



## MODEL HS35 DRAWWORKS OPTICAL ENCODER

### Product Description

This specially configured DrawWorks Model HS35 encoder combines rugged, heavy-duty features into a unique through-shaft style for use as a winch-turns counter in the DrawWorks system of oil rigs. It incorporates dual bearings and shaft seals for NEMA 4 and 13 (IP65) ratings, a hard-anodized metal housing and a sealed connector. It comes with a standard 1"-14 diameter threaded connection and a convertible adapter that allows its use in systems with a 5/8"-18 threaded connection. This encoder has an UL, cUL, and ATEX/CENELEC intrinsically safe rating when installed with the proper barriers (refer to BEI P/N 924-60004-XXX series on the back of this specification sheet). This barrier is high performance, galvanically isolated and carries US and European agency approvals. It is suitable for ALL Hazardous locations, regardless of gas and dust types.



### SPECIFICATIONS

#### Electrical Specifications

<b>Code</b>	Incremental
<b>Output Format</b>	2 channels (A and B) in quadrature $\pm 27^\circ$ electrical, with index and complements (see Figure 1)
<b>Cycles per Shaft Turn</b>	Up to 5,000 (see Table A)
<b>Supply Voltage</b>	5 or 9V
<b>Current Requirements</b>	120mA (typical)
<b>Output Device</b>	5V/OC, 9V/OC, 5V/OCR, 40mA max current sink; 5 or 5V/V line driver 100mA source/sink; 5V only
<b>Frequency Response</b>	150 KHz
<b>Output Termination Pinouts</b>	See Table 1

## Mechanical Specifications

<b>Shaft Bore</b>	0.375" diameter through with convertible adapter for 1" or 5/8" air coupler.
<b>Starting Torque at 25°C</b>	7in-oz
<b>Shaft Material</b>	416 stainless steel
<b>Bearings</b>	52100 bearing steel
<b>Bearing Housing</b>	Die cast aluminum
<b>Bearing Life</b>	7.5 X 10 <sup>9</sup> revs at rated load (50,000 hrs at 2500 RPM)
<b>Maximum RPM</b>	6,000 RPM (see frequency response, below)
<b>Moment of Inertia</b>	0.019 oz-in-sec <sup>2</sup>
<b>Weight</b>	Approximately 18 oz.

## Environmental Specifications

<b>Enclosure Rating</b>	NEMA 4/13 (IP65)
<b>Temperature</b>	-40° to +80°C standard
<b>Shock</b>	50 G/s at 11msec duration
<b>Vibration</b>	5 to 2000 Hz @ 20 G's
<b>Humidity</b>	98% RH without consideration

