DVO2

Optical Oxygen Sensor

DATA SHEET (V03.02; 07/2024)

The DVO2 is released by:

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1 INTRODUCTION

The DVO2 is an optical oxygen sensor for gas measurements based on luminescence quenching of a sensor dye. The dye is excited with red light, and the properties of the resulting luminescence are measured in the near infrared. The presence of molecular oxygen quenches the luminescence, changing its intensity and lifetime fully reversibly.

This principle is very robust. It shows virtually no interferences to other gases (except Cl_2 and NO_2), has a very low drift, and the sensor is fully solid-state. It does not deplete over time, unlike galvanic oxygen sensors with their limited shelf life. Optics and electronics are hermetically sealed from the measured gas. For typical diving environmental conditions, a 15-year operating life is expected.

The sensor comes with a factory calibration. If required, the user can perform a simple 1-point calibration at ambient air or an extended 3-point calibration. The DVO2 features build in temperature compensation and a digital interface that provides oxygen partial pressure values. No additional signal conditioning is necessary. A mounting thread and a robust locking connector allows easy installation.

Features

- ✓ High-accuracy measurement
- ✓ Low drift
- ✓ Factory calibrated
- ✓ Long life
- ✓ Fast response (t_{63}<2s)
- ✓ Digital output of oxygen partial pressure
- ✓ Temperature compensation
- ✓ Low power consumption
- ✓ Lead free, ROHS compliant
- ✓ Gold plated contacts

Potential Applications

- ✓ Self-contained re-breathing diving apparatus
- ✓ Oxygen gas analyzer
- ✓ Oxygen control in diving chambers (HBO)
- ✓ Oxygen control on breathing air compressors

2 SPECIFICATIONS

Analytical Performance

Measuring range	in units of hPa	in units of %O2
Typical	0-1000 hPa	0-100% O2 (gas)
Maximum*	0-2000 hPa	
Accuracy** @ 10°C – 40°C	±0.2 hPa at 10 hPa ±5 hPa at 200 hPa ±20 hPa at 1000 hPa	±0.02% O2 at 1% O2 ±0.5% O2 at 20% O2 ±2% O2 at 100% O2
Accuracy** @ -10°C – 60°C	±1 hPa at 10 hPa ±10 hPa at 200 hPa	±0.1% O2 at 1% O2 ±1% O2 at 20% O2
Resolution**	±0.1 hPa at 10 hPa ±1 hPa at 200 hPa ±5 hPa at 1000 hPa	±0.01% O2 at 1% O2 ±0.1% O2 at 20% O2 ±0.5% O2 at 100% O2
Detection limit	0.1 hPa	0.01% O2
Response time (t63)	< 2 sec.	
Drift	typ. < 1% O2 / year ***	
Max. number of measurements	> 500 million ****	
Lifetime	> 5 years ****	
Warm-up time	3 min (reduced accuracy during warm-up)	
Internal atmospheric pressure sensor measurement range	300 – 1100 mbar (measured through the venting capillary at the backside of the housing).	

* the output of the measured value becomes more and more inaccurate above this limit

** given for factory calibration. Units of $\%O_2$ given for 1013 mbar ambient air pressure.

*** at 21% O_2, 25°C, 1013 mbar ambient gas pressure, protected from direct sunlight. The drift can be significantly increased after the exposure to elevated temperature >60°C or to specific chemicals (refer to section 3).

**** at 21% O_2, 25°C, 1013 mbar ambient gas pressure, protected from direct sunlight. If measured every second, calculated lifetime can be longer than 15 years.

