

# BALANCING ACT

PRODUCE ELECTRICITY EFFICIENTLY – WITH A  
SENSE OF ENVIRONMENTAL RESPONSIBILITY

PAGE 4

### ULTRASONIC MEASUREMENT

Custody transfer and volume  
flow measurement

PAGE 13

### INDUSTRY EXPERTISE

Intelligent solutions for  
power plants

PAGES 4 TO 9

50 years

## Dust Measurement

Pioneer in environmental protection



## 50 YEARS OF ENVIRONMENTAL MEASUREMENT TECHNOLOGY AT SICK

## FROM DUST TO THE WORLD'S MARKET LEADER



*When system engineers rave about the „RM 4“ or „RM 61“, they're not talking about old car models, rather SICK's legendary in-situ dust measuring devices of the RM series from the 1960s. The long successful transmissiometers, famous for their reliability, are partly still in operation today. With the popular smoke detectors, SICK captured the then-fledgling world market for environmental technology 50 years ago and still holds this position today thanks to new developments and patents.*

The ancient Romans exiled glassblowers out of the city to eliminate the billowing smoke during production. This „thick air“ from industrial smokestacks and exhaust pipes still burdens the health of people today. During the 18th century, the first measurement devices were developed for bakers and miners in particular. They were able to determine dust exposure by means of impaction. From the late 19th century, only with more advanced konimeters could even finer particles be collected, separated and analyzed microscopically.

The London Smog Disaster of 1952 was a turning point. It led to forward-looking environmental legislation that advanced environmental technology beyond targets and limits to today, where the market is concerned about the lowest dust concentrations. Fifty years ago, Erwin Sick set new standards with his patented transmission and scattered light technique. He invented the first dust measuring device that could be installed directly on the smokestack and the first visible range measuring devices for tunnels with a measurement base of 20 meters. In addition, it could also be used to monitor visibility up to 100 meters at airports.

With the renowned RM series from SICK, the density of smoke in industrial smokestacks could be measured for the first time quantitatively and qualitatively, low drift and self-controlling. RM 4 and RM 61 are also the grandfathers of the state-of-the-art in-situ gas analysis technology that SICK established worldwide in the 1980s.

But dust never sleeps. For this reason, dust measuring devices have also been continuously improved. They not only meet the latest requirements, but handle several additional tasks in parallel and can be used everywhere, in every measuring range and any system type. The most recent product family, the very rugged, versatile DUSTHUNTER, again has the markings of a cult star. From the early stages, SICK's dust measuring devices have remained only: legendarily reliable and easy.



MEASUREMENT PRINCIPLES GO HEAD-TO-HEAD IN THE PROCESS OF INERTING A TOLUENE TANK

## OXYGEN TECHNOLOGIES DO BATTLE



The TRANSIC100LP laser transmitter has exactly the right nose for oxygen – and a customer's own comparison has proved this. Pitted against the established method of paramagnetic measurement, TDLS technology is able to offer a lower initial investment level for measuring stations, and much more besides: It also considerably reduces operating and maintenance costs for controlling inerting processes.

>> When it comes to controlling inerting systems, the range of measuring techniques available is varied. To date, the tried-and-tested solution of paramagnetic oxygen analyzers – extractive measuring devices – have always been the industry standard. But now it is becoming clear that TDLS is taking over the role of best-practice technology for oxygen measurement.

## OXYGEN AND TDLS TECHNOLOGY

Tunable diode laser spectroscopy (TDLS) is already a well-known technique for highly selective measurements and, up to now, has found its place in demanding chemical and HPI tasks as well as combustion monitoring applications. Its advantages lie in the level of robustness it offers, its resilience to disturbances, and its minimal maintenance requirements. Now, thanks to the new generation of TDLS process transmitters from SICK, this technology is available at a price that makes it a very attractive option for standard measurements. Having already proven successful at more than 500 measuring stations, the TRANSIC 100LP has been developed as an in-

trinsically safe version (soon in line with ATEX/IECEx) for installations in zone 1 and measurements in zone 0, and can be used both in-situ and with extraction.

## ONTO A WINNER

After a year of testing, the American chemicals company which carried out the comparison didn't take long to reach a decision. It had been looking for an alternative type of measuring technology after encountering repeated problems with its paramagnetic oxygen analyzers. What really mattered was that the device had to be easily accessible when installed on the tank; ideally, a gas conditioner would not necessarily be required and it would be possible to calibrate the equipment on site. Ultimately, it was the TRANSIC121LP laser transmitter, with FM approval for use in Ex-protected working environments, that won out over the competition. The PTFE filter designed to protect the transmitter meant it was possible to do away with the gas conditioner altogether. Additionally, a straightforward extractive gas sampling system enabled the transmitter to be installed in a way that made it easy to ac-

cess. Finally, the equipment has made the job of calibration using nitrogen and ambient air much easier for the maintenance staff.

## DOWN WITH COSTS!

The company scrutinized and evaluated the two measurement principles under entirely neutral conditions, looking at factors including cost. In this particular area, the TDLS technology and transmitter concept proved a clear winner: In fact, gas conditioning costs dropped to virtually zero. Similarly, installation costs fell by three-fourths and the financial outlay associated with TDLS measurement amounted to 64 % less than the paramagnetic measurement principle.

Even when it came to maintenance, the TRANSIC figures spoke volumes: This technology effortlessly saved 75 % of expenses. While one hour's maintenance work on the gas conditioner per month was logged in the case of TDLS measurement, paramagnetic measurement clocked up four hours per month. What is more, the results showed that the TDLS measuring station required just a fourth of the parts and consumable materials that paramagnetic measurement did over the course of the year.

Further product information:  
[www.mysick.com/en/transic100lp](http://www.mysick.com/en/transic100lp)





# POWER GENERATION

PRODUCE ELECTRICITY EFFICIENTLY – AND DO SO WITH A SENSE OF ENVIRONMENTAL RESPONSIBILITY

## A DIFFICULT BALANCING ACT

There are many tasks involved in generating electricity in a profitable manner. The range spans from cost-effective logistics and efficient use of fuel to varied safety measures to protect man and machine. The top priority is environmental protection. Nothing makes more sense than to seek professional support through intelligent sensors from SICK.

>> For every stage of production, SICK has intelligent sensors, which can be used to monitor transport and storage in the combustion process, denitrification (DeNO<sub>x</sub>) or dust removal from exhaust gas to flue gas desulfurization or monitoring of emissions. You define the measurement task, we find the practical measurement solution as if it were made for you. Everything from a single source. It makes no difference whether coal or gas-fired power plants, biomass power plants or diesel generators are at issue.

### SPECIFICALLY MONITOR EMISSIONS

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. Regardless if you are measuring emissions from coal-fired plants, combined cycle plants

or diesel engines we can supply the appropriate analyzers to meet your regulatory compliance needs. Together with the approved data acquisition system, shelter and services SICK provides a complete emission package from start to finish.

### EFFICIENT COMBUSTION

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<sub>2</sub>, CO and primary air flow, all in-situ, to provide the quickest possible signal for control.

### PREVENT CORROSION

Boiler corrosion can be a nightmare for plant owners. It means shortened boiler lifetime, increased maintenance and repair cost, unwanted outages: in short – lower plant efficiency. SICK provides a system to monitor CO and O<sub>2</sub> directly at the boiler wall to limit the potential for corrosion.

### CAREFULLY CONTROL POLLUTION

Scrubbers, catalytic reactors and particulate filters all remove gaseous 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.

### CONTINUOUSLY MANAGE MATERIAL FLOW

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.

