

MST PID-TVOC sensor

The MST PID-TVOC sensor is a detector base photoionization detection. It can be easily installed onto handheld/portable/online VOC monitoring instruments (for example, handheld TVOC monitors), and is good to use around fenceline, EX area, etc.

Due to the safety of the PID, it is very easy to be integrated in other system, while considerably reducing the R&D cost. The mechanism is that the gas molecules with ionization potential than the ionization energy of the UV lamp will be detected, such as some VOCs. When pass through the UV channel, these gas molecules are ionized generating electrical signals, followed by being converted to concentrations values.



Features

- Unique brass nickel-plated housing, anti-electromagnetic interference
- Cover single hole, Double waterproof breathable membrane
- Low noise, high sensitivity, low detection limit
- 2 point calibration, Small linear error
- $R^2 \geq 0.995$ (whole range)
- High performance UV lamp, Better stability
- Explosion-proof: Ex ia C T4 Ga
- Options: 10,000ppm, 5,000ppm, 2000ppm, 200ppm, 20ppm

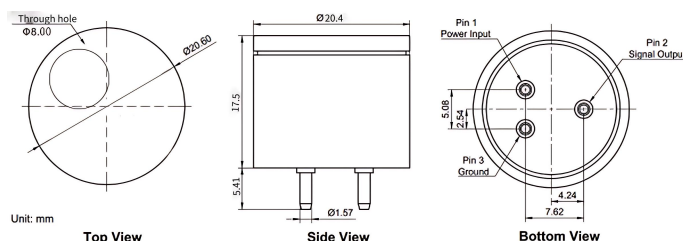
Applications

- Petrochemical field
- National security
- Grid monitoring
- VOC online emission monitoring
- Leak detection

Optional configuration and performance

Optional range						
	10.6eV(Isobutylene)	10,000 ppm	5,000 ppm	2,000 ppm	200 ppm	20ppm
	MDQ (Isobutylene)	300ppb	250ppb	150ppb	20 ppb	5ppb
	T90	≤ 3 s	≤ 3 s	≤ 3 s	≤ 5s	≤ 5s

- Temperature : -40°C to 55°C
- Relative Humidity : 0 to 93%(Non-Condensing)
- Humidity Response:<1%@93%rh
- Humidity Quenching Effect:<15%@93%rh



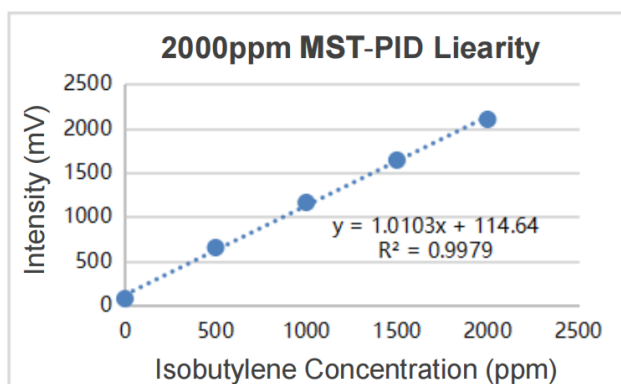
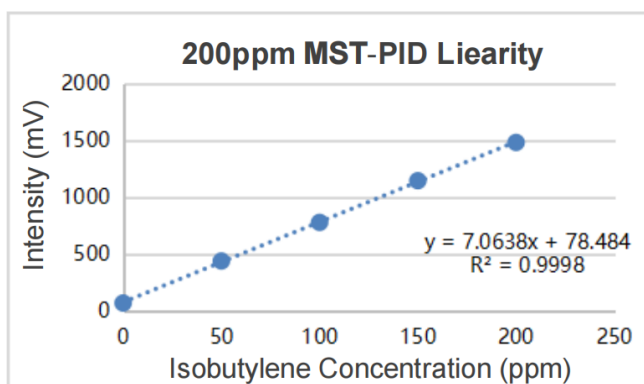
Electrical Parameter

