

LuminOx

Fluorescence-based Optical Oxygen Sensor

GENERAL DESCRIPTION

The LuminOx Family (LOX) is a range of factory calibrated oxygen sensors which measure ambient oxygen partial pressure (ppO₂) levels using the principle of fluorescence quenching by oxygen.

By default LuminOx measures ppO₂ (mbar) and temperature (°C). An optional pressure sensor enables LuminOx to also measure barometric pressure (mbar) and to convert the ppO₂ reading to an oxygen concentration (O₂%).

The sensor benefits from low power operation, traditionally associated with electrochemical sensors, while providing a much longer lifetime due to the non-depleting sensing principle.

LuminOx is ppO₂ and temperature compensated, enabling accurate operation over a wide environmental range without the need for additional system components. Unlike other sensor technologies, LuminOx is very stable and robust, does not contain lead or any other hazardous materials and has negligible cross sensitivity to other gases.

CLEANING

The housing of the sensor can be cleaned using a damp cloth. The sensor should not be immersed in any cleaning media.

Full application and technical support can be provided by our knowledgeable and highly experienced engineering team if required.



ELECTRICAL AND ENVIRONMENTAL SPECIFICATION

| | |
|---------------------------|---|
| Supply Voltage (Vs) | 4.5 to 5.5 Vdc |
| Supply Current (Is) | <7.5mA (streaming 1 sample per second), <20mA Peak |
| Output Type | 3.3V TTL level RS232 |
| Operating Temperature | -30°C to +60°C |
| Storage Temperature | -30°C to +60°C |
| Humidity | 0-99% Rh (non-condensing) |
| Barometric Pressure Range | 100 to 1400mbar (LOX-01) 500 to 1200mbar (LOX-02) |

PERFORMANCE SPECIFICATION*

| | |
|--|--|
| Oxygen Measuring Range | 0-300mbar ppO ₂ 0-25% O ₂ (LOX-02) |
| Response Time | T90 <30s (Typical) |
| ppO ₂ Accuracy / Resolution | <2%FS / 0.1mbar |
| Temperature Accuracy / Resolution | Indication Only / 0.1°C |
| Pressure Accuracy / Resolution | ±5mbar / 1mbar (LOX-02) |
| O ₂ % Accuracy / Resolution | Determined by ppO ₂ and Pressure Accuracy / 0.1% (LOX-02) |
| Lifetime | >5 years |

*At ambient conditions. All performance measurements are at STP unless otherwise stated. Following extreme temperature fluctuations, re-calibration may be required.

MECHANICAL

| | |
|--------------------|--|
| Connection | 4 gold-plated pins (0.64mm ²) on a 2.54mm grid for PCB mounting via sockets or hand soldering with a no-clean flux (do not put the sensor through a PCB washing process) |
| Housing Dimensions | 20mm max diameter x 12.5mm high |

BENEFITS

- Low power
- Can also measure O₂% & barometric pressure (LOX-02)
- Suitable for battery power use
- Long life
- High accuracy
- Small & compact
- Low cost
- Maintenance free
- Contains no hazardous materials
- Connects directly to microcontroller without any additional circuitry.
- Factory Calibrated

APPLICATIONS

- Oxygen Detection
- Portable Equipment
- Breathing Apparatus
- Inerting
- Medical
- Lab Equipment
- Agriculture
- Incubation
- Fire Prevention
- Flue Gas in Condensing Boilers



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The LuminOx range has been designed as an alternative to electrochemical sensors but with the benefits of RoHS compliance, long life and complete environmental compensation built-in.

The sensor is available with and without a built-in barometric pressure sensor. LuminOx's native measurement is partial oxygen pressure (ppO₂) in mbar. By incorporating a barometric pressure sensor, LuminOx is able to measure O₂ vol. % in addition to ppO₂

LuminOx is designed to measure ambient oxygen levels are therefore the entire sensor must be in the measurement gas for correct operation.

Unlike electrochemical sensors, LuminOx requires no additional signal conditioning circuitry and connects directly to the interfacing microcontroller via 3.3V-level RS232 link. This reduces costs and simplifies system design.

Details of the RS232 protocol and commands are given below.

RS232 Setup:

The following setup should be used when using the RS232 interface.

