



**Honeywell Sensepoint
Gas Sensors**

Safety

WARNINGS

1. This unit is intended for use at a normal, or reduced, levels of atmospheric oxygen and pressure only, i.e. <21% oxygen and <1.1bar. Oxygen deficient atmospheres (Combustible: less than 10%V/V, Toxic: less than 6%V/V) may suppress the sensor output.
2. Refer to the local or national regulations relative to the installation at the site. For Europe see EN60079-29-2, EN60079-14 and EN61241-14.
3. Operators should be fully aware of the action to be taken if the gas concentration exceeds the alarm level.
4. The Toxic Sensepoint ECC (electrochemical cell) contains a small quantity of acid.
5. The installation should consider not only the best placing for gas leakage related to potential leak points, gas characteristics and ventilation, but also placement where the potential for mechanical damage is minimised or avoided.
6. Electrostatic risk - Do not rub or clean with solvents. Clean with a damp cloth. High velocity airflows and dusty environments can cause hazardous electrostatic charges.
7. The purchaser should make the manufacturer aware of any External effects or Aggressive substances that the equipment may be exposed to.

CAUTIONS

All models:

1. Do not modify or alter the sensor construction as essential safety requirements may be invalidated.
2. Install using certified Ex e, Ex d or Ex tb junction box, connectors and glanding.
3. Dispose of in accordance with local disposal regulations. Materials used:

Combustible: Standard LEL and PPM Sensor - Fortron®
(PPS - polyphenylene sulphide).
High Temperature LEL: Stainless Steel

Toxic: Sensor - Fortron® (PPS - polyphenylene sulphide),
Cell: - PPO (modified polyphenylene oxide).

Combustible only:

1. Atmospheres above 100% LEL (LEL version) or 50% LEL (ppm version) may suppress the sensor reading.
2. This equipment is designed and constructed as to prevent ignition sources arising, even in the event of frequent disturbances or equipment operating faults.
NOTE: The control card must have a suitably rated fuse.

Toxic only:

1. Exposures to toxic gases above the design range may require re-calibration of the sensor.
2. Do not access the interior of the Sensepoint gas sensor when hazardous (explosive) gas or dust is present.
3. This equipment is designed and constructed as to prevent ignition sources arising, even in the event of frequent disturbances or equipment operating faults. The electrical input is protected with a fuse.

Safety

Honeywell Analytics Limited can take no responsibility for installation and/or use of its equipment if this is not done in accordance with the appropriate issue and/or amendment of the manual.

The user of this manual should ensure that it is appropriate in all details to the exact equipment to be installed and/or operated. If in doubt, the user should contact Honeywell Analytics Limited for advice.

Honeywell Analytics Limited reserve the right to change or revise the information supplied in this document without notice and without obligation to notify any person or organisation of such revision or change.

If further details are required that do not appear in this manual, contact Honeywell Analytics Limited or one of their agents.

ATEX Special Conditions for Safe Use

- **Combustible LEL Version**

The detector must be protected from impact.

The integral supply cables must be protected from impact and terminated in a suitable terminal facility.

The detector is considered to present a potential electrostatic risk and must not be located in high air flows or rubbed.

- **Toxic Version**

The detector head must be protected from impact.

The detector head must not be used in atmospheres containing greater than 21% oxygen.

The integral supply leads must be mechanically protected and terminated in a terminal or junction facility suitable for the area classification if the installation.

The terminal box and any shrouding metal work (when used) must be effectively earthed.

The detector head is considered to present a potential electrostatic risk and must not be located in high air flows or rubbed.

The front cover must not be removed when a dust hazard exists and must be fully tightened when replaced.

The detector head is designed to be mounted vertically with the gas sensor facing downwards.

- **High Temperature Version**

The integral supply cables must be mechanically protected and terminated in a suitable terminal or junction facility.

Equipotential bonding is to be provided by the mounting arrangements.

The sensor enclosure provides ingress protection IP66 only when the sensor is provided with the weather guard and mounted with the sinter pointing downwards.

- **PPM Version**

The detector must be protected from impact.

The integral supply cables must be protected from impact and terminated in a suitable terminal facility.

The detector is considered to present a potential electrostatic risk and must not be located in high air flows or rubbed.

- **Additional Special Conditions for Safe Use – EN60079-29-1 approved PPM Version**

After putting a new sensor into service zero should be checked in weekly intervals to confirm sensor stability.

On occasion sensors may show an influence of temperature which may exceed the tolerances of EN 60079-29-1. See technical handbook.

Safety

On occasion sensors may show an influence of pressure on zero which may exceed the tolerances of EN 60079-29-1. See technical handbook.

The sensors should be protected against vibrations. When exposed to vibrations the sensors may show deviations which exceed the tolerances of EN 60079-29-1 and should be calibrated in shortened intervals.

Independent of the setting of the parameter "Power-on inhibit" of the system 57 control card false alarms may be shown after switching on.

If gas concentrations significantly above the measuring range cannot be excluded at operation, all alarm relays of the control card should be configured in such a way that alarming also takes place in the presence of faults.

If a sensor is exposed to a gas concentration significantly above the measuring range it shall be calibrated immediately afterwards.

Revision History

Revision	Comment	Date
Issue 9	A03280	May 2010
Issue 10	A03738	April 2012
Issue 11	A0xxxx	June 2019

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1. Introduction

Two types of Sensepoint gas sensor are available - one for Combustible gases and one for Toxic gases. The Combustible gas sensor type comes in three different versions - Standard LEL, High Temperature (HT) LEL, and PPM.

1.1 COMBUSTIBLE GAS SENSORS

The Sensepoint gas sensor for combustible gases is a sealed disposable sensor for the detection of flammable gases and is designed for industrial use with an approved junction box.

The sensor is a certified product that can be used in atmospheres that will potentially contain combustible or explosive gases, consequently, the sensor must be installed in a manner consistent with the certification approval.

Each sensor will, in practice, be connected to a control system housed in a safe area which may be supplied separately by Honeywell Analytics or another manufacturer.

There are three types of Sensepoint for combustible gases which are distinguished by the levels of gas that can be detected by the sensor or by the operating temperature:

- **Standard LEL Version**

The standard LEL sensor detects gas concentrations up to 100% LEL of a target gas with a resolution in the region of 5% LEL, depending on the gas being detected.

The sensor is available with M20, M25, M26 or 3/4 NPT threads.

- **High Temperature LEL Version**

The High Temperature version is available for use in temperatures up to 150°C.

The sensor is available with M20, M25 or 3/4 NPT threads.

- **PPM Version.**

Depending on the gas type, the PPM detector can detect gas in the range 2000 to 15000ppm. This greater sensitivity is achieved through use of amplifier electronics housed in the sensor and consequently, the upper operational temperature of the sensor is limited.

The sensor is available with M20 or 3/4 NPT threads.

Caution: ***The design of the PPM version of Sensepoint has been optimised for ppm levels of detection. Exposure to concentrations above the recommended range may result in ambiguous readings.***

M20 thread is the preferred standard size provided with Honeywell Analytics junction boxes.

The sensors can be fitted with accessories such as Weather Protection, Flow Housings (for use when calibrating the sensor and in sampling systems), and a Collecting Cone for the detection of gases which are lighter than air.

When the sensors are used in forced air systems with metal accessories (e.g. Weather Protection) the accessories should be connected to an electrical ground via a separate earth. Metal junction boxes used within forced air systems should also be connected to an earth using a suitable earth lead.

1. Introduction

Sensepoint sensors for combustible gases employ a catalytic pellistor sensor device which is used as part of a Wheatstone Bridge measuring circuit. This is certified for hazardous areas to EN 60079 and EN 61241 and is protected against water and dust ingress to IP65 as standard and IP67 when fitted with the Weather Protection (LEL HT version IP66 with Weather Protection).

The Sensepoint HT must be fitted into a suitably approved Ex e, Ex d or Ex tb high temperature junction box (e.g. FEEL Flameproof Enclosures) fitted with an approved cable gland for external wiring (e.g. Peppers Cable Glands, Series A3LF or CR3 CROLOCK Series).

The sensor requires a 200mA current supply, nominal 3V, derived from a suitable control card.

Sensepoint sensors for combustible gases can be used as a replacement for Honeywell Analytics models 910 and 780 sensors. Accessories fitted to these units are fully compatible with the Sensepoint range of products.

1.2 TOXIC GAS SENSOR

Sensepoint for toxic gases is a sensor designed for the detection of toxic gases and also oxygen deficiency. It is for industrial use with an approved junction box. The sensor is a certified product that can be used in atmospheres that will potentially contain combustible or explosive gases, consequently, the sensor must be installed in a manner consistent with the certification approval.

Each sensor will, in practice, be connected to a control system housed in a safe area which may be supplied separately by Honeywell Analytics or another manufacturer.

Sensepoint for toxic gases employs an electrochemical cell sensor device which is gas specific. The sensor is used as part of a 4-20mA loop powered measuring circuit.

The sensor includes a voltage clamp within a sealed Ex d/ Ex tb enclosure and an electrochemical cell driver and cell within an Intrinsically Safe (IS) portion of the sensor.

Different sensor versions detect different gases. Sensors are available for the detection of H₂S, CO, Cl₂, NH₃, H₂, SO₂, NO, NO₂, O₂ and are available with M20, M25 or ¾ NPT threads.

The sensor can be fitted with accessories such as Weather Protection, and Flow Housings (for use when calibrating the sensor and in sampling systems). The sensor can be fitted to either Ex e, Ex d or Ex tb types of junction box since the rear portion of the sensor is mounted within the Ex d enclosure.

A voltage clamp produces IS voltage rails for the removable front portion of the sensor. This front portion is certified IS and is unable to provide enough energy to initiate an explosion. This allows a simple hydrophobic barrier to be used as protection for the electrochemical cell sensing element, resulting in a fast speed of response to gases, while remaining a product which can be terminated using normal Ex e, Ex d or Ex tb components and procedures.

In addition, when a control card has insufficient adjustment to allow accurate calibration, local calibration potentiometers are accessible at the sensor for span and zero adjustment.

The mounting of a sensor in direct sunlight may lead to the drying of the electrochemical cell and this may result in loss of operation of the cell. A sunshade should therefore be fitted in adverse sunlight conditions.

1. Introduction

The Toxic Sensepoint is certified for use in hazardous areas to EN 60079-0, EN 60079-1, EN 60079-11, EN 61241-0 and EN61241-1, and is protected against water and dust ingress to IP65 as standard and IP67 when fitted with the Weather Protection.

Prolonged exposure to concentrations of toxic gases may require sensor re-calibration.

Information notices

The types of information notices used throughout this handbook are as follows:



WARNING

Indicates hazardous or unsafe practice which could result in severe injury or death to personnel.

Caution: *Indicates hazardous or unsafe practice which could result in minor injury to personnel, or product or property damage.*

Note: Provides useful/helpful/additional information.

If more information outside the scope of this technical handbook is required please contact Honeywell Analytics.