### USE THE SERVICE WITHOUT WORRIES

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

SCR BYPASS MEASUREMENT SYSTEM FOR SELECTIVE CATALYTIC REDUCTION SYSTEMS

## POWER PLANTS CAN SAVE MONEY WITH THE NEWEST MEASUREMENT SOLUTION FROM SICK

Finally a solution has been developed to measure efficiency of stack gas cleaning systems in large ducts which is both economically and environmentally sound. Thanks to the unique SCR Bypass System from SICK, modern power plants now have a way to actually guarantee the removal efficiency of their systems.

>> The measuring technique allows operators to control the process and influence the final emission limits at an early stage. In addition, the system can aid in maximizing the run-times of catalytic converters, minimizing ammonia consumption and insuring that the ammonia content of fly ash is kept to a minimum so that it can be used for other purposes.

### SIMPLY CLEVER

The SCR Bypass System measures NO<sub>x</sub> in flue gas using a so-called bypass system to achieve a typical gas concentration – a representative sample is taken through specially designed lances with evenly distributed ports. The bypass system with its network of lances is installed in the inlet duct to the SCR and a nearly identical system in the outlet duct. The correct placement and size of the lances is determined in conjunction with the engineering company following their design for the SCR implementation in the plant. The sensors and analyzers take measurements using bypass cuvettes – specially developed by SICK – without

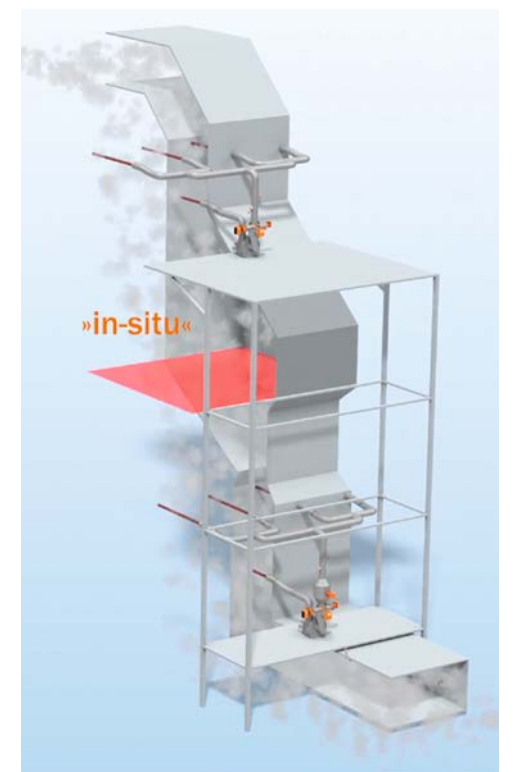
distorting any of the results. Gas analyzers and flowmeters from SICK are part of the team of instruments.

### CONTROL IN SECONDS

The GM32 UV analyzer measures NO<sub>x</sub> content directly within the bypass cuvette, while the optics of the analyzer are cooled and maintained free of dust using purge air. The measurement result obtained enables the injection of ammonia to be precisely regulated. In addition volumetric flow measurement provides the information to calculate mass flow. The gas mixture is also measured after the SCR. If NO<sub>x</sub> concentration is still high, ammonia injection is increased. If ammonia level is too high, injection is reduced. The GM700 from SICK is an additional unit on the outlet skid that precisely measures the ammonia slip and moisture content.



[www.sick.com/denox-control](http://www.sick.com/denox-control)



A highend complete measuring solution – developed by SICK: The SCR Bypass System quickly provides information so that DeNO<sub>x</sub> control in large ducts is easily done. 3 meter long lances extend into the duct to take representative sample.





## RELIABLE MASS EMISSIONS RATE

# PERFORMANCE IS AT ITS BEST IN DIFFICULT CONDITIONS

Reliable emission monitoring is essential due to the fossil fuels creating a significant carbon footprint. The solution is from SICK.

>> South Africa's largest electricity producer has set itself a significant task: to continuously monitor its dust concentration levels and, at the same time, meet the requirements stipulated by the country's environmental legislation. The company, ESKOM, operates a number of large power plants that use fossil fuels, and has established links with coal mines in the area for this very reason. In fact, ESKOM is an electricity supplier to not only South Africa itself, but other Sub-Saharan nations too.

## NOT UP FOR NEGOTIATION

Emission monitoring is not negotiable and also essential for process optimization. The emission measurements are governed by South Africa legislation, controlled and enforced by the governing body named the "Green Scorpions". Should pre-defined limits be continuously exceeded and no corrective action taken by the power supplier, penalties will be charged. Should continuous breaches of these limits continue, the plant will be forced to shut down. ESKOM will be on the safe side with his comprehensive monitoring and measuring technologies: they must be robust, accurate and highly reliable being on-line 24/7.

Providing the power plants with reliable mass emissions rates the transmission monitor DUSTHUNTER T200 and the flow measuring device FLOWSIC100H were selected from the extensive SICK Process Automation portfolio.

## CENTERED ON DUST MONITORING

Transmission is a widely used optical technology that is ideal for monitoring from a small to a large active measuring path. The DUSTHUNTER T200 also automatically monitors the contamination and corrects the measuring value, providing adequate warning if contamination exceeds the tolerable level for the optical monitoring system.



It is additionally equipped with an automatic self-adjustment, exclusive to SICK. It corrects shifts in the optical axis, which can occur in the case of thermal expansion of the stack. Both save unnecessary maintenance work. The automatic self-adjustment makes it extremely simple to start-up the device.

## MEASURING FLOW UNDER ANY CIRCUMSTANCES

Measuring gas flow in stacks of over three meters or more in diameter is practically impossible without ultrasound. Conventional measuring technology falls short when faced with low gas flow rates and gas flow turbulence or when particles in the gas contaminate the transducer. But FLOWSIC100H makes short work regardless of unfavourable flow conditions and impure gases. And thanks to different probe lengths, it can also be used for any wall thicknesses.

Further industry information:  
[www.sick.com/industries](http://www.sick.com/industries)

## SOLAR ENERGY: SIDOR AND DUSTHUNTER JOIN IN WORKING AT NIGHT

The production of clean energy is not just a German issue. There is a brand new hybrid power plant now online in Spain. The solar thermal system is responsible for power generation during the day, the biomass during the night. Emission measurement by SICK is in use around the clock.

>> Termosolar Borges, the world's first commercial solar-biomass hybrid power plant, has been erected near Barcelona. An enormous parabolic solar field of more than 180,000 square meters combined with a biomass boiler guarantees continuous power even when the heavens are dark. Authorities plan to produce up to 98,000 MWh per year in approx. 6,500 hours. The hybrid system ensures more uniform power generation with high stability.

The steam for the turbines is generated by sunlight. The biomass heating block comes into play when the sun is down. Steam is generated by burning forest waste or energy crops. All in all, this is a much more user-friendly solution than using a natural gas boiler, for example, as the "green" fuels only release the same amount of CO<sub>2</sub> into the atmosphere that

they previously drew in from it. Nevertheless, the flue gas is cleaned before exiting the smokestack. And it is precisely here where the measurement devices from SICK come into play: The SIDOR gas analyzer and DUSTHUNTER SP100 dust monitor.

## SOVEREIGN IN ITS DISCIPLINE

The SIDOR measures the gas components CO, CO<sub>2</sub> and O<sub>2</sub>, and meets all requirements for emission measurements from large combustion plants according to EN 2001/80/EC. The gas analyzer is also used to optimize combustion and for operational measurement. The power plant also relies on the high stability of its measurement devices. The entire SIDOR design is tailored for this specific purpose. Its intelligent signal processing and highly stable detectors make long-term stability possible.

SIDOR only needs to be adjusted every 1/4 year with inert gas or component-free ambient air.

