SENSOR.KOSMOS.

Issue 36 I November 2026



SENSITEC SENSORS IN MOTION

Dobot relies on TMR technology from Wetzlar

NEW MULTI-CHIP PACKAGES FROM SENSITEC

Maximum integration for the next generation of magnetoresistive sensor solutions

A LOOK BACK OVER 15 YEARS

How innovations from 2011 to the present day are shaping sensor technology.

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5 YEARS OF JOINT DEVELOPMENT
INNOVATION WITH A VISION FOR THE FUTURE

Five years ago, the merger of Sensitec and the Sinomags Group marked the beginning of a new chapter in our company's history. Looking back, it is clear that this partnership has developed into a strong foundation for technological growth and international collaboration. The combination of German expertise in development and application, together with efficient, vertically integrated manufacturing, opens up new opportunities – both for our customers and for the further development of magnetic sensor technology.

Recent years have been characterised by a steadily rising demand for magnetoresistive sensors. TMR technology, in particular, is becoming increasingly important worldwide. To keep pace with this development, we have expanded our wafer manufacturing capacity through targeted investments. At the same time, our development and production teams are continuously working on new TMR stacks, innovative sensor designs and optimised manufacturing processes to meet the growing demands of a wide variety of applications.

Our product portfolio is also evolving. The trend is towards more highly integrated sensor solutions with an expanded range of functions. Modern multi-chip packages combine sensor technology and signal processing in a compact design, enabling easier integration into our customers' systems. This results in high-performance solutions that combine precision, reliability and cost-effectiveness.

This development is particularly evident in robotics. Magnetic sensors are now a key component of modern automation solutions and are used in collaborative robots as well as in highly dynamic drive systems.

One particularly exciting field for the future is humanoid robotics. Robotic dogs and humanoid systems require a wide range of high-precision sensors to detect angular and joint movements. Here, TMR sensors offer decisive advantages thanks to their high resolution, energy efficiency and reliability. Initial applications are already demonstrating the potential of this technology.

At the same time, the rapid development of artificial intelligence is transforming numerous areas of life and the economy. As data centres, smart production facilities and high-performance power supply systems are expanded, the need for precise current measurement is also growing.
The Sinomags Group has a broad portfolio of current sensors in this area and is thus able to support applications ranging from industrial automation and renewable energy to modern AI infrastructures.
The market also confirms this trend. High growth rates are expected to continue for magnetoresistive sensors in the coming years, with TMR technologies in particular showing above-average growth.
These prospects underscore the importance of continuous investment in research, development and manufacturing.
Another milestone is on the horizon with the Sinomags Group's planned initial public offering in Hong Kong. This demonstrates the group's successful development whilst laying the foundations for further growth and future investment. For us, this is above all a sign that magnetoresistive sensor technology is increasingly recognised worldwide as a key technology for the mobility, energy supply and automation of tomorrow.

In this issue of Sensor.Kosmos, we take a look at these developments. It showcases new products, innovative technologies and examples of applications that illustrate just how widely magnetic sensor technology is already being used today – and what opportunities it opens up for the future.
I hope you find these insights into current developments interesting and that you enjoy reading this issue.



René Buß
CTO / VP Innovation & Sales

SENSITEC SENSORS IN MOTION

Dobot relies on TMR technology from Wetzlar



We are delighted to announce an exciting new partnership: our collaboration with **Shenzhen Dobot Corp Ltd., China.**

Dobot is now one of the leading suppliers of collaborative robots (cobots). The company was founded in 2015 and has developed into an internationally established manufacturer within just a few years.
Its product portfolio comprises various robotic solutions for applications in the automotive industry, electronics manufacturing, medical technology and other industrial sectors.

We are therefore all the more delighted that Dobot has chosen to use Sensitec's sensor technology in the development of its innovative four-legged robot.
In this way, sensor technology from Wetzlar/Mainz is helping a rover from China to race across the world – or perhaps even through world history – with precision, dynamism and intelligent motion control.

www.dobot-robots.com



A total of **48 TA903 TMR sensors** are used to precisely measure the movements in the joints and wheels. These are integrated into eight joints and four wheels and enable precise motion control of the system.

TMR sensors (tunnel magnetoresistive sensors) offer significant advantages over conventional Hall sensors. These include, in particular, high sensitivity, low power consumption, excellent linearity and high temperature stability.
These properties play a particularly important role in demanding applications in robotics, enabling precise and reliable motion detection.

The TMR chips used in the Dobot application are developed by our team and manufactured at our own wafer production facility in Mainz. This high level of vertical integration enables us to closely integrate development and production, as well as to continuously refine our technologies and solutions.
Robotics is one of the most dynamic fields of technology of our time. Together with our majority shareholder, **Sinomags**, we are systematically expanding our activities in the field of cobot and robotics applications. Our collaboration with Dobot demonstrates the contribution that modern sensor technology can make to the development of intelligent and precise motion sequences – and we look forward to many more joint projects in which our sensors will measure the motion of the future.

Peter Radde, Managing Director



When technology inspires:
Peter Radde meets the Dobot Rover.

Our Managing Director, Peter Radde, is pictured here together with DOBOT's four-legged robot.
Thanks to his close collaboration with our majority shareholder, Sinomags, and his regular visits to China, Peter has first-hand knowledge of the Asian market and its dynamics. Whilst there, he had the opportunity to see the robot's capabilities for himself.
He was particularly impressed by the precise and fluid movements, as well as the system's dynamism. The rover follows its user, moves confidently through its surroundings and reacts with extreme precision to different movements – aided by the intelligent sensors in its joints and wheels.

Applications such as these impressively demonstrate the potential that lies in the combination of modern sensor technology and innovative robotics. At the same time, they highlight how development and manufacturing expertise from Wetzlar and Mainz is helping to actively shape the technologies and applications of tomorrow.



