Process Insights™

Premium Insights Into Process

HIGH-PURITY PRODUCT GUIDE

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HIGH-PERFORMANCE GAS ANALYZERS FOR HIGH PURITY APPLICATIONS

SPARK

The Spark family offers the best balance of detection performance and cost. Designed for high-efficiency process monitoring applications, Spark analyzers are easy to install and use, require no maintenance, and deliver part-per-billion detection performance for common analytes, such as H_2O, CO, CO_2, CH_4, C_2H_2 and more. Typical applications for Spark analyzers include unmanned air separation units (ASUs), truck fill operations and cylinder analysis for bulk and select specialty gases of industrial and High-Purity grade. Pre-purifier measurements in UHP gas facilities also frequently use Spark analyzers as process monitors.

Spark Series

Spark CH_4

This analyzer is ideal for monitoring methane impurities in highly automated operations due to its affordable price, 24/7 operation, and zero maintenance.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA

Select Specifications

Detection	Range	LDL (3σ/24h)
CH_4 in N_2	0 – 80 ppm	7.5 ppb
CH_4 in Ar	0 – 70 ppm	6.5 ppb
CH_4 in He	0 – 50 ppm	6 ppb
CH_4 in H_2	0 – 80 ppm	7.5 ppb
CH_4 in O_2	0 – 50 ppm	6 ppb
CH_4 in CDA	0 – 80 ppm	7.5 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price

Applications
- Industrial gas QC
- Air separation units (safety and process control)
- Fuel-cell hydrogen analysis

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Spark+ CO

This analyzer extends the affordable and reliable Spark series to the detection of trace carbon monoxide in a variety of bulk and industrial gases.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA

Select Specifications

Detection	Range	LDL (3σ/24h)
CO in N_2	0 – 2000 ppm	120 ppb
CO in O_2	0 – 1800 ppm	110 ppb
CO in He	0 – 1800 ppm	110 ppb
CO in H_2	0 – 2500 ppm	150 ppb
CO in CDA	0 – 2000 ppm	120 ppb
CO in Ar	0 – 1600 ppm	100 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price

Applications
- Industrial gas QC
- ASU process control
- Truck fill measurements
- Fuel-cell hydrogen analysis

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

Spark Series

Spark CO_2

Carbon dioxide is a very common contaminant and can especially cause harm when gases are liquified. The Spark CO_2 offers an easy way to monitor this impurity before cryogenic transport and storage.

Available Background Gases

N_2 • He • Ar • H_2 • O_2 • CDA

Select Specifications

Detection	Range	LDL (3σ/24h)
CO_2 in N_2	0 – 1500 ppm	250 ppb
CO_2 in O_2	0 – 1200 ppm	220 ppb
CO_2 in He	0 – 1200 ppm	220 ppb
CO_2 in H_2	0 – 2000 ppm	400 ppb
CO_2 in CDA	0 – 1500 ppm	250 ppb
CO_2 in Ar	0 – 1200 ppm	220 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price
- Wide dynamic range

Applications

- Industrial gas QC
- ASU process control
- Fuel-cell hydrogen analysis

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Spark C_2H_2

This analyzer provides a much more convenient way to monitor acetylene in many safety-critical applications compared to cumbersome GCs and NDIRs.

Available Background Gases

N_2 • O_2 • CDA

Select Specifications

Detection	Range	LDL (3σ/24h)
C_2H_2 in N_2	0 – 80 ppm	8 ppb
C_2H_2 in O_2	0 – 70 ppm	7 ppb
C_2H_2 in CDA	0 – 80 ppm	8 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price

Applications

- Industrial gas QC
- Air separation units (safety and process control)

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

Spark Series

Spark H_2O

Our lowest cost moisture analyzer, ideal for industrial process and quality control. The Spark makes CRDS analysis affordable, while maintaining high levels of performance.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA • Ne • Kr • Xe • SF_6 • CF_4

Select Specifications
(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in N_2	0 – 2000 ppm	12 ppb
H_2O in Ar	0 – 900 ppm	4.5 ppb
H_2O in H_2	0 – 1750 ppm	7.5 ppb
H_2O in O_2	0 – 1000 ppm	6 ppb
H_2O in CDA	0 – 1800 ppm	10 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price
- Extremely wide dynamic range

Applications
- Industrial gas QC
- Air separation units
- Truck and cylinder fill measurements
- Fuel-cell hydrogen analysis
- Medical gases

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- Linear fit mode
- Dew point measurement
- 19" rack mount
- Environmental enclosure

See website for more details

Spark H_2O in CO_2

Affordable & reliable, just like the Spark H_2O, with the additional capability of detecting sub-ppm moisture in pure CO_2. This analyzer is the ideal choice for industries requiring moisture analysis in CO_2 and inert gases.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA • CO • CO_2

Select Specifications
(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in CO_2	0 – 600 ppm	550 ppb
H_2O in N_2	0 – 500 ppm	7.5 ppb
H_2O in O_2	0 – 250 ppm	7.5 ppb
H_2O in CDA	0 – 450 ppm	7.5 ppb
H_2O in CO	0 – 480 ppm	7 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Affordable price

Applications
- Industrial gas QC
- ASU process control
- Truck fill measurements
- Beverage CO_2 analysis
- Gas-cooled nuclear reactors

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- Linear fit mode
- Dew point measurement
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

