

H25

2,5" SOLID SHAFT ABSOLUTE 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: SSI, parallel and analog outputs
- Extensive electrical protection reduces damage due to miswiring
- High noise immunity especially useful in electrically noisy automation environments
- Certifications in Hazardous Locations: 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})		2×10^8 revs (1300 hrs at 2 500 RPM) at rated load, 1×10^{10} revs (67 000 hrs at 2 500 RPM) at 10% of rated load

Electrical

Certification	Output Formats	Electronic	Output Signals	Operating Voltage +V	Supply Current (no loads)	Current per Channel	Short Circuit Proof	Overvoltage protection	Reverse Polarity Tolerant	Frequency Capability	Refresh Rate	Operating Temperature Range ^{(1) (2)}
Ordinary Location + Non-Incendive Ex ec IIC T4 Gc Ex ec IIC T3 Gc	Parallel ^{(3) (4)}	28/V	HTL	4,75-30V	<75mA	<40mA	Yes	Up to 33V	Yes	Up to 100kHz	10µs (H25) 5µs (H25X)	-40°C.. +100°C
	(Normal or Excess Gray, Natural Binary and Binary Coded Decimal codes)	28/0	Open Collector	4,75-30V	<75mA	<40mA	Yes	Up to 33V	Yes	Up to 100kHz		-40°C.. +100°C
		28/5	TTL	4,75-30V	<75mA	<40mA	Yes (Except to +V)	Up to 33V	Yes	Up to 100kHz		-40°C.. +80°C
	Serial Synchronous Interface ⁽⁶⁾ (Binary or Gray codes)	SSI	TTL	4,75-30V	<75mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	100kHz to 1MHz	<80µs	-40°C.. +100°C
	Analog ⁽⁵⁾	4-20mA	Current	15-30V	<100mA	<=20mA	No	Up to 33V	Yes	Up to 100Hz	<80µs	-40°C.. +100°C
		0-10V	Voltage	15-30V	<100mA	<=20mA	No	Up to 33V	Yes	Up to 100Hz		-40°C.. +100°C

⁽¹⁾ Surface encoder temperature.

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

⁽³⁾ Output IC's in Parallel outputs encoders 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.

⁽⁴⁾ Parallel output encoders: Due to the refresh rate, the speed should be kept below 1500rpm (H25) or 3000rpm (H25X) to observe the code continuity on the output: bits signal duty cycle or phase between bits signals are not guaranteed.

⁽⁵⁾ Analog output encoders can have custom signal curves shape over 360°, please contact factory.

⁽⁶⁾ H25X encoders with SSI interface: Frequency capability is limited according the the formula: from 100kHz to Fmax = 106 / (resolution in bits – 10) for encoder >13bits, ex: Fmax=166kHz for 16 bits encoder.

