iAQ Pro

Frequently Asked Questions

This document is intended to provide technical clarification for professional users and distributors. Specifications and operational guidance are subject to change as the product evolves.

SENSORS

1. Sensing methods & expected drift

The iAQ Pro employs a hybrid sensor architecture (optical, electrochemical, MEMS, and solid-state). Each sensor class exhibits known aging and environmental sensitivities:

Sensor	Sensing Method	Expected drift
Particulate Matter	Optical particle counting with size binning and mass conversion	• Drift primarily results from optical contamination and does not have a specific drift rate. • An automated cleaning cycle that heats the internal optics to remove moisture and a high fan cycle to expel dust is run automatically after every five measurement cycles and can be triggered on demand • In high dust or high humidity environment, it is recommended to manually run the cleaning cycle from the settings menu before running a measurement cycle.
Carbon Dioxide	Non-dispersive infrared	• Long-term drift is low and automatic baseline correction reduces drift to typically <1–2% per year under indoor conditions.
TVOC & NO_x	Metal-oxide semiconductor, index based	• MOS sensors exhibit sensitivity drift with cumulative exposure and humidity cycling. • Values are reported as qualitative indices, not absolute concentrations
Temperature & Relative humidity	Solid-state digital sensing	• Solid-state sensors show minimal drift; typical long-term stability is suitable for continuous monitoring.
Differential pressure	MEMS based thermal mass flow pressure sensing	• Intrinsic sensor drift is very low. • Dominant error sources are port contamination, tubing kinks, or condensate, not sensor aging.
Sound level	Electret condenser mic with calibrated analog front end	• No drift due to aging. • The port is protected by a PTFE membrane that protects against dust and moisture.
Carbon Monoxide	Electrochemical gas cell	• Base line drift ±2 to ±5 ppm per year • Sensitivity drift (span) less than 5% per year • Drift is monotonic
Radon (e-POD)	Continuous electronic radon detection using ionization-based counting	• Less than 5% sensitivity change over a multi-year service life • There is no base line drift in the traditional sense as the background counts are statistically bounded • Radon uncertainty decreased with integration time going from ±25% @ 24 hours to less than ±5% at 72
Drywall Moisture	A combination of capacitive sensing and resistive impedance measurement	• Sensing electronics drift is negligible and is less than 0.1% over a span of years • Practical long-term drift is less than 1-2% full-scale per year • High humidity would cause temporary offset and can be corrected by using a known dry reference material in the same environment. Temperature compensation is built in. • Capacitive sensing provides long-term stability with minimal drift while impedance measurement offers high sensitivity to conductive moisture. Comparing both channels improves confidence if operating in high humidity.

2. Are PM and gas sensors single-point or multi-point calibrated, and at what intervals is recalibration recommended?
Calibration approach varies by sensor technology:

Particulate Matter (PM) & CO_2 (SEN66): Factory multi-point calibrated by the sensor manufacturer. CO_2 additionally uses automatic baseline correction to maintain long-term accuracy under typical indoor conditions.

Carbon Monoxide (electrochemical): Factory calibrated. Due to predictable age-related drift, annual recalibration is recommended for worker-safety, compliance, or defensibility-critical use.

TVOC / NO_x: Factory baseline characterization only. These are index-based qualitative sensors, not absolute concentration instruments, and are not field-calibrated in the traditional sense.

Differential Pressure: Factory calibrated; recalibration is typically not required unless physical ports or tubing are altered or contaminated.

3. How does the NO_x qualitative index translate in practice? What does a change mean?
The NO_x value reported by iAQ Pro is a qualitative air-quality index, not a ppm measurement. In practice, a change in the NO_x index indicates:

- Increased presence of combustion byproducts
- Changes in ventilation effectiveness
- Relative degradation or improvement of indoor air quality over time

Interpretation guidance:

- Use NO_x trends for pattern recognition and comparative analysis
- Correlation changes with occupancy, combustion sources, or ventilation events
- Do not cite NO_x values as regulatory concentration measurements

This aligns with how MOS-based air-quality indices are used in professional monitoring tools.

