Atlas Scientific™
Environmental Robotics

V 1.3

Revised 10/20

EZO-O2™

Embedded Oxygen Sensor

Reads	**Gaseous O^2**
Range	**0 – 42% (2x atmospheric O^2 levels)**
Calibration	**Factory calibrated**
Response time	**1 reading per second**
Resolution	**0.01**
Accuracy	**+/- 0.01 (0.02 PPT)**
Connector	**5 lead data cable**
Cable length	**1 meter**
Data protocol	**UART & I^2C**
Default I^2C address	**108 (0x6c)**
Data format	**ASCII**
Operating voltage	**3.3V – 5V**
Life expectancy	**~3.5 years**

Written by Jordan Press
Designed by Noah Press

This is an evolving document, check back for updates.

Table of contents

UART

I²C

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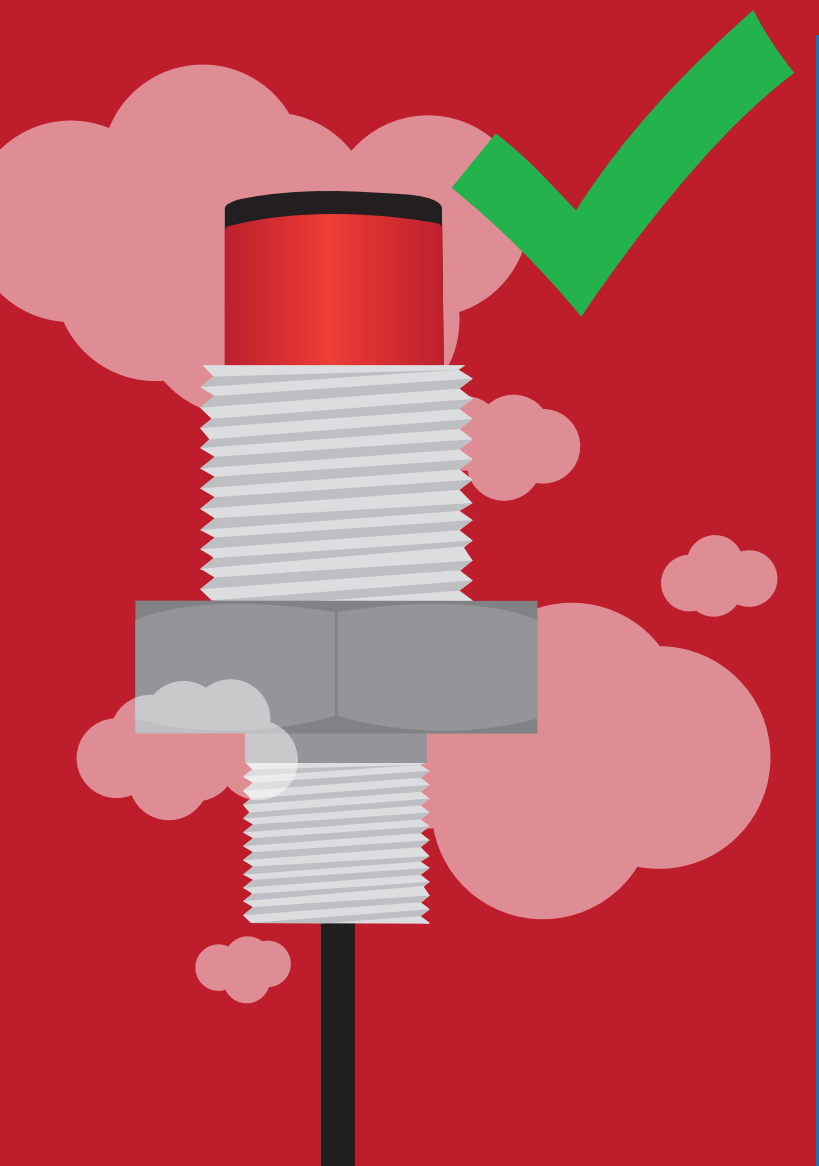
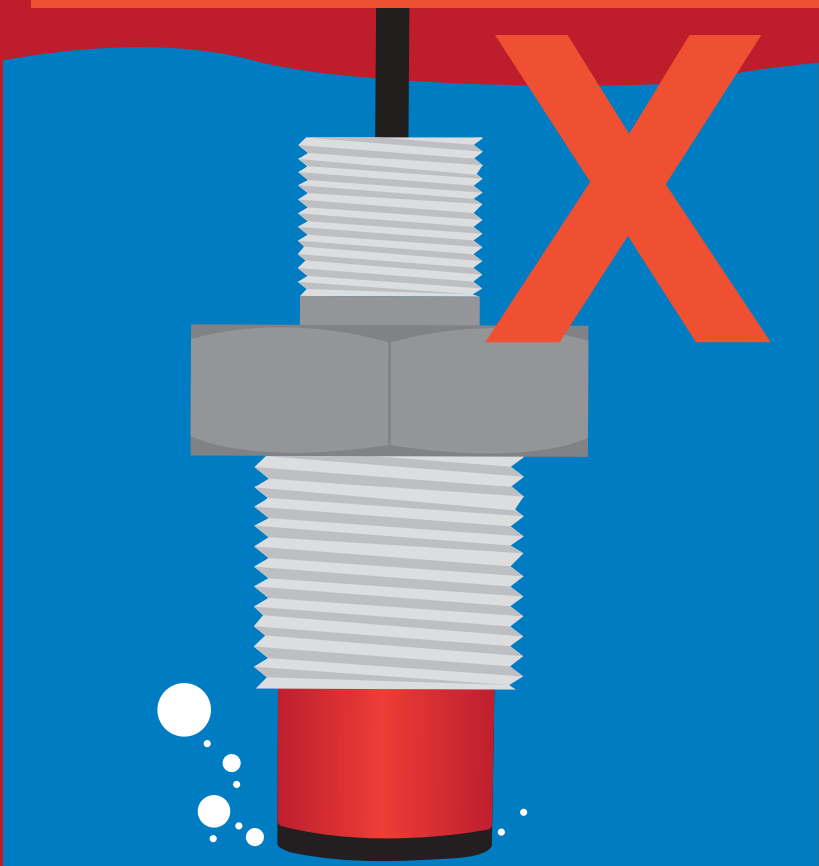
Attention

The EZO-O2™ is 100% operational out of the box.
CALIBRATION IS UNNECESSARY

This sensor detects GASEOUS O^2



This sensor does *not* read dissolved O^2

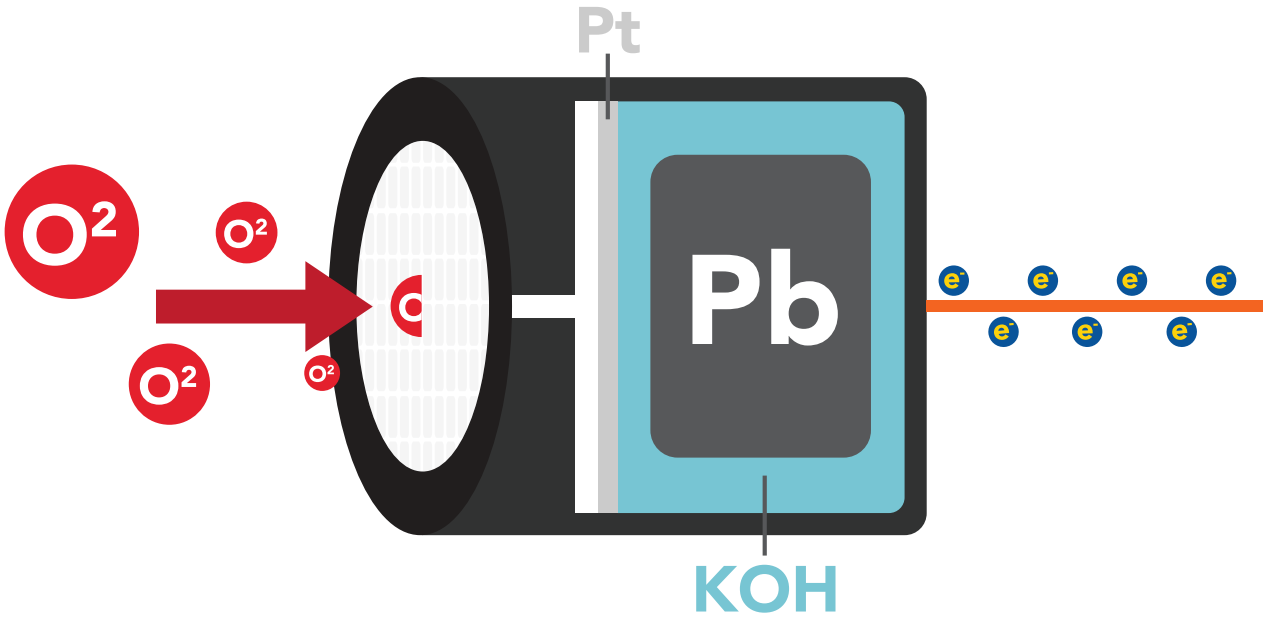


DO NOT SUBMERGE!

Click here for our line of Dissolved Oxygen sensors.

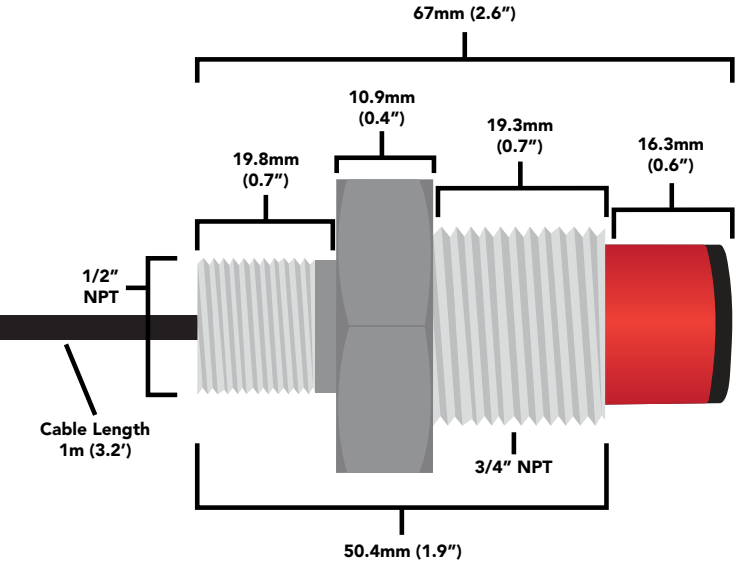
Operating principle

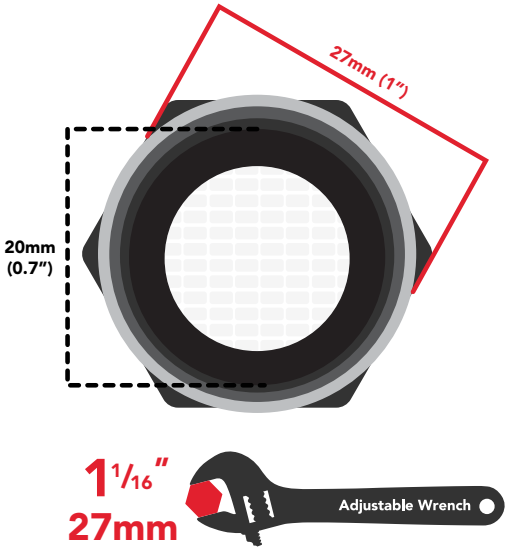
The Atlas Scientific EZO-O2™ Embedded Oxygen Sensor is an electrochemical sensing device that detects the partial pressure of oxygen through reduction. The sensor can be thought of as a small fuel cell. When the oxygen comes in contact with the sensor, the "fuel cell" begins to produce a current. A teflon membrane ensures that the oxygen enters the sensor at a steady rate.



Physical properties

The EZO-O2™ sensor only detects gaseous oxygen levels. This device cannot read dissolved O2 levels. *DO NOT SUBMERGE IN LIQUID.*





Weight 146g

Body 316 Stainless Steel

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Pin out

Data and power cable pinout

White – RX/SCL
Green – TX/SDA
Black – GND
Red – VCC
Blue – ALM

The alarm pin will go high when a set O^2 level has been crossed.

If unused leave **ALM** floating. Do not connect **ALM** to **VCC** or **GND**.

See page **19** to enable O^2 level alarm in UART mode.
See page **43** to enable O^2 level alarm in I2C mode.

