EMISSION MEASUREMENT TECHNOLOGY

SINGLE-SOURCE TECHNOLOGIES AND SOLUTIONS

Gas analyzers, dust measuring devices, analyzer solutions

SICK
Sensor Intelligence.

FUTURE-ORIENTED EMISSIONS MONITORING

A CRITICAL STEP TOWARD A HEALTHY ENVIRONMENT

Global warming and the emergence of the greenhouse effect make it necessary to act. Around the world, industries and regions that impact emissions are being prompted to reduce or, ideally, to prevent their generation of hazardous substances and environmental pollution. Here the focus is particularly on areas with intensive energy consumption and major urban industrial centers. They are all united by a common goal: to support effective climate protection and to preserve and restore a clean environment.

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In many countries there is a legislative basis for a sustainable, environmentally compatible reduction of greenhouse gas emissions as well as laws and regulations relating to the emission of pollutants. These regulations include specifications for technology and modes of operation for systems as well as specifications detailing the permissible pollutant limits. Moreover, provisions are being established that allow measurement technology to be used for monitoring.

The key lies in forward-looking planning of industrial facilities and in continuous monitoring of their emissions. Targeted minimization of emissions requires them to be reliably determined and analyzed both quantitatively and qualitatively. Thanks to decades of experience, SICK is the only manufacturer worldwide in this area with a complete portfolio for emission measurement technology. SICK uses innovative technologies and proven measurement principles to ensure future-oriented solutions – even when subjected to ever increasing environmental and safety-related requirements.

Contents

Power plants

Power plants are subject to various requirements. These depend on the fuels used, such as coal, oil or gas. The following pollutants in particular must be continuously measured, depending on applicable local environmental regulations: CO, NO_x SO_2 and dust as well as reference parameters such as flow rate, temperature, O_2 (and H_2O, where applicable).

Waste incineration

Various requirements apply, depending on the type of incineration plant, for example, household waste, industrial waste or hazardous waste. Pollutants such as HCl, HF, NO_x, SO_2, VOC (Volatile Organic Compounds) and dust load as well as O_2 and/or H_2O must be continuously measured in accordance with local environmental regulations. Increasingly, the additional parameter of total mercury Hg must also be detected continuously.

Cement production

Various pollutants are continuously measured in the chimney of plants for producing cement clinker and cement, as well as for firing and crushing lime. Depending on the local environmental regulations, these should include CO, NO_x and SO_2, as well as dust. The reference figures of flow rate, O_2 and/or H_2O are frequently measured.
When burning alternative fuels it is also necessary to measure additional components such as HCl, HF, Hg and VOC.

Maritime

For flue gas and exhaust gas purification monitoring, the focus is on on-board systems on cargo and passenger ships. Typically, however, these systems are also subject to increased vibrations. In particular, these components are measured: SO_2, CO_2, NO, NO_2 and O_2, plus the option of measuring NH_3, CH_4 and H_2O, and the denitrification plants are monitored. Essential requirements are approvals such as the type approval “DNV GL” in accordance with MARPOL Annex VI, NO_x Technical Code 2008 and MEPC.184 (59) and effective measuring point switching.

Metals and steel production

Plants for calcination, melting or sintering ores as well as the production of non-ferrous metals have rough environmental conditions, such as high dust loads and strong vibrations. The gases produced during the procedures are processed further and must be measured and monitored accordingly.

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Chemicals, oil and gas

Chemical parks generally include a fossil fuel-fired power plant, which generates both electricity and steam.
Gases produced during the process are exploited thermally and must be monitored accordingly. Parts of the plant may include explosion-proof areas.

Glass and ceramics

Emission measurement technology is used in systems for manufacturing glass and glass fibers, for melting ceramic materials and for firing ceramic products. Typical requirements include fine silicates and borates with high abrasion potential in the flue gases.

Pulp and paper

TRS emissions arise in the kraft pulp process primarily in the limekiln and in alkali combustion. They are strictly regulated by authorities due to the associated intensive odor contamination. For this reason, concentrations of hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide or the sum parameter of TRS must be continuously measured.

Greenhouse gases

The greenhouse gas CO_2 is responsible for 75% of global climate change. However, CO_2 and the other gases, CH_4 and N_2O, present varying degrees of hazard potential. Likewise, legislators worldwide are forcing operators to declare greenhouse gas cargo. For example, in the USA and Canada this is implemented in the EPA's Greenhouse Gas Reporting Program. In the EU it is covered by the Emissions Trading Directive. A precise measurement of the volumetric flow is necessary in order to provide greater accuracy than the bulk cargo calculation.

Additional areas of application

SICK provides emissions monitoring solutions in many other industries that are tailored to the respective measuring task. For example:

- Systems for biological treatment of waste
- Surface treatment with organic substances
- Crematories, cremation
- Mining

For the product family overview of our emission measurement technology, refer to page 22

Monitoring exhaust emissions in power plants

Environmental regulations stipulate that certain harmful substances and reference values must be continuously monitored. Regulations on emission monitoring vary from country to country. Measurement technology must be assessed with regard to its suitability in many countries; for example, in accordance with EN 15267-3 in Europe, or in accordance with EPA standards in the USA. SICK's wide range of products in the emission monitoring field ensures that it offers complete solutions.

Recommended products

DUSTHUNTER SP100 33
PowerCEMS 35
MERCEM300Z 27
FLOWSIC100 36
GHG-Control 31

Emission monitoring in waste incineration plants

In the stack, the pollutants HCl, HF, CO, NO_X (NO and NO_2), SO_2, NH_3, C_{total}, dust, and the reference values of gas velocity, pressure, temperature, O_2, and H_2O are continuously measured. In some countries, such as Germany, continuous measurement of the total mercury content is also required. In order to further process this information and transmit it to the authorities, the measured values are transferred to a data acquisition system. The measurements must be taken in accordance with the relevant regulations, such as those laid down in the EU Waste Incineration Directive (WID) 2000/76/EC, implemented in Germany in the 17th German Federal Emission Protection Directive (BImSchV).

Recommended products

MCS100FT 29
GM700 23
Dust measuring devices 32
MERCEM300Z 27
FLOWSIC100 36
MEAC 31

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Emission measurements in cement plants

Environmental regulations stipulate that certain pollutants in the flue gas emitted by cement plants, as well as the reference values, must be continuously monitored. The emissions monitoring regulations vary from country to country. In many countries, the emission measurement technology must be performance-tested, for example, according to EN 15267-3 in Europe. With its broad range of products for performing emissions monitoring, SICK offers flexible, complete one-stop solutions.

Recommended products

MCS100E HW. 29
GM700 23
Dust measuring devices 32
MERCEM300Z 27
FLOWSIC100 36
MEAC. 31

Monitoring of emissions on ships

Environmental regulations stipulate that certain harmful substances and reference values must be continuously monitored. The regulations on emission monitoring vary from country to country. Measurement technology must be assessed with regard to its
suitability in many countries; for example, in accordance with EN 15267-3 in Europe, or in accordance with EPA standards in the USA. SICK's wide range of products in the emission monitoring field ensures that it offers complete solutions. The analyzer solution MARSIC, developed specifically for ships, facilitates the measurement of NO, NO_2,SO_2,CO_2, H_2O, CO, CH_4, and O_2.

Recommended products

MARSIC. 29
Dust measuring devices 32

TECHNOLOGIES

In-situ gas analysis

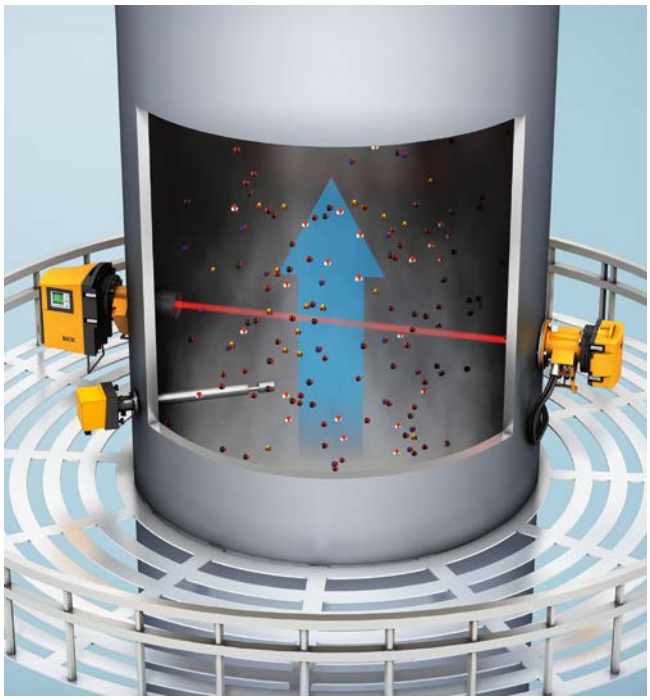
Thanks to SICK's innovative in-situ measurement technology, the measuring devices can be mounted at the measurement location directly in the duct through which the gas flows. This device solution features minimal maintenance requirements and very short response times.

SICK provides two in-situ versions

- Cross-duct version
  - for representative measurement results across the entire duct cross-section
- Measuring probe versions
  - optimized for single-sided installation allowing simple integration into an extremely varied range of system conditions. For example, overpressure, wet gases or very high test gas concentrations and dust loads.

