



# POSITION SENSORS

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## SELECTION GUIDE

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# As an industrial consumer, you require the highest levels of quality and reliability in the products you purchase

It is critical that devices operate, day after day, after day in some of the most extreme conditions imaginable. Sensata - BEI Sensors understands these needs and backed by decades of experience, designs sensors that offer uncompromising quality and performance. Sensata upholds a standard of excellence in our products, customer service experience and commitment to being your preferred partner for position sensors. We fully understand that your complete satisfaction is key to our success.

Sensata provides reliable position, speed and inclination sensing products for mission-critical and extreme environment applications in the industrial, military/aerospace and off-road equipment markets worldwide. Our products utilize **the latest optical, magnetic and potentiometric sensing technologies.**

The comprehensive product line includes absolute and incremental encoders, Hall effect sensors, as well as rotary and linear potentiometers. Specialized products for **harsh environments** include those certified for use in hazardous areas, wash-down environments and applications where they are exposed to extreme vibration, shock and operating temperatures. New ranges of **SIL3/ Ple functional safety encoders** can be used in safety applications involving speed control with or without rotation detection as well as position counting applications. In addition to an extensive range of standard product offerings, we have the ability and expertise to make **product adaptations** and create completely customized sensing solutions to suit even the most challenging applications.

Sensata's experienced customer service staff offers an outstanding level of service, both before and after the sale. Our order department quickly answers questions on order status, pricing and availability, or helps specify a unit to meet your exact requirements. Our highly trained applications staff helps with any technical needs, whether it's assistance with an interface or questions about crossing over a competitor's part number. The Sensata engineering team also consults on advanced technical issues. We consistently provide this high level of service to an active customer base of thousands of companies. Everyone at Sensata works toward a common goal to provide the most reliable products and deliver the best customer service.

**Sensata - BEI Sensors is the preferred position sensors partner to leading companies around the globe.**

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Sensata - BEI Sensors product offering includes a comprehensive range of output options that allow users to integrate the product in all the most common network interfaces.

Refer to the table below for the output option associated to each product series

## INTERFACE OPTIONS

Type	Option	Description	Incremental Encoders	Absolute Single-Turn Encoders	Absolute Multi-Turn Encoders	Hall Effect Sensors
Analog	A	Analog (ex: 4-20 mA, 0-10V, etc)	•	•	•	•
	SC	Sin/Cos	•			
	T	Tachometer (ex: 4-20 mA, 0-10V, etc)	•			
Digital	CT	Commutation track	•			
	PWM	Pulse width Modulation				•
	Q	Quadrature ABZ	•			•
Parallel	GC	Gray Code		•	•	
	NB	Natural Binary		•	•	
	X	BCD, Excess Code		•		
Serial	BISS	Biss		•		
	IO	IO-Link	•	•		•
	S1	RS232		•	•	•
	SSI	Serial Synchronous Interface		•	•	•
Serial + Incremental	SPQ	Absolute with digital inc channels		•	•	
	SPSC	Absolute with inc sin cos channels		•	•	
Fieldbus	CAN	CANopen		•	•	•
	DN	DeviceNet			•	
	PB	Profibus		•	•	
Ethernet	MB	Modbus TCP			•	
	EC	Ethercat			•	
	EIP	Ethernet/IP			•	
	PL	Powerlink			•	
	PN	Profinet			•	
Programmable	PR	Programmable resolution/ outputs	•	•	•	•



# SERVING THE POSITION SENSING NEEDS OF THESE MAJOR INDUSTRIES

These days, engineers have to do more with fewer resources. Sensata | BEI Sensors helps by acting as an extension of your engineering team. Our application and design engineers assist with everything from creating custom sensors to troubleshooting installations. We are more than just a supplier. We partner with our customers to help make their operations run more easily and efficiently.

## Mining

In mining applications, Sensata helps with everything from shaft elevator control and ore cart positioning to the control of heavy equipment such as excavators and earthmovers. Sensors in this environment have to withstand high shock and vibration, along with extremely dusty and wet conditions. Sensata manufactures rugged products designed to deliver optimum performance in these demanding operations. In addition, when hazardous area certifications are required, Sensata offers a number of products certified by UL, CENELEC, LCIE and MSHA rating agencies.

## Metal Manufacturing

There are few harsher, more corrosive environments than a steel mill. Molten steel is cast into large slabs at blistering temperatures. Water from line sprayers hits freshly poured slabs, creating clouds of steam. Every piece of equipment is exposed to continuous humidity. Sensata speed and position sensors are engineered to withstand this unforgiving environment. Encoders are available with stainless steel housings and other protective coatings to prevent corrosion and rust. High IP ratings are offered to resist pressurized spray, condensation and dust. Sensata's products are built tough to operate reliably in these severe conditions.

