

# AIR OPTIC™

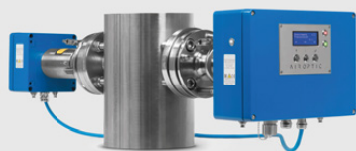
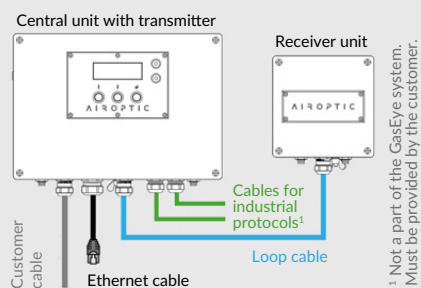
REAL TIME GAS ANALYZERS

GasEye™ analyzer  
looks deeply  
into your process

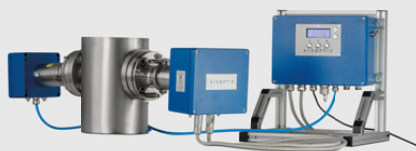
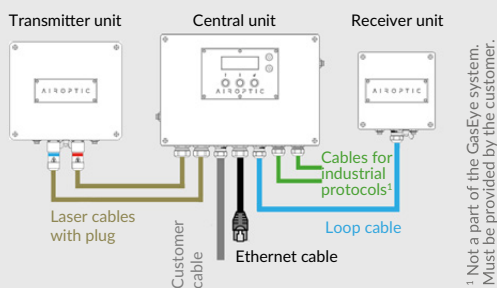


GasEye™ single and multigas  
cross duct analyzer

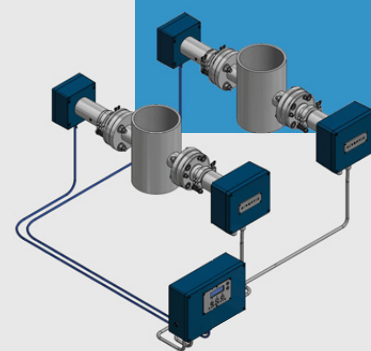
TDLS - Tunable Diode Laser Spectrometer



GasEye™ Cross Duct SG - Single gauge analyzer



GasEye™ Cross Duct MG - Multi gauge analyzer



GasEye™ Cross Duct MG MP Multi gauge multi point

## Configuration

|                            | TRANSMITTER  | RECEIVER                        | CENTRAL UNIT    |
|----------------------------|--|---------------------------------|-----------------|
| DIMENSIONS w x h x l [mm]: | 330 x 230 x 350  | 160 x 160 x 330                 | 330 x 230 x 110 |
| WEIGHT [kg]:               | 15   | 13                              | 16              |
| EQUIPMENT:                 | display with status indicators, power indicator, 4 cable glands, Ethernet socket, purging fittings | 1 cable gland, purging fittings |                 |

## MATERIALS

|                    |   |
|--------------------|---|
| HOUSINGS:          | protection IP 66, coated aluminium, RAL 5010 (optional RAL 7040)  |
| PROCESS INTERFACE: | stainless steel 316 with quartz or sapphire window, standard flanges DN50PN16, DN65PN10 easy to clean or 2"150 lbs. Optional other DN, ANSI, JIS sizes available. |
| PURGING TUBES:     | inside diameter: 38 mm, length: 400mm (optional other dimensions), stainless steel 316 (optional PFA coating)   |
| PROCESS GASKETS:   | reinforced graphite   |



GasEye™  
Webserver  
Remote access  
capability

No special software requirements – works on any device – just plug in IP66 rated Ethernet cable (included in the delivery) to the device.

- Perfect tool for remote diagnostics/remote commissioning/remote service
- Easy access to parameters, measurements and spectra
- 3 access levels (password protected)

## ANALYTICAL PERFORMANCE

|                           |  |
|---------------------------|--|
| LIMIT OF DETECTION (LOD)  | from 0.01 ppmv*m                                     |
| PRECISION                 | LOD or 1% of the measured value, whichever is larger |
| ACCURACY                  | LOD or 2% of the measured value, whichever is larger |
| CALIBRATION               | up to 50 g/Nm <sup>3</sup> depending on the process  |
| ZERO DRIFT AND SPAN DRIFT | negligible   |