The measurement device is also convenient to repair. The measuring cuvettes can be replaced on site directly without any time-consuming temperature calibration. A large LC display also makes it easy to read any text, even in Spanish. Due to the low installation depth, the SIDOR does not need a lot of space.

Dust emission measurements are made using the DUSTHUNTER SP100. The dust measuring device with a measuring probe was easy to install on just one side of the smoke stack and measures even the smallest dust concentrations.

Further industry information:  
[www.sick.com/industries](http://www.sick.com/industries)





## DIESEL POWER PLANTS

EVEN IN THE MIDDLE OF NOWHERE  
EMISSION LIMITS  
HAVE TO BE CONSIDERED

Diesel power plants run with heavy oil have to meet emission limits, too – reliable supervision even under difficult flue gas conditions: with hot/extractive or in-situ technology by SICK.



>> More and more diesel power plants run by heavy oil are used for the decentralized generation of energy. This is an economic alternative to conventional power generation, especially for the supply of islands, remote residential areas and industries or for seasonally varying demands. For these power plants there are also emission limits which have to be observed and continuously monitored.

Not every measuring system can cope with the special flue gas conditions of diesel motors using heavy oil. High soot and sulfuric concentrations make the measuring task difficult. Above all, maintenance needs have to be kept low, because this kind of power plant is near-

ly always in a remote location. And who has the time to spontaneously travel long distances? Service planned well in advance is advantageous.

 Further industry information:  
[www.sick.com/industries](http://www.sick.com/industries)

## Reliable emission measuring concepts

The analyzers and measuring devices by SICK measure all gas and dust components resulting from the emission measurement. And as demands define technology, fitting solutions by SICK are always ready and in action. The robust construction of hot/extractive and in-situ emission measuring systems for decentralized diesel power stations require very little maintenance. In-situ systems such as GM32 or GM35 and the MCS100E HW extractive system have all the relevant European approvals. SICK's worldwide presence ensures that maintenance and repairs can be handled locally.

Finally, the motto can only be: The monitoring of emissions has to be absolutely efficient and reliable.

DIFFERENT TECHNOLOGIES FOR  
RELIABLE MEASURING QUALITY

For the measurement of exhausts of diesel motors run with heavy oil, in-situ analyzers like the GM32 for the emission measurement of SO<sub>2</sub> and NO<sub>x</sub> are especially suitable. This measuring method is nearly independent of dust loading and corrosive flue gas conditions and notably low-maintenance. Should further components for example O<sub>2</sub>, CO, NH<sub>3</sub> have to be registered, additional analyzers are used like GM35 for CO, CO<sub>2</sub>, H<sub>2</sub>O and GM700 for NH<sub>3</sub> or ZrO<sub>2</sub>-oxygen analyzers.

An economic alternative is in this case the hot/extractive measurement with the MCS100E HW which can register all of the mentioned components with one single system. The heating of gas contacted parts prevents corrosion and reactions between flue gas components. Apart from that, multiplex operation is possible, if allowed. Internal adjustment filters perform routine checks without the need for test gases, which are often very difficult to obtain.



## NO AIR POLLUTION FROM SEAWATER FLUE GAS DESULFURIZATION

WHO SAYS THAT THE AIR IS CLEAN  
ON THE RED SEA?

Proven technology and high measuring performance – SICK takes over monitoring of process parameters for controlling flue gas cleaning and for emission control.

>> Marafiq, leading private water and electricity utility in the Kingdom of Saudi Arabia, combines power generation and seawater desalination on the Red Sea in a grand, sustainable project called Yanbu 2. Three power plant units and two desalination plants provide industry in Yanbu with power and water.

A huge work package was distributed. SICK impressed with its established exchange platform and takes over accurate monitoring at the electrostatic precipitator (ESP) and at the sea water flue gas desulphurization (SWFGD). That's the way to run the process optimally, and to comply also with emission regulations by local Saudi law.

ACTIVE MEASUREMENT:  
BEFORE – AFTER

The steam for the power plant turbines is generated by firing heavy fuel oil. Flue gases form, which are not environmentally friendly that then have to be scrubbed. The first measuring device from SICK, the DUSTHUNTER SB100, operates just after the electrostatic filter. It measures dust concentrations in the flue gas independent for gas velocity and humidity. The great thing about the DUSTHUNTER is that it measures the contamination on the optics and automatically corrects the measuring signal and gives a warning. Unnecessary maintenance cycles are avoided. This is a significant advantage especially in remote areas.

The flue gas is then washed with seawater in the scrubbing tower. Due to the alkaline components in seawater, the operator can avoid the use of chemicals. The operator is giving the information early, at the inlet of the gas washer, about the high concentrations of SO<sub>2</sub>. The flue gas cleaned of pollutants then only needs to pass by the GM32 from SICK in the scrubber outlet. The in-situ gas monitor measures SO<sub>2</sub> in large and small ranges with high accuracy with-

out gas sampling and transportation. The measured values for plant control are quickly available in real time. The measured values can be relied upon as deviations are visible at the right time thanks to self-monitoring. The probe is corrosion-protected and Teflon-coated and particularly well-suited in this application.

## ON THE INTERNATIONAL STAGE

SICK works very closely with customers around the world – locally and still in close collaboration with experts at its headquarters. "Careful planning, perfect organization and timely execution are important. More important, however, is to understand the customer's wishes and to substantiate this already in the planning phase with successful solutions," explains Mathias Dumas, SICK Dubai.

 Further industry information:  
[www.sick.com](http://www.sick.com)







## RAW GAS MEASUREMENT

# IT'S WORTH TAKING A CLOSER LOOK

Incineration plant operators must be informed about treatment processes in flue gases as quickly as possible. Modern process measurement requires a state-of-the-art technology as demonstrated by the MCS300P HW from SICK.

>> The flue gas purification systems must ensure that the specified pollutant components in exhaust gases never exceed limit values as defined by WID 2000/76/EU. For this reason the selection of the correct gas cleaning method arises during the planning stage for state of the art "Waste-to-Energy" plants. Of similar importance is the selection of the right measuring system, so that these gas concentrations can be safely detected upstream prior to the flue gas scrubber. Only then a precise prediction of the pollutant load can be given.

Of notable consideration is HCl, which exhibits the highest corrosion potential. Reliable measurement is designed to be able to better monitor system wear off and reduces significantly the overhaul cycle of the flue gas purification system from semi-annually to annually.

## DRY OR WET – THE MEASURING SYSTEM IS DECISIVE

Both, wet scrubbing devices as well as dry scrubbers, are ideally suited for reducing HCl and SO<sub>2</sub> concentrations. These concentrations must be accu-

rately determined in advance to recognize possible peaks in the exhaust gas in time and to determine the optimal dosing of lime milk or bicarbonate for the scrubbing process, thus enabling the controlled application of chemicals.

And that is precisely the keyword for the MCS300P HW from SICK because the multi-component analyzer system is ideally suited for this purpose. It measures components with variable measuring ranges from low (ppm) to high (vol%) concentrations and serves with rapid process information with response times in the range of approximately 30 seconds. The measured gas is continuously sampled via a sampling probe with



a heated filter before being fed via a heated hose to the heated gas cell of the analyzer. The original gas composition, including water content, is retained (above the acid dew point). By doing this, the risk of corrosion due to condensation is eliminated. A special compressed air vessel is installed near the sampling unit to ensure efficient cleaning of the coarse filter cartridge at the tip of the probe. This cleaning process is achieved by an instrument air blow back function. This keeps the sampling free of clogging and saves considerable maintenance costs.