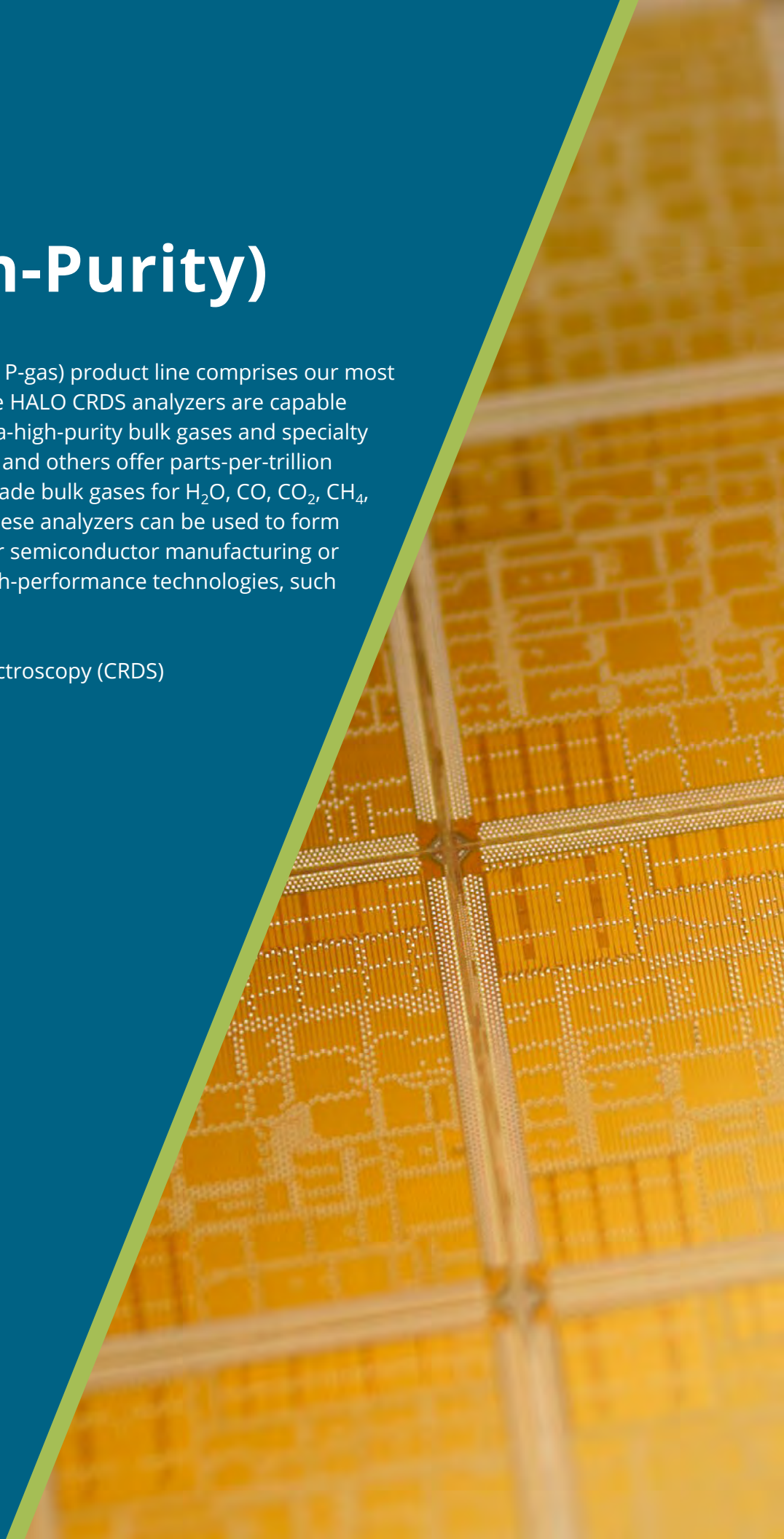
Environmental CEM & GHG

Water Analysis

HALO (Ultra-High-Purity)

The HALO Ultra-High-Purity Gas (or P-gas) product line comprises our most powerful trace gas analyzers. These HALO CRDS analyzers are capable of detecting trace impurities in ultra-high-purity bulk gases and specialty gases. The HALO KA Max, Max QCL and others offer parts-per-trillion detection capability in electronic-grade bulk gases for H_2O, CO, CO_2, CH_4, NH_3, O_2, H_2, and more. Together, these analyzers can be used to form complete ppt-level CQC systems for semiconductor manufacturing or used in combination with other high-performance technologies, such as APIMS.

Technology: Cavity Ring-Down Spectroscopy (CRDS)



HALO (Ultra-High-Purity)

HALO Max QCL CO NEW!

This QCL-based system allows for fast and continuous real-time measurements, eliminating batch processing techniques commonly found with GCs. Additionally, QCL-CRDS eliminates the need for regular calibration and provides the most sensitive CO measurement with the lowest operating cost.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA

Specifications

Detection	Range	LDL (3σ/24h)
CO in N_2	0 – 0.5 ppm	200 ppt
CO in He	0 – 0.35 ppm	130 ppt
CO in Ar	0 – 0.4 ppm	150 ppt
CO in H_2	0 – 0.5 ppm	200 ppt
CO in O_2	0 – 0.45 ppm	170 ppt
CO in CDA	0 – 0.5 ppm	200 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- Fast, real-time measurements – no batch processing
- No consumables or maintenance
- No expensive carrier gas required

Applications
- UHP Gas quality control
- Semiconductor bulk gas

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software

See website for more details

HALO Max QCL CO_2 NEW!

This system is also based on QCL-CRDS and offers extremely low detection limits for carbon dioxide (CO_2) without the need for user calibration or regular maintenance. It also eliminates batch processing common with GCs.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA

Specifications

Detection	Range	LDL (3σ/24h)
CO_2 in N_2	0 – 2.5 ppm	100 ppt
CO_2 in He	0 – 2 ppm	90 ppt
CO_2 in Ar	0 – 2 ppm	80 ppt
CO_2 in H_2	0 – 4 ppm	180 ppt
CO_2 in O_2	0 – 2 ppm	90 ppt
CO_2 in CDA	0 – 2.5 ppm	100 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- Fast, real-time measurements – no batch processing
- No consumables or maintenance
- No expensive carrier gas required

Applications
- UHP Gas quality control
- Semiconductor bulk gas

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Requires inert purge gas for maximum performance

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (Ultra-High-Purity)

HALO KA Max H_2O

Our highest performing moisture analyzer. The ultimate trace gas analyzer for the highest purity bulk gases used in advanced semiconductor manufacturing.

Available Background Gases
N_2 • He • Ar • H_2 • O_2 • CDA

Select Specifications
(see website for more)

Detection	Range	LDL*
H_2O in N_2	0 – 5 ppm	100 ppt
H_2O in He	0 – 1 ppm	100 ppt
H_2O in H_2	0 – 4 ppm	100 ppt
H_2O in O_2	0 – 2.5 ppm	100 ppt
H_2O in CDA	0 – 4 ppm	100 ppt

*The LDL is defined as 3σ over 24h or the H_2O drydown limit, whichever is higher.