Baudrate: 9600
 Flow Control: None
 Parity: None
 Stop bits: One
 Data Length: 8 bits

RS232 Command Set:

All RS232 communication is performed using ascii characters, *Table 1* shows the legal characters for each description block. There are three modes available: Poll Mode, Stream Mode and Off Mode.

| Description Block | Legal Character(s) | Hex |
|-------------------|--|--|
| <Command> | "M", "O", "%", "T", "P", "A", "#", "e" | 0x4D, 0x4F, 0x25, 0x54, 0x50, 0x41, 0x23, 0x65 |
| <Argument> | "0" – "9" | 0x30 – 0x39 |
| <Separator> | " " | 0x20 |
| <Terminator> | "\r\n" | 0x0D 0x0A |

Table 1

Poll Mode (M 1):

Each request is built using a combination of the description blocks. (See Table 1). A typical arrangement will be one of the following formats:

- <Command><Terminator>
- <Command>< Separator><Argument><Terminator>

Each response will be in the following format:

- <Command>< Separator><Argument><Terminator>

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Error Codes

When a request has been unsuccessfully received, an error code may appear in a response format. Table 3 provides more information on possible causes and actions.

| Response: | Description: | Possible Cause: | Action |
|------------|-------------------------|--|--|
| "E 00\r\n" | RS232 Receiver Overflow | No <Terminator> received before overflow. | Check RS232 Setup, Confirm correct termination. |
| "E 01\r\n" | Invalid Command | Unrecognised <Command> received. | Check command is valid Check command is upper Case "M" instead of "m" |
| "E 02\r\n" | Invalid Frame | Incorrect character in frame < Separator>. | Check correct separator is used. |
| "E 03\r\n" | Invalid Argument | <Argument> not allowed or in limits. | Check Argument is no longer than 6 characters long. Check Argument is within limits Check Argument is available for command. |

Table 3

Stream Mode (M 0):

By default stream mode is initiated on sensor power-up and will supply an output string approximately once every second. This provides the data for ppO₂, Temperature, Pressure, O₂ and Sensor Status. The format is provided below, for more details on the format see Table 2.

- "O xxxx.x T yxx.x P xxxx % xxx.xx e xxxx\r\n"

or the equivalent block description:

- <Command>< Separator><Argument>< Separator><Command>< Separator><Argument>< Separator><Command>< Separator><Argument>< Separator><Command>< Separator><Argument>< Separator><Command>< Separator><Argument>< Terminator>"

Off Mode (M 2):

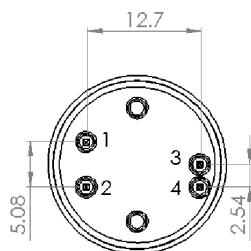
In this mode, LuminOx stops taking measurements and current consumption reduces to less than 6mA constantly.

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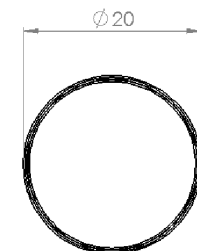
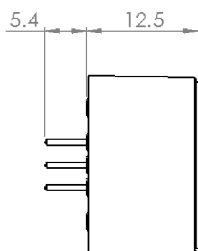
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PRODUCT DIMENSIONS (All dimensions in mm)



Bottom View



Top View

PINOUT:

- Pin 1: Vs (+5V)
- Pin 2: GND (0V)
- Pin 3: 3.3V RS232 Sensor Transmit
- Pin 4: 3.3V RS232 Sensor Receive

NOTES:

Always apply power to the sensor pins 1 and 2 before attempting to communicate on pins 3 and 4.

The sensor should be treated as an electronic component and handled using the correct ESD handling precautions.

PART NUMBERING SYSTEM

LOX - XX

Type

- 01: Measures 0-300 mbar ppO₂ and temperature (°C)
- 02: Measures 0-300 mbar ppO₂, 0-25% O₂, temperature (°C) and 500-1200mbar barometric pressure

For additional information or help in choosing the most suitable sensor for your application, please contact us. We can provide full application and technical support on all products.

WARNING

Personal Injury

DO NOT USE these products as safety or Emergency Stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

CAUTION

Do not exceed maximum ratings.

Carefully follow all wiring instructions, incorrect wiring can cause permanent damage to the device.

Do not use chemical cleaning agents.

Failure to comply with these instructions may result in product damage.

It is the customer's responsibility to ensure that this product is suitable for use in their application. For technical assistance or advice, please email us: technical@sstsensing.com

General Note: SST Sensing Ltd reserves the right to make changes in product specifications without notice or liability. All information is subject to SST's own data and considered accurate at time of going to print.

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