

NIV+

Delivering exceptional patient–device synchrony in the Elisée™ range



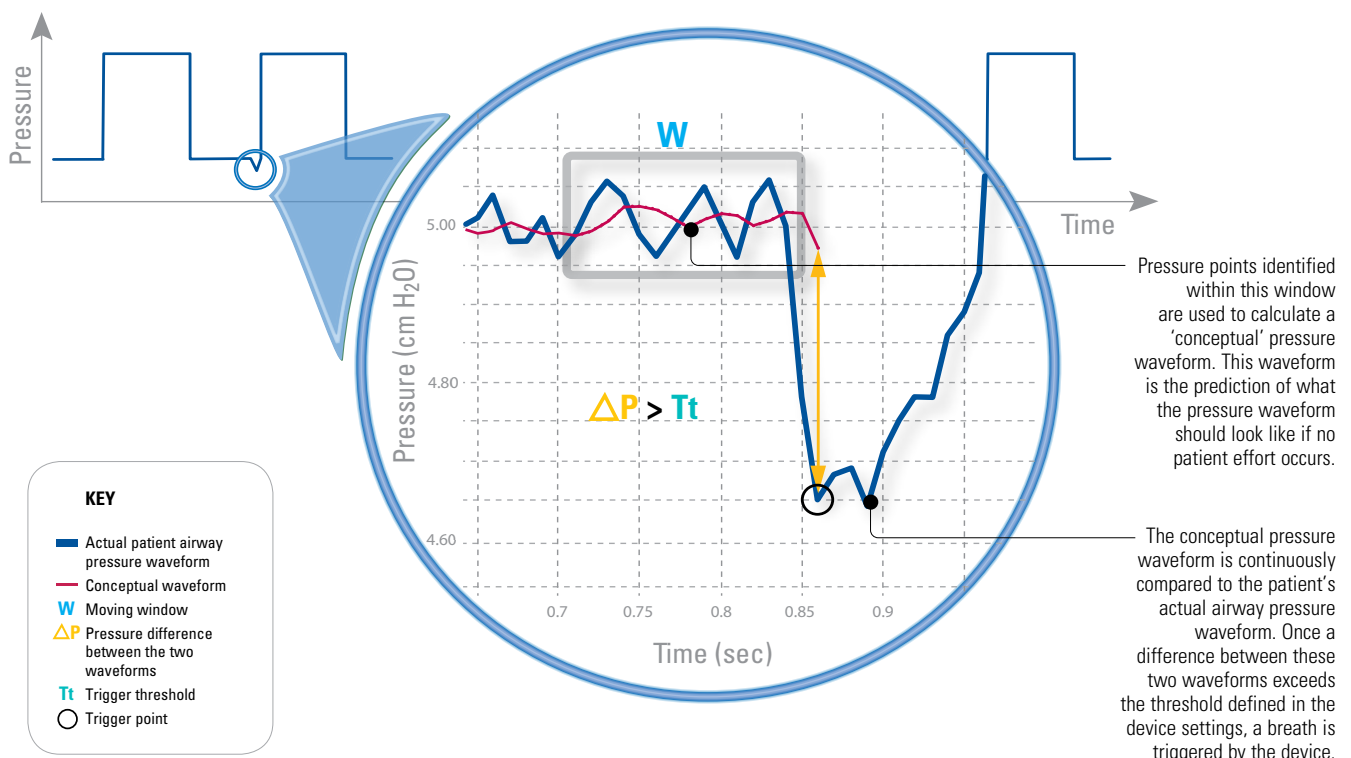
Exclusive to the Elisée device range, *NIV+* is ResMed's new trigger sensitivity technology that fine-tunes existing trigger settings to improve patient–device synchrony in both adult and paediatric patients.

A major challenge for traditional noninvasive ventilators has been maintaining device synchrony with patients' respiration, especially in the presence of unintentional leak. Unintentional leak may arise due to factors such as poor mask fit or fast pressure transitions.

Measuring against the trigger thresholds selected in each device, the new *NIV+* algorithm detects even the slightest changes in a patient's breathing pattern and the earliest instance of leak—and promptly reacts to maintain maximum patient–device synchrony.