Advantages

- Continuous and direct measurement, no sampling
- Cross-duct version for representative measurement results or measuring probe version for simple installation
- GMP measuring probe with open measuring gap or GPP gas diffusion probe



Extractive gas analysis

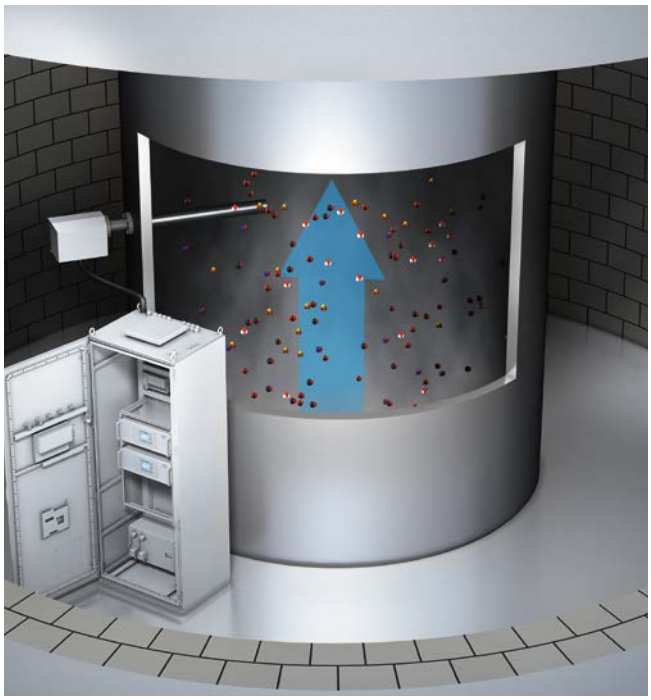
SICK's extractive gas analyzers can be used in a broad range of applications. A partial gas flow is extracted from the gas duct through selected probes, prepared and fed to the analyzer module under constant conditions. The entire gas treatment from the extraction and processing to the analysis is optimally designed for the measurement task.

Two variants of measurement technology are available

- Hot-extractive measurement technology
  - All components that come into contact with the test gas are heated and kept above the dew point. The analysis is done under constantly hot measurement conditions and yields accurate results, even with very narrow measuring ranges. Ideal for detection of multiple gas components as well as water-soluble components such as HCl, HF or NH_3.
- Cold-extractive measurement technology
  - The gas sampling is optionally designed with a heated or unheated test gas line. Gas drying is achieved with a high-performance gas cooler. The “cold” measurement is handled by the analyzer.

Advantages

- Configurable analyzer modules for a wide range of applications
- Customized solutions designed for numerous possible measuring components
- Accurate and reliable measurement results
- Detection of aggressive, corrosive or combustible gases



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MEASUREMENT PRINCIPLES

Scattered light backward

Dust measurement via laser-based backscattering

Even if the dust concentrations are very low, the measurement principle of SICK's laser-based backscattering detects the relevant values with great accuracy.
A laser diode irradiates the dust particles in the measurement medium with modulated light in the visible spectrum. A highly sensitive detector detects the light scattered by the particles and transmits the measurement signal to an evaluation unit. The compensation for background radiation and ambient light, automatic checking of the zero point and reference point, as well as a check for contamination mean the system yields stable and reproducible measurement results.

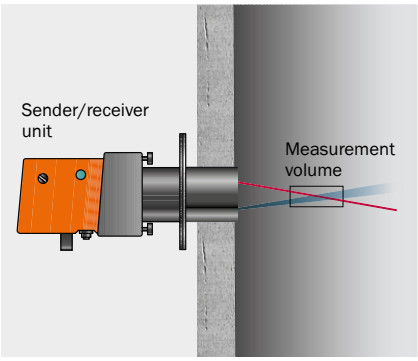
UV spectroscopy

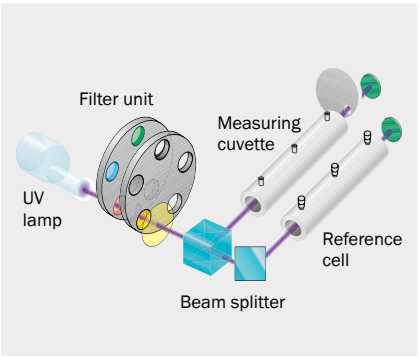
UV resonance absorption spectroscopy (UVRAS)

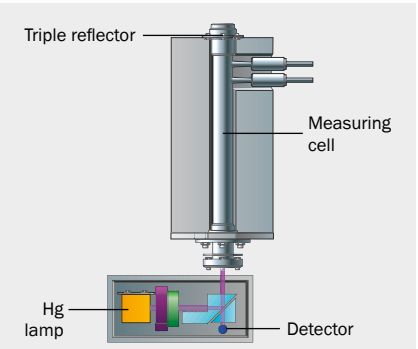
SICK equips cold-extractive process photometers with the measurement principle of UV resonance absorption spectroscopy (UVRAS). The system makes use of the fact that certain gases exhibit specific absorption characteristics in the ultraviolet spectrum. In order to achieve this, the test gas is irradiated with ultraviolet light. The concentration of a gas component can then be determined through selective use of the wavelength and measurement of the absorption. In this manner, the analyzer is able to measure gas concentrations of, for example, NO_2, NH_3, SO_2 and H_2S, by means of interference filter correlation (IFC).

ZAAS – Zeeman atomic absorption spectroscopy

An Hg-discharge lamp emits an element-specific spectrum, which enables an extremely sensitive level of mercury measurement. A magnetic field applied around the discharge lamp creates an additional reference wavelength (the Zeeman effect), which lies outside of the absorption range of Hg atoms. This compensates perfectly for cross sensitivities and lamp aging or contamination.
A high-temperature converter converts the bound Hg at approximately 1000 °C into elemental Hg. The advantages of this are that no chemicals or catalyzers are required, maintenance is minimal and there are no moving parts. The patented direct Hg measurement system makes, for example, the MERCEM300Z into a reference device for continuous mercury analysis.







Overview of all measurement principles and evaluation methods

- Tunable diode laser spectroscopy (TDLS)
- Electrochemical cell
- Flame ionization detection (FID)
- FTIR spectroscopy
- Gas filter correlation
- Gravimetric analysis
- Interference filter correlation
- Scattered light backward
- Scattered light forward
- NDIR spectroscopy
- NDUV spectroscopy
- Paramagnetic dumbbell principle
- Temperature: PT1000, pressure: piezoresistive
- Transmittance measurement
- Ultrasonic transit time difference measurement
- UV spectroscopy
- Thermal conductivity measurement
- Zeeman atomic absorption spectroscopy
- Zirconium dioxide sensor

EVERYTHING FROM STAND-ALONE DEVICES TO COMPLETE ANALYZER SYSTEMS

Whether cost-optimized standard systems or customized designs, SICK provides application-related solutions and, upon request, will design complete gas analysis systems.

Measuring devices

For efficient and cost-effective system integration, the GMS800 product family has a standardized 19" housing or optimized system housing available for cabinet installation.

GMS820
Pressure-resistant encapsulated housing
→ Page 24

GMS810
19" rack housing
→ Page 24

GMS815
Wall-mounted enclosure
→ Page 24

To measure aggressive gases, in-situ analyzers such as the GM32 can be used even in Ex areas and can be linked to analysis systems. The DUSTHUNTER family of dust measuring devices is also easy to connect to analysis systems. In-situ gas analyzers such as GM32 or GM700 measure directly in the process.

GM32-Ex
Ex version
→ Page 22

DUSTHUNTERSP100
Probe design with measurement of scatter
→ Page 32

Wall-mounted enclosure and pressure-resistant encapsulated housing are optimized for use in Ex zones.

Multi-component analyzer systems

Compact analyzer systems with extremely straightforward handling, trouble-free installation and commissioning on site with very low maintenance requirements. Additionally equipped with state-of-the-art communication options, such as Ethernet, Modbus or Meeting Point Router MPR, these systems are suitable for remote monitoring of the entire emission monitoring system – and are thereby pre-equipped for future requirements.

Complete analyzer systems with high-quality serial modules and components that can be optimally tailored to the specific requirements thanks to their configurable design.

Multi-component analyzer systems
→ Page 34

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Ready-to-use analyzer containers

Tailor-made designs including the complete range of peripheral equipment with expert application consulting and comprehensive project management. Multiple analyzers or complete analyzer systems can be housed in containers along with the required control devices and power supply units. In addition, a data acquisition system can be included, such as the MEAC from SICK for acquiring, processing and evaluating measurement data. Climate-controlled containers are also available upon request of the customer.

Custom engineering

Planning and engineering at SICK is based on long-time experience with all kinds of emissions monitoring. Regardless of whether the applications are in power plants or subjected to difficult conditions of explosive environments in a refinery, SICK's engineers plan and design tailor-made solutions suitable for your specific requirements using state-of-the-art CAD systems. All products are designed in accordance with the applicable international and national standards. An experienced project management team and global service organization support the customer to ensure reliable and sustained operation of the systems.

Competencies of SICK

- All required technologies from a single source
- Comprehensive product spectrum for all requirements
- Solutions for all measurement tasks and statutory requirements

REQUIREMENTS OF EMISSION MEASUREMENT SYSTEMS

The selection of a continuous emission measurement system (CEMS) is complex; after all, decisions regarding significant investments and operating costs must be made in these cases.

