

**VARIO**  
*plus*  
*Industrial*

# THE PORTABLE CEMS



HIGH ACCURACY & EXTREME  
PORTABILITY FOR INDUSTRIAL  
APPLICATIONS



since 1984®

**AIR**  
*fair*

EMISSION MONITORING SYSTEMS

O<sub>2</sub>

CO<sub>2</sub>  
calc.

CO<sub>2</sub>  
meas.

CO

CO  
HIGH

NO

NO<sub>2</sub>

NO<sub>x</sub>

SO<sub>2</sub>

H<sub>2</sub>S  
H<sub>2</sub>

CH<sub>4</sub>  
C<sub>3</sub>H<sub>8</sub>

# VARIOplus Industrial

**Suitable for industrial applications using combined infrared (NDIR) technology and electrochemical sensors for maximum versatility.**

**Complies with USEPA methods CTM-030 and CTM-034 and international ASTM D6522**

**Certified according to DIN EN 50379-1 and DIN EN 50379-2**

## Functions of the VARIO PLUS INDUSTRIAL

- >> Simultaneous measurements of up to 9 gas components!  
E.g. O<sub>2</sub>, CO, NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO-high, CO-very high, H<sub>2</sub>S or H<sub>2</sub>, CH<sub>4</sub> or C<sub>3</sub>H<sub>8</sub>  
Up to 6 electrochemical sensor configurations are possible!  
Plus additional 3 gas NDIR bench with CO<sub>2</sub>, CO-high, CH<sub>4</sub> (C<sub>3</sub>H<sub>8</sub>).
- >> Emission calculations including: mg/m<sup>3</sup>, NO<sub>x</sub> as mg/m<sup>3</sup> NO<sub>2</sub>, true measurement of NO<sub>x</sub> = NO + NO<sub>2</sub>, including O<sub>2</sub> referencing (normalization) to user definable values
- >> Gas temperature measurement up to 2,012°F (use stainless steel up to 1,200°F, use Inconel tubes up to 2,012°F)
- >> Integrated gas cooler and automatic condensate draining pump / PTFE filter
- >> Air purging pump for CO-sensor protection
- >> Built-in speed printer with easy paper loading
- >> Internal data storage for up to 8,500 measurements!
- >> RS 232 port
- >> RS 485 port
- >> 8 channel analog outputs 4 .... 20mA
- >> Differential pressure measurement ± 40 inH<sub>2</sub>O (100 hPa)
- >> Automatic self test of software and hardware functions
- >> Large, high-contrast and backlit graphic display with ZOOM function

## Continuous analysis of:

O<sub>2</sub> Long-life (0...21.0 Vol.-%)  
CO H<sub>2</sub>-compensated (0 ... 4,000 / Overload 10,000 ppm)  
Combustion air temperature (short plug included)  
Stack gas temperature  
Stack pressure  
Differential pressure  
Differential temperature

## Combustion calculations (fuel type dependent):

CO<sub>2</sub>  
CO/CO<sub>2</sub> ratio  
Dew point  
Excess air and air ratio (Lambda)  
Combustion efficiency  
Heat losses

## Interfaces:

## OPTIONAL \*



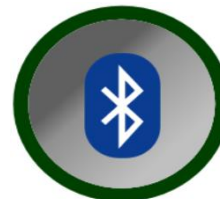
**RS232 / RS485**  
Data transfer



**4 to 20 mA\*:**  
Connect to  
PLC



**SD card\*:**  
4 GB  
Data Memory



**Bluetooth\*:**  
Data transfer



**AUX\*:**  
For additional  
external sensors

# VARIOplus Industrial

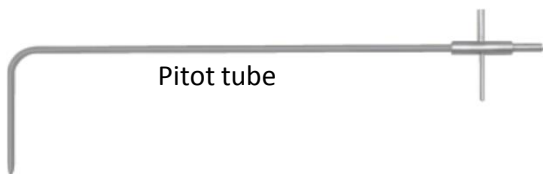
## SIMULTANEOUS MEASUREMENT OF UP TO 9 GAS COMPONENTS

### ADDITIONAL OPTIONS

- >> SD card 4 GB for large volume data logging
- >> External battery for measurement operation up to 6 hours
- >> Sample probe with heated filter
- >> Heated gas sample line, length 120" or 200" (only with grid voltage supply)
- >> Sample probe tubes with length from 12" to 80"
- >> Gas velocity measurement using Pitot tube [Nm<sup>3</sup>/s] and mass flow calculation [mg/s]
- >> 8 channel analog outputs 4 ... 20 mA
- >> External 12 Vdc power supply cable from cigarette lighter
- >> Robust aluminum framed transport case with dolly
- >> Analyzer heating device (freeze protection)



