



## HS20 SERIES INCREMENTAL ENCODER

### Introduction

The Model HS20 is a compact hollow shaft 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 IP65 sealing requirements when ordered with the shaft seal.

## GEN<sup>2</sup>

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

<b>Shaft Bores</b>	0.625", 0.500", 0.375"
<b>Allowed Misalignment</b>	0.005: T.I.R. on mating shaft 0.75" from shaft end
<b>Bore Runout</b>	0.001 T.I.R.
<b>Starting Torque at 25°C</b>	1.0 in-oz max. without shaft seal; 2.5 in-oz max with shaft seal
<b>Bearings</b>	High precision ball bearings, Material: Chrome steel
<b>Shaft Material</b>	Stainless Steel
<b>Bearing Housing</b>	Die cast aluminum with protective finish
<b>Cover Die</b>	Die cast aluminum with protective finish
<b>Bearing Life</b>	2x10 <sup>9</sup> revs at rated load, 1 x 10 <sup>10</sup> revs at 10% rated load
<b>Maximum RPM</b>	10,000 RPM (see frequency response, below)
<b>Moment of Inertia</b>	.625 thru shaft: 3.68 X 10 <sup>-4</sup> oz-in-sec <sup>2</sup> [26.04 X g*cm <sup>2</sup> ] .375 blind shaft: 5.32 X 10 <sup>-4</sup> oz-in sec <sup>2</sup> [37.60 X g*cm <sup>2</sup> ]
<b>Weight</b>	8 oz. typical

## Electrical

<b>Code</b>	Incremental
<b>Output Format</b>	2 outputs in quadrature, A leads B CCW, 1/2 cycle index, Z, gated with negative B Consult factory for other output formats.
<b>Cycles per Shaft Turn</b>	1 to 10,000
<b>Supply Voltage</b>	5 to 28 VDC +/- 5%
<b>Current Requirements</b>	100 mA typical + output load, 250 mA (max)
<b>Voltage/Output</b>	28/V: Multi-Voltage Line Drive, 5–28 VDC in, $V_{out} = V_{in}$ 28/5: TTL, RS422 Line Driver, 5–28 VDC in, $V_{out} = 5$ VDC 28/O: NPN Line Driver Open Collector, 5–28 VDC in, NPN out (30V MAX) 5, 12, 15 or 24/OR: R=100 ohm / V: 5V=470 ohm, 15V=1.5K ext.
<b>Protection Level</b>	Reverse, overvoltage and line driver output protection diodes
<b>Frequency Response</b>	300 kHz
<b>Output Terminations</b>	see Table 1, following pages

## Environmental

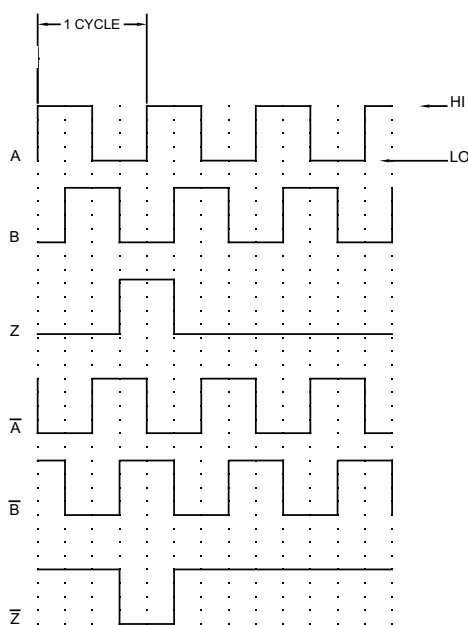
<b>Enclosure Rating</b>	IP65 when ordered with shaft seal and cable gland on cover. IP50 when ordered with no shaft seal.
<b>Temperature</b>	Operating temperature -40° C up to 85° C standard. Check factory for higher temperature options. Storage temperature -40° C to 100° C
<b>Shock</b>	100 g's for 5 msec duration
<b>Vibration</b>	50 to 2000 Hz @ 30grms
<b>Humidity</b>	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)



