

IR600 Datasheet

Infrared Gas Sensor for Hazardous Areas (Fixed Systems)

The IR600 Series gas sensors are designed to detect and monitor the presence of CO₂, hydrocarbons and acetylene using the same non-dispersive infrared (NDIR) principle as used in the SGX Sensortech range of miniature infrared gas sensors. Dual detector channels are used with a reference for background compensation. A temperature sensor is mounted for temperature compensation.

IR600 sensors are designed to be integrated with fixed gas detection systems. Their construction is a stainless steel flameproof enclosure with an integral stainless steel sinter for the safe entry of the gases being tested.

Three types of mounting thread are available to allow easy fixing to the junction box of the fixed system. On the front face there is an external M46 thread for attaching optional accessories for use in different applications. The IR600 Series incorporates an inbuilt and sealed preamplifier/buffer and require connection to suitable transmitter systems for their power supply, operation and signal processing. The IR600 lead in/out terminates in an 8-pin connector.

FEATURES

- For detection of the following gases:
 - Carbon Dioxide (IR601),
 - Hydrocarbons (IR602, IR603)
 - Acetylene (IR604)
- Diffused gas sampling via sinter
- Low power
- Reference channel for self-compensation
- Special gold plated optical/gas cavity for stable signal levels
- Operational in varying temperature, pressure and humidity
- Fast response
- Rugged stainless steel construction
- No moving parts
- Resistance to corrosion
- Immunity from 'poisoning'
- Reliable fail-safe operation
- Low maintenance
- Sealed preamplifier/buffer electronics
- Accessories available for field applications
- ATEX certified
- CSA certified (Canada and US)



OPERATING PRINCIPLE

SGX Sensortech manufactures a range of Infrared (IR) Gas Sensors for a variety of gases and vapours in different applications. These are compact and robust gas diffusion type sensors based on an SGX Sensortech patented optical design. They run on low power and use well proven Non-Dispersive Infrared (NDIR) detection methods.

The sensor operates using the natural ability of the target gases to absorb radiation in the infrared portion of the electromagnetic spectrum. Using an infrared source, detector and selective optical filters the SGX infrared sensors can be used to detect a range of target gases. More information on the NDIR sensors can be found in the SGX Sensortech Application Notes.

TECHNICAL SPECIFICATION

Mechanical

Dimensions	See Outline on Page 5
Body material	Stainless Steel
Weight	435g

Environmental

Ambient temperature range for operation (ATEX): for operation (CSA): storage:	-20°C to +60°C -20°C to +65°C -20°C to +60°C
Operational pressure range	700kPa to 1300kPa
Humidity range for operation and storage	0 to 95% RH (Non-condensing)
Gases Detected	Carbon Dioxide, hydrocarbons

Electrical

DC supply to detectors	See Outline on Page 5
Typical power	180mW / 5V
Lamp Supply (Recommended)	+5V, 60mA (Square Wave at 4Hz, 50% duty cycle)



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PERFORMANCE

For test purposes, all data taken using the following conditions:

- SGX linearisation and temperature compensation algorithms; see Infrared Sensor Application Notes.
- Lamp modulation 0.4 - 5.0 V, square wave, at 4 Hz and 50% duty cycle.
- Ambient temperature (20°C) and pressure (103 kPa).
- All gases diluted in dry nitrogen.

Sensor type	IR601	IR602	IR603	IR604
Gas	Carbon Dioxide	Hydrocarbons		Acetylene
Sensing range	0 - 5.0%vol.	0 - 100% LEL and 0 - 100% vol. <i>(same sensor is suitable for both ranges)</i>		
Maximum response time (T90)	<40 s			
Voltage output in nitrogen for active and reference channels	4.0 ± 0.5 V centred on 2.5 V			
Sensitivity to gas over full concentration range (before linearisation)	see Fractional Absorbance curves			
Maximum deviation from linearity	±0.1% vol.			
Maximum variation of zero from -20 to +55 °C	±10 ppm/°C	±30 ppm/°C		
Resolution (See note 1)	100 ppm <i>(at 2%vol)</i>	500 ppm <i>(at 5%vol)</i>		
Maximum non-reproducibility of zero at 20 °C	±100 ppm	±500 ppm		
Maximum non-reproducibility of sensitivity at 20 °C	±200 ppm	<±1000 ppm		
Long-term zero drift/month	<±100 ppm	±500 ppm		
Response to 0 - 90% change in RH at 20 °C (in target gas)	0% vol <i>(at 2%vol)</i>	+0.1% vol <i>(at 5%vol)</i>	+0.3% vol <i>(at 5%vol)</i>	+0.5% vol <i>(at 2.5%vol)</i>
MTBF (lamp dependent only)	>10 years for 5 V operation			
Vibration	Complies with EN 60079-29-1			
Ingress Protection	See Weather Cap accessory, Page 6			

Note 1: The resolution will vary with gas concentration due to the non-linear response to the target gas, therefore the best resolution will be at the low concentrations and will get worse as the concentration increases.