How *NIV+* works

Using an intelligent breath-tracking feature, Elisée devices constantly monitor the patient's airway pressure during expiration using a 350 millisecond moving window, as shown below.



NIV+ introduces greater sensitivity to this trigger detection process, so that even the weakest patient effort is detected ... making it highly beneficial for paediatric patients in particular.

Accurate, precise trigger monitoring

Thanks to the new *NIV+* algorithm, triggering is extremely precise in the Elisée devices. The following technologies work together to provide greater sensitivity and precision in detecting a wide range of patient effort and responding accordingly, regardless of low or high leak ... which means greater patient-device synchrony and more effective noninvasive ventilation.

Highly accurate conceptual waveform for better results

The calculation of the conceptual waveform is integral to the performance of the *NIV+* algorithm. Accuracy is maximised using:

- a highly-accurate sensor—dedicated to working at a resolution of 0.01 cm H₂O
- a moving window at an optimised sample rate of 100Hz.

Three dedicated algorithm filters for closer detection

Three dedicated, intelligent filters are applied to the conceptual waveform, continuously scanning it to determine if the gap between the conceptual and actual pressure corresponds to patient effort.

Filter 1: assesses triggering in the presence of leak.

Filter 2: detects weak patient effort.

Filter 3: detects regular patient effort.

Together, these filters maintain excellent patient-device synchrony by reacting quickly and efficiently to changes in leak and patient effort.



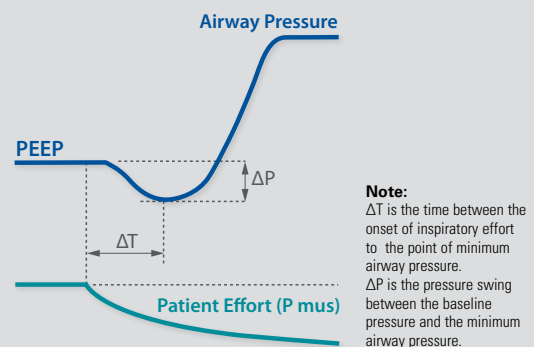
NIV+ is built into ResMed's Elisée 250 and 350 ventilators, and is available in the Elisée 150 as an optional software upgrade.

Proven to provide better patient outcomes

NIV+ was bench-tested by INSERM—the French National Institute of Health and Research—under their bench-test protocol.^{1,2}

According to the protocol, trigger performance is scored as follows:

- Appropriate:** if $\Delta T \leq 100$ ms and $\Delta P \leq -1$ cm H₂O.
- Acceptable:** if $\Delta T \leq 150$ ms and $\Delta P \leq -1.5$ cm H₂O or if $\Delta T \geq 100$ ms or $\Delta P \leq -1$ cm H₂O.
- Inappropriate:** if the ventilator did not detect the inspiratory effort or in case of auto-triggering.



Tests revealed outstanding results for *NIV+*.^{1,2,3}

- In the Duchenne paediatric patient profile, the *NIV+* trigger (in PS mode) demonstrated a ΔT of 65 ms and a ΔP of only -0.55 cm H₂O.
- In the Cystic Fibrosis patient profile, the *NIV+* trigger (in PS mode) demonstrated a ΔT of 69 ms and a ΔP of only -0.99 cm H₂O.

Further tests, even in the presence of leak, have also proven that *NIV+* accurately detects patient effort, with the trigger time delay and trigger pressure achieving impressive results:^{1,2}

- With unintentional inspiratory leak of up to 95 L/min, Elisée demonstrated a ΔT of 140 ms and did not auto-trigger. (Tested on the Duchenne paediatric patient profile in PS mode.)

With the precision of *NIV+*, patients receive more consistent, effective, comfortable ventilation. This makes *NIV+* an integral part of effective therapy.

¹ INSERM *NIV+ Bench-test Report/Paediatric patterns*, July 2009 by Prof Fauroux, Prof Lofaso and B. Louis

² INSERM *NIV+ Bench-test Report/Adult patterns*, July 2009 by Prof Fauroux, Prof Lofaso and B. Louis

³ Tested without unintentional leak