

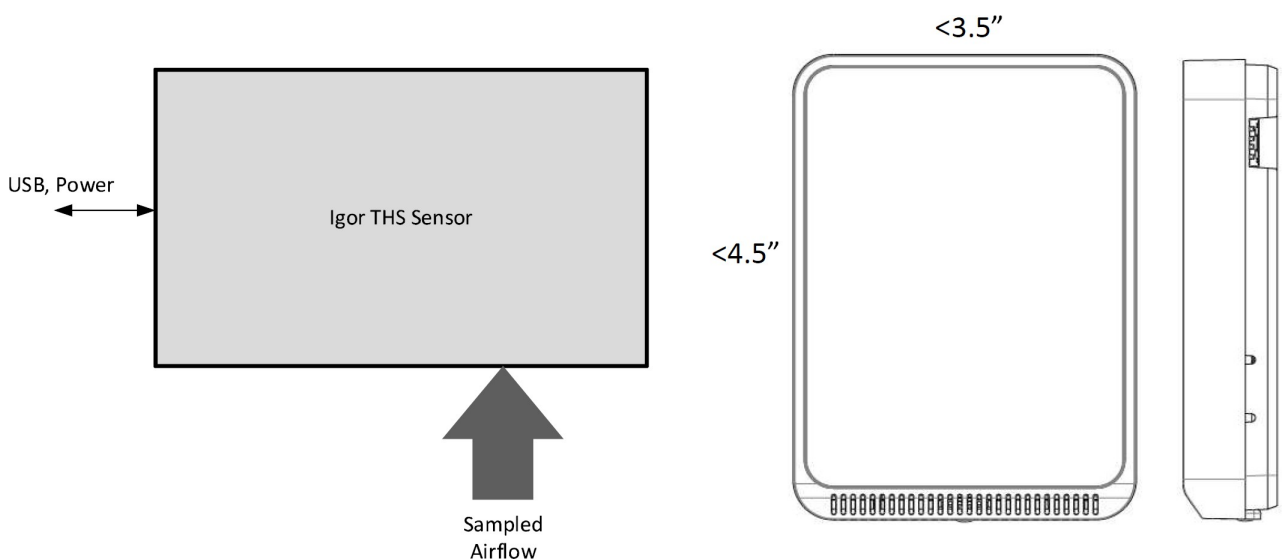
Igor® PM2.5, CO₂, TVOC, Temperature & Humidity IAQ Sensor

Model: ISPMIAQ-U-U

The Igor PM2.5, CO₂, Total VOC, Temperature, Humidity Sensor (Model ISPMIAQ-U-U) is mounted in its own standalone plastic case and is meant to connect to a nearby Igor Node via USB. The ISPMIAQ-U-U receives power and transmits data over the USB connection.

General

- USB power and communication, under 2.5W total power draw
- Embedded Sensor
- Mass Concentration Size PM2.5 (particles that have a diameter less than 2.5 micrometers)
- Temperature Range: -20C to +85C
- Relative Humidity Range: 0-100% non-condensing
- TVOC Range: 0-60,000 ppb (parts per billion)
- CO₂ Range: 0-60,000 ppm (parts per million)*
- Long term reliability; 10-year operation expected
- Wall mounted



