GAS QUALITY ANALYZERS FOR NATURAL GAS APPLICATIONS

Honeywell

CHANGING GAS QUALITY OVER THE WORLD

Natural gas is one of the predominant energy resources across the world. For transparent and accurate custody transfer of natural gas, the determination of the energy content within the transported gas is key.

As the number of gas sources continues to grow, the amount of measuring points required, grow rapidly. Honeywell provides a set of intelligent gas solutions across the natural gas value chain.

THE NEED

Growing energy needs, globalization and the liberalization of the gas trade are driving demand for efficient and innovative gas measuring equipment, particularly more capable gas quality analyzers. One aspect of this trend is the global distribution of gases from various sources and in various qualities.

A large number of processes relating to the use of gas, such as gas turbines, are very sensitive to varying gas parameters and must be adjusted or regulated accordingly. Alternatively the range of gas parameters can be limited by mixing gas in the transport network. Both cases require efficient process measuring equipment for gas quality.

While energy measurement in the distribution network is becoming more and more important, the need for simple and low maintenance analyzers is increasing. At the same time, the billing to end customers needs to be made easy and more accurate.

THE SOLUTIONS

Correlative vs GC

Our solutions can be divided into two groups: correlative analysers and gas chromatographs (GC).

The Honeywell correlative analyser (GasLab Q2) includes an infrared sensor to measure the absorption of hydrocarbons and carbon dioxide in natural gas. In addition, another sensor detects the heat conductivity of the full mixture of natural gas. By analyzing this information about infrared inactive components (like Nitrogen), target values are determined and the Wobbe-index can also be calculated.

The Honeywell correlative analyser provides users with real-time data for a wide range of applications, with faster, more efficient analysis than a gas chromatograph.

The gas chromatograph (GC) analyzers (EnCal 3000 and EnCal 3000 proChain) inject natural gas into a carrier gas stream that further proceeds to a column where natural gas is separated into its constituents. The separated components then pass a detector that converts the peaks into peak areas that are proportional to the concentration of the measured components.

With collated data from all the concentrations, the heating value / Wobbe-index / density of the natural gas is calculated. The GC analyzers provide very accurate and consistent insight on the energy content and other parameters of any type of gas and allow measurement of almost any gas mixture.

ENCAL 3000
AND ENCAL 3000 QUAD

The Encal 3000, our flagship gas chromatograph, is specially designed to deliver accurate natural gas energy measurements with low running maintenance costs. Eliminating multi-port column switching valves, it uses micro electro-mechanical systems (MEMS), capillary columns to deliver high repeatability and compositional accuracy resulting in improved custody transfer measurements and lower lost-and-unaccounted-for gas.

Optimized for highly variable shale gas supplies, the EnCal 3000 provides superior measurement performance using only a single, calibration gas. The injector, columns and detectors are designed to last for the life of the EnCal. Combined with the lack of multi-port column-switching valves, this makes it easy for even inexperienced technicians to learn and support. The EnCal 3000 is also capable of measuring some contaminants and odorants with a C6+ or C9 analysis thereby eliminating the need to additional separate analyzers which further reduces costs and station complexity.

The EnCal 3000 is so accurate that we even can accurately determine the HydroCarbonDewpoint (HCDP). We do this by interpreteation of all boiling point of the isomers of hexane and higher plus the cyclic-hydro-carbon species. This data, together with the equation-of-state (EOS), allows us to predict the HCDP at any given pressure.

The standard EnCal 3000 uses one or two columns for a broad application range, which can be placed in the standard housing, when more columns are needed one additional housing can be attached to the initial housing to have a maximum of up to four columns, for extended gas analysis applications. This we call the EnCal 3000 Quad.

ENCAL 3000 PROCHAIN

With the new EnCal 3000 proChain, Honeywell sets a new standard in cost effective gas chromatography for natural gas. It provides accurate determination of all main natural gas parameters – heating value, Wobbe index, density, CO_2 concentration – while keeping CAPEX and OPEX to a minimum. Reducing the internal size of the measurement device results in the lowest carrier gas usage in the market, as low as 2 milliliters per minute. This means only one bottle of helium (50 litres @ 200 barg) every seven (!) years.

The EnCal 3000 proChain is an Ex-d type analyzer, designed for installation in hazardous areas. This makes it possible to install the analyzer near the sampling point and, if required, outdoors. With optional heater elements fitted, the EnCal 3000 proChain can operate in temperatures as low as -25°C (-13°F). High temperature environments are not a challenge for this analyser either as its maximum operating temperature is 55°C (130°F). or outside installations the use of sun/rain shades is mandatory. Should your application environment require operation outside these temperature range, please contact your Honeywell representative as alternative solutions are available.

The gas chromatograph that will measure your natural gas according to the latest standards, while keeping both CAPEX and OPEX to a minimum, will be the next best thing – the proChain.

THE GASLAB Q2

The GasLab Q2 on-line gas quality analyzer provides fast, continuous analysis of natural gas' calorific value, Wobbe-index and methane number to optimize billing, efficiency and emissions. It is the ideal solution for anyone whose operations and emissions are adversely impacted by fuel quality variations. Requiring no routine maintenance and able to reduce operational expenses

The GasLab Q2 does not need to burn or oxidate its sample gas and therefore has no need for auxilary gasses, nor does it contain very hot surfaces. The analyzer works continuously and updates its reading each second, whereas gas chromatographs normally need three minutes.

The GasLab Q2 is designed to operate in many hazardous areas and wide ambient temperature ranges. This simplifies installation and allows the Analyzer to be placed close to the process supporting a short response time. In measurement mode, the gas quality calculations are updated every second. Routine calibration is performed automatically at a user-programmed time and day, a simple binary mixture.

