| H25 SERIES

INCREMENTAL ENCODER

Introduction

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.

GEN 2

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)

Applications

- Machine control – speed and position
- From wood harvesting all the way to processed lumber
- Oil well logging – wireline and coil tubing
- Agricultural equipment - center point irrigation, planting, harvesting
- Web process control - dancers, slitters, flying knives
- Food processing – inspection stations, conveyor control.

SPECIFICATIONS

Mechanical

Shaft Diameter	3/8" standard (1/4" as special feature)
Flat On Shaft	3/8" Shaft: 0.75 long X 0.03" deep, 1/4" shaft 0.75 X .02 deep
Shaft Loading	3/8" shaft: Up to 40 pounds axial and 35 pounds radial
Shaft Runout	0.0005 T.I.R. at midpoint regardless of shaft diameter
Starting Torque at 25°C	1.0 in-oz max without shaft seal; 2.5 in-oz max with shaft seal.
Bearings	High precision ball bearings, Material: Chrome steel; shielded bearings standard, sealed bearings optional
Shaft Material	Stainless Steel
Bearing Housing	Die cast aluminum with protective finish
Cover	Die cast aluminum with protective finish
Bearing Life	2 X 10^8 revs (1300 hrs at 2500 RPM) at rated load, 1 X 10^{10} revs (67,000 hrs at 2500 RPM) at 10% of rated load
Maximum RPM	10,000 RPM nominal, 8000 RPM with 1/2" shaft (see Frequency Response, below)
Moment of Inertia	4.1 X 10^{-4} oz-in-sec^2
Weight	13 oz typical

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Electrical

Code	Incremental
Output Format	2 outputs in quadrature, A leads B CCW, 1/2 cycle index , Z, gated with negative B Consult factory for other output formats.
Cycles per Shaft Turn	2 to 80,000 (see table 2)
Supply Voltage	5 to 28 VDC +/- 5%
Current Requirements	100 mA typical +output load, 250 mA (max)
Voltage/Output	(See notes) **15/V:** Line Driver, 5–15 VDC in, Vout = Vin **28/V:** Line Driver, 5–28 VDC in, Vout = Vin **28/5:** Line Driver, 5–28 VDC in, Vout = 5 VDC **28/O:** Open Collector, 5–28 VDC in, OCout
Protection Level	Reverse, overvoltage and line driver output protection diodes
Frequency Response	300 kHz
Output Terminations	See Table 1

Environmental

Enclosure Rating	IP66 when ordered with shaft seal (on units with an MS connector) or a cable gland (on units with cable termination).
Temperature	Standard operating temperature -40° C to +85° C; options available at -40° C to +100° C (Consult factory). Storage temperature -40° C to +100° C.
Shock	100 g's for 5 msec duration
Vibration	50 to 2000 Hz @ 30grms
Humidity	98% RH without condensation

