OPSIS®

opsis.se

Continuous Emissions Monitoring
and Process Control

Sulfuric Acid Production

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and Process Control

Sulfuric Acid Production

The process control of a sulfuric acid plant needs good and reliable detection of gas phase SO_2. To measure SO_2 can be a challenge due to the corrosive environment and high concentration of SO_2.

Several places in the process needs to be monitored and to transport the sample gas is difficult. A large dynamic range is needed as the SO_2 concentration can vary between 15% volume and a few mg/m^3.

Most systems installed need a lot of maintenance, sometimes as often as every day.

The OPSIS DOAS system is different and provides sulfuric acid plants with an accurate analyser that can measure in temperatures up to 1000°C and with a maximum pressure of 1 Bar (G).

The system operates with a minimum of maintenance. A typical service interval with an OPSIS system is 3 to 6 months. The OPSIS DOAS system is a non-contact method, using an optical measurement path that operates across a duct. The optical light is transported in an optical fibre to the analyser and one analyser can operate several paths.

Besides the measurements of SO_2, additional gases such as SO_3, H_2O and O_2 can be measured.

RETURN OF INVESTMENT

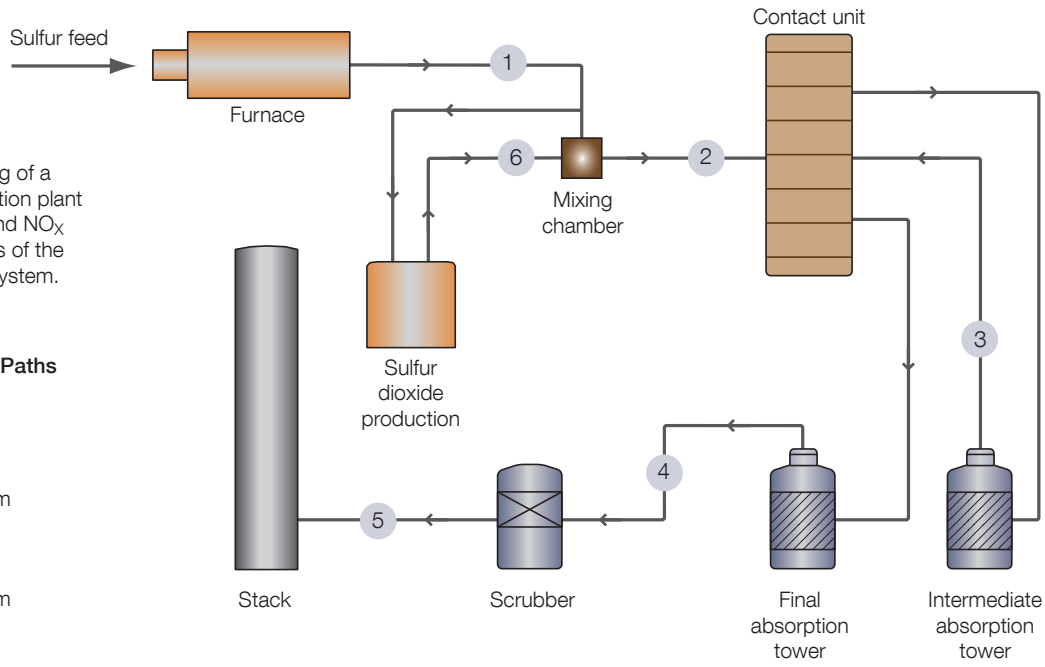
The cost of investing in an OPSIS DOAS system, to measure SO_2 and other gases, is small compared to the amount of money that can be saved by having better control of the process. The cost of the OPSIS DOAS system is also small compared to the amount of money that are spent on maintaining old systems based on extractive techniques.

TEST AND APPROVALS

The OPSIS system has been tested and approved by a number of internationally recognized institutes and authorities. The system meets the European directive for power plants and is approved by German TÜV, British MCERTS and U.S. EPA. Full details are available on request.

OPSIS PRODUCT PORTFOLIO

OPSIS has a full product portfolio for measurements of gases in a sulfuric acid production plant. It includes systems for continuous emissions monitoring, process control as well as for air quality monitoring. The total solution also includes highly skilled service and support.
For further information, please visit www.opsis.se.



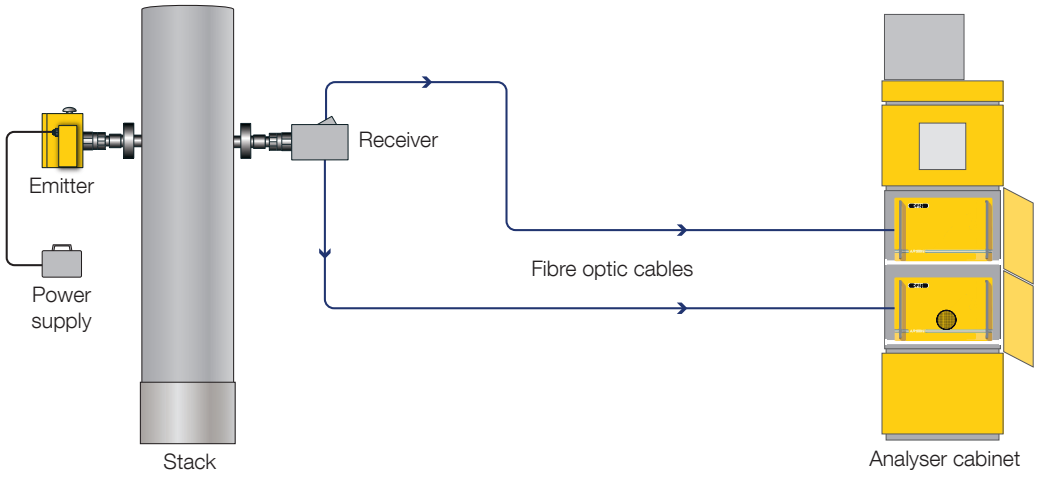
A schematic drawing of a sulfuric acid production plant including the SO_2 and NO_X measurement points of the OPSIS monitoring system.

