



Portable Indoor Air Quality Instruments and Smart Sensor Specifications

yesAIR

yes
plus LGA



Table of Contents

Product Overview: Indoor Air Quality Instruments	4
Overview: Gas Detection Sensor Technologies.....	5
Target Gas Sensor Specifications	
RelativeHumidity(RH).....	7
Temperature.....	7
Ammonia (NH ₃).....	8
Arsine (AsH ₃).....	8
Carbon Dioxide (CO ₂).....	9
Carbon Monoxide (CO).....	12
Chlorine (Cl ₂).....	13
Chlorine Dioxide (ClO ₂).....	14
Combustibles.....	15
Ethylene (C ₂ H ₄).....	16
Ethylene Oxide (C ₂ H ₄ O).....	16
Fluorine (F ₂).....	17
Formaldehyde (CH ₂ O).....	18
Hydrogen(H ₂).....	19
Hydrogen Chloride (HCl).....	19
Hydrogen Cyanide (HCN).....	20
Hydrogen Fluoride (HF).....	21
Hydrogen Sulphide (H ₂ S).....	22
Nitrogen Dioxide (NO ₂).....	22
Nitric Oxide (NO).....	23
Oxygen (O ₂).....	24
Ozone (O ₃).....	25
Phosphine (PH ₃).....	26
Silane (SiH ₄).....	27
Sulphur Dioxide (SO ₂).....	28
Total Volatile Organic Compounds (TVOC).....	29
 AdditionalChemicalSymbols.....	 30
Important Notes.....	30

Indoor Air Quality Instruments

YESAIR Eight Channel Air Quality Monitor



- » 8 sensor capacity
- » > 30 plug & play sensor choices
- » Data logging to SD flash card
- » Lightweight, contoured & comfortable handheld device

YES Plus LGA Fifteen Channel Air Quality Monitor



- » 15 sensor capacity
 - » > 30 plug & play sensor choices
 - » Data logging to SD flash card
 - » Internal sample pump with inline filter
-

Gas Detection Sensor Technologies

Categories of gas detection systems are defined by the technology they use: electrochemical sensors generally detect toxic gases, catalytic and infrared sensors detect combustible gases and TVOC sensors detect toxic gas, organic compounds and chemicals.



ELECTROCHEMICAL

Toxic gas sensors & oxygen sensors

LIFE SPAN

2 - 5 years (sensor type & manufacturer dependent). Oxygen typically 3 years.

SPECIFICITY

Specific to target gas with known cross sensitivity to a small variety of gases.

RANGE

Typically 0 - 1.0 ppm or 0 - 2,000 ppm, sensor dependent.

POISONING / DAMAGING

- Oxygen deprivation
- Exposure to high concentrations of solvent vapours
- Very high concentrations of target gas
- Reactive gases
- Environments with high temperatures, low temperatures (freezing)
- Very low levels of relative humidity (less than 10 - 15%)

APPLYING SPAN GAS

- Use span gas with air balance or nitrogen balance
- Flow rate should be a minimum of 0.5 LPM (lighter-than air gases) to a maximum of 1.0 LPM (heavier-than-air gases)
- Do NOT humidify span gas when flowing

CATALYTIC

Combustible gas sensors, toxic gas sensors at very high concentrations (% volume)

LIFE SPAN

3 - 8 years (typically if not poisoned)

SPECIFICITY

Specific to combustible gases only in the LEL ranges

RANGE

0 - 100% LEL of target gas

POISONING / DAMAGING

High concentrations of target gas, lead vapours, silicon vapours, alkylated heavy metals.

APPLYING SPAN GAS

- Use span gas with air balance ONLY.
- Flow rate should be a minimum of 0.5 LPM (lighter-than air gases) to a maximum of 1.0 LPM (heavier-than-air gases)
- Do not humidify span gas when flowing

Gas Detection Sensor Technologies

INFRARED

Toxic, combustible & refrigerant gas sensors

LIFE SPAN

10 years +

SPECIFICITY

Specific to target gas.

RANGE

0 - 1,000 ppm or 0 - 100% volume. Target gas, manufacturer dependent.

POISONING / DAMAGING

No known poisoning agents. Condensing humidity will damage sensor and distort readings.

APPLYING SPAN GAS

- Use span gas with air balance or nitrogen balance. Nitrogen balance ONLY for CO₂ sensors.
- Flow rate should be approximately 0.5 LPM. Some sensors are flow sensitive.
- Do NOT humidify span gas when flowing.

