



## Operating Instructions

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

# UMEX<sup>100</sup> Passive Sampler for Formaldehyde Cat. No. 500-100

## Performance Profile

<b>Sampling Rate:</b>	28.6 ml/min with a relative standard deviation of 7.6% at a wind velocity of 5 to 100 cm/sec for 15 min to 24 hrs 20.4 ml/min wind velocities < 5 cm/sec for 1 to 7 days <i>See the Passive Sampling Guide at <a href="http://www.skinc.com">www.skinc.com</a> for UME<sup>X</sup> 100 sampling rates for other aldehydes.</i>
<b>Validation Range:</b>	0.06 to 3.0 ppm
<b>Detection Principle:</b>	Formation of stable DNPH-hydrazone in the presence of formaldehyde*
<b>Analysis Method:</b>	Solvent extraction and analysis by HPLC (high-performance liquid chromatography) with UV detection
<b>Lower Detection Limits:</b>	15 min: 200 ppb (0.24 mg/m <sup>3</sup> ) 8 hr: 5 ppb (0.006 mg/m <sup>3</sup> ) 24 hr: 2 ppb (0.002 mg/m <sup>3</sup> ) 7 days: 0.2 ppb (0.0002 mg/m <sup>3</sup> )
<b>Shelf-life:</b>	12 mos from date of manufacture at ≤ 39.2 F (4 C)
<b>Storage:</b>	<i>Before use:</i> ≤ 39.2 F (4 C) <i>After use:</i> ≤ 39.2 F (4 C) and analyze within 3 wks
<b>Capacity:</b>	29 µg/sample
<b>Accuracy:</b>	± 25%, exceeds OSHA requirements
<b>Temperature Effects:</b>	No effect on sampling rate between 10 and 30 C
<b>Humidity Effects:</b>	No effect from 10 to 80% relative humidity (RH). <i>Do not use sampler below 10% RH.</i>
<b>Wind Velocity Effects:</b>	No effect from 5 to 100 cm/sec
<b>Interferences:*</b>	• Highly specific for formaldehyde. Large amounts of carbonyl compounds may reduce the uptake of formaldehyde • Use in ozone levels < 0.5 ppm
<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)

\* If sampling in an atmosphere containing formalin, see [www.skinc.com/instructions/1795.pdf](http://www.skinc.com/instructions/1795.pdf) for field study information.

## Description

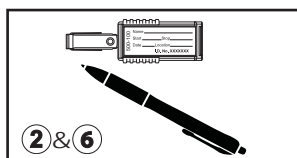
The UME<sup>X</sup> 100 Passive Sampler for Formaldehyde has a green sliding cover that opens and closes easily to start and stop sampling. Because of its relatively high sampling rate and sensitive analysis, the UME<sup>X</sup> 100 can be used for 15-minute (STEL) sampling in the ppm range, personal monitoring up to 12 hours, and 24-hour to 7-day monitoring of contaminants found in indoor environments.

## Sampling

- UME<sup>X</sup> samplers are designed for single use only. Do NOT reuse UME<sup>X</sup> samplers.
- Do not use Sharpie® markers or equivalent to mark label or pouch as these can off-gas VOCs.

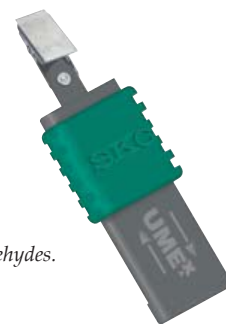
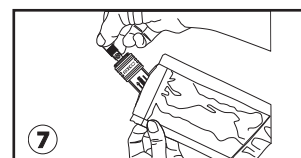
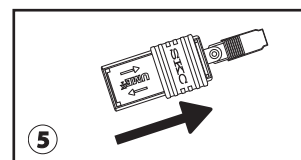
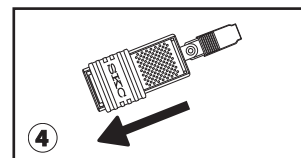
1. Open the pouch and remove the sampler. **Do not discard the pouch as it is used to protect the sampler during shipment to the laboratory. Store the pouch away from potential formaldehyde sources.** *Note: Inside the pouch is a small length of tape similar to the tape inside the sampler. This tape protects the background of the sampler should any formaldehyde in the atmosphere enter the pouch. Leave the tape inside the pouch at all times and send along with the sample to the laboratory.*