Claudia Ulbricht, Marketing & PR

BIOTRONIK
excellence for life

Reliable sensor technology for MRI-compatible cardiac implants

When precision sensor technology helps to make medical innovations safe and sustainable

Growing demand for MRI diagnostics among heart patients

Magnetic resonance imaging (MRI) is now one of the most important imaging techniques in modern medicine. It provides high-resolution images without the use of ionising radiation and plays a central role in the diagnosis of numerous conditions. At the same time, the number of patients with implantable cardiac devices such as pacemakers or implantable cardioverter-defibrillators (ICDs) is steadily increasing. It is estimated that around one in two patients with such an implant will require an MRI scan at some point in their lives. [1]

In the past, MRI scans were often restricted or impossible for this patient group, as strong magnetic fields and electromagnetic interference could impair the function of the implants.[2]

MRI-compatible cardiac implants

So-called MR-conditional systems have been developed to enable patients with cardiac implants to undergo MRI scans.

With ProMRI® technology, BIOTRONIK offers a comprehensive portfolio of pacemakers, ICDs and cardiac resynchronisation systems that have been specifically developed and tested for use in an MRI environment. These implantable systems allow MRI examinations to be carried out under defined conditions, thereby expanding diagnostic possibilities.

The development of such systems requires a holistic approach: the implant and associated electrodes must be tested both individually and as an integrated system. Requirements include, amongst other things, limiting potential temperature increases, ensuring stable therapeutic functions and resistance to electromagnetic interference.[3]

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[1] https://www.acc.org/latest-in-cardiology/articles/2024/05/21/10/30/current-state-of-mri-with-cardiac-devices
[2] https://www.heartrhythmjournal.com/article/S1547-5271(25)02347-1/fulltext
[3] https://www.biotronik.com/en-us/professionals/featured-technologies/promri

Technical challenges in the MRI environment

MRI generates a complex electromagnetic environment consisting of a strong static magnetic field, rapidly changing gradient fields and high-frequency electromagnetic signals. These factors can induce electric currents, cause components to heat up or affect the sensors and control systems of implanted devices. [4]

For implantable cardiac devices, this means that their design must be specifically adapted to these conditions. Modern systems therefore utilise optimised circuit designs, suitable materials and intelligent control mechanisms to ensure safe operation during MRI scans.[3]

Automatic detection of the MRI environment

A key advancement in modern implant technology is the ability to automatically detect the MRI environment and respond to it. BIOTRONIK systems featuring MRI Guard 24/7 have an integrated sensor that continuously monitors magnetic fields. If an MRI scanner is detected, the system automatically switches to a predefined MRI mode. [3]

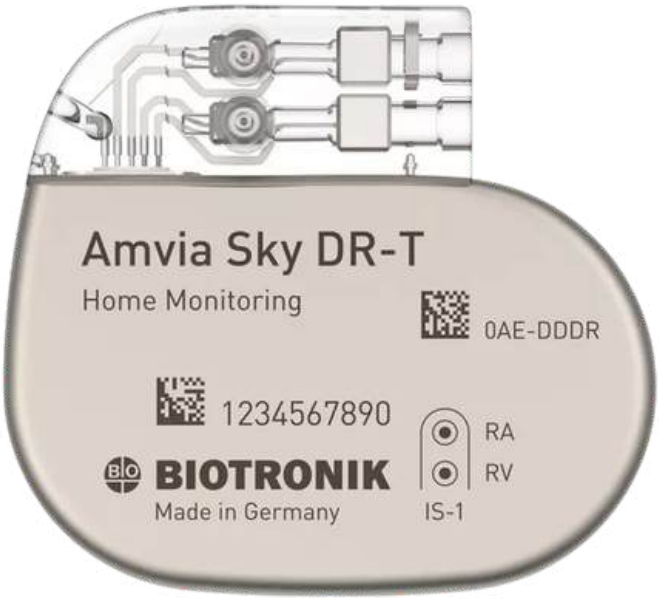
Once the examination is complete and the patient has left the MRI field, the implant automatically reverts to its original therapy settings.[5]

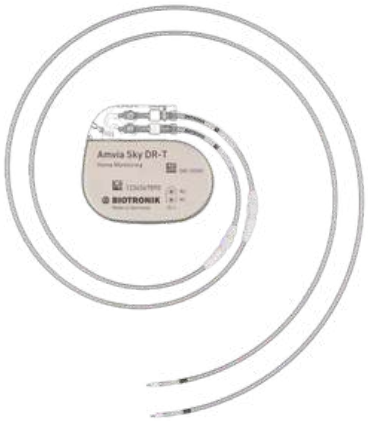


[3] https://www.biotronik.com/de-de/medizinische-fachkraefte/innovative-technologien/promri

[4] https://pmc.ncbi.nlm.nih.gov/articles/PMC4848040/

[5] https://www.medimaging.net/mri/articles/294798471/next-gen-pacemaker-with-continuous-mri-sensor-eliminates-device-scans-before-and-after-exams.html





Real-life example: Amvia pacemaker
Devices from BIOTRONIK's Amvia Sky and Amvia Edge pacemaker ranges demonstrate the practical application of modern MRI functionality. The integrated MRI Guard 24/7 function enables automatic switching to MRI mode.
In conventional workflows, the necessary pre- and post-programming associated with an MRI scan can take up to 28 minutes. This additional effort ties up staff resources and prolongs scan times. By automatically detecting the MRI environment, MRI Guard 24/7 significantly reduces this time requirement and simplifies workflows in clinical practice.

Another advantage is the sensor's long-term activation capability: it can remain activated for entire follow-up intervals of up to one year. Within this timeframe, MRI scans can be carried out at any time without the need to reactivate the MRI Guard 24/7 function.[6]

[6] https://www.biotronik.com/de-de/medizinische-fachkraefte/innovative-technologien/promri



The role of sensor technology

At the heart of this functionality lies highly reliable magnetoresistive sensor technology. The GMR sensors used must accurately detect strong magnetic fields whilst simultaneously meeting the most stringent requirements in terms of miniaturisation, energy efficiency and long-term stability.

