ANALYT MESSTECHNIK



INSTRUCTIONS FOR USE

SKC UMEx 200 Passive Sampler for Nitrogen Dioxide

Sampling nitrogen dioxide with the single-use SKC UMEx 200 passive sampler 500-200, from 15 minutes to 24 hours, and preparing and analysing the sample in the laboratory by ion chromatography.

AMTC-IN-0053

About this document

These instructions cover the SKC UMEx 200 Passive Sampler, Cat. No. 500-200, used for nitrogen dioxide (NO_2). It takes you through taking a personal or area sample, sealing it and sending it to the laboratory. A chapter for the laboratory gives the sample preparation, the analysis by ion chromatography and the calculation of the result.

Read Safety (p. 4) and Product and supplied items (p. 5) first. Then follow Before use (p. 6), Procedure (p. 7) and After use and sample handling (p. 8) step by step, and pass Analysis (p. 8) on to your laboratory with the samples. The same sampler also collects sulphur dioxide (SO_2); the separate SO_2 instructions for the UMEx 200 cover that analysis in full.

Keep these instructions for the lifetime of the product. The current revision is on the product page at analyt-mtc.com.

How these instructions mark information

⚠ CAUTION

A hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Practices not related to personal injury — damage to the product, the process or the sample.

Note

Information that helps understanding; never a hazard.

Document information

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Revision history

Rev.	Date	Change
2	October 2026	Quality programme: new document type, number and identity pages.
1	October 2026	First issue.

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CHAPTER 1

Safety

Read this chapter before you use the sampler. Its safety messages are repeated where they apply in the chapters that follow.

Intended use

The SKC UMEx 200 measures nitrogen dioxide in air without a pump, as a personal sample on a worker's collar or as an area sample. It is validated from 0.051 to 8.5 ppm for sampling times of 15 minutes to 24 hours. Each sampler is for single use only: do not reuse it.

The treated tape

Wear gloves whenever you handle the sampler, in the field and in the laboratory.

⚠ CAUTION

The tape inside the sampler is chemically treated. Wear gloves when you handle the sampler.

⚠ CAUTION

The reactive tapes are chemically treated. Handle them with gloves and clean forceps.

NOTICE

Check the expiry date. The expiry date is on the label on the outside of the pouch. An expired sampler can give an invalid result. Do not use the sampler after the last day of the month shown.

NOTICE

Do not reuse the sampler. The UMEx 200 is designed for single use only. A reused sampler may not collect the sample reliably, so the result is then invalid.

CHAPTER 2

Product and supplied items

The SKC UMEx 200 is a small, single-use badge that measures nitrogen dioxide in the air. It needs no pump: clip it to a worker's collar for a personal sample, or place it in the area you want to monitor, and slide its cover open.

Nitrogen dioxide diffuses through the perforated diffusion plate and is collected on a tape treated with triethanolamine (TEA), at a rate of 17.3 mL/min. Each sampler holds two sections of tape: a sample section, and a blank/correction section that the laboratory uses to correct the result for the background. The laboratory extracts the tapes with water and determines the nitrite by ion chromatography. Sulphur dioxide can be analysed on the same sampler.

Parts of the sampler

The yellow sliding cover (6) starts and stops the sample: slide it to the *on* position to begin sampling and to the *off* position to end it. The blank section of tape (4) is marked by a small indentation, so the laboratory can tell the two tapes apart.

The back of the sampler has spaces for the date, the location and the start and stop times of the sample.



Figure 2-1. The UMEx 200 sampler.

