



# POWER

SENSOR SOLUTIONS FOR COAL-FIRED POWER PLANTS

**SICK**  
Sensor Intelligence.

## CHALLENGES IN COAL-FIRED POWER PLANTS

The power industry faces a number of challenges when generating electricity. In every plant, the efficient use of fuel and protection of assets are of utmost importance to insure optimum profitability. Emission monitoring and pollution control is a requirement in nearly every country. SICK is an ideal partner for the power industry. With its broad range of intelligent sensors and solutions they have proven their applicability in all areas of the power generation process, from material flow to pollution control to emissions monitoring – all from a single source.



Read more about sensor solutions for the power industry:  
[→ www.sick.com/power](http://www.sick.com/power)



### Emission monitoring

The regulatory requirements for emission monitoring and reporting are becoming more stringent in nearly every country in the world. In order to insure compliance, many customers turn to SICK to meet their needs for dust, volumetric flow and continuous gas emissions monitoring solutions.



### Pollution control

Scrubbers, catalytic reactors and particulate filters all remove pollutants from the flue gas to meet stringent environmental limits. SICK's range of in-situ gas analyzers provides real-time measurement data to calculate removal efficiency and control system performance.



### Combustion efficiency

Combustion efficiency means getting the maximum energy out of the fuel, without damage or danger to plant staff and equipment. SICK measures a number of parameters which are used for combustion control:  $O_2$ , CO and primary air flow, all in-situ, to provide the quickest possible signal for control.



### Material handling

Monitoring fuel flow into the plant optimizes throughput, reduces loading time and saves maintenance time. SICK has a wide variety of scanners used to measure bulk volumes on conveyors as well as level measurements in bins and silos. Sensor data to help increase production efficiency.



### Service and maintenance

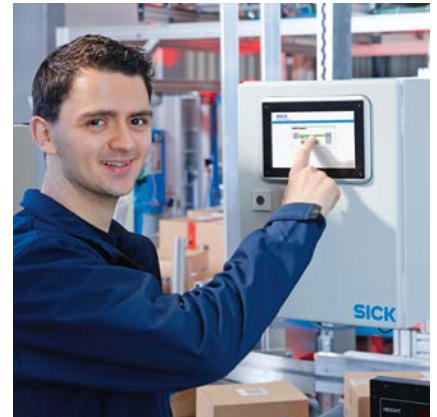
Competent consulting, qualified planning support, detailed project planning and engineering, installation and start-up – SICK provides all of these services with our own personnel. SICK is also available for service support of the equipment during scheduled outages and in emergency situations.

## FROM A SINGLE DEVICE TO A COMPLETE ANALYSIS SYSTEM

SICK's capabilities do not end with the sale of a single product. We employ an extensive team of custom system planning and project engineers as well as detail engineers with expertise in electrical and mechanical engineering. SICK's

system engineers plan and design tailor-made solutions including the complete range of peripheral equipment such as walk-in shelters, PLC connections, calibration gas distribution and data handling and evaluation. All solutions are design-

ned and built in accordance with recognized international standards. An experienced project manager follows the project from initial order through to site acceptance test and hand over to local field service specialists.

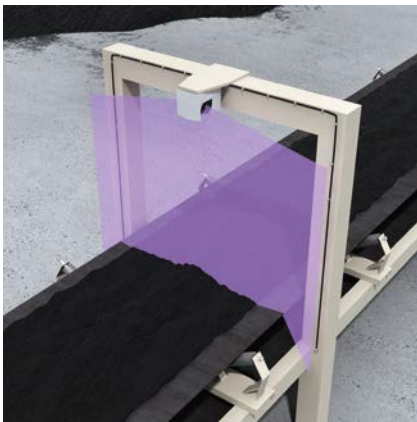


Analyzers and measurement systems supply monitoring and control-relevant information and protect people and systems. When optimally integrated and maintained, these components and systems

guarantee safe processes, constant product quality and protect people and the environment. From the outset and over many years, SICK LifeTime Services provide suitable services for all

aspects of your measurement systems and plants: from planning and conception to commissioning and ongoing operations, all the way to conversions and upgrades.

## COAL HANDLING



### Conveyor control and crusher monitoring

Coal is transported on conveyor belts, moving from the coal pile to the crushers or transfer points. Volume measurement is necessary here to control coal delivery to the mill, optimize throughput and reduce load time. The Bulkscan® flow sensor records volume flow on conveyors without contact, based on the principle of laser flight time measurement. The integrated center-of-gravity calculator maximizes transport performance and detects one-sided loading or uneven belt loads.

