

Applications

- Measurement of dust concentration in dry or moist, steam-saturated and corrosive stack gases
- Monitoring of municipal and hazardous waste and sewage sludge incinerators
- Monitoring of power plants
- Measurement of dust concentration in hot gases with special configurations

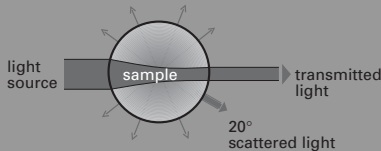
Benefits

- Extractive system with heating of sample
- Built in compliance with EN 14181
- Automatic zero and reference point checking
- Easy adjustment with checking rods
- Maximum sensitivity in the $\mu\text{g}/\text{dscm}$ range

DUST EMISSION MONITORING SYSTEM STACKGUARD

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Dust concentration measurement



Extractive measurement

Dust particles in the stack gas scatter the light of a beam passed through the gas. Measurement of the scattered light intensity is therefore a reliable indicator of the sample's dust particle concentration.

In most countries, the admissible dust concentration emitted by large incinerators, power plants and dust extraction plants is limited by law. Continuous measurement of the concentration is mandatory.

The moisture content of the stack gas dictates whether the dust concentration can be measured in situ in the stack or requires extraction, i.e. sample taking. Only hot, dry stack gases that involve no risk of water droplets occurring as a result of condensation are suitable for in situ measurement. But wet gases that have been cooled down by scrubbers or are saturated with water or gases from plants operated close to the gas's dew point have to be extracted and heated above the dew point to avoid falsification of the readings by the resultant droplets. The StackGuard dust emission monitoring system covers the latter cases, i.e. those requiring extraction.

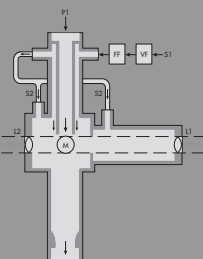
Extractive measurement offers the added benefit of permitting the connection of sensors for measuring gases like O₂, CO, NO_x, SO_x, etc., to the sampling pipe.

Measurement method

StackGuard uses the dual-beam method to measure the scattered light intensity of the withdrawn sample. This is done by relating the light scattered at 20° to the light passing straight through the sample. As a result, the method automatically compensates any fluctuations of the light source as well as any effects of ageing or temperature on the electronics.

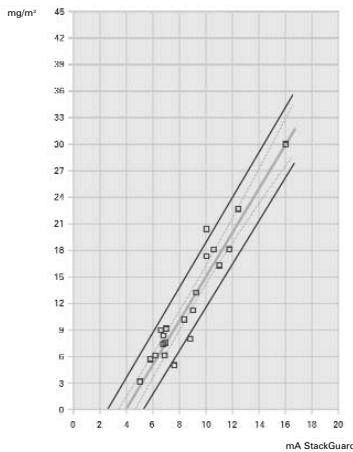
Use of a laser light source minimizes the stray light and improves the StackGuard's sensitivity to the µg/m³ level.

Flow cell contamination



Any optical dust measurement system has to contend with the problem of dust particle build-up on the optical windows and walls of the flow cell, which falsifies the readings. StackGuard eliminates this type of contamination with a shroud of filtered purge air. In addition to the shroud, purge air is also applied to the flow cell windows.

Calibration



As a rule, measurements of dust content are required to state the concentration in mg/m^3 or mg/dscm . But the intensity of the scattered light produced by a given dust particle depends greatly on particle characteristics such as size, shape, colour, relative density, etc. Consequently, an absolute measurement of the dust concentration in mg/dscm is achievable only with an application-specific calibration. The calibration curve is obtained by comparing the measured value with a manual gravimetric measurement. Application of the curve makes it possible to state the measured value directly in mg/dscm of the substance in question.

In order to remain as independent as possible from the grain size distribution of the particles or any fluctuations of the gas velocity in the stack, sample taking is done superisokinetically.

At the factory, SIGRIST dust measuring instruments are calibrated with a paraffin oil mist based on a defined dust, namely polystyrene-latex aerosol (PLA) with $1\ \mu\text{m}$ grain size.

