

# Gas Analytics Measurement Solutions for Industrial Applications

## Gas Analyzers

### Measure Where It Really Matters

**Monitoring and controlling the level of harmful or explosive gases in your process is key to ensuring the safety of the environment, people, assets and increasing process efficiency. METTLER TOLEDO's unique range of gas analysis solutions gives you the power to decide where to measure, everywhere it matters.**

Based on long-standing field experience in analytical solutions for liquid measurement, METTLER TOLEDO has developed systems for gas analysis that offer:

- **In situ and in-line capability:** our systems are built to measure, right there where you need to measure
- **Low cost of ownership:** outstanding measurement performance without the drawback of heavy maintenance
- **Ruggedness and long-term stability** for continuous use in the harshest environments.

#### The best technology for the job

METTLER TOLEDO's choice of technologies for gas measurement all feature the ability to measure in situ, without the need for gas sampling or conditioning.

- GPro® 500 **Tunable Diode Laser (TDL)** analyzers provide the highest level of reliability and fastest response time in process control and safety applications.
- Membrane covered InPro **amperometric oxygen sensors** are largely

insensitive to moisture and dust: they are ideally suited for inerting and blanketing applications.

#### TDL: Laser-sharp view into your process

With TDL absorption spectroscopy, a diode laser with a highly specific and extremely narrow emission wavelength is used to resolve single absorption lines of the gas species to be measured. The absorption lines are carefully selected to avoid cross-interference from other background gases. Using direct absorption spectroscopy, a spectrum is taken and compared with spectral reference data stored in the on-board database for any given temperature and pressure. The concentration of the gas is then calculated, and any inconsistency between reference data and measurement will trigger an alarm.

#### Process adaptations that fit anywhere

Many users want to reap the benefits of interference-free, drift-free TDL tech-

nology for better process control and lower maintenance costs. However, for reliable measurement with a TDL, necessary framework conditions such as minimum optical path length, availability of purge gas supply, or high dust load in a process can sometimes get in the way. Acknowledging these constraints, METTLER TOLEDO has developed specific adaption solutions to substantially increase the coverage of possible TDL applications.

The new wafer-type adaption allows cross-section installation down to DN50 (2") pipes with no flow restriction and minimum pipe work required. Further, static process gas conditions are not an obstacle to the GPro 500 with the availability of the new process purge-free probe for inertization and blanketing applications. Finally, the filter probe is ideal for measurement in high-dust applications where cross-stack-type TDLs typically fail due to the loss of signal intensity.



**New gases, new opportunities for process and combustion applications:**

- |                               |                       |                       |                               |
|-------------------------------|-----------------------|-----------------------|-------------------------------|
| Oxygen:                       | CO:                   | – Syngas              | CO/CH <sub>4</sub> :          |
| – Blanketing and inertization | – Combustion          | – Ammonia             | – Combustion                  |
| – Combustion control          | – ESP filter          | – Fired heaters       |                               |
| – Reformers                   | – CO boiler           | – Process heaters     | H <sub>2</sub> O:             |
| – Chlorination                | – FCC units           | – Carbon black        | – Chlorine gas                |
| – Flare stacks                |                       | – Ethylene            | – H <sub>2</sub> reformer gas |
| – Thermal oxidizer            | CO <sub>2</sub> :     | – Hydrogen production | – Tower dryer exhaust         |
| – Vapor recovery              | – FCC units           |                       |                               |
| – Formaldehyde                | – Ethylene oxide (EO) | CH <sub>4</sub> :     | H <sub>2</sub> O:             |
|                               | – Ethylene            | – Syn gas             | – Chlorine gas                |
|                               | – PTA plant           |                       | – H <sub>2</sub> reformer gas |
|                               |                       |                       | – Tower dryer exhaust         |
|                               |                       |                       | H <sub>2</sub> S:             |
|                               |                       |                       | – Sulfur recovery             |
|                               |                       |                       | NH <sub>3</sub> :             |
|                               |                       |                       | – Ammonia slip                |
|                               |                       |                       | HCl:                          |
|                               |                       |                       | – Stack monitoring            |



▶ [www.mt.com/gas](http://www.mt.com/gas)