PID / TVOCS

Toxic gas sensors, organic compounds & chemicals

LIFE SPAN

3 - 8 years (typically if not contaminated and with regular maintenance)

SPECIFICITY

Non specific. Will respond to any compound that has an ionization potential less than the ionization potential of the lamp.

RANGE

0 - 30 ppm or 0 - 300 ppm, sensor dependent

CONTAMINATION

Many other gases, vapours, chemicals. Condensing humidity can cause false positive readings.

APPLYING SPAN GAS

- Use span gas with air or nitrogen balance.
 - Flow rate should be a minimum of 0.5 LPM.
 - Do NOT humidify span gas when flowing.
-

Target Gas Sensors

Releative Humidity (RH)

SENSOR

Type	Thin film capacitive
Standard Range	5 - 95% RH (non-condensing)
Resolution	2% RH
Accuracy	No data available
Long Term Drift	2% (\pm) / 12 months
Response Time	< 10 seconds

INSTRUMENT

Displayed Resolution	1%
Warm Up Time @ Switch On	5 minute operational, 20 minute max accuracy
Recommended Calibration Frequency	1 yr for best performance

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non- condensing
Operating Life (<i>Estimated</i>)	3 yrs +

Temperature

SENSOR

Type	Negative Coefficient Thermistor
Standard Range	0°C to 50°C (32°F to 122°F)
Resolution	0.1°C @ 25°C
Accuracy	No data available
Long Term Drift	0.5°C (\pm) / 12 months
Response Time	< 10 seconds

INSTRUMENT

Displayed Resolution	0.1°C
Warm Up Time @ Switch On	5 minute operational, 10 minute max accuracy
Recommended Calibration Frequency	1 yr for best performance

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non- condensing
Operating Life (<i>Estimated</i>)	6 yrs +

Ammonia (NH ₃) 50 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 50 ppm
Resolution	1 ppm
Accuracy	No data available
Long Term Drift	< 5% / 6 months
Response Time	t ₉₀ = < 60 sec calculated fr 5 minute exposure
Cross Sensitivities	Alcohols @ 1,000 ppm = 0 ppm
	CO ₂ @ 5,000 ppm = 0 ppm
	CO @ 100 ppm = 0 ppm
	Hydrocarbons @ % range = 0 ppm
	H ₂ @ 10,000 ppm = 0 ppm
	H ₂ S @ 20 ppm = 2 ppm
	Cross sensitivity list not fully completed.
	Sensor maybe sensitive to other gases.

INSTRUMENT	
Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approx 2 - 2.5 min (warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL	
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	2 yrs

Arsine (AsH ₃) 1 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 1 ppm
Resolution	< 15 ppb @ 20°C (68°F)
Accuracy	No data available
Long Term Drift	< 5% / 6 months
Response Time	t ₉₀ = <30 seconds calc fr 2 minute exposure
Cross Sensitivities	CO @ 85 ppm = 0 ppm
	H ₂ @ 3,100 ppm = 0 ppm
	NO ₂ @ 10 ppm = 2 ppm
	C ₃ H ₃ OH @ 25,000 ppm = 0 ppm
	H ₂ S @ 18 ppm = 10.8 ppm

Cross Sensitivities *continued*

SO₂ @ 18 ppm = 5.4 ppm
Cl₂ @ 0.85 ppm = 0.24 ppm
HCl @ 7.8 ppm = 1 ppm
HF @ 7.2 ppm = 0 ppm
HCN @ 12.6 ppm = 0.7 ppm
SiH₄ @ 4.3 ppm = 0.7 ppm
H₂Se @ 0.8 ppm = 0.24 ppm
B₂H₆ @ 0.2 ppm = 0.28 ppm
PH₃ @ 0.2 ppm = 0.24 ppm

INSTRUMENT

Displayed Resolution	0.001 ppm (1 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	20 - 95% non- condensing
Operating Life (<i>Estimated</i>)	1.5 yrs

Carbon Dioxide (CO₂)

5,000 ppm

SENSOR

Type	Infrared
Standard Range	0 - 5,000 ppm
Resolution	50 ppm fr 0 - 2,500 ppm, then 100 ppm up to FSD
Accuracy	± 2% full scale @ 20°C (68°F), 1 bar pressure, applied gas 2.5% volume CO ₂
Long Term Drift	± 50 ppm / month @ 20°C (68°F) ambient, (max ± 150 ppm / yr)
Response Time	t ₉₀ = > 30 seconds @ 20°C (68°F)
Cross Sensitivities	None

