for use with the Field Calibrator (P/N C00-000). They are marked with a gas concentration in ppm H2S which corresponds to the concentration when released within the Field Calibrator.

Ampoules may start to lose concentration after a specified period. The Ampoule label will state : 'EXP (date)'. Please adhere to this cut-off date.

Out-of-date ampoules should therefore be regarded with suspicion , particularly if erratic results are obtained in calibration.

Ampoules are manufactured in various concentrations and are distinguished by the addition of a suffix to the part No. See table for details.

Part Number	Suffix	Concentration ppm H2S
50-004	-23	3
50-004	-11	5
50-004	-3	10
50-004	-9	20
50-004	-21	25
50-004	-15	50
50-004	-5	100