InPro 6800G/  
InPro 6850iG    InPro 6900iG    InPro 6950iG    GPro 500

| Industrial Processes               | InPro 6800G/<br>InPro 6850iG | InPro 6900iG | InPro 6950iG | GPro 500 |
|------------------------------------|------------------------------|--------------|--------------|----------|
| <b>Chemical Industry</b>           |                              |              |              |          |
| Inerting                           | •                            | •            | •            | •        |
| Blanketing                         | •                            | •            | •            | •        |
| Process / safety                   |                              |              |              | •        |
| Vapor recovery                     | •                            | •            |              | •        |
| Thermal oxidizer / process heaters |                              |              |              | •        |
| Flare                              |                              |              |              | •        |
| <b>Food and Beverage Industry</b>  |                              |              |              |          |
| CO <sub>2</sub> recovery           |                              |              | •            |          |
| <b>Petrochemical</b>               |                              |              |              |          |
| Flue gas                           |                              |              |              | •        |
| Flares                             |                              |              |              | •        |
| Process / safety                   |                              |              |              | •        |
| ESP filters                        |                              |              |              | •        |
| Combustion                         |                              |              |              | •        |

Application guide for gas analyzers (for more application examples, visit [www.mt.com/GPro500-eBook](http://www.mt.com/GPro500-eBook))

## Comparison of Oxygen Measurement Technologies Selection Criteria to Help You Choose the Right Tool

**There is no single measurement technology that will work for every application. METTLER TOLEDO is dedicated to identifying and offering the best technologies for robust in process gas measurements. For making oxygen measurements, we have three technologies. The following is a general guideline for selecting the best technology. To make the final determination, please contact your local METTLER TOLEDO representative.**

### Oxygen measurement across the process industries

From preventing the build-up of explosive gas mixtures in chemical processes, to nitrogen blanketing for inhibiting product oxidation, to ensuring carbon dioxide purity in the Food and Beverage industry, measurement of oxygen is a vital element of many industrial processes.

### Amperometric

This is an electro-chemical measurement technology housed in a compact package. It is a depleting technology, some maintenance and consumables is required. Chemical interferences are possible; knowledge of the gas composition is required for evaluation.

For more information on this technique, refer to the Measurement Theory section of this catalog.

### Tunable Diode Laser (TDL)

METTLER TOLEDO's TDL technology is immune to most interferences and the sensor's materials of construction are quite robust. There is no regular maintenance and the sensor is designed for long term continuous operation while

being virtually drift free. TDL is suited for the most challenging and critical applications. The physical package is a bit larger than the amperometric and optical sensors. For more information on this technique, refer to the Measurement Theory section of this catalog.

|                                       | Amperometric                    | TDL Oxygen                           |
|---------------------------------------|---------------------------------|--------------------------------------|
| <b>Applications</b>                   | Inerting & Blanketing           | Process Control, Safety & Combustion |
| <b>Flow required</b>                  | No, great for tank inerting     | Certain applications require flow    |
| <b>Range</b>                          | 5-50,000 ppm or 50 ppm to 60%   | 0.01 – 100%                          |
| <b>Max temperature</b>                | 70 °C (158 °F)                  | 600 °C (1112 °F)                     |
| <b>Low pressure</b>                   | -0.81 bar (-11.8 psig)          | -0.7 bar (-10.15 psig)               |
| <b>High pressure</b>                  | +7.95 bar (115.3 psig)          | +9 bar (130.53 psig)                 |
| <b>N<sub>2</sub> purging required</b> | No                              | Sometimes                            |
| <b>Maintenance, consumables</b>       | Required                        | No                                   |
| <b>Capital</b>                        | \$                              | \$\$\$                               |
| <b>Probe size</b>                     | Very small, for confined spaces | Larger, for pipes 2" dia. or larger  |
| <b>Hazardous area technique</b>       | Intrinsic safety                | Explosion proof                      |
| <b>Background gas interference</b>    | Susceptible to some             | None                                 |
| <b>SIL</b>                            | No                              | SIL2 compatible version available    |
| <b>ATEX/FM Approved</b>               | Yes                             | Yes                                  |

# TDL Gas Analyzers

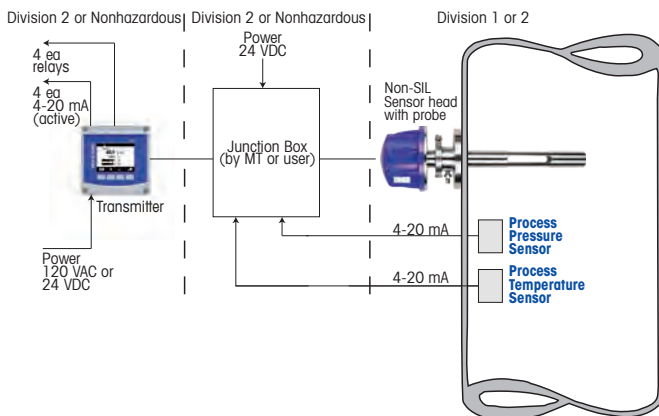
For Every Installation Location in Your Plant



