



## Operating Instructions

863 Valley View Road, Eighty Four, PA 15330 USA  
Tel: 724-941-9701 • www.skcinc.com

# UMEX<sup>200</sup> Passive Sampler for Nitrogen Dioxide Cat. No. 500-200



### Performance Profile

<b>Sampling Rate:</b>	17.3 ml/min with a relative standard deviation of 11.5%
<b>Validated Concentration Range:</b>	0.051 to 8.5 ppm, 15 min to 24 hrs
<b>Analysis Method:</b>	Solvent extraction and IC analysis with conductivity detection
<b>Lower Detection Limits:</b>	15 min: 200 ppb 8 hrs: 6.3 ppb 24 hrs: 2 ppb
<b>Collection Method:</b>	Tape treated with triethanolamine (TEA); built-in blank included
<b>Shelf-life:</b>	18 mos from date of manufacture at ambient temperature
<b>Storage:</b>	<i>Before use:</i> Ambient temperature <i>After use:</i> Ambient temperature or at $\leq 39.2$ F (4 C) and analyze within 3 weeks
<b>Accuracy:</b>	$\pm 27\%$
<b>Temperature Effects:</b>	No effect on sampling rate from 22 to 40 C
<b>Humidity Effects:</b>	No effect from 20 to 80% relative humidity (RH)
<b>Wind Velocity Effects:</b>	No effect from 5 to 100 cm/sec
<b>Interferences:</b>	None identified
<b>Dimensions:</b>	3.4 x 1.1 x 0.35 in (8.6 x 2.8 x 0.89 cm)
<b>Weight:</b>	0.38 oz (10.9 gm)
<b>Slide Cover:</b>	Yellow

*Note: SO<sub>2</sub> can be analyzed on the same UMEX<sup>200</sup> Sampler as NO<sub>2</sub>.*

# Sampling Instructions

**Cautions:** • Do not store with food.

- Before sampling, check the expiration date on the label on the outside of the pouch. Do not use after the last day of the month indicated.
- SKC recommends using gloves when handling chemically treated media.
- UME<sup>x</sup> samplers are designed for single use only. Do NOT reuse UME<sup>x</sup> samplers.

1. Open the aluminized pouch and remove the sampler. Do not discard the pouch; use it to send sampler to the laboratory. **Store the pouch away from potential nitrogen dioxide sources.**
2. Enter date and location in the space provided on the back of the sampler.
3. Position the sampler on a worker's collar for personal sampling or in an appropriate location for area sampling.
4. Slide the sampler cover to the "on" position to begin sampling. Enter the sample start time in the space provided on the back of the sampler.
5. After sampling for the desired time, up to 24 hours, slide the sampler cover to the "off" position to stop sampling. Enter the sample stop time in the space provided on the back of the sampler.
6. Place the sampler in the original pouch immediately after sampling.
7. Seal the pouch. Send pertinent information and sample to an accredited laboratory for analysis.

## Analysis Instructions for Nitrogen Dioxide

### Calibration Standards - Nitrite

Purchase commercially available nitrite standards appropriate for your application. Prepare a range of nitrite standards in de-ionized ultra-filtered (DIUF) water and prepare as outlined in *Sample Preparation*.

### Sample Preparation for Nitrogen Dioxide

1. Remove the sampler from the pouch and the sliding cover from the sampler.
2. Use clean forceps to lift out the reactive tape from each section. Place each section in a sealed vial. This provides a sample and a blank/correction.

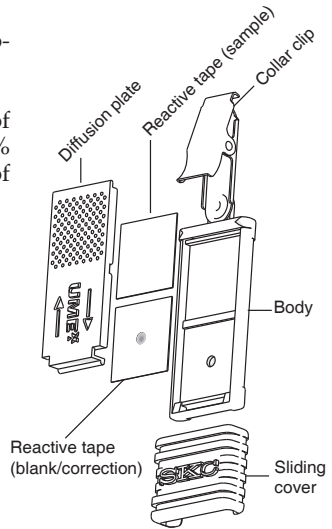
**Note:** It is also acceptable to use a "lot" blank to correct for background. One lot blank is included in each box of badges.

**Note:** The blank/correction section of tape has an indentation for easy identification.

3. Nitrite is desorbed from both the sample and the blank/correction tapes by inserting each in its own 4-ml glass vial containing 2 ml of de-ionized ultra-filtered water and placing them on a vibrator/shaker for 20 minutes.

4. Immediately transfer 1 ml of extract to an auto-sampler vial for analysis of nitrogen dioxide.
5. If also analyzing for SO<sub>2</sub>,<sup>§</sup> pipette 1 ml of extract into a vial and dilute with 1 ml of 0.15% hydrogen peroxide. Shake well for analysis of sulfur dioxide.

§ Sampling rate for SO<sub>2</sub> is 15.2 ml/min.



### Nitrogen Dioxide Sample Analysis

1. The sample extracts are analyzed for nitrite by ion chromatography with conductivity detection.
2. A 20-microliter portion of the extract is injected onto a Dionex 4 x 250-mm AS14A column and with an 8.0/1.0-mM sodium carbonate/sodium bicarbonate eluent. For low levels ( $\leq 0.4$  ppm), inject 70  $\mu$ l onto the column.
3. Calculate the nitrite results by comparing against a standard calibration curve.
4. Subtract any nitrite found in the blank from the sample section.
5. Calculate the volume of air in liters using the following equation:

$$\frac{\text{Time (minutes)} \times \text{Sampling rate (17.3 ml/min)}}{1000}$$

6. Calculate the nitrogen dioxide concentration in ppm using the following equation:

$$\frac{\text{ppm nitrogen dioxide} = (\text{mass of nitrite ion on badge}) \times 24450}{\text{Air volume (L)} \times \text{Molecular weight (46.01 gm/mole)}}$$

**Note:** No correction factor is applied for the conversion of nitrite ion to nitrogen dioxide. Any correction factor is part of the sampling rate for the badge.

<b>UME<sup>x</sup> Passive Samplers<sup>#</sup></b>	<b>Cat. No.</b>
<b>UME<sup>x</sup> 200,<sup>**</sup></b> for sulfur dioxide and/or nitrogen dioxide, pk/10	<b>500-200</b>
<b>UME<sup>x</sup> 100,<sup>**†</sup></b> for formaldehyde and other aldehydes, pk/10	<b>500-100</b>
<b>UME<sup>x</sup> 300,<sup>**</sup></b> for ammonia, pk/10	<b>500-300</b>

<b>Treated Tape for QC - UME<sup>x</sup> 200,<sup>**</sup> pk/25</b>	<b>P20098</b>
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\* Limited shelf-life      † Do not store with food.      ‡ Storage at ≤ 39.2 F (4 C) required

# UME<sup>x</sup> passive samplers are designed for single use only. Do NOT reuse UME<sup>x</sup> samplers.

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