

THE CRITICAL IMPACT OF SENSOR CHOICE IN MEDICAL DEVICES

The long-term accuracy, sensitivity and reliability of sensors will have a direct impact on the safety, quality and clinical trust of a medical device

Honeywell

CONTENTS



INTRODUCTION



Choosing the right sensor early in the design process helps reduce added development costs and accelerate speed to market for new products, while helping prevent costly field failures, reducing compliance risk and improving patient outcomes.

This e-book highlights essential considerations for selecting sensors and demonstrates how enhanced reliability can differentiate products in a competitive market, giving healthcare innovators and medical device developers a competitive edge and supporting business growth.

Systemic and societal changes driving the adoption of advanced medical devices

Healthcare and patient care continue to evolve based on advances in technology to improve the patient journey and ultimately, treatment outcomes. The rise in chronic diseases such as cardiovascular conditions, diabetes and respiratory disorders, along with aging populations and a shift toward value-based preventive care, is escalating the demand for advanced medical devices.

As they become more integral across the healthcare ecosystem, a heightened focus on performance will likely increase exponentially. To help medical devices withstand this increasing pressure, advances in sensors and sensing technology that prioritize reliability as much as functionality will be required.

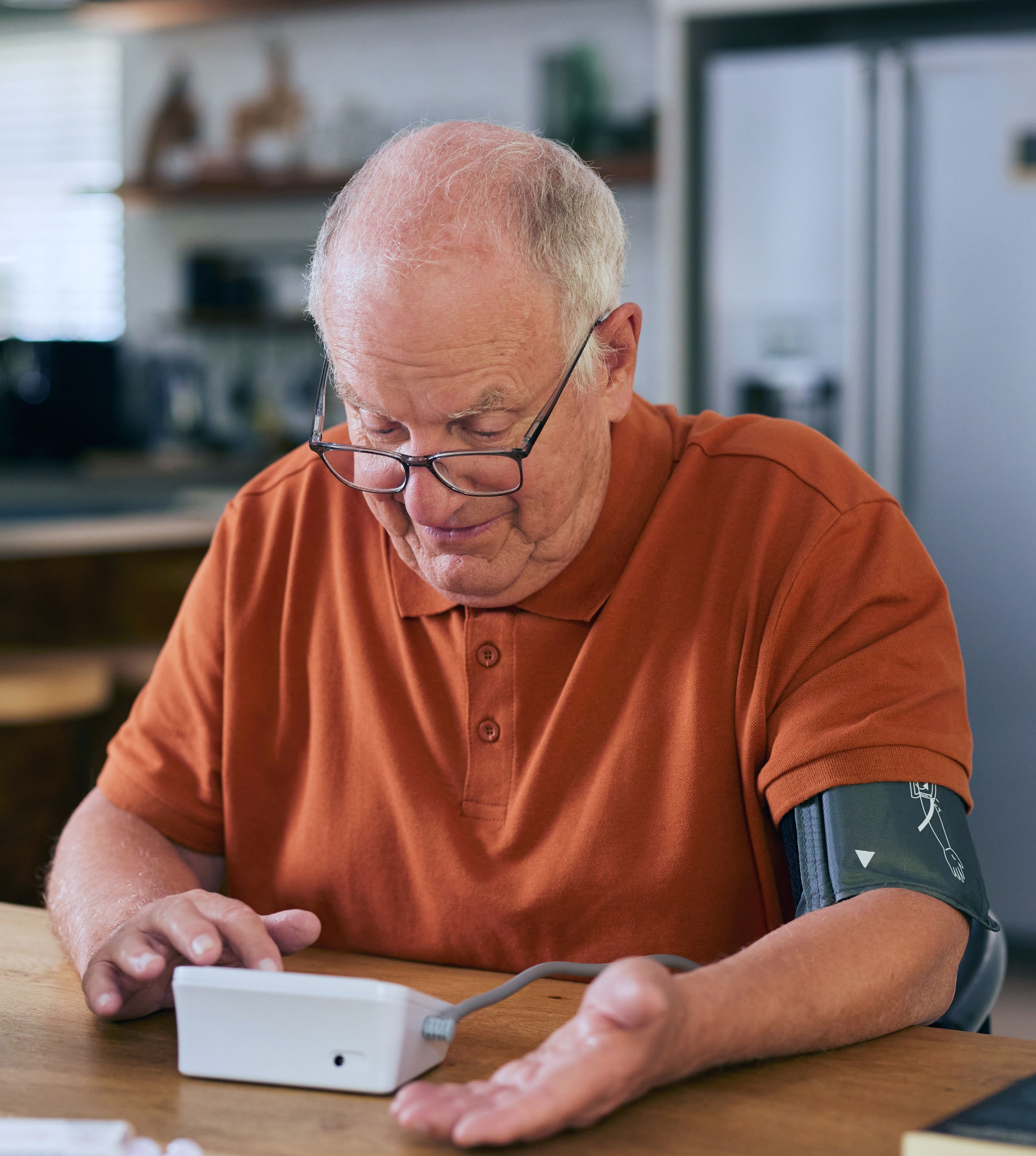
GROWTH OF MEDICAL DEVICES AND THEIR IMPACT ON PRECISION MEDICINE

The convergence of these systemic and societal changes is increasing the demand for:

- Diagnostic and monitoring devices
- Surgical implants
- Home-based monitoring
- Rehabilitation tools
- Wearable, connected and remote-monitoring technologies

These technological innovations, which include miniaturized sensors, wireless data transmission and AI-powered analytics, are enabling new device categories and expanding applications for existing ones, which in turn escalate the demands on sensing technology, with reliability being a critical consideration.





Let's take a closer look at some of the key drivers impacting the medical device market and elevating the importance of reliable sensing technology.

A shift to decentralized and home-based care

Healthcare is moving beyond hospitals to homes and remote settings, driving demand for compact, portable and highly reliable medical devices enabled by precision sensing.