- Supply Voltage: 3.2V – 5.5 VDC
- Current: 30 mA – 45 mA
- Power Consumption: 90 mW – 250 mW (Depending on supply voltage and temperature)
- Output: 0.045 V – 2.9 V
- Warm Up Time: 1 min

Physical Characteristics

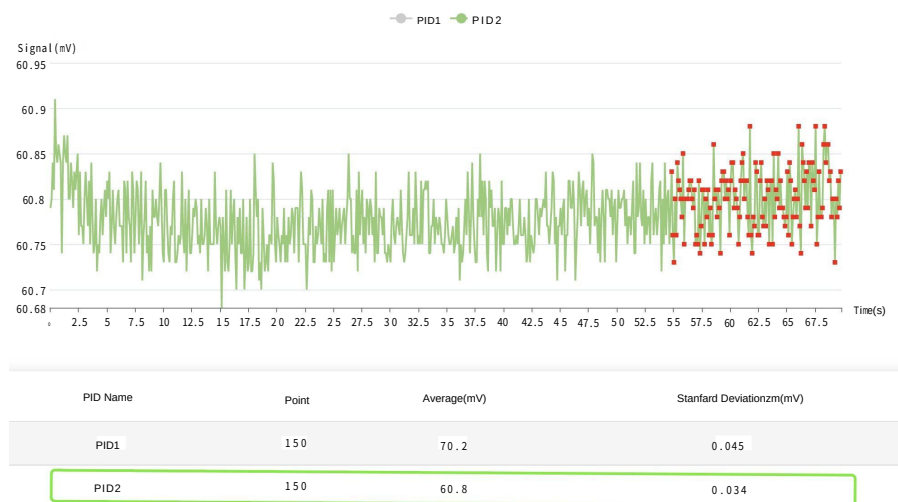
- Weight:<22g
- Appearance type: 4 series 3 pin mode (Industrial standard)
- Components: detector cell, channel, filters (2), UV lamp, seal, spacer
- Uv Lamp life: <10000h
- Warranty period: 1 year

Linearity



Zero point noise

Pass zero air for at least 1 minute, test sensor zero. The 15s data interval (red dot) was selected, and the mean value was taken as the zero value and the multiple standard deviation (1σ) as the zero noise.

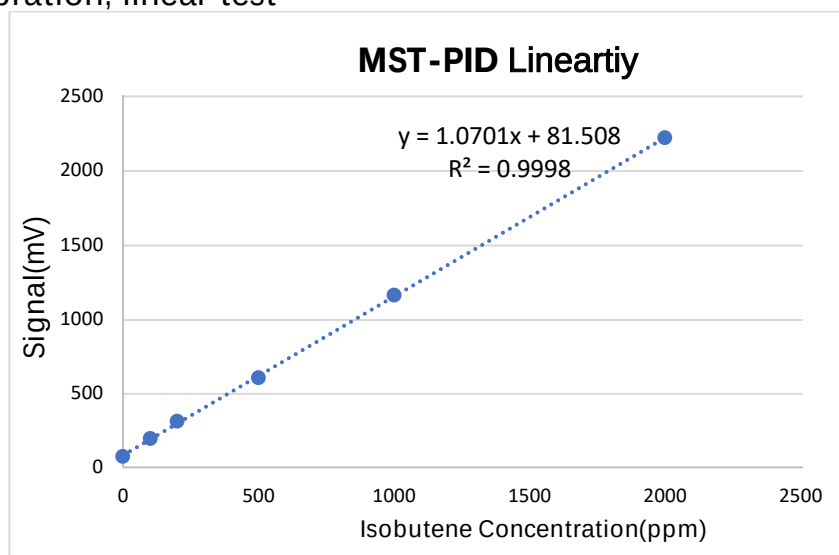


Sensor zero noise $\leq 0.06\text{mV}$

Detection Lower limit (MDQ)

Sample concentration corresponding to 3 times signal-to-noise ratio (S/N) is used as the detection limit of the sensor (theoretical calculation value). The sensitivity of the sensor is closely related to the ionization energy and other properties of the measured substance. For different gas under test, the detection limit of the sensor will be different. Generally, the stronger the sensor's response to a substance to be measured, the lower the detection limit of that substance will be. The lower detection limit (isobutene) for MST-PID (2000ppm range) is 300ppb.

