

# Wall Mounted 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

**Low O2 output Alarm:** This Open Drain output connects to GND if Oxygen Concentration Drops below 87%.

# 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 (MENU) push button.

# Menus

- **PO3 | O3 menu:** Displays O3 % concentration by weight on left side, and O3 concentration in grams per meter<sup>3</sup> on right side of LCD display.
- **PSI | gPh menu:** Displays Oxygen gas pressure in **psig** 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.

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# Specification

Size	5" x 4" x 1.25"
Weight	570g
Power	Unregulated 9 - 30Vdc, 18ma
Gas Ports	Female 1/8 NPT / Anodized Aluminum
Accuracy	<ul style="list-style-type: none"><li>• Ozone concentration (<math>\pm 0.1\%</math>) by weight</li><li>• Ozone Production (<math>\pm 2\%</math>)</li><li>• Oxygen (<math>\pm 1.5\%</math>)*</li><li>• Flow Rate (<math>\pm 0.2</math>SLPM) *</li><li>• Pressure (<math>\pm 0.5\%</math>FS)</li><li>• Temperature (<math>\pm 0.2^\circ\text{C}</math>)</li></ul>
Range	<b>Ozone:</b> 0-30% by weight; 0 – 476 g/NM <sup>3</sup> <b>Oxygen:</b> 20.8%* - 100% <b>Flow:</b> 0 - 100 slpm at 80 psia, 20°C; 0 - 20 slpm at 15 psia, 20°C Pressure: 0 – 35 psi O2, O3 Temperature: -45 to +70°C
Direction of Flow	Oxygen, Ozone – Unidirectional
Survival Temperature range	-85 to +85°C

Outputs	<b>Digital:</b> RS-232 <b>Analog:</b> 4-20mA, 0-5V DC linearly proportional to 0 to 20% O <sub>3</sub>
Display	LCD
O <sub>2</sub> Alarm	Sinks up to 20ma to GND if O <sub>2</sub> 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 DigiO<sub>3</sub> parameter is measured by the DigiO<sub>3</sub> within its O<sub>2</sub> sensor.

## **Defining the Inlet source of O<sub>2</sub>**

Inlet O<sub>2</sub> must be defined due to variance between molecular weight of concentrator and cylinder gas. DigiO<sub>3</sub> 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 O<sub>2</sub>.
2. Oxygen source is from Tanks or cylinders - 100 O<sub>2</sub>.

DigiO<sub>3</sub> factory default is to inlet gas from an Oxygen Concentrator - Con O<sub>2</sub>.

To switch between the latter two options, switch to FLO | O<sub>2</sub> menu. Then hold the MENU button for approximately 10 seconds. Then display will alternate between Con O<sub>2</sub> and then 100 O<sub>2</sub>. Once MENU button is depressed, inlet gas source is permanently remembered by the DigiO<sub>3</sub>.

## **Field Calibrations**

The DigiO<sub>3</sub> 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.**
- Without turning on the ozone generator, connect Oxygen feed gas to Inlet Oxygen port of DigiO<sub>3</sub>. Then connect the outlet Oxygen port to Ozone generator inlet. Then connect Ozone generator discharge to DigiO<sub>3</sub> Ozone inlet port. Turn Oxygen flow on and establish normal flow and pressure through the DigiO<sub>3</sub> and the Ozone generator.
- While holding down, the MENU button, power-up the DigiO<sub>3</sub>. Resulting DigiO<sub>3</sub> O<sub>3</sub> readings will zero.
- If needed, to return back to factory calibration, apply dry air to O<sub>2</sub> 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 MENU 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 MENU Button O<sub>3</sub> level Calibration.

