
KB-501 型防爆气体探测器 操作手册

ISO9001认证企业



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1 概述

KB-501 型气体探测器是我公司生产的新型气体检测仪器,其突出特点是采用高性能催化燃烧气敏元器件(可燃气体)和电化学传感器(氧气、有毒气体)结合精良 SMD 工艺制造而成,具有良好的重复性和抗湿温度干扰性、使用寿命长、操作方便等优点。适应于工业环境中检测气体浓度。

KB-501 型气体探测器可将空气中可燃气体和氧气、有毒气体浓度转化为电信号输出远传,采用三线制(4-20mA 输出)或四线制(RS485 总线输出)结构,由监控仪表或气体报警控制器远离现场察看探测结果。适用于炼油厂、化工厂、液化气站、燃气锅炉房、加油加气站、喷漆房等使用以及产生易燃易爆气体和有毒有害气体的工业现场进行气体安全检测报警。

1.1 本产品设计、制造、检定遵守以下国家标准:

GB50493-2009 《石油化工可燃气体和有毒气体检测报警设计规范》

GB3836.1-2000 《爆炸性气体环境用电气设备 第 1 部分: 通用要求》

GB3836.2-2000 《爆炸性气体环境用电气设备 第 2 部分: 隔爆型“d”》

GB15322.1-2003 《可燃气体探测器 第 1 部分: 测量范围为 0~100%LEL 的点型可燃气体探测器》

1.2 本产品经国家制定的法定权威机关审查及检验,并通过防爆合格检验。

2 技术指标

产品型号	产品名称	技术指标		
		测量范围	报警点	输出方式
KB-501	可燃气体探测器	(0~100%)LEL	-	三线制(4~20)mA 四线制 RS485 总线 可选
KB-501	有毒气体探测器	见附表		

其它技术指标

检测原理:催化燃烧(可燃气体)、电化学(氧气、有毒气体);甲烷、二氧化碳(红外)、有机挥发物(PID 光离子);

使用寿命:催化燃烧 2-3 年;电化学 2 年;红外 5 年以上;PID5 年以上;

适用气体:见附表;

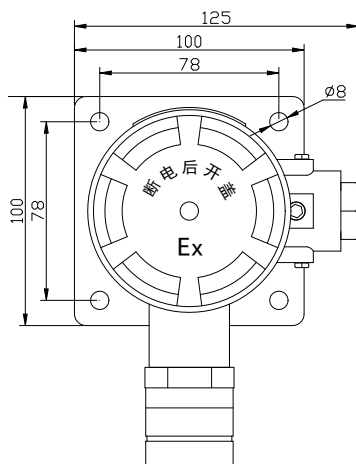
采样方式： 自然扩散；
环境温度： $-40^{\circ}\text{C} \sim 70^{\circ}\text{C}$ ；
相对湿度： $<95\%$ ；
防爆等级： Ex d II CT6；
精 度： $\pm 3\%$ (F.S)
电 源： DC24V $\pm 25\%$ ；
功 耗： 2W/路；
使用电缆： 1.5mm² $\times 3$ (4-20mA)，1.5mm² $\times 4$ (RS485)；
传输距离： $\leq 1000\text{m}$ ；
整机重量： $\leq 1200\text{g}$ ；
压力限制： 86kPa $\sim 106\text{kPa}$ 。

3 安装与接线说明

3.1 安装位置

- a) 气体探测器选点应选择阀门、管道接口、出气口或易泄漏处附近方圆 1m 的范围内， 尽可能靠近，但不要影响其它设备操作，同时尽量避免高温、高湿环境。
- b) 气体检测探头安装高度：检测氢气、天然气、城市煤气等比重小于空气的气体时，采用距屋顶 1 m 左右安装；检测液化石油气等比重大于空气的气体时，采用距地面 0.3 m $\sim$ 0.6 m 左右安装。
- c) 气体检测探头用于大面积气体检测时可采用 10 m² $\sim$ 12 m² 一个探头布置，也可达到检测报警效果。
- d) 气体检测探头安装时应传感器朝下固定，锁紧螺母应完全拧紧，探头盖应完全盖好，用螺钉拧紧，以达到防爆要求。