## IT PAYS OFF

The MCS300P can be actively integrated into the control circuit, e.g. for lime milk metering. It reliably detects concentration peaks and is therefore vital for loading waste material of unknown composition onto the grate.

Many operators agree: the acquisition of the MCS300P HW for process monitoring achieves ROI within the first year by operational cost savings of 10 - 15 % per year.

 Further industry information:  
[www.sick.com](http://www.sick.com)

## ENVIRONMENTALLY-FRIENDLY NICKEL SMELTING

# PRUDENT FLOW MEASUREMENT ENABLES SO<sub>2</sub> TO BE CAPTURED

Flow measurement is no child's play. Streams of non-homogeneous, corrosive, hot gases can quickly prove too challenging for conventional measurement systems.

>> Sulfur dioxide is produced not only when burning fossil fuels containing sulfur as for example coal or petroleum products, but also when smelting copper. High concentrations of SO<sub>2</sub> are a major threat to our ecosystem.

the disruption that external purging air would cause the gas stream is avoided and maximum measurement accuracy is assured – even at low flow rates or when dust pollution levels are high.

## A WELL-ROUNDED PROJECT

Flow measurement was part of a complex project delivered by a leading global engineering and construction company with offices in Canada. "The collaborative process was enjoyable and went smoothly," confirms Mark Gooch, SICK's Regional Sales Manager for Eastern Canada. "We were also able to assist where other aspects of the FLOWSIC100 implementation were con-

cerned." Customer's engineers will be receiving training from SICK to enable them to complete minor maintenance work independently. Regular service inspections have been agreed. "That way, the customer will have peace of mind at all times."

 Further product informations:  
[www.sick.com](http://www.sick.com)

## BENEFITING FROM FLOWSIC100

From furnace to converter, gas flow must be measured at every stage of the process. The goal of the measuring system is clearly defined: reliable measuring regardless of circumstances. With SICK's high-performance ultrasonic flowmeter, the customer is now able to optimize internal process balancing. The FLOWSIC100 has been configured specifically for these difficult process conditions with aggressive gas composition. Only the meter's modular design has achieved the perfect combination of compatible ultrasonic transducers and special materials. The meters show what they can do despite the difficult conditions in which they have to operate.

## EVEN WHEN THINGS GET REALLY HOT

The FLOWSIC100 is capable of operation at temperatures of up to 260 °C, without cooling. Upwards of 260 °C, operation continues with internal cooling that is unique to FLOWSIC100. Normal ambient air is sucked in directly at the measuring point and directed to the sensors via internal channels. As a result,

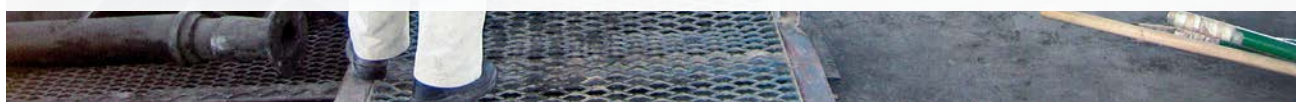






FUEL SAVINGS, COMBUSTION OPTIMIZATION, QUALITY ASSURANCE

## PROCESS OPTIMIZATION STARTS AT THE ROTARY KILN



To best control the combustion process of alternative fuels, superior measurement technology that copes with aggressive gases in the furnace intake is required. For this reason, a Spanish cement plant opted for hot measurement technology at the rotary kiln. The MCS300P HW gas analysis system can now be used in combination with the SCP3000 gas sampling probe from SICK to provide reliable measured values at a high level of availability.

>> The time was ripe for a new system to measure  $O_2$ ,  $CO$ ,  $NO$  and  $SO_2$  at the furnace intake. Difficult conditions in the rotary kiln place very high demands on gas sampling and analysis technology. Temperatures up to  $1400^\circ C$ , dust concentrations up to  $2000\text{ g/m}^3$  and high concentrations of chlorine and sulfur within the gas circuit are typical. Clogged gas lines and increased corrosion are often the result. This leads to intensive, time-consuming maintenance.

### SO, DO IT RIGHT

The MCS300P HW infrared analyzer system with the SCP3000 gas sampling probe from SICK represents a system with extremely high stability, which, due to the significantly lower maintenance expense compared to cold extractive systems, has higher availability and helps to cut costs.

### DETAILS ARE CRUCIAL

During the hot kiln inlet measurement, the hot gas passes from the rotary kiln into the rugged gas analyzer via a heated filter, a heated sample gas line and a heated sample gas pump without any further gas conditioner.

The sample gas is filtered, conveyed and analyzed at temperatures that are constantly above  $200^\circ C$ , i.e. always above the water and acid dew point. Condensation and corrosion are prevented by hot gas sampling and preparation. The proven measuring cuvettes of the analyzer system are designed for concentrations from low ppm to high Vol% values.

Despite the high concentrations of chlorine and sulfur compounds, deposits and blockages cannot form on the intake opening of the sampling probe. An

optimized geometry of the intake opening and regular backflushing using a „shock blower“ prevent this effect. The cyclic rotation of the probe by  $90^\circ$  also shakes off any accumulated dust. In the event of a fault, the probe is pulled back automatically to protect it from damage.

### EXPANSION IS CONCEIVABLE

SICK Spain directly supported the customer through commissioning and beyond with introductions to the system. Presumably, the process-relevant component HCl will soon be included in the measurement grid for this customer. In addition, an identical system is being considered for other plants.

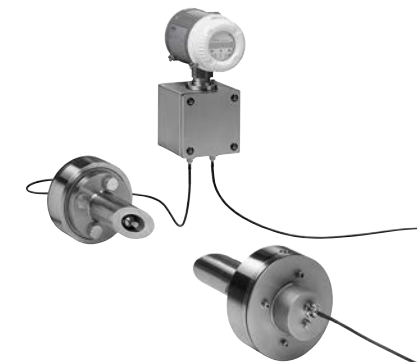
 Further industry information:  
[www.sick.com/industries](http://www.sick.com/industries)



CUSTODY TRANSFER AND VOLUME FLOW MEASUREMENT WITH ULTRASOUND

## SUCCESSFUL DUO IN WESTERN SIBERIA

The FLOWSIC600 ultrasonic gas flow meter has proven itself throughout the world for custody transfer metering of natural gas. However, natural gas needs to be measured even if it is not billed – for internal measurements for balancing or network monitoring and for process control. The FLOWSIC300 is simply ideal for such applications and also a very economical measurement solution.



>> There is a support point for Russian gas production in the Western Siberian lowlands, approx. 3,000 km north of Moscow. The natural gas from various gas wells is routed in 6" pipelines to a central treatment plant in which solids are first separated and the natural gas is dried. The cleaned gas is then routed in a large 20" pipeline to another plant another 30 km away. Here it is prepared to be fed into the gas grid. Measurement of gas volumes to the first transfer station is a typical non-custody measurement long-term stability and reliability play an important role here.

### THE IDEAL MEASURING DEVICE FOR EVERY MEASURING POINT

The gas flow rate is measured at the individual gas wells using the FLOWSIC600 in a 2-path configuration. After more than two years of maintenance-free operation, this design has proven itself extremely reliable and rugged against the natural contaminations of raw natural gas.

The FLOWSIC300 comes into use in the 20" collection pipe after initial treatment. It was installed on site in a pipe section and used in the pipeline directly. The reduced material costs by not using a massive meter body make the FLOWSIC300 a very economical solution for this balance measurement. Particularly convenient for the customer: The measuring signals of the pressure and temperature sensors are fed into the meter directly and calculated according to accepted algorithms using the integrated volume conversion. In this way, the measured values of the different measuring points in the supply grid can be compared to each other directly.