Associated Documents

Sensepoint Combustible ppm Operating Instructions	Part No: 2106M0513
Sensepoint HT Combustible Sensor Quick Start Guide	Part No: 2106M0523
Sensepoint Combustible LEL Operating Instructions	Part No: 2106M0501
Sensepoint Toxic Operating Instructions	Part No: 2106M0514

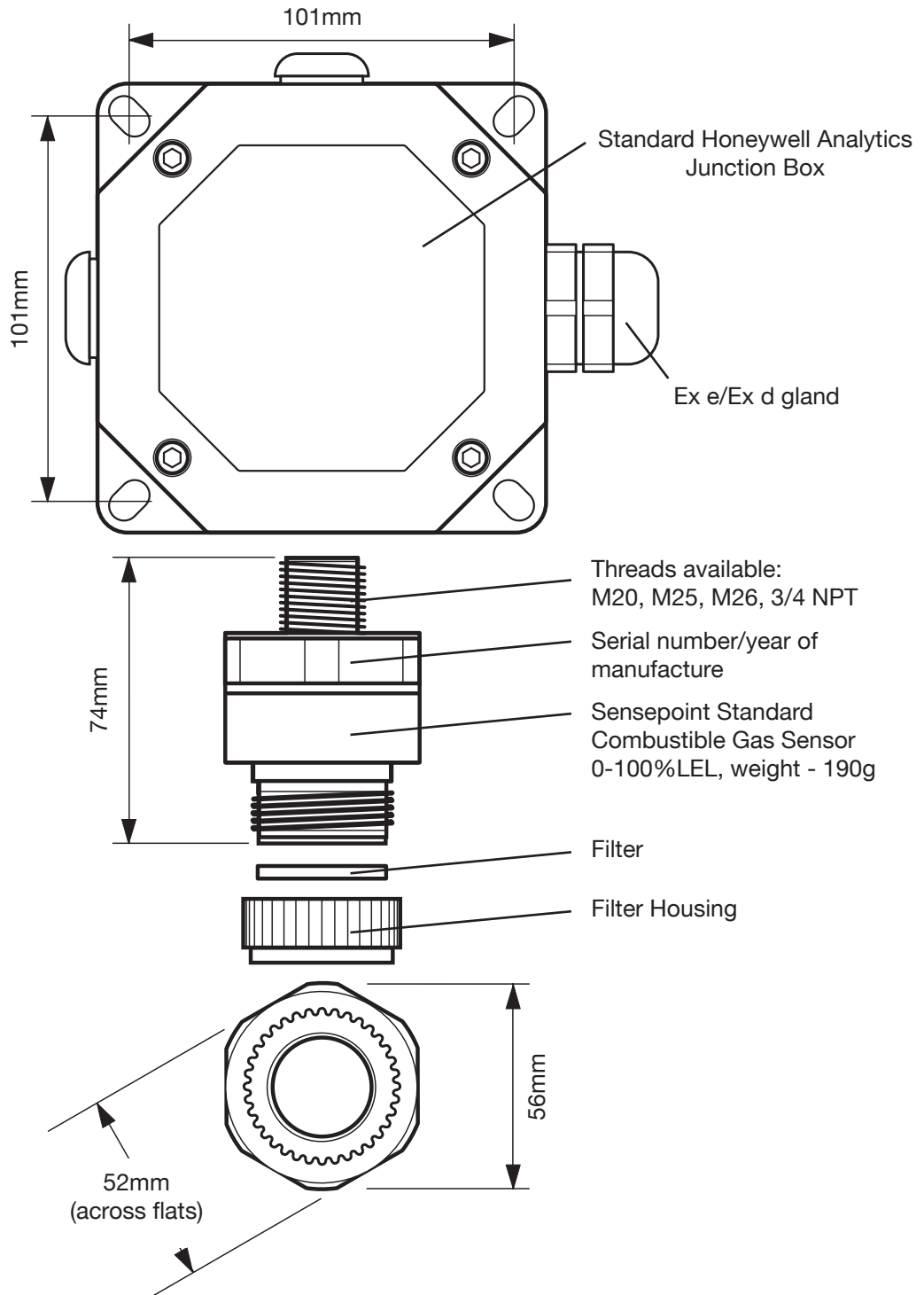
2. Main Features

This chapter provides an overview of the following components, and provides their dimensions:

