

Technical Specifications

MEASUREMENT

Operating Principle	Catalytic Bead
Gases Detected	Most combustible gases and vapour
Poison Resistance	Some
Measurement Range	0 - 100%LEL
Output Sensitivity	12 - 18 mV/%methane
Response Time (T₉₀)	<15 Seconds (methane)
Linearity	Linear in range 0-5% methane
Resolution	Dependant on electronics

ELECTRICAL

Operating Voltage	2.0 ± 0.1 VDC
Detector Operating Current	180 mA in recommended circuit
Maximum Power Consumption	422 mW

MECHANICAL

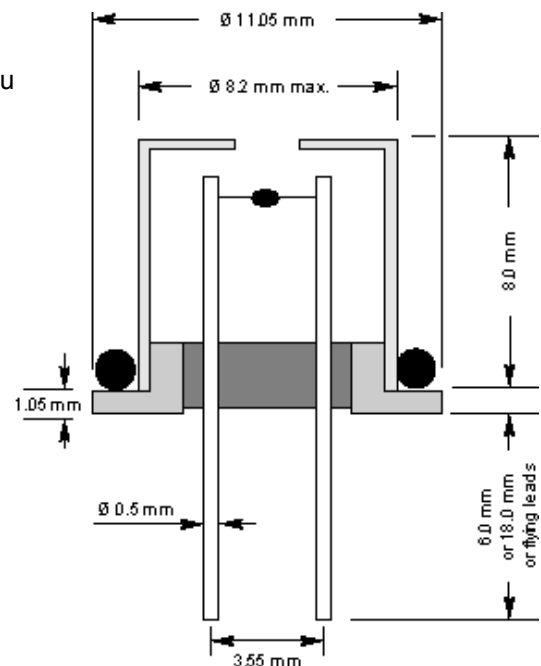
Connection	18 mm pins
Housing Material	Stainless Steel 316
Pin Material	High temperature alloy
Orientation	Any

LIFETIME

Long Term Sensitivity Drift	<5% signal / month
Long Term Zero Drift	<2%LEL _{methane} / month
Standard Warranty	12 months from date of despatch

N.B. All performance data is based on conditions at 20°C, 50%RH and 1013 mBar unless otherwise stated.

Product Dimensions



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

Relative Sensitivity

The table below shows the variation in response of a 200N-E 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).

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

Gas / Vapour	Relative Sensitivity	Gas / Vapour	Relative Sensitivity	Gas / Vapour	Relative Sensitivity
Methane	100	Methane	100	Methane	100
Propane	55	Methanol	85	Ethyl Acetate	45
n-Butane	55	Ethanol	65	Hydrogen	90
n-Pentane	45	iso - Propyl Alcohol	50	Ammonia	120
n-Hexane	45	Acetone	55	Cyclohexane	50
n-Heptane	45	Methyl Ethyl Ketone	45	Leaded Petrol	55
n-Octane	40	Toluene	35	Unleaded Petrol	65

Each sensitivity has been rounded to the nearest 5%.

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.

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.

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. No liability is accepted for any consequential losses, injury or damage resulting from the use of this document or from any omissions or errors herein. The data is given for guidance only. It does not constitute a specification or an offer for sale. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application.

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

Key Features & Benefits:

- Compact, open can design
- High poison resistance

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Sensitivity	11 to 15 mV/%methane
T90 Response Time	<15 seconds
Poison Resistance	Highly Resistant
Linearity	Linear up to 5% methane

ELECTRICAL

Operating Voltage	2.0 ± 0.1 VDC
Detector Operating Current	280 mA in recommended circuit
Resolution	Electronics dependant

MECHANICAL

Casing Material	Stainless steel 316
Pin Material	KOVAR alloy
Orientation Sensitivity	None

ENVIRONMENTAL

Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 10%
Operating Humidity Range	0-100% RH non-condensing

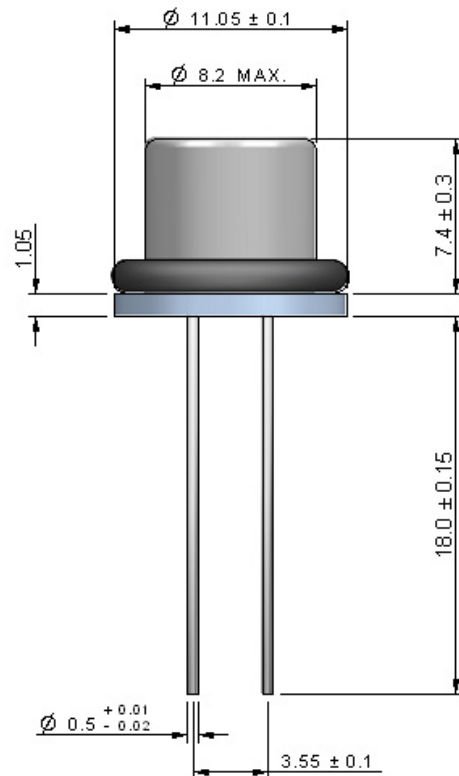
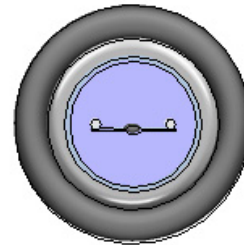
LIFETIME

Long Term Span Drift*	<1% signal/month
Long Term Zero Drift*	<1% LEL _{methane} /month
Recommended Storage Temp	0°C to 20°C
Shelf life	6 months in sealed container
Expected Operating Life	2 years in clean air
Warranty	12 months from date of despatch

* Measured over a 6 month period

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

Performance Characteristics



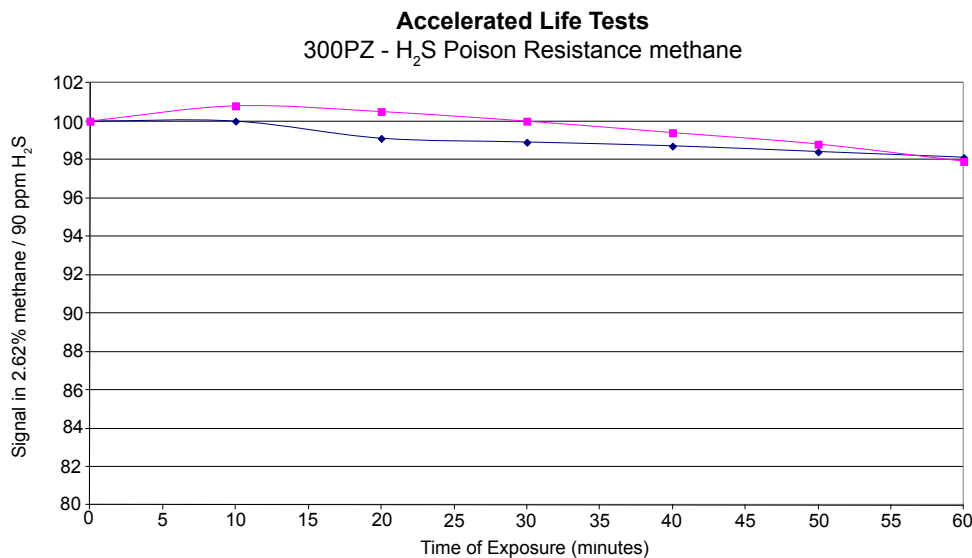
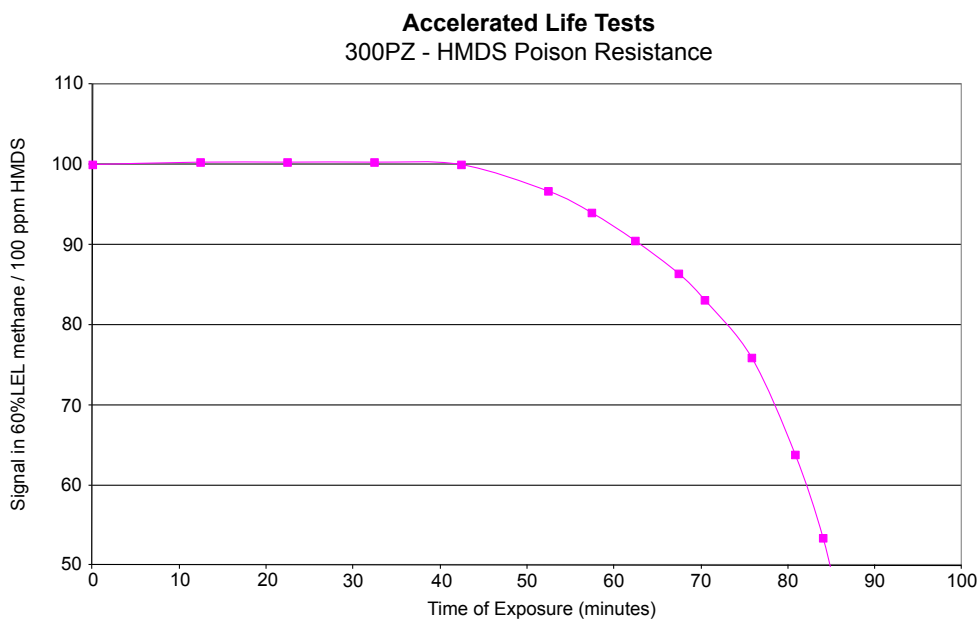
All tolerances ± 0.15 mm

Poison Resistance

The graphs below show the effects of typical silicone and sulfur containing compounds on a 300PZ CiTipeL[®]. Hexamethyl-disiloxane (HMDS) is chosen as an example of a particularly virulent poison, the effects of which are irreversible. Hydrogen sulfide (H₂S) is also a commonly encountered poison.

The graphs show the results of accelerated tests on unprotected sensors - in practice it is extremely unlikely continuous levels of even a few ppm of HMDS would be encountered. Similarly, 100 ppm H₂S is approximately seven times the Short Term Exposure Limit in the UK.

The 300PZ will operate for significantly longer in an environment containing silicone oil vapours than a traditional standard sensor. The effect of 100 ppm H₂S is also very small, and upon removal of H₂S the sensor will return to its original sensitivity. In practice, this means the 300PZ can operate for months or years in an environment where a traditional sensor may need replacing after a matter of days or weeks.



Relative Sensitivity

The table below shows the variation in response of a CDH300 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).

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

Combustible Gas/Vapour	Relative Sensitivity	Combustible Gas/Vapour	Relative Sensitivity
Methane	100	Acetone	45
Propane	70	Methyl Ethyl Ketone	40
n - Butane	65	Toluene	20
n - Pentane	60	Ethyl Acetate	35
n - Hexane	40	Hydrogen	100
n - Heptane	40	Cyclohexane	40
n - Octane	25	Unleaded Petrol	35
Methanol	70	Ethylene	90
Ethanol	50	1,3, Butadiene	70
iso - Propyl Alcohol	40	Acetylene	75

*Each sensitivity has been rounded to the nearest 5%

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

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	37 ± 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	4.25 VDC
Detector Operating Current	56 ± 6 mA
Maximum Power Consumption	276 mW
Resolution	Electronics dependant

MECHANICAL

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

ENVIRONMENTAL

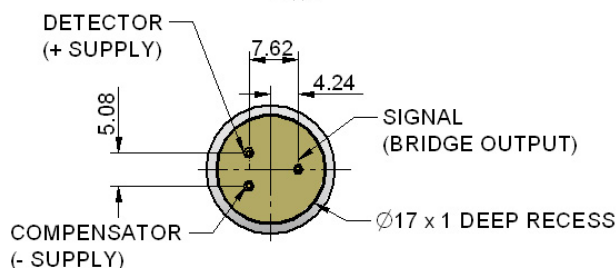
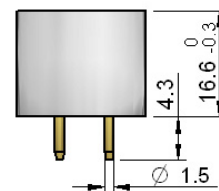
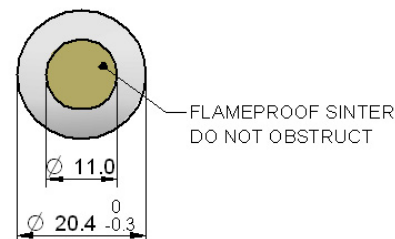
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

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

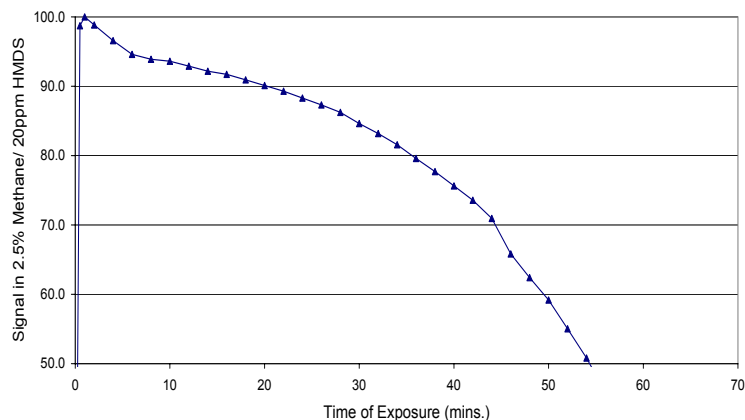


All dimensions in mm

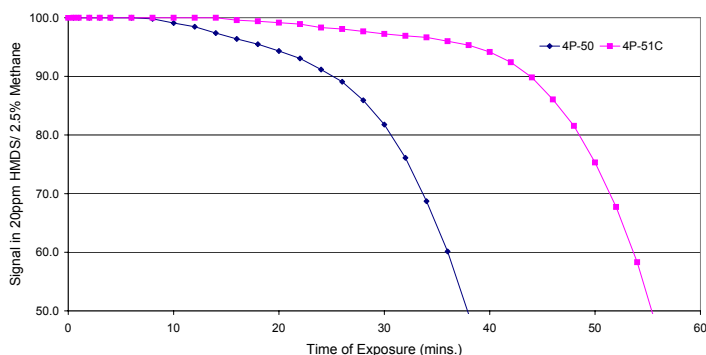
All tolerances ±0.15 mm unless otherwise stated

Product Data Sheet

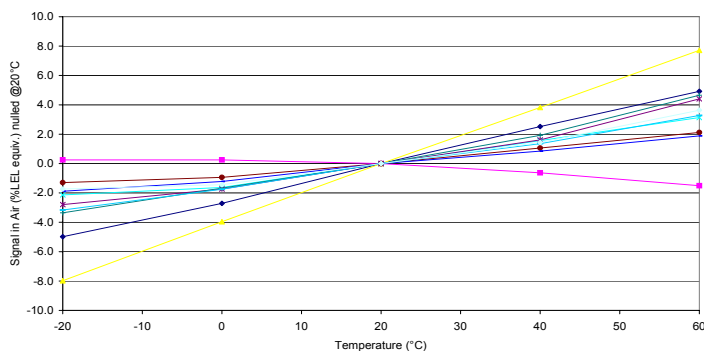
Accelerated Life Tests 4P-50 - HMDS Poison Resistance



Accelerated Life tests 4P-50 vs 4P-51C HMDS Poison Resistance



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	115
Propane	65	Acetone	70
n-Butane	65	Methyl ethyl ketone	55
n-Pentane	60	Toluene	40
n-Hexane	50	Ethyl acetate	60
n-Heptane	45	Hydrogen	115
n-Octane	40	Ammonia **	130
Methanol	95	Cyclohexane	55
Ethanol	85	Leaded Petrol	60
Iso-propyl alcohol	60	Unleaded Petrol	60
Acetylene	80	Ethylene	85
1, 3-Butadiene	60		

* 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, ,  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 -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).