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- Fast, real-time measurements – no batch processing
- No consumables or maintenance

Applications
- UHP Gas quality control
- Semiconductor bulk gas

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- 19" rack mount

See website for more details

HALO KA Max NH_3

Our highest performing ammonia analyzer. The ultimate trace gas analyzer for the highest purity bulk gases used in advanced semiconductor manufacturing.

Available Background Gases
N_2

Specifications

Detection	Range	LDL (3σ/24h)
NH_3 in N_2	0 – 7 ppm	150 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance

Applications
- UHP Gas quality control
- Semiconductor bulk gas

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- 19" rack mount

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

HALO (Ultra-High-Purity)

HALO KA Max CH_4

Our highest performing methane analyzer. The ultimate trace gas analyzer for the highest purity bulk gases used in advanced semiconductor manufacturing.

Available Background Gases

N_2 • He • Ar • H_2 • O_2

Specifications

Detection	Range	LDL (3σ/24h)
CH_4 in N_2	0 – 8 ppm	500 ppt
CH_4 in He	0 – 5 ppm	400 ppt
CH_4 in Ar	0 – 7 ppm	450 ppt
CH_4 in H_2	0 – 8 ppm	500 ppt
CH_4 in O_2	0 – 7 ppm	500 ppt

Features and Benefits

- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance

Applications

- UHP Gas quality control
- Semiconductor bulk gas

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- 19" rack mount

See website for more details

HALO KA H_2O

The state-of-art trace moisture analyzer for high purity bulk and specialty gases used in semiconductor manufacturing and other High-Purity applications.

Available Background Gases

N_2 • He • Ar • H_2 • D_2 • O_2 • CDA • CO • CO_2 • GeH_4 (mix) • COS • Ne • Kr • Xe • Cl_2 • HCl • HBr • SF_6 • NF_3 • C_xF_y

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in N_2	0 – 20 ppm	300 ppt
H_2O in He	0 – 4 ppm	100 ppt
H_2O in H_2	0 – 16 ppm	200 ppt
H_2O in O_2	0 – 10 ppm	150 ppt
H_2O in CO_2	0 – 25 ppm	800 ppt

Features and Benefits

- Part-per-trillion detection limits
- Calibration-free with zero drift
- Fast speed of response
- Large selection of gas matrices
- No consumables or maintenance

Applications

- UHP Gas quality control
- Semiconductor bulk gas
- Industrial gas QC
- High-Purity CO_2
- Etch and cleaning gases
- Fluorinated gases

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- Corrosion-resistant model
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (Ultra-High-Purity)

HALO OK

The world's only all-optical ultra-trace oxygen analyzer. Ideal addition to HALO KA/KA Max analyzers for purity monitoring of semi bulk gases.

Available Background Gases

N_2 • He • Ar • H_2 • CO_2

Select Specifications

Detection	Range*	LDL (3σ/24h)
O_2 in N_2	0 – 2.5 ppm	200 ppt
O_2 in He	0 – 0.5 ppm	50 ppt
O_2 in Ar	0 – 1 ppm	90 ppt
O_2 in H_2	0 – 2 ppm	150 ppt
O_2 in CO_2†	0 – 5 ppm	5000/1000 ppt‡

*Higher range model available
†Special configuration required, must be specified at time of order.
‡LDL of 1000 ppt requires addition of TIGER OPTICS' Zero Gas Panel and Linear Fit Mode.

Features and Benefits

- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No false spiking or false positives

Applications

- UHP Gas quality control
- Semiconductor bulk gas
- Oxygen analysis in CO_2
- Fuel-cell hydrogen analysis

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Requires H_2 utility gas

See website for more details

HALO H2 NEW!

The HALO H2 analyzer enables optical detection of hydrogen impurities, making this analyzer perfect for numerous applications. New: low-range model with ppt-level detection limits.

Available Background Gases

N_2 • He • Ar • O_2 • CDA

Select Specifications

(see website for more)

Detection	Range*	LDL (3σ/24h)
H_2 in N_2	0 – 20 ppm	0.3 ppb
H_2 in He	0 – 4 ppm	0.10 ppb
H_2 in Ar	0 – 9 ppm	0.13 ppb
H_2 in O_2	0 – 1000 ppm	15 ppb
H_2 in CDA	0 – 1000 ppm	15 ppb

*Specifications shown are for low-range model; see website for higher ranges

Features and Benefits

- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- Virtually maintenance-free

Applications

- UHP Gas quality control
- Semiconductor bulk gas
- Quality control for process gas or bulk gas systems

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Requires N_2/O_2 mixture or CDA utility gas

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (High-Purity)

The HALO analyzers for High-Purity or G-gas are our most versatile and established family of trace gas analyzers. Considered by many to be the “gold standard” of trace gas analysis, these HALO CRDS analyzers serve a wide range of applications from High-Purity bulk gas to specialty gas analysis. The HALO 3 line offers a versatile selection of part-per-billion-level analyzers for detecting H_2O, CO, CO_2, CH_4, NH_3, CH_2O and more. Many HALO systems are available for detecting trace contaminants in specialty gases, such as corrosives, hydrides, fluorocarbons, oxides and so on. And specially designed low pressure analyzers, such as the HALO RP and QRP, can detect residual H_2O in vacuum chambers and semiconductor deposition tools.

Technology: Cavity Ring-Down Spectroscopy (CRDS)

HALO (High-Purity)

HALO 3 CO

Improved detection limits for carbon monoxide (CO) make this analyzer a compelling solution for various applications from air separation to fuel-cell hydrogen analysis.