## Heavy Motors

Sensata has supplied high quality, rugged encoders to heavy motor manufacturers for decades. Heavy motors are found in all types of harsh industrial environments and require extremely rugged feedback devices. Sensata's products have the proven reliability needed for successful operation in these environments. If a motor is needed for use in a hazardous area, simply select one of Sensata's large catalog of UL and ATEX pre-certified products. They provide drop-in feedback solutions that are ready to operate in hazardous areas worldwide. Custom product adaptations are also available for seamless integration into any motor design. Sensata's design engineers are always on hand to provide any amount of customization, from simple shaft and connector modifications to designing a new sensor around your exact requirements



## Oil & Gas

Sensors used in the oil and gas industry must withstand high temperature and pressure in potentially explosive locations and extreme shock and vibration, along with exposure to chemicals, dirt and moisture. Position sensors perform crucial functions in oil and gas applications and must operate reliably day in and day out to ensure an optimized yield. Sensata is well aware of these unique upstream, midstream and downstream requirements and has designed products that feature uncompromising quality and performance. Hard anodized housings, gross leak tests, extended temperature ranges and a variety of sealing options are available on numerous Sensata products. Sensata also offers one of the largest selection of hazardous area rated products, including UL Class I Division 1 and 2, and Class II Division 1 and 2, and ATEX Zone 1 and Zone 2 (See page 9). A variety of communication protocols including Profibus, CANopen and DeviceNet are also offered.

## Off-Road Equipment for Construction & Agriculture

Sensata's products have stood the test of time, providing a high degree of reliability and performance, while withstanding the severe conditions posed by off-road and industrial vehicle applications. These demanding applications rely on precise position sensing and redundant safety for steering and wheel systems, steer-by-wire systems, gear sensing, pedal and throttle control, hand acceleration, valve and control logging, cabin controls and more. Whether exposed to dirt, extreme temperatures, or moisture, the rugged construction of Sensata products ensures their accurate and reliable operation day after day, year after year.














































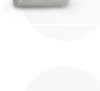


## Cranes

Cranes are critical pieces of equipment for a variety of industries around the world. The environments where they operate are almost as diverse as the materials they move. Whether it's loading and unloading cargo in unforgiving seaports, or handling material on a factory floor, cranes require reliable feedback solutions to do their job properly and safely. BEI Sensors offers a variety of position sensors and a real-time wireless interface system, rugged enough for the toughest environmental conditions, while providing the position and speed feedback needed to move materials with precision and accuracy.





# INCREMENTAL ENCODERS

## METRIC SIZE SERIES











































Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?	
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area		
	HHM3	30mm		4 to 6mm	Connector, Cable	Q	1,024	6,000	-40 to +100 (at 5Vdc)	Magnetic	•	•	•			•		Miniature and Robust
	GHM4/GHK4/GZT4	40mm	  	6mm	Connector, Cable	Q	2,500	9,000	-20 to +80	Magnetic		•	•				•	Compact
	DHK5	58mm		6 to 15mm	Connector, Cable	IO, PR, Q, SC	500 000	6,000	-30 to +100	Optical		•	•					Industrial Standard Programmable Non Incendive
	DHM5			6 to 15mm	Connector, Cable	IO, PR, Q, SC	500 000	12 000	-30 to +100	Optical		•	•					Industrial Standard Programmable Non Incendive
	DH05			6 to 15mm	Connector, Cable	IO, PR, Q, SC	500 000	6,000	-30 to +100	Optical		•	•					Industrial Standard Programmable Non Incendive
	DXK5	58mm		10mm	Cable	PR, Q, SC	500 000	6,000	-30 to +100	Optical	•	•	•	•	•	•		Heavy duty, Stainless Steel
	DXM5			10mm	Cable	PR, Q, SC	500 000	3,000	-30 to +100	Optical	•	•	•	•	•	•		Heavy duty, Stainless Steel
	DX05			10mm	Cable	PR, Q, SC	500 000	6,000	-30 to +100	Optical	•	•	•	•	•	•		Heavy duty, Stainless Steel
	KHK5 /KHM5/ KH05	58mm	  	6 to 15mm	Cable	CT, PR	500 000	6,000	-40 to +100	Optical	•	•	•			•		Programmable with commutation track
	IHM5/IBM5/ IXM5	58mm		6 to 15mm	Connector, Cable	Q	80,000	6,000	-30 to +70	Optical		•						ATEX, Intrinsically safe Zone 0-20 Stainless steel
	IH05/IB05/ IX05			6 to 15mm	Connector, Cable	Q	80,000	6,000	-30 to +70	Optical		•						ATEX, Intrinsically safe Zone 0-20 Stainless steel
	DHM9/DXM9 GHM9/GXM9 GHU9/GXU9	90mm	  	11 to 14mm	Connector, Cable, TB	IO, PR, Q, SC	80 000	6,000	-20 to +80	Optical		•	•	•	•	•		Heavy duty, Stainless Steel
	NHM9/NXM9 NHU9/NXU9		  	11 to 14mm	Connector, Cable, TB	A	10,000	6,000	-20 to +80	Optical	•	•		•	•	•		Incremental + Tachometer
	IHM9			11 to 14mm	Connector, Cable, TB	Q	80,000	6,000	-30 to +70	Optical	•	•		•		•		Intrinsically safe Zone 0-20
	GAUX/GEUX	109mm		30mm	Cable	Q	10,000	3,000	-20 to +60	Optical		•		•	•			Explosion Proof Zone 1-21 Mining Ex I M2
	GAMX/GEMX	116mm		12mm	Cable	Q	10,000	6,000	-20 to +60	Optical		•		•	•			Explosion Proof Zone 1-21 Mining Ex I M2

