Cost-Effective High-Resolution Encoder Design

Auto-Calibration, On- and Off-Axis with 21 Bits



With the KTM52xx/53xx family, Conntek introduces a new generation of encoder ICs for precise absolute angle measurement. The devices combine 21-bit resolution, automatic calibration and typical accuracy down to ±0.015° with flexible on- and off-axis concepts. This makes them suitable for complete encoder solutions as well as position measurement systems, robotics and demanding drive applications.

High Precision Without Complex Optics

Conventional optical encoders achieve high precision, but often require comparatively complex mechanical and optical designs and can be sensitive to contamination. Magnetic encoders provide a robust alternative, provided that typical influences such as magnet tolerances, mounting deviations and mechanical eccentricities can be effectively compensated.

This is precisely where Conntek's **KTM52xx/53xx family** comes in. The AMR-based encoder ICs measure the absolute angular position over 360° and combine robust magnetic sensing with integrated digital signal processing and automatic calibration. On-axis and off-axis variants are available to accommodate different mechanical requirements.

Automatic Calibration for High Accuracy

The achievable accuracy of magnetic angle measurement systems depends not only on the sensor itself, but on the interaction between the sensor, magnet and mechanical design. Even small deviations in positioning, eccentricity or magnet geometry can cause nonlinear angular errors.

The **KTM52xx/53xx family** integrates extensive signal conditioning directly into the device. Linear error components such as offset, amplitude and phase deviations are compensated first. In addition, automatic nonlinear calibration (ANLC) corrects higher-order angular errors using an internal 64-point correction table. These values can either be determined automatically in the assembled system or, for the highest accuracy requirements, using an external reference encoder.

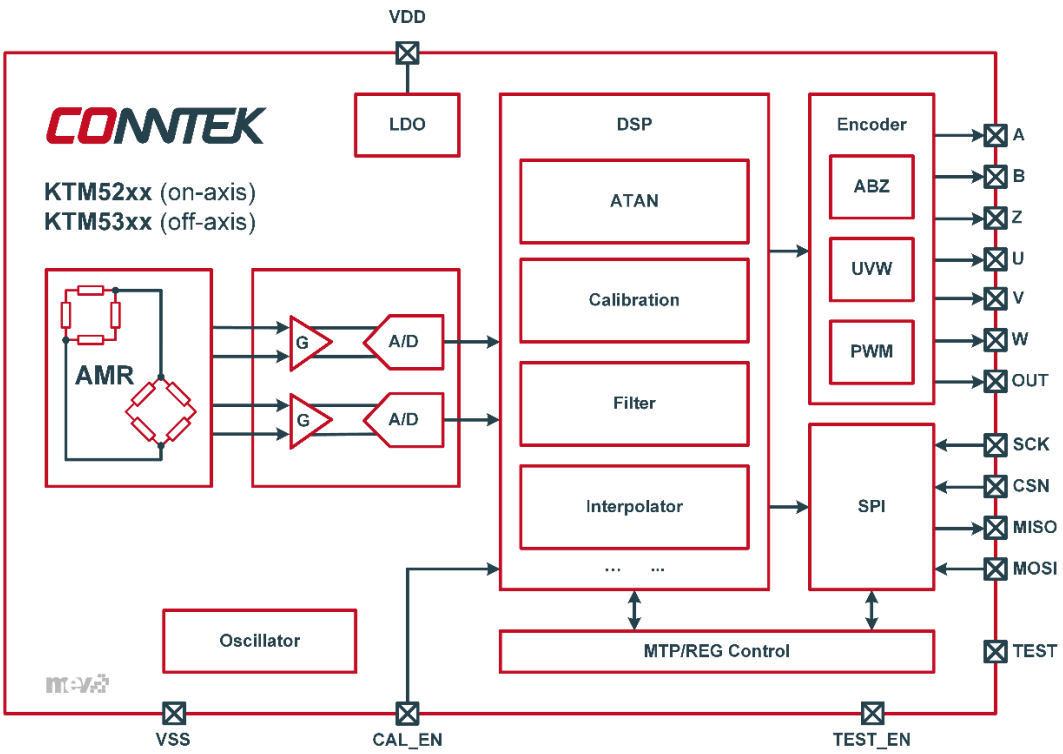
A particular advantage is that calibration can be performed directly in the fully assembled system. This allows actual magnet and mounting tolerances to be taken into account without having to move the entire compensation process to an external controller or software. The resulting parameters are stored in the integrated non-volatile memory and are available again after power-up.