## MEASUREMENT CONDITIONS

|                         |  |
|-------------------------|--|
| PROCESS GAS TEMPERATURE | 0 °C to 1500 °C                                  |
| PROCESS GAS PRESSURE    | 0.7 - 2.0 barA up to 40 barg special application |
| MAXIMUM PATH LENGTH     | up to 25 meters                                  |

## CLIMATIC CONDITIONS

|                     |                          |
|---------------------|--------------------------|
| AMBIENT TEMPERATURE | -30°C to +60°C           |
| AMBIENT PRESSURE    | 800 – 1200 hPa           |
| AMBIENT HUMIDITY    | RH < 99%, non-condensing |

## TECHNICAL SPECIFICATION

|                      |  |
|----------------------|--|
| OUTPUTS              | 4 x analog output 4 – 20 mA (gas concentration, process transmission, 2 x AUX) – easy user selection via DIP switch between active/passive mode  |
|                      | 8 x digital output   |
| INPUTS               | 4 x analog input 4 – 20 mA (process temperature and pressure, 2 x AUX) – easy user selection via DIP switch between active/passive mode  |
|                      | 1 x RTD (PT100/PT1000) – easy user selection via DIP switch between PT100/PT1000 and 2-/3-/4-wires   |
|                      | 8 x digital input  |
| LOCAL USER INTERFACE | Human Machine Interface (HMI) – LCD backlight display located on the transmitter housing lid   |
|                      | Ethernet port:<br>a) WebServer – system configuration and data acquisition via web browser<br>b) Windows based program – GasEye logger for real-time data acquisition<br>c) remote service and diagnostics |
| OPTIONAL             | Modbus (TCP/IP), Modbus RTU, Profinet, Profibus  |

## DYNAMIC PERFORMANCE

|                             |                   |
|-----------------------------|-------------------|
| WARM-UP TIME:               | approx. 5 minutes |
| MINIMUM RESPONSE TIME (T90) | 100 milliseconds  |

## ELECTRICAL CHARACTERISTICS

|                   |                              |
|-------------------|------------------------------|
| POWER INPUT       | 24 VDC NOMINAL (19 – 30 VDC) |
| POWER CONSUMPTION | < 15VA (< 25VA IF ATEX)      |

## PROCESS PURGING (IF NECESSARY)

|                          |                      |
|--------------------------|----------------------|
| PURGING GAS              | instrument air or N2 |
| PROCESS PURGE FLOW RATES | 5 – 50 l/min         |
| SENSOR PURGE FLOW RATES  | 0.2 – 7 l/min        |

ADDITIONAL BUILD-IN FEATURES

AUTOMATIC GAIN CONTROL (AGC)

AGC ensures correct gas measurement even at high dust loads resulting in loss of optical transmission down to 0.5%. AGC operates fully automatic with no need for manual adjustment of the signal gain under any process conditions.

SELF-CALIBRATION FEATURES

internal reference gas compartment is used for closed loop control of the zero and span drift

SAFETY

LOW VOLTAGE DIRECTIVE (LVD) 2014/35/EU

PN-EN 60825-1:2014-11 – Safety of laser products – Part 1: Equipment classification and requirements  
PN-EN 61010-1:2011 – Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE (EMC) 2014/30/UE

Emission: EN 55016-2-1:2014+A1:2017, EN 55016-2-3:2017+A1:2017  
Immunity: EN 61000-4-2:2009, EN 61000-4-3:2006 + A1:2008 + A2:2010, EN 61000-4-4:2012, EN 61000-4-5:2014 + A1:2017, EN 61000-4-6:2014, EN 61000-4-29:2000

QPS CERTIFICATION

Explosion protection (optional version):  
Class I, Div 2, Groups ABCD T6/T4  
Class I, Zone 2, AEx op is op pr pzc IIC T6/T4 Gc Ex op is op pr pzc IIC T6/T4 Gc  
Class II, Div 2, Groups FG T85°C/T135°C  
Zone 22, AEx op is op pr pzc IIIB T85°C/T135°C Dc Ex op is op pr pzc IIIB T85°C/T135°C Dc  
CSA 60079-0-19: 4th Ed., CSA 60079-2-16: 2nd Ed.,  
CSA 60079-28-16: 1st Ed., UL 60079-0: 7th Ed., UL 60079-2: 6th Ed.  
UL 60079-28: 2nd Ed.