Checking the calibration

For the quarterly calibration check, a checking rod is provided with a built-in glass of defined turbidity that makes it possible to correct the instrument in a matter of seconds. If it is necessary to check the zero point, a zero-air filter can be inserted ahead of the instrument.

Automatic drift check

To eliminate variances between calibration intervals, the StackGuard regularly checks the stability of the zero point and a reference point. If excessive drift is found, an alarm is given.

Certification

In Germany, StackGuard was tested by TÜV Rheinland and officially declared to be a performance-tested measuring instrument in compliance with 13. and 17. BImSchV.

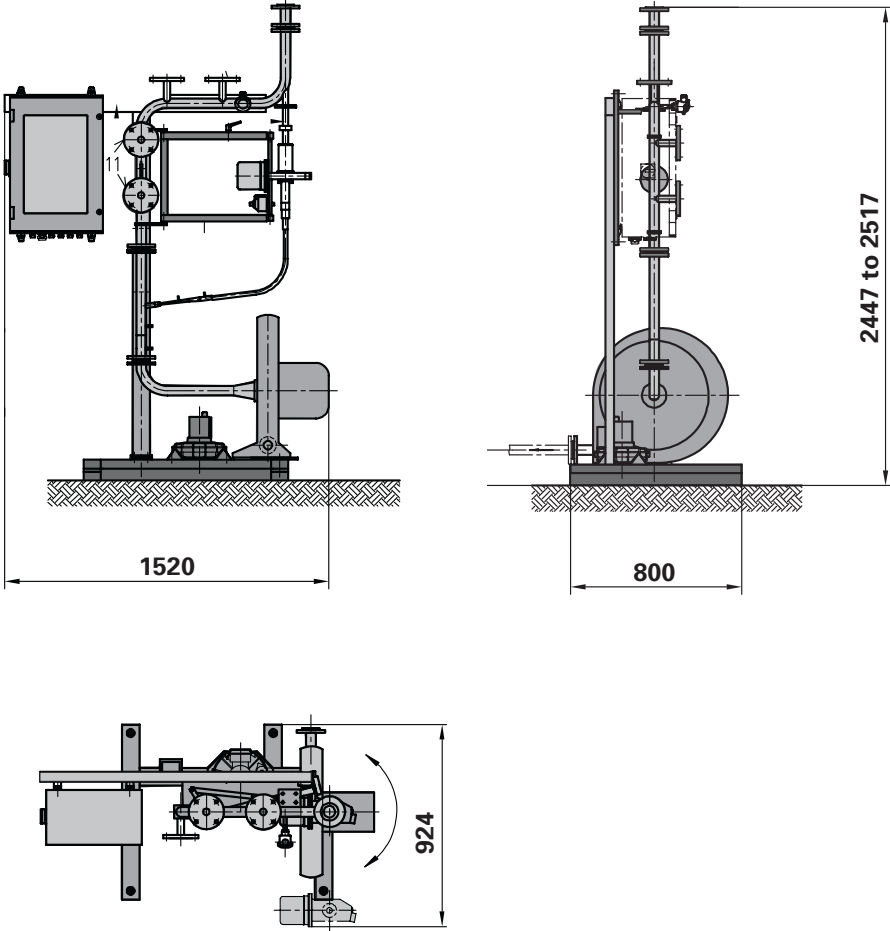
It also meets the requirements of EN 14181 and the American PS11.

Besides delivering and displaying the readings, the SIGAR 2 control unit controls the entire monitoring system with its heaters, valves and fans.

With its two-line LC display and operating structure employing plain text guidance, SIGAR 2 affords easy access to the StackGuard for operation, configuration and servicing. It has two 0/4 .. 20 mA current outputs and five relays configurable as limit or alarm contacts. An optional bus coupler available for connection to PROFIBUS DP enables direct data transmission and instrument control via the digital interface.