### MODULAR DESIGN

The FLOWSIC300 can be configured on a modular basis for various applications. Whether for simple control measurements or for precise process measurements, in which greater measurement accuracy and increased tolerance toward disrupted flow profiles is required, the FLOWSIC300 is ideally suited for both. The 1-path configuration is ideally suited for installation into pipes with small nominal diameters and for simple control measurements. The 2-path configuration offers increased measurement accuracy in the event of disturbance in particular. It can even be installed when the process is running. For maximum measurement accuracy and comfort, the FLOWSIC300 can also be pre-installed and calibrated at SICK into a pipe section.

### THE NEW STANDARD

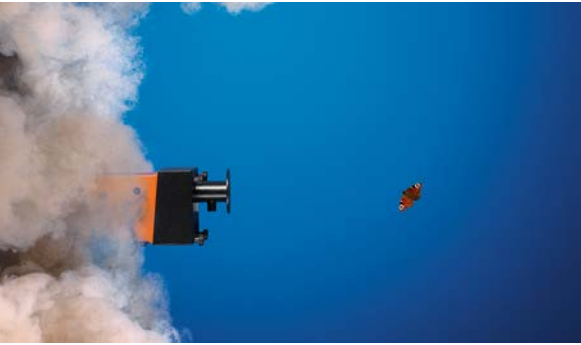
The FLOWSIC300 uses the high-quality components of the FLOWSIC600 and can be integrated flexibly and compactly

into existing pipelines. Our customers can now also enjoy the advantages of ultrasonic technology for custody transfer measurements for non-custody measurements: high reliability and long-term stability, no pressure loss, no wear and the outstanding software of the FLOWSIC600. The software continuously monitors the device and provides all functions that have made the FLOWSIC600 so successful for custody transfer from simple operation to comprehensive log functions to integrated volume conversion.

 Further product information:  
[www.sick.com](http://www.sick.com)







TODAY A TOUGH COCOON, TOMORROW A DELICATE BUTTERFLY

## THERE'S A DUSTHUNTER FOR EVERY APPLICATION

Regardless of what environmental standard the DUSTHUNTER from SICK is monitoring, whether there's a high or a low particle concentration or how difficult the monitoring conditions are: you're always certain to have the optimum monitoring solution.

>> Devices for monitoring particles need to be exposed not only to the particles themselves, but also to hot, corrosive stack gases. DUSTHUNTER, the series of dust monitors from SICK are extremely robust and utilize very precise optical monitoring techniques. They contain components that automatically compensate for monitoring errors caused by the gas, which result in very long maintenance intervals. After installation, a DUSTHUNTER requires very little attention.

Of all the new dust monitors, the DUSTHUNTER C200 is the furthest ahead of its time. It takes into account the fact that the environmental standards in many countries are undergoing a process of change and that emissions are constantly decreasing. Lower dust concentrations are set to become the rule rather than the exception, meaning that where today transmission technique may be the best course, tomorrow it will be scattered light. On the other hand, dust concentrations that vary over time

are neither uncommon. With the DUSTHUNTER C200, you're certain to always have the optimum monitoring solution. It is also suitable for the toughest stack conditions. It is certified according to the standard of your choice and it automatically monitors the contamination and corrects the measuring value. It is also equipped with an automatic self-adjustment of the optical axis, exclusive to SICK.

 Further product informations:  
[www.sick.com](http://www.sick.com)

### EMISSIONS TRADING

## GHG-CONTROL: NEVER EASIER TO MEASURE GREENHOUSE GASES

GHG-Control is the only in situ solution for CO<sub>2</sub>, CO or N<sub>2</sub>O emissions and the direct path to measure CO<sub>2</sub> (equivalent) emissions on annual basis. The highly accurate measured values of the complete system demonstrability allow total uncertainties of less than 2.5 % – without complicated calculation of the material flows.

>> Direct measurement of greenhouse gas emissions is ideal for companies that are required by law to report gases and for those that have to buy more certificates for every extra ton of CO<sub>2</sub> emitted each year. Even where calculation methods are permitted, there are good reasons supporting measurement provided by SICK's GHG-Control.

### MEASURE RATHER THAN CALCULATE

The measurement results of CO<sub>2</sub>, CO, N<sub>2</sub>O emissions are highly accurate and always up to date. Alternative fuels and co-firings play no role in this. It is not necessary to convert from a dry to wet basis of gas. The often significant time and personnel costs to sample and calculate substance flows and fuel quali-

ties go away. The safety supplements are not needed any more because only actually emitted greenhouse gas mass are reported and settled.



### THE IDEAL DEVICE COMBINATION

The combination of three proven devices from SICK is unique: The gas analyzer for accurate measurement even with fast or short-term process variations. The volume flow meter for detection of total exhaust volume using reliable ultrasonic measurement technology. The data acquisition unit that collects and analyzes the measured values from the gas analyzer and volume flow meter and creates a report of all data required for reporting.

### THE PERFECT PARTNER

As a customer, you are in the best hands at SICK with its all-round services, with answers to questions about project planning to implementation to technical support and service. Decide for yourself.

[www.sick.com/ghg-control](http://www.sick.com/ghg-control)

### THAT'S HOW SYSTEMS ARE MANAGED TODAY

## SECURE REMOTE MAINTENANCE

SECURE REMOTE MAINTENANCE ACCORDING TO INFORMATION SECURITY GUIDELINES

Timely information is the key to success – and in service, too. But how does timely, comprehensive expert support work today? How do you reduce costs and effort? SICK Remote Service is the solution of the future. On top of that, the Internet-based remote maintenance concept from SICK is absolutely safe according to the latest requirements. From the base package to packages fully customized to the needs of the customer, this Remote Service is a must-have.

>> A smooth production process is what counts and ensuring the high availability of devices is a critical challenge. A professional service routine is therefore ever more important to proactively prevent breakdowns and to quickly assess and resolve error messages from measuring instruments.

SICK does all it can to support its customers with safe, uncomplicated expertise. The most economical solution is always the focus. In most cases, access to systems via the Internet or wirelessly is cheaper, faster and more flexible than a service technician on site. With SICK Remote Service, expensive early service calls can be avoided and even repairs

alone establishes the remote connection to the Service Center via the SICK Data Center. The tamper-resistant access authorization is web-based and the infrastructure and connection logic make only minimal demands on the customer's firewall.

### JUST CLICK ON SERVICE

Similar to a modem, the SICK Meeting Point Router (MPR) is responsible for activation and termination of the Remote Service meeting with just one click. The MPR connects the measurement sensors to the SICK Service Center and then also ensures separation of the network. Integrated workflows at SICK ensure a smooth process, e.g. automatic e-mail



desktop sharing, Modbus TCP or SICK's own SOPAS device software.

### HUNDRED PERCENT TRANSPARENCY

Usage reports can be viewed at any time on the portal. You always know when and who requested and carried out remote maintenance. System-specific documents such as e-plans, device files and firmware updates can be made available online. It is also possible to have SICK expertise available when commissioning measuring instruments.

### THE PACKAGE MAKES IT

Secure remote access and excellent service from SICK can be scheduled in three tiered service ranges to match the different needs of customers. The „Core“ package provides the cost-effective flat rate base service. The „Prime“ service package also includes document management and the heartbeat function to keep remote access to the system open at all times. Remote Service offers the „Pro“ package with individually customizable services including integration of external partners such as system integrators. The good feeling of safety is free.



and maintenance can be carried out at the customer site much more efficiently – all tools needed are already on board.

### THERE FOR YOU WITH SAFETY

The Service Remote platform from SICK is designed for technically flawless, confidential operation and follows the strict guidelines of the German Federal Office for Information Security. The customer

notification of Remote Service meeting activation.