- **Combustible sensors**
- **Toxic sensor**

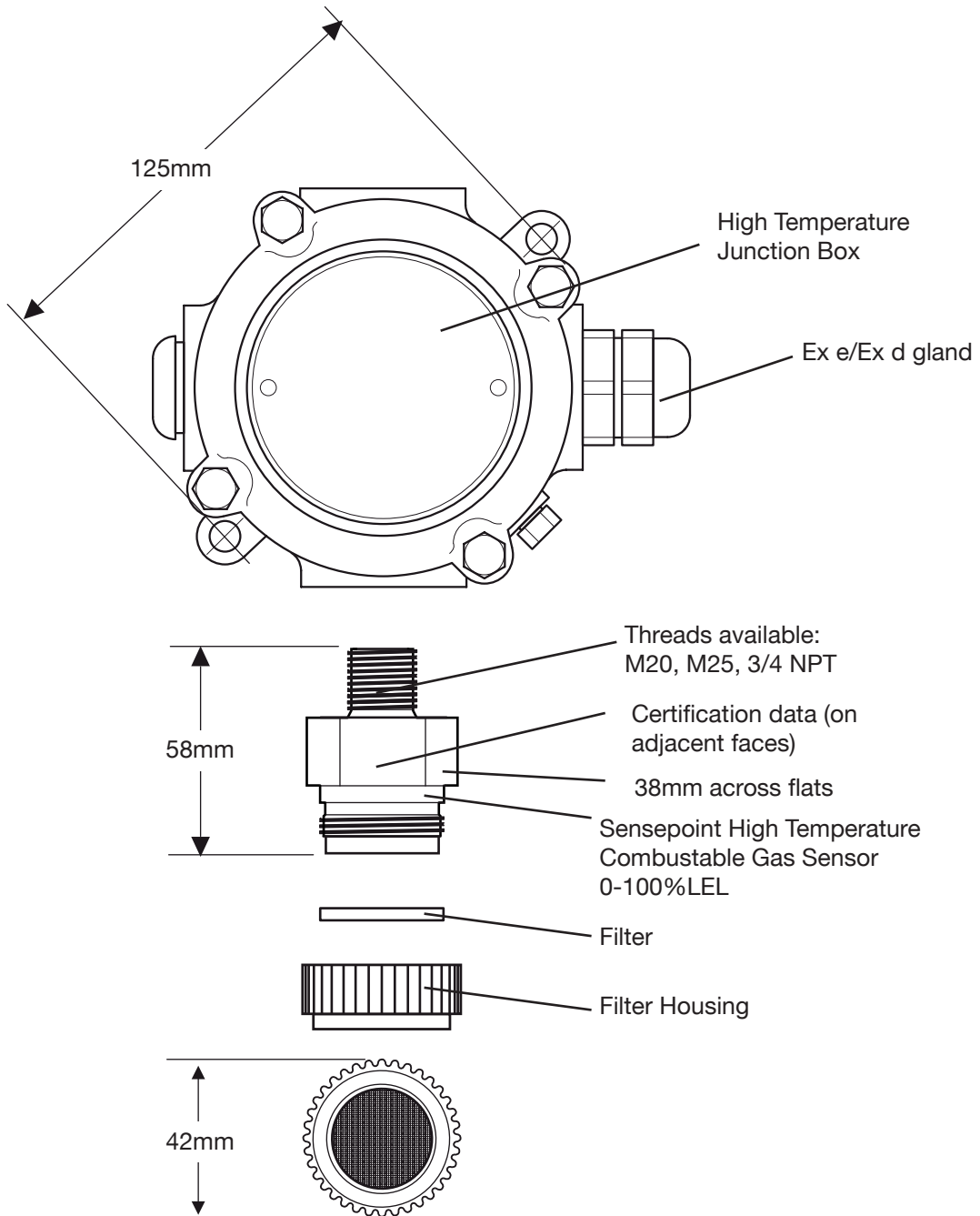
2.1 COMBUSTIBLE SENSORS

2.1.1 LEL - Standard



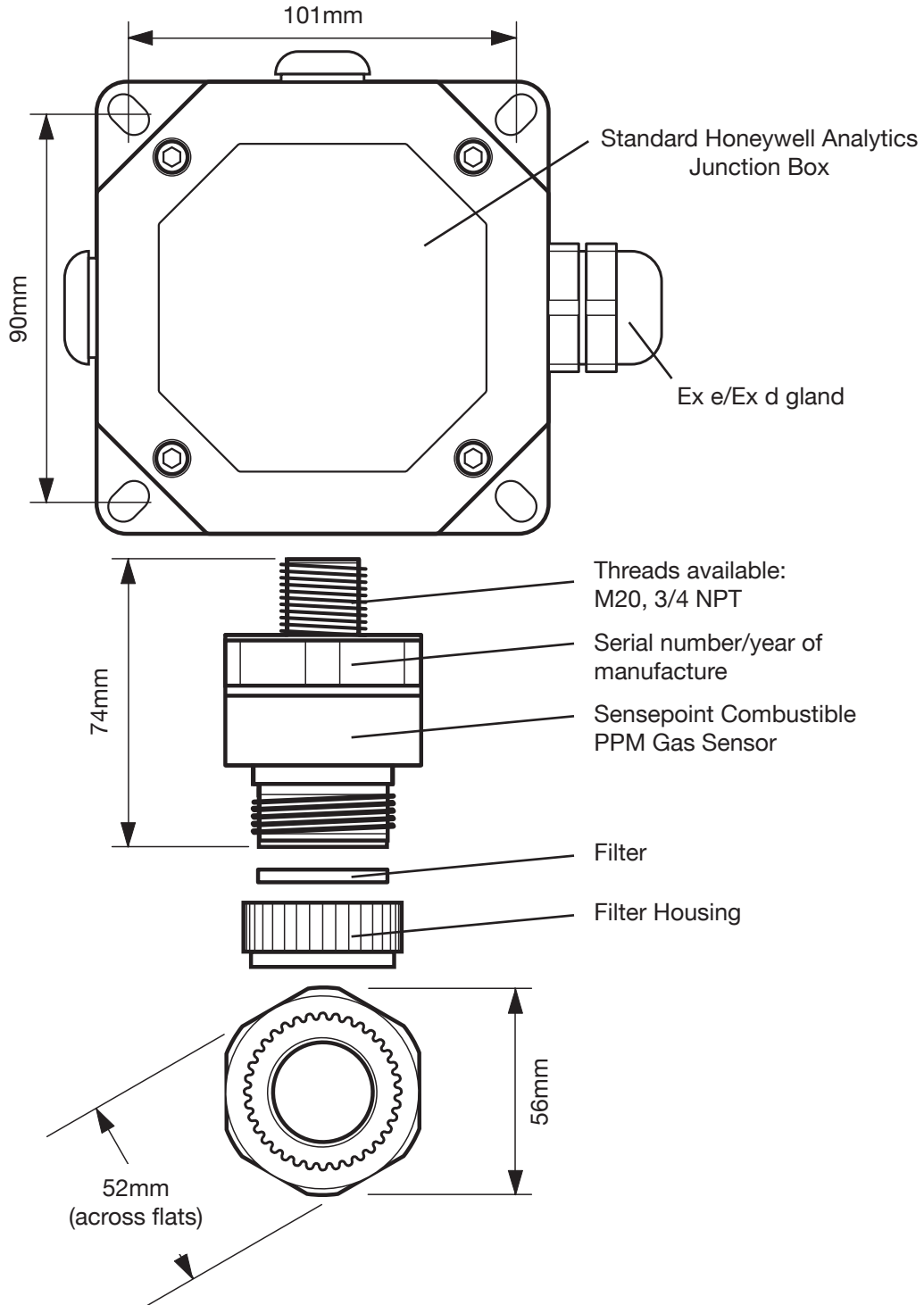
2. Main Features

2.1.2 LEL - High Temperature



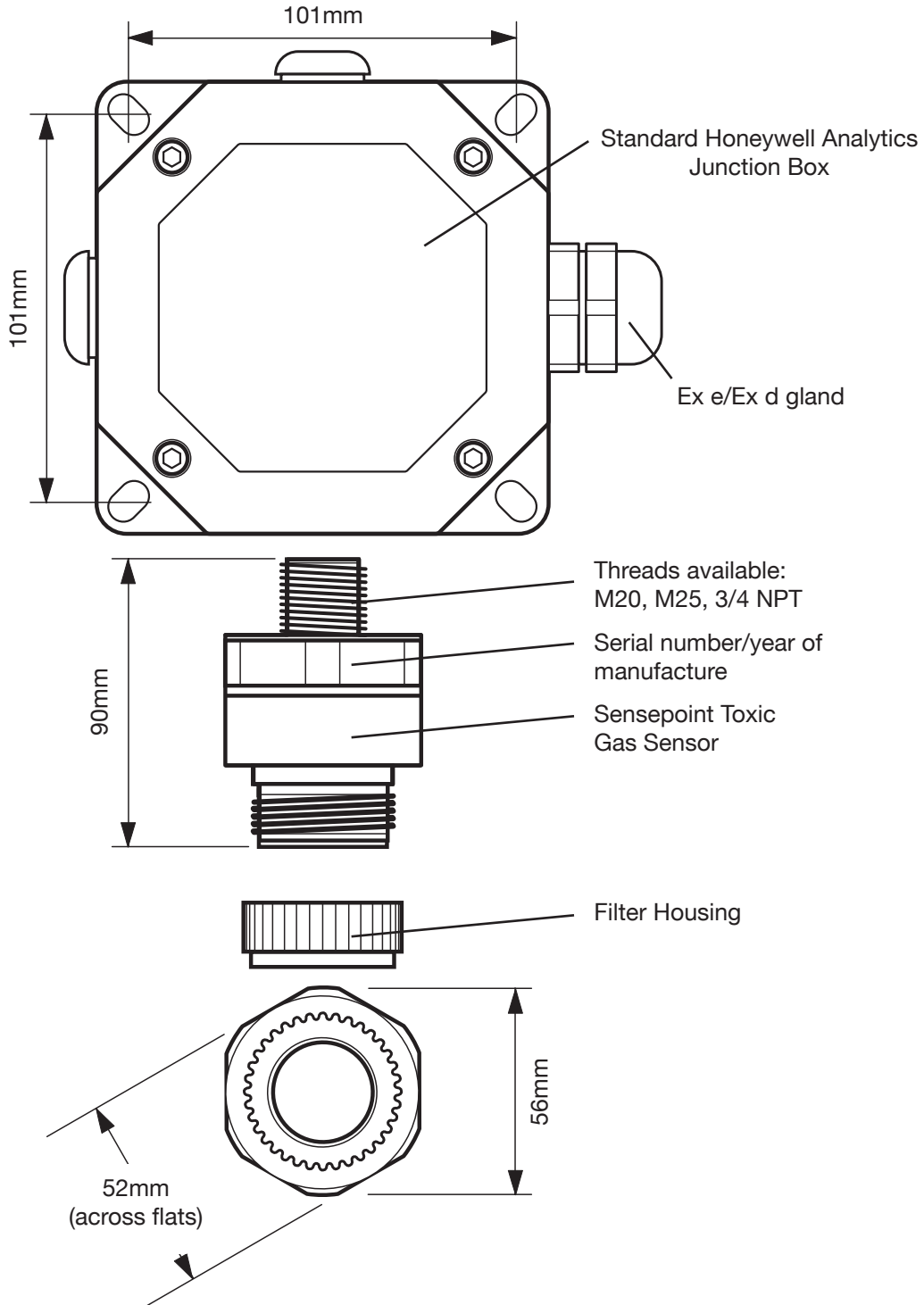
2. Main Features

2.1.3 PPM



2. Main Features

2.2 TOXIC SENSOR



3. Installation and Operation

This chapter provides the following information:

- how to install Combustible and Toxic types of Sensepoint sensor
- how to install sensor accessories
- additional details necessary when fitting sensors in forced air conditions and aspirated systems
- operational details
- calibration instructions
- fault diagnosis

3.1 SENSOR INSTALLATION

General Installation Guidelines

The following general points should be noted before any installation is carried out.

- The installation is to be performed, with the power disconnected, by a qualified installation engineer.
- All Sensepoint models must be fitted to a suitably approved Ex d, Ex e or Ex tb junction box that is also fitted with a suitably approved cable gland and connector block.
- Ensure that the junction box thread is compatible with the sensor thread marked on the sensor.
- The sensor should be fitted into a threaded or tapped hole within the junction box and locked in place with a lock nut if the parallel thread version is being used.
- The sensor should be installed in a location free from direct heat sources.
- For optimum protection against water ingress the sensor should be fitted such that it points downwards. This position provides the most effective sensing whilst protecting the sensor against ingress of water and dust.
- When mounting the junction box and sensor, consideration should be given to the density of the target gas relative to air. In addition, consideration should be given to possible splashing from liquid. For example, when mounted close to ground level, mud splashes can coat the gas diffusion membrane.
- Do not mount the sensor in direct sunlight.
- When installing the sensor in fast flowing gas or dust streams (e.g. ducts), care should be taken to ensure that any exposed metalwork within the gas stream is properly earthed in order to prevent electrostatic build up and discharge (see 3.1.4).
- The installation should consider not only the best placing for gas leakage related to potential leak points, gas characteristics and ventilation, but it should also consider the potential for mechanical damage and how to avoid or minimise this.
- The equipment is designed and constructed as to prevent ignition sources arising, even in the event of frequent disturbances or equipment operating faults. For Toxic, the electrical input is protected with a fuse. For Combustible LEL, PPM and HT versions, the control card must have a suitable rated protective fuse. For system connection information, refer to the documentation for the associated control system.

3. Installation and Operation

3.1.1 Combustible Sensors

The installation instructions for the Standard LEL and PPM sensor versions are similar, those for the High Temperature version are different. The procedures are described in the following two sections.

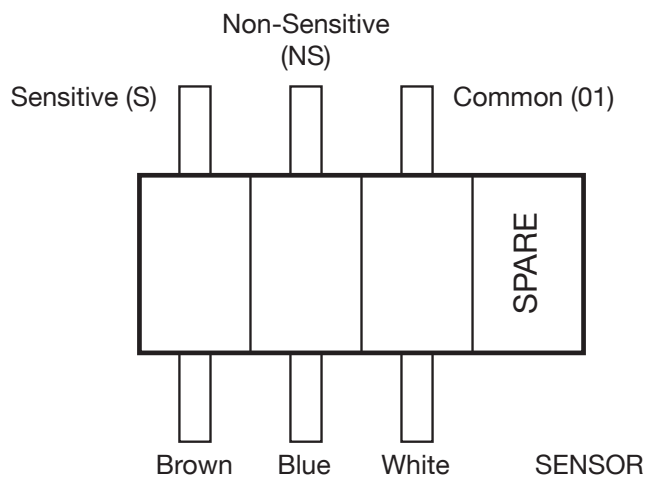
Standard LEL and PPM Versions

1. Remove the sensor's protective disc before use by unscrewing the filter housing, removing the filter and then the disc.

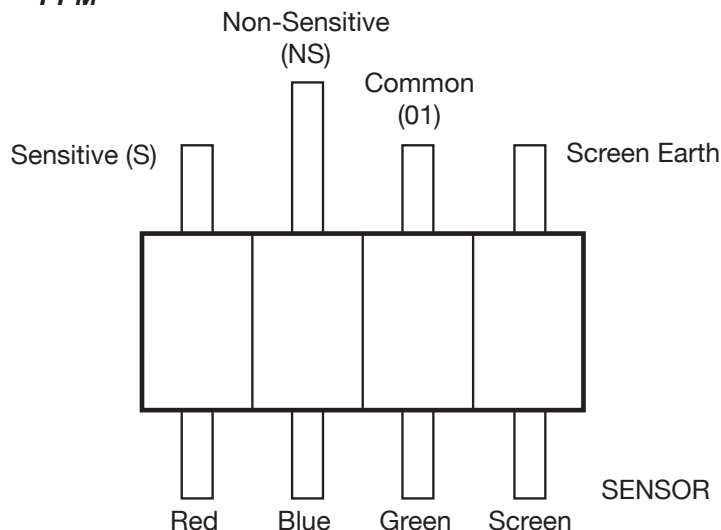
Discard the protective disc.

2. Refit the filter into the filter housing and replace the filter housing on the sensor.
3. The field connections should be three-core multi-strand cable with a maximum conductor size of 2.5mm² (14AWG). A screened cable is necessary for PPM versions and is recommended for optimum performance of LEL versions.
4. Connect the field and Sensepoint wiring to the junction box connector block as shown in the following diagrams.

Standard LEL



PPM



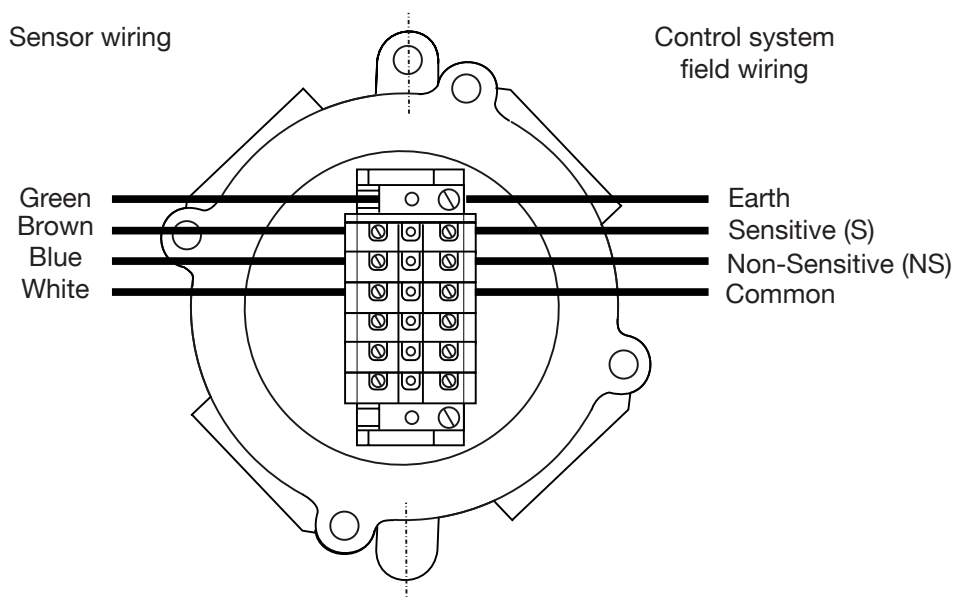
3. Installation and Operation

The screen from the Sensepoint PPM version should be connected to the screened cable entering the junction box or to a signal earth such as the continuity plate in the junction box. The earth should be terminated at one end only and it is recommended the termination should be made at the control card end of the cable.

Note: Both the LEL and PPM sensors require 200mA current at a nominal 3V supply.

High Temperature LEL Version

1. Install the high temperature junction box.
See the manufacturer's instructions.
2. Remove the junction box lid.
3. Fit the Sensepoint HT sensor to the junction box.
Ensure that the junction box thread and the sensor thread are compatible. Push the sensor wires through the cable entry in the junction box and screw the sensor body firmly home into the entry. Lock the sensor in place with a suitable lock-nut.
4. Connect the sensor wiring to the junction box terminal strip.
See the subsequent wiring diagram. Use multicore cable, three wire minimum, of conductor size 2.5mm² (14AWG) max.
5. Fit a suitable gland to the box, secure the control system cable and connect the field wiring to the terminal strip.
6. Refit the junction box lid.



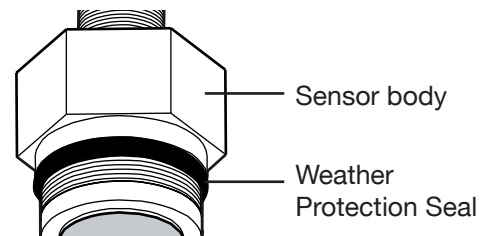
Note: Earth equipotential bonding must be achieved either by the sensor's integral earth conductor
or via the sensor rear mounting thread.

7. Unscrew the filter housing from the sensor body and remove the filter from the filter housing.
Discard the filter housing with protective disc. The filter housing material cannot withstand high temperatures.

3. Installation and Operation

8. Also discard the filter if the sensor is installed indoors.
If the sensor is installed outdoors fit the previously removed filter (if required) to the High Temperature Weather Protection accessory (Part No: 00780-A-0076) and fit the accessory to the sensor.

