

# DSO5H MODELS

## SIL3 PLe INCREMENTAL ENCODERS

### Introduction

When an automation system requires a high degree of risk mitigation of failure modes, often times Functional Safety equipment can be a part of the solution. Sensata | BEI Sensors offers a wide range of Functional Safety encoders to fit most any application or electrical interface requirement. Rated at SIL3 (PLe), these encoders allow safe operation in set-up, production and maintenance modes, significantly reducing operational risks. All encoders have the option of a Digital HTL or TTL operation as an alternative to the Sine/Cosine outputs found on most Functional Safety encoders. This makes them a compatible replacement for existing encoders when migrating to a higher safety level of operation. The DSO5H series incorporates a hollow shaft-style mounting that can accept shafts of 14 mm in diameter. It is mounted with a stator coupling kit and a clamp to secure it to the shaft. The encoder body is 58mm in diameter.



### Features

- Usable up to SIL3 and Cat.4 / PLe according to IEC 61508 / EN ISO 13849
- Suitable for safe motor feedback according to IEC 61800-5-2
- Robust and excellent resistance to shock and vibration
- High protection level: IP65
- High temperature performance –20°C to +85°C
- 58mm standard size encoder
- Through hollow shaft 14mm
- Wide choice of connection configurations
- Power supply 5Vdc or 11 - 30Vdc
- Digital TTL/RS422, HTL or sine/cosine 1Vpp output
- Resolutions up to 2500ppr

### Applications

- Industrial automation
- Automated guided vehicles
- Mills for lumber, steel and other metals
- Printing and packaging equipment
- Food processing equipment
- Forming and die presses

## SPECIFICATIONS

### Mechanical

	DSO5H
<b>Material</b>	<b>Cover:</b> Powder coated aluminum <b>Body:</b> aluminum <b>Shaft:</b> AISI 303 stainless steel
<b>Bearings</b>	6803 series - sealed
<b>Maximum Loads</b>	<b>Axial:</b> 20 N <b>Radial:</b> 40 N
<b>Shaft Inertia</b>	< 9,500 g.mm <sup>2</sup>
<b>Static/Dynamic torque</b>	10 / 85 mN.m
<b>Permissible max. speed</b>	9,000 RPM
<b>Continuous max. speed</b>	4,000 RPM
<b>Theoretical mechanical lifetime L<sub>10h</sub></b> <sup>(A)</sup>	> 24 X 10 <sup>9</sup> turns / 100,000 hours
<b>Encoder weight (approx.)</b>	0.28 kg

<sup>(A)</sup> **Continuous max. speed – ½ max. load – according to ISO 281: 1990, L<sub>10</sub>**

## Electrical Characteristics / Functional Safety Parameters <sup>(B)</sup>

Electronic Version	Output signals	Operating Voltage +V	Supply current	Current per channel pair	Short circuit protected	Reverse polarity protected	PFD	PFH	MTTFd	DC
2G2	Digital TTL RS422	5V +/-5% <sup>(C)</sup>	100mA with no load	40mA	Yes	Yes	7.51E-05	8.58E-10	1331	HIGH
5G2		11-30V <sup>(C)</sup>			Not to +V		9.52E-05	1.09E-09	1050	
5G5	Digital HTL				Yes		9.52E-05	1.09E-09	1050	
2WT	Sine Cosine 1Vpp	5V +/-5% <sup>(C)</sup>	70mA with no load	10mA	Yes		4.29E-05	4.90E-10	2328	
5WT		11-30V <sup>(C)</sup>			Not to +V		6.60E-05	7.53E-10	1515	

<sup>(B)</sup> Safety mission time: 20 years

<sup>(C)</sup> Device must be supplied by a Class 2 LPS or SELV/PELV limited energy source  $\leq 60V$ .

## Environmental & Standards Conformity

	DS05H
<b>Protection (EN 60529)</b>	IP65
<b>Salt Spray (EN 60068-2-11 part 2)</b>	96h
<b>Humidity (EN 60068-2-38)</b>	93% @ 65°C
<b>Shock (EN 60068-2-27)</b>	$\leq 500m.s^{-2}$ (6 ms, half sine)
<b>Vibration (EN 60068-2-6)</b>	$\leq 200m.s^{-2}$ (10...2000Hz)
<b>Operating temperature</b>	-20 to 85°C (encoder T°)
<b>Storage temperature</b>	-20 to 85°C
<b>EMC Immunity Test</b>	EN 61000-6-2, increased levels
<b>EMC Emission Test</b>	EN 61000-6-4, increased levels
<b>Isolation</b>	1000 Veff
<b>Functional safety</b>	IEC 61508
	IEC 62061
	ISO 13849-1
	IEC 61800-5-2
<b>Encoders usable up to SIL3 / PLe with specific requirements, see safety user manual for details.</b>	
<b>Z and Z/ are not safety signals.</b>	