If you take into account the entire service life of a system, a low initial investment may turn out to be the most expensive solution in the end. Additionally, individual requirements of the respective industrial facility influence the suitability and costs of the CEMS technology in question.

10 steps to a suitable emission measurement system

Define the process parameters, components and required measuring ranges to be monitored

The number and type of components to be monitored and recorded in accordance with the requirements of environmental authorities determine the selection of a suitable CEMS system.

- ☐ Is there a complete list of measuring components and parameters, and are the required measuring ranges and tolerances present?
- ☐ Do reference parameters such as temperature, pressure, moisture or O_2 content have to be measured? Do particle concentrations, opacity or mass flow have to be determined?

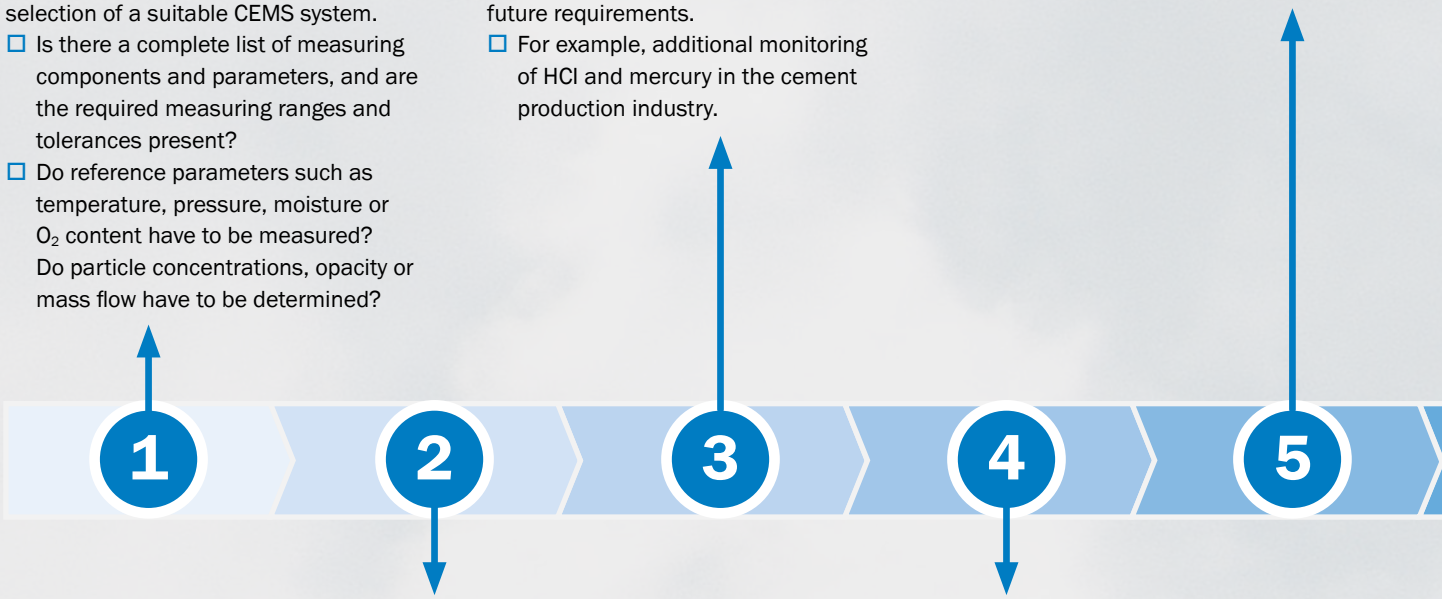
Expect that new regulations will go into effect

Environmental legislation is forcing the trend towards a sustainable and environmentally aware economy. For this reason, it should be possible to adapt or retrofit the CEMS system for possible future requirements.

- ☐ For example, additional monitoring of HCl and mercury in the cement production industry.

Determine potential sources for critical gas components

If critical gas components are produced, such as organic compounds, NH_3, chlorine or sulfur, the CEMS system must be able to measure these components reliably, even in high concentrations.



Classify the valid conformities and regulations

The respective reporting system is usually derived from national regulations or international specifications.

- ☐ What national regulations and standards apply?
- ☐ Is it necessary to take international standards such as EU directives or US EPA standards into consideration?
- ☐ Do additional specifications apply due to specific plant requirements?

Clarify the on-site operating conditions

Aggressive gas components can influence the operation and reliability of CEMS systems when using alternative fuels.

- ☐ What fuel is now being used or soon will be?
- ☐ When using alternative fuels, does the system meet the stringent thermal requirements for monitoring waste treatment processes?

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The reason for this is that production industries such as the power-supply industry or the cement industry are generally subject to defined regulations and laws governing the reduction of emissions. In the end, the operating costs over the entire service life can amount to up to three times the cost of the initial investment, ➜ Page 9 depending on the selected measurement technology (in-situ, cold or hot extractive) and the mix of various measurement principles used.

Assess the CEMS operating conditions throughout the service life

Gas cleaning plants such as $DeNO_x$ or wet scrubbers significantly reduce the amount of pollutants. However, higher NH_3 concentrations due to the addition of ammonia or carbamide as well as deviations in temperature and moisture can significantly reduce the availability and operational lifetime of the measuring system.

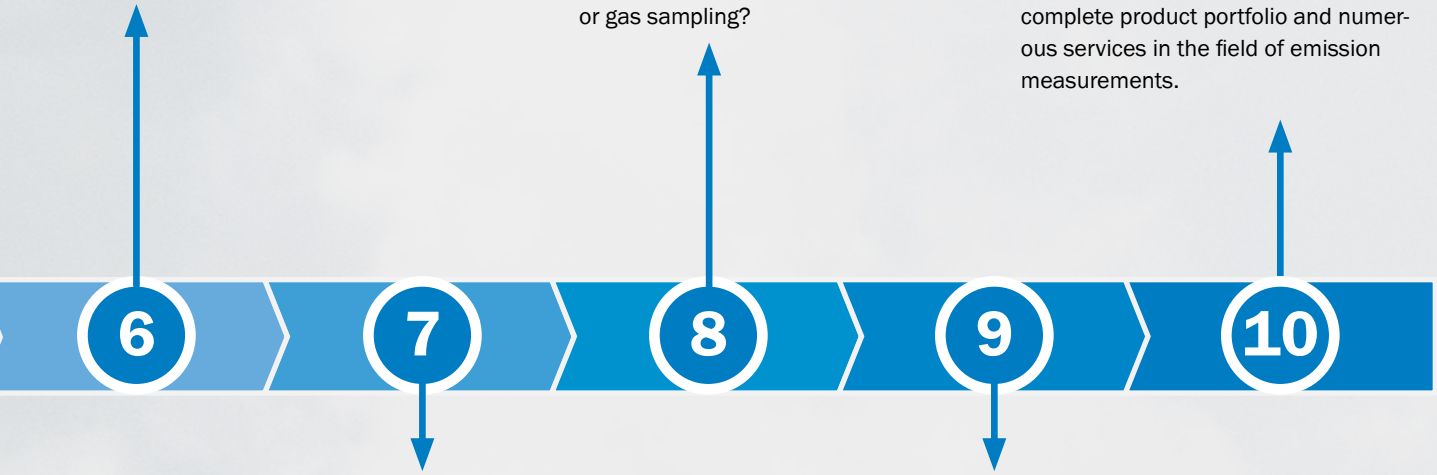
Requirements for operating and maintaining the CEMS

In accordance with quality standards, the CEMS must exhibit verifiable availability of more than 95%, including all maintenance and testing cycles. Critical points include:

- ☐ Gas conditioning in the event of condensate- or acid-forming components?
- ☐ Downtime caused by filter exchange or gas sampling?

Evaluate the capacity of the provider

A supplier of CEMS systems should be able to provide effective decision-making support in finding a suitable solution. The realization of individual measurement tasks in combination with competent service should be the decisive factor, not the potentially limited range of technical options provided by a specific supplier. SICK is characterized by decades of proven competence, a complete product portfolio and numerous services in the field of emission measurements.



Calculate the total operating costs

The operational lifetime of a CEMS is typically more than 10 years. The actual operating costs can amount to more than triple the cost of acquisition, depending on the selected measuring technology. The following is to be taken into consideration:

- ☐ Composition of the CEMS, including gas sampling and conditioning
- ☐ Consumables / additives and spare parts
- ☐ Maintenance and service intervals

Clarify the on-site access conditions and ambient conditions

The availability of consumables / spare parts and additives is extremely important for industrial plants that are difficult to access (oil platforms, gas compressor stations, plants in climatically extreme areas).

- ☐ Can diagnostics and maintenance be performed remotely via wireless communications or Internet to achieve targeted deployment of specialist personnel?
- ☐ What are the prevailing ambient conditions, for example, temperature fluctuations, etc.?

STANDARDIZED COMMUNICATION

Ideally, all data, measured values and parameters will always be available for evaluation and can be conveniently viewed and adjusted. This is precisely why standardized data communication for digital control systems and the company management level are available when SICK products are used. Moreover, this is available from the system network across systems. This makes it possible to have convenient access to installations even in remote areas.

