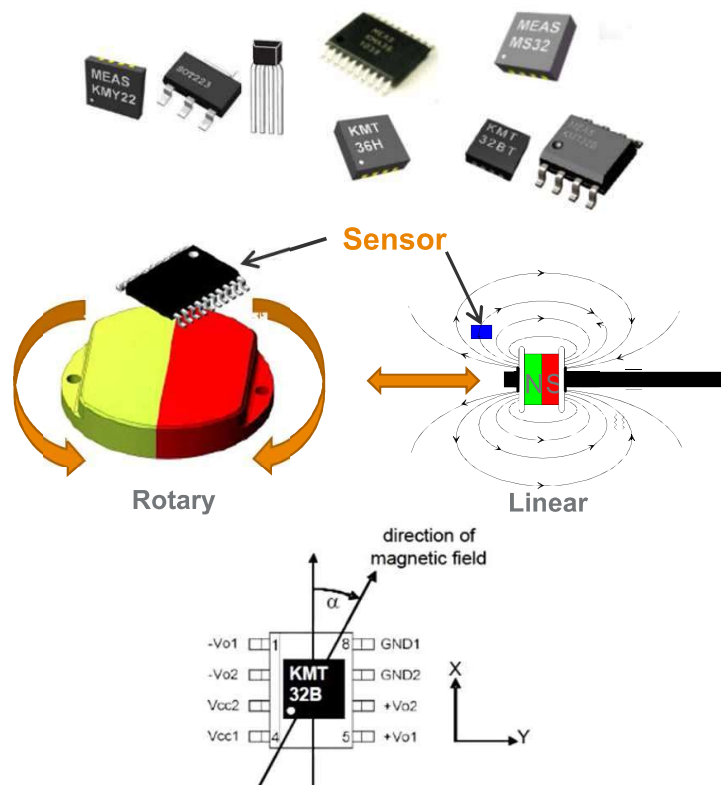


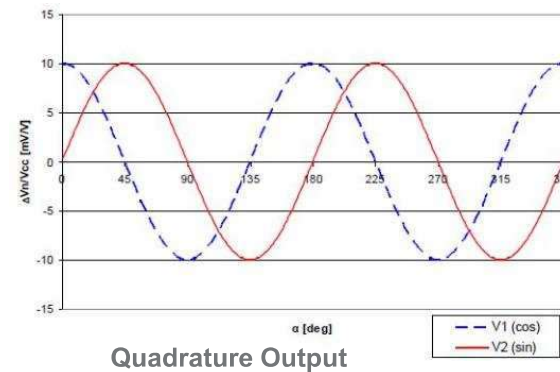
AMR

HOW DO POSITION SENSORS WORK

Magneto-Resistive (M-R) Based Position Sensor



- An array of M-R sensors on a chip
- The array is designed to sense the angular orientation of magnetic flux lines
- As the flux lines from a separate magnet move and rotate, the sensor can measure the motion
- The output signal can be analog (quadrature), or digital (I2C)



AMR ROTARY & POSITION SENSOR COMPONENTS

Packaging

- DFN, radial lead, SMD, PCB module
- Small footprint
- External magnet required

Performance

- Measure the angular position of magnetic flux lines
- Low sensitivity to magnet distance
- Insensitive to magnet strength
- DC volts, sine/cosine quadrature, PWM, I2C digital

Applications

- Industrial Machine Controls
- Indicators and Monitors
- Motion Control
- Robotics
- Solid State Potentiometer
- Stepper Motor Control
- Valve Position Monitor
- Mil/Aero Guidance
- Medical Device Feedback



AMR Sensor Components

Function: Non-contact measurement of changes in the angle of a magnetic field; enables design of devices that can detect disturbance in extremely weak fields (traffic detection sensors) or strong fields (encoders)

Technology: AMR (Anisotropic Magneto-Resistive) ; low sensitivity to distance from target (magnet); insensitive to magnet strength variations

Applications: Linear/rotary position; counterfeit banknote detection; etc.