## STANDARD CONNECTIONS

		0V	+V	A or S	B or C	Z	A/ or S/	B/ or C/	Z/	Ground
<b>G6</b>	<b>M23 - 12 pins CW</b>	1	2	3	4	5	6	7	8	Connector body
<b>G8</b>	<b>M23 - 12 pins CCW</b>	10 + 11	2 + 12	8	5	3	1	6	4	Connector body
<b>G3</b>	<b>PVC cable 8 wires 8230/020</b>	WH white	BN brown	GN green	YE yellow	GY grey	PK pink	BU blue	RD red	General shielding
<b>GP</b>	<b>PUR cable 12 wires 8230/050</b>	WH white + WH/GN white /green	BU blue + BN/GN brown / green	GY grey	BN brown	RD red	PK pink	GN green	BK black	General shielding

Note: All connections are UL certified, except G3 and GP



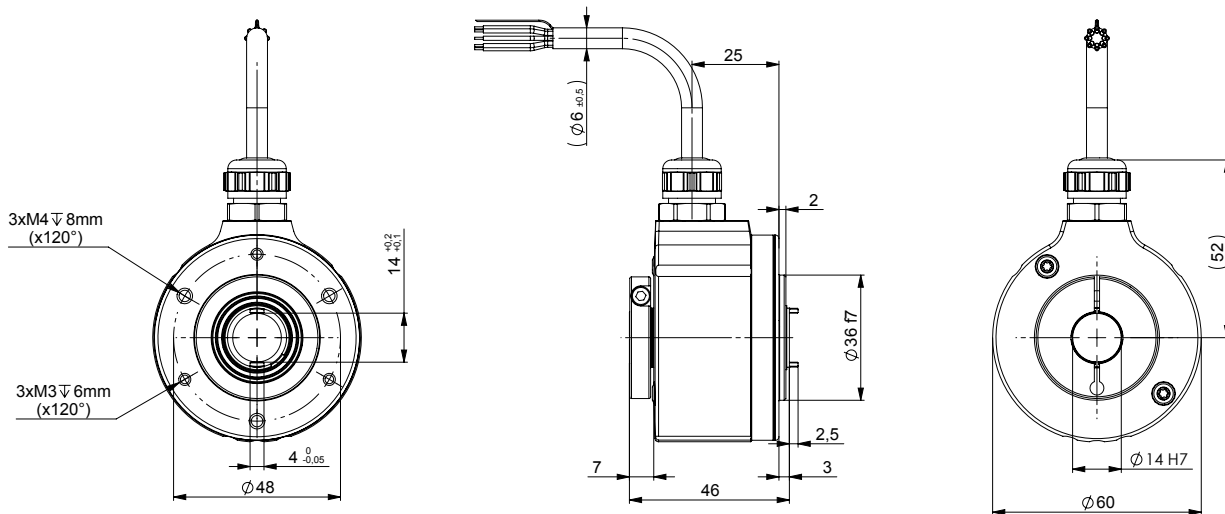
## RESOLUTIONS

250 256 360 500 512 1000 1024 1500 2000 2048 2500

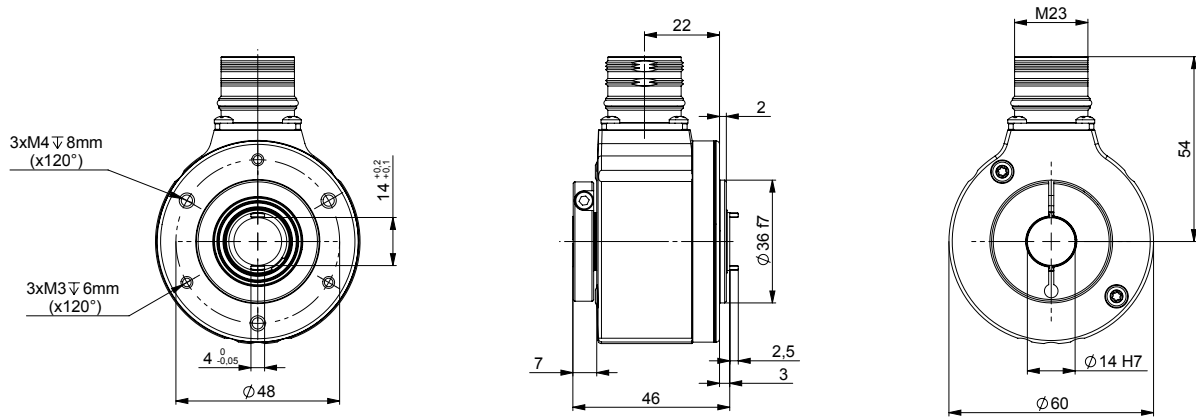


## DIMENSIONS

### DS05H14 - Through hollow shaft 14mm - Cable output Radial (G3R)



**DS05H14 - Through hollow shaft 14mm - M23 Connector output Radial - With stator coupling 9445/044**



		9445/044	9445/047
<b>Permissible misalignments</b>	<b>Axial</b>	+/- 1mm	+/- 1mm
	<b>Radial</b>	+/- 0.2mm	+/- 0.2mm
	<b>Perpend.</b>	+/- 2°	+/- 5°
	<b>Runout</b>	0.1mm	0.1mm
<b>Angular rigidity</b>		600 N.m/rad	100 N.m/rad



**GENERAL NOTES**

***For a safe installation according to the required safety level needed in the application, refer to the user safety User Manual. The safety User Manual provides the technical information (drawings, electrical data, etc...) for a safe integration. A quick installation guide is provided with each encoder for use by the technician who installs the device on the equipment.***



# DSO5H ORDERING OPTIONS

Example : DSO5H14 // 5G5 // 01024 // GPR050 // \*\*DX\*\*

Contact the factory for special versions, ex: resolution, connection, flange...

	<b>DSO5H</b>	<b>14</b>	//	<b>5G5</b>	<b>9</b>	//	<b>01024</b>	//	<b>GP</b>	<b>R</b>	<b>050</b>	//	<b>**DX**</b>
<b>Family</b>													
<b>DSO5H</b>													
<b>Shaft</b>													
<b>14 = 14 mm</b>													
<b>Supply + Output stage + Output signals</b>													