**SHAFT TYPE**  Shafted  Blind Shaft  Through Shaft



**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.

# INCREMENTAL ENCODERS

## IMPERIAL SIZE SERIES































Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?				
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area					
	L15	1.5"		0.25"	Cable	Q	8,192	5,000	0 to +70	Optical			•					Small, light duty			
	H20	2.0"		0.25 to 0.375"	Connector, Cable	Q, SC	10,000	8,000	-40 to +85	Optical / Magnetic	•	•	•			•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus			
				0.25 to 0.625"	Connector, Cable	Q	10,000	6,000	-40 to +85	Optical / Magnetic		•	•					•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus	
				0.25 to 0.375"	Connector	Q	2,048	5,000	-40 to +85	Optical / Magnetic	•	•	•						•		Intrinsically safe, IP67
	L25	2.5"		0.25	Connector, Cable	Q	80,000	10,000	-40 to +85	Optical / Magnetic			•						Very low shaft torque		
	E25			0.25 to 0.375"	Connector, Cable	Q	80,000	10,000	-40 to +85	Optical / Magnetic			•						Very low shaft torque Integral flex coupling		
	H25			0.375 to 0.5"	Connector, Cable	PR, Q, SC	80,000	30,000	-40 to +85	Optical / Magnetic	•	•	•	•				•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus	
	HS25			0.375 to 0.75"	Connector, Cable	Q	80,000	6,000	-40 to +85	Optical / Magnetic			•	•					•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus
	ES25			0.25 to 0.375"	Connector	Q	2,048	5,000	-40 to +85	Optical / Magnetic	•	•	•						•		IP67 temporary immersion
	HS35	3.5"		0.50 to 1.00"	Connector, Cable	Q, SC	80,000	6,000	0 to +70	Optical			•	•				•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus	
	HS35 Drawworks			1.00"-14 UNS, 5/8"-18 5/8" or 3/8" Thru	Connector, Cable, TB, ETB	Q	5,000	6,000	-40 to +85	Optical			•						•		Intrinsically Safe, TB=Terminal Block ETB=Enclosed terminal box
	LP35	3.5"		HS: 30MM max. IC: 1/2, 3/4", 14, 20mm Solid: 12mm, 3/8"	Connector, Cable, ETB	PR, Q	10,000	6,000	-40 to +85	Magnetic	•	•	•	•				•		Intrinsically Safe, Non Incendive, ATEX, IECEx, cULus ETB=Enclosed Terminal box	
	H38	3.8"		.375"	Conduit	Q	80,000	10,000	0 to +70	Optical / Magnetic	•	•						•		Explosionproof, ATEX, IECEx and cULus	
	H40	4.0"		0.625"	Conduit	Q	80,000	10,000	0 to +70	Optical / Magnetic	•	•		•				•		Explosionproof, cULus	
	HS45	4.5"		1.75"/2.00"	Connector, Cable, TB	Q	8,192	5,000	0 to +70	Optical			•	•				•		Intrinsically Safe, Non Incendive, ATEX, IECEx and cULus	