The measured values are communicated via Modbus protocol and analog outputs. It is possible to connect external signals to monitor contact closures, e.g. low pressure limit of calibration bottle or sampling system status.

The operational expenditure (OPEX) of the GasLab Q2 is up to 70% lower against the commonly used gas chromatographs and calorimeters.

It supports a wide range of uses including natural gas feedstock blending; point-of-use custody transfer; real-time quality control of the fuel mix for gas turbines in power plants; and improved combustion control for kilns, metal processing, and glass industries.

THE CONCLUSION

The Honeywell measurement portfolio for the natural gas sector is designed to provide reliable and accurate volume and energy value measurement across a wide range of applications.

Supported by a complete portfolio of gas measurement technologies, including a full range of temperature and pressure transmitters and flow computers, Honeywell's midstream gas measurement offering comprises a mix of accurate, fast, and cost-effective solutions.

YOUR VALUES

EnCal 3000

- Improved performance of your process through faster measurements.
- Improved accuracy of measurement (uncertainty on HV <0.1%).
- Improved measurement confidence as verified by PTB / Nmi / OFGEM.
- Reduced OPEX due to low Helium usage and modular design.

EnCal 3000 proChain

- Fit for purpose natural gas measurement, while low CAPEX.
- Reduced OPEX through minimal helium usage.
- Cyber secure by design.

GasLab Q2

- Reduced risk through field-proven technology within many installations to certified global energy standards.
- Improved accuracy of measurement under with no carrier gas / burner air or special calibration mixtures.
- Improved measurement confidence as verified by NMi.
- Improved performance of your process through faster measurements.

THE DIFFERENCES

	ENCAL 3000	GASLAB Q2	ENCAL 3000 PROCHAIN	BASELINE
CAPEX	On baseline	On	Below	25 kEuro
Accuracy	Above baseline	On baseline	On baseline	Class A
Speed	On Baseline	Faster (realtime)	On baseline	4 minutes
Flexibility	High	2 applications	1 Application	10 application
Helium	Low	None	Very low	1 bottle/year
OPEX	Below baseline	Below baseline	Below baseline	2 days/year
Cyber secure	On baseline	Above	Above	Method lock / password

ENCAL 3000 AND ENCAL 3000 PROCHAIN KEY DIFFERENTIATORS AND BENEFITS	
Maintenance free	1 bottle of Helium every 2 (EnCal 3000) or 7 (EnCal 3000 proChain) years
Ready for the future	Ready for measuring hydrogen injection in the gas grid
Sustainable future	Biogas measurements standard available
Integrated redundancy	Double block and bleed valves allow fault free multi stream sampling.
Perfect for safety	Odorization measurements ensure adequate smell to natural gas, preventing accidents.
Smaller is better	Smaller parts (MEMS) make smaller errors, leading to smaller uncertainties

GASLAB Q2 KEY DIFFERENTIATORS AND BENEFITS	
Maintenance free	1 bottle of methane every 5 years
No auxiliary air needed	No burner air needed / no purge air needed
Sustainable future	Biogas measurements standard available
Integrated redundancy	Double block and bleed valves allow fault free multi stream sampling.
Perfect for blending	Blend control applications preventing off spec gas
Fast measurement	For better control of processes

ANALYZER NAME		ENCAL 3000 PROCHAIN	GASLAB Q2	ENCAL 3000
MEASUREMENT TECHNIQUES	**INFO**	**GAS CHROMATOGRAPHY**	**CORRELATIVE**	**GAS CHROMATOGRAPHY**
Analytical Hardware		C6+ / single train / dual column backflush to detector	IR + TCD	Paralel dual on column injection
Allowable Gasses		Natural gas	Natural gas / BioGas	Multiple applications
Typical Relative Repeatability (RSD)	Heating Value	0.025%	0.10%	0.005%
Cycle Update Time	Seconds	180	1	60 -300 (application dep)
Ambient Conditions	(° C)	-25 to + 60	-25 to +55	-25 to + 60
APPROVALS				
Safety	Main approvals	cCSAus / ATEX / IECEx	cFMus (C1D2) / ATEX / IECEx (Z1)	cFMus / ATEX / IECEx
	Other	NEPSI / INMETRO	KOSHA / JPEx	NEPSI / INMETRO
Metrological		NMi / LNE	NMi / LNE	NMi / PTB / LNE / INMETRO / GOST
IP Rating	Ingress protection	IP66	IP64	IP66
COMMUNICATION INTERFACES				
Type		Modbus Serial / TCP	Modbus Serial / TCP	Modbus Serial / TCP
	Analog out	none	4	3
	local config port	USB / TCP	USB / TCP	TCP
HEATING VALUE CALCULATIONS	**STANDARD**			
	ISO	Yes	Yes	Yes
	ASTM	Yes	Yes	Yes
	GPA	Yes	Yes	Yes
	GOST	(pending)	No	(pending)
	AGA	8 & 9	No	yes, with controller
DATALOGGING				
	depth / length	configurable	configurable	35 days
GAS STREAMS				
Nr Of Streams	Stream + Cal	5 + 1	1 + 1	5 + 1
Carrier Gas Usage	bottles per year	0.15	N/A	0.5
Calibration Gas	nr of components	11	2	11 or more
POWER	**WATT**			
Typical	Watt	16	30	18
Max	with heaters	30	60	50
Voltage	VDC	24	24	24

For more information

To learn more about Intelligent Gas Solutions, visit www.honeywellprocess.com or contact your Honeywell account manager.

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BR-20-46-ENG | 02/21

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