Note, the DVO2 outputs oxygen partial pressure pO_2 (hPa). The unit volume percent oxygen ($\%O_2$) is given here only for convenience. If the air pressure P at the oxygen sensing membrane is identical to the air pressure at the venting capillary on the backside of the housing, then the measurement of the internal pressure sensor can be used for converting pO_2 into units of $\%O_2$ by the formula:

$$\text{volume percent oxygen}[\%O_2] = 100 \times pO_2[hPa] / P[hPa]$$

Environment

Temperature range during operation	-10 to 60°C
Temperature range during storage	-40°C to 60°C
Note: Exposure to temperatures >60°C might lead to increased drift of the oxygen measurement within the next weeks.	
Humidity	Backside: Non-condensing Sensing Membrane: Dew point must not be within the membrane
Maximum absolute pressure	20 bar (limiting factor is the built-in pressure sensor)
Maximum differential pressure	3 bar

Interface

Supply Voltage	3.3 – 5.0 V DC **
Standby / Peak Currents	ca. 8 mA / 40 mA *
Energy Consumption per Measurement	ca. 1-2 mAs
Communication Interface	3.0 V UART (5 V tolerant)
Connector	Molex 560020-0430 (gold plated contacts)

* inrush currents after power up can be higher

Mechanical

Dimensions	Ø 28,5 mm x 28 mm
Weight	10,5 g
Mounting Thread	M16 x 1
Housing Material	Polycarbonate
Conformity to RoHS directive	RoHS compliant, lead free

**** WARNING:**

If the supply voltage is below 3.3 V DC (e.g. 3.0 V DC), the digital interface of the sensor can be still working, but the oxygen readings might show significant deviations from the real oxygen values. It is on the user's authority to supervise the supply voltage and to discard the oxygen readings, if the supply voltage falls below 3.3 V DC.

3 CROSS-SENSITIVITY AND CHEMICAL COMPATIBILITY

The following table shows the compatibility and possible cross sensitivities to some important chemical substances at a given concentration range. An “X” under “OK” indicates compatibility. “Cross-Sensitivity” indicates that the oxygen measurement is influenced by this substance. “Damage” indicates that this substance might physically damage the DVO2 (marked in red).

Substance	Concentration	OK	Cross-Sensitivity	Damage	Comment
Moisture	0-100% X	X			
CH_4 <20% X		X			
Cl_2			X	X	
CO		X			
CO_2		X			
H_2S		X			
NO		X			1.
NO_2			X	X	2.
N_2O		X			
Inorganic acids / bases		X			
"Methanol, Ethanol, Isopropanol, Formic Acid, Acetic Acid"		X			3.
"Methanol, Ethanol, Isopropanol, Formic Acid, Acetic Acid”			X		4.
Ethylene oxide			X		5.
Other volatile organic compounds			X	X	6.

Comments:

1. NO may form NO2 in presence of oxygen.
2. Ca. 5-10 times more sensitive to NO2 than to oxygen. Slow degradation over time.
3. 0.1%v in gas corresponds approximately to the vapour pressure above a 0.5-1% solution in water at 25°C.
4. Recalibration after conditioning at constant substance levels might be possible.
5. Exposure to EtO (e.g. for sterilization) will cause increased drift. Recalibration after exposure is possible.
6. Can result in erroneous oxygen readings and significantly enhanced drift. Interference depends on the compound. Substances with high vapour pressure or high reactivity are expected to be worse.

4 COMMUNICATION INTERFACE

The communication interface is a standard UART (3.0V levels, 5V tolerant). The default settings of the UART after power-up are:

- 19200 Baud Rate, 8 Data Bits, 1 Stop Bit, no Parity, no Handshake

The module needs ca. 1 sec. power up time before it responds to commands. If the module comes with an USB-adapter-cable, the “Simple DVO2 Logger” software (for PC with operation system “Windows”) installs automatically a virtual serial port driver (COM-port), which is directly connected to the internal UART interface of the module. The virtual COM-port can be accessed by standard COM-port libraries in any programming language under Windows.

4.1 General Definitions

Every command sent from the “master” to the device must be terminated by a single carriage return (0x0D), or by a carriage return followed by a line feed (0x0D, 0x0A). This termination is indicated in the following by the symbol “↵”. Values (numbers) are separated with spaces from each other and the command header. The command header is a unique string of characters. If the command with all values could be successfully interpreted by the device, the command is echoed after completion of the requested task, appended with requested values and terminated by a single carriage return (0x0D) only. Otherwise, the response begins with an error header followed by an error code. Italic letters represent placeholders for numbers, which are transmitted as ASCII-Strings (human readable). The absolute maximum range of all values transmitted in the communication protocol is from -2147483648 to +2147483647**.** The only exception is the command #IDNR which can return higher values.