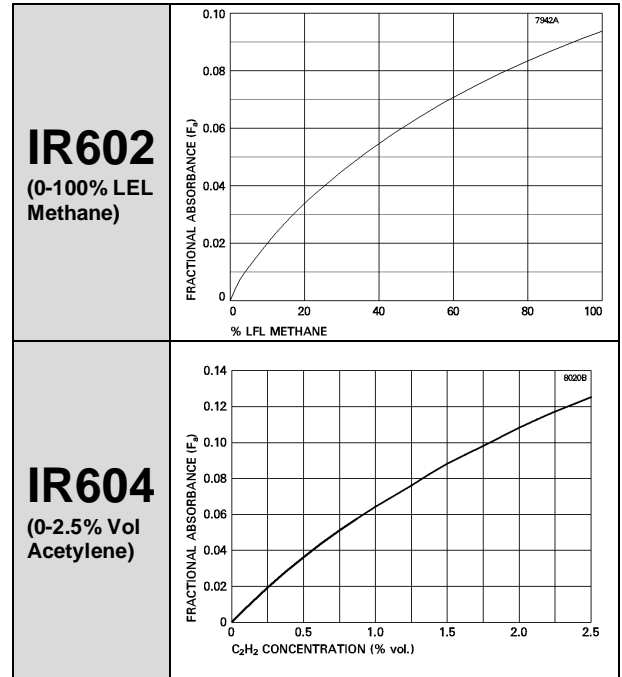
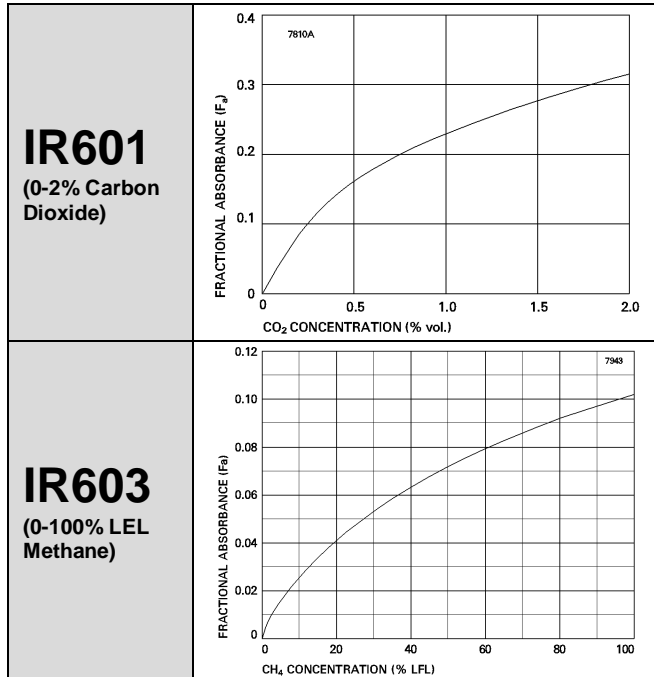
HANDLING PRECAUTIONS

1. Do not allow sensors to fall on the floor. This could cause lamp filament breakage, damage to the pins and the gas entrance aperture.
2. Do not apply mechanical force against the gas entrance aperture.
3. Do not immerse sensors in water or other fluids.
4. Protect the gas entrance aperture against dust ingress and sprayed materials.
5. Anti-static handling precautions must be taken.