3.2 气体探测器尺寸及安装方法



单位：mm

在探测现场选择无腐蚀性气体、油烟、尘埃的安装位置，避免水浸。安装方法参照如下：

如果用户要把探测器安装在墙面上，可先根据上图 2 所示的探测器结构尺寸选择合适的墙面，然后用四个 M6×60 的膨胀螺栓对准探测器的安装孔位牢固固定即可。

用户需要将探测器安装对接到 G1/2 的管螺纹时，可另购管接头配件，进行对接安装。

3.3 探测器接线

接线注意事项：

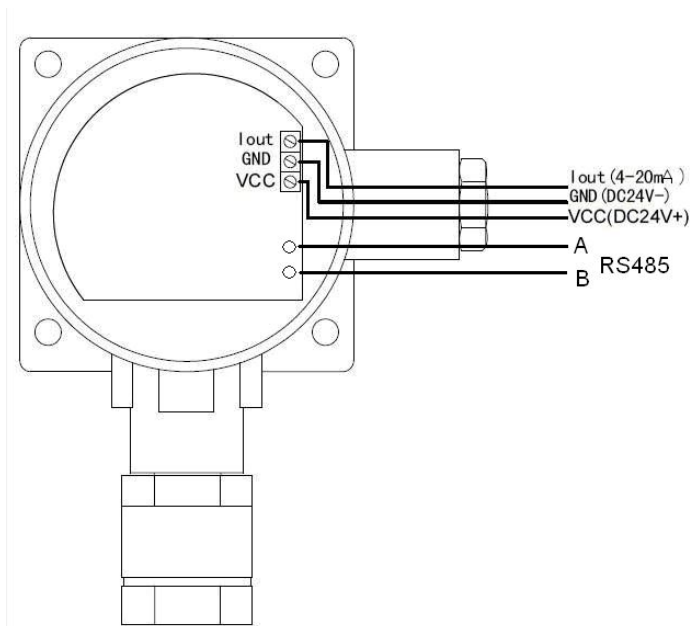
探测器如上 3.1 安装位置和 3.2 安装方法固定牢固后，将探测器的前盖旋下，将传输电缆从进线孔穿入，再穿垫片、橡胶密封圈至壳体内。

将导线按标记分别接到壳体内对应的接线端子上，检查接线正确无误后，再将壳体内多余的电缆线抽出，最后将压紧螺母拧紧，压紧橡胶密封圈，抱紧电缆线（隔爆设计要求）。使用防爆软管时也可与本探测器直接连接。

控制器和探测器之间，用线径不小于 1.5mm^2 ($\leq 1000\text{m}$) 电缆连接。

各环节连接检查无误后，将前盖旋紧。根据用户现场条件，也可先把电缆接好，再将探测器固定。

KB-501 气体探测器接线示意图



KB-501 型气体探测器有 4-20mA 和 RS485 两种信号输出方式

- (1) 选择 4-20mA 输出方式时接 VCC (DC24V+)、GND (DC24V-) 和 Iout (4-20mA) 三根线；
- (2) 选择 RS485 输出方式时接 VCC (DC24V+)、GND (DC24V-) 和 A、B 四根线；

4 校准标定

探测器在使用一定时间后（厂商建议 6-12 个月）需要进行校准标定，标定时需要向厂商购买标定专用显示单元和红外遥控器。

4.1 零点校正

- 1、将气体探测器置于洁净空气中；
- 2、按说明书给探测器接入 DC24V 电源；
- 3、按“设置”键一次，屏幕显示“---”，通过“移位”键和“+”、“-”键输入“SOE”，按“确认”键即进入零点标定状态，待采样值稳定后，按“确认”键保存，仪器自动退出标定状态。

注意一定要放在洁净空气环境中，不可在正常工作时进行此项设置。

4.2 单点标定

传感器使用一定时间后，将由于漂移而导致测量结果产生误差，为了方便用户自行校正，KB-501 具有单点校正功能。

- 1、按说明书给探测器接入 DC24V 电源；
- 2、按“设置”键一次，屏幕显示“---”，通过“移位”键和“+”、“-”键输入“CAE”，按“确认”键即进入高点标定状态；
- 3、通入指定浓度的标准气体，待采样值稳定后，按“确认”键后进入浓度值调整状态，将此数值调整为与通入标准气体的浓度值一致后，再按“确认键”保存，仪器自动退出标定状态。