4.2 Detecting communication errors and optional CRC

The protocol supports two levels of communication error handling. The first level is realized simply by the fact, that the device always echoes the complete command as it was received from the master. This way the master can compare the echo with the originally sent command. If there is a difference, then the master should send the command again.

However, the echoing of the command does not allow detecting potential communication errors within the returned values added by the device to the original command. For this purpose, it is possible to enable a cyclic redundancy check (CRC) based on the CRC16 definition as used for MODBUS protocols (CRC-16-IBM). The CRC is enabled by the command #CRCE (see below). Now every answer from the device to the master is terminated by the string “: ␣*C*↵” where *C* is the CRC16 checksum represented as a decimal ASCII-string (human readable).

The CRC is calculated for all ASCII-characters (unsigned bytes) from the very beginning of the returned string until the character just before the ":" proceeding the CRC16 checksum. Please note, that also spaces (ASCII code 32) are included in the CRC calculation.

The reminder of this document shows only examples with disabled CRC. So, the returned string from the device is only terminated by "↲", i.e. a single carriage return (0x0D).

4.3 Commands

Read Device Information:		**#VERS**	↲
Response	**#VERS**	***D N R S***	↲

Returns general information about the device: D represents the device id, which is always D=8 for any DVO2 module, N returns the number of oxygen channels which is N=1 for the DVO2 module. R represents the firmware revision (e.g. R=328 designates firmware revision 3.28). S is a byte number indicating which sensor types are available. The bits refer to the following sensor types: bit 0: oxygen, bit 1: temperature within housing, bit 2: pressure within housing, bit 3: relative humidity within housing. If S=15 (default) then the module is equipped with all these sensor types.

Read Unique ID Number:		**#IDNR**	↲
Response	**#IDNR**	***N***	↲

Returns an identification number N being unique for each single device, which is an unsigned 64 bit integer. Therefore, the decimal ASCII representation of this number can be up to 20 chars in length. Please note, that the unique ID number is not equivalent to the serial number off the device.

Measure Oxygen and return the results:

#DOXY	↲

Response

#DOXY	O T S	↲

Measures (1) the temperature, (2) the oxygen partial pressure (pO2), (3) the total pressure + humidity WITHIN the sensor housing, (4) ambient light and returns the results:
O: Oxygen partial pressure, signed 32 bit integer in units of 10^{-3} hPa
(O = 203456 corresponds to 203.456 hPa, typ. range 0-210 hPa)
T: Temperature, signed 32 bit integer in units of m°C
(T = 17892 corresponds to 17.892°C
T = -1965 corresponds to -1.965°C, typ. range 0 – 50°C)
S: Status (unsigned 32 bit integer) with warning and error bits, where bit(x)=1 means:
bit(0): WARNING, the detector amplification was automatically reduced in order to avoid saturation of the detector. The oxygen reading is still valid. This might happen at low temperatures together with low oxygen values causing high luminescent intensities of the oxygen indicator. Or the sensor might be exposed to excessive ambient light (e.g. sun light).
bit(1): FATAL ERROR, oxygen sensor signal intensity too low (<20mV)
bit(2): FATAL ERROR, oxygen sensor signal or ambient light too high
bit(3): FATAL ERROR, oxygen reference signal intensity too low (<20mV)
bit(4): FATAL ERROR, oxygen reference signal or ambient light too high (>2400mV)
bit(5): FATAL ERROR, failure of the temperature sensor
bit(6): reserved
bit(7): WARNING, the humidity within the sensor housing is >90%RH. This might lead to fatal electronic problems and therefore to a failure of the oxygen measurement.
bit(8): reserved
bit(9): ERROR, failure of the pressure sensor within the sensor housing, this has no direct influence on the measured oxygen partial pressure
bit(10): ERROR, failure of the humidity sensor within the sensor housing, this has no direct influence on the measured oxygen partial pressure

Measure Partial Pressure Oxygen and Return Additional Raw Data:

#DRAW ↲

Response

#DRAW | OTSDIAPH ↲

Measures (1) the temperature, (2) the oxygen partial pressure (pO2), (3) the total pressure + humidity WITHIN the sensor housing, (4) ambient light and returns the results including raw data:
O: refer to the command #DOXY
T: refer to the command #DOXY
S: refer to the command #DOXY
D: the phase shift „dphi", signed 32 bit integer in units of m° (millidegrees)
(e.g. D = 24385 corresponds to 24.385°, typ. range 5°-60°)
I: the signal intensity of the oxygen sensor, signed 32 bit integer in units of µV
(e.g. I = 124072 corresponds to 123.072 mV, typ. range 100-500mV)
A: the ambient light entering the sensor, signed 32 bit integer in units of µV
(e.g. A = 12792 corresponds to 12.792 mV, typ. range 0 - ca. 100mV)
P: the ambient pressure at the BACKSIDE of the module, signed 32 bit integer in units of µbar
(e.g. P = 999734 corresponds to 999.734 mbar, typ. range 900-1100mbar)
H: the relative humidity inside the housing in units of m%RH
(e.g. H = 40365 corresponds to 40.365 %RH, typ. range 10-90%RH)

dphi (D). The fundamental raw data of the oxygen measurement is the phase shift „dphi" (D) which is together with the temperature (T) internally converted into the oxygen reading (O).
Signal intensity (I). This represents the measured luminescent intensity of the oxygen sensor. The signal intensity can be used for checking the quality of the sensor. Please note, that the signal intensity is highly dependent on the actual oxygen level. Therefore, measured signal intensities can be only compared with each other, if they have been measured at similar oxygen levels. Typical signal intensities are 200-400 mV at oxygen levels of ca. 200 hPa at room temperature.

"Ambient light (A). Immediately before each oxygen measurement, the device measures also the ambient light entering the oxygen detector. Considerable amounts of ambient light might enter the optoelectronics, if the sensor is exposed e.g. to direct sun light. This might lead to a saturation of the optical detector and to an invalid oxygen measurement (see parameter Status S). As a thumb of rule the sum of ambient light (A) and signal intensity (I) should not exceed ca. 2000 mV. If it exceeds this value, the sensor must be shaded from the external light source.
Ambient pressure (P). This gives the ambient air pressure measured at the BACKSIDE of the housing (i.e. the side where the electrical connector is positioned).
Relative humidity (H). The relative humidity measured inside the housing including the optoelectronics. The inner volume of the housing is connected via a thin channel to the BACKSIDE of the housing (connector side). Therefore, the humidity will be in the long run influenced by the humidity present at the BACKSIDE of the housing. A rel. humidity > 90% will lead to a warning in the status (S). "

Indicate Logo:

Command	
#LOGO	↲

Response

#LOGO	↲

The status LED of the device flashes 4 times (total duration ca. 1 second). This command can be used to identify which device belongs to which interface port, if several devices are operated in parallel.

Enable or disable CRC checksum: **Note WARNING below!***

#CRCE	K	↲

Response

#CRCE	*K*	↲

K = 0: Disable the CRC checksum (default)
K = 1: Enable the CRC checksum
The current status is automatically saved in the flash memory, so the status is persistent even after a power cycle.

Read User Memory:

#RDUM	*R N*	↲

Response

#RDUM	*R N Y1 …Y_N*	↲

The device offers a user memory of altogether 64 signed 32bit integer numbers (range -2147483648 to 2147483647) which is located in the flash memory and is therefore retained even afterpower cycles. This read command returns N (N=1...64) consecutive values Y1 ... Y_N from the user memory starting at the user memory address R (R=0...63). Note, that N+R must be <=64.

Write User Memory:

#WRUM	*R N Y1 … YN*	↲

Response

#WRUM	*R N Y1 …Y_N*	↲

This command writes the N (N=1...64) values Y1 ... Y_N consecutively starting at the user memory address R (R=0...63). Note, that N+R must be <=64. **IMPORTANT: This command must be used economically**, because the flash memory is designed for typ. max. 20000 flash cycles. Each time this command is executed, it will trigger a flash cycle.

