| H20 SERIES
INCREMENTAL ENCODER

Introduction
The Model H20 is a compact encoder designed to economically fill the resolution range up to 10,000 cycles per turn. This compact unit features a precision disc, precision ball bearings and EMI shielding. The encoder meets IP66 sealing requirements when ordered with the shaft seal and one of the available connectors.

GEN 2

For **Generation 1** datasheet click here.

Features
- Compact size to fit in tight installations
- Well-sealed for dusty and wet environments
- Shielded against EMI
- Reverse voltage protection
- Over voltage protection
- Output protection diode
- Any resolution from 1 to 10000 is available

Applications
- Machine control
- Process control and automation
- Agricultural machinery
- Robotics
- Food processing
- Metering operations

SPECIFICATIONS

Mechanical

Shaft Diameter	3/8" and 1/4" diameters standard.
Flat on Shaft	Standard on 3/8" shaft, 0.60" long; Special feature on 1/4" shaft
Shaft Loading	3/8" shaft: Up to 10 lbs axial and 20 lbs radial
Shaft Runout	.001 T.I.R. maximum
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
Shaft Material	Stainless Steel
Bearing Housing	Die cast aluminum with protective finish
Cover	Die cast aluminum with protective finish
Bearing Life	$2x10^8$ revs at rated load, 1×10^{10} revs at 10% rated load
Maximum RPM	10,000 RPM (see frequency response, below)
Moment of Inertia	2.56×10^{-4} oz-in-sec^2
Weight	9 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	1 to 10000
Supply Voltage	5 to 28 VDC +/- 5%
Current Requirements	100 mA typical + output load, 250 mA (max)
Voltage/Output	28/V: Multi-Voltage Line Drive, 5–28 VDC in, Vout = Vin 28/5: TTL, RS422 Line Driver, 5–28 VDC in, Vout = 5 VDC 28/O: NPN Line Driver Open Collector, 5–28 VDC in, NPN out (30V MAX) 28/VR, HTL Line Driver 5-28 VDC in, Vout=Vin 120 mA per channe 5, 12, 15 or 24/OR: R=100 ohm / V: 5V=470 ohm, 15V=1.5K ext. I
Protection Level	Reverse, overvoltage and line driver output protection diodes
Frequency Response	300 kHz

Environmental

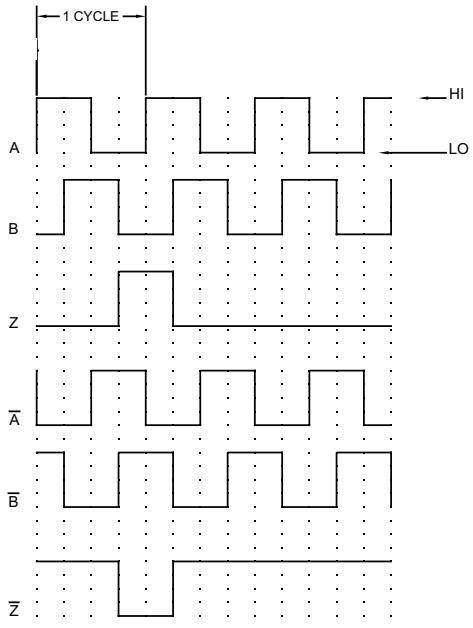
Enclosure Rating	IP66 when ordered with shaft seal and MS connector on cover. IP65 when ordered with shaft seal and cable gland. IP50 when ordered with no shaft seal.
Temperature	Operating temperature -40° C up to 85° C standard. Check factory for higher temperature options. Storage temperature -40° C to 100° C
Shock	100 g's for 5 msec duration
Vibration	50 to 2000 Hz @ 30grms
Humidity	98% RH without condensation

Notes and Tables: All notes and tables referred to in the text can be found in the pages that follow.