Product Data Sheet

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

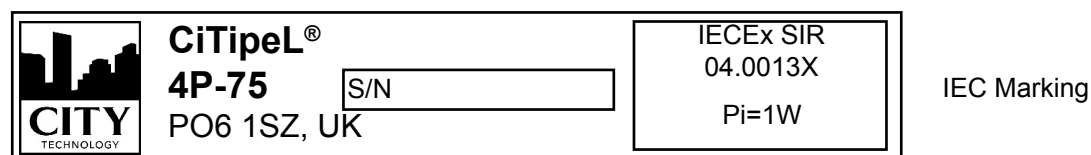
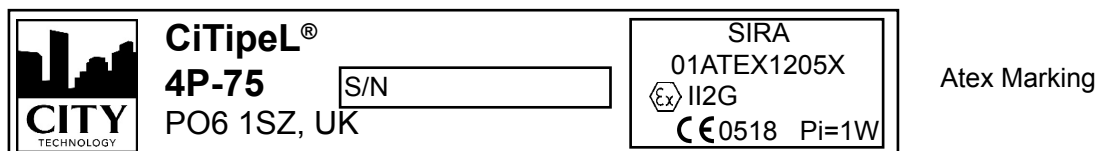
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hickey	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 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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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

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	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	37 ± 7 mV/%methane
T90 Response Time	<20 seconds (methane)
Poison Resistance	Resistance to H ₂ S poisoning Superior silicone resistance
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	4.25 VDC
Detector Operating Current	56 ± 6 mA
Maximum Power Consumption	276 mW
Resolution	Electronics dependant

MECHANICAL

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

ENVIRONMENTAL

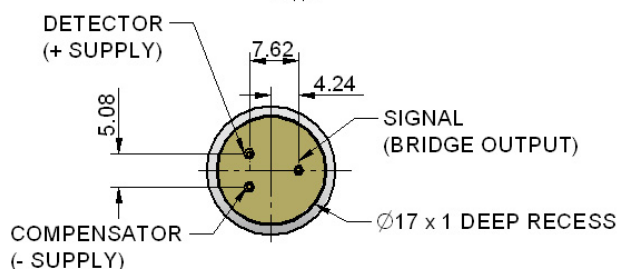
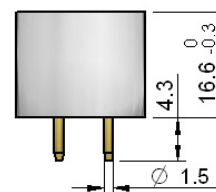
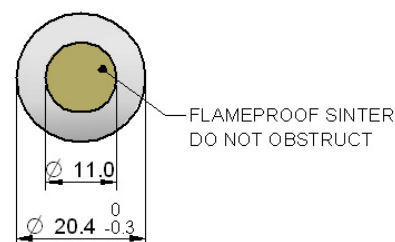
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

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

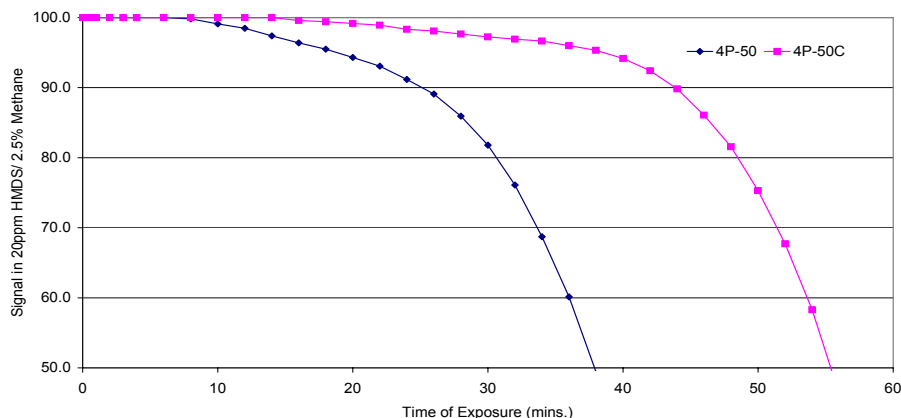
N.B. Flow rate of 300 ml/min. Conditions at 20°C, 50% RH, and 1013 mbar unless otherwise noted.

Product Dimensions

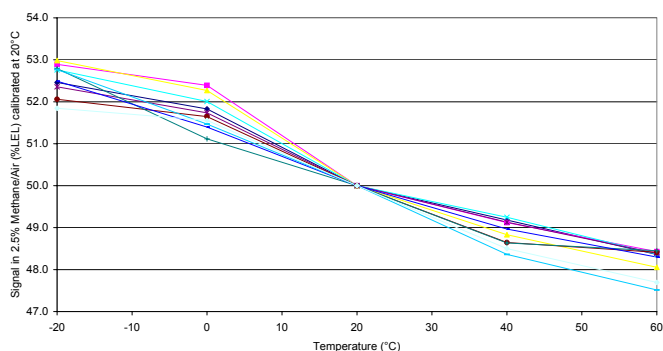


All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

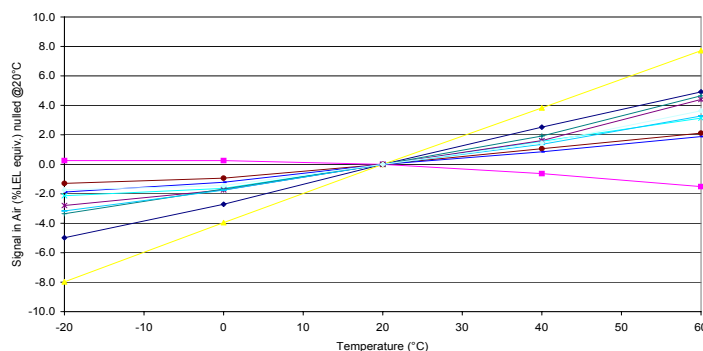
Accelerated Life tests 4P-50 vs 4P-50C HMDs Poison Resistance



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	130
Propane	70	Hydrogen	120
n-Butane	70	Ammonia **	155
n-Pentane	60	Cyclohexane	55
n-Hexane	60	Ethylene	90
Acetylene	85	1, 3-Butadiene	60

* 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, (Ex) II2G, 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).

Product Data Sheet

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

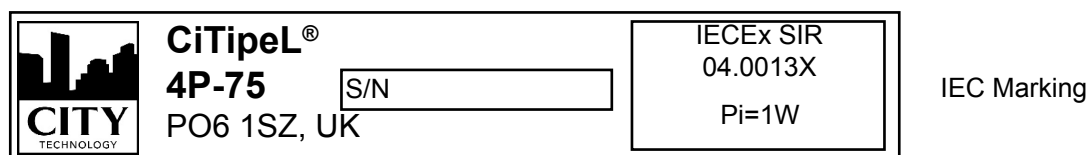
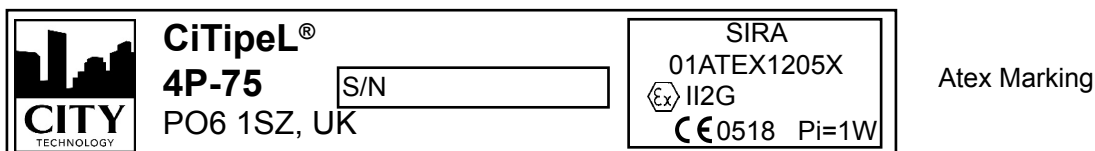
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hikle	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 475°C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

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. No liability is accepted for any consequential losses, injury or damage resulting from the use of this document or from any omissions or errors herein. The data is given for guidance only. It does not constitute a specification or an offer for sale. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application.

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

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	24 ± 4 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	3.0 VDC
Detector Operating Current	75 ± 7 mA
Maximum Power Consumption	263 mW
Resolution	Electronics dependant

MECHANICAL

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

ENVIRONMENTAL

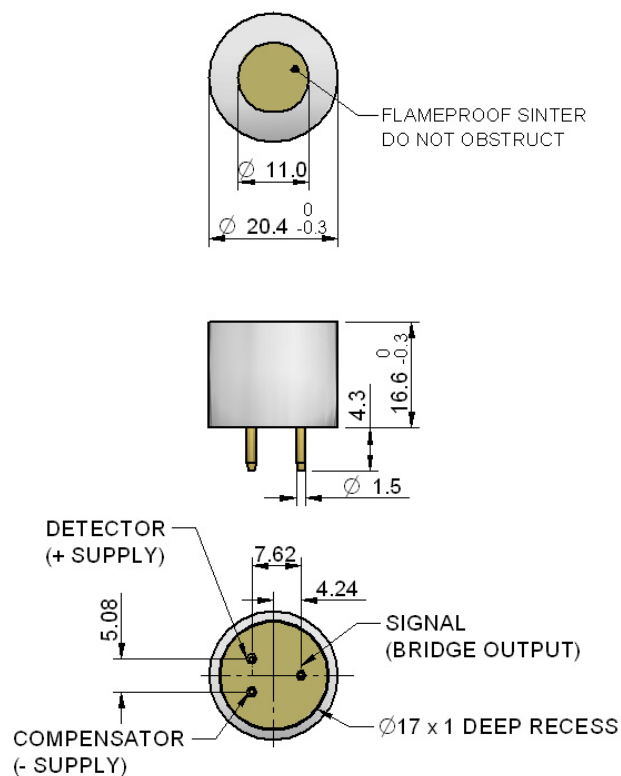
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

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

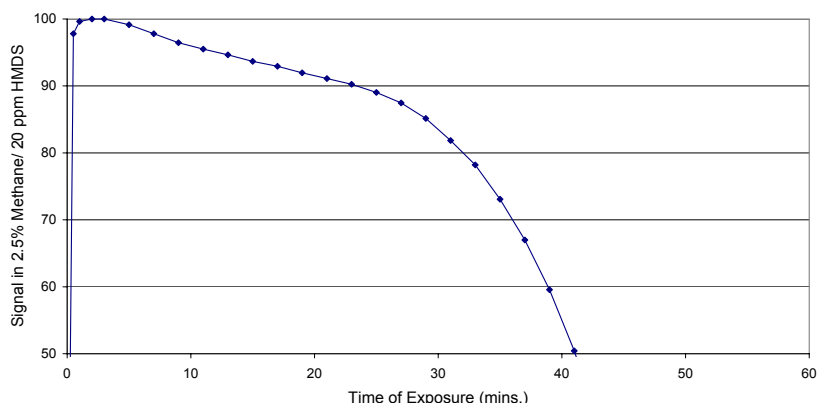
N.B. Flow rate of 300 ml/min. Conditions at 20°C, 50% RH, and 1013 mbar unless otherwise noted.

Product Dimensions

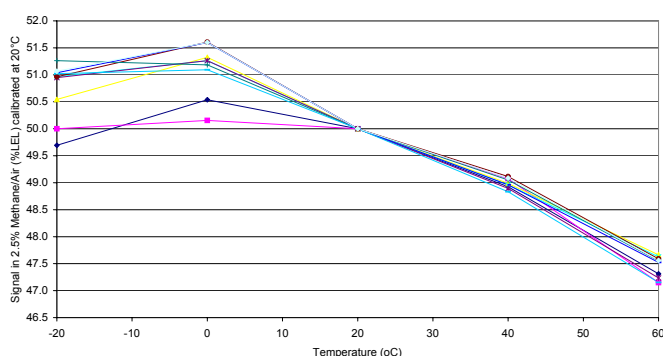


All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

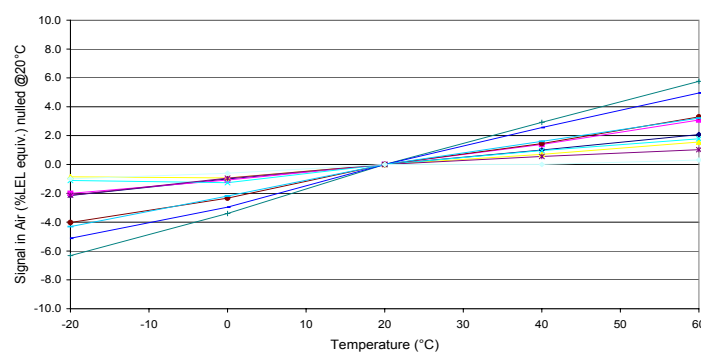
Accelerated Life Tests 4P-75 HMDS Poison Resistance



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	120
Propane	65	Acetone	70
n-Butane	65	Methyl ethyl ketone	55
n-Pentane	55	Toluene	40
n-Hexane	55	Ethyl acetate	55
n-Heptane	45	Hydrogen	110
n-Octane	35	Ammonia **	140
Methanol	85	Cyclohexane	50
Ethanol	85	Leaded Petrol	60
Iso-propyl alcohol	65	Unleaded Petrol	60
Acetylene	90	Ethylene	90
1, 3-Butadiene	60		

* 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, (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 -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).

Product Data Sheet

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

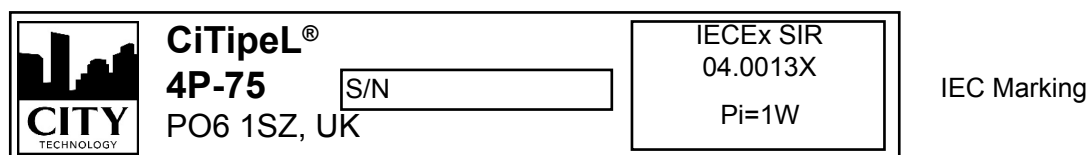
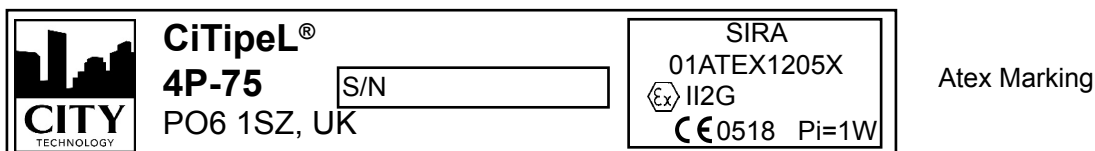
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hikle	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 475°C	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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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

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	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 ₂ S poisoning Superior silicone resistance
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	3.0 VDC
Detector Operating Current	75 ± 7 mA
Maximum Power Consumption	263 mW
Resolution	Electronics dependant

MECHANICAL

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

ENVIRONMENTAL

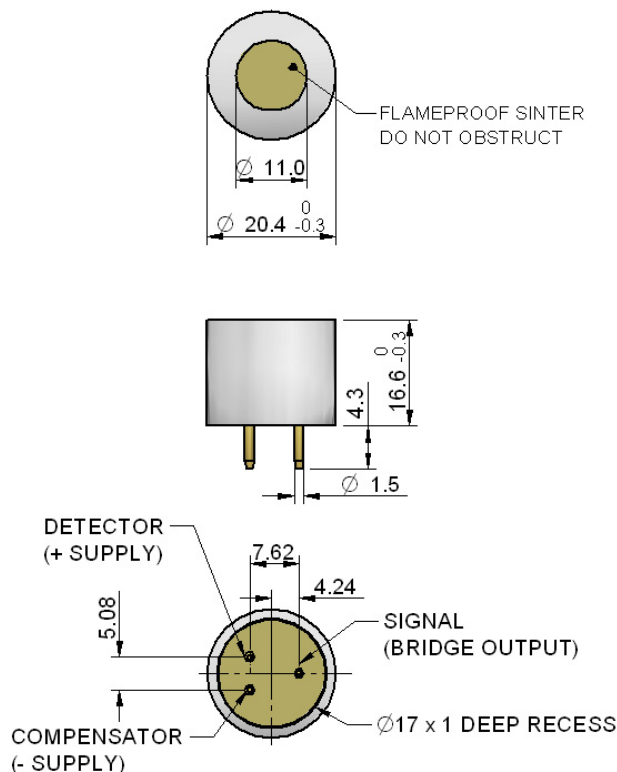
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

LIFETIME

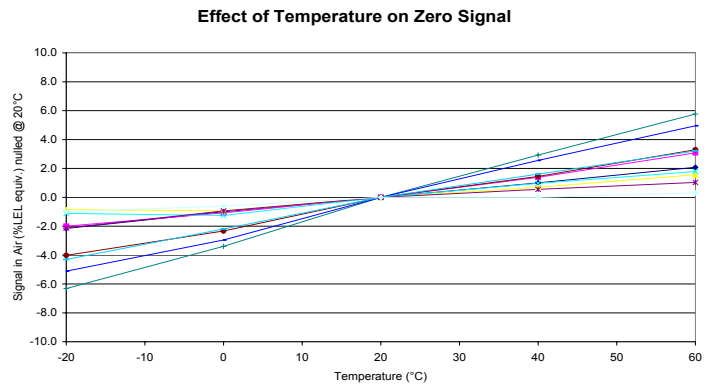
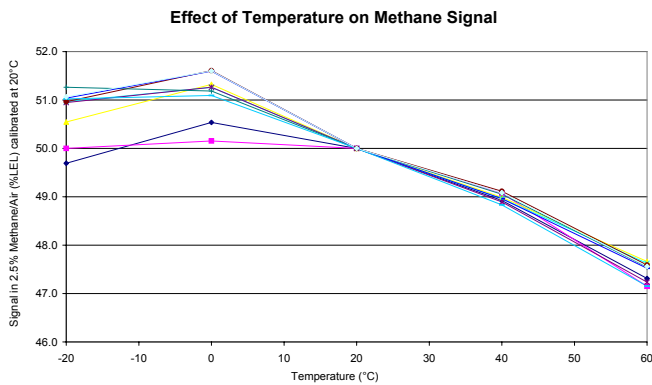
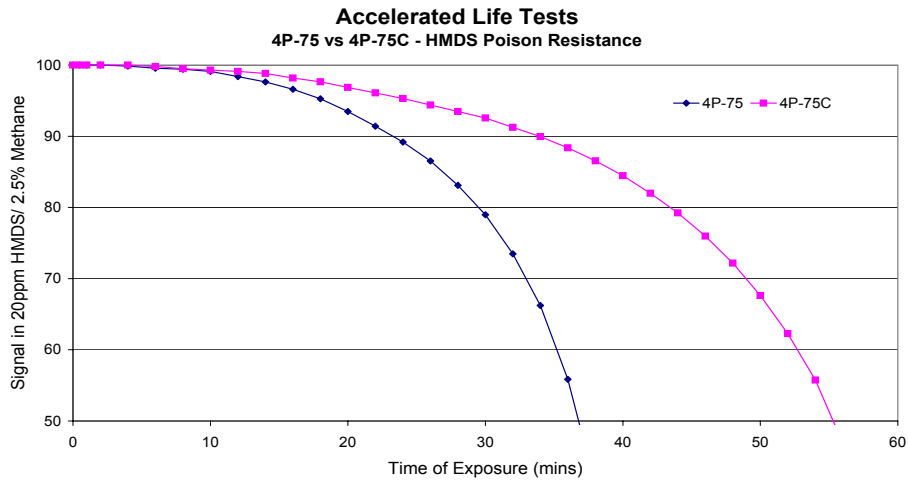
Long Term Span Drift	<5% signal/month
Long Term Zero Drift	<5% LEL _{methane} /month
Recommended Storage Temp	0°C to 20°C
Shelf life	6 months in sealed container
Warranty	12 months from date of despatch

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



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	120
Propane	65	Hydrogen	110
n-Butane	65	Ammonia **	140
n-Pentane	55	Cyclohexane	50
n-Hexane	50	Ethylene	95
Acetylene	90	1, 3-Butadiene	60

* 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).