**SHAFT TYPE**  Shafted  Blind Shaft  Through Shaft



**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.

# ABSOLUTE SINGLE-TURN ENCODERS

## METRIC SIZE SERIES
































Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?	
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area		
	AHM3	30 mm		4 to 6mm	Connector, Cable	A, CAN, PWM, SSI	12 Bits	6,000	-40 to +85	Magnetic	•	•	•				•	Encapsulated encoder
	AHM4/AXM4	40 mm		6 mm	Connector	A, CAN, SSI	13 Bits	12,000	-40 to +85	Magnetic		•	•		•			Compact, Stainless Steel
	CHK5	58mm		6 to 14mm	Connector, Cable	BISS, CAN, GC, NB, PB, PWM, SPSC, SSI	16 Bits	9,000	-20 to +90	Optical	•	•	•					Accurate Single-Turn
	CHM5			6 to 10mm	Connector, Cable	BISS, CAN, GC, NB, PB, PWM, SPSC, SSI	16 Bits	9,000	-20 to +90	Optical	•	•	•					Accurate Single-Turn
	CH05			6 to 14mm	Connector, Cable	BISS, CAN, GC, NB, SPSC, SSI	16 Bits	6,000	-20 to +85	Optical		•	•					Accurate Single-Turn
	CXK5/CXM5/CX05	58mm		10mm	Cable	CAN, GC, NB, SSI	13 Bits	3,000	-20 to +85	Optical	•	•	•		•	•		Heavy duty, Stainless Steel, IP69K
	AHK5, AH05	58mm		6 to 10mm	Connector, Cable	A, CAN, IO, PWM, SSI	12 Bits	6,000	-40 to +85	Magnetic		•	•		•	•		Economical solution (Optional electronic encapsulated)
	AHM5			6 to 10mm	Connector, Cable	A, CAN, IO, PWM, SSI	12 Bits	6,000	-40 to +85	Magnetic		•	•		•	•		Economical solution (Optional electronic encapsulated)
	AXM5S			6 to 10mm	Connector, Cable	A, CAN, PWM, SSI	12 Bits	6,000	-40 to +85	Magnetic		•	•		•	•		Heavy duty, Stainless Steel
	FHK5/FXK5	58mm		15mm	Connector	CAN, PB, SSI	16 Bits	6,000	-40 to +85	Optical		•	•					Field bus Terminal box Stainless Steel
	FHM5/FXM5			10mm	Connector	CAN, PB, SSI	16 Bits	6,000	-40 to +85	Optical	•	•	•					Field bus Terminal box
	CHM9/CHU9/CXU9	90mm		11 to 12mm	Connector, Cable	A, BISS, CAN, GC, NB, PB, SSI	16 Bits	6,000	-20 to +90	Optical	•	•		•	•	•		Heavy duty, Stainless Steel
	CAUX/CEUX	109mm		30mm	Cable	CAN, SSI	14 Bits	3,000	-20 to +40	Optical		•	•		•			Explosion Proof Zone 1-21
	CAMX/CEMX	116mm		12mm	Cable	GC, NB	13 Bits	6,000	-20 to +40	Optical		•	•		•	•		Explosion Proof Zone 1-21

**SHAFT TYPE**  Shafted  Blind Shaft  Through Shaft



**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.

# ABSOLUTE MULTI-TURN ENCODERS

## METRIC SIZE SERIES















Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area	
	THM4/TXM4		6 to 10mm	Connector, Cable	A, CAN, SSI	12x13 Bits	12,000	-40 to +85	Magnetic	•	•			•	•		Energy harvesting
			THK4		6mm	Connector	A, CAN, SSI	12x13 Bits	12,000	-40 to +85	Magnetic		•			•	•
	MHK5		15mm	Connector, Cable	CAN, EC, EIP, DN, MB, PB, PL, PN, SSI	16x14 Bits	6,000	-40 to +85	Optical		•	•					Ethernet Interface, Mechanical
			MHM5		6 to 10mm	Connector, Cable	CAN, EC, EIP, DN, MB, PB, PL, PN, SSI	13x16 Bits	6,000	-20 to +85	Optical	•	•	•			
	PHM5		6 to 10mm	Connector	CAN, PB, SPQ, SSI, X	16x16 Bits	6,000	-20 to +85	Optical		•	•					Accurate Available with incremental channels
			PHO5		6 to 14mm	Connector	CAN, PB, SPQ, SSI, X	16x16 Bits	6,000	-20 to +85	Optical		•	•			
	MXM5		6 to 10mm	Connector, Cable	CAN, PB, SSI	16x14 Bits	6,000	-20 to +85	Optical	•	•	•					Stainless Steel
	THM5/TXM5		6 to 10mm	Connector, Cable	A, CAN, IO, PWM, SSI	12x16 Bits	6,000	-40 to +85	Magnetic		•	•		•	•		Stainless Steel for Food & Beverage Economical solution
			THK5		6 to 15mm	Connector, Cable	A, CAN, IO, PWM, SSI	12x16 Bits	6,000	-20 to +85	Magnetic		•	•			•
	PHM9		11 to 12 mm	Connector, Cable, Terminal Box	CAN, GC, NB, PB, SSI	13x16 Bits	6,000	-20 to +85	Optical	•	•		•				Heavy duty
			PHU9		30mm	Connector, Cable, Terminal Box	CAN, PB, SSI	13x16 Bits	3,600	-20 to +80	Optical	•	•				
	PAUX/PEUX		30mm	Cable	CAN, SSI	13x16 Bits	3,000	-20 to +40	Optical		•	•		•	•		Explosion Proof Zone 1-21
	PAMX/PEMX		12mm	Cable	CAN, SSI	13 Bits	6,000	-20 to +40	Optical		•	•		•	•		Explosion Proof Zone 1-21
	MAAX/MAUX		12 to 20mm and 1/2" to 1"	Connector	CAN, PB, SSI	16x16 Bits	3,000	-20 to +40	Optical		•	•	•	•	•		Explosion Proof Zone 1-21