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

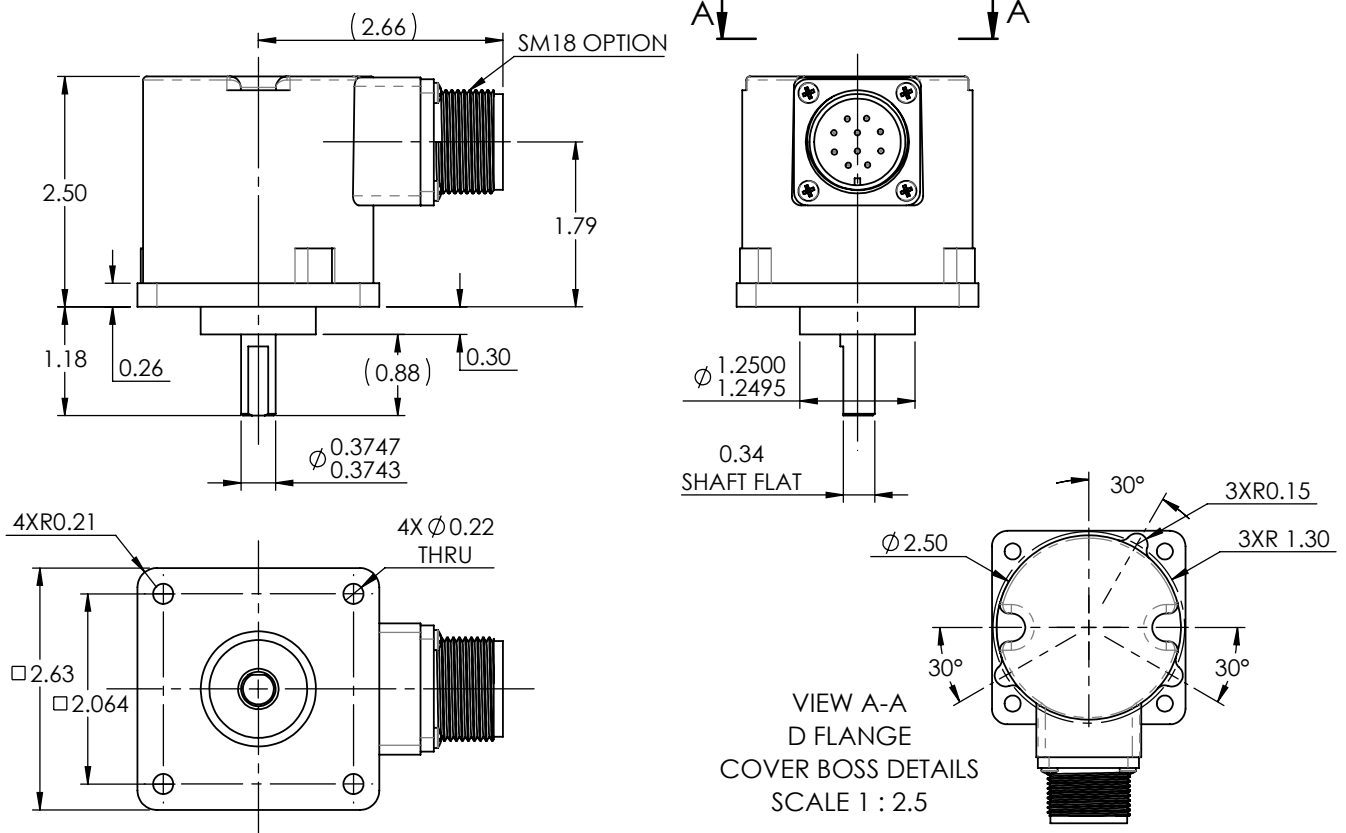
⁽¹⁾ Extended temperature ratings : some models can operate down to -55°C. Extended temperature ranges can affect other performance factors. Consult with factory