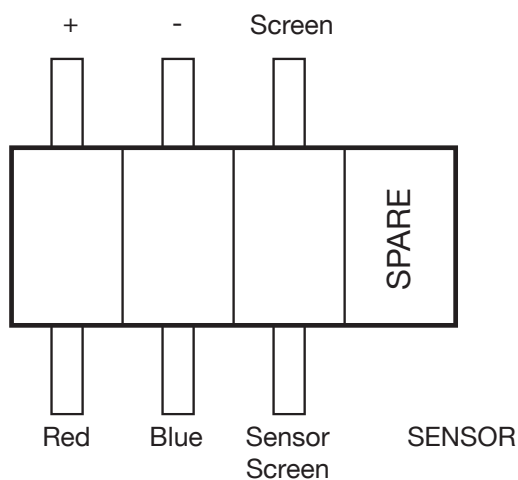
Fit the seal supplied with the Weather Protection accessory to the sensor body. Screw the accessory firmly onto the sensor until it seats against the sensor body hexagon.



9. Power-up the system and check for correct operation.
Note: The sensor requires 200mA current at a nominal 3V supply.

3.1.2 Toxic Sensor

- Remove the sensor's protective disc before use by unscrewing the filter housing. Discard the protective disc. Replace the Filter housing.
- Replace the filter housing on the sensor.
For oxygen versions, remove the neoprene stopper ensuring all adhesive film is also removed and snap the RFI screen and internal hydrophobic assembly (supplied separately) - into place.
- The field cabling should be screened, two core, multi-strand cable with a maximum conductor size 2.5mm² (14AWG).
The screen from the Sensepoint Toxic sensor should be connected to the screened cable entering the junction box or to a signal earth such as the continuity plate in the junction box.
The earth should be terminated at one end only and it is recommended the termination should be made at the control card end of the cable.
- The Toxic Sensepoint wiring is connected at the connector block within the junction box as



shown in the following diagram.

- The sensors are supplied pre-calibrated although this should be checked on initial installation. For increased accuracy in specific applications, on-site calibration is recommended (see 3.3).
Note: The Toxic sensor requires an 18 to 30V power supply at a loop current of 30mA.

3. Installation and Operation

3.1.3 Accessories

A list of accessories that can be fitted to the different types of sensor can be found in **Appendix C**.

1. Before fitting the Weather Protection and Flow Housings to the Sensepoint sensor, the thread adapter, which is supplied with the accessory, should be fitted.
The adaptor converts the M40 thread of the accessory to the smaller M36 accessory thread of the sensor. Ensure that the face seal is properly made.

Refer to 3.1.5 for details of accessory installation in aspirated systems using the Flow Housing.

For improved protection against water and dust ingress when using the Weather Protection, a hydrophobic barrier (Part Number 00910-A-0404) can be fitted between sensor and housing.

Note: this may increase response time.

2. Older accessories can be fitted to the Toxic sensor, e.g. those used with older 780 or 910 systems.

These accessories will screw directly onto the sensor, after fitting an O-ring in the groove provided, in the same manner as for the old type sensor.

3. When using older Toxic accessories (e.g. those used on a 911 system), the neoprene gasket should be transferred to the new sensor and the accessory fitted in the normal way.
4. The use of the Weather Protection accessory affects the speed of response.

3.1.4 In forced air conditions

The following instructions must be observed for all plastic-bodied versions of Sensepoint installed in forced air conditions. These instructions are in addition to the instructions previously described in the installation procedures.

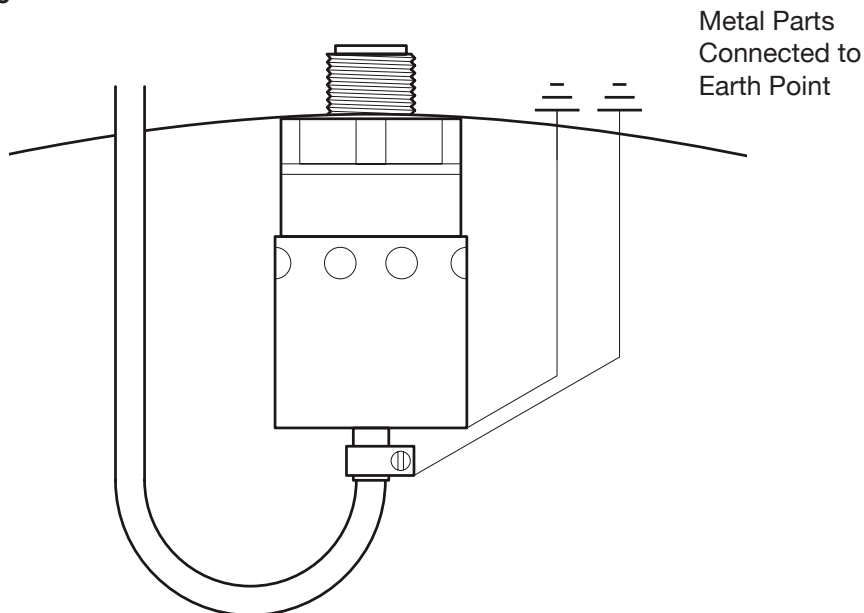
A potential hazard exists when installing plastic based sensors in forced air flow conditions such as found in ducts. If the fast flowing air or gas is dry, the plastic sensor and tubing have the potential to attract an electrical charge. This may discharge in the form of a spark which may have enough energy to ignite a combustible gas mixture.

The sensor housing material is not inherently antistatic. However, independent tests have shown that a static discharge does not occur if all metallic parts are earthed.

The Sensepoint sensor is therefore suitable for installation in forced air flow conditions when installed correctly in the following manner.

3. Installation and Operation

Example



It is imperative that any accessory attached to the sensor is either:

- of non-conductive material, e.g. the plastic Weather Protection, or,
- if made of a conducting material, suitably earthed.

Note: If the sensor is screwed directly into a junction box, the thread of the junction box should not be formed by a metal insert in a non-conducting box.

3.1.5 Aspirated Systems

When used in aspirated systems, Sensepoint may be fitted with a Flow Housing accessory. It is recommended that the sensor be placed on the positive pressure side of any pumping system, but where a negative pressure is unavoidable, it is essential that there are no leaks around the Flow Housing threads, such that ambient air may be drawn into the system, leading to false readings.

It is therefore recommended that the sensor accessory thread be coated with a non-silicon based petroleum grease in order to ensure an efficient seal is created.

Note: On Toxic gas or Oxygen versions it is especially important that the internal hydrophobic filter retaining slots are effectively sealed in this manner.

3.2 CONTROLS AND DISPLAYS

Sensepoint versions for both combustible and toxic gases have no local alarms or displays. Gas readings, alarm levels and displays are a function of the control system for the sensors. The Toxic sensor allows zero and span adjustments to be made locally at the sensor if required.

3. Installation and Operation

3.3 SENSOR CALIBRATION

Caution: Calibration procedures should only be carried out by qualified personnel.

Sensors should be calibrated at concentrations representative of those to be measured. It is always recommended that the Sensepoint sensor is calibrated with the target gas it is to detect. If this is not possible, cross calibration should be performed (see 3.3.2 and 3.3.3).

Since combustible sensors require oxygen for correct operation, a mixture of gas in air should be used for calibration purposes

Note: When calibrating in high air flow, the flow rate of the calibration gas needs to be increased. Please refer to the information below.

3.3.1 Calibration Procedure - Combustible

The calibration adjustments are carried out at the control card and gassing is performed at the sensor.

- (1) Prior to calibration, allow the sensor to warm up for approximately 10 minutes, or 20 minutes for the PPM version.
- (2) First ensure there is no gas present on the sensor. If combustible gas is suspected to be in the vicinity of the Sensepoint sensor, fit a Flow Housing accessory and flow clean air over the sensor.
- (3) Set the zero reading on the control system.
- (4) Remove the filter housing or accessory and replace it with a Flow Housing accessory, if not already fitted.
- (5) Connect the Flow Housing input to a regulated cylinder, containing a known concentration of target gas at approximately the sensor alarm point (e.g. 50% LEL Methane in air for the LEL version, 50% FSD gas in air for the PPM version), using nylon or PTFE tubing.

Caution: As some test gases may be hazardous, the Flow Housing outlet should exhaust to a safe area.

- (6) Pass the gas through the Flow Housing at a flow rate of 1 litre per minute. Allow the sensor two to three minutes to stabilise. When gassing with air, adjust the control card to indicate zero. For span, the control card should be adjusted to indicate the concentration of the target gas being applied.

Note: It is useful to record the mV output of the sensor, via the control card, throughout the life of the sensor to ensure that there are no poisoning effects that will reduce the sensor performance. This would be indicated by a reduction in the mV output for the same gas concentration. It is recommended that the sensor is replaced when 60% loss has occurred.

- (7) Remove the Flow Housing and refit the filter housing or accessory. Ensure that the gas reading has returned to zero.

3. Installation and Operation

Calibration with Weather Housing (not tested by DEKRA EXAM for the PPM-version)

If it is not possible to gain access to the sensor to fit a Flow Housing, gas can be applied to the Weather Housing using the gassing nozzle.

It is necessary to make allowance for windy conditions or fast air flow (e.g. in a duct), which could disperse the test gas. Follow the procedure above, but adjust the flow rate of the calibration gas according to wind speed as follows: -

Wind Speed		Test Gas Flow Rate (litres/minute)	
Miles per hour	Metres per second	Standard Weather Protection (02000-A-1640)	Metal Weather Protection (00780-A-0076)
0	0.0	1.0	1.0
5	2.2	1.5	1.0
10	4.4	5.0	1.0
15	6.7	7.0	1.5
20	8.9	8.0	2.0
25	11.1	9.0	2.5
30	13.4	9.5	3.0
35	15.6	10.0	4.0
40	17.8	10.0	5.0

3. Installation and Operation

3.3.2 Cross Calibration Procedure - LEL Versions

Caution: Where the user calibrates any sensor using a different gas, responsibility for identifying and recording calibration rests with the user. Refer to the local regulations where appropriate.

When the Sensepoint Combustible LEL sensor is to be calibrated with a gas which is different to the gas or vapour to be detected, the following cross calibration procedure should be followed:

Notes:

1. Table 1 lists the gases according to the reaction they produce at a given detector.
2. An eight star (8*) gas produces the highest output, while a one star (1*) gas produces the lowest output. (These are not applicable at ppm levels.)

Table 1 Star Rating of Gases

Gas	CAS Number	LEL (%v/v)	Star Rating
Acetone	67-64-1	2.5	5
Ammonia	7664-41-7	15.0	7
Benzene	71-43-2	1.2	3
Butane	106-97-8	1.4	4
Butanone	78-93-3	1.8	4
Butyl Acetate	123-86-4	1.3	2
Butyl Acrylate	141-32-2	1.2	2
Cyclohexane	110-82-7	1.2	4
DiEthyl Ether	60-29-7	1.7	4
Ethane	74-84-0	2.5	5
Ethanol	64-17-5	3.1	5
Ethyl Acetate	141-78-6	2.2	4
Ethylene	74-85-1	2.3	5
Heptane	142-82-5	1.1	3
Hexane	110-54-3	1.0	3
Hydrogen	1333-74-0	4.0	6
Methane	74-82-8	4.4	6
Methanol	67-56-1	5.5	5
MIBK	108-10-1	1.2	3
Octane	111-65-9	0.8	2
Pentane	109-66-0	1.4	3
Propan-2-ol	67-63-0	2.0	3
Propane	74-98-6	1.7	4
Propylene	115-07-1	2.0	5
Styrene	100-42-5	1.1	2
TetraHydroFuran	109-99-9	1.5	3
Toluene	108-88-3	1.1	3
TriEthylAmine	121-44-8	1.2	4
Xylene	1330-20-7	1.0	2

3. Installation and Operation

To cross calibrate the Sensepoint combustible gas sensor:

1. Obtain the star rating for the calibration gas and the gas to be detected from Table 1.
2. Using Table 2, look up the correction factor.
3. Multiply the Calibration Gas concentration (in %LEL) by the correction factor to get the effective concentration.
4. Use the effective concentration when setting up the control card during the calibration procedure.