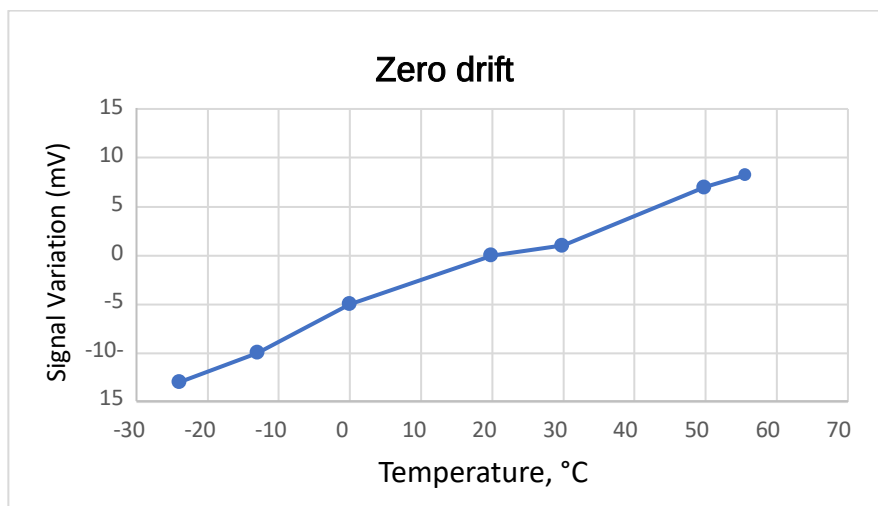
Multi-point calibration, linear test



The actual detection limit of MST-PID was 2000-3500ppm, and the linearity was $R^2 \geq 0.995$

