Product Data Sheet

Product Datasheet

CDH300-B Combustible Gas Sensor

Document Purpose

The purpose of this document is to present the performance specification of the CDH300-B.

This document should be used in conjunction with the Product Data Handbook (7pelops.pdf), the Product Safety Datasheet (PSDS 21) and the CDH300-B Instructions for Safe Use.

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

For guidance on the safe use of the sensor, please refer to the Product Data Handbook and the CDH300-B Instructions for Safe Use.

Product Data Sheet

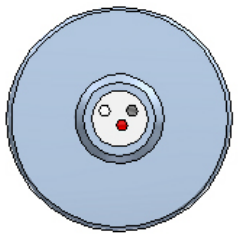
Key Features & Benefits:

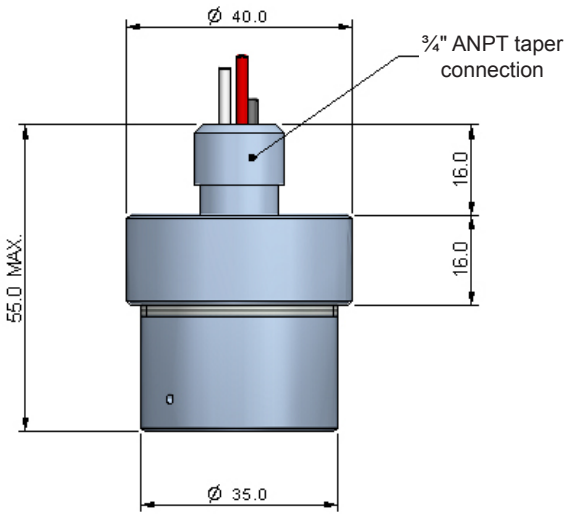
- **Robust, Heavy Duty Design**
- **High Poison Resistance**

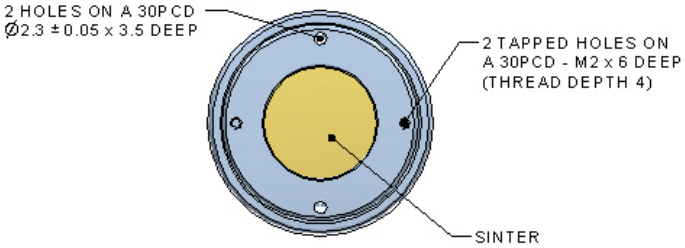
Performance Characteristics

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
H_2S 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	-20ºC to +55ºC
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	0ºC to 20ºC
Shelf life	6 months in sealed container
Expected Operating Life	2 years in clean air
Warranty	12 months from date of manufacture

Product Dimensions







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

Special Conditions for Safe Use

The CDH300-B 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 CDH300-B Gas Sensing Head shall not be used as a safety related device.

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

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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

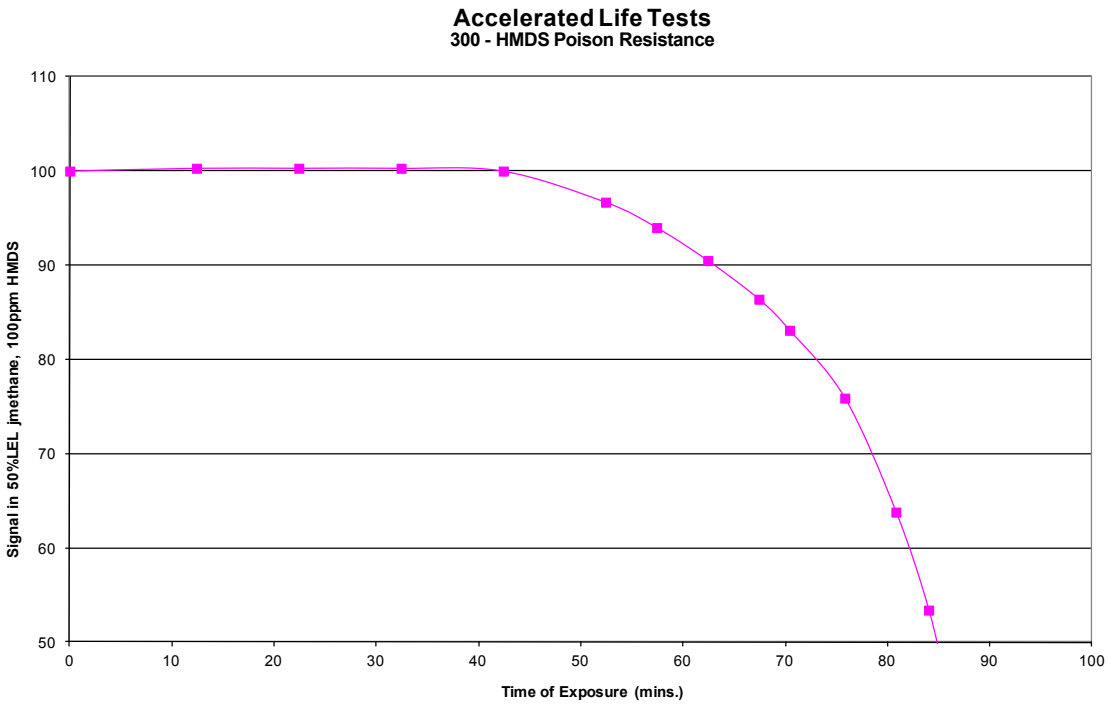
Approval Body:	SIRA CERTIFICATION SERVICE
Test Standard:	EN 60079-0:2006 General Requirement EN 60079-1:2007 Flameproof Enclosures "d"
Product Categories:	Ex d IIC T6 Gb, ⟨Ex⟩ II2G, CE 0518
Certificate Number:	01 ATEX1204X

