

WELCOME TO the Next-Generation TetraGraph Era:

Navigating the
New Frontier of Precision
Beyond Twitch
Monitoring





NEXT-GENERATION TETRAGRAPH®: the Future of TOF Monitoring

Smart — Accurate — Essential:
Redefining EMG Monitoring

Experience Seamless Monitoring
with TetraGraph's Intelligent Design
and Unmatched Precision

EMGINE™

Powered by EMGINE™, Next-Generation TetraGraph® delivers advanced quantitative neuromuscular monitoring that extends beyond traditional train-of-four assessment. Intelligent, software-driven analysis enables personalized evaluation of neuromuscular block—supporting confident NMBA dosing, intubation readiness assessment, and timely reversal throughout the perioperative continuum.

Senzime's TetraGraph® Adaptive Intelligence™ aids in signal strength optimization and automates workflows in accordance with guidelines from the American Society of Anesthesiologists (ASA) and the European Society of Anaesthesia and Intensive Care (ESAIC).

Its advanced 7th generation algorithm—refined based on over six billion real-world data points—analyzes muscle function at 4 times higher resolution, delivering unmatched accuracy and sensitivity in muscle function analysis.

“Achieving optimal signal strength ensures precise sensor placement, **enhancing the accuracy** even at profound and complete levels of neuromuscular block.”

Large, high-resolution,
non-glare display—
2.5x bigger for
enhanced visibility



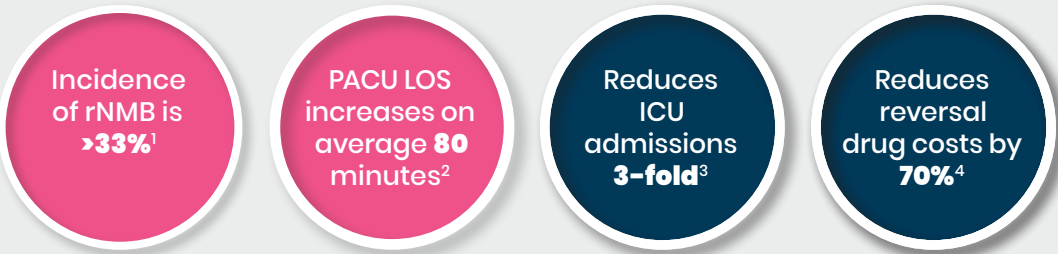
TetraGraph features a slim, portable design to augment a dynamic OR with multiple mounting options and seamless connectivity.

Accommodating complex patients and procedures like robotic and tucked-arm cases, its sustainable footprint and future-proof platform assures lasting reliability, top-tier performance, and facilitates software upgrades.

TetraGraph brings the future of quantitative TOF monitoring to reality.

TACKLE THE
Challenge of Residual
Neuromuscular Block

Elevating Patient Safety and Outcomes
by Advancing Beyond Conventional Techniques



The Clinical Problem:
Residual Neuromuscular Block

Residual neuromuscular block (rNMB) remains a challenge in perioperative care that contributes to increased postoperative complications, prolonged recovery times, and higher healthcare costs. Despite advancements in anesthesia, rNMB afflicts countless surgical patients with respiratory distress, muscle weakness, increased risk of critical respiratory events, and other severe conditions.

The Solution:
TetraGraph EMG-based Monitoring

EMG-based monitoring ensures precise detection of residual block through accurate, real-time neuromuscular assessments with higher sensitivity and specificity than traditional methods.

Priority 1:
Patient Safety

EMG-based monitoring complies with ASA and ESAIC guidelines. Trustworthy TetraGraph aligns with best practices and enhances patient safety protocols.