INSTRUMENT

Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approx 2 - 2.5 min (warm up delay time)
Recommended Calibration Frequency	2 yrs, 1 yr for best accuracy

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non-condensing
Operating Life (<i>Estimated</i>)	5 - 10 yrs

Carbon Dioxide (CO ₂) 10,000 ppm	
SENSOR	
Type	Infrared
Standard Range	0 - 10,000 ppm
Resolution	50 ppm fr 0 - 2,500 ppm, then 100 ppm up to FSD
Accuracy	± 2% full scale @ 20°C (68°F), 1 bar pressure, applied gas 2.5% volume CO ₂
Long Term Drift	± 500 ppm / month @ 20°C (68°F) ambient
Response Time	t ₉₀ = > 30 seconds @ 20°C (68°F)
Cross Sensitivities	None

INSTRUMENT	
Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approx 2 - 2.5 min (warm up delay time)
Recommended Calibration Frequency	2 yrs, 1 yr for best accuracy

ENVIRONMENTAL	
Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non-condensing

Carbon Dioxide (CO ₂) 5% volume	
SENSOR	
Type	Infrared
Standard Range	0 - 5% volume
Resolution	1% of measuring range for readings above 50% of range, 0.5% of measuring range for readings below 50% of range
Accuracy	± 2% full scale @ 20°C (68°F), 1 bar pressure, applied gas 2.5% volume CO ₂
Long Term Drift	± 500 ppm / month @ 20°C (68°F) ambient
Response Time	t ₉₀ = > 30 seconds @ 20°C (68°F)
Cross Sensitivities	None

INSTRUMENT	
Displayed Resolution	0.1% volume
Warm Up Time @ Switch On	Approx 2 - 2.5 min (warm up delay time)
Recommended Calibration Frequency	2 yrs, 1 yr for best accuracy

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non-condensing
Operating Life (<i>Estimated</i>)	5 - 10 yrs

Carbon Dioxide (CO₂)**20% volume****SENSOR**

Type	Infrared
Standard Range	0 - 20% volume
Resolution	0.1% volume
Accuracy	± 1% volume at STP(20°C, 101.325 kPa) & time of calibration
Long Term Drift	± 1% volume / month @ 20°C (68°F) ambient
Response Time	t ₉₀ = > 30 seconds @ 20°C (68°F)
Cross Sensitivities	None

INSTRUMENT

Displayed Resolution	0.1% volume
Warm Up Time @ Switch On	Approx 2 - 2.5 min (warm up delay time)
Recommended Calibration Frequency	2 yrs, 1 yr for best accuracy

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non-condensing
Operating Life (<i>Estimated</i>)	5 - 10 yrs

Carbon Dioxide (CO₂)**100% volume****SENSOR**

Type	Infrared
Standard Range	0 - 100% volume
Resolution	1% of measuring range for readings above 50% of range, 0.5% of measuring range for readings below 50% of range
Accuracy	± 1% volume at STP (20°C, 101.325 kPa) & time of calibration ± 10% volume across temperature and pressure when calibrated at altitude
Long Term Zero Drift	± 1% volume / month @ 20°C (68°F) ambient
Response Time	t ₉₀ = < 30 seconds @ 20°C (68°F) ambient
Cross Sensitivities	None

INSTRUMENT

Displayed Resolution	0.1% volume
Warm Up Time @ Switch On	Approx 3 min (warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity	0 - 95% non-condensing
Operating Life (<i>Estimated</i>)	> 5 yrs

Carbon Monoxide (CO)**50 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 50 ppm
Resolution	0.5 ppm
Accuracy	No data available
Long Term Drift	zero: 0.2 ppm equivalent change / yr in clean air. Sensitivity: 3% change / yr in clean air (value based on twice per month test)
Response Time	$t_{90} = < 25$ seconds fr 0 - 400 ppm
Cross Sensitivities	H_2S @ 20 ppm = < 0.1 ppm NO_2 @ 10 ppm = < 0.1 ppm Cl_2 @ 10 ppm = < 0.1 ppm NO @ 50 ppm = < 5 ppm
Cross Sensitivities <i>continued</i>	SO_2 @ 20 ppm = < 0.1 ppm H_2 @ 20°C (68°F) @ 400 ppm = < 60 ppm C_2H_4 @ 400 ppm = < 25 ppm NH_3 @ 20 ppm = < .01 ppm