Power consumption

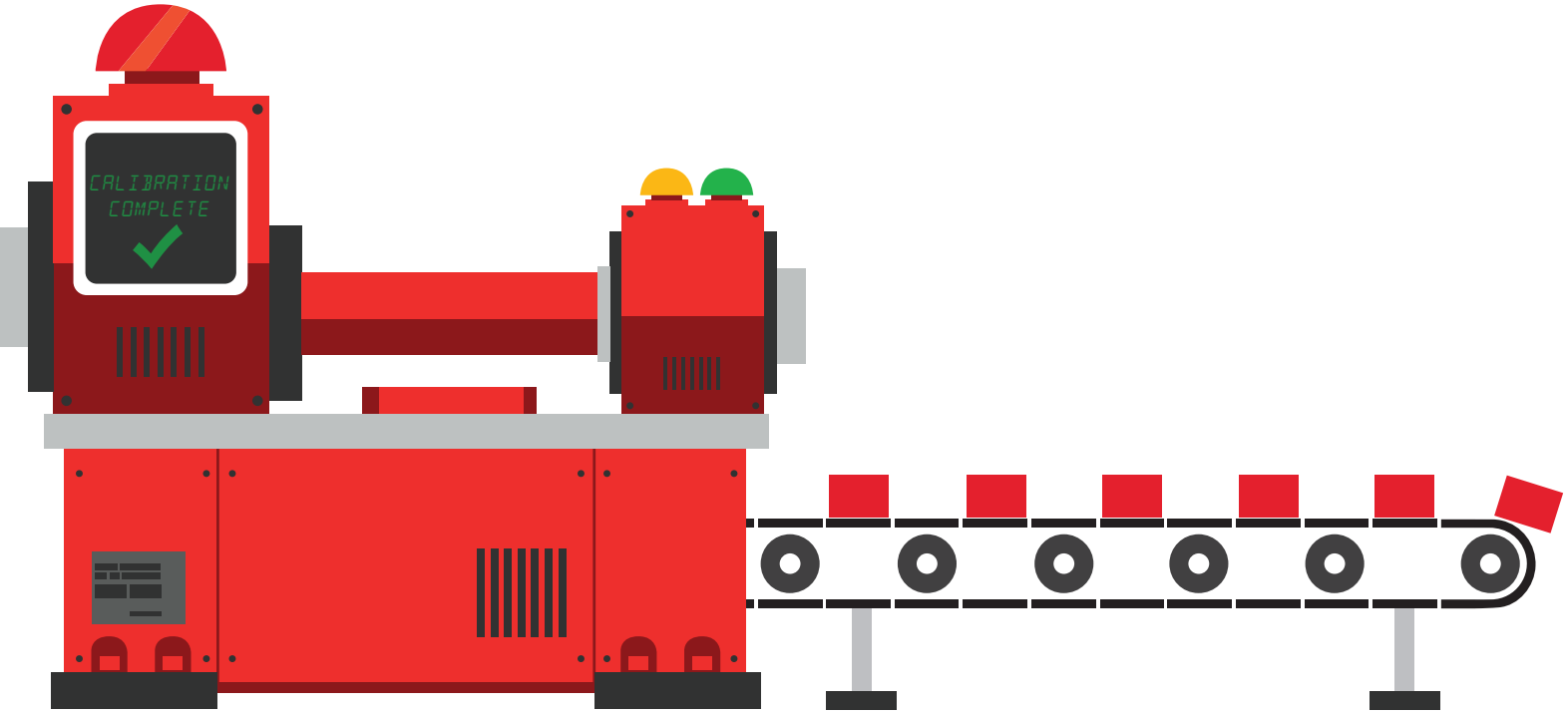
	LED	MAX	SLEEP
5V	ON	14.6 mA	0.5 mA
	OFF	13.9 mA	
3.3V	ON	13.7 mA	0.4 mA
	OFF	13.5 mA	

Absolute max ratings

Parameter	MIN	TYP	MAX
Storage temperature	-30 °C		75 °C
Operational temperature	-20 °C	25 °C	50 °C
VCC	3.3V	3.3V	5.5V

Calibration theory

The Atlas Scientific EZO-O2™ Embedded Oxygen Sensor comes pre-calibrated. As part of the manufacturing process Atlas Scientific performs a two-point factory calibration.



Low point calibration = 0% O^2
High point calibration = 20.95%

The factory calibration data is permanently stored in the sensor and cannot be erased.

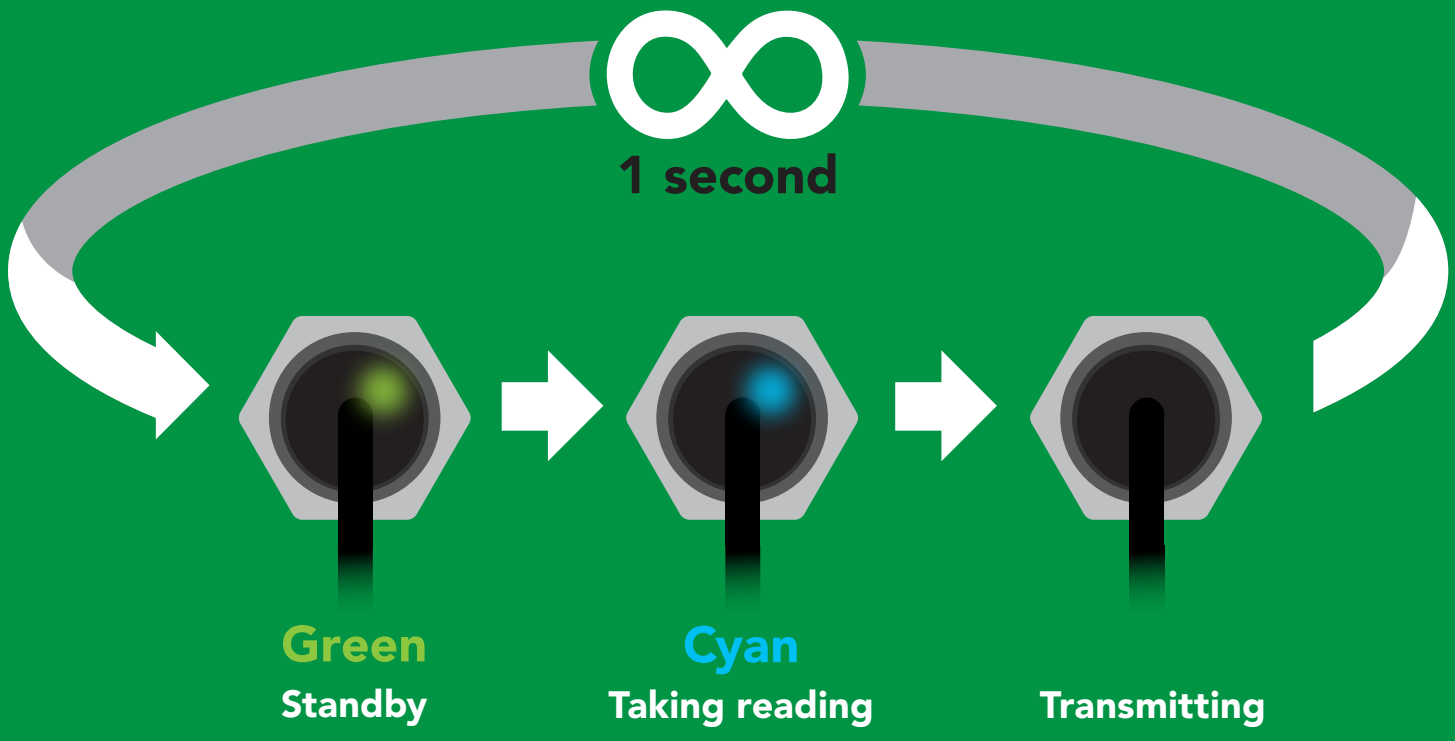
Custom calibration

After ~12 months of operation the EZO-O2™ Embedded Oxygen Sensor may need to be re-calibrated. A simple single point recalibration to the atmospheric O^2 level is all thats needed.

Default state

UART mode

Baud	**9,600**
Readings	**continuous**
Speed	**1 second**
LED	**on**



✓ Available data protocols

UART

default

I²C

X Unavailable data protocols

SPI

Analog

RS-485

Mod Bus

4–20mA

UART mode

Settings that are retained if power is cut

Baud rate
Calibration
Continuous mode
Device name
Enable/disable response codes
Hardware switch to I^2C mode
LED control
Protocol lock
Software switch to I^2C mode

Settings that are *NOT* retained if power is cut

Sleep mode

UART mode

8 data bits	no parity
1 stop bit	no flow control

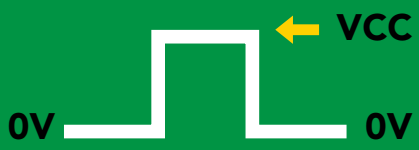
Baud

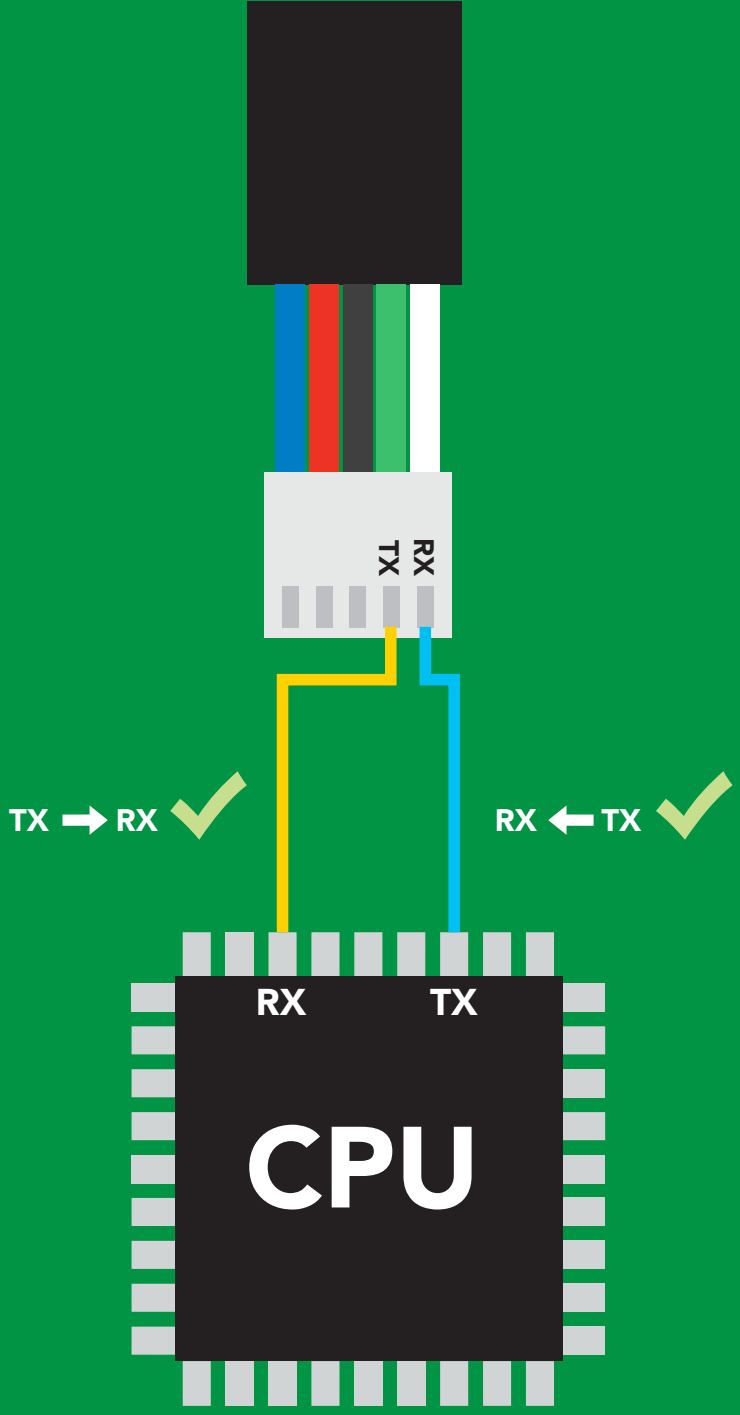
300
1,200
2,400
9,600 default
19,200
38,400
57,600
115,200

RX
Data in

TX
Data out

Vcc 3.3V – 5V





Data format

Reading	**Gaseous O^2**
Units	**percent concentration & PPT (when enabled)**
Encoding	**ASCII**
Format	**string** (CSV string when PPT is enabled)
Terminator	**carriage return**

Data type	**Floating point**
Decimal places	**2**
Smallest string	**4 characters**
Largest string	**16 characters**

