

DigiO3 Ozone / Multi Parameter Sensor

Ozone ($\pm 0.1\%$), Oxygen ($\pm 1.5\%$), Pressure ($\pm 0.5\%$),
Standard Flow Rate ($\pm 0.2\text{SLPM}$), Ozone production ($\pm 2\%$), O₂ & O₃ Temperature ($\pm 0.2^\circ\text{C}$)



DigiO3, a modern breakthrough in Digital Signal processing Ultrasonic Ozone & Oxygen sensing technology is manufactured to prevent oxidation, DigiO3 features a virtually unlimited longevity and no need for field calibrations. There is no warm-up time, no dependencies on pressure and temperature and no mechanical failures.

Concentration: DigiO3 measures Ozone & Oxygen concentrations within its respective O₃ & O₂ sensors.

Ozone production : DigiO3 displays Ozone production in units of grams per hour.

Flow Rate & Pressure: DigiO3 measures Standard Flow rate & pressure within its O₂ sensor

Temperature: DigiO3 measures Temperature within its respective O₃ & O₂ sensors.

Outputs: LCD, 4 to 20ma, 0 to 5V, RS-232

Operation:

DigiO3 is designed to operate strictly in conjunction with Ozone Generators. To operate properly, incoming gas stream (Air, Cylinder Oxygen, output of an Oxygen Concentrator), supplied to Ozone

Generator, must be connected to O2 sensor inlet. O2 sensor outlet is then connected to Ozone Generator inlet. The Ozone Generator outgoing - Ozone enriched gas stream must be connected to O3 sensor inlet. In the event that the temperature of ozone enriched gas stream exceeds the temperature of the environment by more than 5°C, the unit will begin to display correct readings within 5 minutes after commencing gas flow through the sensor. Switch over between menus by pressing Display (SW1) push button.

Menus

- **PO3 | O3 menu:** Displays O3 % concentration by weight on left side, and O3 concentration in grams per meter³ on right side of LCD display.
- **PSI | gPh menu:** Displays Oxygen gas pressure on left side, and O3 production in grams per hour on right side of LCD display.
- **FLO | O2 menu:** Displays O2 Standard Flow Rate in SLPM on left side, and O2 % concentration on right side of LCD display.
- **tO2 | tO3 menu:** Displays O2 temperature in °C on left side, and O3 temperature in °C on right side of LCD display.

Specification

Size	5.5" x 3" x 5/8"
Weight	50g
Power	Unregulated 9 - 30Vdc, 10ma
Gas Ports	Male 1/8" Hose barbs
Accuracy	<ul style="list-style-type: none"> • Ozone concentration ($\pm 0.1\%$) by weight • Ozone Production ($\pm 2\%$) • Oxygen ($\pm 1.5\%$)* • Flow Rate (± 0.2SLPM) * • Pressure ($\pm 0.5\%$FS) • Temperature ($\pm 0.2^\circ\text{C}$)
Range	<p>Ozone: 0-30% by weight; 0 – 476 g/NM³</p> <p>Oxygen: 20.8%* - 100%</p> <p>Flow: 0 - 100 slpm at 80 psia, 20°C; 0 - 20 slpm at 15 psia, 20°C</p> <p>Pressure: 0 – 35 psi</p> <p>O2, O3 Temperature: -45 to +70°C</p>
Direction of Flow	Oxygen, Ozone – Unidirectional
Survival Temperature range	-85 to +85°C
Outputs	<p>Digital: RS-232</p> <p>Analog: 4-20mA, 0-5V DC linearly proportional to 0 to 20% O3</p>
Display	LCD
O2 Alarm	Sinks up to 20ma to GND if O2 concentration drops below 87%

* - If inlet gas is Air, Oxygen & Ozone Concentration measurement must be taken at Flow Rate of less than 10 LPM

4 to 20ma, 0 to 5V Ozone content analog Outputs

These two outputs produce Analog linearly proportional representation of the concentration of Ozone from 0 to 20% weight by weight as follows:

- At 0%: 4ma and 0V DC.
- At 20%: 20ma and 5V DC.