Available Background Gases

N_2 • He • Ar • H_2 • O_2 • CDA

Specifications

Detection	Range	LDL (3σ/24h)
CO in N_2	0 – 2000 ppm	40 ppb
CO in O_2	0 –1800 ppm	35 ppb
CO in CDA	0 – 2000 ppm	40 ppb
CO in Ar	0 – 1600 ppm	30 ppb
CO in He	0 – 1800 ppm	35 ppb
CO in H_2	0 – 2500 ppm	50 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications

- UHP Gas quality control
- Industrial gas QC
- Air separation units
- Certified reference materials and calibration gases
- Research & development
- Fuel-cell hydrogen analysis
- Syngas and fuel gas

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

HALO 3 H_2O

Our most versatile moisture analyzer, with sub-ppb detection limits, excellent range, and a large selection of background gases. The HALO 3 is the moisture analyzer of choice in many industries.

Available Background Gases

N_2 • He • Ar • H_2 • D_2 • O_2 • CDA • CO • CO_2 • GeH_4 (mix) • SO_2 • COS • Ne • Kr • Xe • Cl_2 • HCl • HBr • H_2S • H_2Se • SF_6 • NF_3 • C_xF_y

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in N_2	0 – 20 ppm	1.2 ppb
H_2O in He	0 – 4 ppm	0.25 ppb
H_2O in H_2	0 – 16 ppm	1.0 ppb
H_2O in O_2	0 – 12 ppm	0.7 ppb
H_2O in CO_2	0 – 25 ppm	2 ppb

Features and Benefits

- Sub-part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- Large selection of background gas matrices
- No consumables or maintenance

Applications

- UHP Gas quality control
- Semiconductor bulk gas
- Industrial gas QC
- Air separation units
- Fluorinated gases
- Gas standard preparation
- Gas-cooled nuclear reactors

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- Corrosion-resistant model
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (High-Purity)

HALO 3 NH_3

This analyzer offers a variety of ranges for ammonia analysis in bulk gases, plus an "N_2O model" for analysis of NH_3 in pure nitrous oxide.

Available Background Gases

N_2 • H_2 • CO_2 • N_2O

Select Specifications

Detection	Range	LDL (3σ/24h)
NH_3 in N_2*	0 – 35 ppm	2.5 ppb
NH_3 in H_2*	0 – 30 ppm	2.0 ppb
NH_3 in CO_2	0 – 30 ppm	2.5 ppb
NH_3 in N_2O†	0 – 200 ppm	10 ppb/50 ppb

*Higher and lower ranges available
†Available with "N_2O model", lower LDL requires vacuum pump

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance
- Multiple detection ranges available

Applications

- UHP Gas quality control
- Industrial gas QC
- Fuel-cell hydrogen analysis
- Gas standard preparation

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- Environmental enclosure
- Vacuum pump may be required for N_2O model

See website for more details

HALO 3 CH_4

Methane is a key indicator for hydrocarbon impurities in gases. This analyzer is designed to measure trace CH_4 down to low ppb levels to ensure bulk gases and standard cylinders are free from harmful hydrocarbons.

Available Background Gases

N_2 • He • Ar • H_2 • O_2

Specifications

Detection	Range	LDL (3σ/24h)
CH_4 in N_2	0 – 8 ppm	1.6 ppb
CH_4 in He	0 – 5 ppm	1.1 ppb
CH_4 in Ar	0 – 7 ppm	1.4 ppb
CH_4 in H_2	0 – 8 ppm	1.6 ppb
CH_4 in O_2	0 – 6 ppm	1.1 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance
- Custom detection ranges available

Applications

- UHP Gas quality control
- Industrial gas QC
- Air separation units
- Gas standard preparation

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

HALO (High-Purity)

HALO 3 HF

This analyzer specializes in monitoring trace HF down to sub-ppb levels in fluorinated specialty gases, as well as common inert bulk gases.

Available Background Gases

N_2 • He • SF_6 • NF_3 • C_xF_y

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
HF in N_2	0 – 5 ppm	0.4 ppb
HF in He	0 – 1.3 ppm	0.4 ppb
HF in SF_6	0 – 8 ppm	1.2 ppb
HF in NF_3	0 – 7.5 ppm	0.6 ppb
HF in CF_4	0 – 6 ppm	0.8 ppb

Features and Benefits

- Part-per-trillion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications

- UHP Gas quality control
- Fluorocarbon chemistry
- Semiconductor specialty gas
- Gas standard preparation

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

HALO 3 HCl

High sensitivity, fast speed of response and maximum ease of use make this system ideal for detecting trace HCl in various industrial and research applications.

Available Background Gases

N_2 • H_2 • CDA

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
HCl in N_2	0 – 20 ppm	1.0 ppb
HCl in CDA	0 – 20 ppm	1.0 ppb
HCl in H_2	0 – 10 ppm	1.0 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications

- UHP Gas quality control
- CEM standard preparation
- Fuel-cell hydrogen analysis
- Research & development
- High-purity gas systems
- Gas mixtures

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (High-Purity)

HALO 3 CO_2

This analyzer offers single-digit ppb-level detection of trace carbon dioxide (CO_2) for bulk gas applications.

Available Background Gases
N_2 • He • Ar • O_2 • CDA • HCl

Select Specifications
(see website for more)

Detection	Range	LDL (3σ/24h)
CO_2 in N_2	0 – 25 ppm	8 ppb
CO_2 in He	0 – 25 ppm	8 ppb
CO_2 in Ar	0 – 25 ppm	8 ppb
CO_2 in O_2	0 – 25 ppm	8 ppb
CO_2 in CDA	0 – 25 ppm	8 ppb
CO_2 in HCl	0 – 30 ppm	9 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications
- UHP Gas quality control
- Industrial gas QC
- Air separation units
- Certified reference materials and calibration gases
- Research & development
- Fuel-cell hydrogen analysis
- Syngas and fuel gas

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

HALO 3 CH_2O

This model detects trace amounts of formaldehyde in the low-ppb range. It is ideal for the preparation of CH_2O air quality gas standards and the analysis of fuel-cell hydrogen.

Available Background Gases
N_2 • H_2

Specifications

Detection	Range	LDL (3σ/24h)
CH_2O in N_2	0 – 40 ppm	5 ppb
CH_2O in H_2	0 – 40 ppm	6 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications
- UHP Gas quality control
- Industrial gas QC
- Fuel-cell hydrogen analysis
- Gas standard preparation
- Research & development

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

HALO (High-Purity)

HALO 3 D_2O/HDO

Deuterium (D_2) is used in various applications from research to the manufacturing of optical fibers. Moisture impurities in D_2 are therefore a combination of the heavy water isotopes D_2O and HDO. This analyzer is designed to detect traces of both molecules.

