Gas detection in air intakes

When it comes to monitoring of ventilation air, at air intakes, in ventilation ducts or at ventilation outlets, the trend has been towards lower trip levels and/or faster response times. This product information discusses these issues in order to help choosing the right detector for the task.

Fast response
Generally all agree that fast response to detect gas is an advantage. However this has to be seen in conjunction with actual gas concentration levels and the delay to any action after detector response. I.e. 0.5 – 1 second faster response may be of little use if the process to act on this takes up to 10 seconds. Also, fast detection at 40%LEL concentration is useless if the gas-release is already diluted by a large number of air changes.

High sensitivity
Depending on your application, a lower trip level may be a better way to achieve fast response to gas ingress and egress. Air intakes are normally located quite a distance away from potential leak points and areas with “background gas concentration”, so using detectors with a higher sensitivity here is an advantage.

Gas concentration and trip levels
Trip levels will normally be set lower than the gas concentration you intend to protect your air intake against. A gas detector will use some time to display (output) the actual gas level, so if the criteria is to “prevent intrusion of XX%LEL gas, by giving alarm within Y seconds”, then the trip level may be at half or even less of the gas %LEL given.

The chart shows the response to 50%LEL gas for the 3 GD10 versions. E.g. if the requirement is a trip (high alarm) within 2 seconds, the standard GD10P and a trip level at 20%LEL is sufficient. If you need a trip within 1 second, then a GD10PE with a trip level of 10%LEL or a GD10P-1s (fast) with a trip level of 20% LEL (25%LEL) is OK.

![Response at 50%LEL gas](chart.png)

Note: The charts are for illustration purposes only.

Reference: SDM-60281 - Gas detection in air intakes.doc
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Product Information
GD10P / GD10PE

The picture is slightly different in the case we would like to have the same response criteria for a gas concentration of 25%LEL. For a trip response within 2 seconds, the GD10PE at 10%LEL or the GD10P-1s (fast) at 20%LEL is required. A response within 1 second is possible with the GD10PE at 5%LEL only.

<table>
<thead>
<tr>
<th>Minimum levels</th>
<th>Warn</th>
<th>Trip</th>
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</thead>
<tbody>
<tr>
<td>GD10P-1s</td>
<td>15%LEL</td>
<td>20%LEL</td>
</tr>
<tr>
<td>GD10P-5s</td>
<td>10%LEL</td>
<td>20%LEL</td>
</tr>
<tr>
<td>GD10PE</td>
<td>3%LEL</td>
<td>4%LEL</td>
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</tbody>
</table>

For air intakes and for gas turbine ventilation we may be concerned about gas concentration of even lower levels, here the GD10PE is the best option.

Warning- and Trip-levels
We recommend that a safety margin of 100% (i.e. 2x) of the nominal long term stability tolerance is used as the lowest level for a “warning” or “low alarm”. A warning should not initiate any automatic shutdown action. For high alarm or trip, a minimum level of 20% of full scale of the detector is recommended.

It is also good practice to have a certain distance between low and high alarm levels, and a factor of 2x has been the typical industry standard. With the trend of reducing alarm levels, this margin between warning and shutdown has been reduced in several projects.

Choosing the right GD10 for the task
GD10P- standard (“5 sec”)
This detector should be the default choice as a general point detector. Depending on your requirements it is also suitable for air intakes and duct mounting. Warning and trip levels can be down to 10%LEL and 20% LEL respectively (2x margin).

GD10P – fast (“1 sec”)
This detector is designed for fast response, and is very fast at trip levels (high alarm) of 20%LEL and above. Please note that at a trip level of 20%, the minimum warning level of 15% is quite close.

GD10PE
This detector is 5 times as sensitive as standard point detectors, its scale covering 0 – 20%LEL. At gas concentrations above scale, it will maintain an output of 20%LEL. GD10PE is designed for fast detection of low gas concentrations. For detection of gas concentrations of less than 20%LEL, i.e. when you need trip levels (high alarm) of 5 -15%LEL, the GD10PE is the best solution available.