

H25

2,5" SOLID SHAFT INCREMENTAL ENCODERS - ORDINARY & HAZARDOUS LOCATIONS

The H25 is the flagship of the BEI Sensors product line. It was designed from the ground up for the industrial marketplace. The H25 offers features such as EMI shielding, high precision ball bearings and matched thermal coefficients on critical components. The encoder meets up to IP66 sealing requirements when ordered with the shaft seal.

GEN²

For **Generation 1** datasheet [click here](#).



Features

- Wide operating temperature range
- Ruggedized, well-sealed unit for long life operation
- Industry standard interfaces make it easy to install
- Extensive electrical protection reduces damage due to miswiring
- High noise immunity especially useful in electrically noisy automation environments
- Selected configurations available in 1 to 3 days shipment ("Express Encoder" option)
- Certifications in Hazardous Locations: Intrinsically safe or Non-incendive UL/Atex/IECEx

Applications

- Machine control
- Robotics
- Material handling
- Web process control - dancers, slitters, flying knives
- Food processing

SPECIFICATIONS

Mechanical

Material	Cover: Die cast Aluminum with Iridite finish Body: Aluminum Shaft: AISI 303 Stainless Steel	
Bearings	High precision ball bearings, Material: Chrome steel; shielded bearings standard, sealed bearings optional	
Maximum Loads	Axial	40 pounds
	Radial	35 pounds
Shaft inertia	$4,1 \times 10^{-4}$ oz-in-sec ²	
Torque	1,0 in-oz (max) without shaft seal 2,5 in-oz (max) with shaft seal	
Permissible Max. Speed	10 000 RPM	
Continuous Max. Speed	6 000 RPM	
Encoder Weight (Approx.)	13 oz typical	
Theoretical Mechanical Lifetime (F_{axial} / F_{radial})	2 x 10 ⁸ revs (1300 hrs at 2 500 RPM) at rated load, 1 x 10 ¹⁰ revs (67 000 hrs at 2 500 RPM) at 10% of rated load	

Electrical

Certification	CENELEC Classification	Electronic	Output Signals ^{(4) (5)}	Operating Voltage +V	Supply Current (no loads)	Current per Channel	Short Circuit Proof	Overvoltage protection	Reverse Polarity Tolerant	Frequency Capability	Resolutions category ⁽¹⁾	Operating Temperature Range ^{(2) (3)}	
Ordinary Location + Non-Incendive	Ex ec IIC T4 Gc Ex ec IIC T3 Gc	28/V	HTL	4,75-30V	<75mA	<40mA	Yes	Up to 33V	Yes	Up to 1MHz	Standard	-40°C.. +100°C	
											Low		
											High	-40°C.. +80°C	
		15/V	HTL	9-16V	<75mA	<40mA	Yes	Yes	Up to 18V	Yes	Up to 300kHz	Standard	-40°C.. +100°C
												Low	
		28/O	Open Collector	4,75-30V	<75mA	<40mA	Yes	Yes	Up to 33V	Yes	Up to 300kHz	Standard	-40°C.. +100°C
												Low	
		28/5	TTL	4,75-30V	<75mA	<40mA	Yes (Except to +V)	Yes	Up to 33V	Yes	Up to 1MHz	Standard	-40°C.. +100°C
Low													
High	-40°C.. +80°C												
Intrinsically safe	Ex ia IIC	5/V	TTL	4,5-6V	<75mA	<40mA	Yes	Up to 6,8V	Yes	Up to 1MHz	Standard	-40°C.. +80°C	
											Low		
											High		
		5/O ⁽⁶⁾	Open Collector	4,5-6V	<75mA	<40mA	Yes	Yes	Up to 6,8V	Yes	Up to 300kHz	Standard	-40°C.. +80°C
												Low	
												High	
	Ex ia IIB	9/V	HTL	8-12V	<75mA	<40mA	Yes	Up to 16V	Yes	Up to 1MHz	Standard	-40°C.. +80°C	
											Low		
9/O ⁽⁶⁾	Open Collector	8-12V	<75mA	<40mA	Yes	Yes	Up to 16V	Yes	Up to 300kHz	Standard	-40°C.. +80°C		
										Low			
										High			

⁽¹⁾ See resolutions section for details.

⁽²⁾ Surface encoder temperature

⁽³⁾ UL Listed: -20°C +80°C. Device must be supplied by a Class 2, LPS or SELV limited energy source 250mA.