Available Background Gases

N_2 • D_2 ($^2H_2$)

Specifications

Detection	Range	LDL (3σ/24h)
D_2O in D_2	0 – 20 ppm	3 ppb
D_2O in N_2	0 – 50 ppm	7 ppb
HDO in D_2	0 – 30 ppm	5 ppb
HDO in N_2	0 – 40 ppm	6 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications

- Research & development
- Optical fiber manufacturing
- Semiconductor fabrication
- Healthcare & pharmaceuticals

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- 19" rack mount
- Environmental enclosure

See website for more details

HALO LP H_2O

The HALO LP is designed for the detection of trace moisture in hydrides, such as ammonia, phosphine and arsine, which are used in the production of LEDs and semiconductor devices.

Available Background Gases

N_2 • He • Ar • H_2 • NH_3 • PH_3 • AsH_3 • GeH_4 • SiH_4 • NO

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in NH_3	0 – 20 ppm	9 ppb
H_2O in PH_3	0 – 10 ppm	9 ppb
H_2O in N_2	0 – 6 ppm	1.0 ppb
H_2O in NO	0 – 100 ppm	16 ppb
H_2O in AsH_3*	0 – 10 ppm	5 ppb

*Detection in arsine requires special model

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance
- Low-pressure operation for interference-free detection

Applications

- High-brightness LED production
- Semiconductor specialty gas
- UHP ammonia QC
- MOCVD

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Speed+ performance upgrade
- Environmental enclosure
- 19" rack mount
- Requires vacuum pump

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

HALO (High-Purity)

HALO RP H_2O

This HALO RP model detects moisture impurities in chambers and semiconductor process tools down to 50 Torr of pressure in various background gases, including purge, cleaning and process gases.

Available Background Gases
N_2 • He • Ar • H_2 • CO • NH_3 • PH_3 • AsH_3 • HCl

Select Specifications
(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in N_2	0 – 20 ppm	1.5 ppb
H_2O in H_2	0 – 20 ppm	1.5 ppb
H_2O in HCl	0 – 25 ppm	3 ppb
H_2O in PH_3	0 – 25 ppm	3 ppb
H_2O in AsH_3	0 – 10 ppm	5 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance
- Large selection of background gases

Applications
- Epitaxy
- MOCVD

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Requires vacuum pump
- Corrosion-resistant model
- 19" rack mount

See website for more details

HALO RP HF

This HALO RP model detects hydrogen fluoride impurities in low-pressure chambers and semiconductor process tools down to 50 Torr of pressure.

Available Background Gases
N_2 • BF_3

Select Specifications

Detection	Range	LDL (3σ/24h)
HF in N_2	0 – 10 ppm	0.75 ppb
HF in BF_3	0 – 13 ppm	0.9 ppb

*Arsine detection requires special mode

Features and Benefits
- Sub-part-per-billion detection limits
- Calibration-free with zero drift
- Fast speed of response
- No consumables or maintenance

Applications
- Epitaxy
- MOCVD

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Requires vacuum pump
- 19" rack mount

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

HALO (High-Purity)

HALO QRP

This HALO QRP is designed to monitor moisture impurities in state-of-the-art semiconductor process tools at pressures as low as 1 Torr.

Available Background Gases

N_2 • He • Ar • H_2 • HCl

Select Specifications

Detection	Range	LDL (3σ/24h)
H_2O	0 – 12 $mTorr_{pp}$ (1200 ppm @ 10 Torr)	1 $\mu Torr_{pp}$ (100 ppb @ 10 Torr)

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- No consumables or maintenance
- Works over a wide pressure range from 1 Torr to 1000 Torr

Applications

- Epitaxy
- Atomic Layer Deposition (ALD)
- MOCVD

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Requires vacuum pump
- Corrosion-resistant model

See website for more details

HALO H_2O in N_2O

This analyzer specializes on detecting moisture impurities in High-Purity nitrous oxide (N_2O), but also offers ppb detection limits in common bulk gases.

Available Background Gases

N_2 • He • Ar • H_2 • O_2 • N_2O

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
H_2O in N_2O	0 – 20 ppm	7.5 ppb
H_2O in N_2	0 – 15 ppm	2.2 ppb
H_2O in Ar	0 – 6 ppm	1.0 ppb
H_2O in He	0 – 3 ppm	0.5 ppb
H_2O in H_2	0 – 12 ppm	1.9 ppb
H_2O in O_2	0 – 8 ppm	1.2 ppb

Features and Benefits

- Part-per-billion detection limits
- Calibration-free with zero drift
- No consumables or maintenance
- Can be used in N_2O, but also in bulk gases

Applications

- Gas standards preparation
- Medical gas
- Quality control for process gas or bulk gas systems

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- 19" rack mount
- Environmental enclosure

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

T-I MAX (AMC)

The T-I Max product line is designed for ultra-trace impurity detection in semiconductor fabs. Airborne molecular contamination (AMC) in cleanrooms, reticle storage, FOUP cleaning tools and litho secondary filters are just some of the popular applications. The unique design of these analyzers makes them keenly adapted to provide maximum speed of response in semi-humid environments. The T-I Max series masters the challenging parts-per-trillion (ppt) detection of reactive species like HF, HCl or NH_3.

No matter if it is our single-species models or the new T-I Max X2/X3 with multiple contaminants in one unit, the systems are designed for maximum uptime to ensure that your process will not be operating blind to AMC threats.

Technology:
Cavity Ring-Down Spectroscopy (CRDS)

T-I Max (AMC)

T-I Max NH_3

The proven generation of AMC monitors for the most advanced semiconductor fabs. This analyzer monitors ppt-levels of ammonia (NH_3) in real-time in the cleanroom and other critical environments.