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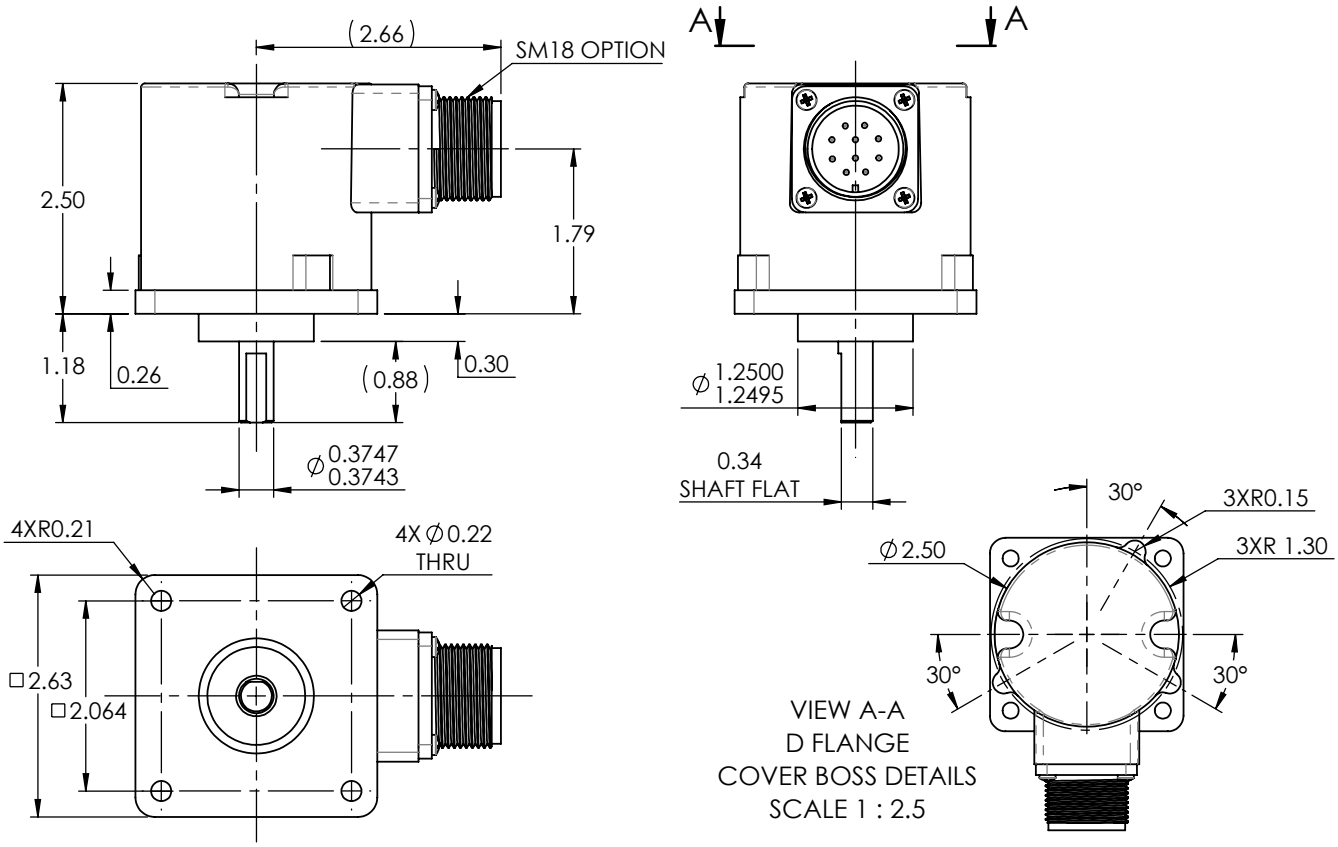
DIMENSIONS