*1 ppm = 1000 ppb

PM2.5 Specifications

Parameter	Conditions	Value	Units
Mass concentration range	-	0 to 1,000	µg/m ³
Mass concentration size range	PM2.5	0.3 to 2.5	µm
Mass concentration precision ¹ for PM2.5 ²	0 to 100 µg/m ³	±10	µg/m ³
	100 to 1000 µg/m ³	±1.25	% m.v. / year
Maximum long-term mass concentration precision limit drift	0 to 100 µg/m ³	±1.25	µg/m ³ / year
	100 to 1000 µg/m ³	±1.25	% m.v. / year
Number concentration range	-	0 to 3,000	#/cm ³
Number concentration size range	Pm2.5	0.3 to 2.5	µm
Number concentration precision ¹ for PM2.5 ²	0 to 1000 #/cm ³	±100	#/cm ³
	1000 to 3000 #/cm ³	±10	% m.v.
Maximum long-term number concentration precision limit drift	0 to 1000 #/cm ³	±12.5	#/cm ³ / year
	1000 to 3000 #/cm ³	±1.25	% m.v. / year
Sampling interval	-	1±0.04	seconds
Typical start-up time ³	200 – 3000 #/cm ³	8	seconds
	100 – 200 #/cm ³	16	seconds
	50 – 100 #/cm ³	30	seconds
Sensor output characteristics	PM2.5 mass concentration	Calibrated to TSI DustTrak™ DRX 8533 Ambient Mode	
	PM2.5 number concentration	Calibrated to TSI OPS 3330	
Lifetime ⁴	24 h/day operation	> 10 years	
Acoustic emission level	0.2 m (max)	25	dB(A)
Long-term acoustic emission level drift	0.2 m (max)	+0.5	dB(A). / year
Additional T-dependent mass and number concentration precision limit drift	Temperature difference to 25°C typ.	±0.5	% m.v. /°C
Weight	-	26.3±0.3	g

1. Also referred to as “between-parts variation” or “device-to-device variation.”

2. Verification Aerosol for PM2.5 is a 3% atomized KCl solution. Deviation to reference instrument is verified in end-tests for every sensor after calibration.
3. Time after starting Measurement-Mode, until a stable measurement is obtained.
4. Lifetime is based on mean-time-to-failure (MTTF) calculation. Lifetime might vary depending on different operating conditions.

CO₂ Specifications¹

1. Unless otherwise stated, default conditions of T=25°C, humidity = 50% RH, p =1013 mbar, V_{DD} = 3.3V, continuous measurement mode with measurement rate of two (2) seconds apply to values listed in the following CO₂, Humidity, and Temperature Specifications tables.

Parameter	Conditions	Value
CO ₂ measurement range		0 – 40'000 ppm 0 - 5'000 ppm
Accuracy ²	400 ppm - 10'000 ppm	± (30 ppm ± 3%MVI
Repeatability ³	400 ppm - 10'000 ppm	± 10 ppm
Temperature stability ⁴	T = 0 ... 50°C	± 2.5 ppm / °C
Response time ⁵	τ _{63%}	20 seconds
Accuracy drift over lifetime ⁶	400 ppm - 10'000 ppm ASC field-calibration algorithm activated; and SCD30 in environment allowing for ASC or FRC field calibration algorithm applied	± 50 ppm

Humidity Specifications⁷

Parameter	Conditions	Value
Humidity measurement range	-	0%RH - 100% RH
Accuracy ⁸	25°C, 0 - 100%RH	± 3%RH
Repeatability ³	-	± 0.1%RH
Response time ⁵	τ _{63%}	8 s
Accuracy drift	-	< 0.25%RH /year

Temperature Specifications⁷

Parameter	Conditions	Value
Temperature measurement range ⁹	-	-40°C - 70°C
Accuracy ⁸	0 – 50°C	± (0.4°C + 0.023 x (T[°C]-25°C))
Repeatability ³	-	± 0.1°C
Response time ⁵	τ _{63%}	> 10 s
Accuracy drift	-	< 0.03°C / year

Footnotes 2—9 >>

2. Deviation to a high-precision reference in the calibrated range (400-10'000 ppm) of the sensor. Accuracy is fulfilled by >90% of the sensors after calibration. Rough handling, shipping, and soldering reduces the accuracy of the sensor. Full accuracy is restored with FRC or ASC recalibration features. Accuracy is based on tests with gas mixtures having a tolerance of $\pm 1.5\%$.
3. RMS error of consecutive measurements at constant conditions. Repeatability is fulfilled by > 90% of the sensors.
4. Average slope of CO₂ accuracy when changing temperature, valid at 400 ppm. Fulfilled by 90% of the sensors after calibration.
5. Time for achieving 63% of a respective step function. Response time depends o design-in, heat exchange, and environment of the sensor in the final application.
6. CO₂ concentrations <400 ppm may result in sensor drifts when ASC is activated. For proper function of the ASC field-calibration algorithm, the sensor must be exposed to air with CO₂ concentration 400 ppm regularly.
7. Design-in of the sensor in the final application and environment affects the accuracy of the RH/T sensor component. For optimal performance, heat sources must be considered. Use an integrated on-board RH/T compensation algorithm to account for the actual design-in.
8. Deviation to a high precision reference. Accuracy is fulfilled by >90% of the sensors after calibration.
9. The RH/T sensor component is capable of measuring up to T=120°C. Measuring at T >70°C might result in permanent damage to the sensor.