In MRI environments in particular, reliable and reproducible detection is crucial to ensure that the switch to MRI mode occurs at the correct time. Equally important is the error-free return to normal operation once the device has left the magnetic field.

Modern MR sensor systems thus make a significant contribution to the safe operation of implantable medical devices in challenging electromagnetic environments.

Added value for patients and clinics

The combination of MRI-compatible implants and intelligent MR sensor technology represents a significant advance in patient care. Patients with cardiac implants gain access to a key diagnostic technology that is indispensable in fields such as oncology, neurology and orthopaedics.

At the same time, hospitals benefit from more efficient workflows and reduced administrative burden when managing MRI scans for patients with implants. Automated processes help to minimise sources of error and optimise treatment overall.

Given the growing importance of MRI in medical diagnostics, reliable sensor solutions will continue to play a central role in the further development of implantable systems.

BIOTRONIK
excellence for life

BIOTRONIK SE & Co. KG
Woermannkehre 1
12359 Berlin, Germany
Tel: +49 (0)30 - 6 89 05 - 0

www.biotronik.com



Jörg Stamm, René Buß, Ravi Subrahmanyan, Tim Ellrodt, Quinn Krekorian, Johannes Paul, Jörg Traute (from left to right)

Visit to MSEI in Mainz

In October 2025, Sensitec welcomed its long-standing client MSEI from the USA to its Mainz site. The visit provided an excellent opportunity for face-to-face discussions on current developments and future projects.

Among other things, the discussions centred on a new development project for the next generation of pacemakers and implantable defibrillators. The partners are working together on innovative sensor solutions that will make a significant contribution to the medical technology of tomorrow.

The group photo was taken during the visit to Mainz and highlights the close and successful collaboration between MSEI and Sensitec.

Corporate structure

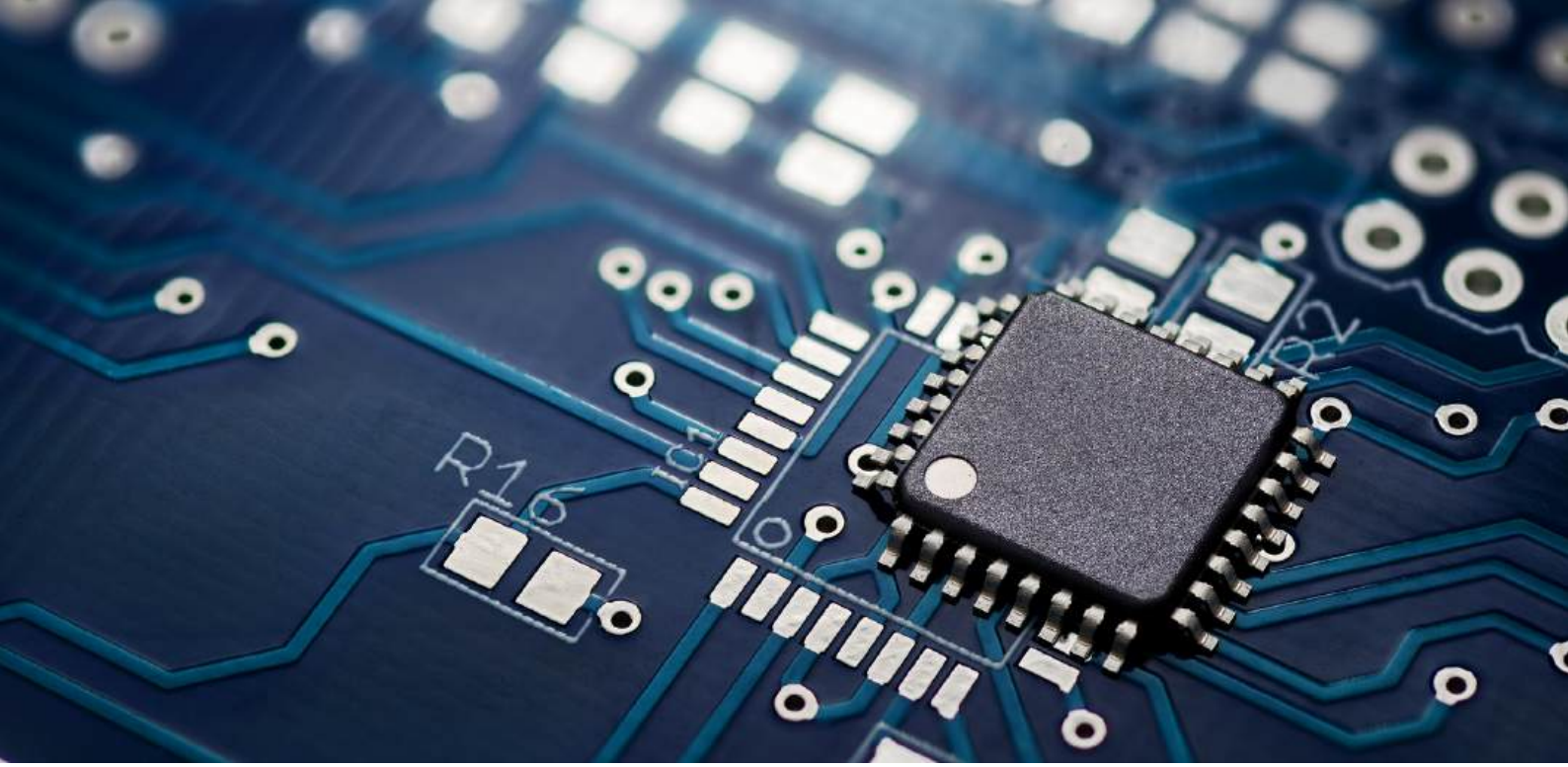
BIOTRONIK and Micro Systems Technologies (MST) are closely linked. Micro Systems Engineering, Inc. (MSEI) is part of MST.

