
From: "Alex Deas" <alex@technicaldivers.com>
To: "Martin Parker" <MartinParker@dialin.net>
Sent: 23 August 2000 00:04
Attach: apv000821.doc
Subject: Re: Interest in a CO2 alarm?

Private email

Dear Martin,

Thanks for your email.

The CO2 sensor of choice is the GMM221 series from Vaisala. Information on the sensor is in my office: I will send it to you tomorrow - I have a pdf. I bought a 5% FSD sensor and OEM conditioning module from Vaisala earlier today after some dialogue, along with the other bits from RS, Farnell etc that I need for it to work on the Inspiration. The sensor is somewhere in the £300 mark but could be pushed down to sub £200 if you just take bare sensors from them in reasonable sized drops. One off was £411. The sensor should last indefinitely: it is silicon micromachined, and entirely non-reactive.

Once I have built and tested the prototype, I would be more than happy to pass over all the information - even sending down the unit: I am not in the business of making dive kit. AP building it into the Inspiration makes a lot of sense. I will do this as quickly as I can - within 6 weeks assuming I get my Inspiration bits back within a couple of weeks: they have just gone off today for the new handsets and extra valves in the bladders. An output from the CO2 sensor into the junction box could be achieved easily.

The only real problem with the CO2 sensor route so far is that there is simply no room within the Inspiration housing to fit the thing to the scrubber outlet so it will have to go on the inlet. I need to see if I can get accurate figures configured this way. On flaws, some people have shot it down because of condensation, but these things work in a fermenter! In theory the beam is very wide, condensation should have minimal effects.

The Vaisala dual beam unit comes with full compensation. Essentially it produces an output directly proportional to the number of CO2 molecules in the IR beam, ie a direct PPCO2 reading. Other sensors I looked at required a lot more work, and were both pressure and temperature dependent. Replicating the signal conditioning and sensor drive from the Vaisala is straight forward, as is putting on a power switching system to reduce the consumption, a sample and hold and a few other bits and pieces. It should all fit easily on a circuit board 3 inches by 2.

On a related and still private issue, I am still not comfortable with the safety of the handsets even with the latest round of mods. There is a small pile of things that would give AP a hard time if a relative brought

in a real expert in life critical system design. I emphasise that I am not decrying your overall design: the Inspiration is extremely well designed and engineered, and I have no intention of ever being an expert witness - I am opposed to the whole process. It is just that the control issues in the Inspiration technically are not up to scratch for a life critical system, and that means my safety too as a user. You may find the attached document an interesting one, even if just prompting an off the wall review internally within AP of just how safe is the current control system. Sooner or later the HSE or other safety bodies in the UK will do this for you if you don't do it yourselves and document it.

Sooner or later someone will sue AP over the Inspiration and win. We have a reasonably sized patent section in Acuid Corp, and when considering legal action, those who have seen a lot of action comment that irrespective of the merits of the case, you have a 50/50 chance of winning. This means that when you do something that someone might sue you for, protect yourself first because even if you are right, they can still win. I have everything in trusts, and don't own more than the clothes I stand in. I am surprised you have AP Valves producing Inspirations. Splitting your business into two, one called AP Valves with all the risky things but no assets and the other with the assets, is obvious self preservation. You can do this easily: so long as you hold the same share value at the end, there is not even a tax issue. One just creates some Board minutes which drivel on about the need to focus the business etc, benefits of outsourcing etc as the rational. The business with assets would make things under contract for the other, with disclaimers that it is a pure contractor, not responsible for goods inspection, design etc. It would be a great shame if someone saw AP as a substitute for the insurance policy they could not get. If they realise AP as a man of straw, they do not bother. The only people left then is the HSE etc, and a proper life critical safety review is the way to fend that off. Implementing some of the suggestions in the attached may even reduce the accident rate, you never know :-)

With best regards and wishes,

Alex Deas