Protocols

SICK OPC server

OPC technology is used to exchange data between field devices and Windows-based applications. OPC is suitable only for non-deterministic communication.

The free SOPAS OPC server from SICK follows the OPC-DA specification and therefore can be used on Windows operating systems. In addition to the standard data types, our OPC server also supports methods that enable unlimited access to the SICK sensors from an HMI [1].

Modbus TCP / RTU

Modbus has become established alongside other fieldbus protocols as a de facto standard for industrial communication. A stable specification and a widely available base technology enable fast and reliable data transfer.

Compared to other fieldbus concepts, Modbus is supported by almost all device manufacturers and is widely accepted among users. Further advantages include low investment costs and little need for training.

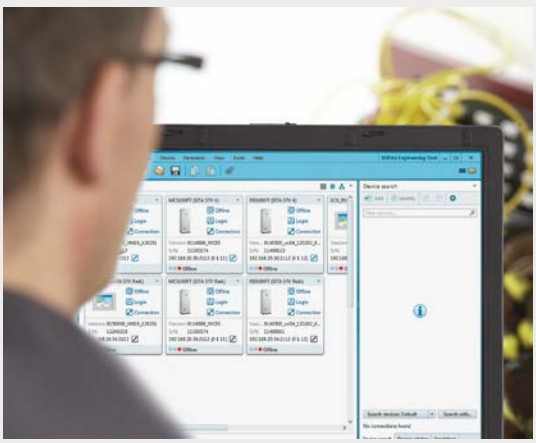
Analog and digital signals and other protocols

Of course the measuring devices and analysis systems from SICK also include analog and digital signals and interfaces.

Additional protocols, such as PROFIBUS, are available upon request.

[1] HMI = Human Machine Interface.

SICK SOPAS ET – powerful configuration and diagnostic software



- Available as a free download
- Enables user-friendly configuration, diagnostics and maintenance of SICK devices
- Projects with multiple SICK devices can be easily managed and edited
- Provides an intuitive user interface and a structured device catalog
- Search for and find all connected devices with just a single click
- Always provides an optimum overview of the project with various viewing options (panels, lists, topologies)
- Only one data format is required for project management and data set management

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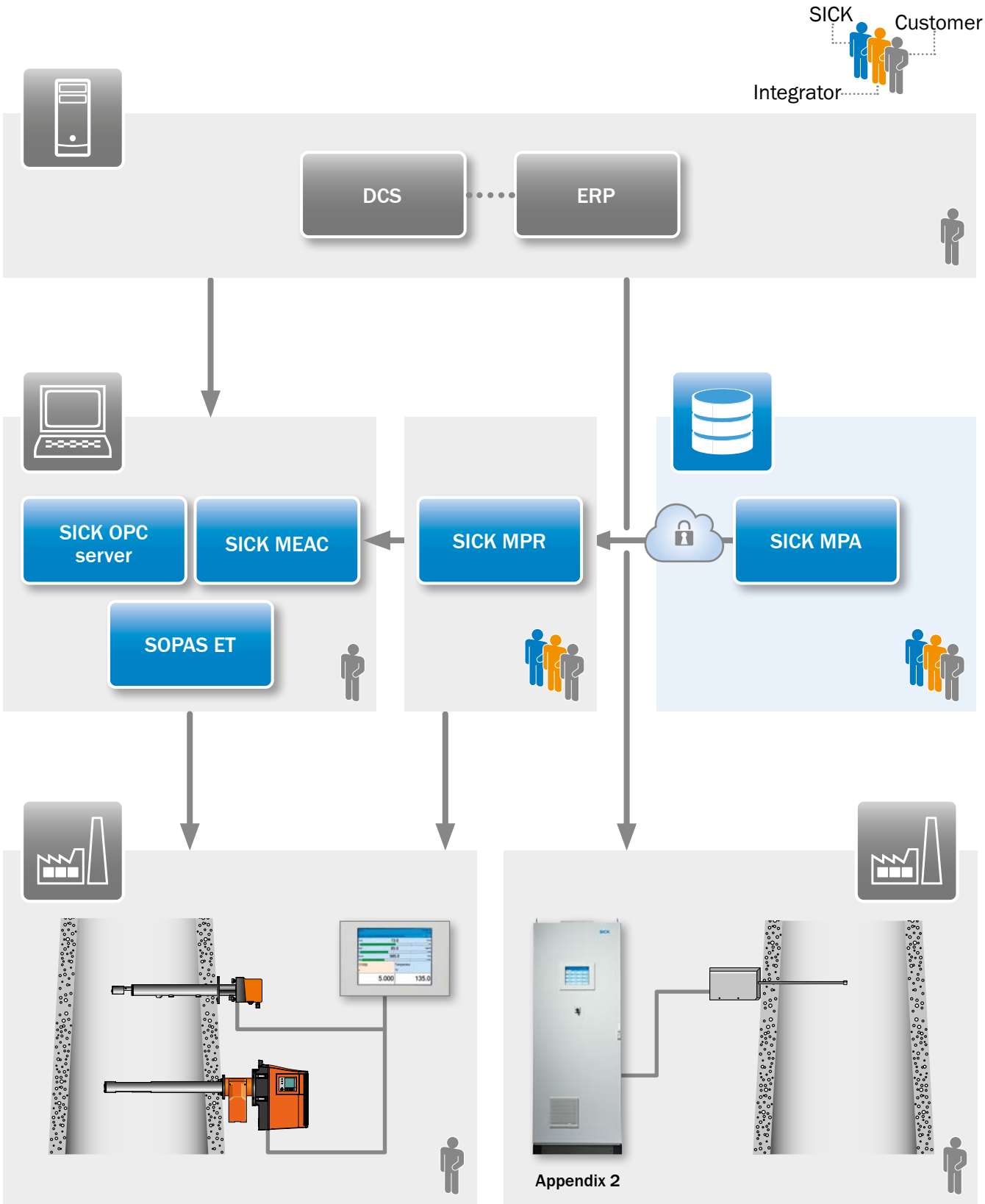

Appendix 2

Terms/legends

DCS = Distributed Control System
ERP = Enterprise Resource Planning
SICK MEAC = Measured Value Acquisition and Evaluation
SOPAS = SICK Open Portal for Application Software
MPR = Meeting Point Router
MPA = Meeting Point Architecture/Remote Service Platform
https://remoteservice.sick.com

SERVICE FOR ALL YOUR SYSTEM AND MEASUREMENT SYSTEM REQUIREMENTS

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. Over 60 years of experience in the field and industrial expertise makes us a competent partner for the specific requirements of our customers.

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Modular service contracts – flexible for every requirement

An important part of LifeTime Services from SICK is the modular service concept, which allows every business to create its own individual service contract from different service modules. We are happy to give you advice on which service components are right for you.

Assured productivity – at all times

As an operator with SICK as your experienced and competent service partner, you can fully concentrate on your core business and on increasing productivity, efficiency, and earnings.

Performance, availability and security – efficient service through reliable remote maintenance

Providing expert assistance and fast service is a priority not only during commissioning, but also during operation. Fast, system-specific support provided by specialists is more important than ever. Complex systems and growing cost pressure require optimized maintenance costs and proactive service.

Close to you – short distances save time and money

With over 200 service employees in more than 80 countries, SICK ensures that service and spare parts are available around the globe.

Sales / Service
Production / R&D
Regional Competence Center

OVERVIEW OF OUR SERVICES

Consulting and design

Consulting and planning

SICK offers comprehensive support for your measuring task in accordance with official requirements. We guide you through the entire life cycle of your measurement system and support you in selecting new measurement technology.

Training and education

Training

For reliable operation and maintenance of your measuring devices, SICK offers training catered to your needs: from on-site briefing and product training, all the way to customer-specific workshops.

Verification and optimization

Maintenance

Regular maintenance ensures long service life and reduces wear. You receive quick, expert support from experienced technicians, which ensures a high rate of availability.

Test gas management

In combination with maintenance, the supply of necessary test gases plays a vital role. If necessary, SICK can organize the provision of necessary test gases for you.

Servicing

SICK performs preventive maintenance tasks before a fault occurs in a measuring device due to wear or a failure in one of its modules.

Service contracts

Individual services in a service contract with SICK can be designed according to your requirements. We use our wealth of experience when we consult with you. You automatically receive our maintenance service when you need it.

Inspection

The condition of your system is assessed and the causes of wear determined, which yields the necessary consequences for future use.

Extended warranty

To supplement the statutory warranty period, SICK can offer an extended warranty that is valid for up to five years as part of a service contract.

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Product and system support

On-call service

You can reach our service specialists around the clock as needed. If service is needed, a service technician will be available within the response time agreed upon in the Service Level Agreement.

Technical support

If you have technical questions or issues related to use or operation, contact one of our experts by phone. Thanks to a 24/7 service level agreement, they can be reached around the clock.

Remote maintenance – SICK Remote Service

Complex systems and increasing cost pressures demand proactive service and optimized maintenance costs. Secure Internet connections enable expert support with just a click: no travel time and setup time needed.

Mounting and commissioning

From laying electrical and pneumatic cables and mounting devices on-site to setting the device parameters with subsequent training, SICK offers a one-stop solution.

Factory repairs

Repairs on devices are carried out directly on the device manufacturer's premises and these devices are subjected to the same quality assurance measures as new devices. Due to increased demands on availability, SICK offers express repairs or provides replacement devices.