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Receiving data from device

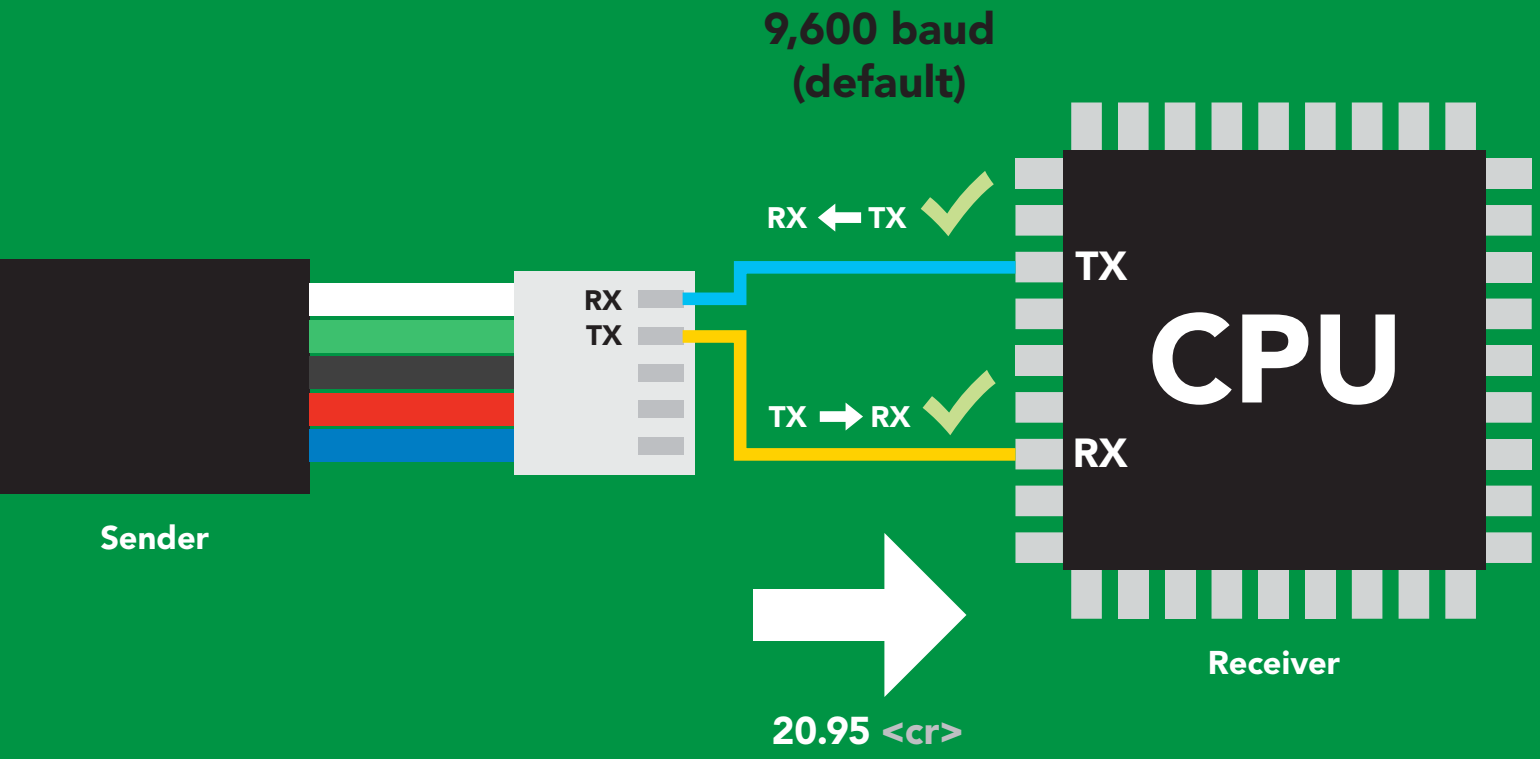
2 parts

ASCII data string

Command

Carriage return <cr>

Terminator



Advanced

ASCII:	2	0	.	9	5	<cr>
Hex:	32	30	2E	39	35	0D
Dec:	50	48	46	57	53	13

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Sending commands to device

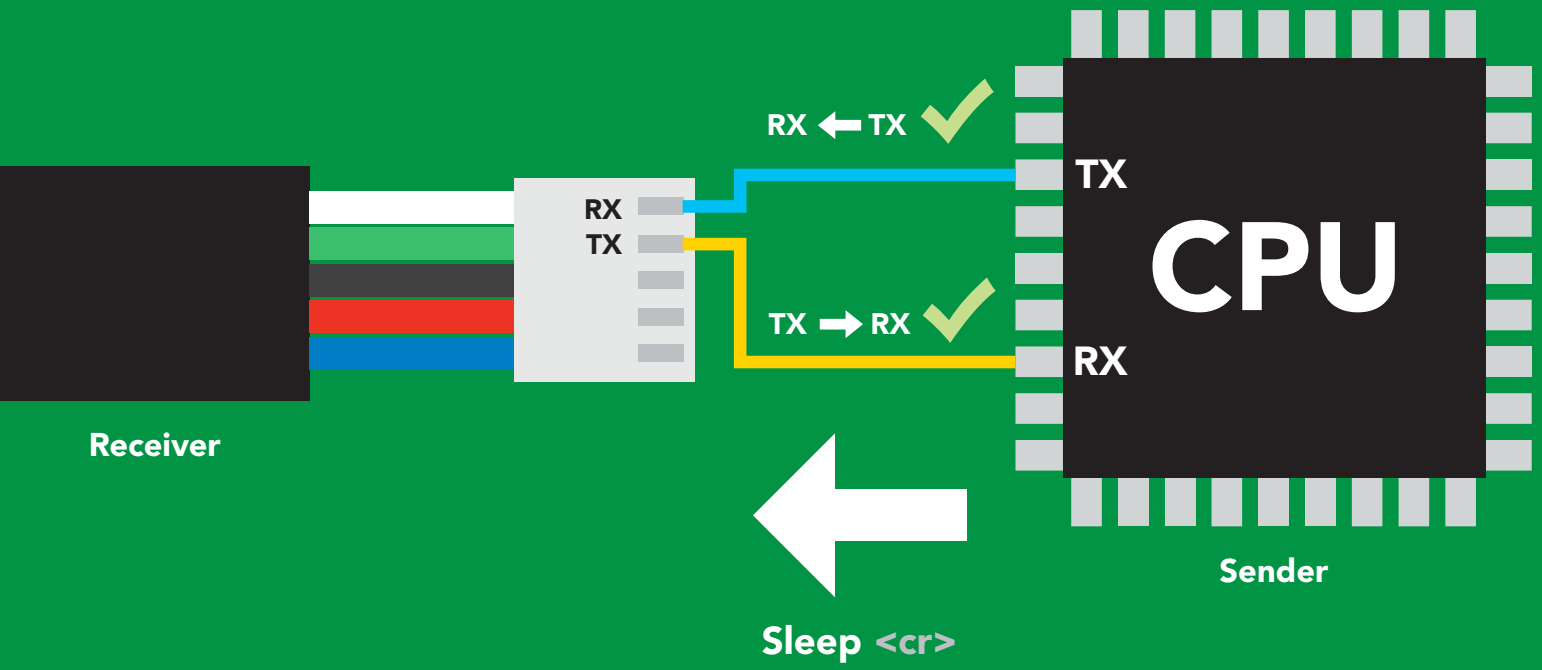
2 parts

Command (not case sensitive)

ASCII data string

Carriage return <cr>

Terminator



Advanced

ASCII:	S	l	e	e	p	<cr>
Hex:	53	6C	65	65	70	0D
Dec:	83	108	101	101	112	13

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LED color definition

Green
UART standby

Cyan
Taking reading

Purple
Changing baud rate

Red
Command not understood

White
Find

	LED ON
5V	+0.7 mA
3.3V	+0.2 mA

UART mode
command quick reference

All commands are ASCII strings or single ASCII characters.

Command	Function		Default state
Alarm	enable/disable alarm	pg. 19	n/a
Baud	change baud rate	pg. 28	9,600
C	enable/disable continuous mode	pg. 17	enabled
Cal	performs calibration	pg. 20	n/a
Factory	enable factory reset	pg. 30	n/a
Find	finds device with blinking white LED	pg. 16	n/a
i	device information	pg. 24	n/a
I2C	change to I²C mode	pg. 31	not set
L	enable/disable LED	pg. 15	enabled
Name	set/show name of device	pg. 23	not set
O	enable/disable internal temperature	pg. 22	disabled
Plock	enable/disable protocol lock	pg. 29	n/a
R	returns a single reading	pg. 18	n/a
Sleep	enter sleep mode/low power	pg. 27	n/a
Status	retrieve Status Information	pg. 26	n/a
T	Temperature compensation	pg. 21	n/a
*OK	enable/disable response codes	pg. 25	n/a

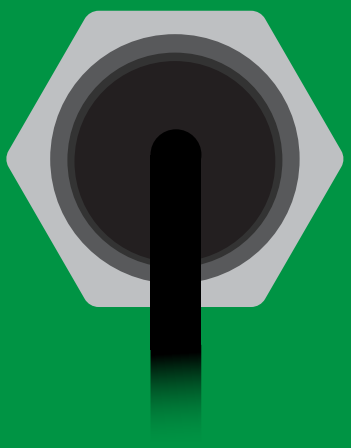
LED control

Command syntax

L,1 <cr> LED on **default**
L,0 <cr> LED off
L,? <cr> LED state on/off?

Example	Response
L,1 <cr>	*OK <cr>
L,0 <cr>	*OK <cr>
L,? <cr>	?L,1 <cr> or ?L,0 <cr> *OK <cr>

L,1



L,0

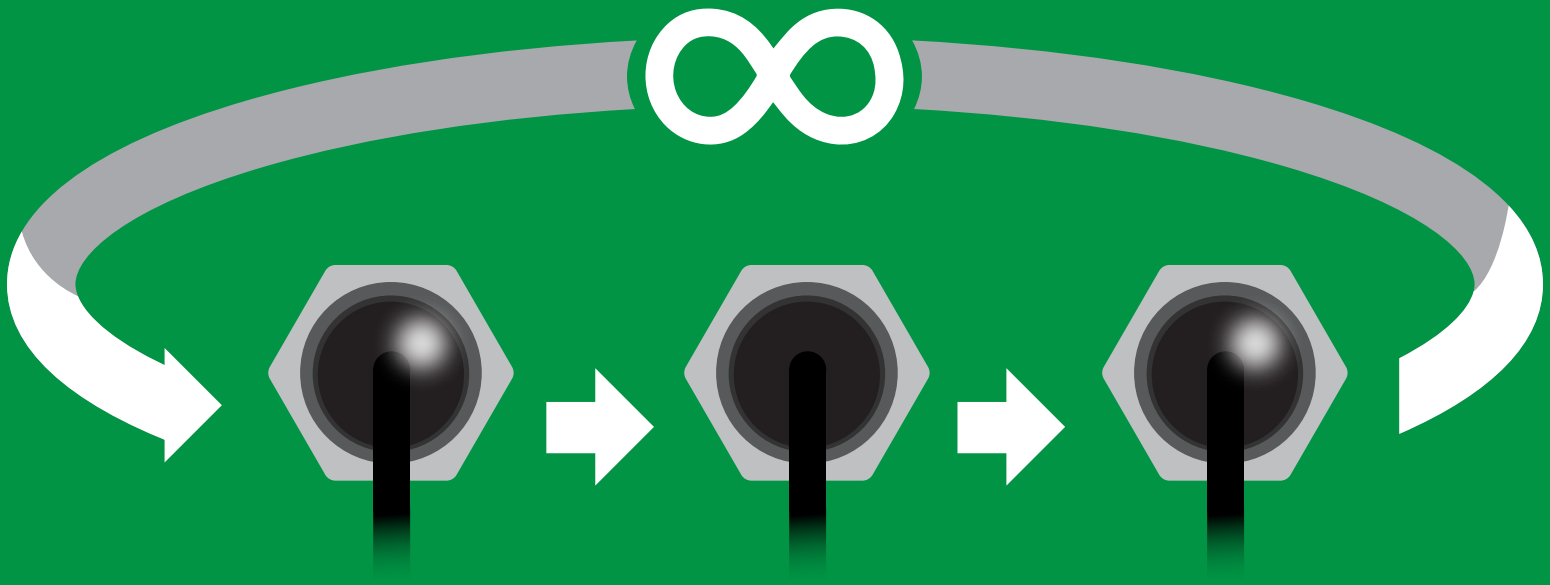
Find

Command syntax

This command will disable continuous mode
Send any character or command to terminate find.

Find <cr> **LED rapidly blinks white, used to help find device**

Example	Response
Find <cr>	***OK** <cr>



Continuous mode

Command syntax

C,1 <cr> enable continuous readings once per second **default**

C,n <cr> continuous readings every n seconds (n = 2 to 99 sec)

C,0 <cr> disable continuous readings

C,? <cr> continuous reading mode on/off?

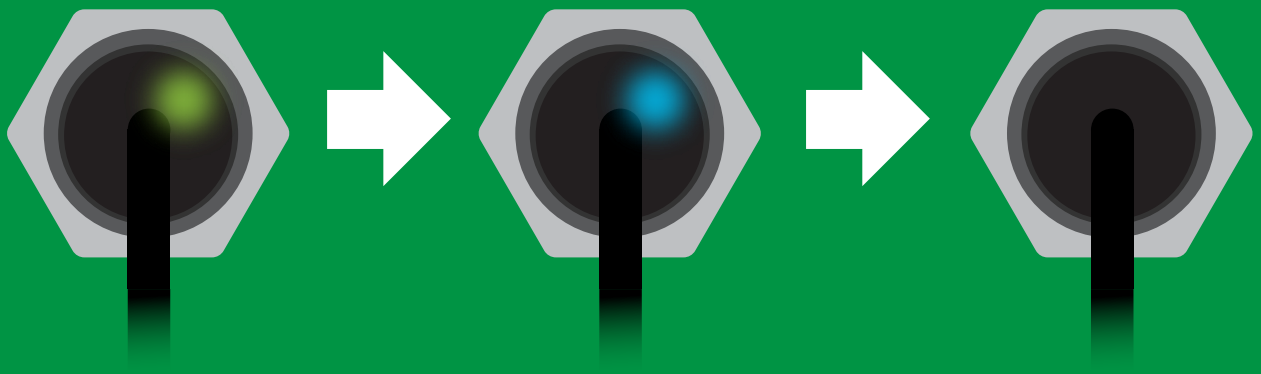
Example	Response
C,1 <cr>	*OK <cr> O2 (1 sec) <cr> O2 (2 sec) <cr> O2 (n sec) <cr>
C,30 <cr>	*OK <cr> O2 (30 sec) <cr> O2 (60 sec) <cr> O2 (90 sec) <cr>
C,0 <cr>	*OK <cr>
C,? <cr>	?C,1 <cr> or ?C,0 <cr> or ?C,30 <cr> *OK <cr>

Single reading mode

Command syntax

R <cr> takes single reading

Example	Response
R <cr>	20.95 <cr> *OK <cr>



Green
Standby

Cyan
Taking reading

Transmitting

1 second

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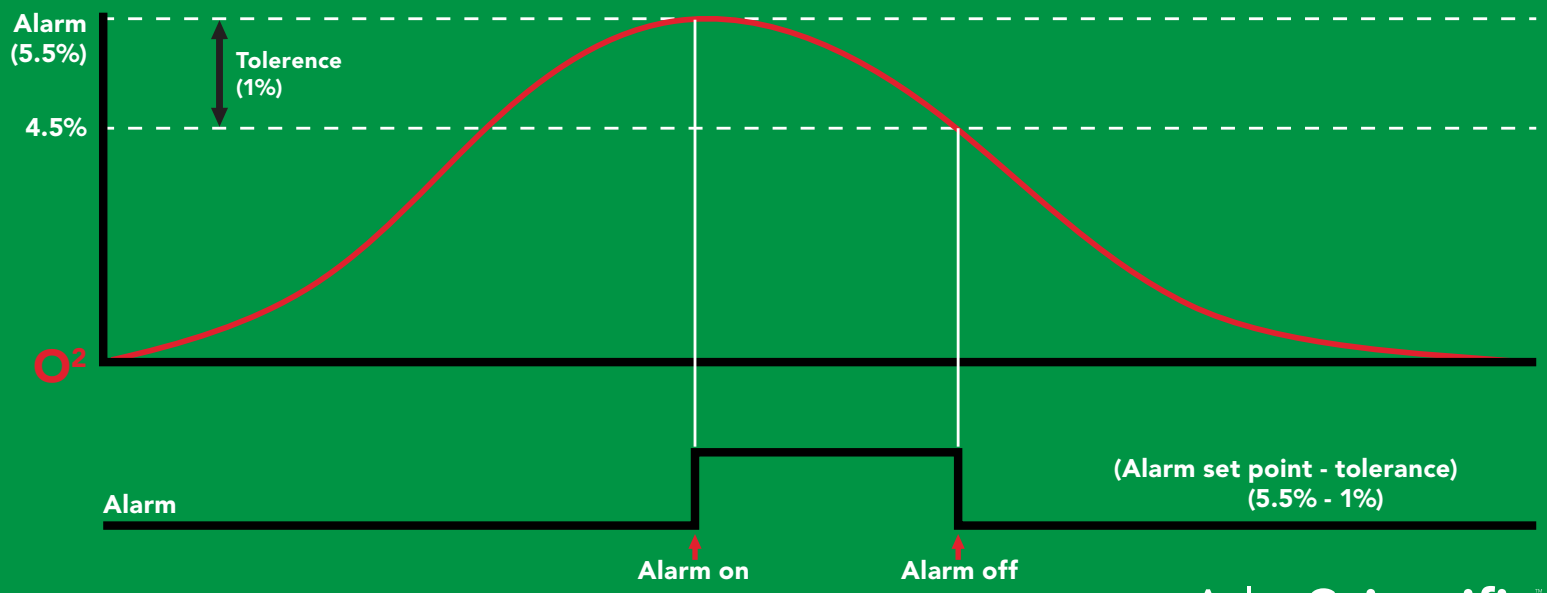
Alarm

Command syntax

The alarm pin will = 1 when O2 levels are > alarm set point. Alarm tolerance sets how far below the set point O2 levels need to drop before the pin will = 0 again.