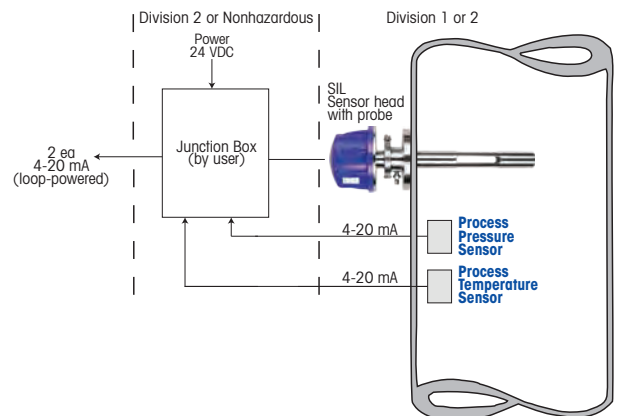
**Standard Purged    Wafer    Non-Purge    Non-Purged with filter and Blow-back    Extractive    Cross-Pipe**

|                               |  |   |  |  |   |  |
|-------------------------------|--|---|--|--|---|--|
| <b>Optical Path Interface</b> | Insertion probe  | Flow thru. Body is part of pipeline system                    | Insertion probe                                  | Insertion probe                            | Extractive cell   | Full diameter  |
| <b>Min Flow Requirement</b>   | Yes  | Yes   | No   | Yes  | No  | Yes  |
| <b>Process Interface/Size</b> | Mounts in pipe 4" diameter or larger                                   | 2", 150 lb ANSI or 3", 150 lb ANSI or 4", 150 lb ANSI         | Mounts in pipe 4" diameter or larger             | Mounts in pipe 4" diameter or larger       | N/A   | Pipes 1–3 m diameter                                 |
| <b>Typical Application</b>    | Near saturated gas stream e.g. combined gas vent line to destruct unit | Near saturated gas stream e.g. dryer, solvent, vapor recovery | Clean dry gases e.g. Storage tank safety blanket | Dry gases with particulate e.g. Flue gases | Clean dry gases from customer's extractive gas sampling system e.g. marine vapor recovery | Hot, flue gases, e.g. ammonia slip/ducts, and stacks |

## Transmitter version



## Direct analog out version



## GPro 500 TDL Building Your Measurement System

### Selection of Components

For proper operation and optimal performance in your process, each element of your measurement system must be carefully chosen. A complete measurement system requires components including a sensor, junction box, cable and transmitter.

### Sensor Selection

METTLER TOLEDO sensors are high performance and long lasting. However, proper selection must be made according to the application and process environment to which it will be exposed.

Basic selection considerations are:

- Gas to be measured
- Measurement range
- Operating temperature/pressure range
- Alarm level
- Accuracy required
- Background gases & concentrations
- Ambient temperature
- Contaminants (particulates, oils, condensate, aerosols)
- Piping/vessel sizes
- Gas stream velocity
- Dust and particle content

The sensor is made up of two significant pieces, as discussed below:

### 1a. Sensor-Spectrometer Portion (head)

Once it has been determined that we can successfully make the desired measurement, selection of correct head is relatively simple

Choices include:

- Gas to be measured (presently O<sub>2</sub>, CO, CO<sub>2</sub>, HCl, H<sub>2</sub>S, CH<sub>4</sub> CO/CH<sub>4</sub>, CH<sub>4</sub>, NH<sub>3</sub> and H<sub>2</sub>O vapor)
- Safety approval type (FM or ATEX)
- Requirement for SIL2

### 1b. Sensor – Process Adaption Portion

Upon detailed review of the process conditions and using our many years of experience, we select the best style adaption for the application and the appropriate size.

This is a brief summary of the process adaption styles (each available in various sizes):

- Purged probe
- Non-purged probe
- Non-purged probe with filter and optional blowback
- Wafer
- Extractive
- White cell

In addition to the sensor style and size, other decisions include:

- Seal material (Kalrez® types or graphite)
- Optic material (borosilicate glass, quartz or sapphire)
- Wall thickness (to accommodate wall insulation)
- Process connection size
- Material of construction: 316L, 316Ti stainless steel and C22 Hastelloy are standard; others are available on request.



