UNION Instruments.
Competence in gas monitoring

UNION Instruments GmbH is an Germany based manufacturer of devices and systems in gas measurement technology with a global approach. The company specialises in determining the energy content (calorimetry) and composition (analysis) of gases for industrial purposes covering a broad range of applications. The modular design of the devices makes them especially suited for custom solutions.

UNION Instruments offers our customers flexibly configurable standalone devices as well as complete solutions (systems) designed for individual needs including planning and engineering.

The characteristic feature of such a complete solution is the combination of different measuring methods to form a complete system. This tailor-made offer includes all measures from counselling, planning, engineering and installation to commissioning on site. This includes as well the correct documentation according to ISO and/or CSA/UL.

Our service performance

Support
The UNION-hotline helps to solve all inquiries and urgent issues fast and easy. Device specific concerns can be solved worldwide within minutes by direct communication via TEAMVIEWER.

Training
UNION offers individual in-house training or on-site seminars for installation, use and maintenance of our devices even at the customer's premises. Training is individually adapted to the client's requirements.

Repair service
A global service for inspection, maintenance and repair of our devices and systems is provided directly by UNION and via its distributors.

Original spare parts
Original spare parts for the majority of UNION's products are on stock directly at site and ready for dispatch within a few hours.

COMPETENCE IN GAS MONITORING

UNION Instruments GmbH ■ Zeppelinstrasse 42, 76185 Karlsruhe, Germany
Phone: +49 (0) 721-68 03 81 0 ■ Fax: +49 (0) 721-68 03 81 33 ■ E-Mail: info@union-instruments.com

www.union-instruments.com

Upgraded CWD in a hot-rolling steel mill - economical and ecological

A calorimeter CWD2005 was upgraded with a NDIR gas analysis sensor and thus enables cost efficient re-use of waste process gases to heat a rolling steel furnace





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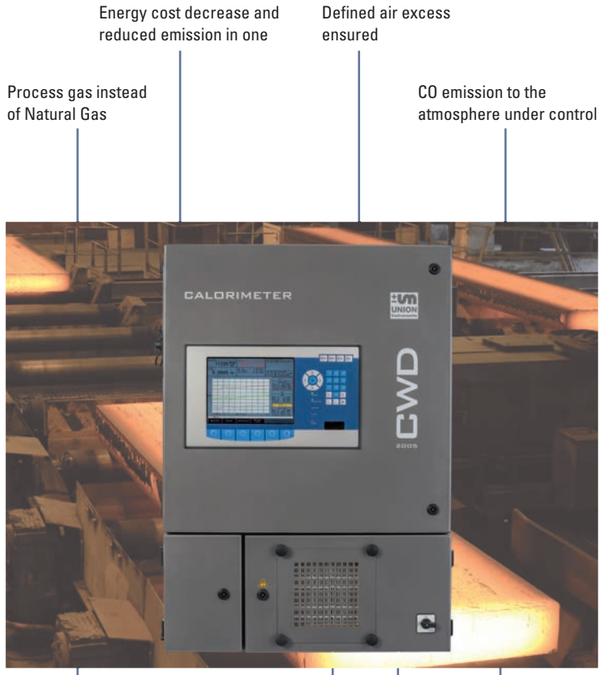
Process gases to replace Natural Gas

Today, even though they have less energy content than natural gas, process gases from industrial plants e.g. steel mills or chemical plants - formerly considered as waste gas and flared - are now being re-used as combustion gas instead of natural gas in other thermal processes such as e.g. steel rolling furnaces. However, the fluctuating composition of process gases, especially in CO and consequently energy content, calls for special measures. The energy content of the process gas must be adjusted to the level which is required by the following application. This is achieved by continuous monitoring its actual energy content and controlled adding of natural gas. A high-performance gas measuring system with short response time is required for that.

Application in hot-rolling steel plants

In steel mills with integrated hot-rolling furnaces, the process gases produced by the steel mill are utilized as combustion gas in the burners of the downstream hot-rolling mill. The properties of the combustion gas must meet two quite different requirements: (1) a defined excess of air must be ensured in the various zones of the furnace to achieve the desired steel quality and (2) the CO concentration in the off-gas from the furnace must not exceed legally defined limits since the plant may otherwise be shut down because of locally existing emission directives. Consequently, the plant operator must be able to quickly and accurately notice the changes in process gas composition and, on this basis, add natural gas in a controlled manner to meet the two requirements at any time. This is only possible using a high performance gas measuring instrumentation.



The measuring system

UNION Instruments did especially configure and engineer a measuring system for this application. The system uses the direct reading Wobbe-type CWD2005 calorimeter upgraded with an additional NDIR-type gas analysis module and a special data processing software. The system directly determines Wobbe index and gas density values as well as the concentrations of CH_4 and C_{2+}, while heating value and air requirement are calculated from these data. The sum of information received from the calorimetric and gas analysis measurements delivers the basis for the accurate control of the NG addition with respect to the requirements of the challenging hot-rolling process (defined excess of air).

Three special tasks solved

The potential presence of alkanes (CH_4, C_{2+}) in the process gas would cause a higher air requirement to burn them compared to CO. This is considered with the NDIR gas analysis which continuously determines the concentration of these components. A second important aspect is the total reaction time of the measuring system, which must be short enough to ensure proper functioning of the downstream steel-rolling process. The size of the plant and the mixing of gases in the gas pipes act as “delay elements” and must be considered in the control strategy. UNION Instruments has developed a computer model based on such delay elements that can be adapted to different plant dimensions by assigning parameters. Finally, to ensure highest availability of the process, the measuring system can be designed redundantly. In this case, each system supplies its measured and converted values to the controller, which then determines the controlled variable for the mixing device.

Application segment	CWD2005	CWD2005 CT	CWD2005 PLUS	CWD2005 DPC	CWD2005 SPC	CWD2000 Ex	W2005
Natural gas, Biomethane, Liquid gas	✓	✓	✓	✓	✓	✓	✓
Blast furnace gas, Coke gas, Mixed gas, Low Gas	✓	–	(✓)	–	–	–	✓
Refinery gas, Mixed gas, High gas	✓	–	✓	✓	✓	✓	✓
Certifications / Conformity	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	PTB approval 7.631 08.64	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	Standards NFPA 496:2013 ANSI/ISA 12.01 (customer specific "limited production certification report")	BVS 04 ATEX E 018 X	–
Measured values	Wobbe-Index, Specific Gravity						Wobbe-Index
Calculated values	Heating value, Calorific value						Heating-/ Calorific value (constant Specific Gravity)
Ex Class	–	–	–	Class I Div 2 Groups B, C, D, T4	Class I Div 2 Groups B, C, D, Methane, T4 (customer specific "limited production certification report")	II 2G Ex d IIA T3 Gb	–

Device series CWD2005