4. For PM measurements, is the device using optical particle counting converted to mass, and what assumptions are used?
Yes. *Optical PM measurements are not equivalent to gravimetric laboratory sampling*. iAQ pro PM measurements are derived through:

1. Optical particle counting
2. Size binning
3. Conversion to mass concentration (µg/m³)

Mass conversion uses:

- Standardized particle density assumptions
- Industry-accepted optical-to-mass models

5. Can raw sensor data (not just processed values) be exported for third-party analysis or expert review?
Yes. The iAQ Pro supports export of:

1. Raw and semi-processed sensor readings
2. Time-stamped data streams
3. Alert events and acknowledgements

Supported formats are CSV and JSON.

6. How is cross-sensitivity (e.g., VOC interference with gas sensors) handled or flagged?
iAQ Pro sensors are calibrated and deployed in accordance with their underlying measurement technologies. Quantitative measurements are provided where appropriate, while index-based sensors are intended for trend analysis and comparative interpretation. Raw data access, time-stamped records, and multi-parameter correlation support defensible reporting when used by qualified professionals.

While cross-sensitivity is an inherent characteristic of many gas-sensing technologies, it is explicitly accounted for in system design and documentation. iAQ Pro addresses cross-sensitivity through:

- Known sensor response profiles documented by the manufacturer
- Multi-parameter correlation (e.g., VOC index vs CO)
- Rate-of-change analysis to identify anomalous behavior performed by the end user
- Clear labeling of qualitative vs quantitative measurements in user guides

Rather than masking cross-sensitivity, the system emphasizes trend visibility and contextual interpretation, allowing qualified users to distinguish real environmental changes from known interference effects. *Final interpretation remains the responsibility of the trained professional.*

7. Drywall Moisture e-POD: Is the 0–100% moisture index relative or correlated to actual %MC?
The 0–100% moisture value is a relative moisture index, not a direct measurement of gravimetric moisture content (%MC).

Key clarifications:

- The index correlates to moisture presence and relative severity, not oven-dry mass fraction
- Readings are material- and condition-dependent
- Values are intended for comparative assessment, trend analysis, and documentation, not laboratory %MC certification

Moisture e-Pods are designed for professional screening, comparative analysis, and trend documentation. Measurements should be interpreted in context, using appropriate deployment duration, baseline reference, and professional judgment. The system supports defensible reporting when used in accordance with these guidelines.

8. Drywall Moisture e-POD: How is in-field calibration performed and documented?
The moisture e-Pod supports field baseline calibration.

Typical in-field calibration procedure is as follows:

1. Place the probe against a known dry reference material representative of the site
2. Establish a baseline reading
3. Store that baseline within the measurement session from the settings menu on the moisture card on the touch panel
4. Subsequent readings are evaluated relative to that baseline

Calibration events are:

- User-initiated
- Time-stamped
- Logged as part of the measurement record

9. Drywall Moisture e-POD: Can baseline readings from "known dry" materials be locked for comparison?
Yes. The system supports locking a dry baseline for comparative measurements, allowing:

- Side-by-side evaluation of suspect vs reference areas
- Trend tracking over time
- Clear documentation of moisture changes or remediation effectiveness

10. RADON e-POD: What is the minimum recommended deployment duration for actionable radon data?
The minimum recommended deployment duration is 48 hours. Radon measurement uncertainty is dominated by counting statistics, not sensor drift and integration time directly improves confidence. A minimum sampling time of 48 hours aligns with EPA guidance for short-term radon assessment. Longer deployments (72 hours or more) further reduce statistical uncertainty and are recommended when practical.

11. RADON e-POD: Is the ±0.8 pCi/L accuracy maintained during unattended multi-day logging?
Yes — within specified environmental conditions and appropriate integration duration.

