# Photoionization PID Sensor

## User's Manual V2.0

## (Model：4R-PID)

Valid from: 2021-05

Zhengzhou Winsen Electronics Technology Co., Ltd

# Statement



Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes …etc., please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD

# Photoionization PID Sensor 4R-PID

## Product Introduction

4R-PID is a high-performance photoionization PID sensor. It has the characteristics of high sensitivity, wide detection range and wide spectrum. It can detect thousands of volatile organic compounds (VOCs) and some inorganic vapors in different application fields. The detection range starts from 1ppb and is up to 10000 ppm, with extremely fast response speed and high resolution. It can be used in kinds of portable and fixed instruments and various of analytical instruments.


Fig1. Sensor picture

## Features

High sensitivity; Wide detection range; Fast response time; Reliable stability; Long service life; World leading technology.

## Main Application

Emergency Response

Industrial Hygiene

Personal Safety

Detection of VOCs

Monitoring of Environmental Quality

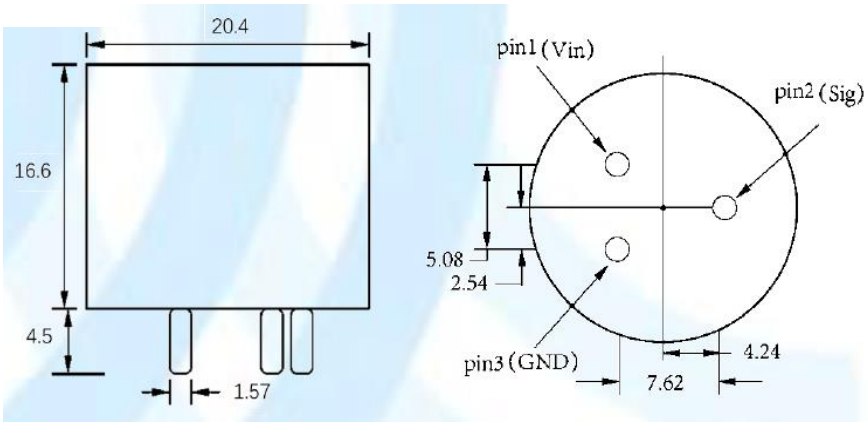
Oil and Petrochemical Safety

Soil Pollution and Management

## Pins definition

PIN1. Power supply (3.2~5.5V DC)
Pin2. Signal output
Pin3. GND

**Fig2.Dimension (unit: mm)**



## Technical Parameters

| Detection Range（ppm） | 0~10 ppm | 0~40ppm | 0~100ppm | 0~6000ppm | 0~10000 ppm |
|---|---|---|---|---|---|
| Resolution | 1ppb | 10ppb | 25ppb | 500ppb | 2ppm |
| Sensitivity（mv/ppm） | >40 | >10 | >5 | >0.1 | >0.1 |
| Target Gas | VOC， Energy≤10.6eV Volatile Gases | | | | |
| Working Voltage | 3.2~5.5 V | | | | |
| Zero Voltage | U0>20 mV | | | | |
| Output Voltage | 0.02~2.0V (3.3 V max) | | | | |
| Response Time（T90） | ≤5 S | | | | |
| Accuracy | ≤±2% (No Condensation) | | | | |
| Humidity | 0~99% (No Condensation) | | | | |
| Working Pressure | 800~1200 mbar | | | | |
| Storage Tem | 0~25℃ | | | | |
| Working Tem | -20~50 ℃ | | | | |
| Lifespan | 3 years (lamp and electrode not included) | | | | |
| Warranty | 12 Months (lamp and electrode not included) | | | | |

## Signal Output

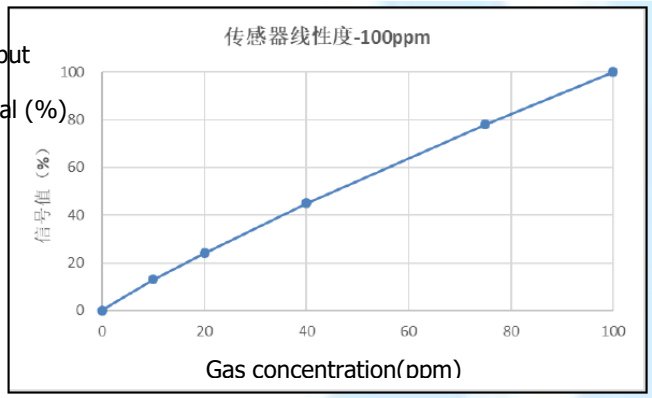



**Fig3**. Typical linear output curve(100ppm)

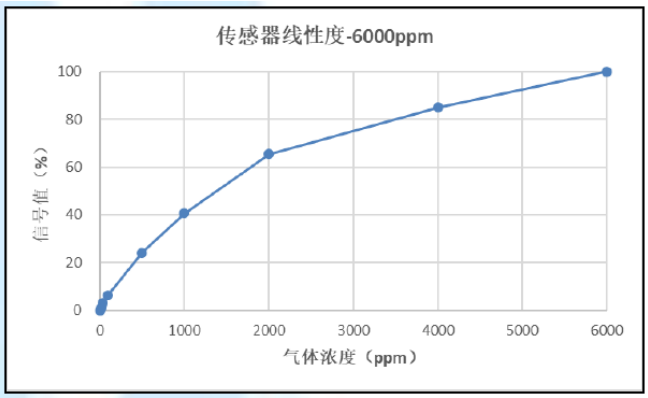



**Fig4**. Typical linear output curve(6000ppm)

## Temperature influence

The normal operating temperature of the sensor ranges from -20ºC to 50ºC. The sensor works up to -30 ° C without damage to the sensor, however the performance of the sensor is not guaranteed at extreme temperatures. The change of ambient temperature has little influence on the performance of the sensor. The temperature correlation curve is shown in the following figure.

