

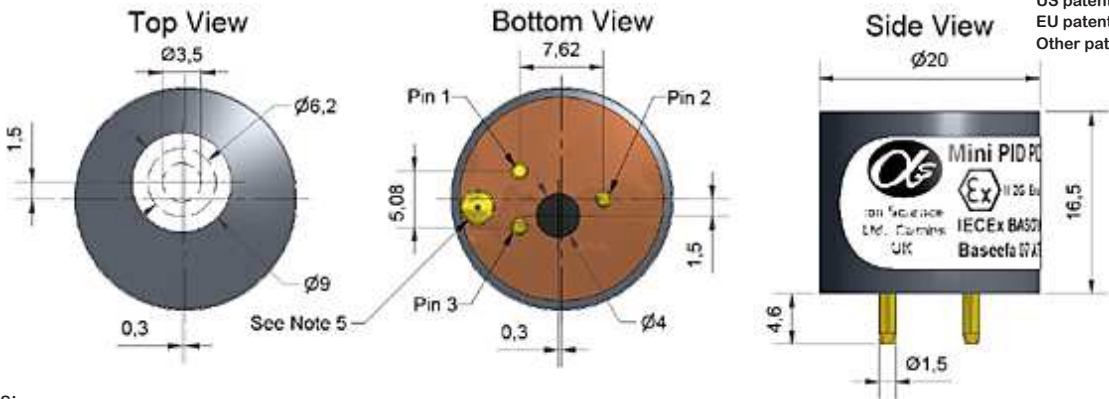


# PID-A1 Photo Ionisation Detector



US patent 7,046,012  
US patent 7,821,270  
EU patent 1474681  
Other patents

Figure 1 PID-A1 Schematic Diagram



- Notes:

  - Do not obstruct Ø3.5 sensing area
  - Seal between Ø6.2 and Ø9.0 (if different to atmosphere)
  - Pin out details:  
Pin 1: + V supply (See note 5)  
Pin 2: Signal output  
Pin 3: 0 V supply
  - All dimensions ±0.1mm unless otherwise stated
5. Input voltage selector hole:

a) When filled with solder the onboard regulator is disabled. A regulated supply of 3.0 - 3.6 V (typically 3.0 V) is then required.

b) When not filled with solder the onboard regulator is enabled. A regulated or unregulated supply between 3.6 - 10 V is then required for IS applications, or up to 18 V for non-IS applications. These sensors will be internally regulated to 3.3V

**Normally shipped with regulator disabled.**

## PERFORMANCE

|                                  |   |   |          |
|----------------------------------|---|---|----------|
| Target gases                     | VOCs with ionisation potentials < 10.6 eV |   |          |
| Minimum resolution               | (ppb isobutylene)                         | HPPM lamp (part #001-0019-02)                   | < 100    |
|                                  |   | LLHS lamp (part #001-0030-01)                   | < 50     |
| Linear range                     | (ppm isobutylene)                         | (5% deviation)                                  | 300      |
| Overrange                        | (ppm isobutylene)                         |   | 6,000    |
| Sensitivity                      | (linear range)                            | (mV / ppm Isobutylene, see Table 1 for options) | > 0.3    |
| Full stabilisation time          | (minutes to 100 ppb)                      |   | 20       |
| Warm up time                     | (seconds)                                 | time to full operation                          | 5        |
| Offset voltage                   | (mV)                                      |   | 52 to 57 |
| Response time (t <sub>90</sub> ) | (seconds)                                 | diffusion mode                                  | < 3      |

## ELECTRICAL

|                   |   |  |  |
|-------------------|---|--|--|
| Power consumption | 70 mW (typical) at 3.0 V, 350 mW transient for 200 msec on switch-on<br>90 mW at 3.3 V, 460 mW transient for 200 msec on switch-on  |  |  |
| Supply voltage    | 3.0 to 3.6 VDC Ideally regulated ±0.01V (onboard regulator disabled)<br>3.6 to 10 VDC (onboard regulator enabled)<br>(maximum 10V for IS approval, maximum 18 V for non-IS) |  |  |
| Output signal     | Offset voltage (minimum 50 mV) to Vmax<br>(Vmax = Vsupply - 0.1 V when regulator is enabled)  |  |  |

## ENVIRONMENTAL

|                         |  |                               |                        |
|-------------------------|--|-------------------------------|------------------------|
| Temperature range       | -40°C to +55°C (Intrinsically Safe); -40°C to +65°C (non-IS) |                               |                        |
| Temperature dependence  | 0°C to 40°C  | 90% to 100% of signal at 20°C |                        |
|                         |  | -20°C                         | 140% of signal at 20°C |
| Relative humidity range | Non-condensing   |                               |                        |
| Humidity sensitivity    | During operations: 0% to 75% rh transient                    |                               |                        |

