

Measures Wobbe Index, Combustion Air Requirement Index (CARI) and Calorific Value of Natural Gas and Gaseous Fuels

WIM COMPAS™

Wobbe Index, Calorific Value and BTU Analyzer



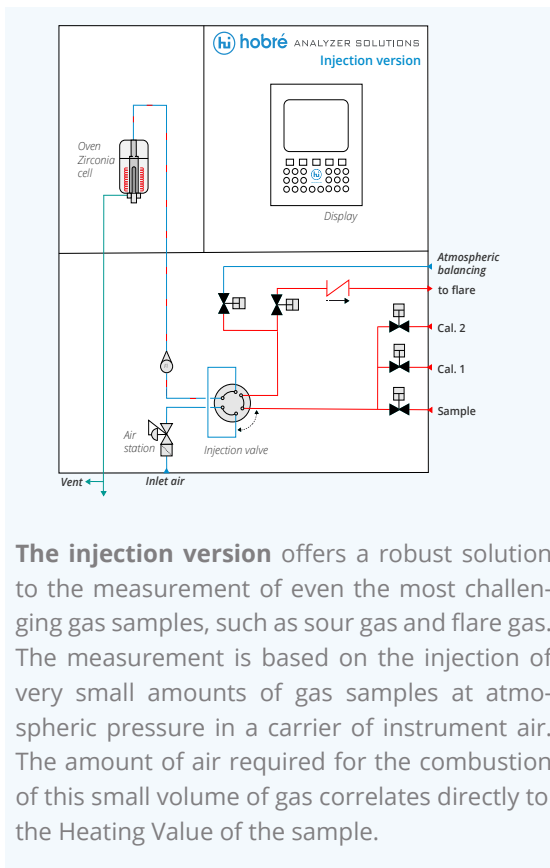
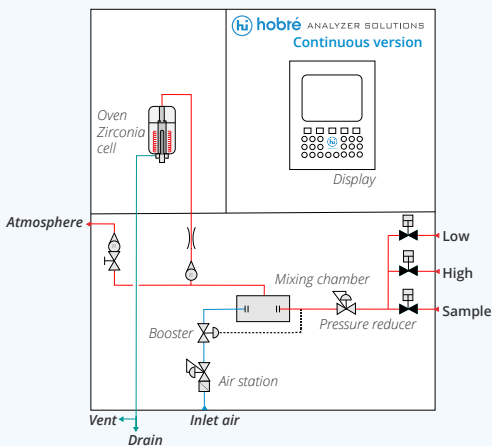
Introduction

The WIM COMPAS™ adds to Hobr 's portfolio of process analyzers for measuring Wobbe Index, Heating Value/BTU, Combustion Air Requirement Index (CARI), Air Demand and Specific Gravity. The Wobbe Index and/or Heating Value are critical parameters used to optimize blending and combustion processes. Designed and manufactured in-house, the WIM COMPAS™ builds on Hobr 's 20+ years of success and experience with residual oxygen type analyzers. The analyzer is considered a market leader in the oil & gas industry. Today, Hobr ' offers the fourth generation of WIM analyzers to the market.

Principle of Operation

The technology of the WIM COMPAS™ is based on the measurement of the amount of air required for the complete combustion of sample gas. This method is referred to in ASTM D4891-13 and ISO 15971. Depending on the task, Hobr ' can offer a **continuous** (fast-responding) unit or an **injection** version, which is capable of handling the most challenging applications.

The continuous analyzer is designed for maximum performance in terms of response time and repeatability. A small sample flow is mixed continuously with dry air over critical orifices. The air-fuel mixture is combusted in a catalytic oven and the residual oxygen is measured using a reliable, highly accurate zirconia cell. The residual oxygen is a measure for the CARI and correlates well to the Wobbe Index.



The injection version offers a robust solution to the measurement of even the most challenging gas samples, such as sour gas and flare gas. The measurement is based on the injection of very small amounts of gas samples at atmospheric pressure in a carrier of instrument air. The amount of air required for the combustion of this small volume of gas correlates directly to the Heating Value of the sample.

Typical applications

(Natural) Gas blending

Offering an unmatched combination of speed of response, accuracy, repeatability and availability, the WIM COMPAS™ is the preferred instrument to optimize gas-blending stations. This application initiated the development of the WIM 20+ years ago.