注意正确操作，不可在正常工作时进行此项设置。

5 常见故障及解决办法

故障现象	故障原因	处理方式
对检测气体无反应	传感器坏	更换传感器
	电路故障	厂家维修
与控制器连接异常	布线故障	检查线路
	电路故障	厂家维修

6 注意事项

- a) 本机需在无腐蚀性气体、油烟、尘埃并防雨的场所使用，防止从高处跌落或受剧烈震动。
- b) 探头处不得有快速流动气体直接吹过，否则会影响测试结果。
- c) 勿使本机经常接触浓度高于检测范围以上的高浓度气样，否则会损失传感器工作寿命。
- d) 对于混合性可燃气体或液体蒸气等监测气样与标定气样不同的环境，本机检测结果会与实际气体浓度有一定误差。
- e) 本机出厂前均经严密检查测试，为保证测量精度，应定期进行校准标定，一般半年校准一次，也可根据现场有关规定进行。
- f) 正常工作环境下检测，传感器都能达到技术指标中所示的使用寿命。

附表：测量气体量程及报警值

气体类型	量程	报警值	传感器类型
NH ₃	0-100 PPM	25 PPM / 50 PPM	电化学
Cl ₂	0-50.0 PPM	1.0 PPM / 2.0 PPM	
H ₂	0-1000 PPM	50 PPM / 100 PPM	
CH ₂ O	0-100 PPM	25 PPM / 50 PPM	
O ₂	0-30.0%vol	19.5%vol / 23.5%vol	
H ₂ S	0-100 PPM	10 PPM / 20 PPM	
HCl	0-30.0 PPM	5.0 PPM / 10.0 PPM	
HCN	0-50.0 PPM	5.0 PPM / 10.0 PPM	
PH ₃	0-20.0 PPM	0.3 PPM / 0.6 PPM	
HF	0-10.0 PPM	3.0 PPM / 6.0 PPM	
NO	0-250 PPM	25 PPM / 50 PPM	
CO	0-500 PPM	35 PPM / 70 PPM	
SO ₂	0-20.0 PPM	2.0 PPM / 4.0 PPM	
	0-2000 PPM	10 PPM / 20 PPM	
ClO ₂	0-50.0 PPM	0.3 PPM / 0.5 PPM	
NO ₂	0-20.0 PPM	1.0 PPM / 2.0 PPM	
C ₂ H ₄ O(ETO)	0-100 PPM	10PPM / 20 PPM	
O ₃	0-10.0 PPM	5.0 PPM / 10.0 PPM	
CH ₄	0-100%LEL	25%LEL / 50%LEL	催化燃烧
C ₃ H ₈	0-100%LEL	25%LEL / 50%LEL	
H ₂	0-100%LEL	25%LEL / 50%LEL	
NH ₃	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₄ O	0-100%LEL	25%LEL / 50%LEL	
CH ₃ CH ₃	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₄	0-100%LEL	25%LEL / 50%LEL	
C ₄ H ₁₀	0-100%LEL	25%LEL / 50%LEL	
C ₄ H ₈	0-100%LEL	25%LEL / 50%LEL	
C ₇ H ₈	0-100%LEL	25%LEL / 50%LEL	

C ₂ H ₇ N	0-100%LEL	25%LEL / 50%LEL	
C ₈ H ₁₀	0-100%LEL	25%LEL / 50%LEL	
CH ₄ O	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₆ O	0-100%LEL	25%LEL / 50%LEL	
C ₃ H ₄ O	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₃ Cl	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₇ N	0-100%LEL	25%LEL / 50%LEL	
C ₃ H ₉ N	0-100%LEL	25%LEL / 50%LEL	
CH ₃ Br	0-100%LEL	25%LEL / 50%LEL	
CO ₂	0-10.0%vol 0-5000ppm	3.0%vol / 5.0%vol 800 PPM / 1500 PPM	红外
CH ₄	0-5.0%vol 0-100%vol	1.0%vol / 1.5%vol 5%vol / 10%vol	
VOCs	0-300ppm	50 PPM / 100 PPM	PID 光离子

