John Lamb <viamed.john.lamb@gmail.com>

Oxygen Sensors Problem, please read!!!

3 messages

Valeriy Gorbunov <vgorbuno@yahoo.com> Sun, Oct 6, 2013 at 1:30 AM
Reply-To: Valeriy Gorbunov <vgorbuno@yahoo.com>
To: Vandagraph <enquiries@vandagraph.co.uk>
Cc: "sales@vandagraph.co.uk" <sales@vandagraph.co.uk>, "info@vandagraph.co.uk" <info@vandagraph.co.uk>

Dear Sir and Madam,

My name is Valeriy Gorbunov, I am a certified Megalodon rebreather diver.

Recently I purchased an oxygen sensor replacement, it is Vandagraph (as they say) SC-I22D model came from Innerspace Systems Corporation via local dive store, S/N ISC102892, manufactured May, 2013, label at the back 8010012, in bar-code ID652039.

Problem description.

When a dive starts, on descend and staying at depth 20-30m the new sensor shows 10% less PO2 readings above 1ATA PO2.
Example (the sensor in the problem is #3):

Calibration at 100% O2 on the surface:
#1: 1.00
#2: 1.00
#3: 1.00

10m
#1: 0.70
#2: 0.70
#3: 0.70

20m
#1: 1.43
#2: 1.42
#3: 1.30 ?!

On ascend it equalizes:
12m
#1: 1.11
#2: 1.10
#3: 1.09

and all 3 sensors are staying in sync.
If in the same dive I descent again all 3 sensors are showing about the same readings:

16m
#1: 1.32
#2: 1.31
#3: 1.28

After the sensor is stored on air (till next weekend) the problem reappears on next dive descend underwater again.
It looks like ambient pressure change (pressurizing and/or maybe something else, e.g. moisture) is affecting the sensor's output.

The measurements condition.
Air mV before dive:
#1: 9.8 mV
#2: 9.3 mV
#3: 10.3 mV

Air mV after dive:
#1: 9.8 mV
#2: 9.8 mV
#3: 10.6 mV

Everything is measured by 2 independent dive computers ISC APEX and Shearwater Predator, all 3 sensors are calibrated at 100% oxygen (1ATA PO2) under 13C temperature (working temperature under water) to eliminate possible influence of temperature-compensation, and all readings are identical on both computers.
2 other sensors are from the same supplier #1: ISC101421 and #2: ISC101423, manufactured in Jul, 2012, opened and put in use in Jan, 2013.

Theoretically, old sensors #1 and #2 can be identically in error showing 10% over the real PO2 (they are from the same lot and S/N are close), but odds are 2:1 that the new sensor #3 is failing.

Very big problem is when all those measurements are repeated in a pressure chamber filled with 100% oxygen and pressurized to 1 Bar (2ATA PO2) the sensor behaves normally and I can't pressurize it more than 1 Bar to reproduce the error.

Please let me know your thoughts. You may change the sensor's design a bit since July 2012.
It is very important you do not ignore my message because if the question is not resolved I have to remove all Vandagraph sensors and notify anyone I know not to use them anymore, that would be sad because I dove with Vandagraph sensors since Jan 2013 and liked it.

With all my respect,

Valeriy Gorbunov

Victoria BC
Canada

p.s. I took another sensor from the dealer S/N 102884, the problem was the same.
Next dive I'll try to rotate the sensors to eliminate possible computer circuits influence.

Valeriy Gorbunov <vgorbuno@yahoo.com> Sun, Oct 6, 2013 at 5:53 AM
Reply-To: Valeriy Gorbunov <vgorbuno@yahoo.com>
To: "john.lamb@vandagraphst.com" <john.lamb@vandagraphst.com>, "steve.nixon@vandagraphst.com" <steve.nixon@vandagraphst.com>, "ryan.swaine@vandagraphst.com" <ryan.swaine@vandagraphst.com>

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John Lamb <john.lamb@vandagraphst.com> Sun, Oct 6, 2013 at 11:28 AM
To: Valeriy Gorbunov <vgorbuno@yahoo.com>
Cc: "steve.nixon@vandagraphst.com" <steve.nixon@vandagraphst.com>, "ryan.swaine@vandagraphst.com" <ryan.swaine@vandagraphst.com>

Hi Valeriy,
I am out of the office for a few days and need to examine your data closely before I can reply in depth..
Meanwhile two important things.

1. It is vital you copy your email to Jerry Whately at InnerSpace.
   I cannot comment on the Megladon without Jerry being aware and contributing.
   As John Lamb I have had experience with oxygen sensors since 1965 and with their use in re-breathers since 1995. I can therefore discuss in depth my experiences and how sensors work and generally re-act underwater.
   For legal reasons any specific comments on InnerSpace sensors has to be routed through them. I see no problems in this area.
2. Have you read my book "The practice of oxygen measurement for divers"

Did you by any chance measure the sensor outputs in air when they were new?
What are they now? Are atmospheric conditions similar.

Kind regard s
John S.Lamb

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