Oxygen pressure

This DigiO3 parameter is measured by the DigiO3 within its O2 sensor.

Defining the Inlet source of O₂

Inlet O₂ must be defined due to variance between molecular weight of concentrator and cylinder gas. DigiO3 is equipped to measure Oxygen concentration of all ordinarily supplied to Ozone Generators inlet Oxygen sources as follows:

1. Oxygen source is pure air or from an Oxygen Concentrator - Con O2.
2. Oxygen source is from Tanks or cylinders - 100 O2.

DigiO3 factory default is to inlet gas from an Oxygen Concentrator - Con O2.

To switch between the latter two options, switch to FLO | O2 menu. Then hold the Display button for approximately 10 seconds. Then display will alternate between Con O2 and then 100 O2. Once Display button is depressed, inlet gas source is permanently remembered by the DigiO3.

Field Calibrations

The DigiO3 is Factory Calibrated. No Field calibrations are necessary or desirable. The following adjustment procedures are provided to a technically savvy operator.

- **Adapt to normal operating conditions.**
 1. Without turning on the ozone generator, connect Oxygen feed gas to Inlet Oxygen port of DigiO3. Then connect the outlet Oxygen port to Ozone generator inlet. Then connect Ozone generator discharge to DigiO3 Ozone inlet port. Turn Oxygen flow on and establish normal flow and pressure through the DigiO3 and the Ozone generator.
 2. While holding down, the Display button, power-up the DigiO3. Resulting DigiO3 O3 readings will zero.
 3. If needed, to return back to factory calibration, apply dry air to O2 sensor tube and perform step #2 above.
- **Adjust Ozone reading to a desired value:**

DigiO3 is equipped with a limited user calibration capability. Ordinarily this function should not be necessary as DigiO3 does not require re-calibration. This function is primarily intended to be utilized by ozone technicians or other technical personnel for special reasons such as adverse temperature or humidity or related to a specific Ozone Generator, which could be producing byproduct gases such as O6 & O9.

Procedure: Ozone enriched gas of at least 3% must be flowing through the O3 sensor, and incoming Oxygen flow through the O2 sensor. Follow the bellow described Display Button level Calibration to Adjust O3 to your expected level.

Result: This Ozone level change will proportionally effect all three Ozone display parameters.

Example: You desire that for a given Ozone Generator - your DigiO3 measures Ozone similarly to your UV based analyzer. You adjust your Ozone output from your Ozone generator to more than 3% by weight. Then you pass the resultant gas stream through the O3 sensor of the DigiO3. Then you follow the bellow described Display Button O₃ level Calibration.

- **±0.1% accuracy:**

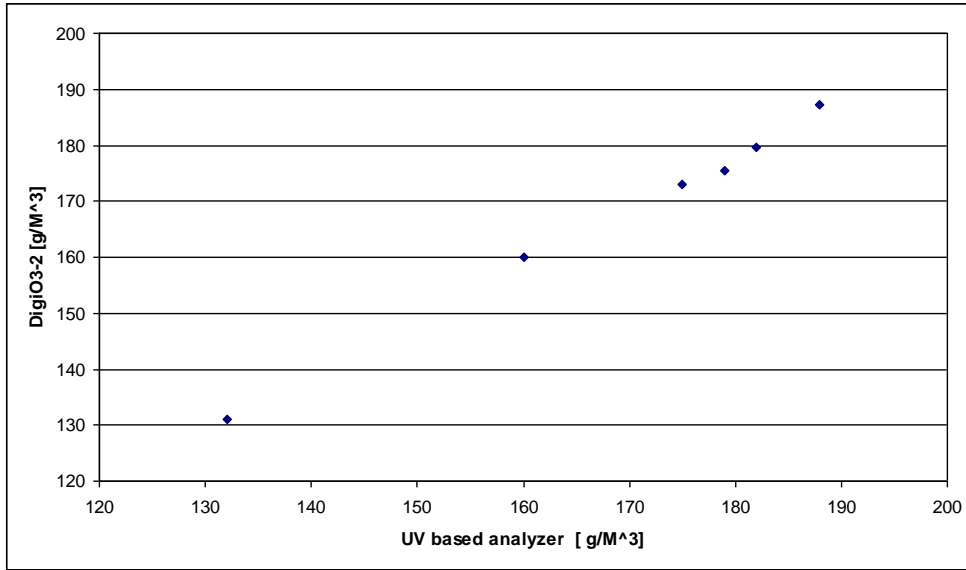
The DigiO3 is factory calibrated to measure Ozone stream produced by a most common Corona Discharge type Ozone Generator , which may contain various impurities. You can easily bring your DigiO3 to measure Ozone at its unprecedented accuracy of ±0.1%. Background: Molecular weight of Air - 29 and of Nitric Oxide (NO) – 30. If we apply dry Air to O2 gas stream and Nitric Oxide to O3 gas stream our Ozone display should read 7.7%.