Product Data Sheet

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

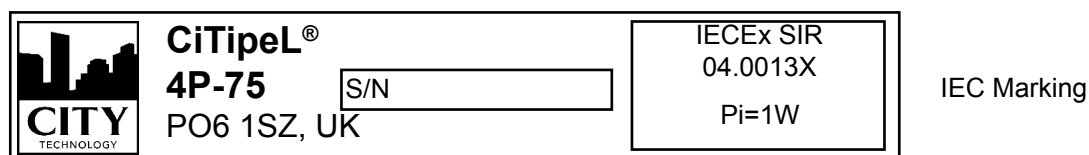
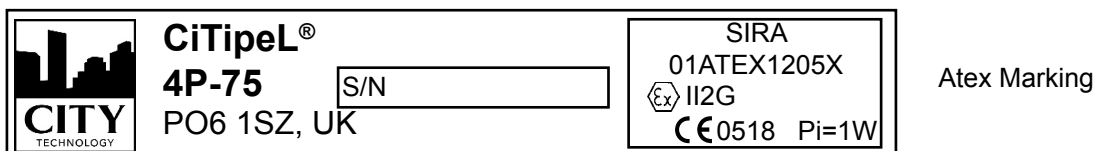
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hikle	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 475°C	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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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

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

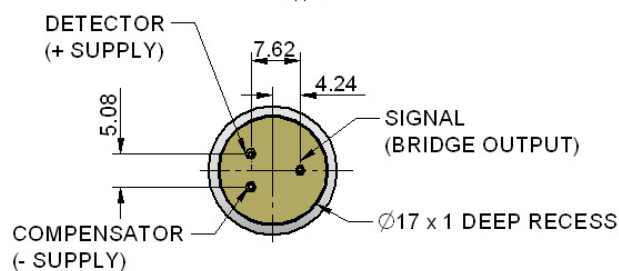
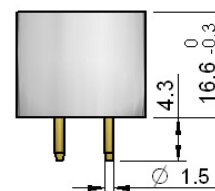
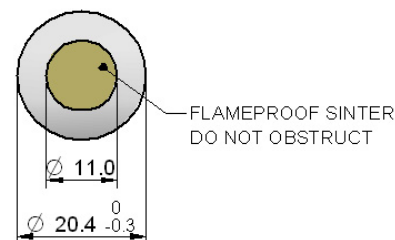
ENVIRONMENTAL

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

Product Dimensions

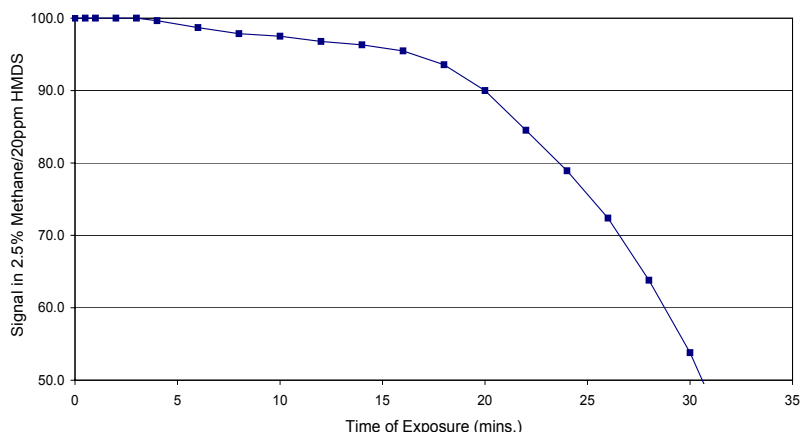


All dimensions in mm

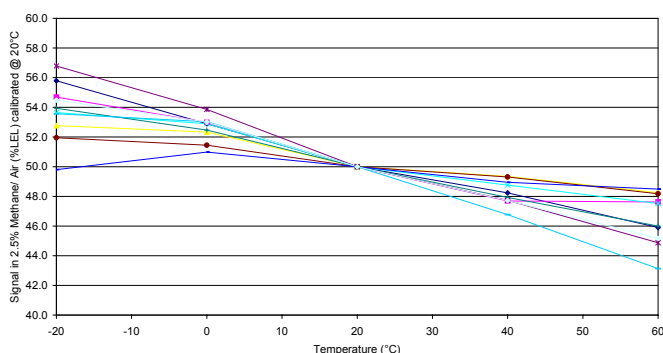
All tolerances ±0.15 mm unless otherwise stated

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

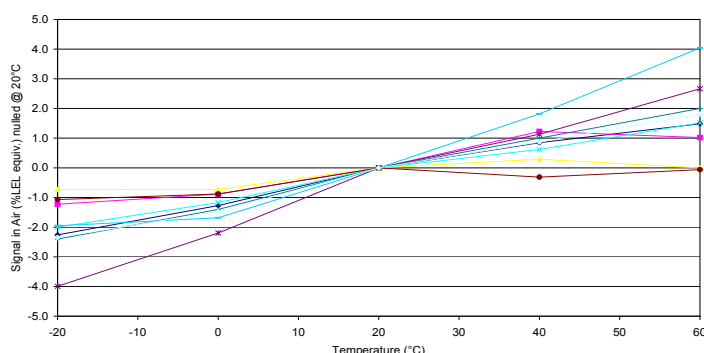
Accelerated Life Tests 4P-90 - HMDS Poison Resistance



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: 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 -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).

Product Data Sheet

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

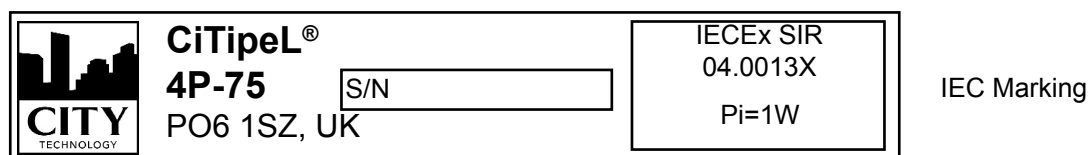
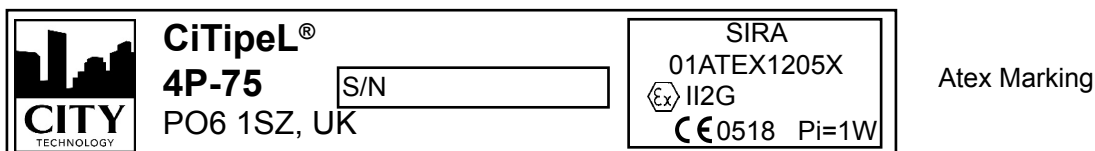
Cement:	DW30	CW2248/HY956EN
Manufacturer	Flogates & Hickey	Ciba-Geigy
Type of compound	Ceramic cement	Epoxy resin
Colour	Off white	Beige (natural)
Filler type and %	40% silica	55.2% trihydrated Al_2O_3
Other additives	25% MgO 35% $MgSO_4$	8.3%
Surface treatments	None	None
Temperature index	Stable to 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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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

Key Features & Benefits:

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

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Sensitivity	31 ± 5 mV/%methane
T90 Response Time	<5 seconds (methane)
Poison Resistance	Resistance to H ₂ S poisoning Superior Silicone resistance
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	3.30 VDC
Detector Operating Current	78 ± 6 mA
Maximum Power Consumption	295 mW
Resolution	Electronics dependant

MECHANICAL

Weight	2 g (nominal)
Orientation Sensitivity	None

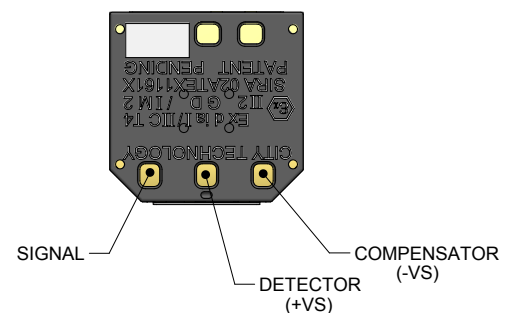
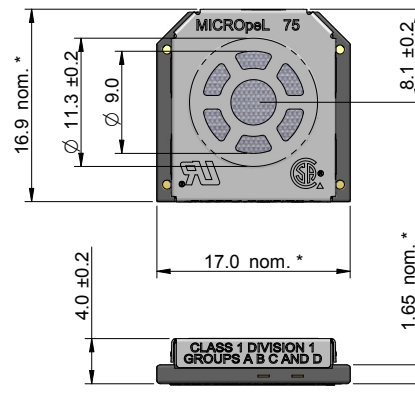
ENVIRONMENTAL

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	<3% 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

Product Dimensions



Note: * Fits recommended Connector

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

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

Relative Sensitivity

The table below shows the response variation of a MICROpeL 75 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	Acetone	65
Propane	60	Methyl ethyl ketone	55
n-Butane	70	Toluene	55
n-Pentane	60	Ethyl acetate	55
n-Heptane	50	Hydrogen	125
n-Octane	45	Cyclohexane	60
Methanol	105	Unleaded petrol	55
Ethanol	80	Ethylene	100
iso-propyl alcohol	60	Acetylene	95

*Each sensitivity has been rounded to the nearest 5%

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

Product Approvals

Approval Body:

SIRA CERTIFICATION SERVICE

Test Standard:



EN 60079-0:2009 Explosive Atmospheres Part 0 - General Requirements
EN 60079-1:2007 Explosive Atmospheres - Equipment Protection by Flameproof Enclosures "d"
EN 60079-11:2007 Explosive Atmospheres - Equipment Protection by Intrinsic Safety "i"
EN 60079-31:2009 Explosive Atmospheres - Equipment Dust Ignition Protection by Enclosure "t"

Certification Code: Refer to section 7.2

Certification Number: Sira 02ATEX1161X

Atex Marking: II2 GD/IM2 0518

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 02ATEX1161X;

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 and T4.
2. The equipment is certified for use in ambient temperatures of -20°C to +55°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. The 'X' suffix to the certificate number relates to the following conditions for safe use;
 - 7.1 The product shall be protected from mechanical stresses caused by impact and drop tests prescribed in EN 60079-0:2006 clauses 26.4.2 and 26.4.3.
 - 7.2 The Micropel models have the following power and temperature ranges:

Micropel 75 models	Ex d ia I/IIC T4 (Tamb -20°C to +55°C) {P _{MAX} 0.8 W} Mb Gb Ex t IIIC T135°C (Tamb -20°C to +55°C) {P _{MAX} 0.8 W} IP6X Db
or	Ex d ia I/IIC T5 (Tamb -20°C to +40°C) {P _{MAX} 0.49 W} Mb Gb Ex t IIIC T100°C (Tamb -20°C to +40°C) {P _{MAX} 0.49 W} IP6X Db
or	Ex d ia I/IIC T5 (Tamb -20°C to +55°C) {P _{MAX} 0.42 W} Mb Gb Ex t IIIC T100°C (Tamb -20°C to +55°C) {P _{MAX} 0.42 W} IP6X Db
- 7.3 The Micropel miniature combustible gas sensors shall only be connected to a gas detector that provides a maximum, output power (P_o) not greater than that detailed in the list above. In the case of the Micropel 75 models, this shall be an intrinsically safe supply.
- 7.4 The product shall be protected from exposure to light prescribed in EN60079-0 clauses 7.3 and 26.10

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: PEI, PPS or PTFE


Flame arrester: Stainless steel 316 mesh

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 MICROpeL™ is available in several formats. Each will carry the certification shown in 10.1 on the sensor and as shown in 10.2 on the packaging:

10.1 CITY TECHNOLOGY
MODEL DESIGNATION
SERIAL NUMBER (to include year of manufacture)
Sira 02ATEX1161X
 II2 G D / IM2

The sensor may also contain information relevant to other certification bodies

10.2 CITY TECHNOLOGY AND/OR CITY TECHNOLOGY LOGO.
MODEL DESIGNATION
Ex d ia I/IIC T4 (Tamb -20°C to + 55°C)
Pi=0.8W
IP6X

The packaging may also contain information relevant to other certification bodies, as well as information e.g. patent numbers, of a non-certification nature.

11. Certain substances are known to have a detrimental effect on catalytic elements as used in the MICROpeL™ series.

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 MICROpeL™ should be provided.

Approval Body: UNDERWRITERS LABORATORIES INC.

Test Standard: UL913



Product Categories: Class I, Division 1, Groups A,B,C and D.

File Number: E180262

Conditions of Acceptability

1. These devices shall be installed in a suitable enclosure in accordance with the end product standard.
2. These devices shall be used within their specified electrical ratings.
3. These devices are intended for use in intrinsically safe circuits or within intrinsically safe devices.
4. Temperature test is to be performed on end use product.

Approval Body: CANADIAN STANDARDS ASSOCIATION

Test Standards: CAN/CSA E60079-0:02, Part 0
CAN/CSA E60079-1:02, Part 1
CAN/CSA E60079-11:02, Part 11
CAN/CSA - C22.2.No 157-92



Product Categories: Class I, Division 1, Groups A, B, C, D and T3C

File Number: 103143

Notes

1. The sensor (operating voltage 3.3V) is suitable as intrinsically safe for Class I, Division 1, Groups A, B, C, D, T3C when connected in compatible intrinsically safe gas detector circuits under assessed fault conditions.
2. Certified as a component where the combustible gas performance tests shall be conducted on the gas detector, and final assembly subject to acceptance by CSA. The final assembly of the gas detector shall determine the markings or suitability in the appropriate hazardous location.
3. The sensor shall be protected from mechanical stresses caused by impact and drop tests. The applicable tests shall be conducted in the final assembly.

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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Key Features & Benefits:

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

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	31 ± 5 mV/%methane
T90 Response Time	<5 seconds (methane)
Poison Resistance	Resistance to H ₂ S poisoning Superior silicone resistance
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	3.30 VDC
Detector Operating Current	78 ± 6 mA
Maximum Power Consumption	295 mW
Resolution	Electronics dependant

MECHANICAL

Weight	2 g (nominal)
Orientation Sensitivity	None

ENVIRONMENTAL

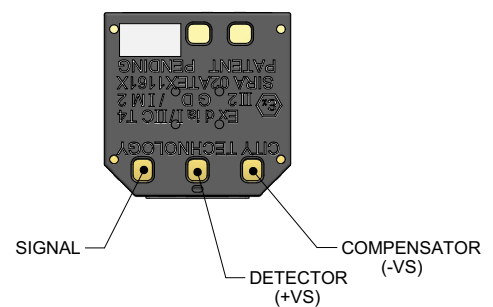
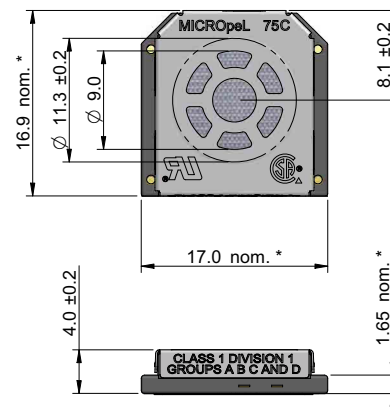
Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 20%
Operating Humidity Range	0-90% RH non-condensing

LIFETIME

Long Term Span Drift	<3% 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 500 ml/min. Conditions at 20°C, 50%RH, and 1013 mBar unless otherwise noted.