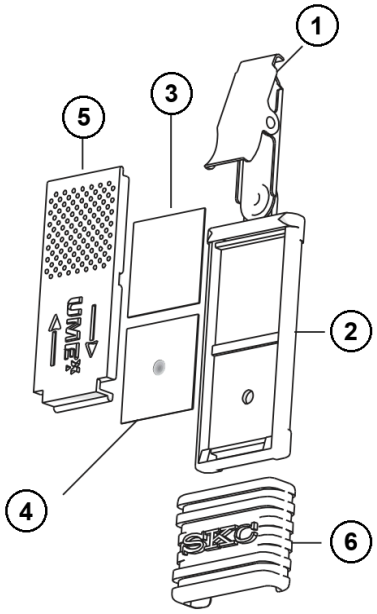


Figure 2-2. The sampler, exploded view. (1) Collar clip. (2) Body. (3) Reactive tape, sample section. (4) Reactive tape, blank/correction section, with indentation. (5) Diffusion plate. (6) Sliding cover.

Each sampler comes in its own aluminised pouch, and each box of samplers contains one lot blank.

The sampler can sample for 15 minutes up to 24 hours. Its full performance data are in Specifications (p. 10).

CHAPTER 3

Before use

Each sampler comes in its own aluminised pouch. Keep the pouch: the finished sample travels in it to the laboratory. The numbers in brackets refer to Figure 2-2 (p. 5).

Before you start

NOTICE

Check the expiry date. The expiry date is on the label on the outside of the pouch. An expired sampler can give an invalid result. Do not use the sampler after the last day of the month shown.

⚠ CAUTION

The tape inside the sampler is chemically treated. Wear gloves when you handle the sampler.

Store unused samplers at ambient temperature. The shelf life is limited: check the expiry date on the pouch.

Have a pen ready for the label on the back of the sampler.

CHAPTER 4

Procedure

Take the sample

NOTICE

Do not reuse the sampler. The UMEx 200 is designed for single use only. A reused sampler may not collect the sample reliably, so the result is then invalid.

1. Open the aluminised pouch and take out the sampler. Keep the empty pouch and store it away from anything that could give off nitrogen dioxide.
2. Write the date and the location in the space on the back of the sampler.
3. For a personal sample, clip the sampler to the worker's collar (1). For an area sample, place it at a suitable point in the area.
4. Slide the cover (6) to the *on* position. Sampling starts now. Write the start time on the back of the sampler.
5. When the sampling time is over, at most 24 hours later, slide the cover to the *off* position. Sampling stops. Write the stop time on the back of the sampler.

CHAPTER 5

After use and sample handling

Send the sample

1. Put the sampler back into its original pouch immediately after sampling.
2. Seal the pouch.
3. Send it to an accredited laboratory for analysis, together with the sampling details: date, location, start and stop time.

Sample storage

A sampled badge can be kept at ambient temperature or in a refrigerator at 4 °C (39.2 °F) or below. Have it analysed within 3 weeks of sampling.

Analysis

This chapter is for the laboratory. Nitrogen dioxide collected on the TEA-treated tape is extracted with water and determined as nitrite by ion chromatography with conductivity detection. Pass these instructions on with the samples. The numbers in brackets refer to Figure 2-2 (p. 5).

CAUTION

The reactive tapes are chemically treated. Handle them with gloves and clean forceps.

Calibration standards

Use commercially available nitrite standards suited to your application. Prepare a range of nitrite standards in de-ionised ultra-filtered (DIUF) water, and treat them as described in Preparing the sample (p. 8).

Preparing the sample

1. Take the sampler out of the pouch and remove the sliding cover (6).
2. With clean forceps, lift the reactive tape out of each of the two sections and put each tape into a sealed vial. You now have a sample (3) and a blank/correction (4); the blank tape is the one with the indentation.
3. Add each tape to its own 4 mL glass vial holding 2 mL of DIUF water, and desorb the nitrite on a vibrator or shaker for 20 minutes.
4. Straight away, transfer 1 mL of the extract to an autosampler vial for the nitrogen dioxide analysis.
5. If you also analyse for sulphur dioxide: pipette 1 mL of the extract into a vial, dilute it with 1 mL of 0.15 % hydrogen peroxide and shake well. This vial is for the sulphur dioxide analysis.

Note

Lot blank. Instead of the built-in blank, you can also correct for the background with a lot blank. Each box of samplers contains one.