Procedure: Purge O2 sensor with dry air; Then apply pure NO – Nitric Oxide (99.9% at 1 LPM) to O3 sensor. Then follow the bellow described Display Button O₃ level Adjustment to Adjust the O3 level to 7.7%.

- **O₃ level Adjustment**

switch to PO3 | O3 menu. Observe the O3 display. (Avoid touching the sensor tubes immediately before or during this procedure.) Hold down the Display button for approximately 10 seconds. Display will show changing O3 concentrations. Release Display button once the expected concentration is reached. Once Display button is released, desired Ozone level is permanently stored by the DigiO3.

Sample UV based Ozone Analyzer vs. DigiO3 readings



RS-232

TTL level RS-232 Usart bit stream exits the DigiO3 via its board edge J2 connector. To adapt to RS-232 levels external Digi-RS232 adapter (see below) is needed.

RS-232 Output Protocol

Baud rate: 19.2Kbits/sec

Parity: None

Bits: 8

Stop bits: 1

RS-232 Output Bit Stream

1. Delimiter – A5H (hex)
2. [grams per hour] O₃ – XX
3. [SLPM] Flow Rate - XX
4. [%] O₂ – XX
5. [% weight by weight] O₃ – XX

Connectors:

J1 Power

Pin	Description
1	Power Input: 9 to 20V dc, 15mA
2	GND

J2 Analog Ozone outputs

Pin	Description
1	4-20ma
2	GND
3	0 to 5Vdc
4	GND

J3 Low O2 Alarm

Pin	Description
1	+5V
2	Open drain low Oxygen Concentration alarm. GND if O2 concentration drops below 87%

