SUNSTAR传感与控制 http://www.sensor-ic.com/ TEL:0755-83376549 FAX:0755-83376182E-MAIL: szss20@163.com

IR31CE
Miniature Infrared Gas Sensor for CO_2 Monitoring under High Pressure Conditions

FEATURES

- Configured for CO_2, 0 to 2% or 0 to 5% volume concentration
- Can be used for CO_2 monitoring up to 30 bar
- Diffused gas sampling
- Mesh particulate filter
- Low power
- Reference channel for self-compensation
- Special gold plated optical/gas cavity for stable signal levels
- Fast response
- Rugged stainless steel construction
- No moving parts
- Resistance to corrosion
- Series 4 size to complement electrochemical oxygen sensors
- Immunity from 'poisoning'
- Reliable fail-safe operation
- Low maintenance
- Suitable for fixed or portable respiratory instrumentation

DESCRIPTION

The IR31CE is derived from the IR31BC and IR11BD CO_2 sensors which use the proven non-dispersive infrared (NDIR) principles to detect and monitor the presence of gases. With modified bandpass filtering in the active and reference channels, the IR31CE can reliably track CO_2 levels under conditions where the IR absorption lines change from their normal positions. This can happen where collision broadening occurs for CO_2 gas at high pressure (20 to 30 bar). The sensor is useful for respiratory monitoring in the hyperbaric conditions found in deep diving and other submarine environments.

OPERATION

To operate as an NDIR gas sensor, the IR31CE must be interfaced to a suitable transmitter for power supply and for amplifying and processing signals. The end-user may linearise the output signal and include compensation for temperature and pressure changes within the system software. To facilitate this, inputs must be provided from pressure and temperature sensors installed close to the IR31CE inside the instrument housing.

A set of Application Notes is available from the e2v technologies website, to explain more about NDIR gas sensing and provide advice for the end-user on interfacing sensors and processing signals.

Infrared Sensor Application Note 1: Background to NDIR Gas Sensing

Infrared Sensor Application Note 2: Signal Processing

Infrared Sensor Application Note 3: Software Design

Infrared Sensor Application Note 4: Electronics Design

Infrared Sensor Application Note 5: Determining Coefficients for Linearisation and Temperature Compensation

Infrared Sensor Application Note 6: Advice for Using Infrared Gas Sensors in Mining Applications

(Photograph shows device approximately 3 x actual size)

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.
6. Under no circumstances should the sensor pins be soldered directly to a pcb or wires. Excessive heat could cause irrepairable damage to the pyroelectric detectors.

Gas Mixtures

The IR31CE must not be used for monitoring CO_2 in mixtures including hydrocarbon gases or vapours.

e2v technologies (uk) limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU, UK Telephone: +44 (0)1245 493493 Facsimile: +44 (0)1245 492492
e-mail: enquiries@e2v.com Internet: www.e2v.com Holding Company: e2v technologies plc

e2v technologies inc. 4 Westchester Plaza, PO Box 1482, Elmsford, NY10523-1482 USA Telephone: (914) 592-6050 Facsimile: (914) 592-5148
e-mail: enquiries@e2vtechnologies.us

© e2v technologies (uk) limited 2008
SUNSTAR传感与控制 http://www.sensor-ic.com/ TEL: 0755-83376489 FAX:0755-83376182 E-MAIL: szss20@163.com

TECHNICAL SPECIFICATION

Mechanical

Dimensions	see outline, page 3
Body material	stainless steel
Weight	27 g

Environmental

Ambient temperature range: for operation for storage	 −20 to +55 °C −25 to +85 °C
Operational pressure range	1000 to 30 000 hPa
Humidity range for operation and storage	0 to 95% non-condensing
Vibration	complies with EN61779-1
Ingress protection	requires extra protection depending on application

Electrical

DC supply to detectors	+3 to +15 V; +5 V recommended
Maximum power supply	180 mW
Lamp supply	3 to 5 V (60 mA), modulation 4 Hz, 50% duty cycle recommended **Note:** Applying >5 V will reduce the lamp lifetime
Warm-up time	<20 s to operate, <30 s min. to full specification at 20 °C