Output: DC voltage; sine/cosine; PWM; I²C






Sensor Types: DC powered; absolute & incremental sensing

Package: Die; SMT; PCB; hybrid circuit

Designs: Standard catalog; Custom



AMR Standard Components

Type class	KMY weak	MS weak	KMT strong	KMA strong	MLS strong
					
Component senses	1 field component	1 field component	Field direction	Field direction	Field direction
Output	bipolar	unipolar	sin, cos	analog 0-5V, digital I2C	sin, cos
Application:	+ very sensitive + very low noise	+ very accurate + low hysteresis	+ very accurate + high resol. + simple ω calc + 360° possible + air gap	+ universal encoder IC + 180°/360° + 13 bit resol. + I2C or SPI + air gap	+ very precise + large air gap + SMT + for 1, 2, 2.5 or 5mm pole pitch
rotation	-	(✓)	✓	✓	pole wheel
linear	sensor array	sensor array	(✓)	(✓)	scale
presence	✓	✓	-	-	-

Summary Components & Applications

measurement		component		device	modul	applicat. examples
		passive	active			
	180° 	KMT37 	(KMA39) Analog 			<ul style="list-style-type: none"> steering angle EPS consumer
	360° 	KMT36H 	KMA36 PWM, I2C 	BT360 4-20mA	TS360 Trim sender	<ul style="list-style-type: none"> universal encoder potenti.replacem.
	Magnet based 	KMT $\approx l_{\text{magnet}}$	KMA36 $\approx l_{\text{magnet}}$	STM25 25mm	MRLF 30mm 100mm	<ul style="list-style-type: none"> linear position pneumatic handler level
	Scale based 	MLS 	KMA36 5mm pole pitch	ED34 PCB Inkr. ABZ UART	ED34 Inkr. AB	<ul style="list-style-type: none"> linear position pole wheel
	switch 	MS32 MS46 (double)	(MD47)			<ul style="list-style-type: none"> pneumatic end point brake light switch
	Low field 	KMY KMZ		MRLF PCBA	MRLF 100	<ul style="list-style-type: none"> level linear position

Markets - Applications

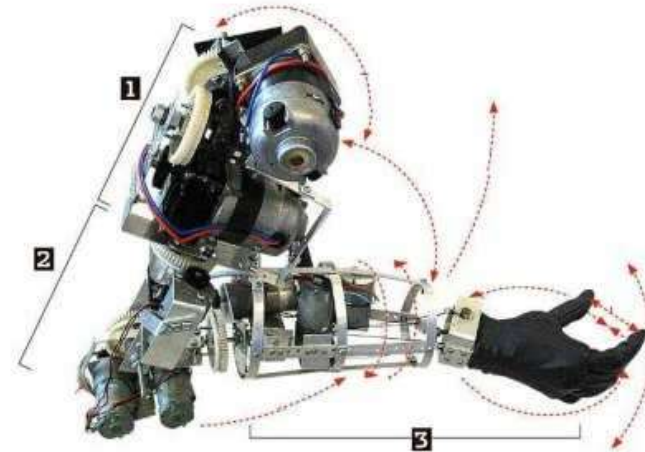
Encoder Applications

- Anything that Rotates
 - Medical Panel
 - Flow meters
 - Kiosk machines
 - Emission control test beds
 - Automotive alignment equipment
 - Drive by wire controls
 - Motor timing
 - Construction equipment
 - Material handling equipment
 - Welding machines
 - Elevators
 - Packing equipment
 - Exercise equipment
 - Engine dynamometers
 - Motor control
 - Gas pumps
 - Medical automation
 - Advertising displays
 - Tachometers
 - Industrial automation
 - Gaming
 - Vending machines
 - Camera pan and tilt
 - Appliance metering
- Short (<4" for Absolute) Linear Stroke
 - Valve Position
 - Transmission shifter
 - Infusion Pump Position
 - Medical Bed Position
 - Medical device



Medical Devices

- **Prosthetics or robotic surgery**
Where space is limited
- Medical applications that require
- Small MR devices that measure
 - Very accurately
 - With low power



Medical Devices

Many medical devices require **linear or rotational position** measurements:

