

ROTARY HUMAN-MACHINE-INTERFACE APPLICATIONS

MA8XX FAMILY

Rotary knobs are used in a diversity of human to machine interface applications with examples including the program selector on a washing machine or the infotainment control in a car. These applications typically use a conventional potentiometer or mechanical rotary switch which have limited lifetime due to mechanical wear and tear or environmental degradation. The use of magnetic angle sensors to implement contactless sensing eliminates both issues to provide a long lifetime solution.

The MagAlpha MA8xx family is a new simple-to-use digital magnetic sensor range designed to replace analog potentiometers or rotary switches in such applications. The sensor detects the absolute angular position of a permanent

magnet attached to the rotating knob. Typically, a simple diametrically magnetized cylinder with a 3 to 8 mm diameter is suitable.

Different options are available, including digital angle output via SPI/SSI bus, incremental ABZ interface, or PWM output.

Programmable threshold magnetic field strength detection is built in to enable implementation of a contactless push or pull button. Detection is performed by reading the device registers or the logic state of the two output signals. In this way, a combined rotary knob with “push or pull to select” functionality can be created.

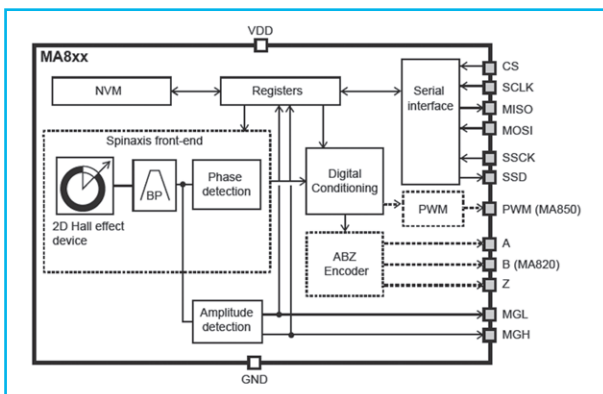
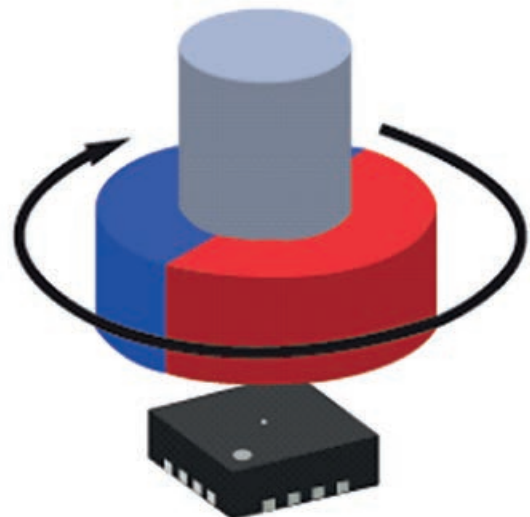


Figure 1: Block Diagram of MA8xx Family Sensor



Push Button Functionality

The MA8xx family provides contactless push or pull button functionality via programmable magnetic field strength thresholds, which can detect the distance of the magnet to the sensor. The graph in Figure 2 shows how this may be implemented with a change in magnet position of approximately 0.9 mm crossing the programmed field threshold to cause the MGH signal to change from logic 0 to logic 1.

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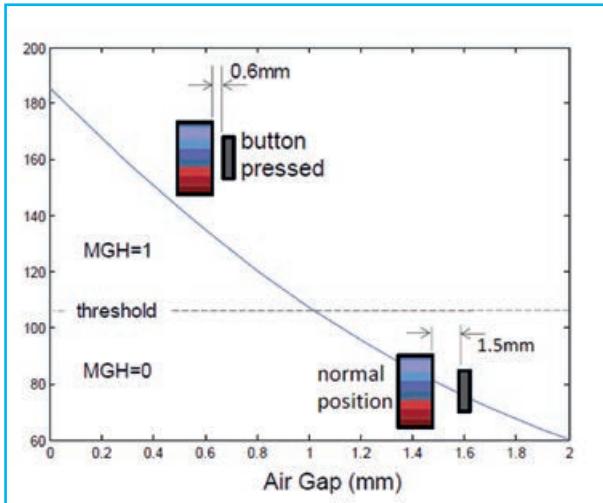


Figure 2: Example of Push Button Detection B(mT) v. Air Gap

Non-Volatile Memory

Configuration parameters are automatically stored in the MA8xx device's non-volatile memory via the SPI interface. The non-volatile memory provides storage for the reference zero angle position and the magnetic field detection thresholds. The MA8xx family operates from a 3.3 V supply and is packaged in a 3 x 3 mm QFN package. The operating temperature is -40 to +125°C.

MA8xx Family Sensor Range

FEATURES BY PART		UNIT	MA800 – DIGITAL OUT	MA820 – ABZ INCREMENTAL OUT	MA850 – PWML OUT
			TURNING KNOB APPLICATIONS		
Effective angle resolution	bit		8	8	8
Magnetic field range	mT		30 ... 150	30 ... 150	30 ... 150
Zero setting			•	•	•
SPI register configuration			•	•	•
Absolute angle on SPI	bit		8	-	-
Absolute angle on SPI	bit		8	-	-
ABZ incremental				•	
ABZ resolution	PPR			1 ... 64	
PWM output					•
PWM resolution	bit				8
Magnetic field detection			•	•	•
Push button functionality			•	•	•