**Control unit
SIGAR 2**

Dimensions

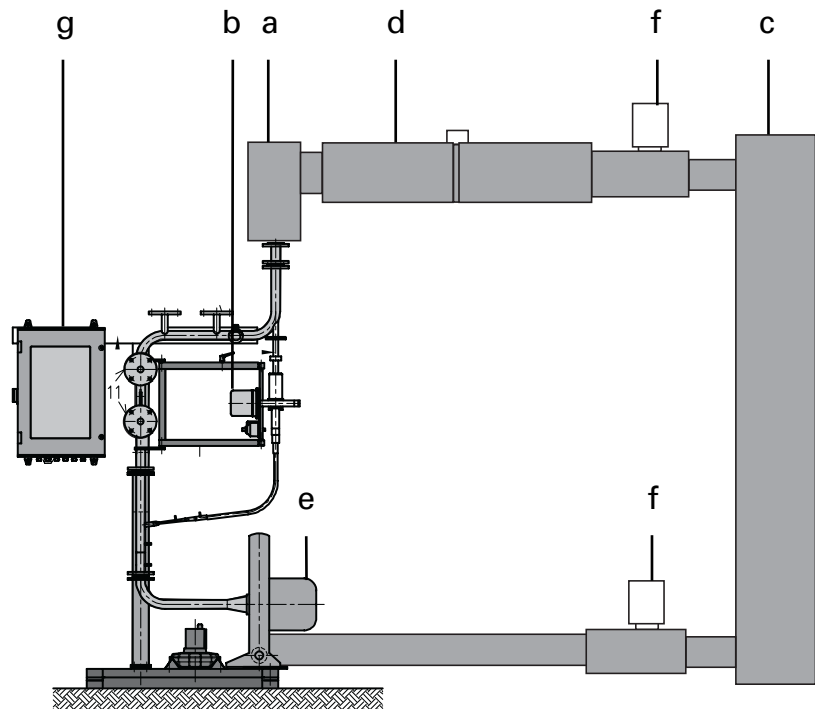


System concept

A ring pipe system (a) with a large diameter of 40 mm carries the gas being monitored with high velocity to the instrument (b) and back into the stack gas duct (c). This arrangement reduces deposits to a minimum. In the ring pipe, the gas is heated with heating elements (d) to the required temperature above the dew point. The sample is withdrawn from the ring pipe close to the photometer and then returned to it after measurement. Withdrawal is powered by a radial fan (e). In the event of a malfunction, shutoff valves (f) isolate the monitoring system from the stack to protect it against corrosion by aggressive gases. The entire operation, control and monitoring of the system is done with the control unit (g). The maximum length of the sample taking system is 25 m.

The ring pipe is adapted individually to each installation. The necessary information can be determined with a questionnaire.

Because StackGuard is fully compatible with older Sigrist dust monitors Type KTNR or CTNR, it can be retrofitted in a given case without any need to replace or adapt the ring pipe.



SPECIFICATIONS

Dust Concentration Measurement

Measuring principle:	20° scattered light measurement
Measuring span:	0 ... 100 PLA
Measuring ranges:	0.. 0,05/0 .. 0,1/0 .. 0,3/0 .. 1/0 .. 3/0 .. 10/0 .. 30/0 .. 100 PLA
Resolution:	± 0,0002 PLA
Measurement wavelength:	650 nm

Photometer StackGuard

Sample temperature:	max. 170°C
Sample pressure:	±3000 Pa (±30 mbar)
Flow rate:	25 ... 50 l/min
Ambient temperature:	-20°C ... +50°C
Ambient humidity:	0 .. 99% r.h., noncondensing
Weight:	8,4 kg
Protection degree:	IP65

Ring Pipe

Flow rate:	790 .. 930 l/min @ 160°C
Weight:	ca. 240 kg (standard version)
Pipe length:	max. 25 m overall length
Stack connections:	DN65 PN6 with flange DIN 2641 or to customer spec
Protection degree:	IP40 (additional insulation required for outdoor installation)

Control Unit SIGAR 2

Power supply:	3 x 340 .. 440 V ; 50/60 Hz
Power input:	5.5 kVA (standard version with 2 heaters)
Current output:	2 x 0/4 ... 20 mA; burden max. 600 W
Interface:	Profibus DP (optional)
Contacts:	5 separately configurable relay contacts 250 V AC, 4 A
Protection degree:	IP 65
Weight:	22 kg

Representative:



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 **SIGRIST**
PROCESS-PHOTOMETER