- T6/T85°C: -30°C ≤ Tamb ≤ 59°C (remote purge system location)
- T6/T85°C: -30°C ≤ Tamb ≤ 40°C (local purge system location)
- T4/T135°C: -30°C ≤ Tamb ≤ 59°C (local purge system location)

ATEX DIRECTIVE 2014/34/EU

Explosion protection - ATEX Zone 1/21 (optional version):  
GasEye Cross Duct Ex1:  
II 1/2G Ex pxb op is IIC T6 Ga/Gb  
II 1/2D Ex pxb op is IIIC T85°C Da/Db  
GasEye Cross Duct Ex1 IS:  
II 1/2G Ex pxb ia op is IIC T6 Ga/Gb  
II 1/2D Ex pxb ia op is IIIC T85°C Da/Db  
GasEye Cross Duct Ex1 ET and GasEye Cross Duct Ex1 ET IS:  
II 1/2G Ex db eb h ia ib op is pxb q IIC T4 Ga/Gb  
II 1/2D Ex h ia ib op is pxb q tb IIIC T135°C Da/Db  
EN IEC 60079-0:2018, EN 60079-2:2014, EN 60079-11:2012, EN 60079-26:2015, EN 60079-28:2015

IECEX CERTIFICATION

Explosion protection - IECEx Zone 2/22  
Ex op is pzc IIC T6 Gc  
Ex op is pzc IIIC T85°C Dc  
IEC 60079-0:2017  
IEC 60079-2:2014  
IEC 60079-28:2015

Certificate No. LR3167-1

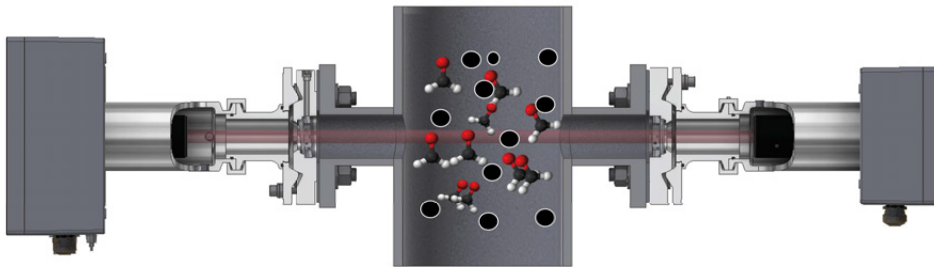
Certificate No. KDB 20ATEX0003X

Certificate No. IECEx KDB 19.0004X

MULTI COMPONENTS

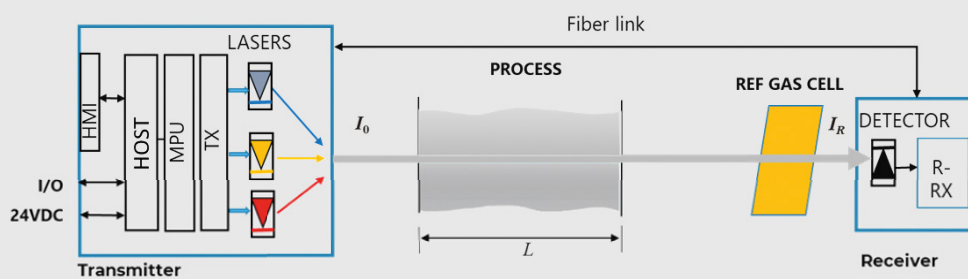
- CO + O2
- CO + CO2
- CO + CH4
- H2S + O2
- HCHO + H2O
- HCOOH + CO
- HCL + H2O
- NH3 + H2O
- NO + NH3
- NO + NO2
- CO + CH4 + O2
- CO + O2 + H2O + CH4
- SO2 + HCL + NH3 + H2O
- SO2 + HCL + CO + H2O
- CUSTOM – MULTI COMPONENTS