Alarm,en,[1,0]	<cr>	enable / disable alarm
Alarm,n	<cr>	sets alarm
Alarm,tol,n	<cr>	sets alarm tolerance (0 – 60)
Alarm,?	<cr>	alarm set?

Example	Response	
Alarm,en,1 <cr>	*OK <cr>	Enable alarm
Alarm,5.5 <cr>	*OK <cr>	
Alarm,tol,1 <cr>	*OK <cr>	O2 level must fall one percentage point below set point for alarm to reset.
Alarm,? <cr>	?,alarm,5.50,1.00,1 <cr>	if all are enabled



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Calibration

After ~1 year the sensor may need re-calibration. A single point calibration to atmospheric O2 levels is all thats needed. 0 point calibration can also be done if accuracy at low O2 levels is needed.

Command syntax

Cal,nn.nn <cr> calibration to O2 levels at your altitude. nn.nn =%o2

Cal,0 <cr> calibrate device to 0 oxygen

Cal,clear <cr> delete calibration data

Cal,? <cr> device calibrated?

Example	Response
Cal,20.95 <cr>	*OK <cr> Calibrated to O2 concentration at sea level
Cal,0 <cr>	*OK <cr>
Cal,clear <cr>	*OK <cr>
Cal,? <cr>	?Cal,0 <cr> or ?Cal,1 <cr> (single point) or ?Cal,2 <cr> (two point) *OK <cr>

Altitude (feet)	Altitude (meters)	%
1,000	305	20.1
5,000	1,524	17.3
10,000	3,048	14.3

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Temperature compensation

Command syntax

Air temperature affects how the senor works, not the actual O2 concentration in the air.

T,n <cr> n = any value; floating point or int

T,? <cr> compensated temperature value?

RT,n <cr> set temperature compensation and take a reading

Example	Response
T,19.5 <cr>	*OK <cr>
RT,19.5 <cr>	*OK <cr> 20.95 <cr> Temperature compensated O2 reading
T,? <cr>	?T,19.5 <cr> *OK <cr>

Enable/disable parameters from output string

Command syntax

O, [parameter],[1,0]	<cr>	enable or disable output parameter
O,?	<cr>	enabled parameter?

Example	Response
O,PPT,1 / O,PPT,0 <cr>	*OK <cr> enable / disable PPT
O,%,1 / O,%,0 <cr>	*OK <cr> enable / disable percent concentration
O,? <cr>	?,O,%,PPT <cr> if both are enabled

Parameters

PPT	O^2 in parts per thousand
%	O^2 in percent concentration

Followed by 1 or 0

1	enabled
0	disabled

* If you disable all possible data types your readings will display "no output".

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Naming device

Command syntax

Do not use spaces in the name

Name,n	<cr>	set name
Name,	<cr>	clears name
Name,?	<cr>	show name

n =

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Up to 16 ASCII characters

Example	Response
Name, <cr>	*OK <cr> name has been cleared
Name,zzt <cr>	*OK <cr>
Name,? <cr>	?Name,zzt <cr> *OK <cr>

Name,zzt <cr>

*OK <cr>

Name,? <cr>

?Name,zzt <cr>
*OK <cr>

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Device information

Command syntax

i <cr> **device information**

Example	Response
i <cr>	?i,O2,1.0 <cr> *OK <cr>

Response breakdown

?i,	O2,	1.0
	↑ Device	↑ Firmware

Response codes

Command syntax

*OK,1 <cr> enable response **default**
*OK,0 <cr> disable response
*OK,? <cr> response on/off?

Example	Response
R <cr>	20.95 <cr> *OK <cr>
*OK,0 <cr>	no response, *OK disabled
R <cr>	20.95 <cr> *OK disabled
*OK,? <cr>	?*OK,1 <cr> or ?*OK,0 <cr>

Other response codes

*ER	unknown command
*OV	over volt (VCC>=5.5V)
*UV	under volt (VCC<=3.1V)
*RS	reset
*RE	boot up complete, ready
*SL	entering sleep mode
*WA	wake up

These response codes cannot be disabled

Reading device status

Command syntax

Status <cr> **voltage at Vcc pin and reason for last restart**

Example	Response
Status <cr>	**?Status,P,5.038** <cr> ***OK** <cr>

Response breakdown

?Status, P, 5.038

- P: Reason for restart
- 5.038: Voltage at Vcc

Restart codes

P	powered off
S	software reset
B	brown out
W	watchdog
U	unknown

Sleep mode/low power

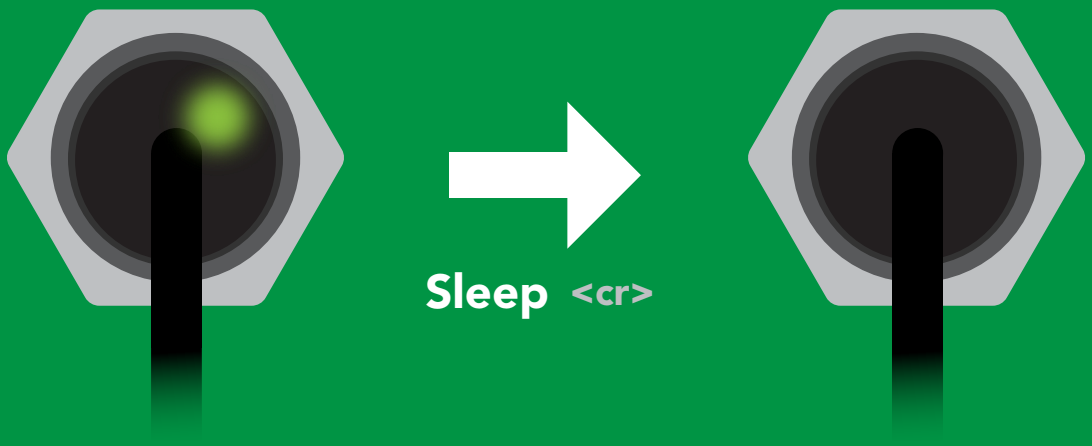
Command syntax

Send any character or command to awaken device.

Sleep <cr> enter sleep mode/low power

Example	Response
Sleep <cr>	*OK <cr> *SL <cr>
Any command	*WA <cr> wakes up device

	MAX	SLEEP
5V	14.6 mA	0.5 mA
3.3V	13.7 mA	0.4 mA



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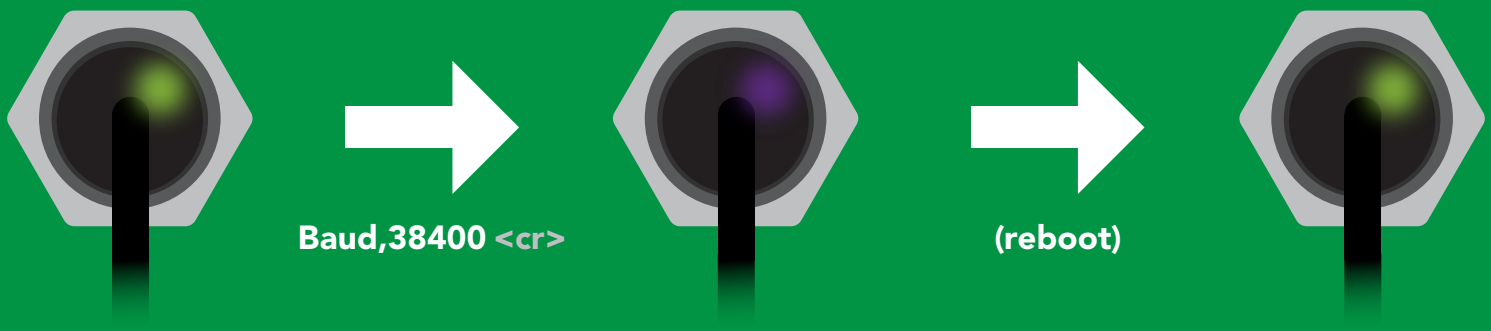
Change baud rate

Command syntax

Baud,n <cr> change baud rate

Example	Response
Baud,38400 <cr>	*OK <cr>
Baud,? <cr>	?Baud,38400 <cr> *OK <cr>

n =
- 300
- 1200
- 2400
- **9600 default**
- 19200
- 38400
- 57600
- 115200



Protocol lock

Command syntax

Locks device to UART mode.

Plock,1 <cr> enable Plock

Plock,0 <cr> disable Plock **default**

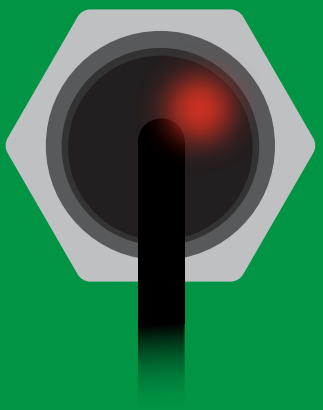
Plock,? <cr> Plock on/off?

Example	Response
Plock,1 <cr>	*OK <cr>
Plock,0 <cr>	*OK <cr>
Plock,? <cr>	?Plock,1 <cr> or ?Plock,0 <cr>

Plock,1

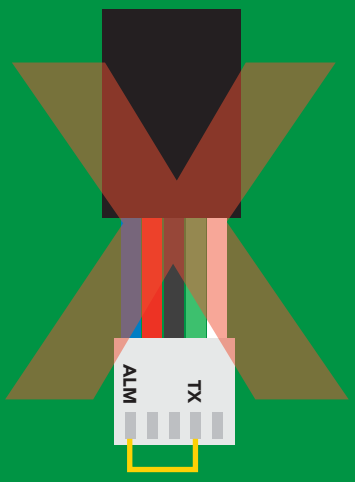
*OK <cr>

I2C,100



cannot change to I²C

*ER <cr>



cannot change to I²C

Factory reset

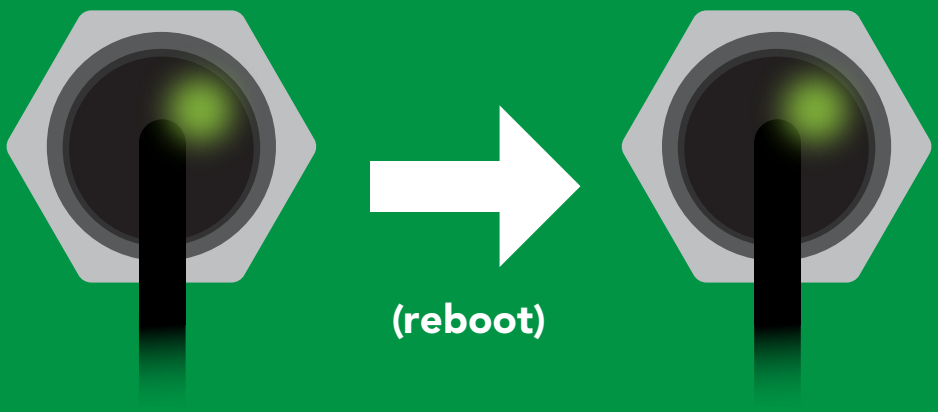
Command syntax

Clears custom calibration
"*OK" enabled

Factory <cr> enable factory reset

Example	Response
Factory <cr>	*OK <cr>

Factory <cr>



(reboot)

*OK <cr>

*RS <cr>
*RE <cr>

Baud rate will not change

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Change to I²C mode

Command syntax

Default I²C address 108 (0x6C)

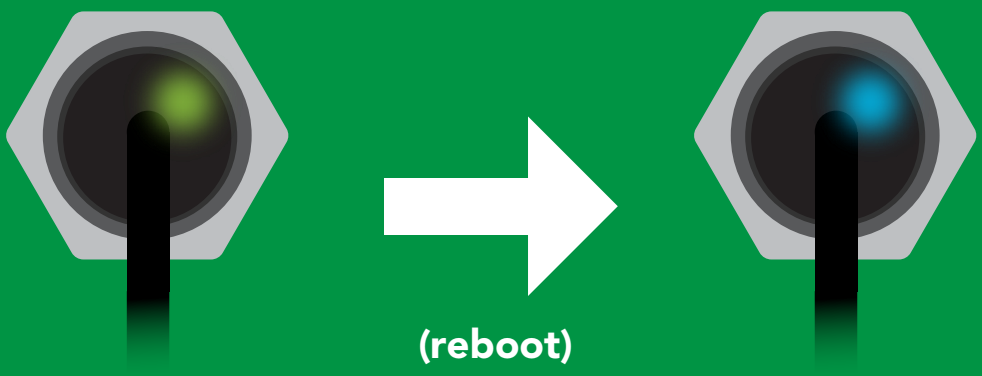
I2C,n <cr> sets I²C address and reboots into I²C mode

n = any number 1 – 127

Example	Response
I2C,100 <cr>	*OK (reboot in I²C mode)