**SHAFT TYPE**  **Shafted**  **Blind Shaft**  **Through Shaft**

**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.









# ABSOLUTE SINGLE-TURN ENCODERS

## IMPERIAL SIZE SERIES



Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area	
 <b>H25/H25X</b>	2.5"		0.375" to 0.50"	Connector, Cable	A, GC, NB, S1, X	15 bits	12,000 Bits	0 to +70	Optical	•	•	•	•	•	•		Non incensive, ATEX, IECEx and cULus (H25X)
 <b>HS35</b>	3.5"		0.50 to 1.00"	Connector, Cable	A, GC, NB, SSI	16 bits*	6,000 Bits	0 to +70	Optical		•	•		•	•		Heavy duty Hollow shaft
 <b>LP35</b>			HS: 30mm max. IC: 1/2", 3/4", 14mm, 20mm Solid: 12mm, 3/8"	Connector, Cable, ETB	CT, PR, Q, SSI	16 bits	6,000 Bits	-40 to +85	Magnetic	•	•		•				Non Incensive, ATEX, IECEx and cULus ETB=Enclosed Terminal Box IC=Integrated Shaft Coupling
 <b>H38</b>	3.8"		0.375"	Conduit	A, GC, NB, S1, SSI	13 bits	10,000 Bits	0 to +70	Optical	•	•			•	•		"Explosionproof, ATEX, IECEx and cULus"
 <b>H40</b>	4.0"		0.625"	Conduit	A, BCD, GC, NB, S1, SSI, X	13 bits	10,000 Bits	0 to +70	Optical	•	•	•	•				Explosionproof, cULus

# ABSOLUTE MULTI-TURN ENCODERS

## IMPERIAL SIZE SERIES



















Series	Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution (Max)	Mechanical Speed RPM (Max)	Standard Operating Temp (°C)	Technology	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							Why Select This ?
										Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area	
 <b>HMT25</b>	2.5"		0.375" to 0.5"	Connector	A, GC, NB, SSI	12x12	6,000 Bits	0 to +70	Optical	•	•	•	•	•	•		Industrial Standard
 <b>H38</b>	3.8"		.375"	Conduit	A, GC, NB, SSI	12x12	10,000 Bits	0 to +70	Optical	•	•	•		•	•		Explosionproof, ATEX, IECEx and cULus
 <b>H40</b>	4.0"		0.625"	Conduit	A, GC, NB, SSI	12x12	10,000 Bits	0 to +70	Optical	•	•	•	•		•		Explosionproof, cULus

**SHAFT TYPE**  **Shafted**  **Blind Shaft**  **Through Shaft**



**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.



## FUNCTIONAL SAFETY ENCODERS










Series	Mechanical Specifications	Shaft Type	Shaft Diameter	Resolution	Max. Speed	Termination
 <b>DSM5H</b>	58 mm Aluminium IP65		6, 10 mm and 3/8"	250, 256, 360, 500, 512, 1000, 1024, 2048, 2500	6000 RPM	Cable or M23 Connector Axial or Radial
 <b>DSM5X</b>	58 mm Stainless steel IP69K		10 mm	250, 256, 360, 500, 512, 1000, 1024, 2048, 2500	3000 RPM	Cable Axial
 <b>DST5H</b>	58 mm Aluminium IP65		9.52mm to 14mm	250, 256, 360, 500, 512, 1000, 1024, 2048, 2500	6000 RPM	Cable or M23 / M12 connector Axial or Radial
 <b>DSK5</b>	58 mm Aluminium IP65		9.52mm to 14mm	2500	6000 RPM	Cable or M23 / M12 connector Axial or Radial
 <b>DSK5HKB</b>	58 mm Aluminium IP65		7.3mm, tapered 10%	2500	6000 RPM	Cable or M23 / M12 connector Axial or Radial
 <b>DSM9H</b>	90 mm Aluminium IP65		11, 12 mm	1024, 2048	6000 RPM	Cable or M23 Connector Axial or Radial
 <b>DSM9X</b>	90 mm Stainless steel IP66		11, 12 mm	1024, 2048	6000 RPM	Cable or M23 Connector Axial or Radial
 <b>DSU9H</b>	90 mm Aluminium IP65		20, 25, 30 mm and 1"	1024, 2048	3000 RPM	Cable or M23 Connector Radial
 <b>DSU9X</b>	90 mm Stainless steel IP66		20, 25, 30 mm and 1"	1024, 2048	1500 RPM	Cable or M23 Connector Radial