⁽⁴⁾ Complementary outputs are recommended for use with line driver type (source/sink) outputs. When used with differential receivers, this combination provides a high degree of noise immunity.

⁽⁵⁾ Output IC's are available as either Line Driver or NPN Open Collector types. Open Collectors require external pull-up resistors, resulting in higher output source impedance (sink impedance is similar to that of line drivers). In general, use of a Line Driver style output is recommended. Line Drivers source or sink current and their lower impedance mean better noise immunity and faster switching times.

Warning: do not connect any line driver outputs permanently to 0V,+V or to any other signal. This may overtime damage the driver. Unused outputs should be isolated and left floating.

Our applications specialists would be pleased to discuss your system requirements and the compatibility of your receiving electronics.

These IS encoders must be installed per Control Drawing 08292-001.

⁽⁶⁾ Output IC's NPN Open Collector are also available with internal 2,7K ohm pull-up resistors : 5/OR or 9/OR

Environmental

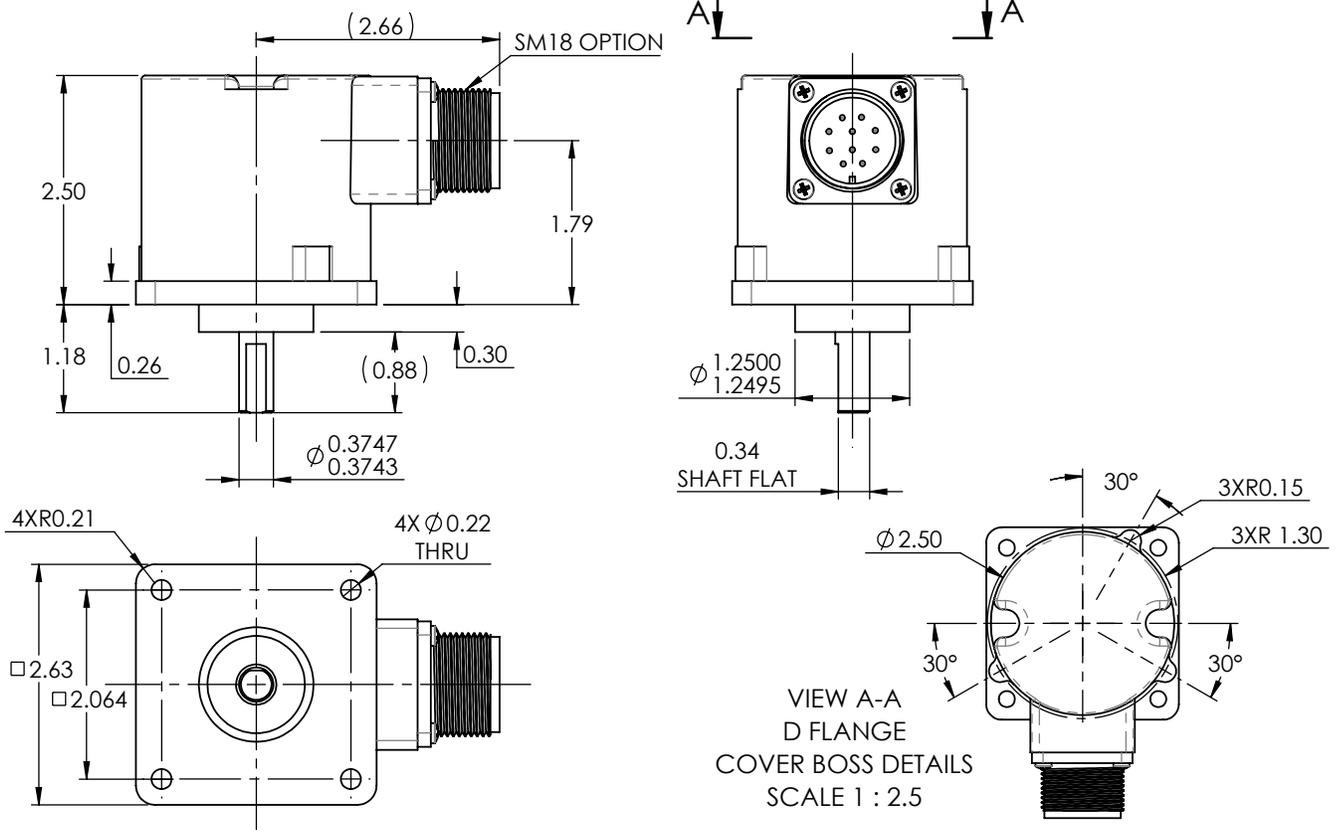
Shocks (EN 60068-2-27)	≤ 1000 m.s-2 (during 5 ms)
Vibrations (EN 60068-2-6)	≤ 300 m.s-2 (50...2 000Hz)
EMC	EN 61000-6-2, EN 61000-6-4
Isolation	1 000V eff
Operating Temperature ⁽¹⁾	See Electrical table above
Storage Temperature	-40°C ... +100°C
Protection (EN 60529)	IP 65 IP66 when ordered with shaft seal (on units with an MS connector) or a cable gland (on units with cable termination).
Humidity	93% RH non-condensing at 20 °C