Product Dimensions



Note: * Fits recommended Connector

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

Relative Sensitivity

The table below shows the response variation of a MICROpeL 75C 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	Hydrogen	125
Propane	60	Ethylene	100
n-Butane	70	Acetylene	95
n-Pentane	65	n-Heptane	50
*Each sensitivity has been rounded to the nearest 5%			

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

Product Approvals

Approval Body:

SIRA CERTIFICATION SERVICE

Test Standard:



EN 60079-0:2009 Explosive Atmospheres Part 0 - General Requirements
EN 60079-1:2007 Explosive Atmospheres - Equipment Protection by Flameproof Enclosures "d"
EN 60079-11:2007 Explosive Atmospheres - Equipment Protection by Intrinsic Safety "i"
EN 60079-31:2009 Explosive Atmospheres - Equipment Dust Ignition Protection by Enclosure "t"

Certification Code: Refer to section 7.2

Certification Number: Sira 02ATEX1161X

Atex Marking:  II2 GD/IM2  0518

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 02ATEX1161X;

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 and T4.
2. The equipment is certified for use in ambient temperatures of -20°C to +55°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. The 'X' suffix to the certificate number relates to the following conditions for safe use;
 - 7.1 The product shall be protected from mechanical stresses caused by impact and drop tests prescribed in EN 60079-0:2006 clauses 26.4.2 and 26.4
 - 7.2 The Micropel models have the following power and temperature ranges:

Micropel 75 models	Ex d ia I/IIC T4 (Tamb -20°C to +55°C) {P _{MAX} 0.8 W} Mb Gb Ex t IIIC T135°C (Tamb -20°C to +55°C) {P _{MAX} 0.8 W} IP6X Db
or	Ex d ia I/IIC T5 (Tamb -20°C to +40°C) {P _{MAX} 0.49 W} Mb Gb Ex t IIIC T100°C (Tamb -20°C to +40°C) {P _{MAX} 0.49 W} IP6X Db
or	Ex d ia I/IIC T5 (Tamb -20°C to +55°C) {P _{MAX} 0.42 W} Mb Gb Ex t IIIC T100°C (Tamb -20°C to +55°C) {P _{MAX} 0.42 W} IP6X Db
 - 7.3 The Micropel miniature combustible gas sensors shall only be connected to a gas detector that provides a maximum, output power (P_0) not greater than that detailed in the list above. In the case of the Micropel 75 models, this shall be an intrinsically safe supply.
 - 7.4 The product shall be protected from exposure to light prescribed in EN60079-0 clauses 7.3 and 26.10

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: PEI, PPS or PTFE
- Flame arrester: Stainless steel 316 mesh
- 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 MICROpeL™ is available in several formats. Each will carry the certification shown in 10.1 on the sensor and as shown in 10.2 on the packaging:
- 10.1 CITY TECHNOLOGY
MODEL DESIGNATION
SERIAL NUMBER (to include year of manufacture)
Sira 02ATEX1161X
Ⓔ II2 G D / IM2
- The sensor may also contain information relevant to other certification bodies
- 10.2 CITY TECHNOLOGY AND/OR CITY TECHNOLOGY LOGO.
MODEL DESIGNATION
Ex d ia I/IIC T4 (Tamb -20°C to + 55°C) Mb Gb
Pi=0.8W
IP6X
- The packaging may also contain information relevant to other certification bodies, as well as information e.g. patent numbers, of a non-certification nature.

11. Certain substances are known to have a detrimental effect on catalytic elements as used in the MICROpeL™ series.

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 MICROpeL™ should be provided.

Approval Body: UNDERWRITERS LABORATORIES INC.

Test Standard: UL913



Product Categories: Class I, Division 1, Groups A,B,C and D.

File Number: E180262

Conditions of Acceptability

1. These devices shall be installed in a suitable enclosure in accordance with the end product standard.
2. These devices shall be used within their specified electrical ratings.
3. These devices are intended for use in intrinsically safe circuits or within intrinsically safe devices.
4. Temperature test is to be performed on end use product.

Approval Body: CANADIAN STANDARDS ASSOCIATION

Test Standards: CAN/CSA E60079-0:02, Part 0
CAN/CSA E60079-1:02, Part 1
CAN/CSA E60079-11:02, Part 11
CAN/CSA - C22.2.No 157-92



Product Categories: Class I, Division 1, Groups A, B, C, D and T3C

File Number: 103143

Notes

1. The sensor (operating voltage 3.3V) is suitable as intrinsically safe for Class I, Division 1, Groups A, B, C, D, T3C when connected in compatible intrinsically safe gas detector circuits under assessed fault conditions.
2. Certified as a component where the combustible gas performance tests shall be conducted on the gas detector, and final assembly subject to acceptance by CSA. The final assembly of the gas detector shall determine the markings or suitability in the appropriate hazardous location.
3. The sensor shall be protected from mechanical stresses caused by impact and drop tests. The applicable tests shall be conducted in the final assembly.

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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Key Features & Benefits:

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

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected (see note 1)	Methane and Hydrogen
Range	0-100% LEL
Sensitivity	31 ± 5 mV/%methane
T90 Response Time	<5 seconds (methane)
Poison Resistance	Resistance to H ₂ S poisoning Excellent silicone resistance
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 3% methane
Hydrogen Relative Response (see note 2)	110% of methane signal

ELECTRICAL

Operating Voltage	3.30 VDC
Detector Operating Current	78 ± 6 mA
Maximum Power Consumption	295 mW
Resolution	Electronics dependant

MECHANICAL

Weight	2 g (nominal)
Orientation Sensitivity	None

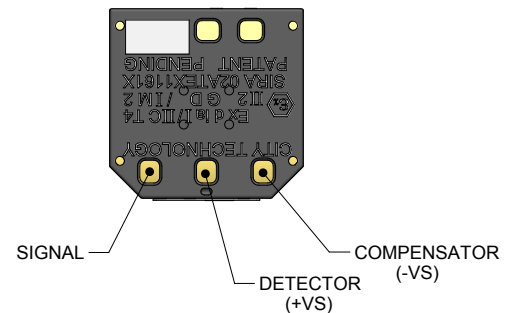
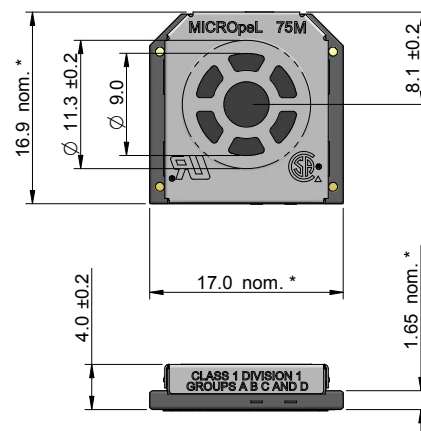
ENVIRONMENTAL

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	<3% 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

Product Dimensions



Note: * Fits recommended Connector

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

- Notes
- 1 This sensor contains an active charcoal filter and is consequently unsuitable for the measurement of combustible gases and vapours other than methane and hydrogen..
 - 2 Relative sensitivity data is intended for guidance only. For the most accurate measurements an instrument should be calibrated using the gas under investigation.
- N.B. Flow rate of 500 ml/min. Conditions at 20°C, 50%RH, and 1013 mBar unless otherwise noted.

Product Approvals

Approval Body:

SIRA CERTIFICATION SERVICE

Test Standard:



EN 60079-0:2009 Explosive Atmospheres Part 0 - General Requirements
EN 60079-1:2007 Explosive Atmospheres - Equipment Protection by Flameproof Enclosures "d"
EN 60079-11:2007 Explosive Atmospheres - Equipment Protection by Intrinsic Safety "i"
EN 60079-31:2009 Explosive Atmospheres - Equipment Dust Ignition Protection by Enclosure "t"

Certification Code: Refer to section 7.2

Certification Number: Sira 02ATEX1161X

Atex Marking:  II2 GD/IM2  0518

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 02ATEX1161X;

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 and T4.
2. The equipment is certified for use in ambient temperatures of -20°C to +55°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. The 'X' suffix to the certificate number relates to the following conditions for safe use;
 - 7.1 The product shall be protected from mechanical stresses caused by impact and drop tests prescribed in EN 60079-0:2006 clauses 26.4.2 and 26.4.3.

7.2 The Micropel models have the following power and temperature ranges:

Micropel 75 models Ex d ia I/IIC T4 (Tamb -20°C to +55°C) {P_{MAX} 0.8 W} Mb Gb
Ex t IIIC T135°C (Tamb -20°C to +55°C) {P_{MAX} 0.8 W} IP6X Db
or
Ex d ia I/IIC T5 (Tamb -20°C to +40°C) {P_{MAX} 0.49 W} Mb Gb
Ex t IIIC T100°C (Tamb -20°C to +40°C) {P_{MAX} 0.49 W} IP6X Db
or
Ex d ia I/IIC T5 (Tamb -20°C to +55°C) {P_{MAX} 0.42 W} Mb Gb
Ex t IIIC T100°C (Tamb -20°C to +55°C) {P_{MAX} 0.42 W} IP6X Db

7.3 The Micropel miniature combustible gas sensors shall only be connected to a gas detector that provides a maximum, output power (P_o) not greater than that detailed in the list above. In the case of the Micropel 75 models, this shall be an intrinsically safe supply.

7.4 The product shall be protected from exposure to light prescribed in EN60079-0 clauses 7.3 and 26.10

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: PEI, PPS or PTFE


Flame arrester: Stainless steel 316 mesh

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 MICROpeL™ is available in several formats. Each will carry the certification shown in 10.1 on the sensor and as shown in 10.2 on the packaging:

10.1 CITY TECHNOLOGY
MODEL DESIGNATION
SERIAL NUMBER (to include year of manufacture)
Sira 02ATEX1161X
 II2 G D / IM2

10.2 CITY TECHNOLOGY AND/OR CITY TECHNOLOGY LOGO.

MODEL DESIGNATION

Ex d ia I/IC T4 (Tamb -20°C to + 55°C) Mb Gb

Pi=0.8W

IP6X

The packaging may also contain information relevant to other certification bodies, as well as information e.g. patent numbers, of a non-certification nature.

11. Certain substances are known to have a detrimental effect on catalytic elements as used in the MICROpeL™ series.

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 MICROpeL™ should be provided.

Approval Body: UNDERWRITERS LABORATORIES INC.

Test Standard: UL913




Product Categories: Class I, Division 1, Groups A,B,C and D.

File Number: E180262

Conditions of Acceptability

1. These devices shall be installed in a suitable enclosure in accordance with the end product standard.
2. These devices shall be used within their specified electrical ratings.
3. These devices are intended for use in intrinsically safe circuits or within intrinsically safe devices.
4. Temperature test is to be performed on end use product.

Approval Body:	CANADIAN STANDARDS ASSOCIATION
Test Standards:	CAN/CSA E60079-0:02, Part 0 CAN/CSA E60079-1:02, Part 1 CAN/CSA E60079-11:02, Part 11 CAN/CSA - C22.2.No 157-92
	
Product Categories:	Class I, Division 1, Groups A, B, C, D and T3C
File Number:	103143

Notes

1. The sensor (operating voltage 3.3V) is suitable as intrinsically safe for Class I, Division 1, Groups A, B, C, D, T3C when connected in compatible intrinsically safe gas detector circuits under assessed fault conditions.
2. Certified as a component where the combustible gas performance tests shall be conducted on the gas detector, and final assembly subject to acceptance by CSA. The final assembly of the gas detector shall determine the markings or suitability in the appropriate hazardous location.
3. The sensor shall be protected from mechanical stresses caused by impact and drop tests. The applicable tests shall be conducted in the final assembly.

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.

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. No liability is accepted for any consequential losses, injury or damage resulting from the use of this document or from any omissions or errors herein. The data is given for guidance only. It does not constitute a specification or an offer for sale. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application. Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

Key Features & Benefits:

- Robust, Heavy Duty Design
- High Poison Resistance

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Sensitivity	12 to 16 mV/%methane
T90 Response Time	<15 seconds
Poison Resistance	Highly Resistant
H₂S Filter Lifetime	Typically 1000 ppm hr
Linearity	Linear up to 5% methane

ELECTRICAL

Operating Voltage	2.0 ± 0.1 VDC
Detector Operating Current	300mA in recommended circuit
Resolution	Electronics dependant

MECHANICAL

Casing Material	Stainless steel 316
Weight	275 g (nominal)
Orientation Sensitivity	None

ENVIRONMENTAL

Operating Temperature Range	-20°C to +55°C
Operating Pressure Range	1 atm ± 10%
Operating Humidity Range	0-100% RH non-condensing

LIFETIME

Long Term Span Drift	<2% signal/month
Long Term Zero Drift	<2% LEL _{methane} /month
Recommended Storage Temp	0°C to 20°C
Shelf life	6 months in sealed container
Expected Operating Life	2 years in clean air
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.

Options Available

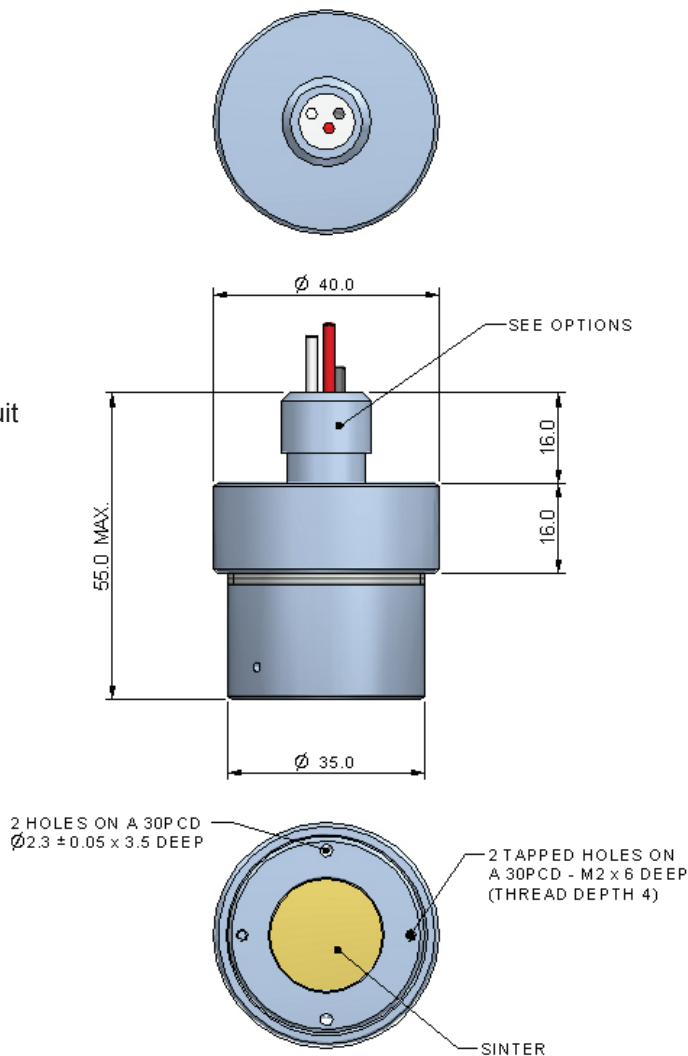
The CDH300 CiTipeL[®] Detector Head is available with a choice of thread sizes for attachment to a junction box or suitable alternative (see drawing). The standard options available are given below. (Note: Metric threads are for use outside of North America).

Order Codes

Other thread dimensions are available on request.

CDH300-A 1/2" ANPT taper connection	PM030-220
CDH300-B 3/4" ANPT taper connection	PM030-210
CDH300-C M20 metric connection	PM030-250
CDH300-D M16 metric connection	PM030-260

Product Dimensions



All dimensions in mm

All tolerances ±0.15mm unless otherwise stated

Special Conditions for Safe Use

The CDH Gas Sensing head shall only be installed in a suitably certified increased safety enclosure, which provides physical protection for the cable, and protects the epoxy resin potting compound from light. The installation of the CDH Sensing Head in the enclosure shall maintain an ingress protection rating better than code IP54 as stated in IEC 60529.

The CDH-Series Gas Sensing Head shall not be used as a safety related device.

Product Approval



Approval Body:

CANADIAN STAND'S ASSOC'N

Test Standard:

CSA Std C22.2 No 30-M1986
Explosion-Proof Enclosures for Use in
Class 1 Hazardous Locations

Product Categories:

Class 1, Groups A, B, C, D.