The entire group of companies combines expertise in medical technology, microelectronics, sensor technology and engineering.



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New multi-chip packages from Sensitec

Maximum integration for the next generation of magnetoresistive sensor solutions

With the launch of a new generation of multi-chip packages, Sensitec is expanding its portfolio to include highly integrated sensor solutions that combine state-of-the-art magneto-resistive technologies with intelligent signal processing in a single SMD-compatible component. By combining tried-and-tested AMR sensor technology and innovative TMR technology with high-performance electronics, a platform is created that not only significantly increases the integration density but also delivers considerable added value for developers and system manufacturers.

Instead of distributing the sensor, evaluation electronics and signal processing across several components, Sensitec integrates all core functions into a compact multi-chip package.

The result is robust, space-saving and SMD-compatible solutions that can be easily integrated into automated manufacturing processes and significantly reduce development effort.

One component – numerous functions

The new multi-chip packages enable high-precision position, angle and speed measurements using just a single SMD component. In addition to the actual sensor elements, the modules already incorporate the complete signal processing system, including interpolation, error correction, temperature compensation, diagnostic functions and programmable output signals.

In addition, an integrated automatic sensor calibration ensures that the sensor parameters are optimally adjusted either during commissioning or, optionally, during subsequent operation. This significantly simplifies both the design-in and the configuration of the end product, whilst reliably compensating for manufacturing tolerances and operating conditions. Functions such as auto-calibration, EEPROM-based parameterisation and fault diagnosis are already integrated into the module.

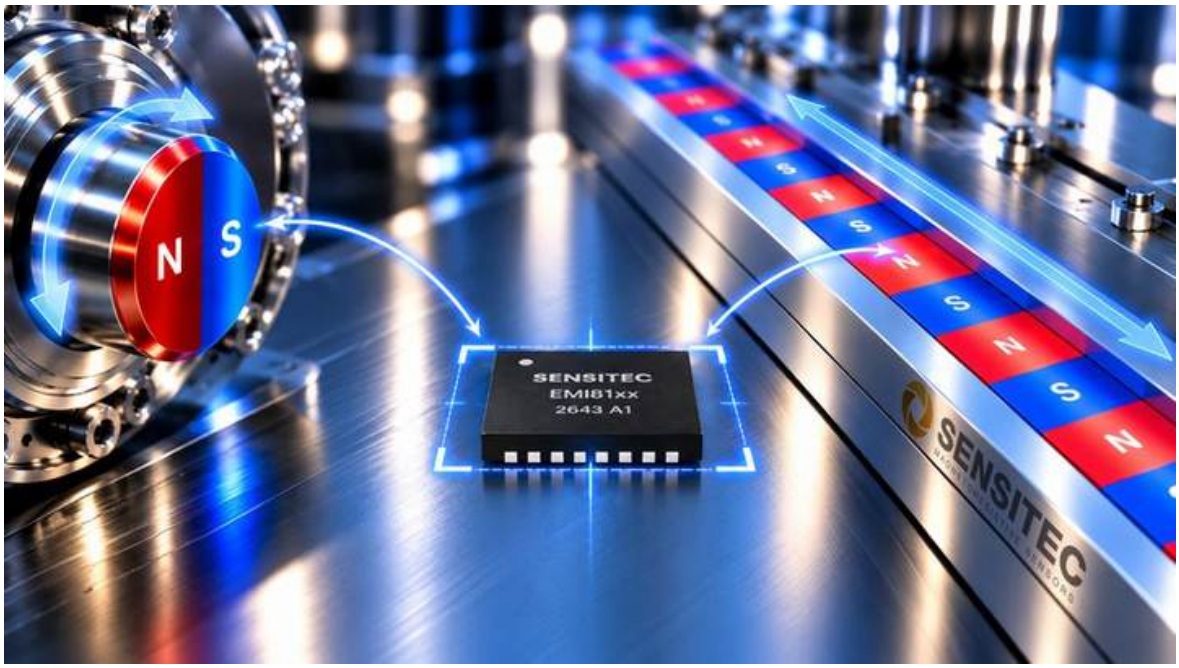
A key feature of the new product family is its programmable signal processing. Users can flexibly adapt sensor parameters and output characteristics to their specific application, thereby gaining an exceptionally high degree of design freedom. A single sensor module can thus meet a wide variety of requirements whilst simultaneously reducing the number of variants as well as development and storage costs.

Tried-and-tested AMR technology meets state-of-the-art TMR sensor technology

Sensitec combines two high-performance magnetoresistive technologies in its new platform.