⁽¹⁾ Extended temperature ratings : some models can operate down to -55°C. Extended temperature ranges can affect other performance factors. Consult with factory

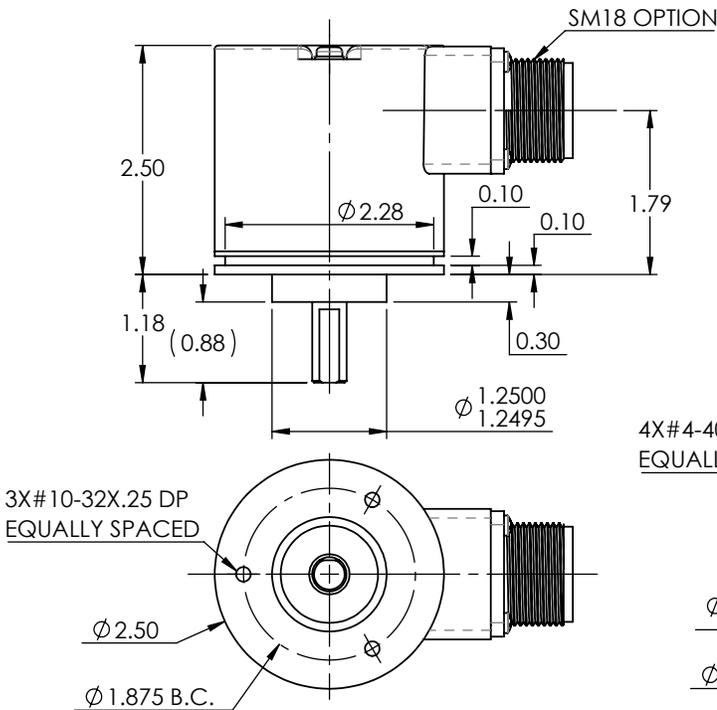
DIMENSIONS

Dimensions in inches

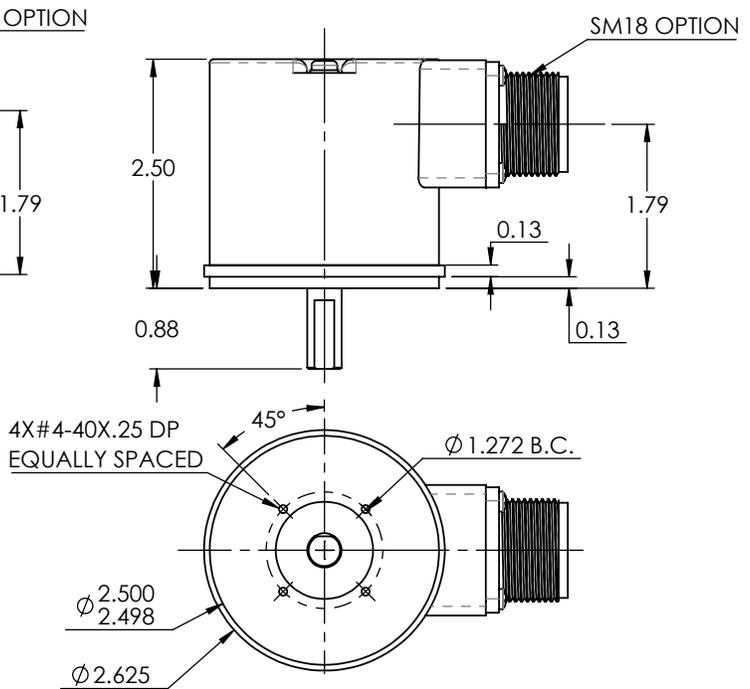
H25D SQUARE FLANGE (WITH STANDARD 3/8" SHAFT AND SM18 CONN.)