Certificate Number:

LR 103143



Approval Body:

SIRA CERTIFICATION SERVICE

Test Standard:

EN 60079-0:2006 General Requirement
EN 60079-1:2007 Flameproof Enclosures "d"

Product Categories:

Ex d IIC T6 Gb, II2G, 0518

Certificate Number:

01 ATEX1204X

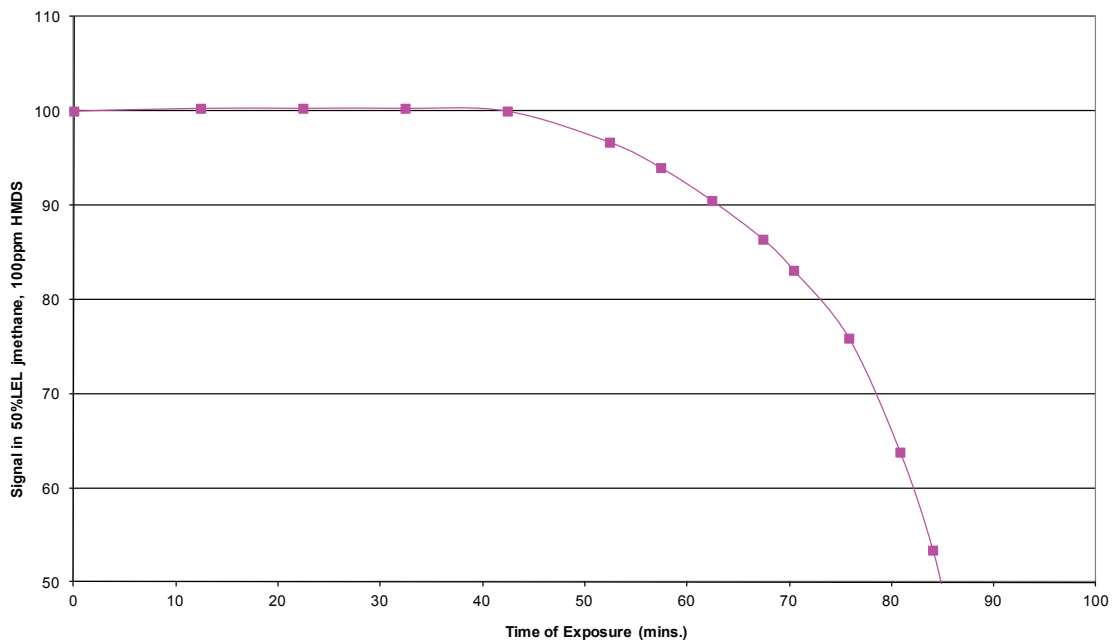
Poison Resistance

The graphs below show the effects of typical silicone and sulphur containing compounds on a 300P CiTipeL®. Hexamethyl-disiloxane (HMDS) is chosen as an example of a particularly virulent poison the effects of which are irreversible. Hydrogen sulphide (H₂S) is also a commonly encountered poison.

The graphs show the results of accelerated tests on unprotected sensors - in practice it is extremely unlikely continuous levels of even a few ppm of HMDS would be encountered. Similarly 100ppm H₂S is approximately seven times the Short Term Exposure Limit in the UK.

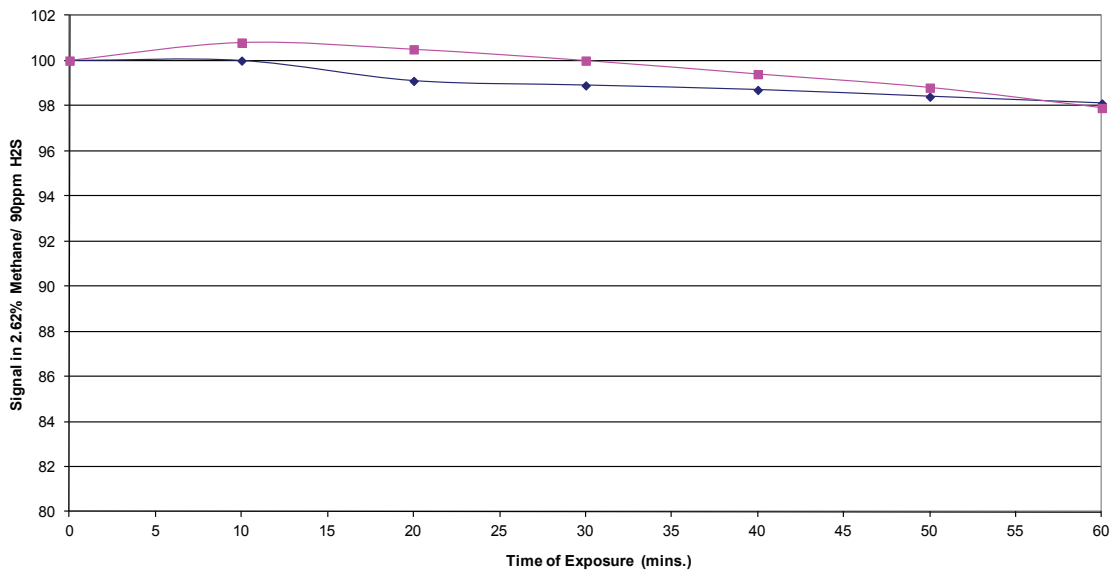
From the graph, the 300P will operate for significantly longer in an environment containing silicone oil vapours than a traditional standard sensor. The effect of 100ppm H₂S is also very small, and upon removal of H₂S the sensor will return to its original sensitivity. In practice this means the 300P can operate for months or years in an environment where a traditional sensor may need replacing after a matter of days or weeks.

Accelerated Life Tests
300P - HMDS Poison Resistance



Product Data Sheet

Accelerated Life Tests
300P - H2S Poison Resistance methane



Relative Sensitivity

The table below shows the variation in response of a CDH300 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).

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

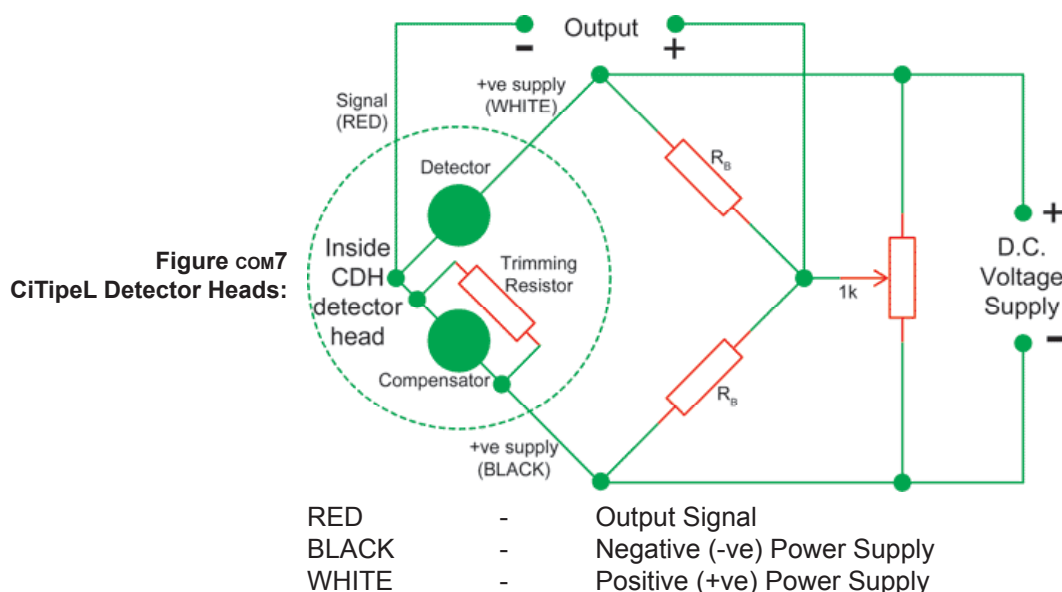
Combustible Gas/ Vapour	%LEL Relative Sensitivity	Combustible Gas/ Vapour	%LEL Relative Sensitivity
Methane	100	Methane	100
Propane	55	Acetone	35
n - Butane	50	Methyl Ethyl Ketone	20
n - Pentane	40	Toluene	35
n - Hexane	30	Ethyl Acetate	30
n - Heptane	35	Hydrogen	80
n - Octane	30	Ammonia	100
Methanol	70	Cyclohexane	40
Ethanol	40	Leaded Petrol	50
iso - Propyl Alcohol	35	Unleaded Petrol	40

*Each sensitivity has been rounded to the nearest 5%

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 01ATEX1204X;

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. The CDH Series Gas Sensing Head shall only be installed in a suitably certified increased safety enclosure that provides physical protection for the cable and protects the epoxy resin potting compound from light. The CDH should be screwed into the de-energised enclosure until the maximum number of threads are engaged. The installation of the CDH in the enclosure shall maintain an ingress protection rating better than code IP54 as stated in EN 60529;1991. Electrical connection of the CDH Sensing Head to a suitable circuit should be made as described in Figure com 7.



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 ₂ O 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 CDH 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 CDH300 Gas Sensing Head as an example:



11. Certain substances are known to have a detrimental effect on catalytic elements as used in the CDH 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 CDH 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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Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



CMP200 CiTipeL®

Performance Characteristics

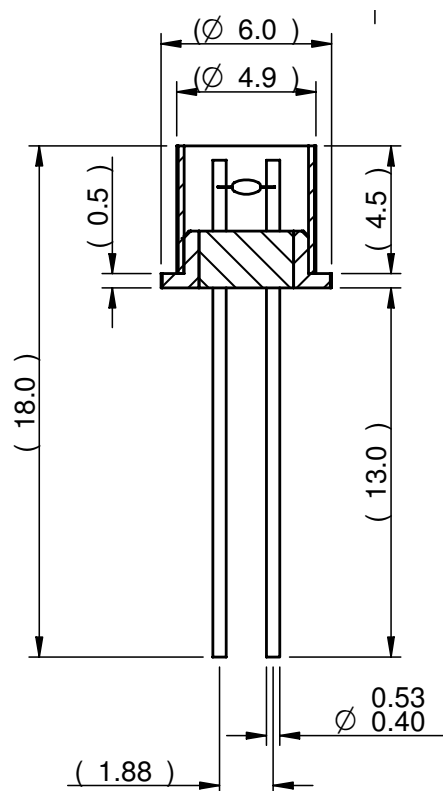
Gases Detected	Methane
Range	0-100% LEL
Operating Voltage	3.3±0.1V d.c.
Detector Operating Current	≈68mA
Poison Resistance	Resistant to H ₂ S and silicones
Output Sensitivity	27 to 34mV/%methane
T₉₀ Response Time	<15 seconds (methane)
Linear to	0-3% methane
Long Term Sensitivity Drift	<5% signal/month
Long Term Zero Drift	<5%LEL _{methane} /month
Warranty Period	12 months from date of despatch

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

Ordering Information

CMP200 with 13mm pin connection CMP200-D

Outline Dimensions



All tolerances ±0.15mm unless otherwise stated

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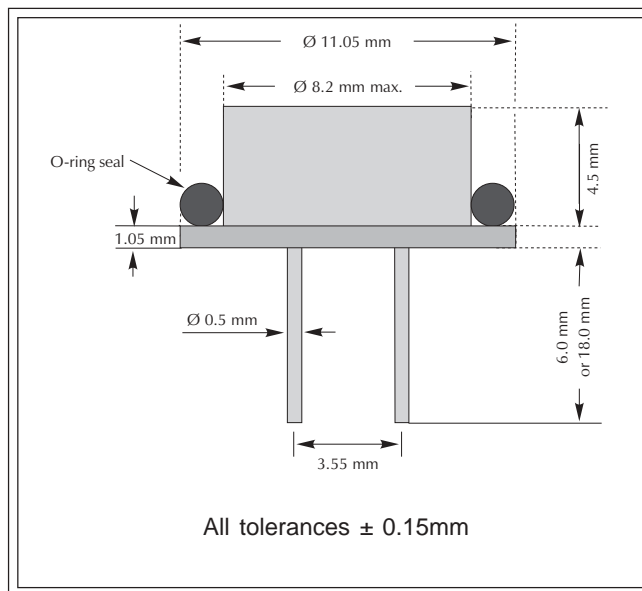
Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.



P50 CiTipeL[®]

Performance Characteristics

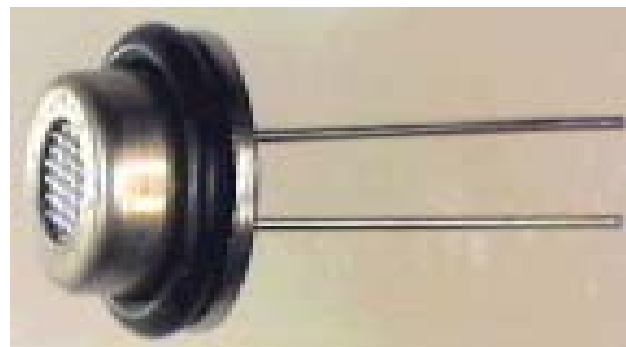
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Operating Voltage	4.25 ± 0.1 V d.c.
Detector Operating Current	<60mA
Output Sensitivity	36 to 56 mV/%methane
T₉₀ Response Time	<15 seconds
Linear to	0-3% methane
Long Term Sensitivity Drift	<5% signal/month
Long Term Zero Drift	<5%LEL _{methane} /month
Warranty Period	12 months from date of despatch



Ordering Information

P50 CiTipeLs are available with 0.5mm diameter pins, 18mm long suitable for direct mounting on a PCB.

Order Code
with 18mm pin connection P50-E



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

Key Features & Benefits:

- Compact, open can design
- High poison resistance
- Superior shock and orientation insensitivity

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Most combustible gases and vapours
Range	0-100% LEL
Sensitivity	28 ± 5 mV/%methane
T90 Response Time	<20 seconds (methane)
Poison Resistance	Increased silicone and chlorine poison resistance
Linearity	Linear up to 3% methane

ELECTRICAL

Operating Voltage	3.5 ± 0.1 VDC
Detector Operating Current	75 mA in recommended circuit
Resolution	Electronics dependant

MECHANICAL

Casing Material	Stainless steel 304
Pin Material	KOVAR alloy
Orientation Sensitivity	None

ENVIRONMENTAL

Operating Temperature Range	-5°C to +60°C
Operating Pressure Range	1 atm ± 10%
Operating Humidity Range	0-100% RH non-condensing

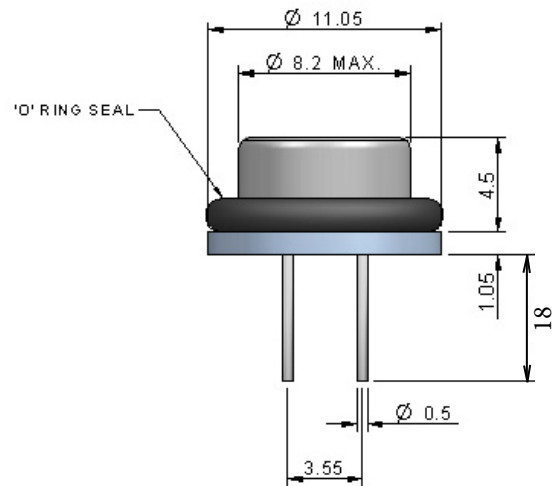
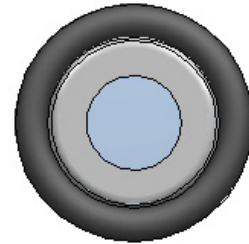
LIFETIME

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
Expected Operating Life	2 years in clean air
Warranty	12 months from date of despatch

* Measured over a 6 month period

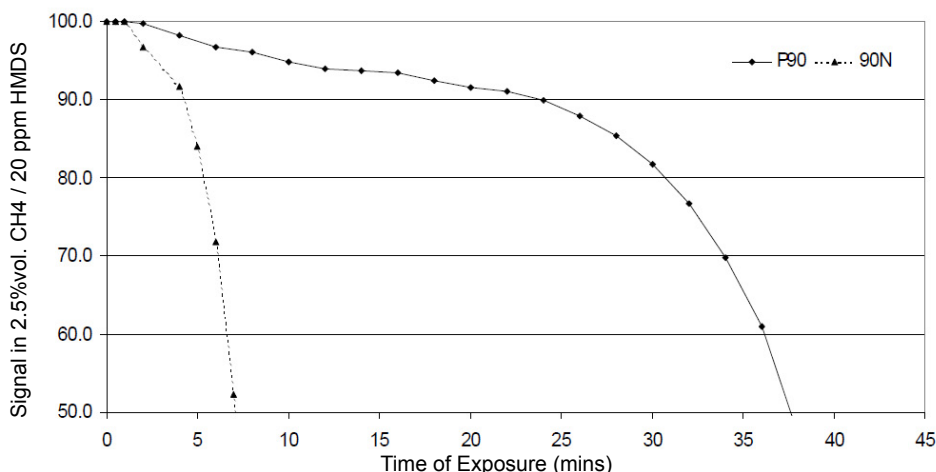
N.B. Flow rate of 300 ml/min. Conditions at 20°C, 50% RH, and 1013 mbar unless otherwise noted.

