Product Data Sheet

Product Datasheet

4P75C T4 Combustible Gas Sensor

Document Purpose

The purpose of this document is to present the performance specification of the 4P75C T4 sensor.

This document should be used in conjunction with Operating Principles (OP01), the Product Safety Datasheet (PSDS 22) and the 4P Pellistors Instructions for Safe Use.

The data provided in this document are valid at 20°C, 50% RH and 1013 mBar for 3 months from the date of sensor manufacture. Output signal can drift below the lower limit over time. For guidance on sensor performance outside of these limits, please refer to the Operating Principles.

For guidance on the safe use of the sensor, please refer to the Operating Principles and the 4P Pellistors Instructions for Safe Use.

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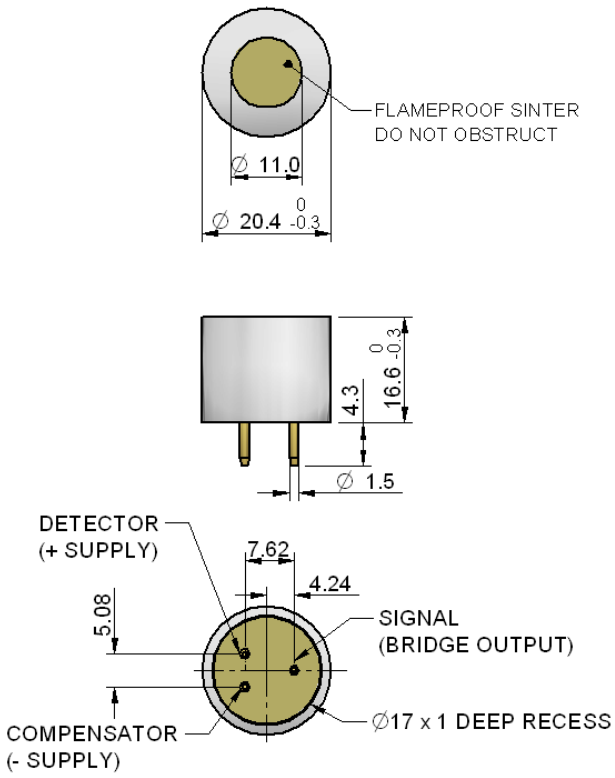
Key Features & Benefits:

- **ATEX, UL and CSA Approvals**
- **Withstands EN/IEC 60079-0 impact test**
- **Enhanced H_2S and silicone poison resistance**

Performance Characteristics

MEASUREMENT	
Operating Principle	Catalytic Oxidation
Gases Detected	Combustible gases
Suitable for	Methane, ethane, propane, butane, pentane, hexane, carbon monoxide & hydrogen
Unsuitable for	Higher hydrocarbons, alcohols, ketones, esters, hydrogen sulfide and other sulfur containing compounds
Range	0-100% LEL
Sensitivity*	24 ± 4 mV/%methane
T90 Response Time*	<20 seconds (methane)
Poison Resistance	Resistance to H_2S poisoning Superior silicone resistance
H_2S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane
ELECTRICAL	
Operating Voltage	3.0 ± 0.02 VDC
Detector Operating Current	75 ± 7 mA
Maximum Power Consumption	263 mW
Resolution	1% LEL
MECHANICAL	
Casing Material	Stainless steel 316
Pin Material	Gold plated brass
Weight	24 g (nominal)
Orientation Sensitivity	None
ENVIRONMENTAL	
Operating Temperature Range	-20ºC to +55ºC
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	0ºC to 20ºC
Shelf life	6 months in sealed container
Warranty	12 months from date of despatch

Product Dimensions



All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

* **Specifications are valid at 20°C, 50%RH and 1013 mbar at a flow rate of 300 ml/min. Performance characteristics outline the performance of sensors supplied within the first 3 months. Output signal can drift below the lower limit over time.**

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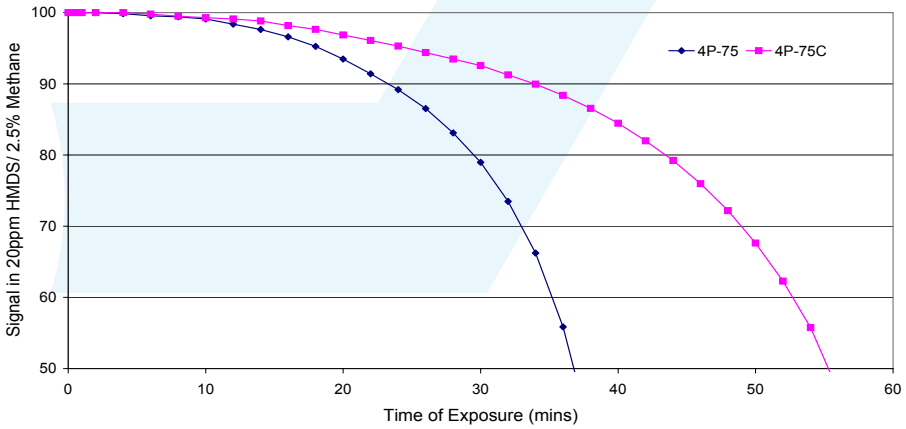
IMPORTANT NOTE