Important clarification:

- Long-term stability of the radon sensor is high
- Measurement uncertainty decreases with longer integration time
- Accuracy during unattended multi-day logging is statistically stable, not degraded by sensor aging

The dominant source of uncertainty is short-term statistical variation, not drift.

12. RADON e-POD: How does the radon e-Pod compare methodologically to EPA-recognized radon devices?
The iAQ Pro radon e-Pod uses continuous measurement principles consistent with EPA-recognized radon monitors but is intended for professional screening and documentation rather than laboratory certification.

Methodologically, the radon e-Pod operates on the same continuous measurement principles as EPA-recognized continuous radon monitors (CRMs):

- Continuous electronic detection
- Time-integrated radon concentration
- Statistical averaging over defined deployment periods

The key distinctions are:

- EPA "gold standard" instruments are optimized for regulatory certification and laboratory workflows
- iAQ Pro radon e-Pod is designed for professional screening, trend analysis, and mitigation verification

Radon e-Pods are designed for professional screening, comparative analysis, and trend documentation. Measurements should be interpreted in context, using appropriate deployment duration, baseline reference, and professional judgment. The system supports defensible reporting when used in accordance with these guidelines.

13. Are radon and moisture e-Pods hot-swappable, or must the unit be powered down?
e-Pods are electronically hot-swappable.

Best practice:

- Pause or stop an active measurement session
- Insert or remove the e-Pod
- Resume logging to maintain clean data segmentation

Power-down is not required, but proper session handling is recommended for defensible records.

CLOUD

1. Who owns the data

The end user owns all collected data.

- Automation Research Group (ARG) acts solely as a data processor, not as a data owner.
- Distributors do not own customer data unless explicitly contracted by the end user.
- ARG does not sell, monetize, or repurpose customer measurement data

2. Is there a full data export (CSV/JSON) including timestamps, alerts, and audit trails?

Yes. The cloud platform supports full historical data export, including:

- Time-stamped sensor readings
- Alert events and thresholds
- Alert acknowledgements
- Device metadata and deployment context

Supported export formats are CSV and JSON.

3. How long is historical data retained if the cloud service is discontinued?

If the optional $5/month/unit cloud service is discontinued:

- Data remains accessible for a defined grace period of 60 days.
- Users are provided with the opportunity to perform a full export via email and SMS (registered account information) alerts.
- ARG does not delete data without a final notice and a further 24 hours of grace period.
- Local device storage also ensures that data is not immediately lost if connectivity or service lapses.

4. **Are timestamps synchronized to NIST or cellular time standards?**

Device timestamps are synchronized using cellular network time sources. Cellular time is continuously corrected and traceable to national time standards (including NIST). Time synchronization is maintained automatically without user intervention.

5. Is the cloud environment SOC-2, ISO 27001, or equivalent compliant?

The cloud infrastructure is designed and operated in accordance with industry-standard security best practices, consistent with:

- SOC-2 principles
- ISO 27001-aligned controls
- Key elements include:
- Encrypted data in transit and at rest
- Role-based access control
- Secure authentication
- Audit logging

Formal certification status may vary by deployment and hosting provider, but the architecture follows enterprise-grade security expectations.

6. Can multiple stakeholders be given read-only access?

Yes. The platform supports role-based, read-only access for multiple stakeholders, including:

- Industrial hygienists (IH)
- Insurance carriers
- Contractors
- Regulators
- Property owners or consultants

Access controls ensure:

- Data integrity
- No unauthorized modification
- Clear separation of roles and responsibilities

7. Scope of the Cloud Service:

The optional cloud service provides:

- Secure data storage
- Fleet dashboards
- Alert delivery (SMS/email)
- Remote access to historical data
- Multi-stakeholder visibility
- Device updates

The service is not required for device operation but significantly enhances unattended monitoring, reporting efficiency, and defensibility. *All measurement data collected by iAQ Pro devices remains the property of the end user. Automation Research Group provides secure data processing, storage, and access controls in support of professional monitoring workflows. Full data export, time-stamped records, and role-based access support defensible reporting and audit requirements.*