- Bulkscan® flow sensor



→ [www.sick.com/Bulkscan\\_LMS511](http://www.sick.com/Bulkscan_LMS511)



### Protecting the coal mill by monitoring CO and O<sub>2</sub>

CO and O<sub>2</sub> measurement in the coal mill is important for early warning of a smoldering fire and/or a leak in the inerting system. The MKAS analyzer system equipped with an explosion-protected sampling probe is the ideal solution for this. The MKAS can be configured to sequentially monitor a number of mills. The long-term stable SIDOR gas analyzer provides simultaneous measurements of O<sub>2</sub> and CO. It is the ideal device for safety-relevant measurements.

- SIDOR extractive gas analyzer
- MKAS customized analyzer system



→ [www.sick.com/SIDOR](http://www.sick.com/SIDOR)

→ [www.sick.com/MKAS](http://www.sick.com/MKAS)



### Overflow protection for coal bunkers/silos

Coal is typically stored in silos after it has been pulverized. In order to prevent overflowing of the silo, a point measurement of the level is needed. The vibration limit switch LBV300 is particularly outstanding for its ruggedness. The LBV300 has no mechanically moving parts and is also resistant to deposit formation, making it an ideal choice for use in bin level monitoring of coal.

- LBV300 level sensor



→ [www.sick.com/LBV300](http://www.sick.com/LBV300)

# COMBUSTION PROCESS



## Monitoring primary air flow

Power plant efficiency requires continuous monitoring and optimization of the combustion process. The supply of combustion air is critical because it delivers the required amount of oxygen to ensure safe and efficient combustion and minimize fuel consumption as well as NO<sub>x</sub> emissions. Reliable and accurate monitoring of combustion air flow at the boiler inlet is very important. The FLOWSIC100 ultrasonic flow meter is ideal for measuring flow in this hot and dusty environment. The system measures accurately even at low flow rates with no loss of pressure.



→ [www.sick.com/FLOWSIC100](http://www.sick.com/FLOWSIC100)

- FLOWSIC100 M-AC volume flow measuring device



## Monitoring re-circulation air

Monitoring the recirculation air for CO is important because it provides the necessary signal needed to control the addition of fresh air, to maintain the correct stoichiometric ratio and optimize the efficiency of the combustion process. In-situ analysis provides the fast response necessary for control. The GM901 in-situ CO gas analyzer is available with a filter probe. As a result, it is suited to measuring in dusty environments and the installation is fast and simple.



→ [www.sick.com/GM901](http://www.sick.com/GM901)

- GM901 in-situ gas analyzer



## Combustion efficiency measurements

Reliable and accurate monitoring of O<sub>2</sub> and CO at the boiler outlet are key elements to control the excess air in the combustion process. Zirconium oxide oxygen analyzers are the most widely used combustion control instruments. CO is measured at the economizer as a secondary component for burner control. The ZIRKOR200 in-situ analyzer provides a reliable and rapid measurement of oxygen even at high temperatures. The GM35 gas analyzer measures CO concentrations as well as temperature and pressure quickly, easily and economically.

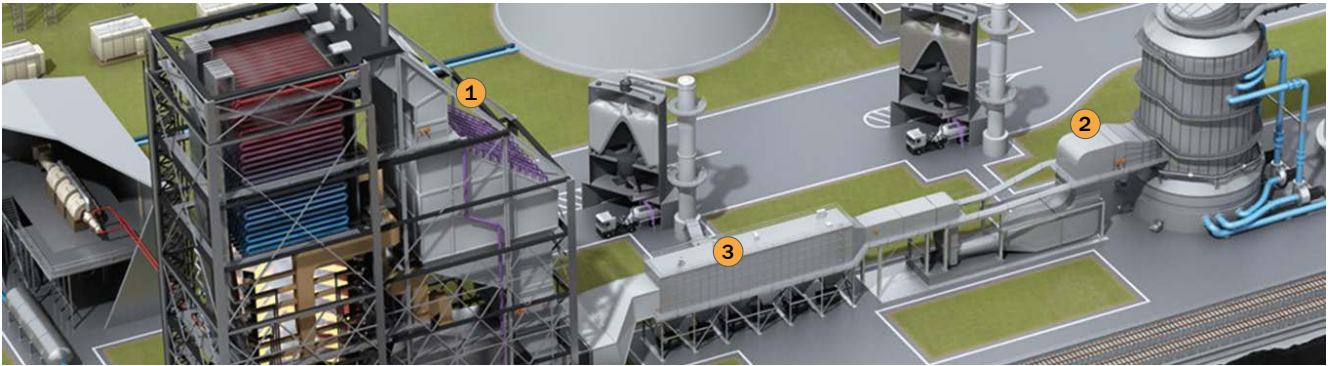


→ [www.sick.com/ZIRKOR200](http://www.sick.com/ZIRKOR200)

- ZIRKOR200 in-situ gas analyzer
- GM35 in-situ gas analyzer

→ [www.sick.com/GM35](http://www.sick.com/GM35)

# POLLUTION CONTROL



## Measuring SCR efficiency

The gas conditions include high dust and high temperature, so analyzer/probe installation location is critical.  $\text{NO}_x$  and  $\text{O}_2$  are measured at the inlet and outlet of the SCR to calculate removal efficiency. Ammonia is monitored on the outlet to insure that  $\text{NH}_3$  slip is low to meet emission limits and to limit contamination. SICK offers in-situ gas analyzers GM32, GM700 and ZIRKOR200 to measure all of these key parameters.