- **±0.1% accuracy:**

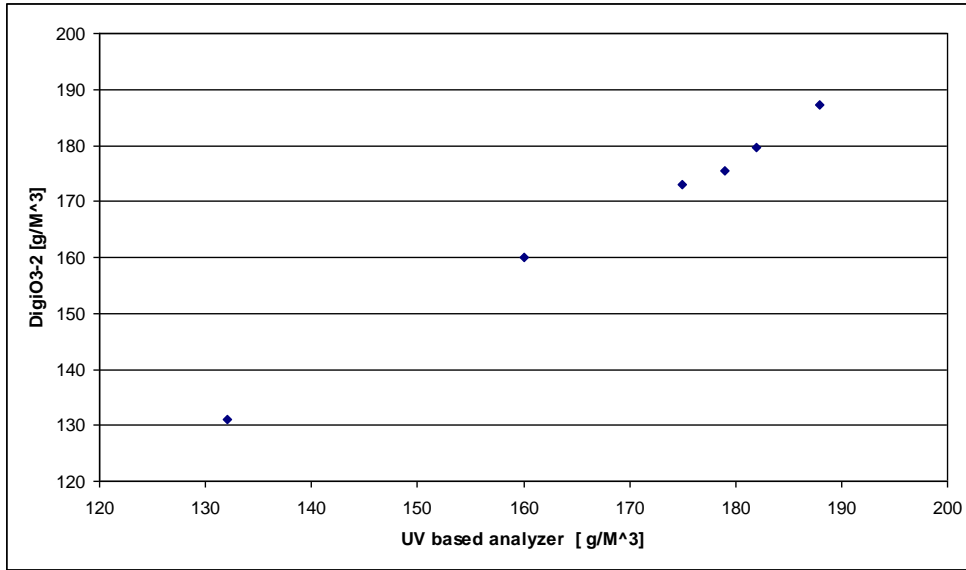
The DigiO3 is factory calibrated to measure Ozone stream produced by a most common Corona Discharge type Ozone Generator , which may contain various impurities. You can easily bring your DigiO3 to measure Ozone at its unprecedented accuracy of ±0.1%. Background: Molecular weight of Air - 29 and of Nitric 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 MENU Button O<sub>3</sub> level Adjustment to Adjust the O3 level to 7.7%.

- **O<sub>3</sub> 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 MENU button for approximately 10 seconds. Display will show changing O3 concentrations. Release MENU button once the expected concentration is reached. Once MENU 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] O<sub>3</sub> – XX
3. [SLPM] Flow Rate - XX
4. [%] O<sub>2</sub> – XX
5. [% weight by weight] O<sub>3</sub> – XX

# Connectors:

## J1 Power

Pin	Description
1	Power Input: 9 to 30V dc, 18mA
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 <sub>in</sub>
6	GND