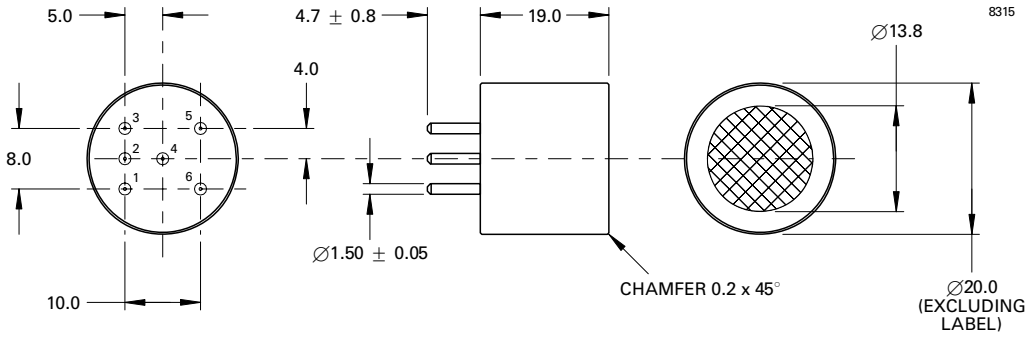
PERFORMANCE

All measurement data taken using:
- e2v 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 (1010 hPa).
- All gases diluted in nitrogen.
Note: Any variation from these conditions may affect sensor performance.

Gas	Carbon Dioxide
Gas concentration range	0 - 2% vol.
Maximum response time (T90)	<20 s
Typical detector output voltage in nitrogen (x 165 pre-amplifier gain): active channel reference channel	 1.3 to 2.5 V 1.6 to 4.2 V
Sensitivity to gas over full concentration range (before linearisation)	see Fractional Absorbance Curve
Maximum deviation from linearity	±0.1% vol.
Typical variation of zero with temperature (−20 to +55 °C)	±10 ppm/°C
Resolution (dependent on electronics)	100 ppm
Maximum non-reproducibility of zero at 20 °C	±100 ppm
Maximum non-reproducibility of sensitivity at 20 °C	±100 ppm
Long-term zero drift/month at 20 °C	±100 ppm
Response to 0 - 90% change in RH at 20 °C in 2% vol. carbon dioxide	0% vol.
MTBF (lamp dependent only)	>10 years for 5 V operation >20 years for 3 V operation

SUNSTAR自动化 http://www.sensor-ic.com/ TEL: 0755-83376489 FAX:0755-83376182 E-MAIL: szss20@163.com
e2v technologies

OUTLINE (All dimensions in millimetres; see note 1)



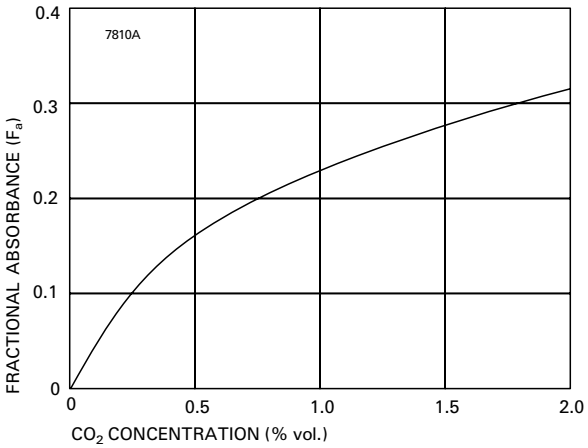
Pin	Connection
1	+ V detector supply
2	Lamp
3	Lamp return
4	Active detector output
5	Reference detector output
6	0 V input (connected internally to sensor body)

Outline Notes

1. Body dimensional tolerances ±0.1 mm. Pin dimensional tolerances as indicated.
2. The IR31CE is designed to fit into press-mount pcb sockets. The end-user should choose a socket to accommodate the full sensor pin length. This will ensure a stable mechanical location as well as good electrical contact. e2v technologies recommend the Wearns Cambion type 450-1813-01-03-00 single-pole solder mount socket with through hole, or a suitable equivalent.

FRACTIONAL ABSORBANCE CURVE

Typical Sensitivity to 0 to 2% vol. CO_2



Whilst e2v technologies has taken care to ensure the accuracy of the information contained herein it accepts no responsibility for the consequences of any use thereof and also reserves the right to change the specification of goods without notice. e2v technologies accepts no liability beyond that set out in its standard conditions of sale in respect of infringement of third party patents arising from the use of tubes or other devices in accordance with information contained herein.