Gas Sensing Performance Signals Specifications

The values listed below are valid at 25°C and 50% RH and typical (typ) VDD.

Parameter	Signal	Value
Measurement Range ¹	Ethanol	0 ppm to 1000 ppm
	H ₂	0 ppm to 1000 ppm
Specified measurement range	Ethanol	0.3 ppm to 30 ppm
	H ₂	0.5 ppm to 3 ppm
Accuracy ^{3, 4}	Ethanol	typ.: 15% of meas. value
	H ₂	typ.: 10% of meas. value
Sensitivity	Ethanol	-1.0
	H ₂	-1.0
Sensitivity tolerance ³	Ethanol	typ. tolerance \pm 7% rel. error max. tolerance \pm 4% rel. error
	H ₂	typ. tolerance \pm 7% rel. error max. tolerance \pm 4% rel. error
Long-term drift ^{3, 5, 4}	Ethanol	typ.: 1.3% of meas. value
	H ₂	typ.: 1.3% of meas. value
Resolution	Ethanol	0.2% of meas. value
	H ₂	
Sampling frequency	Ethanol	Max. 40 Hz
	H ₂ s	

1. Exposure to ethanol and H₂ concentrations up to 1000 ppm have been tested. For applications requiring the measurement of higher gas concentrations, please contact Igor Technical Services.
2. 2ppm (parts per million): 1 ppm = 1000 ppb (parts per billion).
3. 90% of the sensors will be within the typical accuracy tolerance; >99% are within the maximum tolerance.
4. Valid at an air flow of >1m/s.
5. Long-term drift is stated as change of accuracy per year of operation.
6. Test conditions: operation in 250 ppm Decamethylcyclopentasiloxane (D5) for 200h simulating 10 years of operation in an indoor environment.

Air Quality Signals Specifications

Parameter	Signal	Value
Output range	TVOC	0 ppb to 60000 ppb
	CO ₂ eq	400 ppm to 60000 ppm
Resolution	TVOC	0 ppb – 2008 ppb
		2008 ppb – 11110 ppb
		11110 ppb – 60000 ppb
	CO ₂ eq s	400 ppm – 1479 pp0m
		1479 ppm – 5144 ppm
		5144 ppm – 17597 ppm
		17597 ppm – 60000 ppm
	Sampling Rate	TVOC s
CO ₂ eq		

Operation Conditions, Lifetime, and Maximum Ratings

Parameter	Conditions	Value
Temperature operating conditions	Valid for CO ₂ sensor	0 – 50°C
Humidity operating conditions	Non-condensing. Valid for CO ₂ sensor	0 – 95 %RH
DC supply voltage	Exceeding specified range will result in damage to the sensor	-0.3V – 6.0V
Voltage to pull up selector-pin	Max criteria	4.0V
	Min criteria	1.75V
Storage temperature conditions	Exceeding specified range will result in damage to the sensor	-40°C – 70°C
Maintenance interval	Maintenance free when ASC field calibration algorithm is used	None
Sensor lifetime	-	15 years

Who to Contact

Igor Technical Services

For technical assistance, please contact Igor Technical Services. Our Technical Services phone line is staffed from 7:00 A.M. to 5:00 P.M. Central time, Monday through Friday, except for U.S. holidays. If arranged in advance, we can have an engineer available during local business hours.

Phone: 515-661-4412 | 1-877-588-2650

Email: support@igor-tech.com

Inquiries

For other inquiries, please contact us here:

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