The Remote platform from SICK integrates both SICK experts and external partners such as system integrators for the remote access. The options for connecting to the SICK Remote Service platform are many: from measuring systems and devices to web servers, VNC

 Further service information:  
[www.sick.com/service](http://www.sick.com/service)





FOR LIQUIDS AND BULK MATERIALS

## EVALUATING VIBRATIONS, DETECTING LIMIT LEVELS

Both the LFV and the LBV limit switches offer widespread use, can be configured according to the particular process, have approvals for a wide variety of applications and convince through their non-friction and maintenance-free operation.

>> Providing overfilling signals or preventing dry-running for all pumped liquids are typical tasks of the LFV series. The vibrating fork sensors of the LBV family have been specially designed for containers with bulk materials or powdered media such as cement, wood pellets, plastic granulate or glass. Both series

utilise the piezoelectric measurement principle. The vibration sensors are available as fork or monoprobe form. They ensure high immunity to contamination, depositing and external vibration effects. Pressure differences and eddies e.g. during the filling of containers, as well as foam, gas or bubble formation have no effect on sensor function or switching accuracy. The electronics of the LFV evaluate frequency changes while, in case of the LBV, the rise or fall in amplitude determines whether a switching signal is transmitted to an evaluation device.

### ADAPTION TO PROCESS CONDITIONS

The vibration limit switches from SICK offer modular configuration according to the task involved. In addition to the standard versions SICK also offers devices that are ATEX-certified for installation in potentially explosive zones.

 Further product information:  
[www.sick.com](http://www.sick.com)

gases in the ATEX Zone 1 category. The cuvettes can also be used for the measurement of toxic and corrosive gases.

### SAVING POTENTIAL FROM AUTOMATIC ADJUSTMENT

The highlight of the MCS300P Ex is the optional adjustment filter wheel. In comparable analyzers, costly test gases must be used for adjustment and automatic checking of the drift behavior. In particular, this means high work and safety expenditure for explosion areas. Thanks to the adjustment filter wheel of the MCS300P Ex, this is no longer needed, resulting in savings of time and money. In addition, the newly designed, compact construction of the MCS300P Ex-series also goes a long way to easing installation, commissioning and maintenance.

 Further product information:  
[www.mysick.com/en/mcs300p](http://www.mysick.com/en/mcs300p)



MULTI-COMPONENT ANALYZING SYSTEM MCS300P EX

## A WIDE SCOPE OF SAFETY FUNCTIONS FOR EX-AREAS

The IR multi-component analyzer system now also performs measurements directly in hazardous areas. Thanks to the special Ex-cuvettes, flammable gases can be reliably detected.

>> Particularly when it comes to process gases, MCS300P stands for proven measurement technology in a compact and clearly designed device, which means that it is also easy to install and to maintain. The MCS300P Ex can also be used in Ex-zones 1 and 2 as a 2G and 3G ATEX class device. This enables the analyzer also to be used in the chemical industry and for refinery applications such as the production of Isocyanates and Vinylchloride.

For heavy industrial use at measurement gas temperatures of up to 140 °C and pressures up to 20 bar, the device is ideally equipped: it has welded connection flanges, integrated safety purge chambers, double elastomer seals. Its tightness is proven by a helium leakage test. The electrically heated process cuvettes have the „Increased Safety“ fire protection design for safe use in Ex-zone 1, as well as for the measurement of ignitable and flammable measurement



MINESIC700 GHG

## METHANE AND CARBON DIOXIDE: GREENHOUSE GASES IN UNDERGROUND COAL MINES

Coal mines in Australia must also meet requirements for measuring greenhouse gas emissions. The analyzers and gas flow measuring devices must comply with government regulations for measurement accuracy: MINESIC700 GHG.

>> In coal mines, CO<sub>2</sub> and CH<sub>4</sub> are continuously measured to foresee and if possible prevent mine explosions.

for this measurement are usually the exhaust duct, shaft openings or ventilator.

### MINESIC700 GHG SETS HIGH STANDARDS

The MINESIC700 TBS tube bundle system handles long-term monitoring of the mine atmosphere. In addition, CO<sub>2</sub> and CH<sub>4</sub> flows out of the exhaust ducts of the mine into the atmosphere. These greenhouse gas emissions are subject to taxation in Australia. The MINESIC700 GHG from SICK is used to measure emissions and allows accurate calculation of taxes. Excessive tax charges can be avoided. The sampling sites

The MINESIC700 GHG is a continuous measurement system using proven SICK technology. The system comprises an S715 wall mounted analyzer utilizing both infrared benches and a paramagnetic cell, FLOWSIC100 ultrasonic flow meters and high accuracy temperature and pressure transmitters. A custom-designed reporting software and humidity measurement is available as an option.

The reporting software package developed by SICK calculates and provides reports on total greenhouse emissions at the site. Ranges for the components can be set to give the tightest tolerances for normal measuring concentrations so as to minimize errors in the reporting.

The MINESIC700 GHG can be supplied in a stand-alone cabinet or integrated into the MINESIC700 TBS allowing for total mine gas analysis and emission monitoring in the one system.

 Further industry information:  
[www.sick.com](http://www.sick.com)

NEW CONTROL SOFTWARE FOR ANALYZER SYSTEM GMS800

## A quantum leap in software

From V1.x directly to V3.x: the level of development is truly remarkable. The advantages for users have also skyrocketed. The new BCU rounds off the modular gas analyzer system GMS800 making it genuinely user-friendly. Systems can be reconfigured easily and quickly on-site, without detailed knowledge of the analyzer.

>> Over 60 different gas components, 6 analyzer modules and 3 versions ranging from 19", wall or explosion-protected housings mean the measuring task determines the choice of equipment. However, operation and control of the analyzers is undertaken uniformly via the integrated display and control module, available now with the new BCU from SICK. All of the functions have been expanded to meet state-of-the-art require-

ments. In doing so, the legendary S700-series' user-friendliness and practical features of SOPAS software have been optimally combined to support OPC and MODBUS communication.

### USER-ORIENTED

The measured results can be configured as required, directly and straightforwardly thanks to a menu-driven system. In doing so, the user is able to focus

on the actual measured components. Knowledge of the analyzer and its technical details is not required. This means the calibration processes are carried out in a component-related manner.

Free definition of formulas for cross interference compensation of internally or externally measured components. Predefined functions for measurement point switching of up to 8 points. Simple limit value configuration. Plus many more interesting advantages.

 Further product information:  
[www.mysick.com/en/gms800](http://www.mysick.com/en/gms800)



## MERCEM300Z MERCURY MONITORING SYSTEM FOR CERTIFIED MEASUREMENTS IN CEMENT PLANTS

# LONG MAINTENANCE INTERVALS COMBINED WITH LOW MEASURING RANGES

System operators are coming to the realization that mercury limit values are only going to get lower. As a result, they need to adapt their measuring equipment accordingly. Certified to EN 15267, the MERCEM300Z is the only system suitable for use in cement plants. It is even able to monitor mercury with precision in the smallest range from 0 to 10  $\mu\text{g}/\text{m}^3$ . What's more, maintenance requirements are very low. The innovative and future-fit nature of this measuring technology is currently unrivaled.

>> Certifications primarily assure quality and create trust. Accordingly, suitability tests have become increasingly more stringent over time. The new European standard EN 15267 saw the yardstick lifted even higher.