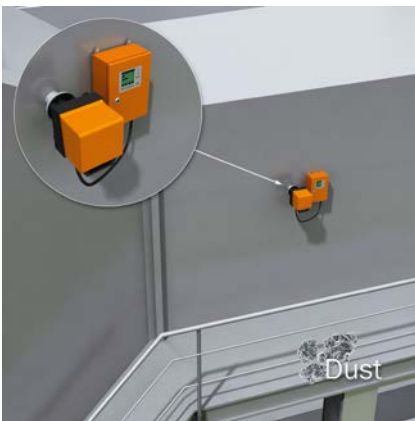
- GM700 in-situ gas analyzer
- GM32 in-situ gas analyzer
- ZIRKOR200 in-situ gas analyzer



→ [www.sick.com/GM700](http://www.sick.com/GM700)

→ [www.sick.com/GM32](http://www.sick.com/GM32)

→ [www.sick.com/ZIRKOR200](http://www.sick.com/ZIRKOR200)



## Monitoring dust removal efficiency

Flue gases from coal-fired combustion are loaded with particulate matter and due to environmental regulations, must be cleaned before release into the atmosphere. This is done with an electrostatic precipitator or fabric filters. The correct operation of the filter is checked by continuously monitoring the dust concentration after the filter. The DUSTHUNTER SP100 is a good choice for very low to medium dust concentrations. An automatic check of zero and reference point as well as contamination check are integrated in the device.

- DUSTHUNTER SP100 scattered light dust measuring device



→ [www.sick.com/DUSTHUNTER\\_SP100](http://www.sick.com/DUSTHUNTER_SP100)



## Flue gas desulfurization (FGD) control

$\text{SO}_2$  and  $\text{O}_2$  are typically measured at the inlet and outlet of the flue gas desulfurization system to control the lime dosing and insure the removal efficiency of this key pollution control system. The GM32 in-situ gas analyzer measures  $\text{SO}_2$  fast and under process conditions without complicated gas transport, the ZIRKOR200 measures  $\text{O}_2$  with a corrosion resistant probe. Both devices can be installed directly in the ductwork keeping the cost of installation low.

- GM32 in-situ gas analyzer
- ZIRKOR200 in-situ gas analyzer



→ [www.sick.com/GM32](http://www.sick.com/GM32)

→ [www.sick.com/ZIRKOR200](http://www.sick.com/ZIRKOR200)

## CONTINUOUS EMISSION MONITORING



### Dust and flow measurement

Dust concentration or opacity is measured in the stack emissions from a coal-fired power plant. This can be difficult in very wet stack gases, e.g. after a scrubber. In order to calculate mass emissions, the total gas throughput needs to be accurately monitored with a stack flowmeter which can handle difficult conditions, e.g. in large diameter stacks or during frequent changes in load. SICK offers a wide range of dust measurement devices and field proven flow meters which are designed to handle these challenges.

- FLOWSIC100 volume flow measuring device
- FWE200DH scattered light dust measuring device



→ [www.sick.com/FLOWSIC100](http://www.sick.com/FLOWSIC100)

→ [www.sick.com/FWE200DH](http://www.sick.com/FWE200DH)



### Gas pollutant emissions monitoring

Environmental regulations require the continuous monitoring of certain pollutants and reference values. These are specific for each country, but typically  $\text{SO}_2$ ,  $\text{NO}_x$ ,  $\text{CO}$  and  $\text{O}_2$  are required. In many countries, emission analyzer systems must be suitability tested and approved for use. A specially developed CEMS package, the PowerCEMS100 is designed to do the job and has been approved by an independent test body. The system requires little maintenance which is especially important to plant operators.

- PowerCems100 customized analyzer system



→ [www.sick.com/PowerCEMS100](http://www.sick.com/PowerCEMS100)



### Monitoring mercury emissions

Monitoring stack emissions for mercury concentrations is becoming increasingly important for coal-fired power plants. Even though the actual concentration is low, the total volume of flue gas emitted by a coal-fired plant makes this a pollutant that needs to be continuously monitored. SICK has recognized this early and has developed a MERCURY CEMS system MERCEM300Z which surpasses other on-line systems for accuracy, up-time and low level measurement.

- MERCEM300Z extractive gas analyzer



→ [www.sick.com/MERCEM300Z](http://www.sick.com/MERCEM300Z)



## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

**For us, that is “Sensor Intelligence.”**

### **Worldwide presence:**

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → [www.sick.com](http://www.sick.com)