Table 2 Correction Factors

Sensor calibrated to detect	Sensor used to detect							
	8*	7*	6*	5*	4*	3*	2*	1*
8*	1.00	1.24	1.52	1.89	2.37	2.98	3.78	4.83
7*	0.81	1.00	1.23	1.53	1.92	2.40	3.05	3.90
6*	0.66	0.81	1.00	1.24	1.56	1.96	2.49	3.17
5*	0.53	0.66	0.80	1.00	1.25	1.58	2.00	2.55
4*	0.42	0.52	0.64	0.80	1.00	1.26	1.60	2.03
3*	0.34	0.42	0.51	0.64	0.80	1.00	1.27	1.62
2*	0.26	0.33	0.40	0.50	0.63	0.79	1.00	1.28
1*	0.21	0.26	0.32	0.39	0.49	0.62	0.78	1.00

Note

1. Assuming average performance of the sensor, the sensitivity information in Tables 1 and 2 is normally accurate to $\pm 20\%$.
2. It is recommended that the calibration gas has a star rating within 2 stars of the target gas.

Example

1. Target gas to be detected is Butane. The calibration gas available is 46%LEL Methane.
2. The star rating of Methane is 6 and Butane is 4.
3. From Table 2, the correction factor is 1.56.
4. The control card should therefore be told the concentration is $(46.0 \times 1.56) = 72\%$ LEL in order to give an accurate reading for Butane using Methane as a calibration gas.

Note: It is important to calibrate the sensor at the approximate alarm levels to allow for non-linearity of the sensors at gas concentrations above 80% LEL.

3. Installation and Operation

3.3.3 Cross Calibration Procedure - PPM Version (not tested by DEKRA EXAM)

Caution: Where the user calibrates any sensor using a different gas, responsibility for identifying and recording calibration rests with the user. Refer to the local regulations where appropriate.

When the Sensepoint Combustible PPM Sensor is to be calibrated with a gas which is different to the gas/vapour to be detected, the subsequent cross calibration procedure should be followed.

Table 3 lists the gases according to the reaction they produce at a given detector. (These are not applicable at LEL% levels.)

Applied Gas or Vapour	Relative Sensitivity*
Acetone	120
Ammonia	55
Butane	164
Butanone (MEK)	140
Cyclohexane	193
Diethyl ether	140
Ethane	133
Ethylene	181
Heptane	200
Hexane	193
Hydrogen	113
MIBK	181
Octane	197
Propane	153
Tetrahydrofuran	136
Toluene	181
Triethylamine	142
Xylene	173
Methane	100

* relative to Methane = 100

3. Installation and Operation

Table 4 Minimum Recommended Full Scale Deflection (FSD)

Applied Gas or Vapour	FSD	Applied Gas or Vapour	FSD
Acetone	5000ppm	Hydrogen	5000ppm
Ammonia	15000ppm	MIBK	3000ppm
Butane	5000ppm	Octane	3000ppm
Butanone (MEK)	5000ppm	Propane	5000ppm
Cyclohexane	3000ppm	Tetrahydrofuran	5000ppm
Diethyl ether	5000ppm	Toluene	3000ppm
Ethane	5000ppm	Triethylamine	5000ppm
Ethylene*	3000ppm	Xylene	3000ppm
Heptane	3000ppm	Methane*	7000ppm
Hexane	3000ppm		

*Ethylene and Methane are available in the range 0-10 %LEL (Ethylene 2300 ppm, Methane 4400 ppm) meeting the performance standard EN60079-29-1. See Appendix A.4 for specification.

Cross calibration formula:

$$S = \frac{C \times Y}{Z}$$

where: **S** = The scale reading to be set (ppm).

C = The concentration of the calibration gas.

Y = The relative sensitivity to Methane of the calibration gas.

Z = The relative sensitivity to Methane of the gas to be detected.

PPM Cross Calibration Example:

If the target gas is **Xylene** in the range 0-3000ppm and the calibration gas available is **Ethane** at 2000ppm.

(1) Applying the calibration formula:

$$S = \frac{C \times Y}{Z} = \frac{2000\text{ppm} \times 133}{173} = \frac{266000}{173} = 1538\text{ppm}$$

(2) The control card scale (meter) should be set to **1500ppm** to give an accurate reading for **Xylene** using **2000ppm Ethane** as a calibration gas.

3.3.4 Calibration Procedure - Toxic

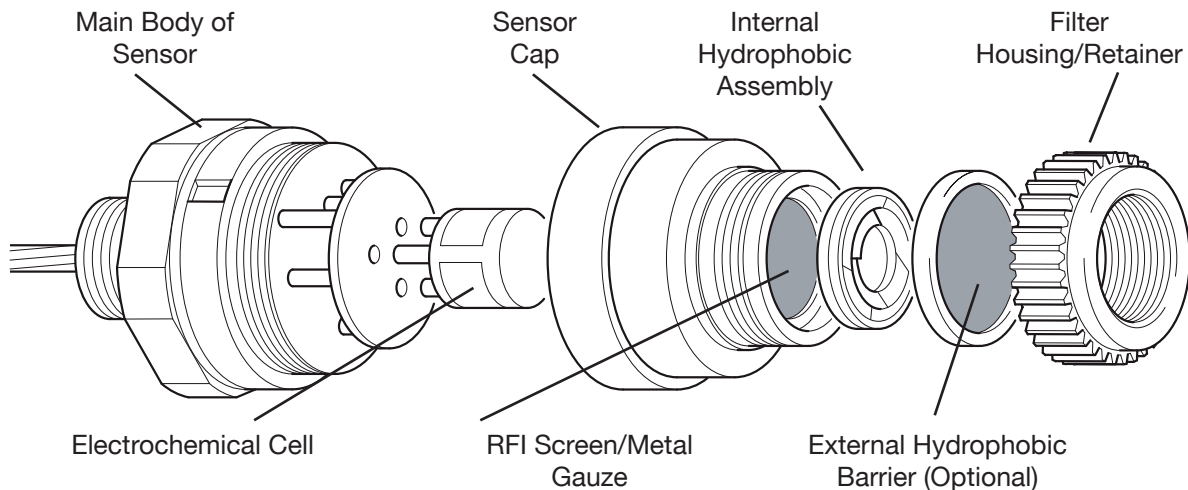
The Sensepoint toxic sensor is supplied pre-calibrated, however, for increased accuracy in specific applications, on-site system calibration is recommended.

Caution: Re-calibration should only be attempted by qualified service personnel.

Calibration should only be attempted after the sensor has been installed and power applied for a time exceeding the stabilisation time (see **Appendix A**). In the first instance the initial calibration should be performed at the control card for the sensor. If there is insufficient span or zero control at the control card, adjustments can be performed using the potentiometers on the sensor.

3. Installation and Operation

1. Ensure that power is applied to the sensor and the sensor output is stable.
2. First ensure there is no target gas present, and zero the sensor at the control card. If the target or a cross interfering gas is suspected to be in the vicinity of Sensepoint, it may be necessary to connect a cylinder of zero gas to a Flow Housing and pass clean air across the sensor at 1 litre per minute to allow for a stable zero to be achieved.



3. To set the sensor span, fit the Flow Housing and connect a gas cylinder of known concentration (approximately 50% FSD in air) to the Flow Housing accessory using nylon or PTFE tubing.

Tubing lengths should be kept to a minimum to avoid reducing speed of response.

Note: When calibrating for Nitrogen Oxide, and because Nitrogen Oxide is unstable when mixed with Oxygen, a mixture of Nitrogen Oxide in Nitrogen is used. The applied gas flow time should be kept to the minimum needed to obtain the necessary readings.

Caution: As the test gas may be hazardous, it is important that the outlet of the Flow Housing is exhausted to a safe area.

4. Apply the gas at a flow rate of 1 litre per minute for the recommended application time (see Table 7).
5. Adjust the span at the control card to read the concentration of the gas applied.
6. Remove the Flow Housing and gas supply.

Calibration with Weather Housing

If it is not possible to gain access to the sensor to fit a Flow Housing, gas can be applied to the Weather Housing using the gassing nozzle.

It is necessary to make allowance for windy conditions or fast air flow (e.g. in a duct), which could disperse the test gas. Follow the procedure above, but adjust the flow rate of the calibration gas according to wind speed as follows: -

3. Installation and Operation

Wind Speed (mph)	Wind Speed (m/s)	Test Gas Flow Rate (litres/minute) 02000-A-1635
0	0.0	1.0
5	2.2	1.0
10	4.4	1.5
15	6.7	1.5
20	8.9	1.5
25	11.1	1.5
30	13.4	1.5
35	15.6	1.5
40	17.8	1.5

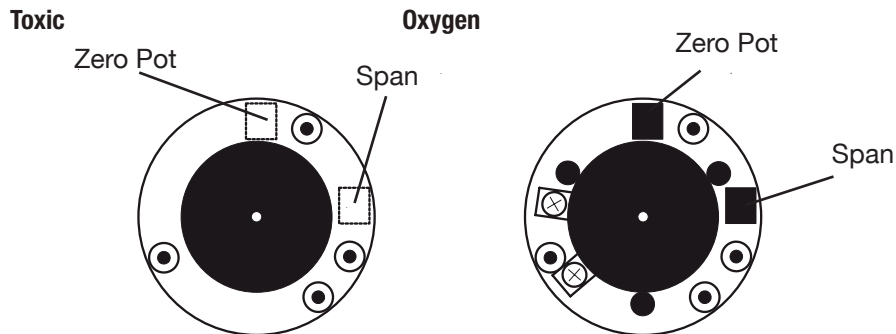
Table 6 Test Gas Concentrations

Gas	Range	Recommended Test Concentration	Application Time Minutes	Operating Temp.	
				Min.	Max.
H ₂ S	0 to 20ppm	10ppm	3 mins	-20°C	+50°C
H ₂ S	0 to 50ppm	20ppm	3 mins	-20°C	+50°C
H ₂ S	0 to 100ppm	50ppm	3 mins	-20°C	+50°C
CO	0 to 100ppm	50ppm	3 mins	-20°C	+50°C
CO	0 to 200ppm	100ppm	3 mins	-20°C	+50°C
CO	0 to 500ppm	250ppm	3 mins	-20°C	+50°C
Cl ₂	0 to 5ppm	3ppm	10 mins	-20°C	+50°C
Cl ₂	0 to 15ppm	10ppm	10 mins	-20°C	+50°C
O ₂	0 to 25% V/V	19% V/V	1 mins	-15°C	+40°C
NH ₃	0 to 50ppm	25ppm	10 mins	-20°C	+40°C
NH ₃	0 to 1000ppm	500ppm	10 mins	-20°C	+40°C
H ₂	0 to 1000ppm	500ppm	3 mins	-5°C	+40°C
H ₂	0 to 10000ppm	3000ppm	3 mins	-5°C	+40°C
SO ₂	0 to 15ppm	10ppm	5 mins	-15°C	+40°C
SO ₂	0 to 50ppm	20ppm	5 mins	-15°C	+40°C
NO	0 to 100ppm	50ppm	5 mins	-5°C	+40°C
NO ₂	0 to 10ppm	5ppm	5 mins	-15°C	+40°C
NO ₂	0 to 50ppm	20ppm	5 mins	-15°C	+40°C

If it is necessary to adjust the sensor set up because insufficient span or zero adjustment is available at the control card, follow these instructions:

1. Open the sensor enclosure by unscrewing the sensor cap assembly from the sensor main body and replace with a Calibration Cover (Part No: 2106D2097) and Flow Housing.
2. If the output, with no gas applied, is not zero then adjust the zero potentiometer through the Calibration Cover access holes (see following diagram) to obtain a zero indication.

3. Installation and Operation



3. Connect a gas cylinder of known gas concentration of approximately 50% FSD to the Flow Housing using nylon or PTFE tubing.

Caution: As the test gas may be hazardous, it is important that the outlet of the Flow Housing is exhausted to a safe area.