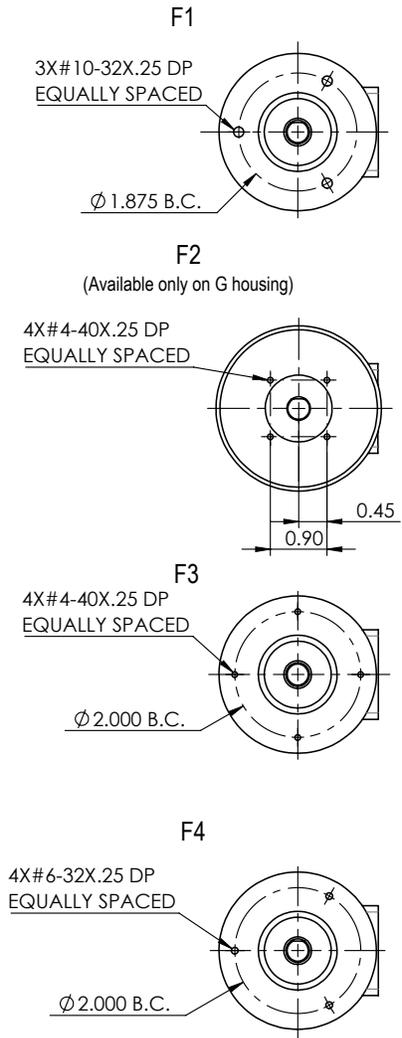
H25E SERVO MOUNT (WITH OPTIONAL F1 FACEMOUNT)



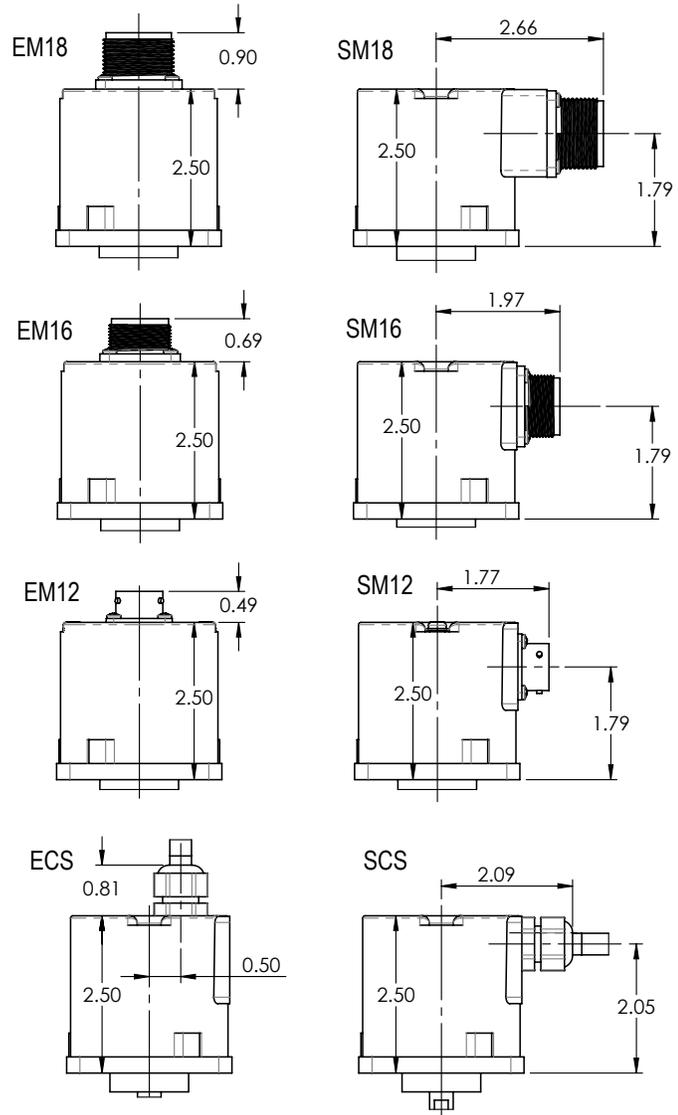
H25G SERVO MOUNT (WITH OPTIONAL F2 FACEMOUNT)



FACEMOUNT OPTIONS
(NOTE RESTRICTIONS)