Replacement devices

SICK offers suitable replacement devices during downtimes for your measuring devices. These replacement devices are commissioned on-site by our service technicians.

Factory Acceptance Test (FAT)

In the Factory Acceptance Test, experienced SICK technicians inspect devices and systems for completeness. By customer request, we can also jointly perform a function test. You receive the documented test results in the form of either a test log or an acceptance log.

QAL3 support

SICK guides you through the QAL3 procedure for your measurement system and, in doing so, checks the accuracy, linearity and drift of the zero points and reference points of the device curve at least once during the maintenance interval.

Adjustment

If impermissible deviations are found on the emission measurement systems or the devices for industrial instrumentation that are in use, then these items must be readjusted. SICK implements these measures for you using suitable test equipment and reference materials.

Calibration

Emission measurement systems must be calibrated every three years (QAL2). SICK can take over the complete service in compliance with the legal provisions and through collaboration with a measuring institute permitted to perform the measurement.

Functional test

Emission measurement systems must be inspected once a year in accordance with EN 14181. If necessary, SICK takes over the complete service and coordinates the necessary steps with your supervisory authority.

Upgrade and retrofits

Upgrade service

Regular updates to the device software and evaluation systems ensure the availability of the measurement system over the long term. This can occur through remote maintenance, within scheduled time frames or as an event-controlled process.

Spare part management

We will work with you to create an optimal spare part strategy for your measurement task. Whether the spare parts are stocked on your premises or at a SICK location depends on the availability requirements.

No guarantee of worldwide distribution of SICK service elements, due to local restrictions on rights of use and service availability.

PRODUCT SELECTION

	Measured method		Certifications																	
	In-situ	Extractive	2000/76/EC (17. BImSchV) (17th German Federal Emission Protection Directive)	2001/80/EC (13. BImSchV) (13th German Federal Emission Protection Directive)	2010/75/EC	27. BImSchV (27th German Federal Emission Protection Directive)	30. BImSchV (30th German Federal Emission Protection Directive)	1999/13/EC (31. BImSchV) (31st German Federal Emission Protection Directive)	EN 15267	EN 14181	EN 13284-1	EN 16911-2	Type examination (TÜV)	TA Luft	GOST	MCERTS	U.S. EPA	MARPOL Annex VI and NTC 2008 – MEPC.177(58) – MEPC.184(59)	BEP 2010, Status Index and Classification (SKK) 2012
Gas analyzers																				
GM32	■		■	■		■			■	■					■	■	■			
GM35	■		■	■		■				■				■	■	■				
GM700	■		■			■			■	■										
GM901	■												■							
ZIRKOR302	■		■	■						■					■					
S700 [2]		■	■	■		■				■					■	■				
GMS800 [2]		■	■	■		■			■	■				■	■	■				
SIDOR		■		■		■			■	■				■	■	■				
MERCEM300Z		■	■	■					■	■							■			
GMS800 FIDOR		■				■			■	■										
GME700		■																		
Analyzer solutions																				
MARSIC		■																■		
MCS100FT		■	■	■		■			■	■										
MCS100E HW		■	■	■					■	■					■	■	■			
GHG-Control [3]	■																			
Combiprobe CP100	■																			
MEAC			■	■		■	■	■											■	
Dust measuring devices																				
DUSTHUNTER SB100	■		■	■	■	■			■	■				■	■	■				
DUSTHUNTER SP100	■		■	■	■	■			■	■				■	■	■	■			
DUSTHUNTER T200	■		■	■		■			■	■				■	■	■	■			
FWE200DH		■	■	■		■			■	■				■			■			
SHC500 Gravimat		■									■				■		■			
System solutions																				
PowerCEMS [4]		■	■	■		■			■	■				■	■	■				
MKAS [4]		■	■	■		■			■	■					■	■				
MKAS Compact [4]		■	■	■		■			■	■				■	■	■				
Ultrasonic gas flow measuring devices																				
FLOWSIC100	■		■	■		■	■		■	■		■		■	■	■				

[1] VOC = Volatile Organic Compounds.

[2] Depending on analyzer module used.

[3] See GM35 and FLOWSIC100.

[2] Depending on analyzer used.

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	Measured components																Protocols, remote						Page
	CO	NO	NO_2	SO_2	NH_3	CO_2	N_2O	HCl	HF	CH_4	H_2O	O_2	Hg	VOC [1]	Dust	Flow	Modbus TCP	OPC	Modbus RTU	PROFIBUS DP	Meeting Point Router (MPR)	SOPAS ET configuration software	
		■	■	■	■												■	■	■		■	■	→ 22
	■					■	■				■										■	■	→ 23
					■			■	■			■								■	■		→ 23
	■																			■	■		→ 23
												■									■	■	→ 23
	■	■		■								■							■		■		→ 24
	■	■	■	■		■	■			■		■		■			■	■	■		■	■	→ 25
	■	■		■		■	■			■		■							■		■		→ 25
													■				■	■			■	■	→ 27
														■			■	■	■		■	■	→ 27
					■			■	■		■	■								■	■		→ 27
	■	■	■	■	■					■		■					■	■	■		■	■	→ 28
	■	■	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	■	→ 29
	■	■	■	■	■	■		■		■	■	■					■		■	■	■		→ 29
	■					■	■									■					■	■	→ 30
															■	■	■		■	■	■	■	→ 31
																	■	■	■	■	■		→ 31
															■		■		■	■	■	■	→ 32
															■		■		■	■	■	■	→ 32
															■		■		■	■	■	■	→ 33
															■		■		■	■	■	■	→ 33
																							→ 33
	■	■	■	■								■					■	■	■		■	■	→ 34
	■	■	■	■		■	■			■		■							■		■		→ 35
	■	■	■	■		■	■			■		■							■		■		→ 35
																■	■		■	■	■	■	→ 36

IN-SITU GAS ANALYZERS

	 **GM32**	 **GM35**	
	Measure aggressive gases directly and quickly — even in ATEX zones	Efficient control of combustion and dehydration processes	
Technical specifications			
Measurement principles	Differential optical absorption spectroscopy (DOAS), Chemometrical data evaluation (CDE)	Gas filter correlation, Interference filter correlation	
Measuring components	NH_3, NO, NO_2, SO_2, H_2S, CH_3SH, $(CH_3)_2S$, $(CH_3)_2S_2$, TRS	CO, CO_2, H_2O, N_2O	
Performance-tested measurands	NO, SO_2	CO, CO_2, H_2O	
Max. number of measurands	8	3	
Process temperature	≤ +550 °C Versions for higher temperatures on request	Measuring probe version: 0 °C ... +430 °C For N_2O measurement max 180 °C Cross-duct version: 0 °C ... +500 °C For N_2O measurement max 180 °C	
Process pressure	–60 hPa ... 200 hPa Relative	Open measuring probe (GMP): ≤ 120 hPa Depending on purge air supply Gas-testable measuring probe (GPP): ≤ 250 hPa Depending on purge air supply Cross-duct version: Depending on purge air supply	
Ambient temperature	–20 °C ... +55 °C Temperature change ±10 °C/h maximum	–40 °C ... +55 °C Temperature change ±10 °C/h maximum	
Conformities	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS, GOST	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS	
Enclosure rating	Standard version: IP 65, IP 69K Ex-version: IP 65	IP 66 / NEMA 4x	
Device version	Cross-duct version, measuring probe version, Ex-version	Cross-duct version, measuring probe version	
At a glance			
	• Direct, fast in-situ measurement • No gas sampling, no gas transport, no gas conditioning • Up to eight measuring components at the same time, plus process temperature and pressure • DOAS and CDE evaluation process • Numerous independent measuring ranges with consistent accuracy • Automatic self-test function (QAL3) without test gases • Overpressure encapsulated design for ATEX Zones 1 and 2	• Dynamic humidity correction • Fast in-situ measurement directly in the process • Simultaneous determination of up to three gas components, temperature and pressure • No gas sampling and conditioning • Gas testable version of measuring probe available • Integrated self test and control functions	
Detailed information	➜ www.sick.com/GM32	➜ www.sick.com/GM35	

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	GM700	**GM901**	**ZIRKOR302**
	Efficient process analysis – even under difficult conditions	CO measurement for emission monitoring and process control	Rapid oxygen measurement for optimization of industrial processes
	Diode laser spectroscopy (TDLS)	Gas filter correlation	Zirconium dioxide sensor
	HCl, HF, NH_3, O_2	CO	O_2
	HF	–	O_2
	1	1	1
	–40 °C ... +430 °C Depending on version	0 °C ... +430 °C Depending on device version	Stainless steel probe: 0 °C ... +700 °C Inconel probe: 0 °C ... +950 °C Ceramics probe: 0 °C ... +1,400 °C
	250 hPa Depending on version and purge air supply	≤ 120 hPa Depending on device version	700 hPa ... 1,100 hPa
	–40 °C ... +50 °C Depends on parameterization; temperature change max. ±10 °C/h	–20 °C ... +55 °C	–20 °C ... +55 °C
	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181	Type examination (TÜV)	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, EN 14181
	IP 65 GM700 evaluation unit; cast metal enclosure: IP 67/NEMA 6	IP 65 / NEMA 4x	IP 65 / NEMA 4x
	Measuring probe version, cross-duct version	Cross-duct version, measuring probe version	Ejector version, pump version
	• High selectivity due to high spectral resolution • Short response times • No calibration required • No moving parts: minimal wear and tear • No gas sampling and conditioning required	• Representative measurement across the duct • Operation via evaluation unit • Short response times • Verifiable with gas-filled cuvette; gas testable probe with test gas	• All parts in contact with gas are heated • Automatic testing and adjustment with ambient air • Fixed physical zero point • Short response time • Operation of up to 3 sensors via one evaluation unit
	➜ www.sick.com/GM700	➜ www.sick.com/GM901	➜ www.sick.com/ZIRKOR302