4. Apply gas at a flow rate of 1 litre per minute for the recommended application time. (See **Table 6**).
5. Adjust the span pot through the Calibration Cover access holes to read the concentration of gas applied.
6. Remove the Calibration Cover and Flow Housing and replace with the original sensor cap and fit with a new external hydrophobic assembly (optional) if required.

Note: Some gases, such as Chlorine, H₂S and Ammonia can stick to the walls of tubes, regulators and sensors. It is advisable that, when calibrating with these gases, the pipes used are as short as possible and that the sensor reaches a maximum value before spans are adjusted.

3.4 FAULT DIAGNOSIS

3.4.1 Combustible

Caution: There are no user serviceable parts within the Sensepoint sensor for combustible gases, and attempted changes may invalidate the certification requirements.

Symptom	Cause/Remedy
Sensor reads non zero all the time.	Gas could be present, ensure there is no target gas in the atmosphere.
Sensor reads non zero when no gas is present.	Adjust the control system zero.
Sensor reads low when gas is applied.	Adjust the control system span.
Sensor reads high when gas is applied.	Adjust the control system span.
Sensor reads zero when gas is applied	Check the wiring. Check the dust protection disc is removed from the filter housing. Check the sensor is not obstructed. Check the sinter and filters are not obstructed. Replace the sensor if failure is suspected.

3. Installation and Operation

3.4.2 Toxic

Symptom	Cause/Remedy
The sensor reads non zero at all times.	Gas could be present, ensure there is no target gas in the atmosphere. Background or other volatile organic gases may be present, e.g. solvents can interfere with the operation of the sensor.
The sensor reads non zero when no gas is present.	Adjust the sensor or control card zero.
The sensor zero cannot be adjusted at the control card.	Adjust the sensor zero with the control card zero set at the approximate mid-point.
The sensor reads low when gas is applied.	Adjust the sensor or the control card span. For O ₂ versions, check that the neoprene plug and adhesive film has been removed from under the plastic retainer.
The sensor reads high when gas is applied.	Adjust the sensor or the control card span.
Unable to span the sensor at the control card	Adjust the sensor span at the sensor.
The sensor reads zero when gas is applied.	<p>Check the wiring.</p> <p>Check the dust protection disc is removed.</p> <p>Check that the hydrophobic barrier is not obstructed.</p> <p>Check the filters, if fitted, are not blocked.</p> <p>For O₂ versions, check that the neoprene plug and the adhesive film has been removed from under the plastic retainer.</p> <p>Replace the sensor if failure is suspected. Temperatures above 80°C will cause failure of thermal protection fuses.</p>
No output from the sensor.	<p>No power to the sensor.</p> <p>Thermal fuse or current limiting fuse blown.</p> <p>Replace the sensor.</p>

4. Maintenance

This chapter provides the following information:

- **Schedule for routine maintenance**
- **Procedures for routine maintenance/parts replacement**

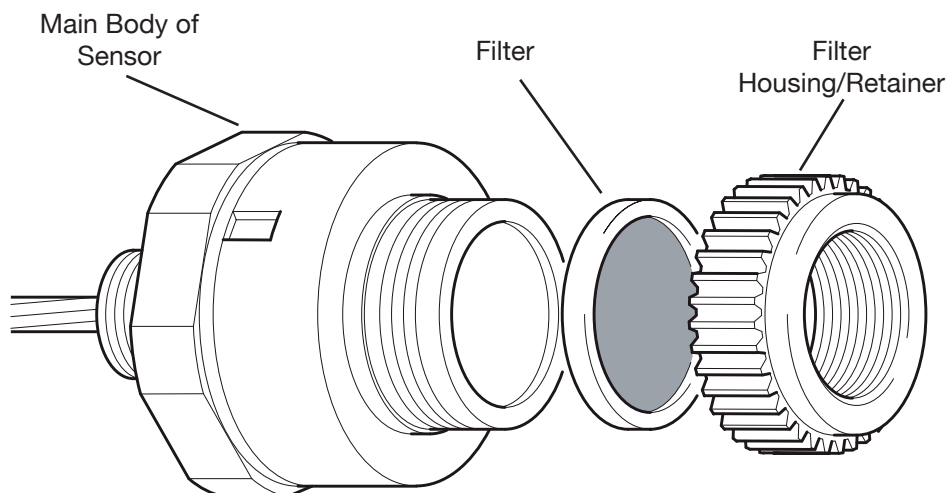
4.1 ROUTINE MAINTENANCE SCHEDULE

Sensepoint Type	Frequency	Maintenance Action	Equipment Required
All models	6 monthly	Check the zero and span	Test Gas, Regulator, Flow Housing
	On gas alarm	Check the zero and span. Replace the sensor if necessary.	Test Gas, Regulator, Flow Housing
Combustible	3 monthly	Check the filters for cleanliness	-
	5 yearly	Replace the sensor if required	-
Toxic - H ₂ S, CO models	2 yearly	Replace the cell if required	-
Toxic - Cl ₂ , O ₂ , NH ₃ , H ₂ , SO ₂ , NO, NO ₂ models	Annually	Replace the cell if required	-

4.2 COMBUSTIBLE SENSOR MAINTENANCE PROCEDURES

4.2.1 Changing the Filter

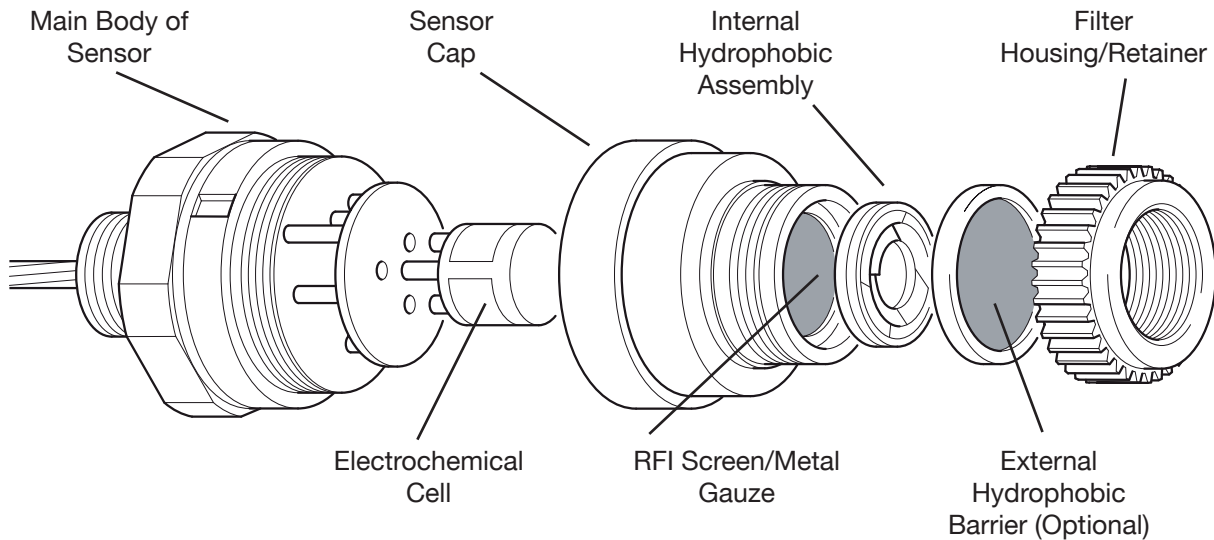
1. Unscrew and remove the filter housing/retainer or accessory from the sensor body.
2. Remove the old filter and replace with a fresh filter.



3. Replace the filter housing/retainer or accessory.

4. Maintenance

4.3 TOXIC SENSOR MAINTENANCE PROCEDURES



Note: When replacing the electrochemical cells the sensor cap has to be removed. The inside surfaces of the cap are coated with a silver based coating which is used to shield the cell and electronics from external RF fields.

When removing the sensor cap it may be noted that the silver coating is incomplete on the threaded portion. This does not affect the operation and should not be a cause for concern. If small particles of silver are noted inside the enclosure on removing the cap, remove these by gently blowing away any loose material. Ensure the O-ring is fitted into the groove on the main body (at the top of the Sensor Cap thread) and fully tighten when the cell is replaced.

When replacing the sensor cap note that it has a single moulded thread pick up point and care must be taken to engage the thread correctly to avoid cross threading. The sensor cap should be tightened hand tight or to a torque of 5Nm.

4.3.1 Changing the External Filter

- (1) Unscrew and remove the filter housing/retainer (or accessory if fitted) from the sensor.
- (2) Remove the old external hydrophobic barrier (Hydrophobic Barrier is Optional) and replace it with a new one if fitted.
- (3) Replace the filter housing/retainer (or accessory if fitted).
Ensure any required seals are in place.

4.3.2 Replacing the Electrochemical Cell and Internal Filter

- (1) Unscrew and remove the filter housing/retainer (or accessory if fitted) from the sensor.
- (2) Remove the old internal hydrophobic assembly by pushing against the snap fit, through one of the retaining slots, with a small flat bladed screwdriver.
The assembly will pop out.

Caution: Do not attempt to lever the assembly out as this may damage the housing.

- (3) Remove the internal metal gauze insert.
- (4) Open the enclosure by unscrewing the sensor cap assembly from the sensor main body.

4. Maintenance

Ensure that the electrochemical cell does not rotate with the cap.

(5) Gently pull the old electrochemical cell from the PCB.

See the subsequent note about replacing the Oxygen electrochemical cell.

Caution: Dispose of the electrochemical cell in accordance with local regulations.

(6) Remove the new cell from its packaging and remove the shorting link across the base of cell.

(7) Plug the new cell into the PCB.

Note: For Oxygen Sensepoint, unscrew the old cell connections, then screw in the new one. Support O₂ screw pillars during removal and refitting of O₂ cell screws. Please refer to supplied instruction leaflet.

(8) Screw the sensor cap assembly back onto the sensor main body.

(9) Fit the new internal metal gauze assembly.

(10) Fit the new internal hydrophobic assembly.

Note: The sensor should now be calibrated. Re-calibration should only be attempted by qualified service personnel.

(11) Replace the filter housing/retainer or accessory.

(12) In the event of an apparatus failure, return unit to Honeywell Analytics.

4.3.3 Changing the Sensor

The following is a general procedure that describes how to replace any of the Sensepoint sensors.

1. Isolate all associated power supplies and ensure that they remain **OFF** during this procedure. Ensure a gas free atmosphere.
2. If fitted, unscrew and remove the filter housing/retainer or accessory from the sensor body.
3. Remove the junction box lid.
4. Disconnect the sensor wiring from the junction box terminal strip.
Record the location of the sensor wiring in the terminal blocks.
5. Remove the Sensepoint sensor from the junction box.
If fitted first remove the sensor lock-nut. Unscrew the sensor body from the cable entry. Feed the sensor wires out through the cable entry in the junction box
6. Fit the new sensor.
Follow the installation instructions described in Chapter 3 when fitting the replacement sensor.
7. Refit the filter housing/retainer or accessory to the sensor body.
8. Switch on all associated power supplies.
9. Check that the system is working correctly.
Carry out any calibration procedures required.
10. Return the system to normal operation.

Appendix A – Specifications





A.1 COMBUSTIBLE LEL - STANDARD VERSION

Gases Detected	Combustible gases in the LEL range with the sensitivity dependent on gas type.
Range	0 - 100% LEL Methane. Other gas ranges may vary.
Operating Temperature Range	-40°C to +80°C (See Certification)
Temperature Effects	Better than $\pm 1\%$ LEL zero stability across range -20°C to +55°C. Better than $\pm 3\%$ LEL span stability across range -40°C to +80°C.
Operating Humidity Range	20% to 90% RH continuous. 10% to 99% intermittent - non condensing.
Humidity Effects	Better than $\pm 1\%$ LEL zero stability across range. Better than $\pm 2\%$ LEL span stability across range.
Operating Pressure Range	90 to 110kPa.
Pressure Effects	Better than $\pm 1\%$ LEL zero stability across range. Better than $\pm 5\%$ LEL span stability across range.
Warm-up Time	10 minutes.
Response Time	Dependent upon the accessories fitted as follows:

Accessory	Typical T50(s)	Typical T60(s)	Typical T90(s)
Standard M40 Weather Protection with hydrophobic barrier	7.0	7.5	13.5
Standard M40 Weather Protection without hydrophobic barrier	6.0	7.0	11.0
Metal M36 Weather Protection with hydrophobic barrier (780 style)	9.0	10.0	19.5
Metal M36 Weather Protection without hydrophobic barrier (780 style)	8.0	9.0	16.0
No Weather Protection fitted	4.0	5.5	8.5

Voltage Range	2.9V to 3.5V bridge (at 200mA drive current).
Power Consumption	700mW.
Signal Output	mV bridge.
Sample Flow Rate	Recommended 1 to 1.5 litres/minute.