Reference:

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- Butterly A, et al.: Postoperative residual curarization from intermediate-acting neuromuscular blocking agents delays recovery room discharge. *Br J Anaesth* 2010; 105:304-309.
- Grabitz SD, et al.: The effects of postoperative residual neuromuscular blockade on hospital costs and intensive care unit admission: A population-based cohort study. *Anesth Analg* 2019; 128:1129-1136.
- Thilen SR, et al.: Management of muscle relaxation with rocuronium and reversal with neostigmine or sugammadex guided by quantitative neuromuscular monitoring. *Anesth Analg*. 2024 Sep 1;139(3):536-544.
- Ebert TJ, et al.: Train-of-four ratio, counts and post-tetanic counts with the TetraGraph electromyograph in comparison with mechanomyography. *Journal of Clinical Monitoring and Computing*. August 2024.
- Wedemeyer Z, et al.: "Accuracy and Precision of Three Acceleromyographs, Three Electromyographs, and a Mechanomyograph Measuring the Train-of-Four Ratio in the Absence of Neuromuscular Blocking Drugs" *Anesthesiology*. 2024; <https://doi.org/10.1097/ALN.0000000000005051>.
- Wedemeyer Z, et al.: "Comparative Performance of Stimpod Electromyography with Mechanomyography for Quantitative Neuromuscular Blockade Monitoring." *Journal of Clinical Monitoring and Computing*. vol. 38, 2023, pp. 205-212. <https://doi.org/10.1007/s10877-023-01087-1>.
- Bowdle A, et al.: "A Comparison of a Prototype Electromyograph vs. a Mechanomyograph and an Acceleromyograph for Assessment of Neuromuscular Blockade." *Anaesthesia*, vol. 75, 2020, pp. 187-195. <https://doi.org/10.1111/anae.14872>.

Why Forgo Conventional Techniques for EMG Train-of-Four Monitoring?

Unmatched Precision:

The 7th generation TetraGraph EMG algorithm offers 4x higher resolution, measuring compound muscle action potential (CMAP) with greater precision than other methods to ensure absolutely accurate neuromuscular assessments.

Independent of Limb Movement:

Unlike traditional monitoring techniques, TetraGraph EMG can function without requiring unimpeded thumb movement during clinical procedures enabling flexibility in arm positioning, such as tucking arms under surgical drapes.

Seamless Integration:

Senzime TetraGraph complements external multiparameter monitors and electronic health records to automate charting and maximize direct patient care.

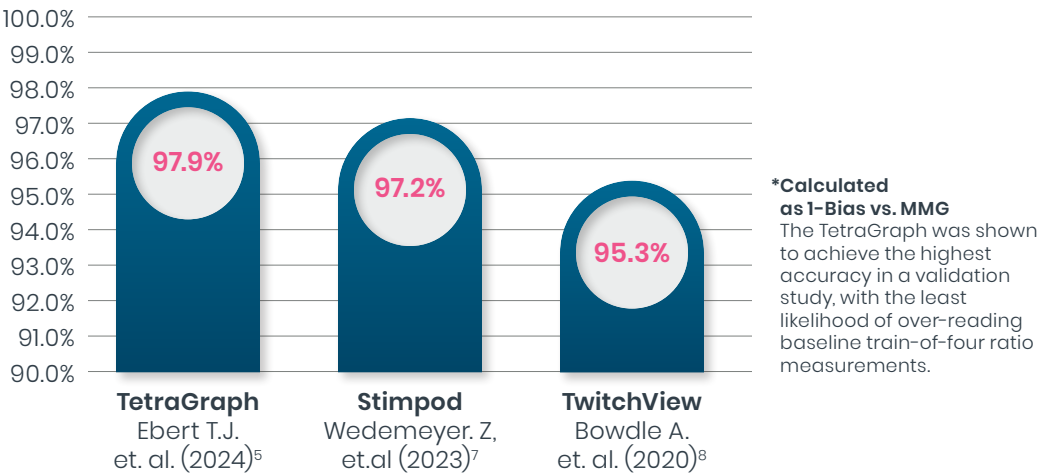
Clinical Validation and Study Results:

TetraGraph® EMG has been clinically validated as more accurate and consistent—at all levels of block including deep—than MMG, with strong correlations ($r > 0.9$) across TOF ratios, TOF counts, and PTC measurements. Its portable design, accuracy at all levels of block, and simplicity of use make it an ideal tool for neuromuscular monitoring in clinical settings.⁵

A recent clinical study published in *Anesthesiology* (2024) demonstrated that TetraGraph achieves accuracy and precision when measuring baseline TOF ratios. TetraGraph produced results similar to the clinical reference standard, mechanomyography (MMG), reinforcing its reliability for quantitative TOF monitoring.⁶

EMG Devices Comparison:

Accuracy to reference for commercially available EMG neuromuscular monitoring devices*^{6, 7-8}



	TetraGraph EMG	Other EMG Devices
Clinically validated at all levels of block, including deep and profound blocks	Yes	No
Proprietary Level-of-Block Gauge™ for easy-to-interpret, high-resolution, real-time display of individual EMG readings, waveforms (CMAPs) and trends	Yes	No
TetraGraph® Adaptive Intelligence™ to aid in signal strength optimization, providing confidence in the accuracy of every reading	Yes	No
Backed by over 40 years of research, and developed with insights from global leaders in anesthesiology	Yes	No
7th generation advanced EMG algorithm with 4x resolution, superior artifact handling, and noise cancellation without the need for extra (ground) electrodes.	Yes	No
Complete sensor portfolio, from infants to adults with sensitive skin	Yes	No

Three Unique Trend Views to Elevate Clinical Confidence

Explore advanced trend graph capabilities for enhanced anesthesia management and post-procedure analysis

1

Rapid trends displayed on the TetraGraph® Level-of-Block Gauge™

The TetraGraph introduces the first-ever Level-of-Block Gauge™ displaying short-term, rapid trends of muscle block using with faded needles.

This advanced display offers an intuitive and easy-to-interpret window indicating the direction and last measurement results of a patient's neuromuscular block or reversal, minimizing any second-guessing.



2

Real-Time Trend Graph

A real-time graph featuring a secondary y-axis that displays the Level of Block, allowing for straightforward interpretation of the gauge. Updates are made instantly as new data are added.



3

Post-Procedure Data Review

Review post-procedure data on a full-screen, high-resolution trend display with intuitive zoom-in controls. A dynamic line tool allows for the selection of specific values or time points within the trend graph for detailed insights.





SIMPLY INTELLIGENT Next Generation TOF Monitoring

Introducing the First-Ever Level-of-Block Monitor with TetraGraph® Adaptive Intelligence™

Proprietary TetraGraph® Level-of-Block Gauge™

TetraGraph uses our proprietary Level-of-Block Gauge™, an innovation that evolved from our enduring dedication to precision-based patient monitoring. This essential component continues to raise quantitative TOF monitoring market standards in personalized anesthesia.



EMG Analysis Made Smart

Reimagined in TetraGraph technology, intelligent EMG analysis with Peak-to-Trough (PtT) analytics gives clinicians the added assurance of industry-leading accuracy and optimum patient-centered care.

Every possible surgical case is familiar to our 7th generation EMG algorithm. Powerful computations are automatically formulated from a knowledge base comprising millions of waveforms.

Intelligent Automation from Induction to Recovery

ENGINE™ integrates a series of adaptive software features that automate neuromuscular monitoring workflows across all phases of care. These include guided sensor placement, adaptive stimulation and timing, and automated deep-block management—reducing manual adjustments while maintaining accuracy at all levels of block.

- Automatic transition into deep block and PTC when appropriate
- Stimulation up to 80 mA
- Continuous validation of signal quality

Single-Twitch Button on Start Screen

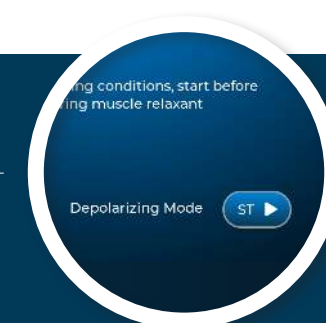
A new Single-Twitch (ST) button makes it faster than ever to toggle between modes.