CONNECTOR OPTIONS



ALLOW FOR APPROX. 2 IN. CABLE BEND
RADIUS BEYOND END OF CABLE GLAND

STANDARD CONNECTIONS

		0V	+V	A	B	Z	A/	B/	Z/	Case Ground	Shield Drain
M18	M18 Connector 10 Pins	F	D	A	B	C	H	I	J	G	—
M12	M12 Connector 10 Pins	F	D	A	B	C	H	J	K	G	—
M16 - ABZ	M16 Connector 7 Pins	F	D	A	B	C	—	—	—	G	—
M16 - ABC		F	D	A	B	—	C	E	—	G	—
CABLE - ABZ	PVC Cable 9 Wires	BK (Black)	RD (Red)	YE (Yellow)	BU (Blue)	OG (Orange)	—	—	—	GR (Green)	WH (White)
CABLE - ABC		BK (Black)	RD (Red)	YE (Yellow)	BU (Blue)	—	WH/YE (White/ Yellow)	WH/BU (White/ Blue)	—	GR (Green)	WH (White)
CABLE - ABZC		BK (Black)	RD (Red)	YE (Yellow)	BU (Blue)	OG (Orange)	WH/YE (White/ Yellow)	WH/BU (White/ Blue)	WH/OR (White/ Orange)	GR (Green)	WH (White)

OUTPUTS

Standard resolutions:

1000, 1024, 1800, 2000, 2048, 2500, 3600, 4000, 4096, 5000, 7200, 10000

Low resolutions ⁽¹⁾: (not found in the Standard resolutions range)

Any resolution within the 1-2500ppr range.

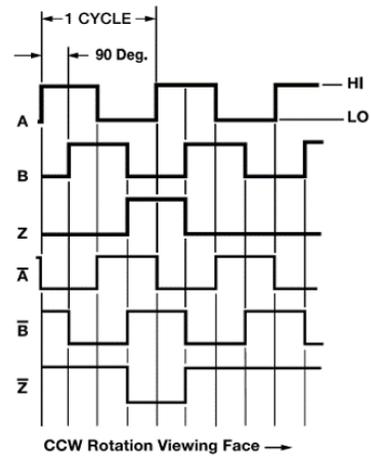
High resolutions: (not found in the Standard resolutions range)

All multipliers of 1000, 1024, 1800, 2500 from 1 to 200.

⁽¹⁾ Signal tolerances available in Instructions Manual

⁽²⁾ Non-standard index widths are available. Consult factory.

Channel Synchronization ⁽²⁾



ORDERING OPTIONS

Example : H25D-SS-2000-ABZC-28/V-SM18

	H25	D	-	-	SS	-	2000	-	ABZ	C	-	28/V	-	S	M18	-	-
Type																	
X = Express Encoder Blank = Standard Leadtime																	
Family																	
H25 = Heavy Duty; 2.5" diameter																	
Housing Configuration																	
D = Square Flange E = 2.50 Diameter Servo Mount G = 2.62 Diameter Servo Mount																	
Optional Face Mounts																	
F1 (Included with Express Encoder H25E housing) F2 (Available with H25G housing only) F3 or F4 Blank = None																	
Shaft Seal Configuration																	
SS = Shaft Seal (Not available on H25G) Blank = Shielded Bearing																	
Cycles Per Turn																	
(Enter Cycles) See Resolutions section																	
Number of Channels																	
A = Single Channel AB = Dual Quad. Channel ABZ = Dual with Index AZ = Single with Index																	
Complements																	
C = Complementary Outputs Blanks = None																	
Voltage/Output																	
Ord. loc + Non-incendive 15/V = 5-15 Vin/out 28/V = 5-28Vin/out 28/5 = 5-28Vin/5Vout 28/O = 5-28Vin/OCout	Intrinsically safe 5/V = 5 Vin/out 5/O = 5 Vin/OCout 9/V = 8-12 Vin/out 9/O = 8-12 Vin/OCout																
Output Termination Location																	
E = End S = Side																	
Output Termination																	
M12 = MS3112E12-10P M16 = MS3102R16S-1P M18 = MS3102R18-1P C = Pigtail Cable (not available in Haz Loc). CS = Cable with seal Cable length specified in inches (i.e. C18 = Pigtail 18" long)																	
Hazardous Area Ratings																	
Blank = None EX = Intrinsically Safe NI = Non-Incendive Contact factory for voltage options																	
Special Features																	
S = Special Features specified on Purchase Order. -S at the end of the model number is used to define a variety of non-standard features such as, special shaft lengths, voltage options, or special testing. Please consult the factory to discuss your special requirements.																	