Alerts, Alarms & Compliance Use

1. Are alert thresholds user-configurable per project, or globally fixed?
Alert thresholds are user-configurable on a per-project or per-deployment basis. Thresholds are not globally fixed

Each project may define:

- Parameter limits
- Alert logic
- Notification rules

This allows thresholds to be tailored to:

- Site-specific conditions
- Regulatory guidance
- Project scope or contractual requirements

2. Can alerts be triggered by rate of change?
Yes. Alerts may be triggered by rate-of-change conditions, enabling detection of:

- Sudden containment failures
- Rapid particulate releases
- Abrupt environmental changes

3. Can alerts be triggered by duration above a threshold?
Yes. Alerts may be configured to trigger when a parameter exceeds a threshold for a defined duration (set from the alert settings menu for each sensor). Short transient spikes are intentionally ignored

4. Can alerts be triggered by combined parameters (e.g., pressure + PM spike)?
Yes. The alert system supports multi-parameter logic, allowing alerts to be generated based on logical combinations (e.g., pressure loss and PM increase). This feature is available in the alert settings menu.

5. Are alert acknowledgements logged for chain-of-custody and audit purposes?
Yes. Alert acknowledgements are:

- Time-stamped
- User-associated
- Logged as part of the measurement record

The system maintains:

- Alert creation time
- Notification delivery
- Acknowledgement events

6. Is there a fail-safe alert if cellular connectivity is lost for a defined period?
Yes. The system supports connectivity-loss detection and alerting. Loss of cellular communication beyond a defined interval (a default of 30 minutes and can be changed from the COMM settings menu) can generate an alert. Local data logging continues uninterrupted during connectivity loss. Once connectivity is restored, buffered data is synchronized to the cloud along with the alert message containing the outage details.

Power, Runtime & Environmental Limits

1. The unit claims up to 72 hours of unattended operation—under what conditions?
The stated 72-hour unattended runtime is based on periodic environmental sampling at approximately one sample per minute, with batched cellular transmission every 10–15 minutes, using the full base sensor suite under typical alert conditions.

- Higher sampling rates or more frequent uploads will reduce runtime
- Continuous alert states will reduce runtime
- Pass-through charging is recommended for multi-day fixed deployments

2. How does battery life change with cellular transmission frequency?
Battery life scales primarily with cellular upload interval. As a reference, 15-minute batch uploads support the 72-hour design basis, while 5-minute uploads typically reduce runtime into the 55-to-65-hour range, and 1-minute uploads may reduce runtime into the 35 to 50 hour range depending on signal strength and transmission retries.

3. How does battery life change with high alert frequency?

- If alerts cause one extra uplink every 5 minutes, treat runtime like the 5-minute upload case above (~55–65 h).
- If alerts cause near-continuous uplinks, runtime approaches the 1-minute upload case (~35–50 h).

4. Is there pass-through charging for continuous long-term deployments?
Yes. The unit supports pass-through operation while charging. For multi-day fixed deployments (week+), use continuous USB-C power (plug the supplied charger into a wall or use a high-capacity power bank to supplement the internal battery) and let the battery act as ride-through.

5. What happens to data if the battery is fully depleted?
There is no loss risk. Data is stored locally on the device. If the battery depletes:

- Logging stops safely
- previously recorded data remains intact

When power returns:

- Logging resumes
- buffered data can be uploaded/synchronized

6. What are the operating environmental limits?

- Operating temperature: 0–50 °C
- Up to 90% rH, non-condensing.

Avoid rapid transitions from cold-soaked storage to warm humid environments. If the unit has been stored cold, allow it to equilibrate sealed in a bag before deployment to prevent internal condensation.