## FUNCTIONAL SAFETY SPLITTERS



Part Number	Splitter Power Supply +Vin	Encoder Power Supply	Max Encoder Frequency	Encoder Input	Safe Output (Direct Encoder Signals Transmission)	Secondary Output (Not Safety rated)
 <b>EAR-001</b>	11-30Vdc  250mA (*)	Selectable : +Vin or 5Vdc, 200mA max.	300kHz	TTL/RS422 or sine 1Vpp	Same as interfaced encoder	Selectable: TTL/RS422 or HTL
<b>EAR-002</b>		+Vin, 200mA max.		HTL		

**SHAFT TYPE**  **Shafted**  **Blind Shaft**  **Through Shaft**

## DRAW WIRE SENSORS

Series	Measuring Length (in)	Measuring Length (mm)	Output Type				Mechanical Only
			Potentiometer	Analog	Incremental	Absolute	
 <b>CDB</b>	30	800	Yes	0	0	0	Yes
 <b>CD050</b>	50	1250	-	0	0	-	0
 <b>CD060</b>	60	1500	-	0	0	0	0
 <b>CD080</b>	100	2500	Yes	Yes	0	0	Yes
 <b>CD115</b>	115	3000	Yes	Yes	0	0	Yes
 <b>CD120</b>	125	3175	-	0	Yes	0	0
 <b>CD150</b>	235	6000	Yes	0	0	0	Yes
 <b>CDS12</b>	390 590	10000 15000	Yes	Yes	0	0	Yes
 <b>CDS18</b>	785 1180 1570 1965	20000 30000 40000 50000	Yes	Yes	0	0	Yes














## INCLINOMETERS

Series	Housing	Measuring Range	Axis	Termination	Output Type			
					Analog 4-20mA	Analog 0-5V	CANopen	SSI
 <b>T-P</b>	Plastic	± 15° ± 30° ± 60° ± 360°	2 (1 for ± 360°)	Connector Cable	Yes	Yes	Yes	Yes
 <b>T-M</b>	Metal (Heavy Duty)	± 15° ± 30° ± 60° ± 360°	2 (1 for ± 360°)	Connector Cable	Yes	Yes	Yes	-



### OUTPUT TYPE

**Yes** Standard option (Datasheet available online) **0** Various combinations available (contact customer service) **-** Not available









# HALL EFFECT SENSORS

Series	Body Size	Shaft Type	Shaft/Bore Size	Terminations	Output Options	Resolution	Linearity	Range of Motion	Standard Operating Temp (°C)	Spring Return	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS							
											Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area	
  	9960	37mm		9.5mm (blade)	Connector, Cable	A, PR, PWM	12 Bits	0.6%	15° to 360°	-40 to +125	CW, CCW	•	•	•		•		
	9360	41mm		4.6mm	Connector	A, PR, PWM	12 Bits	0.6%	15° to 360°	-40 to +85	CW, CCW	•	•	•		•		
	8360	82mm		20.3mm (spline)	Connector	A, PR, PWM	12 Bits	0.6%	15° to 360°	-30 to +85				•		•		
   	HCW4	50mm	Shaft system w/magnet sold separately, ref M9105 Series		Flying leads, Cable with M12 connector	Q	1024 Bits	n/a	0° to 360° continuous rotation	-40 to +85	n/a	•	•	•	•	•		
	ACW4 analog	50mm		A, PWM		12 Bits	±0.3%	0° to 360° continuous rotation	-40 to +85	n/a	•	•	•	•	•	•	•	
	ACW4 digital	50mm		CAN, IO, SSI		12 Bits	±0.3%	0° to 360° continuous rotation	-40 to +85	n/a	•	•	•	•	•	•	•	•
	TCW4	52mm		A, CAN, IO, PWM, SSI		12 x16 Bits	±0.3% single turn	0 to 65536 turns, continuous rotation	-20 to +85	n/a	•	•	•	•	•	•	•	•

**SHAFT TYPE**  **Shafted**  **Blind Shaft**  **Through Shaft**

**CERTIFICATION LEVEL**  All configurations of this models are certified for use in hazardous locations.  Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.

