

4P-90 CiTipeL®

Combustible Gas Sensor
Part Number: PM143-000

Key Features & Benefits:

- ATEX, UL and CSA Approvals
- Withstands EN/IEC 60079-0 impact test
- Enhanced H₂S and silicone poison resistance

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Sensitivity	75 ± 7 mV/%methane
T90 Response Time	<20 seconds (methane)
Poison Resistance	Resistance to H ₂ S poisoning
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	3.3 VDC
Detector Operating Current	28 ± 5 mA
Maximum Power Consumption	288 mW
Resolution	Electronics dependant

MECHANICAL

Casing Material	Stainless steel 316
Pin Material	Gold plated brass
Weight	24 g (nominal)
Orientation Sensitivity	None

ENVIRONMENTAL

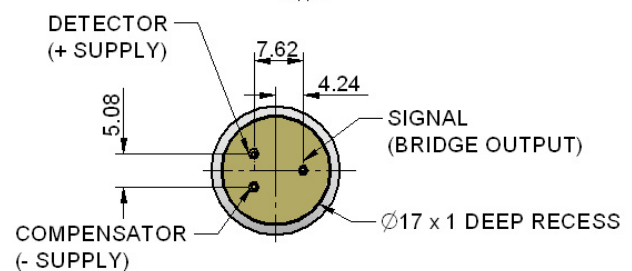
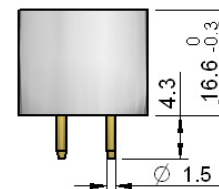
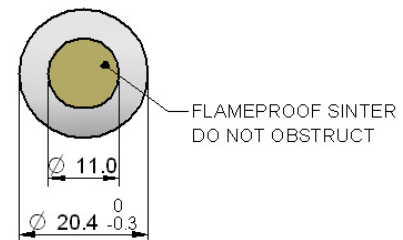
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

LIFETIME

Long Term Span Drift	<5% signal/month
Long Term Zero Drift	<5% LEL _{methane} /month
Recommended Storage Temp	0°C to 20°C
Shelf life	6 months in sealed container
Warranty	12 months from date of despatch

N.B. Flow rate of 300 ml/min. Conditions at 20°C, 50% RH, and 1013 mbar unless otherwise noted.