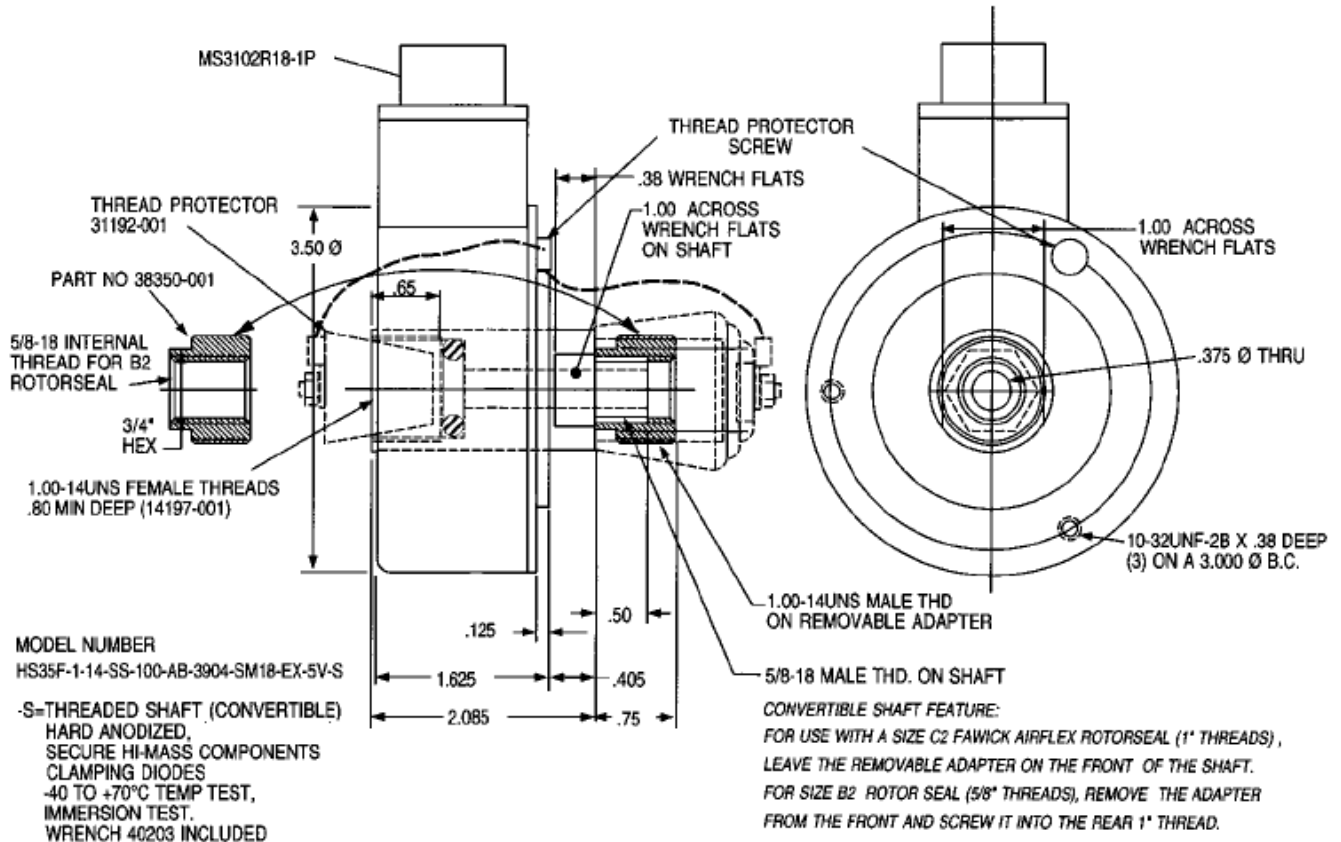


# DIMENSIONS

Dimensions in mm

## MS Connector Termination

TOLERANCES: .XX = ±0.01, .XXX = ±0.005



INTRINSICALLY SAFE WHEN INSTALLED PER  
INSTALLATION DRAWING 924-08064-001

## TABLES

**Table 1** —  
Output Terminations

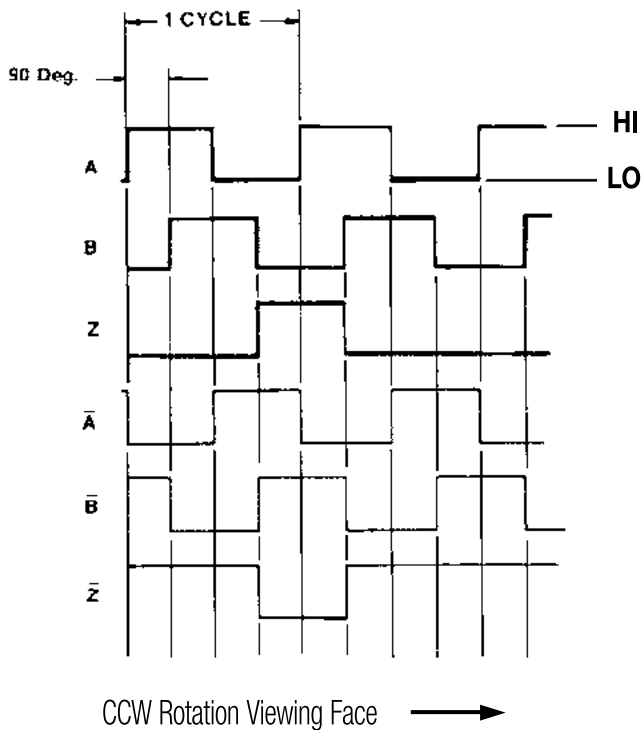
PIN	ABZ	ABZC
A	CH A	CH A
B	CH B	CH B
C	INDEX, Z	INDEX, Z
D	+V (Supply Voltage)	
E	—	
F	0V (Circuit Common)	
G	Case Ground	
H	N/C	$\bar{A}$
I	N/C	CH B
J	N/C	CH Z