FIGURE 1

Output Waveform

(45 deg min edge separation)



CCW Rotation Viewing Shaft

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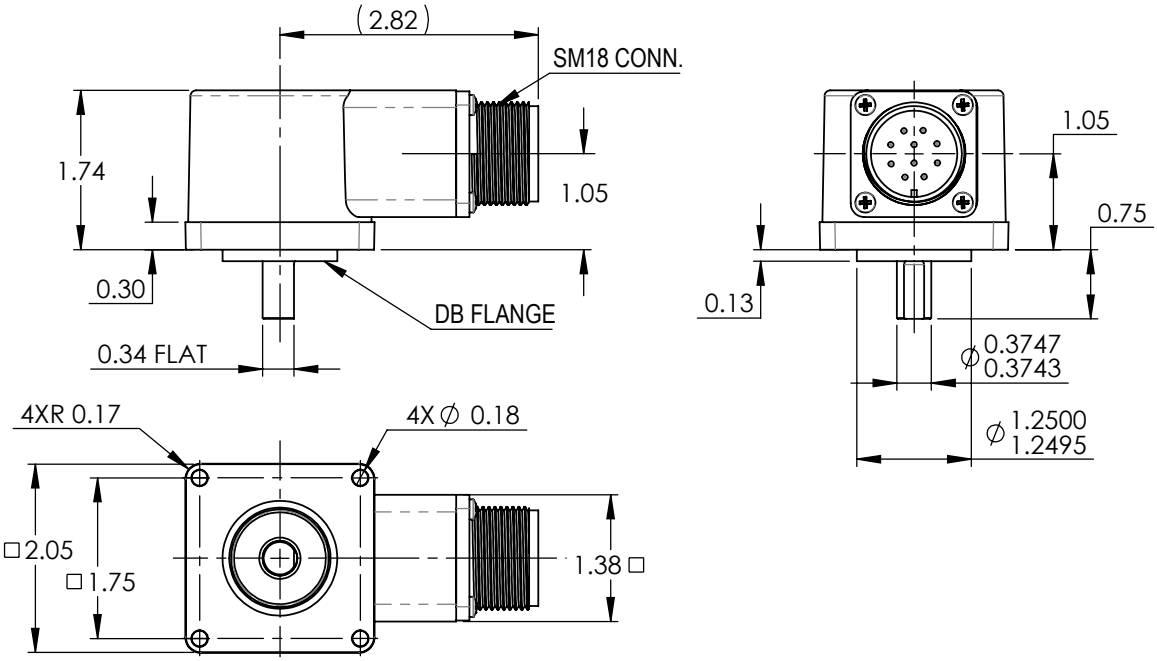
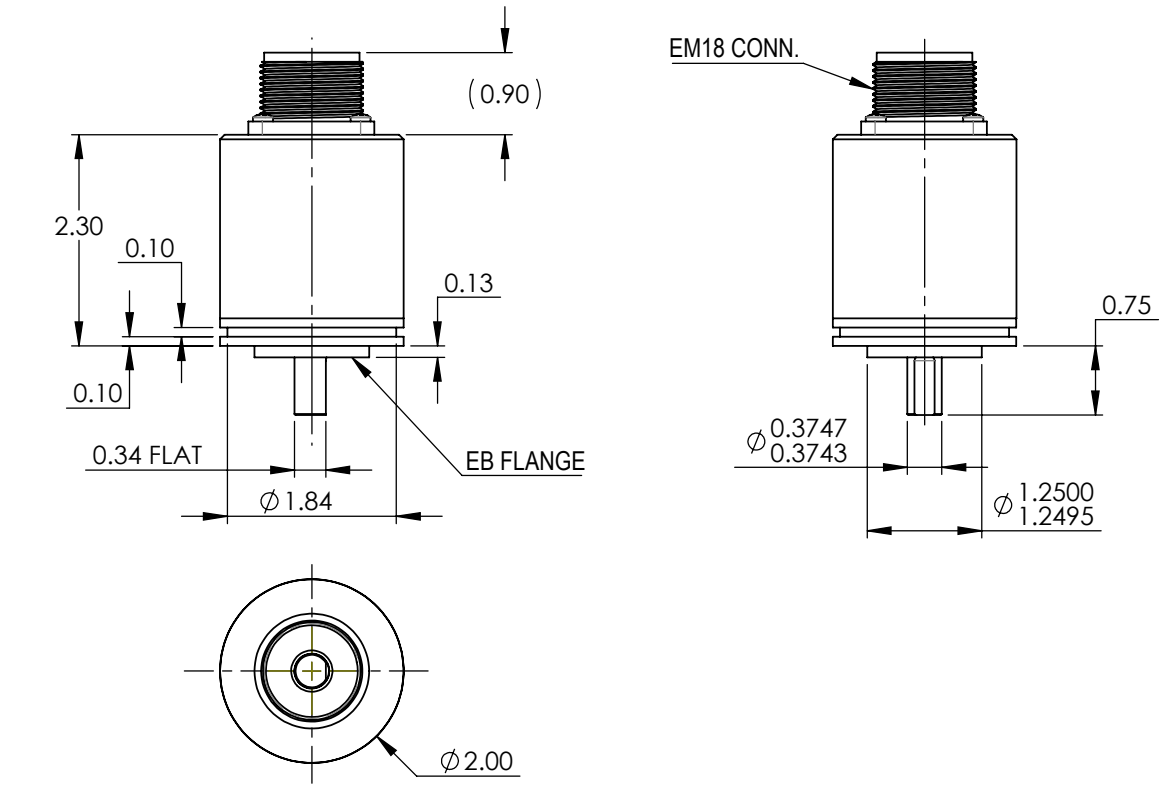
DIMENSIONS
Dimensions in inches