INSTRUMENT

Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	2 yrs, 1 yr for best accuracy

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Carbon Monoxide (CO) 50 ppm	
SENSOR	
Type	Electrochemical (for use in H ₂ background environment)
Standard Range	0 - 50 ppm
Resolution	0.5 ppm
Accuracy	No data available
Long Term Drift	zero: 0.2 ppm equivalent change / yr in clean air. Sensitivity: 3% change / yr in clean air (value based on twice per month test)
Response Time	t ₉₀ = < 30 seconds
Cross Sensitivities	H ₂ @ 900 ppm in 900 ppm CO @ 10°C (50°F) = < 2 ppm H ₂ @ 900 ppm in 900 ppm CO @ 20°C (68°F) = < 4 ppm H ₂ @ 900 ppm in 900 ppm CO @ 30°C (86°F) = < 6 ppm NO ₂ @ 10 ppm = < 0.1 ppm Cl ₂ @ 10 ppm = < 0.1 ppm NO @ 50 ppm = < 0.1 ppm SO ₂ @ 20 ppm = < 0.1 ppm C ₂ H ₄ @ 400 ppm = < 30 ppm NH ₃ @ 20 ppm = < 0.1 ppm
INSTRUMENT	
Displayed Resolution	0.5 ppm
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months
ENVIRONMENTAL	
Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs
Chlorine (Cl ₂) 5 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 5 ppm
Resolution	0.02 ppm
Accuracy	No data available
Long Term Drift	zero: < 0.2 ppm equivalent change / yr in clean air with monthly test. Sensitivity: < 0.4 ppm change / month in clean air with twice monthly test

Response Time	$t_{90} = < 40$ seconds fr 0 - 5ppm (diffusion)
	H ₂ S @ 20 ppm = < -40 ppm
	NO ₂ @ 10ppm = 100 ppm
	NO @ 50 ppm = < 0.5 ppm
Cross Sensitivities	SO ₂ @ 20 ppm = < -2.5 ppm
	CO @ 400 ppm = < 0.1 ppm
	H ₂ @ 400 ppm = < 0.1 ppm
	C ₂ H ₄ @ 400 ppm = < 0.1 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	2 - 2.5 yrs

Chlorine Dioxide (ClO₂)

1 ppm

SENSOR

Type	Electrochemical
Standard Range	0 - 1 ppm
Resolution	0.02 ppm
Accuracy	No data available
Long Term Drift	< 5% / 6 months
Response Time	$t_{50} = < 20$ seconds calc fr 2 minute exposure time $t_{90} = < 120$ seconds calc fr 2 minute exposure
	Alcohols @ 1,000 ppm = 0 ppm
	CO @ 100 ppm = 0 ppm
Cross Sensitivities	Cl ₂ @ 1ppm = 0.6 ppm
	O ₃ @ 0.25 ppm = 0.7 ppm
	H ₂ @ 3,000 ppm = 0 ppm
	H ₂ S @ 20 ppm = -5 ppm

INSTRUMENT

Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 95% non- condensing
Operating Life (<i>Estimated</i>)	2 yrs

Combustibles

100% LEL

SENSOR

Type	Catalytic Pellistor
Standard Range	0 - 100% LEL
Resolution	1% LEL
Accuracy	No data available
Long Term Drift	Minimal
Response Time	$t_{50} < 10$ seconds
Cross Sensitivities	Responds to most flammable gases & vapours

INSTRUMENT

Displayed Resolution	1% LEL
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	1 yr for best performance

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	10 - 90% non- condensing
Operating Life (<i>Estimated</i>)	5 yrs +

Combustibles

5% volume CH₄

SENSOR

Type	Infrared
Standard Range	0 - 5% vol CH ₄
Resolution	0.1% vol CH ₄
Accuracy	No data available
Long Term Drift	± 1% FSD / mth @ 20°C (68°F) ambient, (max ± 3% of full scale / yr)
Response Time	$t_{90} < 30$ seconds @ 20°C (68°F) ambient
Cross Sensitivities	None

INSTRUMENT

Displayed Resolution	0.1% volume
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	1 year