Available Background Gases
Cleanroom Air • N_2 • CDA

Specifications

Detection	Range	LDL (3σ@100sec)
NH_3 in Air	0 – 40 ppm	300 ppt
NH_3 in N_2	0 – 40 ppm	300 ppt
NH_3 in CDA	0 – 40 ppm	300 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No maintenance
- Resistant to VOC and particulate contamination

Applications
- Cleanroom AMC monitoring
- FOUP and Pod monitoring
- Reticle storage
- Mobile AMC cart (w/ GO-cart)

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- GO-cart mobile solution
- SmartAlarm™ interference prevention
- External particle filter
- Requires vacuum pump

See website for more details

T-I Max HF

The proven generation of AMC monitors for the most advanced semiconductor fabs. This analyzer monitors ppt-levels of hydrogen fluoride (HF) a in real-time in the cleanroom and other critical environments.

Available Background Gases
Cleanroom Air • N_2 • CDA

Specifications

Detection	Range	LDL (3σ@100sec)
HF in Air	0 – 1 ppm	20 ppt
HF in N_2	0 – 1 ppm	20 ppt
HF in CDA	0 – 1 ppm	20 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No maintenance
- Resistant to VOC and particulate contamination

Applications
- Cleanroom AMC monitoring
- FOUP and Pod monitoring
- Reticle storage
- Mobile AMC cart (w/ GO-cart)

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- GO-cart mobile solution
- SmartAlarm™ interference prevention
- External particle filter
- Requires vacuum pump

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

T-I Max (AMC)

T-I Max HCl

The proven generation of AMC monitors for the most advanced semiconductor fabs. This analyzer monitors ppt-levels of hydrogen chloride (HCl) in real-time in the cleanroom and other critical environments.

Available Background Gases
Cleanroom Air • N_2 • CDA

Specifications

Detection	Range	LDL (3σ@100sec)
HCl in Air	0 – 4 ppm	100 ppt
HCl in N_2	0 – 4 ppm	100 ppt
HCl in CDA	0 – 4 ppm	100 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No maintenance
- Resistant to VOC and particulate contamination

Applications
- Cleanroom AMC monitoring
- FOUP and Pod monitoring
- Reticle storage
- Mobile AMC cart (w/ GO-cart)

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- GO-cart mobile solution
- SmartAlarm™ interference prevention
- External particle filter
- Requires vacuum pump

See website for more details

T-I Max X2 and X3 NEW!

The latest generation AMC monitor now comes in an all-in-one package. This analyzer measures two (X2) or all three (X3) critical molecules, HF, NH_3 and HCl, in one integrated, rack-mountable package to save space and cost.

Available Background Gases
Cleanroom Air • N_2 • CDA

Select Specifications

Detection	Range	LDL (3σ@100sec)
HF in Air	0 – 1 ppm	40 ppt
NH_3 in Air	0 – 40 ppm	300 ppt
HCl in Air	0 – 4 ppm	100 ppt

Features and Benefits
- Part-per-trillion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- Compact design
- Resistant to VOC and particulate contamination

Applications
- Cleanroom AMC monitoring
- FOUP and Pod monitoring
- Reticle storage
- Multi-point monitoring (w/ 32-point sampling system)

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- 32-point stationary sampling system
- SmartAlarm™ interference prevention
- External particle filter
- Requires vacuum pump

See website for more details

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
Secialty Gas
Airborne Molecular Contaminants (AMC)
Vacuum & Deposition Chambers
Life Safety
Environmental CEM & GHG
Water Analysis

T-I MAX AIR/CEM

These versions of the T-I Max family include -I Max AIR line for detecting harmful chemicals (e.g. CH_2O) and greenhouse gases (CO_2 and CH_4) in environmental applications, as well as the T-I Max CEM for the detection of pollutants in diluted stack gas.

Our T-I Max AIR GHG monitor is designed to meet World Metrological Organization (WMO) measurement requirements to participate in greenhouse gas monitoring networks.

Technology:
Cavity Ring-Down Spectroscopy (CRDS)

T-I Max AIR/CEM

T-I Max AIR NEW!

Accurate and precise measurements of greenhouse gases (GHG), in particular CO_2 and CH_4, are important to assess the effects of climate change. This analyzer meets the latest precision requirements of the World Metrological Organization (WMO) and is therefore ideal for GHG monitoring networks.

Available Background Gases
Air

Specifications

Detection	Range	Precision* (1σ) – 5 min/24 hrs
CH_4 in Air	0 – 20 ppm	1 ppb/2 ppb
CO_2 in Air	0 – 1000 ppm	50 ppb/100 ppb
H_2O in Air	0 – 7%	30 ppm/100 ppm

*at typical ambient levels

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No maintenance

Applications
- Indoor air quality
- Fenceline monitoring

Communication Interfaces
Ethernet, USB, RS-232, RS-485,

Market

Options & Accessories
- Serani Max interface software
- External particle filter
- Requires vacuum pump

See website for more details

T-I Max AIR CH_2O

This advanced, real-time monitor can detect low-ppb levels of formaldehyde (CH_2O) in the environment and indoor air samples to help control this harmful pollutant.

Available Background Gases
Air • N_2 • CDA

Specifications

Detection	Range	LDL (3σ/24h)
CH_2O in Air	0 – 100 ppm	10 ppb
CH_2O in N_2	0 – 100 ppm	10 ppb
CH_2O in CDA	0 – 100 ppm	10 ppb

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No maintenance

Applications
- Indoor air quality
- Fenceline monitoring

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- External particle filter
- Requires vacuum pump

Ultra-High Purity Gas / P-Gas
Industrial Gas / G-Gas & Hydrogen
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Water Analysis

T-I Max AIR/CEM

T-I Max CEM

Excellent sensitivity and outstanding speed of response allow these analyzers to measure emissions from coal-fired power plants, cement kilns, and other sources requiring high dilution ratios, thus simplifying CEM installations and compliance tests.