H20DB SQUARE FLANGE
(WITH STANDARD 3/8" SHAFT AND SM18 CONN.)



H20EB SERVO FLANGE
(WITH OPTIONAL F28 FACEMOUNT AND SM16 CONN.)



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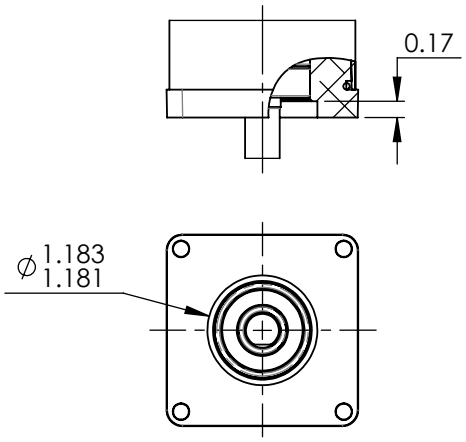
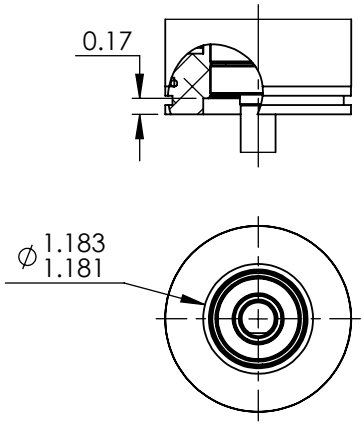