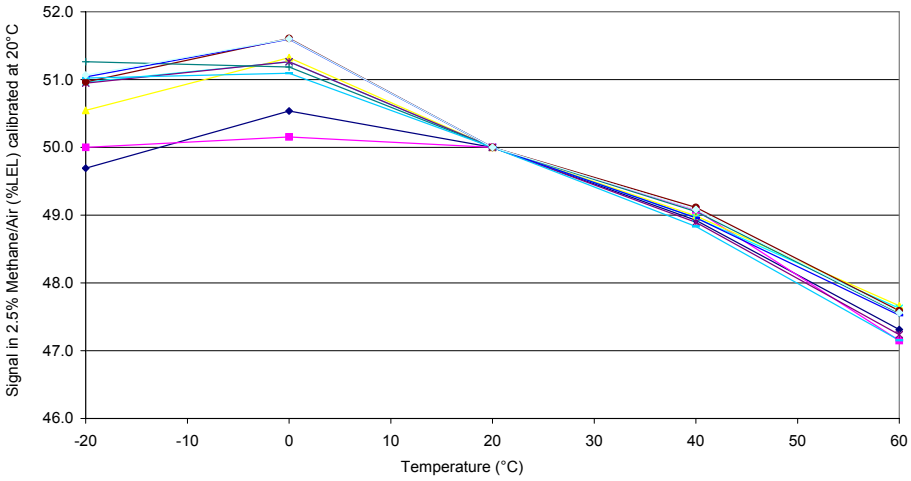
The accelerated life tests, poison resistance and temperature performance data shown below does not form part of the product specification and is supplied for guidance only.

Accelerated Life Tests

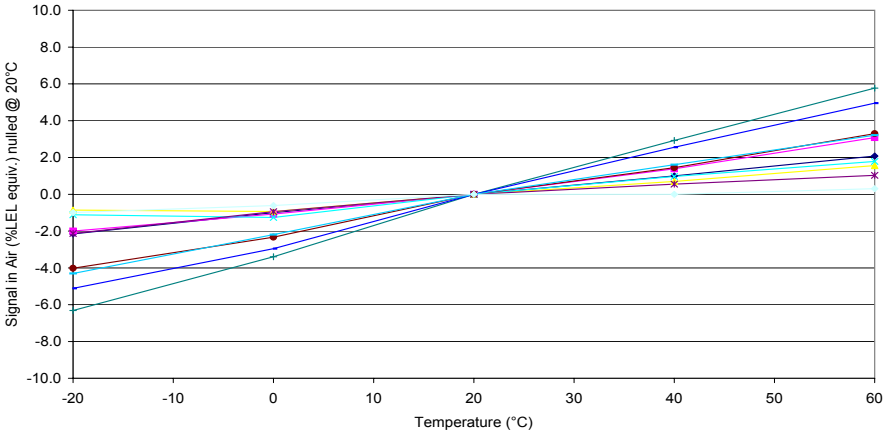
4P-75 vs 4P-75C - HMDS Poison Resistance



Effect of Temperature on Methane Signal



Effect of Temperature on Zero Signal



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Relative Sensitivity

IMPORTANT NOTE

The relative response data shown below does not form part of the product specification and is supplied for guidance only. For the most accurate measurements, an instrument should be calibrated using the gas under investigation.

The table below shows the variation in response of the sensor 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 2.5%vol. CH_4 (50%LEL CH4 based on LEL values from the now obsolete EN50054).

Relative response data are shown in the table below, based on the LEL values stated in EN 50054 (now obsolete) and EN60079-20-1:2010.

Gas / Vapour	Relative Sensitivity **	
	EN 50054 (obsolete)	EN 60079-20-1:2010
Methane	100	100
Propane	64	59
n-Butane	65	56
n-Pentane	58	66
n-Hexane	51	53
Acetylene	90	94
Carbon monoxide	126	130
Hydrogen	120	136
Ammonia ***	144	164
Cyclohexane	57	59
Ethylene	94	89
** Each sensitivity has been rounded to the nearest 1% *** T_{90} for ammonia has been extended. Contact the manufacturer for further details.		

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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, Ex II2G, CE 0518
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: ExdIIC T6 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 -20ºC to +40ºC.

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).

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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_0) 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 & Hikley	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.

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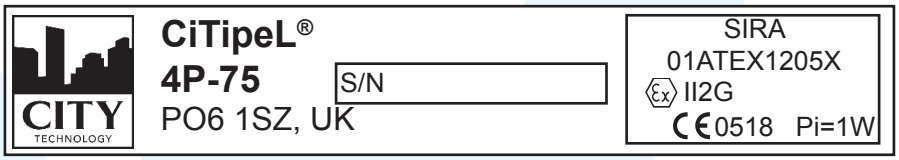
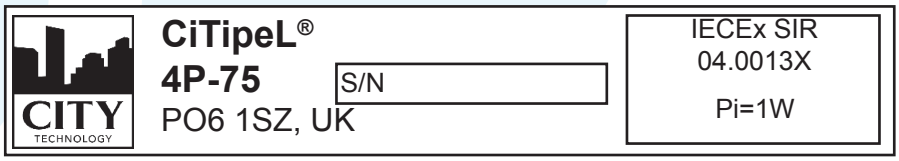
10. The 4P Series Gas Sensing Head is available in several formats depending upon the operating voltage of the sensing elements. The Certification marking is shown below using the 4P-75 Gas Sensing Head as an example:



Atex Marking



IEC Marking

11. Certain substances are known to have a detrimental effect on catalytic elements as used in the 4PSeries 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.