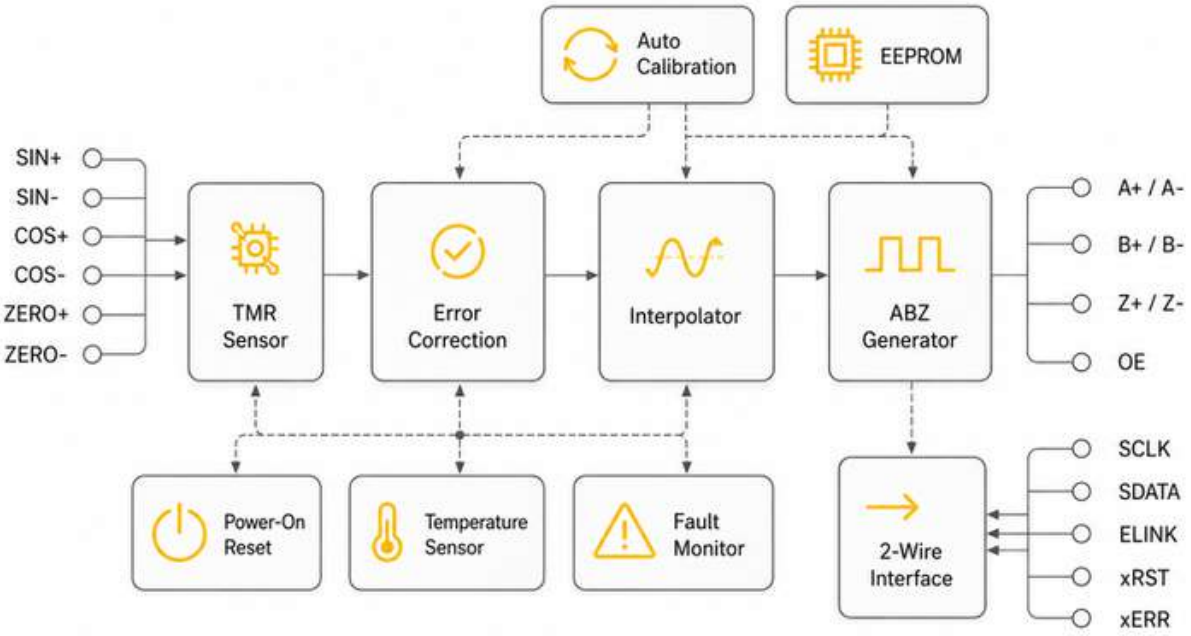
The established **AMR (Anisotropic MagnetoResistance)** technology has been proving its worth for years thanks to its high precision and robustness in industrial position and speed applications. Combined with integrated signal processing, this results in ready-to-use sensor solutions for incremental measurement systems.

The portfolio is complemented by the new **TMR (Tunnel Magnetoresistance)** technology. It offers particularly high signal quality and excellent accuracy, whilst allowing for larger air gaps between the sensor and the magnet. At the same time, it is characterised by minimal offset voltages, extremely low hysteresis and high position tolerance. The integrated TMR sensor element delivers precise sine and cosine signals for non-contact angle measurements and operates reliably within a temperature range of -40 °C to +125 °C.



EMI8131

Functional Block Diagram



Maximum flexibility for industrial applications

Thanks to their high level of integration, the new multi-chip packages are suitable for a wide range of industrial applications.
These include, amongst others:

- Linear position measurement
- Speed measurement
- Absolute and incremental angle measurement
- Motor control and commutation
- Servo drives
- Robotic
- Factory automation
- Mobile machinery
- Industry 4.0 applications

The combination of a compact design, high measurement accuracy and programmable functionality makes these sensors the ideal solution wherever space is limited and the highest performance is required.

First products from the new platform

The new multi-chip family is launched with two high-performance sensor solutions.

EMI8101 – 2 mm fixed-pitch sensor for linear applications and multi-pin rings

The first sensor to be made available is designed for linear position measurement and for use with multipole rings with a pole pitch of 2 mm. The fully integrated SMD module combines an AMR sensor with digital signal processing, an interpolator, error correction, auto-calibration and programmable resolution. Depending on the application, up to 4096 pulses per pole pitch can be achieved. The module is supplied in a compact QFN package and is ideally suited for high-precision incremental measurement systems.

TA903 – 360° absolute encoder for end-of-shaft applications

A second new product, a TMR-based multi-chip sensor, expands the portfolio for absolute angle measurement. The sensor generates high-precision sine and cosine signals over 360° and is ideally suited for measurements at the end of a shaft using a dipole magnet. Thanks to its high signal quality, low angular deviation and minimal hysteresis, it enables extremely precise absolute value measurements.

In the multi-chip package version, combined with highly integrated signal processing, a high-precision, high-performance 12-bit end-of-shaft absolute encoder with auto-calibration is available in a compact 5x5 mm SMD package.

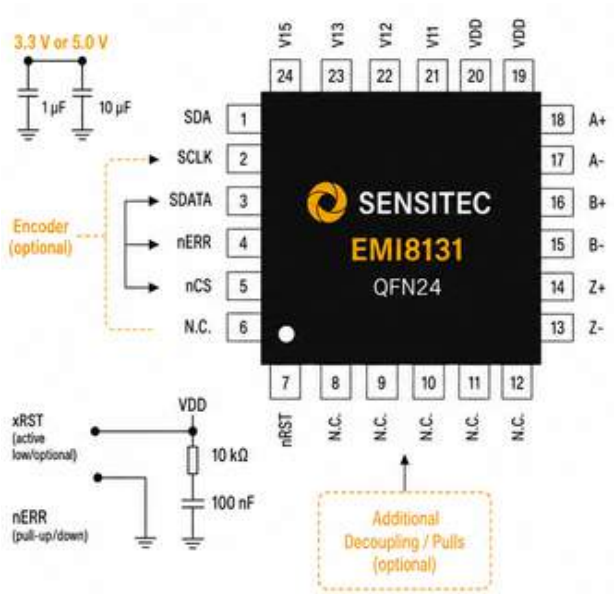
Greater integration.
Better performance.
Greater value creation.

With its new multi-chip platform, Sensitec is consistently pursuing its goal of making magnetic sensor technology smarter, more compact and easier to integrate. The close integration of sensor technology and signal processing reduces the number of external components, simplifies system development and shortens the time-to-market for new products.

The result is high-performance sensor solutions that combine the highest precision, maximum flexibility and exceptionally simple integration – and thus optimally meet the growing demands of modern industrial applications.