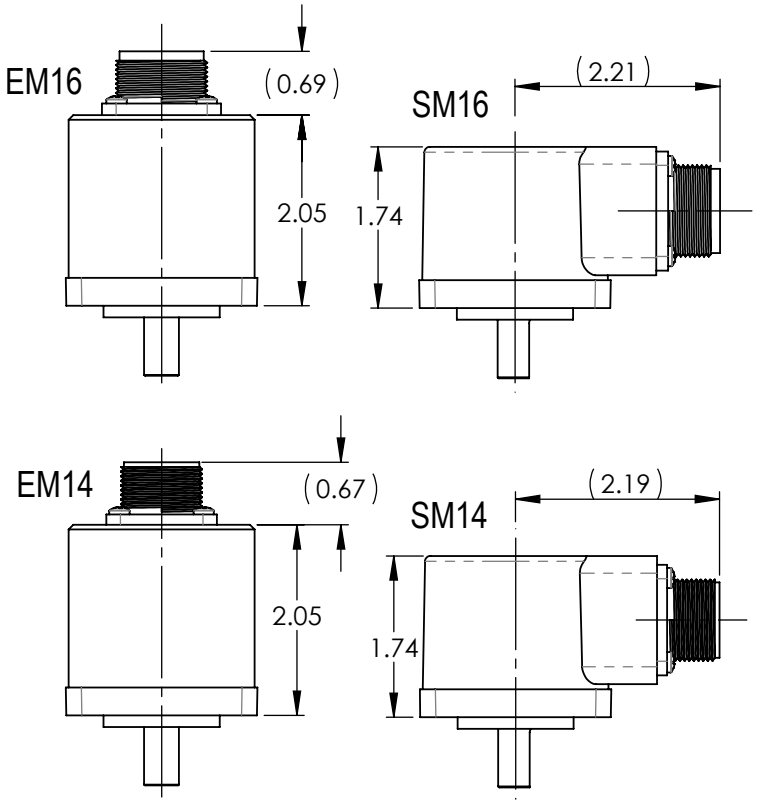
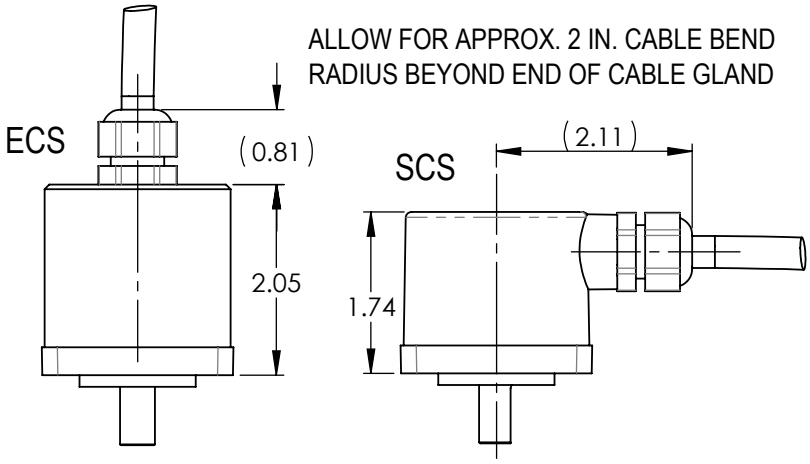
H20DA SQUARE FLANGE



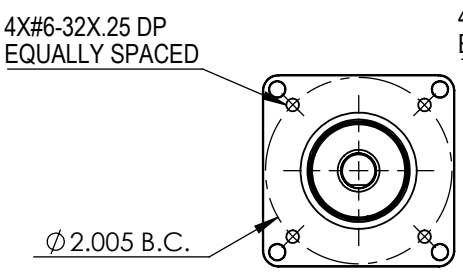
H20EA SERVO FLANGE



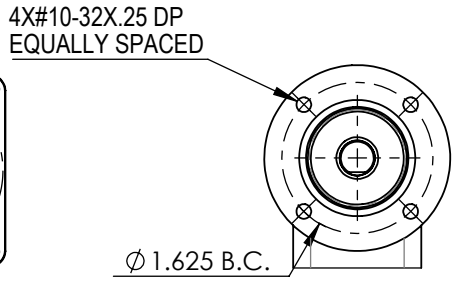




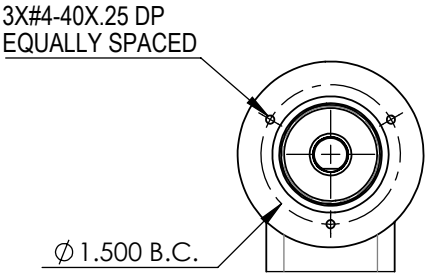
OPTIONAL FACEMOUNTS



F5
(DA OR DB FLANGE ONLY)