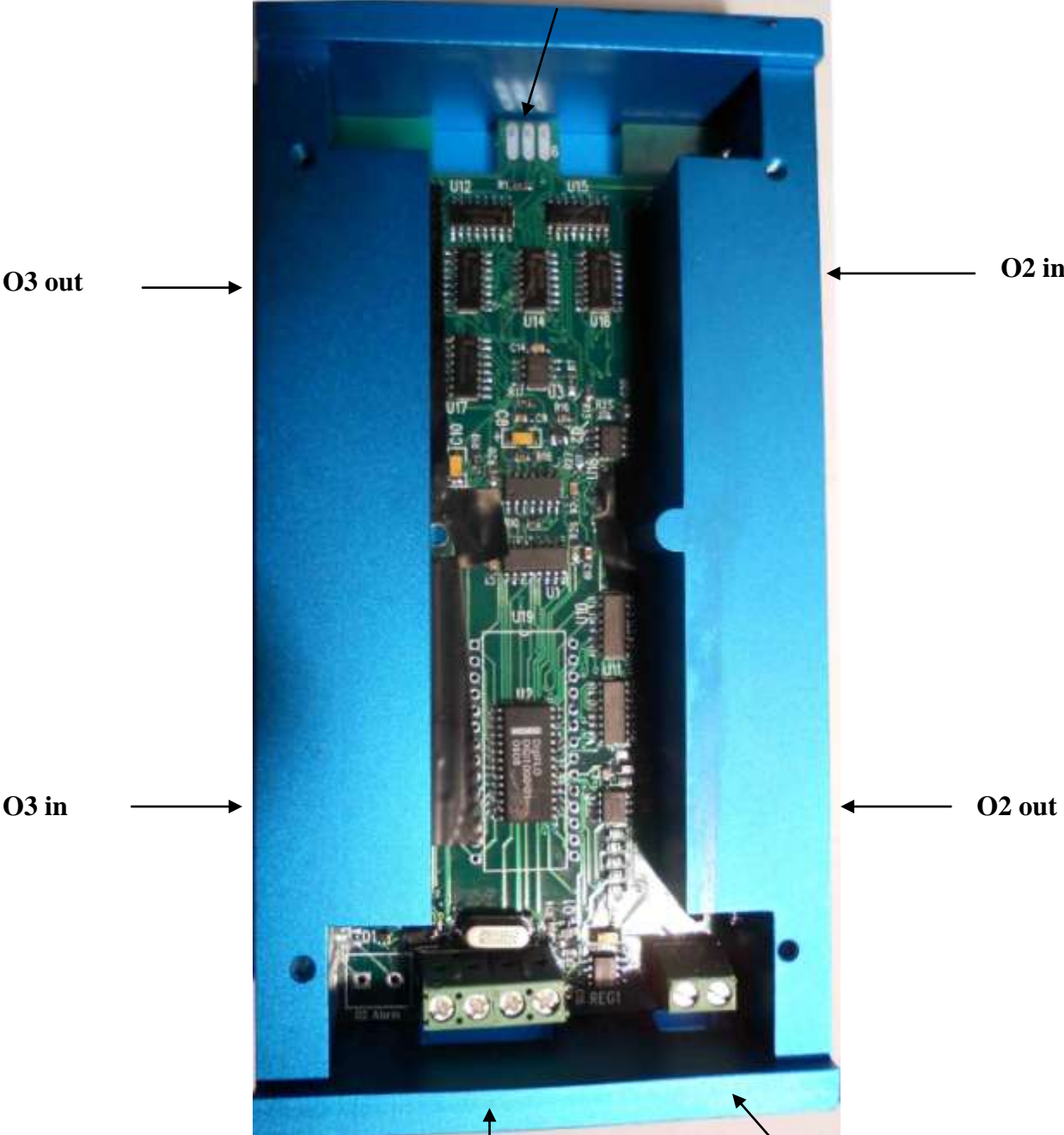
## Additional RS-232 Feature:

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

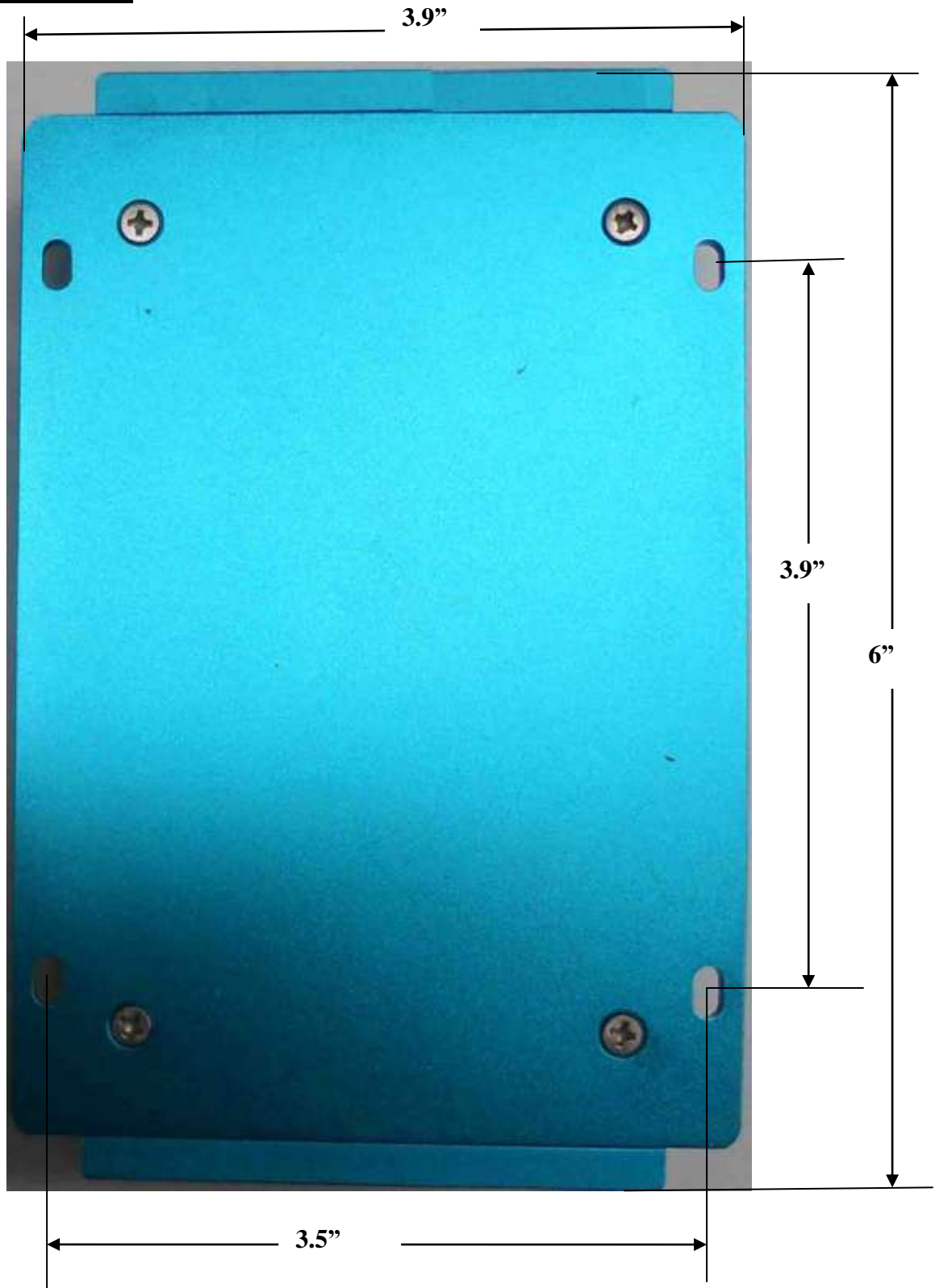
To DigiRS232



4-20mA, 0-5V DC linearly proportional to 0 to 20%

Power

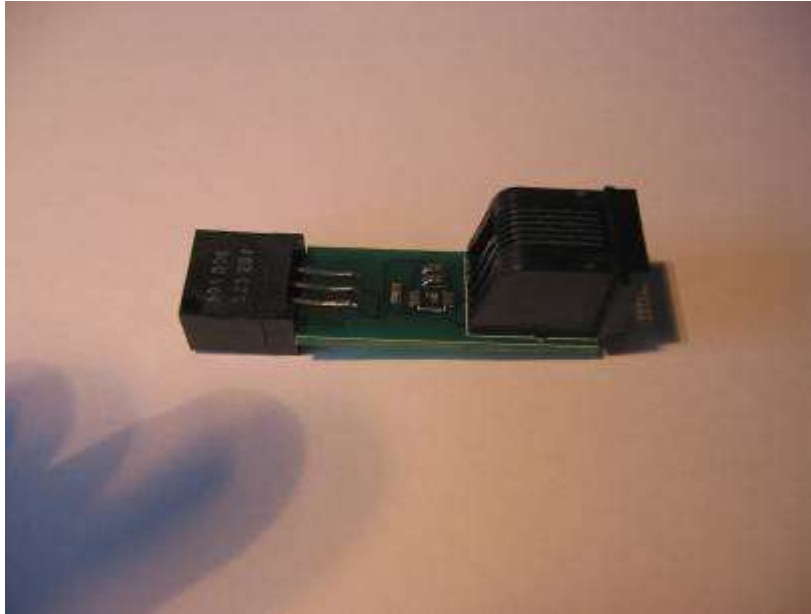
**Dimensions:**





# 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