Quick and Clear Access to Single-Twitch Mode

Use Single-Twitch (ST) mode when a depolarizing neuromuscular blocking agent (NMBA) is given, or start in TOF Mode for non-depolarizing relaxants—supporting seamless workflow from induction through reversal.

Distinct Green Screen for Single-Twitch Mode

ENGINE introduces a new green screen interface that instantly identifies Single-Twitch mode. A prominent blue “Go to TOF” button provides a fast return to TOF monitoring. Together, these intuitive color cues streamline navigation and strengthen visual safety awareness in every case.



THE NEW STANDARD of TOF Accuracy Surpasses Traditional Twitch Monitoring

Proprietary TetraGraph® Adaptive Intelligence™
Series of Specialized Algorithms Automates Your Workflow
from Induction to Recovery

Guided Electrode Setup with Visual Signal Strength Feedback for Personalized EMG-Monitoring

EMGINE™ provides real-time, quantitative feedback on electrode placement using a visual Signal Strength Gauge that remains visible during monitoring. Clinicians can confirm signal quality before or after neuromuscular blocker administration—"strive for 5, and 8 is great"—supporting reliable measurements from induction through recovery.

Estimated Signal Strength

If monitoring cannot begin before muscle relaxants are administered, TetraGraph® Adaptive Intelligence™ provides an estimated, objective signal strength reading to guide precise sensor placement, thereby ensuring accurate and reliable monitoring.



TetraGraph® Adaptive PTC™

Enters Deep Block Mode automatically when TOFC is 0, using a few stimulations to check response amplitude and signal quality. If conditions are met, it proceeds with tetanic stimulation and PTC measurements. Otherwise, it returns to TOF mode, ensuring safe and efficient deep block management.

Adaptive Time Interval

Adjusts measurement intervals automatically based on neuromuscular response changes, ensuring more precise assessments and capturing spontaneous recovery without omission.



0 mV (red):
No signal—check placement



< 5 mV (orange):
Poor—consider repositioning of the sensor



≥ 5–8 mV (yellow-green):
Acceptable, reliable readings



≥ 8 mV (green):
Good, optimal readings

Unified signal icons appear across all screens, extending the same visual feedback throughout the case. Consistency improves confidence and accelerates troubleshooting.



INTUBATION Readiness Indicator (T1/Tc)*

The T1/Tc ratio quantifies suppression of the first twitch relative to control, enabling assessment of block depth during induction.

By directly measuring first twitch amplitude suppression relative to control, this indicator provides objective insight into block depth and supports informed timing of tracheal intubation.¹