Fired heaters

The WIM COMPAS™ is the instrument of choice to optimize industrial combustion processes. Offering the unique possibility of stabilizing the energy flow and optimizing the air-fuel ratio on a feed-forward basis, it enables users to save

on fuel gas cost, reduce emissions and increase throughput. It is also suitable in case high concentrations of hydrogen, carbon monoxide and olefins are present.

Gas turbine control

Rapid fluctuations in fuel gas quality have a negative effect on the performance of a gas turbine in terms of availability, efficiency and emissions. Due to its speed of response the WIM COMPAS™ is frequently used for feed-forward control in turbine applications.





High dew point

The injection-based analyzer measures at low, even atmospheric, pressure and handles high percentage levels of corrosive elements. By offering the possibility of increasing the temperature of the analyzer to 150°C (300°F), the WIM COMPAS™ is capable of handling the most challenging applications, including flare and sour gas.

- By reducing the amount of combusted gas and the amount of air flushing in between injections, contamination to the hot section is minimized and availability is significantly increased.
- Suitable for flare gas containing high percentage levels of sulfur or other contaminants.
- Operates at atmospheric pressure, eliminating the need for a pump and preventing condensation of water and/or heavy hydrocarbons.
- Suitable for zero hydrocarbon emission operation without the need for an external vent gas combustion system.
- Direct measurement of Heating Value. No need for a specific gravity cell.
- Injection interval is adjustable. Standard setting is 30 seconds.
- Measures in accordance with the USA rule 1118 and EPA Flare Emissions 40 CFR.

Turnkey solutions

Besides analyzers, Hobr  has over 35 years of experience in the design and supply of complete analyzer solutions—for instance, a turnkey gas stabilization system. Our designs are application specific, and based on gas composition and further requirements for your process.

Typical gas analysis systems include:

- Diagnostics of critical functions
- Proprietary multiphobic membrane filtration resulting in long maintenance intervals and minimal liquid carryover (both water and hydrocarbon).
- A flow impact probe for sampling, fast response time and minimal liquid carryover.

General information

Operation, service and maintenance

Protected against sun and rain, this robust analyzer is suitable for outdoor installation in a harsh industrial environment. The periodically required calibration can be performed manually or automatically on a timed interval. Generally, the calibration gases last many years. The analyzer only has a few parts that require regular servicing, and it is designed for safe and easy maintenance.

Zero hydrocarbon emissions

Venting hydrocarbon gas into the atmosphere is considered to be an undesirable practice. Hobr  has developed solutions for both the continuous and the injection version to allow zero hydrocarbon emission operation.

High-temperature application

Knowing the dew point for a gas combined with certain levels of corrosive elements is crucial for the success of many applications. As standard, the WIM COMPAS™ can be heated to 55°C (131°F). If necessary, hot application units (up to 150°C/ 300°F) are available upon request.

Certifications

Type approvals are available for installation of the WIM COMPAS™ in the following hazardous areas:

- ATEX II 2G (Zone 1 IIC T3/T4)
- ATEX II 3G (Zone 2 IIC T3/T4)
- IECEx II 2G (Zone 1 IIC T3/T4)
- Class 1, Division 2, Group B,C,D (Zone 2 compliant)
- KCS (Zone 1 IIC T3/T4)
- TR CU (Zone 1 IIC T3/T4)

Benefits

- Fast response (T90 < 5 seconds on Natural Gas)
- High accuracy and repeatability
- Automatic/manual calibration
- Insensitive to ambient temperature fluctuations (no need for HVAC)
- Suitable for outdoor installation in ambient temperatures of 5–40°C/41–104°F (optional down to -20°C/-4°F and/or up to 55°C/131°F)
- Effective measuring range of 0–100% FS.
- Output in MJ/Nm³, kcal/Nm³ and BTU/scf (mass-based values available with integrated specific gravity cell)
- Minimal and easy maintenance
- Suitable for corrosive and dirty applications
- Flameless (no flame-out errors)
- Epoxy coated stainless steel (NEMA4, IP65)

