



# POWER

SENSOR SOLUTIONS FOR POLLUTION CONTROL

**SICK**  
Sensor Intelligence.



## CHALLENGES IN POLLUTION CONTROL IN POWER PLANTS

Power plants, especially coal-fired power generators, are faced with enormous challenges today. In addition to some basic tenets like keeping earnings high and costs low, they are faced with increasingly tighter environmental constraints. Modern pollution control systems are used in all coal-fired power plants in order to comply with new emission limits and standards in every part of the world. Here SICK offers a variety of sensors to help operators successfully meet the challenges in their business day.



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



### Insuring top performance of the asset

Cleaning systems are a costly investment for a power plant. That's why it is essential that they perform effectively and efficiently. Measuring the gas composition at the inlet and outlet helps to monitor the efficiency of the system.



### Reducing the costs of operation (OPEX)

By reducing reagent or adsorbent consumption, the operational costs of the control system can be significantly reduced. Continuous online monitoring can help control reagent consumption and make a significant impact on OPEX.



### Managing rapidly changing loads

One of the biggest challenges for power plants today is the demand for rapid load changes to balance out the electricity feed to the power grid. Abrupt and frequent load changes are taxing not only for the boilers but also for the pollution control equipment.



### Safety and personel protection

The handling of chemical compounds such as urea, anhydrous ammonia and calcium sulfate can be dangerous for workers in the plant. Therefore safety measures must be in place and any equipment used has to be designed to handle corrosive materials.



### Service and maintenance

Competent consultation, detailed project planning and engineering, installation support, start-up and maintenance: SICK provides all of these services with our own fully trained personnel. Routine maintenance during scheduled outages or in emergency situations is also available.



## FROM A SINGLE DEVICE TO A COMPLETE 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

designed 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.

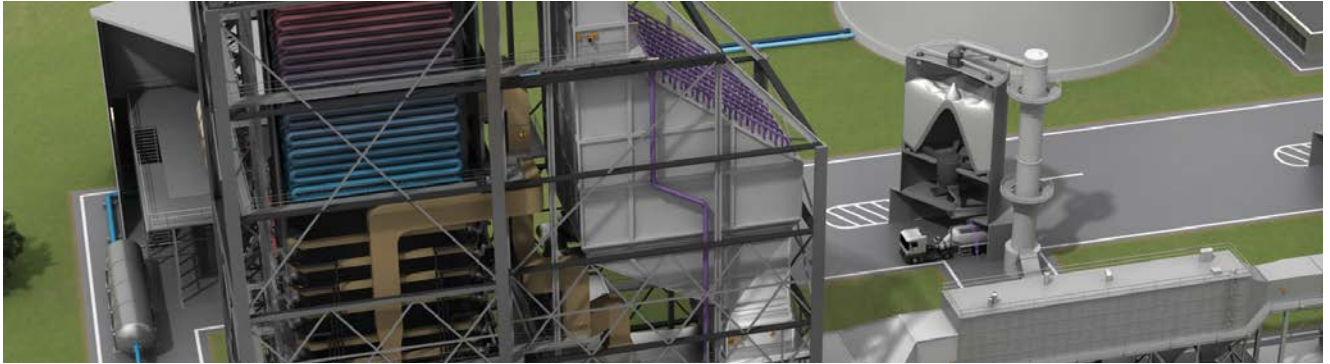


Analyzers and measurement systems supply monitoring and control-relevant information and protect people and systems. When optimally integrated and maintained, these components and sys-

tems 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.

## DeNOx PLANTS



### Economizer outlet and selective catalytic reactor (SCR) inlet

The gas conditions include high dust and high temperature, so analyzer/probe installation location is important. Abrasion and clogging can occur due to particulate load and temperature in both process and ambient environments. The GM32 in-situ gas analyzer measures NO as well as pressure and temperature in the gas duct – directly, quickly and without gas sampling. The ZIRKOR200 in-situ analyzer measures oxygen for reporting normalized values.

- 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)



### Volume flow measurement in the SCR unit

To determine mass emissions, flow in the duct after the SCR can be measured. The FLOWSIC100 H volume flow measuring device is suitable for measurements in large stacks as well as for applications with high dust content. Rugged titanium transducers are standard. For very hot gas temperatures from 260°C to 450°C, the FLOWSIC100 H operates with built-in cooling air to protect the ultrasonic sensor against high temperatures.

- FLOWSIC100 H volume flow measuring device



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



### Selective catalytic reduction (SCR) outlet prior to air heater

The NO<sub>x</sub> concentration is typically measured at the outlet of the SCR to calculate efficiency. Ammonia is also measured here to ensure that NH<sub>3</sub> slip is limited. This can cause clogging of the air heater and other parts of the exhaust system. The GM32 in-situ gas analyzer measures NO<sub>x</sub> concentrations in the exhaust duct – directly, quickly, and without gas sampling and transport. The GM700 in-situ gas analyzer based on the TDLS principle monitors low NH<sub>3</sub> concentrations continuously.