## 2. Transmitter Selection

Transmitters are the component that communicates a sensor's readings into displayed measurements. The transmitter also transfers the data to the process control system.

Most users want the convenience of having a local display, multiple analog inputs/outputs and alarms. For these users we select the model M400, Type 3 transmitter. This 4 wire transmitter is ATEX/FM approved for Zone/Division 2 areas, is suitable for indoor or outdoor use and can be powered from AC or DC.

If your site requires a SIL version of the GPro 500, that version does not utilize the separate (M400) transmitter. The SIL version of the GPro 500 has a simple transmitter built into the sensor's head. It does not have the functionality of the M400, it simply has 2 analog (4–20mA) signal outputs (loop powered).

## 3. Junction Box

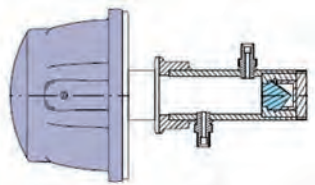
The multi-core cable that connects on one end to the GPro 500 head terminates the other end at a junction box that houses a 16 position terminal strip. METTLER TOLEDO offers a junction box or users can provide their own junction box. The junction box needs to be rated for the area where it will be installed.

## 4. Cable

A multi-core cable is used to connect the GPro 500 head to the junction box. Note: on the FM unit, the cable is shipped loose, the ATEX unit has the cable pre-terminated in the sensor's head.

## 5. Verification Cell

Although not part of the GPro 500, a verification cell is a useful tool to verify calibration and for troubleshooting.



To use the cell, remove the sensor head from the probe and connect the cell to the head using the Tri-Clamp and special gasket. One verification cell can be used for multiple units on the same site. Ambient air can be used as a check gas for the oxygen sensor. To introduce other gases, the cell has inlet and outlet fittings.

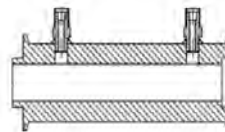
## 6. Diagnostic Software

The MT TDL Suite is PC software with a variety of functions to see into and capture information about the operation of your GPro 500. It is not mandatory to ever use this software but most users find it a powerful tool. The software suite will automatically detect the gas that your unit is designed to measure and will display it appropriately. A CD containing the MT TDL Suite is shipped along with the GPro 500.



## 7. Thermal Barrier

If the process gas is expected to be at a temperature between 250 °C to 600 °C, a thermal barrier can be used to protect the sensor's electronics. The thermal barrier is effectively a spool piece mounted between the sensor and the sensor head.



## GPro 500 Sensor

In Situ Sensor Convenience, with the Power of an Analyzer



Tunable Diode Laser (TDL) measurement technology is recognized for speed and accuracy of measurement, and immunity to background gases. To this, METTLER TOLEDO has added the simplicity of use and low maintenance of in-line sensor design, plus advanced predictive diagnostics. The result is the GPro 500 series, a highly durable line of oxygen sensors for process and safety applications in chemical plant and petrochemical operations.

### Specifications

#### Measurement O<sub>2</sub>

|   |   |
|---|---|
| Effective path length   | Probes: 200, 400, 800 mm (7.87", 15.75", 31.49")  |
|   | Water: 50, 80, 100 mm (1.96", 3.15", 3.94")   |
|   | Extractive cells: 200, 400, 800 mm, 1 m, 10 m<br>(7.87", 15.75", 31.49", 39.37", 393.70")                         |
| Lower detection limit<br>(in 1 meter path length at ambient standard conditions, dry gas, no dust load, in N <sub>2</sub> background) | 100 ppm-v   |
| Measurement range   | 0–100%  |
| Accuracy  | 2% of reading or 100 ppm O <sub>2</sub> , whichever is greater  |
| Linearity   | Better than 1%  |
| Resolution  | <0...0.01% vol O <sub>2</sub> (100 ppm-v)   |
| Drift   | Negligible (<2% of measurement range between maintenance intervals)   |
| Sampling rate   | 1 second  |
| Response time (T <sub>90</sub> )  | O <sub>2</sub> in N <sub>2</sub> 21% >0% in <2 sec  |
| Warm up time  | Typically <1 minute   |
| Repeatability   | ±0.25% of reading or 0.05% O <sub>2</sub> (whichever is greater)  |
| Process pressure range  | 0.3 bar–10 bar (abs)* / 4.35 psi–145.03 psi (abs)   |
| Process temperature range   | 0–250 °C (32–482 °F)<br>Optional (for probe installation) 0–600 °C (0–1112 °F)<br>with additional thermal barrier |

\* firmware 6.23 or higher

### Features Overview

- One-flange installation without alignment
- In situ measurement without sampling system
- Low cost-of-ownership with virtually no maintenance
- Low purge gas consumption for minimum operating costs
- Large choice of process interface options



### Did You Know

Tunable Diode Laser spectrometers are insensitive to background interference from the process gas and moisture, and are largely resistant to heavy dust loads.