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	5 - 95% non-condensing
Operating Life (<i>Estimated</i>)	5 - 10 yrs

Ethylene (C₂H₄)**200 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 200 ppm
Resolution	1 ppm
Accuracy	No data available
Long Term Drift	< 5% / month
Response Time	t ₉₀ = < 100 seconds
Cross Sensitivities	CO = < 60%

INSTRUMENT

Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Ethylene Oxide (C₂H₄O)**20 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 20 ppm
Resolution	0.1 ppm
Accuracy	No data available
Long Term Drift	< 5% signal loss / yr
Response Time	t ₉₀ = < 120 seconds

Cross Sensitivities	Ethanol \approx 55%
	Toluene \approx 20%
	Methyl-ethyl-ketone \approx 10%
	CO \approx 40%

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Fluorine (F₂)

2 ppm

SENSOR

Type	Electrochemical
Standard Range	0 - 2 ppm
Resolution	< 0.02 ppm @ 20°C (68°F)
Accuracy	No data available
Long Term Drift	< 5% / month
Response Time	$t_{90} = < 80$ sec calc fr 4 minute exposure with 1 ppm Cl ₂

Alcohols @ 1,000 ppm = 0 ppm

AsH₃ @ 0.2 ppm = -0.03 ppm

Br = yes; n/d

CO₂ @ 5,000 ppm = 0 ppm

CO @ 100 ppm = 0 ppm

Cl₂ @ 1 ppm = 1.4 ppm

B₂H₆ @ 0.25 ppm = -0.01 ppm

Hydrocarbons @ % range = 0 ppm

Cross Sensitivities

HCl @ 5 ppm = -7 ppm

H₂ @ 10,000 ppm = 0 ppm

HCN @ 1 ppm = -0.05 ppm

H₂S @ 1 ppm = -2 ppm

N₂ @ 100% = 0 ppm

NO₂ @ 10 ppm = 8 ppm

O₃ @ 0.25 ppm = 0.3 ppm

PH₃ @ 0.3 ppm = approximately -0.1 ppm; n/d

SO₂ @ 20 ppm = -0.2 ppm

INSTRUMENT

Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	1.5 - 2 yrs

Formaldehyde (CH₂O)**5 ppm***See Important Notes # 4***SENSOR**

Type	Electrochemical
Standard Range	0 - 5 ppm
Resolution	0.01 ppm
Accuracy	No data available
Long Term Drift	< 2% signal loss / month
Response Time	$t_{so} = < 80 \text{ sec}$
Cross Sensitivities	$H_2 = 1 - 3\%$
	$CO = 10 - 18\%$
	Interference from other reducing gases such as alcohol.

INSTRUMENT

Displayed Resolution	0.01ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs in air

Hydrogen (H ₂) 2,000 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 2,000 ppm
Resolution	2 ppm
Accuracy	No data available
Long Term Drift	< 2% / months
Response Time	t ₉₀ = < 90 seconds
Cross Sensitivities	CO @ 300 ppm = ≤ 60 ppm
	H ₂ S @ 15 ppm = < 3 ppm
	SO ₂ @ 5 ppm = 0 ppm
	NO @ 35 ppm ≈ 10 ppm
	NO ₂ @ 5 ppm = 0 ppm
	Cl ₂ @ 1 ppm = 0 ppm
	HCN @ 10 ppm ≈ 3 ppm
	HCl @ 5 ppm = 0 ppm
	C ₂ H ₄ @ 100 ppm ≈ 80 ppm

INSTRUMENT	
Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL	
Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 yrs +

Hydrogen Chloride (HCl) 30 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 30 ppm
Resolution	< 0.7 ppm @ 20°C (68°F)
Accuracy	No data available
Long Term Drift	< 3% / month
Response Time	t ₉₀ = < 70 seconds calc fr 4 minute exposure
Cross Sensitivities	Alcohols @ 1,000 ppm = 0 ppm
	NH ₃ @ 100 ppm = 0 ppm
	AsH ₃ @ 0.2 ppm = 0.7 ppm
	CO ₂ @ 5,000 ppm = 0 ppm

Cross Sensitivities *continued*

CO @ 100 ppm = 0 ppm
Cl₂ @ 5 ppm = < ±0.1 ppm
Hydrocarbons @ % range = 0 ppm
H₂ @ 10,000 ppm = 0 ppm
HCN @ 20 ppm = 7 ppm
H₂S @ 20 ppm = 60 ppm
NO @ 100 ppm = 45 ppm
N₂ @ 100% = 0 ppm
NO₂ @ 10 ppm = < ±0.5 ppm
PH₃ @ 0.1 = 0.3 ppm
SO₂ @ 20 ppm = 8 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 95% non- condensing
Operating Life (<i>Estimated</i>)	2 yrs

