

**PRODUCT DATASHEET**

# HALO™ RP

## REDUCED-PRESSURE TRACE LEVEL ANALYZER



**Designed for trace level analysis at reduced pressure conditions and available for the detection of H<sub>2</sub>O or HF, the HALO RP offers:**

- Low parts per billion (ppb) detection capability in inert, acid, and hydride background gases
- Absolute measurement (freedom from calibration gases)
- Wide dynamic range – over four orders of magnitude
- Low cost of ownership and operational simplicity
- Clean technology – no external calibration gases required
- CRDS technology, designated by SEMI-F112 06-13 Standard

## Protect Your Product with the HALO RP

It's one thing to be monitoring and have high confidence in your high purity bulk and speciality gases at the post-purifier stage but a lot can change as that same gas then travels through the various fab distribution systems and arrives at the equipment or process chamber. Unless you are monitoring close to the substrate or in the process chamber exhaust, there is risk that high partial pressures of moisture are present during processing, resulting in defects causing yield loss and reliability issues.

For example, in semiconductor fabrication, moisture or hydrogen fluoride present in low-temperature epitaxy (LTE) can affect the quality and strain of the epi layers. In MOCVD processing with hydride gases, excess moisture can lead to significant reduction in luminescence and yield loss.

This is where Process Insights comes in. Able to operate in a pressure range from 50 Torr to 15 psig, the HALO RP trace level analyzer provides users with the unmatched accuracy, reliability, speed of response and ease of operation that users of Tiger Optics' analyzers have come to expect. The HALO RP is available for two different analytes, H<sub>2</sub>O and HF, to ensure that your product is protected from all harmful molecules.

Monitoring for contaminants close to the substrate or in the process chamber exhaust, significantly reduces the risk of process issues that cause product yield losses.

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## Specifications

### Performance

<b>Operating range:</b>	See table below
<b>Detection limit (LDL, 3<math>\sigma</math>/24h):</b>	See table below
<b>Precision (1<math>\sigma</math>, greater of):</b>	$\pm 1\%$ or 1/3 of LDL
<b>Accuracy (greater of):</b>	$\pm 4\%$ or LDL
<b>Speed of response:</b>	< 3 minutes to 95%
<b>Environmental conditions:</b>	10°C to 40°C, 30% to 80% RH (non-condensing)
<b>Storage temperature:</b>	-10°C to 50°C

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### Gas Handling System and Conditions\*

<b>Wetted materials:</b>	316L stainless steel (corrosive gas version optional), 10 Ra surface finish
<b>Gas connections:</b>	1/4" male VCR inlet and outlet
<b>Leak tested to:</b>	1 x 10 <sup>-9</sup> mbar l / sec
<b>Inlet pressure:</b>	50 Torr – 15 psig (0.07 – 2 bara)
<b>Outlet pressure:</b>	<10 Torr (13 mbar)
<b>Flow rate:</b>	0.1 to 1.0 slpm
<b>Sample gases:</b>	N <sub>2</sub> , H <sub>2</sub> , Ar, He, HCl, and others
<b>Gas temperature:</b>	Up to 60°C

## Dimensions & Weight

**Standard sensor** (incl. shutoff valves): H × W × D: 8.73 x 8.57 x 26.4 in (222 x 218 x 670 mm)

**Sensor rack** (fits up to two sensors): H × W × D: 8.73 x 19.0 x 26.4 in (222 x 483 x 670 mm)

**Standard sensor weight:** 30 lbs (13.4 kg)

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## Electrical and Interfaces

<b>Platform:</b>	Max series analyzer
<b>Alarm indicators:</b>	2 user programmable, 1 system fault, Form C relays
<b>Power requirements:</b>	90 – 240 VAC, 50/60 Hz
<b>Power consumption:</b>	40 Watts max.
<b>Signal output:</b>	Isolated 4–20 mA
<b>User interfaces:</b>	5.7" LCD touchscreen, 10/100 Base-T Ethernet USB, RS-232, RS-485 Modbus TCP (optional)
<b>Data storage:</b>	Internal or external flash drive
<b>Certification:</b>	CE Mark

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## HALO RP H<sub>2</sub>O – Trace Moisture Analyzer (Standard Model)

Performance in H <sub>2</sub> O:	Range	LDL (3σ)	Precision (1σ) @ zero
In Nitrogen	0 – 20 ppm	1.5 ppb	0.5 ppb
In Argon	0 – 20 ppm	1.5 ppb	0.5 ppb
In Hydrogen <sup>‡</sup>	0 – 20 ppm	1.5 ppb	0.5 ppb
In Helium	0 – 12 ppm	1.0 ppb	0.3 ppb
In Clean Dry Air (CDA)	0 – 20 ppm	1.5 ppb	0.5 ppb
In HCl <sup>†,‡</sup>	0 – 25 ppm	3 ppb	1.0 ppb
In CO <sup>‡</sup>	0 – 20 ppm	2 ppb	0.7 ppb
In Phosphine <sup>‡</sup>	0 – 10 ppm	9 ppb	3 ppb
In Germane <sup>‡</sup>	0 – 18 ppm	20 ppb	7 ppb

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## HALO RP H<sub>2</sub>O – Trace Moisture Analyzer (Arsine Model)

Performance in H <sub>2</sub> O:	Range	LDL (3σ)	Precision (1σ) @ zero
In Arsine <sup>‡</sup>	0 – 10 ppm	5 ppb	2 ppb
In Nitrogen	0 – 6 ppm	1.0 ppb	0.3 ppb
In Helium	0 – 3 ppm	1.0 ppb	0.3 ppb

## HALO RP HF — Trace Hydrogen Fluoride Analyzer

Performance in HF:	Range	LDL (3 $\sigma$ )	Precision (1 $\sigma$ ) @ zero
In Nitrogen	0 – 10 ppm	0.75 ppb	0.25 ppb
In BF <sub>3</sub> <sup>‡</sup>	0 – 13 ppm	0.9 ppb	0.3 ppb

\* Vacuum source required

† May require corrosive gas version, please contact us for more information

‡ Low leak rate vacuum pump (safety certified for service in relevant gas) required

Contact us for additional analytes and matrices.

U.S. Patent # 7,277,177

## GAIN REAL-TIME INSIGHT INTO YOUR PROCESS

Process Insights delivers premium analytical sensors, analyzers, instrumentation, software and solutions that are mission-critical to keep your operations, personnel, and the environment safe. Our commitment to customer satisfaction is evident through our diverse range of products, programs, and services, designed to accommodate various budgets and application needs.

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