

Magnetic Rotary 5 Click



PID: MIKROE-5691

Magnetic Rotary 5 Click is a compact add-on board for accurate magnet-position sensing. This board features the AS5134, a contactless magnetic rotary encoder from ams AG for accurate angular measurement over a full turn of 360°. It is designed to provide accurate angle measurements with a simple two-pole magnet rotating over the center of the chip, featuring an integrated Hall element, analog front end, and digital signal processing. Offering a high resolution of 8.5 bits, which equates to 360 positions per revolution, it is also capable of high-speed performance, with a maximum RPM of 76875. It can accommodate a wide range of magnetic fields, from 20 to 80mT. It also has an onboard header for incremental and commutation signals of their respective A/B/I and U/V/W signals and pins for Daisy Chain Mode and OTP programming. This Click board™ is suitable for contactless rotary position sensing, rotary switches (human-machine interface), AC/DC motor position control, and brushless DC motor position control.

NOTE: Rotary Magnetic Holder does not come in the same package as this Click board™, but you can find it in our [shop](#).

How does it work?

Magnetic Rotary 5 Click is based on the AS5134, a contactless magnetic rotary encoder from ams AG for accurate angular measurement over a full turn of 360°. The AS5134 is an innovative system-on-chip that offers a wide range of features and capabilities. In addition to its integrated Hall elements, analog front end, and digital signal processing, this chip is designed with power efficiency in mind. It features a Power Down Mode and fast Start-Up sequence and measurement cycles, allowing for low average power consumption. To measure the angle, only a simple two-pole magnet rotating over the center of the chip is required. The

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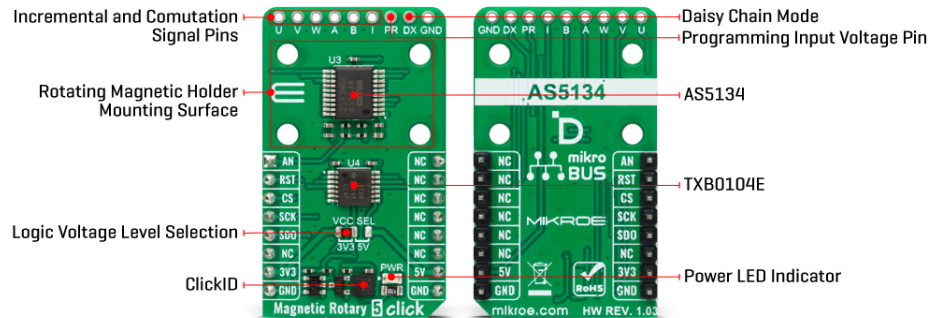


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absolute angle measurement instantly indicates the magnet's angular position with a resolution of 8.5bit equals 360 positions per revolution. It allows high speeds up to 76875RPM and a wide magnetic field input range from 20 to 80mT.



Thanks to its high precision and ability to measure the absolute angle, the AS5134 is suitable for various applications, including contactless position sensing and rotary switches, which can provide a human-machine interface. This chip is also well-suited for motor position control, including both AC/DC and Brushless DC motor position control. This Click board™ communicates with the host MCU using a serial SPI 3-wire read-only connection, only to provide the angular data. An additional way of processing angular data is through the analog pin of the mikroBUS™ socket. With the addition of a lowpass filter at the PWM output pin of the AS5134, this configuration produces an analog voltage proportional to the angle. If the AS5134 angular data is invalid, the PWM output will remain low; thus, the analog output will be 0V.

This Click board™ also comes with an unpopulated header reserved for incremental and commutation signals of their respective A/B/I and U/V/W signals. The phase shift between channels A and B indicates the direction of the magnet movement. Channel A leads channel B at a clockwise magnet rotation by 90 electrical degrees, while channel B leads channel A at a counter-clockwise rotation. Brushless DC (BLDC) motors are also controllable through a standard UVW commutation interface with a programmable number of pole pairs from 1 to 6. These signals will control the electrical angle information according to the number of pole pairs and the actual mechanical angle position.

In addition, this unpopulated header also contains two additional pins marked PR and DX. The PR pin serves to supply the necessary DC voltage in the range of 8 to 8.5V to activate the possibility of permanent programming. Users have the option of zero position programming and magnetic field optimization. Meanwhile, the DX pin can implement a daisy chain mode, providing even greater flexibility in system design. With these added features, the board can be configured for either a two-wire or three-wire mode, depending on the application's specific requirements. Also, unique addition to this board is a position for a rotary magnet holder designed to be used alongside a magnetic rotary position sensor allowing fast prototyping and quick measurements during development.

Although the AS5134 uses 5V as the primary power source, this Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper thanks to the voltage level translator, the [TXB0104E](#). This way, both 3.3V and 5V capable MCUs can use the communication lines properly. However, the Click board™ comes equipped with a library

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containing easy-to-use functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Magnetic
Applications	Can be used for contactless rotary position sensing, rotary switches (human-machine interface), AC/DC motor position control, and brushless DC motor position control
On-board modules	AS5134 - contactless magnetic rotary encoder from ams
Key Features	Accurate angular measurement over a full turn of 360°, user programmable zero position and sensitivity, high speeds, data transmission via 3-wire or analog signal, incremental and commutation signal, low power consumption, daisy chain mode, and more
Interface	Analog, SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Magnetic Rotary 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Analog Signal	AN	1	AN	PWM	16	NC	
ID SEL	RST	2	RST	INT	15	NC	
SPI Select / ID COMM	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
SPI Data OUT	SDO	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	3.3V	7	3.3V	5V	10	5V	Power Supply
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	PWR	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right

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			position 5V
J1	-	Unpopulated	Incremental and Commutation Signals Header
J2	-	Unpopulated	Programming Voltage and Daisy Chain Mode Header

Magnetic Rotary 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Rotation Angle Range	0	-	360	°C
Magnetic Field Range	20	-	80	mT
Magnetic Rotation Speed	-	-	76875	RPM
Resolution	-	8.5	-	bit

Software Support

We provide a library for the Magnetic Rotary 5 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

Library Description

This library contains API for Magnetic Rotary 5 Click driver.

Key functions

- `magneticrotary5_read_angle` This function reads the magnetic angle and automatic gain control (AGC) values measured by the sensor.
- `magneticrotary5_read_mt_cnt` This function reads the multi turn counter value. With each zero transition in any direction, the output of a special counter is incremented or decremented.
- `magneticrotary5_read_voltage` This function reads raw ADC value and converts it to proportional voltage level.

Example Description

This example demonstrates the use of Magnetic Rotary 5 Click board™ by reading and displaying the magnet angular position as well as the AGC and multi turn counter values.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

Other MIKROE Libraries used in the example:

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- MikroSDK.Board
- MikroSDK.Log
- Click.MagneticRotary5

Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE [compilers](#).

mikroSDK

This Click board™ is supported with [mikroSDK](#) - Mikroe Software Development Kit, that needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[AS5134 datasheet](#)

[TXS0104E datasheet](#)

[Magnetic Rotary 5 click 2D and 3D files v103](#)

[Magnetic Rotary 5 click example on Libstock](#)

[Magnetic Rotary 5 click schematic v103](#)

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