

## Key Applications

- Process Gases
- Combustion Gases
- Flare Gases

## Markets

- Chemical and Petrochemical Industries
- Oil & Gas Industry
- Gas Turbines

## Benefits

### Wobbe-compliant measurement principle

- Direct determination of the Calorific Value
- Only one calibration gas needed
- No cross sensitivity to gas components

### Low total cost of ownership

- Long-live Thermopile technology
- 3 years warranty
- 4 years Mean Time Before Failure (MTBF)

### Extremely high availability

- No condensation risk
- No risk of gas flow blocking
- Condensate-free flue gas

### High operator and plant safety

- "Safe condition" 5 min after shutdown
- Zero combustible emission
- Low Temperature: Class T4 (135°C)

### High measuring accuracy approval by PTB

- Fiscal measurement of Natural gas
- Fiscal measurement of Natural gas/ LPG / air mixtures
- Fiscal measurement of Coke oven gas (field approval)

## Features

### Measured values

- Wobbe Index
- Net and Gross Calorific Value
- Specific Gravity
- Air Requirement

### Wobbe-compliant measuring principle

- All combustible gas components are burnt and related temperature increase is measured ("Straight-forward to Wobbe" principle)

### Various Data Output options

- 4-20mA, Modbus, Profibus, Profinet

## High Performance Combustion Calorimeter

with approval for use in hazardous areas according to:

- ATEX II 2G Ex p IIC T4 Gb
- Ex pxb IIC T4 Gb

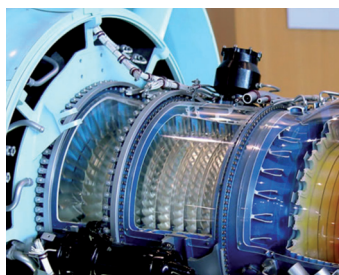
for the determination of Wobbe Index, Calorific Values, and Specific Gravity.



In chemical plants, combustible gases (waste gases) are released and combusted in flares. The quality of these gases varies widely. To ensure correct and continuous flaring, the waste gas must contain a minimum amount of combustible gases. In this case, Natural gas is added, and the gas mix is controlled by the CWD.




Chemical industry processes produce process gases that, depending on their composition and possible further application, are disposed of as waste gas or further used as an energy source or raw material. This is a typical application in industrial parks. In all cases, the calorific analysis of the gas with the CWD is very helpful.

