

## Combustible Gas CiTipeL<sup>®</sup> Specification



# 4P-90C CiTipeL<sup>®</sup>

### Performance Characteristics

<b>Gases Detected</b>	Combustible gases
Suitable for	methane, ethane, propane, butane, pentane, hexane, carbon monoxide and hydrogen
Unsuitable for	higher hydrocarbons, alcohols, ketones, esters, hydrogen sulphide and other sulphur containing compounds
<b>Range</b>	0-100% LEL
<b>Operating Voltage</b>	3.30V d.c.
<b>Detector Operating Current</b>	74±6mA
<b>Poison Resistance</b>	Resistant to H <sub>2</sub> S poisoning Superior Silicone resistance
<b>H<sub>2</sub>S filter lifetime</b>	typically 1000ppm hr
<b>Output Sensitivity</b>	28±5 mV/%methane
<b>T<sub>90</sub> Response Time</b>	<20 seconds (methane)
<b>Linear to</b>	3% methane
<b>Long Term Sensitivity Drift</b>	<5% signal/month
<b>Long Term Zero Drift</b>	<5%LEL <sub>methane</sub> /month
<b>Warranty Period</b>	12 months from date of despatch

N.B. Flow rate of 300 mls min<sup>-1</sup>. Conditions at 20°C, 50%RH, and 1013mBar unless otherwise noted.

### Relative Sensitivity

The table below shows the response variation of a 4P-90C 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).

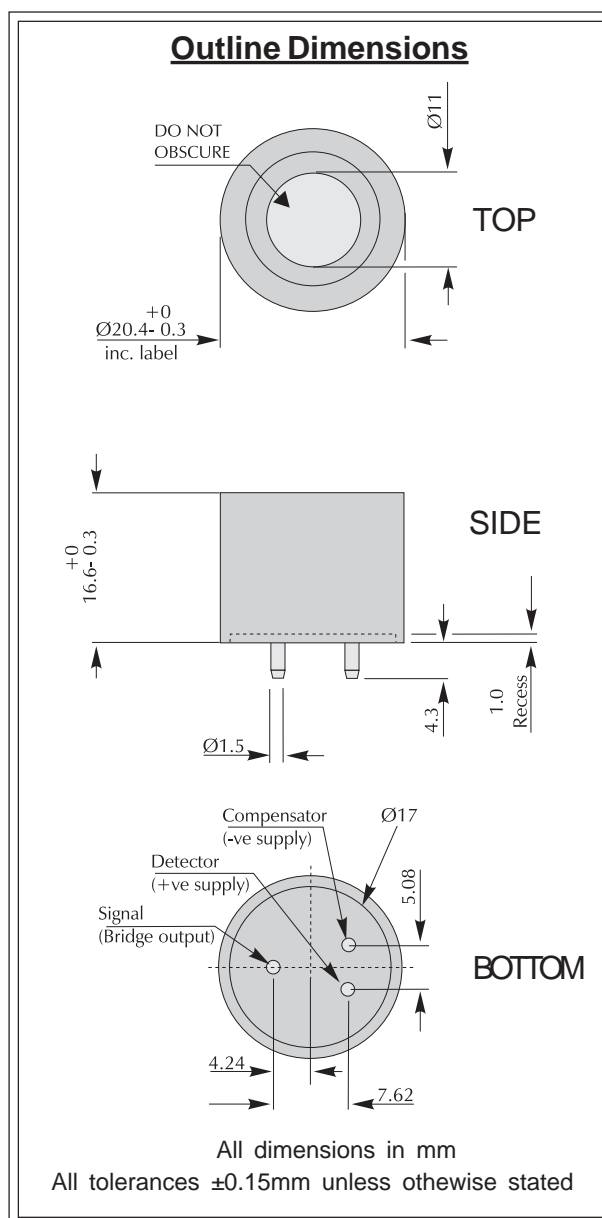
Gas/Vapour	Relative Sensitivity*	Gas/Vapour	Relative Sensitivity*
Methane	100	Carbon monoxide	105
Propane	60	Hydrogen	100
n-Butane	60	Ammonia**	125
n-Pentane	50	Cyclohexane	50
n-Hexane	40	Ethylene	85
Acetylene	80	1, 3 Butadiene	55