Ion chromatography

1. Analyse the extracts for nitrite by ion chromatography with conductivity detection.
2. Inject 20 µL of the extract onto a Dionex AS14A column, 4 × 250 mm, with an eluent of 8.0 mM sodium carbonate and 1.0 mM sodium bicarbonate. For low levels, 0.4 ppm or less, inject 70 µL.
3. Determine the nitrite from a standard calibration curve.
4. Subtract any nitrite found on the blank from the result of the sample section.

Calculating the result

Calculate the air volume sampled, in litres, from the sampling time *t* in minutes:

$$V = t \times 17.3\ \text{mL/min} \div 1000$$

Then calculate the nitrogen dioxide concentration in ppm:

$$\text{ppm } NO_2 = m \times 24\,450 \div (V \times 46.01)$$

- *m*: mass of nitrite ion found on the sampler, blank subtracted, in mg*
- *V*: air volume, in litres
- 46.01: molecular weight of nitrogen dioxide, in g/mol

> **Note**
> No correction factor is applied for the conversion of nitrite ion to nitrogen dioxide. Any such factor is already contained in the sampling rate of the sampler.

* With the constant 24 450 and *V* in litres, *m* is in mg.

Disposal

Dispose of used samplers and their packaging under local regulations.

CHAPTER 6

Specifications

Collection medium	tape treated with triethanolamine (TEA); built-in blank
Sampling rate	17.3 mL/min, relative standard deviation 11.5 %
Validated range	0.051–8.5 ppm, for sampling times of 15 minutes–24 hours
Lower detection limit	200 ppb for 15 minutes; 6.3 ppb for 8 hours; 2 ppb for 24 hours
Accuracy	±27 %
Analysis	solvent extraction; ion chromatography (IC) with conductivity detection
Temperature	no effect on the sampling rate from 22 to 40 °C
Humidity	no effect from 20 to 80 % relative humidity
Air velocity	no effect from 5 to 100 cm/s
Interferences	none identified
Shelf life	limited; see the expiry date on the pouch
Storage	before use: ambient temperature; after use: ambient temperature or ≤ 4 °C (39.2 °F), analyse within 3 weeks
Dimensions, weight	3.4 × 1.1 × 0.35 in (8.6 × 2.8 × 0.89 cm); 0.38 oz (10.9 g); sliding cover yellow

For sulphur dioxide, the sampling rate of the UMEx 200 is 15.2 mL/min; see the SO_2 instructions for its other data.

CHAPTER 7

Ordering information

Order from Analyt-MTC with the order codes.

Ordering information

Description	Pack	Order code
UMEX PASSIVE SAMPLERS*#		
UMEx 200, for sulphur dioxide and/or nitrogen dioxide	10	500-200
UMEx 200, for sulphur dioxide and/or nitrogen dioxide	25	500-200A
UMEx 100, for formaldehyde and other aldehydes‡	10	500-100
UMEx 300, for ammonia‡	10	500-300
QUALITY CONTROL AND ACCESSORIES		
Treated tape for QC, UMEx 200*#	25	P20098
Stand for indoor sampling	1	690-302
Shelter for outdoor sampling	1	690-303

UMEx 400 samplers, for aliphatic amines, must be stored at 4 °C (39.2 °F) or below. Ask Analyt-MTC for them.

* Limited shelf life. ‡ Must be stored at 4 °C (39.2 °F) or below. # For single use only. Do not reuse UMEx samplers.

CHAPTER 8

Service and contacts

Contact and support

ANALYT-MTC Messtechnik GmbH

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www.analyt-mtc.com

Before you call

Have the following at hand so that Analyt-MTC can help you quickly:

- the catalogue number of the sampler, 500-200;
- the lot number and the expiry date on the pouch;
- the sampling time you need and the expected NO_2 level.

Order samplers and accessories from Analyt-MTC, quoting the catalogue number. Contact Analyt-MTC also for technical questions and warranty matters concerning your SKC UMEx 200 Passive Sampler. Warranty is handled under Analyt-MTC's terms of sale. Analyt-MTC's contact details are in this chapter and on the back cover.

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