Available Background Gases

Air • Diluted Stack Gas

Specifications

Detection	Range	LDL (3σ/24h)
T-I Max CEM NH_3	0 – 40 ppm	6 ppb
T-I Max CEM CH_4	0 – 20 ppm	1.5 ppb
T-I Max CEM HF	0 – 1 ppm	0.15 ppb
T-I Max CEM HCl	0 – 4 ppm	0.75 ppb
T-I Max CEM H_2S	0 – 500 ppm	40 ppb

Features and Benefits

- Part-per-billion detection limits
- No heated sample lines needed for stack measurements
- Outstanding speed of response
- No maintenance
- Designed for high specificity to target detection molecule

Applications

- Continuous Emissions Monitoring (CEM)
- Air Quality Measurements

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software
- Dilution probe
- Linear fit mode
- 19" rack mount
- Environmental enclosure
- Requires vacuum pump

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

PRISMATIC

The Prismatic series offers true multi-species capability with the detection of up to four analytes simultaneously in a single gas stream. This way, multiple measurements can be obtained while conserving sample and simplifying gas connections. Applications for the Prismatic series include customized laboratory measurements for routine analytical and research needs, deployment in air separation units (ASUs) and fuel-cell hydrogen analysis in the lab and in the field.

Technology: Cavity Ring-Down Spectroscopy (CRDS)

Prismatic – Multispecies Detection

Prismatic 3

This analyzer allows users to **detect up to four trace molecules simultaneously** in a single gas stream. The Prismatic 3 is ideal for fuel-cell hydrogen QC, laboratory analysis or any other application where convenience and sample preservation are important.

Available Background Gases

N_2 • Ar • H_2 • O_2

Select Specifications

(see website for more)

Detection	Range	LDL (3σ/24h)
CO in H_2	0 – 500 ppm	50 ppb
H_2O in H_2	0 – 25 ppm	100 ppb
CO_2 in H_2	0 – 1000 ppm	320 ppb
CH_4 in H_2	0 – 100 ppm	100 ppb

Features and Benefits

- Part-per-billion detection limits
- Up to four simultaneous detections
- Outstanding speed of response
- No consumables or maintenance
- No vibration sensitivity

Applications

- Laboratory analysis
- Industrial gas QC
- Fuel-cell hydrogen analysis

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software

See website for more details

Prismatic 3+ NEW!

This analyzer allows users to **detect up to four trace molecules simultaneously** in a single gas stream. The Prismatic 3+ is ideal for process control and product QC in air separation units and related applications.

Available Background Gases

N_2 • Ar • He • H_2 • O_2 • CDA

Select Specifications

(see website for more)

Detection	Range	LDL (3σ)
H_2O in N_2	0 – 100 ppm	10 ppb
CH_4 in N_2	0 – 200 ppm	10 ppb
CO in N_2	0 – 2900 ppm	50 ppb
CO_2 in N_2	0 – 4000 ppm	50 ppb

Features and Benefits

- Improved detection limits
- Four simultaneous detections
- Outstanding speed of response
- No consumables or maintenance
- No vibration sensitivity

Applications

- Process control in ASUs
- Industrial gas QC
- Truck fill analysis

Communication Interfaces

Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories

- Serani Max interface software

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

CO-rekt AND ALOHA+ H_2O

The CO-rekt and ALOHA+ H_2O are analyzers specifically designed for special applications.

The CO-rekt is our only CRDS analyzer with Class I, Div 2 rating, making it ideal to monitor trace CO, H_2O and other impurities in hydrogen production (SMR and HyCO).

The ALOHA+ H_2O offers the world's lowest detection limit for moisture in pure NH_3. It is therefore the ideal analyzer for semiconductor and high-brightness LED manufacturing where ultra-high-purity ammonia is used.

Technology: Cavity Ring-Down Spectroscopy (CRDS)

CO-rekt Series

CO-rekt

Featuring Class I, Div. 2 compliant housing, this analyzer is perfect for monitoring CO, CO_2, H_2O or CH_4 impurities in flammable gas processes, such as HyCO, SMR, and syngas production.

Available Background Gases
H_2 • Syngas

Specifications in H_2

Detection	Range	LDL (3σ/24h)
CO-rekt CO	0 – 2000 ppm	150 ppb
CO-rekt CO_2	0 – 1500 ppm	500 ppb
CO-rekt H_2O	0 – 16 ppm*	1.0 ppb
CO-rekt CH_4	0 – 100 ppm*	7 ppb

*Higher ranges available

Features and Benefits
- Part-per-billion detection limits
- Calibration-free with zero drift
- Outstanding speed of response
- No consumables or maintenance
- No vibration sensitivity
- Class I, Div. 2 certification

Applications
- Hydrogen production (HyCO and SMR)
- Syngas production

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- Requires inert gas purge for hazardous locations

See website for more details

ALOHA H_2O Series

ALOHA+ H_2O

This analyzer was specifically designed for the analysis of moisture in ultra-pure ammonia used for the production of high-brightness LEDs and other specialized semiconductor devices. It offers the lowest H_2O detection limit in the industry without background interference.

Available Background Gases
N_2 • He • Ar • NH_3

Specifications

Detection	Range	LDL (3σ/24h)
H_2O in NH_3	0 – 20 ppm	3 ppb
H_2O in N_2	0 – 6 ppm	0.5 ppb
H_2O in He	0 – 3 ppm	0.3 ppb
H_2O in Ar	0 – 4 ppm	0.4 ppb

Features and Benefits
- Single-digit part-per-billion detection limit in pure NH_3
- Calibration-free with zero drift
- No consumables or maintenance
- No vibration sensitivity

Applications
- High-brightness LED production
- Semiconductor specialty gas
- UHP ammonia QC

Communication Interfaces
Ethernet, USB, RS-232, RS-485, 4-20mA analog, Modbus TCP (optional)

Market

Options & Accessories
- Serani Max interface software
- Speed+ performance upgrade
- Requires vacuum pump
- 19" rack mount

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

Quadrupole Mass Spectrometers – MAX300

MAX300-TGM™

The MAX300-TGM was specifically designed for toxic gas monitoring in ambient air. With fast measurements and high sensitivity this multi-channel, multi-sample point analyzer provides stable and accurate analysis for life safety and airborne molecular contamination (AMC) applications.

This versatile and flexible platform enables detection of 15+ gases on up to 46 sample points providing a low cost per gas, per point monitoring solution. An intuitive software platform provides an interface that is user friendly and customizable. The robust analyzer design provides a low cost of ownership by decreasing complexity of maintenance and upkeep.