| COMPONENT               | LOW RANGE           | LIMIT OF DETECTION | HIGH RANGE    |
|-------------------------|---------------------|--------------------|---------------|
| ACETYLENE – C2H2        | 0 – 1/10 ppmv       | 0.01 ppmv*m        | 0 – 100 vol%  |
| AMMONIA – NH3           | 0 – 5/50 ppmv       | 0.1 ppmv*m         | 0 – 100 vol%  |
| CARBON DIOXIDE – CO2    | 0 – 1/10 ppmv       | 0.0005 ppmv*m      | 0 – 100 vol%  |
| CARBON MONOXIDE – CO    | 0 – 1/10 ppmv       | 0.02 ppmv*m        | 0 – 100 vol%  |
| ETHANE – C2H6           | 0 – 1/10 ppmv       | 0.01 ppmv*m        | 0 – 100 vol%  |
| ETHANOL – C2H5OH        | 0 – 10 / 1000 ppmv  | 0.1 ppmv*m         | 0 – 1000 ppmv |
| ETHYLENE – C2H4         | 0 – 1 / 10 ppmv     | 0.01 ppmv*m        | 0 – 100 vol%  |
| FORMALDEHYDE – HCHO     | 0 – 1 / 10 ppmv     | 0.005 ppmv*m       | 0 – 1000 ppmv |
| FORMIC ACID – HCOOH     | 0 – 100 / 1000 ppmv | 0.1 ppmv*m         | 0 – 10 vol%   |
| HYDROGEN – H2           | 0 – 10 vol%         | 1 vol%*m           | 0 – 100 vol%  |
| HYDROGEN CHLORIDE – HCL | 0 – 1 / 10 ppmv     | 0.01 ppmv*m        | 0 – 10 vol%   |
| HYDROGEN CYANIDE – HCN  | 0 – 1/ 10 ppmv      | 0.01 ppmv*m        | 0 – 1000 ppmv |
| HYDROGEN FLUORIDE – HF  | 0 – 1/ 10 ppmv      | 0.01 ppmv*m        | 0 – 1000 ppmv |
| HYDROGEN SULPHIDE – H2S | 0 – 200 ppmv        | 2 ppmv*m           | 0 – 50 vol%   |
| ISO-BUTANE – C4H10      | 0 – 10 / 1000ppmv   | 0.1 ppmv*m         | 0 – 100 vol%  |
| ISO-PENTANE – C5H12     | 0 – 10 / 1000ppmv   | 0.1 ppmv*m         | 0 – 100 vol%  |
| METHANE – CH4           | 0 – 1/ 10 ppmv      | 0.005 ppmv*m       | 0 – 100 vol%  |
| N-BUTANE – C4H10        | 0 – 10 / 1000 ppmv  | 0.1 ppmv*m         | 0 – 100 vol%  |
| NITRIC OXIDE – NO       | 0 – 10 / 5000 ppmv  | 0.01 ppmv*m        | 0 – 50 vo%    |
| NITROGEN DIOXIDE – NO2  | 0 – 50 / 5000 ppmv  | 1 ppmv*m           | 0 – 50 vol%   |
| OXYGEN – O2             | 0 – 1 vol%          | 100 ppmv*m         | 0 – 100 vol%  |
| PROPANE – C3H8          | 0 – 1 / 1000 ppmv   | 0.01 ppmv*m        | 0 – 100 vol%  |
| SULPHUR DIOXIDE – SO2   | 0 – 500/5000 ppmv   | 5 ppmv*m           | 0 – 50 vol%   |
| SULFUR TRIOXIDE – SO3   | 0 – 100 / 5000 ppmv | 2 ppmv*m           | 0 – 50 vol%   |
| WATER – H2O             | 0 – 1 ppmv          | 0.05 ppmv*m        | 0 – 100 vol%  |
| CUSTOM COMPONENT        | xxx ppmv            | xxx ppmv*m         | xxx vol%      |