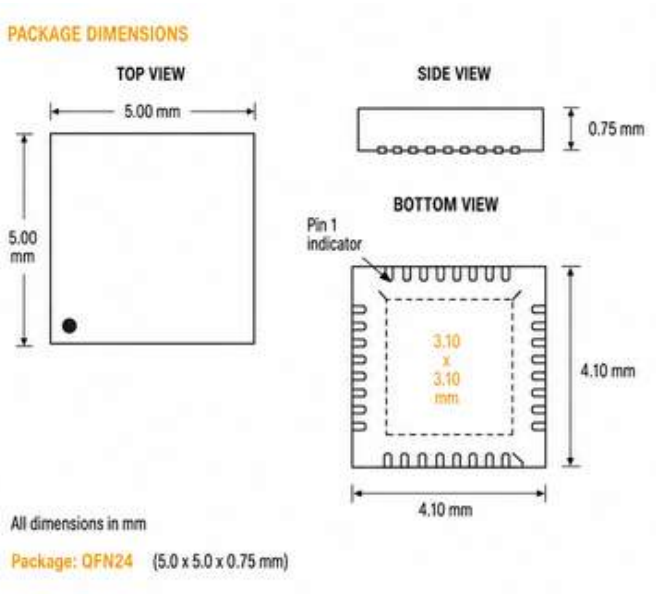
PINOUT

Easy integration. Maximum performance.

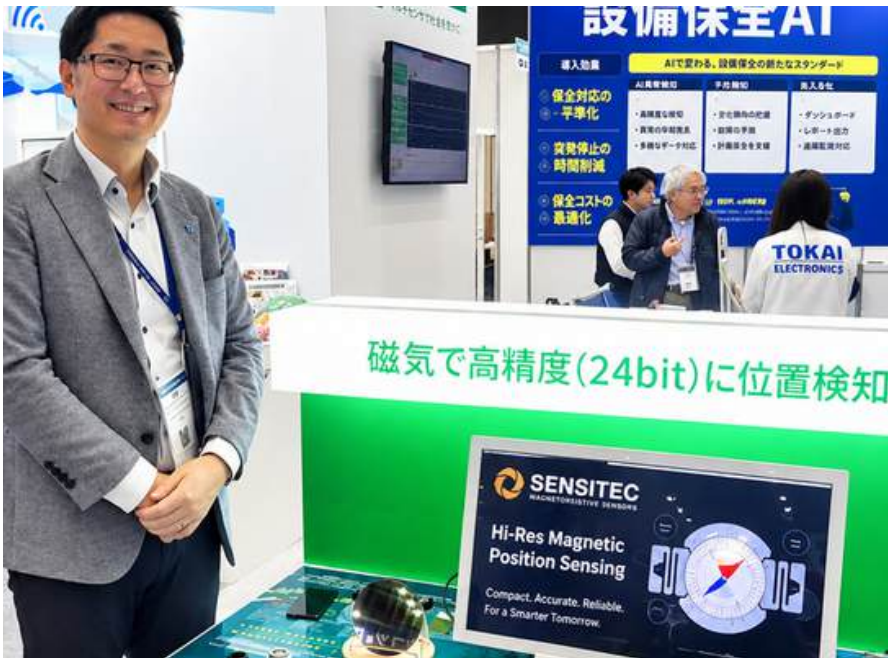


COMPACT QFN24 PACKAGE

Small in size. Big in performance.



René Buß, CTO/VP Innovation & Sales



Tokai Electronics

A strong partner for the Japanese market

The Japanese market for technical products is renowned for its high barriers to entry – and for its enormous opportunities. Anyone wishing to succeed here cannot do so without a thorough understanding of local distribution structures. Sensitec GmbH has taken this step and secured a partnership with Tokai Electronics Co., Ltd., one of Japan's most renowned distributors. The contract has been signed, and the collaboration is already beginning to bear fruit. This is the ideal time to take a look at the distinctive features of the Japanese distribution landscape and at our new partner.

The Japanese distribution landscape – an ecosystem of its own

The distribution of technical products in Japan differs fundamentally from the sales models in Europe or the USA. Here, distributors are not simply resellers, but the key to the market. For foreign suppliers, they are often the only gateway to a fragmented but highly lucrative customer base – particularly the numerous small and medium-sized enterprises (SMEs) that are difficult to reach via direct sales channels.

Selecting a distributor in Japan is a rigorous, mutual process. Japanese distributors scrutinise products and their manufacturers extremely critically to assess whether they fit into their portfolio and market strategy. It is estimated that only around ten per cent of the products submitted are actually included in the portfolio. If the collaboration is successful, it is characterised by a high degree of commitment: exclusive agreements are common, and long-standing, loyal partnerships develop. Establishing an effective partnership can take two to three years – short-term successes are rare. However, the relationship is all the more stable for it: distributors in Japan are extremely loyal to their partners and invest heavily in their joint market success.

Tokai Electronics – a long-established company with a vision for the future

In Tokai Electronics Co., Ltd., we have found a partner that perfectly embodies these principles.

Founded on 1 October 1945 and headquartered in Nagoya, the company looks back on a history spanning more than 80 years. It is listed on the Nagoya Stock Exchange (Main Market) (ticker symbol: 8071) and is characterised by impressive financial strength, with an equity ratio of over 60 per cent.

The company employs around 350 staff on a consolidated basis.

Tokai Electronics does not see itself merely as a distributor, but as an "Electronics Solution Provider" that offers its customers one-stop solutions from a single source.

The business segments are divided into three main areas:

Electronic components and semiconductors:

The development and sale of electronic components, semiconductors and high-performance materials in order to meet customers' requirements and/or solve their problems.

Systems for social infrastructure and factory automation:

Development and distribution of systems for critical infrastructure and factory automation, designed to monitor and detect wear and malfunctions at an early stage.

Software & Embedded Modules:

Development and distribution of software and embedded modules.

Tokai Electronics thus serves a wide range of forward-looking markets, including the automotive industry, energy and the environment, medical technology, the Internet of Things (IoT) and factory automation. The company operates not only in Japan but also maintains a global network, distributing its products and solutions across Asia, North America and other international markets – including via a sales network in countries such as China, Hong Kong, Taiwan, Thailand, the Philippines, Indonesia, Singapore and India.