# POTENTIOMETERS

Series	Range of Motion	Package Size	Number of Outputs/Type	Life	Drive Interface	Supply Voltage	Standard Operating Temperature (°C)	Linearity	Spring Return	Termination	AVAILABLE OPTIONS FOR USE IN EXTREME ENVIRONMENTS						
											Wet	Dirty/ Dusty	Extended Temp	High Shaft Load	Corrosive/ Washdown	High Shock/ Vibration	Hazardous Area
 <b>1200-2800</b>	320° to 358°	22.225 to 76.20mm	1 to 8	2x106 to 50x106	Solid Shaft, Flatted	0.5W to 7W not to exceed 400V	-55 to +125	0.15 to 0.5		Solder Terminals			•				
 <b>9850/9860</b>	85°, 130°	53 x 25mm	1 or 2/Analog ratiometric	1 x 106	Blind Shaftkey	0.15 W	-40 to +125	2%	CW, CCW	Metri Pack 150.2, 3-pin, 6-pin		•	•				
 <b>5320</b>	240°	18x16x12mm	1/Analog ratiometric	1 x 106	Solid Shaft, Flatted	0.25 W	-40 to +125	2%		Terminal Board	•	•	•				
 <b>700</b>	1 to 12" (25.4 to 304.8mm)	0.375L 0.5"Ø (9.52L 12.7mm Ø)	1/Analog ratiometric	5 x 105	Shaft, Threaded	0.25 W/in	-40 to +300	2%		Flying Lead, 3-Wire			•			•	
 <b>600</b>	1 to 12" (25.4 to 304.8mm)	1 to 12 x 0.62" (25.4x304.8x 15.75mm)	1/Analog ratiometric	10 x 106	Shaft, Threaded	0.25 W	-55 to +125	0.7% to 0.08%		Flying Lead, 3-Wire			•			•	
 <b>6300</b>	50 to 100mm	77 to 1077mm x 22mm	1/Analog ratiometric	1 x 106	In Cylinder	0.5W per 50mm	-40 to +125	0.75% to 0.038%		Flying Lead, 3-Wire, Pressure header			•				
 <b>6400</b>	2 to 20" (50.8 to 508mm)	3.3 to 21 x 0.48" (83.82 x 533,4 x 12.19mm)	1/Analog ratiometric	1 x 106	In Cylinder	0.5W per 2"	-40 to +125	0.75% to 0.038%		Flying Lead, 3-Wire, Pressure header			•				
 <b>9600</b>	12.7 to 38.1mm	27 to 52mm x 13mm x 9mm	1/Analog ratiometric	1 x 106	Shaft	0.25 W to 0.75W	-40 to +135	1% to 0.25%	Compression	Solder lugs, 3			•				

**CERTIFICATION LEVEL**



All configurations of this models are certified for use in hazardous locations.



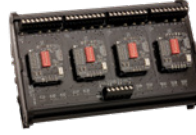


Specific configurations of this models are certified for use in hazardous locations. Standard product is not certified.

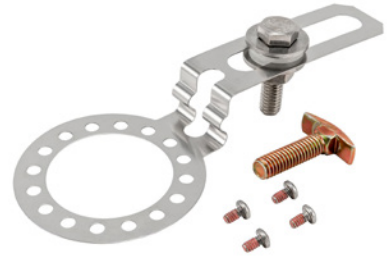
# ENCODER MODULES & SIGNAL ACCESSORIES

These accessories supplement the encoder signal or output by modifying it in some way to overcome challenges faced in an application.

Module	Description	What You Have	What You Need	What to Order	Encoder Usage			
	Shifts data signals voltage level to make them compatible with a variety of controllers without fear of electrical crosstalk or ground loops.	Encoder Output/ Logic Level	Optical Isolator Output Logic Level	Part Number	Can be used with any Incremental Encoder			
						5 VDC	Vout = Vin	60001-003
							Vout = 5VDC	60001-002
							Vout = OC	60001-004
						12 - 15 VDC	Vout = Vin	60001-008
							Vout = 5VDC	60001-012
		Vout = OC	60001-014					
		24 VDC	Vout = Vin	60001-010				
			Vout = 5VDC	60001-011				
			Vout = OC	60001-013				
			Device that limits the amount of power that can go into a hazardous area during a fault condition.  Certified for installation in Class I, Div. 2 Gps A,B,C&D and Zone 2 (IIC) hazardous	5 VDC		Output Logic (Safe Zone)		Designed for Sensata   BEI Sensors Intrinsic Safety incremental Encoders but may be used with any suitable intrinsic safety incremental encoder.
						Vout = 5V	60004-002	
Vout = Vin	60004-003							
Open Collector	60004-004							
Vout = 5V (Open wire detect)	60004-005							
Vout = Vin (Open wire detect)	60004-006							
	Takes encoder signals and converts them to data values for use with computers or lab equipment.	Data Input	Supply to Converter	Part Number	Can be used with any Incremental or SSI Absolute Encoder			
		SSI	S3 (SSI Only)	60013-001				
			5Vdc	60013-002				
		Quadrature	15 Vdc (12 - 15 Vdc)	60013-003				
			24 Vdc	60013-004				
		Special Feature - (Automatic Data Sample - User programmable, Specify: -S= Data Sample Function)	S3 (SSI Only)	60013-007				
			5Vdc	60013-006				
			15 Vdc (12 - 15 Vdc)	60013-010				
			Reduces excess counts by an encoder in high vibration environments by injecting a 1/4 cycle of hysteresis into the signal.	Data Input		Supply and output voltage to Anti-Dither	Part Number	Can be used with any Incremental Encoder
5V	Vout = Vin			60003-004				
	VOUT = OC			60003-002				
	VOUT = 5VDC			60003-003				
15V	Vout = Vin			60003-009				
	VOUT = OC			60003-010				
	VOUT = 5VDC			60003-007				
15V	Vout = Vin			60003-006				
	VOUT = OC			60003-011				
	VOUT = 5VDC	60003-008						