## KEY SPECIFICATIONS

|                      |  |  |  |
|----------------------|--|--|--|
| Operating life       | 5 years (excluding replaceable lamp and electrode stack)                 |  |  |
| IS Approval          | IECEX Ex ia IIC T4; ATEX Ex ia II 1G -40°C < Ta < +55°C (< 10VDC supply) |  |  |
| Onboard filter       | To remove liquids and particulates                                       |  |  |
| Lamp                 | User replaceable   |  |  |
| Electrode stack      | User replaceable   |  |  |
| Error state signal   | Lamp out:  | 32 ±4 mV                                       |  |
|                      |  | Electronic error: 22 ±6 mV                     |  |
| Weight               | < 8g   |  |  |
| Position sensitivity | None   |  |  |
| Warranty period      | Electronics and housing:   | 24 months                                      |  |
|                      |  | Lamp and electrode stack are user replaceable. |  |



## PID-A1 Performance Data

Figure 2 Sensitivity Temperature Dependence

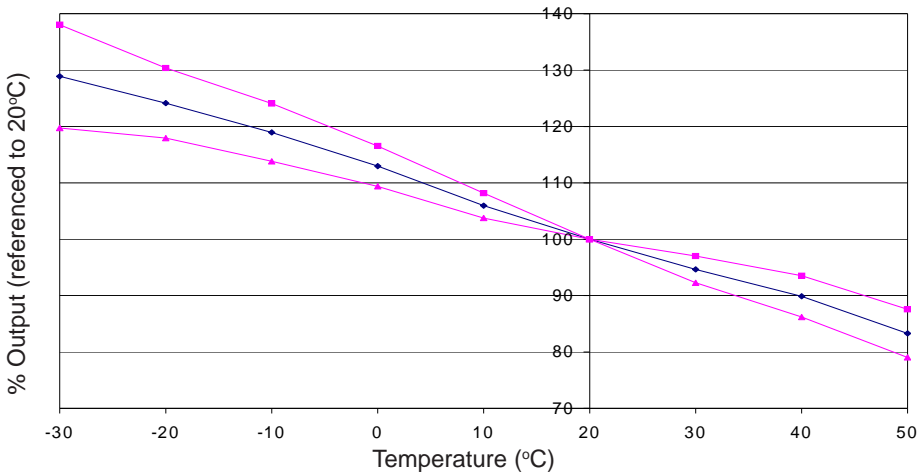
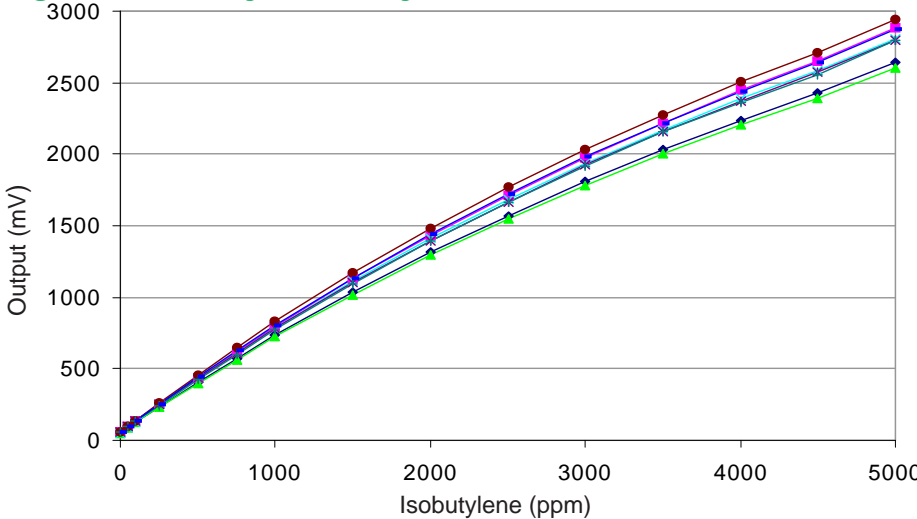


Figure 2 shows the temperature dependence, corrected for the gas law.

This data is taken from a typical batch of PID-A1 sensors tested with 100ppm Isobutylene.

The mean and  $\pm 95\%$  confidence intervals are shown.

Figure 3 Linearity to Isobutylene



PID output is non-linear at higher concentrations but is repeatable and can be corrected in software.

Non-linearity correction depends on the VOC being measured.

Table 1: PID Replaceable Parts/Consumables List

| Lamp type          | Product code | Minimum sensitivity mV/ppm | Minimum range ppm isobutylene | Lamp life lit hours |
|--------------------|--------------|----------------------------|-------------------------------|---------------------|
| 10.0 eV            | 001-0030-02  | 0.2                        | 9000                          | 5000                |
| 10.6 eV (HPPM)     | 001-0019-02  | 0.3                        | 6000                          | 2000                |
| 10.6 eV (LLHS)     | 001-0030-01  | 0.8                        | 2000                          | 5000                |
| 11.7 eV            | 001-0019-03  |                            |                               | 24                  |
| Stack removal tool | 001-0020-00  |                            |                               |                     |
| Lamp spring        | 001-0023-00  |                            |                               |                     |
| Lamp cleaning kit  | 001-0024-00  |                            |                               |                     |

**NOTE:** all sensors are tested at ambient environmental conditions, unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.



At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions.

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. For Application Notes visit "[www.alphasense.com](http://www.alphasense.com)".

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