A partnership of equals
For Sensitec, the partnership with Tokai Electronics represents a strategic milestone. With a partner that boasts decades of market knowledge, technical expertise and a close network of key customers in Japan, we are ideally positioned to successfully establish our high-precision sensor technologies in the Japanese market.
The first signs of this collaboration are already evident. We look forward to a long and successful partnership with Tokai Electronics – and to tackling tomorrow's technological challenges together.

Peter Radde, Managing Director Sensitec GmbH



TOKAI ELECTRONICS

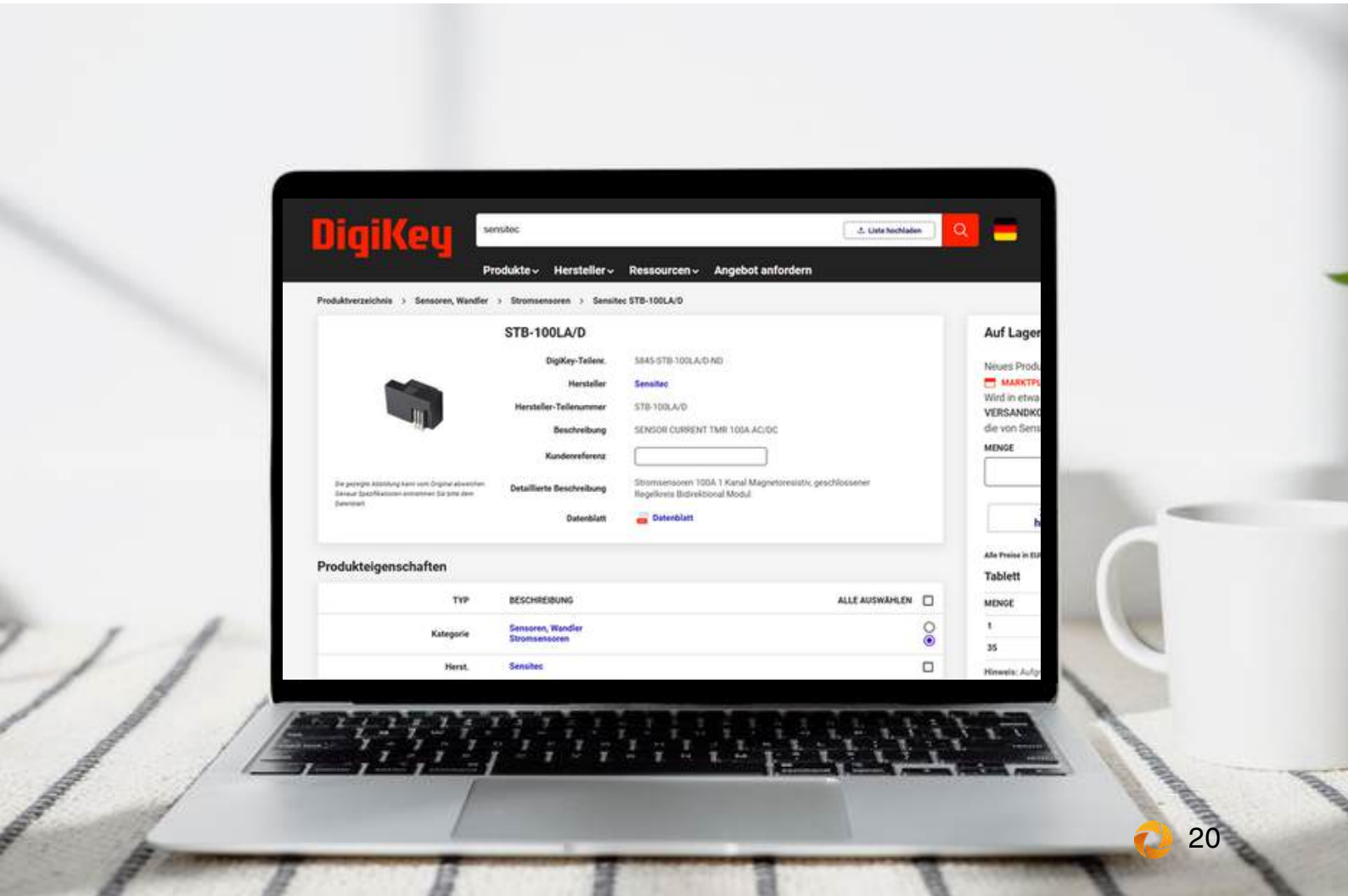
Tokai Electronics Co., Ltd.
3-34-14 Sakae, Naka-ku, Nagoya, Aichi
460-8432, Japan
www.tokai-ele.com

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We are delighted that our sensor solutions are now also available through DigiKey. This means our products are available to customers worldwide around the clock – with transparent stock availability, technical data and straightforward ordering.
Discover our sensors at www.digikey.com – and enjoy maximum flexibility when selecting and purchasing.

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FAIRS& EVENTS

04.– 07. November 2026

Robot World, Korea

One of Asia's leading robotics trade fairs. Companies showcase the latest developments in the fields of robotics, AI and intelligent automation.

10.–13. November 2026

Electronica, Munich

The world's leading trade fair and conference for electronic components, systems and applications.

24.– 26. November 2026

SPS – Smart Production Solutions, Nuremberg

The industry gathering for smart and digital automation. Sensitec presents state-of-the-art magnetoresistive sensor solutions for demanding industrial applications.

01.– 02. December 2026

Bodo's Wide Bandgap Event, Munich

This event focuses on semiconductor technologies such as SiC (silicon carbide) and GaN (gallium nitride).

02.– 04. December 2026

RoboNEXT, Osaka/ Japan

International trade fair for robotics and smart manufacturing in China. It showcases innovative solutions and cutting-edge technologies for industry and automation.