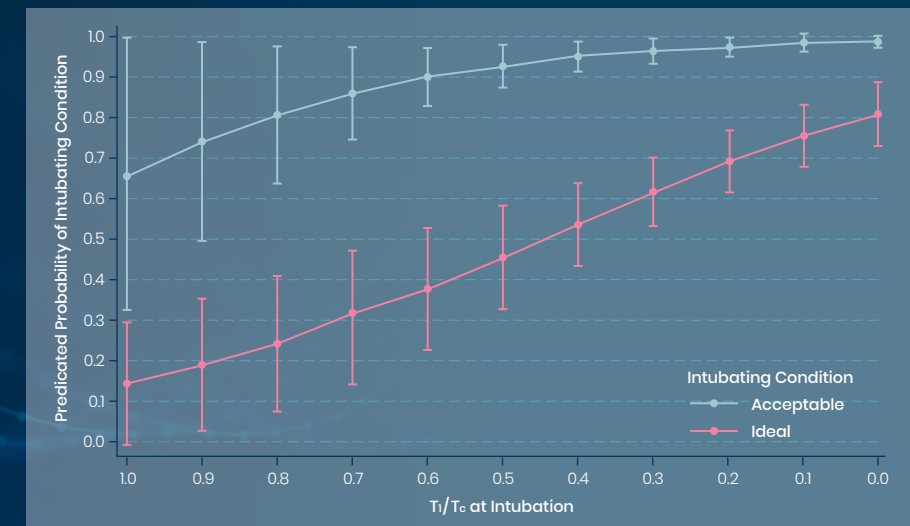


Study:
Mayo Clinic, published 2026
(Renew et al., J Clin Anesth)¹

Objective:
Compare intubation conditions guided by TetraGraph TOF monitoring (Count Group) vs. standard 2-minute wait (Time Group)

- Findings:**
- 73% of patients in the TetraGraph-monitored group achieved ideal intubating conditions vs. 57% in the time-based group ($p = 0.036$)
 - In the standard time group, only 5% had actually reached a TOF count ≤ 1 when intubated
 - A strong correlation was observed between lower T1/Tc ratios and better intubation conditions ($\rho = 0.34$, $p < 0.001$)

Conclusion
Guiding tracheal intubation using quantitative neuromuscular monitoring to confirm sufficient neuromuscular block resulted in significantly better intubating conditions compared with waiting a fixed time after rocuronium administration.



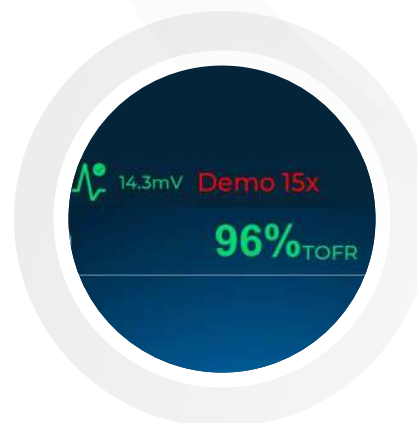
Credit: J.R. Renew et al. Journal of Clinical Anesthesia 108(2026)112066

Relationship between T1/Tc and the Composite Intubating Score. At the time of intubation, the ratio of the amplitude of the first twitch (T1) in the train-of-four (TOF) sequence to the baseline first twitch amplitude (Tc) was compared to the predicted probability of ideal (composite intubation score of 3) or acceptable (composite intubating score between 3 and 6), as modeled by logistic regression. Acceptable conditions are plotted in blue and ideal conditions in red. Error bars are the 95 % confidence intervals.

1. Renew JR, Estevez M, Maramba M, Heckman MG, Fang ZJ, Brull SJ, Epstein RH. Intubating conditions based on the time from rocuronium administration versus the train-of-four count: A randomized, prospective clinical trial. Journal of Clinical Anesthesia. 2026;108:112066.

Integrated Training and Demo Experience

An intuitive Demo Mode allows clinicians to experience a complete next-generation TetraGraph case in minutes. Powered by real clinical data, it provides an interactive walkthrough of key screens, workflows, and decision points—accelerating onboarding and supporting confident adoption across teams.



*Patent pending



Patented, Advanced, Noise-Cancelling Technology

Senzime's TetraGraph system features patented noise-cancelling technology, providing clinicians with precise and reliable patient monitoring during anesthesia. Its innovative design filters out operating room noise by generating a single stimulus signal and measuring noise when no response is expected to ensure clean and accurate data.

Unlike other monitors that require extra (ground) electrodes for noise cancellation, TetraGraph integrates this function into its software, enhancing ease of use, improving patient safety, and bolstering the anesthesia provider's confidence.



VERSATILE for a Wide Range of Patients and Procedures

Revitalizing the Modern OR with Clinician-Centric Connectivity

Next Generation TetraGraph: Engineering Precision in Every Measure

Next-generation TetraGraph was developed with modifiable portability to meld into a dynamic OR environment where every device is as vital as every member.



Connects with Senzime's family of flexible EMG sensors featuring EZClick™, offering 3.65m or 5.5m (12' or 18') cables to adapt to various surgical procedures, such as those with space and movement limitations, like tucked-arm and robotic cases.



