EN

ProSens

Sensor calibration using the Dosed-Reference-Method

Product Information

Description of the method

"Right up to today, isokinetic dust sampling has been the acknowledged method in industry for calibrating continuous dust measuring sensors."

As a specialist measuring equipment manufacturer, we must be able to calibrate our sensors with extreme precision.

In previous calibrations using isokinetic dust sampling, we have found that this method has certain inadequacies in terms of the accuracy of the reference. One problem of isokinetics is that it cannot be used to specify target, fixed calibration points and instead the dust concentrations which prevail at the time of the calibration and are generally very low must be used as calibration points. These points are generally well away from the limit values or switching points which must be calibrated.

Furthermore, isokinetics requires a long measuring time for such low dust concentrations to provide any useful results at all.
Furthermore, external climatic conditions (temperature and humidity) have a major influence on the measurement result.

The measurement result of the sensor is only as good as the reference to which it has been calibrated.

For this reason we have developed the dosed-reference-method as an alternative to isokinetic dust sampling. The main basic idea of this is that a mass flow is dosed into the system which corresponds to a required concentration at a specific flow velocity.

Specimen application:

Principles:

Delivery rate:	Q = v x A	v = Flow velocity [m/s] A = Cross-section area through which material flows [m²]
Dust mass flow:	m_G = Q x c	Q= Delivery rate [m³/h] c = Residual dust concentration [mg/m³]

Possible technical system data:

Maximum dust concentration	25 mg/m³
Flow velocity	15 m/s
Pipeline diameter	1.2 m
Cross-section area	1.1304 m²

When looked at more closely:

Delivery rate:
15 m/s x 1.1304 m² = 17 m³/s * 3600 m³/h = **61200 m³/h**

Dust mass flow:
61200 m³/h * 25 mg/m³ = 1526040 mg/h = **1.52 kg/h**

It now becomes plain that in the event of a dust concentration of 25 mg/m³, the actual dust mass flow is 1.52 kg/h.

At this level it is possible to insert the material using an appropriate dosing unit.

On the basis of a large number of tests and trials at the SWR laboratory, we have developed dosing units and a precise calibration method for this process.

The SWR dosed-reference-method makes it possible to generate accurate calibration points and to reproduce them at any time stop

Sensor calibration process

The following steps are required to complete the calibration.

Step 1:
You send us at least 1 kg of the dust which your filter traps.

Step 2:
You provide us information about the ambient conditions together with the following:
- Flow velocity
- Maximum load
- Pipeline diameter / Pipeline geometry

Step 3:
We find the required calibration parameters at our SWR laboratory and check whether it is possible to dose the dust.

Step 4:
We carry out the calibration at your site on this basis.

Step 5:
After the calibration has been completed successfully, the check number of the calibrated tester is found using a tribotester.
This makes regular testing possible.

Step 6:
We issue you with a calibration certificate.


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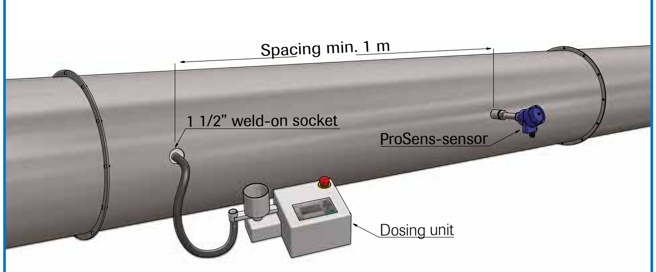
SWR engineering
Calibration certificate

Requirement

- 230 V AC connection for the dosing unit
- Compressed air connection for the air amplifier
- Mounting of the special dosing flange, which will be delivered by SWR in advance after reception of purchase order.



Regular testing

After a precise sensor calibration, the question naturally arises about the cyclical testing of the sensors' measuring function.
The tribotester has been developed for this purpose.

And the measuring effect can be simulated using this tester. A specific cheque number is found for a calibrated sensor by specifying a reference signal. For regular testing, the sensor must generate the same check number if the same reference specifications is used. This means it is possible to ensure that even years later the sensor is still working accurately.

The system

The components required for the calibration are as follows:

- Dosing unit – dosing capacity 0.1 -21 kg/h
- Flexible hose with air amplifier
- SWR tribotester
- Micro scales

Application examples

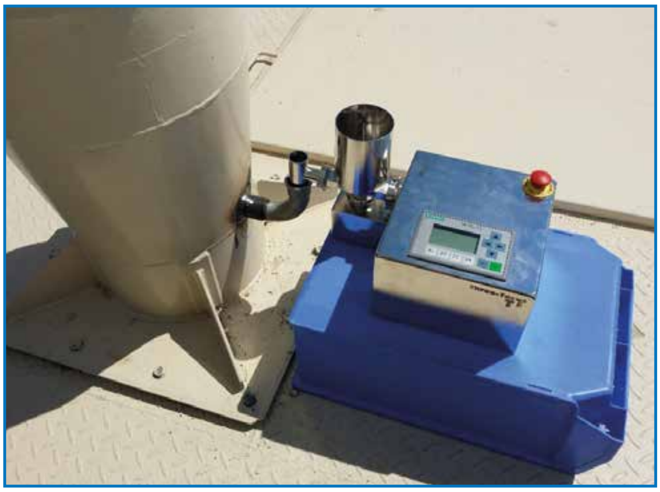
- **Calibration of dust measuring sensors for measuring emissions**

For many industrial processes, companies have an obligation to measure their flue air on the pure gas side to ensure it complies with defined dust limit values.

Our sensor calibration method enables you to calibrate your sensors accurately and thus conduct highly accurate emissions measurements.

- **Calibration of a defined shut-down point**

Many systems have components such as valves whose explosion protection licence is only valid up to a certain concentration.
To ensure explosion protection, and the system must be shut down before this limit concentration is exceeded. This shut-down point can be set accurately using the method described above.



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