### THE YARDSTICK IS HIGH – EN 15267

In the context of certification for use in waste incineration plants, cement as well as power plants, it is no longer permissible to automatically treat all measuring devices as equal where systems for measuring mercury are concerned. There is simply too much variance in flue gas conditions. The cement industry in particular places the highest requirements on Hg systems: high dust loads and high concentrations of  $\text{SO}_2$  or HCl make measuring conditions incredibly difficult.

Tests to EN 15267 require that in addition to the mandatory field test at waste incineration plants, Hg analyzers are now also tested in all types of facility where they may later be put into operation. Field testing of MERCEM300Z took place over a period of more than 12 months at a waste incineration plant and in addition over a period of more than four months at a power plant and a cement plant respectively. The MERCEM300Z sailed through these tighter tests and is the first and cur-

rently the only suitability-tested measuring system for continuous monitoring of mercury in waste incineration plants, in power plants, and in cement works.

The length of the sample gas line is also part of the suitability testing. The MERCEM300Z permits a remarkable distance of 35 m between the sampling probe at the stack and the analyzer system. This is unparalleled by the otherwise standard distance of 10 m. For the operator, this means a much more convenient starting point where the selection of the installation location is concerned. Outside installation at temperatures between  $-20$  to  $+50$  °C also extends the options.

### LONG MAINTENANCE INTERVALS – A CONVINCING ARGUMENT

Even maintenance work is required less often. The MERCEM300Z is designed for maintenance-free continuous duty and is fully equipped with all appropriate control and supervisory functions. All of the components of the system as high temperature oven, ejector, analyzer, etc. are continuously monitored. The integrated adjustment cell takes care of the automatic drift check, thereby controlling that measurements are stable in the long term. The continuous measuring process is not interrupted by consumables or moving parts.



Until now, Hg analyzers could typically only be operated with huge maintenance overheads. While functionality, the effect of cross sensitivities, and system linearity are tested in the laboratory, the field test also tests the suitability of the system under industrial conditions. It is at this stage that the maintenance interval is determined. The minimum requirements demand fault-free operation for a

period of four weeks. This is equivalent to a maintenance interval of one week. The longer the period of fault-free operation, the longer the maintenance interval. In the measuring range from 0 to 10  $\mu\text{g}/\text{m}^3$ , the maintenance interval for the MERCEM300Z is three months; in the measuring range from 0 to 45  $\mu\text{g}/\text{m}^3$ , it is six months.

The innovative technology of the MERCEM300Z supports a certified smallest measuring range from 0 to 10  $\mu\text{g}/\text{m}^3$ . No other measuring device is capable of achieving this. The certified interval for feeding through test gas of six months is also unparalleled. Test gas now only has to be fed through the system twice a year. As mercury is not available in gas bottles and thus additional equipment is required for every task, feeding through test gas more frequently represents a significant cost factor for the operator.

### PATENTED DIRECT MEASUREMENT

Mercury is present in flue gas in various forms: first as elementary mercury ( $\text{Hg}^0$ ) or in oxidized form ( $\text{Hg}^{+2}$ ). The distribution of the various forms is largely dependent upon the raw material and the fuels used, as well as on the downstream flue gas cleaning systems. The operational status of the cement plant (direct or interconnected) is also a significant contributing factor. As a consequence of the constantly changing influencing factors, the precise split between  $\text{Hg}^0$  and  $\text{Hg}^{+2}$  cannot be predicted. These constantly changing and difficult flue gas conditions meant that previous analyzer systems were either not able to operate in facilities of this type or were only able

to operate in them at the expense of increased maintenance overhead.

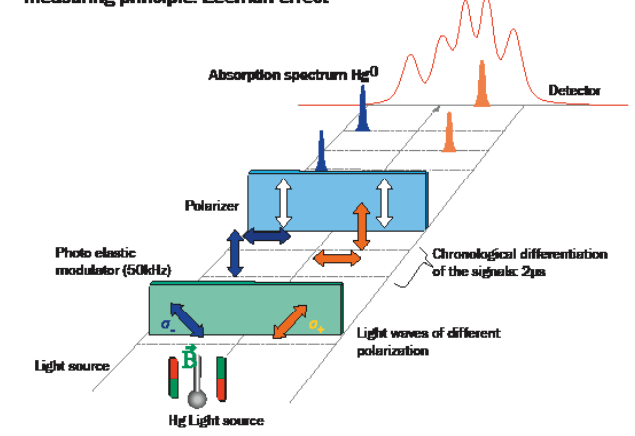
The high measuring capability of the MERCEM300Z is attributable to thermal conversion in conjunction with the Zeeman AAS. The chemically bound mercury in the flue gas is converted into the elementary form in a thermal converter at temperatures significantly above 900 °C. Following conversion, the required total concentration of Hg is then determined precisely in the measure-

ment cell integrated directly into the high temperature converter. Hg analysis directly in the hot cell is patented and has been licensed exclusively for the MERCEM300Z.

The advantages of high-temperature conversion are plain to see: the necessary conversion does not have to be carried out with liquid reagent or with the assistance of a special catalytic converter, as was previously the case. This

(Contd. on page 20)

### Measuring principle: Zeeman effect



THE MERCEM300Z MEASURES THE ELEMENTAL MERCURY PHOTOMETRICALLY USING ZEEMAN ATOMIC ADSORPTION SPECTROSCOPY (ZAAS): A HG DISCHARGE LAMP EMITS LIGHT IN A SPECIFIC WAVELENGTH. A MAGNETIC FIELD IN THE LAMP CREATES THE MEASUREMENT AND REFERENCE WAVELENGTHS (ZEEMAN EFFECT).



reduces running costs and increases operational safety. If the Hg concentration is determined in hot gas immediately after conversion, the elementary mercury cannot react again with other flue gas components – something that is essential if analyzers are to be reliable and precise.

#### BEST POSSIBLE CROSS-SENSITIVITY CORRECTION

With conventional analyzer systems, complex processes are often undertaken to separate the mercury from the rest of the flue gas in order to minimize cross sensitivity. The MERCEM300Z supports a patented solution: the Zeeman atomic absorption principle, which almost entirely eliminates the cross sensitivity of the other flue gas components. The emission line of a mercury vapor lamp is split in a strong magnetic field. The split lines are temporarily displaced through a photo-elastic modulator and a polarizer, thereby returning a measuring signal and a reference signal. Moving components such as filter wheels or choppers are not required. Since the two spectral lines are close together, the cross-sensitivity of other flue gas components – SO<sub>2</sub> for example – has the same effect

on the measuring and reference signals, thus being compensated directly.

#### FOR GOOD REASON: MERCEM300Z

International standards only require the detection of total mercury concentration, i.e., the sum of elementary (Hg<sup>0</sup>) and oxidized (Hg<sup>+</sup>/2<sup>+</sup>) Hg components, in flue gas. In Germany, the limit values for mercury emissions are 50 µg/m<sup>3</sup> (half-hourly mean) and 30 µg/m<sup>3</sup> (daily mean). By comparison, limit values in the USA are much stricter. A distinction is made between existing cement plants that are already in operation and new-built cement plants. Mean values are generated for the limit values over an average of 30 days. For existing cement plants that are already in operation, they are approx. 12.5 µg/m<sup>3</sup>; for new cement plants, this value is just 4.5 µg/m<sup>3</sup>. The MERCEM300Z is already equipped for these measuring ranges.

It combines thermal conversion at high temperatures with Zeeman AAS analysis in a unique, compact, user-friendly analyzer. The MERCEM300Z measures and converts all-in-one. There are no carry-over effects, as mercury is measured directly where it is converted. There is

no solids converter, no dilution, and no recombinations which often falsify results. The MERCEM300Z is a high-end measuring solution which is suitable for use even in power plants and cement works.