Hydrogen Cyanide (HCN) 30 ppm

SENSOR

Type	Electrochemical
Standard Range	0 - 30 ppm
Resolution	0.2 ppm
Accuracy	No data available
Long Term Drift	< 5% / month
Response Time	t ₉₀ = < 50 seconds calc fr 2 minute exposure

Cross Sensitivities

Alcohols @ 1,000 ppm = 0 ppm
CO₂ @ 5,000 ppm = 0 ppm
CO @ 100 ppm = 0 ppm
Hydrocarbons @ % range = 0 ppm
H₂ @ 10,000 ppm = 0 ppm
NO @ 100 ppm = -5 ppm
NO₂ @ 10 ppm = -7 ppm
H₂S @ 20 ppm = 0 ppm
(short gas exposure in minute range;
after filter saturation: ca. 40 ppm reading)

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 95% non- condensing
Operating Life (<i>Estimated</i>)	1.5 - 2 yrs

Hydrogen Fluoride (HF)**10 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 10 ppm
Resolution	0.2 ppm @ 20°C (68°F)
Accuracy	No data available
Long Term Drift	< 10% in 6 months
Response Time	$t_{90} = < 90$ seconds calc fr 4 minute exposure
Cross Sensitivities	$C_2H_4O_2$ @ 100 ppm = 100 ppm Alcohols @ 1,000 ppm = 0 ppm CO_2 @ 5,000 ppm = 0 ppm CO @ 100 ppm = 0 ppm Cl_2 @ 1 ppm = 0.7 ppm Hydrocarbons @ % range = 0 ppm H_2 @ 3,000 ppm = < 1 ppm HCl @ 10 ppm = 6 ppm SO_2 @ 20 ppm = 16 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	1.5 yrs +

Hydrogen Sulphide (H₂S)**50 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 50 ppm
Resolution	< 0.05 ppm
Accuracy	No data available
Long Term Drift	Zero: < 0.1 ppm equivalent change / yr in clean air Sensitivity: < 4% change / yr in clean air with monthly test
Response Time	$t_{90} = < 25$ seconds fr 0 - 20 ppm
Cross Sensitivities	NO ₂ @ 10 ppm = < -20 ppm
	Cl ₂ @ 10 ppm = -25 ppm
	NO @ 50 ppm = < 4 ppm
	SO ₂ @ 20 ppm = < 10 ppm
	CO @ 400 ppm = < 1.5 ppm
	H ₂ @ 400 ppm = < 0.2 ppm
	C ₂ H ₄ @ 400 ppm = < 0.5ppm
	NH ₃ @ 20 ppm = < 0.1 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Nitrogen Dioxide (NO₂)**10 ppm****SENSOR**

Type	Electrochemical
Standard Range	0 - 10 ppm
Resolution	0.1 ppm
Accuracy	No data available
Long Term Drift	< 2% signal loss / month
Response Time	$t_{90} = < 25$ seconds
Cross Sensitivities	H ₂ S @ 20 ppm = < -40 ppm
	Cl ₂ @ 10 ppm = 100 ppm
	NO @ 50 ppm = < 0.5 ppm
	SO ₂ @ 20 ppm = < -2.5 ppm

Cross Sensitivities <i>continued</i>	CO @ 400 ppm = < 0.1 ppm
	H ₂ @ 400 ppm = < 0.1 ppm
	C ₂ H ₄ @ 50 ppm = < 0.1 ppm
	NH ₃ @ 20 ppm = < 0.1 ppm
	CO ₂ @ 5% volume = < 0.1 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Nitric Oxide (NO) 100 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 100 ppm
Resolution	< 0.2 ppm
Accuracy	No data available
Long Term Drift	Zero: 0.5 ppm equivalent change fr -20°C to 20°C (-4°F to 68°F), 1 - 3 ppm equivalent change 20°C to 50°C (68°F to 122°F) Sensitivity: 101 - 105% output change @ 50 ppm btw 20°C (68°F) & 50°C (122°F)
Response Time	t ₉₀ = < 20 seconds fr 0 - 50 ppm
Cross Sensitivities	H ₂ S @ 20 ppm = < 30 ppm NO ₂ @ 50 ppm = < 5 ppm Cl ₂ @ 10 ppm = < 15 ppm SO ₂ @ 20 ppm = < 3 ppm H ₂ @ 400 ppm = < 0.1 ppm CO @ 400 ppm = < 0.1 ppm NH ₃ @ 20 ppm = < 0.1 ppm CO ₂ @ 5% volume = < 0.1 ppm

