

# Model HS52 Explosion Proof Hollow Shaft Incremental Encoder

BEI Sensors



Pictured with hard anodized finish special feature

The HS52 is the industry's first UL and ATEX rated explosion proof hollow shaft encoder. Capable of operating directly in Division 1 or Zone 1 environments, the HS52 does not need an Intrinsic Safety barrier. This provides a simpler, more streamlined feedback system in explosion proof environments worldwide. Fitted with a flex shaft in the bore, the HS52 housing can be rigidly mounted, preventing stress to encoder bearings and providing a more secure attachment for the required hazardous area conduit fittings. Additionally, the compact hollow shaft design provides engineers space saving advantages over traditional shafted encoders.

The HS52 is the ideal position sensing solution for use in oil and gas industries, solvent refining operations, spray painting applications, and explosive environments where space is limited and operating conditions are extreme.

CE EN 55011 and EN 61000-6-2

Ex CENELEC/ATEX : Ex d IIB T4 Gb

UL UL: Class I, Div 1, Group C & D

IECEx UL 11.0009X

## Mechanical Specifications

**Allowable Misalignment:** SP11 Flex Shaft is designed to accommodate up to 0.04" T.I.R radial and  $\pm 0.02$  axial; Consult factory for other shaft options

**Starting Torque at 25°C:** Blind shaft version (BS) = 10 in-oz (max)

**Bearings:** 52100 high carbon steel.

**Shaft Material:** 416 stainless steel

**Bearing Housing:** Die cast and machined aluminum with dichromate finish standard. Hard anodized finish available.

**Cover:** Die cast and machined aluminum.

**Bearing Life:** 7.5 X 10<sup>9</sup> revs (50,000 hrs at 2500 RPM)

**Maximum RPM:** 6,000 MAX. (Temp. Derated 5°C/1,000 RPM above 2,000 RPM for continuous operation)

**Moment of Inertia:**

Blind Shaft =  $8.6 \times 10^{-3}$  oz-in-sec<sup>2</sup> \*

\*with spline flex shaft option

**Weight:** Approx. 3.3 lbs or 1.5 kg

## Electrical Specifications

**Code:** Incremental (Absolute option available)

**Output Format:** 2 channels in quadrature, 1/2 cycle index gated with negative B channel

**Cycles Per Shaft Turn:** 1 to 80,000 (see table 1) For resolutions above 5,000 see BEI for interpolation options

**Supply Voltage:** 5 to 28 VDC available

**Current Requirements:** 100 mA typical +output load, 250 mA (max)

**Voltage/Output:** (see note 3)

28V/V: Line Driver, 5–28 VDC in, Vout = Vin

28V/5: Line Driver, 5–28 VDC in, Vout = 5 VDC

28V/OC: Open Collector, 5–28 VDC in, OCout

**Protection Level:** Reverse, overvoltage and output short circuit

**Frequency Response:** 100 kHz, up to 1MHz with interpolation option (see note 5)

**Output Terminations:** Side conduit

**Note:** Consult factory for other electrical options

## Environmental Specifications

**Enclosure Rating:** IP66

**Hazardous Area Rating:**

Class I, Div 1, Groups C and D

CENELEC/ATEX Gas Groups

IECEx certified

**Temperature:** Operating, 0 to 70°C; extended temperature testing available (see note 6); 80°C max; storage -25 to 90°C.