▶ [www.mt.com/GPro500](http://www.mt.com/GPro500)



**Measurement (All measurement specifications with reference to standard conditions T & P with no dust or particulates) and 1 m optical path**

|   | O <sub>2</sub>   | CO (ppm)  | CO (%)  | H <sub>2</sub> O   | H <sub>2</sub> O ppm                                   | CO <sub>2</sub> (%)  |
|---|--|---|---|--|--|--|
| Effective path length                                   | <b>Probes:</b> 200, 400, 800 mm (7.87", 15.75", 15.75", 31.50").<br><b>Wafer Cell:</b> 104 mm, 110 mm, 154 mm, 164 mm, 214 mm (4.09", 4.33", 6.06", 6.46", 8.43")<br><b>Extractive cells:</b> 200 mm, 400 mm, 800 mm, 1 m, 8 m (7.87", 15.75", 31.50", 39.37", 315") |   |   |  |  |  |
| Measurement range and standard conditions <sup>1)</sup> | 0–100%   | 0–2%  | 0–100%  | 0–20%  | 0–1%   | 0–100%   |
| Lower Detection Limit <sup>2)</sup>                     | 100 ppm-v  | 1 ppm-v   | 1500 ppm-v  | 5 ppm-v  | 1 ppm-v  | 1000 ppm-v   |
| Accuracy  | 2% of reading or 100 ppm O <sub>2</sub> , whichever is greater   | 2% of reading or 1 ppm, whichever is greater          | 2% of reading or 1500 ppm, whichever is greater       | 2 % of reading or 10 ppm, whichever is greater                       | 2% of reading or 1 ppm, whichever is greater           | 2% of reading or 1000 ppm, whichever is greater                        |
| Linearity   | Better than 1%   | Better than 1%  | Better than 1%  | Better than 1%   | Better than 1%   | Better than 1%   |
| Resolution  | <0...01% vol O <sub>2</sub> (100 ppm-v)  | 1 ppm-v   | 1500 ppm-v  | 5 ppm-v  | 1 ppm-v  | 1000 ppm-v   |
| Drift   | Negligible (<2% of measurement range between maintenance intervals)  |   |   |  |  |  |
| Sampling rate   | 1 second   | 1 second  | 1 second  | 1 second   | 1 second   | 1 second   |
| Response time (T90)                                     | O <sub>2</sub> in N <sub>2</sub> 21% >0% in <2 sec   | CO in N <sub>2</sub> 300 ppm-v to 0% in <4 sec        | CO in N <sub>2</sub> 1% to 0% in <4 sec               | H <sub>2</sub> O in N <sub>2</sub> 1% to 0% in <4 sec                | H <sub>2</sub> O in N <sub>2</sub> 1% to 0% in <4 sec  | CO <sub>2</sub> in N <sub>2</sub> 1% to 0% in <4 sec                   |
| Warm-up time  | Typically <1 hour  | Typically <1 hour                                     | Typically <1 hour                                     | Typically <1 hour  | Typically <1 hour                                      | Typically <1 hour  |
| Repeatability   | ±0.25% of reading or 0.05% O <sub>2</sub> , whichever is greater   | ±0.25% of reading or 5 ppm-v CO, whichever is greater | ±0.25% of reading or 0.75%-v CO, whichever is greater | ±0.25% of reading or 50 ppm-v H <sub>2</sub> O, whichever is greater | ±0.25% of reading or 10 ppm-v CO, whichever is greater | ±0.25% of reading or 5000 ppm-v CO <sub>2</sub> , whichever is greater |
| Process pressure range                                  | 0.1 bar to 10 bar (abs)*/ 4.35 psi to 145.03 psi (abs)   | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29.psi (abs)      | 0.8 bar to 1.5 bar (abs)/ 11.6 psi to 21.7.psi (abs)  | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29.psi (abs)                     | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29.psi (abs)       | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29 psi (abs)                       |
| Process temperature range                               | 0 to +250 °C (+32 to +482 °F) Optional (for probe installation).<br>0 to +600 °C (0 to +1112 °F) with built in thermal barrier. 0 to +150 °C (+32 to +302 °F) (White cell)   |   |   |  |  |  |
|   | * firmware 6.23 or higher  |   |   |  |  |  |