TetraSens:
Adaptable for adult patients, ensuring precise neuromuscular monitoring for a wide range of surgical procedures.



TetraSensitive:
Customized for geriatrics and patients with sensitive skin. Hypoallergenic and latex-free with soft edges, including low-profile design.



TetraSens Pediatric:
Regulatory-cleared separately and specifically for infants ≥1 month**, with a low-profile, flexible electrode array gentle on delicate skin.



TetraCord with EZClick™
With the incorporation of our innovative EZClick™ design, the TetraCord provides a satisfying “click” feedback ensuring a secure connection that you can trust to not falter in critical moments. Its robust design is engineered for a firm hold, guaranteeing reliability in a variety of clinical settings.



TetraHub
TetraHub seamlessly connects TetraGraph® to supported external monitors and connectivity hubs, enabling automatic transmission and display of quantitative neuromuscular data, including TOF and TOFR. Designed for compatibility with EHR integration platforms, TetraHub helps streamline data flow and support efficient clinical documentation within existing hospital infrastructures.



TetraCom***
TetraCom seamlessly connects TetraGraph® to hospital EHR systems, automatically transmitting quantitative neuromuscular data—including TOF, TOFR, and PTC—for accurate documentation and streamlined clinical workflow. Built on HL7 with secure Wi-Fi or wired Ethernet, TetraCom makes objective monitoring easier to integrate than ever.

**Age is defined based on the Food and Drug Administration's FDA's guidance: "...the upper age boundary for neonates (through the first 28 days of life) and the lower age boundary for infants (29 days) are defined in days rather than months, consistent with national statistical standards for reporting neonatal and infant mortality according to post-natal age.
***Offered in partnership with R Group (NY, NY). Available in the U.S. only.

Industry-leading options combine seamless integration with external multiparameter monitors and electronic patient health records for an uninterrupted, linear workflow.

MEETING Tomorrow's Demands Today

Designed in Partnership
with Clinicians Across the Globe

Compelling reasons to bring a value-based, sustainable,
and future-proof solution into the OR:



Sorin J. Brull
MD, FCARCSI (Hon),

The visionary behind TetraGraph,
pioneered the technology with over four
decades of research and clinical
practice

Evolving from 40 years of research and feedback from patients and clinicians, the TetraGraph system was invented and tested in the USA, developed and manufactured in Sweden, and is now helping patients in over 30 (and counting) countries worldwide.

Developed and manufactured in Sweden with sustainability built-in as the first TOF monitor incorporating biocompatible materials and a fossil-free energy final manufacturing and assembly process in Uppsala, Sweden.

Future-proof, upgradable platform ready for upcoming software features to keep TetraGraph the State-of-the-Art in technological innovation.

Our community of healthcare providers trusts our unwavering commitment to excellence and utilizes a comprehensive array of features with personalized support from our dedicated team. Our technology prevails in the most demanding conditions to achieve superior patient care. With over 100 years of combined critical care and anesthesia experience, our clinicians will help integrate our technologies into any medical environment for meaningful outcomes that justify your investment every day.

CLINICAL
EDUCATION

IMPLEMENTATION
SUPPORT

POST GO-LIVE
ONGOING
SUPPORT

Explore Senzime Academy. Our eLearning platform is designed to help anesthesia providers master all the capabilities of the TetraGraph system quickly and effectively. Our free online courses ensure compliance with clinical guidelines and enhance patient safety. Access training anytime, anywhere, or use our exportable SCORM files for integration into your hospital's learning management system (LMS).