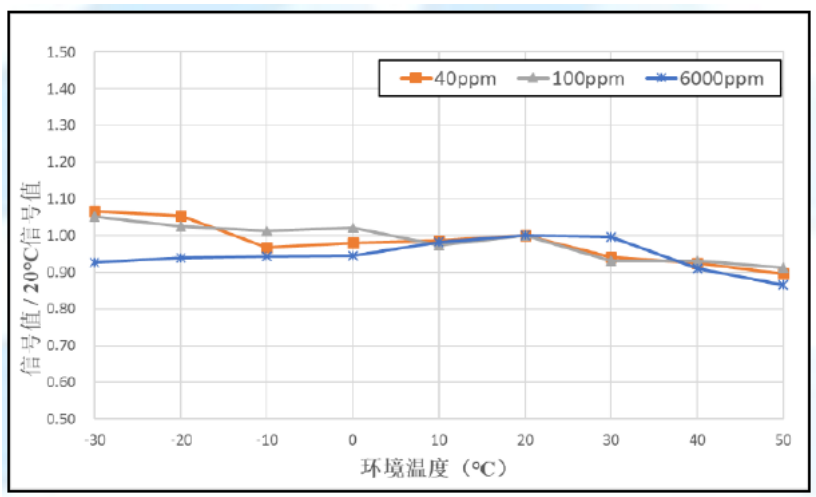



**Fig5**. Temperature curve

## Humidity influence

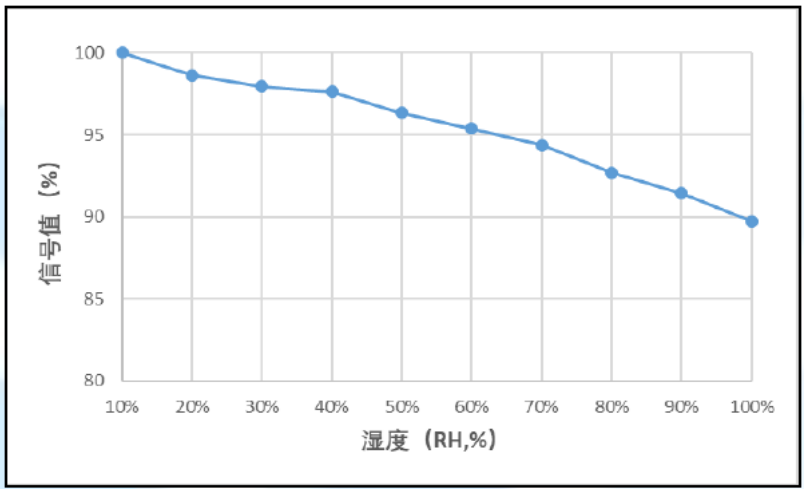



**Fig5**. Humidity curve

## Gas response factor

The ratio of the sensitivity of isobutylene to that of the target gas is called the response factor (RF). For example, the sensitivity of the sensor is 1mV/ PPM for isobutene and 2mV/PPM for benzene, which means that the RF of benzene is equal to 0.5, and the response factor is also different due to the different PID sensor structure design. When using the response factor table, note the following:

●With isobutene as the reference gas and dry air as the equilibrium gas, the response factors of each gas measured under laboratory conditions;

●Depending on the measurement conditions (sample temperature and humidity, background gas, and lamp conditions), the actual value of the response factor in the customer's application may vary;

●Approximate calibration can be performed using response factors when calibration with actual gases is not feasible

## Calibration and drifting

The response of the sensor to the gas may vary over time, and the main reason for this deviation is contamination of the uv lamp window. If the sensor is applied to ambient air containing ionization of heavy compounds or particles, the lamp window will be susceptible to contamination. The window pollution rate is related to the sample gas state, that is, the severity of pollution by chemical substances and particles. The pollution of the lamp window will cause part of the ultraviolet ray to be blocked, thus reducing the sensitivity of the PID sensor. In this case, more frequent calibration and regular cleaning of light Windows are required.

Most volatile organic compounds (such as isobutene, benzene, etc.) do not contaminate the window and the drift is very small. However, some compounds, such as silicone, can quickly deposit and adhere to the light window. In this case, drift may reach 10-20% within 8 hours. In general, if the sensor is used in a relatively clean environment, the recalibration cycle can be slightly longer, so the recalibration cycle can be determined depending on the desired environment and accuracy, ranging from once a month to once every six months.

## Cautions:

●For the first time, the sensor should be preheated for at least half an hour.

●When the calibration is carried out, the operation shall be proceeded after the sensor is completely stable, and the zero point calibration shall be carried out in dry clean air;

●Isobutene gas with a range of about 50% is recommended to be used as the calibration gas.

●Hot plug and insert for the sensor with power on is prohibited.

●It is forbidden to weld the sensor pins, and the pin-sockets are used to connect, and the pin-sockets are allowed to be welded;

●The sensor is not subjected to excessive impact and vibration;

●Do not use the sensor in systems involving personal safety;

●Do not install the sensor in a strong air convection environment, to avoid pressure changes back and forth, resulting in value fluctuation or sensor damage;

●Do not use or store in an environment beyond the range of the sensor for a long time;