

# / Application Note

## Calorific value measurement in the steel industry



In the steel industry, blast furnace gas (a by-product of metal production), coke oven gas (a by-product of coking of coal), or a combination of the two are used as fuel for power generation. Measuring the calorific value of these gases is a routine task to determine the energy content and thus the contribution to operational costs of the steel-making process. The primary combustible components are hydrogen, carbon monoxide and methane, with their ratios varying based on the fuel gas source.

	Typical coke oven gas	Typical blast furnace gas
Hydrogen (H <sub>2</sub> )	50 – 70 %	1 – 5 %
Carbon monoxide (CO)	0 – 10 %	20 – 25 %
Methane (CH <sub>4</sub> )	20 – 30 %	0 – 3 %

A common method of measuring the calorific value is extractive gas analysis. Some typical values for the primary combustibles in coke oven or blast furnace gas are listed above. Depending on the source of the gas, or if both are combined, the values may vary. Typically, the gas is at a slightly elevated temperature at the point of measurement with a minimal overpressure and marginal dust load.

A common challenge for extractive measurement technology is the presence of naphthalene (C<sub>10</sub>H<sub>8</sub>) in the gas max. It can cause clogging in the extraction tubing, leading to high maintenance needs and reduced uptime of the downstream processes.

### / NEO Monitors' solution

The LaserGas™ analyzers from NEO Monitors are based on the well-proven technology of Tunable Diode Laser Absorption Spectroscopy (TDLAS). This technology allows the measurement of gases in-situ, i.e. directly in the duct without gas sampling. In this way, customers benefit from a significant reduction of maintenance needs and consequently an increased uptime of their downstream processes.

Depending on the gas mix, the following analyzer combinations are recommended:

Typical coke oven gas	Hydrogen (H <sub>2</sub> )	LaserGas™ III H2 Ultra
	Carbon monoxide (CO)	LaserGas™ III CO+CH4 Ultra
	Methane (CH <sub>4</sub> )	
Typical blast furnace gas	Hydrogen (H <sub>2</sub> )	LaserGas™ III H2 Ultra
	Carbon monoxide (CO)	LaserGas™ II CO
	Methane (CH <sub>4</sub> )	LaserGas™ II CH4



LaserGas™ III



LaserGas™ II

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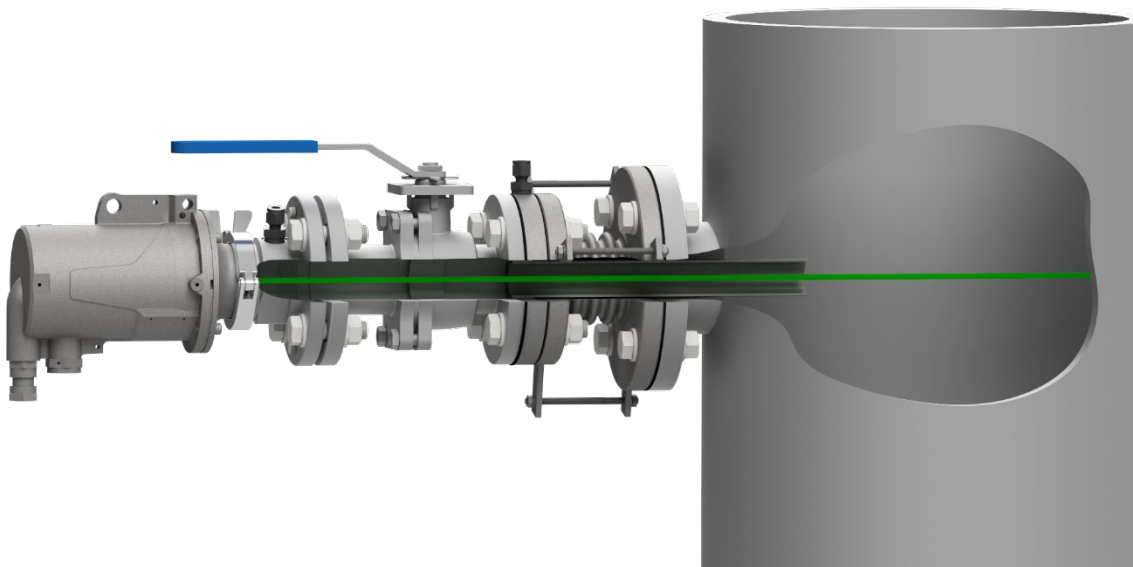
All LaserGas™ products offer:

- Sensitive and selective
- Contactless
- Fast response time
- No drift of zero/span
- Low maintenance requirements
- High reliability and longevity

LaserGas™ III Ultra analyzers use NEO Monitors' proprietary IROSS™ signal processing algorithm, which eliminates certain cross-sensitivities to other gas components that may be present in the process.

### **/ Installation recommendation**

The high carbon monoxide content and its inherent toxicity means that a rigorous, high integrity installation of the analyzers is required. A typical installation example using a combination of flanges for mounting and alignment, and valves is depicted below. The use of insertion tubes is optional; they offer, however, the advantage of lower purge air consumption and a well-defined optical path length which increases the precision of the concentration measurement.



### **/ Further information**

Hydrogen measurement with TDLAS: [Pushing the boundaries – NEO Monitors](#)

IROSS™ - NEO Monitors' proprietary signal processing: [https://neomonitors.com/wp-content/uploads/2024/07/IROSS\\_Extended\\_final.pdf](https://neomonitors.com/wp-content/uploads/2024/07/IROSS_Extended_final.pdf)