Product Dimensions



All tolerances ± 0.15 mm

Accelerated Life Tests - 90N vs. P90 HMDS Poison Resistance



Relative Sensitivity

The table below shows the variation in response of a P90-E 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).

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

Combustible Gas/Vapour	Relative Sensitivity	Combustible Gas/Vapour	Relative Sensitivity
Methane	100	Carbon Monoxide	105
Propane	60	Acetone	60
n - Butane	60	Methyl Ethyl Ketone	50
n - Pentane	50	Toluene	45
n - Hexane	45	Ethyl Acetate	55
n - Heptane	45	Hydrogen	105
n - Octane	40	Ammonia	135
Methanol	80	Cyclohexane	55
Ethanol	70	Leaded Petrol	55
Iso - Propyl Alcohol	55	Unleaded Petrol	55
Acetylene	80	Ethylene	85

*Each sensitivity has been rounded to the nearest 5%

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



Key Features & Benefits:

- Integrated thermister for accurate temperature compensation
- EEPROM programmed with sensor specific performance characteristics
- Compact Size

Technical Specifications

MEASUREMENT

Operating Principle	Non-Dispersive Infra-Red (NDIR)
Measurement Range	0-5% vol. Methane
Accuracy (-20°C to +50°C)	Within ± (0.1% vol CH ₄ + 4% of concentration)
Response Time (T₉₀)	< 35 Seconds
Repeatability:	
Zero	< ±0.015% CH ₄
5% CH ₄	< ±0.05% CH ₄
Linearity	See Operating Principles OP17

ELECTRICAL

Supply Voltage	3-5 VDC, 3.3 V to utilise EEPROM calibration
Power Consumption	<100 mW at 3.3 V
Recommended Lamp Frequency	2 Hz, 50% duty cycle
Minimum Resolution	0.03% CH ₄ at zero 0.1% CH ₄ at range
Warm-up Time	< 10 Seconds

MECHANICAL

Housing Material	Stainless Steel (see back page)
Weight	23 g
Orientation	Any

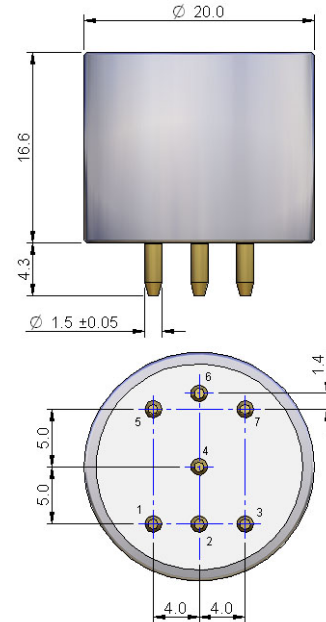
ENVIRONMENTAL

Typical Applications	General Purpose Portable Fixed Methane Detection
Operating Temperature Range	-20°C to +50°C
Operating Humidity Range	0 to 99% RH (non-condensing)
Operating Pressure Range	700 to 1300 mBar with compensation

LIFETIME

Long Term Zero Drift	< ±0.05% CH ₄ per month
Recommended Storage Temp	-20°C to +50°C
MTBF	> 5 years
Standard Warranty	12 months from date of despatch

Product Dimensions



Pin	Function
1	Lamp return
2	Lamp +5V
3	+5V pyro supply
4	Detector output
5	Reference output
6	Thermistor output
7	0V pyro supply

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

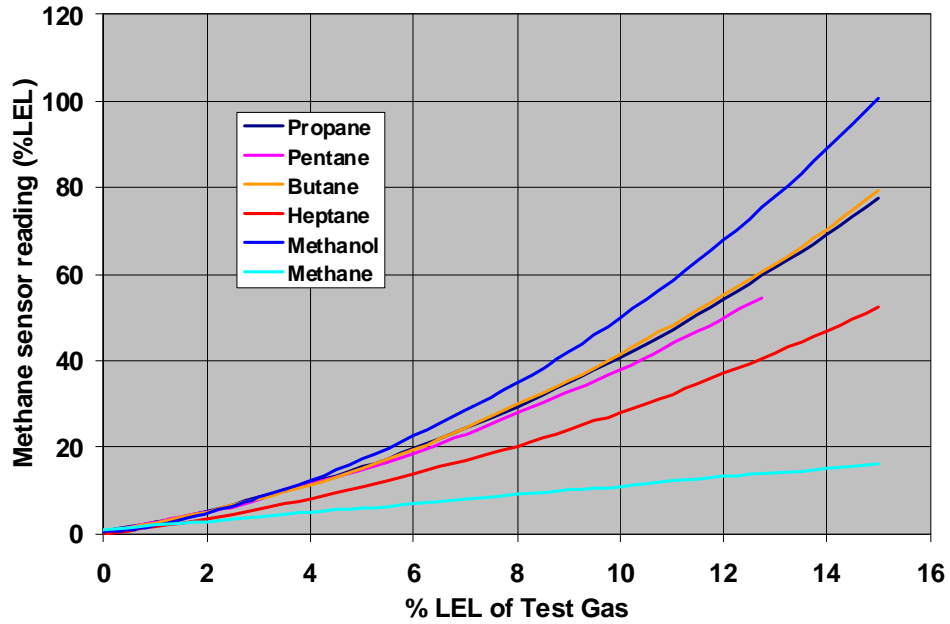
IMPORTANTNOTE:

Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.

All performance data is based on conditions at 20°C, 50%RH and 1013mBar, using City Technology recommended circuitry. For sensor performance data under other conditions, refer to the Characterisation Note and Operating Principles.

IRceL Cross Sensitivity

Methane sensor cross sensitivity



Typical Response of IRceL CH₄ to common Alkanes and Methanol. Note that cross sensitivity is device to device variable and temperature dependant.

Product Approval



Approval Body: UNDERWRITERS LABORATORIES INC®
Test Standard: UL913
CSA.C22.2 No 157
Product Categories: Class 1, Division 1, Groups A, B, C, D
File Number: E180262



Approval Body: SIRACERTIFICATION SERVICE
Test Standard: EN 60079-0:2006 General Requirements
EN 60079-1:2007 Flameproof Enclosures "d"
EN 61241-0:2006 Electrical Apparatus for use in the presence of Combustible Dust
Part 0 : General Requirements.
EN 61241-1:2004 Electrical Apparatus For use in th epresence of Combustible Dust
Part 1 : Protection of Enclosures "td"
Product Categories: Exd/IIC T4 (T_{amb} -20°C to +55°C),
P_{max} = 1.4W MbGb
ExtIIICIP6xDb
II2GD/IM2 0518
Certificate Number: Sira 04ATEX1084X

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 04ATEX1084X;

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 and T4.
2. The equipment is certified for use in ambient temperatures of -20°C to +55°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. The IRceL is designed to be connected to a gas detector which shall provide an intrinsically safe supply and having a maximum output power (P_{max}) not greater than 1.4 watt.
 - 7.2. Because the IRceL has not been proven to withstand the impact and drop tests prescribed in EN 60079-0:2006, clauses 26.4.2 and 26.4.3, additional protection shall be provided to ensure that it cannot be subjected to such mechanical stresses.

8. The certification of this equipment relies upon the following materials used in its construction;
 Enclosure material: either 303 stainless steel, which contains less than 6% magnesium

or 304 stainless steel, which contains less than 6% magnesium

Flame arrester: 316 stainless steel mesh

Cement: CW2248/HY956EN

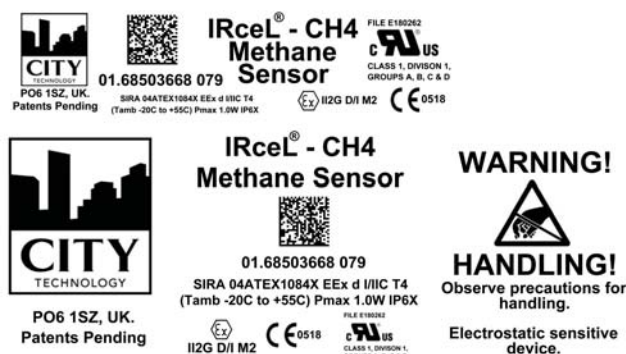
Manufacturer	Ciba-Geigy
Type of compound	Epoxy resin
Colour	Beige (natural)
Filler type and %	55.2% trihydrated Al ₂ O ₃
Other additives	8.3%
Surface treatments	None
Temperature index	170°C
City Tech reference	RM 497

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.

9. The IRceL is available in several formats depending upon the optical filter and components employed. The Certification marking is shown below using the IRceL CH4 label as an example:



Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. No liability is accepted for any consequential losses, injury or damage resulting from the use of this document or from any omissions or errors herein. The data is given for guidance only. It does not constitute a specification or an offer for sale. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application. Performance characteristics on this data sheet outline the performance of newly supplied sensors. Output signal can drift below the lower limit over time.

主要特性及优势

- ATEX, UL和CSA认证
- 经过EN/IEC 60079-0撞击测试
- 提高了抗H₂S和硅中毒能力

性能参数

测量

工作原理	催化燃烧
测量气体	可燃气体
适用类型	甲烷、乙烷、丙烷 丁烷、戊烷、己烷 一氧化碳和氢气
不适用类型	更高阶碳氢化合物、醇类、酮、酯类 硫化氢和其他含硫化物
测量范围	0-100% LEL
灵敏度	28 ± 5 mV/% 甲烷
T90响应时间	<20 s (甲烷)
抗毒性	抗 H ₂ S 中毒 (更强的抗硅中毒特性)
H ₂ S过滤器使用寿命	一般1000 ppm 小时
线性度	3%以内 甲烷

电参数

工作电压	3.3 VDC
工作电流	75 ± 7 mA
最大功耗	288 mW
分辨率	1%LEL

物理参数

外壳材料	不锈钢316
插脚材料	镀金黄铜
重量	24 g
灵敏度方向	无

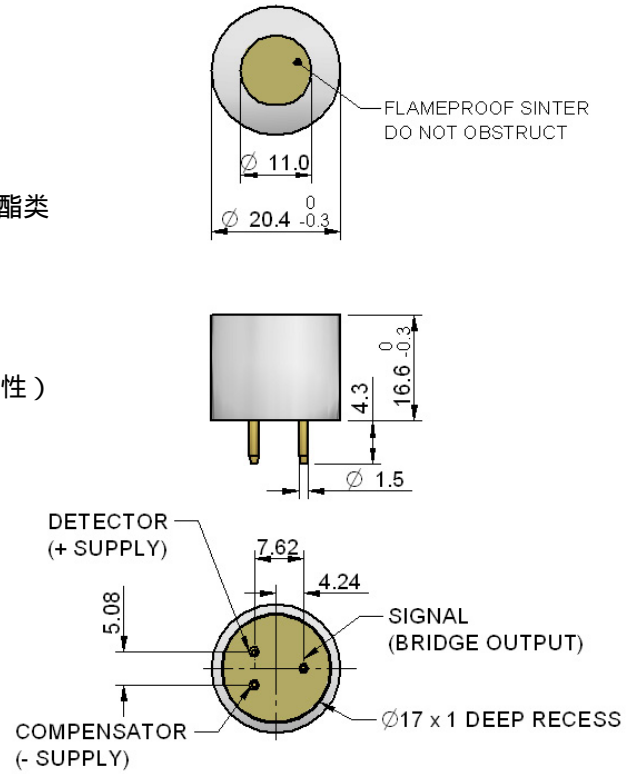
使用参数

工作温度范围	-20°C 到 +55°C
工作压力范围	1个大气压 ± 20%
工作湿度范围	0-90% RH 非冷凝

使用寿命

测量范围长期漂移	<5% 信号/月
零点长期漂移	<5% LEL _{methane} /月
建议保存温度	0°C 到 20°C
保存时间	密封6个月
质量保证	发货后起12个月

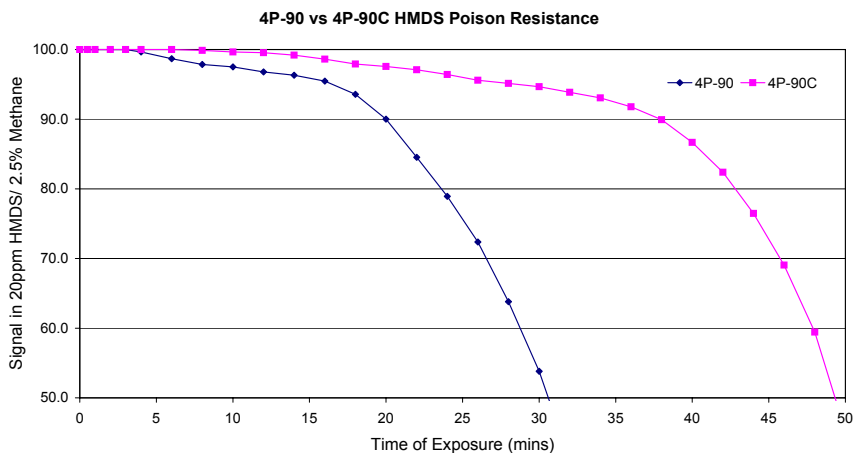
产品尺寸图



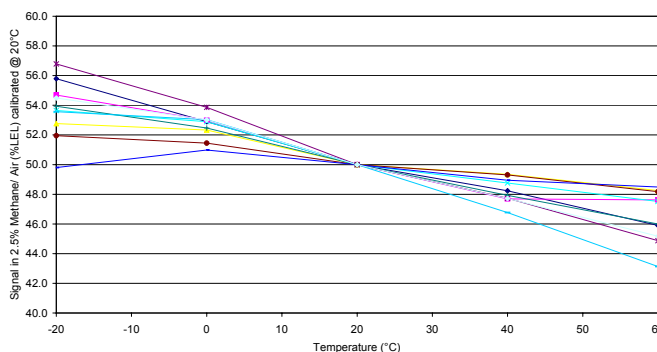
图中所有长度单位均为mm
允许测量误差 ± 0.15mm

测试条件：气流速度300ml/分，1013mbar大气压下，温度20
相对湿度50%

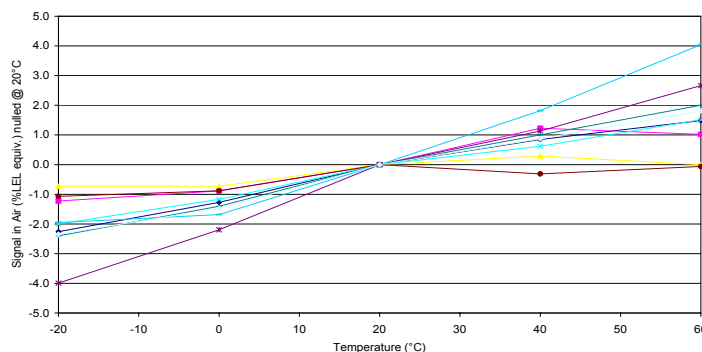
额外性能测试



甲烷信号温度效应



零点温度效应



注意：温度和抗毒性数据仅供参考

相对灵敏度

下表展示了CiTiceLs传感器对一系列相同%LEL浓度气体的不同响应情况，表中所列数据以甲烷气体作为参考 (甲烷=100)。测试所使用甲烷气体浓度为50%LEL CH₄(基于100%LEL CH₄=5% vol)。

注意：表中数据仅供参考，大多数精确测量中，设备/仪器须用气体进行校准。

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 has been extended. Contact City Technology for further details.