Further product information:  
[www.mysick.com/en/mercem300z](http://www.mysick.com/en/mercem300z)

## GM960: TREND MEASURING FOR CORROSION MITIGATION

# PERSPECTIVES FOR THE BOILER WALL MONITOR

The GM960 monitors the inner wall atmosphere by analyzing CO and O<sub>2</sub> at many measuring points of the steam generator. An optimal process combination is being developed together with industry. The measuring system will provide even more efficient support.

>> Low NO<sub>x</sub> combustion technology makes it possible to further reduce NO<sub>x</sub> exhaust gases. Substoichiometric combustion is most often used where less oxygen is used than would be necessary for complete combustion. This mode of operation requires direct monitoring of the wall atmosphere in the burner belt of the boiler to avoid large-scale damage by corrosion on the inner boiler wall.

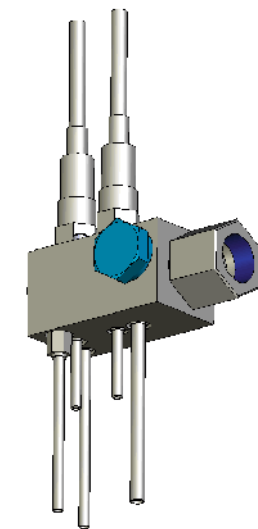
The reduction of corrosion in the boiler is only one aspect. The GM960 can also contribute to combustion optimization. Therefore, development from an isolated single system to a measuring system that is efficiently integrated in the process control system is cutting edge. Initial ideas and concepts have been developed with partners and presented to the power plant industry.

#### MEANINGFUL ANALYSIS

The GM960 boiler wall monitor is designed for that purpose directly. It is a qualitative trend measuring system that monitors the inner wall atmosphere by analyzing CO and O<sub>2</sub> at many measuring points of the coal-fired steam generator.



Further product information:  
[www.sick.com](http://www.sick.com)



The GM960 boiler wall monitor from SICK can be used to prevent the corrosive destruction of the inner boiler wall at an early stage.



## MEASURE GAS CONCENTRATIONS IN POTENTIALLY EXPLOSIVE ATMOSPHERES

# ONLY WITH LEADING-EDGE TECHNOLOGY

Economical and flexible for virtually any requirement: The GMS820P gas analyzer from SICK is used for process control – of course, explosion-protected. It is also perfectly suited for monitoring emissions.

>> Safety and environmental protection are important tasks in refinery plants, e.g. in the steam cracking process in which mainly hydrogen, methane, ethane, ethene, propene, butene and pyrolysis gasoline are generated. The GMS820P gas analyzers are used to ensure that everything remains under control – and if required by the custom-

er the GMS820P is also available in system cabinets of stainless steel.

The GMS820P is not only a modular system for measuring gas components, it also provides all modern communication protocols and thus meets customer expectations (RS485, Ethernet TCP/IP and Standard 4-20 mA) for sim-

ple integration and communication with OPC.

#### MODULAR MEASUREMENT CAPABILITIES

The modular GMS800 family of devices combines various measurement principles and is also best suited for emission measurement. A total of 60 gas components can be detected including CO, NO, NO<sub>2</sub>, SO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>. Tested according to standard, GMS800 meets EN 15267-3 and EPA requirements among other things.

The UV measuring technique of the module DEFOR can analyze very low concentrations in the measuring range of 0 to 10 ppm. This is facilitated by the lack of cross sensitivity to CO<sub>2</sub> and H<sub>2</sub>O. The UV technology is not only a proven

technology for measuring SO<sub>2</sub>, but is also perfectly suited for determining low NO<sub>x</sub> concentrations. NO<sub>x</sub> is calculated by direct measurement of NO<sub>2</sub> and NO and subsequent summation of these two components. No additional NO<sub>x</sub> converter is required.

In addition to the DEFOR module, the GMS800P design also allows the OXOR-P oxygen module to be placed inside of the same housing. This saves the customer costs. The OXOR-P paramagnetic measurement principle is a recognized technology in the refinery for reliable and precise measurement of O<sub>2</sub>.

#### EXPLOSION PROTECTION REQUIRED

Explosion protection is an absolute must in refineries. For this reason, all assemblies that can act as sources

of ignition are encapsulated in the GMS820P, as well as tested and approved in accordance with ATEX II2G Exd IIT6. For harsh industrial applications, the GMS815 Ex-p wall housing can be used in Ex zones 1 and 2. SICK offers many possibilities.



Further product information:  
[www.mysick.com/en/gms800](http://www.mysick.com/en/gms800)



HARDENED HEROS: MEASURE EVEN IN THE COLDEST PLACE IN THE WORLD

FLOWSIC600 ON THE ROCKS

Cold, pressure regulator noise, contamination: reliably measuring volume flow in gases – even at the “coldest place in the world”. With FLOWSIC600 from SICK.

The largest natural gas fields in the world are located in northern Siberia. Here, winter lasts for 253 days. At night, the temperatures can fall as low as -56 °C and the ground can remain frozen down to a depth of several 100 meters. In this icy, snow-covered wilderness, gas is extracted from great depths, then cleaned, processed, compressed and transported west via pipelines.

The gas near the extraction point is contaminated and under high pressure. The gas cools to very low temperatures through decompression in the pipeline. Nevertheless, the process volume flows must still be measured precisely even under these difficult conditions. This represents a great challenge for the measuring technology. An equally large challenge is the noise development near the pressure regulator, which means that robust measuring sensors need to be used. And last but not least: the materials themselves must also be able to withstand the hard climatic conditions.

STAINLESS STEEL METER BODY. TITANIUM AND RUGGED ULTRASONIC SENSORS

Due to the difficult environmental and operating conditions, volume flow measuring devices with the highest possible accuracy and ruggedness are required. The most accurate, most efficient and also the best technical solution is currently ultrasonic technology. FLOWSIC600 is an ultrasonic gas meter that can cope with even these high requirements. The compact design with

integrated cable routing means that the measuring system is rugged, fail-safe and low-maintenance. For these low temperatures the measuring body is made of stainless steel. SICK sensors and the direct path layout provide reliable performance even with pressure regulator noise and contamination. The transducers are made of titanium and allow for use with dry, wet or corrosive gases. For cleaning purposes unnecessary system downtime is avoided by extractable transducers – even under pressure. FLOWSIC600 is a reliable measuring system with long-term stability. The integrated volume corrector also

makes it possible to easily convert the measured value to standard conditions. Here, the MR 113 algorithm is used specifically for the gas composition of the Russian gas reserves.

HIGHEST AVAILABILITY AND RELIABILITY

With FLOWSIC600, the customer has a system that performs accurate measurements under harsh conditions with highest availability and reliability. The technological leader SICK enjoys worldwide recognition thanks to its FLOWSIC devices.

Further product informations:  
[www.mysick.com/de/flowsic600](http://www.mysick.com/de/flowsic600)



The company, founded in 1946, has a global presence with almost 50 subsidiaries and participations as well as numerous sales agencies. SICK currently employs more than 6,300 employees worldwide.

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**FLOWSIC500:** THE FIRST ULTRASONIC GAS METER FOR NATURAL GAS DISTRIBUTION.

THIS IS **SICK**  
Sensor Intelligence.

Gas metering using ultrasound – now, this is also possible for municipal utilities and industrial consumers! No mechanically moving parts. Thus, no wear, no impairment anymore. No overload damage. Instead: highest measurement certainty. With intelligent self-diagnostics. No straight inlet section required. Rapid recalibration via cartridge replacement. FLOWSIC500 fits exactly where you would have installed a conventional gas flow meter in the past. We think that's intelligent. [www.sick.com/flowsic500](http://www.sick.com/flowsic500)