J4 R- S232 output connector. Connects to DigiRS232

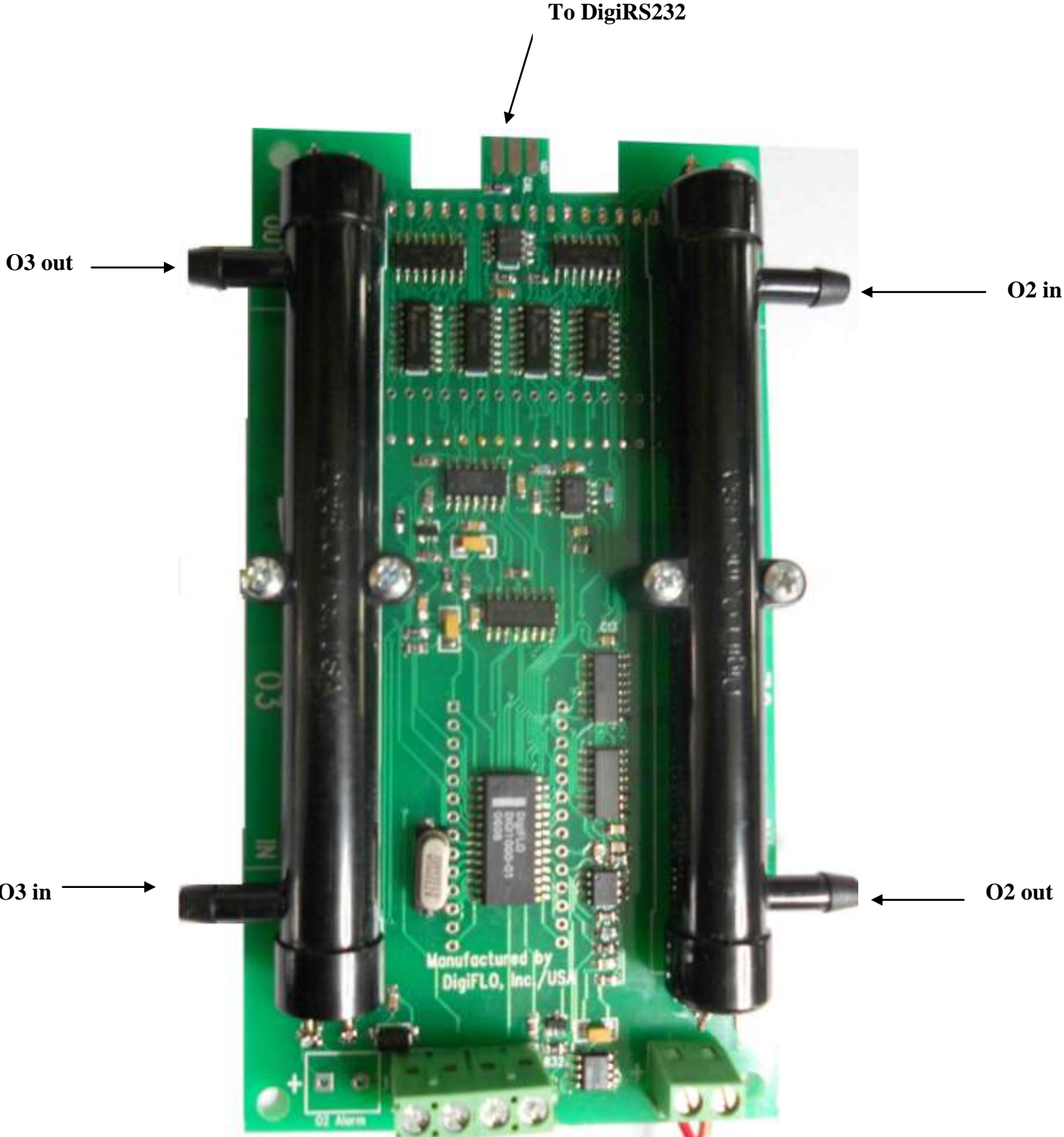
Pin	Description
1	+5V
2	TXD
3	RXD
4	N/A
5	+V _{in}
6	GND

Additional RS-232 Feature:

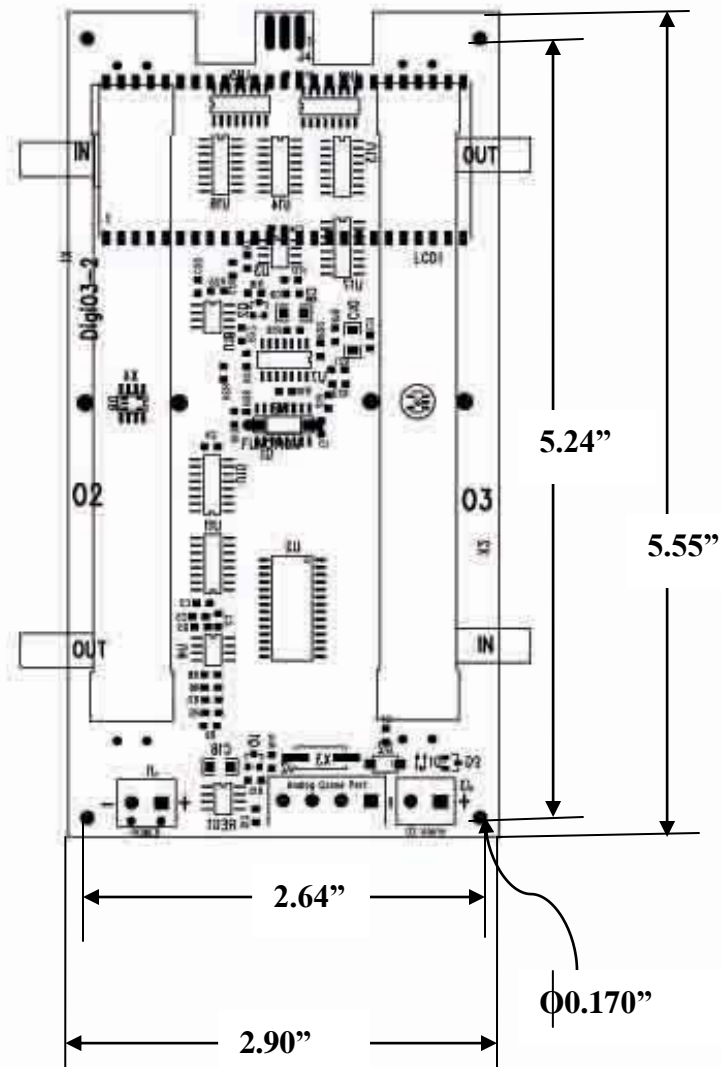
- RS-232 Program is available to download Ozone , Oxygen purities; Flow rate, to a (DOS Mode) PC - <http://dgflo.com/digio32.exe>