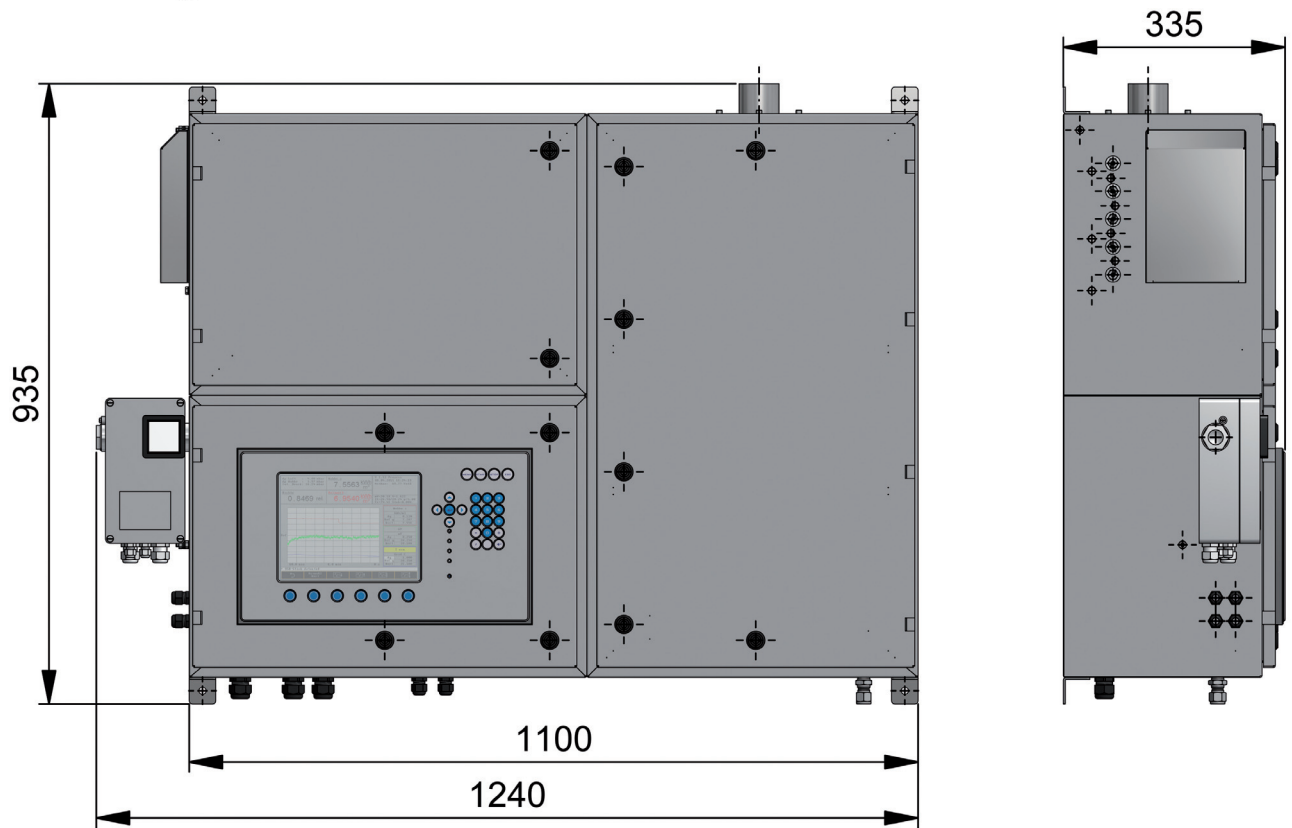


Gas turbines are very common energy generators which react very sensitively to changing operational conditions. Therefore, it is important to know the composition of the combustion gas (typically Natural gas) exactly at any time. The CWD calorimeter is very helpful for this application.