DIMENSIONS

Dimensions in inches

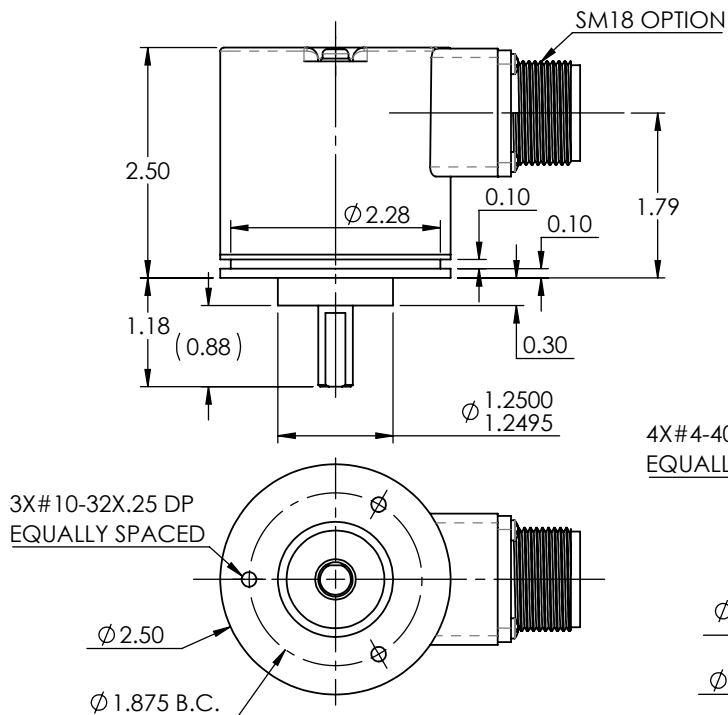
H25D SQUARE FLANGE

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



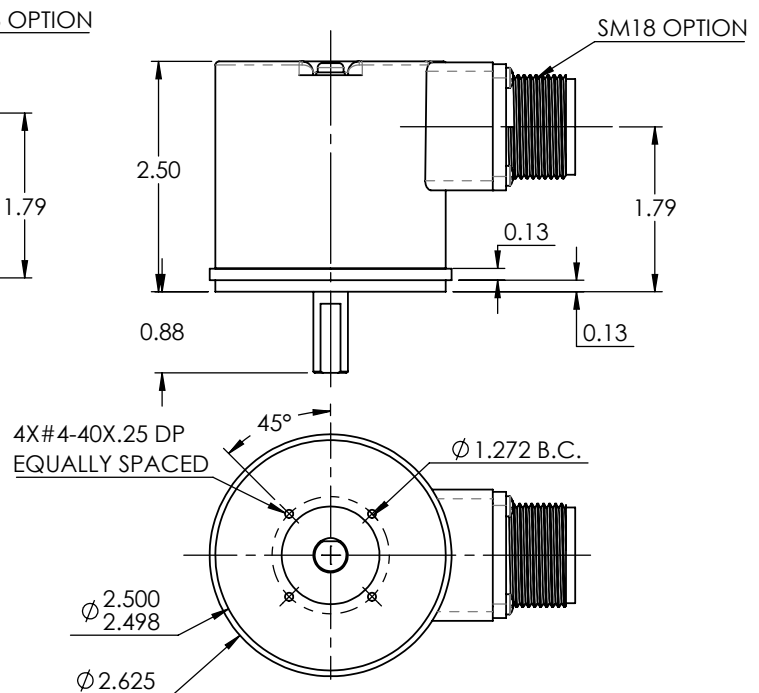
H25E SERVO MOUNT

(WITH OPTIONAL F1 FACEMOUNT)



H25G SERVO MOUNT

(WITH OPTIONAL F2 FACEMOUNT)



FACEMOUNT OPTIONS

(NOTE RESTRICTIONS)

F1

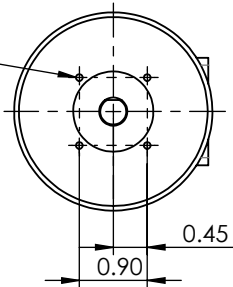
3X#10-32X.25 DP
EQUALLY SPACED

Ø 1.875 B.C.

F2

(Available only on G housing)

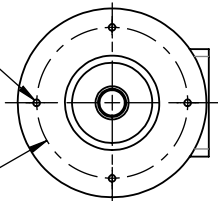
4X#4-40X.25 DP
EQUALLY SPACED



F3

4X#4-40X.25 DP
EQUALLY SPACED

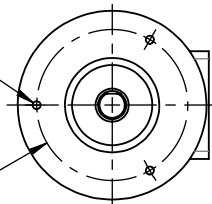
Ø 2.000 B.C.



F4

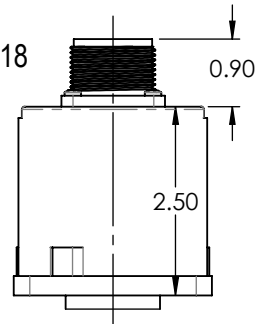
4X#6-32X.25 DP
EQUALLY SPACED

Ø 2.000 B.C.