***上表中所给出的报警值为制造商出厂默认值，供用户参考，用户也可根据需要进行修改**

***用户需要的气体检测量程与上表不符，请向制造商咨询**

***由于气体种类繁多，未列出以及特殊气体请向制造商咨询**

1. Description

Gas detector KB-501 is a new type gas detection device used high performance gas sensor and microcontroller, employed sophisticated SMD technology. It has following advantages: good repeatability , high resistance to humidity-temperature jamming, long performance life and simple operation. It is applied to inspection for gas concentration in industrial environments.

KB-501 translates gas concentration signals into analog signals or digital signals, with three-wire system 4~20mA electric current signals or four-wire RS485 bus output, to connect to a control unit for offsite inspection.

KB-501 is applied to gas safety inspection and alert for industrial scene, such as petroleum refinery, chemical plants, boiler rooms, gas stations, paint spray booths, etc.

2. Technical parameter

Model	Description	Measuring Range	Alarm Threshold Point	Output
KB-501	Combustible gas detector	(0~100%)LEL	Low: 25%LEL High: 50%LEL	Three-wire 4~20mA /
KB-501	Toxic gas detector	Referring to the gas parameter list		For-wire RS485

Detection Principle:

Catalytic combustion (for combustible gas);

Electrochemical (for toxic gas / oxygen);

Infrared (for methane / carbon dioxide);

PID photoionization (VOCs)

Applicable Gas: Referring to the gas parameter list

Sensor Life: Catalytic combustion sensor: 2~3 years

Electrochemical sensor: 2 years

NDIR infrared sensor: >5 years

PID sensor: >5 years

Sampling Method: Natural diffusion

Accuracy: $\pm 3\%$ (F.S)

Operating Temperature: $-40^{\circ}\text{C}\sim 70^{\circ}\text{C}$

Relative Humidity: $<95\%$

Explosion-proof Index: Ex d IIC T6

Power Supply: DC $24\text{V}\pm 25\%$

Power Consumption: 2W/channel

Screw Thread for Installation: G1/2

Used Cable: $1.5\text{mm}^2\times 3$ (4-20mA); $1.5\text{mm}^2\times 4$ (RS485)

Max. Distance between Detector and Host: $\leq 1000\text{m}$

Total Weight: $\leq 1200\text{g}$

Pressure: $86\text{kPa}\sim 106\text{kPa}$

3. Installation and Connection

3.1 Installation

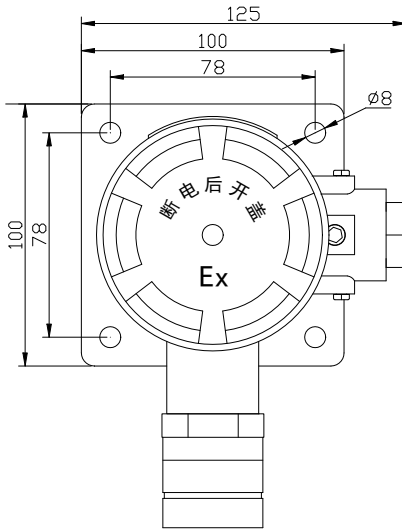
- a) Installation point should be around the valve, pipe joint or other leakiness point with diameter less than 1 m. The nearer, the better, if no influence on the operation of other device. Try to avoid the high temperature or humidity environment.
- b) Proper installation height:
For the gas types which is lighter than air (such as hydrogen, natural gas, etc), recommended installation height is about 1

m below the roof;

For the gas types which is heavier than air (such as LPG), the recommended installation height is about 0.3 m ~ 0.6 m above the floor.

- c) For detection in wide area, we suggest install a detector for every zone of $10 \text{ m}^2 \sim 12 \text{ m}^2$ to ensure the detection and alarming effect.
- d) Screw the sensor mouth down and tighten it. The upper cover need to be screwed down to reach the requirement of explosion-proof.