Power connection:

Remove rear and bottom plates. Protrude power wires through their rear plate window and then Connect unregulated 9 - 30Vdc to to Power J5 Connector.



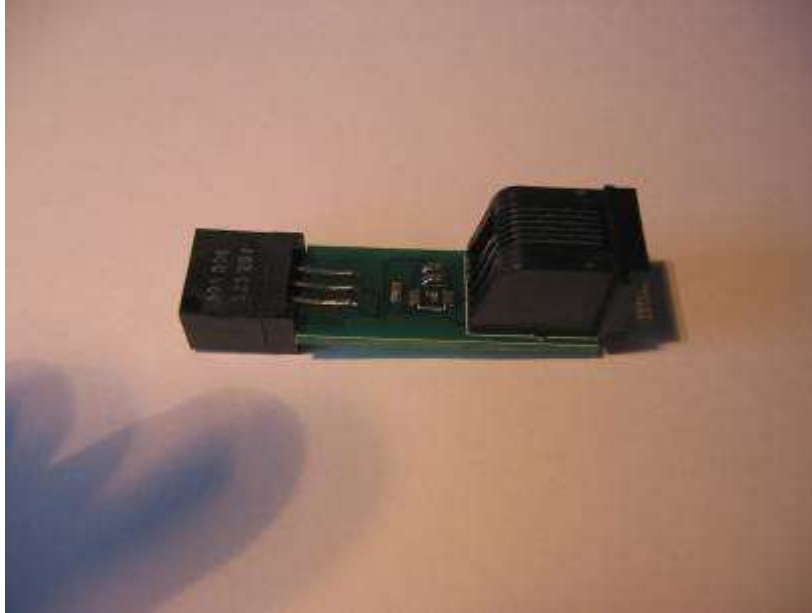
Dimensions:



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Accessories

DigiRS232 Adapter



DigiLED



An accessory to DigiO3, this display provides a user with the ability to remotely display the DigiO3 measurements in bright different colors: Blue, Green & Red. Connection is accomplished via an ordinary 4 wire telephone (or other) cable, which delivers power and RS-232 bit stream from the DigiO3 via DigiRS232 to DigiLED. No dedicated external power supply is necessary - DigiLED receives its power supply from DigiO3 power source.

Specification:

Size	3.5" x 2"
Segment size	0.8"
Colors	Blue, Green, Red
RS-232 IN	Is received from the DigiO3
RS-232 OUT	Continues to other DigiLED's, thus only one DigiO3 connection is needed
Weight	15g
Power	8-15V / 90ma
P/N	DigiLED-Blue; DigiLED-Green; DigiLED- Red

RJ11 Connectors

<u>J1 – RS-232 IN</u>		<u>J2 – RS-232 OUT</u>	
<u>Pin</u>	<u>Function</u>	<u>Pin</u>	<u>Function</u>
1	DC in	1	GND
3	RXD	2	TXD
4	GND	4	DC out

DigiO3 Sensor Pressure Drop Vs. Volumetric Flow Rate