EXTRACTIVE GAS ANALYZERS

S700

Tailor-made gas analysis for process and emission monitoring

Technical specifications	
Measurement principles	NDIR spectroscopy, Interference filter correlation, Paramagnetic dumbbell principle, electrochemical cell, Thermal conductivity measurement
Measuring components	Ar, $CBrF_3$, $CClF_3$, CCl_2F_2, CCl_3F, $CHClF_2$, $CHCl_3$, CH_2Cl_2, CH_2O, CH_3Cl, CH_3OH, $(CH_3)_2O$, CH_4, CO, CO_2, CS_2, $C_2Cl_2F_4$, $C_2Cl_3F_3$, C_2Cl_4, C_2HCl_3, C_2H_2, $C_2H_2Cl_2$, $C_2H_2F_4$, $C_2H_3Cl_3$, C_2H_4, $C_2H_4Cl_2$, C_2H_5OH, C_2H_6, C_3H_4, C_3H_6, C_3H_7OH, C_3H_8, $C_3H_8O_2$, C_4H_{10}, C_4H_6, C_4H_8, C_4H_8O, C_4H_9OH, C_5H_{12}, $C_6H_{10}O$, C_6H_{12}, C_6H_{14}, C_7H_{16}, C_7H_8, C_8H_{10}, He, H_2, H_2O, NH_3, NO, N_2O, O_2, SF_6, SO_2
Performance-tested measurands	CO, NO, SO_2, O_2
Max. number of measurands	5
Process temperature	–
Process pressure	–200 hPa ... 300 hPa With tubed gas paths up to +1,000 hPa
Ambient temperature	+5 °C ... +45 °C
Conformities	2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 14181
Enclosure rating	S710, S711: IP 20 S715: IP 65 / NEMA 4x S720, S721: IP 65 / NEMA 7
Device version	–

At a glance

- 5 different measuring principles available
- Over 60 measuring components from which to choose
- 3 different enclosure versions for several application ranges
- Up to 3 analyzer modules in one enclosure

Detailed information → www.sick.com/S700

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	GMS800	SIDOR
		
	Tailor-made gas analysis solutions for process and emission monitoring	We set standards for extractive photometers
	NDIR spectroscopy, NDUV spectroscopy, UVRA spectroscopy, Interference filter correlation, Paramagnetic dumbbell principle, electrochemical cell, Thermal conductivity measurement	NDIR spectroscopy, Paramagnetic dumbbell principle, electrochemical cell
	Ar, CH_4, CH_3OH, C_2H_2, $C_2H_2F_4$, C_2H_4, C_3H_6, C_3H_8, C_4H_6, Cl_2, CO, CO_2, $COCl_2$, COS, CS_2, H_2, H_2S, He, NH_3, NO, N_2O, NO_2, O_2, SF_6, SO_2, other components on request	CH_4, CO, CO_2, NO, N_2O, O_2, SO_2
	CH_4, CO, CO_2, NO, NO_2, N_2O, O_2, SO_2	CO, NO, SO_2, O_2
	8	3
	Analyzer inlet: 0 °C ... +45 °C	0 °C ... +45 °C Temperature at analyzer inlet
	Hosed gas lines: 200 hPa ... 300 hPa Tubed gas lines: 200 hPa ... 1,000 hPa	200 hPa ... 300 hPa Relative
	+5 °C ... +45 °C	+5 °C ... +45 °C
	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS
	GMS810, GMS811: IP 40 GMS815: IP 65 / NEMA 4x GMS820P: IP 65	IP 20
	19"-rack, wall mounting enclosure, flame-proof enclosure	19"-rack
	• 7 different analyzer modules: DEFOR (NDUV, UVRAS), FIDOR (FID), MULTOR (NDIR), OXOR-E (electrochemical O_2), OXOR-P (paramagnetic O_2), THERMOR (TC) and UNOR (NDIR) • 4 different types of enclosures • Gas module with sample gas pump and/or control sensors • New enclosure type for easy and quick integration in analyzer cabinets • Remote diagnosis via Ethernet with software SOPAS ET	• Detector with high long-term stability • Paramagnetic or electrochemical O_2 measurement • Automatic adjustment with component-free ambient air • Insensitive to contaminations
	➜ www.sick.com/GMS800	➜ www.sick.com/SIDOR

EXTRACTIVE GAS ANALYZERS

MERCEM300Z

Innovative measurement of mercury in flue gases

Technical specifications	
Measurement principles	Zeeman atomic absorption spectroscopy
Measuring components	Hg
Performance-tested measurands	Hg
Max. number of measurands	1
Process temperature	≤ +1,300 °C
Process pressure	850 hPa ... 1,100 hPa
Ambient temperature	MERCEM300Z: –20 °C ... +50 °C MERCEM300Z Indoor: +5 °C ... +35 °C
Conformities	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS
Enclosure rating	MERCEM300Z: IP 55 MERCEM300Z Indoor: IP 43
Device version	Aluminium cabinet

At a glance

- Accurate measurement of “total mercury” directly in a thermal converter (patented)
- Measuring operation without using consumables
- Very low maintenance gas sampling using an ejector pump – no moving parts
- Integrated adjustment cell for automatic drift check
- Automatic adjustment of the entire measuring system with a built-in test gas generator (optional)
- Modular design with the entire system

Detailed information ➜ www.sick.com/MERCEM300Z

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	GMS800 FIDOR	GME700
		
	Solution for continuous hydrocarbon measurements	Sophisticated process analysis “brought into line”
	Flame ionisation detection	Diode laser spectroscopy (TDLS)
	C_{org}	HCl, HF, H_2O, NH_3, O_2
	C_{org}	–
	1	2
	≤ +230 °C	≤ +120 °C Temperature at analyzer inlet
	–120 hPa ... 120 hPa Relative	600 hPa ... 1,200 hPa
	+5 °C ... +40 °C	0 °C ... +50 °C
	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS	–
	IP 40	IP 20
	19"-rack enclosure	19"-rack
	• Standard 19” enclosure for easy integration into all industry-typical systems • Maintenance free ejector pump delivers sample gas to the analyzer • Integrated catalytic converter (option) provides very clean zero gas • Automatic regulation and compensation of process pressure fluctuations • Protective filter at sample gas inlet • High degree of linearity (≤ 2 %) for very low and high measuring ranges	• High selectivity due to high spectral resolution • No calibration required • No moving parts: minimal wear and tear • Heated multipath measuring cell • Hot-wet measurement
	➜ www.sick.com/GMS800 FIDOR	➜ www.sick.com/GME700

ANALYZER SOLUTIONS

MARSIC

Safely on the right course

Technical specifications	
Measurement principles	NDIR spectroscopy, NDUV spectroscopy, electrochemical cell, Zirconium dioxide sensor (oxygen measurement)
Measuring components	CH_4, CO, CO_2, H_2O, NH_3, NO, NO_2, O_2, SO_2
Performance-tested measurands	–
Max. number of measurands	9
Process temperature	+10 °C ... +550 °C
Process pressure	–90 hPa ... 200 hPa
Ambient temperature	0 °C ... +45 °C
Conformities	MARPOL Annex VI and NTC 2008 – MEPC.177(58), Guidelines for exhaust gas cleaning systems – MEPC.184(59), Guidelines for SCR reduction systems – MEPC.198(62), DNV GL Rules for Type Approvals (2012)
Enclosure rating	MARSIC200: IP 54 MARSIC300: IP 44
Device version	Steel sheet enclosure

At a glance

- Rugged design and high level of measurement accuracy
- Up to 4 measurement points with one analyzer
- DNV GL type approval in accordance with MARPOL Annex VI, NO_x Technical Code 2008, MEPC.184(59) and MEPC.198(62)
- Measuring ranges adapted to low and high concentrations of SO_2 and NO_x
- Up to 9 measuring components at the same time: SO_2, CO_2, CO, NO, NO_2. NH_3, CH_4, H_2O and O_2