3.2 Dimensions



(Unit: mm)

The installation point should be far away from aggressive gas, lampblack waste gas, dust, and water logging. The installation method is as below,

If you need to mount the detector on the wall, please select a proper area on the wall according to the above dimension of detector (referring to the picture above). Then, fix the mounting

hole with 4 pc M6×60 plug bolts.

With the help of fitting pipe, you can screw the detector abutting a G1/2 pipe nipple joint.

3.3 Connection Directions

Important:

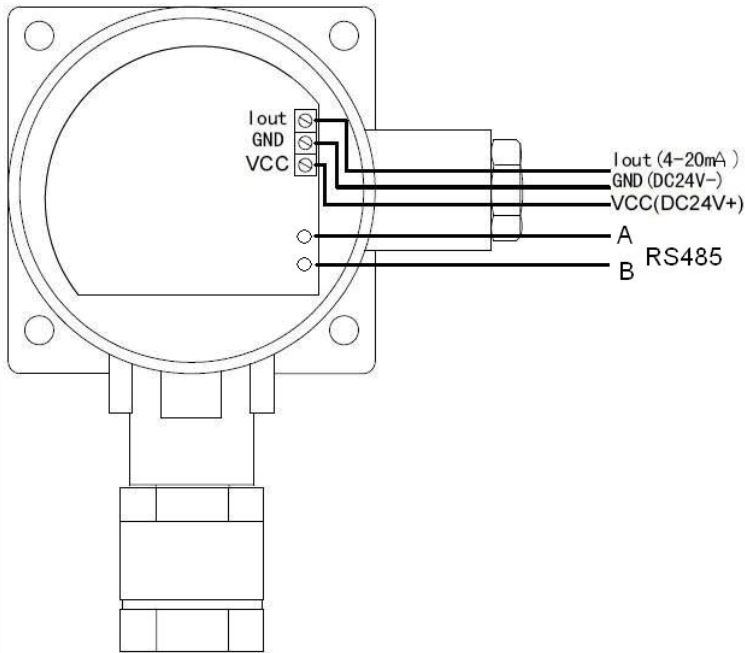
After fixed the detector based on the instruction in 3.1 and 3.2, please open the upper cover. Then, let the transmission cable, washer and rubber obturating ring orderly bore through the connecting entrance hole into the shell inner.

Connect the wire to the terminals in the shell inner according to the marks. Ensure the connection correct, then, extract the spare cable from the shell. Finally tighten the nut and rubber obturating ring to muffle the cable tightly (based on the requirement of explosion-proof design). Also, the explosion-proof hose can be connected to the detector directly.

Connect the detector and control unit with a three-core cable with the wire diameter of no less than 1.5mm^2 ($\leq 1000\text{m}$).

After checked the link connection, please tighten the upper cover. Based on the field conditions, it is also all right if you fix the detector after connected the cables.

Connection Diagram



There are two kinds of output signals (4~20mA and RS485).

- For 4~20mA three-wire, please wire VCC (DC24V+), GND (DC24V-) and I out (4-20mA) terminals.
- For RS485 four-wire, please wire VCC (DC24V+), GND (DC24V-), A and B terminals.

4. Calibration

We recommend recalibrate the gas detector after 6~12 month. For calibration, please use the calibration display board and remote controller from manufacturer.

4.1 Zero Calibration

- Put the gas detector in clear air environment.
- Access power of DC 24V according to the direction in

operating manual.

c) Press the key of “set”, “_ _ _” will be displayed. Input “SOE” by pressing keys of “+”, “-”, “←”, “→” and enter zero calibration menu by pressing “enter” key. After the displayed sampling value be stable, press “enter” key to save the current value and exit.

Caution: Zero calibration must be operated in clear air, do not operate it in the normal working mode.

4.2 Single-point Calibration

After a period of usage, there may be errors caused by drift. In order to facilitate user of correction, KB-501 has the function of single-point calibration.

a) Access power of DC 24V according to the direction in operating manual.

b) Press the key of “set”, “_ _ _” will be displayed. Input “CAE” by pressing keys of “+”, “-”, “←”, “→” and enter single-point calibration menu by pressing “enter” key.

c) Inlet the calibration gas (known concentration), wait until the displayed sampling value be stable. Press “enter” key to enter concentration value adjustment menu. Adjust the data to the same value as calibration gas concentration, press “enter” key to save and exit.