|   | CO ppm/CH <sub>4</sub> %   | CO <sub>2</sub> %/CO %  | HCl (ppm)  | H <sub>2</sub> S (%)  | CH <sub>4</sub> ppm   | NH <sub>3</sub> ppm   |
|---|--|---|--|---|---|---|
| Effective path length                                   | <b>Probes:</b> 200, 400, 800 mm (7.87", 15.75", 15.75", 31.50").<br><b>Wafer Cell:</b> 104 mm, 110 mm, 154 mm, 164 mm, 214 mm (4.09", 4.33", 6.06", 6.46", 8.43")<br><b>Extractive cells:</b> 200 mm, 400 mm, 800 mm, 1 m, 8 m (7.87", 15.75", 31.50", 39.37", 315") |   |  |   |   |   |
| Measurement range and standard conditions <sup>1)</sup> | 0–2% (CO)<br>0–10% (CH <sub>4</sub> )  | 0–100% (CO <sub>2</sub> and CO)   | 0–3%   | 0–50%   | 0–1%  | 0–1%  |
| Lower Detection Limit <sup>2)</sup>                     | 1 ppm-v (CO)<br>100 ppm-v (CH <sub>4</sub> )   | 1000 ppm-v (CO <sub>2</sub> )<br>1500 ppm-v (CO)                            | 0.6 ppm-v  | 20 ppm-v  | 1 ppm-v   | 1 ppm-v   |
| Accuracy  | 2% of reading or 1 ppm (CO) / 100 ppm-v (CH <sub>4</sub> ), whichever is greater   | 2% of reading or 1000 ppm, whichever is greater                             | 2% of reading or 0.6 ppm, whichever is greater         | 2% of reading or 20 ppm, whichever is greater                         | 2 % or 1 ppm  | 2 % or 1 ppm  |
| Linearity   | Better than 1%   | Better than 1%  | Better than 1%   | Better than 1%  | Better than 1%  | Better than 1%  |
| Resolution  | 1 ppm-v (CO)<br>100 ppm-v (CH <sub>4</sub> )   | 1000 ppm-v  | 0.6 ppm-v  | 20 ppm-v  | 1 ppm   | 1 ppm   |
| Drift   | Negligible (<2% of measurement range between maintenance intervals)  |   |  |   |   |   |
| Sampling rate   | 1 second   | 1 second  | 1 second   | 1 second  | 1 second  | 1 second  |
| Response time (T90)                                     | CO/CH <sub>4</sub> in N <sub>2</sub> 2% to 0% in <4 sec  | CO <sub>2</sub> in N <sub>2</sub> 1% to 0% in <4 sec                        | HCl in N <sub>2</sub> 1% to 0% in <4 sec               | H <sub>2</sub> S in N <sub>2</sub> 1% to 0% in <4 sec                 | CH <sub>4</sub> in N <sub>2</sub> 1% to 0% in <4 sec                | NH <sub>3</sub> in N <sub>2</sub> 1% to 0% in <4 sec                |
| Warm-up time  | Typically <1 hour  | Typically <1 hour   | Typically <1 hour                                      | Typically <1 hour   | Typically <1 hour   | Typically <1 hour   |
| Repeatability   | ±0.25% of reading or 5 ppm-v CO/500 ppm-v CH <sub>4</sub> , whichever is greater   | ±0.25% of reading or 5000 ppm-v CO <sub>2</sub> or CO, whichever is greater | ±0.25% of reading or 3 ppm-v HCl, whichever is greater | ±0.25% of reading or 100 ppm-v H <sub>2</sub> S, whichever is greater | ±0.25% of reading or 5 ppm-v CH <sub>4</sub> , whichever is greater | ±0.25% of reading or 5 ppm-v NH <sub>3</sub> , whichever is greater |
| Process pressure range                                  | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29 psi (abs)   | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29 psi (abs)                            | 0.8 bar to 3 bar (abs)/ 11.6 psi to 43.5 psi (abs)     | 0.8 bar to 2 bar (abs)/ 11.6 psi to 29 psi (abs)                      | 0.8 bar to 3 bar (abs)/ 11.6 psi to 43.5 psi (abs)                  | 0.8 bar to 3 bar (abs)/ 11.6 psi to 43.5 psi (abs)                  |
| Process temperature range                               | 0 to +250 °C (+32 to +482 °F) Optional (for probe installation).<br>0 to +600 °C (0 to +1112 °F) with built in thermal barrier. 0 to +150 °C (+32 to +302 °F) (White cell)   |   |  |   |   |   |

<sup>1)</sup> Measurement range and standard conditions (ambient temperature and pressure, 1 m path length).