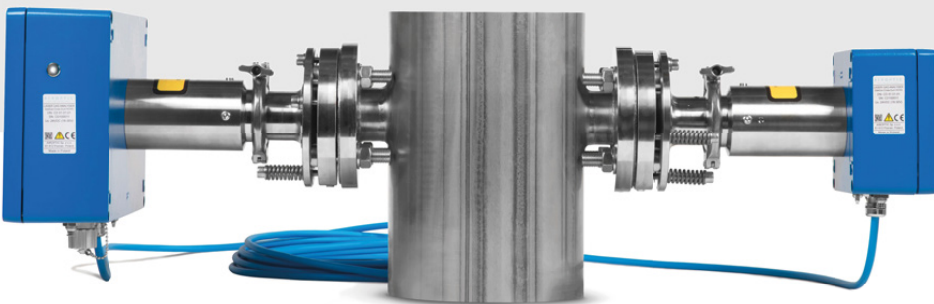
## GasEye™ Cross Duct

GasEye™ Cross Duct is a single or multi-laser analyzer that utilizes tunable diode laser (TDL) absorption spectroscopy. The central unit sends a laser light through the process which is detected by the receiver unit mounted on the opposite side of the process. When a gas of interest is present in this process, it will absorb the laser light. The optical power detected in the receiver unit will depend on the concentration of the gas, temperature, pressure, and optical pathlength according to Beer-Lambert law. In the GasEye™ Cross Duct analyzer, the laser wavelength is specifically chosen to match the fingerprint region of the particular gas of interest and is being continuously scanned over the absorption line(s). Since full spectral information is recovered with very high spectral resolution the analyzer remains immune to foreign gas broadening and is immune to cross-interferences from dust and any other gas constituents in the process. GasEye™ Cross Duct by design can operate in several wavelength regions from Near-Infrared to Mid-Infrared.



## Calibration

Each GasEye™ analyzer is equipped as standard with auto-calibration features for real time monitoring of system status. The reference signal from a reference gas always present in the measurement path ensures correct measurement even in most demanding conditions. This feature removes necessity to perform calibration on-site and keeps your overall maintenance effort low. Proven-in-use: verified in several millions of operating hours with failure rates fulfilling SIL2.



## Features

**Multigas capability:** lasers with different wavelengths in the NIR and MIR range can be combined into one measuring head enabling the measurement of several gases with one analyzer.

- Real time sensing: response time below 0.1 second
- High selectivity: automatic compensation for interference effect from other constituents in the gas sample
- High sensitivity: detection limit below 0.1 ppmv per meter
- In-situ monitoring: direct in the process, no sample preparation
- Maintenance free: equipped with a self-calibrating feature, no field calibration necessary
- Robustness: IP66 enclosure, suitable for outdoor and indoor installations and harsh environments
- Insensitive to dust and smoke in the measured process: up to 50 g/m<sup>3</sup>
- ATEX, IECEx, cQPSUS version available



## Application fields



### POWER/CEMENT/ INCINERATION PLANTS

Combustion optimization  
CO/O<sub>2</sub>/CH<sub>4</sub>/H<sub>2</sub>O  
DENOX (SCNR + SCR)  
NO/NO<sub>2</sub>/NO<sub>x</sub>/NH<sub>3</sub>/H<sub>2</sub>O  
DESOX (WET + SEMI DRY)  
SO<sub>2</sub>/HCL/HF/O<sub>2</sub>/H<sub>2</sub>O



### PRODUCTION/ STORAGE/ TRANSPORTATION OF NG, LNG, H<sub>2</sub>

H<sub>2</sub> /HC/CO<sub>2</sub>/H<sub>2</sub>O/H<sub>2</sub>S  
PSA HCOOH/HCHO/NH<sub>3</sub>  
CO/CO<sub>2</sub>/CH<sub>4</sub>  
H<sub>2</sub>O/H<sub>2</sub>S + CO/H<sub>2</sub>



### REFINERY & PETROCHEMICAL

Hydrogen recycle  
Acetylene converter  
Catalytic reforming  
Cracking, flaring  
Ethylene production  
Sulfur recovery unit  
Olefins



### CHEMICAL PLANTS

Acid plant SO<sub>3</sub>/SO<sub>2</sub>  
Chlorine dryer H<sub>2</sub>O in chlorine  
Fertilizers plant  
NO/NO<sub>2</sub>/NH<sub>3</sub>  
Coke production  
HCN/C<sub>6</sub>H<sub>6</sub>/NH<sub>3</sub>/SO<sub>2</sub>/H<sub>2</sub>S/O<sub>2</sub>

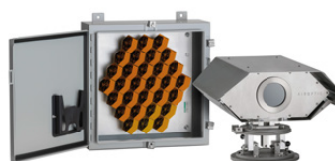
#### GasEye™ Extractive 19" rack



#### GasEye™ Extractive wall mounted cabinet IP66



#### GasEye™ Open Path



## Other products

**A I R O P T I C**™  
REAL TIME GAS ANALYZERS

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