Dimensions in inches

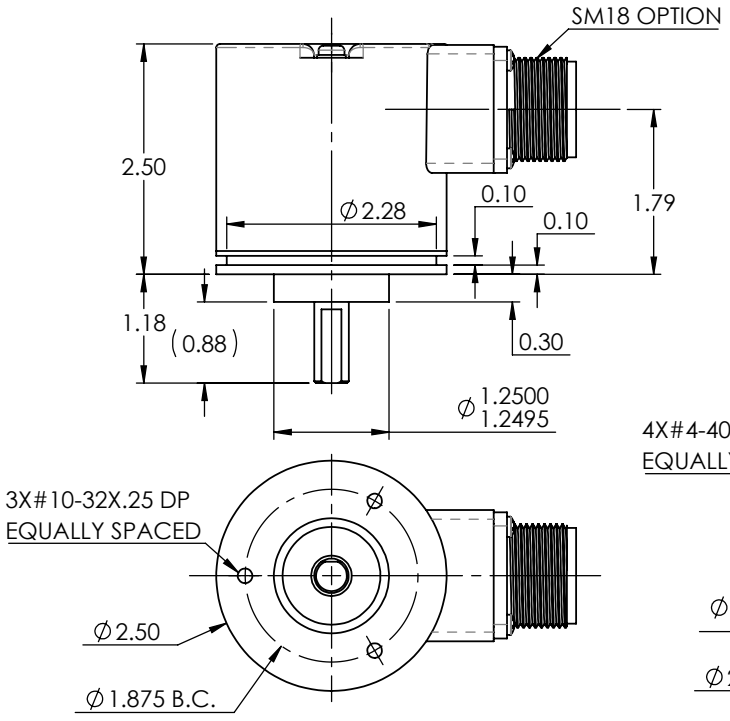
H25D SQUARE FLANGE

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



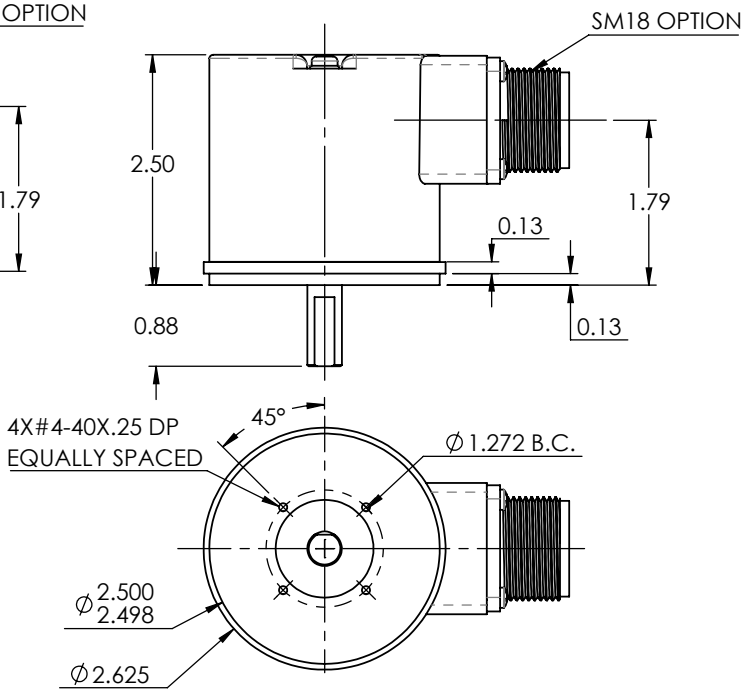
H25E SERVO MOUNT

(WITH OPTIONAL F1 FACEMOUNT)



H25G SERVO MOUNT

(WITH OPTIONAL F2 FACEMOUNT)



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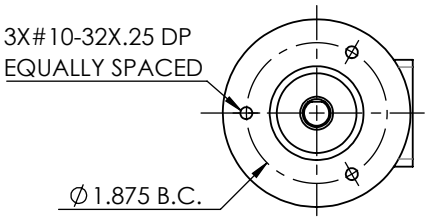
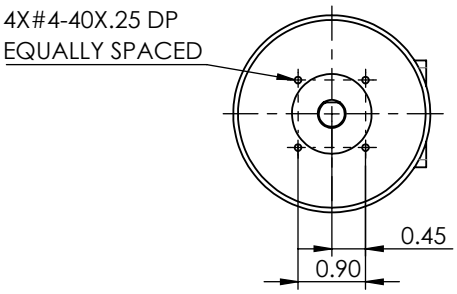
FACEMOUNT OPTIONS
(NOTE RESTRICTIONS)

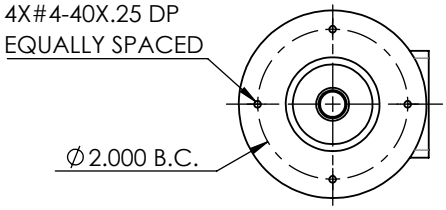
F1



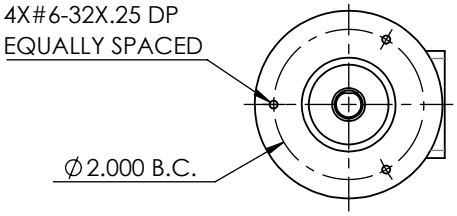
F2
(Available only on G housing)



