nox MEDICAL

Why You Can Trust Nox RIP Belts for Your Sleep Diagnostics

Prioritizing patient comfort while delivering accurate results.



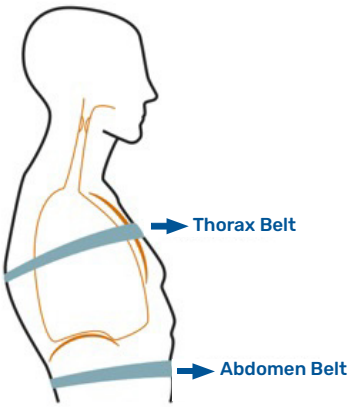
Patented Nox RIP technology

When a patient undergoes a sleep study with Nox Medical's diagnostic equipment, whether at home or in the lab, the patient's breathing throughout the night is recorded with the patented Nox respiratory inductance plethysmograph (RIP) belts.

Designed with a feather-light and breathable material, the belts are worn above the patient's clothes for optimal comfort. To easily conform to all body types, the belts come in multiple sizes, and are built with an elastic material that doesn't restrict movement.

Engineered to move in sync with the natural movements of each breath, the Nox RIP belts help clinicians understand when a patient might experience apneas or hypopneas. Crucially, the belts fully encircle the body — a defining requirement for volumetric RIP, in which changes in electrical inductance are determined solely by changes in thoracoabdominal cross-sectional area, establishing a direct physical relationship to respiratory volume.[1]

The Nox RIP belts come in pairs, fully encircle the body and are designed to minimize any size adjustment loops that may cause signal distortion. One belt encircles the abdomen, near the belly button. A second belt is strapped around the thorax.



What makes RIP "volumetric"?

Not all RIP systems are equal. **Volumetric RIP** refers to belt designs where changes in the RIP signal are directly related to changes in the cross-sectional area of the chest and abdomen during breathing.

In practical terms, the belts fully encircle the body and conform to natural breathing movement. When the chest and abdominal signals are properly calibrated and combined, they can estimate changes in breathing volume; and from that, airflow can be derived.[1] In contrast, non-volumetric RIP does not provide a reliable volume-based signal, so airflow cannot be accurately derived.

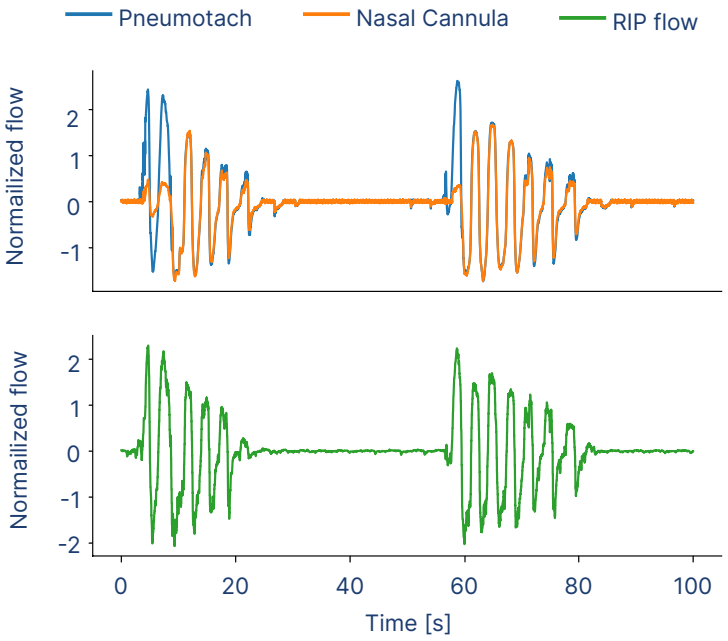
A thin, metal wire conductor woven into the elastic fabric of each Nox RIP provides the impedance that is used to measure the expansion of the chest and the stomach as the patient breathes.

Optimal Comfort

Clinicians may find that the Nox RIP flow signal is reliable enough to be used in lieu of the nasal cannula flow signal and may serve as a backup for when the nasal cannula falls out during the night or if the patient is unable to tolerate the cannula.

Patented automatic calibration ensures that when the patient moves throughout the night, the signal amplitude changes. To maintain accuracy, the Nox RIP belts automatically recalibrate for changes in body position. Continuous calibration is performed for each 30-second epoch to determine the abdomen and thorax's contribution to breathing.

Research shows that the Nox RIP flow signals have a high correlation to signals taken from pneumotach, the gold standard in respiratory measurements.[2]



The nasal cannula underestimates the flow in these breaths while RIP captures them accurately.[3]



Unparalleled Accuracy

Recent scientific papers have used the Nox RIP flow as a surrogate for the cannula flow signal for scoring respiratory events. Montazeri et al. reported that disposable Nox RIP belts achieved average signal reliability of 98.5–98.8%, exceeding the reliability of the cannula and reusable belts, which averaged 85.5–92.5% across datasets.[4] This finding is reinforced by a recent review by Bjarkason et al., which identifies disposable snap-on volumetric RIP belts as the most reliable belt design and reports 98.5% thoracic-belt reliability with strong agreement to nasal cannula flow.[1]

More recent validation work by Finnsson et al. further extends the clinical relevance of high-quality dual-belt RIP, showing that calibrated RIP can quantify ventilation during sleep with substantially reduced bias versus oronasal pneumotachography: small-breath overestimation bias improved from 12.21 to 1.51%eupnea, event-depth bias from 9.06 to 1.00%eupnea, and patient-level concordance was strong for average event depth and ventilatory burden, with ICCs of 0.77 and 0.91, respectively.[2]

1 Bjarkason, S., Finnsson, E., Sigþórsson, S. et al. Toward Physiology-based Sleep Assessment: the Emerging Clinical Role of Advanced RIP Technology. Curr Pulmonol Rep 15, 10 (2026). https://doi.org/10.1007/s13665-026-00410-w

2 Finnsson E, Arnardottir E, Montazeri K, Keenan BT, Schwab RJ, Gislason T, Pack AI, Wellman A, Islind AS, Agustsson JS, Sands SA. Respiratory Inductance Plethysmography to Quantify Changes in Ventilation in Obstructive Sleep Apnea. IEEE Trans Biomed Eng. 2026 May;73(5):1943-1952. doi: 10.1109/TBME.2025.3618403. PMID: 41056175; PMCID: PMC12989205.

3 Finnsson E, Jónsson SÆ, Ragnarsdóttir H, Þráinsson HM, Helgadóttir H, Ágústsson JS, Wellman A, Sands SA. Respiratory inductance plethysmography for the reliable assessment of ventilation and sleep apnea phenotypes in the presence of oral breathing. Sleep Medicine. 2019;64:S115-S116 Montazeri K, Jonsson SA, Agustsson JS, Serwatko M, Gislason

4 T, Arnardottir ES. The design of RIP belts impacts the reliability and quality of the measured respiratory signals. Sleep Breath. 2021;25(3):1535-1541

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