产品认证



安全注意！

本传感器是针对重要安全应用而设计。为确保该传感器或用到了该传感器的设备/仪器能正常工作，请务必在使用前用目标气体进行测试。未能依照规定进行测试，可能会危及人员、财产安全。

本文档在进行编写时已尽可能确保其准确性。根据本公司产品后续改进提升相关条例，城市技术有权在不通知用户的情况下，对产品做出修改。文档中信息仅供用户参考，而非售卖品。任何因使用该文档信息或因文档信息遗漏和错误而造成的财产损失、人身伤害和损毁，本公司概不承担。因更新或测试的因素，产品参数会与文档中有所出入。鉴于产品所使用的场合可能超出城市技术能力所及，因此，我们不能对这些与之相关的应用进行担保。产品的可用性 & 操作过程中的安全性须由用户自行测试后决策。

可燃气体传感器 0 – 100% LEL

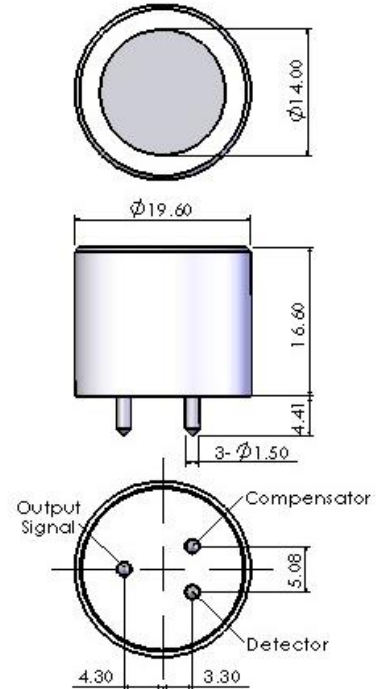
性能表征

产品型号	CLL-6112-300
检测气体	大部分可燃气体和蒸汽
量程	0-100%LEL
灵敏度	22±8 mV/%CH ₄
响应时间(T90)	< 20 秒 (甲烷)
线性	0-75%LEL
长期稳定性	<±5% 信号值/月
基线漂移	<±5%LEL 甲烷/月
质保期	交货后 12 个月

工作条件

工作温度	-20°C to 50°C
工作湿度	15-90%RH (无冷凝)
工作电压	2.3V D.C.
工作电流	110±10 mA
储存环境	无硅、铅、锡、硫等环境中

Outline Dimensions



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

产品特点

- 优秀的耐冲击性
- 优秀的耐高浓度甲烷冲击性
- 优秀的长期稳定性
- 优秀的抗 H₂S 中毒性
- 优秀的抗 HMDS 中毒性

物理性能

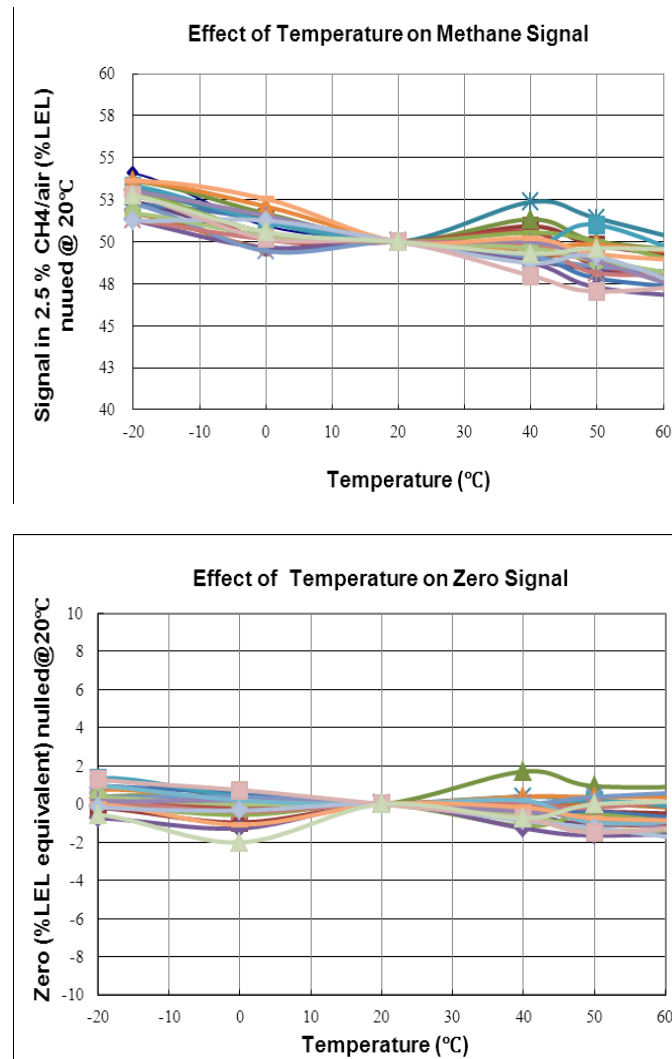
重量	约 20 g
方位要求	无

相对灵敏度

气体/蒸汽	LEL (%vol)	相对灵敏度
甲烷	5.0	100
P 丙烷	2.1	56
正丁烷	1.9	63
正戊烷	1.5	45
正己烷	1.1	31
正辛烷	1.0	26
无铅汽油	1.3	36
氢气	4.0	45
丙酮	2.5	34
乙醇	3.3	36
间二甲苯	1.1	22
甲苯	1.1	29
苯	1.2	36

注：相对灵敏度仅作参考。推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度

温度影响



注: 温度影响仅供参考

产品证书

- **UL**
Class I, Division I, Groups A, B, C&D Hazardous Locations
Certificate No: E187829
- **ATEX(94/9/EC)**
II 2G Ex d IIC
Certificate No: DEMKO 03 ATEX 0311958U
Certificate No: 03 ATEX 0311958U
- **IECEX**
Ex d IIC
Certificate No: IECEX UL 07.0001U

使用须知

1. 以上所有性能规格都是在环境条件: 温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定, 我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动, 并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体, 该传感器有可能对其他气体有响应。

可燃气体传感器 0 – 100% LEL

性能表征

产品型号	CLL-6112-400
检测气体	大部分可燃气体和蒸汽
量程	0 - 100% LEL
灵敏度	23 ± 7 mV/%CH ₄
响应时间(T90)	< 20 秒 (甲烷)
线性度	0 - 75% LEL
长期灵敏度漂移	< ± 5% 满量程/月
长期基线漂移	< ± 5% LEL _{甲烷} /月
质保期	交货后 12 个月

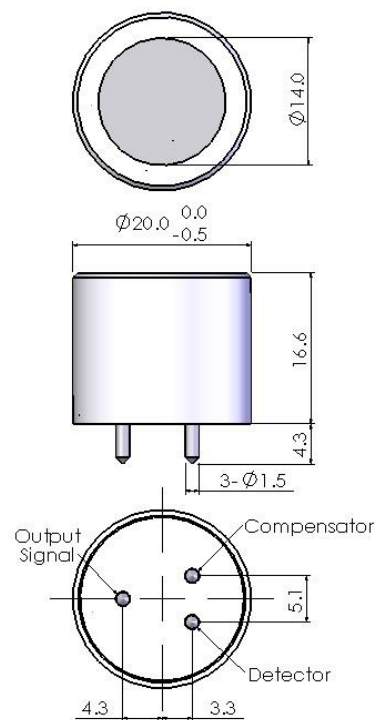
工作条件

工作温度	-20°C to 50°C
工作电压	2.3V D.C.
工作电流	110 ± 10mA
储存环境	无硅、铅、锡、硫等环境中

物理性能

重量	约 20 g
方位要求	无

Outline Dimensions



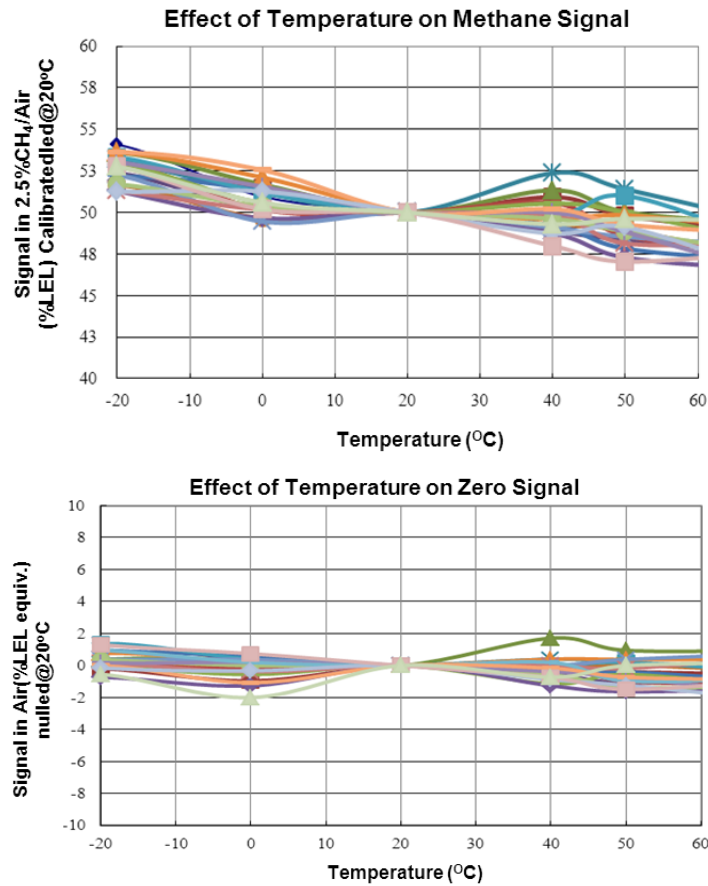
All dimensions are in millimeters.
All tolerances are ±0.2mm,
unless otherwise stated.

相对灵敏度

气体/蒸汽	LEL (%vol)	相对灵敏度
甲烷	5.0	100
丙烷	2.1	63
正丁烷	1.9	63
正戊烷	1.5	50
正己烷	1.1	33
正辛烷	1.0	26
无铅汽油	1.3	36
氢气	4.0	45
丙酮	2.5	34
乙醇	3.3	36
间二甲苯	1.1	22
甲苯	1.1	29
苯	1.2	36
苯乙烯	N/A	N/A

注：相对灵敏度仅作参考。推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。

温度影响



产品证书

- **UL**
Class I, Division I, Groups A, B, C&D Hazardous Locations
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II 2G Ex d IIC
Certificate No: DEMKO 03 ATEX 0311958U
Certificate No: 03 ATEX 0311958U
- **IECEX**
Ex d IIC
Certificate No: IECEX UL 07.0001U

使用须知

1. 以上所有性能规格都是在环境条件: 温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定, 我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动, 并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体, 该传感器有可能对其他气体有响应。

可燃气体传感器 0 – 100% LEL

性能表征

产品型号	CLL-6112-401
检测气体	大部分可燃气体和蒸汽
量程	0 - 100% LEL
灵敏度	23 ± 7 mV/%CH ₄
响应时间(T90)	< 20 秒 (甲烷)
线性度	0 - 75% LEL
长期灵敏度漂移	< ± 5% 满量程/月
长期基线漂移	< ± 5% LEL _{甲烷} /月
质保期	交货后 12 个月

工作条件

工作温度	-20°C to 50°C
工作湿度	15-90%RH (无冷凝)
工作电压	2.3V D.C.
工作电流	110±10 mA
储存环境	无硅、铅、锡、硫等环境中

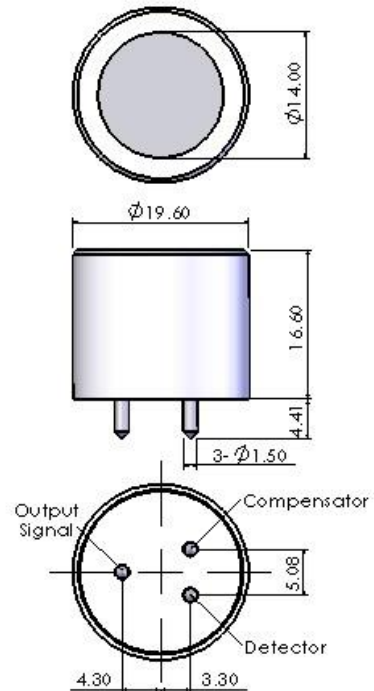
产品特点

- 优秀的耐冲击性
- 优秀的耐高浓度甲烷冲击性
- 优秀的长期稳定性
- 优秀的抗 H₂S 中毒性
- 优秀的抗 HMDS 中毒性

物理性能

重量	约 20 g
方位要求	无

Outline Dimensions



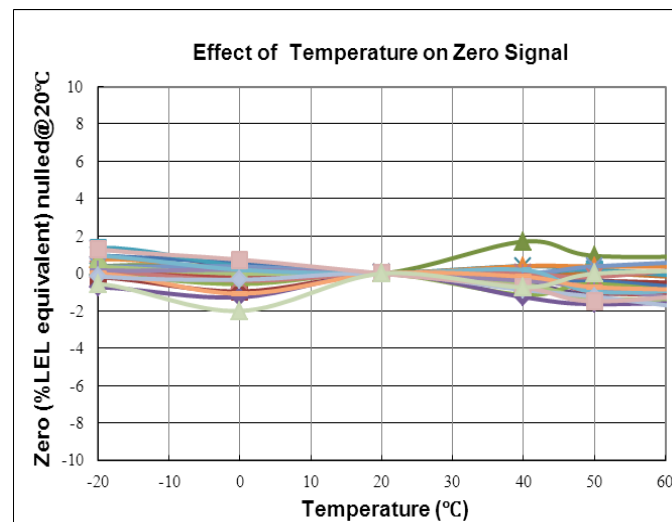
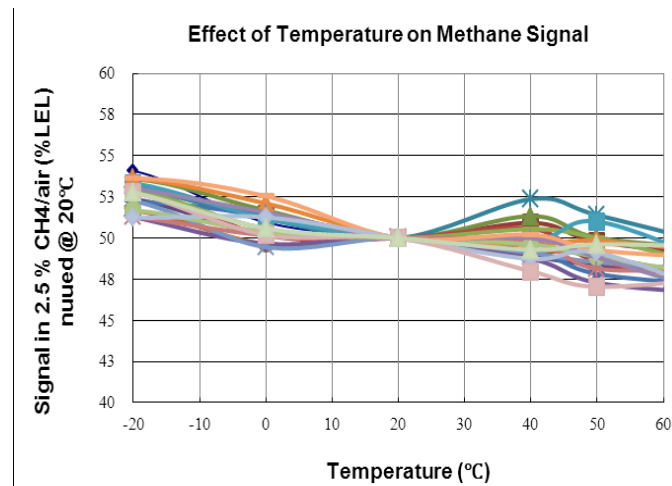
All dimensions in mm
All tolerances: ±0.15mm
unless otherwise stated

相对灵敏度

气体/蒸汽	LEL (%vol)	相对灵敏度
甲烷	5.0	100
丙烷	2.1	63
正丁烷	1.9	63
正戊烷	1.5	50
正己烷	1.1	33
正辛烷	1.0	26
无铅汽油	1.3	36
氢气	4.0	45
丙酮	2.5	34
乙醇	3.3	36
间二甲苯	1.1	22
甲苯	1.1	29
苯	1.2	36

注：相对灵敏度仅作参考。推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度

温度影响



注: 温度影响仅供参考

产品证书

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II 2G Ex d IIC
Certificate No: DEMKO 03 ATEX 0311958U
Certificate No: 03 ATEX 0311958U
- **IECEX**
Ex d IIC
Certificate No: IECEX UL 07.0001U

使用须知

1. 以上所有性能规格都是在环境条件: 温度 20 °C, 相对湿度 50% RH, 一个大气压 (100 kPa 或环境压力) 下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定, 我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动, 并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体, 该传感器有可能对其他气体有响应。

可燃气体传感器 0 – 100% LEL

性能表征

产品型号	CLL-6012-400
检测气体	大部分可燃气体和蒸汽
量程	0-100%LEL
灵敏度	35±10 mV/%CH ₄
响应时间 (T ₉₀)	< 20 秒(甲烷)
线性度	0-75%LEL
长期灵敏度漂移	<±5%满量程/月
长期基线漂移	<±5%LEL _{甲烷} /月
质保期	12 月

工作条件

工作温度	-20°C to 50°C
工作湿度	15-90%RH (无冷凝)
工作电压	4.25V D.C.
工作电流	75±8 mA
储存环境	无硅、铅、锡、硫等环境中