Tighter regulatory scrutiny and risk management

Stricter global regulations are pushing medical device manufacturers to prioritize sensor partners who offer built-in quality assurance, compliance-ready documentation and long-term reliability.

Smart, connected and data-driven devices

The next generation of healthcare devices requires intelligent, data-enabled sensors that seamlessly integrate with digital systems to power real-time monitoring, analytics and connected care ecosystems. These next-generation sensors also have built-in diagnostic capabilities that continuously monitor the sensors to ensure optimal functionality.

Global supply chain fragility and localization pressure

Recent disruptions have made supply chain stability a top concern, creating a competitive edge for sensor providers and medical device developers with in-house manufacturing, diversified sourcing and long-term continuity planning.

Together, these trends position the medical device industry not only as a growth engine within healthcare but also as a primary driver of how care will be delivered in the future. And the realization of this transformation relies heavily on the functionality and reliability of sensors and sensing technology.

THE IMPORTANCE OF SENSOR TECHNOLOGY IN MEDICAL DEVICES

As the “nervous system” of modern medical devices, sensors provide the critical data that clinicians, patients and connected systems rely on to make life-changing and life-saving decisions. These signals drive the functionality, safety and accuracy of today’s healthcare solutions.

In an era where precision medicine, remote monitoring and preventive care are rising priorities, sensor technology has moved from a supporting role to a central pillar of medical innovation. And with an expanding place in healthcare delivery, reliability is as important as functionality.

Sensor technology is the control center of modern medical devices. It transforms raw physiological and environmental signals into actionable insights that improve diagnostics, treatment and patient safety. As healthcare shifts toward personalized, preventive and connected care, the role of medical devices will continue to expand. You need a partner whose sensing technology can help you develop your device capabilities and your business opportunities.

Engineering for precision and performance

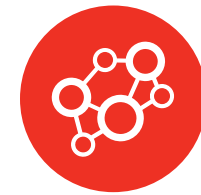
At Honeywell, consideration of a wide range of factors guides our work with our customers, along with a focus on building in performance features that address:



Accuracy and reliability



Data security



Biocompatibility



Environmental robustness



Power efficiency

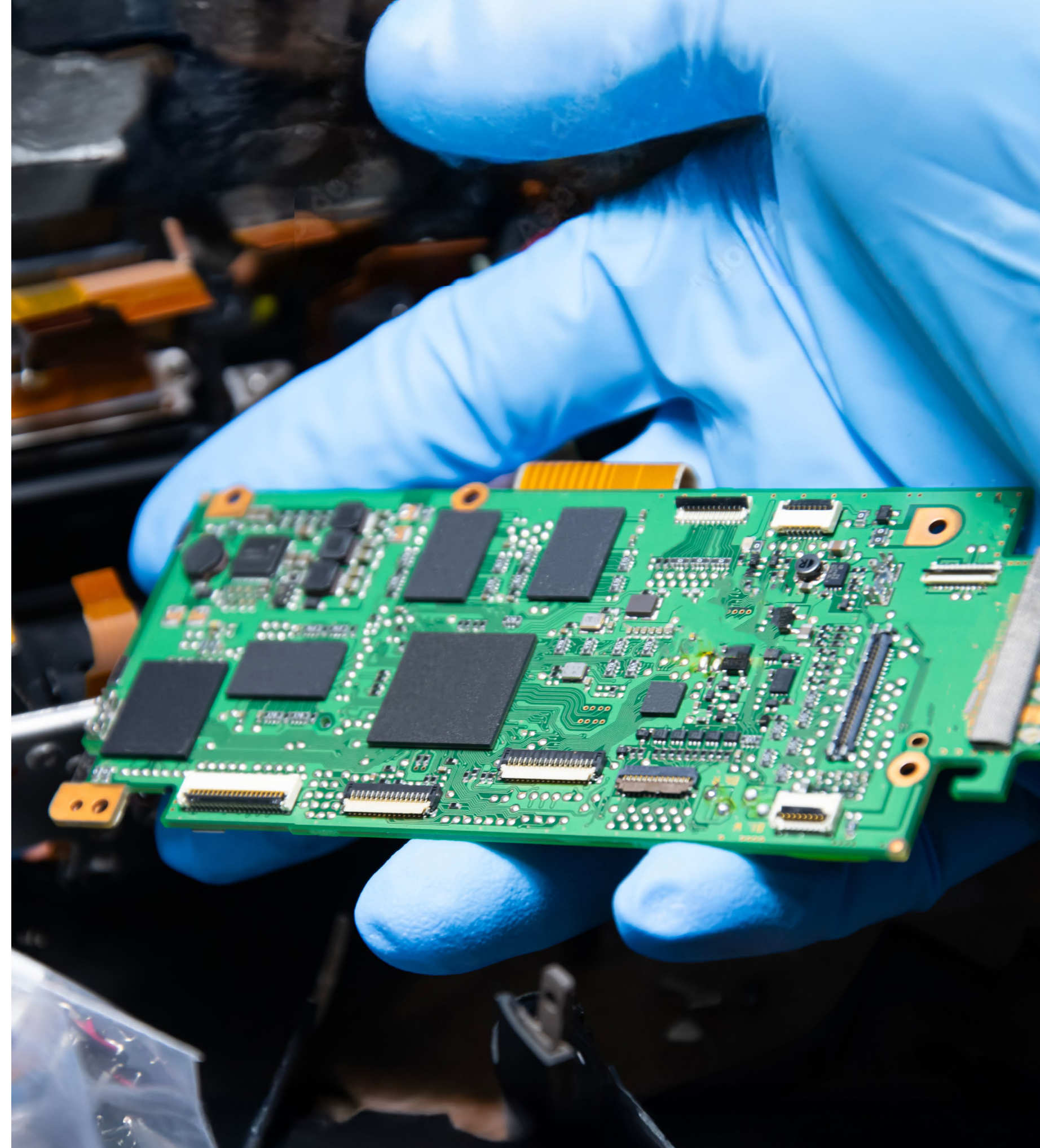


Regulatory requirements

TYPES OF SENSORS IN MEDICAL DEVICES

At Honeywell, we develop sensors and sensor technologies used across a range of devices and customized to specific applications such as:

- Pressure
- Force
- Air flow
- Liquid flow
- Temperature
- Medical gas
- Magnetics



SENSOR RELIABILITY IS NOT OPTIONAL IN TODAY'S HEALTHCARE ENVIRONMENT

While innovation, miniaturization and data analytics have made medical sensors increasingly capable, their reliability ultimately determines their clinical value.

In healthcare, there is no tolerance for close enough. Sensor readings are not just “data points” but insightful and invaluable inputs that drive medical diagnoses, therapeutic decisions and, in some cases, automated life-sustaining interventions. A sensor that is fast but occasionally wrong is not just flawed; it can be dangerous. A lack of reliability should not become a liability.

Reliability in sensor technology encompasses accuracy, consistency, durability and fault tolerance over the device’s intended lifespan and under the full range of operating conditions. Sensors play a key role across the healthcare spectrum and have an outsized impact on:

- Patient safety
- Clinical decision-making
- Trust in medical devices
- Regulatory compliance and liability
- Economic efficiency



RIGHT FROM THE START: APPLYING DESIGN THINKING TO ENHANCE RELIABILITY

You only get one chance to do something right the first time. We take this thinking to heart, which is why we apply design thinking in our sensor development process and employ multiple strategies to enhance reliability:

Material selection

Choosing corrosion-resistant, biocompatible and mechanically robust materials for sensor surfaces and housings. Materials that are also compatible with cleaning and sterilization requirements.

