

MAKING SENSE

02 TYPE SENSORS



The
Validation
Centre
(TVC)
Limited



CHEMICAL O2 CELL SENSORS

Chemical O2 Cell Sensor technology has existed for 30 to 40 years. Their main advantages are:

- reasonably cheap
- robust
- simple to use
- draw a very low current
- ideal for use in simple handheld, battery powered O2 purge monitors

The payoff with using Chemical cell sensors is that the chemical element depletes when it is exposed to Oxygen. Over time the chemical element reduces in the cell until it no longer functions and must be replaced.



Chemical O2
Cell Sensors



CHEMICAL O2 CELL SENSORS

The time taken to deplete depends on the cell construction and the level of Oxygen it is exposed so in most commercially available cells this can be anything from 6 to 18 months. Mainly due to the continually depleting chemical element which, as it depletes, changes the voltage output of the sensor, the cheaper commercially available Chemical cells tend to have a repeatability in the region of +/- 350ppm (+/- 0.0350%) and must be continually adjusted by comparing it to a known O2 level.

Luckily, the air we breathe at normal atmospheric conditions has a known O2 level of approximately 20.9% and this can simply be used as the reference to adjust the sensor to as required prior to use.

Overtime, Chemical cell sensors deplete when exposed to Oxygen until it no longer functions and needs replacing.



Chemical O2
Cell Sensors





Chemical O2
Cell Sensors



CHEMICAL O2 CELL SENSORS

Accuracy at low Oxygen levels depends on the accuracy of the atmospheric conditions adjustment

However, there is an issue with this if you are looking to measure very low Oxygen levels i.e., Sub 1000ppm (0.1%). The accuracy at the low Oxygen levels is entirely dependent on the accuracy of the adjustment that is made at atmospheric conditions so, for example, if you set 20.8% then potentially the unit could read 0ppm at anything below 1350ppm when the offset and sensor accuracy at +/-350ppm is taken into account.

Some of the latest models have an automatic calibration adjustment at atmospheric conditions which greatly reduces the risk of this issue occurring, however, this again does not take in to account any changes in the level of oxygen in the atmosphere due to barometric conditions, therefore the accuracy is compromised.





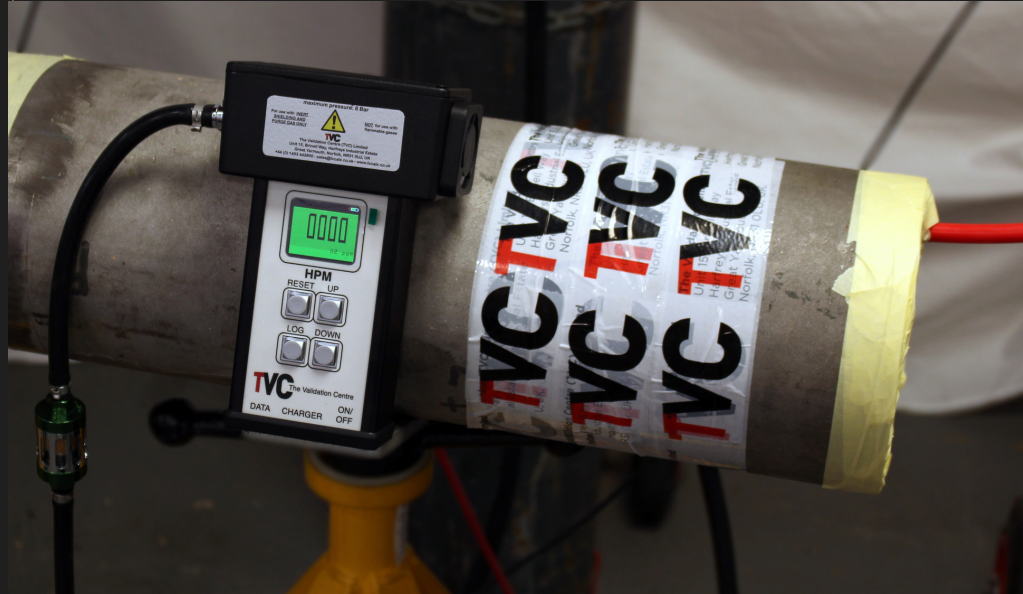
The
Advantages
of Optical
Sensors



Non-depleting and
resolve down to
100ppm O₂ levels.

THE ADVANTAGES OF OPTICAL SENSORS

Optical sensors for the measurement of O₂ have been available within the Medical industries for longer than the Welding industry, however, sensors using this technology have become available at prices which now make them more affordable and useable for welding O₂ purge measurement.





The
Advantages
of Optical
Sensors



THE ADVANTAGES OF OPTICAL SENSORS

The Optical sensor used by TVC in the BPM and HPM handheld purge monitors provides far more additional benefits to traditional Chemical cells. While the price and low power consumption can be compared to Chemical cells, Optical cells have the advantage of:

- resolving down to 100ppm O₂ levels
- repeatability of +/- 100ppm
- an onboard pressure sensor
- automatically correction for barometric pressure
- non-depleting

Since they are non-depleting, apart from a yearly re-calibration, the Optical sensors should last for several years making the cost of ownership over time much lower than equipment fitted with Chemical cells.





Higher
Accuracy
using Hybrid
Dual Sensor
Technology



HIGHER ACCURACY USING HYBRID DUAL SENSOR TECHNOLOGY

Where higher accuracy is required at lower oxygen levels, TVC use Zirconia sensor technology.

