Oxygen Analysers display Partial pressure so if the Analyser is used in Altitude diving care must be exercised to understand and compensate for the changes in partial pressure that occur at Altitude. At high altitude normal calibration may not be possible due the output restrictions of the sensor. Oxygen analysers should be designed not to calibrate if the output is outside the specified limits of the sensor. The correct value for the altitude must be set on calibration. The pressure varies with altitude and the table below is a guide.

To set a calibration at 3,000 feet (approx 1,000 mtrs) the normal pressure of 1Bar will only be 0.92 Bar.
The normal calibration 20.9 must be multiplied by 0.92 = 19.2%

At 3,000 ft calibrate to 19.2%

In practice Latitude and atmospheric conditions also effect the pressure.
Latitude effects can be ignored within the accuracy of normal monitoring
For maximum accuracy the exact atmospheric pressure at the altitude the measurement is to be taken should be used.
As a rule of thumb a 5 mb pressure change will change the calibration by 0.1%

Altitude correction chart at 1Bar			
Altitude		Pressure	Calibration
Feet	Metres	Millbar mb	%
-1000	-305	1.03	21.7
0	0	1	20.9
1000	305	0.97	20.2
2000	610	0.94	19.4
3000	915	0.92	18.7
4000	1220	0.89	18.1
5000	1525	0.86	17.4
6000	1830	0.84	16.8
7000	2135	0.81	16.1
8000	2440	0.79	15.5
9000	2745	0.76	14.9
10000	3050	0.74	14.4
11000	3355	0.72	13.8
12000	3660	0.69	13.3
13000	3960	0.67	12.8
14000	4265	0.65	11.3
15000	4570	0.63	11.8
16000	4880	0.61	11.3
17000	5180	0.59	10.9
18000	5485	0.57	10.4
19000	5790	0.55	10.0
20000	6095	0.54	9.6

The contents of the cylinder do not change.

A mixture of 32% Oxygen at sea level is still 32% Oxygen at altitude. The best analogy is the balloon. The mixture cannot change but as the balloon rises the external pressure reduces and the balloon expands .
Until gas is exhaled a standard Scuba rig can be considered a closed circuit

A closed circuit system cannot change the consistency of the gas being breathed.
A 32% mix will still be a 32% mix when it is breathed.
The divers problems are not concerned with the % mix used but the partial pressures of the gasses as they are breathed. 32% breathed at sea level has a PO_2 = 0.32 bar
At 30 metres sea water depth the PO_2 = 1.28 bar
32% breathed at 5,000 mtrs altitude the PO_2 = 0.16 bar
When diving the absolute pressure is Gauge Pressure + Atmospheric Pressure
This equation does not change. The Gauge Pressure depends on the depth and the Atmospheric Pressure depends on the Altitude above Sea Level.

An Analyser calibrated in Air at seal level would read 10.45 at 5,000 metres.
When measuring Oxygen at altitude the altitude must be known before the instrument can be calibrated. The same techniques should be applied with the outlet open to atmosphere and the measurement taken in still gas at ambient pressure.
It is then possible to determine the PO_2 in the gas delivered to the lungs whilst diving.
In order that the lungs remain working and do not continue to expand or collapse the pressure inside the lungs must be almost equal to the pressure outside of the lungs.
32% at sea level has a PO_2 = 0.32
32% at 5,000mtrs has a PO_2 = 0.16
32% at 5,000mtrs diving to 30 mtrs has a PO_2 = 0.56Bar
3 Bar water pressure + 0.5bar Atmospheric Pressure = 3.5 Bar. x 0.16 bar .