Set Baud Rate:

#BAUD	*R*	↲

Response

#BAUD	*R*	↲

Changes the current baud rate of the UART interface to R. Supported baud rates are 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600, 115200. The default baud rate after a power cycle is always 19200. If the command was successfully interpreted, the response string is sent back by using the old baud rate and afterwards the baud rate is changed. For highest reliability it is recommended to use the default baud rate of 19200.

Calibrate Oxygen Sensor at 0% oxygen: Note WARNING below!*

#CALO	↲

Response

#CALO	↲

Execution of this command will result in a loss of the factory calibration! Calibrates the oxygen sensor at 0% oxygen, giving the lower calibration point of a two-point oxygen calibration. The sensor should be measuring (with the application specific sample interval) for at least 5 min. under steady state conditions, before this command is executed. This command needs up to 10 seconds for completion, before the response is returned. The new calibration is automatically stored in the flash memory and kept even after a power cycle. **Note:** The zero-calibration point is very stable. Only for highly accurate measurements close to 0% O2, a calibration of this point should be considered.
For most applications a 1-point-calibration (e.g. at ambient air) based on the #CAHI command is sufficient.

Note WARNING below!*

Calibrate Oxygen Sensor at given partial pressure oxygen:

#CAHI	P	↲

Response

#CAHI	*P*	↲

Execution of this command will result in a loss of the factory calibration!
P: Oxygen partial pressure in the given calibration standard,
signed 32 bit integer in units of 10^{-3} hPa
(P = 203456 corresponds to 203.456 hPa)
Calibrates the oxygen sensor at a given calibration standard (not equal 0% oxygen!), giving the upper calibration point of a two-point oxygen calibration. The sensor should be measuring (with the application specific sample interval) for at least 5 min. under steady state conditions, before this command is executed. This command needs up to 10 seconds for completion, before the response is returned. The new calibration is automatically stored in the flash memory and kept even after a power cycle.

Calibrate Oxygen Sensor at given partial pressure oxygen / Calibration of Linearity:

Note WARNING below!*

#CLIN	P	↲

Response

#CLIN	*P*	↲

Execution of this command will result in a loss of the factory calibration!
P: Oxygen partial pressure in the given calibration standard,
signed 32 bit integer in units of 10^{-3} hPa
(P = 203456 corresponds to 203.456 hPa)
Calibrates the oxygen sensor at a given calibration standard (not equal 0% oxygen!), giving the upper calibration point of a three-point oxygen calibration*. The sensor should be measuring (with the application specific sample interval) for at least 5 min. under steady state conditions, before this command is executed. This command needs up to 10 seconds for completion, before the response is returned. The new calibration is automatically stored in the flash memory and kept even after a power cycle.
IMPORTANT: This standard must be significantly different to 0% oxygen and it must be significantly different to the upper calibration point (command #CAHI). Otherwise the linearity calibration might make the linearity of the module even worse.
Note: the #CLIN must be executed AFTER the #CAHI command was applied, because the latter command can change the linearity again.
If the upper calibration point (command #CAHI) was performed at ambient air around 210 hPa (this is also the case for the factory calibration from DiveO$_2$), then the linearity might be calibrated e.g. with 100% oxygen calibration gas around 1000 hPa.
Note: If the oxygen readings during a calibration is outside a reasonable range, the error code "#ERR -60" is returned and the calibration is discarded.
***Recommended is a calibration with 100% oxygen @ 1 bar for #CLIN and a calibration with Air (20,9 %) for #CAHI. #CLIN should always executed after #CAHI !**

Note WARNING below!*

Enable/Disable Broadcast Mode:	**#BCST**	**T** ↲
Response	***#BCST***	***T*** ↲

Enables or disables the broadcast mode, and stores the actual status always in the flash memory, so the actual status is persistent even after a power cycle.
T = 0: Broadcast mode is disabled (default).
T = 100..10000: Broadcast mode is enabled with the time interval of T ms. So time intervals between 0.1s and 10s are possible. In broadcast mode the modules triggers itself periodic measurements and returns the results via the UART interface as given by the answer string of the #MRAW command. Note, that the time interval is only an approximated value, as the duration of the actual oxygen measurement and the transmission of the UART response must be added to this interval.
Note, if a command is sent to the module, while the module is transmitting a broadcast message, then the broadcast message might be interrupted at any position by the answer of the requested command. Therefore, it is recommended to disable the broadcast mode (command #BCST 0↲) before sending other commands to the module.