INSTRUMENT

Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 - 3 yrs

Oxygen (O₂)**25% volume****SENSOR**

Type	Electrochemical
Standard Range	0 - 25% volume
Resolution	0.1% volume
Accuracy	No data available
Long Term Drift	< 1% change in output over 3 months
Response Time	$t_{90} = < 15$ seconds fr 0 - 20.9%
Cross Sensitivities	CO ₂ sensitivity: 0.1% change in O ₂ reading per % CO ₂ in 5% CO ₂

INSTRUMENT

Displayed Resolution	0.1% volume
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL

Operating Temperature	0°C to 55°C (32°F to 131°F)
Operating Humidity	< 0.7% fr 0 - 95% RH @ 40°C (104°F)
Operating Life (<i>Estimated</i>)	3 yrs

Ozone (O ₃)	1 ppm
SENSOR	
Type	Electrochemical
Standard Range	0 - 1 ppm
Resolution	< 0.02 ppm @ 20°C (68°F)
Accuracy	No data available
Long Term Drift	< 10% / 6 months @ 20°C (68°F) and 30 - 50% RH
Response Time	t ₉₀ = < 60 seconds calc from 3 minute exposure @ 30 cc / min flow
Cross Sensitivities	Br, I ₂ = yes; n/d
	CO ₂ @ 5,000 ppm = 0 ppm
	CO @ 100 ppm = 0 ppm
	Cl ₂ @ 1 ppm = 1.2 ppm
	N ₂ H ₄ @ 3 ppm = -3 ppm
	H ₂ @ 3,000 ppm = 0 ppm
	H ₂ S @ 20 ppm = -1.6 ppm
	N ₂ @ 100% = 0 ppm
	NO ₂ @ 10ppm = 6 ppm
INSTRUMENT	
Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months
ENVIRONMENTAL	
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non-condensing
Operating Life (<i>Estimated</i>)	1.5 - 2 yrs

Phosphine (PH ₃) 5 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 5 ppm
Resolution	Lower detection limit < 30 ppb
Accuracy	No data available
Long Term Drift	< 5% / 6 months
Response Time	t ₉₀ = < 30 seconds
Cross Sensitivities	CO @ 85 ppm = 0 ppm
	H ₂ @ 3,100 ppm = 0 ppm
	NO ₂ @ 10 ppm = 2 ppm
	C ₃ H ₅ OH @ 25,000 ppm = 0 ppm
	H ₂ S @ 18 ppm = 13 ppm
	SO ₂ @ 18 ppm = 6.5 ppm
	Cl ₂ @ 0.85 ppm = 0.29 ppm
	HCl @ 7.8 ppm = 1.2 ppm
	HF @ 7.2 ppm = 0 ppm
	HCN @ 12.6 ppm = 0.84 ppm
	SiH ₄ @ 4.3 ppm = 0.84 ppm
	H ₂ Se @ 0.8 ppm = 0.29 ppm
	B ₂ H ₆ @ 0.2 ppm = 0.34 ppm
	AsH ₃ @ 0.2 ppm = 0.16 ppm
INSTRUMENT	
Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months
ENVIRONMENTAL	
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	10 - 95% non- condensing
Operating Life (<i>Estimated</i>)	2 yrs

Silane (SiH ₄) 20 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 20 ppm
Resolution	0.05 ppm
Accuracy	No data available
Long Term Drift	< 5% / 6 months
Response Time	t ₉₀ = < 60 seconds calc fr 2 min exposure
Cross Sensitivities	CO @ 85 ppm = 0 ppm
	H ₂ @ 3,100 ppm = 0 ppm
	NO ₂ @ 10 ppm = 2.3 ppm
	C ₃ H ₅ OH @ 25,000 ppm = 0 ppm
	H ₂ S @ 18 ppm = 8 ppm
	SO ₂ @ 18 ppm = 7.4 ppm
	Cl ₂ @ 0.85 ppm = 0.1 ppm
	HCl @ 8 ppm = 0.45 ppm
	HF @ 7.2 ppm = 0 ppm
	HCN @ 12 ppm = 0.77 ppm
	AsH ₃ @ 0.16 ppm = 0.2 ppm
	H ₂ Se @ 0.8 ppm = 0.2 ppm
	B ₂ H ₆ @ 0.2 ppm = 0.27 ppm
	PH ₃ @ 0.2 ppm = 0.35 ppm