F12



F28

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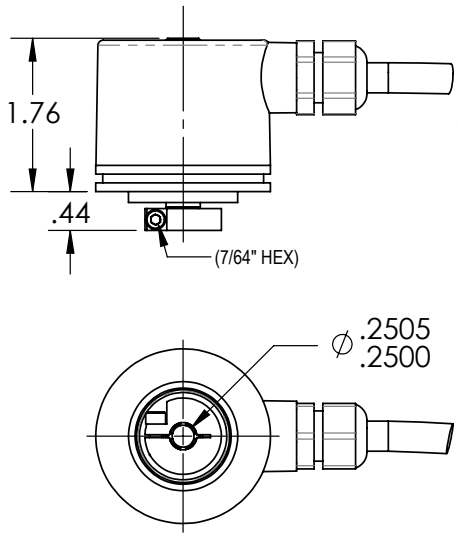
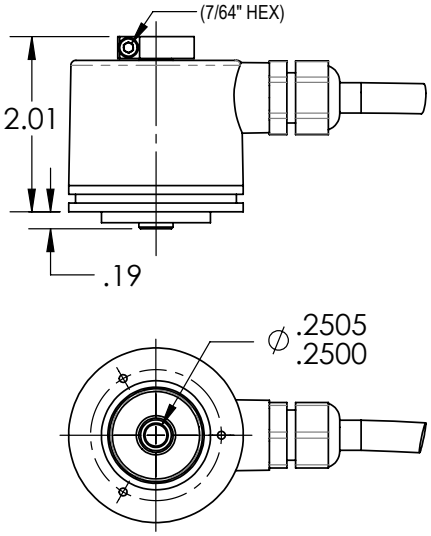
SHAFT VARIATIONS AVAILABLE:

H20EB-HS FRONT CLAMP
H20EB-BS



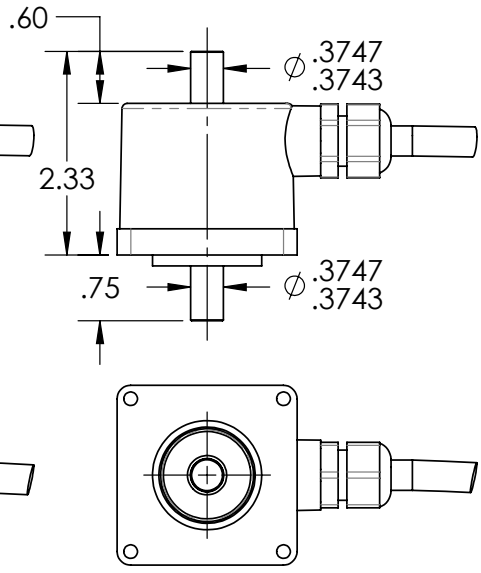
H20EB-HS BORE IS THRU
H20EB-BS BORE IS .85 DP
FROM END OF SHAFT

H20EB-HS REAR CLAMP



H20EB-HS REAR
SHOWN WITH OPTIONAL
F28 FACEMOUNT

H20DB-37TS



TABLES

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 in Model No.	
PIN	PIN	ABZ	ABC
E	A	A	A
D	B	B	B
C	C	Z	A/
B	D	+V (Supply Voltage)	
F	E	—	B/
A	F	0V (Circuit Common)	
	G	Case Ground (CG) (Optional special feature on H20)	

K8 Connector		
PIN (K8)	Function	K8 Accessory Cable Wire
1	A	WHITE
4	B	YELLOW
6	Z	PINK
2	+V (SUPPLY)	BROWN
7	0V (CIRCUIT COMMON)	BLUE
N/C	CASE GROUND	(SHIELD)
3	A/	GREEN
5	B/	GRAY
8	Z/	RED