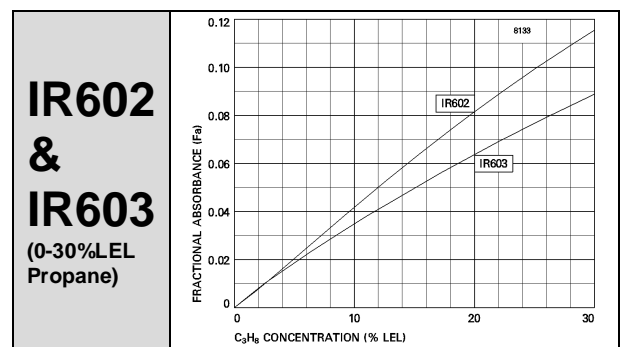
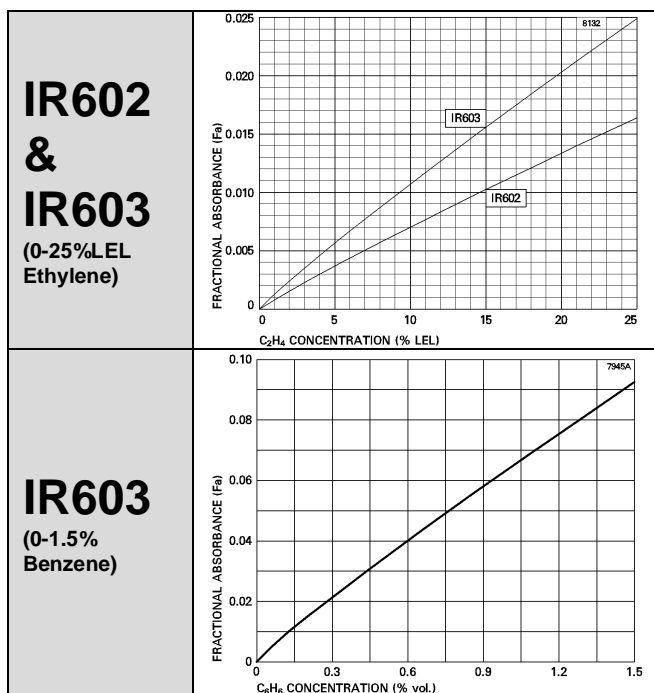
FRACTIONAL ABSORBANCE CURVES

These show the typical sensitivity versus concentration before linearisation for the range of gases. For further explanation, refer to the Infrared Sensor Application Notes.



Principle Target Gases



Other Target Gases



CERTIFICATION

	ATEX	CSA
Certificate / File:	BAS 01ATEX2110X	2589678
Standards:	EN 60079-0:2012 IEC 60079-1:2014 Ed.7	CSA C22.2 No.30 (M1986) CSA C22.2 No.142 (M1987) FM 3600 (Nov 1998) FM 3615 (Feb 2006)
Product Marking:	 II 2G Ex db IIC T5 Gb	 Class I Groups B,C&D
Certified Manufacturing Locations:	SGX Europe Sp. z o.o., Ligocka St. 103, 40-568 Katowice, Poland	
Certificate Address:	SGX Europe Sp. z o.o., Ligocka St. 103, 40-568 Katowice, Poland	

INSTRUCTIONS SPECIFIC TO HAZARDOUS AREA INSTALLATIONS

(Ref : EU ATEX Directive 2014/34/EU)

1. The head is classified as flameproof equipment and is marked:

BAS01ATEX2110X
II 2G Ex db IIC T5 Gb
T_{amb} = -20°C to +60°C
2W/5V MAX

The head should only be used within the limits imposed by this certification and by these conditions of use.

2. The head may be used in a hazardous area without further mechanical protection. However, the cable requires mechanical protection and must be terminated in a suitable enclosure.
3. The head must be efficiently earthed (grounded). This may be achieved by mounting it into an appropriate earthed metal junction box or into a non-metallic junction box fitted with an earth continuity plate used in accordance with the box manufacturer's instructions. There are no internal connections to the sensing head body.
4. In the event that the head becomes embedded in a junction box by over-tightening or corrosion, it may be released by the use of a spanner or wrench on the two flat surfaces on the sides of the body.
5. There are no user serviceable parts inside the body of the sensing head, and no attempt should be made to open the body for any purpose. The unit is non-repairable.
6. The head has not been assessed as a safety device (EHSR 1.5).
7. When installed in outdoor locations where rain or spray could interfere with the safe working of the head, or in indoor locations where water jets, sprays, or hoses are used routinely for cleaning purposes, the head should be fitted with the Weather Cap that is available as an accessory.
8. The end-user/installer should be aware that the certification of the head relies in its construction on the use of the following materials, which are suitable for most common applications:

Enclosure.....Stainless Steel
 Sinter.....Stainless Steel
 Bushing.....Epoxy resin

In accordance with the Note in EN60079-0:2006 Clause 6.1, the end-user/installer shall inform the manufacturer of any adverse conditions that the head may encounter. This is to ensure that the head is not subject to conditions that may cause degradation of these materials.