<b>2G2:</b> 5Vdc, TTL RS422 <b>5G2:</b> 11- 30Vdc, TTL RS422 <b>5G5:</b> 11- 30Vdc, HTL <b>2WT:</b> 5Vdc, Sine 1 Vpp (analog) <b>5WT:</b> 11- 30Vdc, Sine 1 Vpp (analog)													
<b>Channels</b>													
<b>9:</b> Digital electronics AA/ BB/ ZZ/ B before A, CW viewed from flange side Z gated A&B  <b>N:</b> Analog electronics SS/ CC/ ZZ/ C before S, CW viewed from flange side Z ungated Contact factory for other configurations													
<b>Resolution</b>													
<b>250, 256, 360, 500, 512, 1000, 1024, 1500, 2000, 2048, 2500</b>													
<b>Output Termination</b>													
<b>G6:</b> M23 12 pins CW <b>G8:</b> M23 12 pins CCW <b>GP:</b> PUR cable 12 wires <b>G3:</b> PVC cable 8 wires													
<b>Output Orientation</b>													
<b>R:</b> Radial													
<b>Cable Length</b>													
<b>xxx:</b> Cable Length (ex.: 020 = 2 Meters) <b>Blank:</b> No Cable													
<b>Accessories*</b>													
<b>*****:</b> No accessory <b>**DX**:</b> 9445/044 stator coupling <b>**BA**:</b> 9445/047 Tether arm													

\* Parts mounted on encoder and fasteners included in the encoder box.



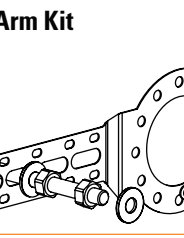
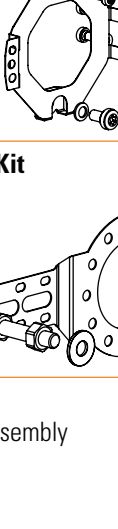
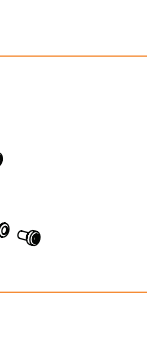
## AGENCY APPROVALS & CERTIFICATIONS



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Description	Part Number
<p><b>Safety Rated Flexmount Kit</b> Hardware included</p> 	<p>M9445/044</p>
<p><b>Safety Encoder Tether Arm Kit</b> Hardware included</p> 	<p>M9445/047</p>
<p><b>Standard Mating Connector</b> 2m, 5m, 10m Mating Cable Assembly</p> 	<p>Extension cords compatible with G6 connection option:            RAL-020-001 = M23, PVC cable, 2m            RAL-050-001 = M23, PVC cable, 5m            RAL-100-001 = M23, PVC cable, 10m</p> <p>Extension cords compatible with G8 connection option:            RAL-020-012 = M23, PUR cable, 2m            RAL-050-020 = M23, PUR cable, 5m            RAL-100-028 = M23, PUR cable, 10m</p>

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