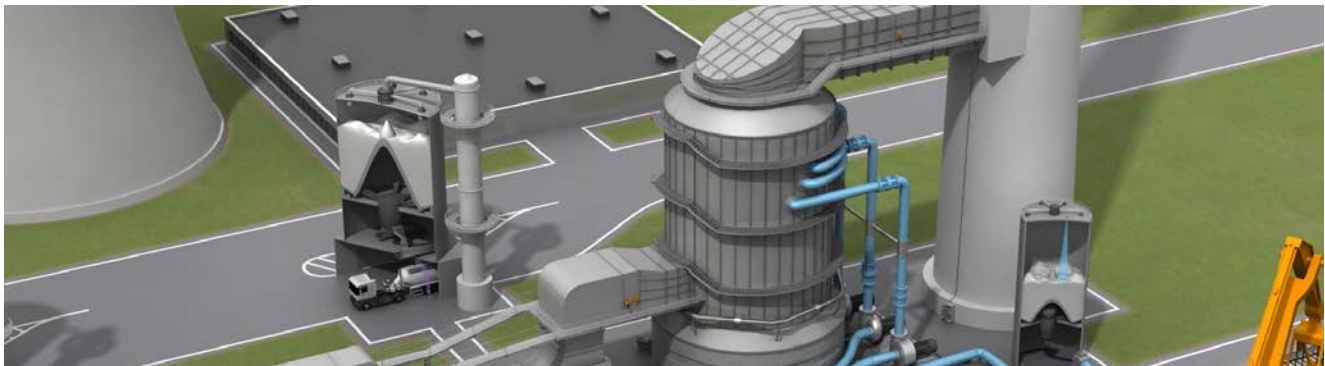
- GM700 in-situ gas analyzer
- GM32 in-situ gas analyzer



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

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

# WET FLUE GAS DESULFURIZATION



## Monitoring the flue gas desulfurization system

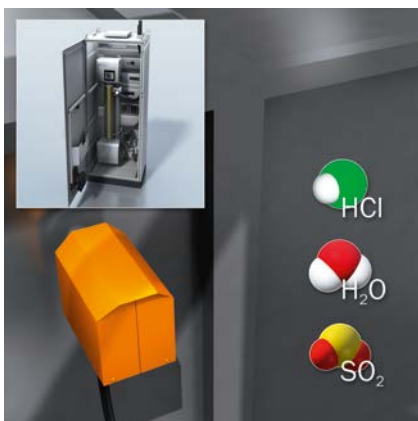
$\text{SO}_2$  and  $\text{O}_2$  are typically measured at the inlet and outlet of the flue gas desulfurization system to control the lime dosing and insure the efficiency of this key pollution control system. The GM32 in-situ gas analyzer measures  $\text{SO}_2$  quickly and under process conditions without complicated gas transport, while 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/ZIRKOR200](http://www.sick.com/ZIRKOR200)

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



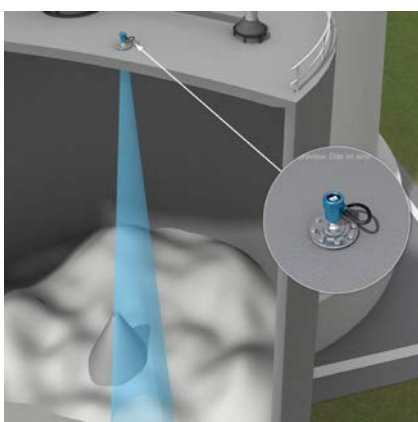
## Measuring acid gases at the FGD outlet

Measuring acid gases such as  $\text{SO}_3$  and  $\text{H}_2\text{SO}_4$  after desulfurization can optimize the dosing of absorbent. Absorbents are used to reduce acid gases as well as to remove elemental mercury and mercury compounds. These acid gases also cause corrosion in the duct work. Their presence is indicated by a “blue plume”. The MCS100E HW multi-component analyzer system measures  $\text{SO}_2$ ,  $\text{SO}_3$ ,  $\text{H}_2\text{SO}_4$ , and a variety of other gases. An integrated adjustment filter gives the operator the ability to run internal checks on the system without the need for expensive and dangerous test gases or liquids.

- MCS100E HW CEMS solution



→ [www.sick.com/MCS100E\\_HW](http://www.sick.com/MCS100E_HW)



## Overflow protection for the lime silo

Lime is typically stored in silos for use as an absorber/neutralizer in the flue gas desulfurization system. In order to prevent overflowing of the silo, a point measurement of the level is recommended. The radar-based LBR SicWave is particularly outstanding for its ruggedness. The level sensor has no mechanically moving parts and is also insensitive to deposit formation, making it an ideal choice for monitoring bin levels.