Appendix A – Specifications

Linearity	Better than $\pm 5\%$ FSD or $\pm 10\%$ reading, whichever is the greater.
Accuracy/Repeatability	Better than $\pm 2\%$.
Zero Stability With Time	Better than $\pm 3\%$ LEL/year.
Span Stability With Time	Better than $\pm 3\%$ LEL/year.
Poisoning	The sensing elements may become inactive after extensive exposure to silicones, halogenated hydrocarbons, heavy metals or sulphur compounds.
Expected Operating Life	5 years.
Storage Life	Typically no degradation is observed in clean, stable conditions for up to 5 years.
Storage Conditions	0 to 25°C. 30 to 70% RH non-condensing. 75 to 110kPa.
IP Rating	IP65 standard; IP67 with Weather Protection.
Thread Adaptor	M20, M25, M26, 3/4 NPT.
Dimensions	56mm diameter x 74mm long (maximum)
Weight	190g.
Certification	 II 2 GD Ex d IIC Gb T85°C Tamb -40° to +55°C  II 2 GD Ex d IIC Gb T100°C Tamb -40° to +70°C  II 2 GD Ex d IIC Gb T135°C Tamb -40° to +80°C  tb IIIC A21 Db IP67 Baseefa08ATEX0265X IECEx BAS08.0068X
CE Standards	This product complies with the relevant CE standards concerning performance: EN60079-29-1 EN50270
A.2 COMBUSTIBLE LEL - HIGH TEMPERATURE VERSION	
Gases Detected	Combustible gases in the LEL range with the sensitivity dependent on gas type.
Range	0 - 20% LEL Note 0-20%LEL range not EN60079-29-1 performance approved 0 - 100% LEL Methane.
Operating Temperature Range	-55°C to +150°C (See Certification)



Appendix A – Specifications

Temperature Effects	Better than $\pm 3\%$ LEL zero stability across range -55°C to $+150^{\circ}\text{C}$. Better than $\pm 4\%$ LEL span stability across range -55°C to $+150^{\circ}\text{C}$.
Operating Humidity Range	20% to 90% RH continuous. 10% to 99% intermittent - non condensing.
Humidity Effects	Better than $\pm 3\%$ LEL zero stability across range. Better than $\pm 3\%$ LEL span stability across range.
Operating Pressure Range	90 to 110kPa.
Pressure Effects	Better than $\pm 3\%$ LEL zero stability across range. Better than $\pm 3\%$ LEL span stability across range.
Warm Up Time	30 minutes.
Response Time	Dependent upon the accessories fitted as follows:





Accessory	Typical T50(s)	Typical T60(s)	Typical T90(s)
Standard M40 Weather Protection with hydrophobic barrier (not to be used in high or low temperature use.)	7.0	7.5	13.5
Standard M40 Weather Protection without hydrophobic barrier (not to be used in high or low temperature use.)	6.0	7.0	11.0
Metal M36 Weather Protection with hydrophobic barrier (780 style)	9.0	10.0	19.5
Metal M36 Weather Protection without hydrophobic barrier (780 style)	8.0	9.0	16.0
No Weather Protection fitted	4.0	5.5	8.5

Voltage Range	2.9V to 3.5V bridge (at 200mA drive current).
Power Consumption	700mW.
Signal Output	mV bridge.
Sample Flow Rate	Recommended 1 to 1.5 litres/minute.
Linearity	Better than $\pm 5\%$ FSD.
Accuracy/Repeatability	Better than $\pm 2\%$ LEL.
Zero Stability With Time	Better than $\pm 5\%$ LEL/year.
Span Stability With Time	Better than $\pm 5\%$ LEL/year.
Poisoning	The sensing elements may become inactive after extensive exposure to silicones, halogenated hydrocarbons, heavy metals or sulphur compounds.
Expected Operating Life	5 years.
Storage Life	Typically no degradation is observed in clean, stable conditions for up to 5 years.

Appendix A – Specifications

Storage Conditions	0 to 25°C. 30 to 70% RH non-condensing. 75 to 110kPa.
IP Rating	IP65 standard; IP66 with Weather Protection.
Thread Adaptor	M20, M25, 3/4 NPT.
Dimensions	42mm diameter x 58mm long (maximum).
Weight	225g.
Certification	 II 2 GD Ex d IIC Gb T3 Tamb -55° to +150°C  tb IIIC T200°C Db IP66 A21 Baseefa08ATEX0264X IECEX BAS08.0069X.
CE Standards	This product complies with the relevant CE standards concerning performance: EN60079-29-1 EN50270
A.3 COMBUSTIBLE PPM - Not EN60079-29-1 approved	
Gases Detected	Combustible gases in the ppm range with the sensitivity dependent on gas type.
Range	0 - 7000ppm Methane. Other gas ranges may vary.
Operating Temperature Range	-30°C to +65°C
Temperature Effects	Better than ±3% FSD zero stability across range (0.06% per °C). Better than ±8% FSD span stability across range.
Operating Humidity Range	20% to 90% RH continuous. 10% to 99% intermittent - non condensing.
Humidity Effects	Better than ±1% FSD zero stability across range. Better than ±2% FSD span stability across range.
Operating Pressure Range	90 to 110kPa.
Pressure Effects	Better than ±2% FSD zero stability across range. Better than ±5% FSD span stability across range.
Warm Up Time	20 minutes.
Response Time	T60 - Less than 6 seconds. T90 - Less than 10 seconds.
Voltage Range	2.9V to 3.5V bridge (at 200mA drive current).

Appendix A – Specifications

Power Consumption	700mW.
Signal Output	mV bridge.
Sample Flow Rate	Recommended 1 litre/minute.
Linearity	Better than $\pm 5\%$ FSD or $\pm 10\%$ reading, whichever is the greater.
Accuracy/Repeatability	Better than $\pm 2\%$.
Zero Stability With Time	Better than $\pm 3\%$ FSD/year.
Span Stability With Time	Better than $\pm 3\%$ FSD/year.
Poisoning	The sensing elements may become inactive after extensive exposure to silicones, halogenated hydrocarbons, heavy metals or sulphur compounds.
Expected Operating Life	5 years.
Storage Life	Typically no degradation is observed in clean, stable conditions for up to 5 years.
Storage Conditions	0 to 25°C. 30 to 70% RH non-condensing. 75 to 110kPa.
IP Rating	IP65 standard; IP67 with Weather Protection.
Thread Adaptor	M20, 3/4 NPT.
Dimensions	56mm diameter x 74mm long (maximum).
Weight	190g.
Certification	 II 2 GD Ex d IIC Gb T85°C Tamb -40° to +55°C  II 2 GD Ex d IIC Gb T100°C Tamb -40° to +70°C  II 2 GD Ex d IIC Gb T135°C Tamb -40° to +80°C  tb IIIC A21 Db IP67 Baseefa08ATEX0265X IECEX BAS08.0068X
CE Standards	This product complies with the relevant CE standards concerning performance: EN50270

Appendix A – Specifications

A.4 COMBUSTIBLE PPM - EN60079-29-1 Approved

Gases Detected Range	Methane, Ethylene 0 - 4400ppm Methane. 0 – 2300ppm Ethylene
Operating Temperature Range	-30°C to +65°C
Temperature Effects	Better than $\pm 8\%$ FSD zero stability across range (0.06% per °C). Better than $\pm 9\%$ FSD span stability across range.
Operating Humidity Range	20% to 90% RH continuous. 10% to 99% intermittent - non condensing.
Humidity Effects	Better than $\pm 7\%$ FSD zero stability across range. Better than $\pm 8\%$ FSD span stability across range.
Operating Pressure Range	80 to 120kPa.
Pressure Effects	Better than $\pm 7\%$ FSD zero stability across range. Better than $\pm 9\%$ FSD span stability across range.
Warm Up Time	20 minutes.
Response Time	Methane T50 < 6 seconds, T90 < 16 seconds. Ethylene T50 < 7 seconds, T90 < 17 seconds.
Voltage Range	2.9V to 3.5V bridge (at 200mA drive current).
Power Consumption	700mW.
Signal Output	mV bridge.
Sample Flow Rate	Recommended 1 litre/minute.
Linearity	Better than $\pm 5\%$ FSD or $\pm 10\%$ reading, whichever is the greater.
Accuracy/Repeatability	Better than $\pm 2\%$.
Zero Stability With Time	Better than $\pm 5\%$ FSD/year.
Span Stability With Time	Better than $\pm 5\%$ FSD/year.
Poisoning	The sensing elements may become inactive after extensive exposure to silicones, halogenated hydrocarbons, heavy metals or sulphur compounds.
Expected Operating Life	5 years.
Storage Life	Typically no degradation is observed in clean, stable conditions for up to 5 years.

Appendix A – Specifications

Storage Conditions	0 to 25°C. 30 to 70% RH non-condensing. 75 to 110kPa.
IP Rating	IP65 standard; IP67 with Weather Protection.
Thread Adaptor	M20, 3/4 NPT.
Dimensions	56mm diameter x 74mm long (maximum).
Weight	190g.
Certification	“Ex logo” II 2 GD Ex d IIC Gb T85°C Tamb -40° to +55°C “Ex logo” II 2 GD Ex d IIC Gb T100°C Tamb -40° to +70°C “Ex logo” II 2 GD Ex d IIC Gb T135°C Tamb -40° to +80°C “Ex logo” tb IIIC A21 Db IP67 Baseefa08ATEX0265X IECEX BAS08.0068X
CE Standards	This product complies with the relevant CE standards concerning performance: EN60079-29-1 (BVS 04 ATEX G 001 X) EN50270

Appendix A – Specifications

A.5 TOXIC

Gas	Range	Response Time		Stabilisation Time	Temp Range (°C)	Zero* Drift Temp	Span* Drift Temp**	Zero Stab/yr ***	Span Stab/yr **	Humid Stab/yr ***
		T50	T90							
H ₂ S	0 - 20ppm	15	40	<3mins	-20 - +50	±5%	±25%	2%	2%	+10%
	0 - 50ppm	15	40	<3mins	-20 - +50	±5%	±25%	2%	2%	+10%
	0 - 100ppm	15	40	<3mins	-20 - +50	±5%	±25%	2%	2%	+10%
CO	0 - 100ppm	12	30	<3mins	-20 - +50	±5%	±20%	2%	4%	+2%
	0 - 200ppm	12	30	<3mins	-20 - +50	±5%	±20%	2%	4%	+2%
	0 - 500ppm	12	30	<3mins	-20 - +50	±5%	±20%	2%	4%	+2%
O ₂	1 - 25% V/V	5	10	<5mins	-15 - +40	-	±10%		2%	±1%
NH ₃	0 - 50ppm	10	65	<3mins	-20 - +40	±6%	±20% ±20%	<2%	20%	+10%
	0 - 1000ppm	10	65	<3mins	-20 - +40	±6%		<2%	20%	+10%
Cl ₂	0 - 5ppm	50	225	<5mins	-20 - +50	±2%	±20/55%#	<2%	2%	+2%
	0 - 15ppm	50	225	<5mins	-20 - +50	±2%	±20/55%#	<2%	2%	+2%
NO	0-100ppm	5	30	12hr	-15 - +40	±5%	±25%	2%	2%	±10%
NO ₂	0-10ppm	30	60	1hr	-15 - +40	±5%	±25%	2%	2%	±10%
H ₂	0-1000ppm	10	45	<3mins	-15 - +40	±2%	±60%	<2%	2%	-2%
	0-10000ppm	10	45	<3mins	-15 - +40	±2%	±60%	<2%	2%	-2%
SO ₂	0-15ppm	10	90	<3mins	-15 - +40	±5%	±15%	<2%	2%	-10%
	0-50ppm	10	90	<3mins	-15 - +40	±5%	±15%	<2%	2%	-10%

where:

* = over the specified temperature range.