Wrong example	Response
I2C,139 <cr> n ≯ 127	*ER <cr>

I2C,100



(reboot)

Green
*OK <cr>

Blue
now in I²C mode

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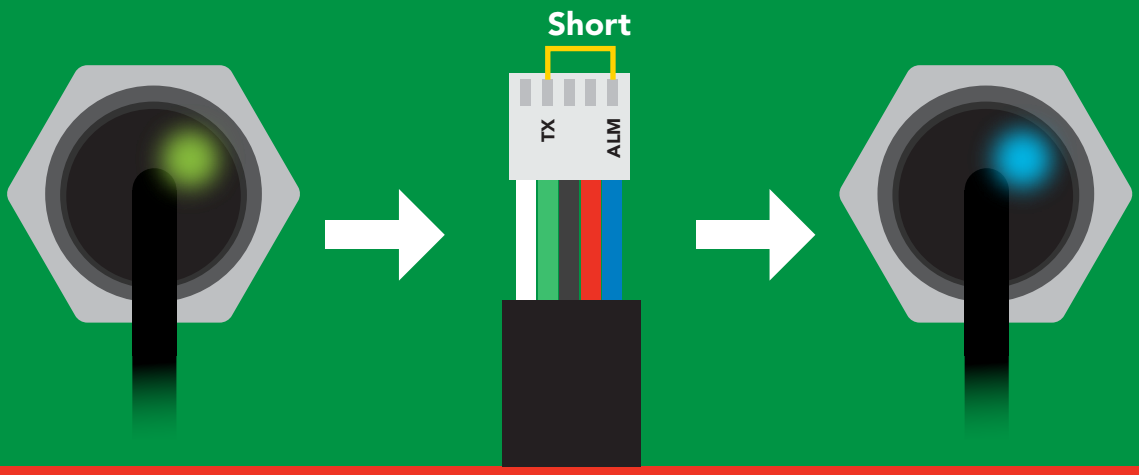
Manual switching to I²C

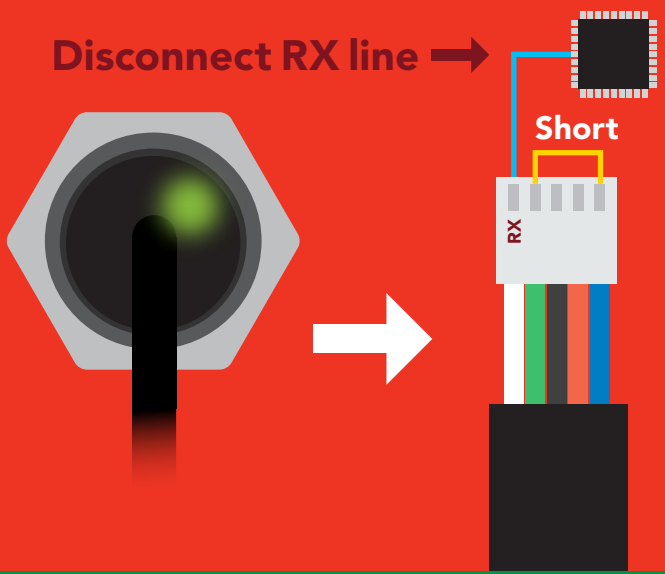
- Disconnect ground (power off)
- Disconnect TX and RX
- Connect TX to ALM
- Confirm RX is disconnected
- Connect ground (power on)
- Wait for LED to change from Green to Blue
- Disconnect ground (power off)
- Reconnect all data and power

Manually switching to I²C will set the I²C address to 108 (0x6C)

Example



Wrong Example



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I²C mode

The I²C protocol is *considerably more complex* than the UART (RS–232) protocol. Atlas Scientific assumes the embedded systems engineer understands this protocol.

To set your EZO™ device into I²C mode click here

Settings that are retained if power is cut

Calibration
Change I²C address
Hardware switch to UART mode
LED control
Protocol lock
Software switch to UART mode

Settings that are *NOT* retained if power is cut

Sleep mode

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I²C mode

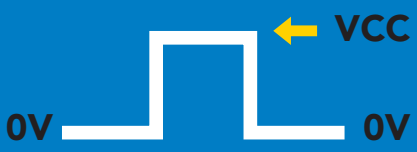
I²C address (0x01 – 0x7F)
108 (0x6C) default

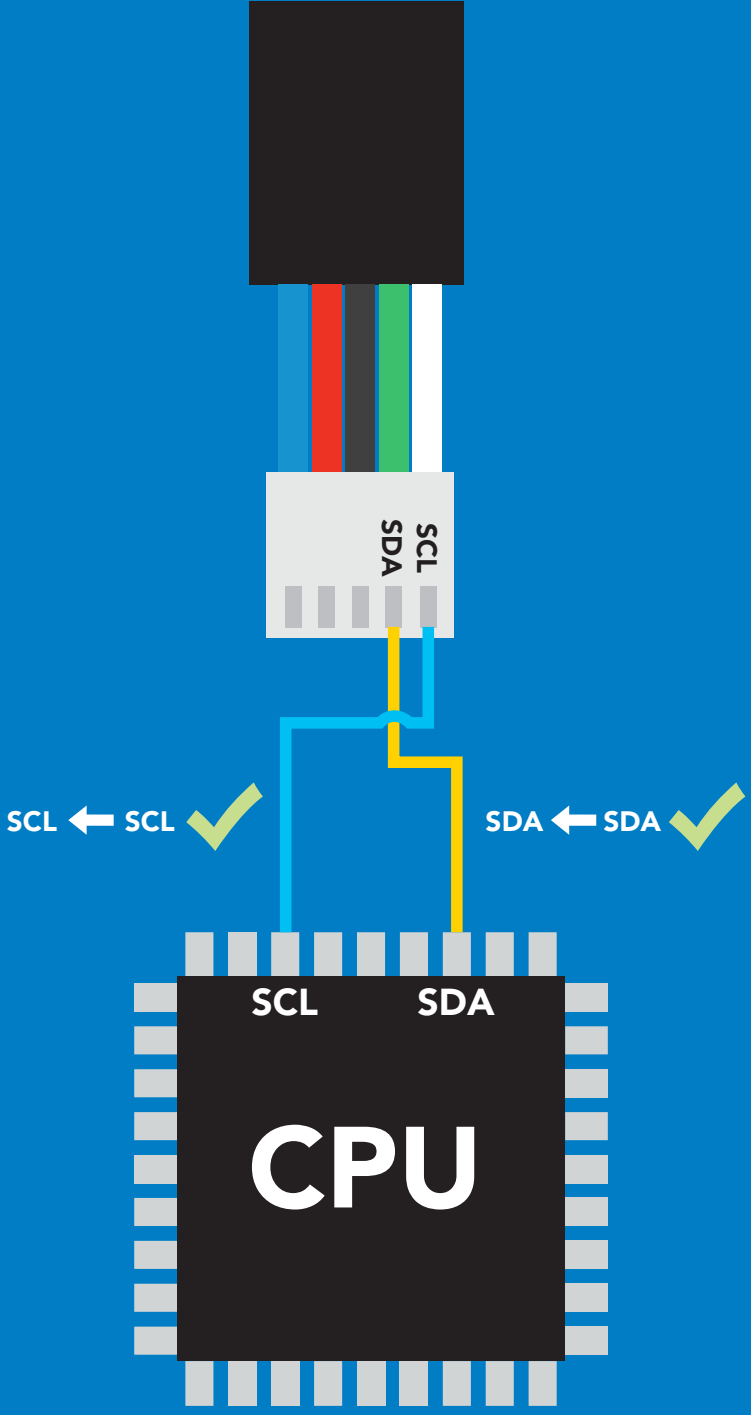
Vcc 3.3V – 5.5V

Clock speed 100 – 400 kHz

SDA

SCL





Data format

Reading Gaseous O^2
Units percent concentration & PPT (when enabled)

Encoding ASCII
Format string
(CSV string when PPT is enabled)

Data type Floating point
Decimal places 2
Smallest string 4 characters
Largest string 16 characters

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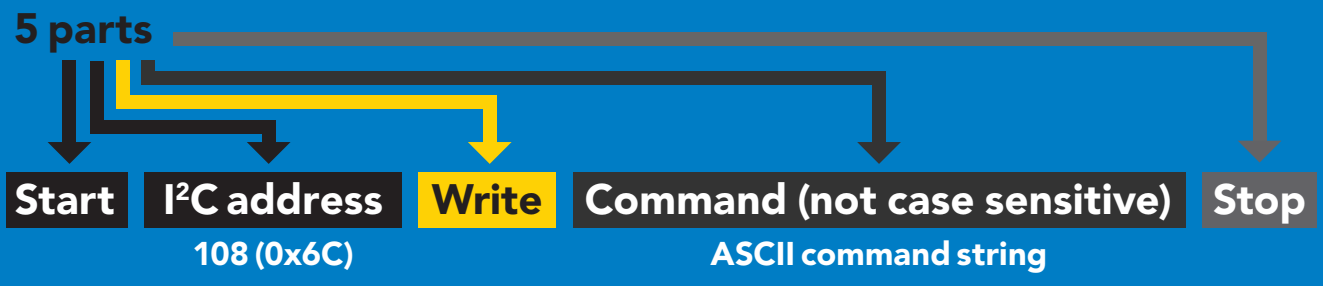
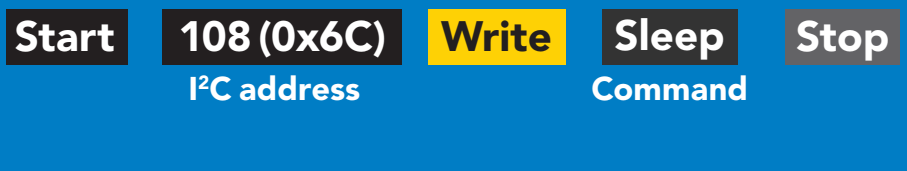
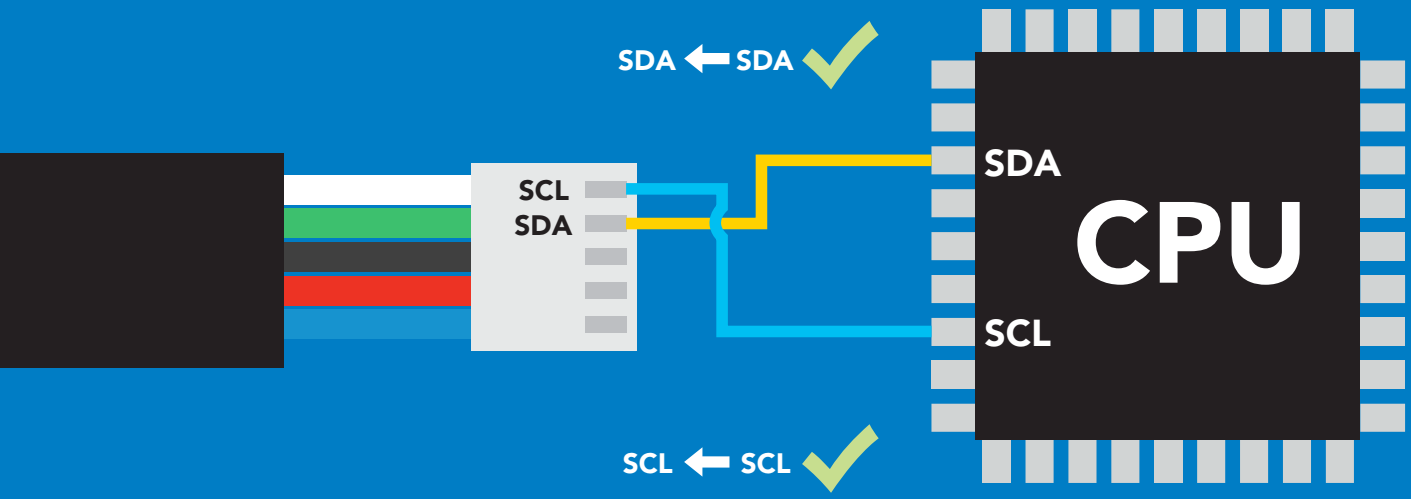
Sending commands to device