Different probes available



Pitot tube

- 1 Draft
- 2 Differential pressure
- 3 Heated hose and T-Gas
- 4 Sample gas inlet
- 5 Dust and particle filter
- 6 Condensate outlet
- 7 Combustion air temp.
- 8 AUX connector
- 9 Ventilation gas cooler
- 10 Eye for shoulder strap
- 11 Easy load speed printer
- 12 SD card
- 13 External keyboard
- 14 Ext.12Vdc power supply
- 15 Grid power supply
- 16 Analog outputs
- 17 RS 485
- 18 RS 232



Remote control unit

# VARIO plus Industrial

## TECHNICAL SPECIFICATIONS

DATA SUBJECT TO CHANGE WITHOUT NOTICE

**VARIO plus IND.** Portable analyzer with up to 6 electrochemical sensors and 3 gas NDIR bench  
**Fuel types** Natural gas, liquid gas, oil light, pellets, wood, coal, user definable fuels

Measurement components	Measuring range	Accuracy
<b>Electrochemical sensors</b>		
O2 Oxygen	0 ... 21.0 Vol-%	± 0.2 Vol-% abs.
CO Carbon monoxide (H2 compensated)	0 ... 4,000 ppm overload 10,000ppm *	± 10 ppm or 5 % reading < 4,000 ppm / 10 % reading > 4,000 ppm
CO Carbon monoxide very high	0 ... 4.0% overload 10.0% *	± 0.02% or 5 % reading < 0.4% / 10 % reading > 0.4%
NO Nitric oxide	0 ... 1.000 ppm overload 5,000ppm *	± 5 ppm or 5 % reading < 1,000 ppm / 10 % reading > 1,000 ppm
NO2 Nitrogen dioxide	0 ... 200 ppm overload 1,000ppm *	± 5 ppm or 5 % reading < 200 ppm / 10 % reading > 200 ppm
SO2 Sulfur dioxide	0 ... 2,000 ppm overload 5,000ppm *	± 10 ppm or 5 % reading < 2,000 ppm / 10 % reading > 2,000 ppm
H2S Hydrogen sulfide	0 ... 200 ppm overload 2,000ppm *	± 5 ppm or 5 % reading up to 500 ppm 10 % reading up to 2,000 ppm
H2 Hydrogen	0 ... 1 % overload up to 2 %	±0.02 % or 5 % reading <1 % 10 % reading >1 %

\*overload range recommend only for short time measurements

Measurement components	Measuring range	Accuracy
<b>3 Gas NDIR Bench with either CH4 or C3H8</b>		
CO CO Carbon monoxide	3 Gas NDIR 0.....10,000ppm up to 10%	± 0.03% or ±3% of reading
CO2 Carbon dioxide	3 Gas NDIR 0.....3% up to 30%	± 0.5% or ±3% of reading
CH4 Hydrocarbons / Methane	3 Gas NDIR 0.....10,000ppm up to 3%	± 0.03% or ±3% of reading
C3H8 Hydrocarbons / Propane	3 Gas NDIR 0.....2,000ppm up to 5,000ppm	± 30 ppm or ±3% of reading
Stack / Flue gas temperature	0 ... 1,200°F / 2,012°F (with stainless steel / Inconel steel tube)	± 4°F ... < 392°F / 1 % reading > 392°F
Primary-air / Ambient temperature	0 ... 572°F	± 2°F
Stack / Differential pressure	+/- 40 inH2O (100hPa)	± 0.01 inH2O or 3% reading
Gas flow velocity measurement	1 ... 100 m/s (using Pitot tube)	±1m/s or 3 % reading

### Calculated values (fuel type dependent)

Carbon dioxide (calculated without NDIR)	0 ... CO2 max.	<b>Air Ratio (Lambda)</b>	1 ... 9.99
Heat losses qA	0 ... 99.9 %	<b>Excess Air</b>	0 ... 99.9
Efficiency	0 ... 100 % / 120 %	<b>CO/CO2 ratio</b>	0 ... 10

### General specifications

Operation temperature	40°F .... 100°F, max. 95 % RH, non condensing
Storage temperature	-4°F ..... 120°F
Ambient conditions	not in aggressive, corrosive or high dust environments, not for use in hazardous areas
Power supply	approx. 2 hours battery operation with gas cooler, without heated gas sampling line
Grid power supply	100 ... 250 Vac / 47 ... 63 Hz
Protection class	IP21
Weight	approx. 15.4 lbs. (without transport case, bag, trolley)
Dimensions	(W x H x D) 21" x 19" x 12"

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