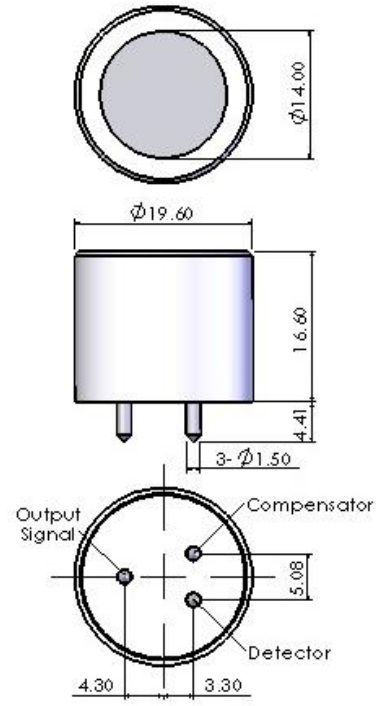
产品特点

优秀的长期稳定性
优秀的抗 H₂S 中毒性

物理性能

重量	约 20 克
方位要求	无

Outline Dimensions



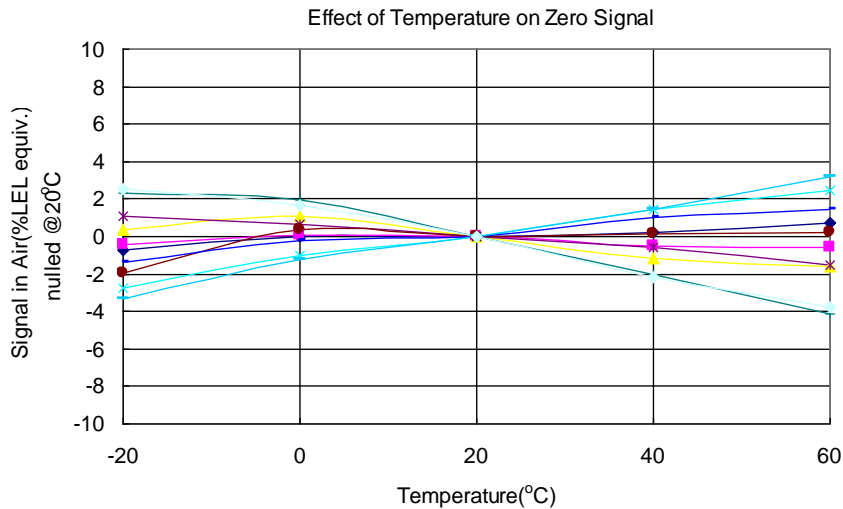
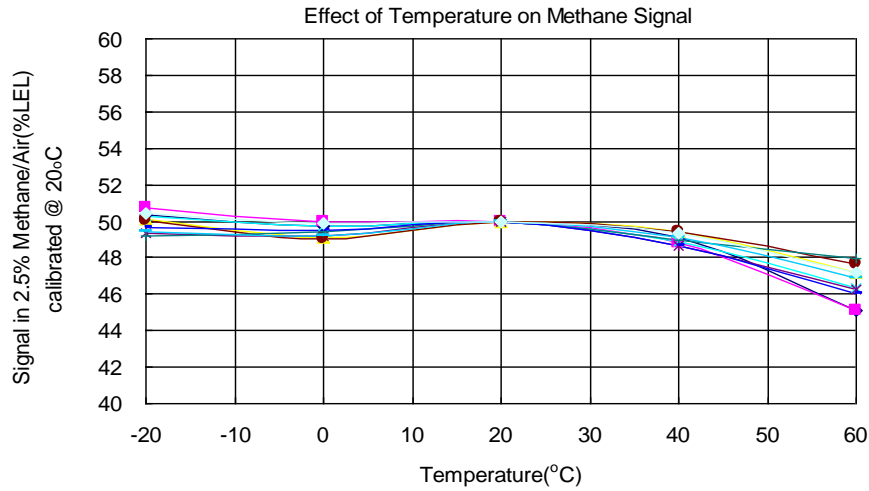
All dimensions in mm
All tolerances ±0.15mm
unless otherwise stated

Relative Sensitivity

气体/蒸汽	LEL (%vol)	相对灵敏度
甲烷	5.0	100
丙烷	2.1	63
正丁烷	1.9	63
正戊烷	1.5	48
正己烷	1.1	40
正辛烷	1.0	34
无铅汽油	1.3	42
氢气	4.0	83
丙酮	2.5	59
乙醇	3.3	59
间二甲苯	1.1	29
甲苯	1.1	33
苯	1.2	43
苯乙稀	1.1	29

注：相对灵敏度仅作参考。推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。

温度影响



Note: Temperature dependence data is supplied for guidance only.

产品证书

- **UL**
Class I, Division I, Groups A, B, C & D Hazardous Locations
Certificate No: E187829
- **ATEX(94/9/EC)**
II 2G Ex d IIC
Certificate No: DEMKO 03 ATEX 0311958U
Certificate No: 03 ATEX 0311958U
- **IECEX**
Ex d IIC
Certificate No: IECEX UL 07.0001U
Ex ia IIC T4 Ga or Ex ia I Ma
Certificate No: IECEX KEM 08.0030U

使用须知

1. 以上所有性能规格都是在环境条件：温度 20 °C, 相对湿度 50% RH, 一个大气压（100 kPa 或环境压力）下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。

可燃气体传感器 0 – 100% LEL

性能表征

产品型号	CLL-6012-401
检测气体	大部分可燃气体和蒸汽
量程	0 - 100% LEL
灵敏度	32 ± 10 mV / %CH ₄
响应时间 (T ₉₀)	< 20 秒(甲烷)
线性度	0 - 75% LEL
长期灵敏度漂移	< ± 5% 信号值/月
长期基线漂移	< ± 5% LEL _{甲烷} /月
质保期	12 个月

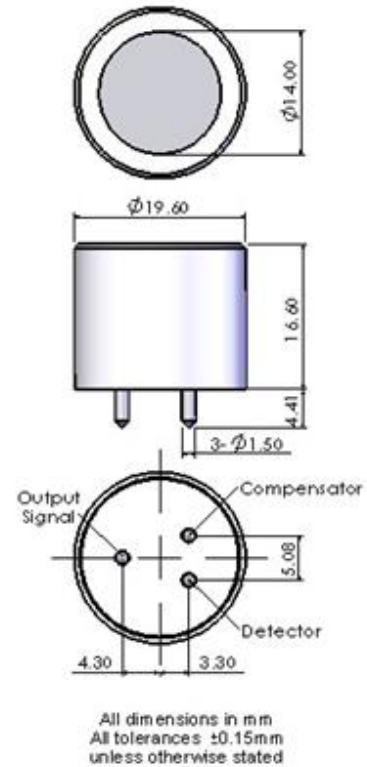
工作条件

工作温度	-20°C to 50°C
工作湿度	15 - 90%RH (无冷凝)
工作电压	4.25V D.C.
工作电流	70 ± 10 mA
储存环境	无硅、铅、锡、硫等环境中

物理性能

重量	约 20 克
方位要求	无

Outline Dimensions

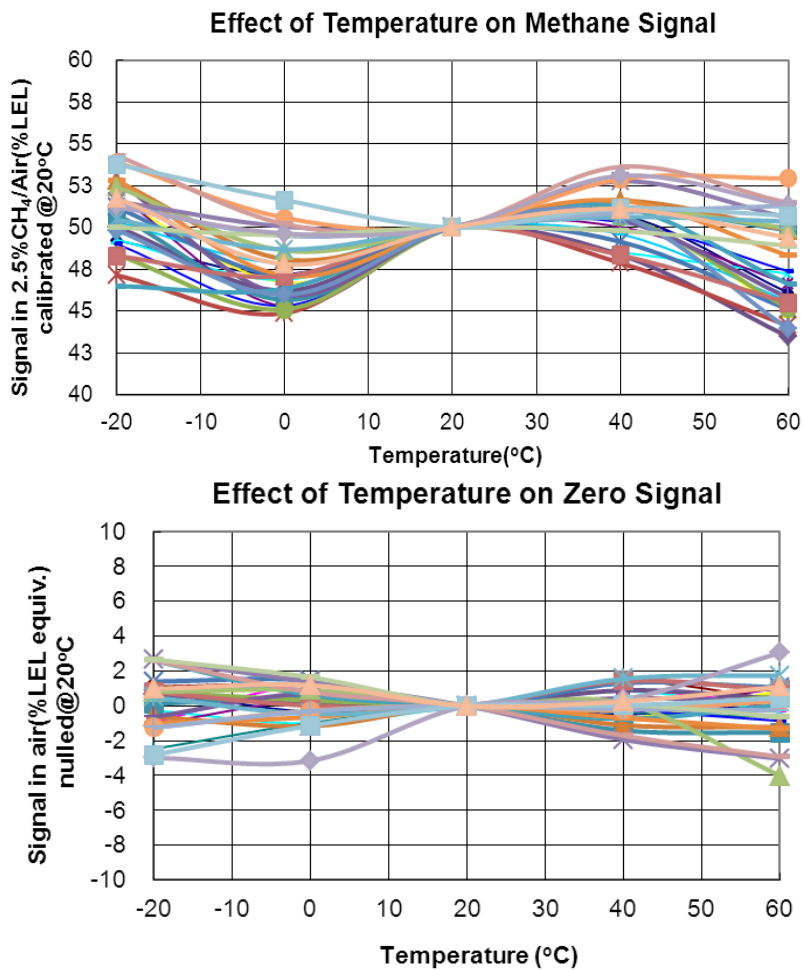


Relative Sensitivity

气体/蒸汽	LEL (%vol)	相对灵敏度
甲烷	5.0	100
丙烷	2.1	63
正丁烷	1.9	63
正戊烷	1.5	48
正己烷	1.1	30
正辛烷	1.0	26
无铅汽油	1.3	36
氢气	4.0	43
丙酮	2.5	26
乙醇	3.3	26
间二甲苯	1.1	22
苯	1.1	29
苯乙稀	1.2	36

注：相对灵敏度仅作参考。推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度

温度影响



注：温度影响仅供参考

产品证书

- **UL**
Class I, Division I, Groups A, B, C&D Hazardous Locations
Certificate No: E187829
- **ATEX(94/9/EC)**
II 2G Ex d IIC
Certificate No: DEMKO 03 ATEX 0311958U
Certificate No: 03 ATEX 0311958U
- **IECEX**
Ex d IIC
Certificate No: IECEX UL 07.0001U

使用须知

1. 以上所有性能规格都是在环境条件：温度 20 °C，相对湿度 50% RH，一个大气压（100 kPa 或环境压力）下测得。
2. 推荐用目标气体进行标定。如果用交叉敏感气体进行标定，我们不保证其标定和测量的准确度。
3. 交叉灵敏度会有 +/- 30% 的浮动，并且可能随着传感器的生产批次不同和传感器的寿命而变化。
4. 上述交叉灵敏度包括但不限于上述气体，该传感器有可能对其他气体有响应。

Product Data Sheet

Product Datasheet

1 LEL 75C Combustible Gas Sensor

Document Purpose

The purpose of this document is to present the performance specification of the 1 LEL 75C Combustible Gas sensor.

This document should be used in conjunction with the 1 LEL 75 Characterisation Note, the Operating Principles (OP01), Instructions for Safe Use and the Product Safety Datasheet (PSDS 22).

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. For guidance on sensor performance outside of these limits, please refer to the 1 LEL 75 Characterisation Note.

Output signal can drift below the lower limit over time. For guidance on the safe use of the sensor, please refer to the Operating Principles OP01 and the Instructions for Safe Use.

Product Data Sheet

Key Features & Benefits:

- Low profile design with small form factor
- Designed to meet industry performance standards
- Enhanced performance over an extended environmental range
- Approved to IP67
- RoHS Compliant
- Approved for use in Zone 0 applications

Performance Characteristics

MEASUREMENT

Operating Principle	Catalytic Oxidation
Gases Detected	Combustible gases and vapours up to C6
Nominal Range	0-100% LEL
Inboard Filter	To remove H ₂ S
Inboard Filter Capacity	1000 ppm hr minimum
Additional Filter	Silica filter to improve silicone resistance
Sensitivity*	31 ± 5 mV/%CH ₄ (TBA)
Response Time (T₉₀)*	<20 seconds (methane) at 20°C
Poison Resistance	Resistance to H ₂ S poisoning Superior Silicone resistance
Resolution	1%LEL
Output Linearity	Linear 3%vol.CH ₄ (Refer to Characterisation Note)

ELECTRICAL

Operating Voltage	3.3 ± 0.05 VDC
Operating Current	84 mA maximum
Power Requirement	280 mW maximum

MECHANICAL

Weight	<5 g
Outer Body Material	PPS Fortron 1140L4
Position Sensitivity	None

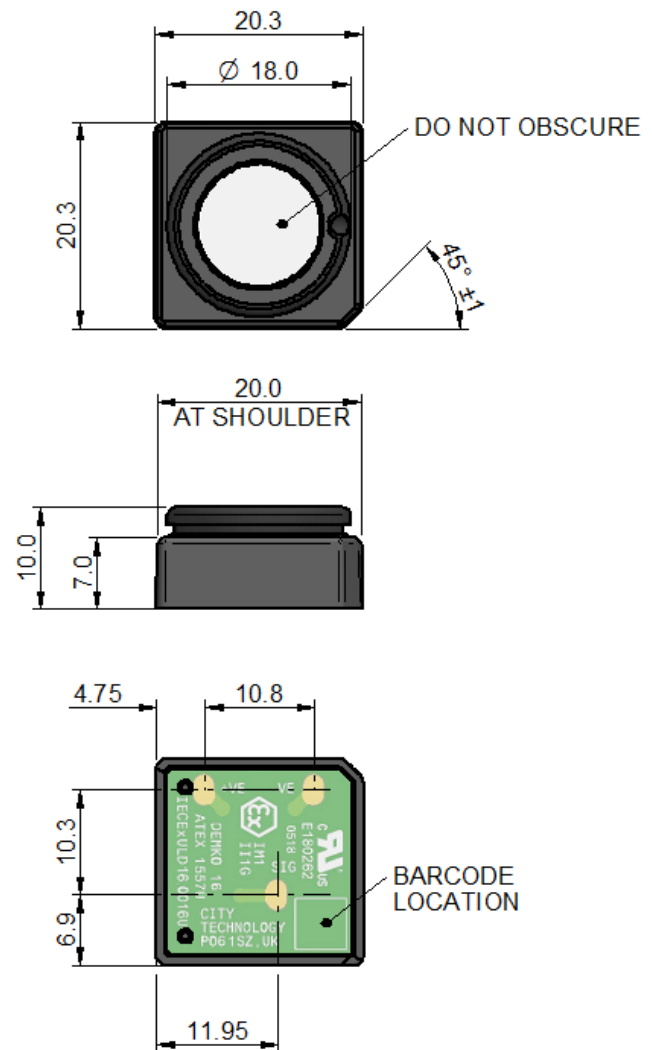
ENVIRONMENTAL

Ideal Storage Temperature	0°C to +20°C
Operating Temperature Range	-40°C to +60°C (Refer to Characterisation Note for performance at < -20°C)
Operating Pressure Range	600 to 1200 mBar
Operating Humidity Range	0-95%rH non-condensing

LIFETIME

Storage Life	6 months in sealed container
Long Term Output Drift	<3% signal/month
Long Term Baseline Drift	<5% LEL _{methane} /month
Expected Operating Life	5 years in air

Product Dimensions



Note: * Fits recommended Connector

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

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

Product Data Sheet

List of Applicable Standards

- CENELEC EN 50303:2000 - Group I, Category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust
- CENELEC EN 60079-0:2012+A11:2013 - Explosive atmospheres – Part 0: Equipment. General requirements
- CENELEC EN 60079-1:2014 - Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
- CENELEC EN 60079-11:2012 - Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"
- IEC 60079-0 Ed. 6 + Corr. 1 + Corr. 2 + I-SH 01 + I-SH 02 - Explosive atmospheres – Part 0: Equipment. General requirements
- IEC 60079-1 Ed. 7 - Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
- IEC 60079-11 Ed. 6 + Corr. 1 + I-SH 01 + I-SH 02 + I-SH 03 - Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"
- UL 60079-0 Ed. 6 - Explosive atmospheres – Part 0: Equipment. General requirements
- UL 60079-1 Ed. 7 - Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
- UL 60079-11 Ed. 6 - Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"
- CSA C22.2 NO. 60079-0:15 - Explosive atmospheres – Part 0: Equipment. General requirements
- CSA C22.2 NO. 60079-1:16 - Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
- CSA C22.2 NO. 60079-11:14 - Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"

Approval Body: UNDERWRITERS LABORATORIES INC®



File Number: E 180262

Certificate Number: DEMKO 16 ATEX 1557U
IECEX ULD 16.0016U

ATEX Marking:

0518



IM1
II1G

Product Data Sheet

Protection Concept Markings

ATEX Marking :	Ex da ia I Ma Ex da ia IIC Ga
UL Marking :	Class 1 Zone 1 AEx da ia IIC Ga
Canadian Marking :	Ex da ia I Ma Ex da ia IIC Ga

Entity Parameters

- | | |
|---------------------|---------------------|
| • $U_i = 12$ Volts | • $U_i = 5$ Volts |
| • $I_i = 3.3$ Amps | • $I_i = 3.3$ Amps |
| • $P_i = 1.3$ Watts | • $P_i = 1.3$ Watts |
| • $C_i = 0$ | • $C_i = 0$ |
| • $L_i = -0$ | • $L_i = -0$ |

Schedule of Limitations (Denoted by U After the Certificate Number)

- The sensors have been evaluated for a service temperature range of -40°C to $+60^{\circ}\text{C}$.
- With regard to thermal ignition, the sensors have been evaluated as suitable for Group I use or for Group II use with temperature code T4 for the stated service temperature range for $U_i = 5$ V.
- For group I applications with $U_i > 5$ V, the sensors must be installed in an enclosure preventing ingress of coal dust.
- The device has not been assessed for resistance to impact or drop. The device shall be installed in a suitably certified enclosure, per type of protection and in accordance with IEC 60079-0.
- The device has an external non-metallic surface greater the 400 mm^2 . It is therefore at risk of build-up of electrostatic charge. The device shall be installed within an enclosure and limited to 400 mm^2 of material exposure.
- With regard to breather thermal temperature, including safety factor of 1.2 - breather surface 99.244°C .

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.

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company's policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application.