OUR SALES TEAM



Jörg Stamm
Europe / Automotive
+49 (0) 6441 5291 231
joerg.stamm@sensitec.com



Peter Radde
APAC / America
+49 (0) 6441 5291 184
peter.radde@sensitec.com



Glenn von Manteuffel
DACH
+49 (0) 9089 92 00 962
glenn.manteuffel@sensitec.com

OUR DISTRIBUTORS

APPT Korea Co. is our distribution partner in South Korea and has extensive experience in the field of SMD technology and equipment. www.appt.com.tw

Compomill is our distributor for the Nordic markets and supports Sensitec with the marketing and technical support of our sensor solutions locally.
www.compomill.com

Dacom West GmbH specialises in the distribution of semiconductors, memory solutions and electronic components for industrial applications.
www.dacomwest.de

Endrich Bauelemente Vertriebs GmbH distributes the full range of the Sensitec current sensors presented here.
www.endrich.com

Tokai Electronics is our distributor in Japan and supports Sensitec with its extensive market and application expertise in serving our customers locally.
www.tokai-ele.com

A look back over 15 years

How innovations from 2011 to the present day are shaping sensor technology.

A look back at issue no. 7 of our Sensor.Kosmos (Nov. 2011) shows just how visionary many of the topics covered at the time were. High-precision gear sensors, smart power measurement for electric mobility and non-destructive testing were still in their infancy back then – today, they have become an integral part of modern industrial applications.



Air-bearing motor spindles set new standards

The cover story focuses on a world first from Levicron GmbH: an industrially applicable, air-bearing motor spindle with an HSK clamping system. The virtually frictionless air bearing enables speeds of up to 90,000 rpm whilst maintaining the highest precision.

GLM sensor modules from Sensitec make a crucial contribution, enabling both highly accurate position determination and highly dynamic control. The spindle's rotor itself is used as a reference standard, thereby eliminating the need for additional encoder discs. The result: reduced imbalance, robust bearing support and positioning accuracy in the nanometre range.



Motorised spindle with air bearings and HSK clamping system
(Source: Levicron GmbH)



left: Integration of the GLM sensor modules / right: Spindle shaft as a measurement reference
(Source: Levicron GmbH)



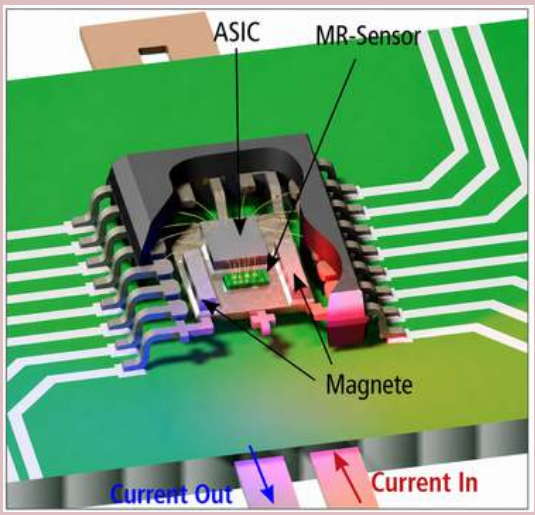
Research for greater safety

As early as 2011, Sensitec was already working intensively on the further development of non-destructive material testing. As part of the European research project IMAGIC, GMR and TMR sensor arrays were developed to reliably detect even the smallest material flaws measuring less than 100 micrometres, as well as defects several millimetres below the surface.
The aim was to significantly improve the performance of testing methods for safety-critical applications – ranging from pipelines to the aviation industry.

Current sensors for the mobility of the future

Another key focus was the launch of the new AMR-based current sensor, the CFS1000. Whilst Hall sensors dominated the market at the time, Sensitec was already utilising magnetoresistive technology, which offered a wider bandwidth, greater measurement accuracy and galvanic isolation. The applications that were described at the time as future markets – inverters for photovoltaics, battery monitoring and electric drives – are now standard features of modern energy and mobility systems.
This current sensor was far ahead of its time, primarily due to its high bandwidth of 500 MHz, and was ideally suited to topologies featuring SiC and GaN semiconductors and correspondingly high switching frequencies, in order to further improve efficiency.





CFS1000 current sensor comprising an AMR sensor chip, a signal processing circuit and two support magnets.



In 2011, the ‘Elefant Racing’ team is presenting the FR11 racing car in the electric vehicles class (Source: Elefant Racing)

Supporting young talent

The support provided to two Formula Student teams demonstrated how sensor technology can be put to practical use. The racing cars from Elefant Racing (University of Bayreuth) and municHMotorsport (Munich University of Applied Sciences) used Sensitec current sensors to precisely monitor their battery systems. Even back then, the accurate measurement of charging and discharging currents played a crucial role in the performance and energy efficiency of electric racing cars.

And training is also a major focus off the racetrack: in Mainz, two apprentices are starting their training in mechatronics, and in Lahnau, two are beginning their training in microtechnology. Both career paths reflect the growing importance of highly qualified specialists in sensor technology and microsystems engineering – a topic that remains as relevant as ever today.

SIDE NOTE

Have we sparked your interest? Take a look at that issue here, or visit our downloads section at: https://www.sensitec.com/en/download/

Link

Conclusion

We now take many of the developments from 2011 for granted: high-precision manufacturing thanks to accurate gear sensor technology, intelligent current measurement for PV inverters and electric vehicle drivetrains, non-destructive testing, and securing a skilled workforce. Looking back shows how visionary ideas become successful applications and how important continuous research and development are for technological progress – and this is precisely where we intend to build on in the future.

Glenn von Manteuffel,
Team Leiter Strategischer Vertrieb

SENSITEC
MAGNETORESISTIVE SENSORS

Sensitec GmbH
Schanzenfeldstrasse 2
35578 Wetzlar, Germany

phone: +49 6441 5291-0
sensitec@sensitec.com
www.sensitec.com

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