TECHNICAL SPECIFICATIONS

Application	Natural Gas, Fuel Gas, Flare Gas, Biogas, BFG, COG, LNG, etc.	
Measuring principle	Residual Oxygen technology	
Sample wetted parts	SS316, Inconel and Platinum	
Installation options	<ul style="list-style-type: none"> - Safe area - ATEX II 2G/3G Ex px [ib] IIC T3/T4 Gb (Zone 1 / 2) - Class 1, Div. 2, Group B, C, D T3 (Zone 2 compliant) - IECEx Ex px [ib] IIC T3/T4 Gb - KCS Ex px [ib] IIC T3/T4 Gb - TR CU Ex px [ib] IIC T3/T4 Gb 	
MEASURING RANGES (CONTINUOUS VERSION) ZERO EMISSION OPERATION OPTIONAL		
Wobbe Index	0 – 100 MJ/Nm ³ / 0 - 2500 BTU/scf range (50 MJ/Nm ³ / 1250 BTU/scf span) ¹⁾	
Accuracy	< ± 0,4% of full scale for Natural Gas	
Repeatability	< ± 0,05% of full scale or ± 30 kJ/Nm ³ (whichever is higher) ¹⁾	
Drift	< ± 0,05% or ± 30 kJ per day (whichever is higher)	
Response time	T90 < 5 seconds on Natural Gas (includes lag time and rise time)	
CARI ²⁾	0 – 25 range	
Calorific Value (SG cell option)	0 – 120 MJ/Nm ³ / 0 - 3000 BTU/scf range (50 MJ/Nm ³ / 1250 BTU/scf span) ¹⁾	
Response time CV signal	T90 < 5 seconds (typically on Natural Gas)	
MEASURING RANGES (INJECTION VERSION)		
Calorific value	0 – 120 MJ/Nm ³ / 0 - 3000 BTU/scf range (50 MJ/Nm ³ / 1250 BTU/scf span) ¹⁾	
Accuracy	± 1,0% of full scale for Natural Gas	
Repeatability	± 0,5% of full scale or ± 50 kJ/Nm ³ (whichever is higher)	
Drift	< ± 0,05% or ± 30 kJ per day (whichever is higher)	
Update time	Default ~30 seconds (injection interval)	
Air Demand	0 – 50 range	
Wobbe Index (SG cell option)	0 – 100 MJ/Nm ³ / 0 - 2500 BTU/scf range (50 MJ/Nm ³ / 1250 BTU/scf span) ¹⁾	
Update time WI Signal	Default ~30 seconds (Injection interval)	
OUTPUTS (CONTINUOUS/INJECTION)		
Local HMI	Full color display with capacitive touchpad (all functions)	
Analogue outputs	2 off isolated 0 / 4 – 20 mA (optionally up to 4), max. 500 Ω load (active)	
Digital outputs	<ul style="list-style-type: none"> - 2 isolated relays (250 VAC) and 8 transistor outputs (24 VAC) standard available - Additional isolated relays, total of 8 (250 VAC) 	
Digital inputs	8 digital inputs (e.g. start calibration, start validation, etc.)	
Communication options	<ul style="list-style-type: none"> - Remote operation / Modbus TCP/IP over Ethernet or Optical fiber - Modbus RTU over RS485 or Optical fiber 	
UTILITIES	Continuous	Injection
Instrument air ³⁾	15 NI/min	0,5 NI/min
	50 NI/min for Ex purge option ATEX / IECEx / KCS / TR CU ⁴⁾	50 NI/min for Ex purge option ATEX / IECEx / KCS / TR CU ⁴⁾
Sample flow	± 1 NI/min	± 0.5 NI/min
Sample pressure	Depending on configuration (typically 1,5 to 5 barg / 21,8 to 72,5 psig)	Depending on configuration (typically -0.3 to 1.5 barg / -4,4 to 21,8 psig) ⁵⁾
Power supply	115/230 VAC, 50/60 Hz	
Power consumption	Depending on configuration (typically 1000 W)	
INSTALLATION (CONTINUOUS/INJECTION)		
Mounting	Wall mounting	
Dimensions (HxWxD)	1000 x 800 x 400 mm (non-Ex version)	
Weight	Typically 80 kg, depending on version	
Enclosure protection	Epoxy coated stainless steel (NEMA4, IP65)	
Ambient temperature range	+5..+40°C (Optional -20..+55°C) ⁶⁾	

¹⁾ Also available in Kcal/Nm³ and kWh/Nm³

²⁾ CARI= Combustion Air Requirement Index

³⁾ At 4 barg minimum, 10 barg maximum

⁴⁾ Pre-purge flow ATEX / IECEx / KCS / TR CU: 70 NI/min. / Class 1 div 2: 1. scfm.