M18 Connector	
PIN	Function
A	A
B	B
C	Z
D	+V
E	—
F	0V
G	—
H	A/
I	B/
J	Z/

Wire Color (22AWG)	Channels in Model No.		
	ABZ	ABC	ABZC
YEL	A	A	A
BLUE	B	B	B
ORN	Z	—	Z
W-YEL	—	A/	A/
W-BLU	—	B/	B/
W-ORN	—	—	Z/
RED	+V (Supply Voltage)		
BLK	0V (Circuit Common)		
GRN	Case Ground (CG) (Optional special feature on H20)		
WHITE	Shield Drain (Shielded Cable Only)		

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

ORDERING OPTIONS

Example : H20DB-37-SS-1024-ABZC-28/V-SM18

H20 D B - 37 - - - SS - 1024 - ABZ C - 28/V - S M18 - -

Type
X = Express (3 days leadtime)
Blank = Standard Leadtime

Family
H20 = Heavy duty, 2.0" dia.

Housing Configuration
D = Square Flange
E = 2.00 Diameter Servo Mount
See dimensions

Pilot Configuration
A = 1.181 (30mm) Female
B = 1.25 x .125 Pilot

Shaft Diameter
Blank when ordering BS, HS or TS shaft types
25 = 0.2497 / 0.2495
37 = 0.3747 / 0.3745

Shaft Type
Blank = Single Ended Shaft (Standard)
BS = Blind Hollow Shaft, 1/4" bore
HS = Through Hollow Shaft, 1/4" bore
TS = Through Solid Shaft, 3/8" standard

Face Mount
F5, F12, F28 See Dimensions
Blank = None

Shaft Seal
SS = Shaft Seal - Available only with Pilot Configuration Option B
Blank = No Shaft Seal

Cycles Per Turn
1 to 10000
Examples: 100 = 100 CPT, 1024 = 1024 CPT, 4096 = 4096 CPT, etc.

No. of Channels
A = Single Channel
AB = Dual Quad. Channel
ABZ = Dual with Index
AZ = Single with Index

Complements
C = Complementary Outputs
Blank = None

Voltage / Output
28/V = 5–28Vin/out
28/5 = 5–28Vin/5Vout
28/O = 5–28Vin/OCout
28/VR = 5-28 VDC in/Vout NOTE: Not available with BS, HS and TS Shaft options
xx/OR = 05, 12, 15, 24Vin/OR

Output Termination Location
E = End
S = Side

Output Termination
M14 = MS3102R14S-6P
M18 = MS3102R18S-1P
M16 =MS3102R16S-1P
K8 = M12 x 1 (metric connector)
CSXX=Cable with Seal. XX is cable length in 6 inch increments starting at 24

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. (See notes)
Blank = no special features

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NOTES

- 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.
- 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.
- Output IC's are available as either Line Driver (LD) or NPN Open Collector (O) types.
- 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.
- 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. 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 with Line Driver type outputs.
- 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.

AGENCY APPROVALS & AVAILABLE CERTIFICATIONS

Special Models of the H20 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 H20 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 T3 Gc T3B: -40°C ≤ Ta ≤ +85°C T4: -40°C ≤ Ta ≤ +55°C	DEMKO 13 ATEX 1209038X
	IEC IECEx	IEC/IECEx	Ex nA IIB T3 Gc T3B: -40°C ≤ Ta ≤ +85°C T4: -40°C ≤ Ta ≤ +55°C	IECEx UL 13.0071X

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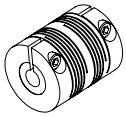
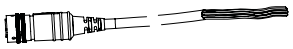
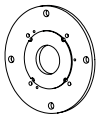
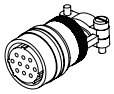
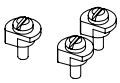
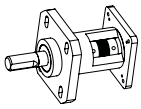
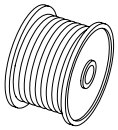
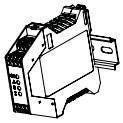
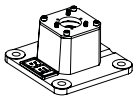
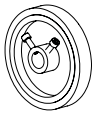
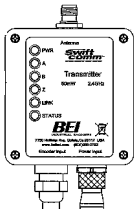
ACCESSORIES

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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