

The NILU SS2000 Sequential Air Sampler for reactive gases

The NILU SS 2000 Sequential Air Sampler is a user-friendly automatic filter sampler. The sampler may be used for gases which can be absorbed on impregnated filters or other kinds of substrates e.g. the iodide absorption method for NO₂ developed by Ferm and Sjödin (1993) and the KOH-impregnated filter method for SO₂ EMEP (1996).

A programmable logic controller (PLC) controls the NILU SS 2000. The flow is set with a restrictor and measured with a mass flow meter. The sample volumes are recorded in standard litres accumulated over the sampling period. The user can set the desired start time for 8 samples in a sequence. The sampling will normally start at the same time every day at 24 hours interval.

Measurement Principle

NO₂

Ambient air is drawn at 0.5 litre per minute through an air intake funnel, a particle pre-filter and glass sinter filters. The glass sinter filters are impregnated with sodium iodide (NaI) and sodium hydroxide (NaOH). Nitrogen dioxide (NO₂) is absorbed in the sinter filter, and the iodide reduces the NO₂ to nitrite (NO₂⁻). The nitrite formed in the sinter filters is extracted with de-ionised water. The concentration of nitrite is then analysed by spectrophotometry (Griess method). The pre-filter introduced in front of the sample manifold is installed to remove particulate matter. Exposed samples are stable for several weeks, which allows transfer to a central laboratory for analysis.

SO₂

Ambient air is drawn at 0.5-1 litre per minute through an air intake funnel and a filter holder containing a pre-filter and a KOH-impregnated filter. The pre-filter collects particles and the KOH-impregnated filter collects sulphur dioxide (SO₂). The impregnated filter is extracted with

0.3% hydrogen peroxide (H₂O₂). The concentration of the sulphate (SO₄⁻) formed is normally analysed by ion chromatography.

Measurement range

NO₂

With a sampling period of 24 hours, the measuring range for NO₂ is 0.1 to 10 µg NO₂/m³ N when 4 ml is used as the extraction volume. Higher concentrations can be measured using a larger extraction volume.

SO₂

With the same sampling period and a flow rate of 1 litre per min, the measuring range for SO₂ is 0.5 to 100 mg SO₂/m³ N when 10 ml is used as the extraction volume.

Sampling efficiency

NO₂

The sampling efficiency is higher than 98% with a flow rate of 0.5 l/min (lpm) at 15% RH. The efficiency is better than 98% at 60% RH even up to 4 lpm.



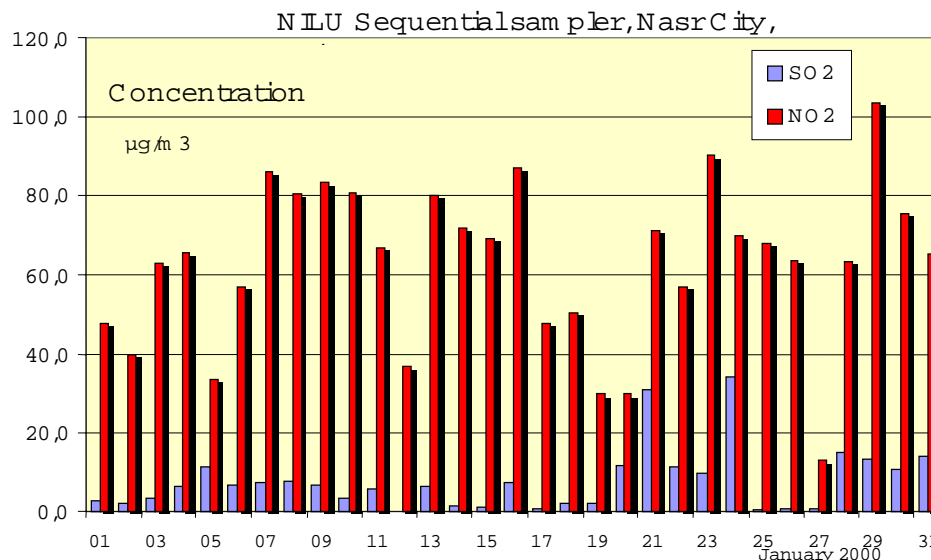
The SS2000 Series of sequential AirSamplers are optionally delivered as a wall model or as a bench model with 8 filter holders in a sequence

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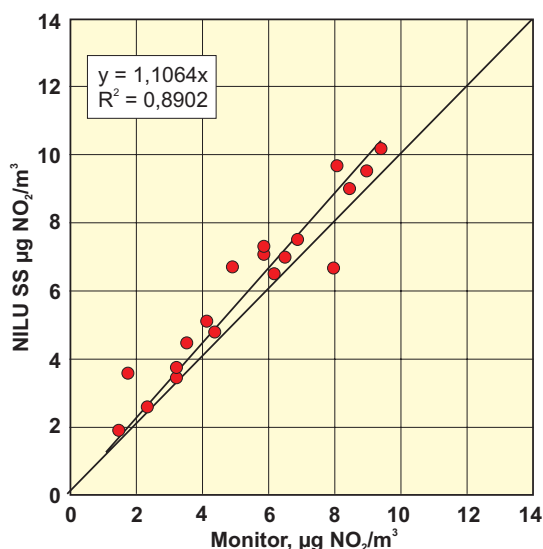
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SO₂

For SO₂, it is important that the relative humidity in the impregnated filter is higher than 20%. Low relative humidity caused by low temperature in the ambient air compared to the room temperature is partly overcome by adding glycerol to the KOH-impregnation solution. In these cases the sampling efficiency is higher than 98%.



Comparison between analysis of samples taken with NILU SS2000 and a chemiluminescence monitor

Flow control

The present flow control is passive. A glass capillary tube sets the flow. The mass flow sensor records and stores the accumulated volume for each sample. The flow meter is calibrated at 25°C and 1013.25 mbar. The flow meter should be checked with a reference flow meter

Technical Specifications

Dimensions: 468x400x188 mm
 Weight: 11.5 kg
 Power required: 230VAC
 Power consumption: Approx. 50W
 Temperature range: 0 to 30°C

Not intended for unprotected outdoor use.

References:

Røyset, O. and Sivertsen, B. (1998) DANIDA; Environmental Information and Monitoring Programme (EIMP). Air quality monitoring component. Mission 10 report. Kjeller (NILU OR 78/98).

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