OUTLINE (All dimensions in millimetres; dimensions without limits are nominal)

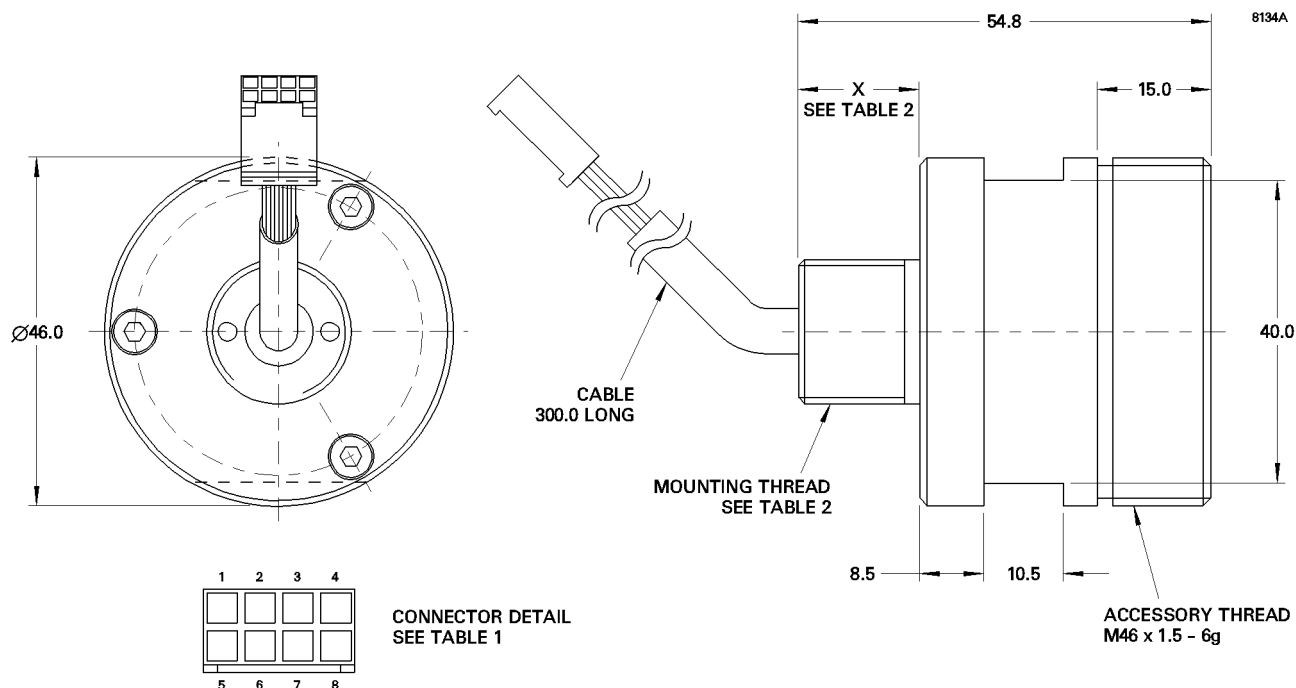


Table 1 - Connections

HE14 crimp socket, 8-way double-row, single orientation

Socket	Wire Colour	Description
1	Red	Temperature Output
2	Yellow	Active Detector Output
3	Blue	0 VA
4	Black	5 VA
5	Orange	2.5 V Reference
6	Brown	Reference Detector Output
7	Green	Lamp
8	Purple	Lamp

Table 2 - Mounting Options

The sensing head is supplied with one of three different mounting threads at the user's choice.