OPSIS Monitoring Paths

1. SO_2: 0–20% Vol.
2. SO_2: 0–20% Vol.
3. SO_2: 0–2% Vol.
4. SO_2: 0–2500 ppm
5. NO: 0–500 ppm
   NO_2: 0–100 ppm
   SO_2: 0–1000 ppm
6. SO_2: 0–20% Vol.

SYSTEM OVERVIEW

An OPSIS system layout for monitoring in a sulfuric acid production plant.



QAL 1 CERTIFICATION:
BEST PERFORMANCE
LONGEST CALIBRATION INTERVAL

PERFORMANCE DATA

(typical data which may vary depending on application)

Compound	Max. measurement range (1 m path)[1]	Lowest measurement range according to EN 15267	Min. detectable quantities (monitoring path 1 m, measurement time 30 sec.)
UV/IR DOAS Analyser Models AR600 / AR602Z / AR602Z/Hg / AR602Z/N / AR602Z/NHg / AR620			
SO_2 emission	0–5000 mg/m³	0–75 mg/m³[3][4]	0.5 mg/m³
SO_2 process	0–100% Vol.	0–10% Vol.[4]	0.1% Vol.
SO_3[2]	0–1000 g/m³	0–10 g/m³[3][4]	0.3 g/m³
NO[3]	0–2000 mg/m³	0–150 mg/m³	0.5 mg/m³
NO_2	0–100% Vol.	0–20 mg/m³	0.5 mg/m³
H_2O	0–100% Vol.	0–30% Vol.	0.1% Vol.
Hg^0	0–1000 µg/m³	0–45 mg/m³	0.5 µg/m³
FTIR DOAS Analyser Models AR650 / AR650/N			
SO_2	0–1000 g/m³	0–10 g/m³[3][4]	30 mg/m³
SO_3	0–1000 g/m³	0–10 g/m³[3][4]	30 mg/m³
CO	0–100% Vol.	0–75 mg/m³	2 mg/m³
H_2O	0–100% Vol.	0–30% Vol.	0.1% Vol.
CO_2	0–100% Vol.	0–20% Vol.	0.1% Vol.
CH_4	0–100% Vol.	0–20 mg/m³	0.5 mg/m³
HF	0–100% Vol.	0–1.5 mg/m³	0.1 mg/m³
HCl	0–100% Vol.	0–15 mg/m³	0.5 mg/m³
LD500 Laser Diode Gas Analyser			
CO	0–100% Vol.	0–5% Vol.[4]	0.1% Vol.
CO_2	0–100% Vol.	0–30% Vol.[4]	0.1% Vol.
H_2O	0–100% Vol.	0–30% Vol.[4]	0.1% Vol.
H_2S	0–100% Vol.	0–2% Vol.[4]	0.1% Vol.
O_2	0–21% Vol.	0–20% Vol.[4]	0.1% Vol.
Temperature	0–1400°C	—	10°C

Accuracy
Better than 2% of measured value or equal to the detection limit (whichever is greater).

Span drift
Less than 2% per year.
Please, refer to QAL1 documents.

Zero drift
Less than 2% of measurement range per year.
Please, refer to QAL1 documents.

Linearity error
Less than 1% of measurement range.

[1] This data refers to a light path of 1 m. For longer paths the maximum range is proportionally smaller. Products are available to create shorter paths in very wide stacks.
[2] Maximum SO_2 concentration 500 mg/m³ × m.
[3] Maximum SO_2 concentration 5 g/m³ × m.
[4] Lowest measurement range.
- Recommended monitoring path length: 1 to 5 m.
- After wet scrubbers or when the particulate concentration is high, the monitoring path length may have to be reduced.
- Max. length of fibre optic cable: please refer to product sheets P9 and P16.

Besides the compounds above, the OPSIS system can monitor the following gases: hydrogen bromide (HBr), bromine (Br_2), iodine (I_2), hydrogen cyanide (HCN), phosgene ($COCl_2$), and others.

FACTORY TESTED SYSTEMS
WITH DELIVERY ON TIME.

Continuous Emissions Monitoring and Process Control by OPSIS

Combines the benefits of UV/FTIR DOAS and TDL technology

Best performance according to QAL 1 certification

Longest calibration interval according to QAL 1 certification

Automatic QAL 3 check as option

No sampling required, non-contact measurement system

One analyser can operate several monitoring paths

Operates with a minimum of maintenance

Low energy consumption

Gas calibration only once per year

Internationally approved

Thousands of systems installed worldwide

Serviced by highly skilled service network

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Please contact your OPSIS supplier to discuss your particular system requirements, including the compounds you wish to monitor. Separate product and other industrial application sheets are available. Specifications subject to change without notice.

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