

Home Health Box for Indoor Air Monitoring

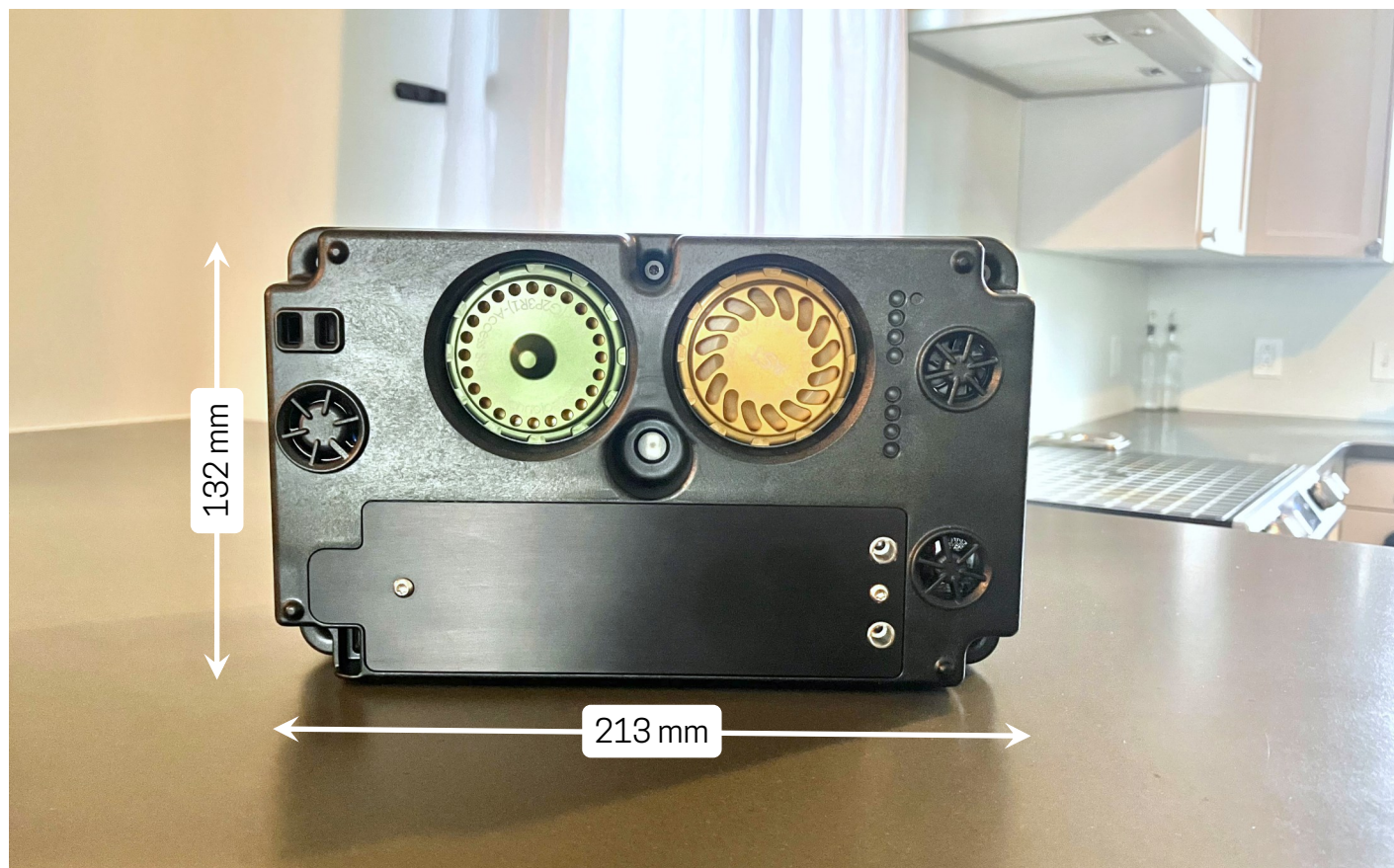
PM and gas sampling + sensors for PM, CO₂, and more

The Home Health Box (HHB) is a compact indoor air monitor that is designed to plug into a wall outlet (with an optional backup battery for interruptions in line power). The HHB can be custom-configured to sample and sense a range of particulate and gaseous pollutants:

- Up to two particulate matter filter samplers (e.g., PM_{2.5}, respirable, PM₁₀)
- Up to two active gas-phase pollutant samplers (e.g., for thermal desorption tubes, glass sorbent tubes, or DNPH-Silica cartridges)
- One time-resolved particulate matter sensor (Sensirion SEN55)
- One NDIR CO₂ sensor (Sensirion SCD30)
- Up to four electrochemical sensors for other gaseous pollutants (e.g., NO₂, CO)

The HHB uses the same virtually-silent pumping technology as our Ultrasonic Personal Air Sampler (UPAS).

For additional information, see: Tryner, J., Phillips, M., Quinn, C., Neymark, G., Wilson, A., Jathar, S.H., Carter, E., Volckens, J. Design and testing of a low-cost sensor and sampling platform for indoor air quality, *Building and Environment*, 2021, 206, 108398, <https://doi.org/10.1016/j.buildenv.2021.108398>.



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Revision 1.7, March 2026

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Configuration Options and Specifications

Particulate matter (PM) sampling channels

Quantity	The Home Health Box can be configured with 0, 1, or 2 PM sampling channels.
Flow rate	1 or 2 L min ⁻¹ (depending on the size-selective inlet used)
Available inlets	PM _{2.5} @ 1 L min ⁻¹ , PM _{2.5} @ 2 L min ⁻¹ , Respirable PM @ 2 L min ⁻¹ , PM ₁₀ @ 2 L min ⁻¹
Filter size	37 or 25 mm; we recommend using 37-mm-diameter PTFE membrane filters from Measurement Technologies Laboratories (PT37P-PF03), depending on analysis needs.

Gas sampling channels

Quantity	The Home Health Box can be configured with 0, 1, or 2 gas sampling channels.
Flow rate	3 to 30 mL min ⁻¹ ; user-programmable
Compatible media	6.35-mm-diameter × 89-mm long thermal desorption tubes Waters Sep-Pak [®] DNPH-Silica cartridge (WAT037500) with Sep-Pak [®] Ozone Scrubber cartridge (WAT054420) installed upstream Common glass thermal desorption tubes (e.g., 6 to 10 mm in diameter)

Pollutant sensors

Baseline package	Particulate matter: Sensirion SEN55 (laser light scattering) Carbon dioxide: Sensirion SCD30 (non-dispersive infrared; NDIR) Qualitative relative tVOCs and NO _x levels: Sensirion SGP41 (metal oxide; MOx)
Electrochemical sensors for additional pollutants (optional)	Up to four Alphasense B-4 series electrochemical sensors. These sensors are designed to measure ppb-level concentrations. Carbon monoxide: CO-B4 (measurement range = <1 to ~10 ppm) Nitrogen dioxide: NO2-B43F (measurement range = <1 to ~15 ppm) Contact our engineering team if you'd like sensors for other pollutants added to your Home Health Box (e.g., NO, O ₃)

Power

Line power	The Home Health Box can run indefinitely when plugged into a wall outlet.
Optional backup battery	Li-ion; 24 W-h; battery life is configuration dependent; 8 h runtime when collecting two filter samples @ 2 L min ⁻¹ and two gas samples @ 30 mL min ⁻¹ with PM, CO ₂ , and NO ₂ sensors on in a location with air density = 1.0 g L ⁻¹ .

Access Sensor Technologies

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