

PRODUCT BROCHURE

# HALO 3 CO™

## TRACE LEVEL CARBON MONOXIDE ANALYZER



### The HALO 3 CO ensures purity and process protection with:

- Parts per billion (ppb) carbon monoxide detection capability
- Wide measurement range, from 0 – 2500 ppm (in hydrogen)
- Freedom from calibration (absolute measurement technology)
- Low cost of ownership
- Compact design
- Simple software interface

## Measure CO with Confidence

Whether for process control or quality control, gas suppliers need accurate, low-level contaminant monitoring to ensure gas quality with no impurities. For refineries and chemical plants it is especially critical to measure carbon monoxide in hydrogen since high levels can poison a customer's process and a supplier's reputation. CO is also a critical impurity in fuel-cell-grade hydrogen that can poison the fuel cell's catalyst.

Monitor purity with the HALO 3 CO analyzer, designed to provide unparalleled accuracy and reliability for your most critical carbon monoxide measurements. Compact and easy to use, this analyzer features proven Cavity Ring-Down Spectroscopy to detect carbon monoxide as low as 40 ppb in your gas.

Users enjoy freedom from periodic sensor maintenance, and with no calibration gases required, operating costs are nearly eliminated. With drift-free stability and rapid response time, the HALO 3 CO is ideal for the continuous, online gas monitoring that is critical to process control in gas and chemical industries or anywhere purity is a necessity.

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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>    | $\pm 0.75\%$ or 1/3 of LDL                   |
| <b>Accuracy (greater of):</b>                           | $\pm 4\%$ or LDL                             |
| <b>Speed of response:</b>                               | < 1 minutes 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>        | Up 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 × W × 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 × W × 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, CO

|                                   | Range        | LDL (3 $\sigma$ ) | Precision (1 $\sigma$ ) @ zero |
|-----------------------------------|--------------|-------------------|--------------------------------|
| <b>CO in N<sub>2</sub>:</b>       | 0 – 2000 ppm | 40 ppb            | 15 ppb                         |
| <b>CO in O<sub>2</sub>:</b>       | 0 – 1800 ppm | 35 ppb            | 12 ppb                         |
| <b>CO in Clean Dry Air (CDA):</b> | 0 – 2000 ppm | 40 ppb            | 15 ppb                         |
| <b>CO in Ar:</b>                  | 0 – 1600 ppm | 30 ppb            | 10 ppb                         |
| <b>CO in He:</b>                  | 0 – 1800 ppm | 35 ppb            | 12 ppb                         |
| <b>CO in H<sub>2</sub>:</b>       | 0 – 2500 ppm | 50 ppb            | 20 ppb                         |

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

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