**Table A** —  
Disc Resolutions (Cycles Per Turn)

32, 100, 250, 360, 500, 512, 600, 1000, 1024, 1200, 1650, 1800, 2000, 2048,  
2100, 2500, 2881, 2884, 3600, 3710, 4096, 5000

## FIGURE 1

Output Waveforms





## ORDERING OPTIONS

**HS35F** - **1-14** - **SS** - **200** - **ABZC** - **C** - **5V/OC** - **SM18** - **EX** - **S**

**Type**  
Hollow Shaft 3.5" Diameter

**Threading**  
1-14: 1" Threaded Bore  
1-14L: 1" Threaded Bore  
100-S: 1" Straight Bore

**Shaft Seal**  
SS: Shaft Seal

**Cycles Per Turn**  
(Enter Cycles)  
(See Table A)

**No. of Channels**  
A: Single Channel  
AB: Dual Channel in Quadrature.  
ABZ: Dual Channel with Index  
AZ: Single Channel with Index

**Compliments**  
C: Complimentary Outputs (5V/V)

**Output IC**  
5V/OC: (Open Collector)  
9V/OC: (Open Collector)  
5V/OCR: (Open Collector with Internal Pull-Up Resistor)  
5V/V: (Line Driver)

**Connector**  
SM18: MS3102F18S-1P, 10 Pin Connector

**Intrinsic Safety**  
EX: Intrinsically Safe Rated Encoder. Must be installed with proper IS barriers.

**Special Features**  
For shaft insert assembly, add -S to model number and specify one of the following P/N on your Purchase Order:  
31386-001: 1"-14 threads on both ends  
31386-002: 1"-14 threads on female end, 5/8"-18 threads on male end  
31386-003: 1"-14 threads on female end, 5/8"-18 threads on male end and adapter nut

### Additional Components

#### BEI Intrinsic Safety Barrier

Supply Voltage to Barrier	Output Type from Barrier	Barrier Part Number
12-24 VDC	$V_{out} = 5VDC$	924-60004-002
12-24 VDC	$V_{out} = V_{in}$	924-60004-003
12-24 VDC	$V_{out} = \text{Open Collector}$	924-60004-004

#### M18 Cable Assembly

Part #	Cable Length
924-31186-1810	10 Feet
924-31186-1820	20 Feet
924-31186-1830	30 Feet
924-31186-1850	50 Feet



## AGENCY APPROVALS & CERTIFICATIONS



Agency	File Number
<b>CE</b>	EN 55011 and EN 61000-6-2
<b>UL</b>	U.S. Standards Class I, Group A,B,C, & D, Class II Group E, F, & G
<b>cUL</b>	Canadian Standards Class I, Zone 0, Group IIC
<b>EX</b>	GENELEC EEX ia IIC T4

Consult factory for more details.

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Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA.

### CONTACT US

#### Americas

+1 (800) 350 2727 – Option 1  
sales.beisensors@sensata.com  
**Europe, Middle East & Africa**  
+33 (3) 88 20 8080  
position-info.eu@sensata.com

#### Asia Pacific

sales.isasia@list.sensata.com  
China +86 (21) 2306 1500  
Japan +81 (45) 277 7117  
Korea +82 (31) 601 2004  
India +91 (80) 67920890  
Rest of Asia +886 (2) 27602006  
ext 2808