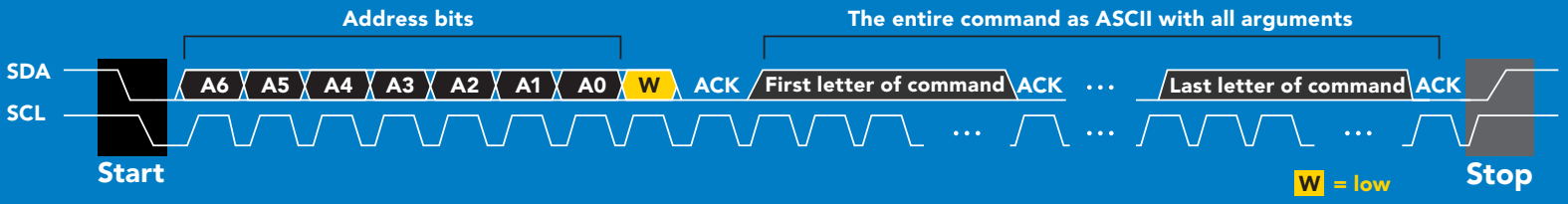


Example





Advanced



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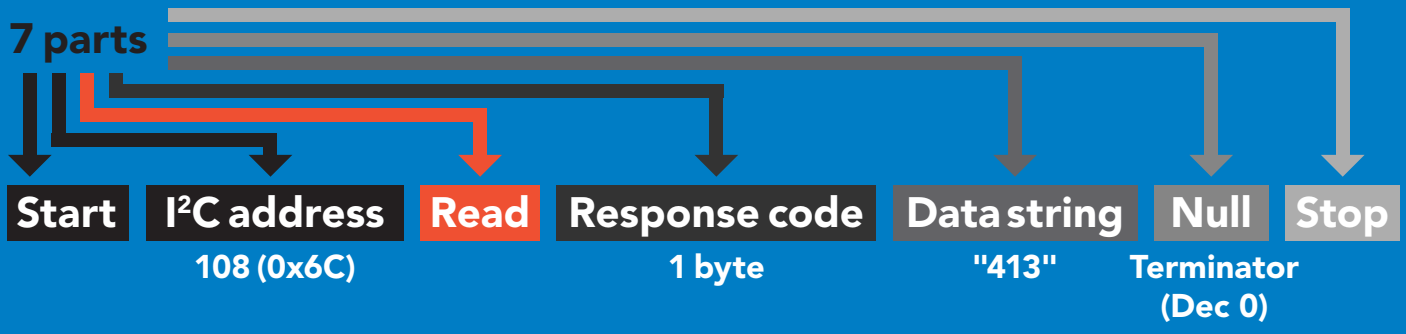
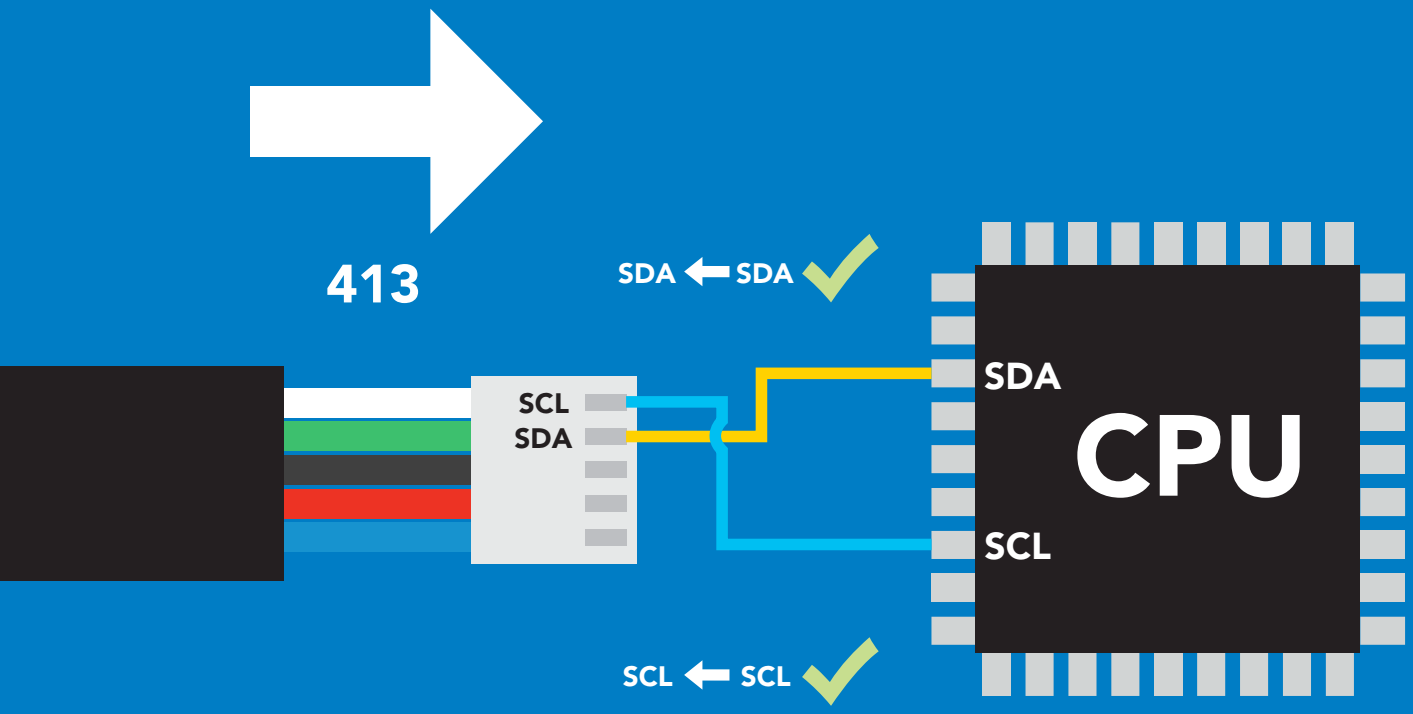
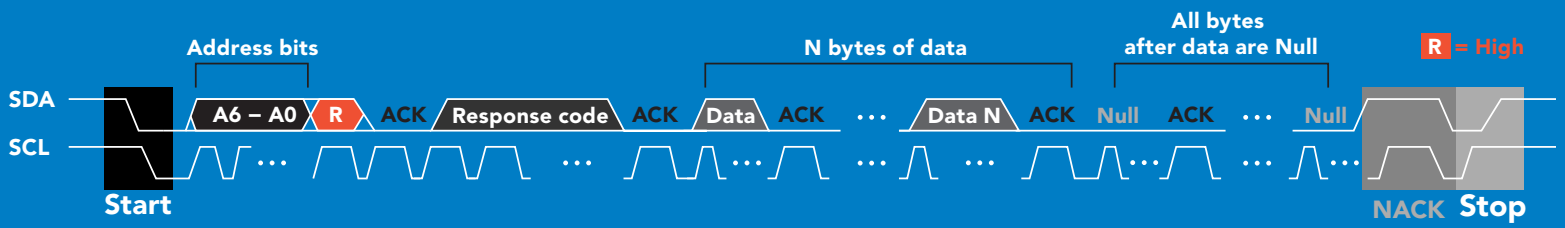
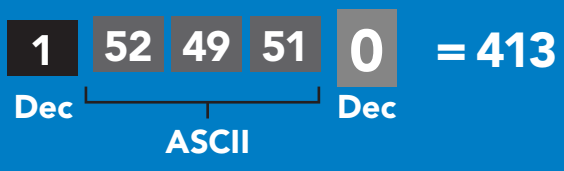
Requesting data from device





Advanced





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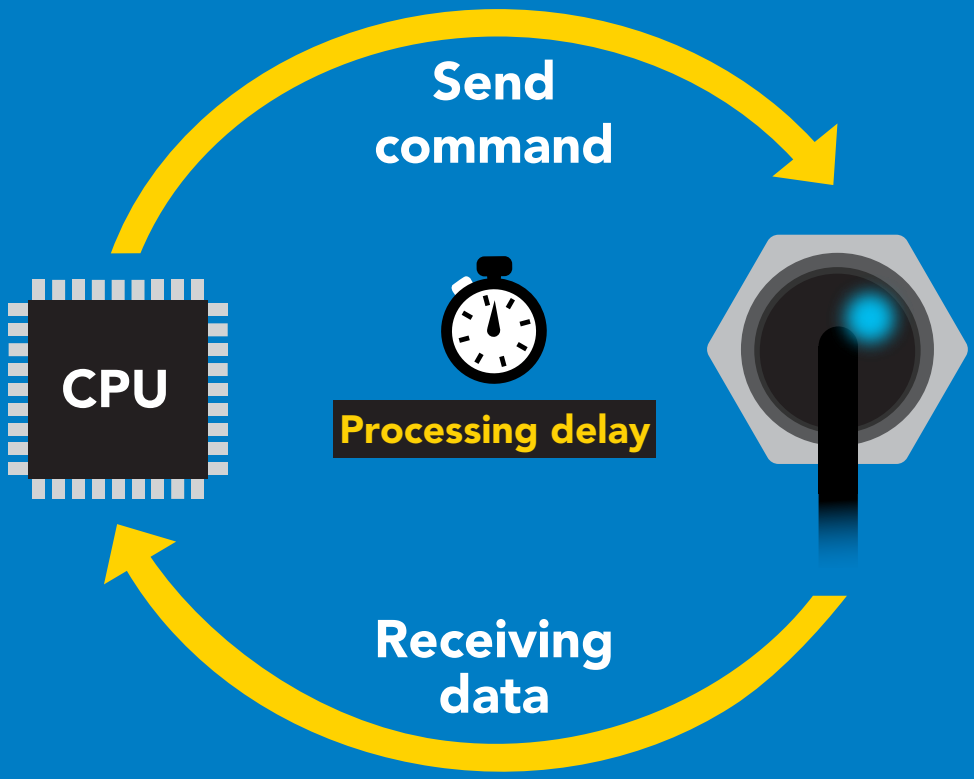
Response codes & processing delay

After a command has been issued, a 1 byte response code can be read in order to confirm that the command was processed successfully.

Reading back the response code is completely optional, and is not required for normal operation.



Example

```
I2C_start;
I2C_address;
I2C_write(EZO_command);
I2C_stop;

delay(300);   Processing delay

I2C_start;
I2C_address;
Char[ ] = I2C_read;
I2C_stop;
```

If there is no processing delay or the processing delay is too short, the response code will always be 254.

Response codes

Single byte, not string

255	no data to send
254	still processing, not ready
2	syntax error
1	successful request

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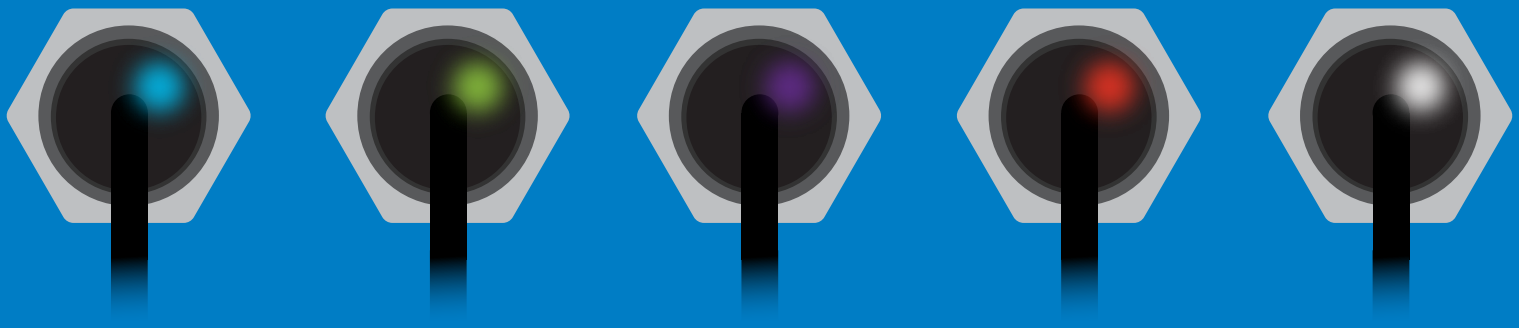
LED color definition



Blue
I²C standby

Green
Taking reading

Purple
Changing I²C address

Red
Command not understood

White
Find

	LED ON
5V	+0.7 mA
3.3V	+0.2 mA

I²C mode
command quick reference

All commands are ASCII strings or single ASCII characters.

Command	Function	
Alarm	enable/disable alarm	pg. 43
Baud	switch back to UART mode	pg. 54
Cal	performs calibration	pg. 44
Factory	enable factory reset	pg. 53
Find	finds device with blinking white LED	pg. 41
i	device information	pg. 47
I2C	change I²C address	pg. 52
L	enable/disable LED	pg. 40
Name	set/show name of device	pg. 47
O	enable/disable internal temp	pg. 46
Plock	enable/disable protocol lock	pg. 51
R	returns a single reading	pg. 42
Sleep	enter sleep mode/low power	pg. 50
Status	retrieve status information	pg. 49
T	enter sleep mode/low power	pg. 45

LED control

Command syntax

300ms processing delay

L,1	LED on	default
L,0	LED off	
L,?	LED state on/off?	

Example Response

L,1

Wait 300ms → 1 (Dec) 0 (Null)

L,0

Wait 300ms → 1 (Dec) 0 (Null)

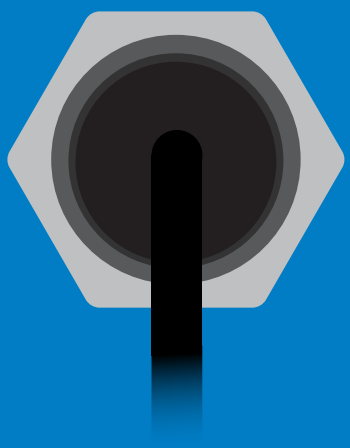
L,?