2. Write the date, location, and sample start time on the label 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 (diffusion plate exposed) to begin sampling.
5. After sampling for the desired time, slide the sampler cover to the "off" position (diffusion plate covered) to stop sampling.
6. Enter the sample stop time on the label on the back of the sampler.
7. Immediately place the sampler in the original pouch and seal the pouch. Send it, along with pertinent information, to an accredited laboratory for analysis. **Use expedited shipping.**



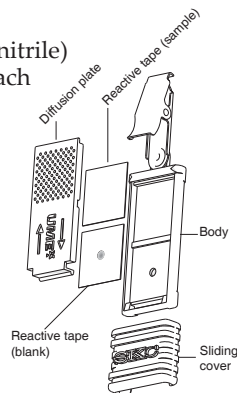
## Analysis

### Desorption

1. Remove the sampler from the pouch and the sliding cover from the sampler. Use forceps (cleaned with acetonitrile) to lift out the reactive tape from each section. **Note:** The blank tape has an indentation for easy identification. Place each one in a sealed vial. This provides a sample and a blank.  
**Note:** It is also acceptable to use a "lot" blank to correct for background. One lot blank is included in each box of badges.
2. Desorb the formaldehyde 2,4-dinitrophenylhydrazine from both the sample and blank tapes by placing each one in its own 4-ml glass vial containing 3 ml of acetonitrile and shaking them by hand for one minute.

### Calculations

1. A 10- $\mu$ l portion of the solution resulting from Step 2 above is subjected to HPLC determination using an octadecylsilane column and a mobile phase consisting of 33% water in methanol.<sup>‡</sup>
2. The formaldehyde 2,4-dinitrophenylhydrazine is detected with UV absorption at 365 nm for optimum results. Detection limit depends on instrument sensitivity.
3. Quantitative analysis is performed using the synthesized formaldehyde hydrazone as an external standard and then converting results to reflect concentration in formaldehyde:



$$\text{Concentration } \mu\text{g/ml formaldehyde} = \text{Concentration } \mu\text{g/ml hydrazone} \times \frac{30.03}{210.21}$$

Where:

Molecular weight of formaldehyde = 30.03

Molecular weight of formaldehyde 2,4-dinitrophenylhydrazine = 210.21

4. Formaldehyde content of the blank tape must always be subtracted from the sample tape when calculating air concentrations.
5. Calculate the results by comparing the standards against the samples:

$$\text{Total mass collected } (\mu\text{g}) = \text{Concentration } (\mu\text{g/ml}) \times \text{Desorption volume (ml)}$$

$$\text{Volume of air (liters)} = \frac{\text{Time (minutes)} \times \text{Sampling rate (28.6 ml/min)}^{\ddagger}}{1000}$$

$$\text{Concentration (mg/m}^3\text{)} = \frac{\text{Total mass collected (mg)} \times 1000}{\text{Total volume sampled}}$$

$$\text{PPM in air} = (24.45/30.03) \times \text{mg/m}^3$$

<sup>‡</sup> Other conditions may be acceptable.

<sup>¥</sup> When calculating results from 7-day sampling, use a sampling rate of 20.4 ml/min.

## Ordering Information

Description	Cat. No.
UMEX 100,* for formaldehyde and other aldehydes, pk/10	500-100
<b>Accessories</b>	
Treated Tape, for QC purposes only, pk/50	P20084
Stand for Area Sampling	690-302

\* Limited shelf-life; storage at  $\leq 39.2^\circ\text{F}$  ( $4^\circ\text{C}$ ) required. Designed for single use only. Do NOT reuse UME<sup>x</sup> samplers.

### References

Levin, J.O. and Lindahl, R., "Diffusive Air Sampling of Reactive Compounds - A Review," *Analyst*, Vol. 119, Jan. 1994, pp. 79-83

Levin, J., et al., "High-performance Liquid Chromatographic Determination of Formaldehyde in Air in the Ppb and Ppm range Using Diffusive Sampling and Hydrazone Formation," *Sweden Environ. Technology Letter* 9, 1988, pp. 1423-1430

OSHA Method 1007 Formaldehyde (Diffusive Samplers), May 2005

Levin, J. O., Lindahl, R., and Andersson, K., "A Passive Sampler for Formaldehyde in Air Using 2,4-Dinitrophenylhydrazine-coated Glass Fiber Filters," *Environmental Science and Technology*, Vol. 20, No. 12, 1986, pp. 1273-1276

## SKC Limited Warranty and Return Policy

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