Detailed information → www.sick.com/MARSIC

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	 **MCS100FT**	 **MCS100E HW**
	Everything under control with advanced, proven technology	Emission and raw gas monitoring with hot measurement
	FTIR spectroscopy, Zirconium dioxide sensor, flame ionisation detection	Gas filter correlation, Interference filter correlation, Zirconium dioxide sensor
	CH_4, CO, CO_2, HCl, HF, H_2O, NH_3, NO, NO_2, N_2O, O_2, SO_2, C_{org}, NO_x, C_3H_8, C_2H_6	CH_4, CO, CO_2, HCl, H_2O, NH_3, NO, NO_2, N_2O, O_2, SO_2
	CO, CO_2, SO_2, NO, NO_2, N_2O, HCl, HF, CH_4, H_2O, O_2, NH_3, C_{org}, C_2H_6	CO, CO_2, HCl, NO, NH_3, SO_2, O_2, H_2O
	16	8
	≤ +200 °C Temperature at analyzer inlet ≤ +1,300 °C	Inlet analyzer system: 0 °C ... +220 °C Process: 0 °C ... +1,300 °C
	900 hPa ... 1,100 hPa	900 hPa ... 1,100 hPa Atmospheric
	Standard: +5 °C ... +35 °C With cooling device: +5 °C ... +50 °C	+5 °C ... +35 °C With cooling device: +5 °C ... +50 °C
	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS
	IP 43 Optional: IP 54	IP 43
	–	–
	• Lowest approved HF measuring range of 0 ... 3 mg/m³ • Automatic spectrum adjustment via AutoVAL for reliable measuring values • Operation via touchscreen • Sample gas transport by an ejector without moving parts • Approved according to EN 15267-3 • Remote control and diagnosis via software SOPAS ET • Automatic adjustment of analyzer • Automatic backflushing and filter cleaning of sampling unit	• Extractive measurement of up to 8 IR-active gas compounds • Additional oxygen and total hydrocarbon analyzers as an option • Gas paths completely heated • Test gas supply at the gas sampling probe or at the analyzer • Back-purging of gas sampling probe for cleaning of filters • Fast sample gas exchange for minimizing adsorption and desorption effects • Automated sample point switching
	➜ www.sick.com/MCS100FT	**➜ www.sick.com/MCS100E HW**

ANALYZER SOLUTIONS

GHG-Control

Measuring rather than calculating greenhouse gases

Technical specifications	
Measurement principles	Gas filter correlation, Interference filter correlation, Ultrasonic transit time difference measurement
Measuring components	CO_2, N_2O, gas velocity
Conformities	–
Max. number of measurands	3
Process temperature	0 °C ... +180 °C
Process pressure	Depending on purge air supply
Ambient temperature	–40 °C ... +55 °C
Enclosure rating	IP 65

At a glance

- In-situ solution for measuring CO_2 and N_2O emissions
- Direct measurement even with changing fuels and mixed fuels
- Measurement without converting from the dry to damp status
- Transfer of the greenhouse gas loads directly to the control unit

Detailed information ➜ www.sick.com/GHG-Control

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	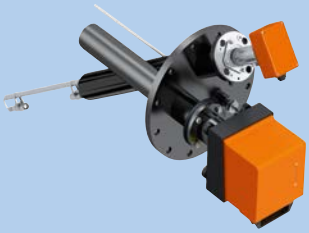	
	Combiprobe CP100	**MEAC**
	Combined measurement of dust, volume flow, pressure, and temperature	Tested and reliable emission data management
	Scattered light forward, Ultrasonic transit time difference measurement	–
	Dust concentration (after gravimetric comparison measurement), gas velocity, gas pressure, gas temperature	–
	–	2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 30. BImSchV, 31. BImSchV, 1. BImSchV, 2. BImSchV, German Clean Air Regulations, EN 14181, BEP 2010, status identifier and classing 2012
	4	–
	–20 °C ... +200 °C	–
	–70 hPa ... 10 hPa	–
	–20 °C ... +60 °C Intake temperatures for purge air: –20 °C ... +45 °C	MEAC data acquisition unit: 0 °C ... +50 °C
	DUSTHUNTER SP100: IP 66 FLOWSIC100 PR: IP 65 Pressure sensor, temperature sensor: IP 54	MEAC data acquisition unit: IP 54
	• No need for mechanical adjustment • Self-testing with the automatic control cycle • Simple configuration and operation with easy-to-use software • For gas temperatures up to 200 °C • For funnels with an internal diameter of 0.7 m and above	• Evaluations according to 1, 2, 13, 17, 27, 30, 31 BImSchV and TA Luft • Analog and digital data collection saved at 5 s/1 min intervals with auto-backup • Distributed visualization, operation in the network and automatic e-mail alarms • Flexible data presentation also in process images • Analog and digital data to the customer system at 5 s/1 min intervals • Recording of QAL3 cycles
	➜ www.sick.com/CP100	**➜ www.sick.com/MEAC**

DUST MEASURING DEVICES

		
	DUSTHUNTER SB100	**DUSTHUNTER SP100**
	The approved dust monitor with scattered light backward measurement	The probe version for scattered light forward measurement
Technical specifications		
Measurement principles	Scattered light backward	Scattered light forward
Measuring components	Scattered light intensity, dust concentration (after gravimetric comparison measurement)	Scattered light intensity, dust concentration (after gravimetric comparison measurement)
Performance-tested measurands	Scattered light intensity	Scattered light intensity
Max. number of measurands	1	1
Process temperature	–40 °C ... +600 °C	Standard version DHSP-T2xx: –40 °C ... +220 °C High temperature version DHSP-T2xx: –40 °C ... +400 °C
Process pressure	With control unit MCU-P: –50 hPa ... 2 hPa Other pressure ranges on request With external purge air unit: –50 hPa ... 30 hPa	With control unit MCU-P: –50 hPa ... 10 hPa With external purge air unit: –50 hPa ... 30 hPa With instrument air (provided by the customer): –50 hPa ... 100 hPa
Ambient temperature	Sender/receiver unit, control unit MCU-N: –40 °C ... +60 °C MCU-P control unit: –40 °C ... +45 °C Intake temperatures for purge air	Sender/receiver unit, control unit MCU-N: –40 °C ... +60 °C MCU-P control unit: –40 °C ... +45 °C Intake temperatures for purge air
Conformities	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS, 2010/75/EU	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS, 2010/75/EU, U.S. EPA PS-11 compliant
Enclosure rating	IP 66	IP 66
Device version	–	Measuring probe version
At a glance		
	• For very low to medium dust concentrations • One-side installation • Contamination check • Automatic check of zero and reference point • Automatic compensation of background radiation, therefore no light absorber necessary • For medium to large duct diameters	• One-side installation • For very low to medium dust concentrations • Automatic check of zero and reference point • Contamination check • Hastelloy probe available for corrosive gas environments • For small to medium duct diameters
Detailed information	➜ www.sick.com/DUSTHUNTER SB100	➜ www.sick.com/DUSTHUNTER SP100

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	DUSTHUNTER T200	FWE200DH	SHC500 Gravimat
			
	The approved transmissiometer with self-alignment	Reliable dust measurement in wet gases	Mobile measurement system for gravimetric dust concentration measurements
	Transmittance measurement	Scattered light forward	Gravimetric analysis
	Transmittance, opacity, relative opacity, extinction, dust concentration	–	Dust concentration
	Dust concentration	–	–
	1	1	1
	–40 °C ... +600 °C	PVDF probe: 0 °C ... +120 °C Hastelloy probe: 0 °C ... +220 °C	Without air cooling: 0 °C ... +250 °C With air cooling: 0 °C ... +400 °C High temperature version: 0 °C ... +600 °C
	With control unit MCU-P: –50 hPa ... 2 hPa With external purge air unit: –50 hPa ... 30 hPa	With SLV4 2BH1300 purge air unit: –20 hPa ... 20 hPa With SLV4 2BH1400 purge air unit: –40 hPa ... 40 hPa	–50 hPa ... 50 hPa
	Sender/receiver unit, reflector, control unit MCU-N: –40 °C ... +60 °C MCU-P control unit: –40 °C ... +45 °C Intake temperatures for purge air	–20 °C ... +50 °C Optional: –40 °C ... +60 °C Intake temperatures for purge air: –40 °C ... +50 °C	–10 °C ... +50 °C
	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, MCERTS, 2010/75/EU, U.S. EPA PS-1 compliant	Approved for plants requiring approval, 2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, U.S. EPA PS-11 compliant	EN 13284-1, U.S. EPA compliant
	IP 66	System: IP 54 Electronics enclosure: IP 65	Closed: IP 65 Opened: IP 54
	Cross-duct version	–	–
	• Integrated contamination check for sender/receiver and reflector unit • Automatic self-alignment of the optical assembly • Automatic check of zero and reference point • For medium to high dust concentrations • For small to large measuring distances	• For very low to medium dust concentrations • Gas sampling and return combined in one probe • Contamination check • Automatic monitoring of zero and reference point	• No dust loss due to optimized sampling system • Automatic data recording and system control • Isokinetic control in real time • Automatic storage and evaluation of the measuring values • Automatic measurement of the flow angle and detection of swirl effects
	➜ www.sick.com/DUSTHUNTER T200	➜ www.sick.com/FWE200 DH	➜ www.sick.com/SHC500

SYSTEM SOLUTIONS

PowerCEMS50

Efficient CEMS system for power plants

Technical specifications	
Measuring components	CO, NO_x, O_2, SO_2
Process temperature	≤ +800 °C Depending on sampling probe
Ambient temperature	+5 °C ... +35 °C With cooling device: +5 °C ... +50 °C Optional
Enclosure rating	IP 54
Device version	Steel sheet cabinet

At a glance

- Basic system measures NO_x, CO and O_2
- Completely configured system with sampling, gas cooler and integrated gas pump
- The system with its free-standing cabinet is suitable for ambient temperatures +5 ... +35 °C
- Measuring value outputs: analog (4 ... 20 mA) or digital (Modbus)
- The system is tested according to EN 61000-6 EMI and electrical safety, and is CE-certified