INSTRUMENT	
Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months

ENVIRONMENTAL	
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	20 - 95% non- condensing
Operating Life (<i>Estimated</i>)	1.5 yrs

Sulphur Dioxide (SO ₂) 20 ppm	
SENSOR	
Type	Electrochemical
Standard Range	0 - 20 ppm
Resolution	< 0.1 ppm
Accuracy	No data available
Long Term Drift	< 2% change / month in clean air
Response Time	t ₉₀ = < 25 seconds fr 0 - 10 ppm
Cross Sensitivities	H ₂ S @ 20 ppm = < 0.1
	NO ₂ @ 10 ppm = < -130 ppm
	Cl ₂ @ 10 ppm = < -40 ppm
	NO @ 50 ppm = < ±2 ppm
	CO @ 400 ppm = < 1.6 ppm
	H ₂ @ 400 ppm = < 0.3 ppm
	C ₂ H ₄ @ 400 ppm = < 40 ppm
	NH ₃ @ 20 ppm = < 0.1 ppm
INSTRUMENT	
Displayed Resolution	0.1 ppm (100 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	6 months
ENVIRONMENTAL	
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	15 - 90% non- condensing
Operating Life (<i>Estimated</i>)	2 yrs

Total Volatile Organic Compound (TVOC)**30 ppm****SENSOR**

Type	Photolionization Detector
Standard Range	0 - 30 ppm
Resolution	0.02 ppm
Accuracy	No data available
Long Term Drift	< 2% change / month in clean air
Response Time	$t_{90} = < 3$ seconds
Cross Sensitivities	Many chemicals & gases. Refer to manual.

INSTRUMENT

Displayed Resolution	0.01 ppm (10 ppb)
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	monthly to 4 months (usage dependent)

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	5 - 95% non- condensing
Operating Life (<i>Estimated</i>)	5 yrs (excluding replacable lamp & electrode stack)

Total Volatile Organic Compound (TVOC)**300 ppm****SENSOR**

Type	Photolionization Detector
Standard Range	0 - 300 ppm
Resolution	0.1 ppm (100 ppb)
Accuracy	No data available
Long Term Drift	< 2% change / month in clean air
Response Time	$t_{90} = < 3$ seconds
Cross Sensitivities	Many chemicals & gases. Refer to manual.

INSTRUMENT

Displayed Resolution	1 ppm
Warm Up Time @ Switch On	Approximately 2 - 2.5 min (instrument warm up delay time)
Recommended Calibration Frequency	monthly to 4 months (usage dependent)

ENVIRONMENTAL

Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	5 - 95% non- condensing
Operating Life (<i>Estimated</i>)	5 yrs (excluding replacable lamp & electrode stack)

Additional chemical symbols not defined above:

Br	Bromine	C_2H_2	Acetylene	B_2H_6	Diborane
ClF_3	Chlorine Trifluoride	C_3H_8O	Isopropyl Alcohol		

Important Notes:

1. Some sensors may be calibrated with correlation gases. If you prefer to have specific sensors calibrated with the target gas, contact our factory for availability and extra costs. Customer will have to bear the cost of the full cylinder of specialty gas plus incoming dangerous goods freight and take ownership of the cylinder of gas remaining.
 2. These specifications have been developed from data considered accurate at the time. No warranty is implied or suggested based on this data. We accept no responsibility for errors or omissions.
 3. Critical Environment Technologies Canada Inc. reserves the right to make design and specification changes without prior notice.
 4. Formaldehyde sensor has high cross sensitivity to Carbon Monoxide, Alcohol & Hydrogen.
 5. Combustible (flammable) gas sensors (catalytic) can be calibrated for a number of target gases. Please specify the target gas desired & we will evaluate your request.
 6. Chlorine, Fluorine, Hydrogen Chloride, Hydrogen Fluoride and Ozone gas sensors are not available with the YES AIR Pump model.
-