*WARNING:

The commands #CALO, #CAHI, #CLIN, #CRCE, and #BCST automatically trigger that the internal configuration and calibration registers of the DVO2 are saved into its internal flash memory ("flash cycle"), in order to make the changes persistent even after power cycles. Note, the DVO2 supports max. ca. 20,000 flash cycles triggered by these commands. If the power supply is interrupted during a flash cycle, then the DVO2 flash memory might be corrupted. There would be no reasonable oxygen readings anymore, which cannot be repaired by consecutive calibration attempts.

SAFETY MEASURES

• Use the commands #CALO, #CAHI, #CLIN, #CRCE, and #BCST economically, i.e. do not use them more frequently than really needed.

• Ensure a stable power supply when executing these commands.

• Always evaluate the response sent back by these commands. After these commands have been executed, the DVO2 will send back the identical command string as an acknowledgement. If you do not receive this answer, the flash memory might be corrupted.

4.4 Error Codes

If a command triggered an internal error or could not be interpreted correctly an error string is sent back instead of the default echo. An error string always begins with the error header "#ERRO" followed by a space character (0x20), a negative error *E* number (starting with a "minus" character (0x2D)), and a carriage return (0x0D).

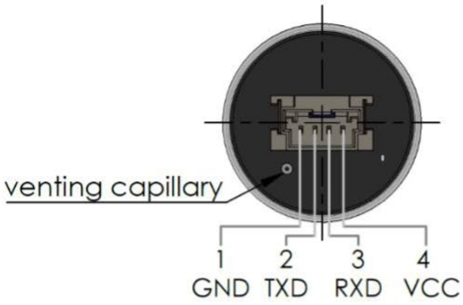
Table 1: Error Codes

#ERRO *E* ↵

E	**Error Type**	**Description**
-1	General	A non-specific error occurred
-21	*UART Parse*	An error occurred while parsing the command string. The last command should be repeated. Check the command syntax!
-22	*UART Rx*	The command string was not received correctly (e.g. device was not ready, last command was not terminated correctly). Repeat the last command.
-22	*UART Header*	The command header could not be interpreted correctly (must contain only characters from A-Z). Repeat the last command.
-26	*UART Request*	The command header does not match any of the supported requests.
-60	*Invalid Calibration*	The performed oxygen calibration is outside the expected range. The calibration is discarded.

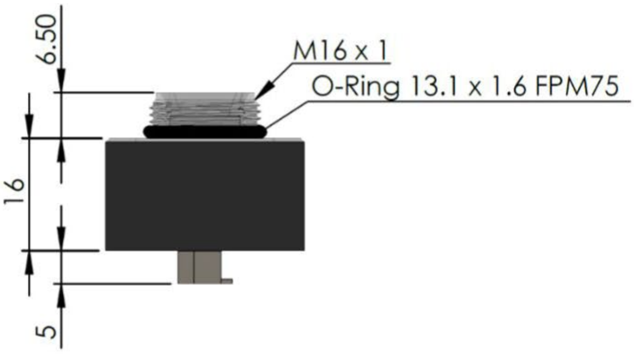
Any other error code not listed here corresponds to a potentially fatal error. Replace the sensor and contact DiveO_2 GmbH.