<sup>2)</sup> Lower Detection Limit (in 1 meter path length at ambient standard conditions, dry gas, no dust load, in N<sub>2</sub> background).

# Gas Analyzers

Measure Everywhere It Matters

## Variant Configurator

|   |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gas Analyzer                                      | GPro 500 | A | T | A | O | P | B | K | S | O | 2 | O | P | D | 1 | X | S | _ | _ | / | A | X |
| 30 027 126*, 30 538 717**                         | GPro 500 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | / | Y | Y |
| <b>Hazardous area approvals</b>                   |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ATEX/IECEX Ex d                                   |          | A | T |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| FM Class 1 Div 1                                  |          | U | S |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Gases</b>                                      |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Oxygen  |          |   |   | A | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CO  |          |   |   | C | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| H <sub>2</sub> O                                  |          |   |   | H | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| H <sub>2</sub> O ppm                              |          |   |   | H | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CO <sub>2</sub> %                                 |          |   |   | C | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CO %  |          |   |   | C | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CO % + CO <sub>2</sub> %                          |          |   |   | C | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CO ppm + CH <sub>4</sub> %                        |          |   |   | C | M |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| H <sub>2</sub> S                                  |          |   |   | S | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| HCl ppm   |          |   |   | L | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| CH <sub>4</sub> ppm                               |          |   |   | M | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| NH <sub>3</sub> ppm                               |          |   |   | N | O |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Process interfaces</b>                         |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Standard Probe purged (SP)                        |          |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Non-purged Filter Probe (NP)                      |          |   |   |   |   |   |   |   | F |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Non-purged Filter Probe with Blow-back (BP)       |          |   |   |   |   |   |   |   | B |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Wafer (W)   |          |   |   |   |   |   |   |   | W |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Extractive Cell (E)                               |          |   |   |   |   |   |   |   | E |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cross-pipe Folded Path (C)                        |          |   |   |   |   |   |   |   | C |   |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Process optics***</b>                          |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Borosilicate                                      |          |   |   |   |   |   |   |   | B |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Quartz  |          |   |   |   |   |   |   |   | Q |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Sapphire  |          |   |   |   |   |   |   |   | S |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Dual Window Borosilicate                          |          |   |   |   |   |   |   |   | C |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Dual Window Quartz                                |          |   |   |   |   |   |   |   | R |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Dual Window Sapphire                              |          |   |   |   |   |   |   |   | T |   |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Process sealings***</b>                        |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Kalrez® 6375                                      |          |   |   |   |   |   |   |   | K |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Graphite  |          |   |   |   |   |   |   |   | G |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Kalrez® (FDA grade) 6230                          |          |   |   |   |   |   |   |   | F |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Kalrez® 6380                                      |          |   |   |   |   |   |   |   | S |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Kalrez® 0090                                      |          |   |   |   |   |   |   |   | R |   |   |   |   |   |   |   |   |   |   |   |   |   |
| PFA-coated FEP                                    |          |   |   |   |   |   |   |   | P |   |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Wetted materials***</b>                        |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1.4404 (equivalent to 316L)                       |          |   |   |   |   |   |   |   |   | S | O |   |   |   |   |   |   |   |   |   |   |   |
| Hastelloy C22                                     |          |   |   |   |   |   |   |   |   | C | O |   |   |   |   |   |   |   |   |   |   |   |
| <b>Optical path probes and extractive cell***</b> |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 200 mm (7.9")                                     |          |   |   |   |   |   |   |   |   |   | 2 | O |   |   |   |   |   |   |   |   |   |   |
| 400 mm (15.7")                                    |          |   |   |   |   |   |   |   |   |   | 4 | O |   |   |   |   |   |   |   |   |   |   |
| 800 mm (31.5")                                    |          |   |   |   |   |   |   |   |   |   | 8 | O |   |   |   |   |   |   |   |   |   |   |
| 1 m (3.3 ft)                                      |          |   |   |   |   |   |   |   |   |   | 0 | 1 |   |   |   |   |   |   |   |   |   |   |
| 2 m (6.6 ft)                                      |          |   |   |   |   |   |   |   |   |   | 0 | 2 |   |   |   |   |   |   |   |   |   |   |
| 3 m (9.8 ft)                                      |          |   |   |   |   |   |   |   |   |   | 0 | 3 |   |   |   |   |   |   |   |   |   |   |
| 4 m (13.1 ft)                                     |          |   |   |   |   |   |   |   |   |   | 0 | 4 |   |   |   |   |   |   |   |   |   |   |

**Variant Configurator (continued)**

| Gas Analyzer                        | GPro 500 | A | T | A | O | P | B | K | S | O | 2 | O | P | D | 1 | X | S | _ | _ | / | A | X |
|-------------------------------------|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 027 126*, 30 538 717**           | GPro 500 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | / | Y | Y |
| 5 m (16.4 ft)                       |          |   |   |   |   |   |   |   |   |   | 0 | 5 |   |   |   |   |   |   |   |   |   |   |
| 6 m (19.7 ft)                       |          |   |   |   |   |   |   |   |   |   | 0 | 6 |   |   |   |   |   |   |   |   |   |   |
| 10 m (32.8 ft)                      |          |   |   |   |   |   |   |   |   |   | 1 | 0 |   |   |   |   |   |   |   |   |   |   |
| None                                |          |   |   |   |   |   |   |   |   |   | X | X |   |   |   |   |   |   |   |   |   |   |
| <b>Process connections***</b>       |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| DN 50/PN 25                         |          |   |   |   |   |   |   |   |   |   |   |   |   | P | D |   |   |   |   |   |   |   |
| ANSI 2"/300 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | P | A |   |   |   |   |   |   |   |
| DN 50/PN 16                         |          |   |   |   |   |   |   |   |   |   |   |   |   | L | D |   |   |   |   |   |   |   |
| ANSI 2"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | L | A |   |   |   |   |   |   |   |
| DN 80/PN 16                         |          |   |   |   |   |   |   |   |   |   |   |   |   | G | D |   |   |   |   |   |   |   |
| ANSI 3"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | G | A |   |   |   |   |   |   |   |
| DN 100/PN 25                        |          |   |   |   |   |   |   |   |   |   |   |   |   | N | D |   |   |   |   |   |   |   |
| ANSI 4"/300 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | N | A |   |   |   |   |   |   |   |
| ANSI 4"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | M | A |   |   |   |   |   |   |   |
| DN 50/PN 16 and 40                  |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 1 |   |   |   |   |   |   |   |
| DN 80/PN 16 and 40                  |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 2 |   |   |   |   |   |   |   |
| DN 100/PN 16                        |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 3 |   |   |   |   |   |   |   |
| ANSI 2"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 4 |   |   |   |   |   |   |   |
| ANSI 3"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 5 |   |   |   |   |   |   |   |
| ANSI 4"/150 lbs                     |          |   |   |   |   |   |   |   |   |   |   |   |   | W | 6 |   |   |   |   |   |   |   |
| Swagelok 6 mm                       |          |   |   |   |   |   |   |   |   |   |   |   |   | E | M |   |   |   |   |   |   |   |
| Swagelok 1/4"                       |          |   |   |   |   |   |   |   |   |   |   |   |   | E | I |   |   |   |   |   |   |   |
| <b>Wall thickness***</b>            |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 100 mm                              |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 1 |   |
| 200 mm                              |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| 300 mm                              |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |
| None                                |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| <b>Filters***</b>                   |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Filter A – 40 µm                    |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | A |
| Filter B – 100 µm                   |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | B |
| Filter C – 200 µm                   |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | C |
| Filter D – 3 µm                     |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | D |
| Filter PTFE Membrane                |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | E |
| No Filter                           |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| <b>Add-on modules***</b>            |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| None                                |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| With Thermal Barrier (up to 600 °C) |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | H |
| 2-fold Multireflection Cell         |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 2 |
| 3-fold Multireflection Cell         |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | 3 |
| <b>Cable</b>                        |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5 m (16.4 ft)                       |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | A |
| 15 m (49.2 ft)                      |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | B |
| 25 m (82.0 ft)                      |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | C |
| 40 m (131.2 ft)                     |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | D |
| None                                |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| <b>Communication interfaces</b>     |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| RS485 (for M400)                    |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |
| RS485 and Direct Analog (SIL)       |          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | A |

\* 6 weeks delivery time. \*\* 3 weeks delivery time. \*\*\* Other configurations upon request.