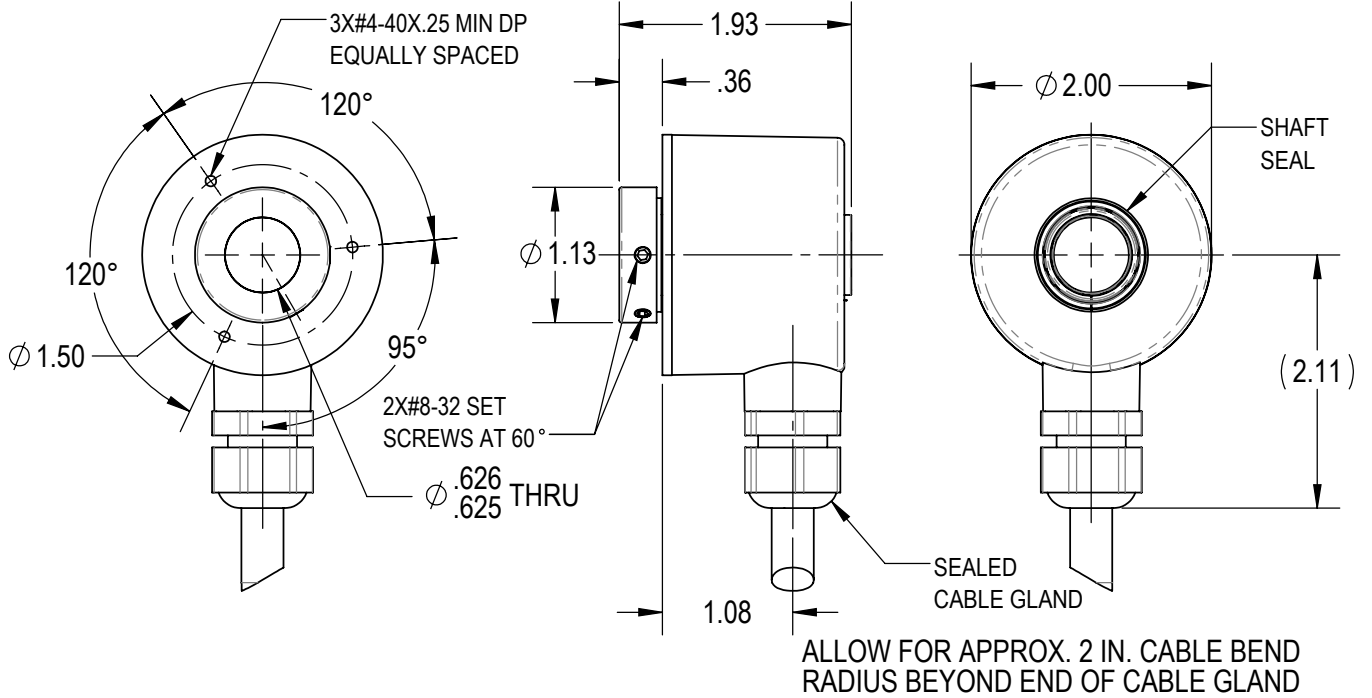
CCW Rotation Viewing Shaft



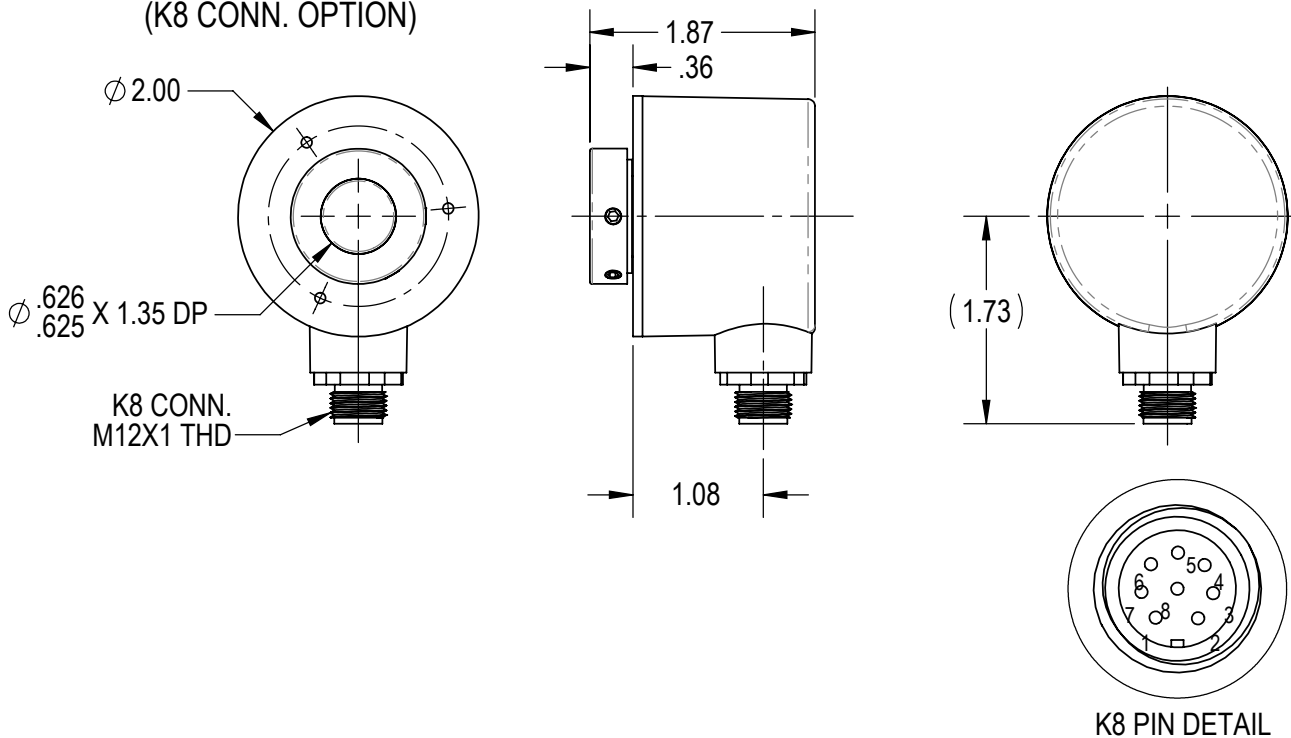
# DIMENSIONS

Dimensions in inches

## HS20-62-SS: .625 IN. THRU