TECHNICAL SPECIFICATIONS

Modes of Operation

TOF Interval	15 seconds – 60 minutes
Automatic stimulus setup	Automatic detection of maximal current Supramaximal current 20% above maximal current
Train-of-Four (TOF Ratio & TOF Count)	4 pulses of 200 or 300 µs duration at 2 Hz repeated at user selected frequency of 15 seconds, 1 minute, 5 minutes, 15 minutes or 60 minutes
Post-tetanic Count (PTC)	PTC consists of Tetanic Stimulation, a set of 250 pulses (pulses at 50Hz over 5 seconds stimulated according to the current setting in the monitor) followed by up to 20 ST pulses at 1 Hz
Single Twitch (ST)	Pulse of 200 or 300 µs duration at 10 or 5 seconds
T1/Tc Intubation Readiness Indicator	T1/Tc ratio displays the relationship between the first twitch and the control twitch

Stimulation

Current	10–80mA @ 50 – 3750 ohm
Pulse Width	200 µs or 300 µs
Pulse Type	Monophasic square wave
Voltage	300V

Sensor Type

Integrated strip sensor	TetraSens disposable stimulator recorder
Sensor stimulus placement	Ulnar nerve or Posterior Tibial nerve
Sensor recording placement	Adductor Pollicis muscle (AP), Abductor Digiti Minimi muscle (ADM), Flexor Hallucis Brevis muscle (FHB)
Duration of use	Single use, cumulative use less than 24 hours on the same patient

Recording

Range	0mV to 50mV but with cut-off at 0.4mV
50/60 Hz filter	Yes
Measurement	Peak-to-Peak Measurement of Action Potential (MAP)

Graphics

Display	Color LCD, Brightness control, Touch Screen interface
MAP (Muscle Action Potentials)	Display of waveforms
TOF	Bar of four pulse amplitudes and %, trend of successive TOFR values
TOFC	TOF Count, integer and trend
ST	Amplitude of response, mV, series of response amplitudes as bars
PTC	Number of post-tetanic count

Power Supply

Charger	EN 60601-1 certified power supply 5V DC
Connection to mains electricity during use	TetraGraph must only be used with the provided power supply adapter
Battery	8 hours continuous operation with new battery in good condition
Battery Specifications	Rechargeable Lithium battery, Fey Elektronik
Cord length	3 meters

Dimensions

Length	215 mm ±10 mm
Width	116 mm ±10 mm
Thickness	38 mm ±10 mm , 85 mm ±10 mm including pole clamp
Weight	< 600g (including battery) < 800g (including battery and pole clamp)

Additional Features

Case Reference Number	8-digit number
Audible stimulus	On/Off
Data review	On-screen review of trend data
Data Interface	TetraHub
Connectivity	Philips Capsule, Philips IntelliBridge, Masimo DCX™, Masimo IRIS® Gateway, GE Healthcare CHA (European market only), Mindray N series (outside U.S. market), TetraCom (US market only), and Getinge Talis Hub (U.S. only)
Data Management	TetraConnect cloud-based connectivity portal to upload, view, share and export data
Communication Interface	USB-C (connected equipment: USB 2.0 or higher)
Patient Cable Cord length	3.65m and 5.5m cable options

Environment during storage

Temperature	5–50°C (41–122°F)
Relative humidity	10% to 85% non-condensing
Atmospheric pressure	50 kPa to 106 kPa

Environment during use

Temperature	15°C to 35°C (59°F to 95°F)
Relative humidity	10–85% non condensing.
Atmospheric pressure	50 kPa to 106 kPa

Standards Applied

IEC 60601-1:2005/AMD1:2012/AMD2:2020
EN 60601-1-2:2015/AMD1:2020
IEC 60601-2-40:2016 & IEC 60601-2-40:2024

Redefining Quantitative Train-of-Four (TOF) Monitoring with the Industry's First-Ever Level-of-Block Gauge™ + TetraGraph® Adaptive Intelligence™

COMMITMENT TO **Patient Safety :**

Our commitment propels healthcare providers to reach a new level of patient care, where every clinician is empowered, every patient assured, and the highest standards of care are not just met — they're invented.



Learn more?
[Sensime.com/NextGen](https://sensime.com/NextGen)

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