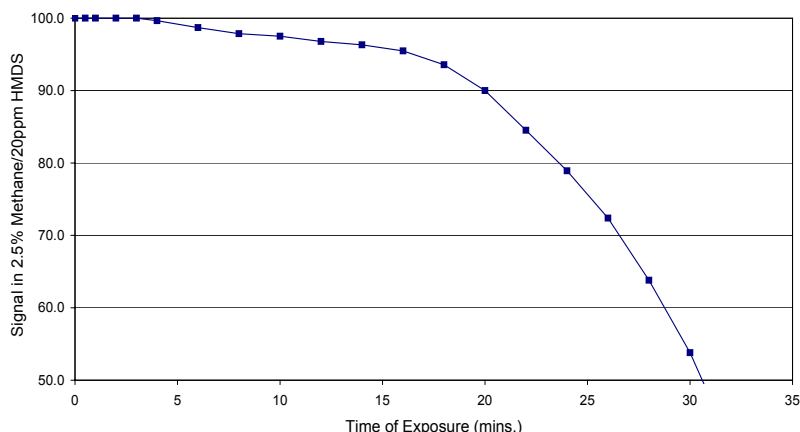
Product Dimensions



All dimensions in mm

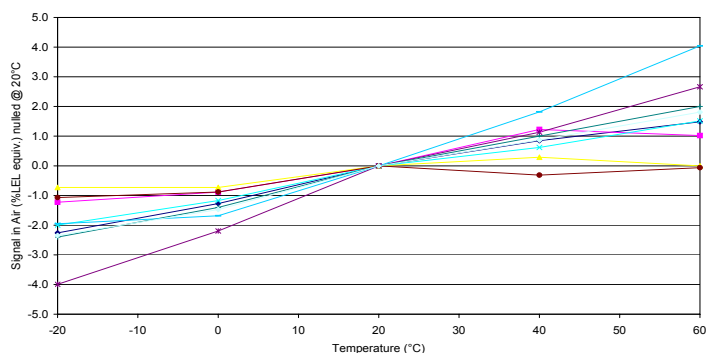
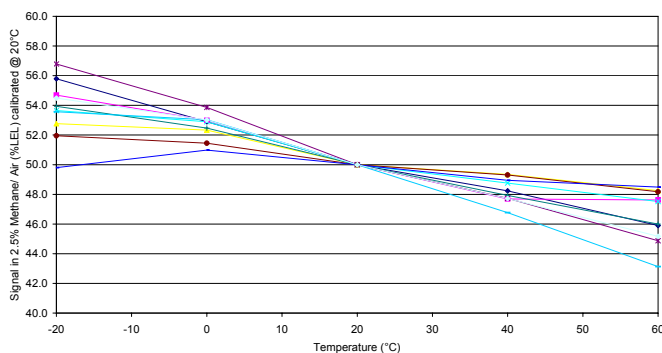
All tolerances ±0.15 mm unless otherwise stated

**Accelerated Life Tests
4P-90 - HMDS Poison Resistance**



Effect of Temperature on Methane Signal

Effect of Temperature on Zero Signal



Note: Temperature and Poison resistance data is supplied for guidance only.

Relative Sensitivity

The table below shows the variation in response of the CiTipeL on exposure to a range of gases and vapours at the same %LEL concentration. The figures are experimentally derived and expressed relative to the methane signal (=100). Testing was performed using 50%LEL CH₄ (based on 100%LEL CH₄ = 5%vol.)

Note: The results are intended for guidance only. For the most accurate measurements, an instrument should be calibrated using the gas under investigation.

Gas / Vapour	Relative Sensitivity*	Gas / Vapour	Relative Sensitivity*
Methane	100	Carbon monoxide	110
Propane	60	Acetone	65
n-Butane	60	Methyl ethyl ketone	50
n-Pentane	55	Toluene	45
n-Hexane	45	Ethyl acetate	50
n-Heptane	45	Hydrogen	105
n-Octane	40	Ammonia **	125
Methanol	90	Cyclohexane	55
Ethanol	70	Leaded Petrol	55
Iso-propyl alcohol	55	Unleaded Petrol	55
Acetylene	80	Ethylene	90
1, 3-Butadiene	55		

* Each sensitivity has been rounded to the nearest 5%
 ** T₉₀ for ammonia has been extended. Contact City Technology for further details.

Product Approval

Approval Body: CANADIAN STANDARDS ASSOCIATION
Test Standard: CSA Std C22.2 No 30-M1986
 Explosion-Proof Enclosures for Use in Class 1 Hazardous Locations
Product Categories: CSA has evaluated the flame propagation characteristics only of the device for Class I, Division 1, Groups A,B, C and D.
Certificate Number: CA 103143



Approval Body: UNDERWRITERS LABORATORIES INC.®
Test Standard: UL 913
Product Categories: Class 1, Groups A, B, C, D.
Certificate Number: E 180262



Approval Body: SIRA CERTIFICATION SERVICE
Test Standard: EN 60079-0: 2006, General Requirements
 EN 60079-1: 2007, Flameproof Enclosures 'd'
Product Categories: ExdIICT6 Gb, ExII2G, CE0518
Certificate Number: 01 ATEX1205X

The 4P is also certified under the IECEx Scheme as follows:

Test Standard: IEC 60079-0: 5th Edition 2007, General Requirements
 IEC 60079-1: 6th Edition 2007, Flameproof Enclosures 'd'
Product Categories: ExdIICT6 Gb
Certificate Number: IECEx SIR 04.0013X