Wait 300ms → 1 (Dec) ?L,1 (ASCII) 0 (Null)

or

Wait 300ms → 1 (Dec) ?L,0 (ASCII) 0 (Null)

L,1



L,0

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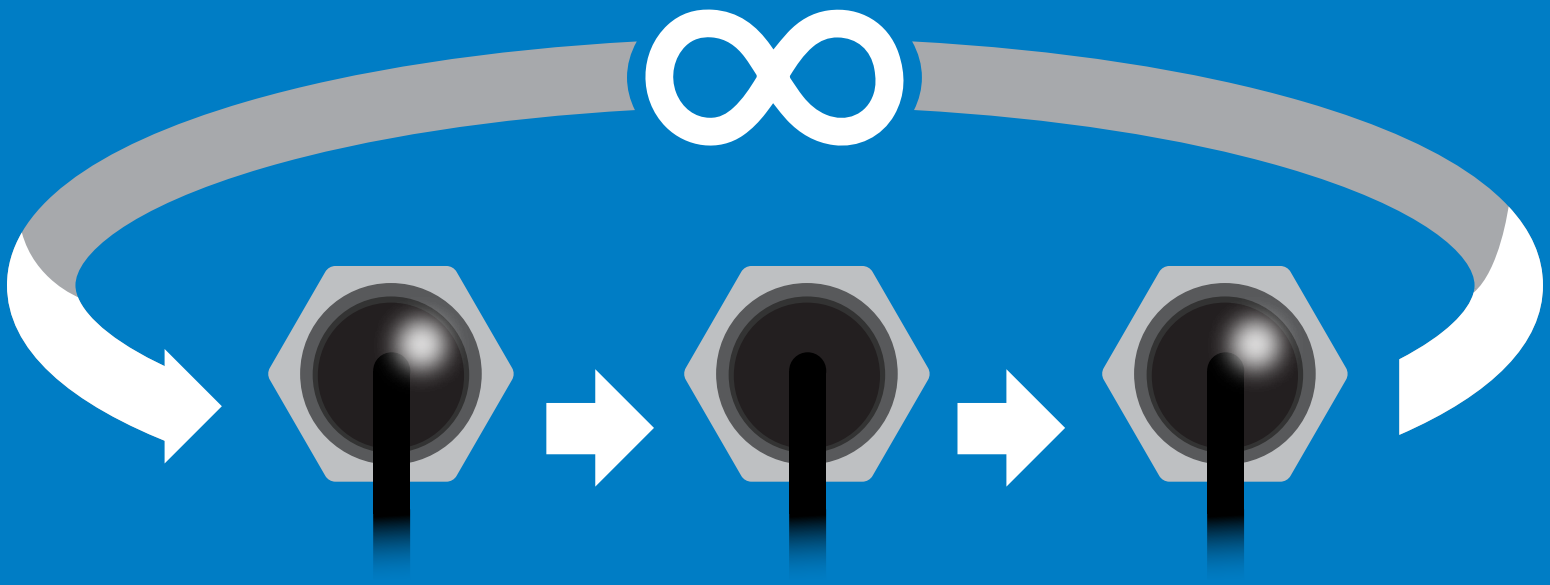
Find

300ms processing delay

Command syntax

Find	LED rapidly blinks white, used to help find device

Example	Response
Find	Wait 300ms 1 Dec 0 Null



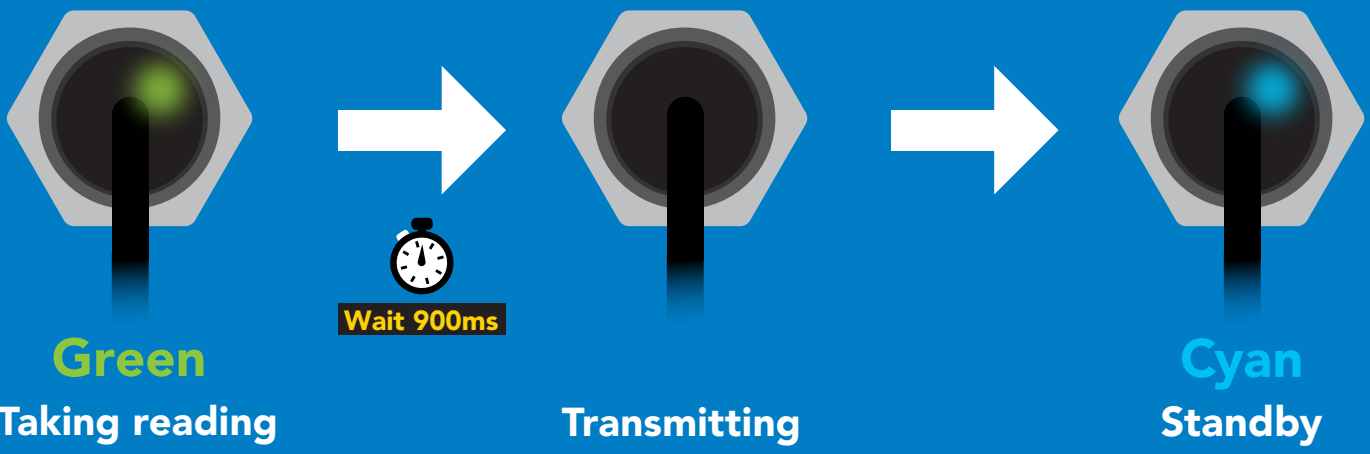
Taking reading

Command syntax

900ms processing delay

R return 1 reading

Example	Response
R	Wait 900ms; 1 Dec; 20.95 ASCII; 0 Null



Alarm

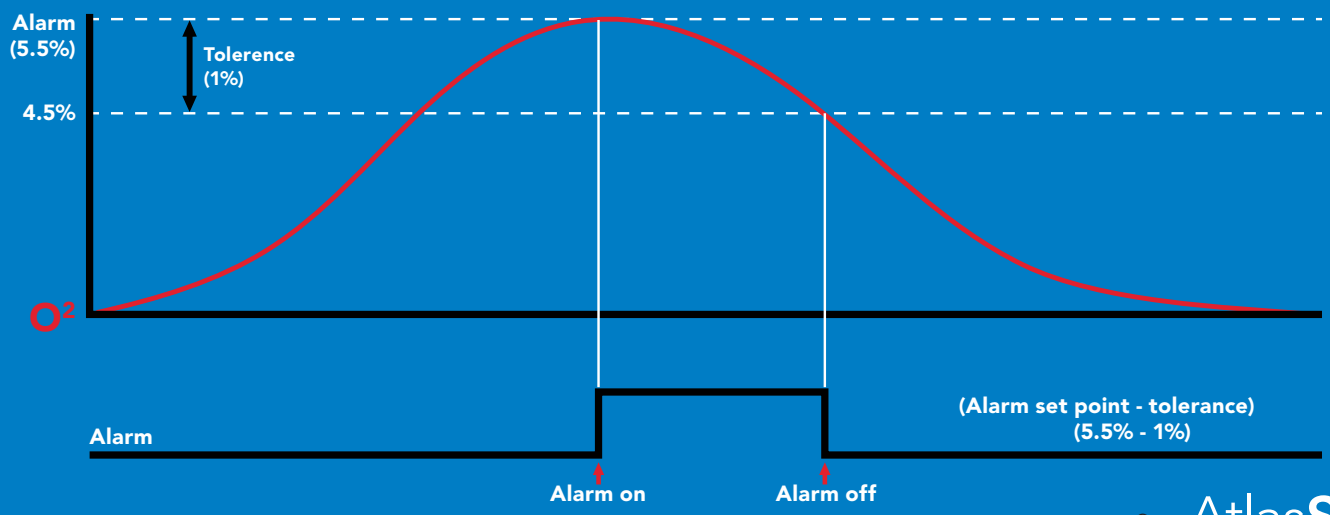
300ms processing delay

Command syntax

The alarm pin will = 1 when O2 levels are > alarm set point. Alarm tolerance sets how far below the set point O2 levels need to drop before the pin will = 0 again.

Alarm,en,[1,0]	enable / disable alarm
Alarm,n	sets alarm
Alarm,tol,n	sets alarm tolerance (0 – 60)
Alarm,?	alarm set?

Example	Response
Alarm,en,1	Wait 300ms → 1 (Dec) 0 (Null) Enable alarm
Alarm,5.5	Wait 300ms → 1 (Dec) 0 (Null)
Alarm,tol,1	Wait 300ms → 1 (Dec) 0 (Null) O2 level must fall one percentage point below set point for alarm to reset.
Alarm,?	Wait 300ms → 1 (Dec) ?,alarm,5.50,1.00,1 (ASCII) 0 (Null) if all are enabled



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Calibration

1300ms processing delay

After ~1 year the sensor may need re-calibration. A single point calibration to atmospheric O2 levels is all thats needed. 0 point calibration can also be done if accuracy at low O2 levels is needed.

Command syntax

Cal,nn.nn	calibration to O2 levels at your altitude. nn.nn =%o2
Cal,0	calibrate device to 0 dissolved oxygen
Cal,clear	delete calibration data
Cal,?	device calibrated?

Example	Response
Cal,20.95	Wait 1300ms — 1 (Dec) 0 (Null) — Calibrated to O2 concentration at sea level
Cal,0	Wait 1300ms — 1 (Dec) 0 (Null)
Cal,clear	Wait 300ms — 1 (Dec) 0 (Null)
Cal,?	Wait 300ms — 1 (Dec) ?Cal,0 (ASCII) 0 (Null) or 1 (Dec) ?Cal,1 (ASCII) 0 (Null) or 1 (Dec) ?Cal,2 (ASCII) 0 (Null)

Altitude (feet)	Altitude (meters)	%
1,000	305	20.1
5,000	1,524	17.3
10,000	3,048	14.3

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Temperature compensation

Command syntax

Air temperature affects how the senor works, not the actual O2 concentration in the air.

T,n	n = any value; floating point or int	300ms processing delay
T,?	compensated temperature value?	
RT,n	set temperature compensation and take a reading	

Example	Response
T,19.5	Wait 300ms — 1 (Dec) — 0 (Null)
RT,19.5	Wait 900ms — 1 (Dec) — 20.95 (ASCII) — 0 (Null) — Temperature compensated O2 reading
T,?	Wait 300ms — 1 (Dec) — ?T,19.5 (ASCII) — 0 (Null)

Enable/disable parameters from output string

Command syntax

300ms processing delay

O, [parameter],[1,0]	enable or disable output parameter
O,?	enabled parameter?

Example

Response

Example	Response
O,PPT,1 / O,PPT,0	Wait 300ms — 1 (Dec) 0 (Null) — enable / disable PPT
O,%,1 / O,%,0	Wait 300ms — 1 (Dec) 0 (Null) — enable / disable percent concentration
O,?	Wait 300ms — 1 (Dec) ?,O,%,PPT (ASCII) 0 (Null) — if both are enabled

Parameters

PPT	O^2 in parts per thousand
%	O^2 in percent concentration

Followed by 1 or 0

1	enabled
0	disabled

* If you disable all possible data types your readings will display "no output".

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Naming device

300ms processing delay

Command syntax

Do not use spaces in the name

Name,n	set name
Name,	clears name
Name,?	show name

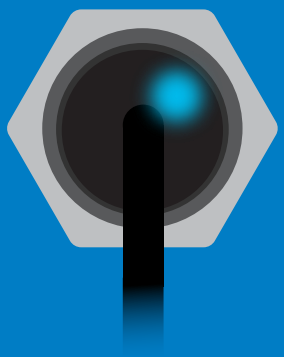
n = _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Up to 16 ASCII characters

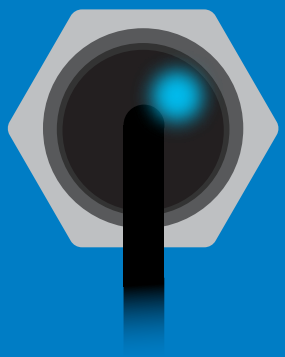
Example	Response
Name,	Wait 300ms → 1 (Dec) 0 (Null) — name has been cleared
Name,zzt	Wait 300ms → 1 (Dec) 0 (Null)
Name,?	Wait 300ms → 1 (Dec) ?Name,zzt (ASCII) 0 (Null)

Name,zzt



1 0

Name,?



1 ?Name,zzt 0

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Device information

Command syntax

300ms processing delay

i device information

Example

i

Response

1 Dec

?i,O2,1.00 ASCII

0 Null

Response breakdown

?i, O2, 1.00

O2 = Device

1.00 = Firmware

Reading device status

Command syntax

300ms processing delay

Status voltage at Vcc pin and reason for last restart

Example

Status

Response

1	?Status,P,5.038	0
Dec	ASCII	Null

Response breakdown

?Status, P, 5.038

P, ↑ Reason for restart

5.038 ↑ Voltage at Vcc

Restart codes

P	powered off
S	software reset
B	brown out
W	watchdog
U	unknown

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Sleep mode/low power

Command syntax

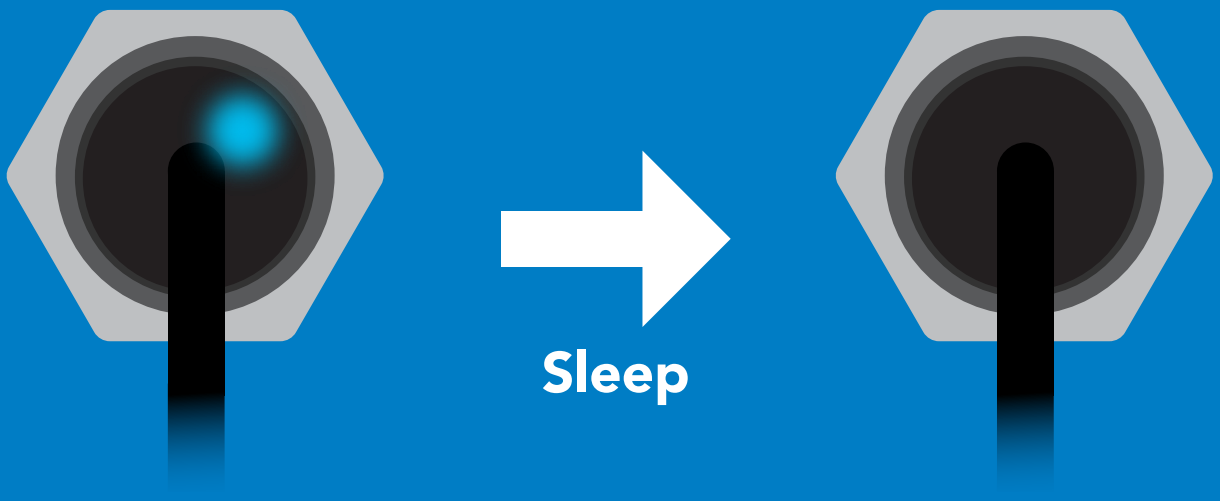
Sleep	enter sleep mode/low power

Send any character or command to awaken device.

Example	Response
Sleep	no response
Any command	wakes up device

Do not read status byte after issuing sleep command.

	STANDBY	SLEEP
5V	14.6 mA	0.5 mA
3.3V	13.7 mA	0.4 mA



Standby

Sleep

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Protocol lock

Command syntax

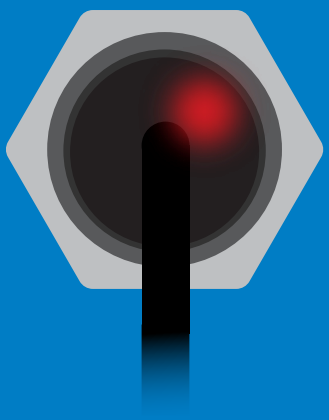
300ms processing delay

Plock,1	enable Plock	Locks device to I²C mode.
Plock,0	disable Plock	default
Plock,?	Plock on/off?	