Module	Description	What You Have	What You Need	What to Order	Encoder Usage		
	Divides the incoming data signal by the Divide-By factor indicated	Note: Other Divide By Factors available consult factory  5V  15V  24V	Divide by factor and Supply/Output Voltage	Part Number	Can be used with any Incremental Encoder		
						Divide by 8, 28V/5	60016-008
						Divide by 4, 28V/5	60016-017
						Divide by 5, 28V/5	60016-031
	Takes a SSI input from 5 to 28 volts and turns it into a 16 bit parallel word	5 - 28V SSI	Output Options		Can be used with any SSI Absolute Encoder		
			5-28V	60007-001			
			5 Volts	60007-002			
	Takes a single encoder signal and shares it through a four-way optically isolated splitter. This allows the user to produce multiple encoder signals off of one encoder.  Each signal can also be modified by inserting a special functional board into a slot for that particular signal.	Note: Other Broadcaster versions available. Consult Factory  5V  15V  24V	Broadcaster Details	Part Number	Can be used with any Incremental Encoder		
						4 Opto Isolators 28V/V	60011-001
						4 Divide By 28V/V	60011-002
						4 Opto Isolators 28V/5	60011-011
						4 Opto Isolators, 3@ 28V/5 and 1@ 28V/OC	60011-068
						4 Anti-Dither outputs @ 28V/V	60011-089
						4 Opto Isolators 28V/V	60011-010
						4 Opto Isolators 28V/V	60011-003
						4 Opto Isolators, 2@ 28V/V and 2@ 28V/5	60011-027
						1 Divide By @ 28V/V and 3 Opto Isolators @ 28V/V	60011-050
						4 Divide By @ 28 V/V	60011-052

## SUPPORT PRODUCTS & ACCESSORIES



### Mounting/Adapters

Flexmounts, tether arms, coupling bellows, flanges and others to adapt the encoder to any installation requirement.



### Connectors/Cable Assemblies

Connectors and pre-made cable assemblies in a variety of lengths for different installation requirements.



### Bore Reduction Sleeves

Used to reduce the bore size down to a size that matches their mating shaft.



### Measuring Wheels

Measuring wheels that can be mounted on a variety of encoders of different shaft sizes.



### Functional Safety Accessories

Flanges, stator couplings, tether arms, other types of accessories necessary for SIL3 encoder installation.



## EXTENSIVE PRODUCT ADAPTABILITY

Sensata | BEI Sensors' exhaustive experience and capabilities in design, engineering and manufacturing allow us to provide **innovative adapted products and complete custom solutions** to meet unique position sensor requirements. For decades we have provided thousands of modifications to all our standard products. From customizations as simple as adding a connector or changing a shaft size to merging parts of two standard products, Sensata takes pride in its ability to adapt to any customer's product needs.

Other adaptations require more significant changes, such as the modification of a product's size and shape so that it will fit into a particular package design. Complete customization, where the technology itself is adapted to meet a customer's requirements, is also fully within Sensata's capabilities. Our experienced engineering team works closely with customers to help specify their requirements, outline a design, develop prototypes and—after final customer approval—move the custom sensor into production.

Sensata has the ability and willingness to make these types of modifications, ensuring that you will receive a position sensor **configured to your specifications**, allowing drop-in installation and simplifying production and assembly at your facility. If you are not finding exactly what you need in this catalog, just ask and we will be happy to create a customized solution with you.



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Technologies

## ABOUT US

Sensata Technologies is one of the world's leading suppliers of sensing, electrical protection, control and power management solutions with operations and business centers in twelve countries. Sensata's products improve safety, efficiency and comfort for millions of people every day in automotive, appliance, aircraft, industrial, military, heavy vehicle, heating, air-conditioning and ventilation, data, telecommunications, recreational vehicles and marine applications. For more information please visit Sensata's website

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