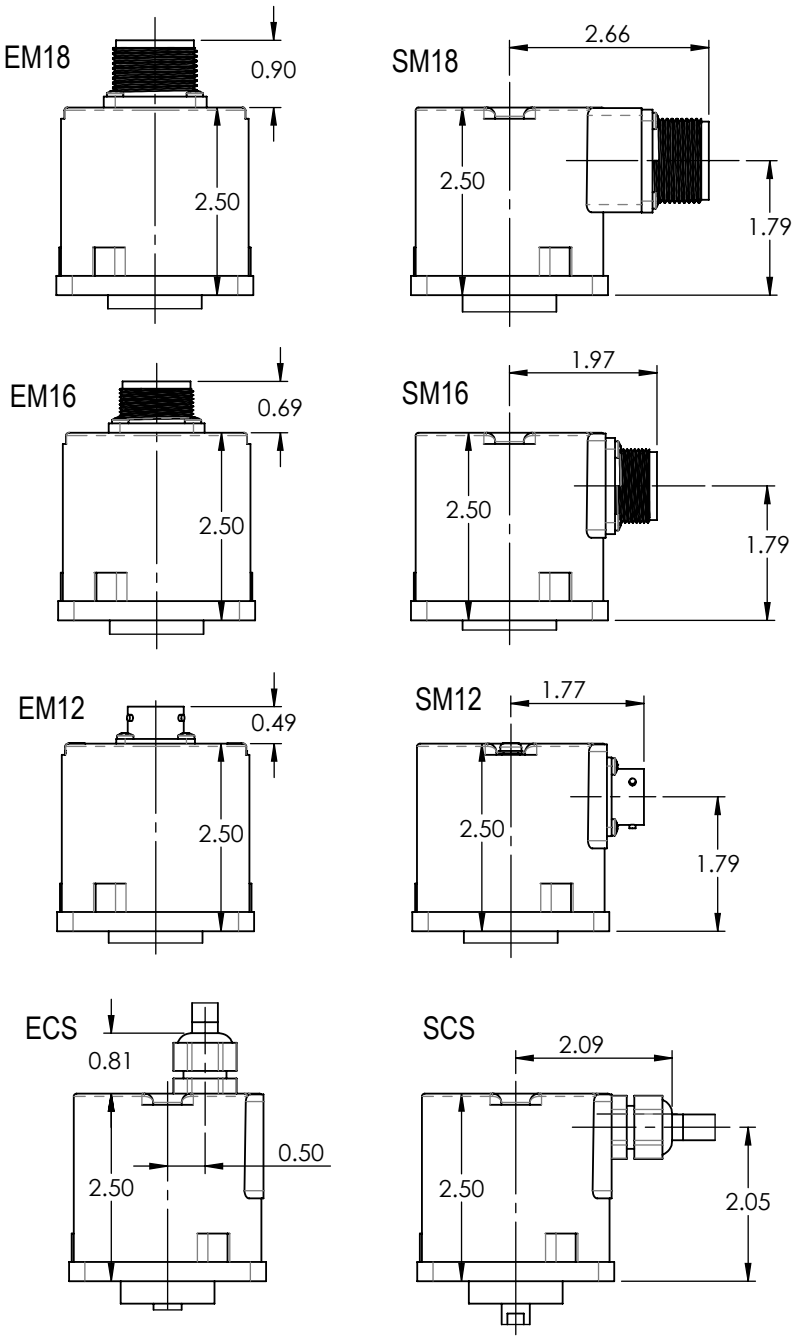
F3



F4



CONNECTOR OPTIONS



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

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Table 1: Incremental Output Terminations

The connector style will determine pinouts. For example, an encoder with ABC channels and an M18 connector uses the table to the right.