Detailed information → www.sick.com/PowerCEMS50

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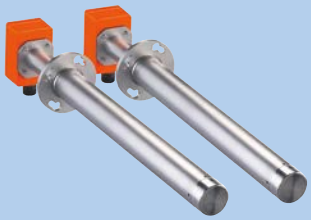
Subject to change without notice

	MKAS	MKAS Compact
		
	Analyzer systems for process and emission applications	Space-saving wall-mounted system for emission and process measurements
	CH_4, CO, CO_2, NO, NO_2, N_2O, O_2, SO_2	CH_4, CO, CO_2, NO, NO_2, N_2O, O_2, SO_2
	Inlet analyzer system: 0 °C ... +200 °C Process: 0 °C ... +900 °C Depending on sampling probe	Inlet analyzer system: 0 °C ... +200 °C Process: 0 °C ... +900 °C Depending on sampling probe
	Standard: +5 °C ... +35 °C Without direct sun exposure With cooling device: +5 °C ... +50 °C	Standard: +5 °C ... +35 °C Without direct sun exposure With cooling device: +5 °C ... +50 °C
	Standard: IP 54 With cooling device: IP 34 For outer cooling circuit	Standard: IP 54 With cooling device: IP 34 For outer cooling circuit
	Steel sheet cabinet, GRP cabinet	Steel sheet cabinet
	• Up to 3 S710 or SIDOR analyzers or NO_x-converter • Includes the major system components • Can be upgraded with optional components • Wired and tested – ready for use	• Compact analyzer cabinet • For maximum 2 S710 or SIDOR analyzers or NOx converter • Includes the major system components • Wired and tested – ready for use
	➜ www.sick.com/MKAS	➜ www.sick.com/MKAS Compact

VOLUME FLOW MEASURING DEVICES



FLOWSIC100

Volume flow measuring devices for continuous emission monitoring (CEMS)

Technical specifications	
Measurement principles	Ultrasonic transit time difference measurement
Measuring components	Volumetric flow, a. c., volumetric flow s. c., gas velocity, sound velocity, gas temperature
Max. number of measurands	1
Process temperature	–40 °C ... +450 °C Depending on device version
Process pressure	–100 hPa ... 100 hPa
Ambient temperature	FLSE100 sender/receiver units , MCU control unit: –40 °C ... +60 °C
Conformities	2001/80/EC (13. BImSchV), 2000/76/EC (17. BImSchV), 27. BImSchV, 30. BImSchV, German Clean Air Regulations, EN 15267, EN 14181, EN 16911-2, MCERTS, GOST
Enclosure rating	IP 65
Device version	Cross-duct version, measuring probe version

At a glance

- Rugged titanium transducers for high durability
- Corrosion-resistant material for application in aggressive gases (option)
- Integral measurement over the duct diameter with types H, M and S
- Probe type PR for economic installation from one side of the duct
- Automatic function control with zero and span point check

Detailed information → www.sick.com/FLOWSIC100

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MEETING POINT ROUTER

		
	SICK Remote Service	**SICK Remote Service**
	Safe remote monitoring for efficient service	Safe remote monitoring for efficient service
Variant	MPR-LAN	MPR-3G
Interfaces	Ethernet (2x)	Ethernet (2x) SMA antenna terminal
Operation	Via LC-display	Via LC-display
Dimensions (W x H x D)	300 mm x 400 mm x 210 mm	300 mm x 400 mm x 210 mm
Weight	15 kg	15.5 kg
Enclosure rating	IP 54	IP 54
Electrical safety	CE	CE
At a glance		
	• Two Ethernet interfaces separate the networks • Check connections using a heartbeat • Remote maintenance activation using a touchscreen • Integrated firewall • Strongly encrypted data transfer via SSH • Logbook entries log all access	• Two Ethernet interfaces separate the networks • Check connections using a heartbeat • Remote maintenance activation using a touchscreen • Integrated firewall • Strongly encrypted data transfer via SSH • Logbook entries log all access • Mobile broadband router for GSM, GPRS, EDGE, UMTS, HSDPA
Detailed information	➜ www.sick.com/MPR-LAN	➜ www.sick.com/MPR-3G

A

Accuracy
Qualitative term for the extent of approximation of detected results to the reference value, whereby depending on determination or agreement, this may relate to the true value, approximate value or an empirical value.

AMS
Automatic Measuring System (AMS) for monitoring emissions from stationary sources, which are installed on the plant.
In the case of extractive AMS, further equipment is included in addition to the actual measuring device (analyzer) for purposes of sampling (e.g. probes, probe gas lines, flow measurement, discharge pumps) and sample conditioning (e.g. dust filter, cooler, converters).

Area of certification
The area in which the automatic measuring system (AMS) is tested and certified in relation to maintenance of the relevant minimum requirements.

C

Calibration
Determination of a calibration function of (temporally) limited validity, which is applied to an AMS for a specified measuring point. A gas mixture of known composition (calibration gases, test gases) with systematically graded contents is applied to the measuring components.

Calibration function
Functional relationship between the measurand, such as the extinction, and the content, such as a mass concentration.

CEM, CEMS, KEMS
Equipment for continuous monitoring of emissions – CEM and CEMS (Continuous Emission Monitoring System). This term is used largely in Great Britain and the USA for “AMS”.

Cross-duct
Based on principles of in-situ measuring technology, the measured values are detected contact-free by the automatic measuring system (AMS) directly in the gas flow and across the entire duct cross-section (cross-duct). In doing so, two measuring devices are aligned to each other (generally a sender-receiver unit and a reflector), so that a representative measurement is ensured for both within the same measuring cross-section.

D

Drift
Monotone change of the calibration function in a specified maintenance interval, leading to a change in the measured value.

E

Emissions
Emissions in terms of the environment refer to the discharge, transmission or disposal of disrupting factors into the environment.

EN 14181/EN 15267
The standard EN 14181 specifies quality assurance levels (QAL) for the suitability of automatic measuring systems (AMS) for corresponding measuring tasks (QAL1), the regular calibration and validation of the AMS (QAL2), the continued monitoring of the AMS during operation of the plant (QAL3) as well as an annual functional test (AST).

Extractive measuring technology
Equipment and complete automated measuring systems (AMS) for sampling, conditioning and analysis of a sample from the gas or media being examined, undertaken at a representative measuring point.

I

In-situ measuring technology
Automatic measuring system (AMS) where the measurement is carried out directly in the gas duct, without removing a sample from the process. If the measurement is undertaken across the cross-section of the exhaust gas duct, then pollutants are detected in a representative manner to a large extent. Refer to cross-duct.

M

Maintenance interval
Maximum permissible period of time within which adherence to the specified values relating to process performance data can be guaranteed, without the need for external maintenance such as refilling, calibration or adjustment.

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Measured value
An estimated value of the air quality characteristic derived from the measurement signal. This usually includes calculations based on calibration and conversions to desired values.

Measurement principle and measurand
The measurement principle makes it possible to measure a value other than the measurand in order to derive the measurand from its value unambiguously. It is based on a repeatable physical occurrence (phenomenon, effect) with a known principle governing the relationship between the measurand and the other variable.

Measurement uncertainty
A parameter that is associated with the measurement result and characterizes the dispersion of the values that could reasonably be attributed to the measurand.

Measuring probe version
Optimized design of in-situ measuring AMS with fixed active measuring distance of the measuring probe, for single-side installation at the measuring point. An automatic self-test function (QAL3) is possible without test gases.
- GMP probe with open measuring gap
- GPP gas diffusion probe

P

Precision
Describes the maximum deviations between independently detected results that the tester obtained by repeatedly carrying out a specified detection process under prescribed conditions. A detection process is considered more accurate if it exhibits smaller “random result deviations”.

R

Reference material
Substance or mixture of substances with a concentration known within specified limits or a device with known properties.

Reference method
A conventionally used measuring method for reference purposes, which yields the recognized reference value of the measurand. Also refer to Standard reference method.

Repeatability
Degree of correspondence between the measurement result for the same measurand under identical measuring conditions. Also refer to Reproducibility.

Reproducibility
Degree of correspondence between the measurement results for the same measurand under unchanged measuring conditions. Also refer to Repeatability.

S

Sensitivity
Describes a change of value in the output variable of a measuring device related to the change of value of the input variable which causes it.

Standard deviation
Positive square root from the mean square deviation of the arithmetic mean divided by the number of degrees of freedom.

Standard reference method
Reference method specified for use in international or national regulations (for example, for calibration and validation of automatic measuring systems (AMS) and for repeated measurements to test for maintenance of the limit values).

Suitability testing
Describes the suitability of automatic measuring systems for monitoring emissions from stationary sources in accordance with the standards EN 14181 and EN 15267-3, which deal with suitability testing and corresponding minimum requirements and test procedures.

T

Test gas
A test gas is a gas or mixture of gases that is suitable for purposes of calibration due to its known composition. It can also be used for validation or verification.

Z

Zero gas
Gas or gas mixture of a known quality (such as a complementary gas of the calibration gas) that does not contain the measuring component(s) and serves to calibrate the zero value of a measuring device.

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With almost 7,000 employees and over 50 subsidiaries and equity investments as well as numerous representative offices 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, 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 additional representatives - www.sick.com

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