**Instructions specific to hazardous area installations
 (reference European ATEX Directive 94 / 9/ EC, Annex II, 1.0.6.)**

The following instructions apply to equipment covered by certificate numbers Sira 01ATEX1205X and SIR 04.0013X;

1. The equipment may be used with flammable gases and vapours with apparatus groups IIA, IIB and IIC and with temperature classifications T1, T2, T3, T4, T5 and T6.
2. The equipment is certified for use in ambient temperatures of -20°C to +40°C.
3. The equipment has not been assessed as a safety related device (as referred to by Directive 94 / 9 / EC Annex II, clause 1.5).
4. Installation of the equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN/IEC 60079-14)
5. Inspection and maintenance of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN/IEC 60079-17).
6. Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN/IEC 60079-19).

7. Special conditions for safe use

7.1. Matrix of limitations

	DW30	CW2248
0.5W	✓	✓
1W	✓	✓

7.2. The 4P Series Sensing Head is designed to be connected to a gas detector which shall provide an intrinsically safe supply and having a maximum output power (P_o) not greater than the wattage detailed in the matrix above.

8. It is recommended that confirmation of adequate sensor performance be conducted on a regular basis by means of a defined, sensor calibration procedure. The calibration frequency will depend upon the environment in which the sensor is operated and on the perceived level of risk from the build up of flammable atmospheres.

9. The certification of this equipment relies upon the following materials used in its construction;

Enclosure material: 316 stainless steel, which contains less than 6% magnesium.

Sinter: 316 stainless steel 316L

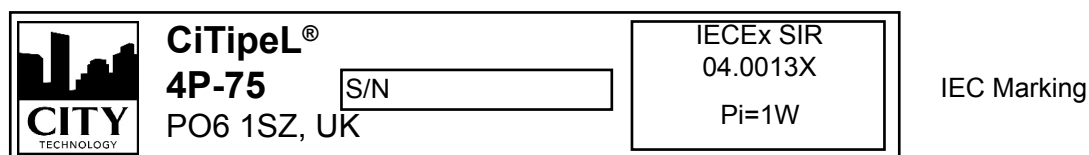
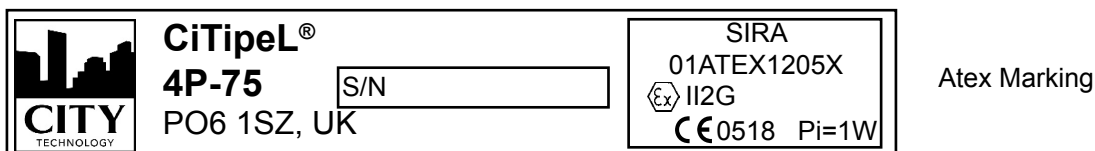
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hickey	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 475°C	170°C
City Tech reference	RM 462	RM 497

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive substances: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.

Suitable precautions: regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

10. The 4P Series Gas Sensing Head is available in several formats depending upon the operating voltage of the sensing elements. The Certification marking is shown below using the 4P-75 Gas Sensing Head as an example:



11. Certain substances are known to have a detrimental effect on catalytic elements as used in the 4P Series Gas Sensing Head.

Poisoning: some compounds will decompose on the catalyst and form a solid barrier over the catalyst surface. This action is cumulative and prolonged exposure will result in an irreversible decrease in sensitivity. The most common of these substances are: lead or sulphur containing compounds; silicones; phosphates.

Inhibition: certain other compounds, especially hydrogen sulphide and halogenated hydrocarbons, are absorbed or form compounds that are absorbed by the catalyst. The resultant loss of sensitivity is temporary and in most cases a sensor will recover after a period of operation in clean air.

In applications where it is suspected that poisons or inhibitors may be present, suitable protection for the 4P Series Gas Sensing Head should be provided.

SAFETY NOTE

This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

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