7. Is the enclosure IP-rated for dust / high humidity / light water exposure?

- Designed for indoor industrial and remediation environments
- Tolerant of dusty air and high humidity
- Not intended for water spray, washdown, outdoor rain exposure, or submersion

8. Is the unit OK in negative-pressure containment environments?

Yes. This is a core use case.

- Differential pressure range: ±500 Pa
- Accuracy: ±2 Pa
- Alerts are programmable (published)

9. Are pressure ports protected from clogging or condensate?

Yes, by design — but maintenance is still required in heavy dust.

- Ports are recessed/protected and suitable for dusty containment environments
- In extreme dust loading, recommend:
- quick visual inspection at deployment start
- clearing ports after high-dust events
- Condensate is treated as an environmental condition to avoid (don't place the unit where liquid water can enter ports

Calibration, Service & Warranty

1. What actions void the 1-year warranty?
The standard 1-year limited warranty covers defects in materials and workmanship under normal use.

The warranty does not cover failures resulting from:

- Unauthorized modification or repair
- Use of third-party or non-approved e-Pods or accessories
- Mechanical damage, abuse, or improper handling
- Exposure to condensing moisture, liquid water ingress, or washdown
- Operation outside published environmental limits
- Damage caused by improper power sources or cabling
- Unauthorized firmware modification or bypassing system protections
- Normal wear of consumable or time-limited sensing elements (e.g., electrochemical gas sensors)

Important clarification:

- Field baseline calibration (e.g., moisture dry-reference baselining) does not void the warranty, as it is part of normal operation.
- Sensor recalibration must follow approved procedures.

The iAQ Pro platform is designed for professional use with defined calibration and service boundaries. Field baseline procedures that are part of normal operation do not void warranty coverage, while unauthorized modification, third-party accessories, or operation outside specified limits are excluded. Factory and approved third-party calibration options are available to support defensible monitoring workflows.

2. Is calibration performed in-house only, or can certified labs do it?
Calibration may be performed:

- In-house by Automation Research Group (ARG), or
- By approved or certified third-party calibration laboratories, depending on sensor type and application

Guidance by sensor class:

- CO (electrochemical): Typically calibrated by ARG or an approved gas-calibration lab
- Differential pressure: Factory or lab calibration; field adjustment is not normally required
- PM / CO_2: Factory-calibrated modules; recalibration is not typically performed in the field
- Moisture: Field baseline calibration supported and documented
- Radon: Factory calibration; no routine field calibration required

Use of unapproved calibration methods may void warranty coverage for affected sensors.

3. What is the typical turnaround time for service or recalibration?
Typical service timelines are:

- Inspection / standard recalibration: ~1–2 weeks
- Repair involving component replacement: may require additional time depending on parts availability
- Turnaround times may vary based on workload, sensor type, and shipping logistics.

4. Are loaner units available during service events?
Yes — loaner units may be available for qualifying customers, subject to:

- Fleet size
- Service scope
- Availability at the time of request

Loaner programs are typically arranged through Quantisyn and are intended to minimize downtime for critical monitoring deployments. ARG can support Quantisyn with additional stock for loaner units.

Roadmap & Expandability

1. What additional e-Pods are planned (timeline and sensor types)?
The iAQ Pro platform was designed from the outset as a modular base + e-Pod system, with expansion as a core requirement rather than an afterthought.

Planned and under-evaluation e-Pod categories will include:

- Additional target gas sensors (application-specific)
- External probes for specialized environments
- Industry-specific sensing modules aligned with remediation, IAQ, and industrial hygiene workflows

2. Will future sensors require new base hardware, or remain backward compatible?
Backward compatibility is a primary design constraint.

- The current iAQ Pro base hardware is designed to support future e-Pods.
- New sensors are expected to remain compatible via firmware and pod updates.

3. Is the expansion port proprietary, and how long is it expected to be supported?
Yes — the expansion interface is proprietary.