BORE (SCS CABLE OPTION)

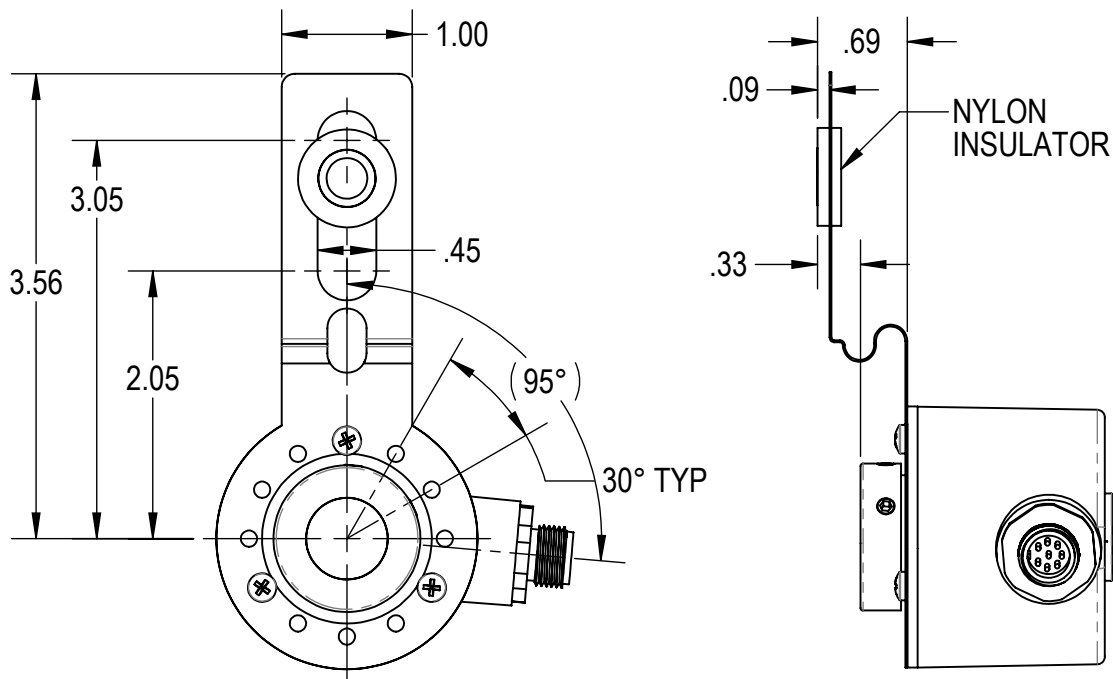


## HS20-62-BS: .625 BLIND BORE (K8 CONN. OPTION)



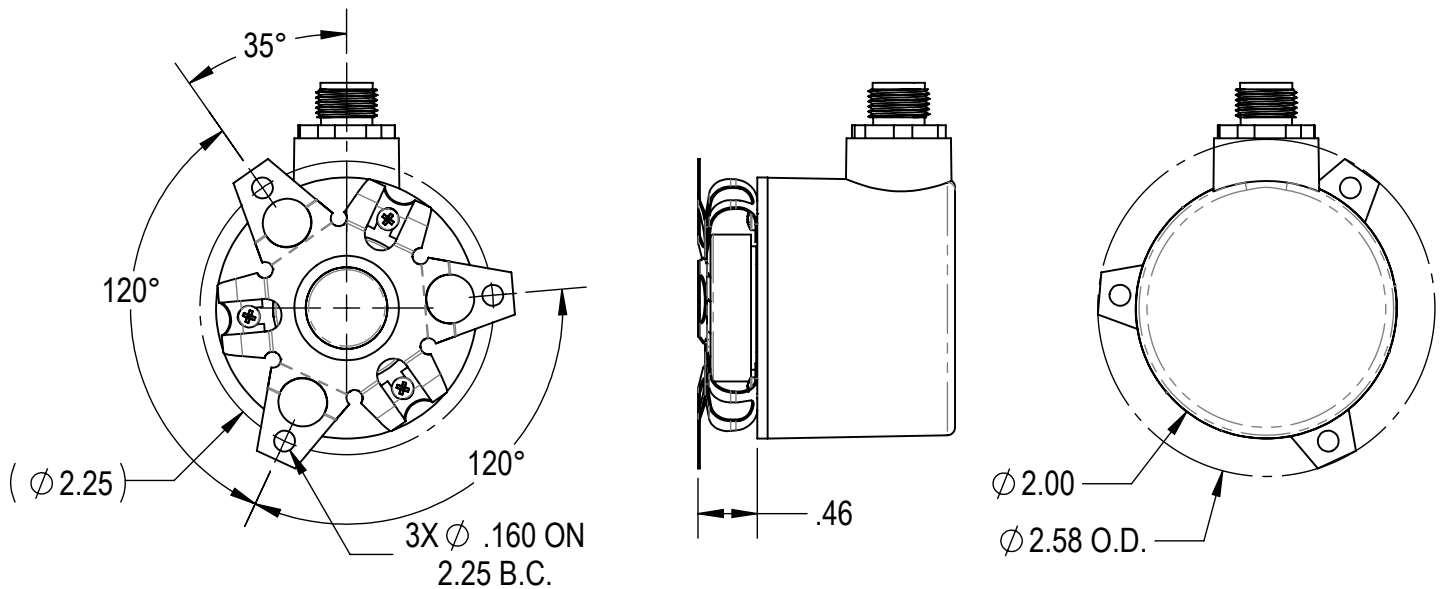
## HS20 - R2: TETHER ARM (STAINLESS STEEL)

(INCLUDES 5/16"-18 MOUNTING HARDWARE NOT SHOWN)



TETHER ARM POSITION SHOWN FOR REFERENCE ONLY. CAN BE MOUNTED AT ANY OTHER ANGLE IN 30° INCREMENTS.