Caution: Single-point setting can not be operated under the normal working condition.

5. Common problems and solutions

Symptoms	Source of Trouble	Troubleshooting
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No response to the detected gas	Sensor damage	Replacement the sensor
	Circuit fault	Factory maintenance
Abnormal connection to the controller	Wiring fault	Check the connected wire
	Circuit fault	Factory maintenance

6. Notes

- Keep the device away from corrosive gas, lampblack, dust and rain when it working. Avoid dropping from height or severe vibrations.
- There should be no rapid flow of gas near the probe, or it will impact the detecting result.
- Do not regular contact the device with high concentration gas which has higher concentration than the detecting range, or the sensor life will reduce.
- For mixed combustible gas or liquid vapor, there may be errors in the detecting result, due to the detecting environment is different from the gas sample calibration environment.
- All devices have to pass strict inspection before they go out. In order to maintain the accuracy, please calibrate it regularly. The suggested period is semiannual, or determined according to the site specific conditions.

Gas Parameter List

Gas	Range	Alarm Threshold	Sensor Type
NH ₃	0-100 PPM	25 PPM / 50 PPM	Electrochemical sensor
Cl ₂	0-50.0 PPM	1.0 PPM / 2.0 PPM	
H ₂	0-1000 PPM	50 PPM / 100 PPM	
CH ₂ O	0-100 PPM	25 PPM / 50 PPM	
O ₂	0-30.0%vol	18.5%vol /23.5%vol	
H ₂ S	0-100 PPM	10 PPM / 20 PPM	

HCl	0-30.0 PPM	5.0 PPM / 10.0 PPM	
HCN	0-50.0 PPM	5.0 PPM / 10.0 PPM	
PH ₃	0-20.0 PPM	0.3 PPM / 0.6 PPM	
HF	0-10.0 PPM	3.0 PPM / 6.0 PPM	
NO	0-250 PPM	25 PPM / 50 PPM	
CO	0-500 PPM	35 PPM / 70 PPM	
SO ₂	0-20.0 PPM 0-2000 PPM	2.0 PPM / 10.0 PPM 10 PPM / 20 PPM	
ClO ₂	0-50.0 PPM	0.3 PPM / 0.5 PPM	
NO ₂	0-20.0 PPM	1.0 PPM / 2.0 PPM	
C ₂ H ₄ O	0-100 PPM	10 PPM / 20 PPM	
O ₃	0-10.0 PPM	5.0 PPM / 10.0 PPM	
CH ₄	0-100%LEL	25%LEL / 50%LEL	Catalytic combustion sensor
C ₃ H ₈	0-100%LEL	25%LEL / 50%LEL	
H ₂	0-100%LEL	25%LEL / 50%LEL	
NH ₃	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₄ O	0-100%LEL	25%LEL / 50%LEL	
CH ₃ CH ₃	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₄	0-100%LEL	25%LEL / 50%LEL	
C ₄ H ₁₀	0-100%LEL	25%LEL / 50%LEL	
C ₄ H ₈	0-100%LEL	25%LEL / 50%LEL	
C ₇ H ₈	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₇ N	0-100%LEL	25%LEL / 50%LEL	
C ₈ H ₁₀	0-100%LEL	25%LEL / 50%LEL	
CH ₄ O	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₆ O	0-100%LEL	25%LEL / 50%LEL	
C ₃ H ₄ O	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₃ Cl	0-100%LEL	25%LEL / 50%LEL	
C ₂ H ₇ N	0-100%LEL	25%LEL / 50%LEL	
C ₃ H ₉ N	0-100%LEL	25%LEL / 50%LEL	

CH ₃ Br	0-100%LEL	25%LEL / 50%LEL	
CO ₂	0-10.0%vol	1.0%vol / 3.0%vol	NDIR infrared sensor
	0-5000ppm	800 PPM / 1500PPM	
CH ₄	0-5.0%vol	1.0%vol / 3.0%vol	
	0-100%vol	5%vol / 10%vol	
VOCs	0-300PPM	50PPM / 100PPM	PID sensor

Remark: Some gas types are not listed, please contact manufacturer.