M14 Connector	M16 Connector	Channels Designated in Model Number	
Pin	Pin	ABZ	ABC
E	A	A	A
D	B	B	B
C	C	Z	$\overline{A}$
B	D	+V (Supply Voltage)	
F	E	—	$\overline{B}$
A	F	0V (Circuit Common)	
	G	Case Ground (CG)	

Wire Color (22AWG)	DA 15P Connector	Channels Designated in Model Number		
		ABZ	ABC	ABZC
YEL	13	A	A	A
BLUE	14	B	B	B
ORN	15	Z	—	Z
W-Yel	10	—	$\overline{A}$	$\overline{A}$
W-Blu	11	—	$\overline{B}$	$\overline{B}$
W-Orn	12	—	—	$\overline{Z}$
RED	6	+V (Supply Voltage)		
BLK	1	0V (Circuit Common)		
GRN	9	Case Ground (CG)		
WHITE		Shield Drain (Shielded Cable Only)		

M18 Connector	
Pin	Channel
A	A
B	B
C	Z
D	+V
E	—
F	0V
G	CG
H	$\overline{A}$
I	$\overline{B}$
J	$\overline{Z}$

M12 Connector	
Pin	Channel
A	A
B	B
C	Z
D	+V
E	—
F	0V
G	CG
H	$\overline{A}$
J	$\overline{B}$
K	$\overline{Z}$

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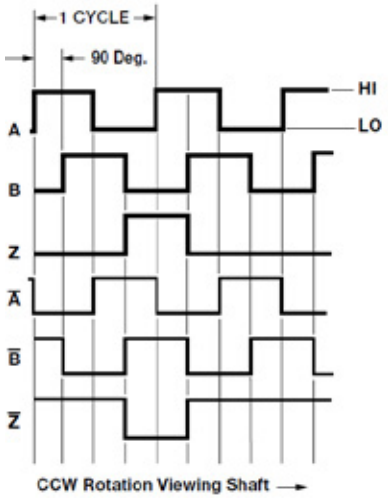
Table 2: Resolutions for Incremental Encoder Models H25

PPR: 1, 2, 3… THROUGH …10000 INCLUDING TABLE BELOW											
10160	15000	19456	24500	28800	33792	38912	44450	51200	58000	64800	71680
10200	15240	19500	24576	29000	34000	39000	45000	52000	58368	65000	72000
10240	15360	19800	24600	29210	34200	39370	45056	52070	58420	65536	72390
10800	15500	20000	25000	29400	34290	39600	45720	52200	59000	66000	72500
11000	15600	20320	25200	29500	34500	39936	46000	52224	59392	66040	72704
11264	16000	20400	25400	29696	34800	40000	46080	52500	59400	66560	73660
11400	16200	20480	25500	30000	34816	40200	46800	53000	59690	66600	73728
11430	16384	21000	25600	30480	35000	40640	46990	53248	60000	67000	73800
12000	16500	21504	25800	30600	35400	40800	47000	53340	60416	67310	74930
12288	16510	21590	26000	30720	35500	40960	47104	54000	60960	67500	75000
12500	16800	21600	26400	31000	35560	41000	47500	54272	61000	67584	75600
12600	17000	22000	26500	31200	35840	41400	48000	54610	61200	68000	76200
12700	17400	22200	26624	31744	36000	41910	48128	55000	61440	68400	77400
13000	17408	22500	26670	31750	36830	41984	48260	55296	62000	68580	77470
13200	17500	22528	27000	31800	36864	42000	48600	55800	62230	68608	77500
13312	17780	22800	27500	32000	37000	42500	49000	55880	62464	69000	78740
13500	18000	22860	27600	32400	37200	42600	49152	56000	62500	69632	79200
13800	18432	23000	27648	32500	37500	43000	49530	56320	63000	69850	80000
13970	18500	23400	27940	32768	37800	43008	50000	57000	63488	70000	
14000	18600	23500	28000	33000	37888	43180	50176	57150	63500	70200	
14336	19000	23552	28200	33020	38000	43200	50400	57344	64000	70656	
14400	19050	24000	28500	33500	38100	44000	50800	57500	64512	71000	
14500	19200	24130	28672	33600	38400	44032	51000	57600	64770	71120	

