DATASHEET

LuminOx

Fluorescence-based Optical Oxygen Sensor

GENERAL DESCRIPTION

The LuminOx Family is a range of factory calibrated oxygen sensors which measure ambient ppO_2 levels using the principle of fluorescence quenching by oxygen.

LuminOx is designed to measure oxygen partial pressure (ppO_2) and temperature as well as oxygen concentration (O_2%) and barometric pressure (if selected). 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 both oxygen pressure 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 knowledgable and highly experienced engineering team if required.

ELECTRICAL AND ENVIRONMENTAL SPECIFICATION

Supply Voltage (Vs)	4.75-5.25 Vdc
Supply Current (Is)	<6mA (streaming 1 sample per second), <17mA Peak
Output Type	TTL level RS232
Operating Temperature	-30°C to +60°C
Storage Temperature	-30°C to +60°C
Humidity	0-99% Rh (non-condensing)
Pressure Range	500 to1200mbar (O_2% version) 100 to1500mbar (ppO_2 version)

PERFORMANCE SPECIFICATION

Oxygen Measuring Range	0-25% (O_2% version) 0-300mbar (ppO_2 version)
Response Time	<15s
Accuracy	Better than 2%FS
Resolution	0.01% / 0.1mbar
Lifetime	>5 years
Recalibation Interval	TBA
Pressure Measurement	Accuracy +/- 5 mbar (only available on O_2% version)
Temperature Measurement	Accuracy +/- 2°C

All performance measurements are at STP unless otherwise stated.

MECHANICAL

Connection	4 gold-plated pins (0.64mm□) on a 2.54mm grid for PCB mounting via sockets or soldering.
Housing Dimensions	20mm max diameter x 12.5mm high

BENEFITS

- Low power
- Also measures O_2% & barometric pressure (if selected)
- 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

RoHS COMPLIANT

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w: www.SSTsensing.com e: sales@sstsensing.com t: +44(0) 1698 740640 f: +44(0)1698 740280

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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 (ppO_2) in mbar. By incorporating a barometric pressure sensor, LuminOx is able to measure O_2 vol. % in addition to ppO_2

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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Table 2 provides a description of all commands and the valid arguments that can be applied to the interface when in Poll Mode (M1). All commands are case sensitive.

Command	Description	Arguments	Response
"M"	Output Mode	0 = Stream 1 = Poll 2 = Off	"M xx\r\n" Where xx equals the Argument of the command.
"O"	Request current ppO_2 value	N/a	"O xxxx.x\r\n" Where xxxx.x equals the ppO_2 in mBar
"%"	Request current O_2 value (only valid for sensors fitted with barometric pressure sensor. Otherwise returns "- - - - - -")	N/a	"% xxx.xx\r\n" Where xxx.xx equals the O_2 in percent %
"T"	Request current temperature inside sensor	N/a	"T yxx.x\r\n" Where y equals the sign '-' or '+' and xx.x equals the temperature in °C
"P"	Request current barometric pressure (only valid for sensors fitted with barometric pressure sensor. Otherwise returns "- - - -")	N/a	"P xxxx\r\n" Where xxxx equals the pressure in mBar
"e"	Sensor Status	N/a	"e 0000\r\n" = Sensor Status Good "e xxxx\r\n" = Any other response contact SST Sensing for advice.
"A"	Request all values (see above: O, T, P, % and e)	N/a	See Stream Mode (M 0), Page 4.
"#"	Sensor Information	0 = Date of manufacture 1 = Serial Number 2 = Software Revision	"# YYYYY DDDDD\r\n" "# xxxxx xxxxx\r\n" "# xxxxx\r\n"

Table 2

Example 1:

Request (What is the current oxygen partial pressure?):

- **O\r\n"** **"0x4F 0x0D 0x0A"**

Response (210.3mbar):

- **O 0210.3\r\n"** **"0x4F 0x20 0x30 0x32 0x31 0x30 0x2E 0x33 0x0D 0x0A"**

Example 2:

Request (Put LuminOx into streaming mode):

- **"M 0\r\n"** **"0x4D 0x20 0x30 0x0D 0x0A"**

Response (LuminOx is now in streaming mode):

- **"M 00\r\n"** **"0x4D 0x20 0x30 0x30 0x0D 0x0A"**

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 ppO_2 , Temperature, Pressure, O_2 and Sensor Status. The format is provided below, for more details on the Argument 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><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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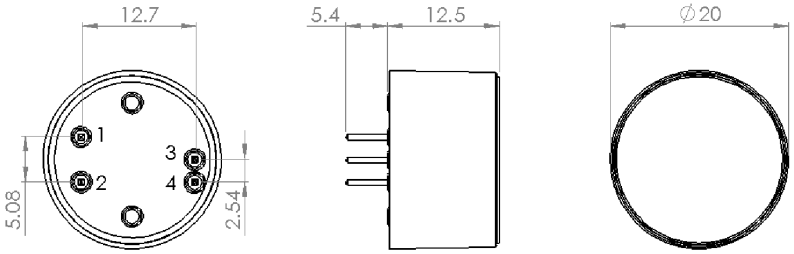
PRODUCT DIMENSIONS
(All dimensions in mm)



Bottom View

Top View

PINOUT:

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

PART NUMBERING SYSTEM

LOX - XX

Type
01: 0-300 mbar ppO_2 (no barometric pressure measurement) 02: 0-25% O_2 (includes barometric pressure measurement)

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	**CAUTION**
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.**	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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