

Detecting the Invisible: Advancing Healthcare Sustainability with Precision Nitrous Oxide (N₂O) Leakage Monitoring and Reporting

RESULTS

- Real-time visibility of gas leakage
- Long term data and trend for critical insights
- Sustainable anesthesia practices and environmental stewardship within healthcare
- No disruption to existing infrastructure

APPLICATION

Detecting and quantifying N₂O leakage in Medical Gas Pipeline System (MGPS) and reporting data and analytics to relevant stakeholders.

INDUSTRY

Life Science / Healthcare

CUSTOMER

The Children's Hospital at Westmead, Sydney Children's Hospitals Network, NSW, Australia

CHALLENGE

Environmental Impact: N₂O significantly contributes to hospital carbon footprint and ozone layer depletion.

Financial Waste: Substantial volumes of nitrous oxide are lost through leakage, without being noticed, resulting in financial losses for hospitals.

Clinical Risk: Odorless and colorless, N₂O leaks are often undetectable and can disrupt supply reliability.

Traditional leak-detection methods like pressure testing provide only momentary snapshots, missing the continuous behaviour of the system. In contrast, real-time online flow measurement delivers high-resolution, ongoing insights, revealing that over 50%* of piped N₂O may be lost through unseen leakage. This improved temporal visibility enables actionable decision-making for effective pipeline management and meaningful emissions reduction.



"The analysis revealed nearly 50% pipeline leakage, providing a clear strategic pathway to eliminate waste and reduce more than 600 tonnes of annual emissions"

A/Prof Justin Skowno, University of Sydney & Director of Research Paediatric Anaesthesia, The Children's Hospital at Westmead

* 1. Skowno, J. J., Kahlaee, H. R., Inglis, A. J., McKinnon, D. & Asher, K. Hospital-level flow measurement to detect nitrous oxide leakage. *Anaesthesia* (2024) doi:10.1111/anae.16309.

SOLUTION

To address this challenge, Emerson engineered and delivered a custom, hospital level flow measurement and reporting solution that enables real time, continuous, and non invasive monitoring of nitrous oxide usage and leakage. The system was designed for installation at the gas source without disruption to existing infrastructure, supports a wide operating flow range, and provides continuous visibility into both total consumption and background losses.

Emerson Micro Motion™ Coriolis mass flowmeters were selected for their high accuracy, reliability, and repeatable multivariable measurement performance. Standardized volumetric flow rates were used for operational and reporting requirements, while total mass measurements were leveraged to independently verify cylinder weight and inventory balance. The flowmeters are self verifying through embedded factory calibration fingerprints, ensuring long term measurement confidence without the need for frequent recalibration.

Emerson integrated the flowmeters with a cloud hosted DeltaV™ SaaS SCADA platform via an on site PACSystems™ Edge computing solution, incorporating secure data handling and transmission. Clinicians can access live and historical trends on their preferred devices, including mobile phones, enabling immediate operational awareness. At the same time, data scientists and analysts can securely download historical and periodic datasets in standard file formats to support deeper analysis, reporting, and sustainability initiatives.



High-resolution Micro Motion Coriolis flowmeter system with DeltaV SaaS SCADA

DELTA V™
MICRO MOTION™
PACSYSTEMS™

