

**PRODUCT DATASHEET**

# HALO 3 H<sub>2</sub>O™

TRACE LEVEL MOISTURE ANALYZER



## Designed for trace level moisture analysis, the HALO 3 H<sub>2</sub>O offers:

- Sub parts per billion (ppb) moisture detection capability in an array of 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
- Low gas consumption to conserve rare and costly gas
- Versatility—trace-level detection in various gas matrices

The HALO 3 H<sub>2</sub>O™ analyzer provides users with the unmatched accuracy, reliability, speed of response and ease of operation that users of our analyzers know and expect. Featuring our powerful Cavity Ring-Down Spectroscopy-based moisture sensor in a very compact and economic analyzer design, this versatile analyzer allows users to measure moisture in most inert, corrosive and toxic gases with just one device. Users also enjoy freedom from requirements such as periodic sensor maintenance, span calibrations, purifier replacement and pump rebuilds. As a result, the HALO 3 H<sub>2</sub>O analyzer is ideally suited to many applications where moisture measurement is extremely critical. These applications include fixed bulk gas continuous quality control, portable mobile analytical carts, process tool monitoring, air separation, gas cylinder quality control and many other demanding applications.

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## Specifications

### Performance

<b>Operating range:</b>	See table on next page
<b>Detection limit (LDL, 3<math>\sigma</math>/24h):</b>	See table on next page
<b>Precision (1<math>\sigma</math>, greater of):</b>	$\pm$ 0.75% or 1/3 of LDL
<b>Accuracy (greater of):</b>	$\pm$ 4% or LDL
<b>Speed of response:</b>	< 1 minute to 90%
<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>	10 – 125 psig (1.7 – 9.6 bara)
<b>Flow rate:</b>	0.05 to 1.8 slpm
<b>Sample gases:</b>	Most inert, toxic, passive and corrosive matrices
<b>Gas temperature:</b>	Up to 60°C

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### Dimensions & Weight

<b>Standard sensor:</b>	H x W x D: 8.73 x 8.57 x 23.6 in (222 x 218 x 599 mm)
<b>Sensor rack</b> (fits up to two sensors):	H x W x D: 8.73 x 19.0 x 23.6 in (222 x 483 x 599 mm)
<b>Standard sensor weight:</b>	28 lbs (12.7 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 per sensor
<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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## Performance, H<sub>2</sub>O

		Range	LDL (3σ)	Precision (1σ) @ zero
INERT/PASSIVE GASES	In Nitrogen:	0 – 20 ppm	1.2 ppb	0.4 ppb
	In Helium :	0 – 4 ppm	0.25 ppb	0.1 ppb
	In Argon:	0 – 9 ppm	0.6 ppb	0.2 ppb
	In Hydrogen:	0 – 16 ppm	1.0 ppb	0.4 ppb
	In Deuterium ( <sup>2</sup> H <sub>2</sub> ):	0 – 14 ppm	0.9 ppb	0.3 ppb
OXYGENATED GASES	In Oxygen:	0 – 12 ppm	0.7 ppb	0.25 ppb
	In Clean Dry Air (CDA):	0 – 18 ppm	1.2 ppb	0.4 ppb
	In CO:	0 – 24 ppm	1.5 ppb	0.5 ppb
	In CO <sub>2</sub> standard:	0 – 25 ppm	2.0 ppb	0.7 ppb
	In CO <sub>2</sub> high range:	0 – 70 ppm	8 ppb	3 ppb
RARE GASES	In SO <sub>2</sub> :	0 – 60 ppm	4 ppb	1.2 ppb
	In Neon:	0 – 5 ppm	0.3 ppb	0.1 ppb
	In Krypton:	0 – 11 ppm	0.6 ppb	0.2 ppb
CORROSIVE GASES	In Xenon:	0 – 13 ppm	0.8 ppb	0.3 ppb
	In Cl <sub>2</sub> *:	0 – 25 ppm	1.5 ppb	0.5 ppb
	In HCl†:	0 – 50 ppm	3 ppb	1.0 ppb
FLUORINATED GASES	In HBr*:	0 – 100 ppm	12 ppb	4 ppb
	In SF <sub>6</sub> :	0 – 15 ppm	1.0 ppb	0.4 ppb
	In NF <sub>3</sub> :	0 – 20 ppm	2.5 ppb	0.9 ppb
	In CF <sub>4</sub> :	0 – 15 ppm	4 ppb	1.2 ppb
	In C <sub>2</sub> F <sub>6</sub> :	0 – 15 ppm	3 ppb	1.0 ppb
	In C <sub>3</sub> F <sub>8</sub> :	0 – 20 ppm	3 ppb	1.0 ppb
	In C <sub>4</sub> F <sub>6</sub> :	0 – 25 ppm	150 ppb	50 ppb
	In C <sub>4</sub> F <sub>8</sub> :	0 – 20 ppm	3 ppb	1.0 ppb
HYDRIDE GASES	In C <sub>5</sub> F <sub>8</sub> :	0 – 32 ppm	30 ppb	10 ppb
	In H <sub>2</sub> S:	0 – 40 ppm	200 ppb	70 ppb
	In H <sub>2</sub> Se‡:	0 – 70 ppm	30 ppb	10 ppb
	In 1% GeH <sub>4</sub> /99% H <sub>2</sub> mixture:	0 – 16 ppm	7 ppb	2.5 ppb
In 10% GeH <sub>4</sub> /90% H <sub>2</sub> mixture:	0 – 16 ppm	35 ppb	12 ppb	

\*Corrosive gas version required

†Corrosive gas version recommended for H<sub>2</sub>O concentration that could exceed 1 ppm

‡Detection in H<sub>2</sub>Se requires special analyzer configuration dedicated to service in H<sub>2</sub>Se. Contact us for more information

Contact us for additional analytes, matrices and ranges.

U.S. Patent # 7,277,177

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