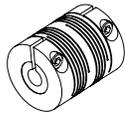
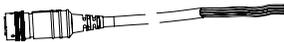
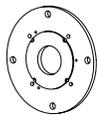
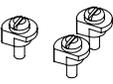
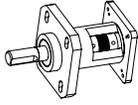
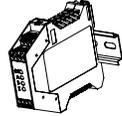
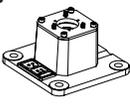
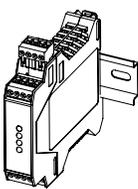
AGENCY APPROVALS & CERTIFICATIONS

Special Models of the H25 Incremental Encoder are available with one or more of the following certifications. Consult with factory in order to ensure how to correctly specify the agency approval(s) that you require.

Harardous Area Ratings	Agency		Ratings and Markings	File Number
Blank		CE	EN 55011: Electromagnetic Disturbance (EMI) EN 61000-6-2: Electromagnetic Compatibility (EMC)	-
EX Intrinsically Safe		UL	Class I, Groups A, B, C, D Class II, Groups E, F, G	E78446
		DEMKO	Ex II 1 G Ex ia IIC T4 Ga (9V/O is II 1 G Ex ia IIB T4 Ga)	DEMKO 06 ATEX 041424X
		IEC/IECEx	Ex ia IIC T4 Ga (9V/O is Ex ia IIB T4 Ga) -40°C ≤ Ta ≤ +85°C	IECEx UL 12.0035X
NI Non-Incendive		UL	Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G	E78446
		DEMKO	Ex II 3 G Ex ec IIC T3 Gc	DEMKO 25 ATEX 3400X
		IEC/IECEx	Ex ec IIC T3 Gc -40°C ≤ Ta ≤ +85°C	IECEx UL 25.0048X



ACCESSORIES

Description	Part Number	Description	Part Number
Flexible shaft couplings 	39074-12-12 = 3/8 to 3/8 39074-12-8 = 3/8 to 1/4 39074-8-8 = 1/4 to 1/4	Connector cable assemblies 	31186-1810 = M18, 10pin, 10 ft length 31186-1820 = M18, 10pin, 20 ft length 31186-1850 = M18, 10pin, 50 ft length 31186-1610 = M16, 7pin, 10 ft length 31186-1620 = M16, 7pin, 20 ft length 31186-1650 = M16, 7pin, 50 ft length 31186-1410 = M14, 6pin, 10 ft length 31186-1420 = M14, 6pin, 20 ft length 31186-1450 = M14, 6pin, 50 ft length 31186-1210 = M12, 10pin, 10 ft length 31186-1220 = M12, 10pin, 20 ft length 31186-1250 = M12, 10pin, 50 ft length
Adapter plates 	38228-001 = Aluminum 38228-002 = Delrin	Connector mates 	MS3106F18-1S = Mates to standard M18 style, 10pin conn. MS3106F16S-1S = Mates to standard M16 style, 7pin conn. MS3106F14S-6S = Mates to standard M14 style, 6pin conn. MS3116F12-10S = Mates to standard M12 style, 10pin conn.
Servo clamps 	31165-001 = 0.093 grip 31165-002 = 0.125 grip	Bulk encoder cable 	37048-003-100 = 100 ft spool 37048-003-500 = 500 ft spool 37048-003-1000 = 1K ft spool
High load bearing assemblies 	11008-000 = H20 and H25 flange mount 11009-001 = H25 foot mount 11009-002 = H20 foot mount	Electronic Modules 	60001-010 = Opto isolator 60011-001 = Broadcaster 60002-000 = Encoder tester *There are many options for Electronic modules, consult factory for help selecting the best one for your application
Mounting adapters 	11012-002 = H25 56C	Intrinsic Safety Barrier 	This galvanically isolated barrier provides both power and signal isolation for an incremental encoder. With differential line driver outputs, it can carry signals up to 500 feet with a bandwidth of up to 250 kHz. For detailed ordering options, refer to accessory specification sheet.
12 in. OD Measuring wheels 	31196-001 = 3/8in. Bore 31196-002 = 1/2in. Bore 31196-003 = 5/8in. Bore		

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