Signal processing algorithms

Implementing advanced filtering to distinguish real physiological signals from noise.

Self-diagnostics

Designing sensors that contain built-in diagnostics that can detect their degradation or malfunction and issue alerts to users.

Redundancy

Using multiple sensing modalities (e.g., optical and electrical) to cross-verify readings.

Ease of calibration

Providing mechanisms for simple, user-friendly recalibration when required.

Fail-safe defaults

Ensuring that in the event of a malfunction, the device reverts to a safe mode or alerts the clinician immediately.

By incorporating thoughtful design approaches into sensor development, we've built a long-term reliability track record that we're proud of, and more importantly, one that has delivered exponential benefits to our customers and their customers.



Reliability as a differentiator for device developers

As medical devices become more connected and autonomous, feeding data to AI algorithms, triggering automated drug delivery or guiding robotic surgery, the cost of unreliable sensors grows exponentially. The trend is clear: reliability is not just a requirement; it's a differentiator. Devices that consistently deliver trustworthy data will earn clinician and patient loyalty, pass regulatory hurdles more smoothly and command premium market positions. No matter how advanced the technology becomes, the fundamental truth will remain: In medicine, a sensor is only as valuable as it is reliable. And it is only as reliable as the data being collected. Bad data in equals bad data out.

GETTING A SENSE OF HONEYWELL AS A PARTNER

Honeywell has deep domain knowledge and an R&D history to be a trusted, long-term partner. With several industry-defining patents, we have the expertise to engineer custom solutions to fit our partners' needs. We offer a single source for all sensing needs, with a broad portfolio of sensors for pressure, airflow, liquid flow and temperature.

Few sensor developers actively market or build for regulatory alignment, leaving risk management to their customers. With in-house QA and test protocols, we provide an added layer of assurance to our design partners.

When combined with our engineering and application expertise, and brought in early in the design process, we are uniquely positioned to help our partners develop medical devices that deliver industry-leading reliability, functionality and performance.





Engineering excellence and application precision

Honeywell delivers deeply engineered, high-performance sensors designed to meet the stringent accuracy, durability and reliability demands of healthcare applications.

- **50+ years of sector experience; 40 years fabricating sensors in-house**
- **Rigorous quality testing aligned with FDA and global compliance standards**
- **Long-term reliability, critical for devices with multiyear life cycles**

Breadth and depth of portfolio

With one of the industry's largest sensor portfolios, spanning pressure, airflow, liquid flow and more, Honeywell simplifies sourcing and accelerates device innovation across a wide range of healthcare applications.

- **50,000+ SKUs including board mount, force, airflow, temperature and more**
- **Proven use cases in ventilators, infusion pumps, dialysis, oxygen concentrators, diagnostic and laboratory equipment, etc.**
- **Design flexibility for hospital, lab and at-home use cases**

Customization and integration support

Honeywell offers unmatched sensor configurability and engineering support to meet the unique needs of device manufacturers, without compromising speed or quality.

- **5M+ configuration options for board-mount sensors**
- **Dedicated engineering teams, supporting custom designs and design-for-compliance insight**
- **Total cost of ownership approach minimizes long-term risk**

Global stability and strategic partnership

Honeywell combines global reach, in-house manufacturing control and a resilient supply chain to ensure long-term availability and support as a strategic partner, not just a supplier.

- **In-house die and ASIC manufacturing to minimize end-of-life disruptions**
- **Presence in 70+ countries, 200+ locations globally**
- **Proven support throughout the product lifecycle**



CONCLUSION

Honeywell Sensing Solutions empowers healthcare innovators to design safer, smarter and more reliable medical devices through one of the industry's most extensive portfolios of precision-engineered, customizable sensors, all backed by decades of domain expertise, regulatory excellence and a globally resilient supply chain.

This evolution to precision medicine requires precision equipment, built with precision technology by people who understand how to bring precision to life, or in this case, health.





Honeywell

For more information:

[Sensing Solutions | Honeywell](#)

Honeywell Sensing Solutions

830 E Araphao Rd
Richardson, TX 75081

©2025 Honeywell International Inc.