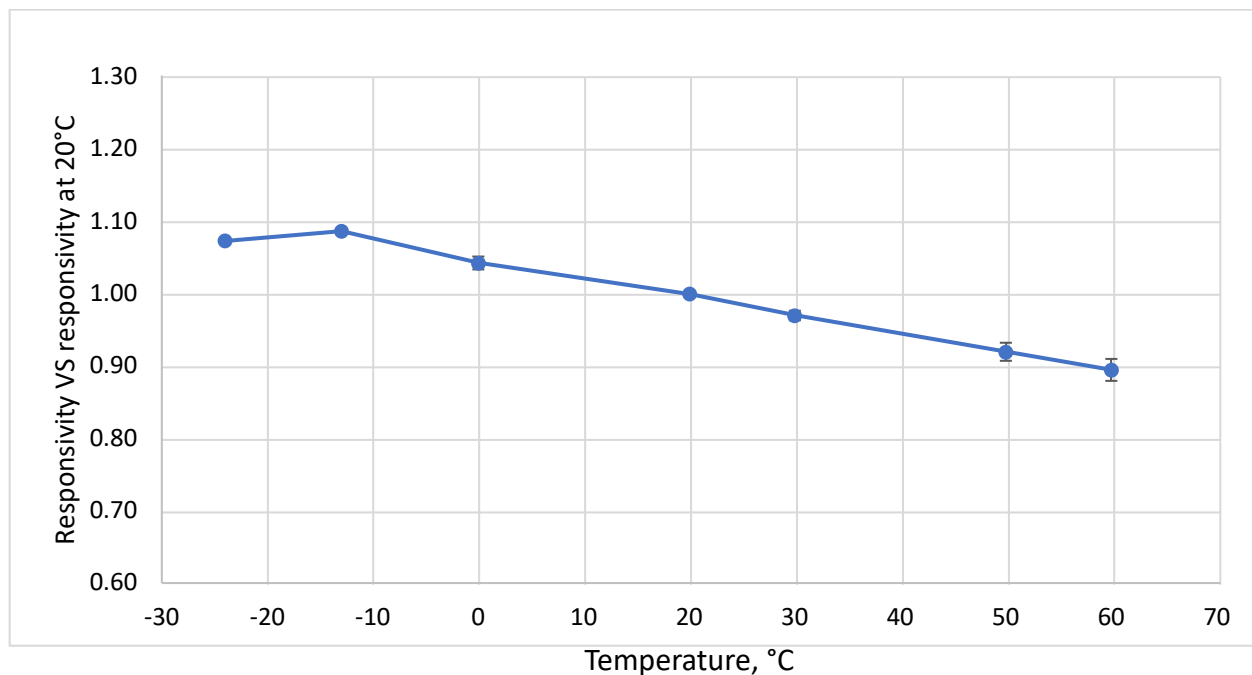
Temperature influence - zero drift

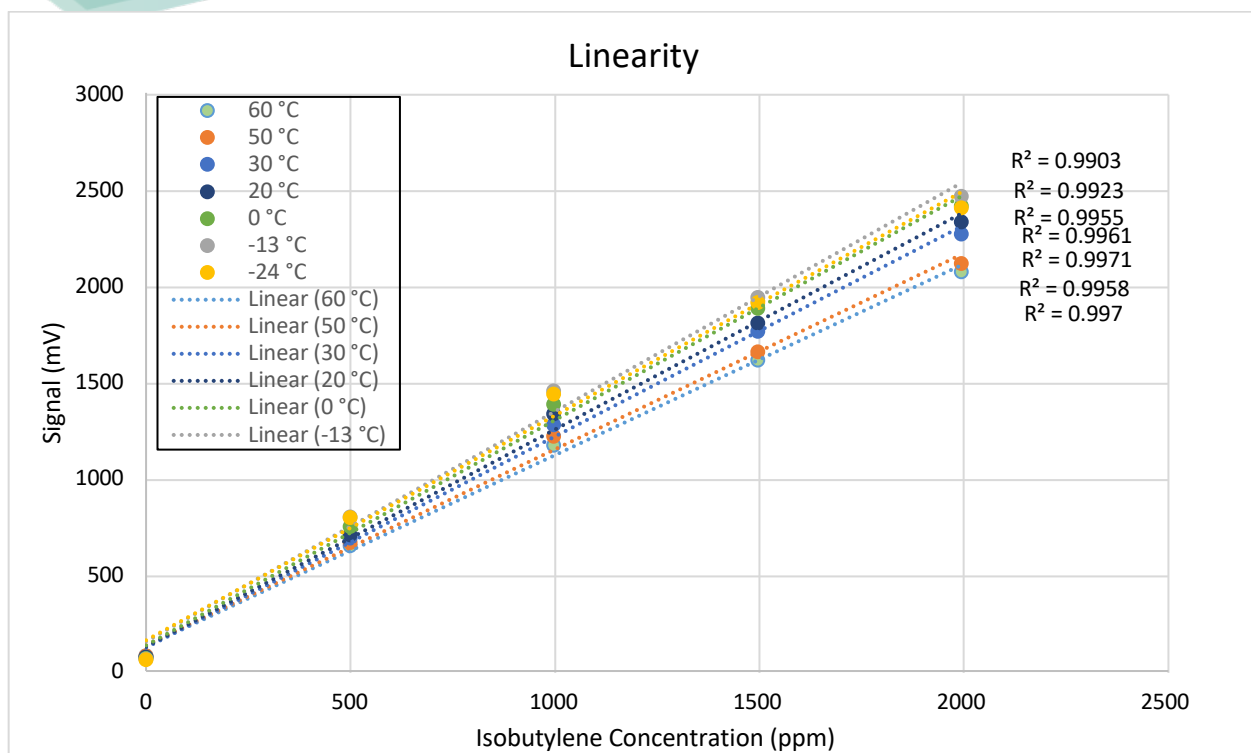
The normal operating temperature of the sensor is -40°C to 55°C . Using the zero value at 20°C as the base, the effect of temperature on the zero drift is $\pm 15\text{mV}$.