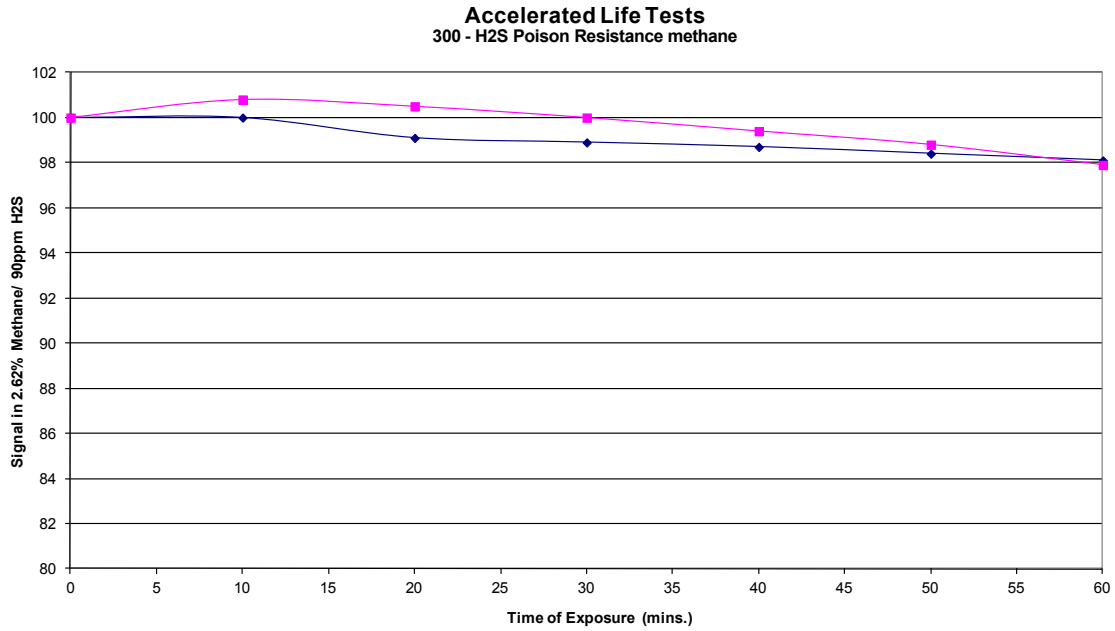
Poison Resistance

The graphs below show the effects of typical silicone and sulphur containing compounds on the sensor. Hexamethyl-disiloxane (HMDS) is chosen as an example of a particularly virulent poison the effects of which are irreversible. Hydrogen sulphide (H_2S) 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 H_2S is approximately seven times the Short Term Exposure Limit in the UK.

From the graph, the sensor will operate for significantly longer in an environment containing silicone oil vapours than a traditional standard sensor. The effect of 100ppm H_2S is also very small, and upon removal of H_2S the sensor will return to its original sensitivity. In practice, this means the 300 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 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 -20ºC to +40ºC.

3. The equipment has not been assessed as a safety related device (as referred to by Directive 94 / 9 / EC Annex II, clause 1.5).

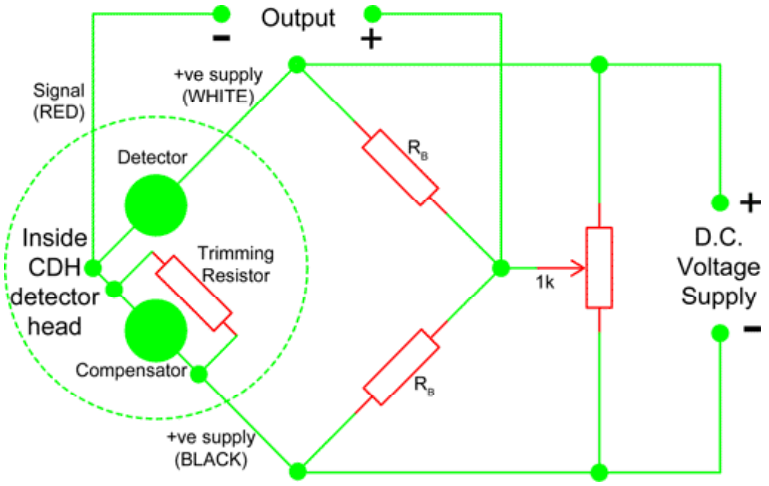
4. Installation of the equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-14)

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 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.

Figure com7
Detector Heads:



RED	-	Output Signal
BLACK	-	Negative (-ve) Power Supply
WHITE	-	Positive (+ve) Power Supply

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

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

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

Sinter: 316 stainless steel 316L

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

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

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

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

10. The CDH 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:

CiTipeL® Detector Head
CDH300

LR 103143
CLASS 1
GROUPS ABC&D

SIRA 01ATEX1204X
Ex d IIC T6 Gb
Ex II2G
CE 0518 Pi=2W

11. Certain substances are known to have a detrimental effect on catalytic elements as used in the CDH 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 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 jeopardise the safety of people and property.