



## Carbon Dioxide and the use of Oxygen Deficiency Monitoring Equipment to protect users

Carbon dioxide is a toxic gas, which affects the human body in a number of ways depending on the exposure levels. Normal carbon dioxide content of the air is 0.03% but when this level rises to 2%, breathing rates double and after several hours exposure, headaches and fatigue may be noticed. At 3%, effects include dizziness, increased heart and pressure rate, more frequent headaches and loss of hearing. At 4-5%, breathing may be four times the normal rate and after only thirty minutes exposure, there will be signs of poisoning and a choking sensation. In the UK, most monitors for carbon dioxide are set at 1.5% (the short term exposure limit for the UK) as a warning and 3% to indicate that the user should immediately leave the area.

Oxygen deficiency monitoring equipment is designed to monitor displacement of oxygen in surrounding air by the introduction of any external gases and is typically used to protect users who may be at risk from non toxic gases such as Nitrogen, Argon or Helium or indeed oxygen enrichment.

Under normal ambient conditions, oxygen represents around 20.9% in dry air but depending on temperature and humidity this may rise as high as 21% or drop to around 20.6% quite normally. If carbon dioxide levels rise to 1.5% in surrounding air, then the concentration of the oxygen remaining will be diluted down from 20.9% to 20.6%. In other words a rise to 1.5% will only give a 0.3% dilution which is indistinguishable from normal environmental changes.

Although oxygen deficiency equipment will eventually register deficiency caused by the introduction of carbon dioxide, dangerous levels will already have been reached before monitors start to register the change. Bearing in mind that most oxygen deficiency alarms do not provide a warning as standard until oxygen levels reach 19%, – this represents CO<sub>2</sub> levels of 9.1% at which stage confusion and unconsciousness would be occurring. Even if oxygen deficiency alarms are adjusted to try to reflect presence of CO<sub>2</sub>, levels will reach at least 2% before a real difference from ambient can be used to trigger an alarm. This is not sensitive enough to provide real protection to users from CO<sub>2</sub>.

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