This is intentional and provides:

- Controlled electrical and protocol behavior
- Consistent performance and power management
- Protection against unreliable third-party accessories

The expansion interface is intended to be supported for the full-service life of the iAQ Pro platform. Automation Research Group does not treat the port as a short-lived or experimental feature. The iAQ Pro platform is designed for long-term expansion through backward-compatible e-Pods. The proprietary expansion interface ensures controlled performance, reliability, and continued support across future sensor additions.

Commercial & Deployment Model

1. Are there fleet discounts on cloud services?
Yes.

Fleet pricing tiers are available for larger deployments. Discounts are structured to support:

- Multi-unit customers
- Long-term monitoring programs
- Distributor-managed fleets

Fleet pricing is handled through distributor agreements and scales with volume.

2. Can distributors brand dashboards or reports?
Yes. The cloud platform supports:

- Distributor branding of dashboards
- Customized report headers and exports
- White-label or co-branded presentation, depending on agreement terms

3. Is pricing expected to remain stable beyond Q1 2026?
Yes.

- Current pricing reflects mature hardware and supply-chain assumptions
- No structural pricing changes are anticipated beyond Q1 2026
- Adjustments, if any, would be driven by extraordinary component, tariff or carrier cost changes, not routine revisions

4. Are there minimum cloud service commitments?
No.

- Cloud service is offered on a per-unit, month-to-month basis
- There are no mandatory long-term commitments
- Customers may discontinue cloud service while retaining full device functionality and local data access

The iAQ Pro commercial model is designed to support scalable fleet deployments without long-term lock-in. Cloud services, branding options, and pricing structures are aligned to distributor and enterprise needs while preserving customer flexibility.

Regulatory & Defensibility Questions

1. Has the device been used in regulatory-accepted monitoring programs (OSHA, EPA, state EPD)?
At this time, the iAQ Pro has not yet been deployed as part of a formally regulated OSHA, EPA, or state EPD compliance program.

Important clarification:

- OSHA and EPA typically regulate methods and outcomes, not specific commercial instruments
- Acceptance is generally based on:
    - Measurement methodology
    - Documentation practices
    - Professional interpretation
    - Use of appropriate instruments for the stated purpose

The iAQ Pro is designed to support professional screening, documentation, and trend analysis, which are commonly used alongside regulatory workflows rather than as sole certification instruments.

2. Can you provide a white paper or validation study comparing iAQ Pro data to existing commercial instruments?
A formal third-party validation study has not yet been published, but this is an explicitly planned activity.

- Planned validation scope (anticipated):
- Side-by-side comparisons under controlled conditions
- Focus on:
    - PM trends and response behavior
    - CO_2 correlation
    - Differential pressure agreement
- Comparison against commonly used professional instruments (e.g., TSI, GrayWolf)

The intent is methodological comparison and correlation, not claims of equivalence to laboratory certification instruments. Until such a study is published, iAQ Pro data should be positioned as professionally collected screening and monitoring data, not as a replacement for lab-certified measurements.

Automation Research Group intends to publish correlation and validation data as the platform sees broader field deployment.

3. How should iAQ Pro data be cited in reports? Does the vendor provide recommended language?
Yes. Automation Research Group provides recommended citation language to support defensible reporting.

Recommended report citation language (use verbatim)

> Environmental measurements were collected using the iAQ Pro multi-parameter monitoring platform. Data were recorded as continuous field measurements for screening, trend analysis, and documentation purposes in accordance with manufacturer guidance. Results should be interpreted in context and are not intended as laboratory-certified measurements.

Optional expanded language (for IH or insurance reports)

> The iAQ Pro platform integrates multiple sensing technologies and provides time-stamped, continuous environmental data. Measurements are suitable for professional screening, comparative analysis, and documentation when interpreted by a qualified professional.

The iAQ Pro platform is intended to support professional environmental monitoring workflows, including screening, trend analysis, and documentation. It is not marketed as a substitute for laboratory-certified instruments. When used appropriately and documented correctly, iAQ Pro data supports defensible decision-making in industrial hygiene, remediation, and insurance contexts.