- Level sensor LBR SicWave



→ [www.sick.com/LBR\\_SicWave](http://www.sick.com/LBR_SicWave)



# MERCURY REMOVAL



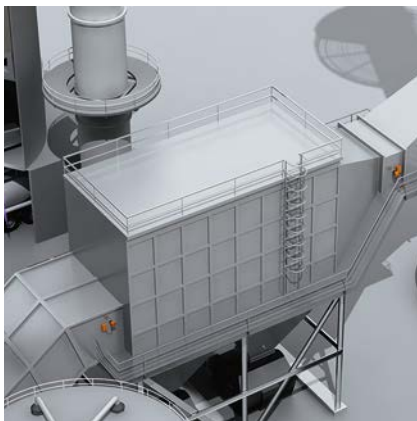
## Mercury removal in the SCR unit

The removal strategy used here is to replace one of the catalyst beds in the SCR with the new type of catalyst. This drives the formation of ionic Hg, which is soluble and can be absorbed by the fly ash and activated carbon. Here, a control measurement of Hg helps to determine the effective reaction of the catalyst. The mercury gas analyzer MERCEM300Z provides reliable measurements of gaseous mercury to help control the removal process.

- MERCEM300Z extractive gas analyzer



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



## Sorbent injection at the ESP or bag filter

In this removal scenario, activated carbon as sorbent is injected upstream of the bag filter to bind with gaseous, ionic mercury and then trapped in the fabric filter. Here, a measurement of acid gas is important because the concentration can impact the effectiveness of the activated carbon. The CEMS solution MCS100E HW measures acid gases such as  $\text{SO}_3$ ,  $\text{H}_2\text{SO}_4$  and HCl continuously to insure good performance of the removal system.

- MCS100E HW CEMS solution



→ [www.sick.com/MCS100E HW](http://www.sick.com/MCS100E HW)



## Mercury removal in the FGD washer

In this system, the Hg removal occurs in 2 steps: Step 1: Capturing the ionic Hg in the wet scrubber, Step 2: Stabilization. This is done to prevent re-emission and is often performed with the addition of Halogen salts to the  $\text{SO}_2$  scrubber. By monitoring mercury at the inlet and outlet, the efficiency of removal can be controlled continuously with the help of the extractive gas analyzer MERCEM300Z.

- MERCEM300Z extractive gas analyzer



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

## PARTICULATE REMOVAL



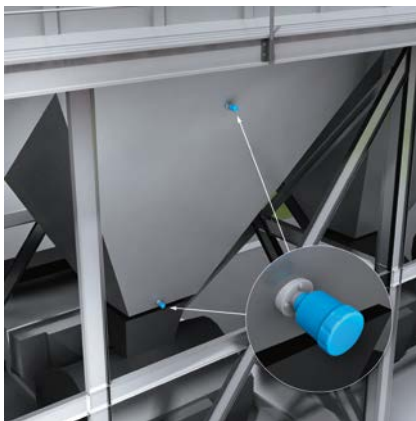
### Electrostatic precipitator protection

Exhaust gases from coal-fired combustion are loaded with dust. The dust has to be removed before the gas is released into the atmosphere. In order to do that, coal-fired plants often use electrostatic precipitators (ESPs). The CO concentration is monitored in the exhaust duct at the inlet of the precipitator. The GM901 gas analyzer is even suitable for difficult measuring tasks such as high dust critical flow profiles, or high measuring gas concentrations.

- GM901 in-situ gas analyzer



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



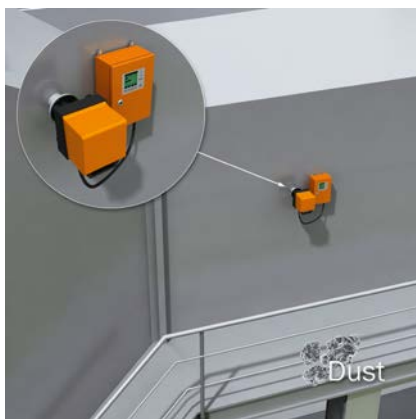
### Ash collection hoppers

The dust particles that pass into the electrostatic precipitator are collected on the plate surfaces. Once the “rapping” is done, the collected dust falls off into collecting hoppers. In order to determine whether the hopper is full, point level measurements are taken. The LBV300 vibrating level switch, which is characterized by its outstanding ruggedness, is ideal for this task. It operates with no mechanical moving parts and is also immune to deposit formation. On top of this, it is easy to install and can be started up without filling.

- LBV300 level sensor



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



### Monitoring dust removal efficiency

Exhaust gases from coal-fired combustion processes are loaded with particles and, due to environmental regulations. Cleaning is done using a filtering system, such as an electrostatic precipitator. The correct operation of this precipitator is ensured by continuously monitoring the dust concentration after the filtering process. The DUSTHUNTER SP100 is a good choice for very low to medium dust concentrations. An automatic check of the zero and reference point as well as a contamination check are integrated into the device.

- DUSTHUNTER SP100 scattered light dust measuring device



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

## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 9,700 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its 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.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the 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 SICK a reliable supplier and development partner.

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

**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)