Thread	Thread code	Dimension X (mm)
Metric 20 x 1.5 mm	1	16.00
ANP (Taper) 1/2" - 14 NPT	2	19.85
ANP (Taper) 3/4" - 14 NPT	3	20.16

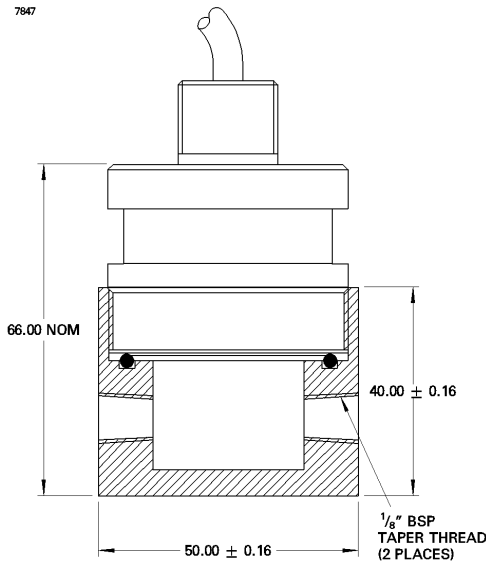
Taper threads are manufactured in accordance with ANSI/ASME B1.20.1.

ACCESSORIES

(All dimensions in millimetres)

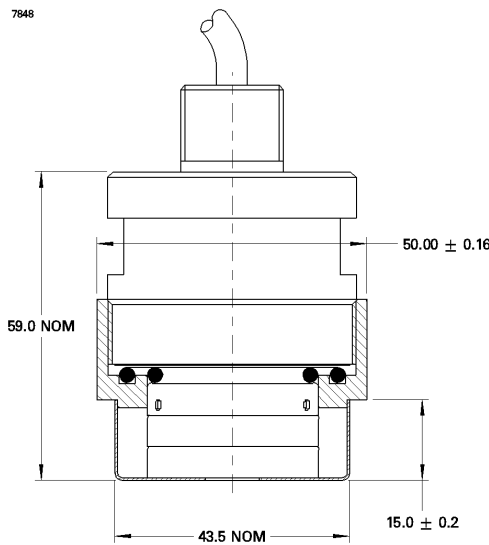
Three accessories are available to complement the IR600 Series gas detection head.

Flow Cap DAS546633AA



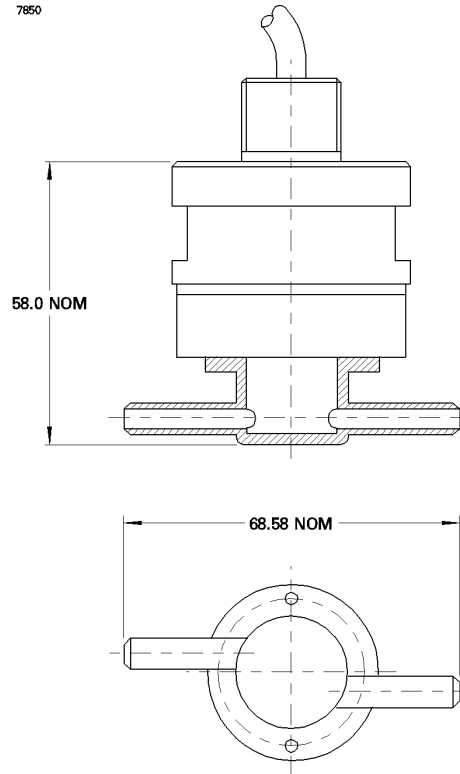
The Flow Cap allows the IR600 to be used in applications where it is to be aspirated permanently with a pumped or pressurised sample. The cap is made of 316 stainless steel and can be used in a variety of applications involving pumped sampling analysis or detection systems.

Weather Cap DAS546632AA



The Weather Cap protects the IR600 from water when used in external locations, where rain or spray could interfere with the safe working of the head, or in internal locations where water jets, sprays or hoses are used routinely for cleaning purposes, etc. The cap is made of 316 stainless steel and has been tested to IP64 for effectiveness, and also to ensure that it does not significantly affect the IR600's performance.

Quick Calibration Hood DPP546618DA



The Quick Calibration Hood is constructed from polypropylene, and provides a convenient means of supplying test gases to the IR600 in the field, for calibration and checking purposes. The assembly push-fits into the central gas access recess of the head, and is designed to accommodate 6 mm ID or 1/4" flexible tubing.

ORDERING INFORMATION

IR60n/n

TARGET GAS

- 1 Carbon Dioxide
- 2 Hydrocarbons (Narrow band)
- 3 Hydrocarbons (Broad band)
- 4 Acetylene

THREAD TYPE

(Refer to Table 2, page 5)

- 1 Metric 20 x 1.5 mm
- 2 ANP (Taper) 1/2" - 14 NPT
- 3 ANP (Taper) 3/4" - 14 NPT

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