** = % of applied concentration.

*** = % of range (FSD).

= ±20% (-20 to 40°C) or ±55% (-20 to 50°C)

Linearity ±5%.

Recovery Time 10ppm clean air
T50 = less than 8 secs
T10 = less than 30 secs.

Operating Humidity Range 20% to 90% RH continuous.
10% to 99% RH intermittent (non-condensing).

Nominal Lower Limit of Measuring Range 0ppm 0.2ppm.

Operating Pressure Range 90 to 110kPa.

Voltage Range 18 to 30V.

Power Consumption 0.9 W maximum.

Appendix A – Specifications

Signal Output Nominal 4 to 20 mA loop powered as follows:

Significance	Signal Loop
Inhibit/Underrange/Fault	Less than 3mA
Zero Signal	4mA
Full Scale Signal	20mA
Over Range/Fault	More than 20mA
Maximum Current	30mA

Sample Flow Rate Recommended 1 to 1.5 litres/minute.

Contaminants The presence of volatile organic gases (e.g. Acetone, MEK, Methanol) can cause false readings.

Expected Operating Life H₂S, CO not less than 24 months.
NH₃, Cl₂, NO, NO₂, SO₂, H₂, O₂ not less than 12 months.



Storage Life 6 months.

Storage Conditions 0 to 25°C.
30 to 70% RH non-condensing.
75 to 110kPa.

IP Rating IP65 standard; IP67 with Weather Protection.

Dimensions 56mm diameter x 90mm long (maximum).

Weight Oxygen 205g.
Others 185g.

Certification  II 2 GD Ex d ia IIC T4 Gb Tamb -40° to +65°C
 Ex tb IIIC A21 IP67 T135°C Db
Baseefa08ATEX0263X
IECEX BAS08.0070X
CSA Class I, Division 2, Groups B, C & D
(approved for hazardous locations in Canada and USA) Certificate number 2404330

CE Standards This product complies with the relevant CE standards concerning performance:
EN50270

Appendix B – Certification

Note: The certification labels are as defined by Directive 94/9/EC. The first label diagram identifies the defined label areas. The other labels contain similar information.

B.1 COMBUSTIBLE - LEL STANDARD VERSION & PPM

CE Mark (Conforms to all applicable European directives)

Manufacturer's Trademark & Address

Product Name

Certification Number

Explosion Protection Mark and Equipment Group & Category

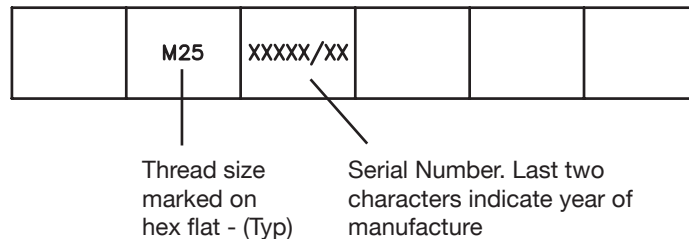
Identification Trademark Number of ATEX Notified Body

Caution

Certified Ambient Temperature Range

Certification Code as BS EN 60079

Certification marking: Front

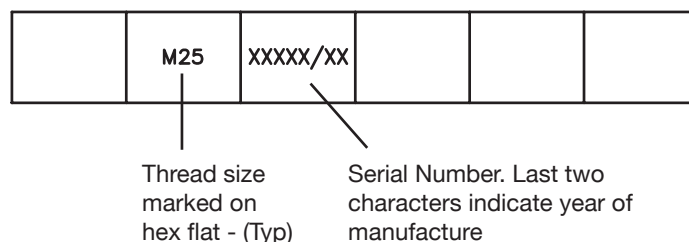


Certification marking: Rear

B.2 COMBUSTIBLE - LEL HIGH TEMPERATURE VERSION

B.3 TOXIC

Certification marking: Front



Certification marking: Rear

Appendix B – Certification

B.4 China RoHS

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCB 板	X	0	0	0	0	0
气体传感器	X	0	0	0	0	0

本表格中未列出的所有部件和配件包含的有害物质都没有超过 GB/T 26572 所要求的限制。

本表格依据 SJ/T 11364 的规定编制

○ : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T26752 规定的限量要求以下。

× : 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。

Appendix C – Accessories & Spare Parts

C.1 COMBUSTIBLE LEL

Description		Part Number
Collecting Cone		02000-A-1642
0-100% LEL Standard Sensor	3/4NPT	2106B1204
	M20	2106B1200
	M25	2106B1201
	M26	2106B1202
	VQ1AB pellistor	M26
0-100% LEL High Temperature Sensor	3/4NPT	2106B2312
	M20	2106B2310
	M25	2106B2311
Filter		00780-F-0018
Filter Housing/Retainer		00780-C-0038
Flow Housing		02000-A-1645
High Temperature Junction Box*		2052D0001
High Temperature Weather Protection		00780-A-0076
Junction Box (Standard)		00780-A-0100
Weather Protection (Combustible)		02000-A-1640

*Note: the certified temperature range of the high temperature junction box is limited to -50°C to +150°C

C.2 COMBUSTIBLE PPM

Description		Part Number
Collecting Cone		02000-A-1642
Filter		00780-F-0018
Filter Housing/Retainer		00780-C-0038
Flow Housing		02000-A-1645
Junction Box (Standard)		00780-A-0100
Sensor (Complete)	M20	2106B1205
	3/4NPT	2106B1209
Weather Protection (Combustible)		02000-A-1640

Storage Conditions

0 to 25°C.
30 to 70% RH non-condensing.
75 to 110kPa.

Appendix C – Accessories & Spare Parts

C.3 TOXIC

Description	Part Number
Electrochemical Cell Exchange Kits	See table
Flow Housing (Standard)	02000-A-1645
Flow Housing (for Adsorbent Gases)	02000-A-3120
Gas Calibration Cap	2106D2097
Junction Box (Standard)	00780-A-0100
Hydrophobic Barrier (External)	00910-A-0404
Weather Protection (Toxic)	02000-A-1635

Electrochemical Cell Exchange Kits

Gas Type	Part Number
Cl ₂	2106B1547
CO	2106B1548
H ₂ (0-1000ppm)	2106B1597
H ₂ (0-10,000ppm)	2106B1598
H ₂ S	2106B1549
NH ₃ (0-50ppm)	2106B1596
NH ₃ (0-100ppm)	2106B1593
NH ₃ (0-1000ppm)	2106B1595
NO	2106B1594
NO ₂ (0-10ppm)	2106B1599
O ₂	2106B1545
SO ₂	2106B1546

To re-order a complete new Toxic sensor see the label on the product leads or contact Honeywell Analytics.

Appendix D – Cross Interference Tables

Calibrated Gas	CO		H ₂ S		Cl ₂		SO ₂		NO ₂	
Sensor Type	Surecell		Surecell		CTL Series 4		CTL Series 4		CTL Series 4	
Interference Gas	Concentration	Reading	Concentration	Reading	Concentration	Reading	Concentration	Reading	Concentration	Reading
Acetylene	–	–	–	–	–	–	–	–	–	–
Ammonia	–	–	–	–	–	–	–	–	–	–
Carbon Dioxide	2.5%	<2	1%	<1	–	–	–	–	–	–
Carbon monoxide	100	100	100	0	300	0	300	3	300	-15
Chlorine	1	0	1	1	–	–	–	–	1	1
Ethanol	–	–	–	–	–	–	–	–	–	–
Ethylene	100	154	500	0	–	–	–	–	–	–
Ethylene oxide	–	–	–	–	–	–	–	–	–	–
Hydrogen	1000	140	500	0	–	–	–	–	–	–
Hydrogen Sulphide	25	0	100	100	15	-1	15	0	15	0
Methane	1%	0	1%	<1	–	–	–	–	–	–
Methanol	–	–	–	–	–	–	–	–	–	–
Nitrogen dioxide	3	0	3	0	–	–	5	-5	20	20
Nitric oxide	100	28	25	0	35	0	35	0	35	0
Phosphine	–	–	–	–	–	–	–	–	–	–
Sulphur dioxide	25	0	2	0	5	0	–	–	5	0

Calibrated Gas	NH ₃		NH ₃		H ₂		NO		O ₂	
Sensor Type	Sensoric 100		Sensoric 100		Sensoric		Sensoric		Plastic C/2	
Interference Gas	Concentration	Reading	Concentration	Reading	Concentration	Reading	Concentration	Reading	Concentration	Reading
Acetylene	–	–	–	–	100	0	–	–	–	–
Ammonia	–	–	–	–	–	–	–	–	–	–
Carbon Dioxide	1%	0	1%	0	1000	0	1%	0	–	–
Carbon Monoxide	300	100	300	3	50	0	1000	0	–	–
Chlorine	5	0	5	0	5	0	5	0	–	–
Ethanol	1000	1	1000	1	–	–	–	–	–	–
Ethylene	1%	0	1%	0	500	0	–	–	–	–
Ethylene oxide	–	–	–	–	–	–	–	–	–	–
Hydrogen	1000	80	1000	25	2000	2000	1000	0	100%	-9%
Hydrogen Sulphide	14	18	14	0	10	0	–	–	–	–
Methane	–	–	–	–	1%	0	–	–	100%	0
Methanol	–	–	–	–	–	–	–	–	–	–
Nitrogen dioxide	50	-25	–	–	10	0	100	0	25ppm	No effect
Nitric oxide	–	–	–	–	–	–	–	–	–	–
Phosphine	–	–	–	–	–	–	–	–	–	–
Sulphur dioxide	25	-21	–	–	2	0	50	0	–	–

Appendix D – Cross Interference Tables

Notes:

1. The figures in the tables are only approximate since cross interference values can vary greatly from cell to cell.
2. These figures do not form the basis for predicting cross sensitivity figures.
3. Cross interferences are not necessarily linear, therefore extrapolation of these figures much beyond the range shown should not be carried out.
4. All quantities are in ppm unless otherwise shown.
5. High concentrations of acid gases (e.g. CO₂, SO₂, NO₂) or helium will enhance the sensitivity to Oxygen. The signal will increase by approximately 0.3% for every 1% of CO₂ present.
Data not available for other gases.
6. Percent levels of chlorine or ozone will give an expected 1:1 cross interference to Oxygen.
No data to confirm this.

Appendix E – Glossary

Explosive Gas Atmosphere

A mixture in air of flammable materials in the form of gas vapour or mist in which, after ignition, combustion spreads throughout the unconsumed mixture.

Lower explosive limit (LEL)

The volume of flammable gas or vapour in air below which an explosive gas atmosphere will not be formed.

Ex d

Flame proof or explosion proof within the confines of the European standards EN60079. An enclosure that can withstand the pressure developed during the internal explosion of an explosive mixture and which prevents transmission of the explosion to the explosive atmosphere surrounding the enclosure.

Ex e

Increased safety within the confines of the European standards EN60079 applied to electrical apparatus that does not produce arcs or sparks in normal service, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures.

PPS

Polymer Polyphenylene Sulphide, suitable for use in most chemical environments (e.g. acids, aldehydes, ketones, alkalis, petroleum, aromatic hydrocarbons, alcohols, ethers, esters and most chlorinated hydrocarbons). Avoid immersion in solvents for extended periods. For further details contact Honeywell Analytics Ltd.

IS

Intrinsically Safe apparatus in which the circuits themselves are incapable of causing ignition of a flammable gas.

Find out more

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