## HS20 - R3: FLEX MOUNT (STAINLESS STEEL)



**Table 1 —**  
 Incremental Output Terminations  
 Other terminations available. Consult factory.

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)		

K8 Connector		
PIN (K8)	FUNCTION	K8 ACCESSORY CABLE WIRES
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



# ORDERING OPTIONS

Example : HS20-62-R2-SS-1024-ABZC-28/V-CS18

HS20 - 62 - R2 - SS - 1024 - ABZC - 28/V - CS18 -

### Family

HS20 = 2.0" diameter

### Shaft Bore

62 = 0.625" bore

50 = 0.500" bore

37 = 0.375" bore

### Tether

Blank = None

R2 = Tether arm

R3 = flex mount

### Shaft Seal Configuration

SS = Through Shaft Rubber Seals

BS = Blind Shaft Rubber 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

xx/OR = 05, 12, 15, 24Vin/OR

### Output Termination

K8 = M12x1 8 pin (metric connector)

CSXXX = Shielded, Jacketed Cable with Cable gland seal and cable length in inches, (i.e. CS18 = 18 inches)

CSXX-M18 = M18 connector (MS3101F18-1P equiv.) on end of XX in. cable. CS18-M18 is standard option

### 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

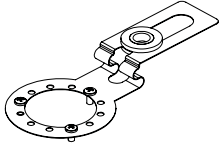
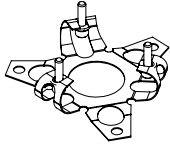
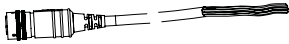
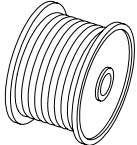
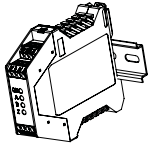
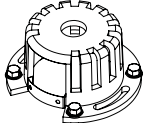
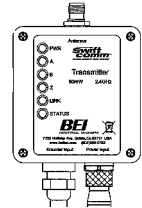
## NOTES

- 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/OV, which may damage the driver. Unused outputs should be isolated and left floating.
- 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 HS20 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 HS20 Hazardous Area Ratings	Agency	Ratings and Markings (for all standard product configurations)	File Number
<b>Blank</b>	 CE	EN 55011: Electromagnetic Disturbance (EMI) EN 61000-6-2: Electromagnetic Compatibility (EMC)	
<b>EX Intrinsic Safety</b>	 UL	Class I, Groups A, B, C, D Class II, Groups E, F, G	20180302-E78446
	 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	Ex ia IIC T4 Ga (9V/OC is Ex ia IIB T4 Ga) -40°C ≤ Ta ≤ +85°C	IECEX UL 12.0035X
<b>NI Non-Incendive</b>	 UL	Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G	20170321-E78446
	 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	Ex nA IIB T3 Gc T3B: -40°C ≤ Ta ≤ +85°C T4: -40°C ≤ Ta ≤ +55°C	IECEX UL 13.0071X

Description	Part Number
<b>Tether Arm</b> 	31187-021 HS20 R2 Tether Arm
<b>Flex Mount</b> 	31134-001 HS20 R3 Flex Mount
<b>Connector Cable Assemblies</b> 	31320-K81M = 1 meter 31320-K85M = 5 meters 31320-K86M = 6 meters 31320-K810M = 10 meters
<b>Bulk Encoder Cable</b> 	37048-003-100 = 100 ft spool 37048-003-500 = 500 ft spool 37048-003-1000 = 1K ft spool
<b>Electronic Modules</b> 	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
<b>Protective Cover Kit</b> 	26068-001 = 3/8 bolts on 56C 26068-002 = #10 tapping screws on 56C
<b>SwiftComm</b> 	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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