Available Background Gases
Ambient air and many more

Select Specifications
(see website for more)

Features and Benefits

- Fully automated, real-time contamination alerts
- Reliable, 24/7 operation
- Reduce false alarms
- Highly responsive to changes in chemical concentration – reducing downtime after an event

Applications

- Life Safety
- Airborne Molecular Contaminants (AMCs)
- Ambient Air Monitoring

Communication & Software

- Questor5 Software
- Tracks and records data
- Automated alarms
- Network accessible
- Secure to 21 CRF Part 11
- Modbus TC/PIP

Detection Limit Specifications (3σ)

Gas	LDL (3σ)
Carbon Tetrachloride (CCl_4)	0.03 ppm
Carbonyl Sulfide (COS)	0.015 ppm
Difluoromethane (CH_2F_2)	0.06 ppm
Germane (GeH_4)	0.05 ppm
Hexafluoro 1, 3-Butadiene (C_4F_6)	0.06 ppm
Hydrogen (H_2)	200 ppm
Methyl silane (CH_6Si)	2.5 ppm
Nitrogen Trifluoride (NF_3)	0.03 ppm
Octafluorocylopentane (C_5F_8)	0.03 ppm
Tetraethylorthosilicate (TEOS)	2.5 ppm

Market

Technology

The MAX300's industry-leading 19mm quadrupole mass filter combined with a design specific to application needs provides the user with an impressive list of advantages:

- Near-zero mass scale drift for outstanding measurement precision and stability
- Analysis rate of less than 0.4 seconds per chemical
- Meet or exceed industry requirements for continuous monitoring
- Dry, oil-free pumping configuration
- Integrated redundant sample pump
- Simple maintenance (<1 per year)
- Customizable alarms and monitoring scheme

See website for more details

Ultra-High Purity Gas / P-Gas

Industrial Gas / G-Gas & Hydrogen

Secialty Gas

Airborne Molecular Contaminants (AMC)

Vacuum & Deposition Chambers

Life Safety

Environmental CEM & GHG

Water Analysis

Integration Solutions

Multi-Max AMC

Surveying different micro-environments in a fab is now fast and easy with our safe, flexible, and user-friendly Multi-Max AMC Monitoring Solution. The specialized cabinet can be equipped with any combination of our T-I Max CRDS analyzers to monitor simultaneously and in real-time for the most critical contaminants in cleanroom air: NH_3, HCl, and HF, among others.

Compatible Products
T-I Max Series AMC monitors

Features and Benefits
- Fits multiple T-I Max AMC analyzers or a T-I Max X2/X3
- Automated manifold with 16, 24 or 32 sampling points
- Optimized sampling lines for shortest response time
- User-friendly interface

Applications
- Airborne Molecular Contaminants in cleanrooms
- Mobile AMC monitoring

CQC Systems

Process Insights large portfolio of analyzers allows us to offer complete Continuous Quality Control (CQC) systems consisting of CRDS, mass spec and other instrumentation to meet UHP customer needs. One typical application is CQC cabinets for real-time bulk gas purity monitoring in semiconductor fabs.

Compatible Products
Most analyzers

Features and Benefits
- Fits almost any combination of gas analyzers (incl. rack-mountable third-party products)
- Fully integration, single-supplier solution

Applications
- Fixed CQC systems
- Pre- and post-purifier monitoring

Enclosure for Hazardous Applications

In some installations, instruments must meet safety classifications to operate in a hazardous area or with flammable or toxic gases. A rated enclosure allows the use of any analyzer in areas that require Class I Div 2, ATEX or other safety classification. Enclosures are purpose-built to fit the installation location and any combination of analyzers.

Compatible Products
Most analyzers

Features and Benefits
- Custom designed to fit your installation and choice of analyzer
- Available for most required safety ratings

Applications
- Measurements in hazardous areas
- Hydrocarbon or hydrogen gas streams
- Toxic gases
- Rating compliance without the need for a special analyzer

Featured CRDS Services & Upgrades

Annual Performance Verification

This annual procedure ensures that your analyzer continues to meet its original specifications. This low cost process is 100% remote, no removal of the analyzer or expensive service visit are required. After completion, we issue a Verification Certificate testifying to the analyzer's correct operation.

Compatible Products
All TIGER OPTICS analyzers

Features and Benefits

- Easy, in-situ remote verification process, with no need to return the analyzer to the factory
- Up-to-date Verification Certificate to comply with your QA/QC standards
- Necessary data can be collected most easily via Serani or Serani Max interface software


Process Insights
Premium Insights Into Process

Verification Certificate

Customer: The Trusted Gas Company
Item: HALO 3
Serial Number: 0123-0-24
Date Tested: 4 February 2019

This certifies that Process Insights has analyzed the Tiger Optics™ instrument data from the instrument described above in accordance with our standard test procedures. The HALO 3 described above does meet factory specifications. Based on the data provided, 0123-0-24 has been certified to meet the criteria below, which we understand are acceptable to the user.

Test	Test Standard	Result
Peak Position	Laser Optimization	17.541
Alignment (8-hour test)	Noise below factory spec.	passed
LDL (in N2)	<1.2 ppb	<1.2 ppb

Installation, Commissioning & Training Package

Purchasing this package with your new CRDS analyzer means that the unit is correctly installed at your site by our trained personnel. This service guarantees that your analyzer will have the best possible performance.

Compatible Products
All TIGER OPTICS analyzers

Features and Benefits

- Ensures correct installation to prevent future issues with your analyzer
- User training and applications support service available
- Gains you peace of mind that your analyzer will not experience issues related to improper installation
- Saves money in the long run by avoiding expensive repair or maintenance costs

Gas Library Additions

Our analyzers come with a variety of pre-calibrated background gases suitable for most users. To utilize the analyzer for more applications, additional background gases can be added, most of them via a simple software update.

Compatible Products
All TIGER OPTICS analyzers (availability of background gases varies by model)

Features and Benefits

- Use existing analyzer for new applications
- Measure in custom background gases used specifically in your facility
- Save money by purchasing additional background gas packages with your new and existing analyzer