Common Architecture Across the Entire Family

The **KTM52xx/53xx family** is based on a common signal-processing architecture. Two AMR Wheatstone bridges generate sine and cosine signals, which are amplified, filtered, digitized and further processed in the integrated DSP. Angle calculation, calibration, filtering and interpolation are all performed there.

Depending on the mechanical design, on-axis and off-axis variants are available. The **KTM5200** and **KTM5220** on-axis devices achieve a typical integral nonlinearity of ±0.015° after calibration. For the off-axis **KTM5300**, Conntek specifies a typical value of ±0.03.

Block Diagram



Flexible Interfaces for Different Encoder Concepts

The **KTM52xx/53xx family** supports several output formats in parallel, allowing flexible integration into different system architectures. The absolute angular position is available with 21-bit resolution via a 4-wire SPI interface. The absolute value can also be output via PWM. Incremental ABZ signals and UVW outputs are provided for conventional encoder applications.

The ABZ resolution is freely programmable up to 65,536 ABZ lines per revolution, corresponding to 262,144 positions. This allows both standard resolutions and application-specific values to be configured directly in the device. The maximum AB output frequency is 8.192 MHz.

The UVW outputs can be configured for 1 to 64 pole pairs, making them suitable, for example, for commutation tasks in electric drives. Alternatively, the corresponding pins can be used for differential ABZ signals.

By combining absolute and incremental position outputs, the same encoder platform can address a wide range of requirements – from high-resolution absolute encoders to conventional incremental interfaces.

Available models

Baustein	Sensor	Anordnung	INL typ. (nach Kalibrierung)	Gehäuse
KTM5200	AMR	On-Axis	±0,015°	TSSOP-16
KTM5220	AMR	On-Axis	±0,015°	QFN-16, 3×3 mm
KTM5300	AMR	Off-Axis	±0,03°	QFN-16, 3×3 mm

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Versatile Applications and Cost-Effective Integration

The combination of 21-bit resolution, automatic calibration, flexible output interfaces and an attractive price makes the **KTM52xx/53xx family** suitable for a broad range of applications. In addition to manufacturers of complete encoder solutions, these include industrial position measurement systems, robotics and automation as well as servo, BLDC and closed-loop stepper motor applications.

The common platform simplifies the implementation of different mechanical and electrical concepts. On-axis and off-axis variants, different package options and both absolute and incremental output signals can be implemented using largely the same architecture. At the same time, calibration can be performed in the fully assembled system, taking actual manufacturing and mounting tolerances into account. This reduces development, adaptation and production effort for a wide range of position measurement solutions.

Availability

Products of the **KTM52xx/53xx family** from Conntek are available in Central Europe from MEV Elektronik Service GmbH. Samples and Evaluation boards are expected for End of 2026.

SPS 2026

MEV will present Conntek's new encoder ICs at SPS 2026 in Nuremberg from November 24 to 26. Hall 4, Booth 174. You are welcome to schedule an appointment and request your free ticket in advance!



About Conntek

Conntek, a brand of KTsense Microelectronics based in Quanzhou, China, develops high-performance magnetic position sensors and encoder ICs for industrial and automotive applications. By combining advanced analog front-end technology with digital signal processing and innovative calibration algorithms, Conntek provides precise, reliable and easy-to-integrate magnetic sensor solutions for modern motion control and positioning systems.

Download & Links

Online version of this product news

KTH5200 data sheet (PDF)

KTH5220 data sheet (PDF)

KTH5300 data sheet (PDF)

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