**Shock:** 50 g's for 11 msec duration

**Vibration:** 5 to 2000 Hz @ 20 g's

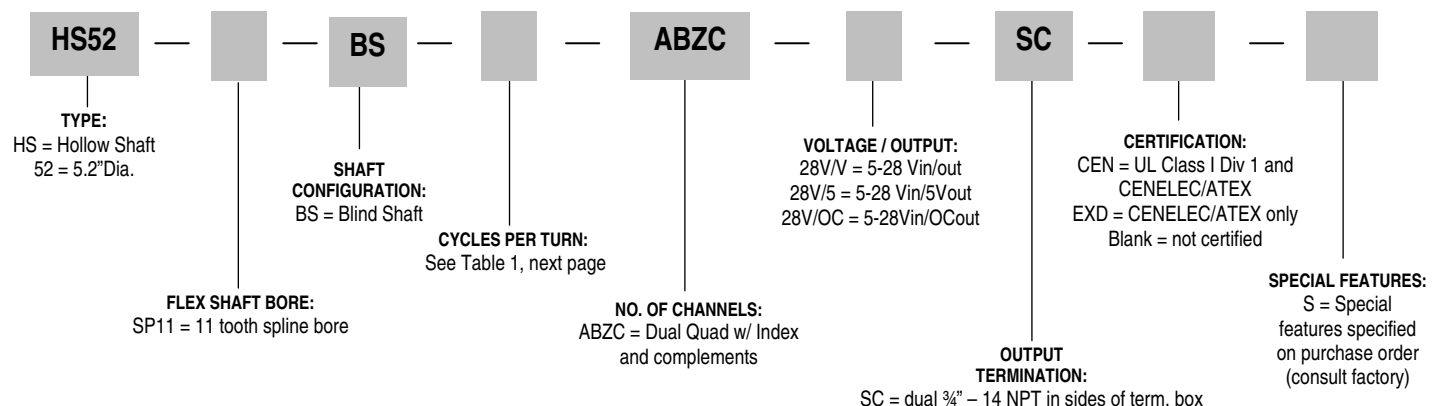
**Humidity:** 100% RH without condensation

**NOTES & TABLES:** All notes and tables referred to in the text can be found on the back of this page.

## HS52 Incremental Ordering Options for assistance, call 800.350.2727

Use this diagram, working from left to right to construct your model number (example: HS52-SP11-BS-1024-ABZC-28V/V-SC-CEN)

All notes and tables referred to can be found on the back of this page.



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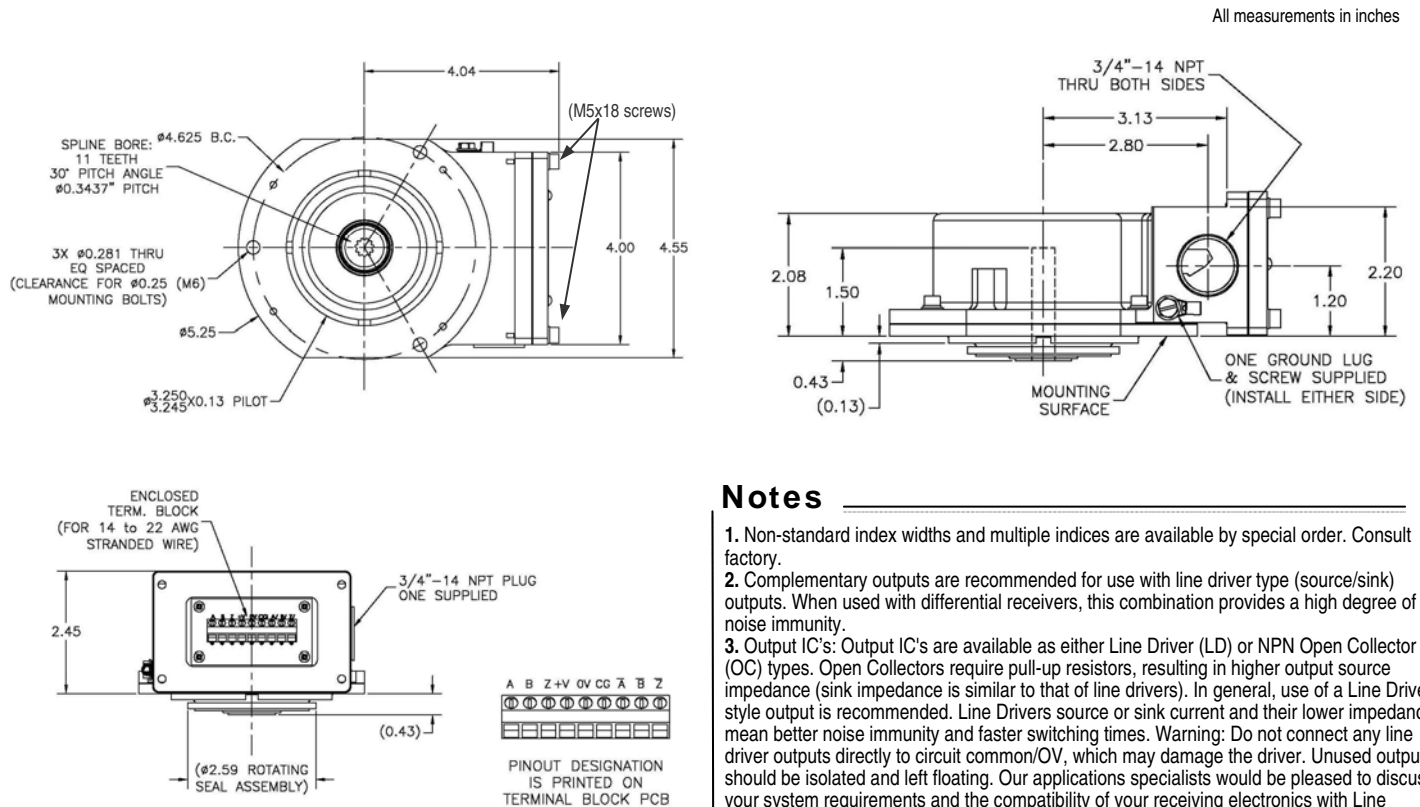
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## Dimensions