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

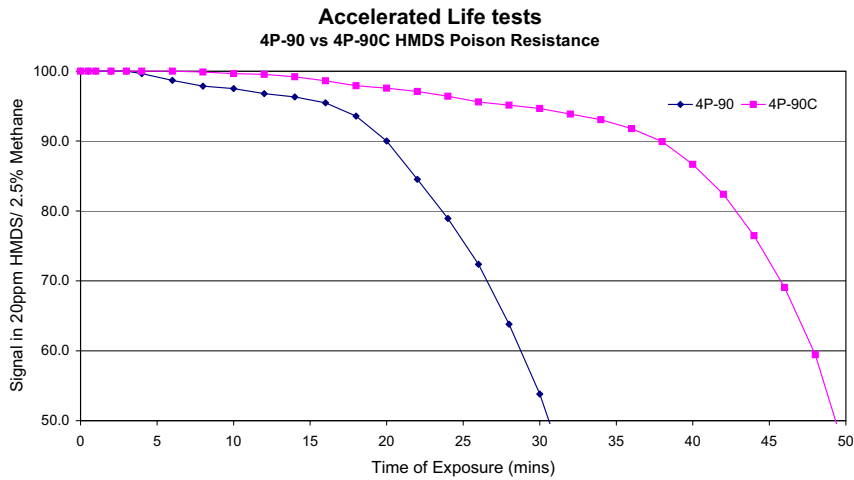
**Note:** The results are intended for guidance only. For the most accurate measurements an instrument should be calibrated using the gas under investigation.

### Enhanced Features

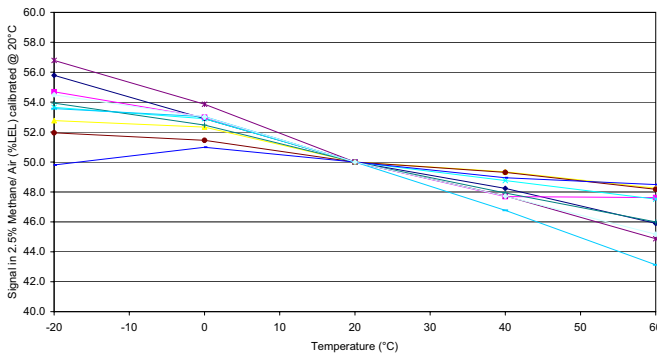
- Significantly increased silicone poison resistance
- Significantly increased H<sub>2</sub>S resistance
- As with all 4P sensors, excellent shock resistance, reduced orientation effects and wake up times
- Withstands EN 50014 impact test



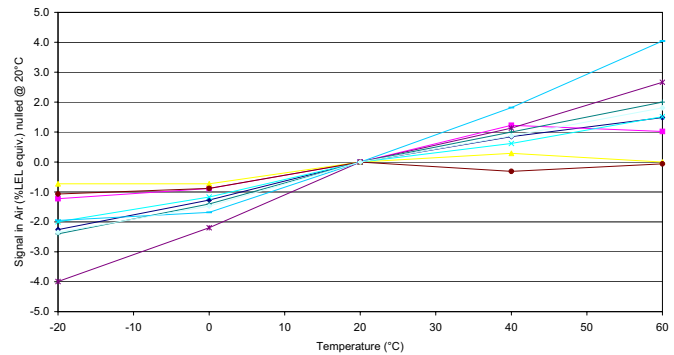
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Effect of Temperature on Methane Signal



Effect of Temperature on Zero Signal



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

## 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.<sup>®</sup>  
**Test Standard:** UL 913  
**Product Categories:** Class 1, Groups A, B, C, D.  
**Certificate Number:** E 180262



**Approval Body:** SIRACERTIFICATION SERVICE  
**Test Standard:** EN 50014:1997 (amendments A1 & A2)  
 EN 50018:2000  
**Product Categories:** EEx d IIC T6, IIC G, 0518  
**Certificate Number:** 01 ATEX 1205X

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

**Test Standard:** IEC 60079-0:2000, Edition 3.1  
 IEC 60079-1:2001, Edition 4  
**Product Categories:** Ex d IIC, P<sub>1</sub> = 1.5W  
**Ref Number:** Sira 03 I 9475

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**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 number Sira 01ATEX1205X;

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 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 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 60079-19).
7. Special conditions for safe use

7.1. Matrix of limitations

	DW30	CW2248
<b>0.5W</b>	✓	✓
<b>1W</b>	✓	✓
<b>Fitted with Plastic Disc</b>	✓ The disc must be protected from impact	✓ The disc must be protected from impact

- 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.

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

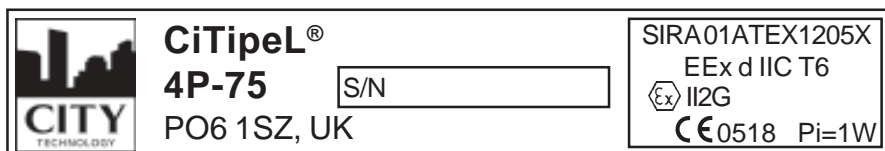
Enclosure material:	316 stainless steel, which contains less than 6% magnesium.	
Sinter:	316 stainless steel 316L S30	
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hikley	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al <sub>2</sub> O <sub>3</sub>
Other additives	25% MgO 35% MgSO <sub>4</sub>	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.

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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.