NOTES

1. The shaft seal is recommended in virtually all installations. The most common exceptions are applications requiring a very low starting torque or those requiring operation at both high temperature and high speed.
2. 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.
3. Output IC's are available as either Line Driver (LD) or NPN Open Collector (OC) types.
4. Open Collectors require 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.
5. 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 directly to circuit common/0V, which may damage the driver.
6. Outputs protection diodes on std. product, diodes will redirect current away from output node if shorted to +V or 0V, excessive voltage will damage diodes.
7. Reverse voltage protection: indefinite reverse polarity at 30VDC.
8. Transient voltage protection: 10/100 us waveform. 600W peak pulse power on 10/100 us waveform.
9. Special -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.

Standard Output Waveform



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EXPRESS ENCODERS: Items highlighted with this are standard Express Encoders and ship in few days.

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
See dimensions

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 Table 2

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

15/V = 5–15 Vin/out
28/V = 5–28Vin/out
28/5 = 5–28Vin/5Vout
28/O = 5–28Vin/OCout

Output Termination Location

E = End
S = Side

Output Termination

M12 = MS3112E12-10P
M16 = MS3102R16S-1P
M18 = MS3102R18-1P
C = Pigtail Cable
CS = Cable with seal
Cable length specified in inches (i.e. C18 = Pigtail 18" long) See table 1

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 (consult factory)
See note 9

*Available in **Generation 1**. For Datasheet click here.

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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.

Model H25 Hazardous Area Ratings	Agency		Ratings and Markings (for all standard product configurations)	File Number
Blank	CE	CE	EN 55011: Electromagnetic Disturbance (EMI) EN 61000-6-2: Electromagnetic Compatibility (EMC)	
*EX Intrinsic Safety	c UL us LISTED	UL	Class I, Groups A, B, C, D Class II, Groups E, F, G	20180302-E78446
	Ex	DEMKO	II 1 G Ex ia IIC T4 Ga (9V/OC is II 1 G Ex ia IIB T4 Ga)	DEMKO 06 ATEX 0614247X
	IEC IECEx	IEC/IECEx	Ex ia IIC T4 Ga (9V/OC is Ex ia IIB T4 Ga) -40°C ≤ Ta ≤ +85°C	IECEx UL 12.0035X
*NI Non-Incendive	c UL us	UL	Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G	20170321-E78446
	Ex	DEMKO	II 3 G Ex nA IIB T4 Gc	DEMKO 13 ATEX 1209038X
	IEC IECEx	IEC/IECEx	Ex nA IIB T4 Gc -40°C ≤ Ta ≤ +80°C	IECEx UL 13.0071X

*Available in **Generation 1**. For Datasheet click here.

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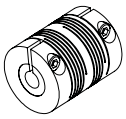
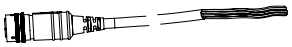
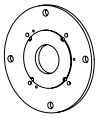
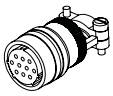
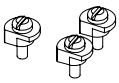
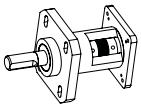
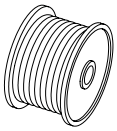
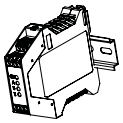
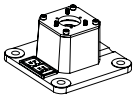
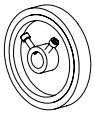
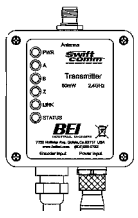
ACCESSORIES

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
High load bearing assemblies 	11008-000 = H20 and H25 flange mount 11009-001 = H25 foot mount 11009-002 = H20 foot mount
Bulk encoder cable 	37048-003-100 = 100 ft spool 37048-003-500 = 500 ft spool 37048-003-1000 = 1K ft spool
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
12 in. OD Measuring wheels 	31196-001 = 3/8in. Bore 31196-002 = 1/2in. Bore 31196-003 = 5/8in. Bore
SwiftComm 	60032-001 = Wireless Interface 5V In, 10FT, M18 60032-003 = Wireless Interface 15V In, 10FT, M18 60032-005 = Wireless Interface 24V In, 10FT, M18

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