Temperature influence - Sample signal and linearity

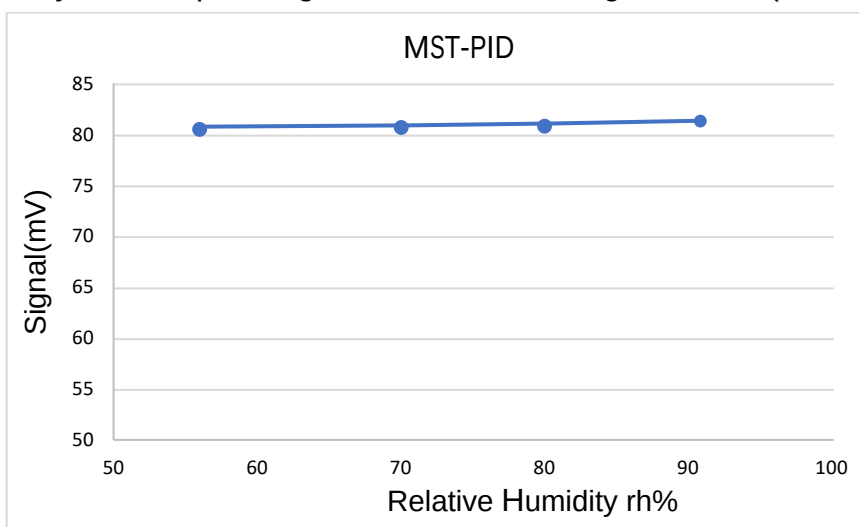
With the sample signal value at 20°C as the benchmark, the influence of temperature on the sample signal is shown in Figure 1 below, and the signal output changes with the temperature by $\pm 10\%$. The influence on the full-scale linearity of the sensor is shown in Figure 2 below.





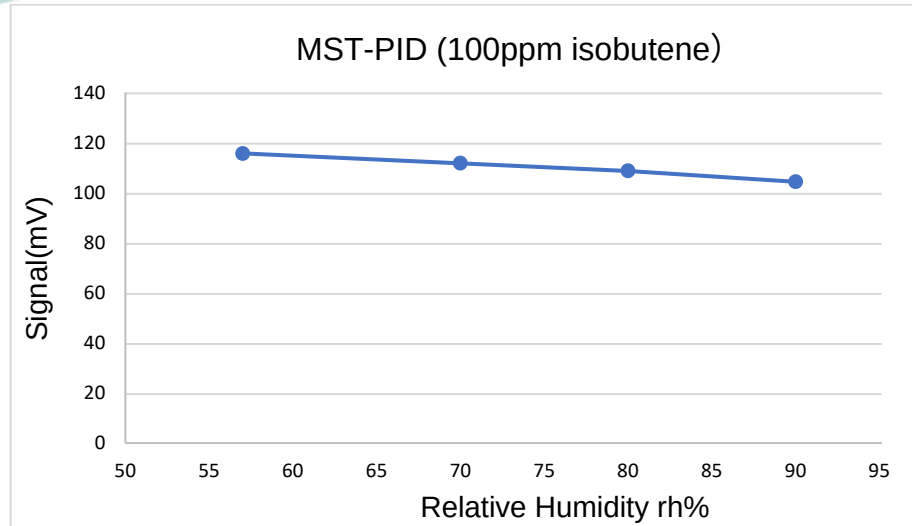
Humidity influence - zero drift

The normal humidity of the sensor ranges from 0 to 93%rh (non-condensing). The influence of humidity on zero point signal is shown in the figure below (less than 1%).



Humidity effect - Sample signal

Usually, the high relative humidity results in low sensor signal. This is because some substances with ionization energy greater than 10.6eV (eg. Water) will absorb the photoelectron energy, but will not be ionized, resulting in less energy of the ionization target detection object. With dry environment (rh<10%), compared to an environment with a relative humidity of 93%, the response was reduced by 8% to 15%.



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