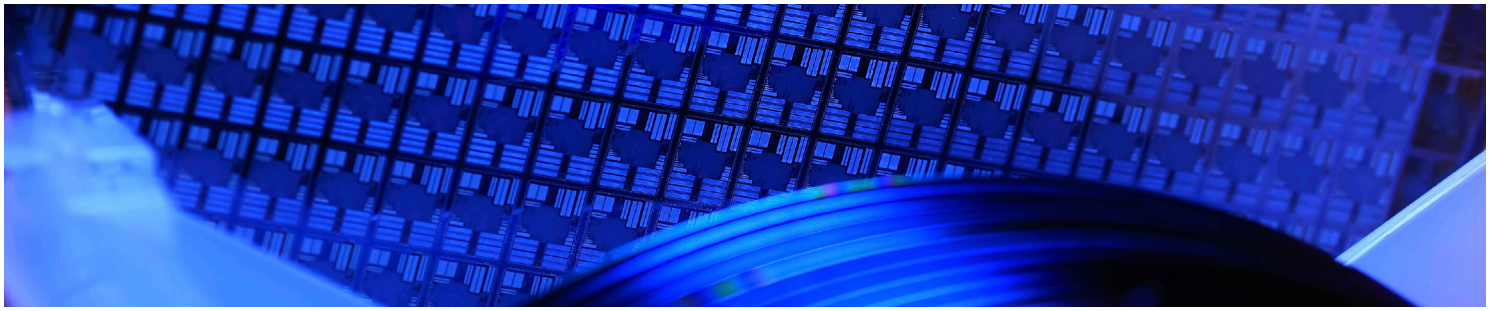


HALO QRP

Trace-Level Low-Pressure Moisture Analyzer

GASES & CHEMICALS | CEMS | ENERGY | ATMOSPHERIC | SEMI & HB LED | SYNGAS | LAB & LIFE SCIENCE

Designed for trace level moisture analysis in low pressure (<50 Torr) applications, the HALO QRP offers:

- Detection limit of 1 µTorr partial pressure H_2O and below
- Absolute accuracy and excellent precision
- Wide dynamic range—over four orders of magnitude
- Low cost of ownership and operational simplicity
- Clean technology—no external calibration gases required
- Compact analyzer footprint, ideal for OEM equipment integration

Protect Your Process with the HALO QRP

Modern semiconductor deposition processes—from low-temperature epitaxy to ALD and MOCVD—operate routinely at chamber pressures far below atmosphere and approach the single-digit torr range. At the same time, process temperatures are steadily decreasing. Under these conditions, residual moisture in the chamber poses a significant threat to process quality and production yields.

Tiger Optics' HALO QRP is optimized to operate under these low-pressure conditions and deliver exact and reliable real-time measurements to verify moisture residue in, for example, the load lock, transfer and process chambers before H_2O contaminants compromise the subsequent process step. Based on Tiger Optics' proven Continuous-Wave Cavity Ring-Down Spectroscopy (CW-CRDS) technology, the HALO QRP sets new standards in ease-of-use and measurement precision for this application, and operates at chamber pressures as low as 1 Torr.

Tiger Optics | 21ST CENTURY SPECTROSCOPY

HALO QRP

Trace-Level Low-Pressure Moisture Analyzer

Performance, H_2O Detection	
Operating range	0 – 12 $mTorr_{pp}$
	(1200 ppm @ 10 Torr)
Detection limit (LDL,	1 $\mu Torr_{pp}$
24 h peak-to-peak variation)	(see chart below for ppb units)
Sensitivity (3σ)	0.5 $\mu Torr_{pp}$
	(see chart below for ppb units)
Precision (1σ, greater of)	± 1% or 1/3 of Sensitivity
Accuracy (greater of)	± 5% or 1/2 of LDL
Speed of response	1 to 2 min (if not flow-limited)
Environmental conditions	10°C to 40°C
	30% to 80% RH (non-condensing)
Storage temperature	-10°C to 50°C

Gas Handling System and Conditions*	
Wetted materials	316L stainless steel
	(corrosive gas version optional)
	10 Ra surface finish
Gas connections	1/4" male VCR inlet and outlet
	with manual shut-off valves
Leak tested to	1 x 10^{-9} mbar l / sec
Inlet pressure†	1 – 1000 Torr
Outlet pressure	<20 mTorr (0.027 mbar)
Sample gases§	N_2, H_2, HCl, Ar (standard)
	He, Cl_2 (optional)
Gas temperature	Up to 60°C (in detection cell)

*Vacuum source required
†Pressure requirements for moisture measurement – for gas purge in standby mode, inlet pressure limit is 15 psig (1500 Torr)
§HCl and Cl_2 sample gases may require corrosive gas version, please contact us for more information.

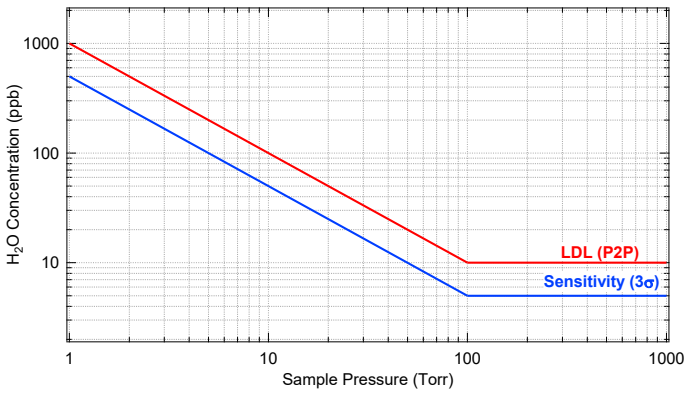
Contact us for additional analytes and matrices.
U.S. Patent # 7,277,177

Dimensions	H x W x D [in (mm)]
Standard sensor	8.73 x 8.57 x 26.4 (222 x 218 x 670)
(incl. shutoff valves)	
Sensor rack	8.73 x 19.0 x 26.4 (222 x 483 x 670)
(fits up to two sensors)	

Weight	
Standard sensor	30 lbs (13.6 kg)

Electrical	
Alarm indicators	2 user programmable
	1 system fault
	Form C relays
Power requirements	90 – 240 VAC, 50/60 Hz
Power consumption	40 Watts max.
Signal output	Isolated 4–20 mA per sensor
User interfaces	5.7" LCD touchscreen
	10/100 Base-T Ethernet
	802.11g Wireless (optional)
	RS-232

Detection Limit and Sensitivity in Concentration Units (ppb)



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