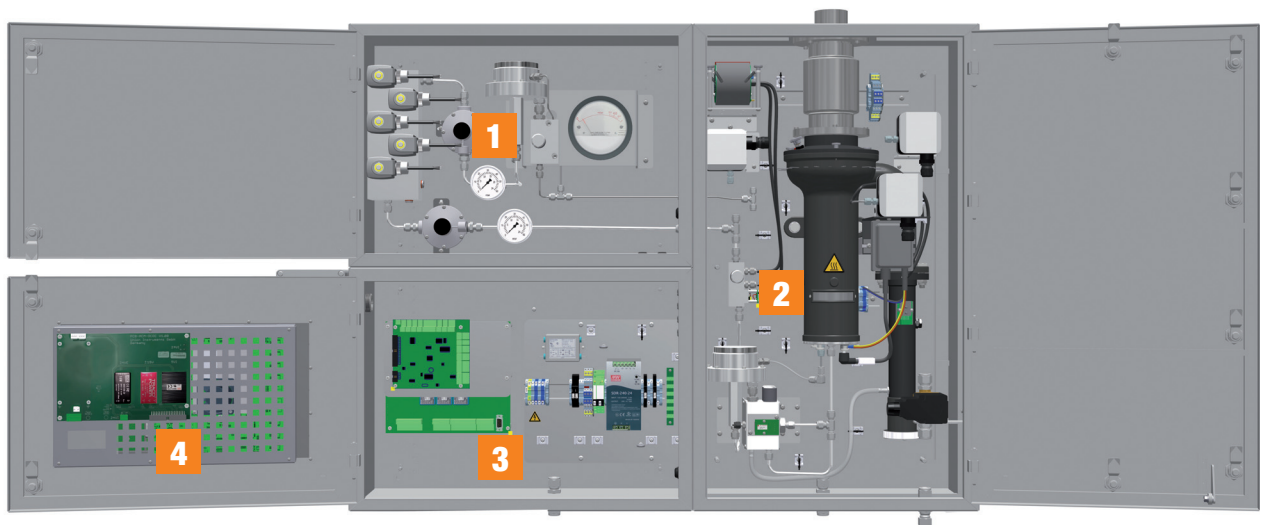
# TECHNICAL SPECIFICATIONS

CWD3000 EXP

Conformity / Certification	
ATEX marking	 II 2G Ex pxb IIC T4 Gb
IECEx marking	Ex pxb IIC T4 Gb
Protection Class	
Chamber 1 (Gas inlet)	IP 44
Chamber 2,3 (Measurement sensor, power supply)	IP 65 (under operation)
Accuracy and Response time	
Measuring Accuracy	See application list (page 4)
Response time T90	≤ 10 sec.
Dimensions / Weight	
Dimension W x H x D [mm]	1240 x 935 x 335
Dimension W x H x D [inch]	49 x 37 x 14
Weight	140 [kg]; (309 lb approx.)
Sample Gas and Instrumental air supply	
Sample gas inlet pressure	25 – 500 mbar
Sample gas consumption	15 – 200 l/h (1 – 7 ft <sup>3</sup> /h)
Sample gas inlet	1
Calibration gas inlet	1 (2 optional)
Support gas inlet	1 (optional)
Test gas inlet	1 (optional)
Tmax. of sample gas	50°C (122°F)
Instrument air consumption	16 000 – 30 000 l/h
Instrument air pressure	3,5 - 10 bar (50 - 145 psi)
Installation and ambient conditions	
Ambient temperature	- 10 ... 50 °C (14 – 131 °F)
Ambient humidity	≤ 95 % relative, condensate free
Power supply and Interfaces	
Power supply	115 VAC, 50/60 Hz; 240 VAC, 50/60 Hz
Interfaces (standard)	Relays (3 pcs), (4)- 20 mA (3 pcs)
Interfaces (optional)	Profibus; Profinet; Modbus RTU/TCP



- 1) Cell 1 (Solenoid valves and pressure controllers)
- 2) Cell 2 (Analyzer with Wobbe and Specific Gravity measurement)
- 3) Cell 3 (Electronics and power supply)
- 4) Controller



