

# ICAD HONO-NO<sub>2</sub> Analyzer SERIES 210

## PATENTED, FAST, ACCURATE AND DIRECT HONO AND NO<sub>2</sub> DETECTION



ICAD-HONO/NO<sub>2</sub>-210L series featuring 19" rack housing and OLED display.



WI-FI



LOW  
MAINTENANCE



LOW POWER  
CONSUMPTION

### DIRECT HONO & NO<sub>2</sub> DETECTION

- ✓ Iterative Cavity DOAS (ICAD) spectroscopy
- ✓ High resolved spectroscopic HONO & NO<sub>2</sub> detection from ~350 to 390nm
- ✓ No observed interferences, e.g. to water, NO<sub>x</sub>, HCHO O<sub>2</sub>
- ✓ No sample drying, e.g. Nafion tubing, required
- ✓ No chemicals or gases required

### LONG-TERM STABILITY AND ROBUSTNESS

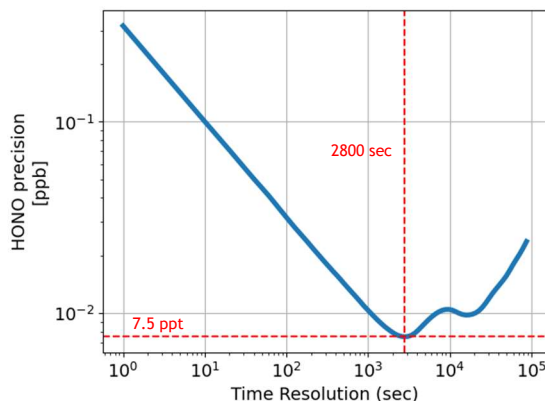
- ✓ Insensitive to temperature and vibrations
- ✓ Independent from absolute light source intensity
- ✓ No zero-point drift, integrated zero measurement

### EASY SET-UP AND OPERATION, LOW MAINTENANCE

- ✓ No gas calibration required, minimal maintenance effort
- ✓ Controllable via Wi-Fi devices (PC, tablet, smartphone)
- ✓ Multiple data communication protocols
- ✓ 19" rack
- ✓ Sustainable: Long life time, low power consumption

### SERIE 210 NEW FEATURES

- ✓ System health GUI and on-board diagnosis
- ✓ Easy adjustment of span calibration in GUI
- ✓ Enhanced time resolution of 1 second
- ✓ Improved long term stability



Time scaled modified Allan deviation for HONO precision. Note: Detection limits are defined as twice the modified Allan deviation values.

Patents: EP3329251; D502016003239.4; GB3329251; FR3329251; US10473583B2; ZL201680057099.6; DE102015000423 (pending); EP325928; D502016014735.3; GB3325928; FR3325928



ICAD Product webpage



Contact Airyx

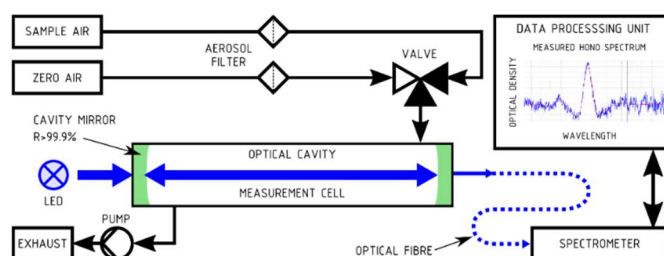
## GRAPHICAL USER INTERFACE AND ON-BOARD DIAGNOSIS

The Graphical User Interface provides easy operation and quick access to advanced functions and data time series. The ICAD can be accessed and controlled by any Wi-Fi device (PC, tablet, smartphone) without additional software/apps required. A comprehensive system health table shows the health status of critical sensor data (e.g. gas flow, supply voltage, temperature) for easy and fast on-board diagnosis.



## MEASUREMENT PRINCIPLE AND GAS FLOW

ICAD instruments are based on optical resonators which provide here long absorption paths of up to 3 km for precise HONO and NO<sub>2</sub> detection especially at low concentrations. Gas concentrations are derived by patented Iterative Cavity DOAS (ICAD) spectroscopy between -350 to 390nm. Below, the measurement scheme is shown.



## INSTRUMENT SPECIFICATIONS

	HONO	NO <sub>2</sub>	Other detectable gases	CO <sub>2</sub> (optional NDIR sensor)
<b>Measurement range<sup>1</sup></b>	0 - 500 ppb	0 - 2000 ppb	<b>Mechanical stability</b>	Insensitive to vibrations
<b>Limit of det.<sup>1</sup> (2σ) at 60 sec</b>	0.08 ppb	0.16 ppb	<b>Power consumption</b>	Less than 40 W at 12 V (typ.)
<b>Precision (1σ) at 1 sec</b>	0.3 ppb	0.6 ppb	<b>Start-up time</b>	Less than 1 min (typ.)
<b>at 60 sec</b>	0.04 ppb	0.08 ppb	<b>Temp. range of operation</b>	-10 to +40° C
<b>Zero Drift<sup>2</sup> ppb / month</b>	< 0.2	< 0.3	<b>Temperature sensitivity</b>	Less than 0.01 ppb/° C
<b>Detection of NO<sub>2</sub> / HONO</b>	Direct spectroscopic measurement		<b>Cross sensitivity</b>	No significant cross sensitivity <sup>5</sup>
<b>Response time (10% to 90%)</b>	1 sec at 2 l/min (flow adjustable)		<b>Weight</b>	Less than 12 kg (depending on config)
<b>Time resolution</b>	1 sec minimum temporal averaging		<b>Consumable gases</b>	No gases/ chemicals needed for operation
<b>Sample flow</b>	1 to 2 l/min		<b>Dimensions W x H x D</b>	19" rack housing 43.8 x 13.3 (3HU) x 66.5 cm
<b>Path length characterization</b>	Helium (every 1 to 2 years, optional) or NO <sub>2</sub> reference measurement or Gas free ICOM <sup>3</sup> method		<b>Data communication</b>	LAN/Wi-Fi/RS232/M2M/OPCUA; Bayern-Hessen Protocol; Volt./Current Output
<b>Calibration</b>	HONO or NO <sub>2</sub> calibration gas not needed <sup>4</sup> ;		<b>Processing unit</b>	Internal embedded PC, with data analysis and measurement software

[1] Custom configurations / measurement ranges available. By reducing the measurement range better precision and LOD can be achieved.

[2] Upper limit. Regularly automated zero measurement reduce measurement noise and guarantee also a negligible zero drift.

[3] ICOM (upcoming with software update): Integrated Calibration by means of optical Modulation. Patented gas free calibration method allows consumable free, automatic path length monitoring and calibration of ICAD measurement cells. Patents: EP325928; D502016014735.3; GB3325928; FR3325928

[4] Literature absorption data for HONO and NO<sub>2</sub> is used for gas quantification.

[5] No significant spectroscopic cross sensitivity to: Carbon oxides, Formaldehyde, Ozone, Methane, Hydrogen, Sulphide, Sulphur dioxide, Chlorine, Chlorine dioxide, Hydrogen cyanide, Hydrogen chloride, Phosphine, Hydrogen, Ammonia, Acetylene, Nitromethane, Ethylene, Ethanol, Methyl mercaptan, Ethyl mercaptan.