The Zirconia sensor is used in conjunction with the Optical sensor to provide an O₂ measurement range from 22% right down to 1ppm. Until now the Zirconia sensors available on the market have typically been either quite large or very power hungry as they need to heat the gas under test up to temperatures of between 500°C and 800°C. This has meant that power hungry heating elements are used, drawing as much as 4 amps, therefore, meaning the sensors are not very practical for battery powered handheld instruments.

TVC has developed a Hybrid Dual Optical Zirconia sensor for the GPM and HPM-02 units which allows an incredibly small, low power Zirconia sensor to be used to measure from 1000ppm down to 0ppm in 1ppm steps and the Optical O₂ sensor to measure from 1000ppm up to atmosphere O₂ levels of 21%.



TVC

Higher
Accuracy
using Hybrid
Dual Sensor
Technology

Less than twice the size of a conventional Chemical O2 cell, the TVC dual sensor module is exceptionally compact.

With a comparable price to Chemical cells, it makes the TVC HPM-02 and GPM units extremely competitive on price with far greater resolution and accuracy.



FROM HANDHELD SPOT CHECKS TO COMPREHENSIVE PURGE MONITORING SYSTEMS



From Handheld
Spot Checks to
Comprehensive
Purge
Monitoring
Systems



REPEATABILITY

- measures to down to 100ppm
- repeatability of +/-100 ppm

- designed for quick spot checks when purging

AFFORDABLE

- affordable price
- low running costs

SPOT CHECKS

BPM

The BPM unit is a basic purge monitor capable of measuring to down to 100ppm with a repeatability of +/-100 ppm and designed for quick spot checks of the O2 levels when purging.

Simple and easy single button operation at a very affordable price with low running costs.



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HPM

Where lower O2 levels, higher accuracy or additional monitoring features are required, the HPM-01 and HPM-02 units have onboard data-logging with programmable high/low limits combined with a simple, easy to see 'Traffic Light' colour changing display.

Like the BPM, the HPM units are very competitively priced with low running costs.



HIGH ACCURACY

- measures lower O2 levels
- higher accuracy
- additional monitoring features

- onboard data-logging
- programmable high/low limits
- 'Traffic Light' colour changing display

ONBOARD DATA- LOGGING

COMPETITIVELY PRICE

- affordable
- low running costs





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DEW POINT SENSOR OPTION

A Dew Point sensor option can be added to the HPM. This allows the HPM to not only measure the O₂ level but also the gas Dew Point from -8 down to -60°C.





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GPM

For semi-permanent or permanent installations, the GPM offers a host of additional functions over the handheld equipment and can be use in robotic or automated installations.

The unit is mains powered and has a large 5.7" OLED colour screen, the same 'Traffic Light' colour changing display function with programmable high/low limits as the HPM units and uses the Hybrid Dual Sensor technology.



Onbaord data-logging and options for:

- External Traffic Light Warning Beacon with Audible alarm
- 3-stage remote gas flow control
- Auto Start/Stop functionality and control for Robotic and Automated installations
- Gas Dew Point/Moisture sensing
- Remote wireless operation for Pipeline tie-in welding of up to 2 Kilometres and a proportional output

UNIVERSAL FUNCTIONALITY

Both the GPM and HPM units have digital outputs which can be connected directly to TVC Weld Data-logging systems or, if required, customers own monitoring equipment.

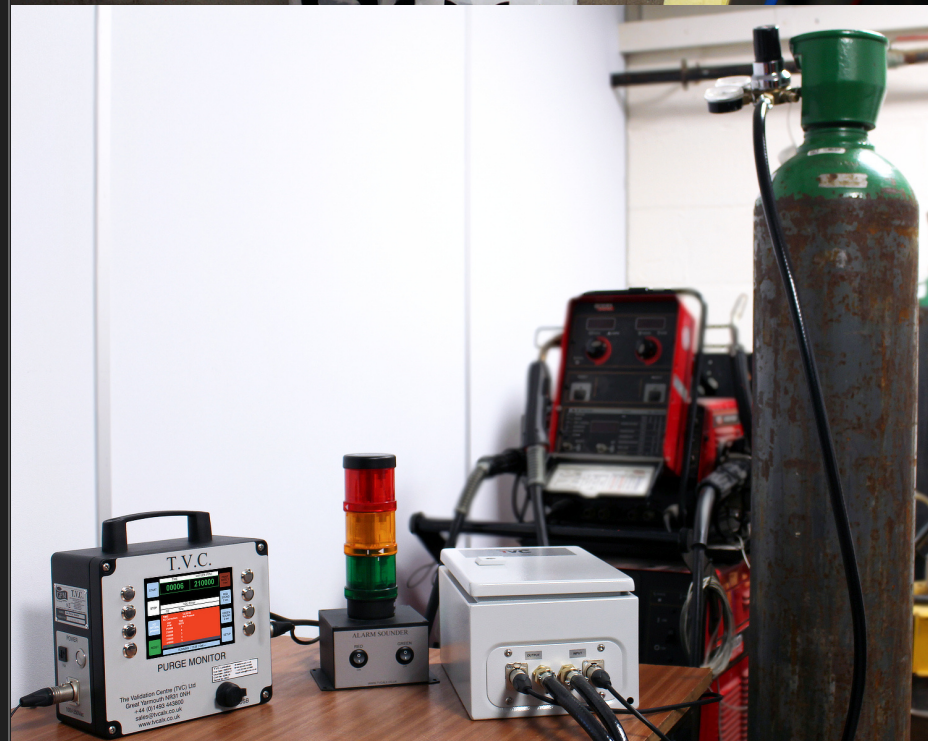


Universal
Functionality





When
Precision
and
Accuracy
Matter



CONTACT

For further information on the range of TVC Purge Monitoring and Gas Measurement Equipment, please contact TVC or one of our authorised Sales Distributors.

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