## CWD3000 Calorimeter Application List

Target Industry	Applic. No.	Application (Type of process gas)	Measuring accuracy [Wobbe Index]
Natural Gas producing and using industries	001	<b>Natural Gas and Biomethane (and gases associated to crude oil)</b> Wobbe index range 30-60 MJ/m <sup>3</sup>   8,0-16,0 kWh/m <sup>3</sup>   7000-14000 kcal/m <sup>3</sup>   750-1500 BTU/ft <sup>3</sup>	±1% MV
Refineries	004	<b>Refinery gas</b> is a mixture of gases generated during refinery processes. These gases are used to process crude oil into various petroleum products. Wobbe index range 25-70 MJ/m <sup>3</sup>   7,0-20,0 kWh/m <sup>3</sup>   6000-16500 kcal/m <sup>3</sup>   650-1800 BTU/ft <sup>3</sup>	±1,5% MV
Iron & Steel	005	<b>Blast Furnace Gas (BFG)</b> . BFG is a by-product of blast furnaces that is generated when the iron ore is reduced with coke to metallic iron. Wobbe index range 3-5 MJ/m <sup>3</sup>   0,8-1,4 kWh/m <sup>3</sup>   700-1200 kcal/m <sup>3</sup>   80-130 BTU/ft <sup>3</sup>	Not applied
	006	<b>Coke Oven Gas (COG)</b> . COG is a fuel gas and a valuable by-product of coal carbonization to produce coke in the steel industry. COG is a potential feedstock for syngas and methanol production. Wobbe index range 19-29 MJ/m <sup>3</sup>   5,3-8,0 kWh/m <sup>3</sup>   4500-7000 kcal/m <sup>3</sup>   480-740 BTU/ft <sup>3</sup>	±1% MV
	007	<b>Mixed gas (BFG + COG)</b> to be used as combustion gas. Wobbe index range 4-7 MJ/m <sup>3</sup>   1,1-1,9 kWh/m <sup>3</sup>   1000-1700 kcal/m <sup>3</sup>   100-180 BTU/ft <sup>3</sup>	Not applied
	008	<b>Mixed gas (BFG + COG)</b> to be used as combustion gas. Wobbe index range 3-5 MJ/m <sup>3</sup>   0,8-1,4 kWh/m <sup>3</sup>   700-1200 kcal/m <sup>3</sup>   80-130 BTU/ft <sup>3</sup>	Not applied
	009	<b>Mixed gas (LDG + COG)</b> to be used as combustion gas. Wobbe index range 3,2-6,2 MJ/m <sup>3</sup>   0,9-1,7 kWh/m <sup>3</sup>   750-1500 kcal/m <sup>3</sup>   80-160 BTU/ft <sup>3</sup>	Not applied
	010	<b>Mixed gas (BFG + COG)</b> to be used as combustion gas. Wobbe index range 5,0-12,5 MJ/m <sup>3</sup>   1,4-3,5 kWh/m <sup>3</sup>   1200-3000 kcal/m <sup>3</sup>   130-320 BTU/ft <sup>3</sup>	Not applied
	011	<b>Mixed gas (BFG + COG)</b> to be used as combustion gas. Wobbe index range 5,2-10,5 MJ/m <sup>3</sup>   1,4-2,9 kWh/m <sup>3</sup>   1250-2500 kcal/m <sup>3</sup>   130-260 BTU/ft <sup>3</sup>	Not applied
	012	<b>Mixed gas (BOFG + NG)</b> to be used as combustion gas. Wobbe index range 4,2-12,6 MJ/m <sup>3</sup>   1,2-3,5 kWh/m <sup>3</sup>   1000-3000 kcal/m <sup>3</sup>   110-320 BTU/ft <sup>3</sup>	Not applied
Biogas plants	017	<b>Raw Biogas</b> from downstream of the fermenters. Wobbe index range 4,0-7,0 MJ/m <sup>3</sup>   1,1-1,9 kWh/m <sup>3</sup>   950-1650 kcal/m <sup>3</sup>   100-175 BTU/ft <sup>3</sup>	±1,5% MV
Oil & Gas Chemical	019	<b>Flare gas</b> ; Wobbe index range 0-90 MJ/m <sup>3</sup>   0-25 kWh/m <sup>3</sup>   0-21500 kcal/m <sup>3</sup>   0-2290 BTU/ft <sup>3</sup>	±2% FS
	020	<b>Flare gas</b> ; Wobbe index range 0-118 MJ/m <sup>3</sup>   0-32,8 kWh/m <sup>3</sup>   0-28180 kcal/m <sup>3</sup>   0-3000 BTU/ft <sup>3</sup>	±2% FS
	021	<b>Flare gas</b> ; Wobbe index range > 800 MJ/m <sup>3</sup>   >222 kWh/m <sup>3</sup>   >191000 kcal/m <sup>3</sup>   >20340 BTU/ft <sup>3</sup>	±2% FS
Chemical Environmental	024	<b>Syngas</b> ; Wobbe index range 0-10 MJ/m <sup>3</sup>   0-2,8 kWh/m <sup>3</sup>   0-2390 kcal/m <sup>3</sup>   0-250 BTU/ft <sup>3</sup>	±2% FS
Metallurgy	025	<b>Carbide gas "low"</b> Wobbe index range 8,4-12,4 MJ/m <sup>3</sup>   2,3-3,4 kWh/m <sup>3</sup>   2010-2960 kcal/m <sup>3</sup>   210-320 BTU/ft <sup>3</sup>	±1,5% MV
	026	<b>Carbide gas "high"</b> Wobbe index range 12,5-19 MJ/m <sup>3</sup>   3,5-5,3 kWh/m <sup>3</sup>   2990-4540 kcal/m <sup>3</sup>   320-480 BTU/ft <sup>3</sup>	±1,5% MV
Testing and Certification	027	<b>Mixed gas LPG (Liquified Petroleum Gas) +air</b> for use as Compliance gas to test gas devices/appliances. Wobbe index range 32-58 MJ/m <sup>3</sup>   8,9-16,1 kWh/m <sup>3</sup>   7640-13850 kcal/m <sup>3</sup>   810-1480 BTU/ft <sup>3</sup>	±1% MV
LPG producing and shipping industry	029	<b>Mixed Gas LPG + Air/NG</b> Wobbe index range 42-59 MJ/m <sup>3</sup>   11,7-16,4 kWh/m <sup>3</sup>   10030-14090 kcal/m <sup>3</sup>   1070-1500 BTU/ft <sup>3</sup>	±1% MV
	030	<b>LPG</b> Wobbe index range 70-87 MJ/m <sup>3</sup>   19,4-24,2 kWh/m <sup>3</sup>   16720-20780 kcal/m <sup>3</sup>   1780-2220 BTU/ft <sup>3</sup>	±1% MV

MJ: Mega Joule; BTU: British Thermal Unit; FS: Full Scale; MV: Measured Value