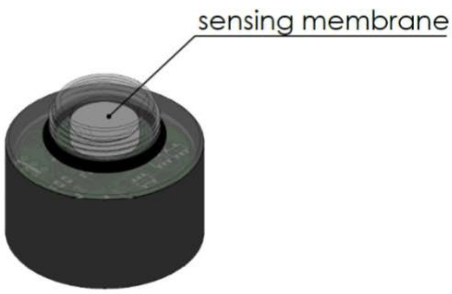
5 MECHANICAL DIMENSIONS AND ELECTRICAL INTERFACE

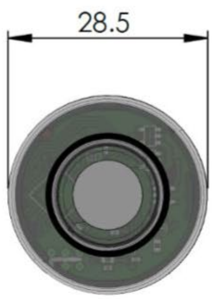


Pin	Name	Function	Description
1	GND	Power	Ground
2	TXD	Digital output 3.0 V levels	Data transmission line of the UART interface
3	RXD	Digital input 3.0 V levels (3.3 V & 5 V tolerant)	Data receive line of the UART interface
4	VCC	Power	Power supply min. 3.3 VDC max. 5.0 VDC

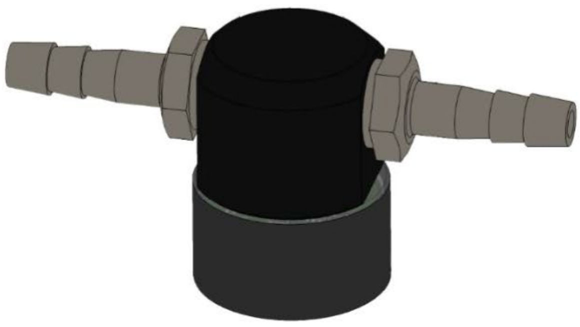
Connector: Molex 560020-0430 (gold plated contacts)







flow-through cell available as accessory



All units given in millimeter (mm).

6 WARNINGS

If using this sensor in safety critical devices or in any other application where failure of the product could result in loss of life, personal injury, or damaged property, this is done at your own risk.

You must always assume that this sensor will give incorrect readings or no readings at all.

The product information and specifications in this document are subject to change without prior notice. The data contained in this document is for guidance only. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

7 FAQ

Q: Why do I only measure approx. 20.7% oxygen in air and not an oxygen content of 20.95%?

A: The sensor would be physically correctly factory calibrated, namely a 3-point calibration with 0% in nitrogen, with 21% oxygen and artificial air (without humidity) and with 100% oxygen. However, according to Dalton's law, the humidity in the atmosphere also contributes to the total pressure as a function of temperature. This means that the water vapour pressure reduces the oxygen concentration in the atmosphere.

Q: Can the sensor also be operated with a lower supply voltage than 3.3 -5 V?

A: If the supply voltage is lower than 3.3 V, the sensor will show incorrect pO2 values. Operation below 3.3 V is therefore not possible.

Q: What is the delay between #DOXY command and waiting for the answer?

A: The delay between receiving the #DOXY-command and sending the answer can be anything between ca. 10 and max. 200 ms. The reason is, that the flash duration is dynamically adapted according to the current oxygen partial pressure, in order to minimize the impact of photobleaching, thus minimizing sensor drift. Practically, a master computer should simply wait for the answer after sending the #DOXY command, limited by a time out. The time out period would be typically 1s.

Q: Is the RX and TX logic level reference, isolated from the VCC +ve level? i.e. if a separate power source is used to run the sensor, then how much tolerance is there in the RX/TX level vs the VCC level?

A: Please refer to the data sheet:

Interface

Supply Voltage	3.3 – 5.0 V DC
Standby / Peak Currents	ca. 8 mA / 40 mA *
Energy Consumption per Measurement	ca. 1-2 mAs
Communication Interface	3.0 V UART (5 V tolerant)

The module accepts any power supply between 3.3V and 5V VCC. The level of TX is always 3.0V. But the RX is 5V tolerant, i.e. any level between 3.0 und 5.0 V is tolerated.

Q: What about a status command response?

A: The communication logic is
(i) send command,
(ii) wait for answer (command is executed),
(iii) answer is received,
(iv) module is again in standby.

Q: Why does the sensor not have an I2C interface? Wouldn't communication have been easier then?

A: The existing UART interface is a generally accepted industry standard. Furthermore, the sensor was not developed for diving...this capability only turned out later by chance. I2C is an on-board communication protocol ideal for short distances and low bandwidth. It was never designed to send data over wires, which would be the use case in CCR.

8 CONTACT

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