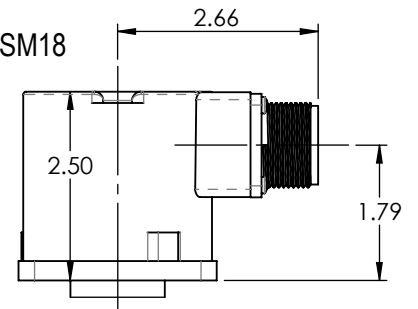


CONNECTOR OPTIONS

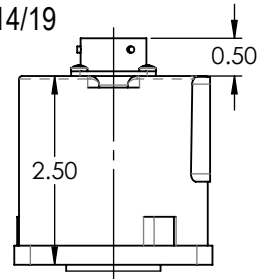
EM18



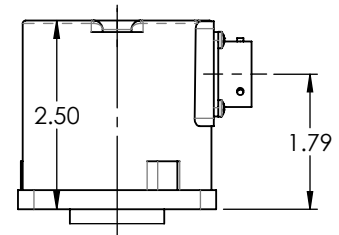
SM18



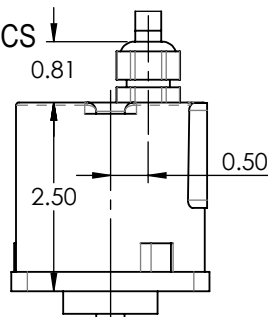
EM14/19



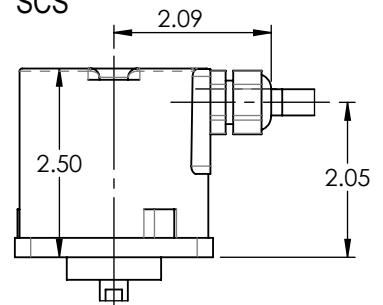
SM14/19



ECS



SCS



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

SSI Outputs

		0V	+V	DATA+	DATA-	CLOCK+	CLOCK-	DIR Control	Case Ground	Shield Drain
M18	10 Pins Connector	F	D	A	H	B	I	C	G	—
M14/19	19 Pins Connector	T	V	A	B	C	D	R	S	—
CABLE	PVC Cable 9 Wires	BK	RD	YE	WT/YE	BL	WT/BL	OR	GN	BARE

Analog Outputs

		0V	+V	ANALOG+	ANALOG-	RESET	DIR Control	Case Ground
M18	10 Pins Connector	F	D	A	H	B	C	G
M16	7 Pins Connector	F	D	A	C	B	E	G
M14/19	19 Pins Connector	T	V	A	B	C	U	S
CABLE	PVC Cable 9 Wires	BK	RD	YE	WT/YE	BL	OR	GN

Notes

Direction of Count control: Standard is CW increasing when viewed from the shaft end. This input control is normally HI (or N/C) and is pulled up internally to +V.

To reverse the count direction, pulled LO (0V) this input.

Latch control: Encoder outputs are active and provide continuous parallel position information when this input control is HI (or N/C). This input is pulled up internally to +V.

When this input is LO (0V), the encoder outputs are latched at the logic state that is present when the latch is applied and will stay latched until this input is no longer grounded.

Reset control: Parallel or SSI encoder outputs code are set to 0 and Analog encoder output is set to 12mA in 4..20mA or 5V in 0..10V when this reset control is applied.

In normal operation, this input control is normally LO (or N/C) and is pulled down internally to 0V.

When this input is HI (+V) during more than 250ms, the encoder allows the reset functionality and applies the reset when this input is released to 0V.

M18 Connector is a MS3102R18-1P, 10-pin connector on the encoder body and mates to an MS3106F18-1S connector or can be used with a standard cable/connector assembly, BEI P/N 31186-18XX (Where XX = 10, 20 30 or 50 for a 10, 20, 30, or 50 foot length). This is the preferred connector for SSI output.

M16 Connector is a ACS02E16S-1P(072), 7-pin connector on the encoder body and mates to an MS3106F16S-1S connector or can be used with a standard cable/connector assembly, BEI P/N 31186-16XX (Where XX = 10, 20 30 or 50 for a 10, 20, 30, or 50 foot length).

M14/19 Connector is a MS3112E14-19P, 19-pin connector on the encoder body and mates to an MS3116J14-19S or equivalent.

RESOLUTIONS

H25 family - standard angular accuracy $\pm 0.2^\circ$:

Available interfaces & resolutions:

- SSI and parallel: up to 13 bits output resolution.
- Analog: 16 bits DAC

H25X family - high angular accuracy $\pm 0.025^\circ$:

Available interfaces & resolutions:

- SSI and parallel: from 12 to 16 bits output resolution.
- Analog: 14 bits DAC

OUTPUTS

Digital Parallel output

Figure 1 -
Gray Code

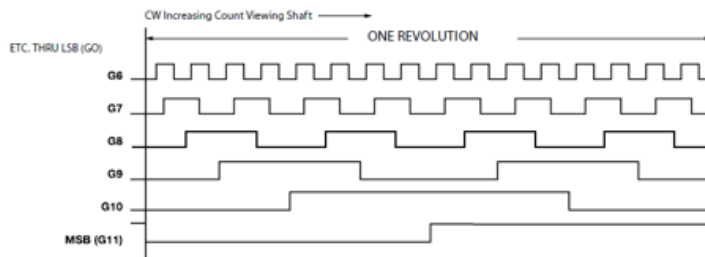
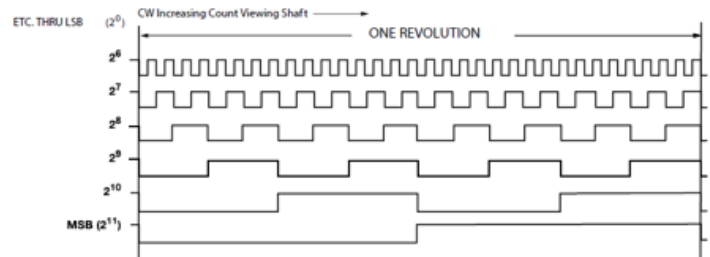
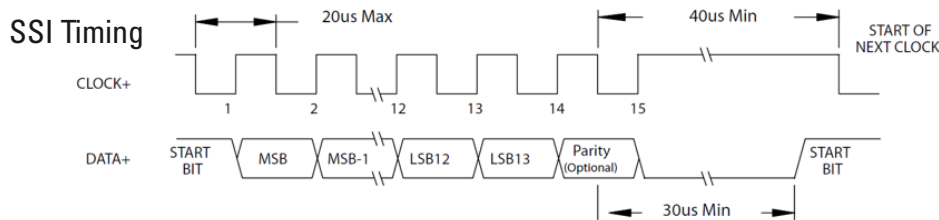


Figure 2 -
Natural Binary



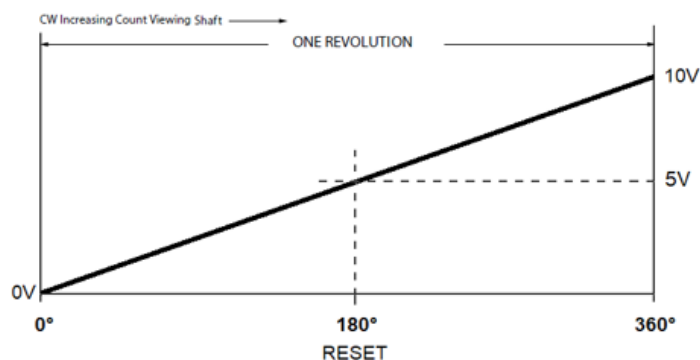
Digital Serial output

Figure 3 -



Analog output

Figure 4 -
A2 - example



ORDERING OPTIONS

Example : H25E-F4-SS-12-GC-28/V-CW-S-M14/19

	H25	E	F4	SS	12	GC	28/V	CW	S	M14/19		
Type												
X = Express Encoder Blank = Standard Leadtime												
Family												
H25 = 2.5" dia., std resolutions up to 12 bits H25X = 2.5" dia., high resolutions up to 16 bits												
Note for the person who updates the specs sheet: Put H25 option in highlight (for Xpress encoder option)												
Housing Configuration												
D = Square Flange E = 2.5 inch diameter servo mount G = 2.62 inch diameter servo mount												
Optional Face Mounts												
F1 F4												
Shaft Seal Configuration												
SS = Shaft Seal												
Number of Bits												
12 = 12-Bits, 4096 counts per turn 13 = 13 Bits, 8192 counts per turn See Resolutions section for available resolutions vs. Family/Output interface												
Code Type												
GC = Gray Code NB = Natural Binary BCD = Binary Coded Decimal X = Excess gray code												
Voltage/Output												
28/V = 5-28 Vin/out 28/5 = 5-28 Vin/5Vout 28/OC = 5-28 Vin/OCout A1 = 4-20mA A2 = 0-10V S3 = Serial Synchronous Interface												
Direction of Count												
CW = Clockwise increasing count CCW = Counter clockwise increasing count												
Output Termination Location												
E = End S = Side												
Termination Type												
M14/19 = 19 pin connector CS = Cable with gland seal Cable length specified in inches (i.e. CS24 = Cable 24" long) M18 = MS3102R18-1P (S3 output only)												
Hazardous Area Ratings												
Blank = None NI = Non-Incendive												
Special Features												
S = Special features specified on purchase order (consult factory)												

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)	-
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
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 31219-1420 = M14/19, 19pin, 20 ft length 31219-1450 = M14/19, 19pin, 50 ft length
Adapter plates 	38228-001 = Aluminum 38228-002 = Delrin
Connector mates 	MS3106F18-1S = Mates to standard M18 style, 10pin conn. MS3116J14-19S = Mates to standard M14/19 style, 19pin 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
Mounting adapters 	11012-002 = H25 56C

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