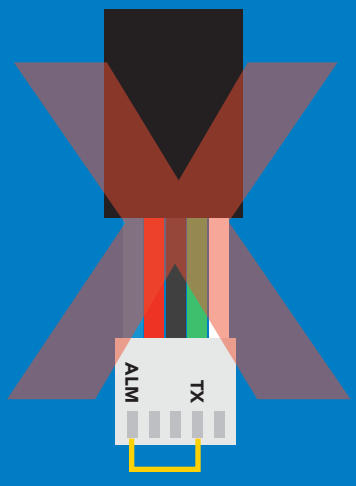
Example	Response
Plock,1	Wait 300ms → 1 (Dec) 0 (Null)
Plock,0	Wait 300ms → 1 (Dec) 0 (Null)
Plock,?	Wait 300ms → 1 (Dec) ?Plock,1 (ASCII) 0 (Null)

Plock,1

Baud, 9600



cannot change to UART



cannot change to UART

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I²C address change

Command syntax

300ms processing delay

I2C,n sets I²C address and reboots into I²C mode

Example	Response
I2C,101	device reboot (no response given)

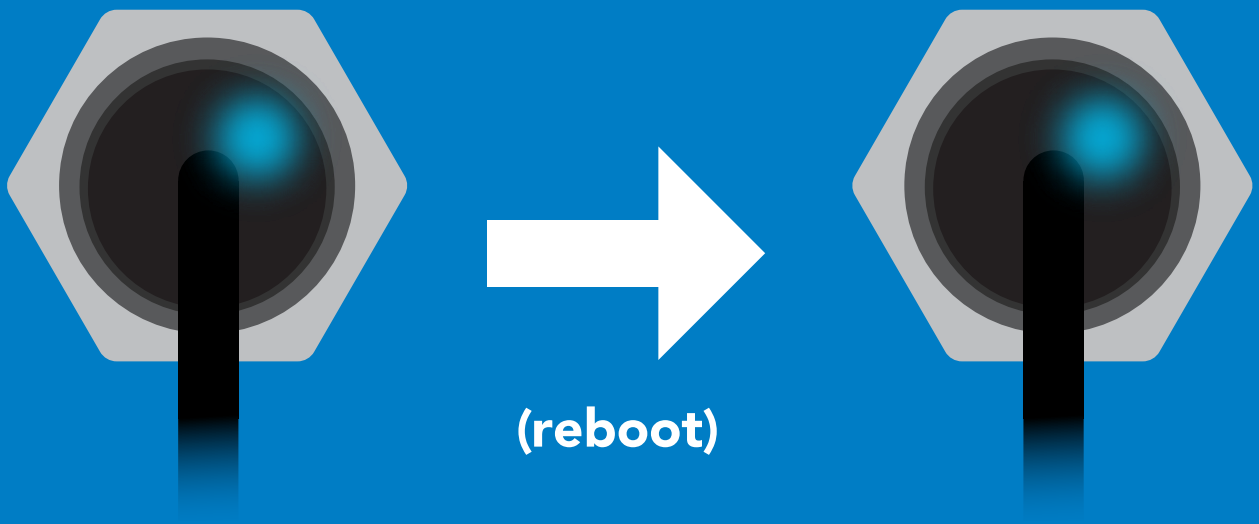
n = any number 1 – 127

Warning!

Changing the I²C address will prevent communication between the circuit and the CPU until the CPU is updated with the new I²C address.

Default I²C address is 108 (0x6C).

I2C,101



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Factory reset

Command syntax

Factory reset will not take the device out of I²C mode.

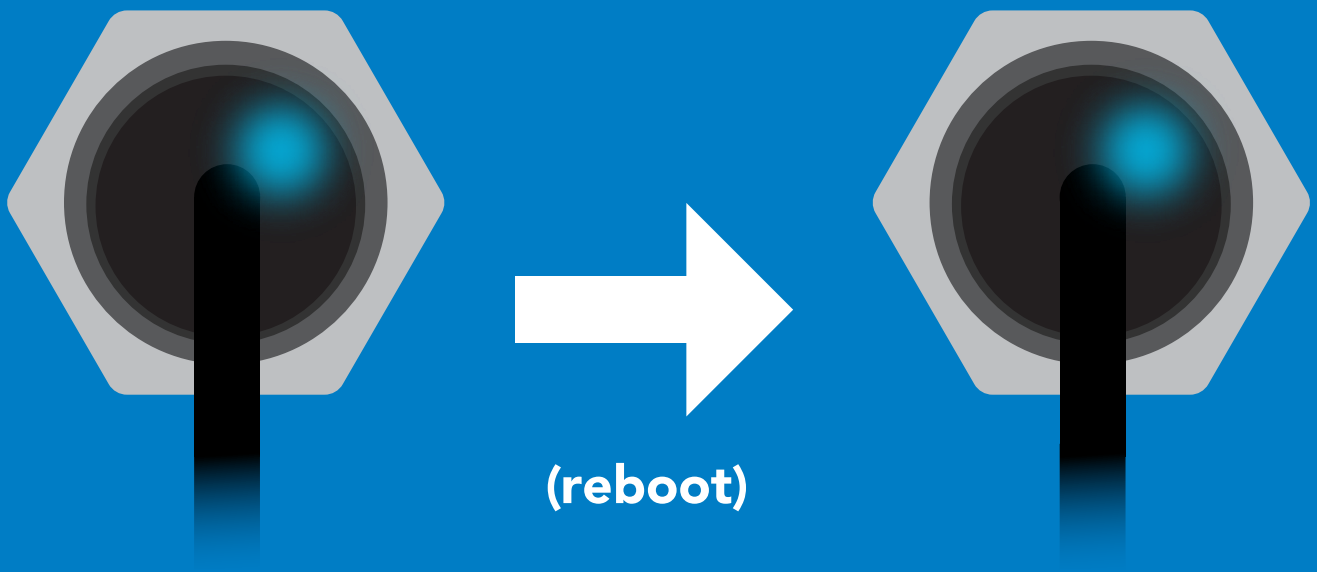
Factory enable factory reset

I²C address will not change

Example	Response
Factory	device reboot (no response given)

Clears custom calibration
LED on
Response codes enabled

Factory



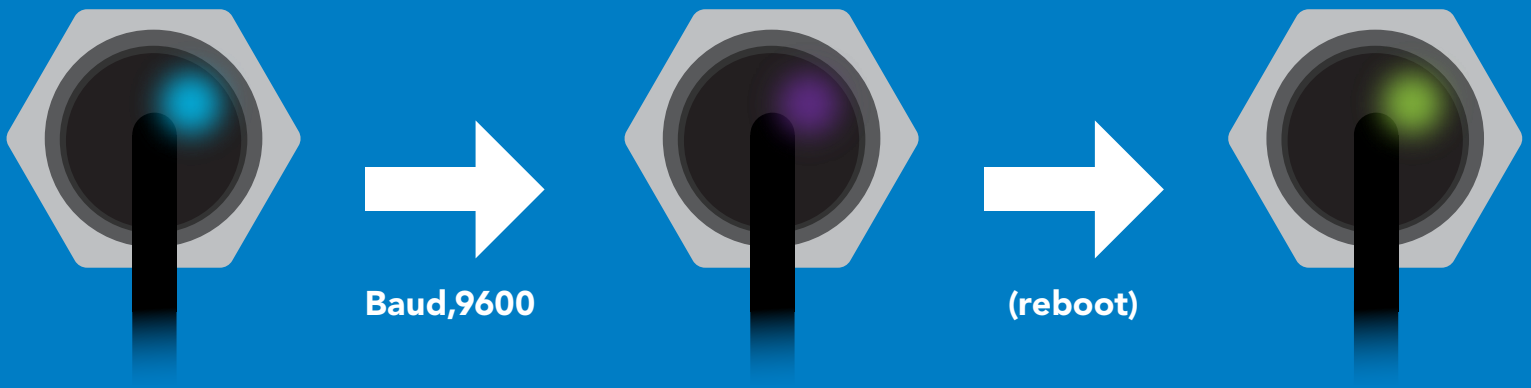
Change to UART mode

Command syntax

Baud,n switch from I²C to UART

Example	Response
Baud,9600	reboot in UART mode (no response given)

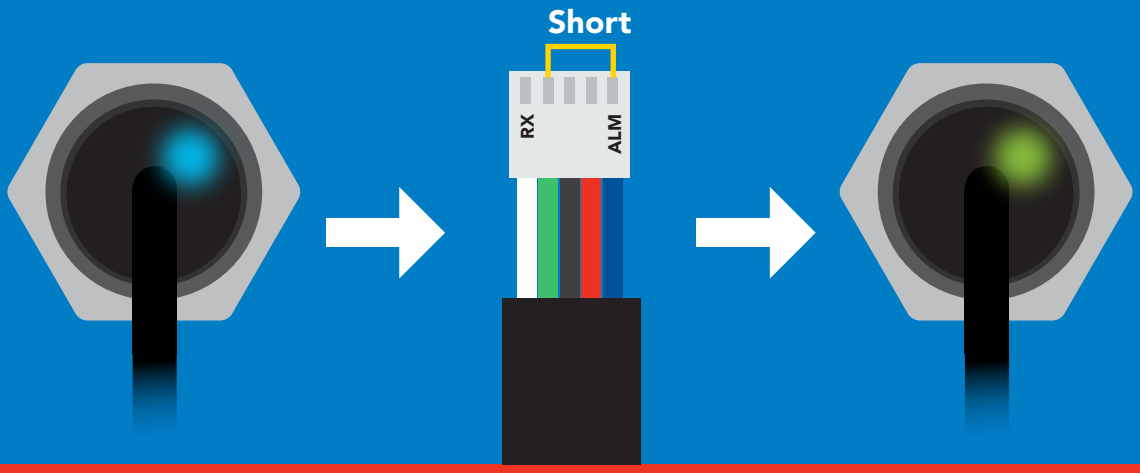
n =
- 300
- 1200
- 2400
- 9600
- 19200
- 38400
- 57600
- 115200



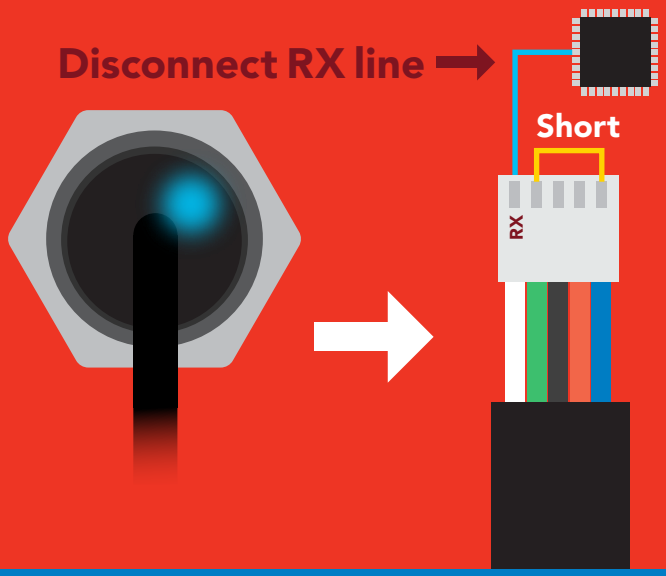
Manual switching to UART

- Disconnect ground (power off)
- Disconnect TX and RX
- Connect TX to ALM
- Confirm RX is disconnected
- Connect ground (power on)
- Wait for LED to change from Blue to Green
- Disconnect ground (power off)
- Reconnect all data and power

Example



Wrong Example



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Datasheet change log

Datasheet V 1.3

Revised naming device info on pages 23 & 47.

Datasheet V 1.2

Revised info for "Pin out" on page 5.

Datasheet V 1.1

Revised info for the Alarm command on pages 19 & 43.

Datasheet V 1.0

New datasheet

Firmware updates

V1.0 – Initial release (June 3, 2020)

V1.01 – Initial release (June 18, 2020)
- Fixed bug with the alarm command not working in certain circumstances.

Warranty

Atlas Scientific™ Warranties the EZO-O2™ Embedded Oxygen Sensor to be free of defect during the debugging phase of device implementation, or 30 days after receiving the EZO-O2™ Embedded Oxygen Sensor (which ever comes first).

The debugging phase

The debugging phase as defined by Atlas Scientific™ is the time period when the EZO-O2™ Embedded Oxygen Sensor is connected into a bread board, or shield. If the EZO-O2™ Embedded Oxygen Sensor is being debugged in a bread board, the bread board must be devoid of other components. If the EZO-O2™ Embedded Oxygen Sensor is being connected to a microcontroller, the microcontroller must be running code that has been designed to drive the EZO-O2™ Embedded Oxygen Sensor exclusively and output the EZO-O2™ Embedded Oxygen Sensor data as a serial string.

It is important for the embedded systems engineer to keep in mind that the following activities will void the EZO-O2™ Embedded Oxygen Sensor warranty:

- **Soldering any part to the EZO-O2™ Embedded Oxygen Sensor.**
- **Running any code, that does not exclusively drive the EZO-O2™ Embedded Oxygen Sensor and output its data in a serial string.**
- **Embedding the EEZO-O2™ Embedded Oxygen Sensor into a custom made device.**
- **Removing any potting compound.**

Reasoning behind this warranty

Because Atlas Scientific™ does not sell consumer electronics; once the device has been embedded into a custom made system, Atlas Scientific™ cannot possibly warranty the EZO-O2™ Embedded Oxygen Sensor, against the thousands of possible variables that may cause the EZO-O2™ Embedded Oxygen Sensor to no longer function properly.

Please keep this in mind:

1. **All Atlas Scientific™ devices have been designed to be embedded into a custom made system by you, the embedded systems engineer.**

2. **All Atlas Scientific™ devices have been designed to run indefinitely without failure in the field.**

3. **All Atlas Scientific™ devices can be soldered into place, however you do so at your own risk.**

Atlas Scientific™ is simply stating that once the device is being used in your application, Atlas Scientific™ can no longer take responsibility for the EZO-O2™ Embedded Oxygen Sensor continued operation. This is because that would be equivalent to Atlas Scientific™ taking responsibility over the correct operation of your entire device.