## Notes

1. Non-standard index widths and multiple indices are available by special order. Consult factory.
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: Output IC's are available as either Line Driver (LD) or NPN Open Collector (OC) 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. Our applications specialists would be pleased to discuss your system requirements and the compatibility of your receiving electronics with Line Driver type outputs.
- 28V/V: Multi-voltage Line Driver (7272\*): 100 mA source/sink. Input voltage 5 to 28 VDC +/- 5% standard (Note:  $V_{out} = V_{in}$ ). This driver is TTL compatible when used with 5 volt supply. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 120 mA typical (plus load current). This is the recommended replacement for 3904R and 7406R open collector outputs with internal pullup resistors. It is also a direct replacement for any 4469, 88C30, 8830 or 26LS31 line driver
- 28V/5: Multi-voltage Line Driver (7272\*): 100 mA source/sink. Input voltage 5 to 28 VDC +/- 5% standard, internally regulated with 5V (TTL compatible) logic out. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 90 mA typical (plus load current).
- 15V/V: Multi-voltage Line Driver (4469\*): 100 mA source/sink. Input voltage 5 to 15 VDC +/- 5% standard (Note:  $V_{out} = V_{in}$ ). TTL compatible when used with 5 volt supply. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 90 mA typical (plus load current). This is a direct replacement for the 4469 Line Driver.
- 28V/OC: NPN Open Collector (3904\*, 7273\*). Current sink of 80 mA max. Current sourced by external pull-up resistor. Output can be pulled up to voltage other than supply voltage (30 V max). Input voltage 5 to 28 VDC +/- 5% standard. Supply current is 120 mA typical. This replaces prior IC's with designations of 3904, 7406, 3302, 681 and 689.
- 5V/OCR, 15V/OCR, 24V/OCR: Open Collector (3904R\*, 7406R\*, 7273R\*): Current sink of 70 mA max. Includes internal pull-ups sized at approximately 100 ohms/volt. Max current source is 10 mA. Supply current is 100 mA typical, 120 mA with internal pull-ups. The 5V/OCR, 15V/OCR and 24V/OCR are often replaced by the 28V/V in system upgrades.
4. 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.
5. Higher frequency response may be available. Please consult with the factory.
6. Extended temperature ratings are available in the following ranges: -40 to 70°C or -40 to 80°C. Max temp extremes above 80°C to +105°C are available but will not be UL or Cenelec certified. Extended temperature ranges can affect other performance factors. Consult with factory for more specific information.

### Encoder Installation

See specification no. 02131-002

### Maintenance and Service

There are no user serviceable parts inside. Encoder must be returned to factory for service.

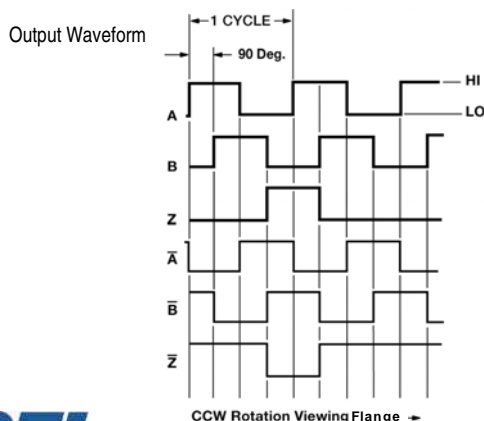
## Tables

TABLE 1: Disc Resolutions

32	100	250	360	420
500	512	600	720	1000
1024	1200	1500	1650	1800
2000	2100	2048	2500	2881
3600	3600	3710	4096	5000

For interpolation please specify the multiplied output (up to 80,000) in the model number, i.e. 80,000-T16.

Figure 1



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