⁵⁾ Consult factory for different sample pressures

⁶⁾ Note: Instrument air temperature should not exceed max. ambient temperature

ORDER CODES

P	Standard version
LP	Integrated sample pump and fast loop (< 1.5 barG / 21.8 psig) - N/A for High Temperature version
C	Continuous measurement principle (1.5 - 5 barG / 21.3 - 72.5 psig) - N/A for High Temperature version
I	Injection system suitable for high dew points and/or corrosive elements (0.3 - 1.5 barG / 4.4 - 21.3 psig)
115	Power supply 115 VAC, 50/60 Hz
230	Power supply 230 VAC, 50/60 Hz
0	No specific gravity meter
SGU	Integrated SG cell up to 55°C / 130°F - N/A for injection version
SGC	Oscillating SG cell up to 75°C / 167°F ⁷⁾
0	No sample pressure monitoring
SPM	Sample pressure monitoring ⁸⁾
OFA	Oven flow alarm ⁷⁾
FPM	Oven flow alarm + Sample pressure monitoring ⁷⁾
0	Non Ex version
1	ATEX II 2G Ex Zone 1 IIC T3/T4 Gb (excluding Backup purge)
3	ATEX II 3G Ex Zone 2 IIC T3/T4 Gb (excluding Backup purge)
Z	CSA Class 1. Div. 2. Group B. C. D T3 version (115 VAC, 50/60 Hz only)
E1	IEC Ex px [ib] IIC T3/T4 Gb (excluding Backup purge)
2	2 analog outputs
4	4 analog outputs
0	No serial communication
R	Remote operation / Modbus TCP/IP over Ethernet
RO	Remote operation / Modbus TCP/IP over Optical fiber
M	Modbus RTU over RS485
MO	Modbus RTU over Optical fiber
RM	Remote operation / Modbus TCP/IP over Ethernet and Modbus RTU over RS485
RMO	Remote operation / Modbus TCP/IP and Modbus RTU over Optical fiber
0	No extra isolated relays added
R	8 off extra isolated relays added (already included in ATEX II 2G / 3G, IEXEc, KCS)
0	No additional fast loop inside the analyzer
F	Fast loop installed inside analyzer (including Multiphobic HPFF Filter)
FA	Fast loop with alarm installed inside analyzer (including Multiphobic HPFF Filter) ⁷⁾
0	Standard ambient temperature range +5 up to +40°C (41 °F up to 104 °F)
H	Heated electronics for low ambient temperatures (down to -20°C) (-4 °F)
C	Cooling for high ambient temperatures (up to +55°C) (131 °F)
HC	Version for ambient temperature range of -20 up to +55°C (-4 °F up to 131 °F)
1	No additional frame included
2	Analyzer mounted on free standing frame (SS304)
ZE	Zero Emission (optional)
HT	High Temperature up to 150°C / 300°F (optional)

⁷⁾ Please consult Hobr  in case this option is required in combination with a High Temperature version.

⁸⁾ Mandatory in case of injection system in combination with specific gravity meter

For more detailed information, please contact our sales representatives through +31 299 420 871



HOBRE INSTRUMENTS

HOBRE IS A LEADER IN THE DESIGN, MANUFACTURING AND MAINTENANCE OF ON-LINE ANALYZERS, SAMPLE SYSTEMS AND COMPLETE TURNKEY ANALYZER SYSTEMS. ESTABLISHED IN 1978, OUR COMPANY FOCUSES MAINLY UPON PROVIDING SOLUTIONS FOR THE OIL AND GAS INDUSTRY AND PETROCHEMICAL SECTOR WORLDWIDE.



HOBRE SERVICES

- FEASIBILITY STUDY & ENGINEERING
- COMMISSIONING, SAT AND START-UP
- TRAINING
- PREVENTATIVE AND CORRECTIVE FIELD SERVICES
- IN-HOUSE MAINTENANCE AND REPAIR
- SPARE PARTS AND SUPPLY
- REMOTE SUPPORT



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