



# HALO 3 HF

## Trace Level Hydrogen Fluoride Analyzer

GASES & CHEMICALS

CEMS

ENERGY

ATMOSPHERIC

SEMI & HB LED

SYNGAS

LABORATORY

### The HALO 3 HF offers:

- Low single-digit parts per billion (ppb) detection capability
- Absolute measurement (freedom from calibration gases)
- Wide dynamic range
- Low cost of ownership and operational simplicity
- Clean technology – no external calibration gases required
- Compact analyzer footprint

The HALO 3 HF trace level hydrogen fluoride gas analyzer provides users with the unmatched accuracy, reliability, speed of response and ease of operation that users of Tiger Optics' analyzers have come to know and expect. Featuring Tiger Optics' proven Cavity Ring-Down Spectroscopy-based trace gas sensor in a very compact and economic analyzer design, this versatile instrument allows users to measure HF in most inert and passive 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 is ideally suited to many applications where HF impurities are extremely critical, such as nitrogen trifluoride (NF<sub>3</sub>) and carbon tetrafluoride (CF<sub>4</sub>) production and semiconductor utilization.

**Tiger**optics

21<sup>ST</sup> CENTURY SPECTROSCOPY

# HALO 3 HF

## Trace Level Hydrogen Fluoride Analyzer



Performance	
Operating range	See table below
Detection limit (LDL, 24 h peak-to-peak variation)	See table below
Sensitivity (3 $\sigma$ )	See table below
Precision (1 $\sigma$ , greater of)	$\pm$ 0.75% or 1/3 of Sensitivity
Accuracy (greater of)	$\pm$ 4% or 1/2 of LDL
Speed of response	< 1 minute to 90%
Environmental conditions	10°C – 40°C 30% – 80% RH (non-condensing)
Storage temperature	-10°C – 50°C

Gas Handling System and Conditions	
Wetted materials	316L stainless steel (optional Hastelloy <sup>®</sup> ) 10 Ra surface finish
Gas connections	1/4" male VCR inlet and outlet
Leak tested to	1 x 10 <sup>-9</sup> mbar l / sec
Inlet pressure	10 – 125 psig (1.7 – 9.6 bara)
Flow rate	Up to 1.8 slpm
Sample gases	Most inert, toxic, passive and corrosive matrices
Gas temperature	Up to 60°C

Performance, HF:	Range	LDL	Sensitivity
In Nitrogen	0 – 5 ppm	0.5 ppb	0.4 ppb
In NF <sub>3</sub>	0 – 7.5 ppm	0.75 ppb	0.6 ppb
In CF <sub>4</sub>	0 – 6 ppm	1.0 ppb	0.8 ppb

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

Dimensions	H x W x D [in (mm)]
Standard sensor	8.75 x 8.5 x 23.6 (222 x 216 x 599)
Sensor rack (fits up to two sensors)	8.75 x 19 x 23.6 (222 x 483 x 599)
Weight	
Standard sensor	28 lbs (12.7 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

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